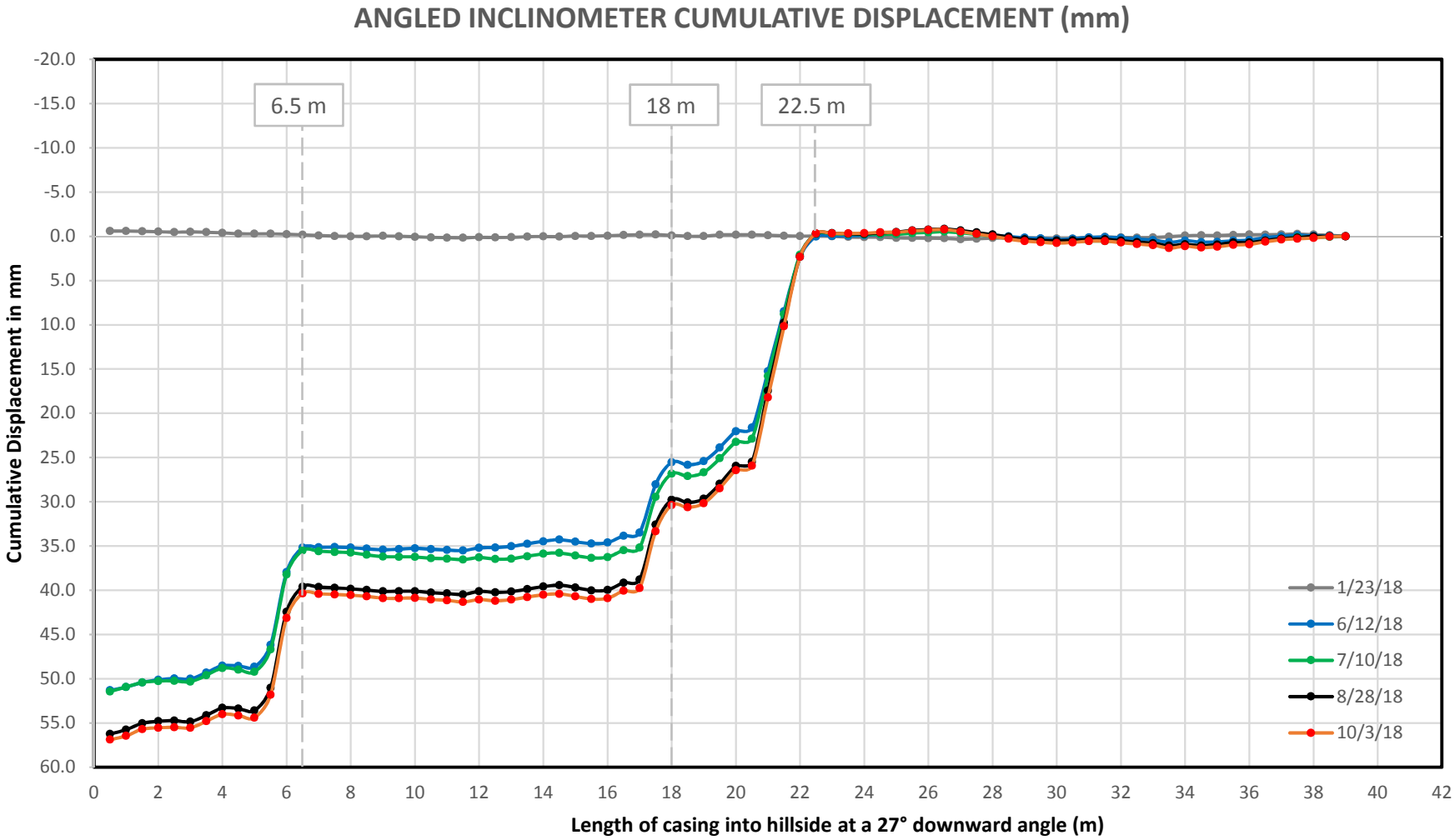
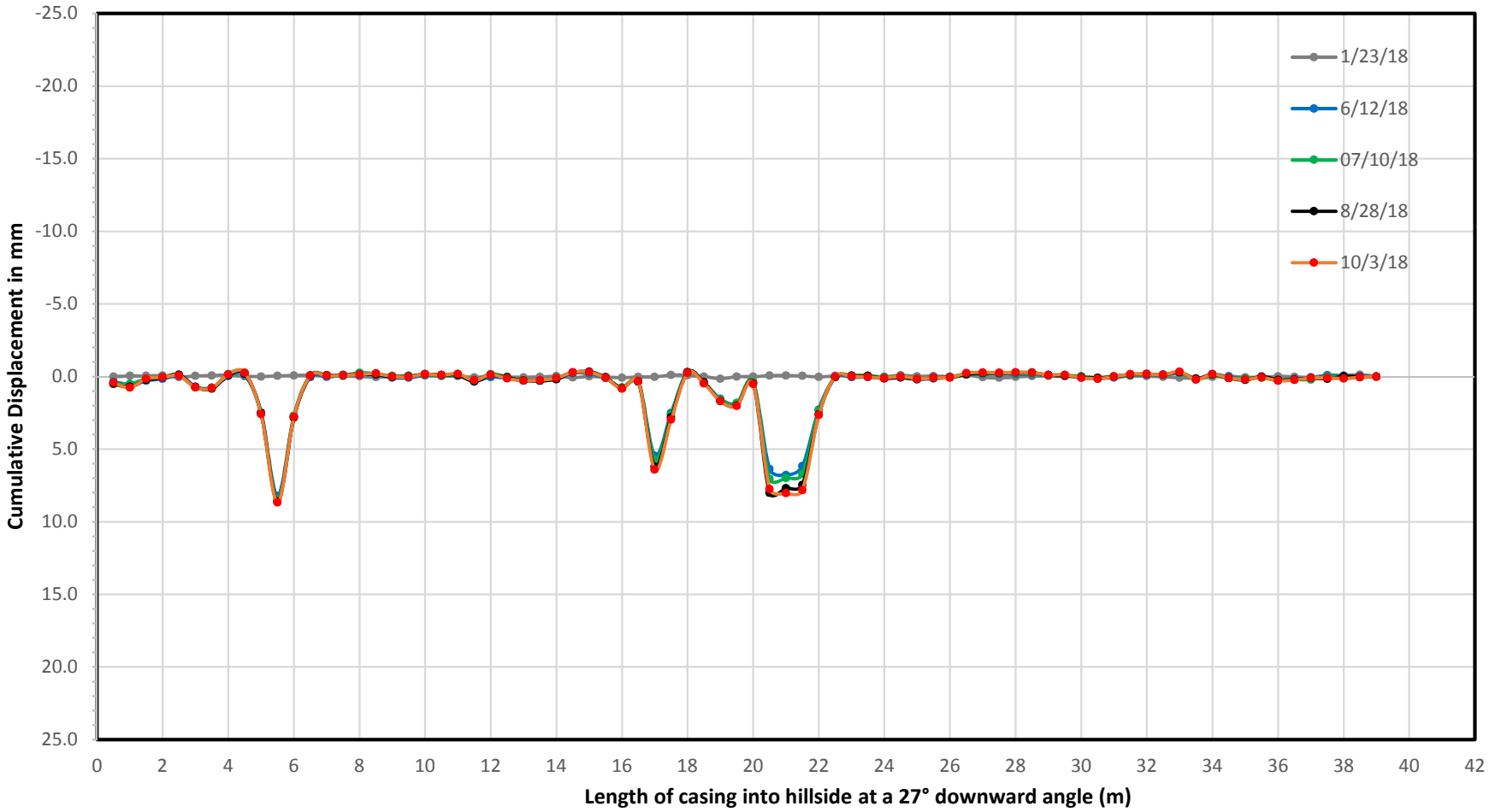
APPENDIX L Slope Inclinometer Data and Plots (through May 21, 2021)



HZ-18-001
LAST CHANCE GRADE
01-DN-101-PM 15.2
October 3, 2018

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
(BIAS SHIFT APPLIED)

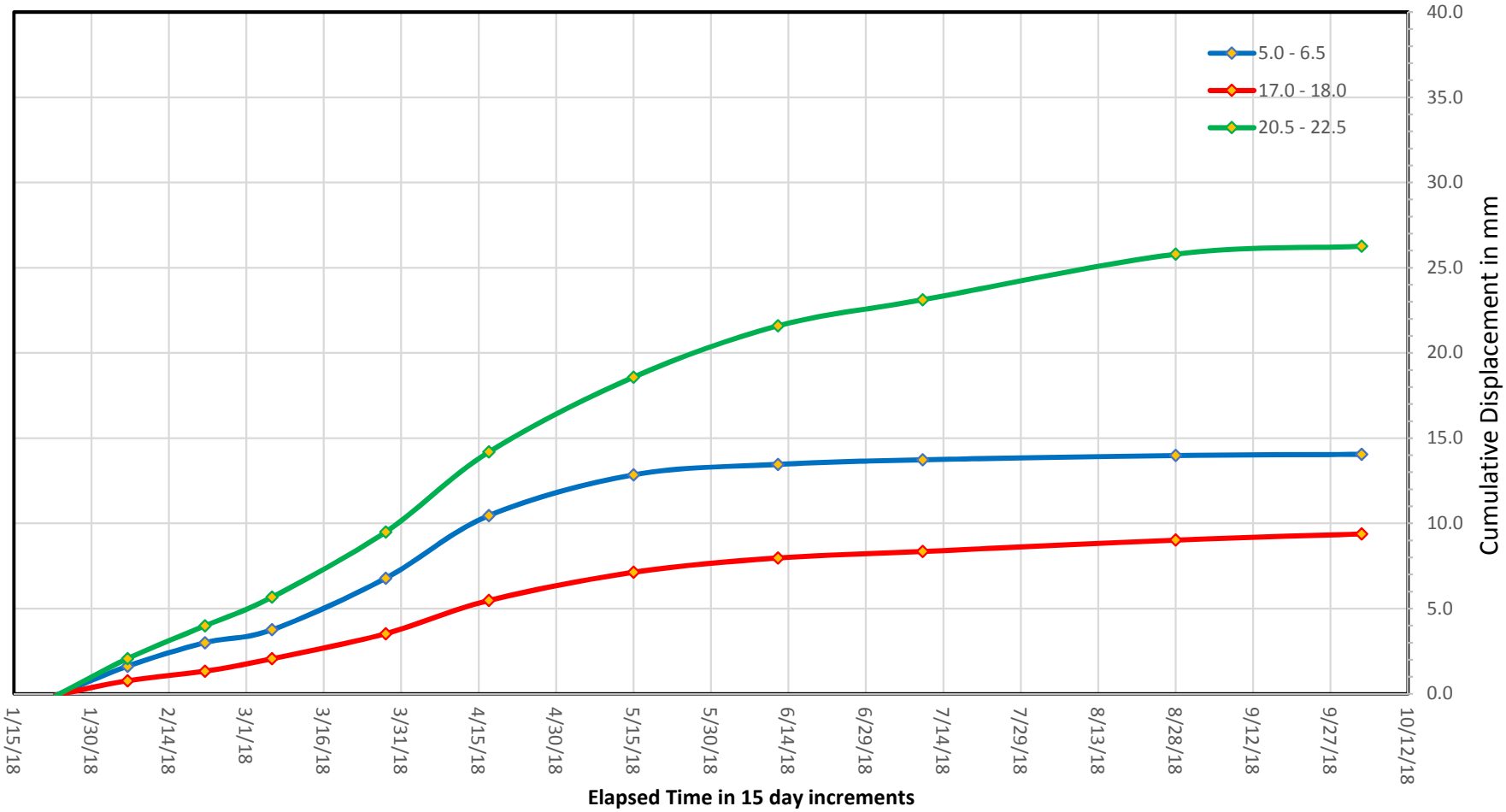
ANGLED INCLINOMETER INCREMENTAL DISPLACEMENT (mm)



HZ-18-001
LAST CHANCE GRADE
01-DN-101-PM 15.2
October 3, 2018

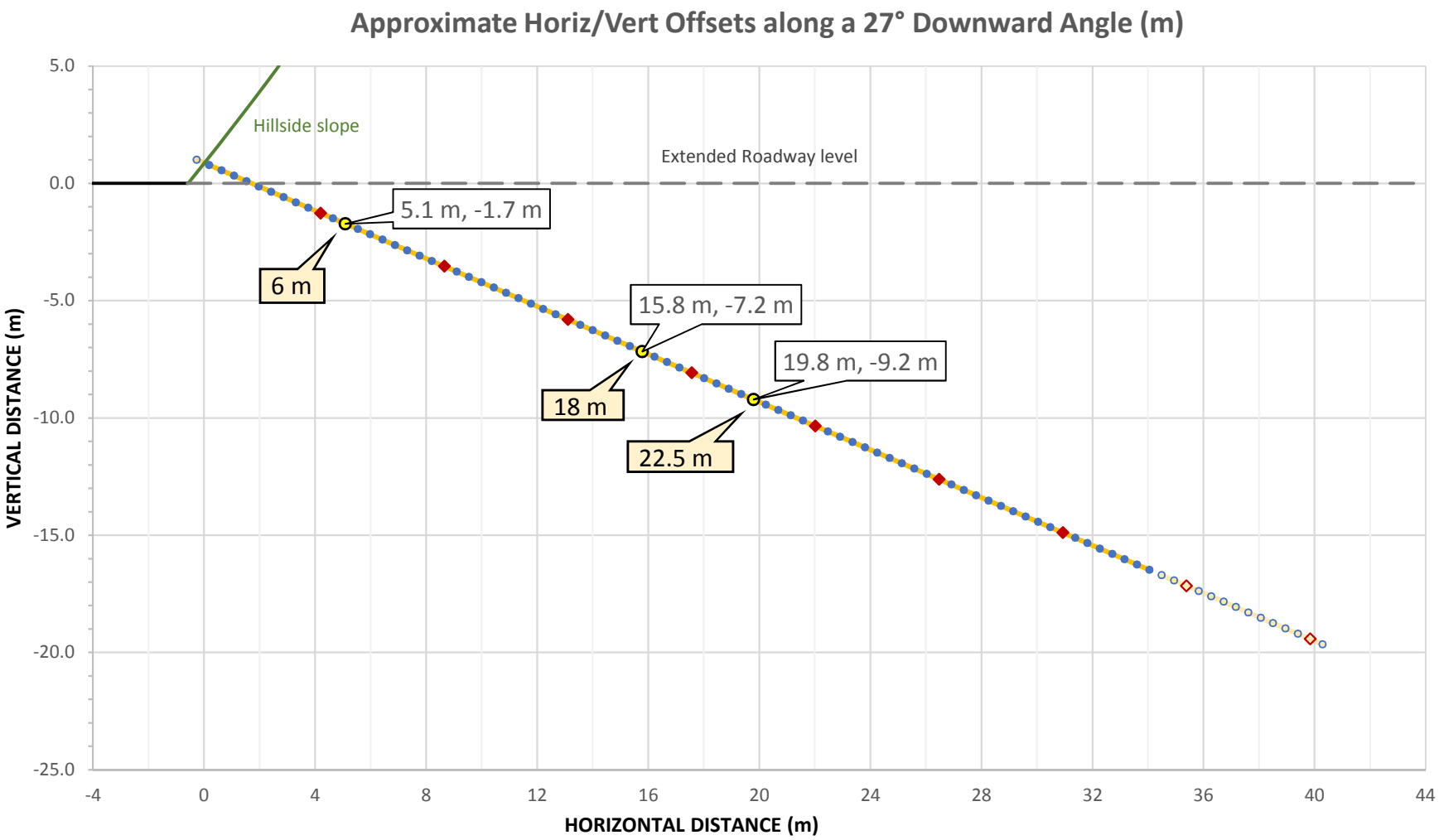
CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
(BIAS SHIFT APPLIED)

CUMULATIVE DISPLACEMENT OVER TIME (mm)



HZ-18-001
LAST CHANCE GRADE
01-DN-101-PM 15.2
October 3, 2018

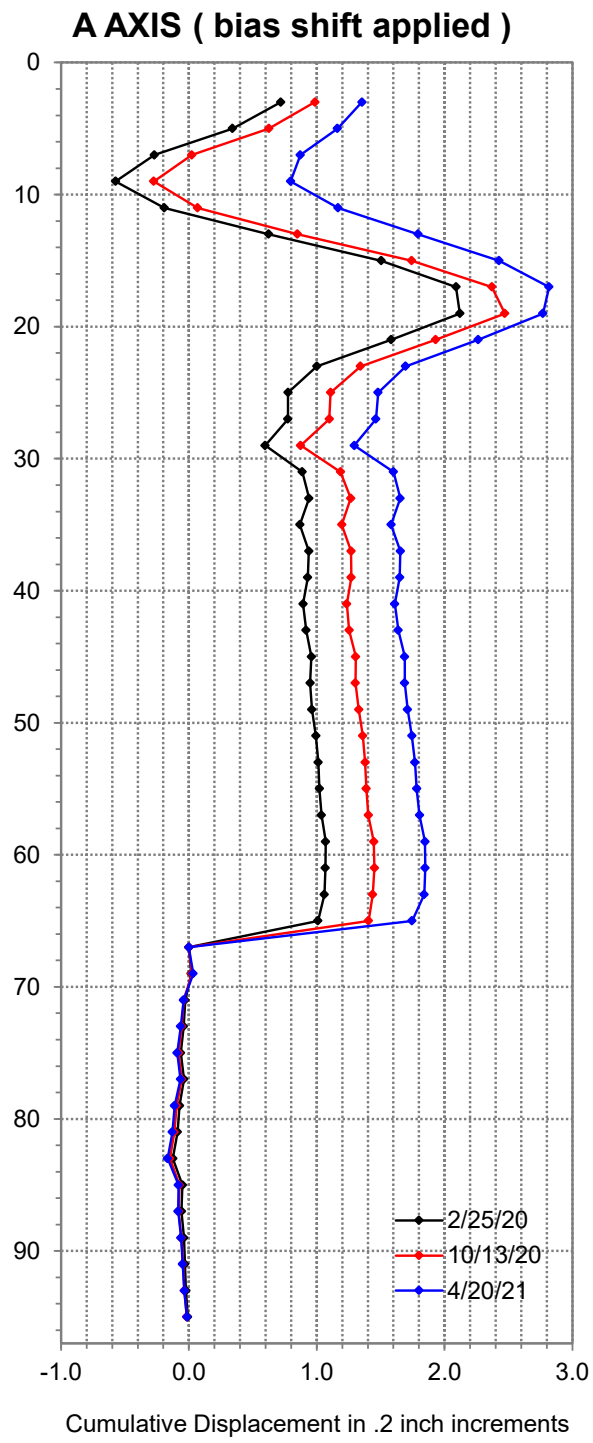
CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
(BIAS SHIFT APPLIED)

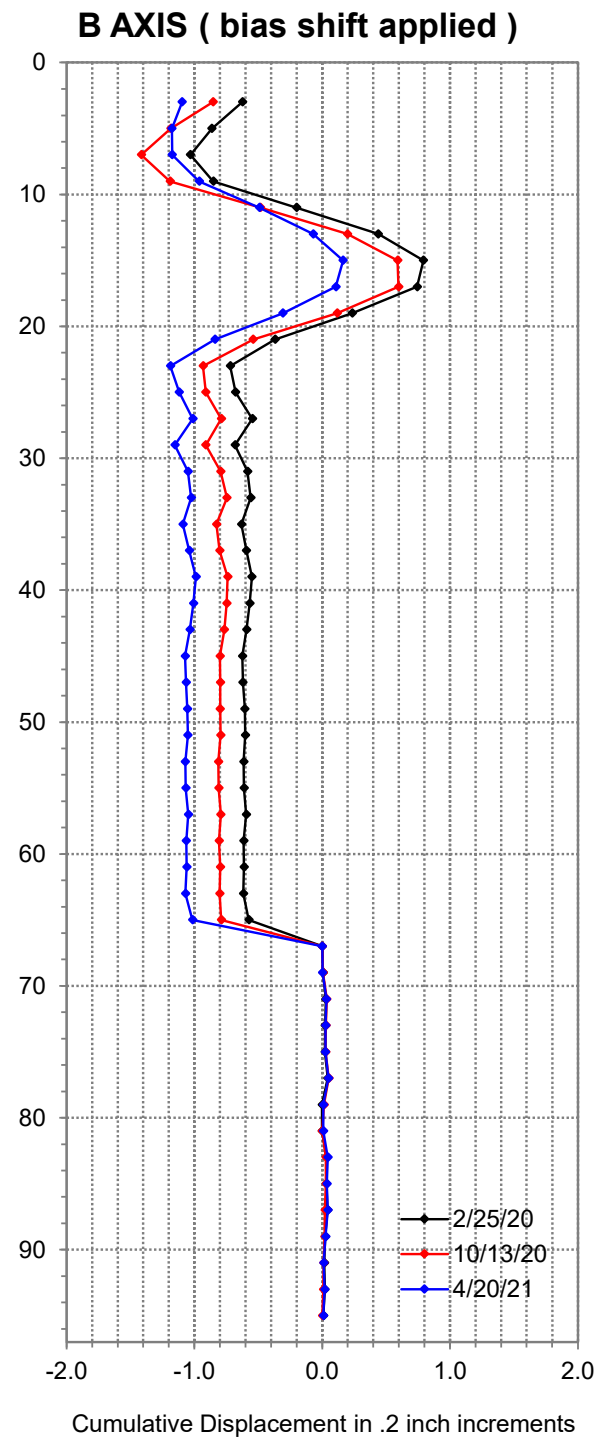


HZ-18-001
LAST CHANCE GRADE
01-DN-101-PM 15.2
October 3, 2018

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

Cumulative Displacement (inches) since 7/24/2018

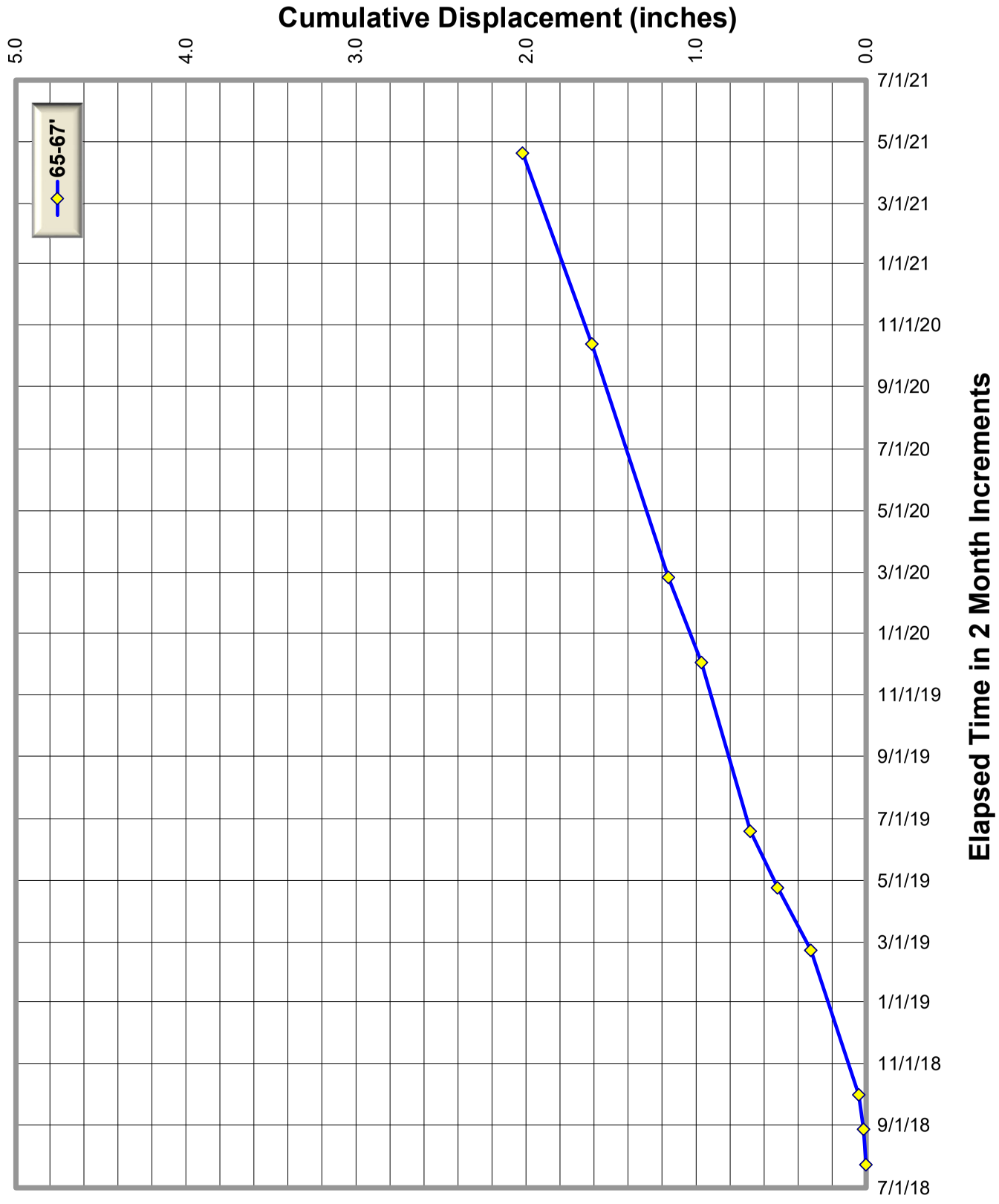




B-1A (RC-18-002)
LCGB
01-DN-101-PM 13.5
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

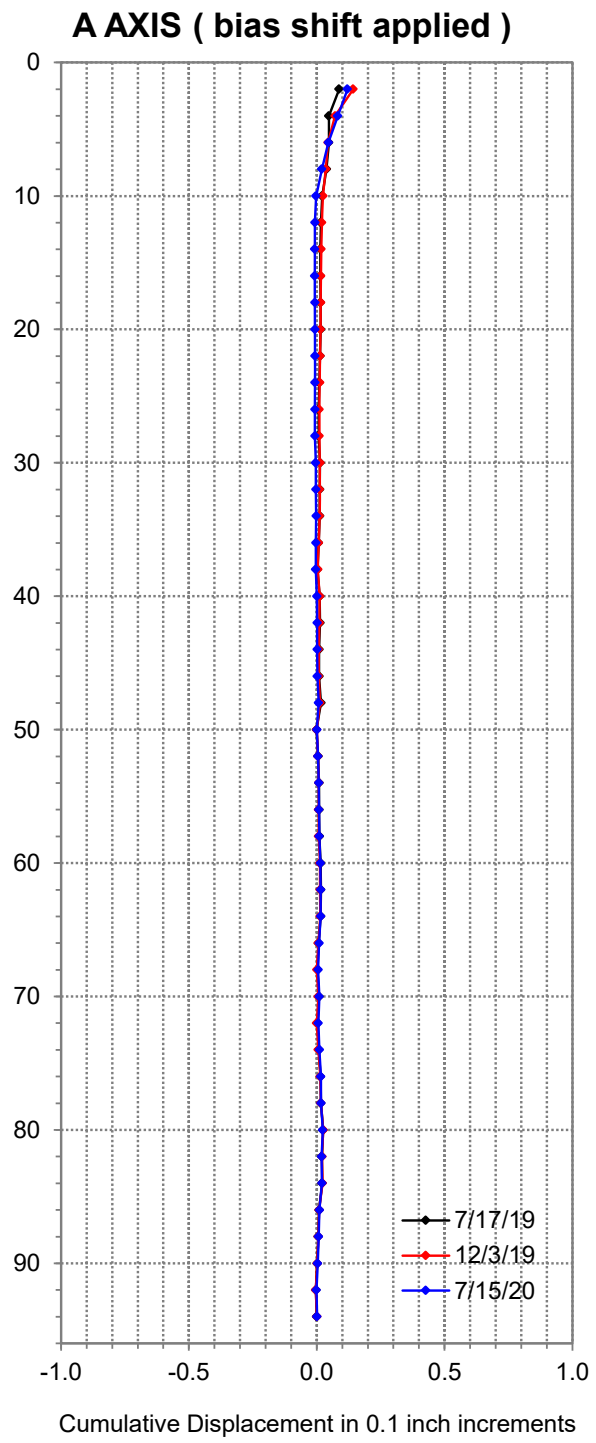
Cumulative Vector Displacement Over Time

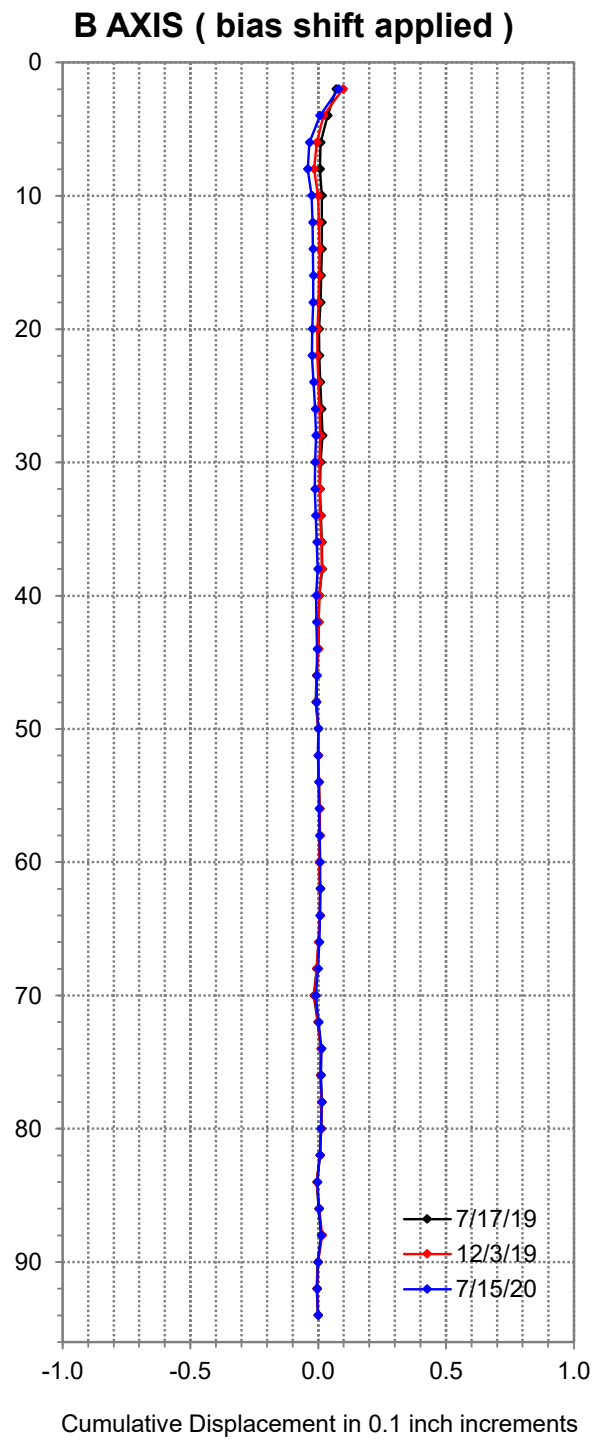


B-1A (RC-18-002)
LCGB
01-DN-101-PM 13.5
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

Cumulative Displacement (inches) since 10/2/2018

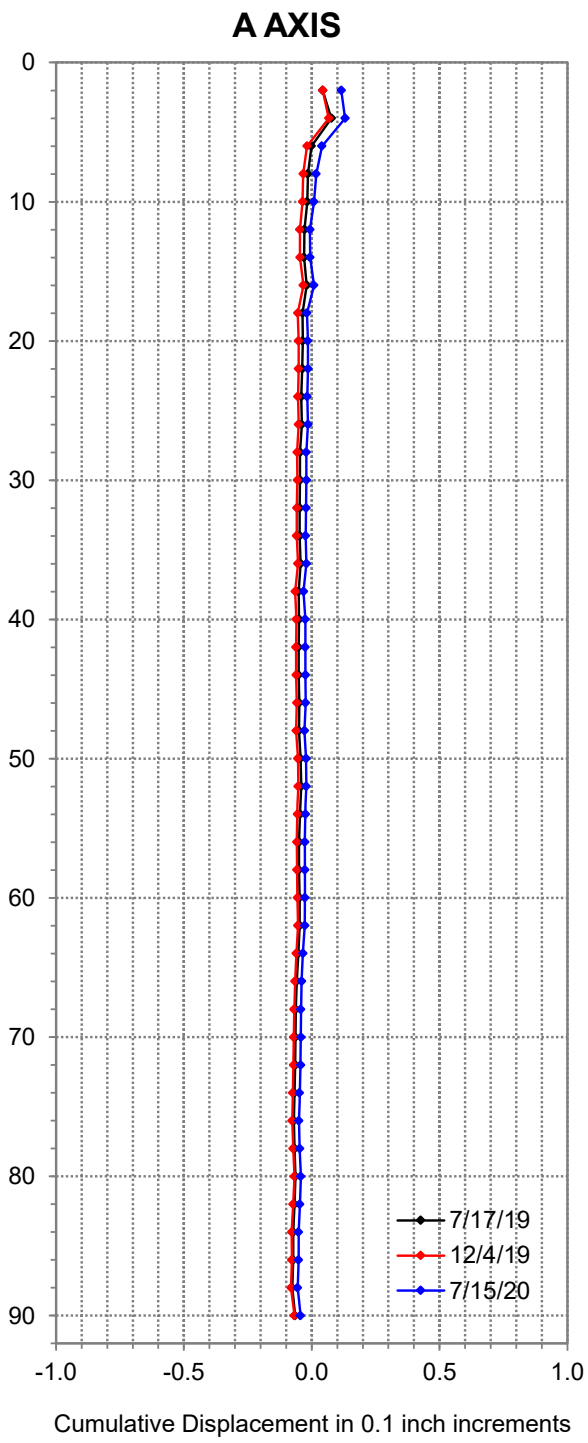


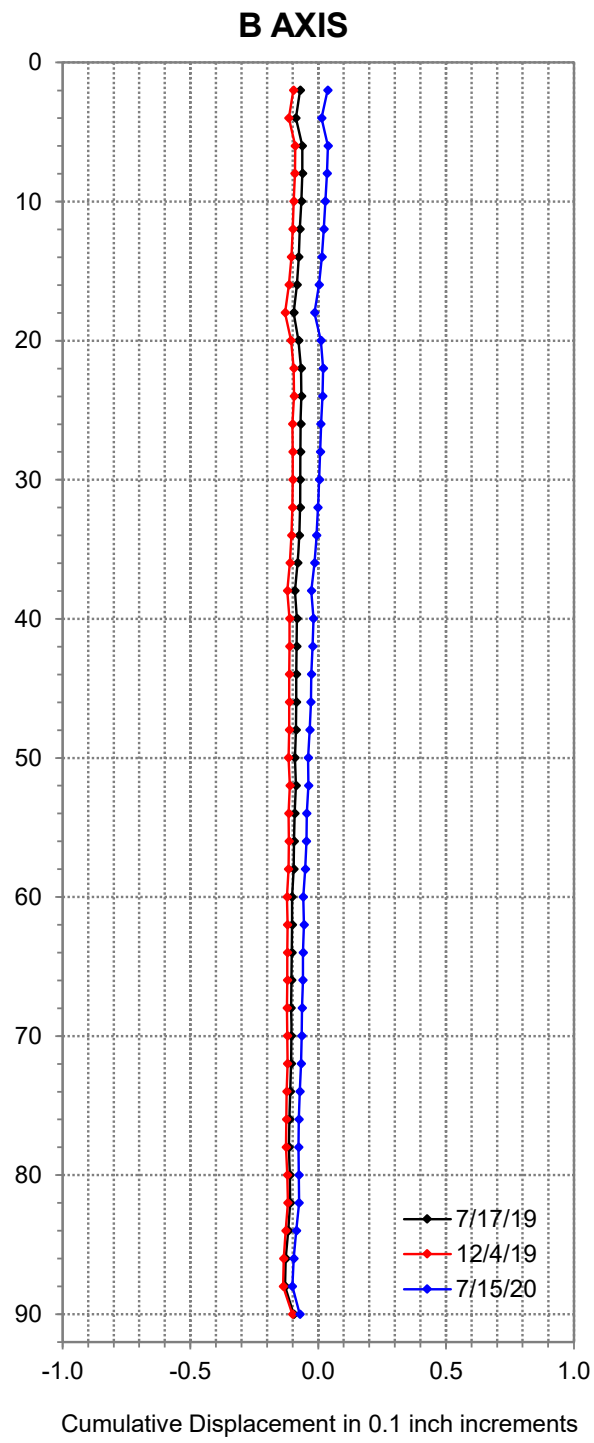


B-7 (RC-18-005)
LCGB
01-DN-101-GREEN DIAMOND
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

Cumulative Displacement (inches) since 10/2/2018

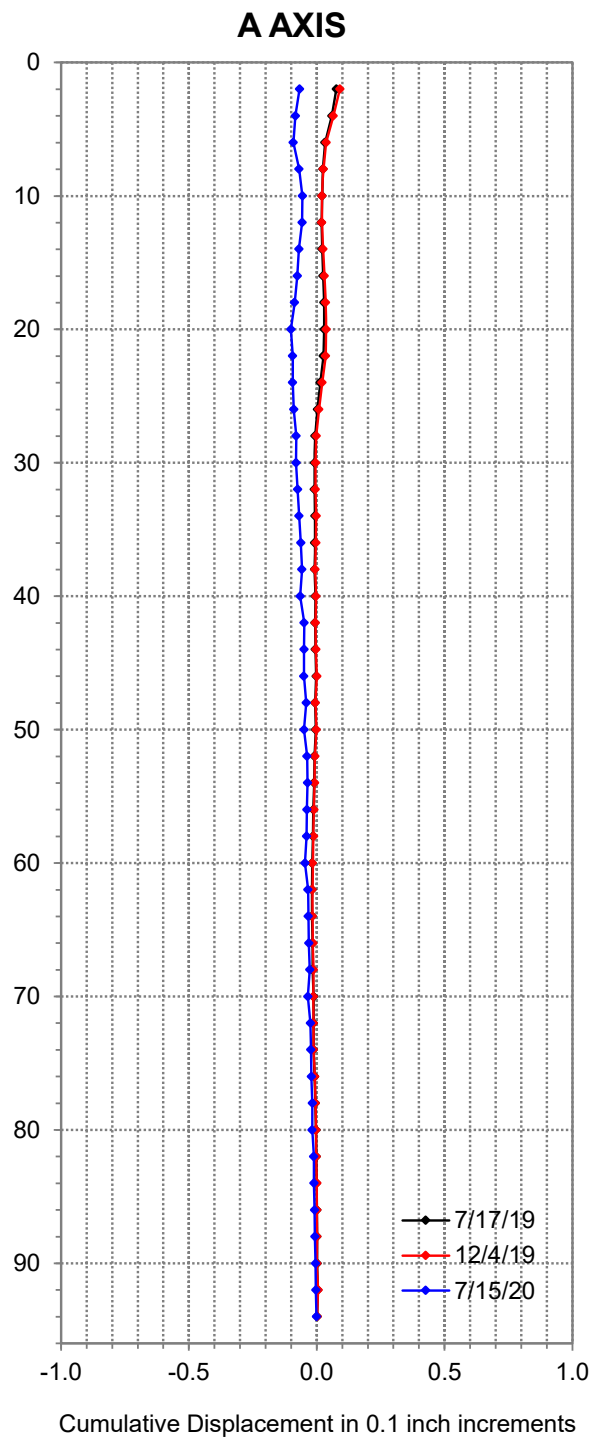


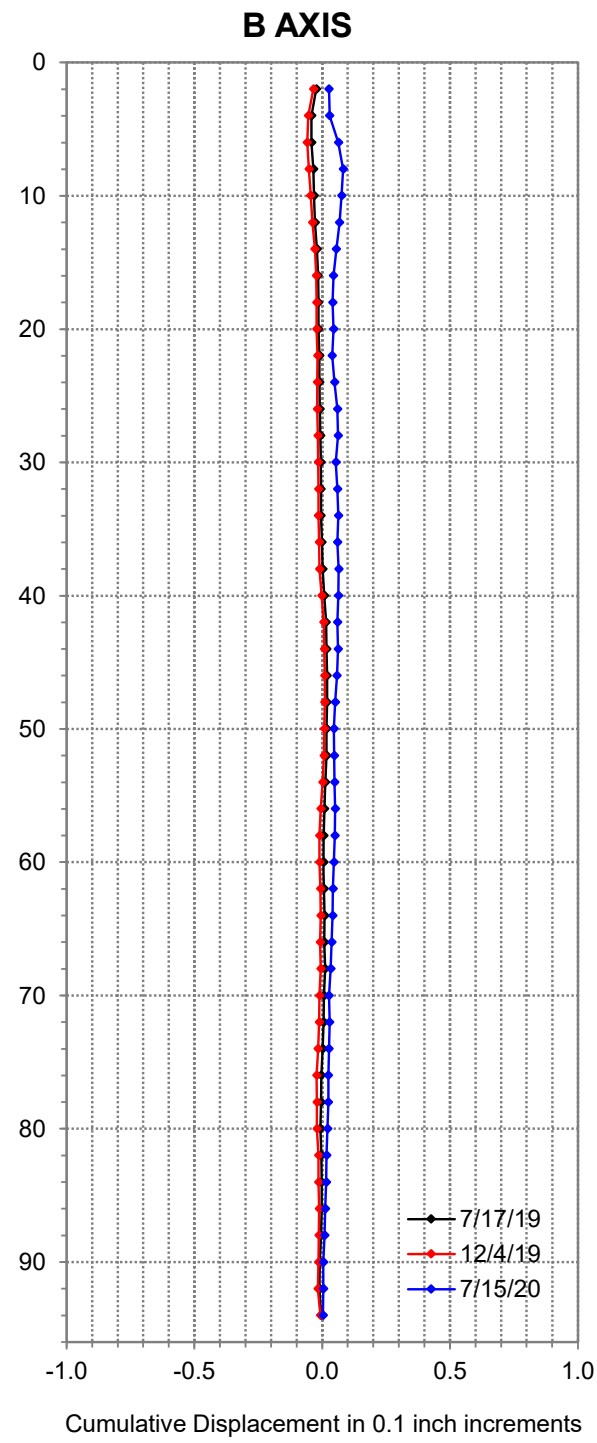


B-6 (RC-18-007)
LCGB
01-DN-101-GREEN DIAMOND
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 10/2/2018

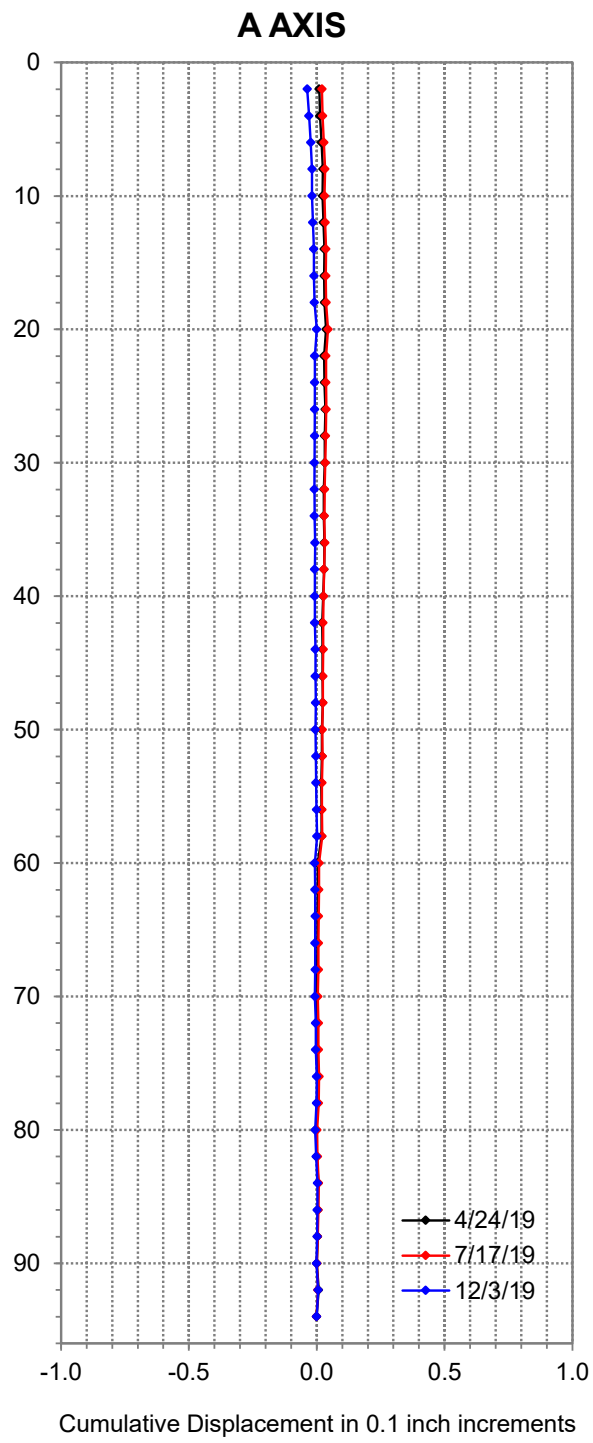


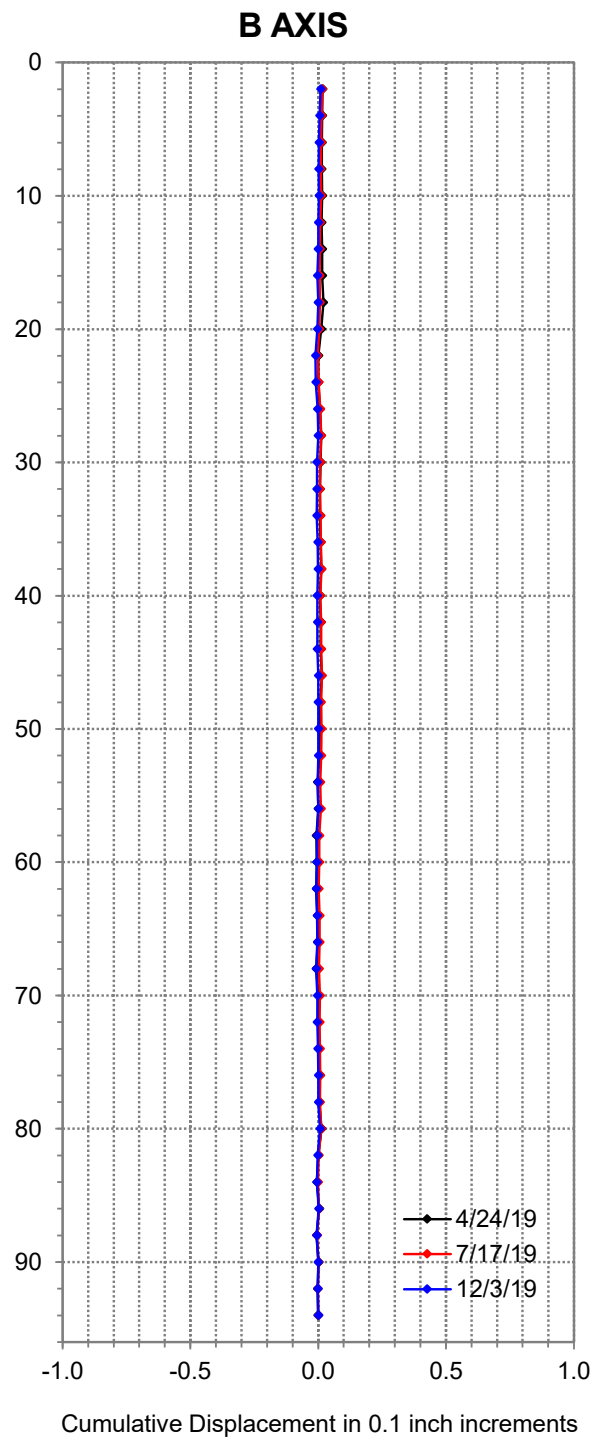


B-5 (RC-18-009)
LCGB
01-DN-101-GREEN DIAMOND
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 10/2/2018

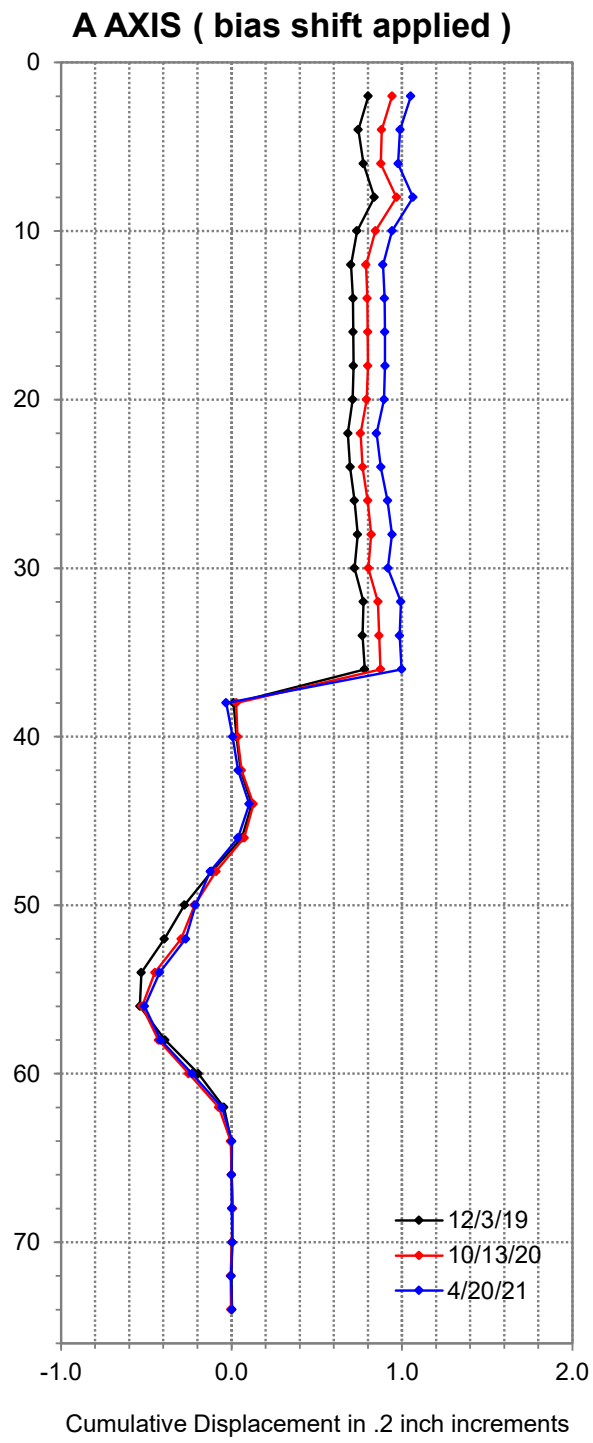


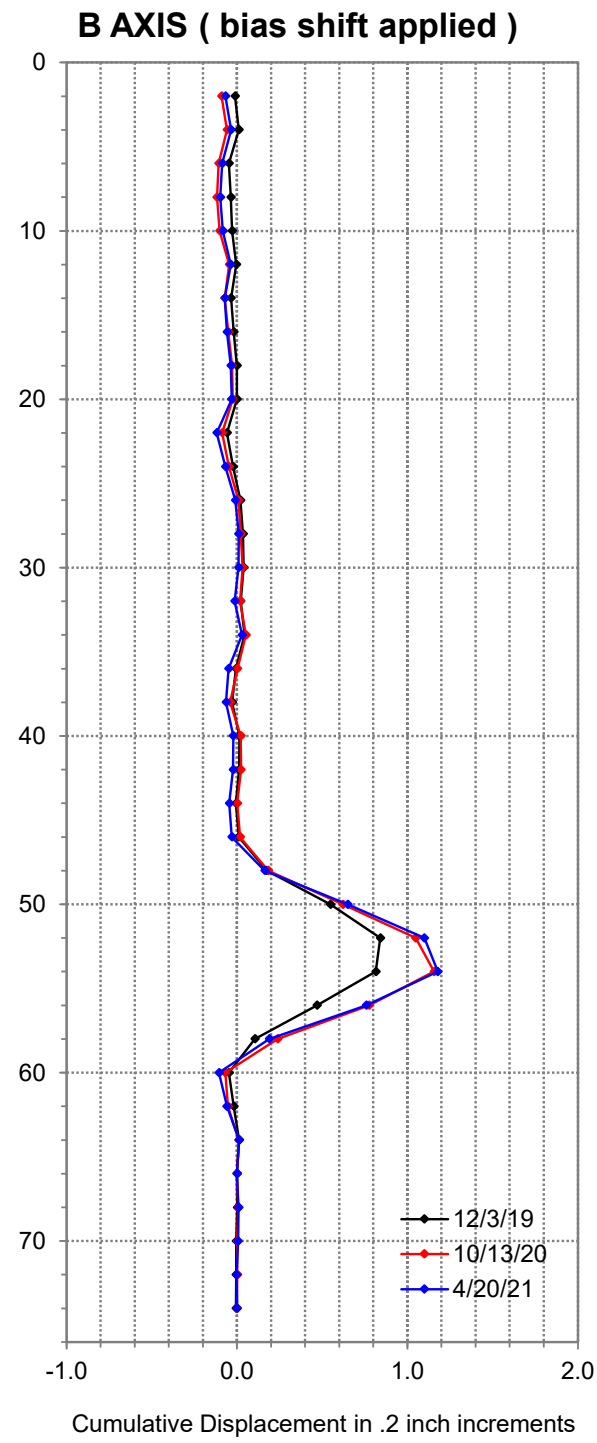


B-3 (RC-18-011)
LCGB
01-DN-101-GREEN DIAMOND
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 7/10/2018

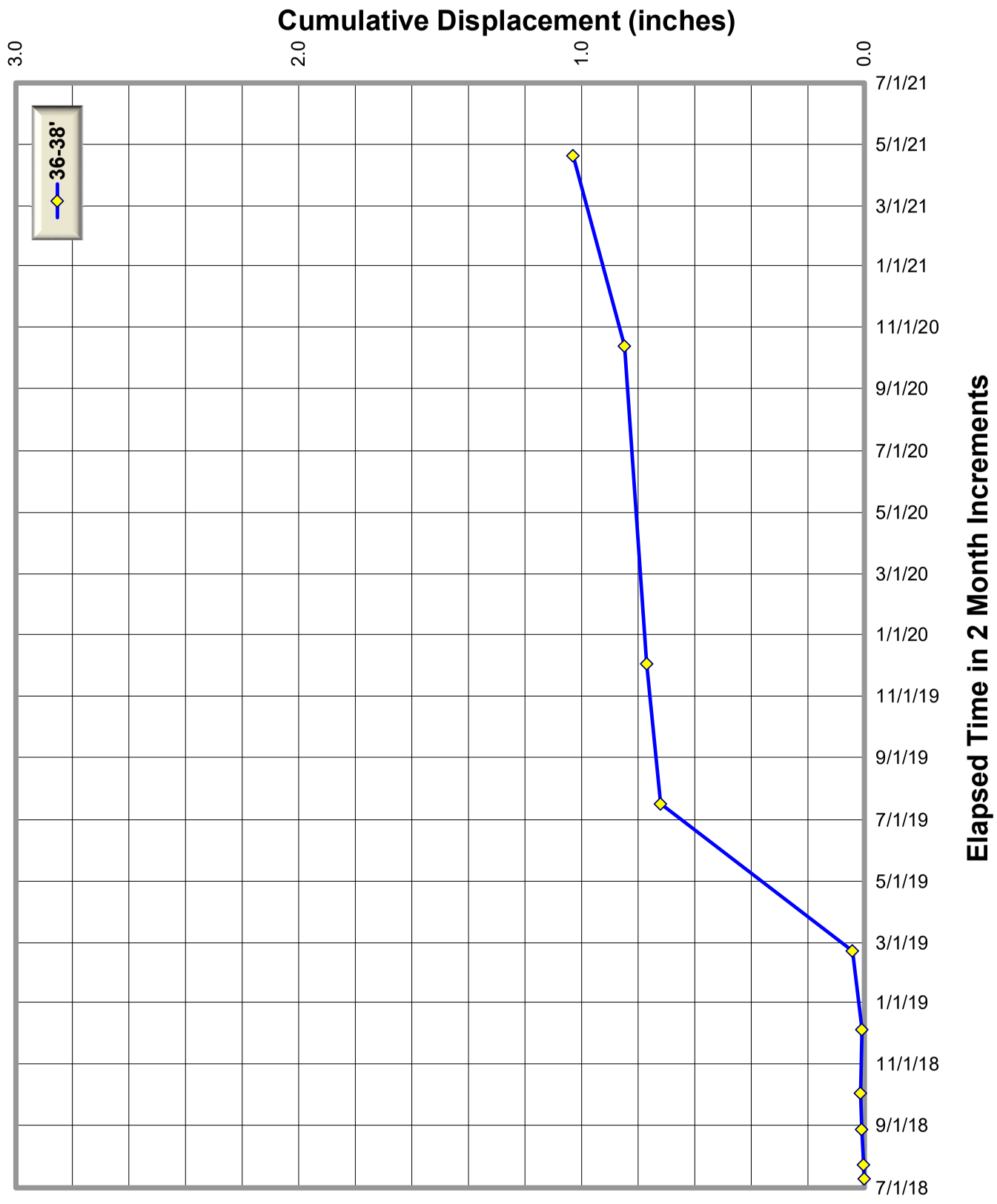




SI-4 (RC-18-020)
WILSON CREEK
01-DN-101-PM 14.4
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

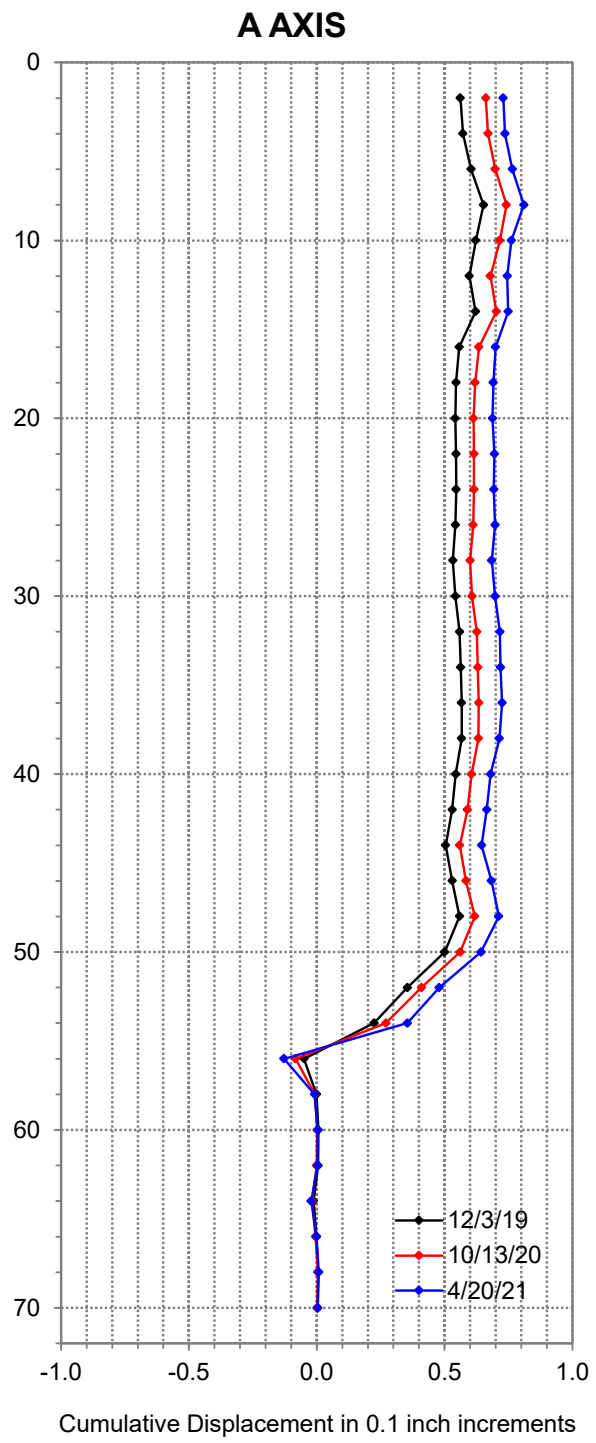
Cumulative Vector Displacement Over Time

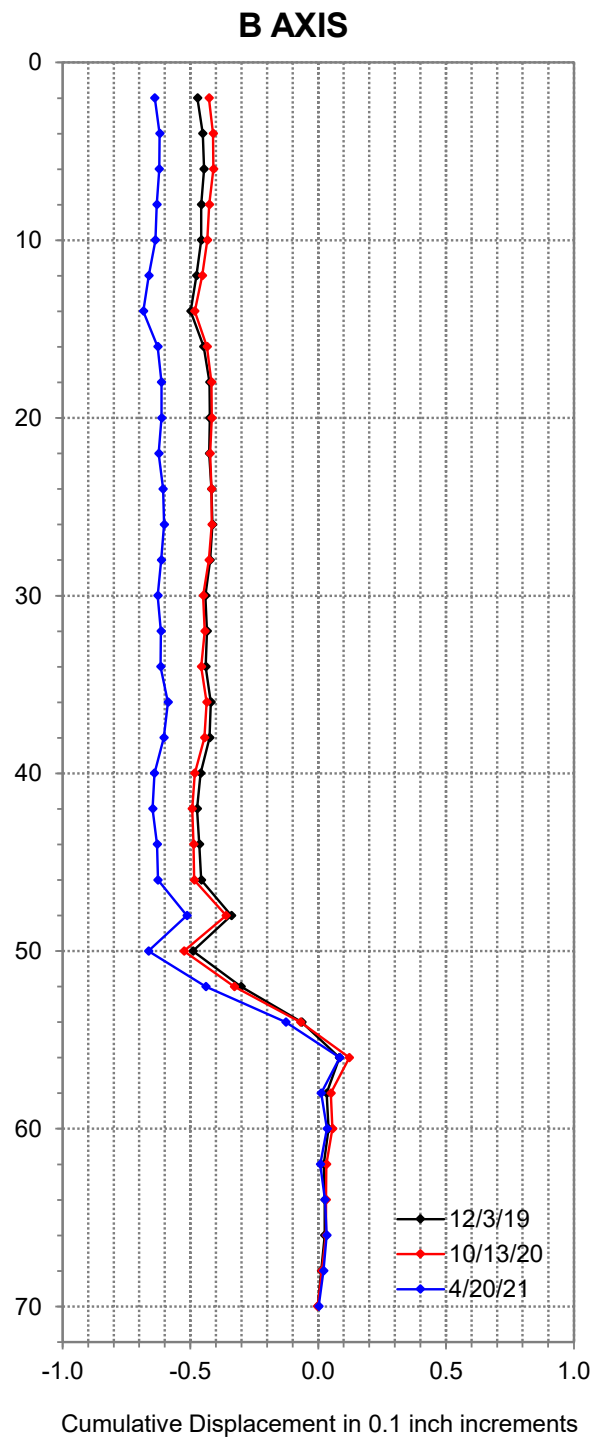


SI-4 (RC-18-020)
WILSON CREEK
01-DN-101-PM 14.4
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

Cumulative Displacement (inches) since 7/10/2018

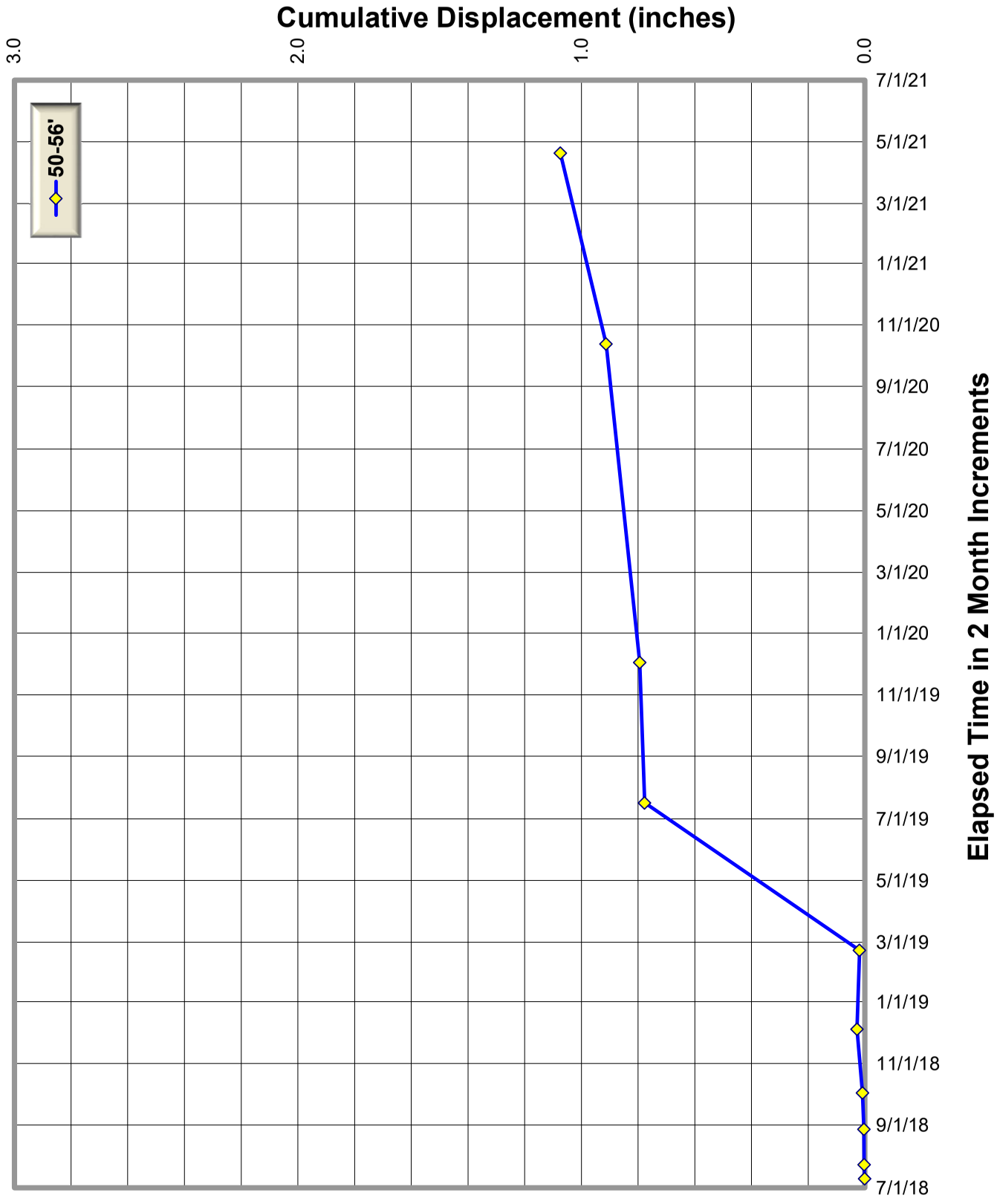




SI-5 (RC-18-021)
WILSON CREEK
01-DN-101-PM 14.4
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

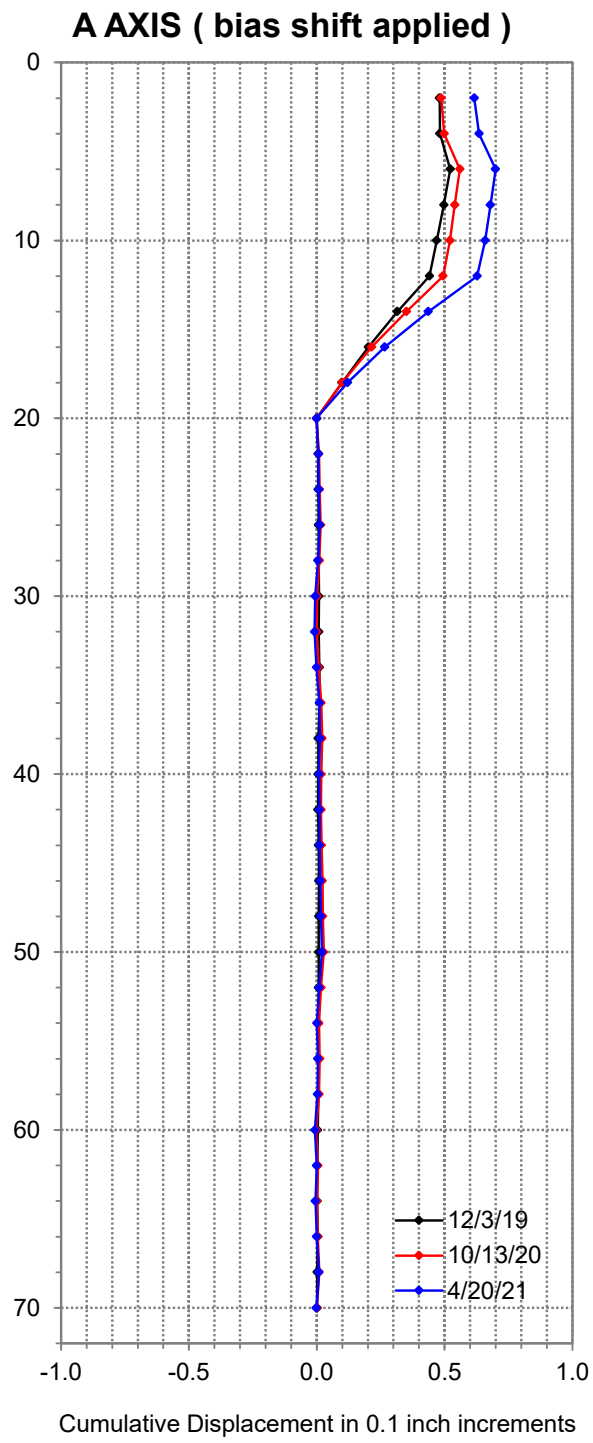
Cumulative Vector Displacement Over Time

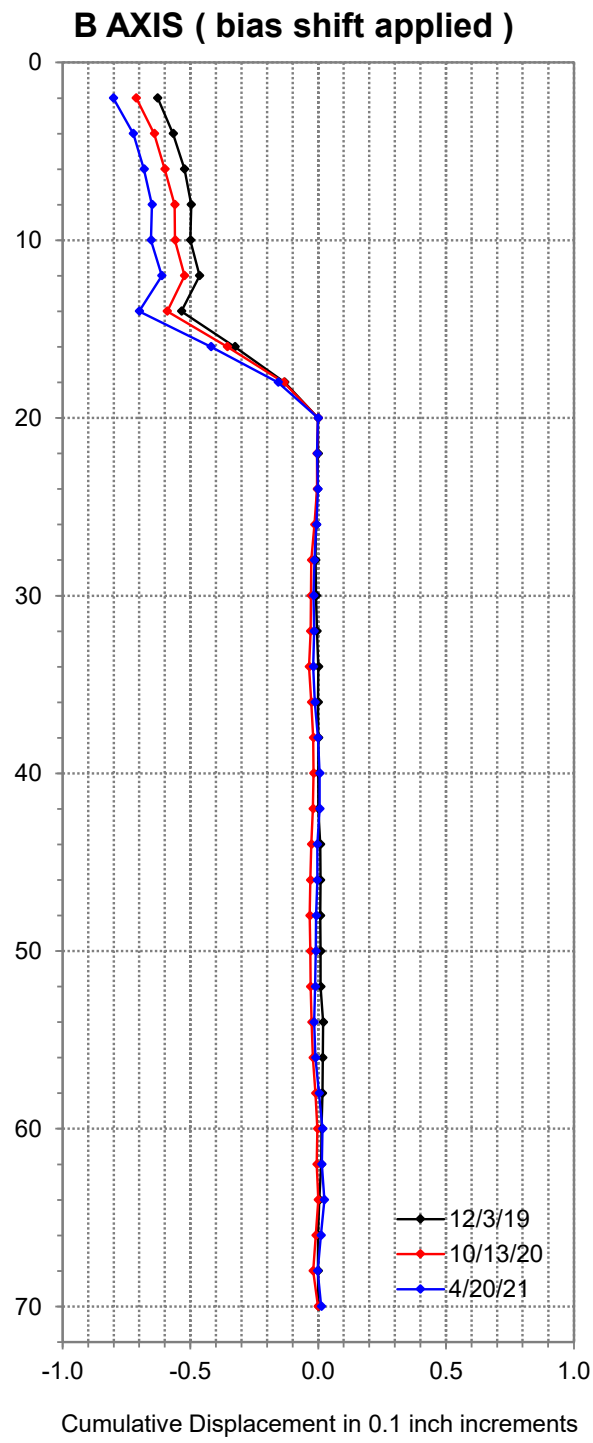


SI-5 (RC-18-021)
WILSON CREEK
01-DN-101-PM 14.4
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 12/5/2018

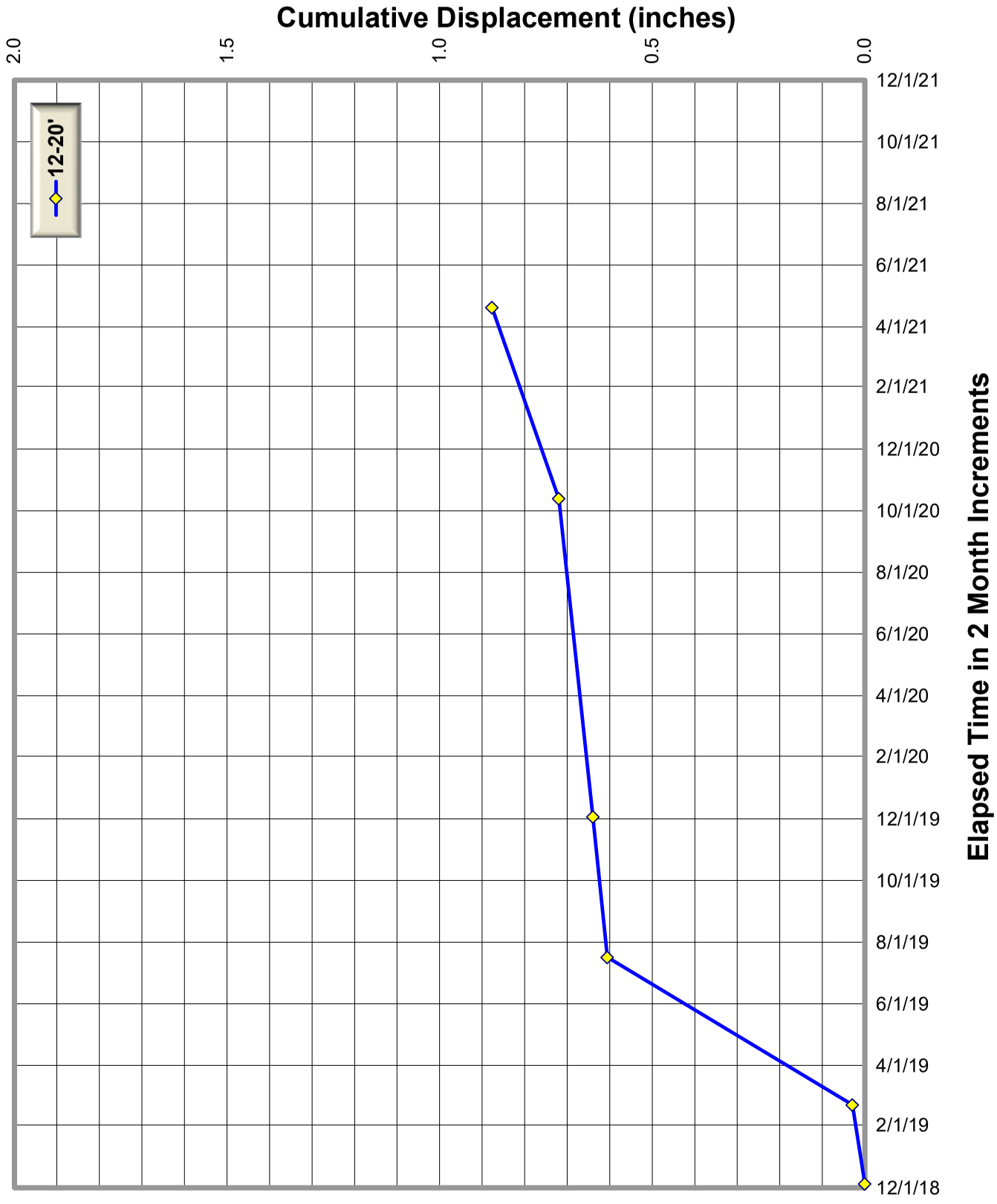




SI-6 (RC-18-022)
WILSON CREEK
01-DN-101-PM 14.4
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

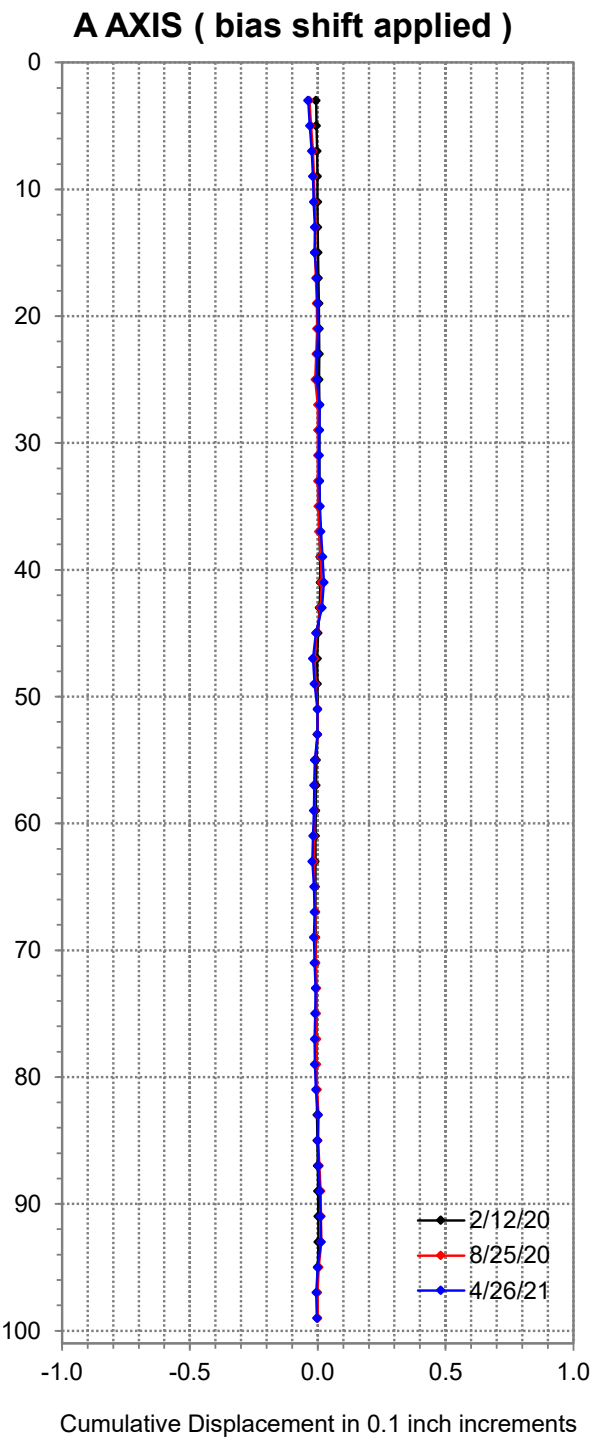
Cumulative Vector Displacement Over Time

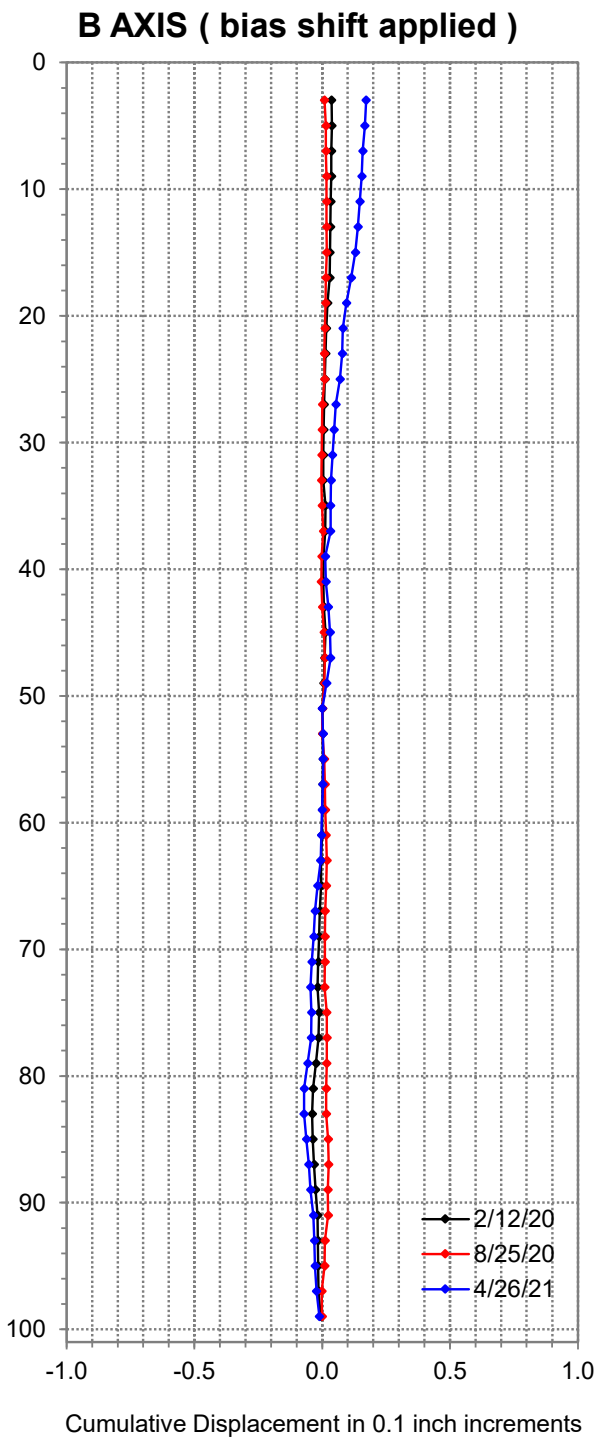


SI-6 (RC-18-022)
WILSON CREEK
01-DN-101-PM 14.4
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

Cumulative Displacement (inches) since 12/4/2019

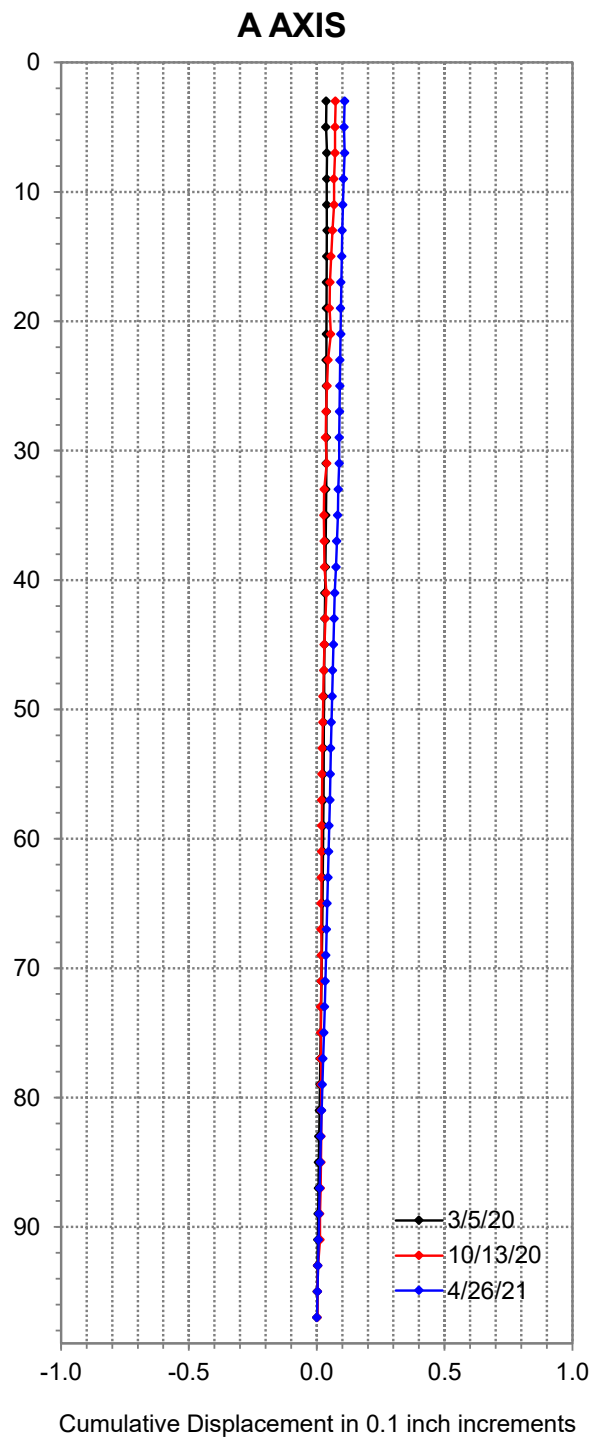


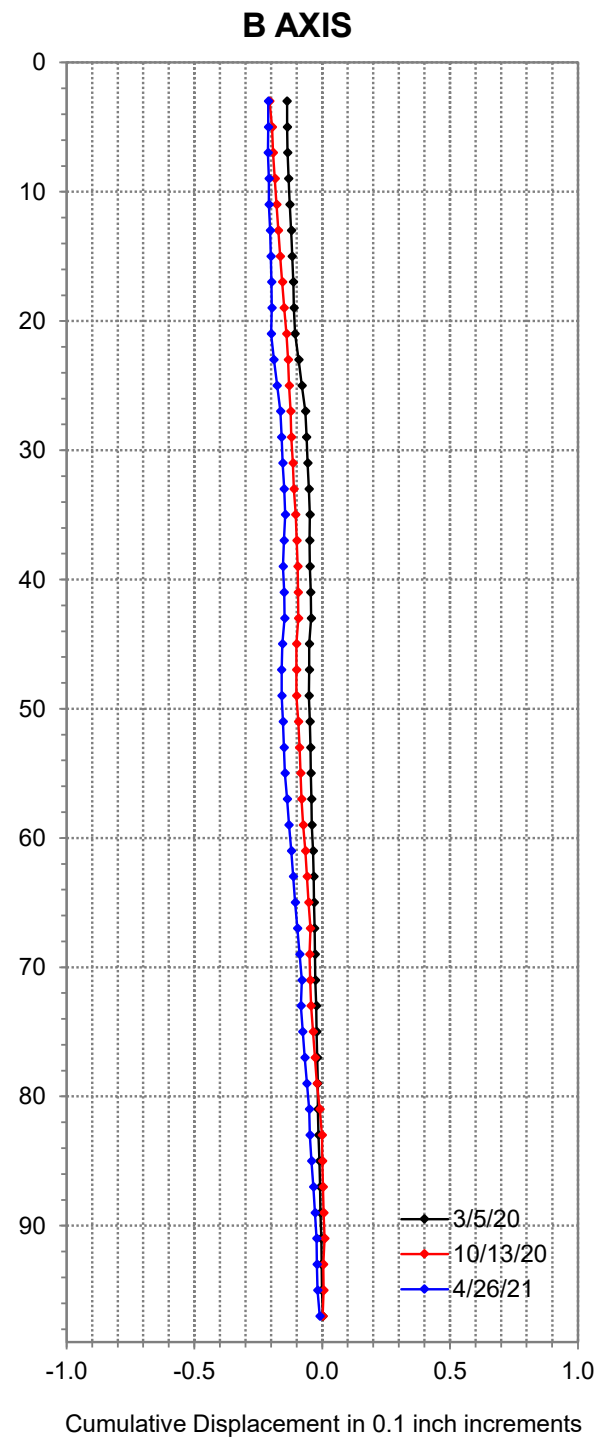


B-21 (RC-19-001)
LCGB Bypass
01-DN-101-PM 14.34
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

Cumulative Displacement (inches) since 12/3/2019

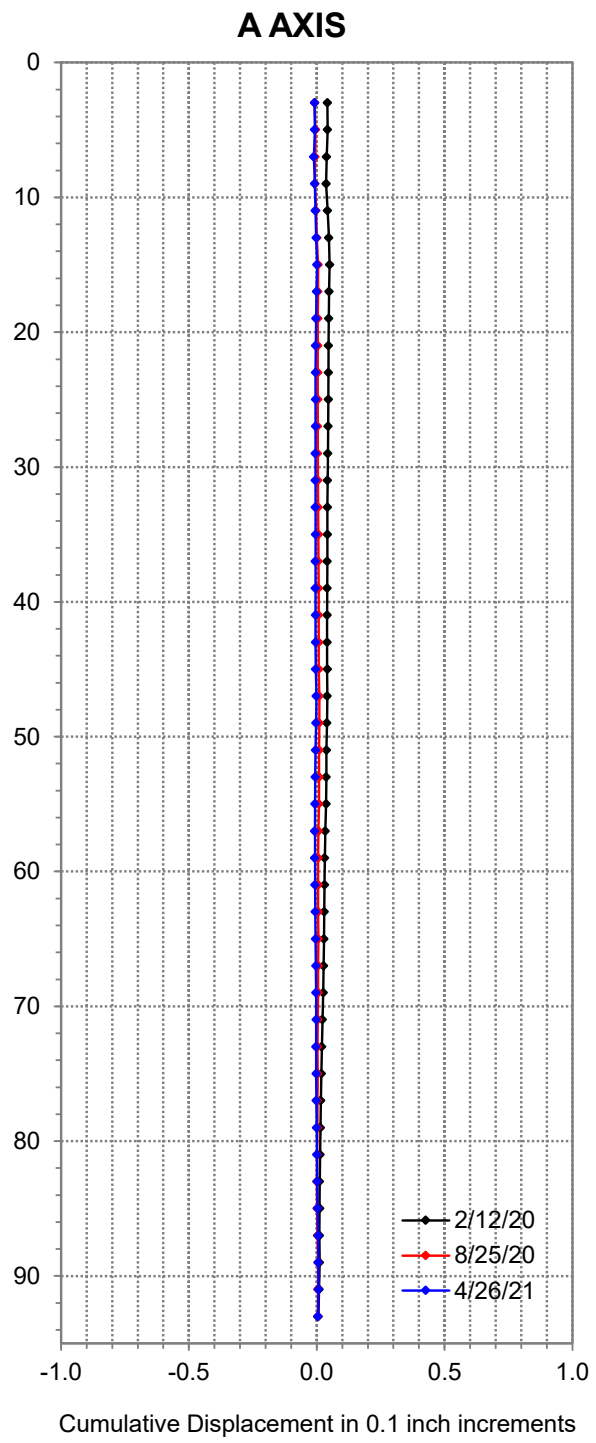


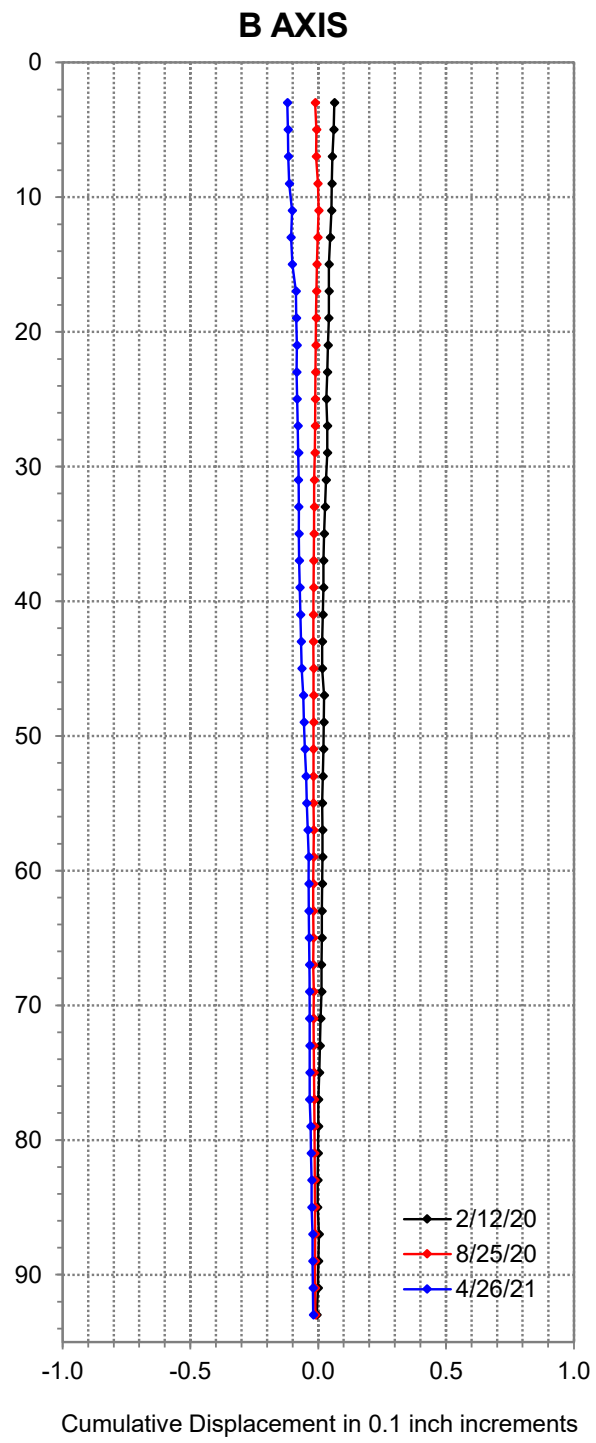


B-15 (SI-19-002)
LCG Bypass
01-DN-101-PM 15.94
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 12/4/2019

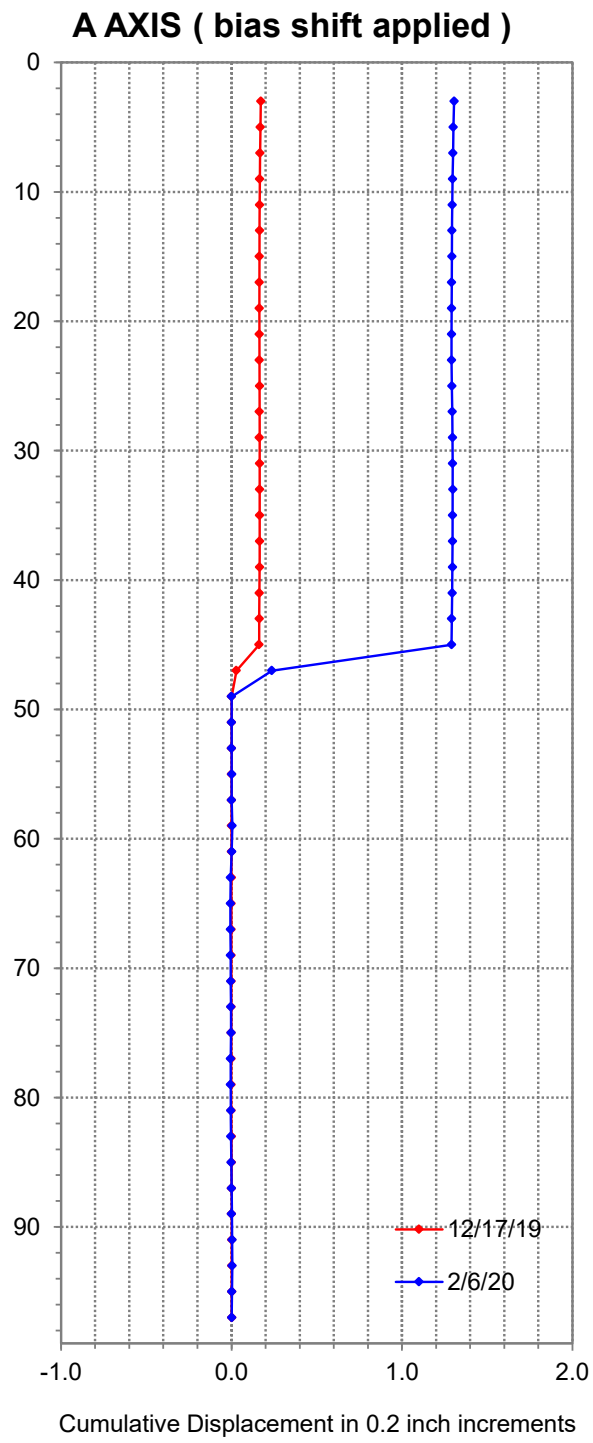


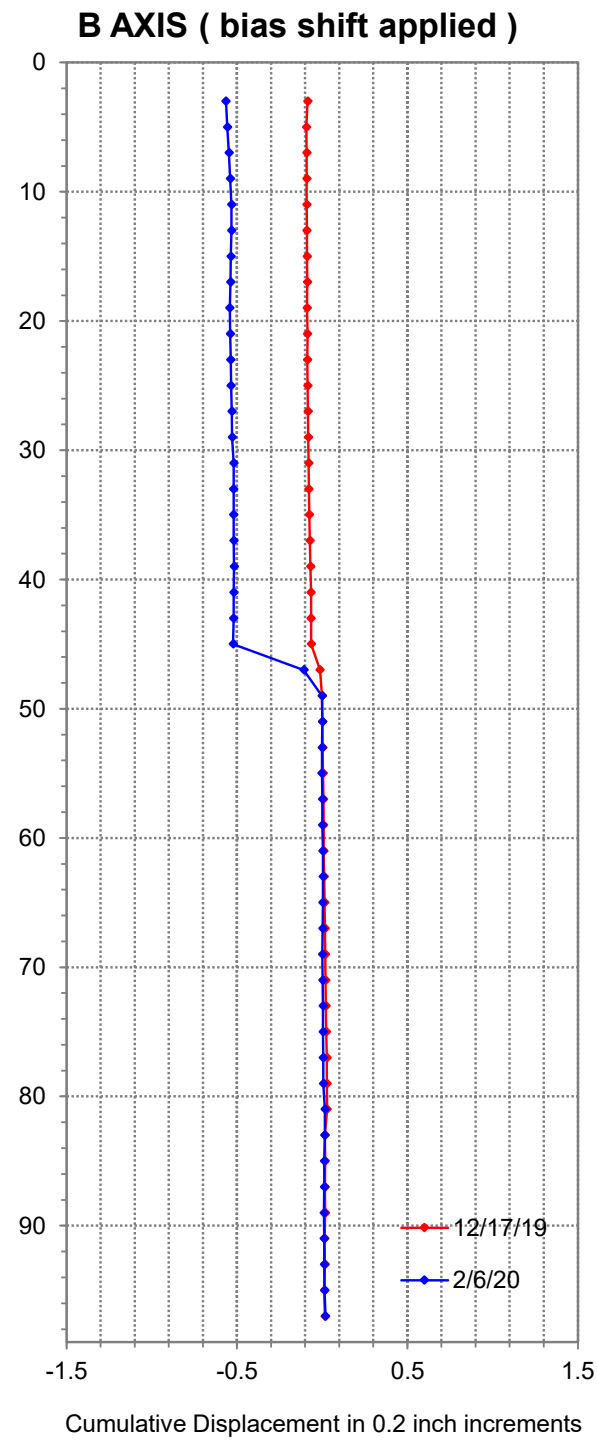


B-17 (RC-19-003)
LCG Bypass
01-DN-101-PM 15.58
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 12/4/2019

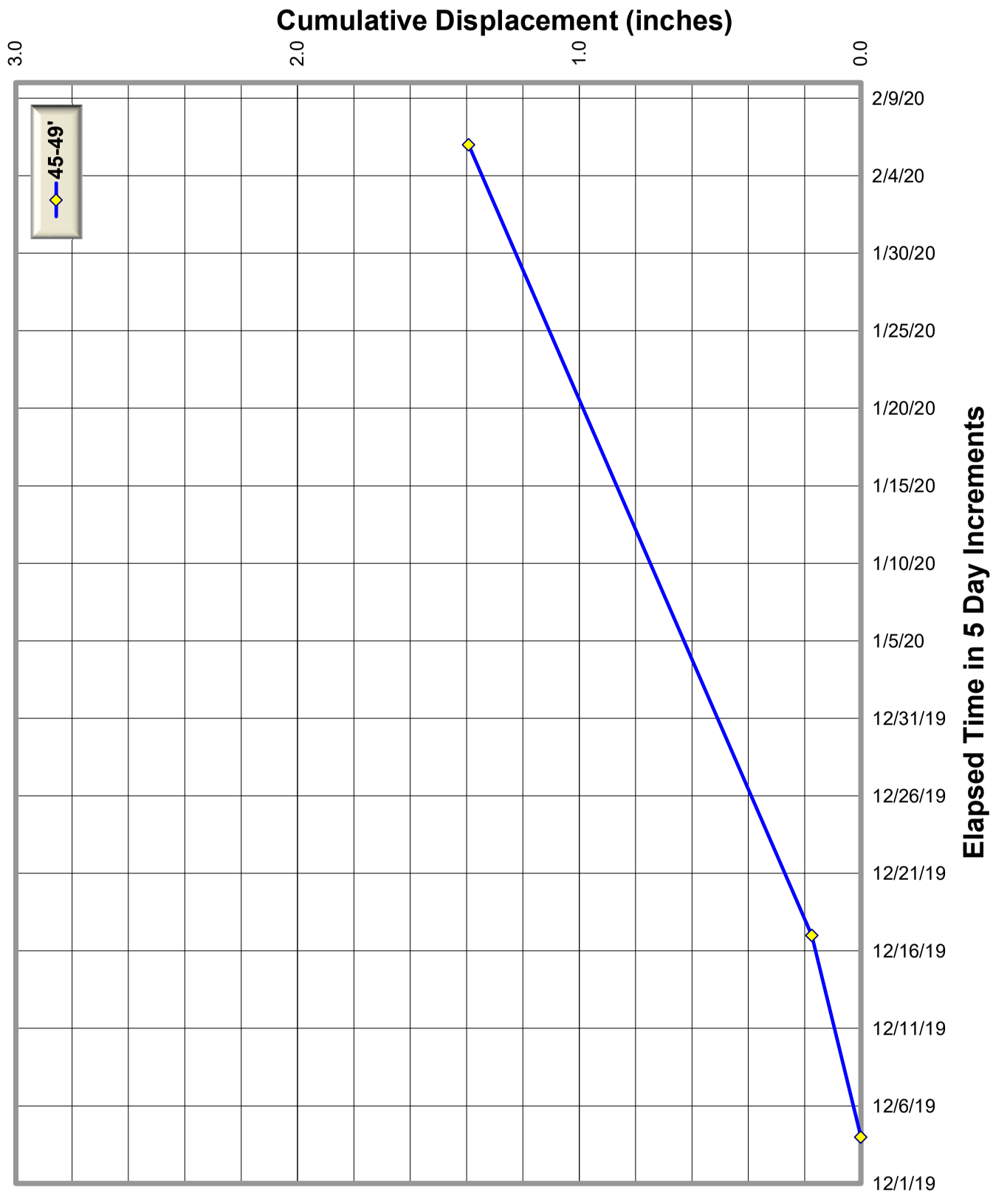




B-12 (RC-19-004)
LCG Bypass
01-DN-101-PM 13.36
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

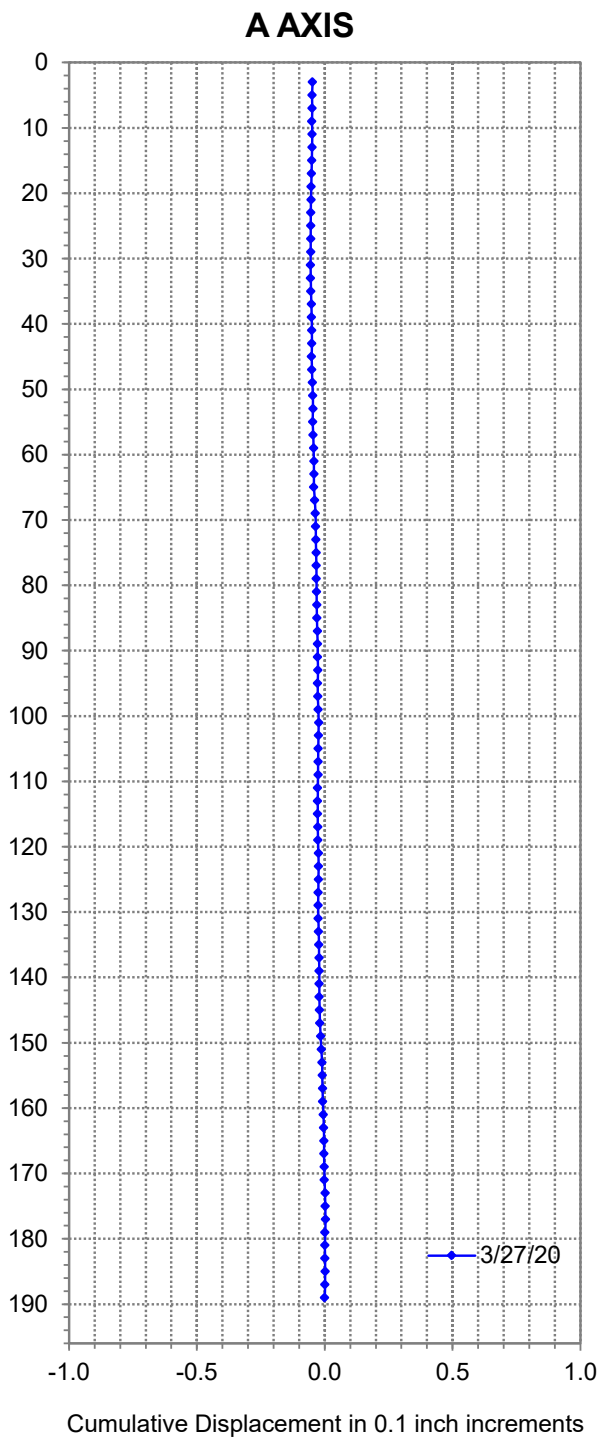
Cumulative Vector Displacement Over Time

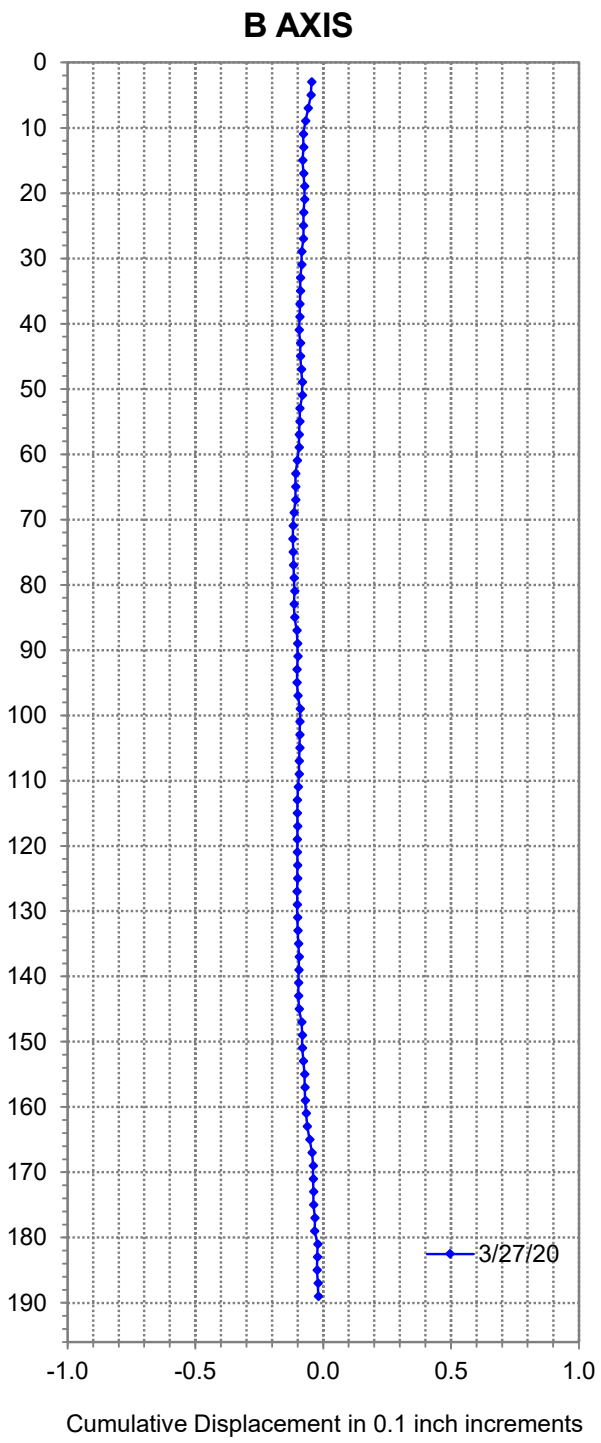


B-12 (RC-19-004)
LCG Bypass
01-DN-101-PM 13.36
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

Cumulative Displacement (inches) since 12/3/2019

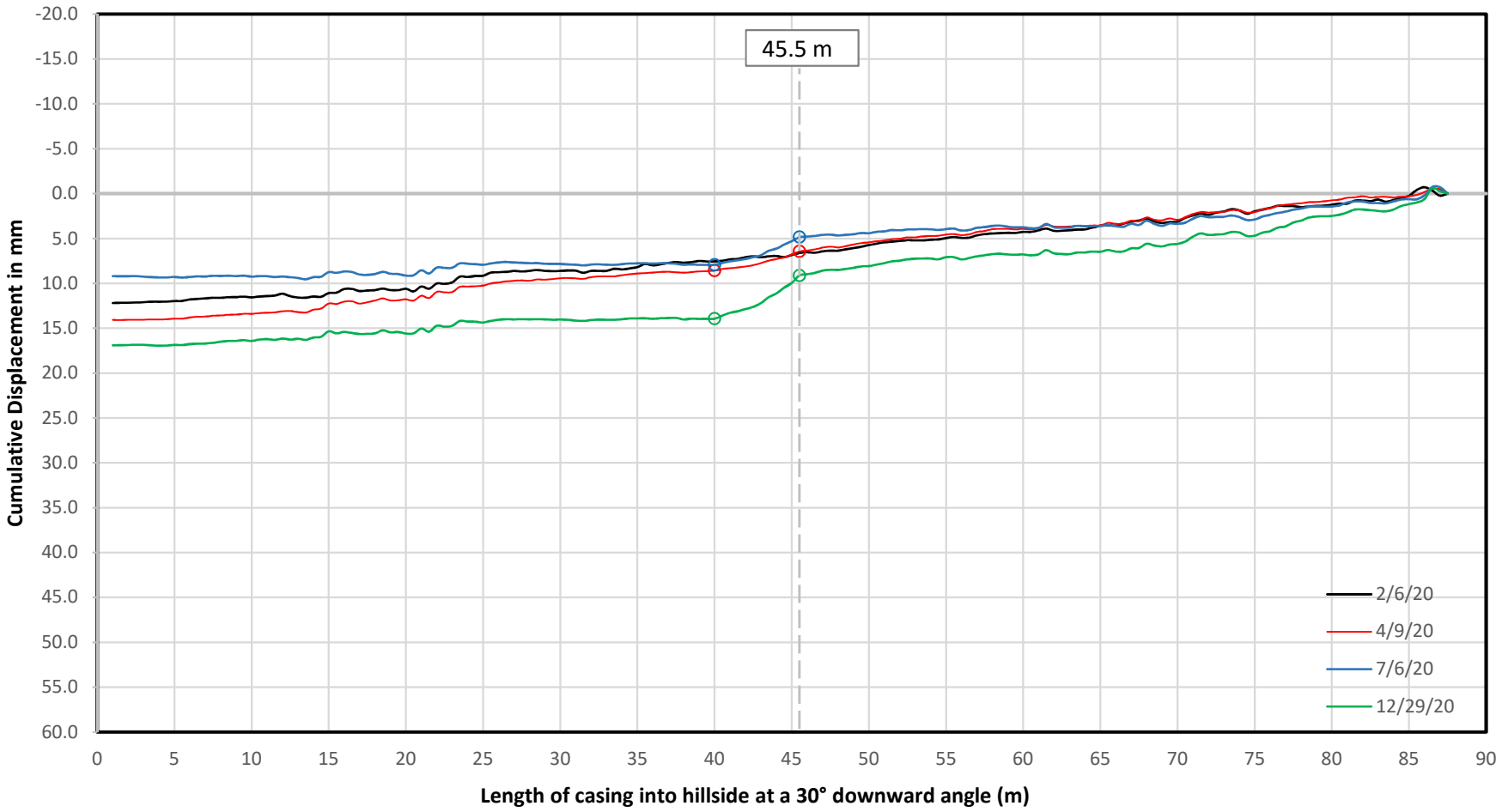




B-10 (RC-19-005)
LCG Bypass
01-DN-101-GREEN DIAMOND
June 14, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

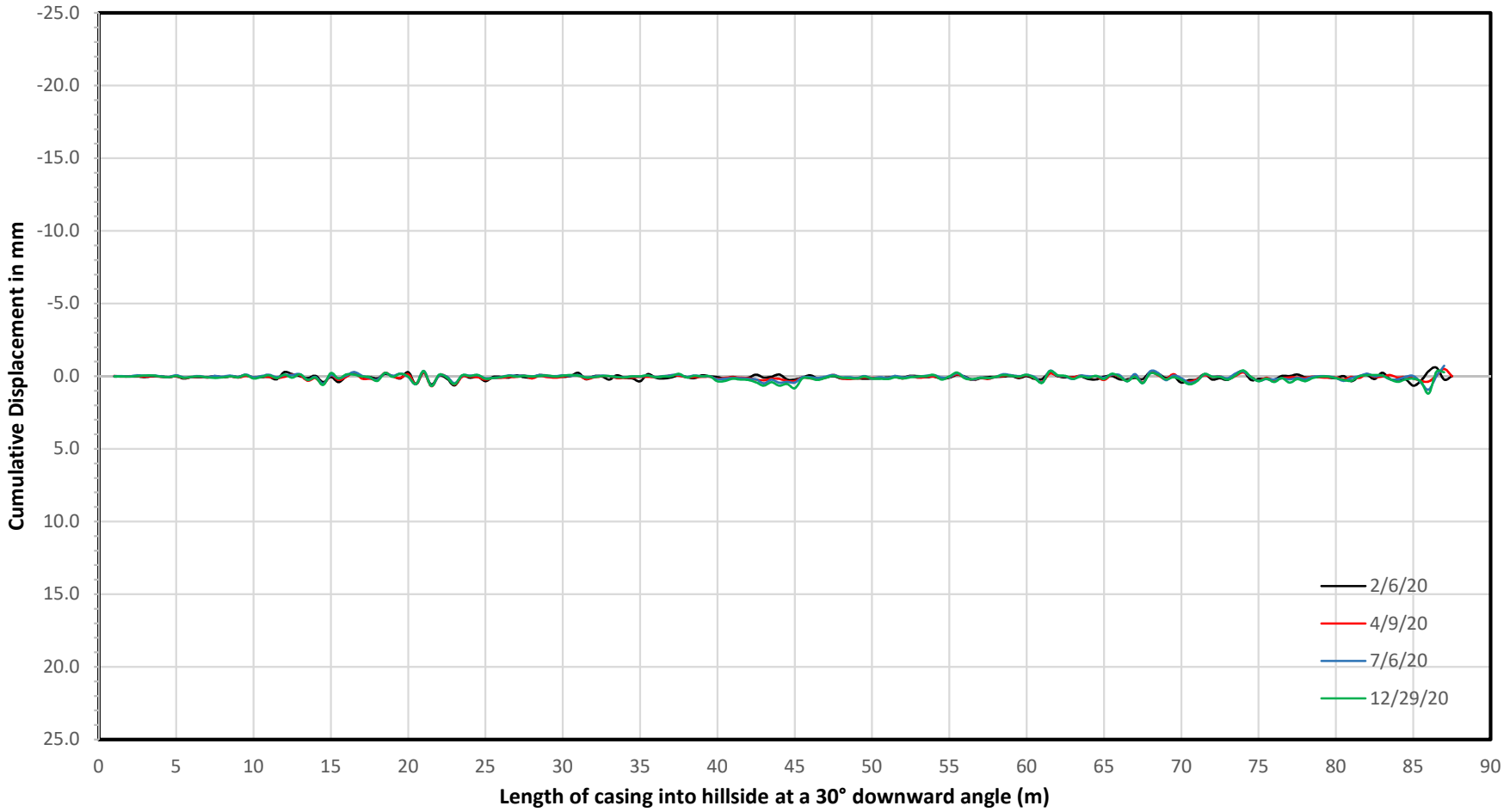
ANGLED INCLINOMETER CUMULATIVE DISPLACEMENT (mm)



HZ-19-006
LCGA Phase II
01-DN-101-PM 14.89
January 6, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

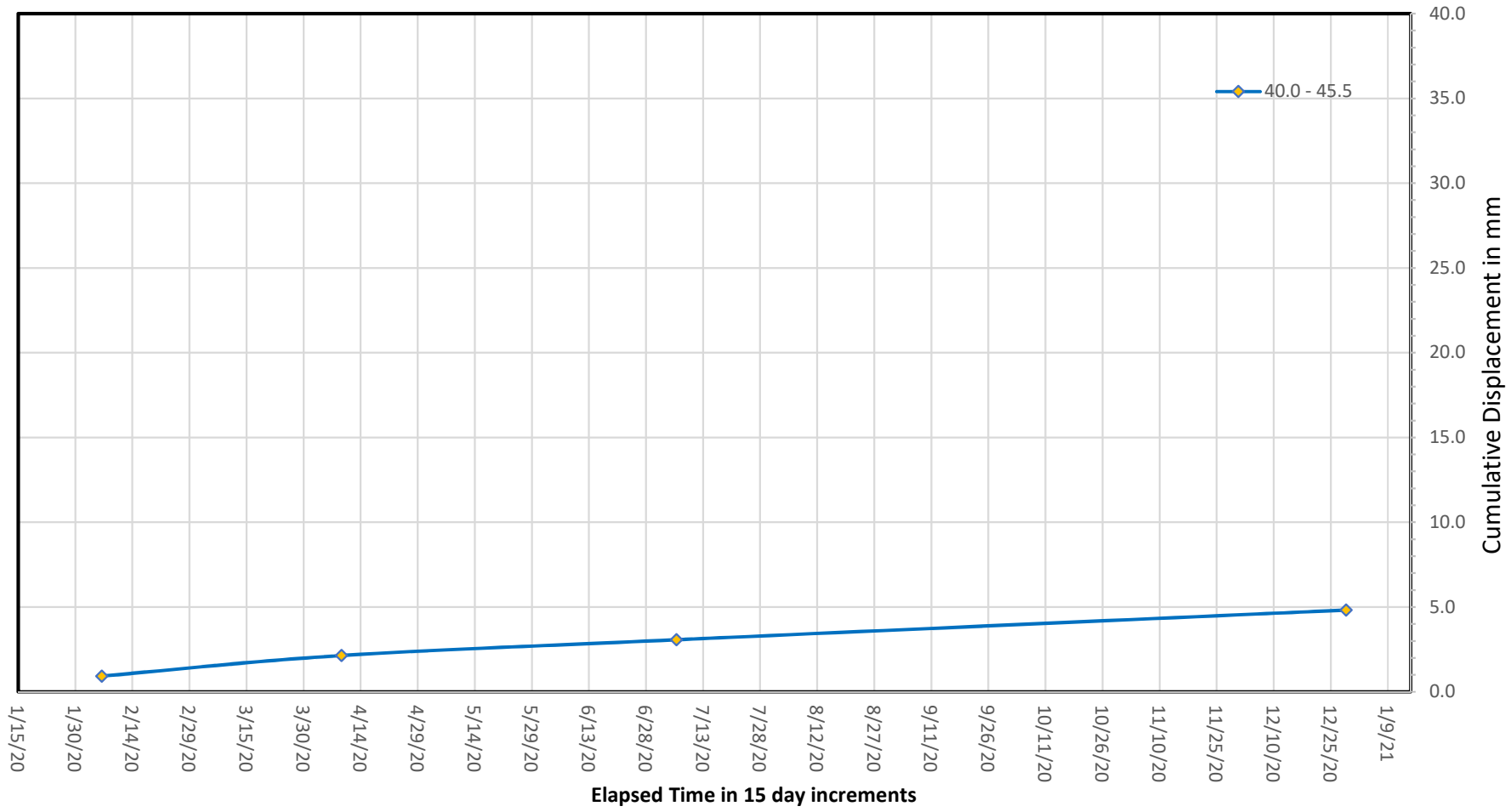
ANGLED INCLINOMETER INCREMENTAL DISPLACEMENT (mm)



HZ-19-006
LCGA Phase II
01-DN-101-PM 14.89
January 6, 2021

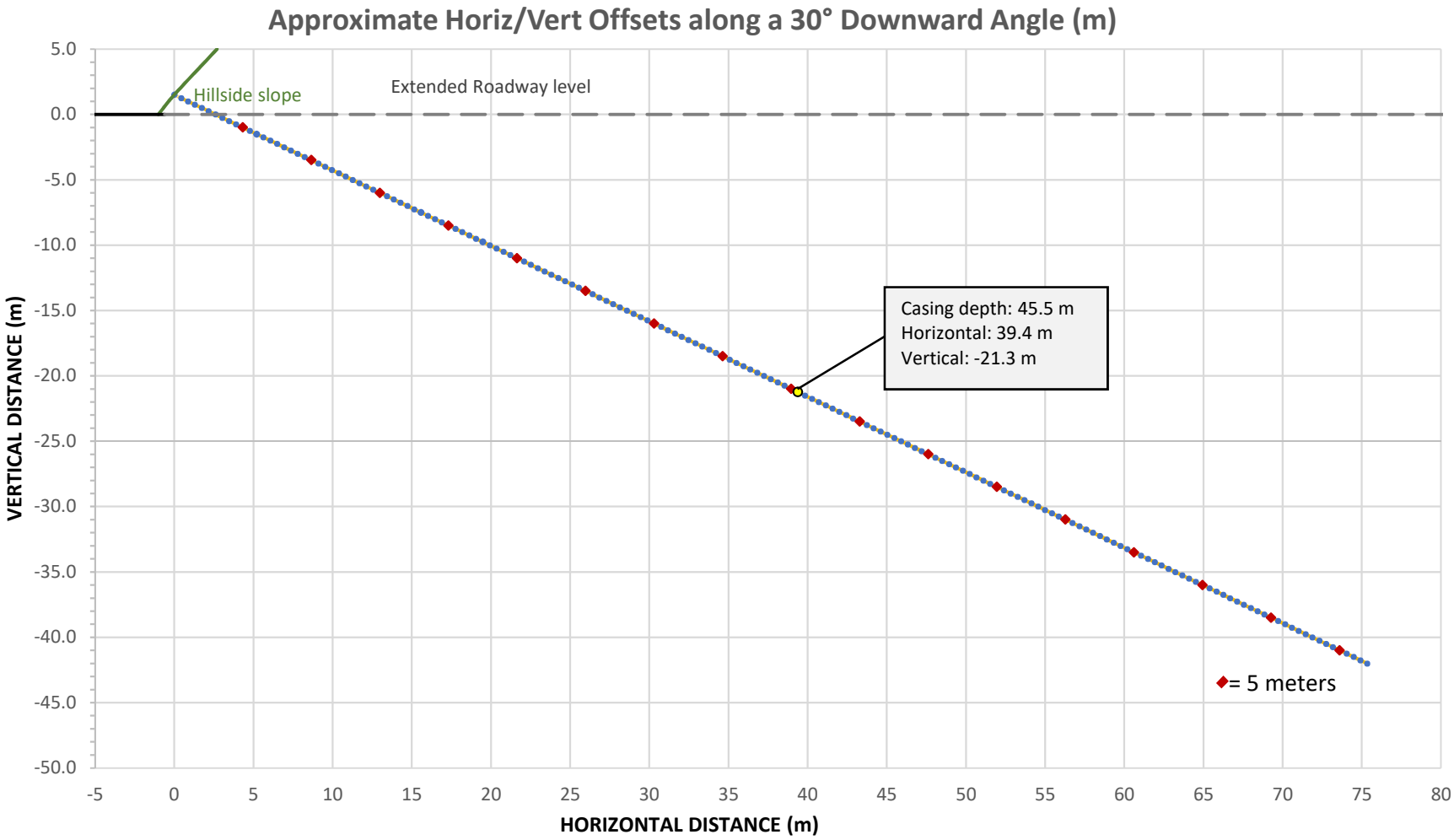
CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

CUMULATIVE DISPLACEMENT OVER TIME (mm)



HZ-19-006
LCGA Phase II
01-DN-101-PM 14.89
January 6, 2021

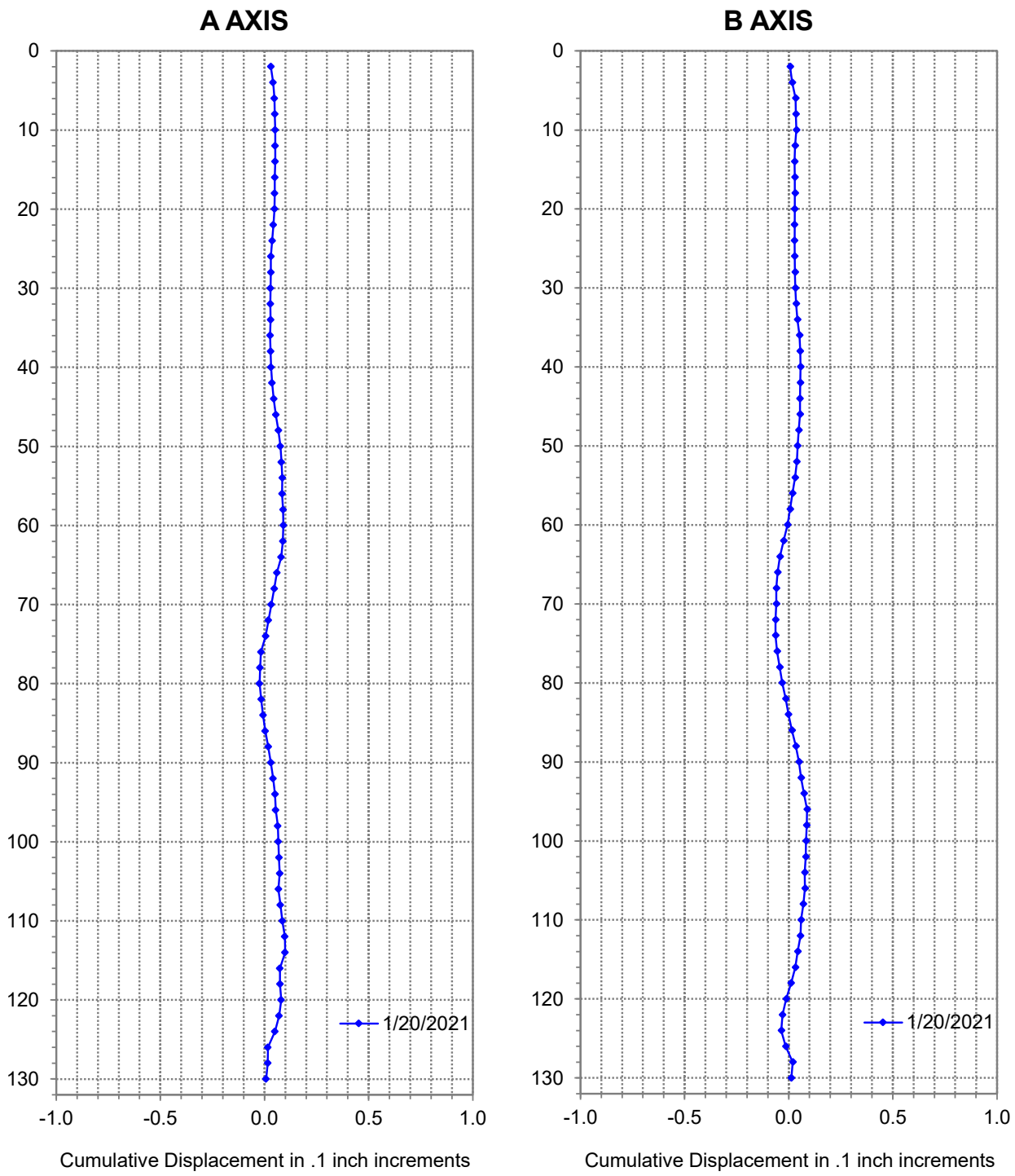
CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED



HZ-19-006
LCGA Phase II
01-DN-101-PM 14.89
October 3, 2018

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

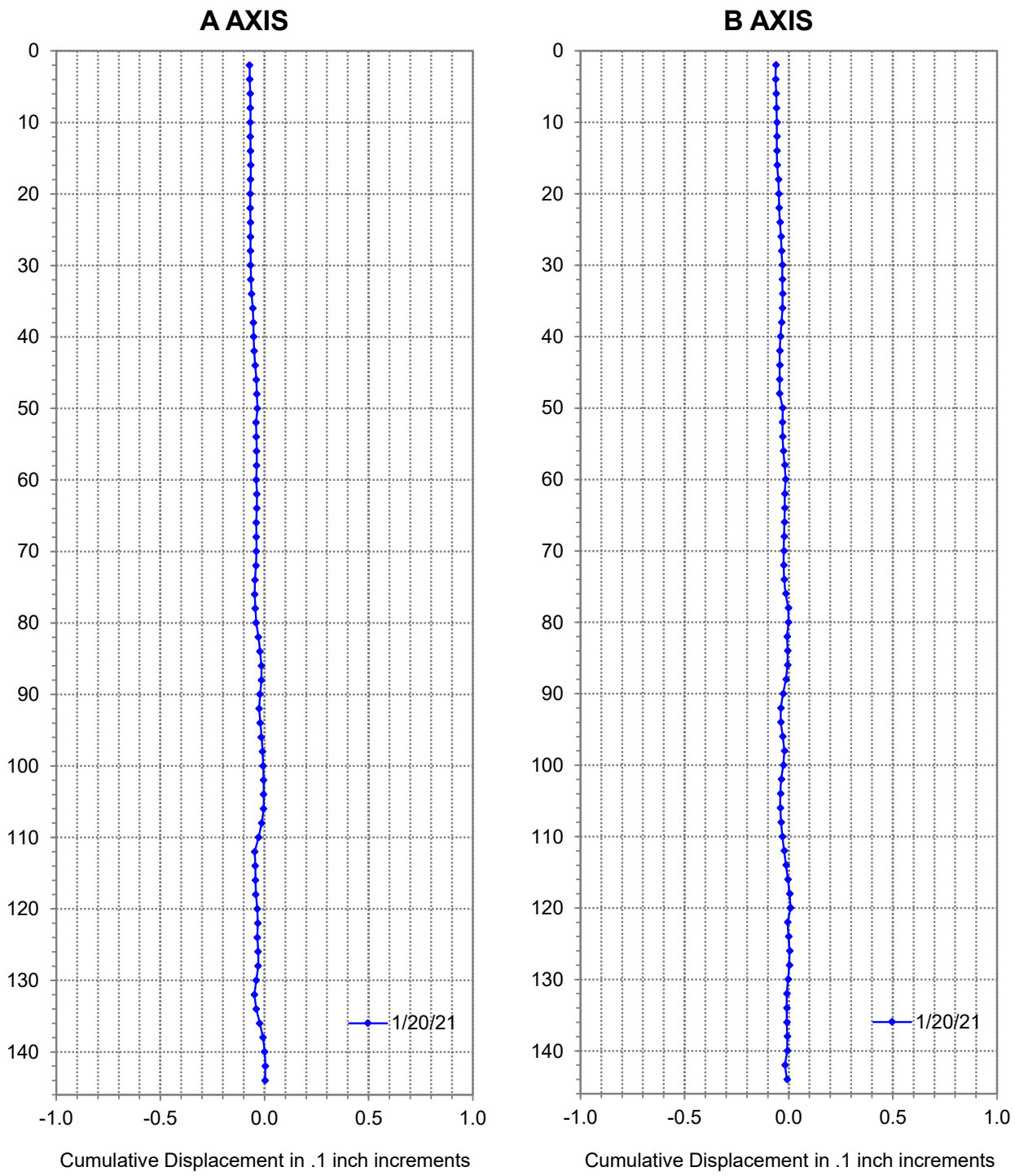
Cumulative Displacement (inches) since 11/24/202



B-40 (D-20-002)
LCG Bypass
01-DN-101- GD
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

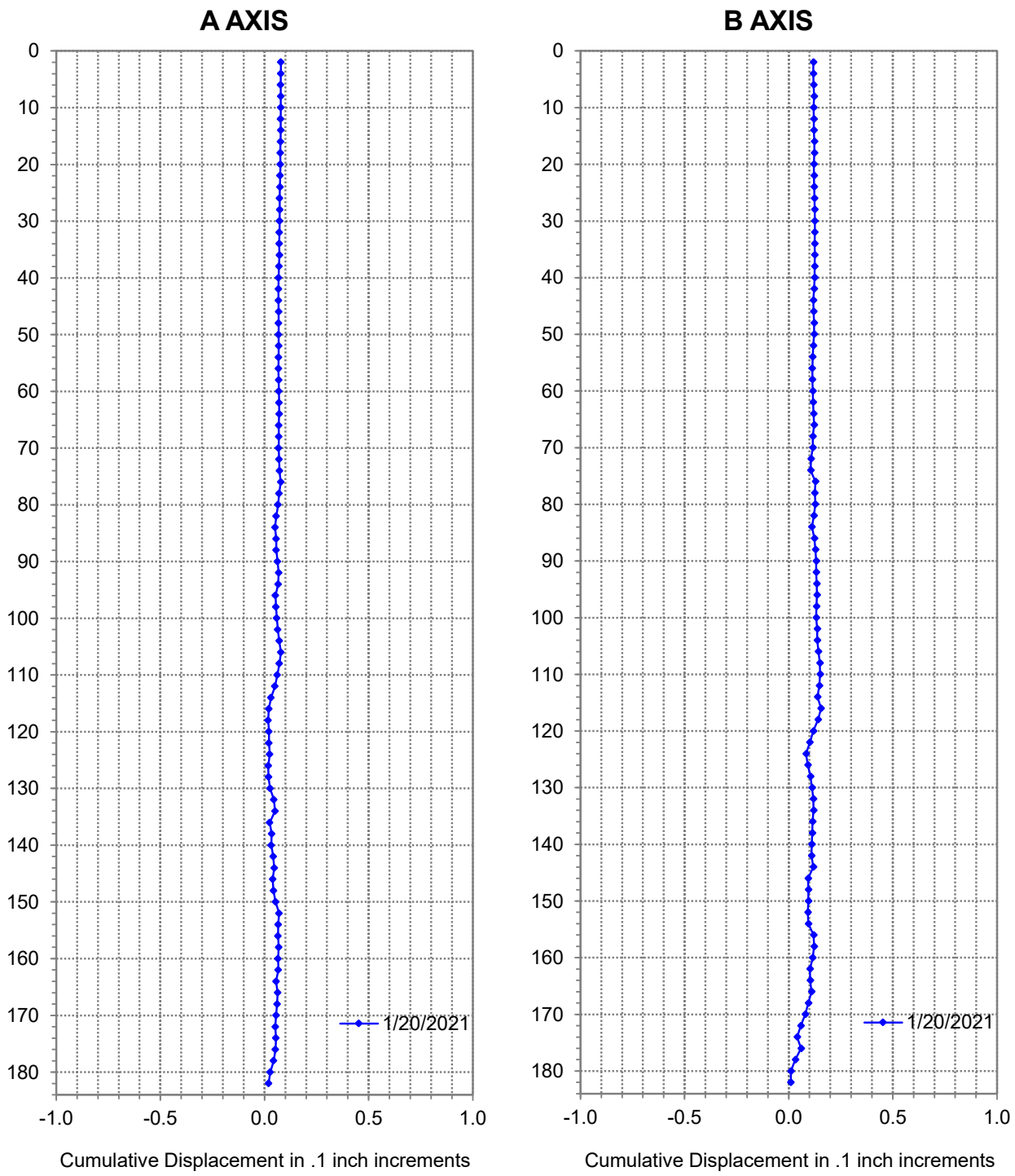
Cumulative Displacement (inches) since 11/24/202



B-13 (RC-20-003)
LCG Bypass
01-DN-101- GD
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 11/24/202



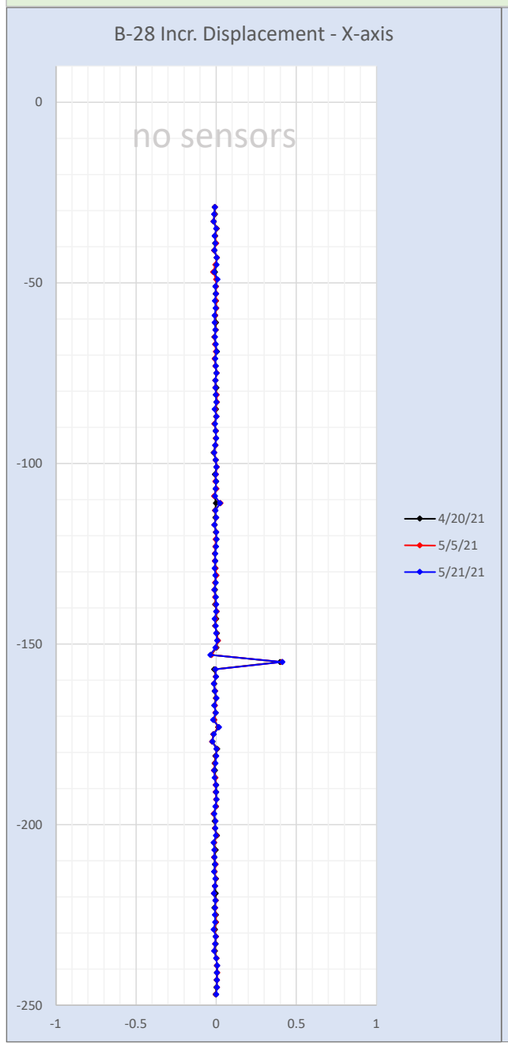
B-11 (RC-20-004)
LCG Bypass
01-DN-101 - GD
June 15, 2021

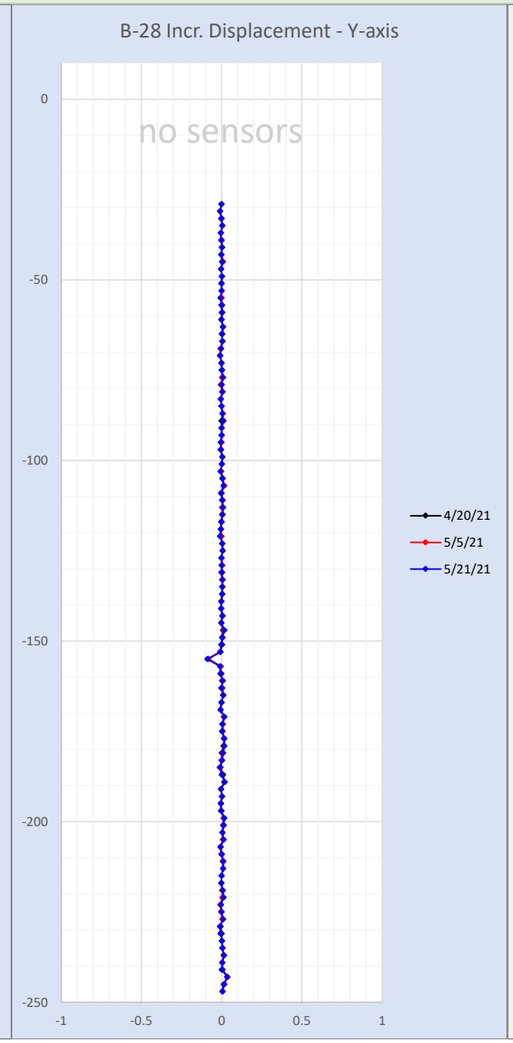
CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

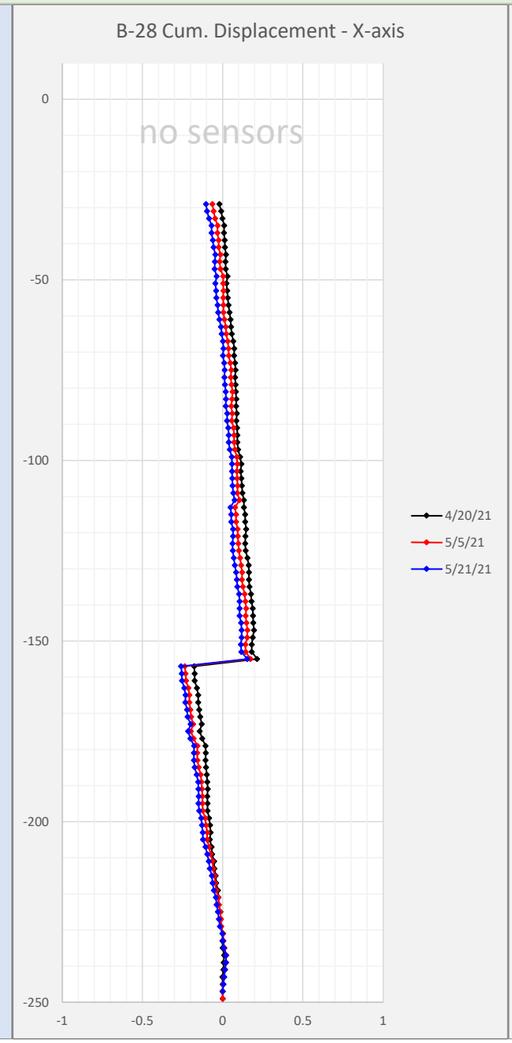
The GeoFlex inclinometer at B-28 has a casing stickup of 2'11" above ground level. These graphs will use 3' even for display purposes. The 220' of GeoFlex sensors are suspended below a 30' "dummy" section that contains no sensors. Thus, the shallowest sensor provides data for the point that is located 2 feet below the "dummy" segment, or 29 ft below ground level. **Data points in the graphs below are indicative of depth in feet <u>below ground level</u>**.

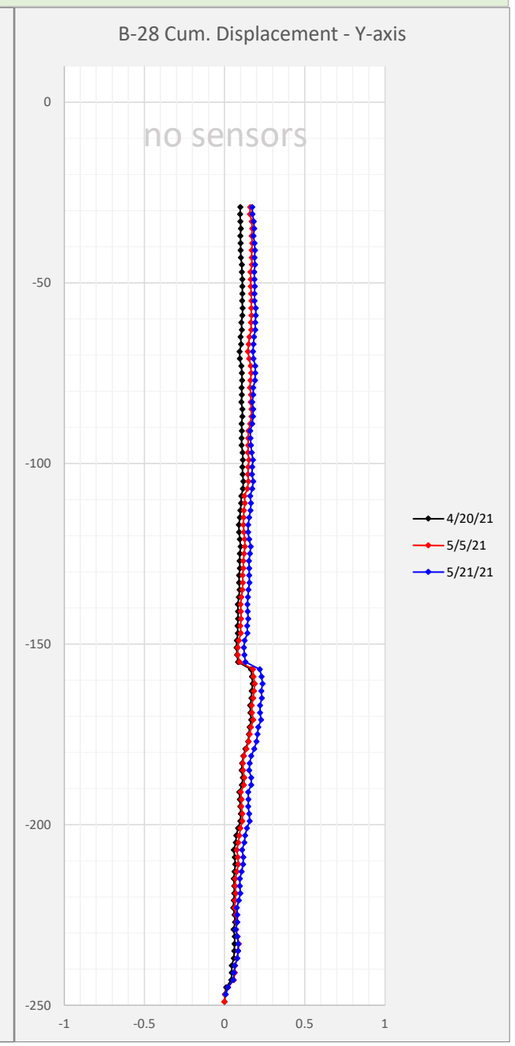
Double-click on a date to add or remove from graphs

2/5/2021
2/6/2021
2/7/2021
2/8/2021
2/9/2021
2/13/2021
2/14/2021
2/15/2021
2/16/2021
2/17/2021
2/18/2021
2/19/2021
3/5/2021
3/17/2021
3/30/2021
4/5/2021
4/14/2021
4/20/2021
5/5/2021
5/21/2021









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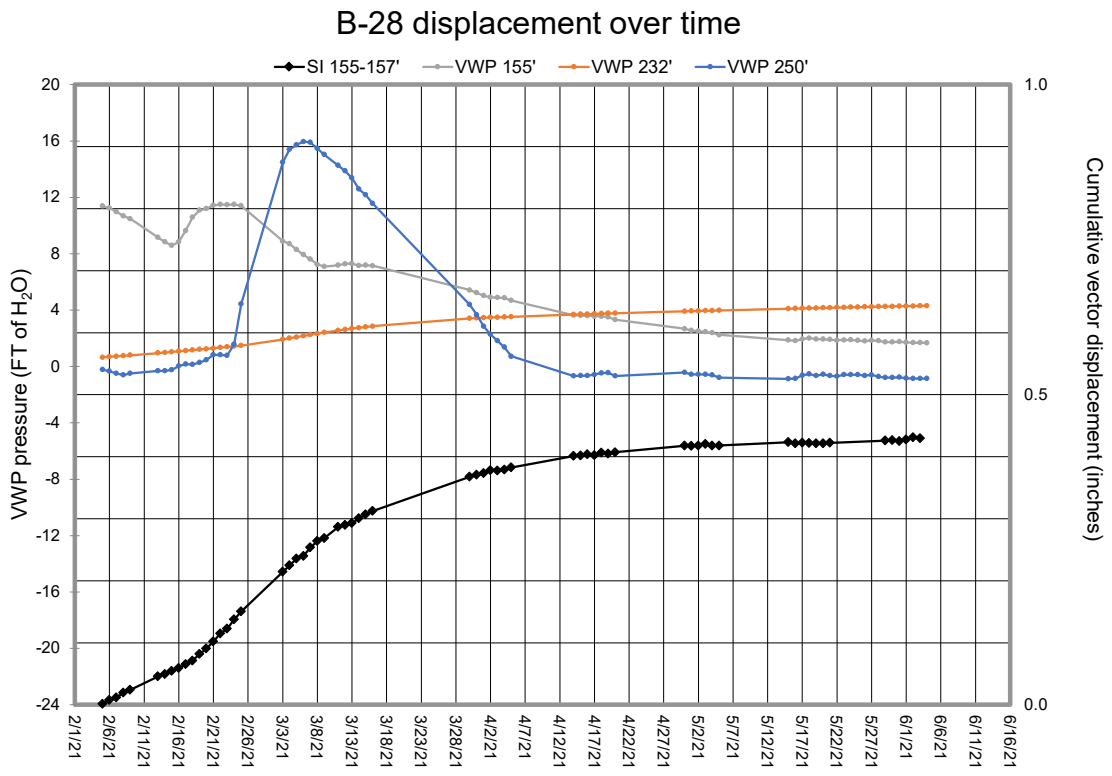
Add series



155-157'			Period disp.	Period rate	Lifetime disp.
Period		Days	in inches	in/year	inches
2/5/2021	2/25/2021	20	0.1503	2.74	0.1503
2/25/2021	3/9/2021	12	0.1180	3.59	0.2683
3/9/2021	3/16/2021	7	0.0442	2.30	0.3125
3/16/2021	4/4/2021	19	0.0666	1.28	0.3791
4/4/2021	4/20/2021	16	0.0280	0.64	0.4071
4/20/2021	5/5/2021	15	0.0109	0.27	0.4180
5/5/2021	5/21/2021	16	0.0045	0.10	0.4225
5/21/2021	6/3/2021	13	0.0073	0.20	0.4298

		Corrected depths:	155' X	157' X	155' Y	157' Y				250'	232'	155'	VWP	SI
HOUR	DATE	TIME STAMP	128' X	130' X	128' Y	130' Y	DIFF X	DIFF Y	VECTOR	FT H_2O	FT H_2O	FT H_2O	DATE	DATE
12	2/5/2021	2/5/21 12:00	-0.01674	-0.0178	-0.02127	-0.02204	-0.00106	-0.00078	0.001317	-0.20906	0.648914	11.3832	2/5/21	2/5/2021
12	2/6/2021	2/6/21 12:00	0.005712	0.000324	-0.03584	-0.03072	-0.00539	0.005121	0.007433	-0.32459	0.686018	11.24734	2/6/21	2/6/2021
12	2/7/2021	2/7/21 12:00	0.025089	0.013724	-0.00137	0.002249	-0.01136	0.003617	0.011926	-0.48535	0.723121	10.98559	2/7/21	2/7/2021
12	2/8/2021	2/8/21 12:00	0.047079	0.028983	-0.02311	-0.01602	-0.0181	0.007088	0.019435	-0.61097	0.758943	10.68624	2/8/21	2/8/2021
12	2/9/2021	2/9/21 12:00	0.010869	-0.01244	-0.04943	-0.04365	-0.02331	0.005787	0.024015	-0.48377	0.796044	10.48627	2/9/21	2/9/2021
12	2/13/2021	2/13/21 12:00	0.046812	0.002286	0.006736	0.016259	-0.04453	0.009522	0.045533	-0.30925	0.952432	9.147989	2/13/21	2/13/2021
12	2/14/2021	2/14/21 12:00	0.044219	-0.00449	-0.01715	-0.00793	-0.04871	0.009222	0.049573	-0.30211	0.993685	8.837122	2/14/21	2/14/2021
12	2/15/2021	2/15/21 12:00	0.062856	0.009693	-0.02387	-0.01118	-0.05316	0.012686	0.054656	-0.24289	1.034937	8.591385	2/15/21	2/15/2021
12	2/16/2021	2/16/21 12:00	0.083606	0.02621	0.003875	0.017421	-0.0574	0.013547	0.058973	0.035437	1.076827	8.83748	2/16/21	2/16/2021
12	2/17/2021	2/17/21 12:00	0.042458	-0.02037	-0.02326	-0.00614	-0.06283	0.017115	0.065119	0.166244	1.118076	9.641006	2/17/21	2/17/2021
12	2/18/2021	2/18/21 12:00	0.041625	-0.02855	-0.03981	-0.02772	-0.07017	0.012091	0.071207	0.137177	1.160603	10.58572	2/18/21	2/18/2021
12	2/19/2021	2/19/21 12:00	0.04092	-0.03926	-0.03144	-0.01491	-0.08018	0.016534	0.081867	0.281442	1.202809	11.08537	2/19/21	2/19/2021
12	2/20/2021	2/20/21 12:00	0.050286	-0.03835	-0.03502	-0.01598	-0.08864	0.01904	0.090661	0.467153	1.246932	11.19157	2/20/21	2/20/2021
12	2/21/2021	2/21/21 12:00	0.069824	-0.03022	-0.02314	-0.00296	-0.10005	0.02018	0.102061	0.828152	1.292332	11.42039	2/21/21	2/21/2021
12	2/22/2021	2/22/21 12:00	0.073423	-0.03977	-0.02412	-0.00305	-0.11319	0.021068	0.115132	0.830528	1.341248	11.49546	2/22/21	2/22/2021
12	2/23/2021	2/23/21 12:00	0.086394	-0.03393	-0.02501	-0.00128	-0.12032	0.023728	0.122641	0.783794	1.387604	11.47258	2/23/21	2/23/2021
12	2/24/2021	2/24/21 12:00	0.051472	-0.08345	-0.02475	0.002069	-0.13492	0.026821	0.137562	1.585813	1.434598	11.48724	2/24/21	2/24/2021
12	2/25/2021	2/25/21 12:00	0.108357	-0.03961	-0.00675	0.019775	-0.14797	0.026527	0.150329	4.437065	1.487665	11.40787	2/25/21	2/25/2021
12	3/3/2021	3/3/21 12:00	0.102093	-0.10877	0.014975	0.053419	-0.21086	0.038444	0.214335	14.48761	1.918833	8.896579	3/3/21	3/3/2021
12	3/4/2021	3/4/21 12:00	0.116412	-0.10466	0.024762	0.06497	-0.22107	0.040207	0.224698	15.40635	2.00128	8.69599	3/4/21	3/4/2021
12	3/5/2021	3/5/21 12:00	0.108512	-0.12317	-0.01909	0.023747	-0.23169	0.042838	0.235613	15.72161	2.085319	8.29114	3/5/21	3/5/2021
12	3/6/2021	3/6/21 12:00	0.123647	-0.11209	0.013853	0.058259	-0.23573	0.044406	0.23988	15.95408	2.168715	7.934915	3/6/21	3/6/2021
12	3/7/2021	3/7/21 12:00	0.145203	-0.10355	-0.0072	0.042166	-0.24875	0.049367	0.253601	15.88956	2.250827	7.612656	3/7/21	3/7/2021
12	3/8/2021	3/8/21 12:00	0.164683	-0.09471	0.021784	0.069654	-0.25939	0.04787	0.263769	15.46444	2.329101	7.240116	3/8/21	3/8/2021
12	3/9/2021	3/9/21 12:00	0.161232	-0.10258	0.038038	0.087384	-0.26382	0.049346	0.268392	15.02819	2.405773	7.088059	3/9/21	3/9/2021
12	3/11/2021	3/11/21 12:00	0.184192	-0.09672	0.009821	0.066228	-0.28091	0.056408	0.286517	14.27003	2.548563	7.189552	3/11/21	3/11/2021
12	3/12/2021	3/12/21 12:00	0.193039	-0.09173	0.025742	0.080666	-0.28477	0.054924	0.29002	13.87106	2.617238	7.284224	3/12/21	3/12/2021
12	3/13/2021	3/13/21 12:00	0.189838	-0.0969	0.006975	0.0663	-0.28673	0.059325	0.292807	13.38559	2.682076	7.29032	3/13/21	3/13/2021
12	3/14/2021	3/14/21 12:00	0.204868	-0.08947	-0.00036	0.060318	-0.29434	0.060676	0.30053	12.57616	2.743718	7.153331	3/14/21	3/14/2021
12	3/15/2021	3/15/21 12:00	0.208843	-0.09181	-0.00229	0.058686	-0.30065	0.060977	0.306776	12.16984	2.802163	7.183097	3/15/21	3/15/2021
12	3/16/2021	3/16/21 12:00	0.223295	-0.08349	0.012771	0.07271	-0.30678	0.059939	0.312585	11.57364	2.857412	7.149386	3/16/21	3/16/2021
12	3/30/2021	3/30/21 12:00	0.214454	-0.14529	0.066626	0.142263	-0.35974	0.075637	0.367605	4.396583	3.40691	5.422568	3/30/21	3/30/2021
12	3/31/2021	3/31/21 12:00	0.213642	-0.15047	0.071658	0.141808	-0.36411	0.07015	0.37081	3.674141	3.429574	5.23655	3/31/21	3/31/2021
12	4/1/2021	4/1/21 12:00	0.225317	-0.14067	0.068459	0.141814	-0.36598	0.073355	0.373263	2.857041	3.45192	5.02644	4/1/21	4/1/2021
12	4/2/2021	4/2/21 12:00	0.22355	-0.14699	0.072357	0.147812	-0.37054	0.075455	0.378147	2.270302	3.473945	4.919398	4/2/21	4/2/2021
12	4/3/2021	4/3/21 12:00	0.212733	-0.15708	0.12146	0.196662	-0.36982	0.075202	0.377384	1.825555	3.493417	4.896049	4/3/21	4/3/2021
12	4/4/2021	4/4/21 12:00	0.237657	-0.13411	0.109328	0.183691	-0.37177	0.074364	0.379135	1.379248	3.513208	4.868748	4/4/21	4/4/2021
12	4/5/2021	4/5/21 12:00	0.201267	-0.1736	0.080632	0.156221	-0.37487	0.075588	0.382416	0.7228	3.530444	4.681217	4/5/21	4/5/2021
12	4/14/2021	4/14/21 12:00	0.215061	-0.1779	0.084287	0.164871	-0.39297	0.080584	0.401143	-0.68186	3.682374	3.648976	4/14/21	4/14/2021
12	4/15/2021	4/15/21 12:00	0.197126	-0.19598	0.091159	0.172948	-0.3931	0.081788	0.401521	-0.6525	3.699928	3.625246	4/15/21	4/15/2021
12	4/16/2021	4/16/21 12:00	0.216705	-0.17979	0.073426	0.150281	-0.39649	0.076855	0.403873	-0.64853	3.716205	3.593604	4/16/21	4/16/2021
12	4/17/2021	4/17/21 12:00	0.204861	-0.18903	0.055962	0.137855	-0.3939	0.081893	0.402318	-0.57024	3.73312	3.560524	4/17/21	4/17/2021
12	4/18/2021	4/18/21 12:00	0.233584	-0.16433	0.081073	0.163553	-0.39792	0.082481	0.406376	-0.45891	3.750992	3.560524	4/18/21	4/18/2021
12	4/19/2021	4/19/21 12:00	0.212969	-0.1835	0.088198	0.169524	-0.39647	0.081326	0.404725	-0.43881	3.767907	3.504789	4/19/21	4/19/2021
12	4/20/2021	4/20/21 12:00	0.188697	-0.20984	0.102435	0.185532	-0.39854	0.083097	0.40711	-0.66757	3.783545	3.324623	4/20/21	4/20/2021
12	4/30/2021	4/30/2021 12:00	0.198764	-0.20977	0.096337	0.182374	-0.40853	0.086036	0.417492	-0.42691	3.915981	2.676404	4/30/21	4/30/2021
12	5/1/2021	5/1/2021 12:00	0.165414	-0.24339	0.104533	0.188315	-0.4088	0.083782	0.417301	-0.55781	3.930341	2.549027	5/1/21	5/1/2021
12	5/2/2021	5/2/2021 12:00	0.161639	-0.24666	0.105929	0.194001	-0.4083	0.088072	0.417692	-0.5549	3.943105	2.497569	5/2/21	5/2/2021
12	5/3/2021	5/3/2021 12:00	0.17833	-0.23245	0.07668	0.165501	-0.41078	0.088821	0.420278	-0.55094	3.95555	2.450787	5/3/21	5/3/2021
12	5/4/2021	5/4/2021 12:00	0.169504	-0.23949	0.082803	0.168735	-0.40899	0.085932	0.41792	-0.60648	3.969909	2.401484	5/4/21	5/4/2021
12	5/5/2021	5/5/2021 12:00	0.173628	-0.23599	0.093592	0.176773	-0.40962	0.083181	0.417983	-0.78105	3.981715	2.244208	5/5/21	5/5/2021
12	5/15/2021	5/15/2021 12:00	0.157243	-0.25682	0.134334	0.222399	-0.41406	0.088066	0.42332	-0.88502	4.10265	1.87848	5/15/2021	5/15/2021
12	5/16/2021	5/16/2021 12:00	0.136697	-0.27577	0.143166	0.230098	-0.41247	0.086932	0.421531	-0.85301	4.11445	1.83024	5/16/2021	5/16/2021
12	5/17/2021	5/17/2021 12:00	0.132202	-0.28106	0.130555	0.218277	-0.41326	0.087722	0.422465	-0.63451	4.12562	1.93500	5/17/2021	5/17/2021
12	5/18/2021	5/18/2021 12:00	0.146987	-0.26607	0.121603	0.206897	-0.41306	0.085294	0.421772	-0.53586	4.13551	2.01708	5/18/2021	5/18/2021
12	5/19/2021	5/19/2021 12:00	0.153322	-0.25928	0.131669	0.217313	-0.41261	0.085644	0.421402	-0.65673	4.14604	1.94724	5/19/2021	5/19/2021
12	5/20/2021	5/20/2021 12:00	0.13101	-0.28129	0.119897	0.206121	-0.4123	0.086225	0.421222	-0.56205	4.15752	1.94760	5/20/2021	5/20/2021
12	5/21/2021	5/21/2021 12:00	0.153505	-0.2593	0.129804	0.219906	-0.41281	0.090101	0.422524	-0.64906	4.16837	1.90944	5/21/2021	5/21/2021
13	5/22/2021	5/22/21 12:00								-0.69006	4.17922	1.857239	5/22/2021	
14	5/23/2021	5/23/21 12:00								-0.57686	4.190386	1.86984	5/23/2021	
15	5/24/2021	5/24/21 12:00								-0.57368	4.20251	1.883161	5/24/2021	
16	5/25/2021	5/25/21 12:00								-0.58267	4.213357	1.843918	5/25/2021	
17	5/26/2021	5/26/21 12:00								-0.64774	4.2258	1.794954	5/26/2021	
18	5/27/2021	5/27/21 12:00								-0.59325	4.237285	1.837438	5/27/2021	
19	5/28/2021	5/28/21 12:00								-0.70884	4.24558	1.824477	5/28/2021	
20	5/29/2021	5/29/21 12:00	0.135197	-0.28108	0.140395	0.229902	-0.41628	0.089506	0.425793	-0.79349	4.257065	1.735546	5/29/2021	5/29/2021
21	5/30/2021	5/29/21 12:00	0.116777	-0.29975	0.132685	0.223396	-0.41653	0.09071	0.426294	-0.79349	4.257065	1.735546	5/30/2021	5/30/2021
22	5/31/2021	5/30/21 12:00	0.118137	-0.29696	0.124162	0.215019	-0.4151	0.090857	0.424923	-0.75381	4.266636	1.756429	5/31/2021	5/31/2021
23	6/1/2021	5/31/21 12:00	0.111879	-0.30581	0.137598	0.227937	-0.41769	0.090339	0.427349	-0.8247	4.274611	1.716463	6/1/2021	6/1/2021
24	6/2/2021	6/1/21 12:00	0.134447	-0.28708	0.151791	0.241151	-0.42153	0.08936	0.430898	-0.86359	4.287053	1.685858	6/2/2021	6/2/2021
25	6/3/2021	6/2/21 12:00	0.125475	-0.29469	0.151148	0.241858	-0.42016	0.09071	0.429844	-0.85381	4.298857	1.686578	6/3/2021	6/3/2021
26	6/4/2021	6/3/21 12:00								-0.85486	4.308427	1.674336	6/4/2021	

For the GeoFlex inclinometer at B-22 there is no suspended "dummy section", nor is there any casing stickup above original ground. The depths of displacements shown in the graphs below are the same as they have been since initial reading.
The depths shown are in feet below ground.

Double-click on a date to add or remove from graphs

1/27/2021
1/28/2021
1/29/2021
1/30/2021
1/31/2021
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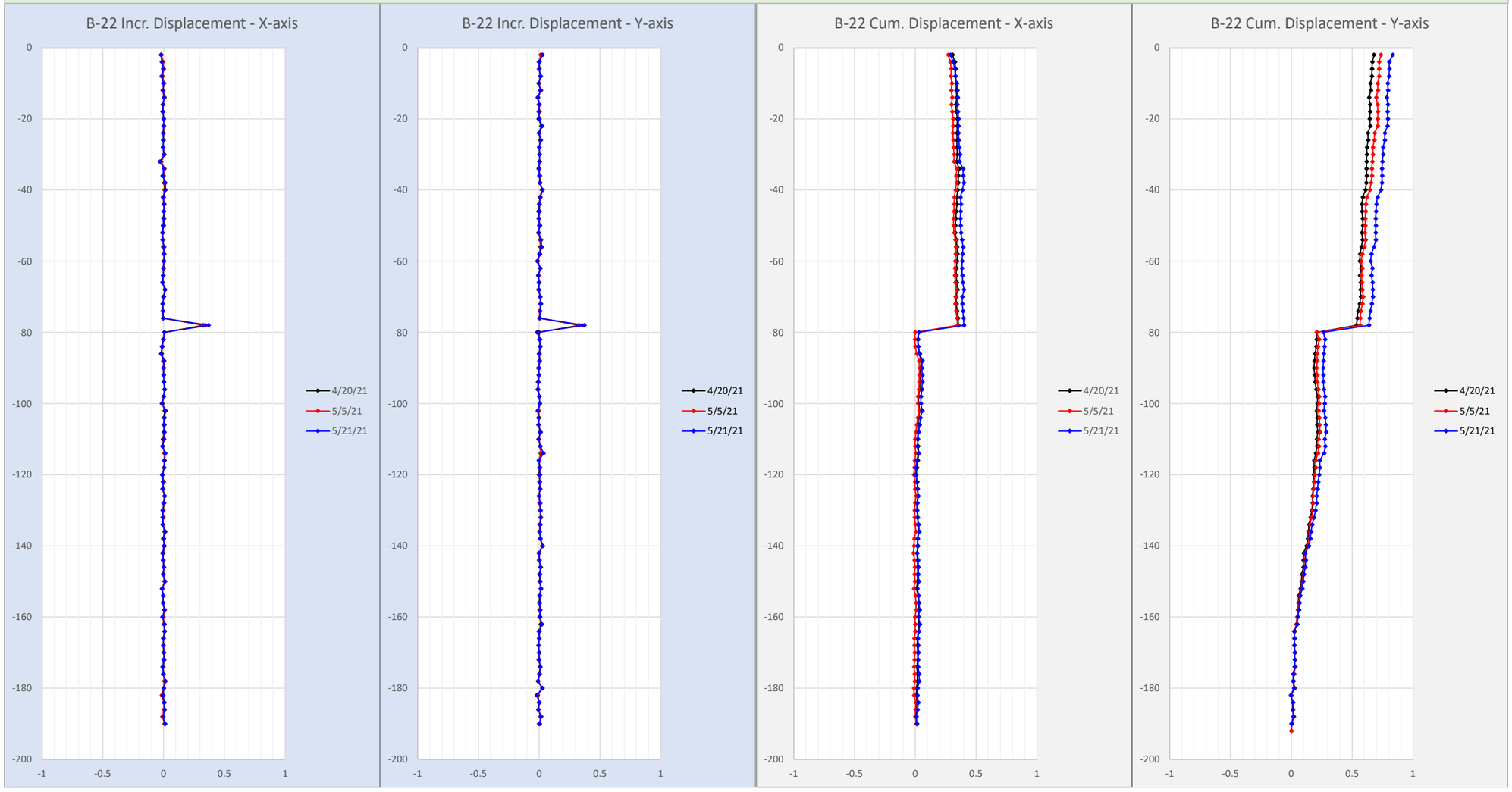
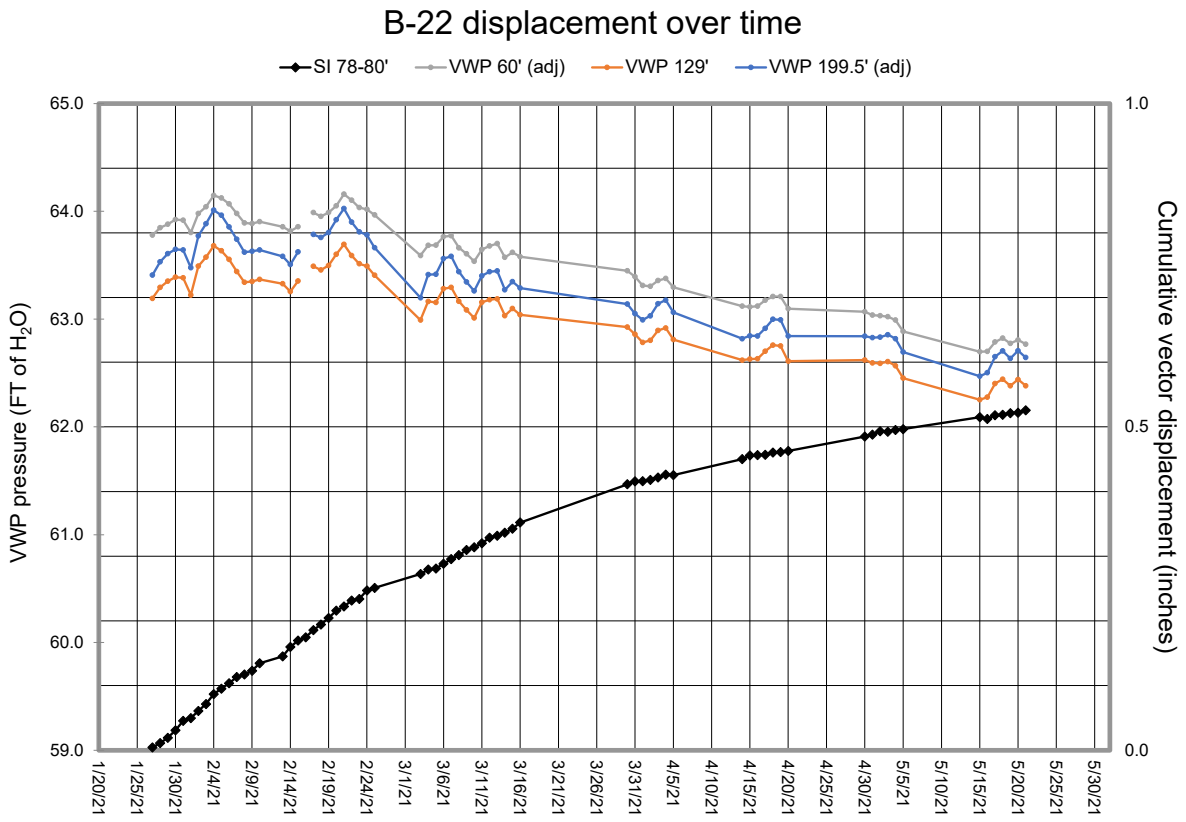
4/14/2021
4/20/2021
5/5/2021
5/21/2021



v2.2

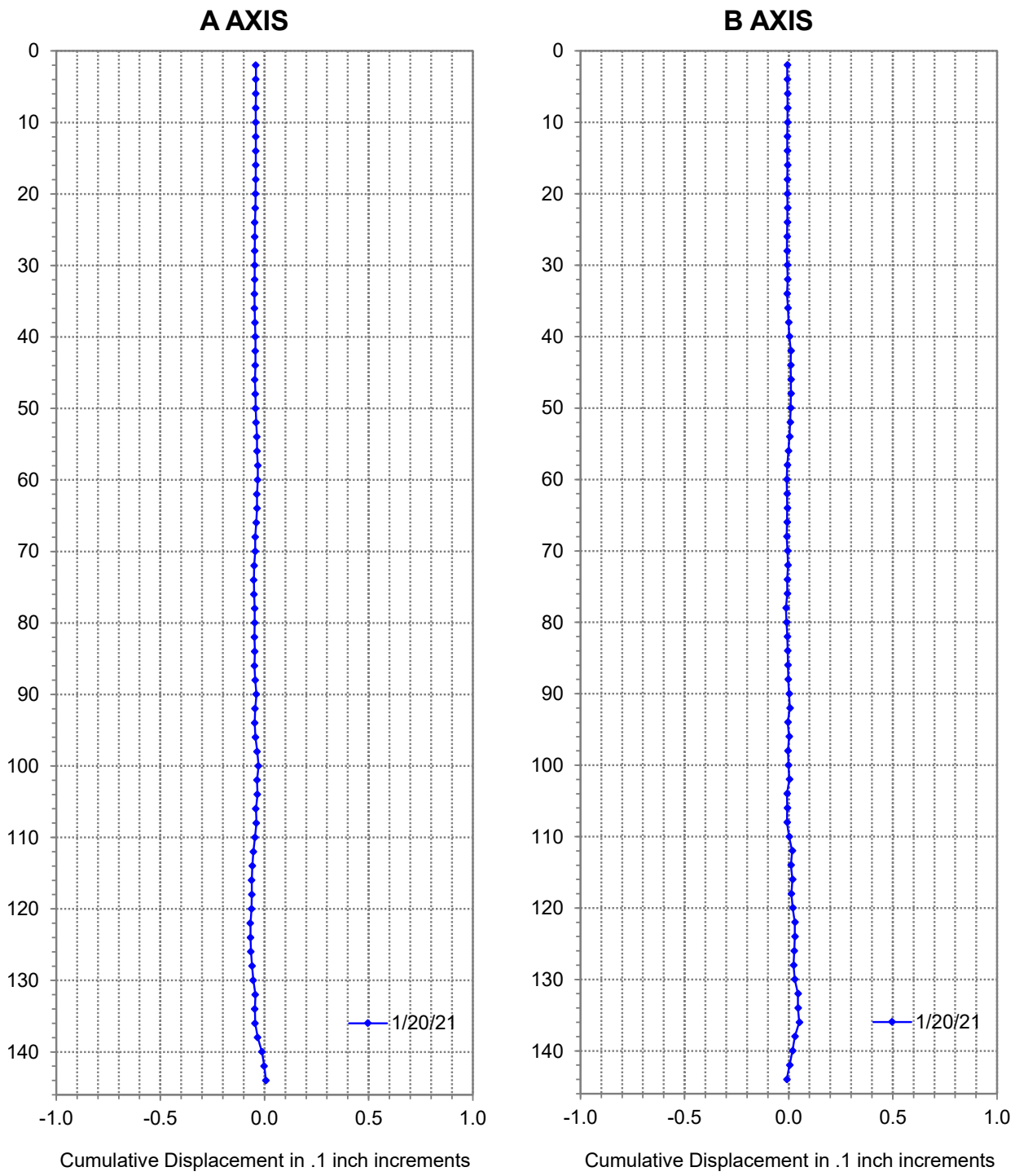
Add series



Period		Days	Period disp. in inches	Period rate in/year	Lifetime disp. inches
1/27/21	2/10/21	14	0.1344	3.50	0.1344
2/10/21	2/25/21	15	0.1165	2.83	0.2509
2/25/21	3/16/21	19	0.1012	1.94	0.3521
3/16/21	4/5/21	20	0.0734	1.34	0.4255
4/5/21	4/20/21	15	0.0373	0.91	0.4628
4/20/21	5/5/21	15	0.0336	0.82	0.4964

HOUR	DATE	TIME STAMP	78' X	80' X	78' Y	80' Y	DIFF X	DIFF Y	VECTOR	199.5' FT H_2O	129' FT H_2O	60' FT H_2O	199.5' adj FT H2O	60' adj FT H_2O	GW date	si DATE
12	1/27/2021	1/27/21 12:00	-0.00422	-0.00847	0.00943	0.008973	-0.00424	-0.00046	0.004267	125.41	63.19	-1.22	63.41	63.78	1/27/21	1/27/2021
12	1/28/2021	1/28/21 12:00	0.028307	0.019143	0.00884	0.002656	-0.00916	-0.00618	0.011056	125.53	63.29	-1.15	63.53	63.85	1/28/21	1/28/2021
12	1/29/2021	1/29/21 12:00	0.02344	0.010024	0.003823	-0.01002	-0.01342	-0.01384	0.019277	125.61	63.35	-1.12	63.61	63.88	1/29/21	1/29/2021
12	1/30/2021	1/30/21 12:00	0.009076	-0.0135	0.044491	0.023667	-0.02258	-0.02082	0.030716	125.65	63.39	-1.08	63.65	63.92	1/30/21	1/30/2021
12	1/31/2021	1/31/21 12:00	0.021415	-0.01132	0.070313	0.038782	-0.03273	-0.03153	0.045448	125.64	63.38	-1.08	63.64	63.92	1/31/21	1/31/2021
12	2/1/2021	2/1/21 12:00	0.019856	-0.0159	0.028553	-0.00601	-0.03575	-0.03456	0.049729	125.48	63.22	-1.20	63.48	63.80	2/1/21	2/1/2021
12	2/2/2021	2/2/21 12:00	0.026074	-0.01697	0.016221	-0.02654	-0.04304	-0.04276	0.060669	125.77	63.49	-1.02	63.77	63.98	2/2/21	2/2/2021
12	2/3/2021	2/3/21 12:00	0.043158	-0.0055	0.043072	-0.0093	-0.04866	-0.05237	0.071485	125.88	63.57	-0.96	63.88	64.04	2/3/21	2/3/2021
12	2/4/2021	2/4/21 12:00	0.052563	-0.00808	0.045275	-0.01677	-0.06064	-0.06204	0.086757	126.01	63.68	-0.85	64.01	64.15	2/4/21	2/4/2021
12	2/5/2021	2/5/21 12:00	0.098476	0.030578	0.048004	-0.01879	-0.0679	-0.0668	0.095246	125.96	63.63	-0.88	63.96	64.12	2/5/21	2/5/2021
12	2/6/2021	2/6/21 12:00	0.064776	-0.00941	0.093436	0.021366	-0.07419	-0.07207	0.103433	125.85	63.55	-0.93	63.85	64.07	2/6/21	2/6/2021
12	2/7/2021	2/7/21 12:00	0.092209	0.009885	0.079689	0.002007	-0.08232	-0.07768	0.113189	125.74	63.44	-1.02	63.74	63.98	2/7/21	2/7/2021
12	2/8/2021	2/8/21 12:00	0.117844	0.033956	0.085267	0.003524	-0.08389	-0.08174	0.117128	125.62	63.34	-1.11	63.62	63.89	2/8/21	2/8/2021
12	2/9/2021	2/9/21 12:00	0.100582	0.013352	0.094025	0.007388	-0.08723	-0.08664	0.122943	125.63	63.35	-1.11	63.63	63.89	2/9/21	2/9/2021
12	2/10/2021	2/10/21 12:00	0.100233	0.002833	0.081019	-0.0116	-0.0974	-0.09262	0.134408	125.64	63.37	-1.10	63.64	63.90	2/10/21	2/10/2021
12	2/13/2021	2/13/21 12:00	0.096879	-0.00627	0.086908	-0.01531	-0.10315	-0.10221	0.145218	125.58	63.33	-1.14	63.58	63.86	2/13/21	2/13/2021
12	2/14/2021	2/14/21 12:00	0.106349	-0.00571	0.125621	0.011801	-0.11206	-0.11382	0.159726	125.51	63.26	-1.18	63.51	63.82	2/14/21	2/14/2021
12	2/15/2021	2/15/21 12:00	0.084854	-0.036	0.14219	0.023302	-0.12085	-0.11889	0.169526	125.62	63.35	-1.14	63.62	63.86	2/15/21	2/15/2021
12	2/16/2021	2/16/21 12:00	0.09267	-0.03049	0.150084	0.02653	-0.12316	-0.12355	0.174457							2/16/2021
12	2/17/2021	2/17/21 12:00	0.111557	-0.02135	0.173579	0.043978	-0.13291	-0.1296	0.18564	125.79	63.49	-1.01	63.79	63.99	2/17/21	2/17/2021
12	2/18/2021	2/18/21 12:00	0.116639	-0.02164	0.160122	0.023619	-0.13828	-0.1365	0.194303	125.76	63.46	-1.05	63.76	63.95	2/18/21	2/18/2021
12	2/19/2021	2/19/21 12:00	0.097302	-0.04909	0.16509	0.022167	-0.1464	-0.14292	0.204594	125.80	63.50	-1.01	63.80	63.99	2/19/21	2/19/2021
12	2/20/2021	2/20/21 12:00	0.1282	-0.02754	0.167563	0.017939	-0.15574	-0.14962	0.215971	125.92	63.60	-0.95	63.92	64.05	2/20/21	2/20/2021
12	2/21/2021	2/21/21 12:00	0.13823	-0.01882	0.188782	0.031318	-0.15705	-0.15746	0.222397	126.03	63.69	-0.84	64.03	64.16	2/21/21	2/21/2021
12	2/22/2021	2/22/21 12:00	0.160178	-0.00476	0.201208	0.038798	-0.16494	-0.16241	0.231476	125.90	63.59	-0.90	63.90	64.10	2/22/21	2/22/2021
12	2/23/2021	2/23/21 12:00	0.178453	0.010316	0.192203	0.029444	-0.16814	-0.16276	0.234009	125.81	63.51	-0.97	63.81	64.03	2/23/21	2/23/2021
12	2/24/2021	2/24/21 12:00	0.175014	-0.00076	0.21528	0.041585	-0.17577	-0.17369	0.247113	125.78	63.49	-0.98	63.78	64.02	2/24/21	2/24/2021
12	2/25/2021	2/25/21 12:00	0.136002	-0.04425	0.221655	0.047064	-0.18025	-0.17459	0.250942	125.66	63.41	-1.03	63.66	63.97	2/26/21	2/25/2021
12	3/3/2021	3/3/21 12:00	0.194849	0.002815	0.271311	0.077926	-0.19203	-0.19338	0.272534	125.20	62.99	-1.41	63.20	63.59	3/3/21	3/3/2021
12	3/4/2021	3/4/21 12:00	0.198683	0.002842	0.282356	0.083155	-0.19584	-0.1992	0.279347	125.41	63.16	-1.32	63.41	63.68	3/4/21	3/4/2021
12	3/5/2021	3/5/21 12:00	0.189499	-0.00899	0.239058	0.040337	-0.19849	-0.19872	0.28087	125.42	63.15	-1.31	63.42	63.69	3/5/21	3/5/2021
12	3/6/2021	3/6/21 12:00	0.189224	-0.01418	0.270288	0.065834	-0.20341	-0.20445	0.288402	125.56	63.28	-1.24	63.56	63.76	3/6/21	3/6/2021
12	3/7/2021	3/7/21 12:00	0.179457	-0.02886	0.296519	0.086897	-0.20832	-0.20962	0.295529	125.58	63.29	-1.23	63.58	63.77	3/7/21	3/7/2021
12	3/8/2021	3/8/21 12:00	0.207384	-0.00489	0.308758	0.094487	-0.21227	-0.21427	0.301616	125.44	63.16	-1.34	63.44	63.66	3/8/21	3/8/2021
12	3/9/2021	3/9/21 12:00	0.216996	-0.00183	0.312692	0.093641	-0.21883	-0.21905	0.309625	125.34	63.08	-1.39	63.34	63.61	3/9/21	3/9/2021
12	3/10/2021	3/10/21 12:00	0.213906	-0.00964	0.293321	0.072927	-0.22354	-0.22039	0.313919	125.26	63.01	-1.46	63.26	63.54	3/10/21	3/10/2021
12	3/11/2021	3/11/21 12:00	0.244122	0.017492	0.31039	0.084267	-0.22663	-0.22612	0.320145	125.40	63.16	-1.35	63.40	63.65	3/11/21	3/11/2021
12	3/12/2021	3/12/21 12:00	0.237648	0.004838	0.316611	0.084525	-0.23281	-0.23209	0.328731	125.44	63.18	-1.32	63.44	63.68	3/12/21	3/12/2021
12	3/13/2021	3/13/21 12:00	0.223104	-0.0113	0.332366	0.097867	-0.23441	-0.2345	0.331568	125.45	63.19	-1.30	63.45	63.70	3/13/21	3/13/2021
12	3/14/2021	3/14/21 12:00	0.238218	-0.00088	0.339232	0.102552	-0.23909	-0.23668	0.336427	125.27	63.03	-1.43	63.27	63.57	3/14/21	3/14/2021
12	3/15/2021	3/15/21 12:00	0.260767	0.016661	0.351992	0.111506	-0.24411	-0.24049	0.342668	125.35	63.10	-1.38	63.35	63.62	3/15/21	3/15/2021
12	3/16/2021	3/16/21 12:00	0.256886	0.009091	0.357211	0.107012	-0.24779	-0.2502	0.352139	125.29	63.04	-1.42	63.29	63.58	3/16/21	3/16/2021
12	3/30/2021	3/30/21 12:00	0.31629	0.02525	0.406205	0.115649	-0.29104	-0.29056	0.41125	125.14	62.93	-1.55	63.14	63.45	3/30/21	3/30/2021
12	3/31/2021	3/31/21 12:00	0.333773	0.03989	0.400871	0.106854	-0.29388	-0.29402	0.415708	125.05	62.86	-1.61	63.05	63.39	3/31/21	3/31/2021
12	4/1/2021	4/1/21 12:00	0.320031	0.025927	0.402215	0.107844	-0.2941	-0.29437	0.416115	124.99	62.78	-1.69	62.99	63.31	4/1/21	4/1/2021
12	4/2/2021	4/2/21 12:00	0.294113	-0.00173	0.427571	0.132316	-0.29584	-0.29526	0.417971	125.03	62.80	-1.70	63.03	63.30	4/2/21	4/2/2021
12	4/3/2021	4/3/21 12:00	0.313664	0.014403	0.447516	0.150521	-0.29926	-0.29699	0.42162	125.14	62.89	-1.64	63.14	63.36	4/3/21	4/3/2021
12	4/4/2021	4/4/21 12:00	0.334563	0.031205	0.437801	0.138484	-0.30336	-0.29932	0.426166	125.18	62.92	-1.62	63.18	63.38	4/4/21	4/4/2021
12	4/5/2021	4/5/21 12:00	0.307618	0.005604	0.444358	0.144619	-0.30201	-0.29974	0.425507	125.06	62.81	-1.70	63.06	63.30	4/5/21	4/5/2021
12	4/14/2021	4/14/21 12:00	0.334816	0.013699	0.514588	0.199021	-0.32112	-0.31557	0.45022	124.82	62.62	-1.88	62.82	63.12	4/14/21	4/14/2021
12	4/15/2021	4/15/21 12:00	0.34223	0.017889	0.494517	0.174052	-0.32434	-0.32046	0.455955	124.84	62.63	-1.89	62.84	63.11	4/15/21	4/15/2021
12	4/16/2021	4/16/21 12:00	0.340611	0.015358	0.482254	0.16201	-0.32525	-0.32024	0.456449	124.84	62.63	-1.88	62.84	63.12	4/16/21	4/16/2021
12	4/17/2021	4/17/21 12:00	0.352708	0.029545	0.518129	0.195324	-0.32316	-0.32281	0.456768	124.91	62.70	-1.83	62.91	63.17	4/17/21	4/17/2021
12	4/18/2021	4/18/21 12:00	0.315344	-0.01025	0.539058	0.213774	-0.3256	-0.32528	0.460242	125.00	62.76	-1.79	63.00	63.21	4/18/21	4/18/2021
12	4/19/2021	4/19/21 12:00	0.323454	-0.00281	0.516696	0.190816	-0.32626	-0.32588	0.461132	124.99	62.75	-1.79	62.99	63.21	4/19/21	4/19/2021
12	4/20/2021	4/20/21 12:00	0.354318	0.02768	0.535423	0.207512	-0.32664	-0.32791	0.462837	124.84	62.61	-1.90	62.84	63.10	4/20/21	4/20/2021
12	4/30/2021	4/30/2021 12:00	0.357933	0.019193	0.559141	0.21183	-0.33874	-0.34731	0.485148	124.84	62.62	-1.93	62.84	63.07	4/30/21	4/30/2021
12	5/1/2021	5/1/2021 12:00	0.340558	-0.00128	0.557321	0.208881	-0.34184	-0.34844	0.488124	124.83	62.59	-1.96	62.83	63.04	5/1/21	5/1/2021
12	5/2/2021	5/2/2021 12:00	0.354689	0.007246	0.572069	0.222019	-0.34744	-0.35005	0.493206	124.83	62.59	-1.97	62.83	63.03	5/2/21	5/2/2021
12	5/3/2021	5/3/2021 12:00	0.360535	0.014926	0.552307	0.201445	-0.34561	-0.35086	0.492492	124.86	62.60	-1.98	62.86	63.02	5/3/21	5/3/2021
12	5/4/2021	5/4/2021 12:00	0.344992	-0.00303	0.563824	0.21138	-0.34803	-0.35244	0.495316	124.82	62.57	-2.01	62.82	62.99	5/4/21	5/4/2021
12	5/5/2021	5/5/2021 12:00	0.347077	-1.2E-05	0.565166	0.210173	-0.34709	-0.35499	0.496479	124.69	62.45	-2.11	62.69	62.89	5/5/21	5/5/2021
12	5/15/2021	5/15/2021 12:00	0.375818	0.013507	0.627065	0.261188	-0.36231	-0.36588	0.514913	124.47	62.25	-2.30	62.47	62.70	5/15/2021	
12	5/16/2021	5/16/2021 12:00	0.369801	0.008851	0.619808	0.256467	-0.36095	-0.36334	0.512153	124.50	62.27	-2.30	62.50	62.70	5/16/2021	
12	5/17/2021	5/17/2021 12:00	0.394605	0.028292	0.625644	0.259418	-0.36631	-0.36623	0.517983	124.65	62.40	-2.21	62.65	62.79	5/17/2021	
12	5/18/2021	5/18/2021 12:00	0.393398	0.026033	0.640879	0.274563	-0.36737	-0.36632	0.518791	124.70	62.44	-2.18	62.70	62.82	5/18/2021	
12	5/19/2021	5/19/2021 12:00	0.383391	0.015593	0.630342	0.261248	-0.3678	-0.36909	0.521062	124.63	62.38	-2.23	62.63	62.77	5/19/2021	
12	5/20/2021	5/20/2021 12:00	0.397427	0.028483	0.613044	0.243959	-0.36894	-0.36909	0.521866	124.71	62.44	-2.19	62.71	62.81	5/20/2021	
12	5/21/2021	5/21/2021 12:00	0.400099	0.029576	0.637121	0.264454	-0.37052	-0.37267	0.525517	124.64	62.38	-2.23	62.64	62.77	5/21/2021	

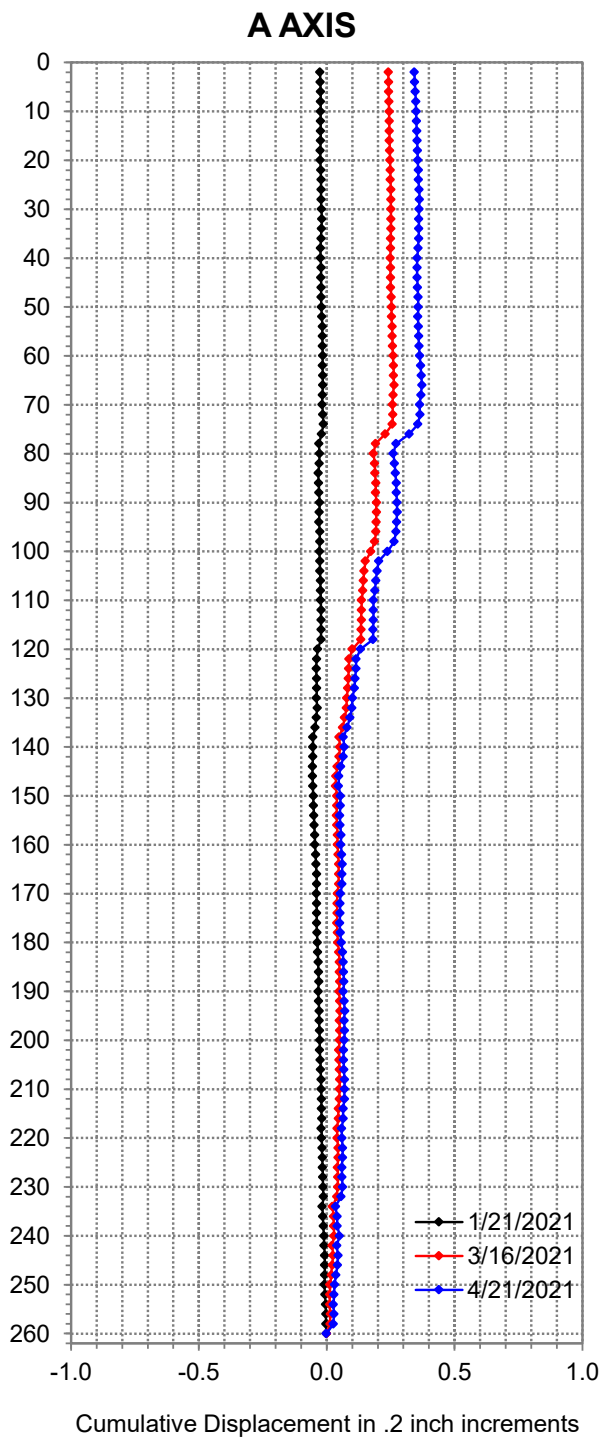
Cumulative Displacement (inches) since 11/24/202

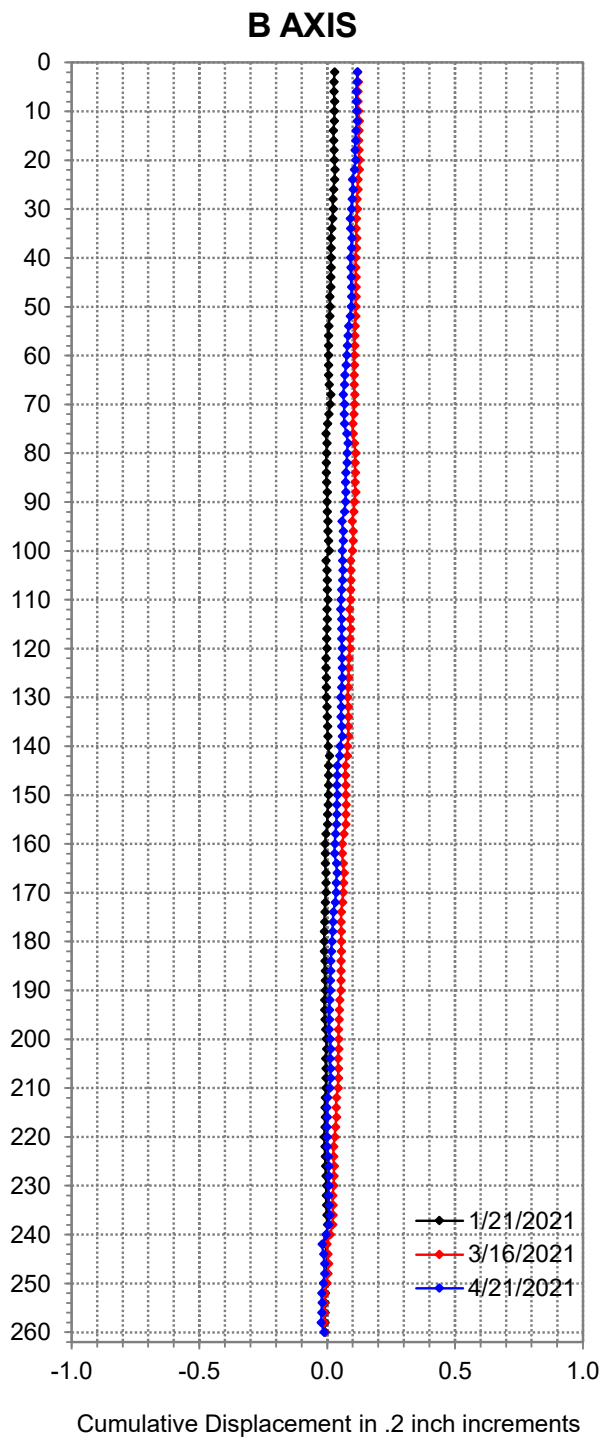


B-16 (RC-20-007)
LCG Bypass
01-DN-101- GD
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 12/22/202

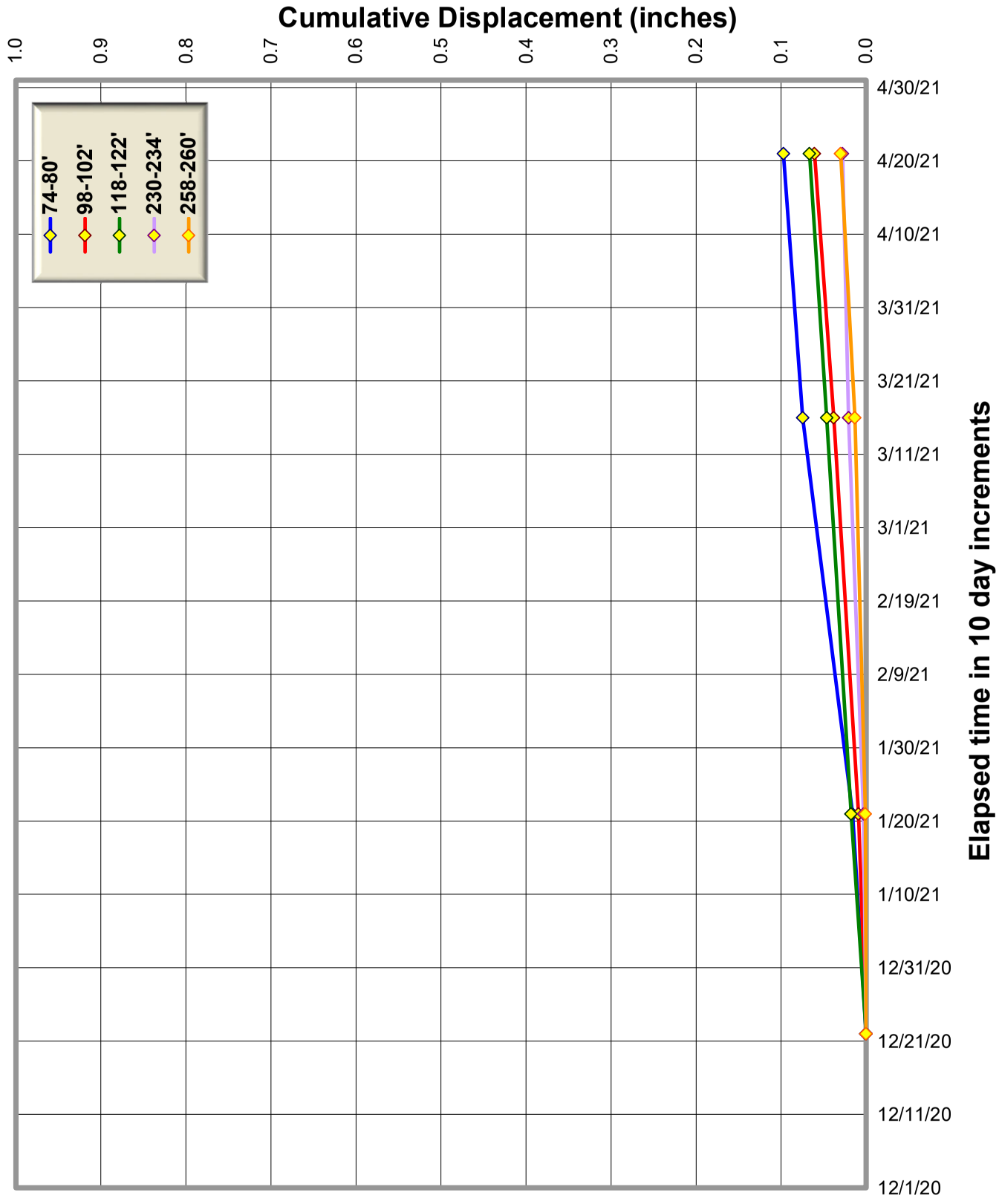




VWP-2 (D-20-009)
LCG Bypass
01-DN-101-PM 14.78
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

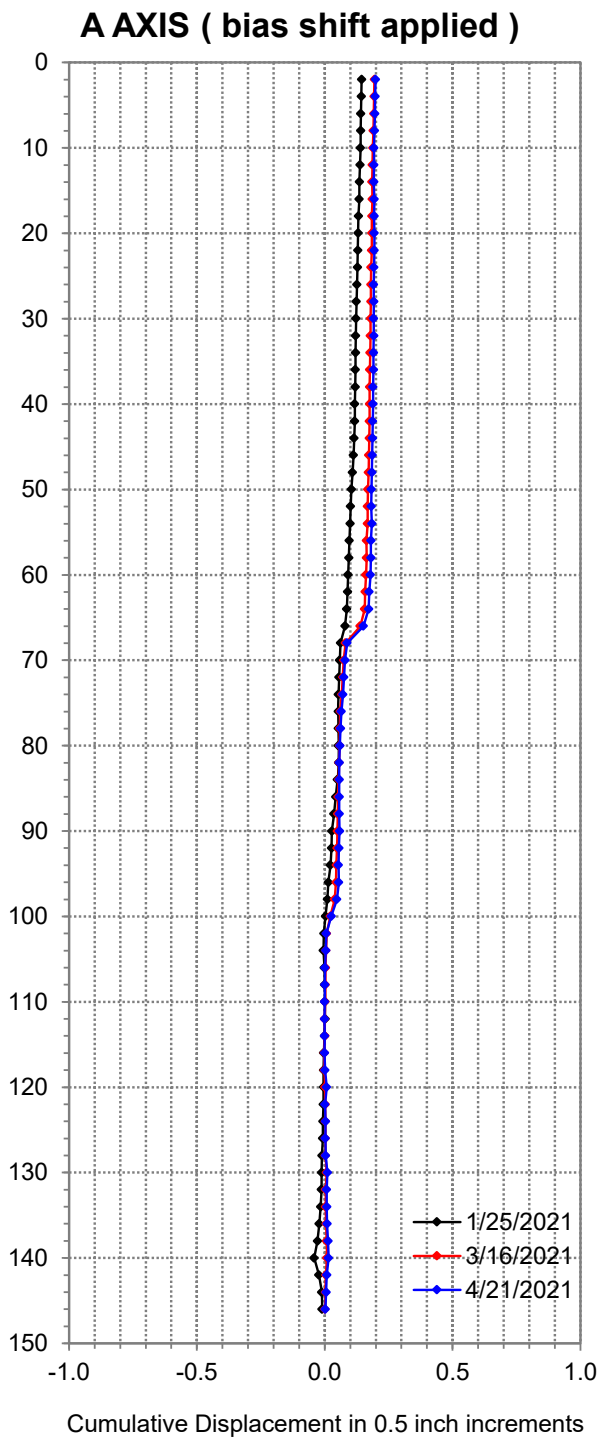
Cumulative Vector Displacement Over Time

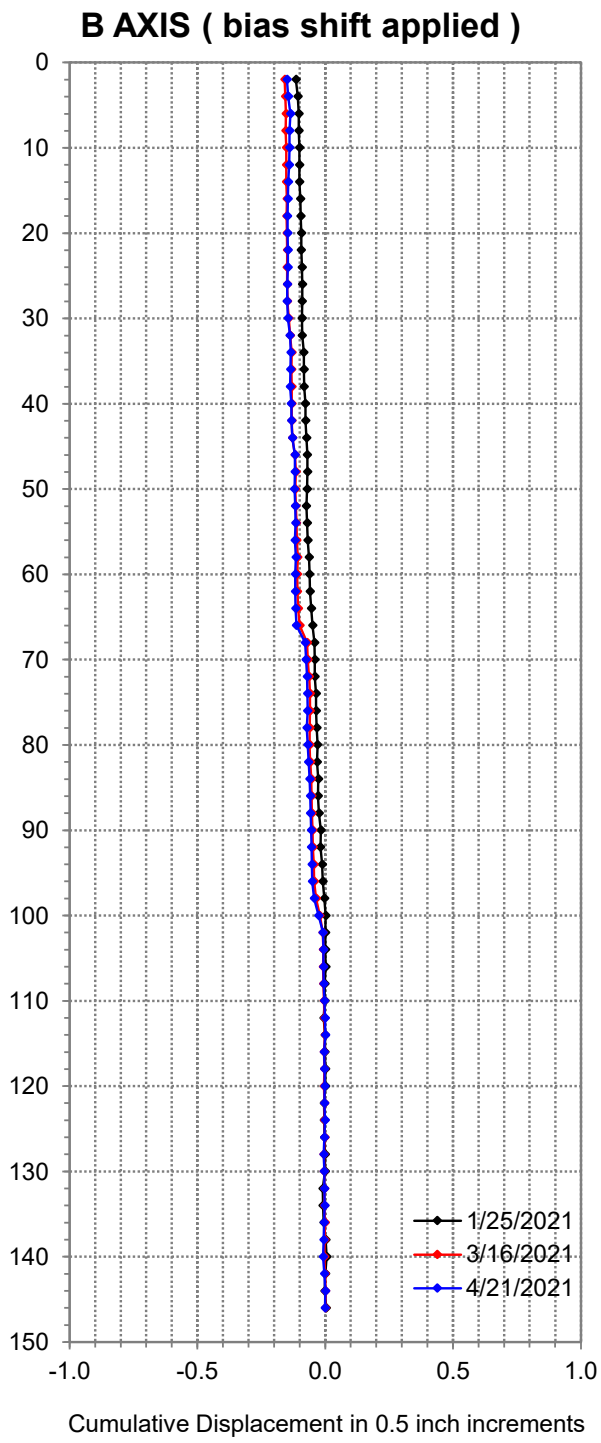


VWP-2 (D-20-009)
LCG Bypass
01-DN-101-PM 14.78
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 12/22/202

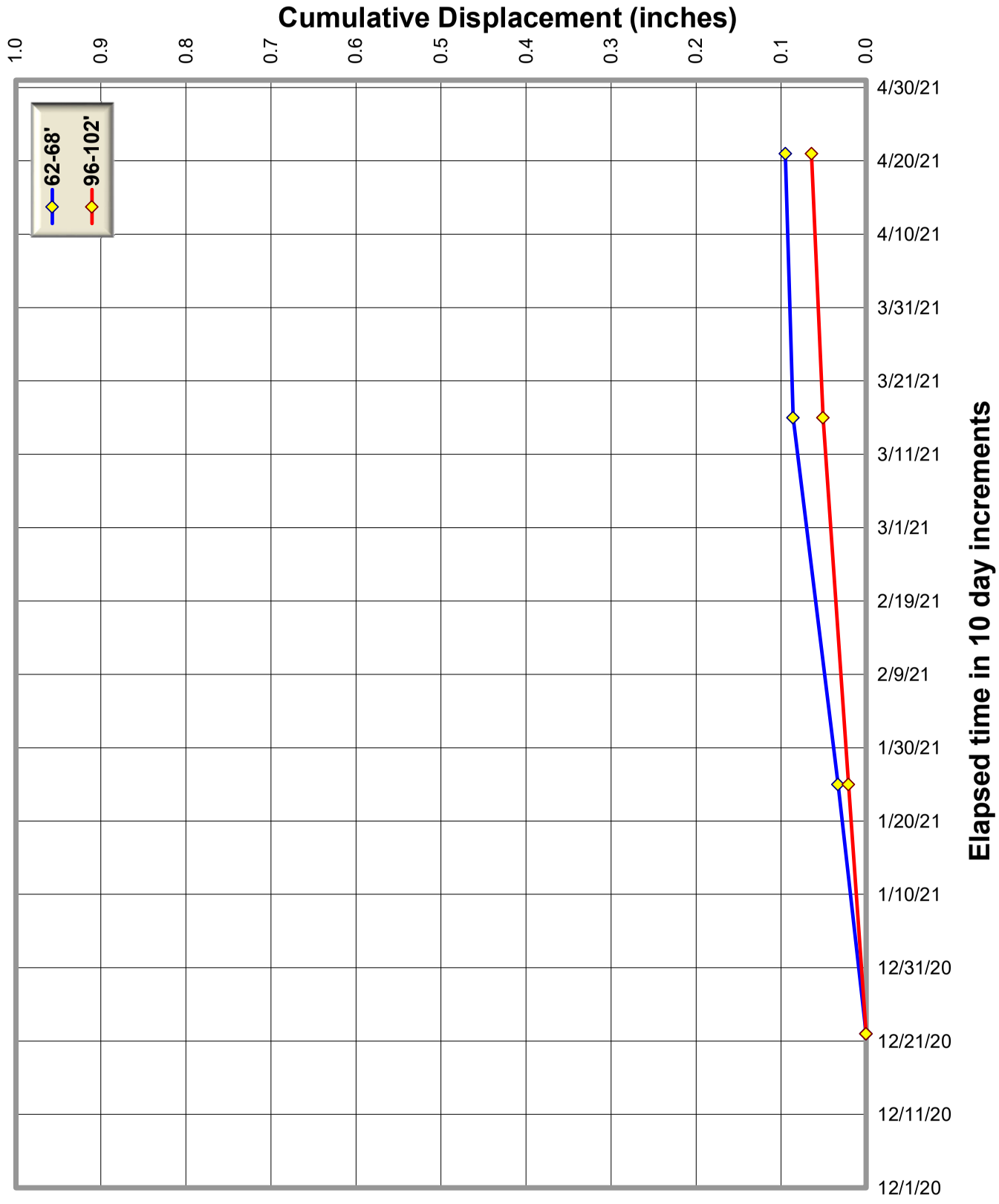




B-24 (D-20-010)
LCG Bypass
01-DN-101-PM 13.8
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

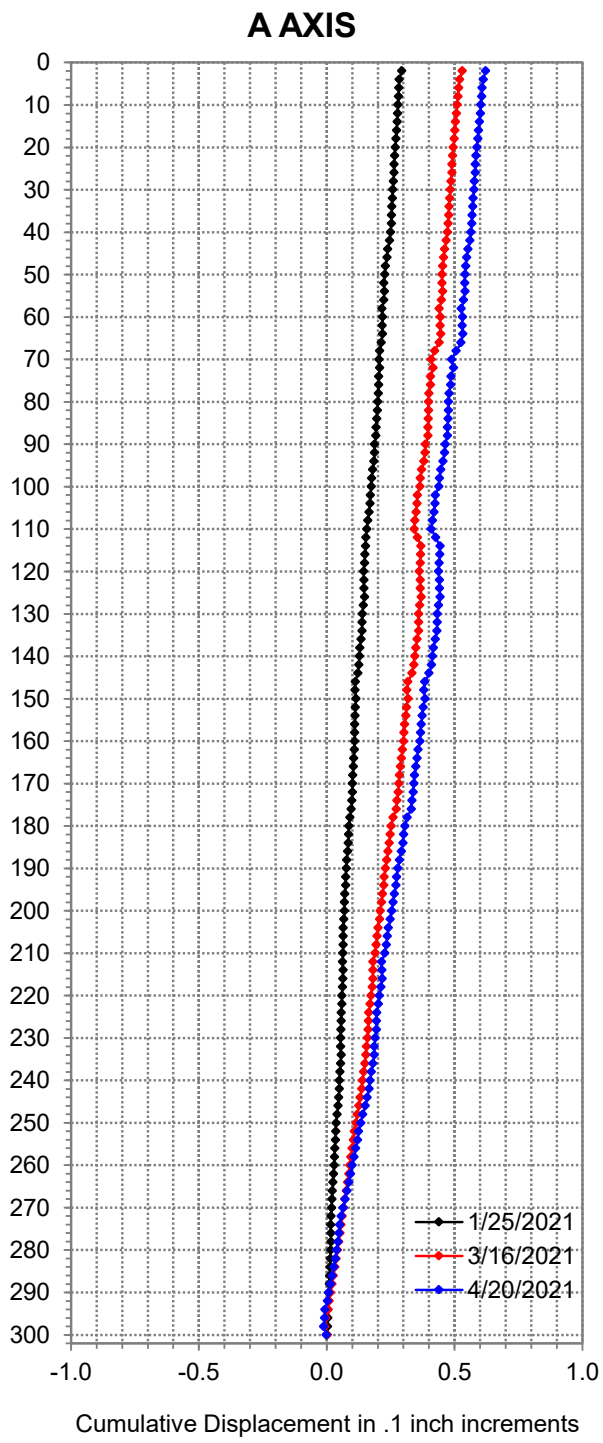
Cumulative Vector Displacement Over Time

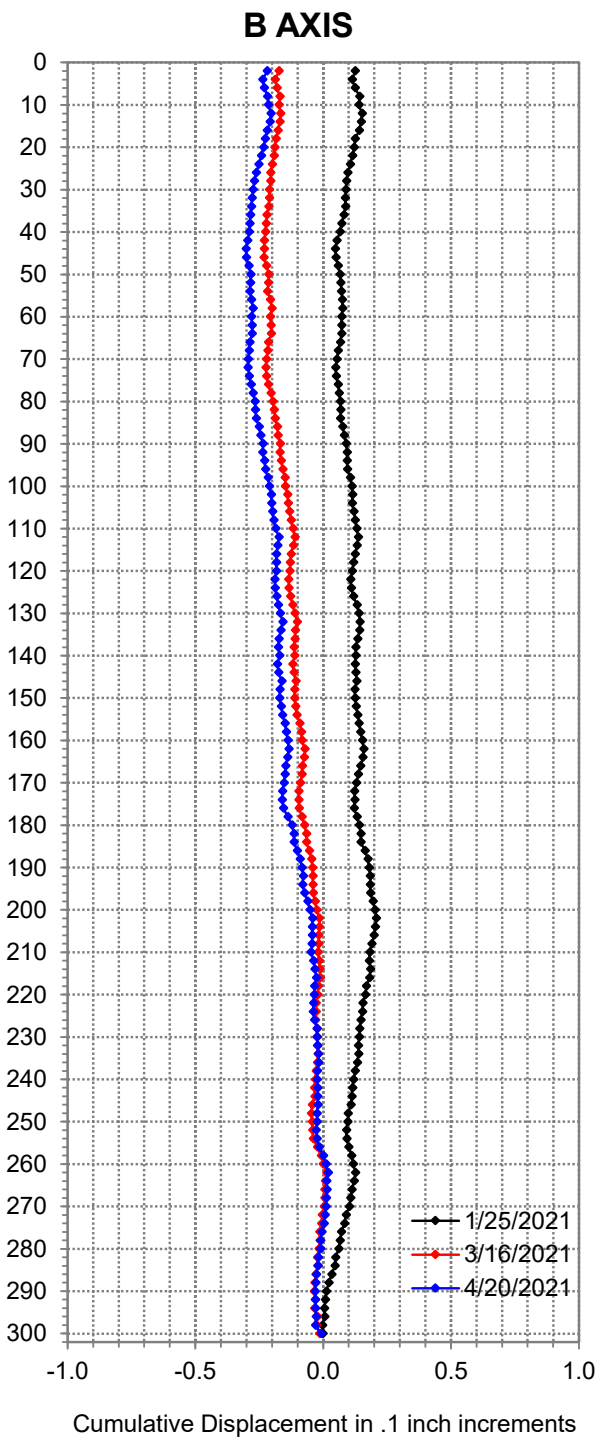


B-24 (D-20-010)
LCG Bypass
01-DN-101-PM 13.8
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

Cumulative Displacement (inches) since 12/22/202

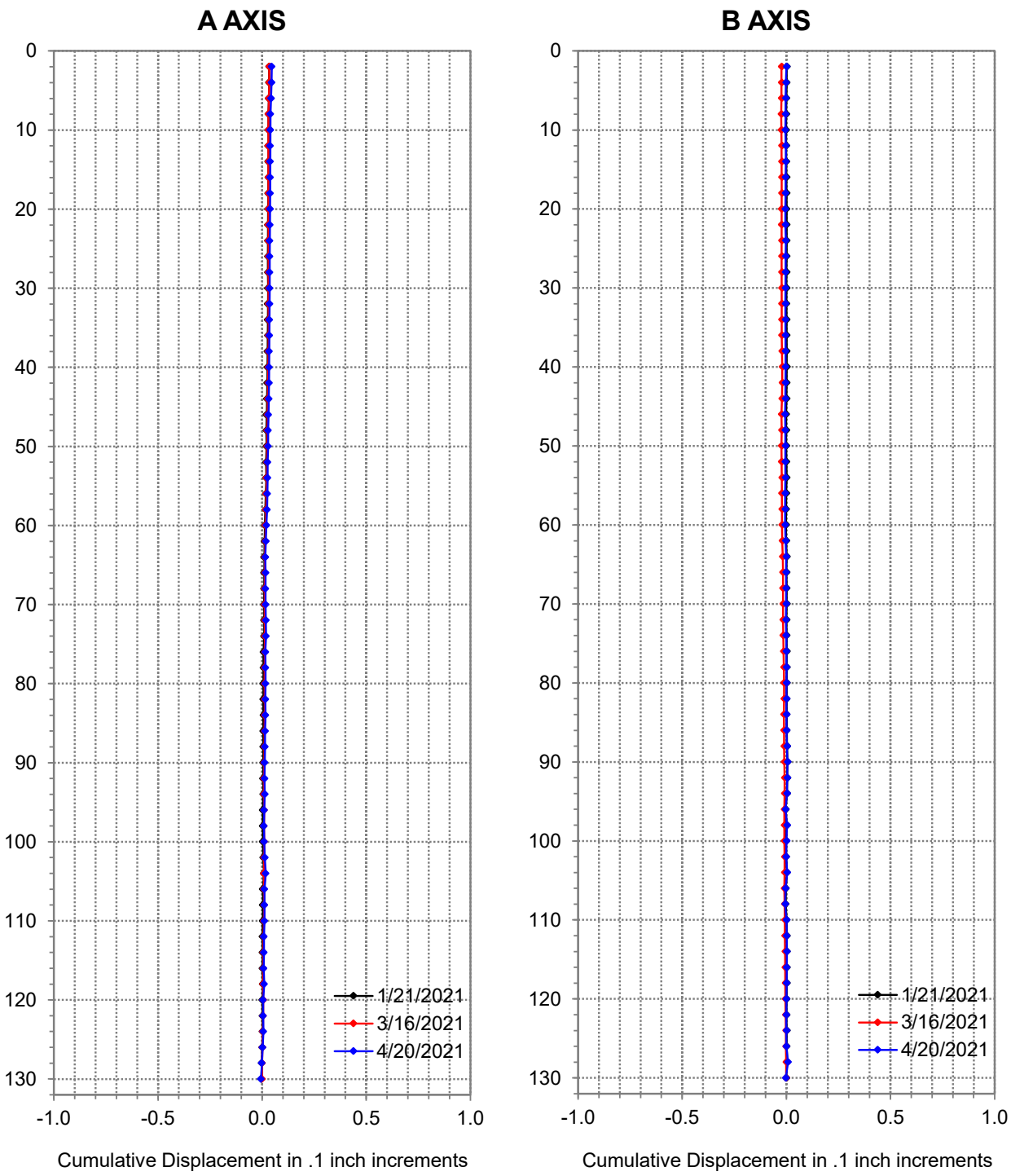




B-32 (RC-20-011)
LCG Bypass
01-DN-101-PM 15.1
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 12/22/202



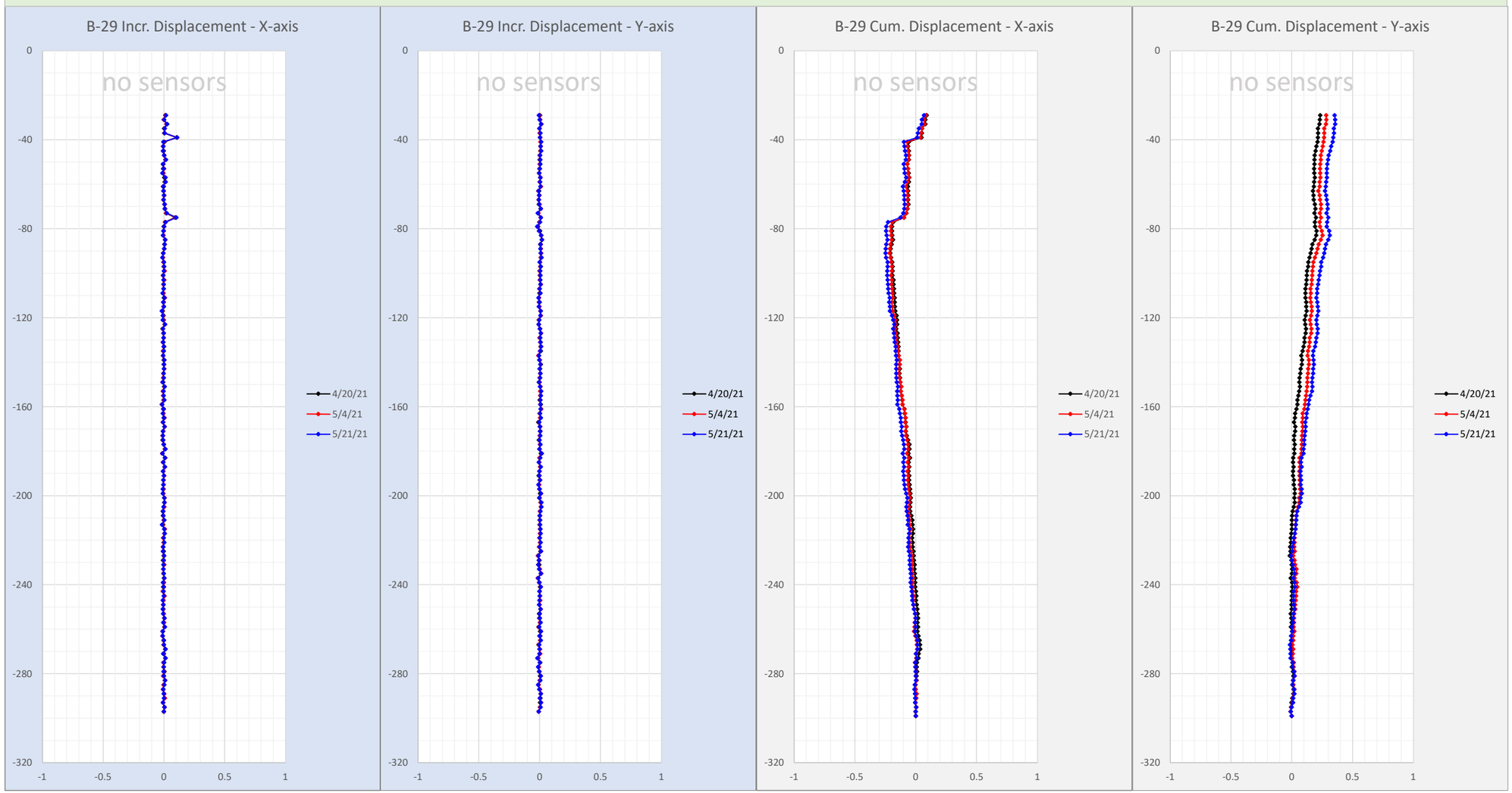
VWP-6 (RC-20-013)
LCG Bypass
01-DN-101-PM 15.5
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

The GeoFlex inclinometer at B-29 has a casing stickup of 2'11" above ground level. These graphs will use 3' even for display purposes. The 270' of GeoFlex sensors are suspended below a 30' "dummy" section that contains no sensors. Thus, the shallowest sensor provides data for the point that is located 2 feet below the "dummy" segment, or 29 ft below ground level. **Data points in the graphs below are indicative of depth in feet <u>below ground level</u>**.

Double-click on a date to add or remove from graphs

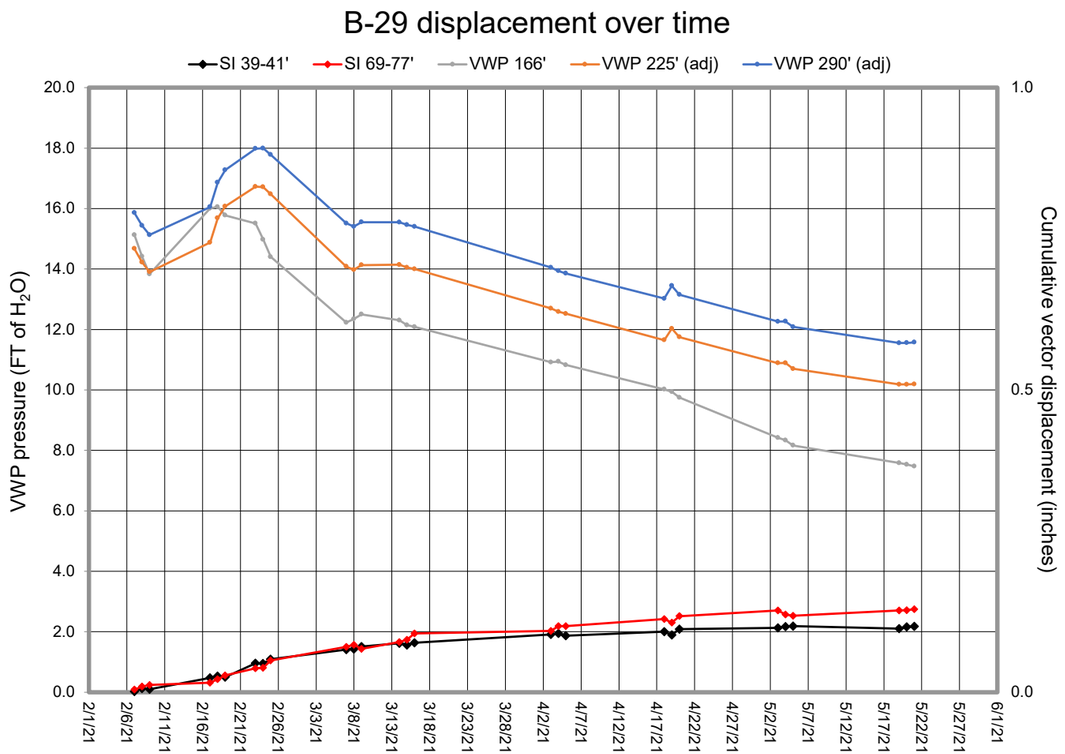
2/7/2021
2/8/2021
2/9/2021
2/16/2021
2/19/2021
3/6/2021
3/17/2021
4/5/2021
4/20/2021
5/4/2021
5/21/2021



v2.2

Add series

a	b	vector
0.027881	0.0004	0.027884



Period		Days	Period disp. (inches)	Period rate (in/year)	Lifetime disp. (inches)	Period disp. (inches)	Period rate (in/year)	Lifetime disp. (inches)
2/7/21	2/25/21	18	0.0544	1.10	0.0544	0.0526	352.92	0.0526
2/25/21	3/9/21	12	0.0212	0.64	0.0756	0.0191	0.58	0.0717
3/9/21	3/16/21	7	0.0062	0.32	0.0818	0.0255	1.33	0.0972
3/16/21	4/5/21	20	0.0116	0.21	0.0934	0.0121	0.22	0.1093
4/5/21	4/20/21	15	0.0107	0.26	0.1041	0.0165	0.40	0.1258
4/20/21	5/5/21	15	0.0050	0.12	0.1091	0.0006	0.01	0.1264
5/5/21	5/21/21	16	-0.0003	-0.01	0.1088	0.011	0.25	0.1374

		Corrected depths:	39' X	41' X	39' Y	39' Y				69' X	77' X	69' Y	77' Y						290'	225'	166'	290' adj	225' adj
HOUR	DATE	TIME STAMP	12' X	14' X	12' Y	14' Y	DIFF X1	DIFF Y1	VECTOR1	42' X	50' X	42' Y	50' Y	DIFF X2	DIFF Y2	VECTOR2	SI DATE	VWP DATE	FT H_2O	FT H_2O	FT H_2O	FT H_2O	FT H_2O
12	2/7/2021	2/7/21 12:00	-0.02253	-0.02355	-0.01011	-0.01057	-0.00103	-0.00046	0.001124	-0.0219	-0.02486	-0.01504	-0.01168	-0.00296	0.003358	0.004477	2/7/2021	2/7/21	119.86	54.68	15.13	15.86	14.68
12	2/8/2021	2/8/21 12:00	-0.03792	-0.04344	-0.01781	-0.01532	-0.00552	0.002497	0.006058	-0.04388	-0.0529	-0.00849	-0.01067	-0.00902	-0.00218	0.009284	2/8/2021	2/8/21	119.44	54.23	14.42	15.44	14.23
12	2/9/2021	2/9/21 12:00	-0.02727	-0.03121	-0.03155	-0.02899	-0.00394	0.002562	0.004701	-0.02981	-0.04019	-0.04301	-0.03695	-0.01038	0.006056	0.01202	2/9/2021	2/9/21	119.13	53.91	13.84	15.13	13.91
12	2/17/2021	2/17/21 12:00	-0.02698	-0.05063	0.001296	0.002162	-0.02365	0.000866	0.023666	-0.05274	-0.06838	-0.00132	-0.00362	-0.01564	-0.0023	0.015804	2/17/2021	2/17/21	120.05	54.88	16.01	16.05	14.88
12	2/18/2021	2/18/21 12:00	-0.01365	-0.04034	-0.0153	-0.01547	-0.02669	-0.00018	0.026691	-0.04205	-0.06352	-0.01798	-0.01653	-0.02147	0.001451	0.021522	2/18/2021	2/18/21	120.86	55.69	16.06	16.86	15.69
12	2/19/2021	2/19/21 12:00	0.009322	-0.01513	0.001093	0.006542	-0.02445	0.005448	0.025053	-0.01679	-0.04467	0.006789	0.006435	-0.02788	-0.00035	0.027883	2/19/2021	2/19/21	121.28	56.08	15.78	17.28	16.08
12	2/23/2021	2/23/21 12:00	-0.03221	-0.0798	0.035387	0.039139	-0.04759	0.003752	0.047739	-0.0682	-0.10766	0.037673	0.038174	-0.03946	0.000501	0.03946	2/23/2021	2/23/21	121.98	56.72	15.51	17.98	16.72
12	2/24/2021	2/24/21 12:00	-0.02046	-0.06777	0.011947	0.013384	-0.04732	0.001438	0.047338	-0.06208	-0.10254	0.015811	0.015228	-0.04046	-0.00058	0.040467	2/24/2021	2/24/21	121.99	56.71	14.98	17.99	16.71
12	2/25/2021	2/25/21 12:00	-0.0085	-0.06286	0.065353	0.068683	-0.05435	0.003329	0.054455	-0.04919	-0.10176	0.06101	0.05775	-0.05257	-0.00326	0.052674	2/25/2021	2/25/21	121.78	56.48	14.40	17.78	16.48
12	3/7/2021	3/7/21 12:00	0.039373	-0.03096	0.059067	0.060276	-0.07033	0.001209	0.070342	-0.03303	-0.10795	0.050657	0.050738	-0.07492	8.08E-05	0.074916	3/7/2021	3/7/21	119.52	54.08	12.23	15.52	14.08
12	3/8/2021	3/8/21 12:00	0.066031	-0.00511	0.094978	0.095876	-0.07115	0.000898	0.071151	-0.00907	-0.08732	0.082782	0.079404	-0.07825	-0.00338	0.078324	3/8/2021	3/8/21	119.41	53.98	12.35	15.41	13.98
12	3/9/2021	3/9/21 12:00	0.050088	-0.02554	0.087036	0.085716	-0.07563	-0.00132	0.075637	-0.03619	-0.1078	0.057869	0.05415	-0.07161	-0.00372	0.071707	3/9/2021	3/9/21	119.55	54.13	12.50	15.55	14.13
12	3/14/2021	3/14/21 12:00	0.052788	-0.02809	0.027214	0.026773	-0.08087	-0.00044	0.080876	-0.02766	-0.1107	0.017801	0.016579	-0.08305	-0.00122	0.083057	3/14/2021	3/14/21	119.55	54.15	12.30	15.55	14.15
12	3/15/2021	3/15/21 12:00	0.072581	-0.00543	0.06566	0.064652	-0.07802	-0.00101	0.078022	-0.00624	-0.09294	0.051552	0.050637	-0.0867	-0.00091	0.086708	3/15/2021	3/15/21	119.47	54.05	12.15	15.47	14.05
12	3/16/2021	3/16/21 12:00	0.114271	0.032462	0.044385	0.04618	-0.08181	0.001795	0.081829	0.021185	-0.07605	0.030044	0.028722	-0.09724	-0.00132	0.097246	3/16/2021	3/16/21	119.41	54.00	12.09	15.41	14.00
12	4/3/2021	4/3/21 12:00	0.051259	-0.04408	0.129962	0.132673	-0.09533	0.002711	0.095373	-0.04296	-0.14427	0.13112	0.129273	-0.10131	-0.00185	0.101326	4/3/2021	4/3/21	118.05	52.70	10.92	14.05	12.70
12	4/4/2021	4/4/21 12:00	0.018002	-0.07911	0.136857	0.137364	-0.09712	0.000508	0.097117	-0.07943	-0.18824	0.14121	0.130167	-0.10882	-0.01104	0.109374	4/4/2021	4/4/21	117.94	52.59	10.94	13.94	12.59
12	4/5/2021	4/5/21 12:00	-0.00599	-0.09943	0.123258	0.126132	-0.09344	0.002874	0.093488	-0.09116	-0.20049	0.121526	0.122017	-0.10933	0.000491	0.109329	4/5/2021	4/5/21	117.86	52.52	10.83	13.86	12.52
12	4/18/2021	4/18/21 12:00	0.042233	-0.05775	0.157178	0.158862	-0.09998	0.001684	0.099999	-0.06914	-0.19017	0.144116	0.13796	-0.12103	-0.00616	0.121189	4/18/2021	4/18/21	117.02	51.65	10.02	13.02	11.65
12	4/19/2021	4/19/21 12:00	-0.00657	-0.10137	0.176365	0.175097	-0.09481	-0.00127	0.094816	-0.10327	-0.21851	0.15738	0.15276	-0.11524	-0.00462	0.115335	4/19/2021	4/19/21	117.45	52.03	9.94	13.45	12.03
12	4/20/2021	4/20/21 12:00	0.047199	-0.0569	0.215372	0.212258	-0.1041	-0.00311	0.104148	-0.06025	-0.18608	0.189793	0.190505	-0.12583	0.000712	0.125827	4/20/2021	4/20/21	117.15	51.75	9.75	13.15	11.75
12	5/3/2021	5/3/2021 12:00	0.049218	-0.05709	0.244489	0.23932	-0.10631	-0.00517	0.106431	-0.05344	-0.18864	0.209538	0.20214	-0.1352	-0.0074	0.135399	5/3/2021	5/3/21	116.27	50.89	8.42	12.27	10.89
12	5/4/2021	5/4/2021 12:00	0.03926	-0.06892	0.266339	0.260956	-0.10818	-0.00538	0.108313	-0.0654	-0.19355	0.239786	0.229971	-0.12816	-0.00982	0.128531	5/4/2021	5/4/21	116.27	50.89	8.34	12.27	10.89
12	5/5/2021	5/5/2021 12:00	0.013771	-0.0953	0.235128	0.230941	-0.10907	-0.00419	0.109155	-0.08434	-0.21069	0.208856	0.204861	-0.12635	-0.004	0.126415	5/5/2021	5/5/21	116.09	50.70	8.17	12.09	10.70
12	5/19/2021	5/19/2021 12:00	0.038778	-0.0665	0.312744	0.310429	-0.10528	-0.00231	0.105303	-0.07074	-0.20605	0.277566	0.272586	-0.13531	-0.00498	0.1354	5/19/2021	5/19/2021	115.55	50.18	7.58	11.55	10.18
12	5/20/2021	5/20/2021 12:00	-0.01076	-0.11883	0.316693	0.314398	-0.10806	-0.0023	0.108088	-0.1079	-0.2434	0.271363	0.266755	-0.1355	-0.00461	0.135578	5/20/2021	5/20/2021	115.56	50.18	7.54	11.56	10.18
12	5/21/2021	5/21/2021 12:00	0.011474	-0.09736	0.34078	0.337126	-0.10883	-0.00365	0.108895	-0.09024	-0.22766	0.293486	0.290528	-0.13742	-0.00296	0.137452	5/21/2021	5/21/2021	115.58	50.19	7.48	11.58	10.19

The GeoFlex inclinometer at B-30 has a casing stickup of 3'6" above ground level. These graphs will use 3' even for display purposes. The 270' of GeoFlex sensors are suspended below a 30' "dummy" section that contains no sensors. Thus, the shallowest sensor provides data for the point that is located 2 feet below the "dummy" segment, or 29 ft below ground level. **Data points in the graphs below are indicative of depth in feet <u>below ground level</u>**.

Double-click on a date to add or remove from graphs

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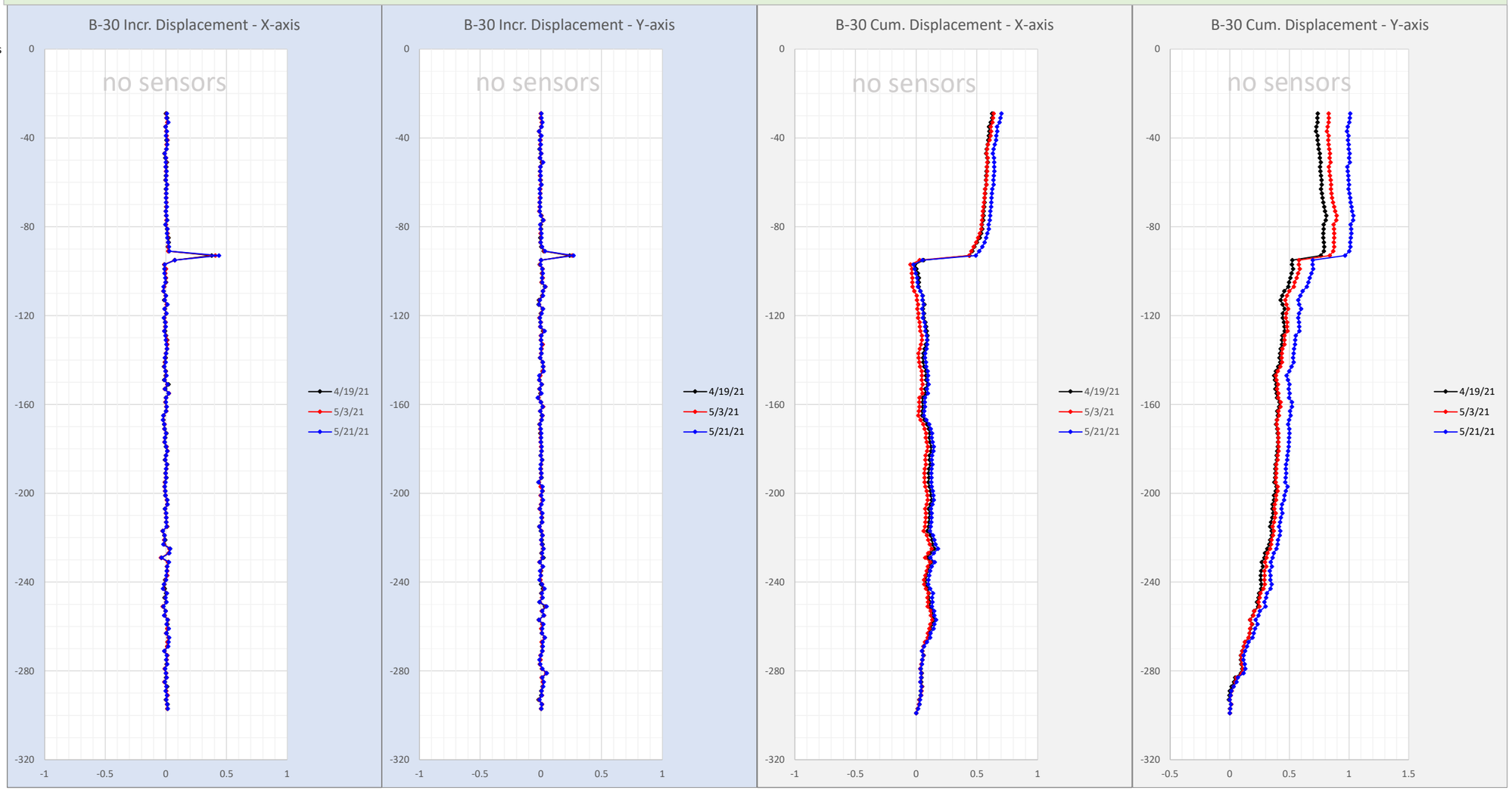
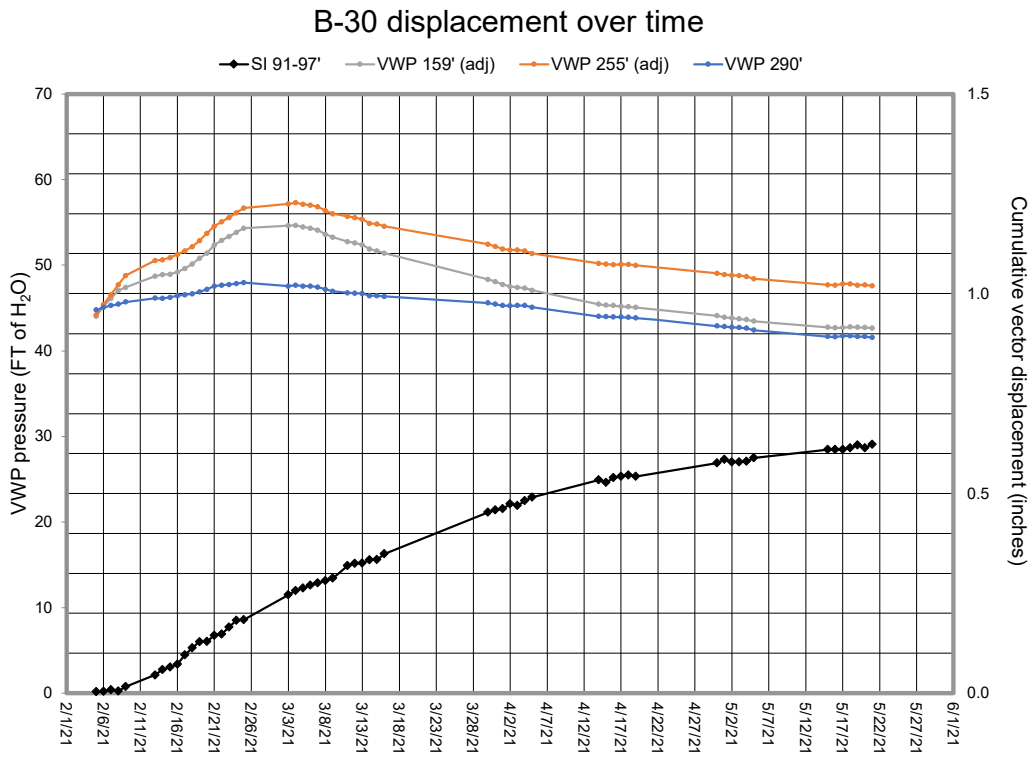
2/5/2021
2/6/2021
2/7/2021
2/8/2021
2/9/2021
2/13/2021
2/19/2021
3/5/2021
3/17/2021
3/30/2021
4/5/2021
4/14/2021
4/19/2021
5/3/2021
5/21/2021



v2.2

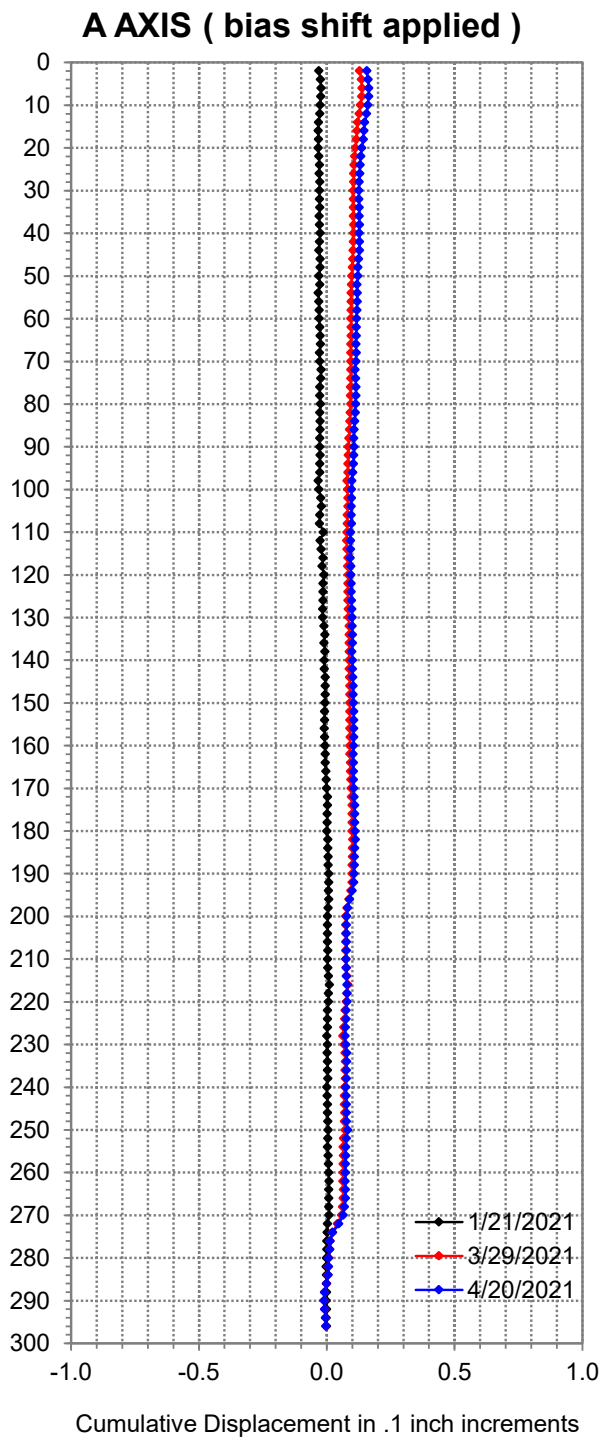
Add series

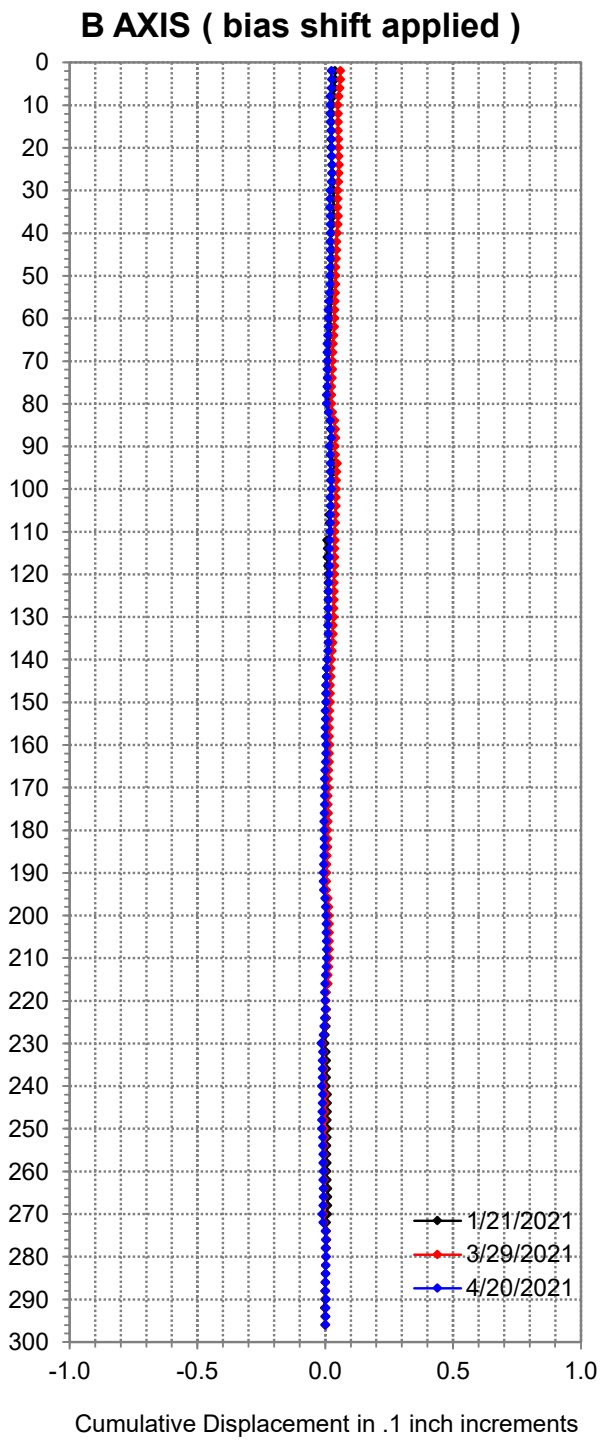


91-97'			Period displacement in inches	Period rate in/year	Lifetime displacement inches
Period		Days			
2/5/2021	2/25/2021	20	0.1836	3.35	0.1836
2/25/2021	3/9/2021	12	0.1038	3.16	0.2874
3/9/2021	3/16/2021	7	0.0609	3.18	0.3483
3/16/2021	4/5/2021	20	0.1424	2.60	0.4907
4/5/2021	4/19/2021	14	0.0519	1.35	0.5426
4/19/2021	5/5/2021	16	0.0462	1.05	0.5888
5/5/2021	5/21/2021	16	0.0342	0.78	0.623

HOUR	DATE	TIME STAMP	91' 64' X	97' 70' X	91' 64' Y	97' 70' Y	DIFF X	DIFF Y	VECTOR	290' FT H_2O	255' FT H_2O	159' FT H_2O	255' adj FT H_2O	159' adj FT H_2O	VWP DATE	SI Date
12	2/5/2021	2/5/21 12:00	-0.05515	-0.05424	0.00449	0.007696	0.000906	0.003206	0.003331	44.76413	87.16348	1.027671	44.16348	44.02767	2/5/2021	2/5/2021
12	2/6/2021	2/6/21 12:00	-0.00054	-0.0016	0.076971	0.073275	-0.00105	-0.0037	0.003843	45.07085	88.41372	2.230542	45.41372	45.23054	2/6/2021	2/6/2021
12	2/7/2021	2/7/21 12:00	0.009802	0.001448	0.028563	0.027478	-0.00835	-0.00109	0.008424	45.2771	89.51952	3.115451	46.51952	46.11545	2/7/2021	2/7/2021
12	2/8/2021	2/8/21 12:00	0.004524	0.003548	0.035368	0.030395	-0.00098	-0.00497	0.005068	45.4571	90.67271	4.000776	47.67271	47.00078	2/8/2021	2/8/2021
12	2/9/2021	2/9/21 12:00	-0.02529	-0.03768	0.076863	0.067021	-0.01239	-0.00984	0.015823	45.70446	91.77305	4.400892	48.77305	47.40089	2/9/2021	2/9/2021
12	2/13/2021	2/13/21 12:00	3.43E-05	-0.0393	0.138033	0.115575	-0.03933	-0.02246	0.04529	46.14661	93.54316	5.691708	50.54316	48.69171	2/13/2021	2/13/2021
12	2/14/2021	2/14/21 12:00	0.002718	-0.05037	0.159624	0.135277	-0.05309	-0.02435	0.058406	46.11994	93.61233	5.89067	50.61233	48.89067	2/14/2021	2/14/2021
12	2/15/2021	2/15/21 12:00	-0.02969	-0.08963	0.12699	0.102648	-0.05995	-0.02434	0.064701	46.22933	93.86594	5.902508	50.86594	48.90251	2/15/2021	2/15/2021
12	2/16/2021	2/16/21 12:00	-0.00196	-0.06736	0.164606	0.134497	-0.0654	-0.03011	0.072002	46.42594	94.24873	6.194616	51.24873	49.19462	2/16/2021	2/16/2021
12	2/17/2021	2/17/21 12:00	0.050169	-0.0257	0.110052	0.052472	-0.07587	-0.05758	0.095245	46.53486	94.6464	6.592051	51.6464	49.59205	2/17/2021	2/17/2021
12	2/18/2021	2/18/21 12:00	0.068883	-0.01971	0.163143	0.092684	-0.0886	-0.07046	0.113199	46.63926	95.13969	7.117656	52.13969	50.11766	2/18/2021	2/18/2021
12	2/19/2021	2/19/21 12:00	0.045761	-0.05523	0.150237	0.070507	-0.10099	-0.07973	0.128669	46.87603	95.84882	7.786985	52.84882	50.78698	2/19/2021	2/19/2021
12	2/20/2021	2/20/21 12:00	0.068525	-0.02639	0.165864	0.07811	-0.09492	-0.08775	0.129267	47.16744	96.7227	8.403094	53.7227	51.40309	2/20/2021	2/20/2021
12	2/21/2021	2/21/21 12:00	0.07463	-0.03319	0.174542	0.078524	-0.10782	-0.09602	0.14438	47.51931	97.53991	9.318742	54.53991	52.31874	2/21/2021	2/21/2021
12	2/22/2021	2/22/21 12:00	0.08377	-0.03787	0.186814	0.102995	-0.12164	-0.08382	0.147721	47.64938	98.0381	9.872678	55.0381	52.87268	2/22/2021	2/22/2021
12	2/23/2021	2/23/21 12:00	0.090047	-0.04558	0.193659	0.099685	-0.13562	-0.09397	0.164999	47.7117	98.53738	10.31786	55.53738	53.31786	2/23/2021	2/23/2021
12	2/24/2021	2/24/21 12:00	0.151695	0.003589	0.230236	0.124074	-0.14811	-0.10616	0.182225	47.8255	99.11418	10.81059	56.11418	53.81059	2/24/2021	2/24/2021
12	2/25/2021	2/25/21 12:00	0.136654	-0.01916	0.243981	0.146773	-0.15582	-0.09721	0.183653	47.95284	99.64813	11.28911	56.64813	54.28911	2/25/2021	2/25/2021
12	3/3/2021	3/3/21 12:00	0.227781	0.010165	0.387605	0.27202	-0.21762	-0.11559	0.246408	47.52202	100.133	11.5927	57.133	54.5927	3/3/2021	3/3/2021
12	3/4/2021	3/4/21 12:00	0.175848	-0.04735	0.360812	0.234033	-0.2232	-0.12678	0.256691	47.63312	100.2967	11.64222	57.29667	54.64222	3/4/2021	3/4/2021
12	3/5/2021	3/5/21 12:00	0.169403	-0.05981	0.363736	0.235631	-0.22921	-0.12811	0.262581	47.54912	100.0998	11.44834	57.09979	54.44834	3/5/2021	3/5/2021
12	3/6/2021	3/6/21 12:00	0.19412	-0.03726	0.404677	0.264583	-0.23138	-0.14009	0.270485	47.55093	100.0115	11.29292	57.01147	54.29292	3/6/2021	3/6/2021
12	3/7/2021	3/7/21 12:00	0.211818	-0.02919	0.3758	0.241255	-0.24101	-0.13454	0.276023	47.43621	99.80292	11.06586	56.80292	54.06586	3/7/2021	3/7/2021
12	3/8/2021	3/8/21 12:00	0.2228	-0.02172	0.422197	0.283129	-0.24452	-0.13907	0.281302	47.16473	99.36176	10.59949	56.36176	53.59949	3/8/2021	3/8/2021
12	3/9/2021	3/9/21 12:00	0.244345	-0.0078	0.367374	0.229506	-0.25215	-0.13787	0.287379	46.94381	98.98489	10.26069	55.98489	53.26069	3/9/2021	3/9/2021
12	3/11/2021	3/11/21 12:00	0.235305	-0.04296	0.428282	0.272732	-0.27827	-0.15555	0.318795	46.76217	98.68934	9.732777	55.68934	52.73278	3/11/2021	3/11/2021
12	3/12/2021	3/12/21 12:00	0.203522	-0.07832	0.449657	0.289001	-0.28184	-0.16066	0.324415	46.72782	98.53938	9.601636	55.53938	52.60164	3/12/2021	3/12/2021
12	3/13/2021	3/13/21 12:00	0.209973	-0.07583	0.413526	0.257231	-0.2858	-0.1563	0.325746	46.66637	98.34049	9.347338	55.34049	52.34734	3/13/2021	3/13/2021
12	3/14/2021	3/14/21 12:00	0.244887	-0.04365	0.413045	0.246394	-0.28853	-0.16665	0.333204	46.41239	97.8734	8.885944	54.8734	51.88594	3/14/2021	3/14/2021
12	3/15/2021	3/15/21 12:00	0.180045	-0.11046	0.420319	0.254649	-0.29051	-0.16567	0.334428	46.41736	97.77523	8.644913	54.77523	51.64491	3/15/2021	3/15/2021
12	3/16/2021	3/16/21 12:00	0.219565	-0.08024	0.454778	0.277476	-0.2998	-0.1773	0.348306	46.32787	97.52926	8.397372	54.52926	51.39737	3/16/2021	3/16/2021
12	3/30/2021	3/30/21 12:00	0.36006	-0.03887	0.545599	0.331861	-0.39893	-0.21374	0.452581	45.58463	95.42226	5.339185	52.42226	48.33919	3/30/2021	3/30/2021
12	3/31/2021	3/31/21 12:00	0.371232	-0.03238	0.540598	0.322719	-0.40361	-0.21788	0.458662	45.45394	95.16838	5.05537	52.16838	48.05537	3/31/2021	3/31/2021
12	4/1/2021	4/1/21 12:00	0.378025	-0.02903	0.550281	0.332614	-0.40706	-0.21767	0.461602	45.30922	94.87438	4.726054	51.87438	47.72605	4/1/2021	4/1/2021
12	4/2/2021	4/2/21 12:00	0.411137	-0.00408	0.54177	0.314022	-0.41521	-0.22775	0.473574	45.26987	94.75222	4.482282	51.75222	47.48228	4/2/2021	4/2/2021
12	4/3/2021	4/3/21 12:00	0.352474	-0.06074	0.58295	0.359085	-0.41322	-0.22387	0.469964	45.31012	94.75089	4.369176	51.75089	47.36918	4/3/2021	4/3/2021
12	4/4/2021	4/4/21 12:00	0.368327	-0.05404	0.583384	0.35159	-0.42237	-0.23179	0.481793	45.29429	94.6651	4.298863	51.6651	47.29886	4/4/2021	4/4/2021
12	4/5/2021	4/5/21 12:00	0.406249	-0.02297	0.568274	0.330347	-0.42922	-0.23793	0.490755	45.08668	94.35893	4.037465	51.35893	47.03747	4/5/2021	4/5/2021
12	4/14/2021	4/14/2021 12:00	0.449479	-0.01616	0.669497	0.408887	-0.46564	-0.26061	0.533605	44.03918	93.17949	2.434783	50.17949	45.43478	4/14/2021	4/14/2021
12	4/15/2021	4/15/2021 12:00	0.443534	-0.01631	0.710735	0.451906	-0.45985	-0.25883	0.527687	43.9921	93.12733	2.342609	50.12733	45.34261	4/15/2021	4/15/2021
12	4/16/2021	4/16/2021 12:00	0.440632	-0.0286	0.735309	0.468812	-0.46924	-0.2665	0.539632	43.94322	93.05712	2.276441	50.05712	45.27644	4/16/2021	4/16/2021
12	4/17/2021	4/17/2021 12:00	0.484801	0.010297	0.748743	0.485805	-0.4745	-0.26294	0.542485	43.93507	93.06414	2.183878	50.06414	45.18388	4/17/2021	4/17/2021
12	4/18/2021	4/18/2021 12:00	0.395973	-0.0831	0.741281	0.479141	-0.47907	-0.26214	0.546099	43.92602	93.07718	2.146393	50.07718	45.14639	4/18/2021	4/18/2021
12	4/19/2021	4/19/2021 12:00	0.462641	-0.01023	0.788337	0.522102	-0.47287	-0.26623	0.542667	43.85042	92.98322	2.06836	49.98322	45.06836	4/19/2021	4/19/2021
12	4/30/2021	4/30/2021 12:00	0.452023	-0.05253	0.835765	0.557173	-0.50455	-0.27859	0.576355	42.89451	92.0472	1.085074	49.0472	44.08507	4/30/2021	4/30/2021
12	5/1/2021	5/1/2021 12:00	0.490549	-0.0185	0.895563	0.606945	-0.50905	-0.28862	0.585179	42.81162	91.89591	0.907119	48.89591	43.90712	5/1/2021	5/1/2021
12	5/2/2021	5/2/2021 12:00	0.479057	-0.02396	0.866434	0.579987	-0.50302	-0.28645	0.57886	42.75953	91.80887	0.825216	48.80887	43.82522	5/2/2021	5/2/2021
12	5/3/2021	5/3/2021 12:00	0.455507	-0.04634	0.86736	0.579675	-0.50185	-0.28768	0.578462	42.71649	91.76201	0.718432	48.76201	43.71843	5/3/2021	5/3/2021
12	5/4/2021	5/4/2021 12:00	0.443919	-0.05844	0.892397	0.602093	-0.50236	-0.2903	0.580206	42.63178	91.65253	0.648388	48.65253	43.64839	5/4/2021	5/4/2021
12	5/5/2021	5/5/2021 12:00	0.461322	-0.04861	0.886887	0.592316	-0.50993	-0.29457	0.5889	42.43062	91.41444	0.448962	48.41444	43.44896	5/5/2021	5/5/2021
12	5/15/2021	5/15/2021 12:00	0.484255	-0.04972	0.948256	0.65383	-0.53398	-0.29443	0.609769	41.66109	90.68042	-0.23290	47.68042	42.7671	5/15/2021	5/15/2021
12	5/16/2021	5/16/2021 12:00	0.491012	-0.0441	0.934753	0.64285	-0.53511	-0.2919	0.609547	41.63526	90.64724	-0.32556	47.64724	42.67444	5/16/2021	5/16/2021
12	5/17/2021	5/17/2021 12:00	0.501543	-0.03549	0.957807	0.669002	-0.53703	-0.28881	0.609764	41.73226	90.79972	-0.27042	47.79972	42.72958	5/17/2021	5/17/2021
12	5/18/2021	5/18/2021 12:00	0.492212	-0.04444	0.944351	0.646177	-0.53665	-0.29817	0.613926	41.75764	90.81715	-0.19843	47.81715	42.80157	5/18/2021	5/18/2021
12	5/19/2021	5/19/2021 12:00	0.479469	-0.06113	0.958181	0.651963	-0.5406	-0.30622	0.6213	41.65112	90.66333	-0.26391	47.66333	42.73609	5/19/2021	5/19/2021
12	5/20/2021	5/20/2021 12:00	0.502578	-0.03363	0.964722	0.66521	-0.53621	-0.29951	0.614187	41.65747	90.70221	-0.29455	47.70221	42.70545	5/20/2021	5/20/2021
12	5/21/2021	5/21/2021 12:00	0.520143	-0.02188	1.002309	0.69516	-0.54202	-0.30715	0.623002	41.55184	90.57418	-0.34433	47.57418	42.65567	5/21/2021	5/21/2021

Cumulative Displacement (inches) since 12/22/202

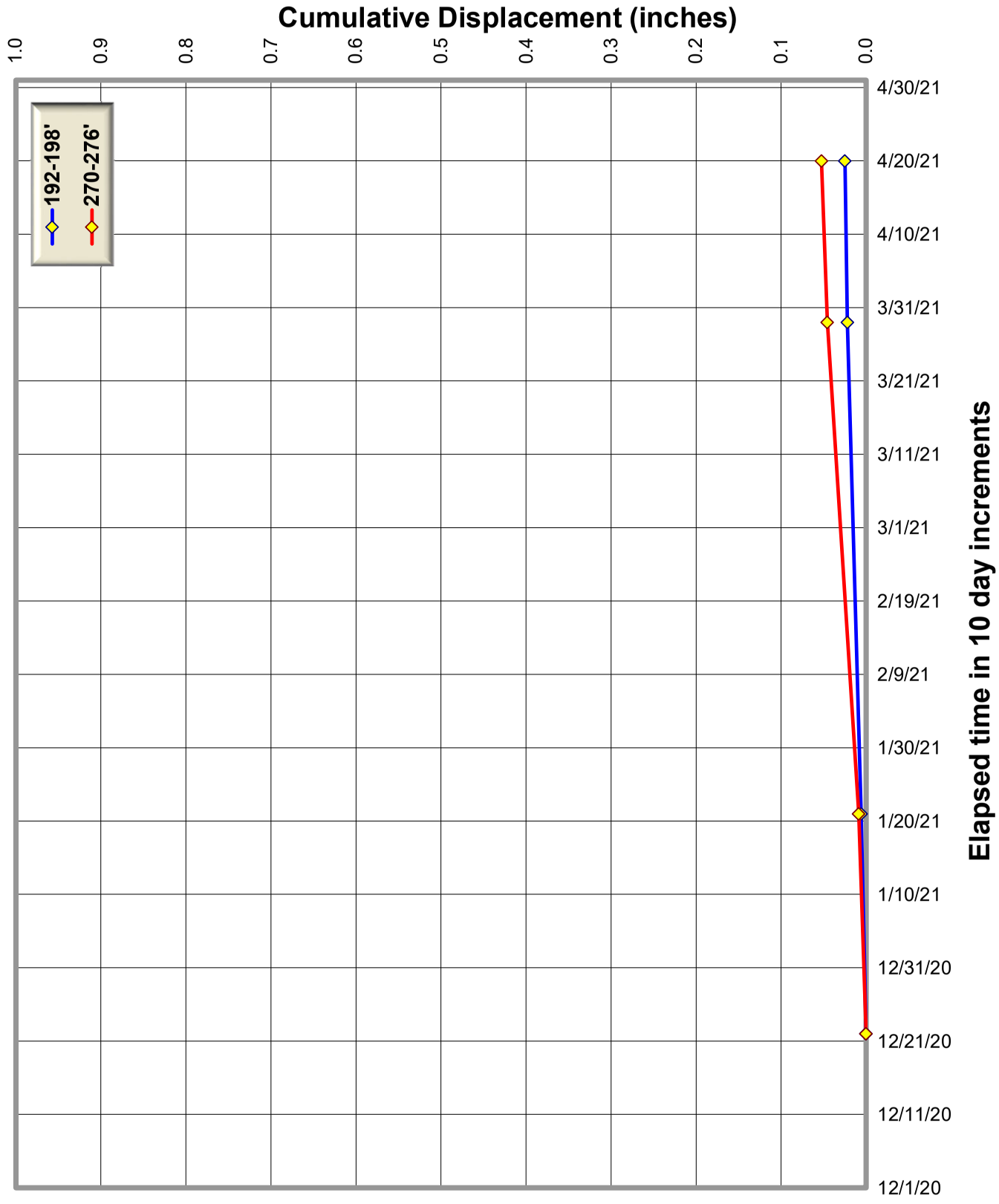




VWP-3 (RC-20-016)
LCG Bypass
01-DN-101-PM 14.92
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

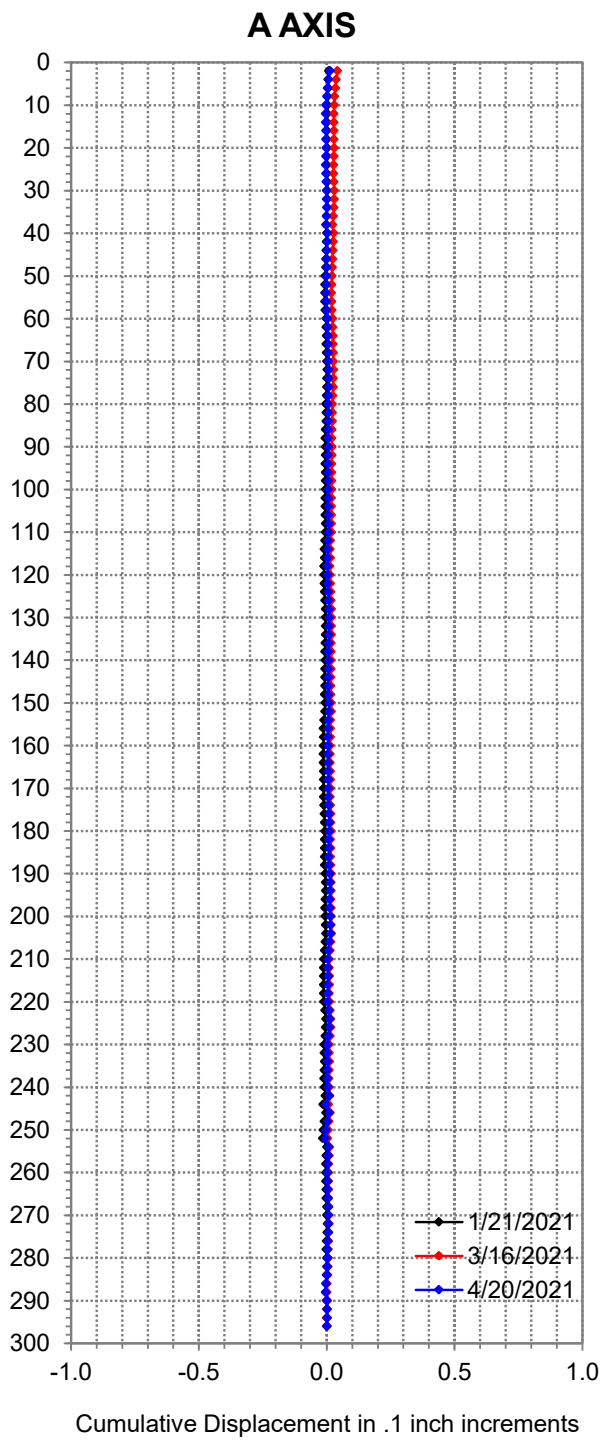
Cumulative Vector Displacement Over Time

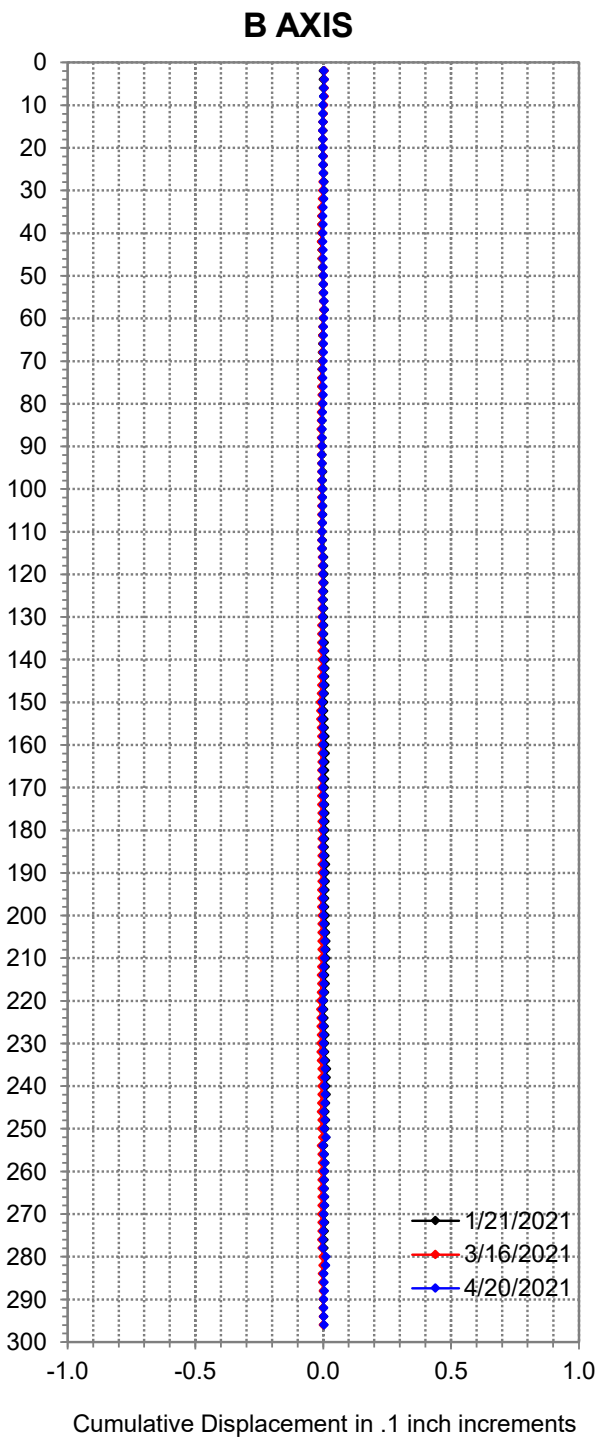


VWP-3 (RC-20-016)
LCG Bypass
01-DN-101-PM 14.92
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

Cumulative Displacement (inches) since 12/22/202

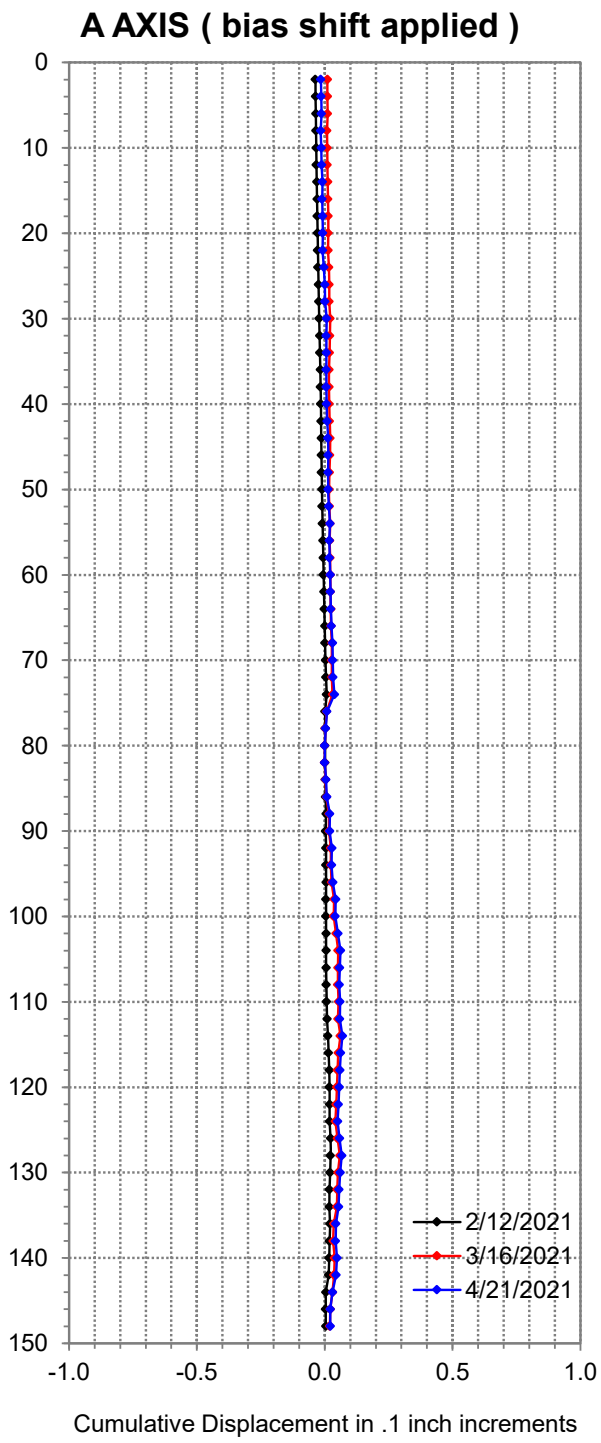


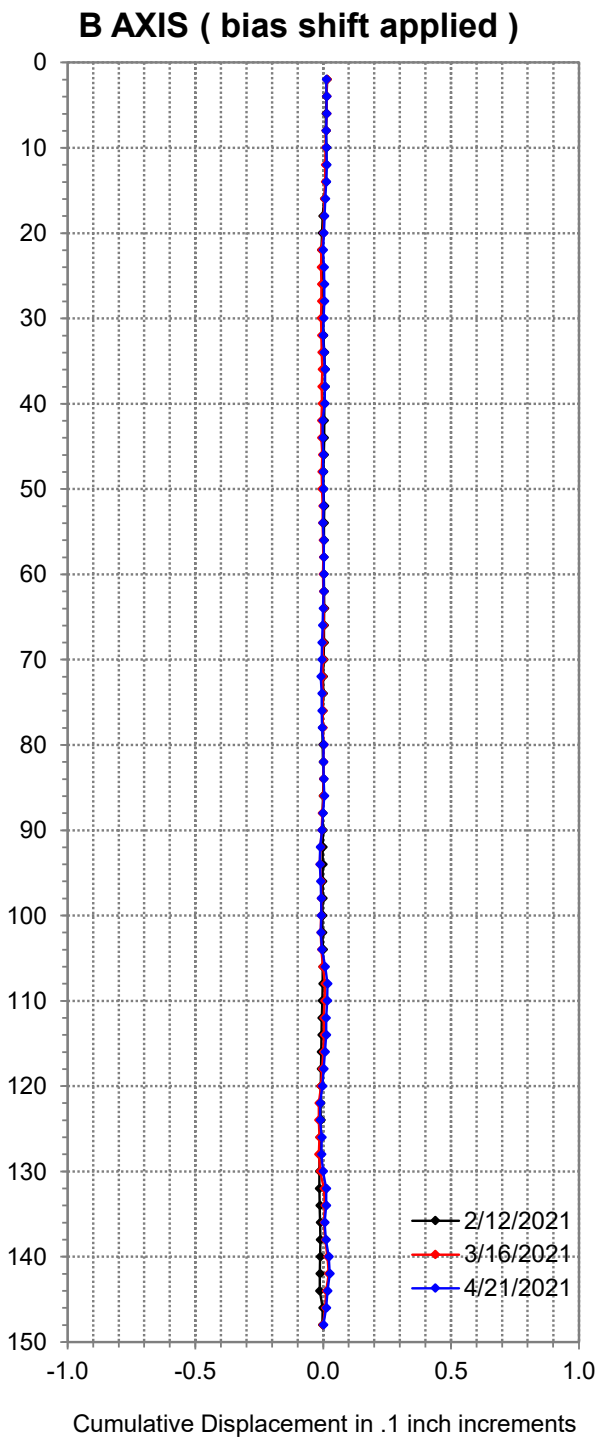


B-18 (RC-20-017)
LCG Bypass
01-DN-101-PM 15.5
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 1/18/2021

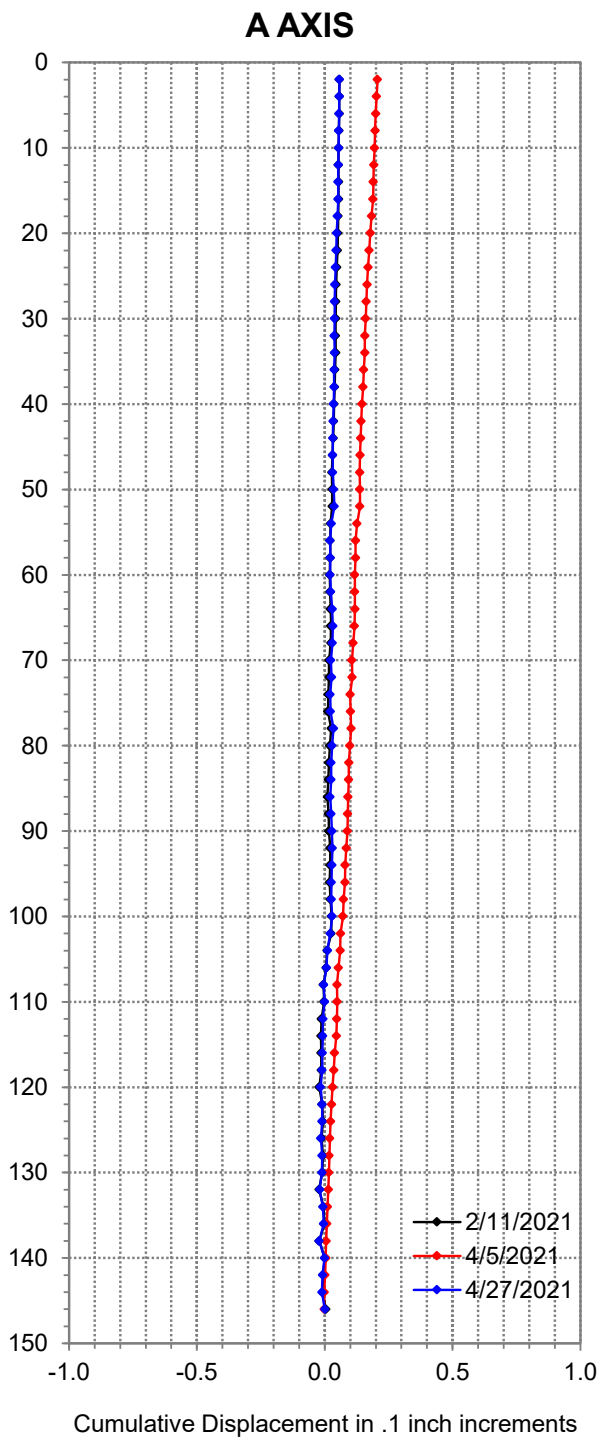


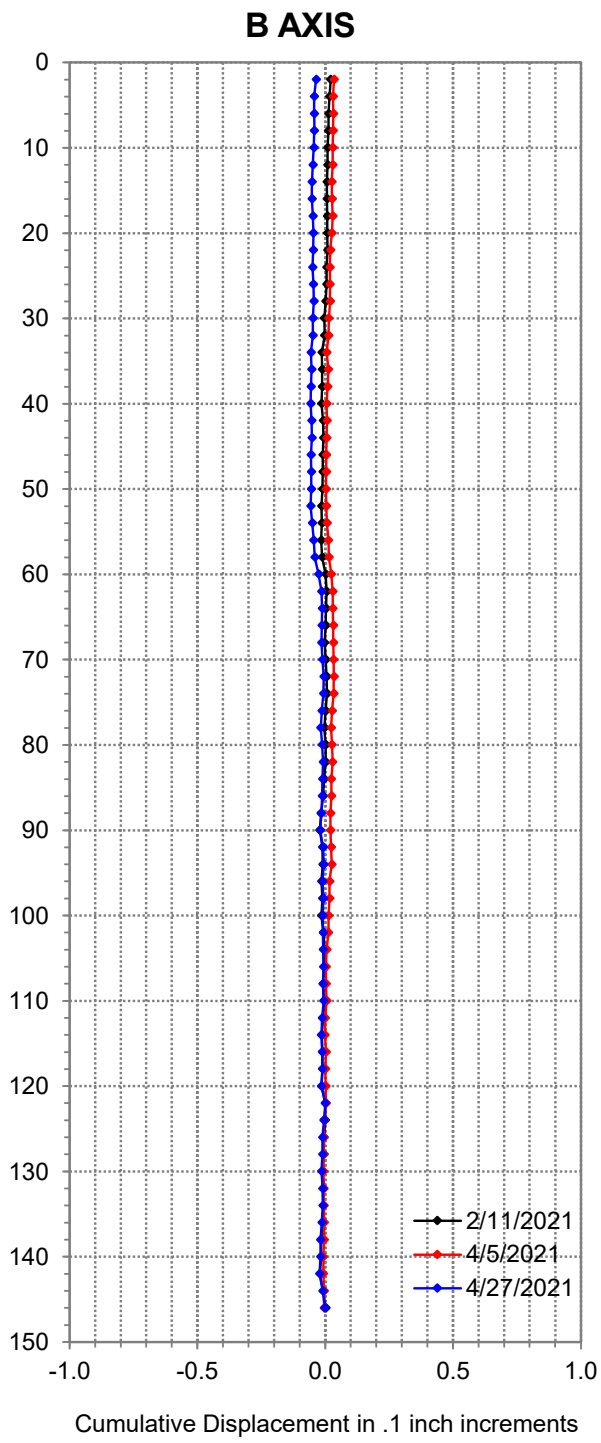


B-50 (RC-20-019)
LCG Bypass
01-DN-101-PM
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504

Cumulative Displacement (inches) since 1/15/2021

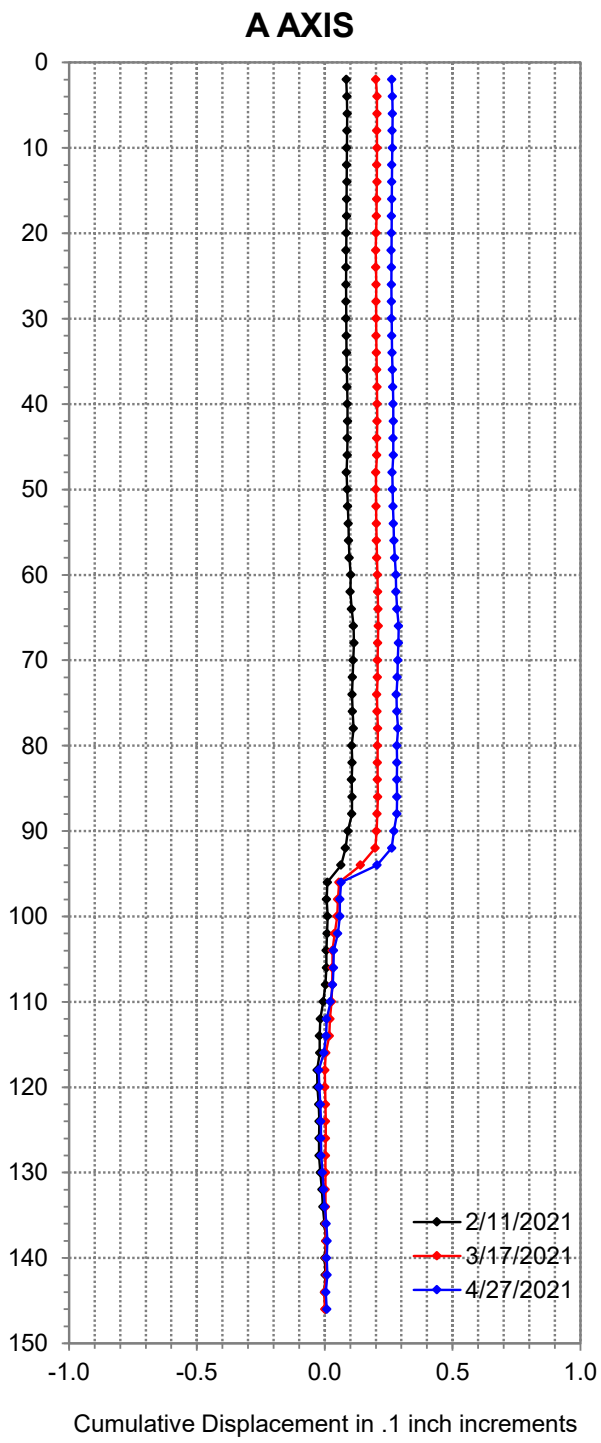


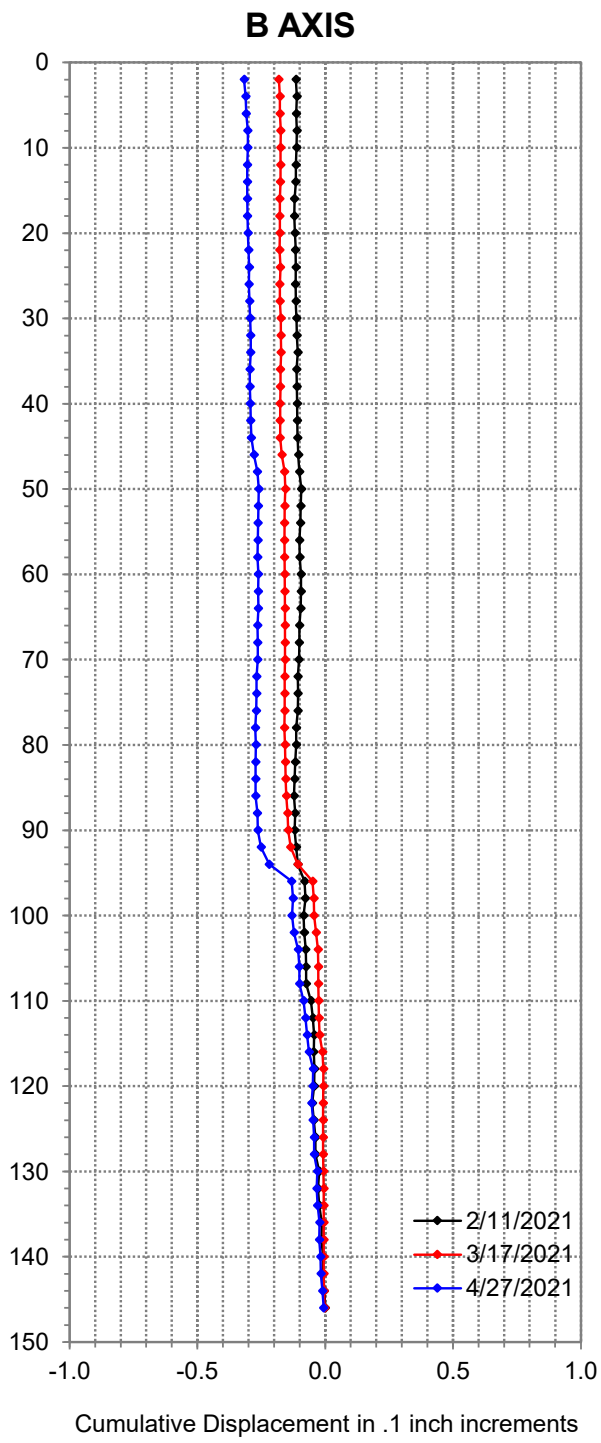


B-46 (RC-20-020)
LCG Bypass
01-DN-101-PM 13.1
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

Cumulative Displacement (inches) since 1/15/2021

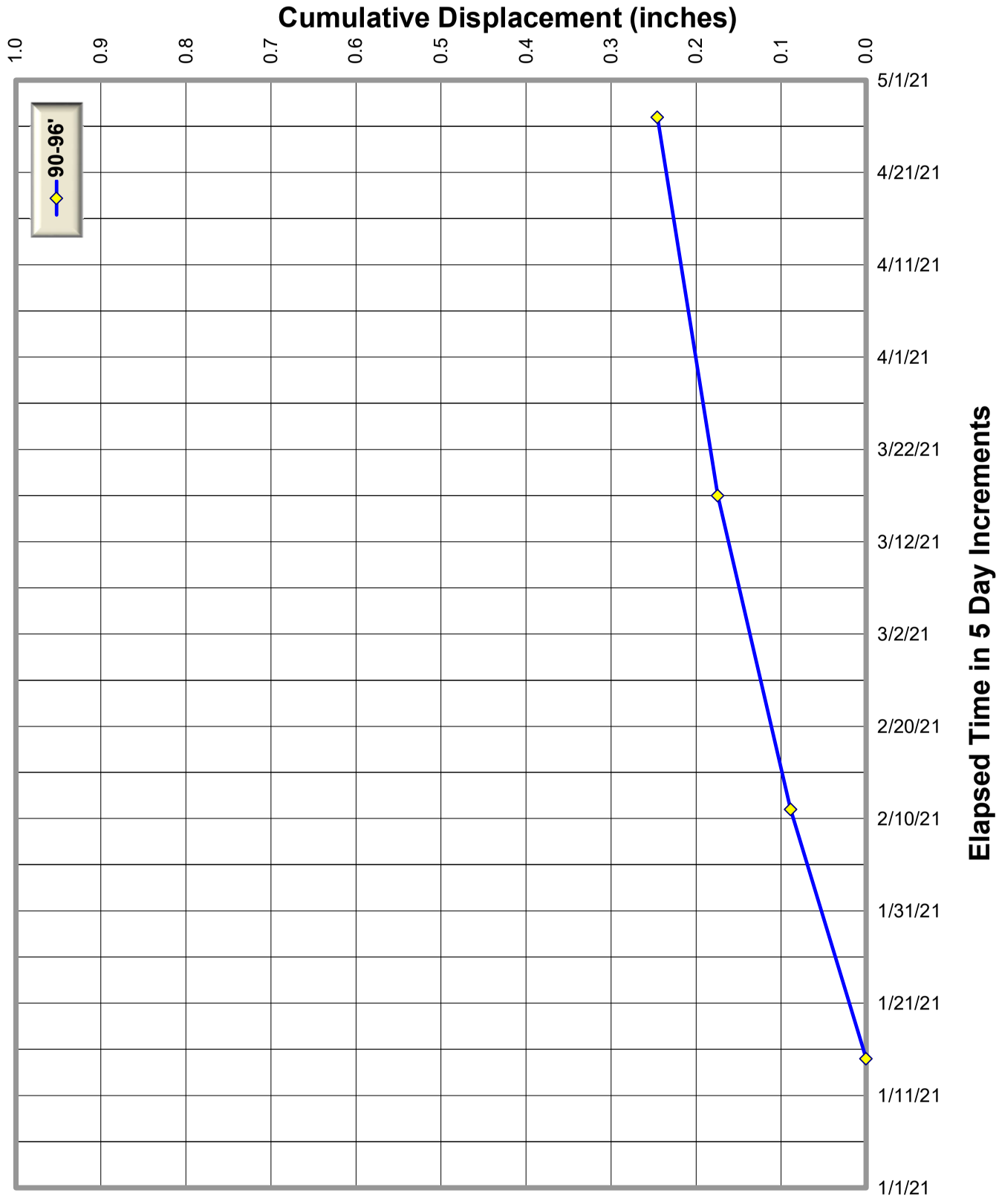




B-47 (RC-21-001)
LCG Bypass
01-DN-101-PM 13.7
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

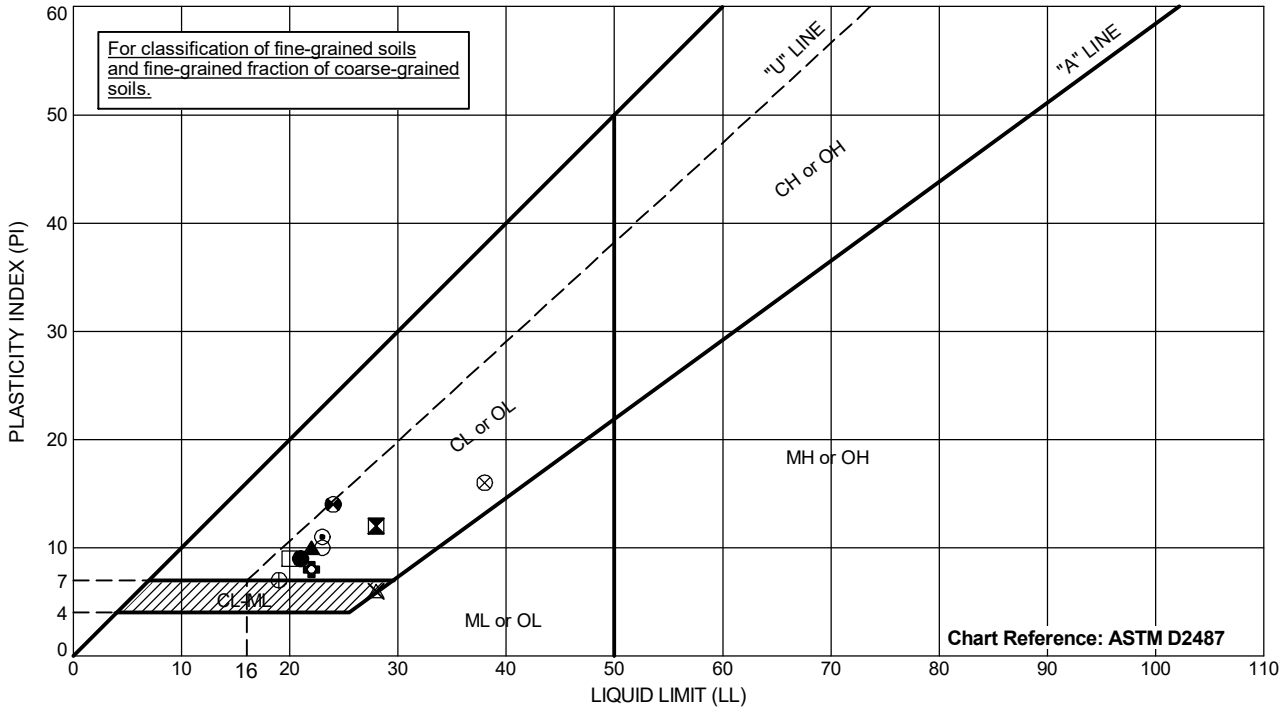
Cumulative Vector Displacement Over Time



B-47 (RC-21-001)
LCG Bypass
01-DN-101-PM 13.7
June 15, 2021

CA-Department of Transportation
DES-OGDW Orinda Field Station
15 Camino Pablo (925) 254-6504
NO BIAS SHIFT APPLIED

APPENDIX M1 Atterberg Limits



Exploration ID		Depth (ft.)	Sample Description [1]	Passing #200	LL	PL	PI
●	D-20-002	30 - 70	SEDIMENTARY ROCK (ARGILLITE)	NM	21	12	9
⊠	RC-20-006	5 - 21.5	FAT CLAY WITH SAND (CH)	25.5	28	16	12
▲	RC-20-006	25 - 41.5	CLAYEY SAND WITH GRAVEL (SC)	21	22	12	10
×	RC-20-007	14 - 16	SEDIMENTARY ROCK (SANDSTONE)	30	28	22	6
⊙	RC-20-013	16 - 17.5	SEDIMENTARY ROCK (ARGILLITE)	NM	23	12	11
✿	RC-20-016	89.5	LANDSLIDE FAILURE ZONE	NM	22	14	8
○	RC-20-017	46.9 - 48.2	SEDIMENTARY ROCK (SANDSTONE)	16.6	23	13	10
△	RC-20-019	11.8 - 17.9	SEDIMENTARY ROCK (SANDSTONE)	40.3	28	22	6
⊗	RC-20-020	5 - 16.5	SANDY FAT CLAY (CH), LEAN TO FLAT CLAY (CL-CH), FAT CLAY (CH)	NM	38	22	16
⊕	RC-21-001	39.6 - 41.6	SEDIMENTARY ROCK (ARGILLITE)	19.0	19	12	7
□	RC-21-001	76.9 - 80.3	SEDIMENTARY ROCK (ARGILLITE)	17.5	20	11	9
⊛	RC-21-001	94.6 - 96.1	SEDIMENTARY ROCK (ARGILLITE)	41.9	24	10	14

[1]Dual classifications of bedrock parent material weathered and/or sheared to intermediate geo-material descriptions are provided on borings logs.
Testing performed in general accordance with ASTM D4318.
NP = Nonplastic
NM = Not Measured

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 0115000099
DRAWN BY: JC
CHECKED BY: BA
DATE: 4/22/2021

ATTERBERG LIMITS

Last Chance Grade Bypass
Del Norte County
California

TABLE

ATTERBERG LIMITS

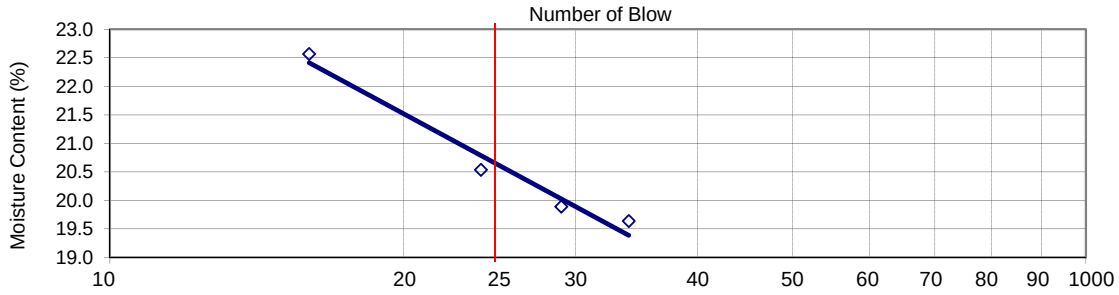
ASTM D-4318-84 / CT-204

Project No: 20-103 Project Name: HNTB, Last Chance Grade Bypass Project

Boring Number:	RC-20-002	Depth (ft/m):	30-70					1
Sample Number:	composite	Description:	CL					
Prepared By:	EA	Date:		Checked By:		JF	Date:	
Pulverized By:		Date:					Container Number	
Tested By:	EA	Date:					Air:	N-5
Computed By:	JF	Date:					Field:	

Trial Number	Field Moisture	1	2	3	4	Plastic Limit 1	Plastic Limit 2
Number of Blow		34	29	24	16		
Can Number		1	2	3	4	5	6
Wt. Wet Soil +Can (gm)		36.99	34.65	33.64	34.93	30.40	33.95
Wt. Dry Soil +Can (gm)		35.27	32.87	32.10	33.01	29.77	33.32
Weight of Can (gm)		26.51	23.92	24.60	24.50	24.25	27.92
Water Content (%)		19.6	19.9	20.5	22.6	11.4	11.7

Liquid Limit (LL, %):	21	Plastic Limit (PL, %):	12	Plastic Index (PI, %):	9

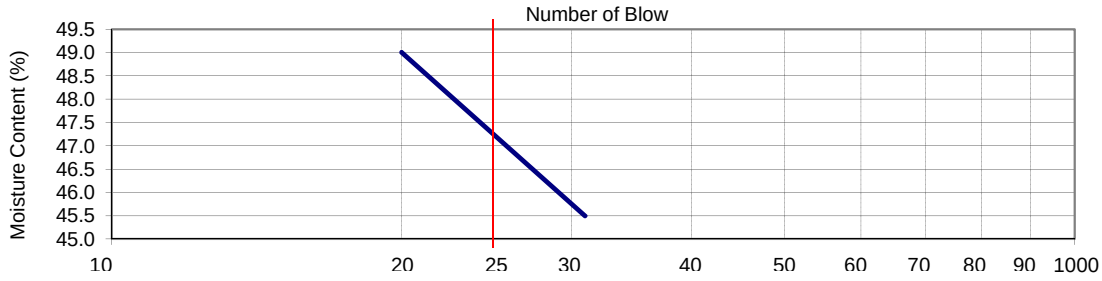


Remark:

Boring Number:		Depth (ft/m):						1
Sample Number:		Description:						
Prepared By:		Date:		Checked By:		JF	Date:	
Pulverized By:		Date:					Container Number	
Tested By:		Date:					Air:	
Computed By:		Date:					Field:	

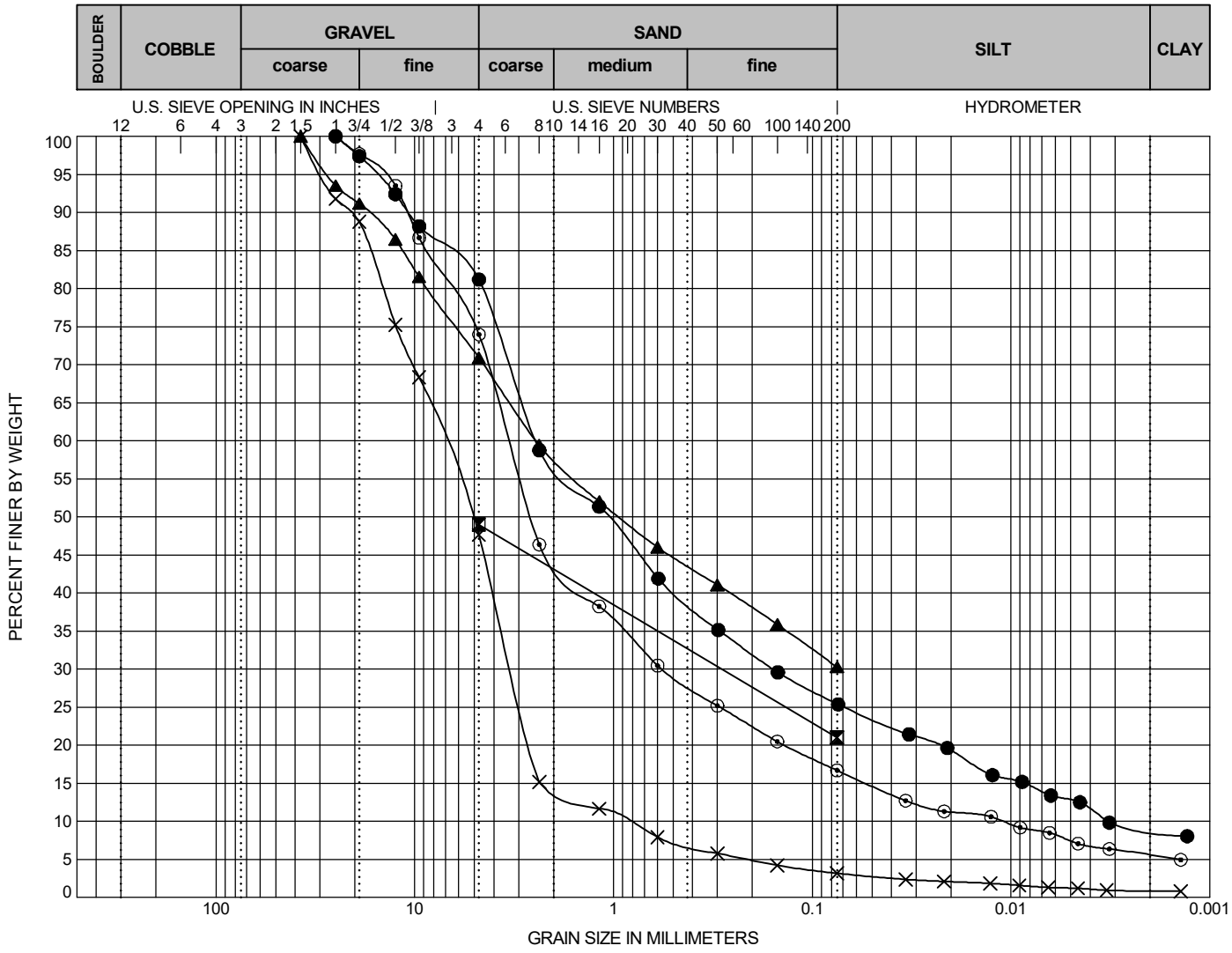
Trial Number	Field Moisture	1	2	3	4	Plastic Limit 1	Plastic Limit 2
Number of Blow							
Can Number							
Wt. Wet Soil +Can (gm)							
Wt. Dry Soil +Can (gm)							
Weight of Can (gm)							
Water Content (%)							

Liquid Limit (LL,%)	Plastic Limit PL,%)	Plastic Index (PI,%)



Remark:

APPENDIX M2 Sieve and Hydrometer Analysis



Exploration ID		Depth (ft.)	Sample Description [1]	LL	PL	PI
●	RC-20-006	5 - 21.5	FAT CLAY WITH SAND (CH)	28	16	12
⊠	RC-20-006	25 - 41.5	CLAYEY SAND WITH GRAVEL (SC)	22	12	10
▲	RC-20-007	14 - 16	SEDIMENTARY ROCK (SANDSTONE)	28	22	6
×	RC-20-017	42.9 - 44.9	SEDIMENTARY ROCK (ARGILLITE AND SANDSTONE)	NM	NM	NM
⊙	RC-20-017	46.9 - 48.2	SEDIMENTARY ROCK (SANDSTONE)	23	13	10

Exploration ID		Depth (ft.)	D_{100}	D_{60}	D_{30}	D_{10}	Cc	Cu	Passing 3/4"	Passing #4	Passing #200	%Silt*	%Clay*
●	RC-20-006	5 - 21.5	25	2.455	0.157	0.003	3.07	748.11	97	81	25.5	16.6	8.9
⊠	RC-20-006	25 - 41.5	4.75	NM	0.285	NM	NM	NM		49	21	NM	NM
▲	RC-20-007	14 - 16	37.5	2.449	NM	NM	NM	NM	91	71	30	NM	NM
×	RC-20-017	42.9 - 44.9	37.5	7.19	3.25	0.88	1.67	8.17	89	48	3.1	2.3	0.8
⊙	RC-20-017	46.9 - 48.2	25	3.335	0.566	0.011	8.76	303.68	98	74	16.6	11.1	5.5

[1]Dual classifications of bedrock parent material weathered and/or sheared to intermediate geo-material descriptions are provided on borings logs.
*These numbers represent silt-sized and clay-sized content but may not indicate the percentage of material with the engineering properties of silt or clay.
Sieve Analysis and Hydrometer Analysis testing performed in general accordance with ASTM D6913(Sieve Analysis) and ASTM D7928 (Hydrometer Analysis).
NP = Nonplastic
NM = Not Measured

Coefficients of Uniformity - $C_u = D_{60} / D_{10}$
Coefficients of Curvature - $C_C = (D_{30})^2 / D_{60} D_{10}$
D_{60} = Grain diameter at 60% passing
D_{30} = Grain diameter at 30% passing
D_{10} = Grain diameter at 10% passing

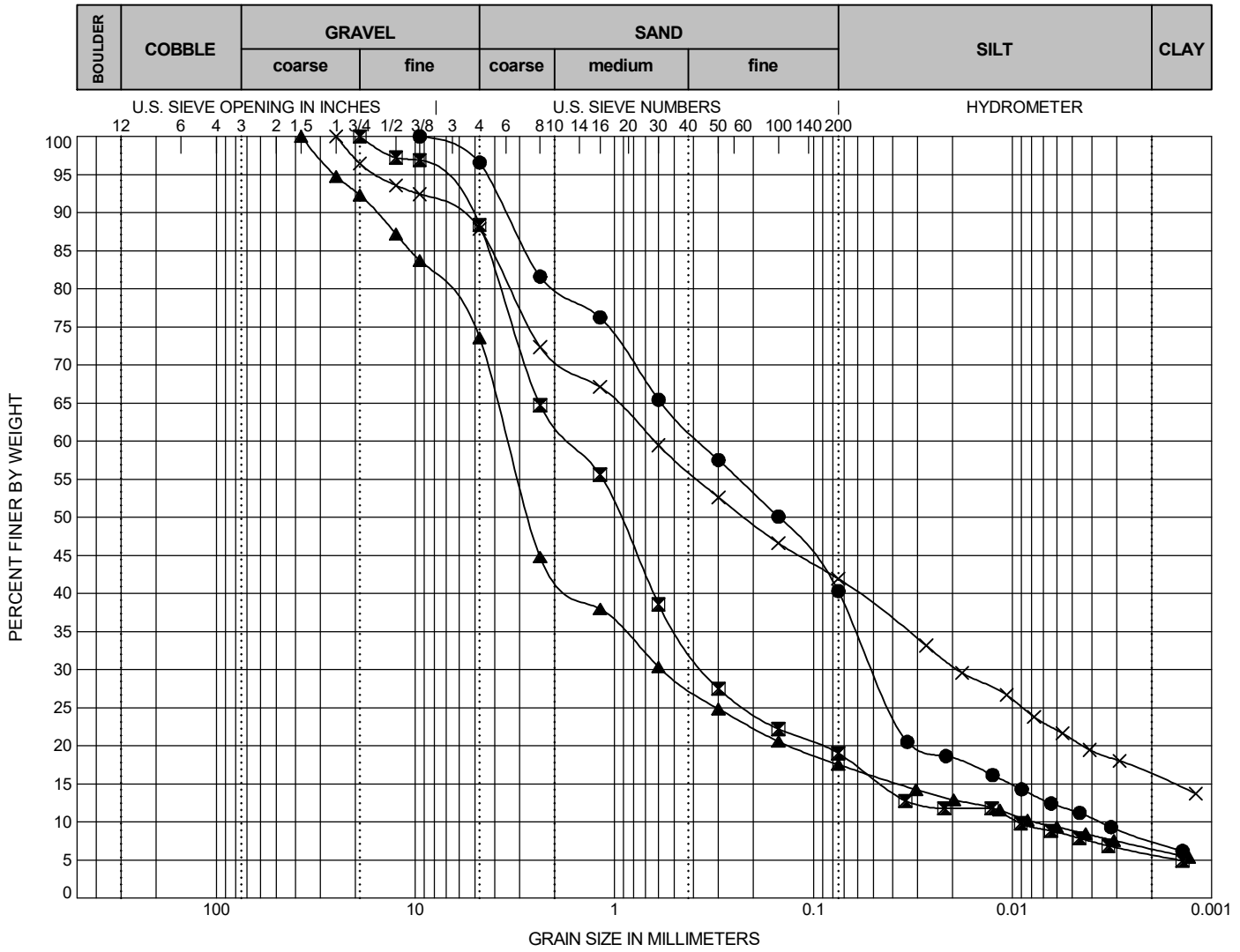
KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 0115000099
DRAWN BY: BA
CHECKED BY: JC
DATE: 6/4/2021

SIEVE ANALYSIS

Last Chance Grade Bypass
Del Norte County
California

TABLE



Exploration ID		Depth (ft.)	Sample Description [1]	LL	PL	PI
●	RC-20-019	11.8 - 17.9	SEDIMENTARY ROCK (SANDSTONE)	28	22	6
⊠	RC-21-001	39.6 - 41.6	SEDIMENTARY ROCK (ARGILLITE)	19	12	7
▲	RC-21-001	76.9 - 80.3	SEDIMENTARY ROCK (ARGILLITE)	20	11	9
×	RC-21-001	94.6 - 96.1	SEDIMENTARY ROCK (ARGILLITE)	24	10	14

Exploration ID		Depth (ft.)	D_{100}	D_{60}	D_{30}	D_{10}	Cc	Cu	Passing 3/4"	Passing #4	Passing #200	%Silt*	%Clay*
●	RC-20-019	11.8 - 17.9	9.5	0.373	0.05	0.004	1.79	101.92		97	40.3	32.8	7.5
⊠	RC-21-001	39.6 - 41.6	19	1.649	0.351	0.009	7.94	175.04	100	88	19.0	13.3	5.7
▲	RC-21-001	76.9 - 80.3	37.5	3.418	0.576	0.008	12.53	440.84	92	74	17.5	11.1	6.4
×	RC-21-001	94.6 - 96.1	25	0.629	0.019	NM	NM	NM	96	88	41.9	25.7	16.2

[1]Dual classifications of bedrock parent material weathered and/or sheared to intermediate geo-material descriptions are provided on borings logs.
*These numbers represent silt-sized and clay-sized content but may not indicate the percentage of material with the engineering properties of silt or clay.
Sieve Analysis and Hydrometer Analysis testing performed in general accordance with ASTM D6913(Sieve Analysis) and ASTM D7928 (Hydrometer Analysis).
NP = Nonplastic
NM = Not Measured

Coefficients of Uniformity - $C_u = D_{60} / D_{10}$
Coefficients of Curvature - $C_C = (D_{30})^2 / D_{60} D_{10}$
D_{60} = Grain diameter at 60% passing
D_{30} = Grain diameter at 30% passing
D_{10} = Grain diameter at 10% passing

KLEINFELDER
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PROJECT NO.: 0115000099
DRAWN BY: JC
CHECKED BY: BA
DATE: 4/22/2021

SIEVE ANALYSIS

Last Chance Grade Bypass
Del Norte County
California

TABLE

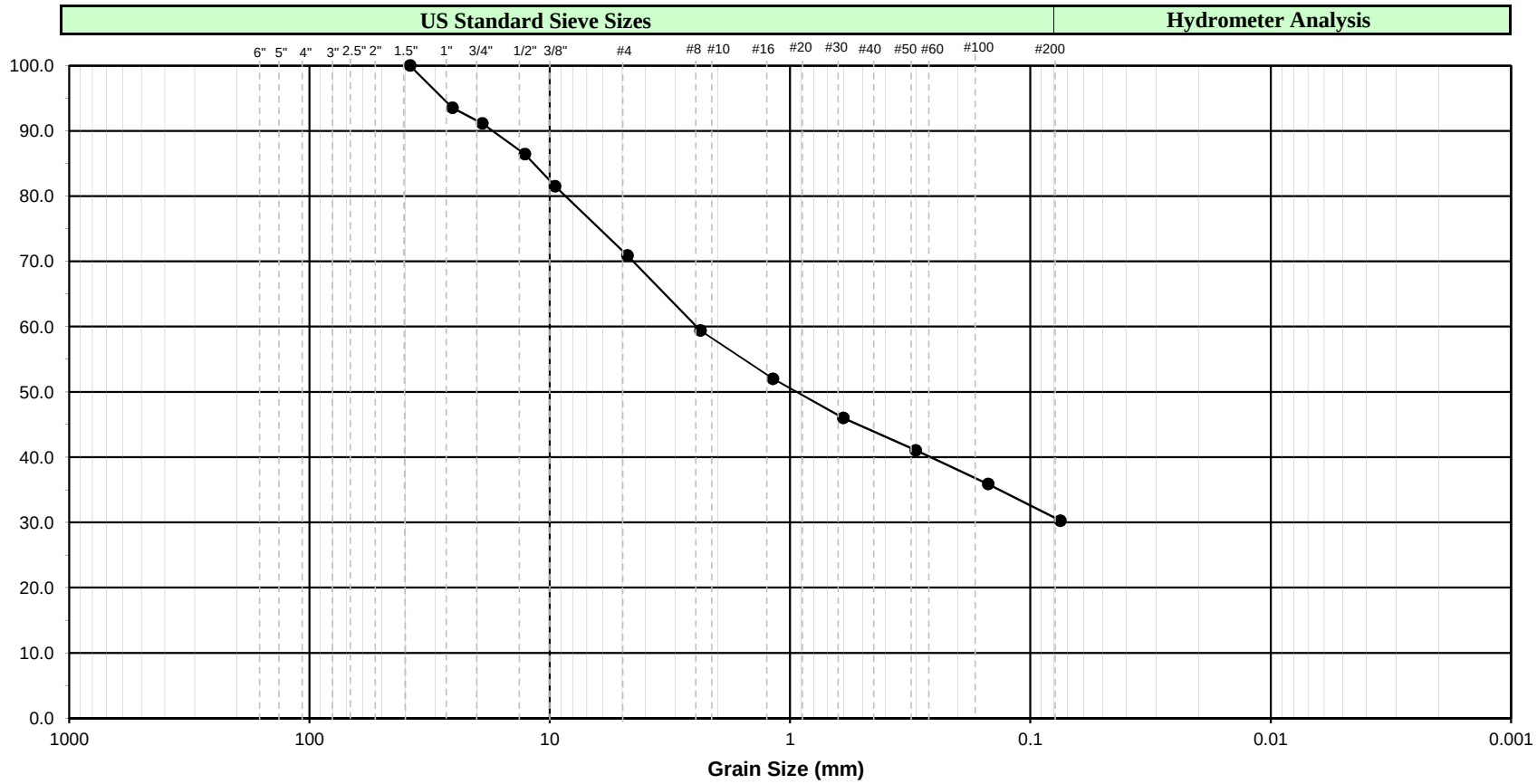
Amount of Material in Soil Finer Than No. 200 Sieve
(ASTM D-1140)

Project No. : 20-103 **Project Name :** Last Chance Grade Bypass Project

Boring No.	: RC-20-006		**Prepared By :** EA	**Date :**	**Percentage of**			**Maximum Size**
Sample No.	:		**Washed By :** EA	**Date :**	**Gravel**	**Sand**	**Fine**	
Depth (ft)	: 25-41.5		**Tested By :** EA	**Date :**	**30**	**49**	**21**	1"
Depth (m)	:		**Checked By :** JF	**Date :**				
Description	: Dark gray, CLAYEY SAND with GRAVEL (SC)				**Sample**		**Retained On**	
X	**Method (A) - Soaked by Water**						**No. 200**	**No. 4**
	Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)				**Tested**	**Moisture**	**Sieve**	
Container Number					S-22	S-22	S-22	S-22
Wet Weight of Soil + Container (gm)					768.25	768.25		
Dry Weight of Soil + Container (gm)						712.97	589.02	
Weight of Container (gm)					115.12	115.12	115.12	
Weight of Dry Soil (gm)					597.85	597.85	473.9	178.78
Moisture Content (%)						9.25		
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve							20.73	29.90
Remark :								1

Boring No.	:		**Prepared By :**	**Date :**	**Percentage of**			**Maximum Size**
Sample No.	:		**Washed By :**	**Date :**	**Gravel**	**Sand**	**Fine**	
Depth (ft)	:		**Tested By :**	**Date :**				
Depth (m)	:		**Checked By :**	**Date :**				
Description	:				**Sample**		**Retained On**	
	Method (A) - Soaked by Water						**No. 200**	**No. 4**
	Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)				**Tested**	**Moisture**	**Sieve**	
Container Number								
Wet Weight of Soil + Container (gm)								
Dry Weight of Soil + Container (gm)								
Weight of Container (gm)								
Weight of Dry Soil (gm)								
Moisture Content (%)								
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve								
Remark :								2

Boring No.	:		**Prepared By :**	**Date :**	**Percentage of**			**Maximum Size**
Sample No.	:		**Washed By :**	**Date :**	**Gravel**	**Sand**	**Fine**	
Depth (ft)	:		**Tested By :**	**Date :**				
Depth (m)	:		**Checked By :**	**Date :**				
Description	:				**Sample**		**Retained On**	
	Method (A) - Soaked by Water						**No. 200**	**No. 4**
	Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)				**Tested**	**Moisture**	**Sieve**	
Container Number								
Wet Weight of Soil + Container (gm)								
Dry Weight of Soil + Container (gm)								
Weight of Container (gm)								
Weight of Dry Soil (gm)								
Moisture Content (%)								
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve								
Remark :								3



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	RC-20-007	composite	14-16				dark gray	Silty to clayey sand with gravel	SM-SC
Remark									

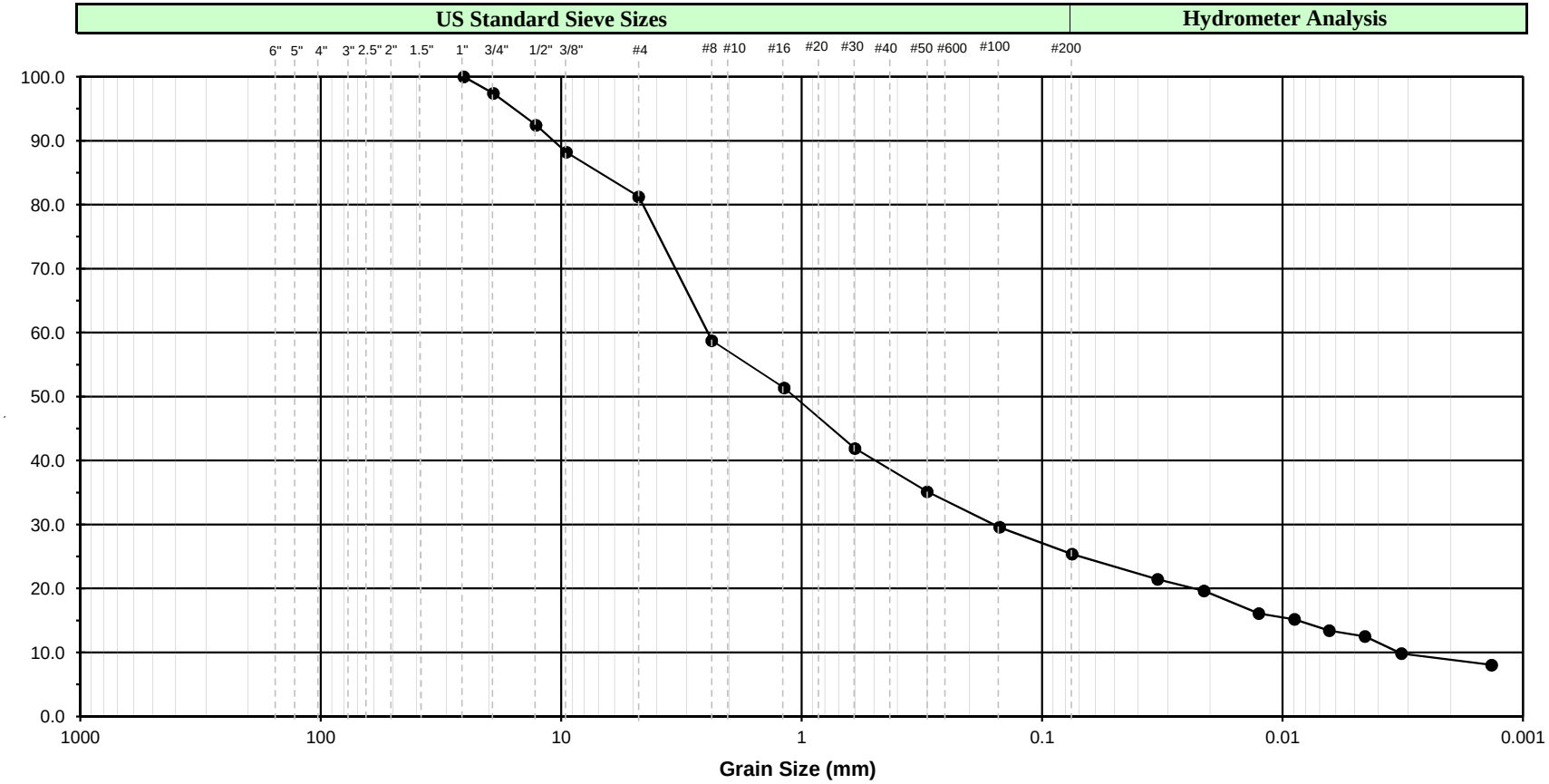
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Last Chance Grade Bypass Project

Project No. : 20-103 **Date :** 04/15/21

GRAIN SIZE ANALYSIS
(ASTM D-6913)

Figure No. :



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)	Depth (m)	Soil Color	Soil Description	U.S.C.S.
●	RC-20-006	compsite	5-21.5		dark gray	Clayey sand with gravel	SC
Remark							

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Last Chance Grade Bypass Project

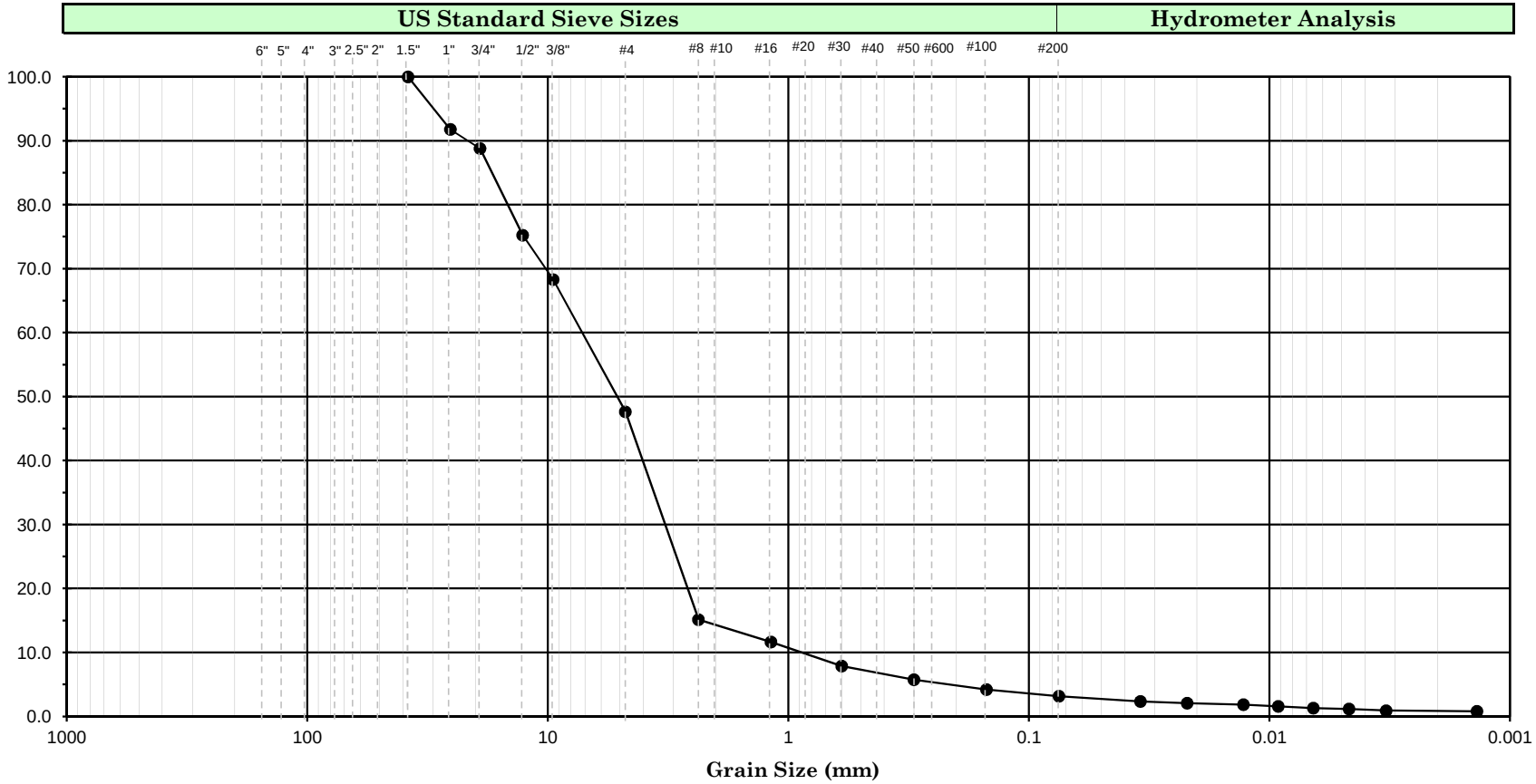
Project No. : *20-103*

Date : *04/22/21*

GRAIN SIZE ANALYSIS

(ASTM D-6913)

Figure No. :



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)	Depth (m)	Soil Color	Soil Description	U.S.C.S.
●	RC-20-017	composite	42.9-44.9		dark gray	Well graded gravel with sand	GW
Remark							

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HNTB, Last Chance Grade Bypass Project

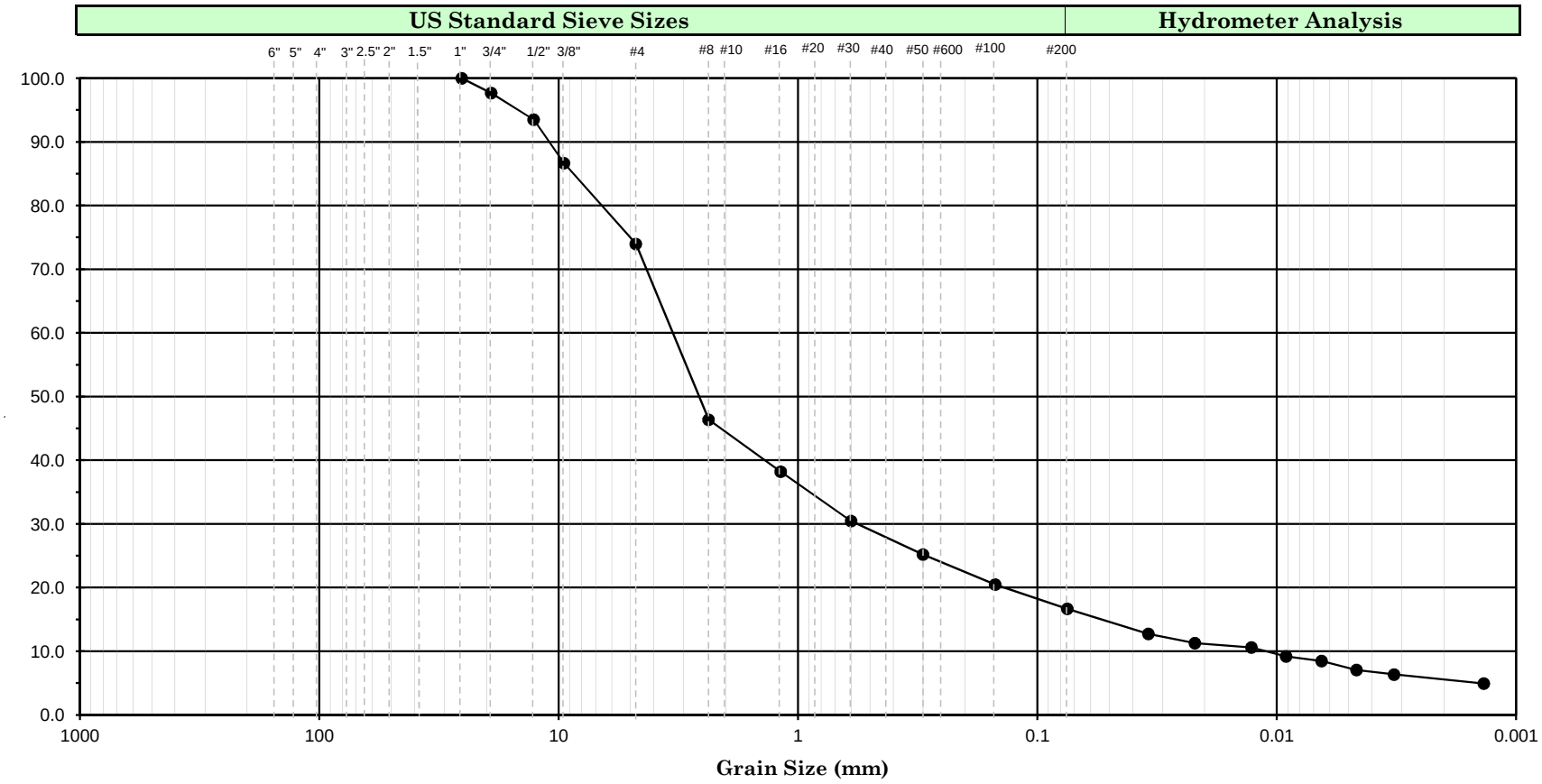
Project No. : 20-103

Date : 04/22/21

GRAIN SIZE ANALYSIS

(ASTM D-6913)

Figure No. :



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)	Depth (m)	Soil Color	Soil Description	U.S.C.S.
●	RC-20-017	compsite	46.9-48.2		dark gray	Clayey sand with gravel	SC
Remark							

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Geotechnical and Earthquake Engineering

HNTB, Last Chance Grade Bypass Project

Project No. : 20-103

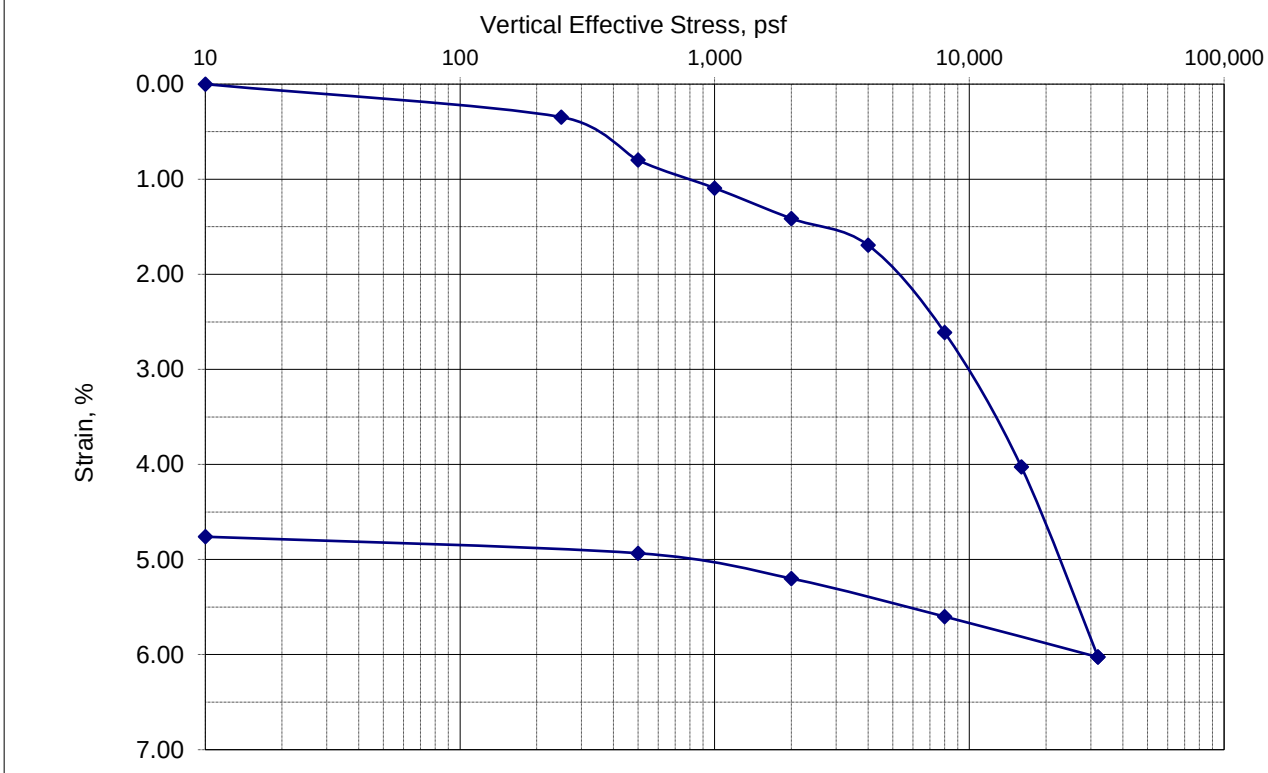
Date : 04/22/21

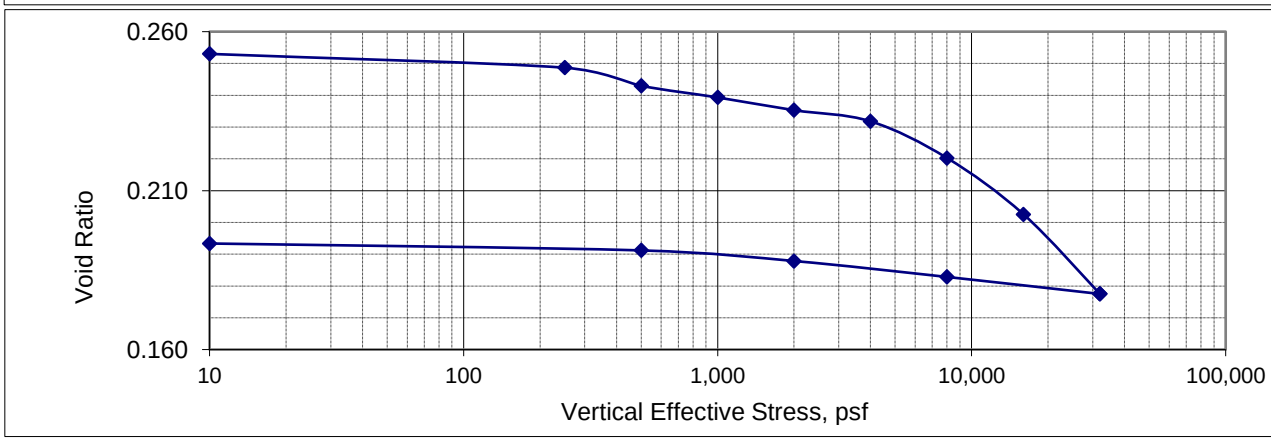
GRAIN SIZE ANALYSIS

(ASTM D-6913)

Figure No. :

APPENDIX M3 Consolidation





Test Method:	ASTM D2435, Method B		Sample Type: Intact		Sample Description: SEDIMENTARY ROCK (ARGILLITE)		
Gs: 2.70	Assumed	LL: nm	PI: nm		Amount of Material Finer than the No. 200, %: nm		
	Height, in.	Diameter, in.	Water Content, %	Wet Density, lb/f^3	Dry Density, lb/f^3	Saturation, %	Void Ratio
Initial	0.750	2.000	7.2	144.2	134.5	76.7	0.253
Final	0.714	2.000	6.1	149.9	141.2	85.6	0.193

Boring:	RC-20-019
Sample:	
Depth, ft:	127.0-127.7
Test Date:	6/17/21-7/1/21

Remarks:

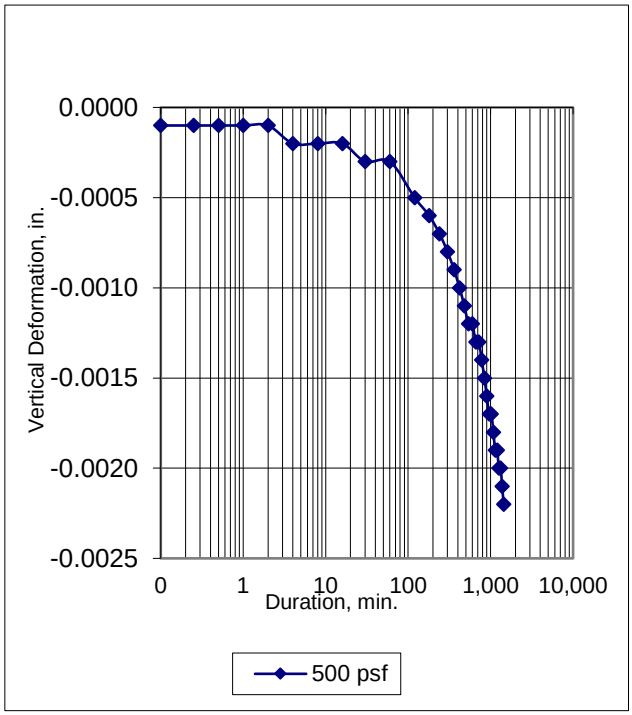
KLEINFELDER
Bright People. Right Solutions.
9969 Horn Rd., Sacramento, CA, 95827

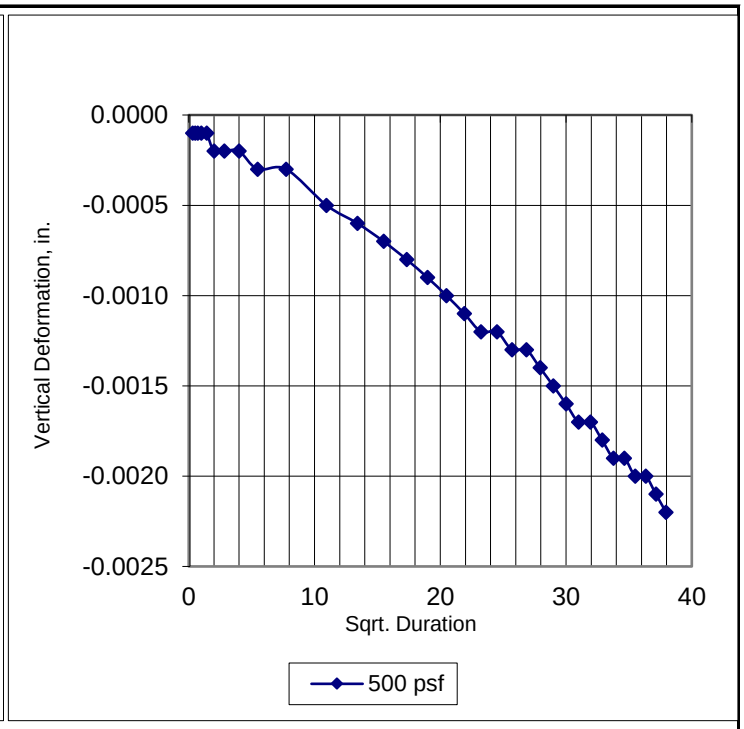
PROJECT NO.:	20208000
ENTRY BY:	J. Slinkard
CHECKED BY:	J. Slinkard
DATE:	7/1/2021

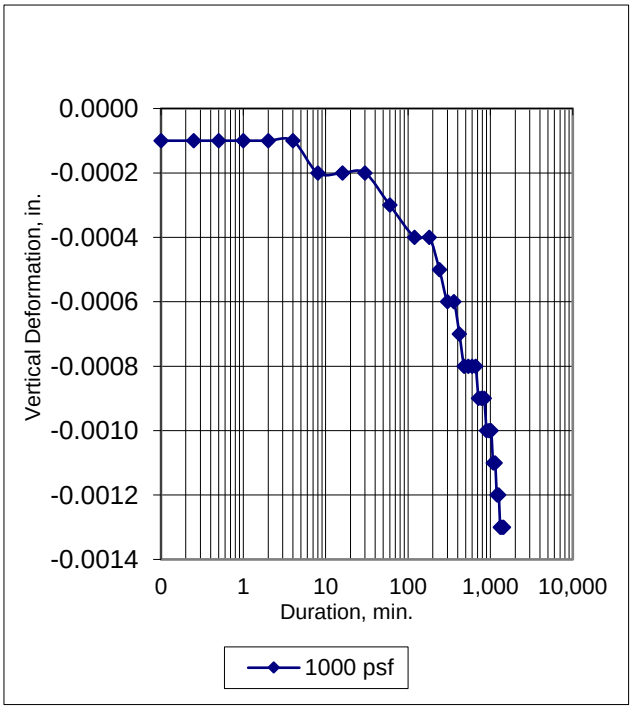
ONE DIMENSIONAL CONSOLIDATION TEST

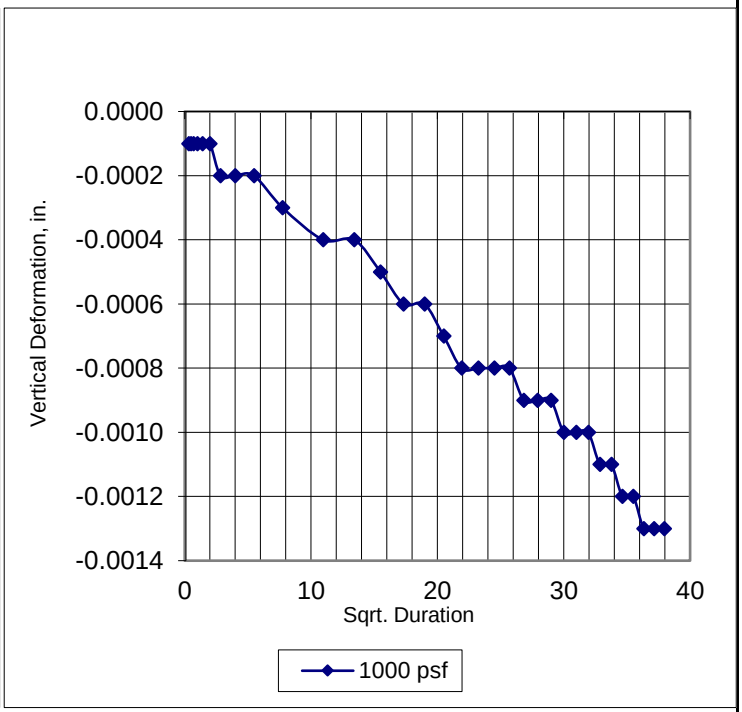
Caltrans D59:
Last Chance Grade Bypass Project
Task Order 1 Phase A_03A2996

FIGURE









Boring:	RC-20-019
Sample:	
Depth, ft:	127.0-127.7
Test Date:	6/17/21-7/1/21

Remarks:

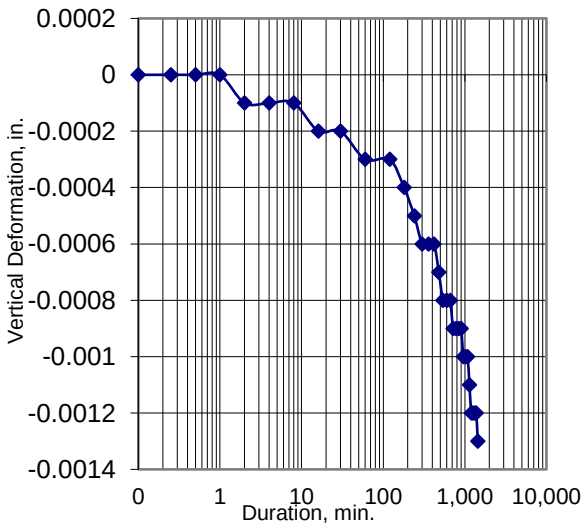
KLEINFELDER
Bright People. Right Solutions.
9969 Horn Rd., Sacramento, CA, 95827

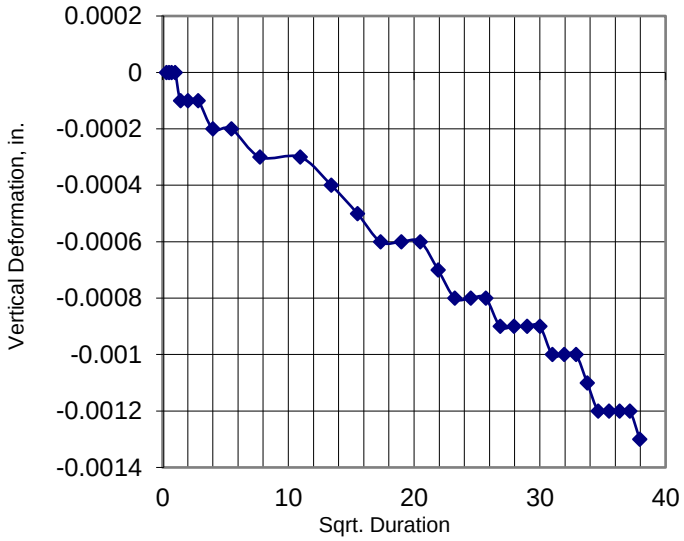
PROJECT NO.:	20208000
ENTRY BY:	J. Slinkard
CHECKED BY:	J. Slinkard
DATE:	7/1/2021

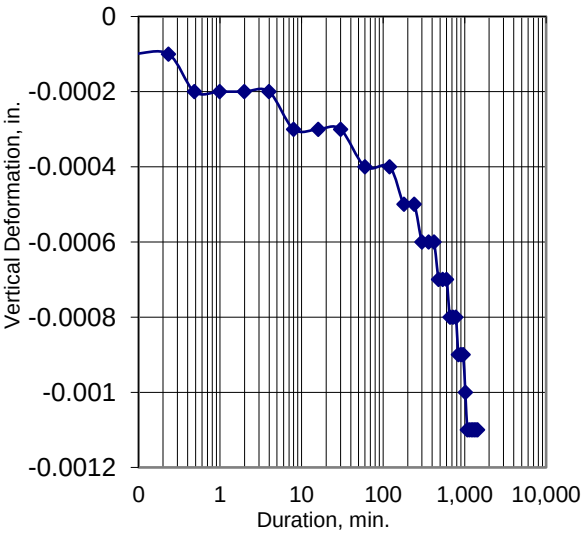
ONE DIMENSIONAL CONSOLIDATION TEST

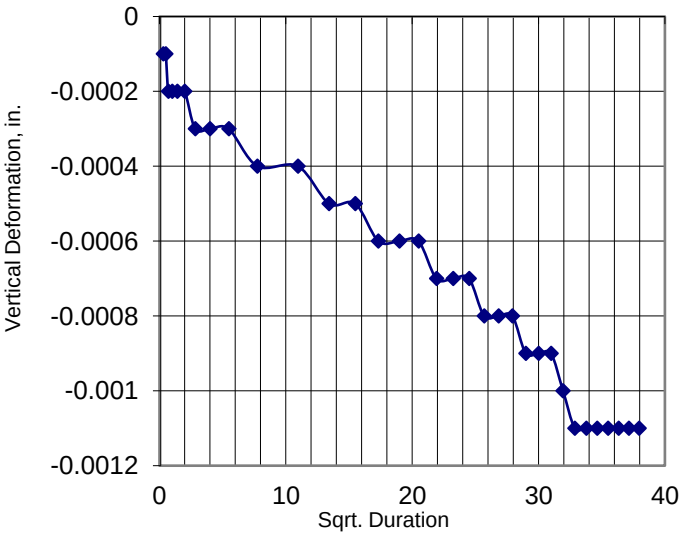
Caltrans D59:
Last Chance Grade Bypass Project
Task Order 1 Phase A_03A2996

FIGURE









Boring:	RC-20-019
Sample:	
Depth, ft:	127.0-127.7
Test Date:	6/17/21-7/1/21

Remarks:

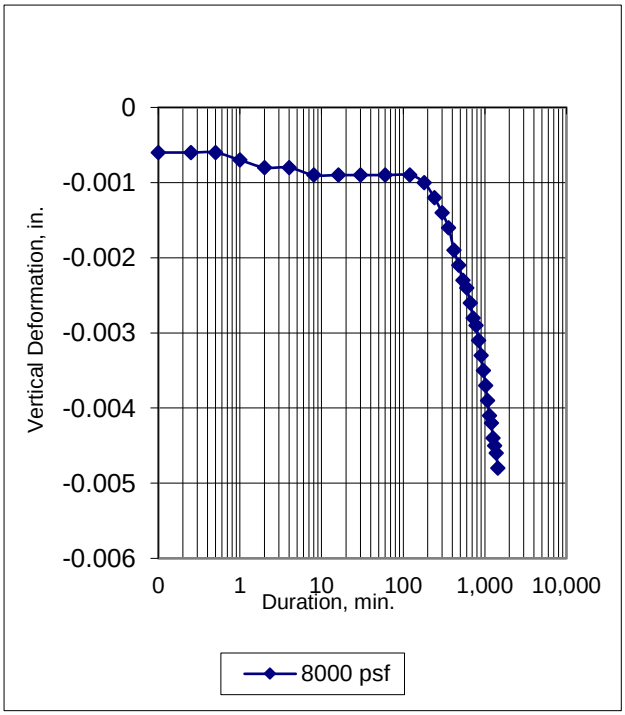
KLEINFELDER
Bright People. Right Solutions.
9969 Horn Rd., Sacramento, CA, 95827

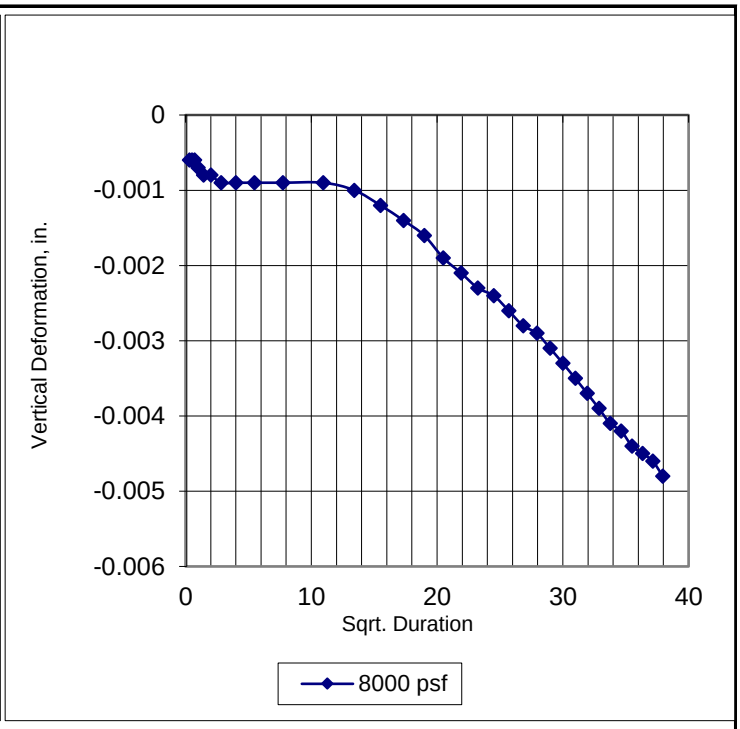
PROJECT NO.:	20208000
ENTRY BY:	J. Slinkard
CHECKED BY:	J. Slinkard
DATE:	7/1/2021

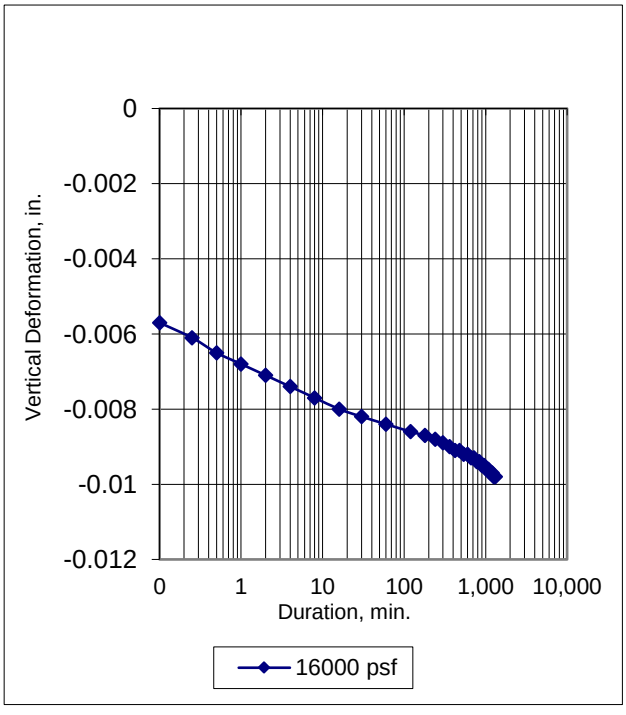
ONE DIMENSIONAL CONSOLIDATION TEST

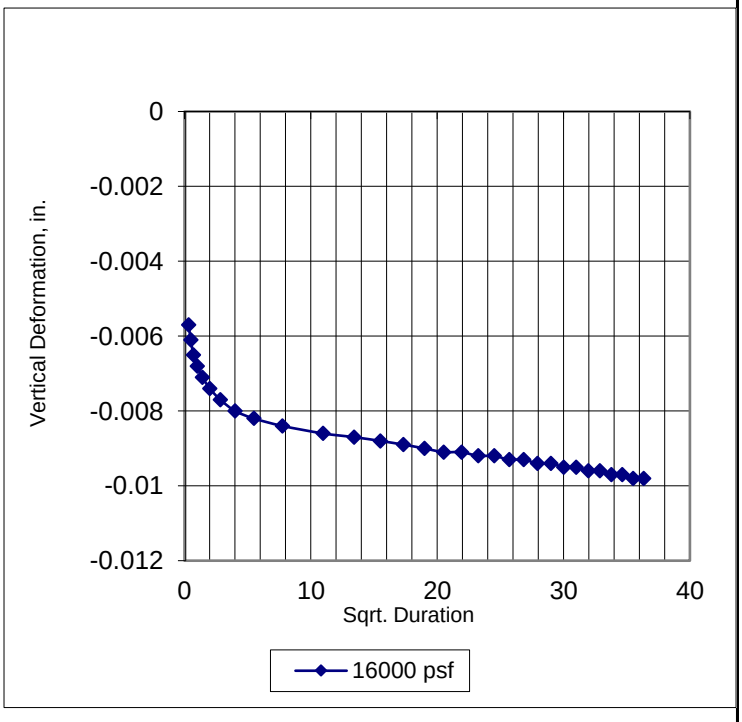
Caltrans D59:
Last Chance Grade Bypass Project
Task Order 1 Phase A_03A2996

FIGURE









Boring:	RC-20-019
Sample:	
Depth, ft:	127.0-127.7
Test Date:	6/17/21-7/1/21

Remarks:

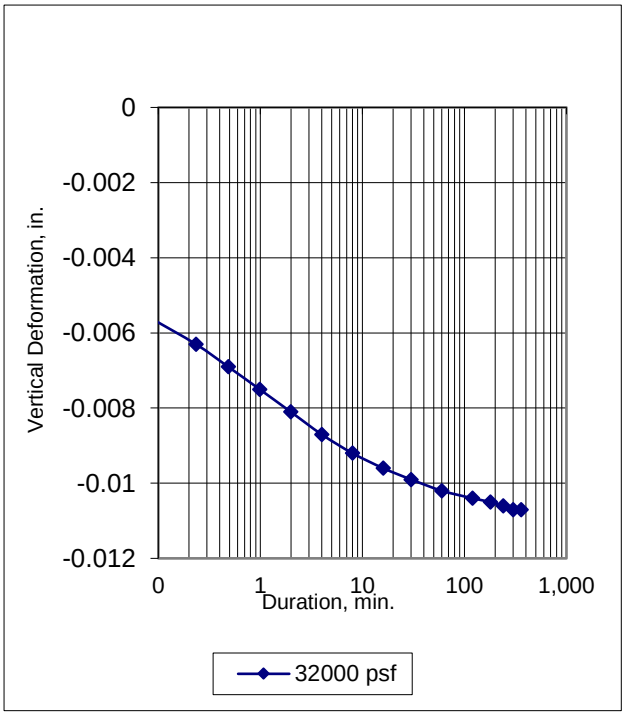
KLEINFELDER
Bright People. Right Solutions.
9969 Horn Rd., Sacramento, CA, 95827

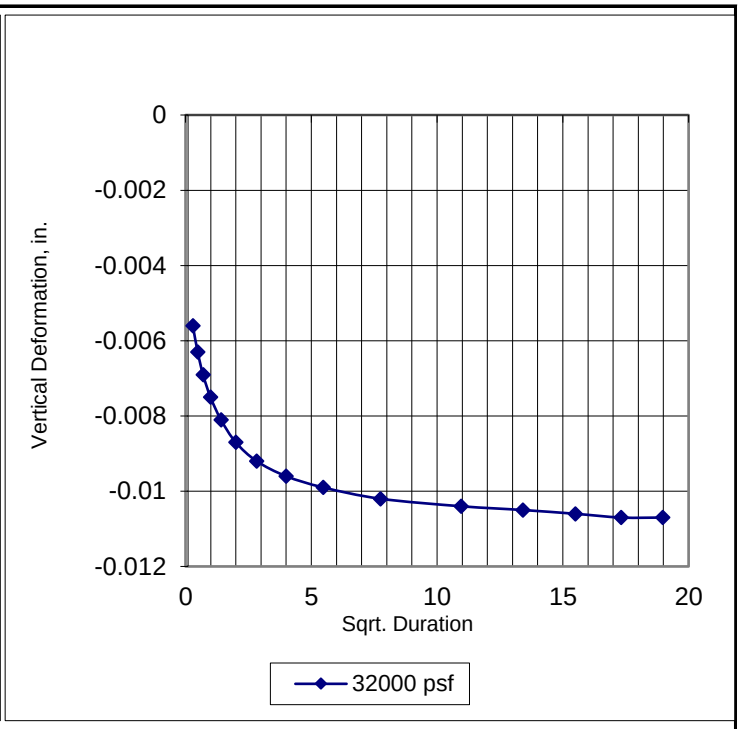
PROJECT NO.:	20208000
ENTRY BY:	J. Slinkard
CHECKED BY:	J. Slinkard
DATE:	7/1/2021

ONE DIMENSIONAL CONSOLIDATION TEST

Caltrans D59:
Last Chance Grade Bypass Project
Task Order 1 Phase A_03A2996

FIGURE





Boring:	RC-20-019
Sample:	
Depth, ft:	127.0-127.7
Test Date:	6/17/21-7/1/21

Remarks:

KLEINFELDER
Bright People. Right Solutions.

9969 Horn Rd., Sacramento, CA, 95827

PROJECT NO.:	20208000
ENTRY BY:	J. Slinkard
CHECKED BY:	J. Slinkard
DATE:	7/1/2021

ONE DIMENSIONAL CONSOLIDATION TEST

Caltrans D59:
Last Chance Grade Bypass Project
Task Order 1 Phase A_03A2996

FIGURE

APPENDIX M4 Unconsolidated Undrained Triaxial Shear

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	HNTB, Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.: ☐	RC-20-002	**Tested by:**	KK	**Date:**	12/08/20
Depth (ft):	30-70	**Checked by:**	JF	**Date:**	12/11/2020
Sample No.	Composite	**Sample Type:**	R		

Sample Description: Dark gray, SILT with SAND (ML)

	1	2	3		
Diameter (in.):	2.45	2.446	2.447	Average:	2.448
Height (in.):	5.018	5.028	5.040	Average:	5.029

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		219.57
Wt. Dry Sample + Container (gms):		211.2
Container (gms)	No. 9	113.45
Moisture Content (%)		**8.6**

Density and Saturation	
Wt. Wet Sample + Container (gms)	1150.05
Container (gms)	228.92
Wet Density (pcf)	**148.3**
Dry Density (pcf)	**136.6**
Void Ratio	**0.234**
% Saturation	**99.0**

Assume Gs=2.70

Test Data Filename:	20103RC22.trx

SKETCH / PHOTO AFTER TEST:

PHOTO FILE NAME: Test In Process\20-103 - HNTB, Last Chance Grade Bypa

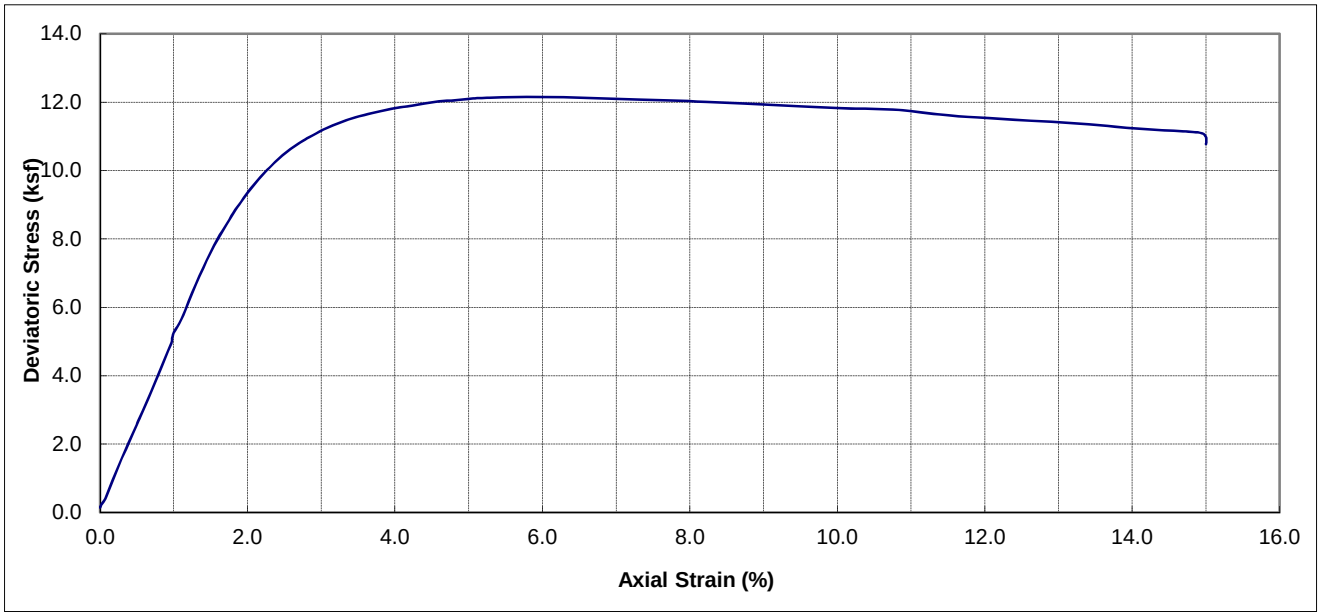
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**1.72**

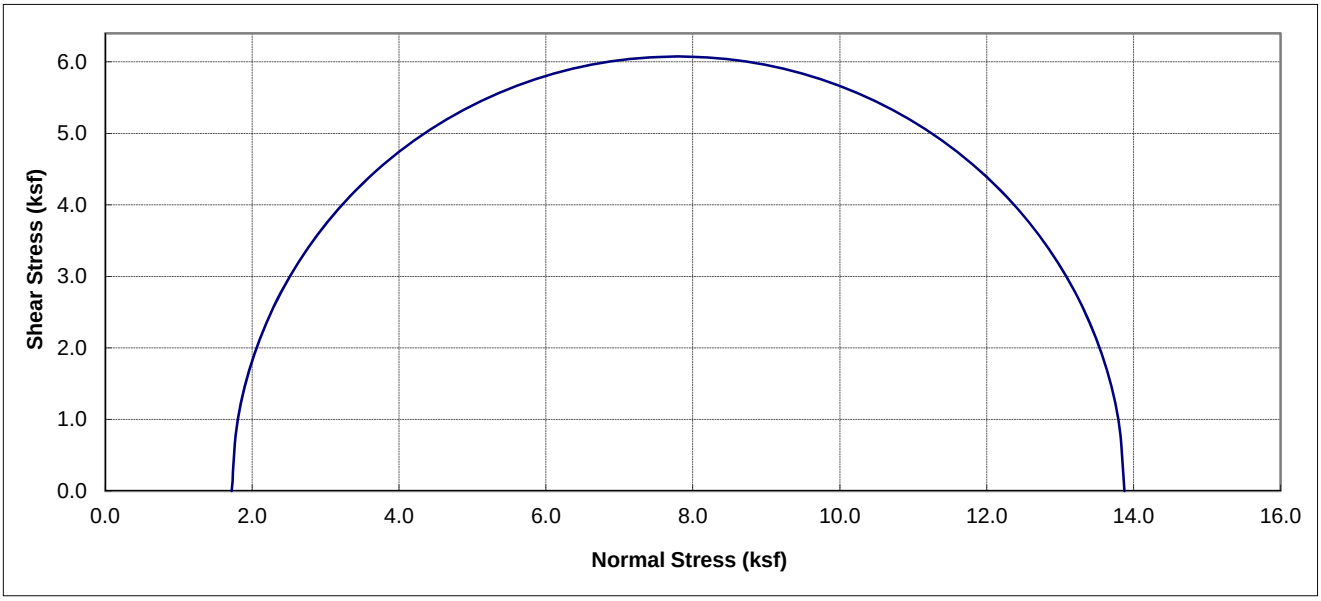
Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure

Deviator Stress (ksf)	**12.15**
Eff. Minor Principal Stress (ksf)=	**1.72**
Eff. Major Principal Stress (ksf)=	**13.87**
Axial Strain (%)=	**5.82**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max Dev. Stress (ksf)	Initial Saturation (%)
RC-20-002	Composite	30-70	Dark gray, SILT with SAND (ML)	136.6	8.56	1.72	12.15	99.0

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

HNTB, Last Chance Grade Bypass Project

UNCONSOLIDATED UNDRAINED TEST
(ASTM D2850)

Project No. : 20-103

Date : 12/08/20

Figure No. :

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	HNTB, Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.: ☐	RC-20-002	**Tested by:**	KK	**Date:**	12/10/20
Depth (ft):	30-70	**Checked by:**	JF	**Date:**	12/11/2020
Sample No.	Composite	**Sample Type:**	R		

Sample Description: Dark gray, SILT with SAND (ML)

	1	2	3		
Diameter (in.):	2.444	2.444	2.444	Average:	2.444
Height (in.):	5.011	5.010	5.010	Average:	5.010

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		219.57
Wt. Dry Sample + Container (gms):		211.2
Container (gms)	No. 9	113.45
Moisture Content (%)		**8.6**

Density and Saturation	
Wt. Wet Sample + Container (gms)	1143.07
Container (gms)	228.92
Wet Density (pcf)	**148.0**
Dry Density (pcf)	**136.4**
Void Ratio	**0.236**
% Saturation	**98.2**

Assume Gs=2.70

Test Data Filename:	20103RC23.trx

SKETCH / PHOTO AFTER TEST:

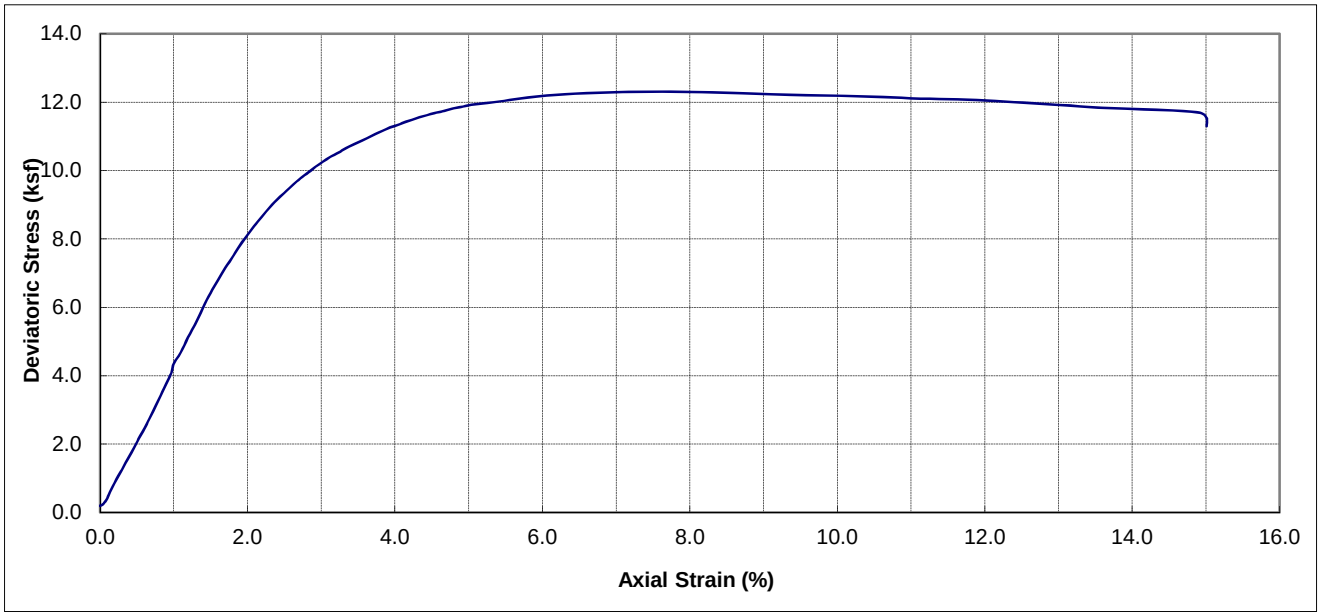
PHOTO FILE NAME: Test In Process\20-103 - HNTB, Last Chance Grade Bypa

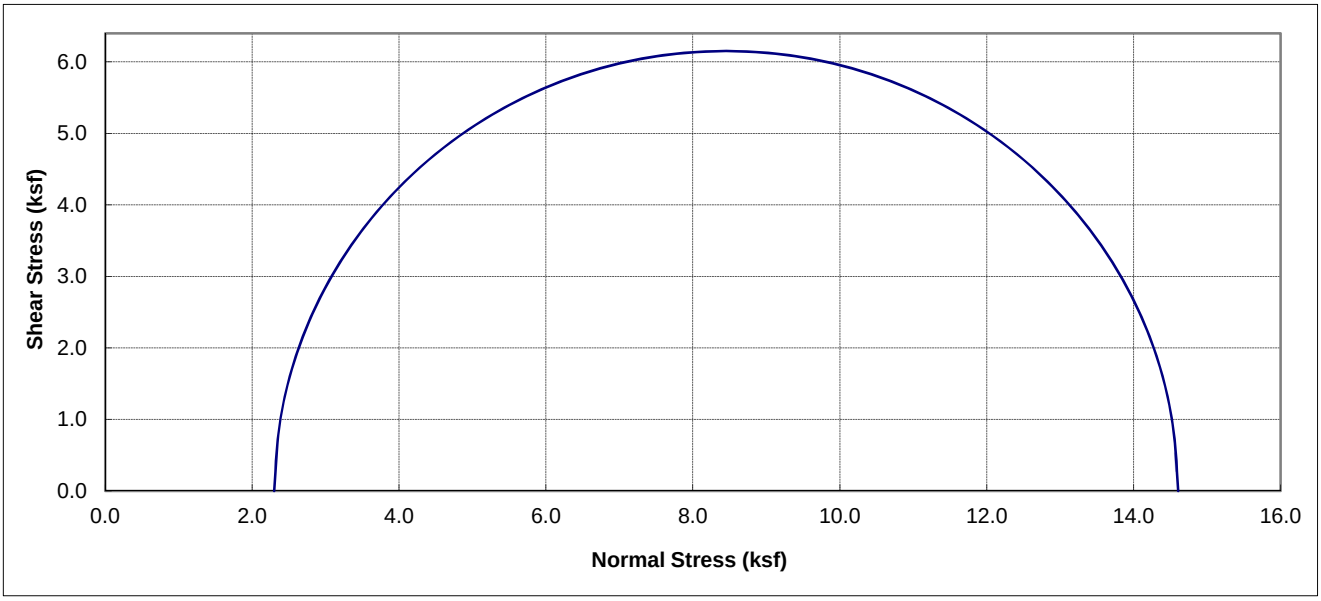
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**2.30**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**12.30**
Eff. Minor Principal Stress (ksf)=	**2.30**
Eff. Major Principal Stress (ksf)=	**14.61**
Axial Strain (%)=	**7.33**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max Dev. Stress (ksf)	Initial Saturation (%)
RC-20-002	Composite	30-70	Dark gray, SILT with SAND (ML)	136.4	8.56	2.30	12.30	98.2

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

HNTB, Last Chance Grade Bypass Project

UNCONSOLIDATED UNDRAINED TEST
(ASTM D2850)

Project No. : 20-103

Date : 12/10/20

Figure No. :

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	HNTB, Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.: ☐	RC-20-002	**Tested by:**	KK	**Date:**	12/10/20
Depth (ft):	30-70	**Checked by:**	JF	**Date:**	12/11/2020
Sample No.	Composite	**Sample Type:**	R		

Sample Description: Dark gray, SILT with SAND (ML)

	1	2	3		
Diameter (in.):	2.444	2.44	2.442	Average:	2.442
Height (in.):	5.038	5.030	5.029	Average:	5.032

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		219.57
Wt. Dry Sample + Container (gms):		211.2
Container (gms)	No. 9	113.45
Moisture Content (%)		**8.6**

Density and Saturation	
Wt. Wet Sample + Container (gms)	1146.44
Container (gms)	228.92
Wet Density (pcf)	**148.1**
Dry Density (pcf)	**136.5**
Void Ratio	**0.235**
% Saturation	**98.5**

Assume Gs=2.70

Test Data Filename:	20103RC24.trx

SKETCH / PHOTO AFTER TEST:

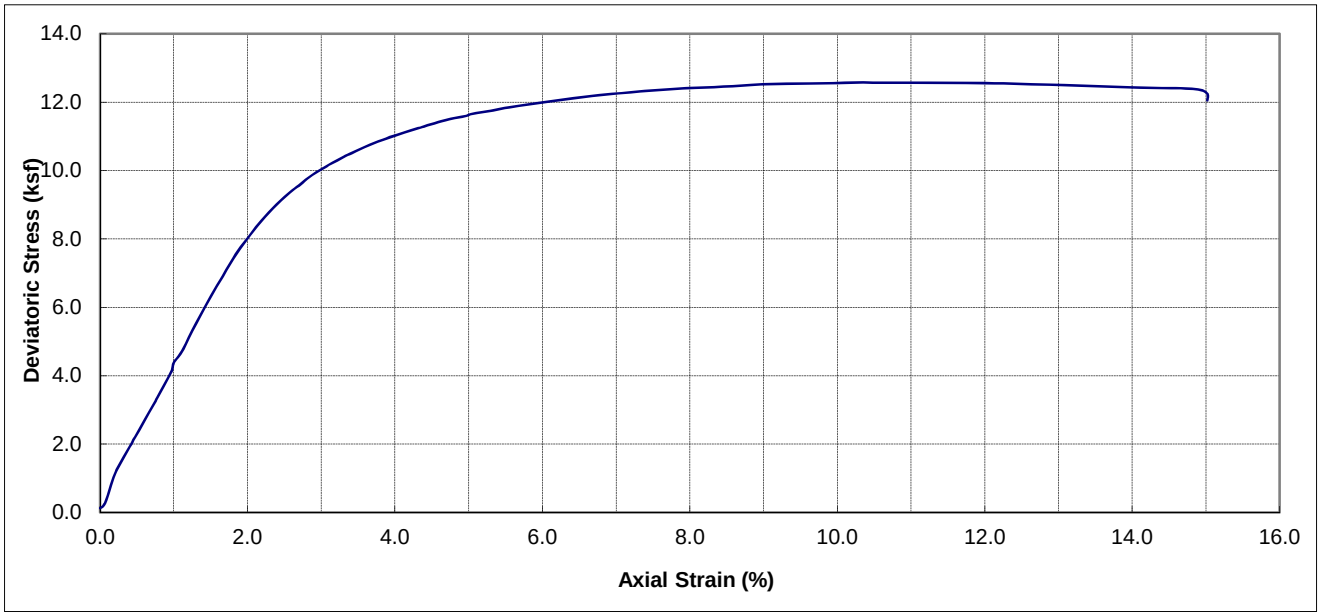
PHOTO FILE NAME: Test In Process\20-103 - HNTB, Last Chance Grade Bypa

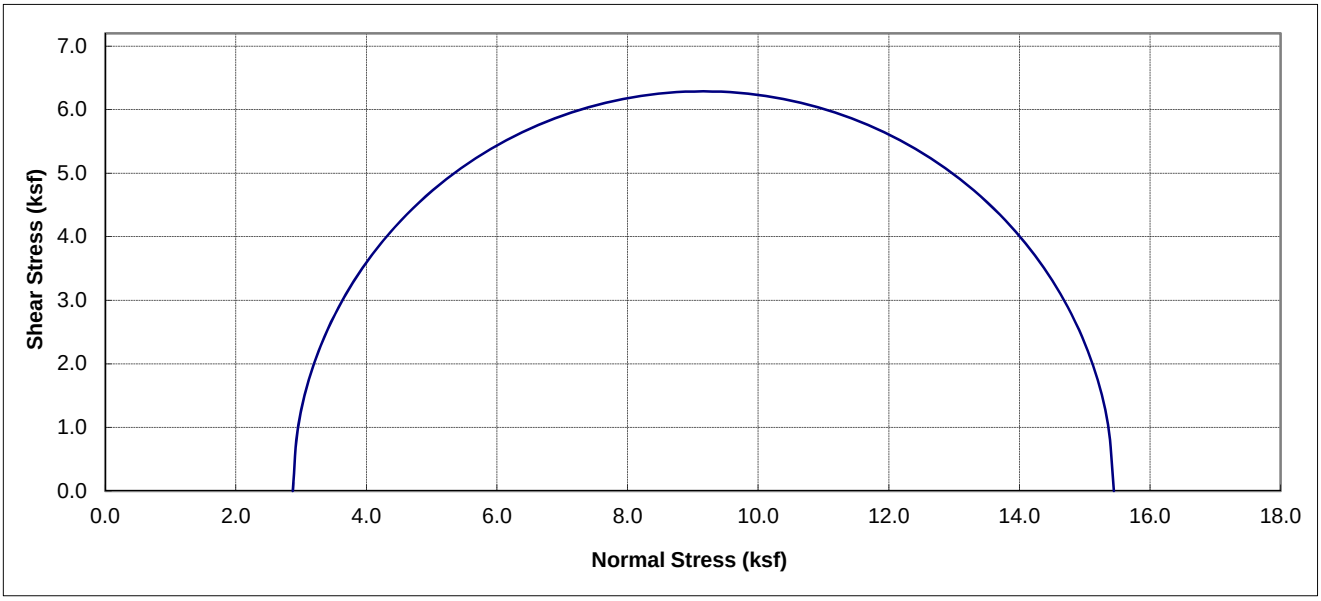
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**2.87**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**12.57**
Eff. Minor Principal Stress (ksf)=	**2.87**
Eff. Major Principal Stress (ksf)=	**15.45**
Axial Strain (%)=	**10.35**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max Dev. Stress (ksf)	Initial Saturation (%)
RC-20-002	Composite	30-70	Dark gray, SILT with SAND (ML)	136.5	8.56	2.87	12.57	98.5

Earth Mechanics, Inc.
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HNTB, Last Chance Grade Bypass Project

UNCONSOLIDATED UNDRAINED TEST
(ASTM D2850)

Project No. : 20-103

Date : 12/10/20

Figure No. :

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	HNTB, Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.: ☐	RC-20-002	**Tested by:**	KK	**Date:**	12/08/20
Depth (ft):	30-70	**Checked by:**	JF	**Date:**	12/11/2020
Sample No.	Composite	**Sample Type:**	R		

Sample Description: Dark gray, SILT with SAND (ML)

	1	2	3		
Diameter (in.):	2.45	2.445	2.449	Average:	2.448
Height (in.):	5.001	5.003	5.000	Average:	5.001

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		219.57
Wt. Dry Sample + Container (gms):		211.2
Container (gms)	No. 9	113.45
Moisture Content (%)		**8.6**

Density and Saturation	
Wt. Wet Sample + Container (gms)	1145.87
Container (gms)	228.92
Wet Density (pcf)	**148.3**
Dry Density (pcf)	**136.6**
Void Ratio	**0.234**
% Saturation	**99.0**

Assume Gs=2.70

Test Data Filename:	20103RC21.trx

SKETCH / PHOTO AFTER TEST:

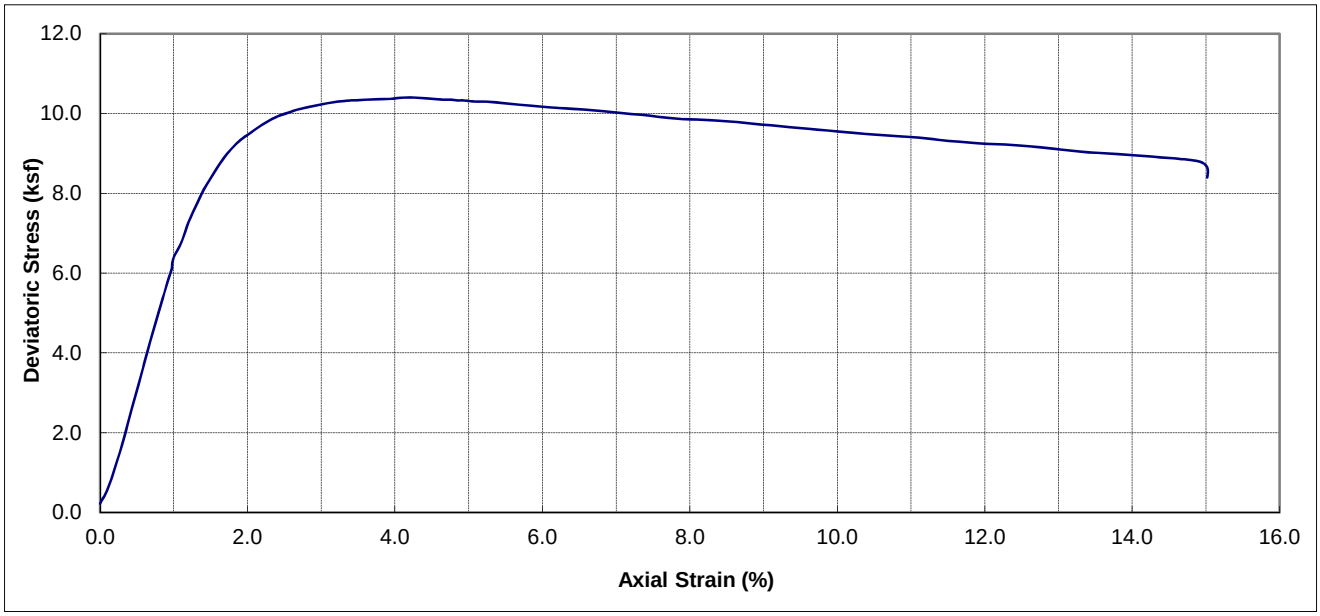
PHOTO FILE NAME: Test In Process\20-103 - HNTB, Last Chance Grade Bypa

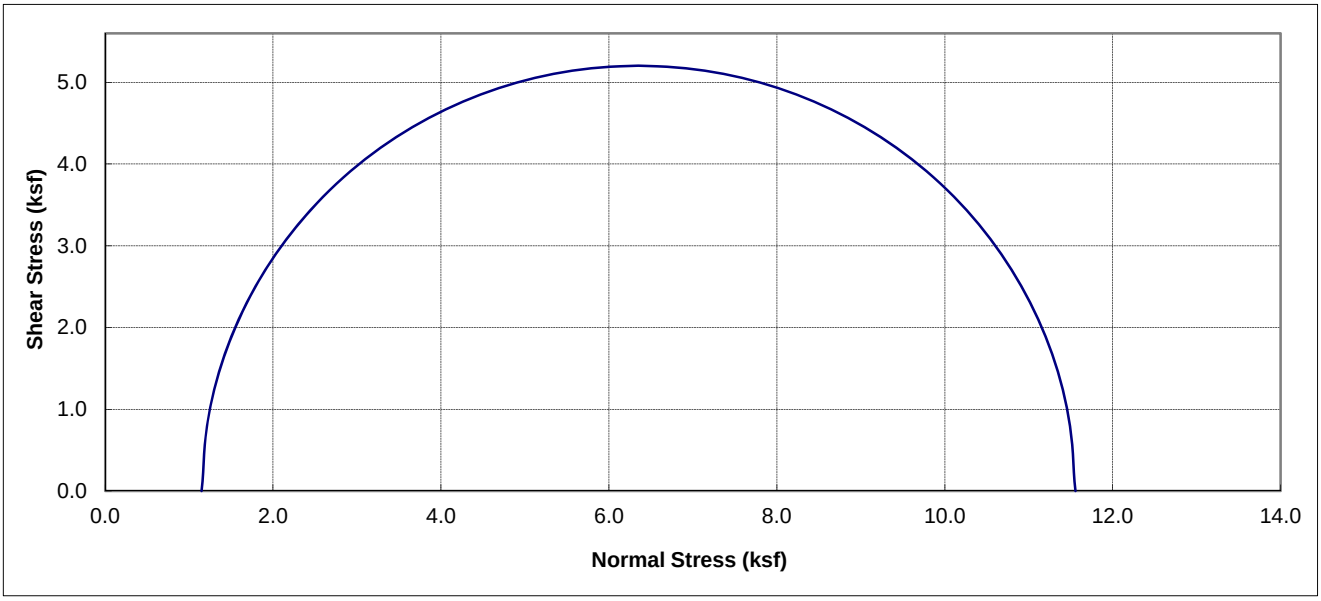
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**1.15**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**10.41**
Eff. Minor Principal Stress (ksf)=	**1.15**
Eff. Major Principal Stress (ksf)=	**11.56**
Axial Strain (%)=	**4.23**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max Dev. Stress (ksf)	Initial Saturation (%)
RC-20-002	Composite	30-70	Dark gray, SILT with SAND (ML)	136.6	8.56	1.15	10.41	99.0

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

HNTB, Last Chance Grade Bypass Project

UNCONSOLIDATED UNDRAINED TEST
(ASTM D2850)

Figure No. :

Project No. : 20-103 **Date :** 12/08/20

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	HNTB, Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.: ☐	R-20-005	**Tested by:**	KK	**Date:**	04/12/21
Depth (ft):	154.1	**Checked by:**	JF	**Date:**	4/13/2021
Sample No.	-	**Sample Type:**	R		

Sample Description: Gray, SANDY lean CLAY (CL)

	1	2	3		
Diameter (in.):	2.405	2.400	2.405	Average:	2.403
Height (in.):	5.641	5.649	5.655	Average:	5.648

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		171.81
Wt. Dry Sample + Container (gms):		169.16
Container (gms)	No. 14	56.88
Moisture Content (%)		**2.4**

Density and Saturation	
Wt. Wet Sample + Container (gms)	1004.21
Container (gms)	0
Wet Density (pcf)	**149.2**
Dry Density (pcf)	**145.7**
Void Ratio	**0.156**
% Saturation	**40.8**

Assume Gs=2.70

Test Data Filename:	21103RC0051541.trx

SKETCH / PHOTO AFTER TEST:

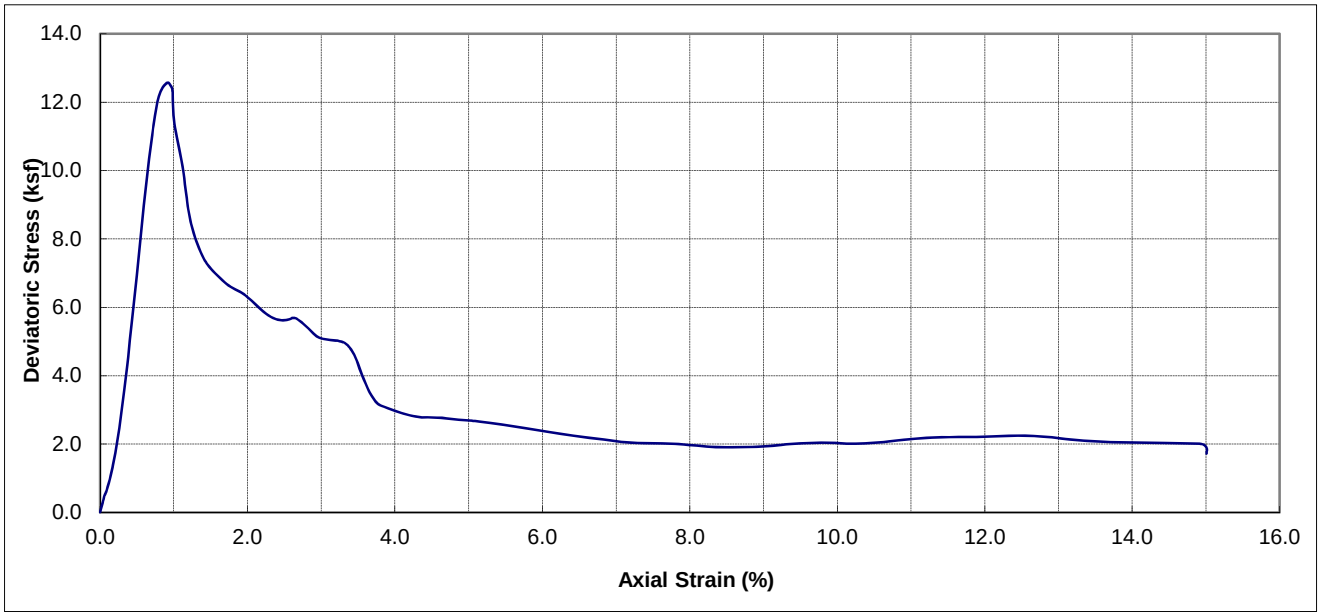
PHOTO FILE NAME: st In Process\20-103 - HNTB, Last Chance Grade Bypass

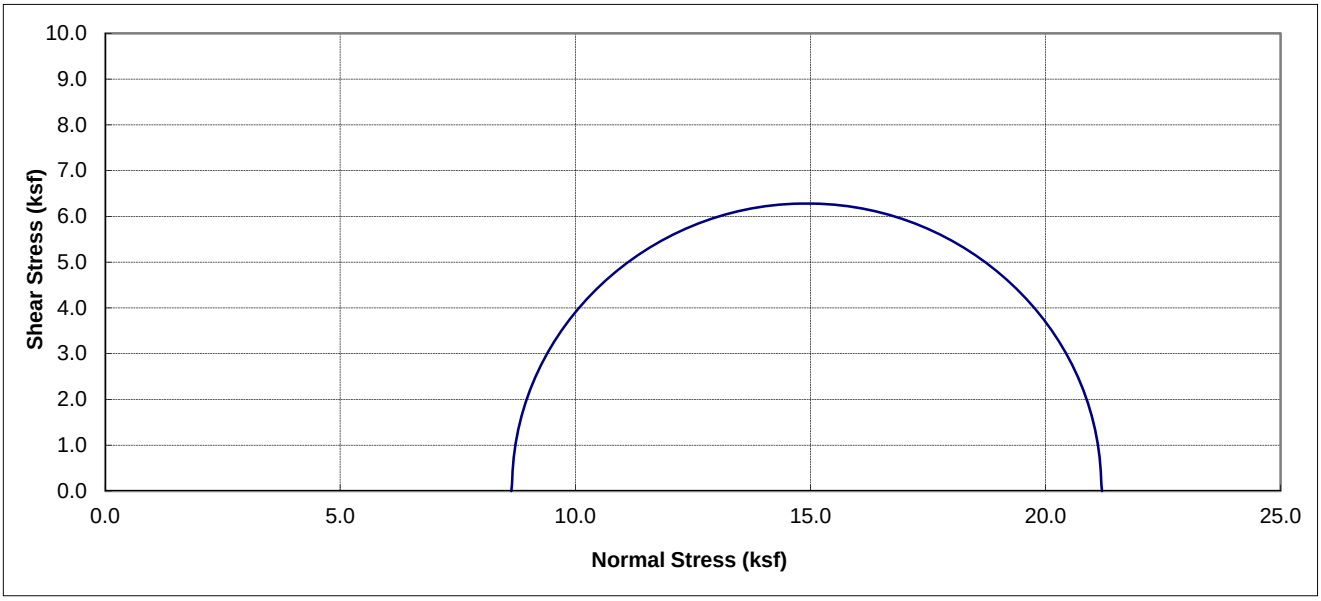
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**8.64**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**12.56**
Eff. Minor Principal Stress (ksf)=	**8.64**
Eff. Major Principal Stress (ksf)=	**21.20**
Axial Strain (%)=	**0.91**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max Dev. Stress (ksf)	Initial Saturation (%)
R-20-005	0	154.1	Gray, SANDY lean CLAY (CL)	145.7	2.36	8.64	12.56	40.8

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	HNTB, Last Chance Grade Bypass Project
	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)
Project No. : 20-103 Date : 04/12/21	Figure No. :

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.: ☐	R-20-006	**Tested by:**	KK	**Date:**	4/12/2021
Depth (ft):	79.8 - 80.8	**Checked by:**	JF	**Date:**	4/13/2021
Sample No.		**Sample Type:**			

Sample Description:

	1	2	3		
Diameter (in.):	2.505	2.505	2.503	Average:	2.504
Height (in.):	4.913	4.910	4.910	Average:	4.911

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		190.78
Wt. Dry Sample + Container (gms):		188.73
Container (gms)	No. 36	58.09
Moisture Content (%)		**1.6**

Density and Saturation	
Wt. Wet Sample + Container (gms)	926.87
Container (gms)	0
Wet Density (pcf)	**145.8**
Dry Density (pcf)	**143.6**
Void Ratio	**0.173**
% Saturation	**24.4**

Assume Gs=2.70

Test Data Filename:	21103RC006808.trx

SKETCH / PHOTO AFTER TEST:

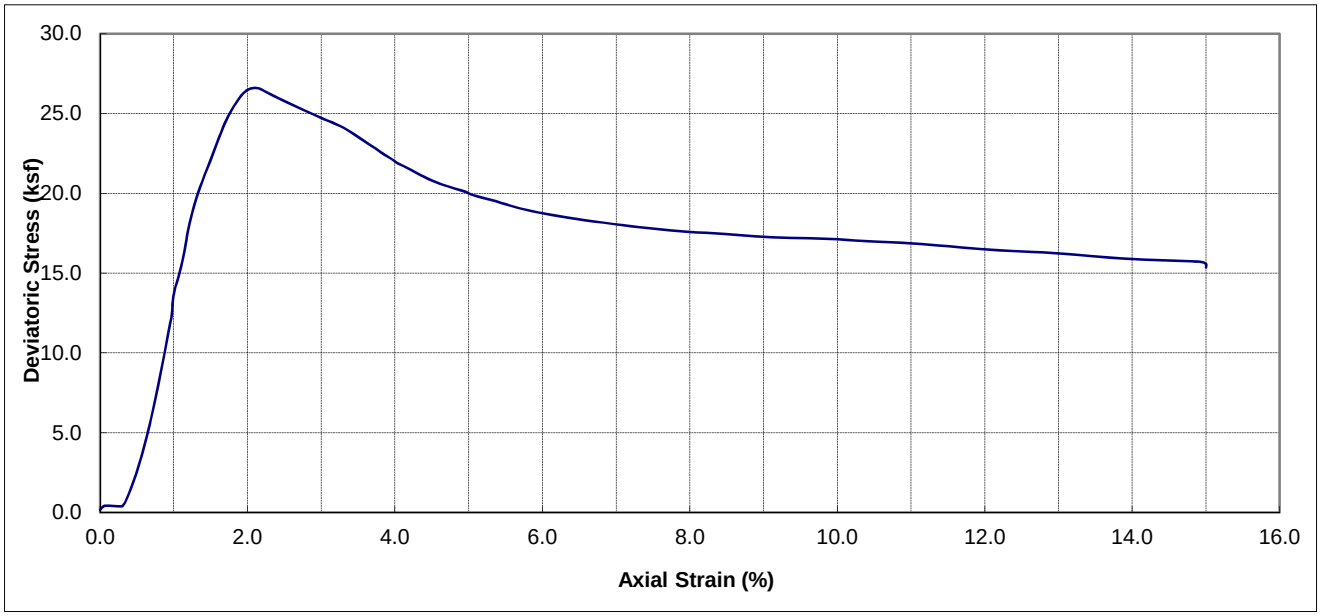
PHOTO FILE NAME: st In Process\20-103 - HNTB, Last Chance Grade Bypass

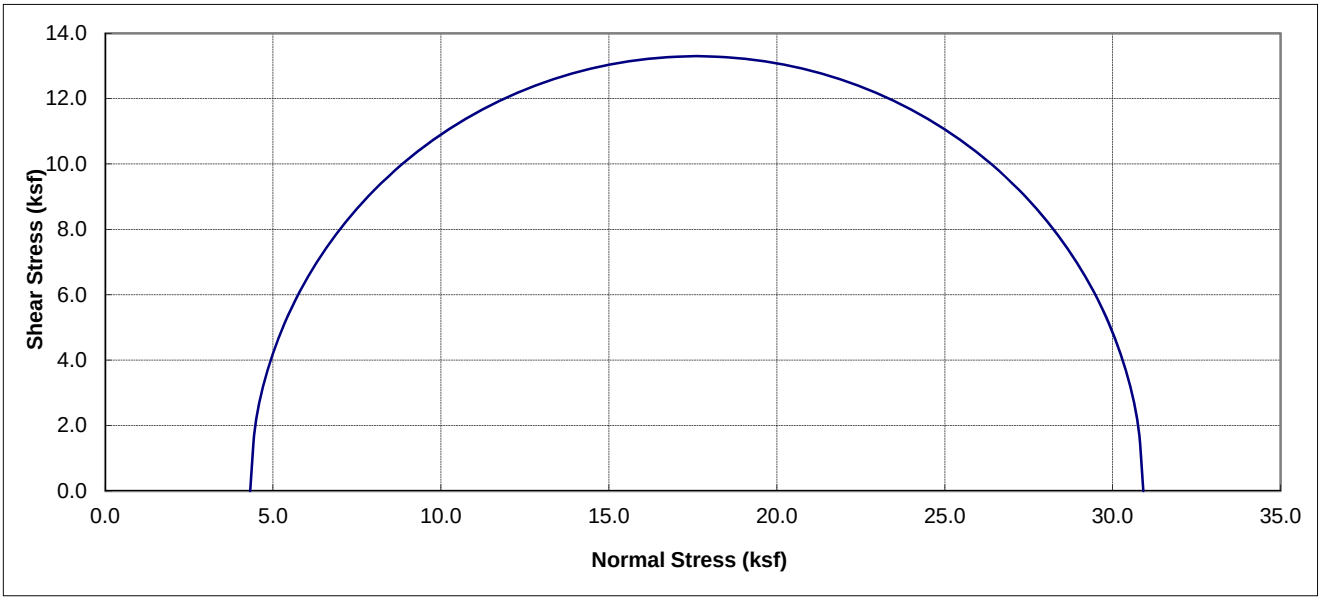
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**4.31**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**26.60**
Eff. Minor Principal Stress (ksf)=	**4.31**
Eff. Major Principal Stress (ksf)=	**30.91**
Axial Strain (%)=	**2.13**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max Dev. Stress (ksf)	Initial Saturation (%)
R-20-006	0	80.8		143.6	1.57	4.31	26.60	24.4

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Last Chance Grade Bypass Project
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 20-103 Date : 04/12/21	(ASTM D2850) Figure No. :

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	Last Chance Grade Bypass Project			**Project No:**	21-103
Boring No.: ☐	R-20-017	**Tested by:**	KK	**Date:**	4/12/2021
Depth (ft):	31.2 - 32.7	**Checked by:**	JF	**Date:**	4/13/2021
Sample No.	-	**Sample Type:**	-		

Sample Description: Gray, SANDY lean CLAY (CL)

	1	2	3		
Diameter (in.):	2.425	2.425	2.428	Average:	2.426
Height (in.):	5.783	5.790	5.800	Average:	5.791

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		178.38
Wt. Dry Sample + Container (gms):		172.43
Container (gms)	No. 43	59.24
Moisture Content (%)		**5.3**

Density and Saturation	
Wt. Wet Sample + Container (gms)	1047.86
Container (gms)	0
Wet Density (pcf)	**149.0**
Dry Density (pcf)	**141.6**
Void Ratio	**0.190**
% Saturation	**74.6**

Assume Gs=2.70

Test Data Filename:	21103RC017327.trx

SKETCH / PHOTO AFTER TEST:

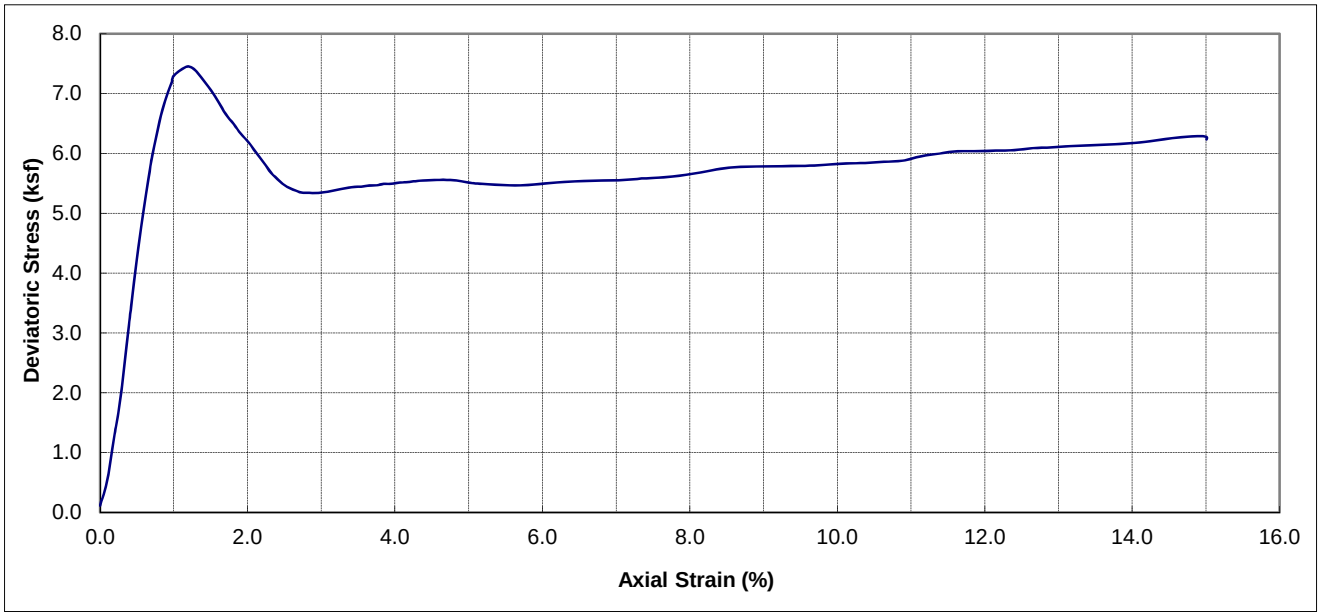
PHOTO FILE NAME: st In Process\20-103 - HNTB, Last Chance Grade Bypass

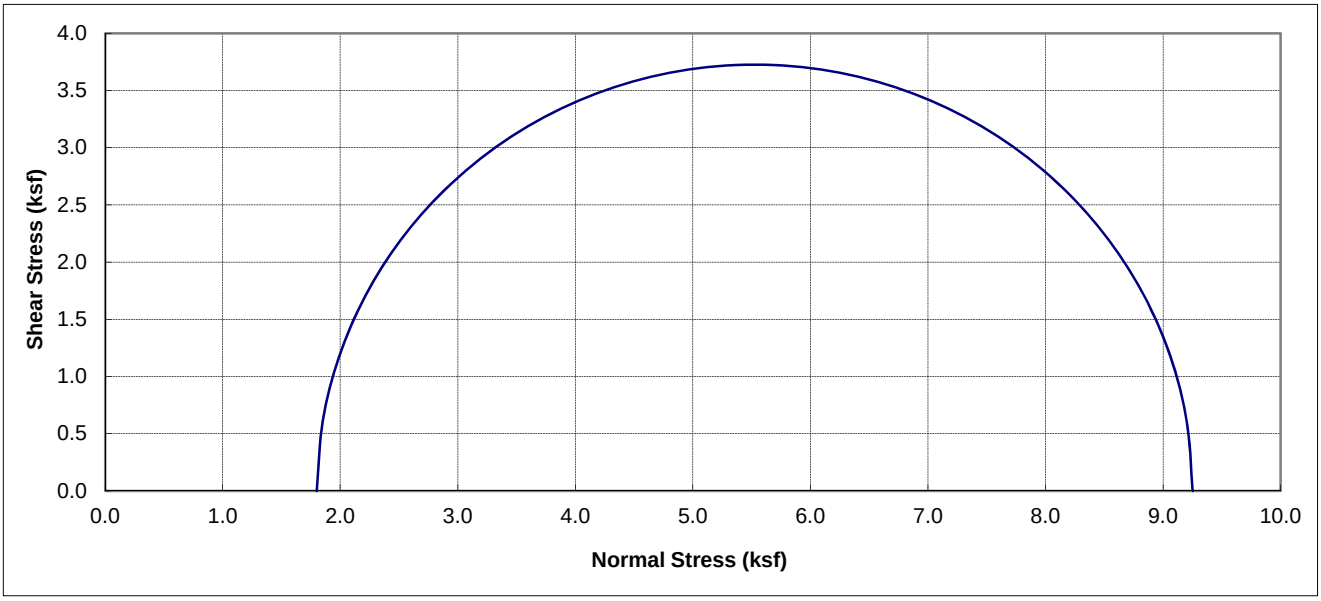
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**1.80**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**7.45**
Eff. Minor Principal Stress (ksf)=	**1.80**
Eff. Major Principal Stress (ksf)=	**9.25**
Axial Strain (%)=	**1.20**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max Dev. Stress (ksf)	Initial Saturation (%)
R-20-017	0	32.7	Gray, SANDY lean CLAY (CL)	141.6	5.26	1.80	7.45	74.6

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Last Chance Grade Bypass Project

UNCONSOLIDATED UNDRAINED TEST
(ASTM D2850)

Project No. : 20-103 **Date :** 04/12/21 **Figure No. :**

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.: ☐	R-20-020	**Tested by:**	KK	**Date:**	4/12/2021
Depth (ft):	66.6	**Checked by:**	JF	**Date:**	4/13/2021
Sample No.		**Sample Type:**			

Sample Description: Dark gray, SANDY lean CLAY (CL)

	1	2	3		
Diameter (in.):	2.475	2.445	2.48	Average:	2.467
Height (in.):	5.527	5.517	5.507	Average:	5.517

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		179.64
Wt. Dry Sample + Container (gms):		172.26
Container (gms)	No. 35	57.42
Moisture Content (%)		**6.4**

Density and Saturation	
Wt. Wet Sample + Container (gms)	985.35
Container (gms)	0
Wet Density (pcf)	**142.3**
Dry Density (pcf)	**133.7**
Void Ratio	**0.260**
% Saturation	**66.6**

Assume Gs=2.70

Test Data Filename:	21103RC020666.xls

SKETCH / PHOTO AFTER TEST:

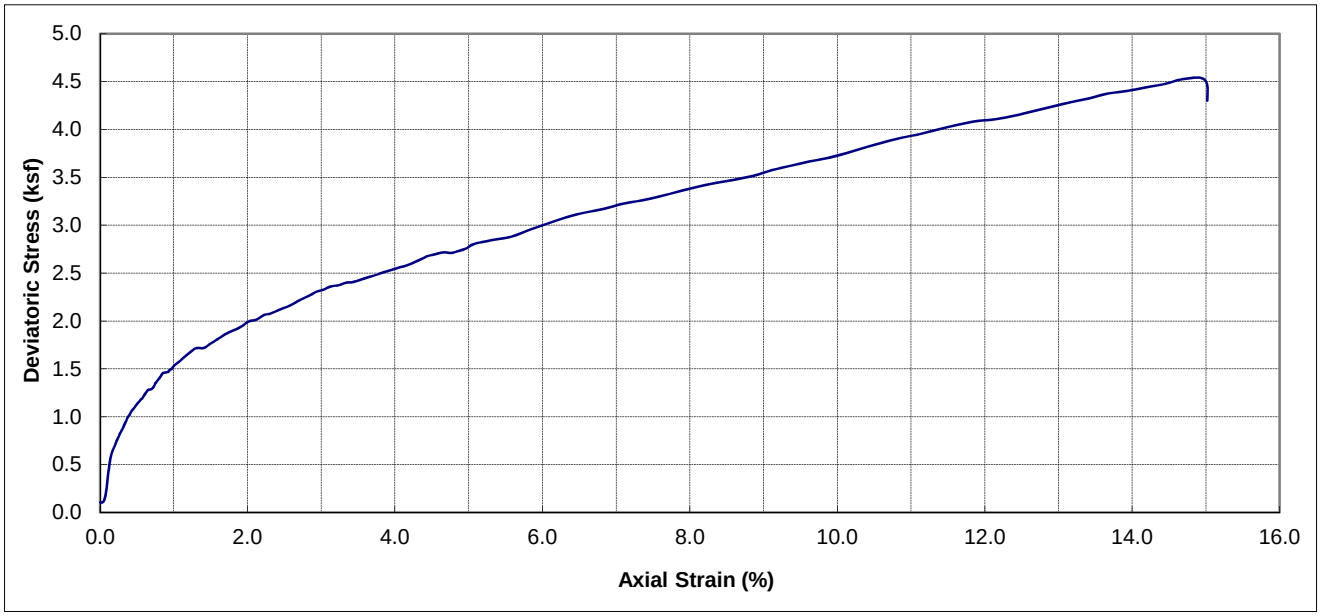
PHOTO FILE NAME: st In Process\20-103 - HNTB, Last Chance Grade Bypass

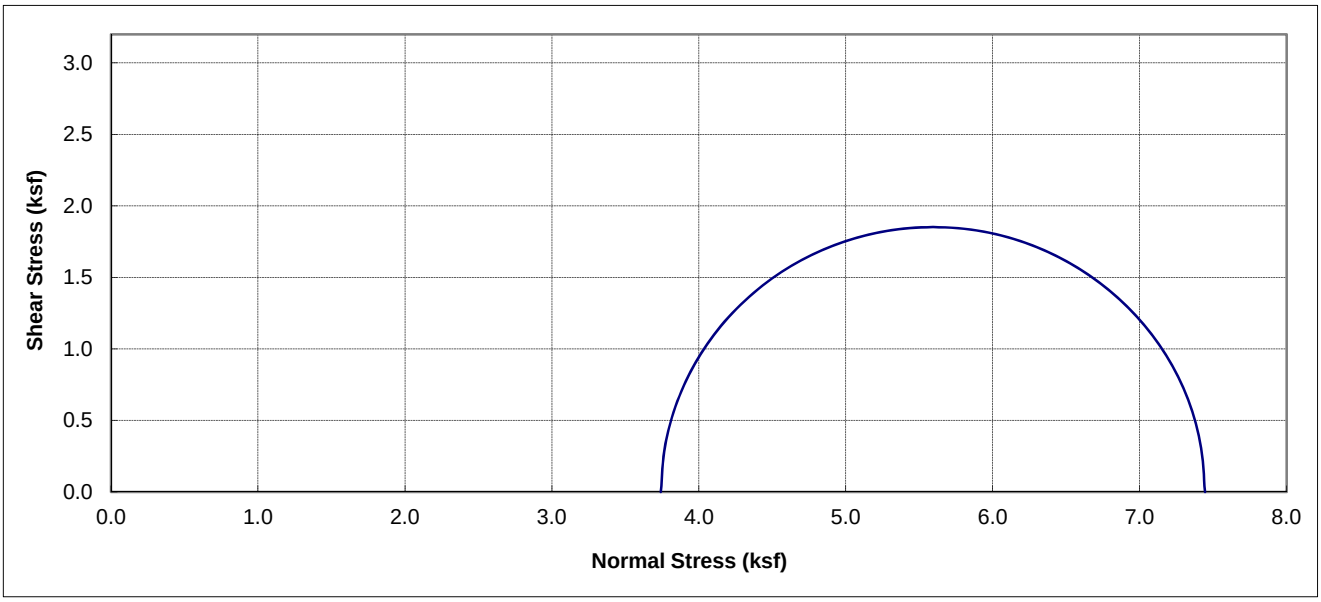
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**3.74**

Failure Criterion: **criterion 2 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**3.70**
Eff. Minor Principal Stress (ksf)=	**3.74**
Eff. Major Principal Stress (ksf)=	**7.45**
Axial Strain (%)=	**9.87**





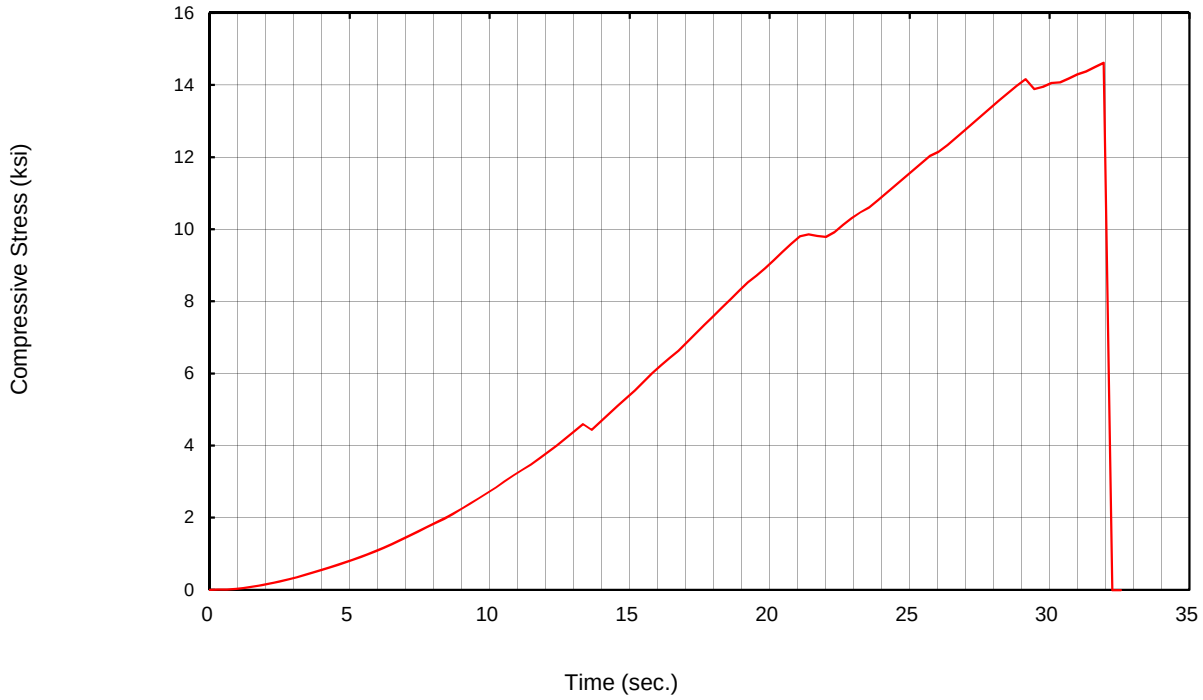
Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-20-020	0	66.6	Dark gray, SANDY lean CLAY (CL)	133.7	6.43	3.74	3.70	66.6

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Last Chance Grade Bypass Project
Project No. : 20-103 Date : 04/12/21	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850) Figure No. :

APPENDIX M5 Unconfined Compressive Strength (Rock)

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-003	**Sample No.:**	-
Depth (ft.) :	95.5 to 96.0	**Sample Type:**	HQ
Sample Description:		**Date :**	04/13/21

Sample Wt. + Ring Wt. (gm)	1096.58	**Area (in²)**	4.468
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	1096.58		
Diameter (in)	2.385	**Bulk Density (pcf)**	167.3
Height (in)	5.589		
Height : Diameter Ratio	**2.343**		



At Failure

Maximum Unconfined Compressive Stress (ksi) = **14.62**

Note:

SKETCH / PHOTO AFTER TEST:

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Last Chance Grade Bypass Project

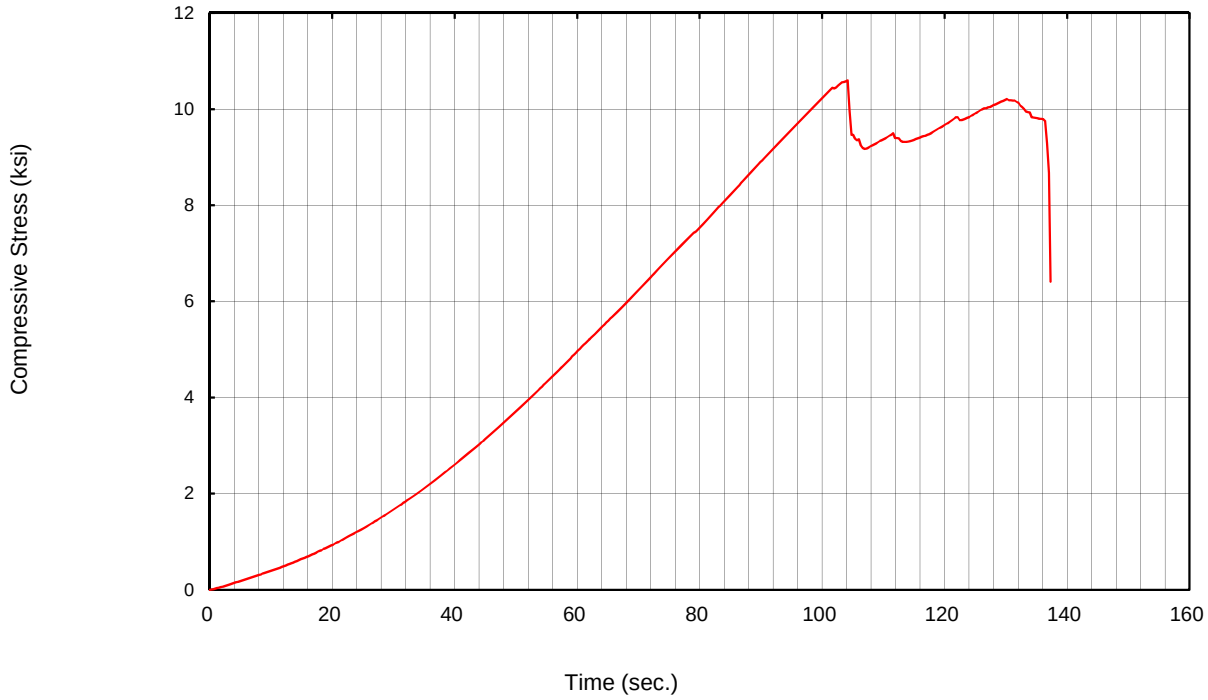
COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

Project No. :	20-103	**Date :**	04/13/21

Figure No. :

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-005	**Sample No.:**	-
Depth (ft.) :	73.7	**Sample Type:**	HQ
Sample Description:		**Date :**	04/23/21

Sample Wt. + Ring Wt. (gm)	1179.91	**Area (in²)**	4.509
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	1179.91		
Diameter (in)	2.396	**Bulk Density (pcf)**	168.5
Height (in)	5.916		
Height : Diameter Ratio	**2.469**		

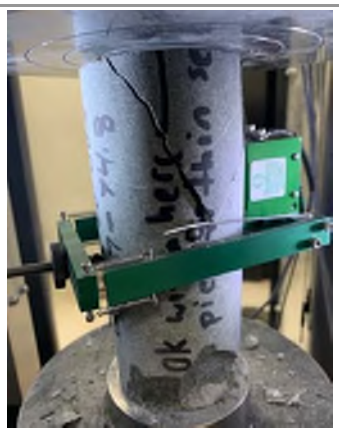


At Failure

Maximum Unconfined Compressive Stress (ksi) = **10.60**

Note:

SKETCH / PHOTO AFTER TEST:



Earth Mechanics, Inc.
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Last Chance Grade Bypass Project

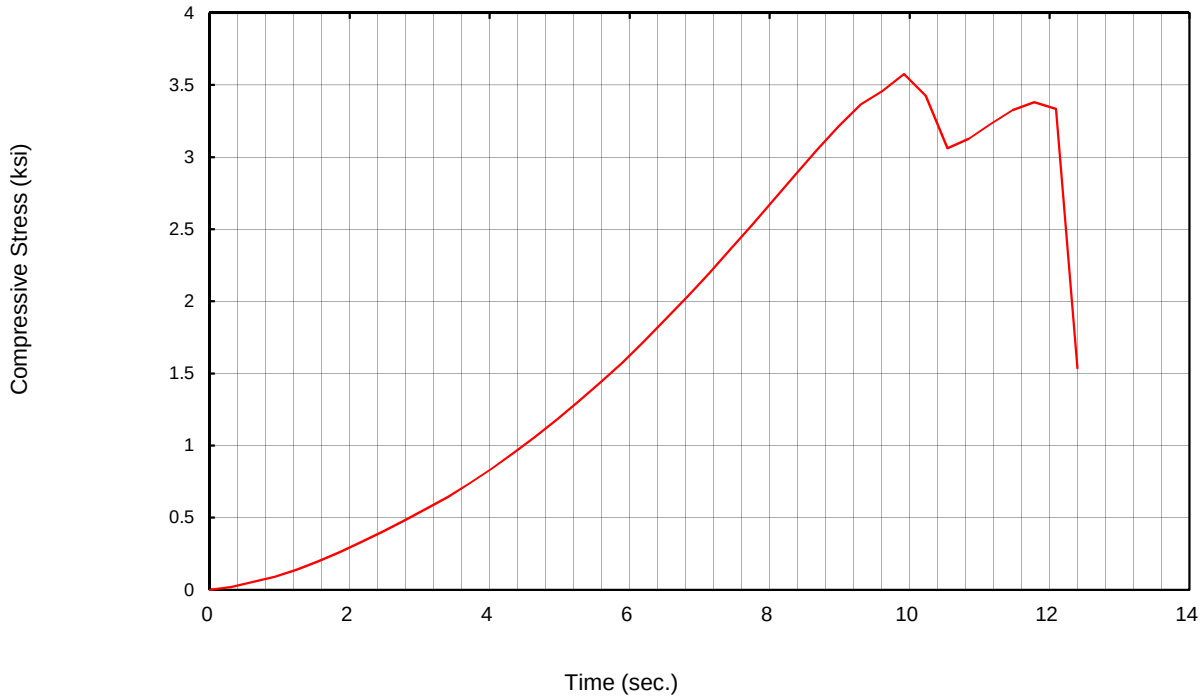
COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

Project No. :	20-103	**Date :**	04/23/21

Figure No. :

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-005	**Sample No.:**	-
Depth (ft.) :	216.4	**Sample Type:**	HQ
Sample Description:		**Date :**	04/14/21

Sample Wt. + Ring Wt. (gm)	1203.95	**Area (in²)**	4.528
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	1203.95		
Diameter (in)	2.401	**Bulk Density (pcf)**	167.1
Height (in)	6.062		
Height : Diameter Ratio	**2.525**		



At Failure

Maximum Unconfined Compressive Stress (ksi) = **3.58**

Note:

SKETCH / PHOTO AFTER TEST:

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Last Chance Grade Bypass Project

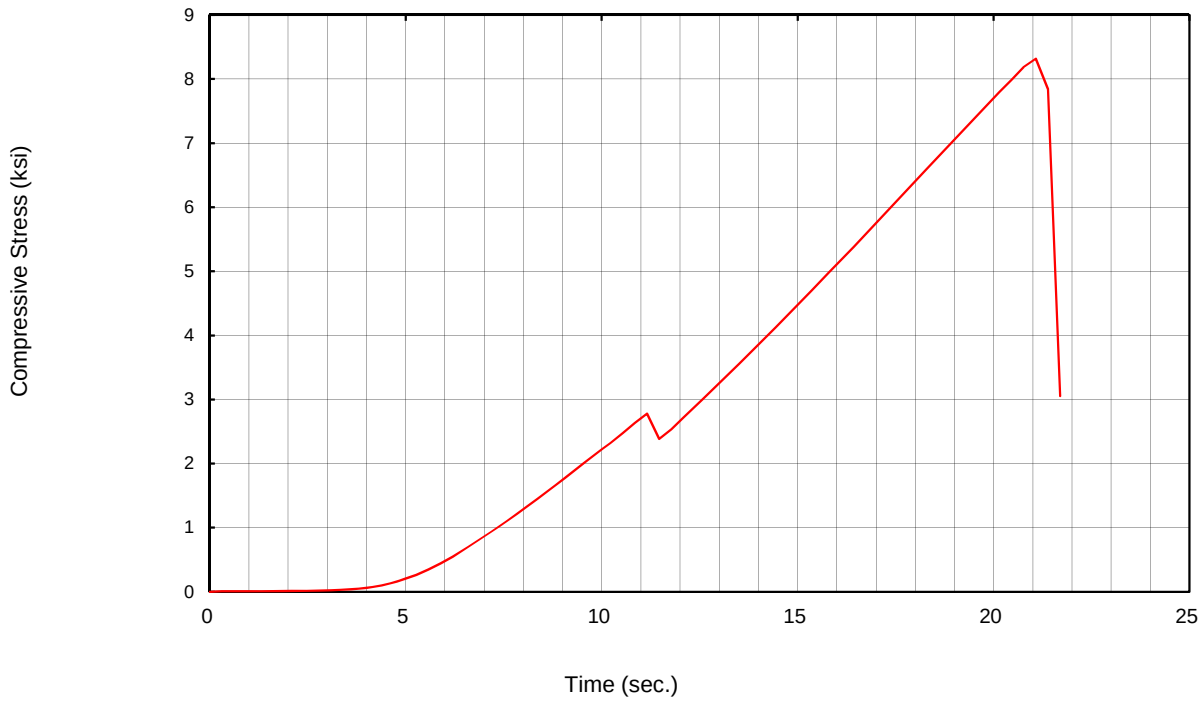
COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

Project No. :	20-103	**Date :**	04/14/21

Figure No. :

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-007	**Sample No.:**	-
Depth (ft.) :	35.0 to 35.6	**Sample Type:**	NQ
Sample Description:		**Date :**	04/13/21

Sample Wt. + Ring Wt. (gm)	563.69	**Area (in²)**	2.405
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	563.69		
Diameter (in)	1.75	**Bulk Density (pcf)**	167.5
Height (in)	5.33		
Height : Diameter Ratio	**3.046**		

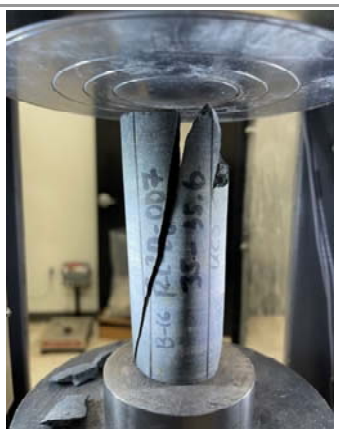


At Failure

Maximum Unconfined Compressive Stress (ksi) = **8.32**

Note:

SKETCH / PHOTO AFTER TEST:



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Last Chance Grade Bypass Project

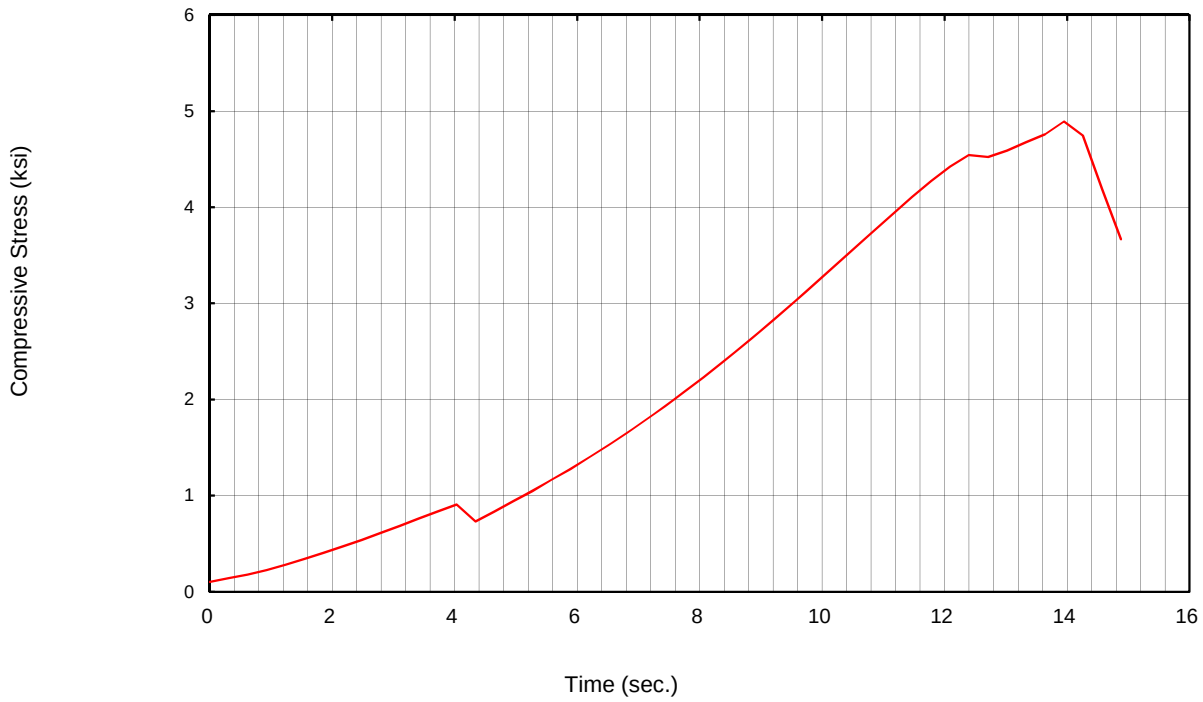
COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

Project No. :	20-103	**Date :**	04/13/21

Figure No. :

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-007	**Sample No.:**	-
Depth (ft.) :	63.0 to 63.4	**Sample Type:**	HQ
Sample Description:		**Date :**	04/16/21

Sample Wt. + Ring Wt. (gm)	1175.95	**Area (in²)**	4.528
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	1175.95		
Diameter (in)	2.40	**Bulk Density (pcf)**	167.0
Height (in)	5.93		
Height : Diameter Ratio	**2.468**		



At Failure

Maximum Unconfined Compressive Stress (ksi) = **4.89**

Note:

SKETCH / PHOTO AFTER TEST:

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Last Chance Grade Bypass Project

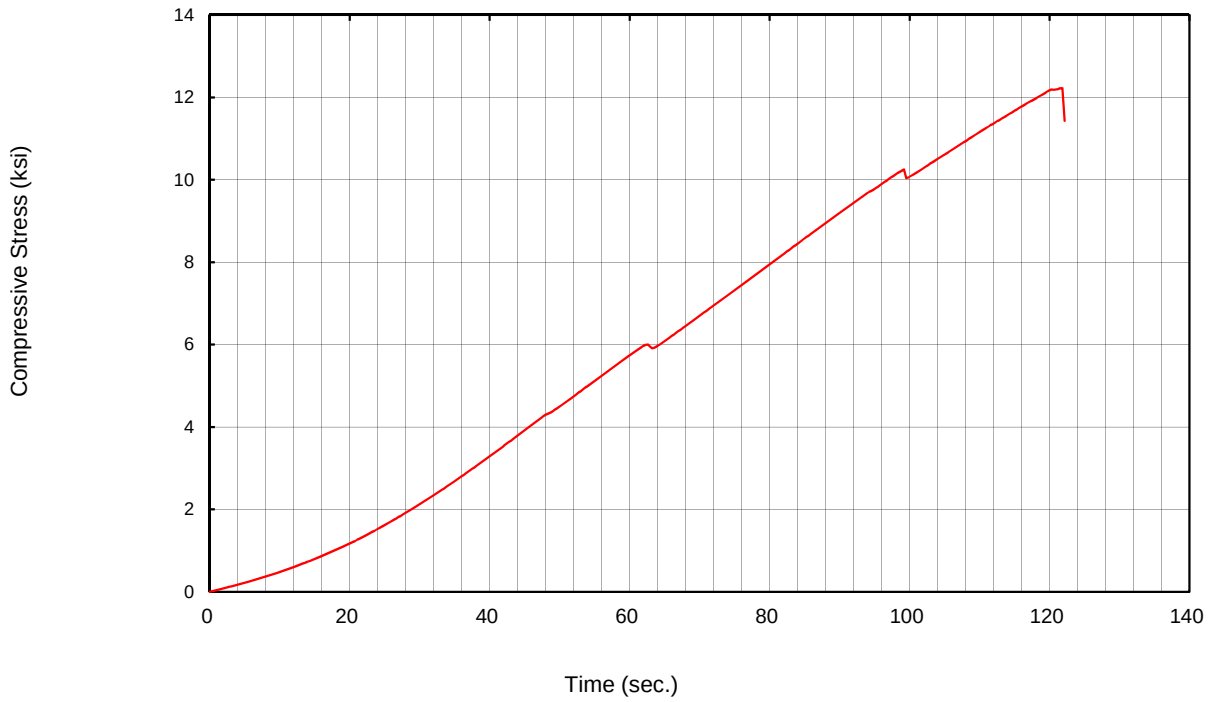
COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

Project No. :	20-103	**Date :**	04/16/21

Figure No. :

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-011	**Sample No.:**	
Depth (ft.) :	168.9-169.6	**Sample Type:**	HQ
Sample Description:		**Date :**	06/08/21

Sample Wt. + Ring Wt. (gm)	1460.84	**Area (in²)**	4.528
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	1460.84		
Diameter (in)	2.40	**Bulk Density (pcf)**	168.9
Height (in)	7.28		
Height : Diameter Ratio	**3.031**		



At Failure

Maximum Unconfined Compressive Stress (ksi) = **12.22**

Note:

SKETCH / PHOTO AFTER TEST:

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Last Chance Grade Bypass Project

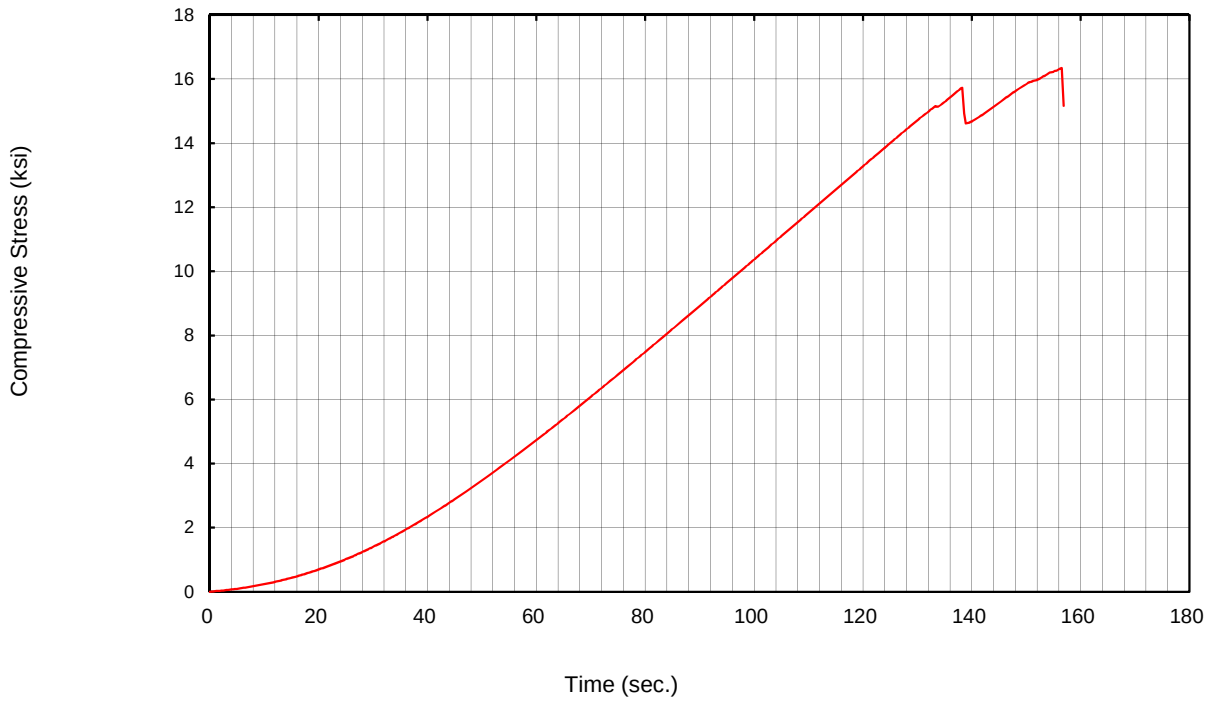
COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

Project No. :	20-103	**Date :**	06/08/21

Figure No. :

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-014	**Sample No.:**	
Depth (ft.) :	87.1-87.6	**Sample Type:**	HQ
Sample Description:		**Date :**	06/08/21

Sample Wt. + Ring Wt. (gm)	977.72	**Area (in²)**	4.554
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	977.72		
Diameter (in)	2.41	**Bulk Density (pcf)**	167.8
Height (in)	4.88		
Height : Diameter Ratio	**2.025**		



At Failure

Maximum Unconfined Compressive Stress (ksi) = **16.35**

Note:

SKETCH / PHOTO AFTER TEST:

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Last Chance Grade Bypass Project

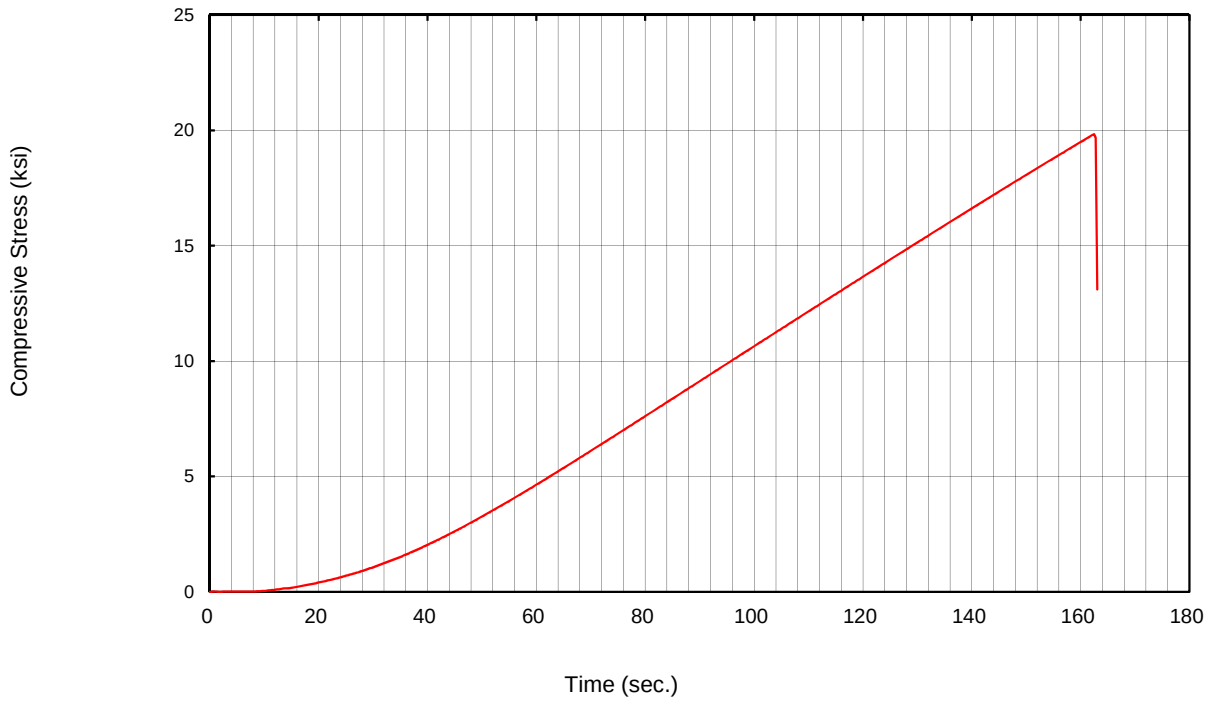
COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

Project No. :	20-103	**Date :**	06/08/21

Figure No. :

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-014	**Sample No.:**	
Depth (ft.) :	111.6-112	**Sample Type:**	HQ
Sample Description:		**Date :**	06/08/21

Sample Wt. + Ring Wt. (gm)	1052.89	**Area (in²)**	4.543
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	1052.89		
Diameter (in)	2.41	**Bulk Density (pcf)**	173.4
Height (in)	5.09		
Height : Diameter Ratio	**2.118**		

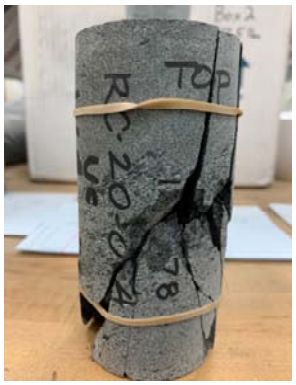


At Failure

Maximum Unconfined Compressive Stress (ksi) = **19.83**

Note:

SKETCH / PHOTO AFTER TEST:



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Last Chance Grade Bypass Project

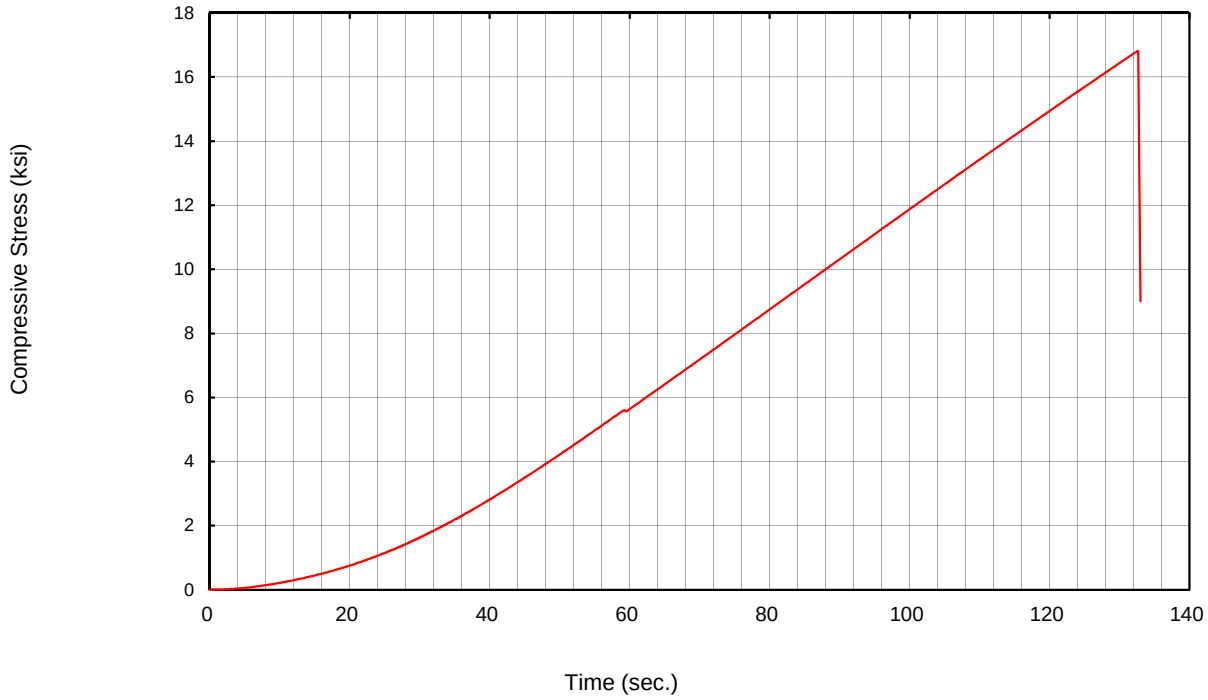
COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

Project No. :	20-103	**Date :**	06/08/21

Figure No. :

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-014	**Sample No.:**	
Depth (ft.) :	280.4-280.9	**Sample Type:**	HQ
Sample Description:		**Date :**	06/08/21

Sample Wt. + Ring Wt. (gm)	1052.89	**Area (in²)**	4.520
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	1052.89		
Diameter (in)	2.40	**Bulk Density (pcf)**	167.9
Height (in)	5.29		
Height : Diameter Ratio	**2.203**		



At Failure

Maximum Unconfined Compressive Stress (ksi) = **16.81**

Note:

SKETCH / PHOTO AFTER TEST:

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Last Chance Grade Bypass Project

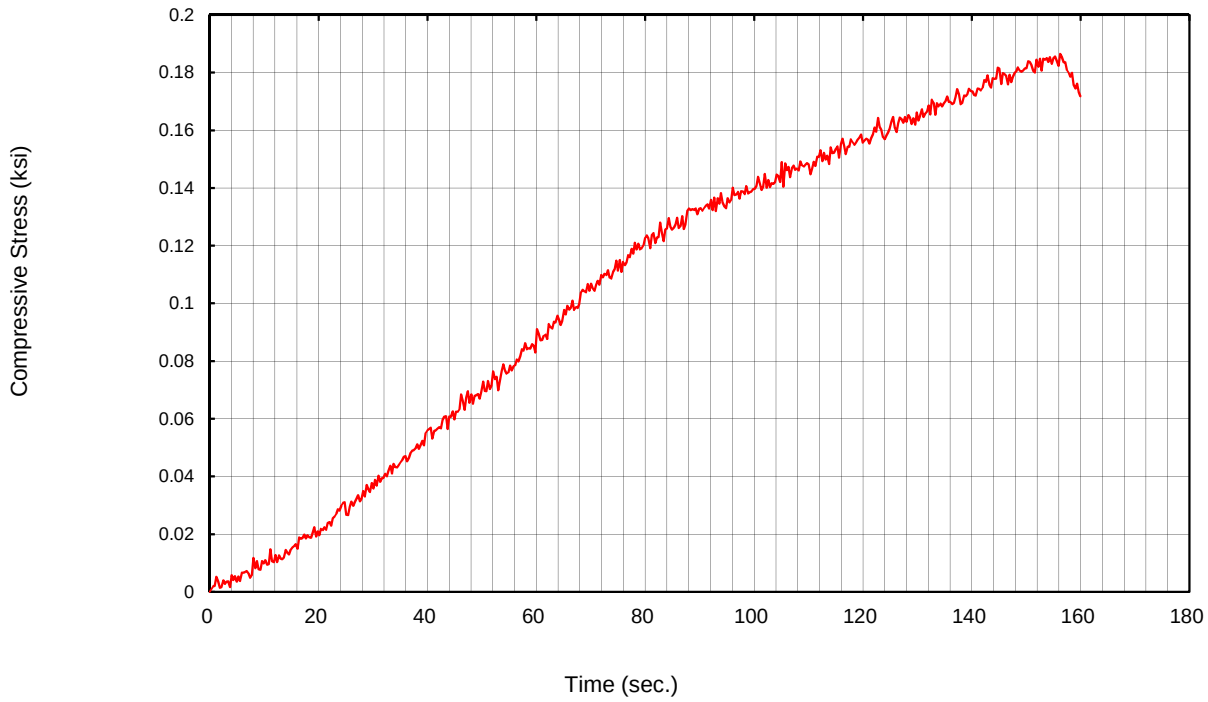
COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

Project No. :	20-103	**Date :**	06/08/21

Figure No. :

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-015	**Sample No.:**	
Depth (ft.) :	262.6	**Sample Type:**	HQ
Sample Description:		**Date :**	06/15/21

Sample Wt. + Ring Wt. (gm)	1044.78	**Area (in²)**	4.543
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	1044.78		
Diameter (in)	2.41	**Bulk Density (pcf)**	146.7
Height (in)	5.97		
Height : Diameter Ratio	**2.483**		

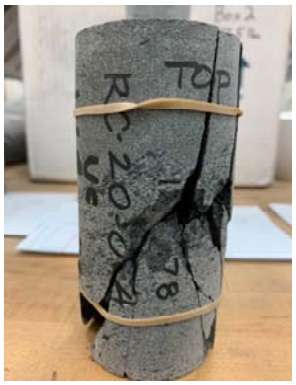


At Failure

Maximum Unconfined Compressive Stress (ksi) = **0.19**

Note:

SKETCH / PHOTO AFTER TEST:



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Last Chance Grade Bypass Project

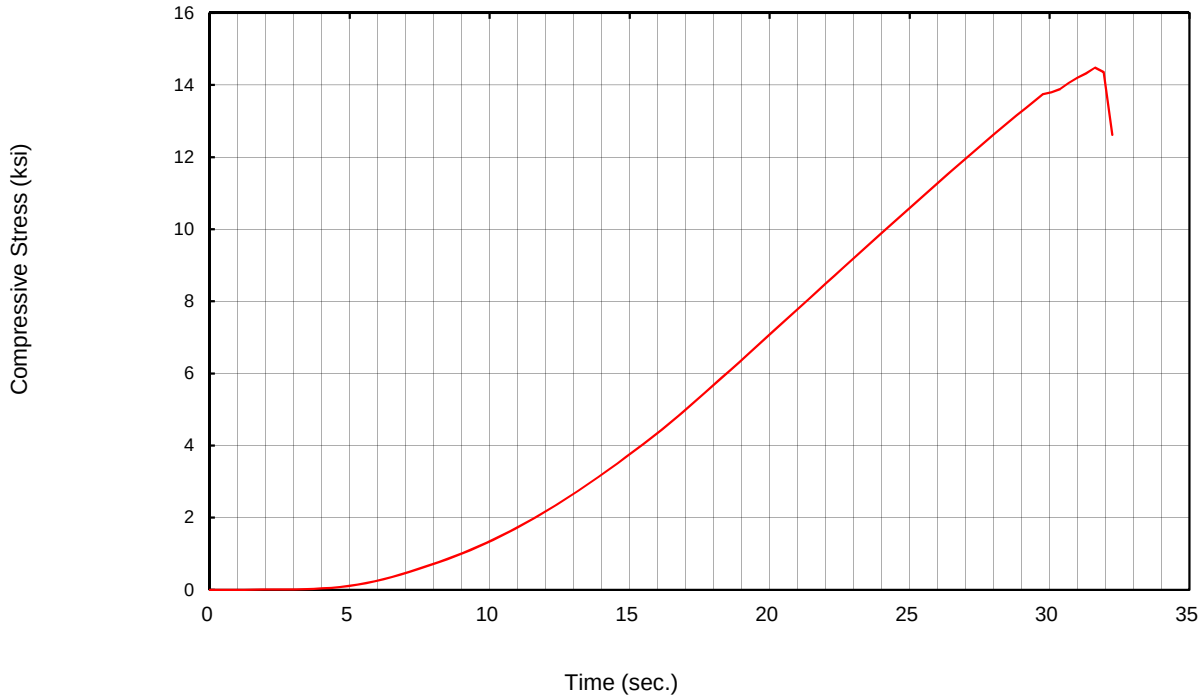
COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

Project No. :	20-103	**Date :**	06/15/21

Figure No. :

Project Name:	Last Chance Grade Bypass Project	**Project No:**	20-103
Boring No.:	RC-20-017	**Sample No.:**	
Depth (ft.) :	101.0 to 101.7	**Sample Type:**	HQ
Sample Description:		**Date :**	04/13/21

Sample Wt. + Ring Wt. (gm)	957.38	**Area (in²)**	4.494
Ring Wt. (gm)	0.00		
Sample Wt. (gm)	957.38		
Diameter (in)	2.39	**Bulk Density (pcf)**	168.1
Height (in)	4.83		
Height : Diameter Ratio	**2.018**		



At Failure

Maximum Unconfined Compressive Stress (ksi) = **14.48**

Note:

SKETCH / PHOTO AFTER TEST:

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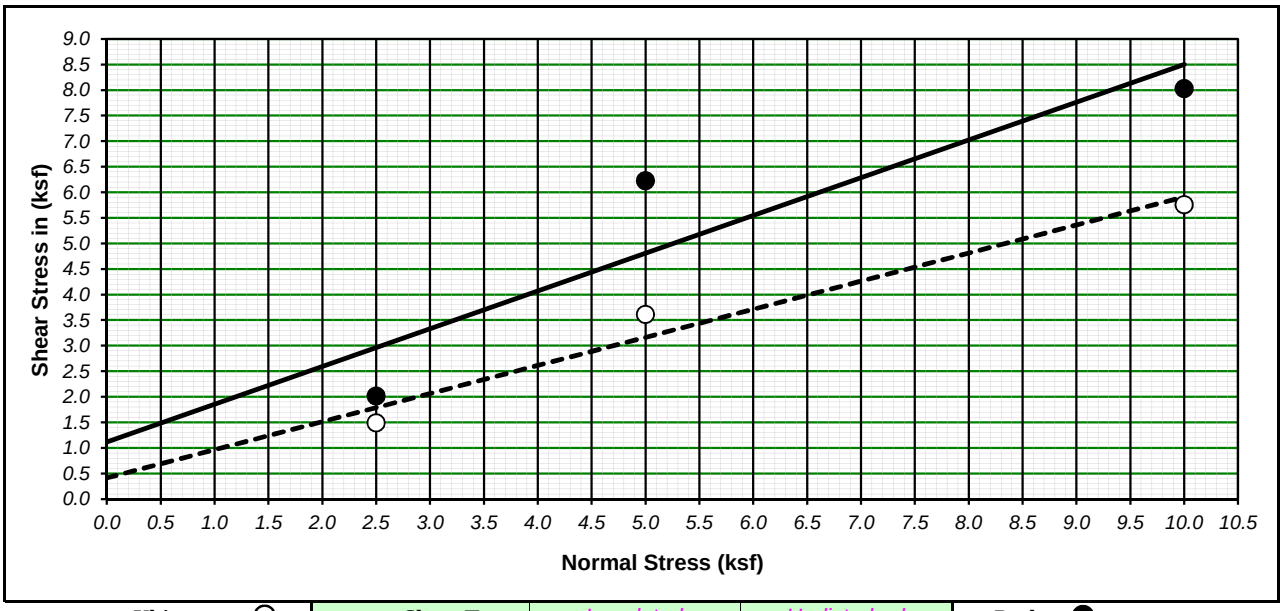
Last Chance Grade Bypass Project

COMPRESSIVE STRENGTH AND ELASTIC MODULI OF INTACT ROCK CONE

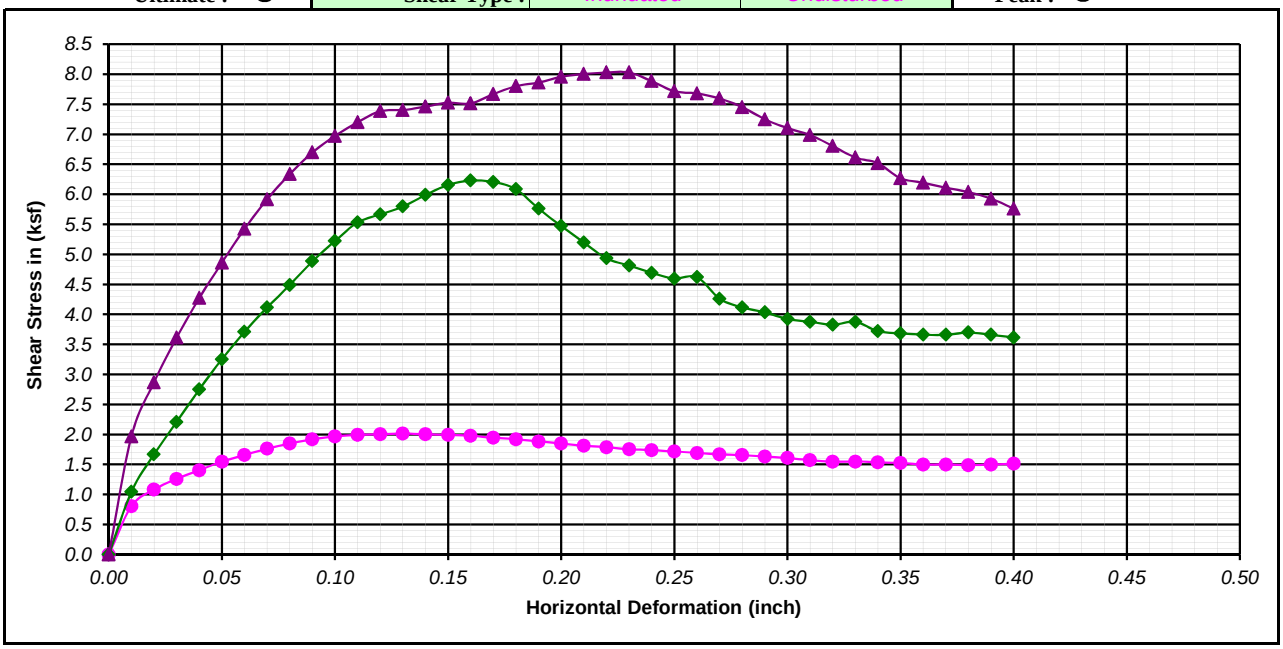
Project No. :	20-103	**Date :**	04/13/21

Figure No. :

APPENDIX M6 Direct Shear (Soil)



Ultimate : ○ | Shear Type : Inundated | Undisturbed | Peak : ●



Boring No.	: RC-20-016	**Strength Intercept (C) :**	1.12	(ksf)	**Peak**	0.41	(ksf)	**Ultimate**
Sample No.	:		53.43	(kPa)		19.82	(kPa)	
Depth (ft/m)	: 89.5 / 0.00	**Friction Angle (ϕ) :**	36.45	Degree		28.79	Degree	
Description	: Black, SANDY lean CLAY (CL)					**Shear Rate** (inch/minute) :		0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	13.52	120.96	19.04	0.39	2.50	119.70	2.02	96.53	1.49	71.25
◆	13.16	121.68	19.15	0.39	5.00	239.40	6.23	298.20	3.61	172.94
▲	13.39	117.43	18.48	0.44	10.00	478.80	8.03	384.38	5.76	275.79

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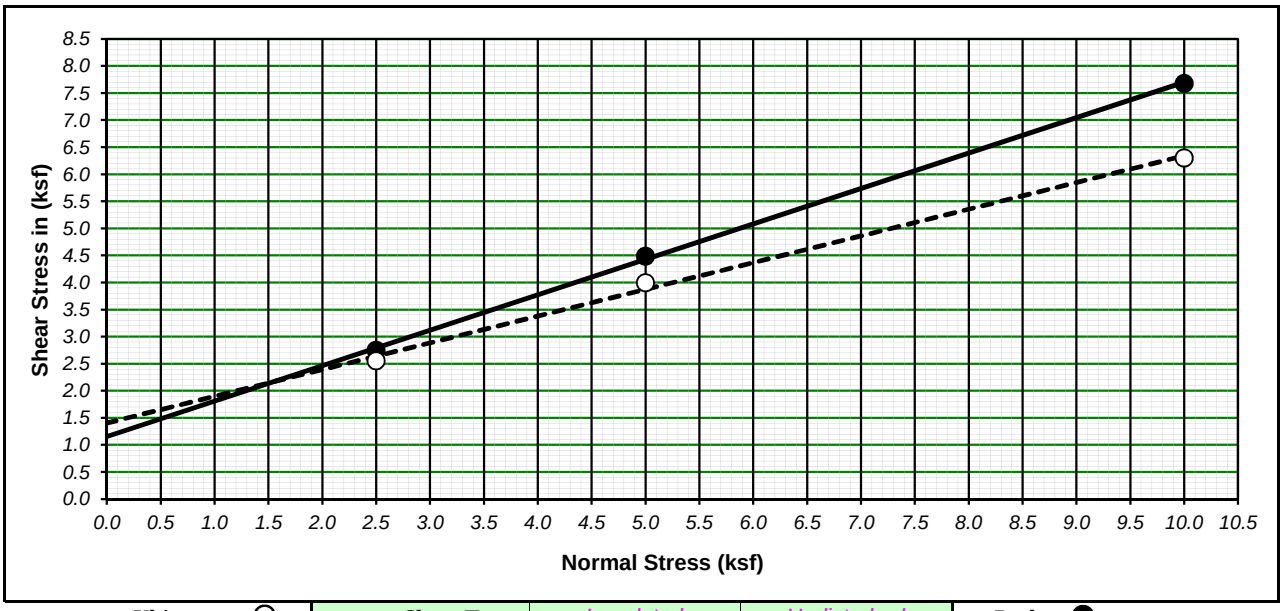
Last Chance Grade Bypass Project

Project No. : 20-103 | **Date :** 06/08/21

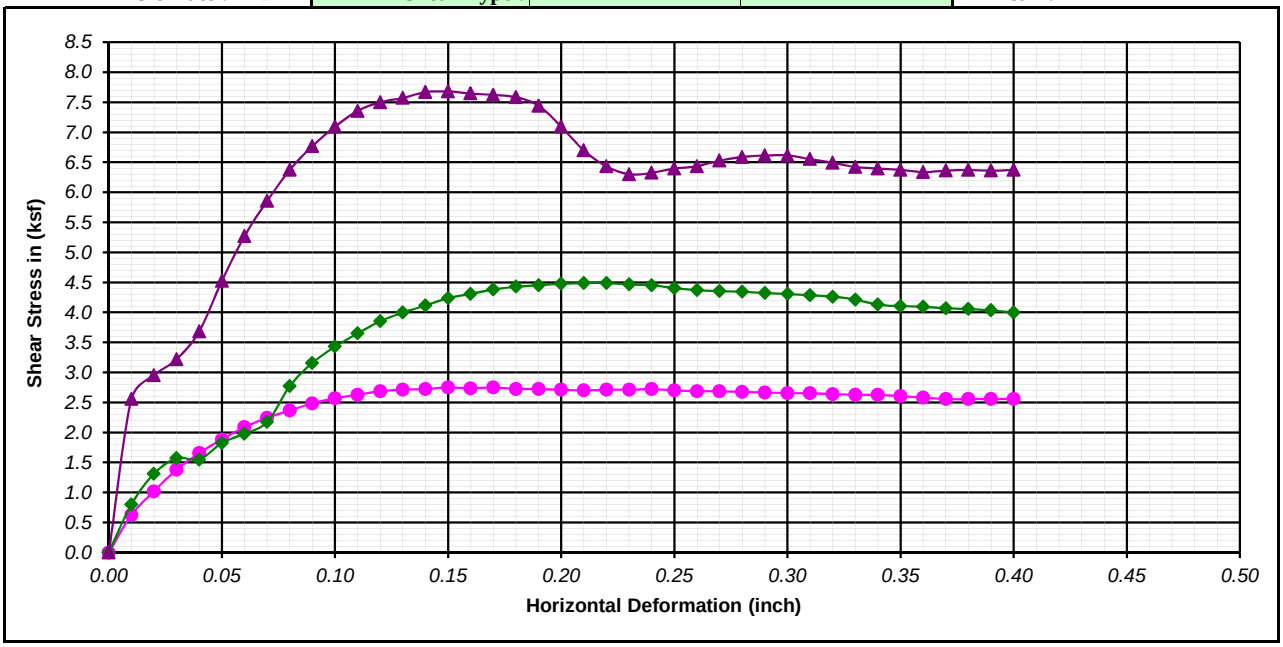
DIRECT SHEAR TEST

(ASTM D-3080)

Figure No.



Ultimate : ○	Shear Type :	Inundated	Undisturbed	Peak : ●



Boring No.	: RC-21-001	**Strength Intercept (C) :**	1.15	(ksf)	**Peak**	1.40	(ksf)	**Ultimate**
Sample No.	:		55.16	(kPa)		67.22	(kPa)	
Depth (ft/m)	: 93.6 0.00	**Friction Angle (ϕ) :**	33.22	Degree		26.28	Degree	
Description	: Black, SANDY lean CLAY (CL)					**Shear Rate** (inch/minute) :		0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	12.96	124.57	19.61	0.35	2.50	119.70	2.75	131.57	2.56	122.38
◆	10.26	131.56	20.71	0.28	5.00	239.40	4.49	214.89	4.00	191.33
▲	12.21	125.32	19.72	0.35	10.00	478.80	7.68	367.72	6.30	301.64

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Geotechnical and Earthquake Engineering

Last Chance Grade Bypass Project

Project No. : 20-103 **Date :** 05/03/21

DIRECT SHEAR TEST
(ASTM D-3080)

Figure No.

APPENDIX M7 Point Load Strength Index

KLEINFELDER
Bright People. Right Solutions.

Point Load Strength Index Test Results ASTM D5731

PROJECT:	Last Chance Grade	**LAB SAMPLE NO.:**	See Below
PROJECT NO.:	20208000	**BORING NO.:**	RC-20-003
PROJECT LOCATION:	01-DN-101-12/15.5	**SAMPLE DESCRIP:**	Highly Weathered Sandstone
SAMPLED BY:	Kleinfelder	**DATE TESTED:**	4/22/2021
DATE SAMPLED:		**REPORTED BY:**	J. Slinkard

Sample No.	Depth (ft)	Test Number	Test Type[1]	Load Orientation Relative to Planes of Weakness	Rock Type	Width, W (in)	Distance Between Platens, D (in)	Failure Load, P (lbs)	D_e^2 (in^2)	Point Load Strength Index, $I_{s(50)}$ (PSI)	Valid/ Invalid Test	Included In Average[2]
1	15-28	1	D	⊥	See Sample Descrip	1.27	2.37	530	5.61	102	Valid	Yes
2	15-28	2	D	⊥	See Sample Descrip	1.29	2.38	750	5.66	145	Valid	Yes
3	15-28	3	D	⊥	See Sample Descrip	1.29	2.38	800	4.83	170	Valid	Yes
4	15-28	4	D	⊥	See Sample Descrip	1.58	2.39	640	5.69	122	Valid	Yes
5	15-28	5	D	⊥	See Sample Descrip	1.25	2.37	330	4.79	71	Valid	Yes
6	15-28	6	D	⊥	See Sample Descrip	1.46	2.36	170	5.55	34	Valid	Yes

Point Load Strength Index[2]

$I_{s(50)}$	**107**	**psi**	**or**	**15,500**	**psf**	**or**	**0.74**	**MPa**

Correlated Uniaxial Compressive Strength[3]

σ_c=	**2,630**	**psi**	**or**	**379,000**	**psf**	**or**	**18.1**	**MPa**

Notes:

1. Test types: D-diametral; A-axial; B-block; and I-irregular lump. // - loaded parallel to feature and ⊥ - loaded perpendicular to feature.
2. In accordance with ASTM D5731, where 10 valid tests results are obtained, the point load index is the average six of ten valid tests, discounting the two highest and two lowest results. If fewer than 10 valid tests were obtained, the lowest and highest may be discounted in the average.
3. For medium strength rock [unconfined compressive strength > 15 MPa (2200 psi)], the correlation factor assumed is 24.5.

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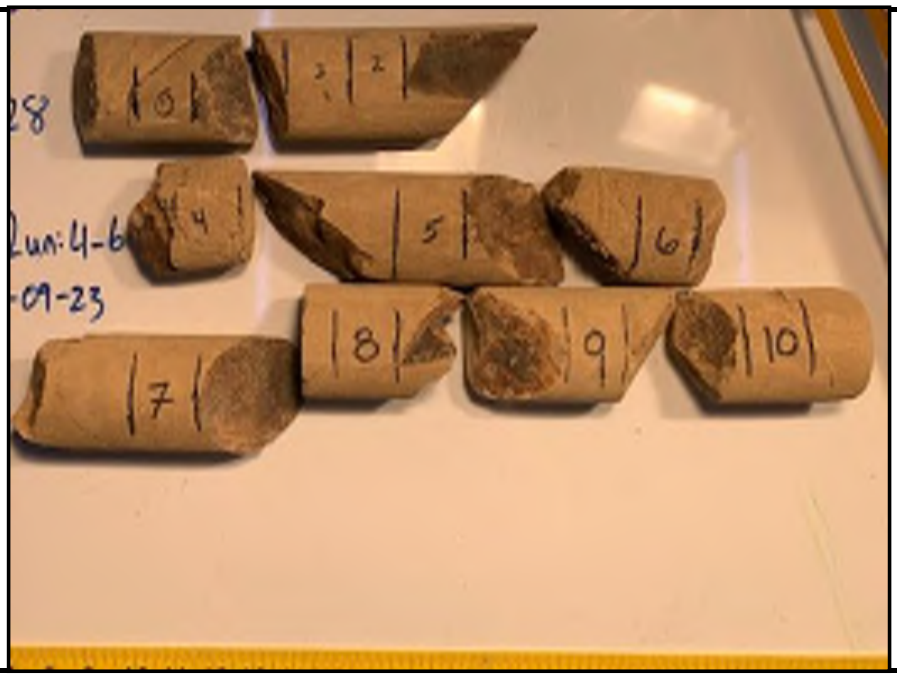
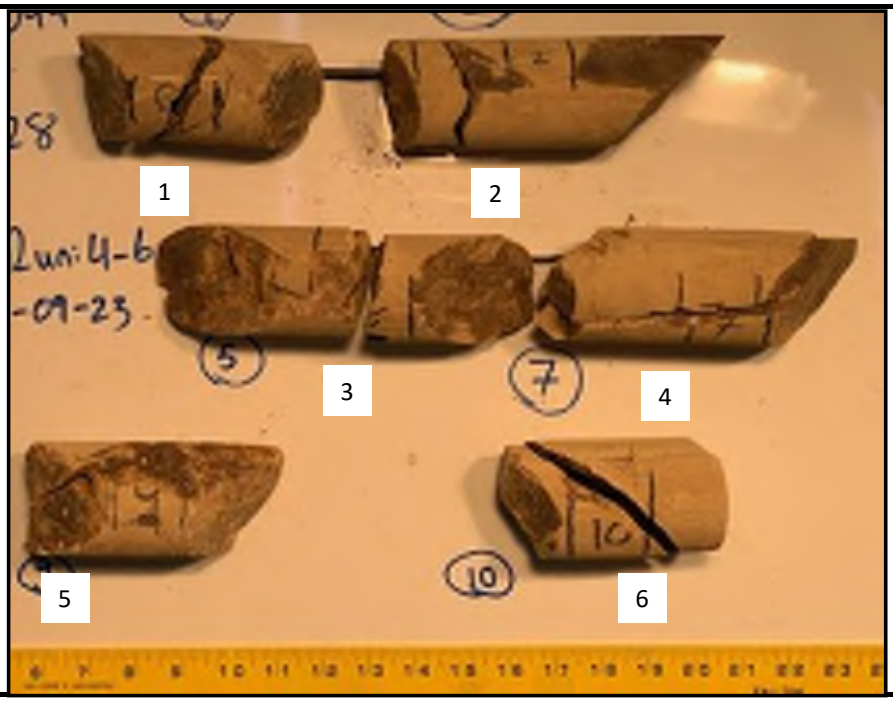
Point Load Strength Index Test Results ASTM D5731

Before



After



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Point Load Strength Index Test Results ASTM D5731

PROJECT:	Last Chance Grade	**LAB SAMPLE NO.:**	See Below
PROJECT NO.:	20208000	**BORING NO.:**	RC-20-003
PROJECT LOCATION:	01-DN-101-12-12.5	**SAMPLE DESCRIP:**	Moderately Weathered Sandstone
SAMPLED BY:	Kleinfelder	**DATE TESTED:**	4/22/2021
DATE SAMPLED:		**REPORTED BY:**	J. Slinkard

Sample No.	Depth (ft)	Test Number	Test Type[1]	Load Orientation Relative to Planes of Weakness	Rock Type	Width, W (in)	Distance Between Platens, D (in)	Failure Load, P (lbs)	D_e^2 (in^2)	Point Load Strength Index, $I_{s(50)}$ (PSI)	Valid/ Invalid Test	Included In Average[2]
1	39-60	1	D	⊥	See Samp. Descrip	1.22	2.37	930	5.63	180	Invalid	No
2	39-60	2	D	⊥	See Samp. Descrip	1.23	2.38	840	5.00	178	Valid	Yes
3	39-60	3	D	⊥	See Samp. Descrip	1.29	2.36	410	5.57	80	Valid	Yes
4	39-60	4	D	⊥	See Samp. Descrip	1.27	2.36	290	4.86	62	Valid	Yes

Point Load Strength Index[2]

$I_{s(50)}$	**107**	**psi**	**or**	**15,400**	**psf**	**or**	**0.74**	**MPa**

Correlated Uniaxial Compressive Strength[3]

σ_c=	**2,610**	**psi**	**or**	**376,000**	**psf**	**or**	**18.0**	**MPa**

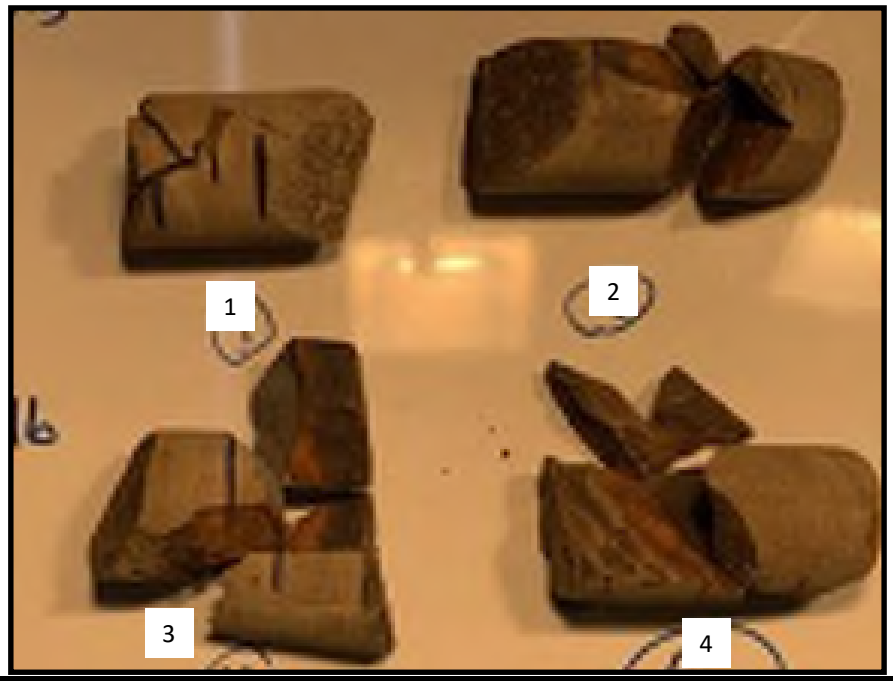
Notes:

1. Test types: D-diametral; A-axial; B-block; and I-irregular lump. // - loaded parallel to feature and ⊥ - loaded perpendicular to feature.
2. In accordance with ASTM D5731, where 10 valid tests results are obtained, the point load index is the average six of ten valid tests, discounting the two highest and two lowest results. If fewer than 10 valid tests were obtained, the lowest and highest may be discounted in the average.
3. For medium strength rock [unconfined compressive strength > 15 MPa (2200 psi)], the correlation factor assumed is 24.5.

Point Load Strength Index Test Results ASTM D5731

Before

After



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Point Load Strength Index Test Results ASTM D5731

PROJECT:	Last Chance Grade	**LAB SAMPLE NO.:**	See Below
PROJECT NO.:	20208000	**BORING NO.:**	RC-20-005
PROJECT LOCATION:	01-DN-101-12/15.5	**SAMPLE DESCRIP:**	Moderately Weathered Sandstone
SAMPLED BY:	Kleinfelder	**DATE TESTED:**	5/24/2021
DATE SAMPLED:		**REPORTED BY:**	J. Slinkard

Sample No.	Depth (ft)	Test Number	Test Type(1)	Load Orientation Relative to Planes of Weakness	Rock Type	Width, W (in)	Distance Between Platens, D (in)	Failure Load, P (lbs)	D_e^2 (in^2)	Point Load Strength Index, $I_{s(50)}$ (PSI)	Valid/ Invalid Test	Included In Average(2)
1	26.9-38.8	1	D	⊥	See Samp. Descrip	1.53	2.39	1050	5.73	200	Valid	Yes
2	26.9-38.8	2	D	⊥	See Samp. Descrip	1.71	2.44	1840	3.63	501	Valid	Yes
3	26.9-38.8	3	D	⊥	See Samp. Descrip	1.29	2.39	1610	5.04	340	Invalid	No
4	26.9-38.8	4	D	⊥	See Samp. Descrip	1.29	2.39	1960	4.99	415	Valid	Yes
5	26.9-38.8	5	I	⊥	See Samp. Descrip	1.38	1.20	2530	2.10	1047	Valid	Yes
6	26.9-38.8	6	D	⊥	See Samp. Descrip	1.38	2.40	2850	5.78	539	Valid	Yes
7	26.9-38.8	7	D	⊥	See Samp. Descrip	1.27	2.18	780	4.76	171	Valid	Yes
8	26.9-38.8	8	D	⊥	See Samp. Descrip	1.35	2.31	5340	4.46	1237	Valid	Yes

Point Load Strength Index(2)

$I_{s(50)}$	**507**	**psi**	**or**	**73,000**	**psf**	**or**	**3.50**	**MPa**

Correlated Uniaxial Compressive Strength(3)

σ_c=	**12,420**	**psi**	**or**	**1,788,000**	**psf**	**or**	**85.7**	**MPa**

Notes:

1. Test types: D-diametral; A-axial; B-block; and I-irregular lump. // - loaded parallel to feature and ⊥ - loaded perpendicular to feature.
2. In accordance with ASTM D5731, where 10 valid tests results are obtained, the point load index is the average six of ten valid tests, discounting the two highest and two lowest results. If fewer than 10 valid tests were obtained, the lowest and highest may be discounted in the average.
3. For medium strength rock [unconfined compressive strength > 15 MPa (2200 psi)], the correlation factor assumed is 24.5.

Point Load Strength Index Test Results ASTM D5731

Before

After

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Point Load Strength Index Test Results ASTM D5731

PROJECT:	Last Chance Grade	**LAB SAMPLE NO.:**	See Below
PROJECT NO.:	20208000	**BORING NO.:**	RC-20-005
PROJECT LOCATION:	01-DN-101-12/15.5	**SAMPLE DESCRIP:**	Moderately Weathered Sandstone
SAMPLED BY:	Kleinfelder	**DATE TESTED:**	5/26/2021
DATE SAMPLED:		**REPORTED BY:**	J. Slinkard

Sample No.	Depth (ft)	Test Number	Test Type(1)	Load Orientation Relative to Planes of Weakness	Rock Type	Width, W (in)	Distance Between Platens, D (in)	Failure Load, P (lbs)	D_e^2 (in^2)	Point Load Strength Index, $I_{s(50)}$ (PSI)	Valid/ Invalid Test	Included In Average(2)
1	62.3-75	1	A	⊥	See Samp. Descrip	2.40	1.31	930	3.97	235	Valid	Yes
2	62.3-75	2	I	⊥	See Samp. Descrip	1.58	1.32	1760	2.66	608	Invalid	Yes
3	62.3-75	3	A	⊥	See Samp. Descrip	2.40	1.35	4490	4.12	1110	Valid	No
4	62.3-75	4	I	⊥	See Samp. Descrip	3.39	3.22	3560	13.90	342	Valid	Yes
5	62.3-75	5	A	⊥	See Samp. Descrip	2.40	1.32	330	3.79	87	Valid	Yes
6	62.3-75	6	I	⊥	See Samp. Descrip	1.31	1.21	560	1.90	253	Valid	Yes
7	62.3-75	7	I	⊥	See Samp. Descrip	1.45	1.84	780	3.39	223	Valid	Yes

Point Load Strength Index(2)

$I_{s(50)}$	**439**	**psi**	**or**	**63,200**	**psf**	**or**	**3.03**	**MPa**

Correlated Uniaxial Compressive Strength(3)

σ_c=	**10,760**	**psi**	**or**	**1,549,000**	**psf**	**or**	**74.2**	**MPa**

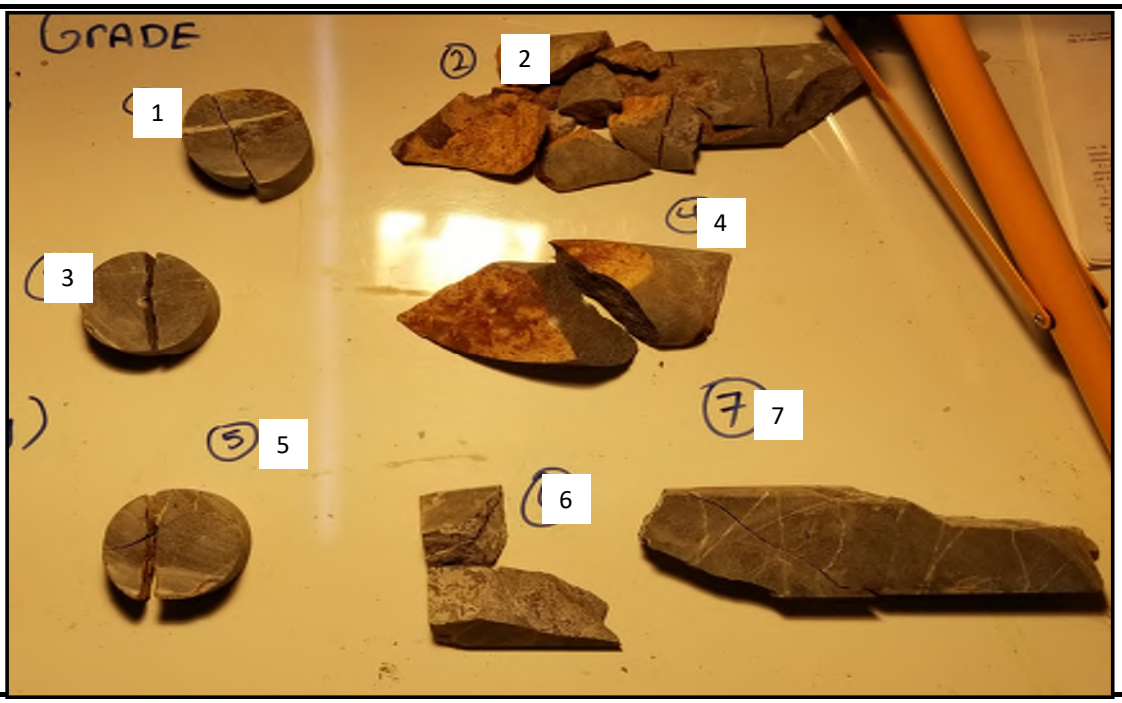
Notes:

1. Test types: D-diametral; A-axial; B-block; and I-irregular lump. // - loaded parallel to feature and ⊥ - loaded perpendicular to feature.
2. In accordance with ASTM D5731, where 10 valid tests results are obtained, the point load index is the average six of ten valid tests, discounting the two highest and two lowest results. If fewer than 10 valid tests were obtained, the lowest and highest may be discounted in the average.
3. For medium strength rock [unconfined compressive strength > 15 MPa (2200 psi)], the correlation factor assumed is 24.5.

Point Load Strength Index Test Results ASTM D5731

Before

After



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Point Load Strength Index Test Results ASTM D5731

PROJECT:	Last Chance Grade	**LAB SAMPLE NO.:**	See Below
PROJECT NO.:	20208000	**BORING NO.:**	RC-20-007
PROJECT LOCATION:	01-DN-101-12/15.5	**SAMPLE DESCRIP:**	Moderately / Slightly weathered sandstone
SAMPLED BY:	Kleinfelder	**DATE TESTED:**	4/22/2021
DATE SAMPLED:		**REPORTED BY:**	J.Slinkard

Sample No.	Depth (ft)	Test Number	Test Type[1]	Load Orientation Relative to Planes of Weakness	Rock Type	Width, W (in)	Distance Between Platens, D (in)	Failure Load, P (lbs)	D_e^2 (in^2)	Point Load Strength Index, $I_{s(50)}$ (PSI)	Valid/ Invalid Test	Included In Average[2]
1	43-51	1	I	⊥	See Sample Description	1.97	1.45	2580	3.50	719	Valid	No
2	43-51	2	D	⊥	See Sample Description	2.40	2.38	630	5.66	121	Invalid	No
3	43-51	3	D	⊥	See Sample Description	2.40	2.29	470	3.24	140	Invalid	No
4	43-51	4	D	⊥	See Sample Description	2.39	2.33	1150	3.92	295	Invalid	No
5	43-51	5	D	⊥	See Sample Description	2.40	2.35	1670	5.52	327	Invalid	No

Point Load Strength Index[2]

$I_{s(50)}$	nm	psi	or	nm	psf	or	nm	MPa

Correlated Uniaxial Compressive Strength[3]

σ_c=	nm	psi	or	nm	psf	or	nm	MPa

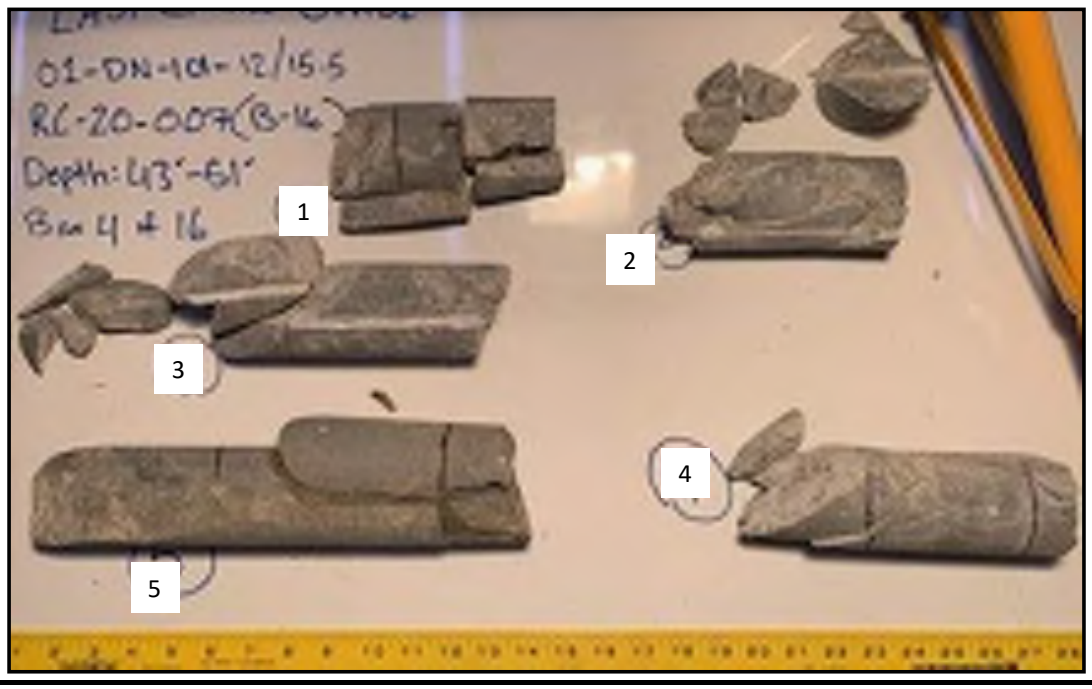
Notes:

1. Test types: D-diametral; A-axial; B-block; and I-irregular lump. // - loaded parallel to feature and ⊥ - loaded perpendicular to feature.
2. In accordance with ASTM D5731, where 10 valid tests results are obtained, the point load index is the average six of ten valid tests, discounting the two highest and two lowest results. If fewer than 10 valid tests were obtained, the lowest and highest may be discounted in the average.
3. Point Load Strength Index and Correlated Uniaxial Strength not provided due to only one valid test.

Point Load Strength Index Test Results ASTM D5731

Before

After



Project Name:	Last Chance Grade Bypass Project		
Boring No.:	RC-20-005	**Sample No.:**	-
Depth (ft.) :	173.8-174.1	**Sample Type:**	HQ
Sample Description:	-	**Date :**	4/26/2021
		Tested By:	KK

Test Type:	diametral	Tare No.:	-
Moisture Condition at Test:	As Received	Tare Weight (gms):	0.00
Core Diameter (in):	2.393	Wet Wt. + Tare (gms):	563.56
Core Length (in):	2.867	Dry Wt. + Tare (gms):	563.56
Failure Load (lbf) (P) :	379.1	Moisture Content (%):	0.00

Uncorrected Point Load Index (I_s):	66.2	psi
Size Correction Factor (F):	1.1	
Corrected Point Load Index (I_{s50}):	73.0	psi

SKETCH / PHOTO BEFORE TEST:

SKETCH / PHOTO AFTER TEST:

Note:

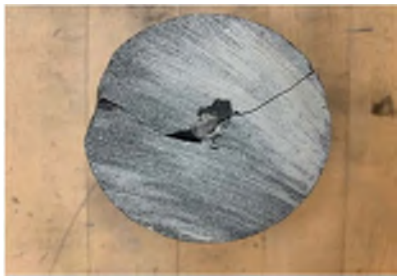
Project Name:	Last Chance Grade Bypass Project		
Boring No.:	RC-20-013	**Sample No.:**	-
Depth (ft.) :	27.5	**Sample Type:**	HQ
Sample Description:	-	**Date :**	6/10/2021
		Tested By:	KK

Test Type:	axial	Tare No.:	-
Moisture Condition at Test:	As Received	Tare Weight (gms):	0.00
Equivalent Core Diameter (in):	2.583	Wet Wt. + Tare (gms):	-
Core Length (in):	2.175	Dry Wt. + Tare (gms):	-
Failure Load (lbf) (P) :	2033.6	Moisture Content (%):	0.00

Uncorrected Point Load Index (I_s):	304.7	psi
Size Correction Factor (F):	1.1	
Corrected Point Load Index (I_{s50}):	349.1	psi

SKETCH / PHOTO BEFORE TEST:

SKETCH / PHOTO AFTER TEST:



Note:

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Last Chance Grade Bypass Project

POINT LOAD STRENGTH INDEX OF ROCK AND APPLICATION OF ROCK

Project No. :	20-103	**Date :**	4/26/2021	(ASTM D5731)	**Figure No. :**

Project Name:	Last Chance Grade Bypass Project		
Boring No.:	RC-20-013	**Sample No.:**	-
Depth (ft.) :	27.6-28	**Sample Type:**	HQ
Sample Description:	-	**Date :**	6/10/2021
		Tested By:	KK

Test Type:	diametral	Tare No.:	-
Moisture Condition at Test:	As Received	Tare Weight (gms):	0.00
Core Diameter (in):	2.410	Wet Wt. + Tare (gms):	-
Core Length (in):	4.532	Dry Wt. + Tare (gms):	-
Failure Load (lbf) (P) :	3716.1	Moisture Content (%):	0.00

Uncorrected Point Load Index (I_s):	639.8	psi
Size Correction Factor (F):	1.1	
Corrected Point Load Index (I_{s50}):	707.9	psi

SKETCH / PHOTO BEFORE TEST:

SKETCH / PHOTO AFTER TEST:

Note:

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Last Chance Grade Bypass Project

POINT LOAD STRENGTH INDEX OF ROCK AND APPLICATION OF ROCK

Project No. :	20-103	**Date :**	4/26/2021	(ASTM D5731)	**Figure No. :**

Project Name:	Last Chance Grade Bypass Project		
Boring No.:	RC-20-013	**Sample No.:**	-
Depth (ft.) :	27-27.3	**Sample Type:**	HQ
Sample Description:	-	**Date :**	6/10/2021
		Tested By:	KK

Test Type:	diametral	Tare No.:	-
Moisture Condition at Test:	As Received	Tare Weight (gms):	0.00
Core Diameter (in):	2.410	Wet Wt. + Tare (gms):	-
Core Length (in):	3.583	Dry Wt. + Tare (gms):	-
Failure Load (lbf) (P) :	3708.8	Moisture Content (%):	0.00

Uncorrected Point Load Index (I_s):	638.6	psi
Size Correction Factor (F):	1.1	
Corrected Point Load Index (I_{s50}):	706.5	psi

SKETCH / PHOTO BEFORE TEST:

SKETCH / PHOTO AFTER TEST:

Note:

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Last Chance Grade Bypass Project

POINT LOAD STRENGTH INDEX OF ROCK AND APPLICATION OF ROCK

Project No. :	20-103	**Date :**	4/26/2021	(ASTM D5731) **Figure No. :**

APPENDIX M8 Cerchar Abrasiveness

CERCHAR ABRASIVENVENESS TEST

ASTM D7625

Project Name: Last Chance Grade Bypass Project
Project No: 20-103
Boring No.:
Tested by: KK
Date: 4/9/2021
Sample Type:
Checked by: JF
Date: 4/22/2021
Pin Hardness HRC=55
Test Equipment: GCTS RAA-100

Boring Number	Depth	Rock Type	Test Surface	Pin Number and CAI or CAI_s reading					Average CAI or CAI_s	CAI Abrasiveness Classification	Note
	ft			1	2	3	4	5	Reading		
RC-20-011	163.6-166.1		Saw Cut	1.90	1.87	1.15	1.1	1.75	2.03	High Abrasiveness	
RC-20-015	199.25		Saw Cut	2.44	2.03	1.46	2.38	0.89	2.30	High Abrasiveness	
RC-20-014	243.7-248		Saw Cut	0.74	0.99	1.43	0.99	1.18	1.54	Medium Abrasiveness	

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CERCHAR ABRASIVENVENESS TEST

ASTM D7625

Project Name: Last Chance Grade Bypass Project
Project No: 20-103
Boring No.:
Tested by: KK
Date: 4/9/2021
Sample Type:
Checked by: JF
Date: 4/22/2021
Pin Hardness HRC=55
Test Equipment: GCTS RAA-100

Boring Number	Depth	Rock Type	Test Surface	Pin Number and CAI or CAI_s reading					Average CAI or CAI_s	CAI Abrasiveness Classification	Note
	ft			1	2	3	4	5	Reading		
RC-20-017	99-101		Saw Cut	1.70	3.04	2.92	1.68	2.11	2.77	High Abrasiveness	
RC-20-005	173.8-174.1		Saw Cut	1.09	0.96	1.60	1.10	1.03	1.62	Medium Abrasiveness	
RC-20-005	205-205.9		Saw Cut	1.88	1.88	1.71	2.06	1.91	2.35	High Abrasiveness	

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APPENDIX M9 Slake Durability

Slake Durability of Shales and Similar Weak Rocks

ASTM D4644

Project Name:	Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.:	RC-20-006	**Tested by:**	KK	**Date:**	4/8/21
Depth (ft):	71.8-72.3	**Checked by:**	JF	**Date:**	4/22/21
Sample No.		**Sample Type:**			

Sample Description: Dark Gray , SCHIST

		Before the test	First Cycle		Second Cycle	
Wt. Wet Sample + Drum (gms):		1753.82				
Wt. Dry Sample + Drum (gms):		1747.22	1457.99		1445.32	
Drum (gms)	1	1235.35				
Moisture Content (%)		**1.3**				
Water Temperature (^{o}C)			23	23	23	23

Photo Before Test:

PHOTO FILE NAME: X:\Employee\Jianmin\Lab Test In Process\20-103 - HNTB, Last Chance Grade Bypass Project\Slake\RC006@71.8.jpg

Photo AFTER Test:

PHOTO FILE NAME: X:\Employee\Jianmin\Lab Test In Process\20-103 - HNTB, Last Chance Grade Bypass Project\Slake\RC006@71.8after.jpg

Results:

Slake Durabillity Index (Id(2):	**41.02018 % (second cycle)**
Natural Water Content :	**1.3 %**
Final Sample Descriptions:	**Type III**

Note: Type I - Retained specimen remain virtually unchanged.
Type II - Retained specimen consist of large and small fragments.
Type III - Retained specimen is exclusively small fragments.

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Slake Durability of Shales and Similar Weak Rocks

ASTM D4644

Project Name:	Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.:	RC-20-017	**Tested by:**	KK	**Date:**	4/9/21
Depth (ft):	37.7-39.7	**Checked by:**	JF	**Date:**	4/22/21
Sample No.		**Sample Type:**			

Sample Description: Dark Gray , SCHIST

		Before the test	First Cycle		Second Cycle	
Wt. Wet Sample + Drum (gms):		1329.09				
Wt. Dry Sample + Drum (gms):		1320.07	1198.3		1190.69	
Drum (gms)	1	845.32				
Moisture Content (%)		**1.9**				
Water Temperature (^{o}C)			23	23	23	23

Photo Before Test:

PHOTO FILE NAME: X:\Employee\Jianmin\Lab Test In Process\20-103 - HNTB, Last Chance Grade Bypass Project\Slake\RC017@37.7before.jpg

Photo AFTER Test:

PHOTO FILE NAME: X:\Employee\Jianmin\Lab Test In Process\20-103 - HNTB, Last Chance Grade Bypass Project\Slake\RC017@37.7.jpg

Results:

Slake Durabillity Index (Id(2)):	**72.7 % (second cycle)**
Natural Water Content :	**1.9 %**
Final Sample Descriptions:	**Type I I**

Note: Type I - Retained specimen remain virtually unchanged.
Type II - Retained specimen consist of large and small fragments.
Type III - Retained specimen is exclusively small fragments.

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Slake Durability of Shales and Similar Weak Rocks

ASTM D4644

Project Name:	Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.:	RC-20-017	**Tested by:**	KK	**Date:**	4/8/21
Depth (ft):	65-67	**Checked by:**	JF	**Date:**	4/22/21
Sample No.		**Sample Type:**			

Sample Description: Dark Gray , SCHIST

		Before the test	First Cycle		Second Cycle	
Wt. Wet Sample + Drum (gms):		1789.69				
Wt. Dry Sample + Drum (gms):		1783.12	1759.26		1754.65	
Drum (gms)	1	1235.35				
Moisture Content (%)		**1.2**				
Water Temperature (^{o}C)			23	23	23	23

Photo Before Test:

PHOTO FILE NAME: X:\Employee\Jianmin\Lab Test In Process\20-103 - HNTB, Last Chance Grade Bypass Project\Slake\RC017@65before.jpg

Photo AFTER Test:

PHOTO FILE NAME: X:\Employee\Jianmin\Lab Test In Process\20-103 - HNTB, Last Chance Grade Bypass Project\Slake\RC017@65.jpg

Results:

Slake Durabillity Index (Id(2):	**94.80256 % (second cycle)**
Natural Water Content :	**1.2 %**
Final Sample Descriptions:	**Type II**

Note: Type I - Retained specimen remain virtually unchanged.
Type II - Retained specimen consist of large and small fragments.
Type III - Retained specimen is exclusively small fragments.

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Slake Durability of Shales and Similar Weak Rocks

ASTM D4644

Project Name:	Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.:	RC-20-019	**Tested by:**	KK	**Date:**	5/17/21
Depth (ft):	36.6-38.8	**Checked by:**	JF	**Date:**	6/11/21
Sample No.		**Sample Type:**			

Sample Description: Dark Gray , SCHIST

		Before the test	First Cycle		Second Cycle	
Wt. Wet Sample + Drum (gms):		1776.71				
Wt. Dry Sample + Drum (gms):		1770.35	1731.94		1704.04	
Drum (gms)	1	1237.11				
Moisture Content (%)		**1.2**				
Water Temperature (^{o}C)			23	23	23	23

Photo Before Test:

PHOTO FILE NAME: X:\Employee\Jianmin\Lab Test In Process\20-103 - HNTB, Last Chance Grade Bypass Project\Slake\RC011@36.6before.jpg

Photo AFTER Test:

PHOTO FILE NAME: X:\Employee\Jianmin\Lab Test In Process\20-103 - HNTB, Last Chance Grade Bypass Project\Slake\RC011@36.6before.jpg

Results:

Slake Durabillity Index (Id(2):	**87.5647 % (second cycle)**
Natural Water Content :	**1.2 %**
Final Sample Descriptions:	**Type II**

Note: Type I - Retained specimen remain virtually unchanged.
Type II - Retained specimen consist of large and small fragments.
Type III - Retained specimen is exclusively small fragments.

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Slake Durability of Shales and Similar Weak Rocks

ASTM D4644

Project Name:	Last Chance Grade Bypass Project			**Project No:**	20-103
Boring No.:	RC-20-019	**Tested by:**	KK	**Date:**	5/17/21
Depth (ft):	38.4-40.4	**Checked by:**	JF	**Date:**	6/11/21
Sample No.		**Sample Type:**			

Sample Description: Dark Gray , SCHIST

		Before the test	First Cycle		Second Cycle	
Wt. Wet Sample + Drum (gms):		1761.32				
Wt. Dry Sample + Drum (gms):		1761.32	1711.92		1699.27	
Drum (gms)	1	1235.35				
Moisture Content (%)		**0.0**				
Water Temperature (^{o}C)			23	23	23	23

Photo Before Test:

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Photo AFTER Test:

PHOTO FILE NAME: X:\Employee\Jianmin\Lab Test In Process\20-103 - HNTB, Last Chance Grade Bypass Project\Slake\RC019@38.4before.jpg

Results:

Slake Durabillity Index (Id(2):	**88.20275 % (second cycle)**
Natural Water Content :	**0.0 %**
Final Sample Descriptions:	**Type II**

Note: Type I - Retained specimen remain virtually unchanged.
Type II - Retained specimen consist of large and small fragments.
Type III - Retained specimen is exclusively small fragments.

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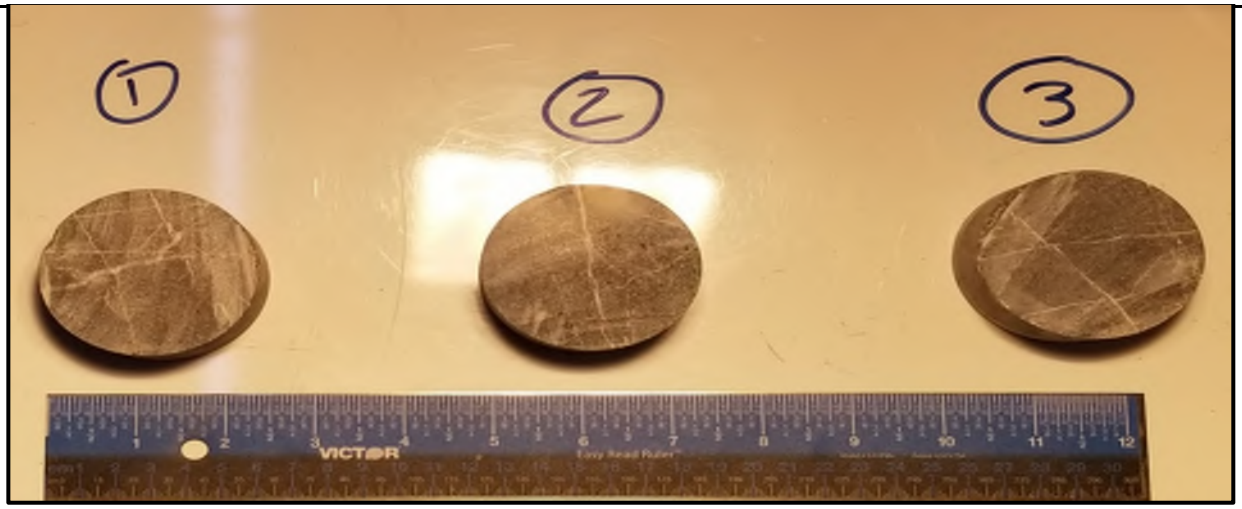
APPENDIX M10 Splitting Tensile (Brazilian)



Test	Length in.	Diameter in.	L:D	Maximum Load, lbf	Splitting Tensile Strength, psi	Failure Type
1	1.38	2.39	0.57	3,372	650	M
2	1.39	2.40	0.58	2,923	560	M
3	1.39	2.40	0.58	6,744	1,280	SH
4						
5						
6						
7						
8						
9						
10						

Moisture Condition: As Received	Average	σt	**830**
	Standard Deviation	S	**390**

Description of Specimen: Slighty weathered sandstone

Test Method: ASTM D3967

Boring:	RC-20-005
Run:	22-24
Depth, ft:	62.6-75
Test Date:	4/23/2021

Failure Type: S = Single Failure Plane, M = Multiple Failure Planes, SH = Shattered, P = Preexisting Plane

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PROJECT NO.: 20208000
ENTRY BY: J.Carmichael
CHECKED BY: J. Slinkard
DATE: 6/16/2021

SPLITTING TENSILE (BRAZILIAN) TEST

Caltrans D59:
Last Chance Grade Bypass Project
Task Order 1 Phase A_03A2996

FIGURE

Test	Length in.	Diameter in.	L:D	Maximum Load, lbf	Splitting Tensile Strength, psi	Failure Type
1	1.34	2.35	0.57	8,992	1,820	M
2	1.22	2.29	0.53	10,791	2,450	M
3	1.15	2.30	0.50	12,364	2,970	M
4						
5						
6						
7						
8						
9						
10						

Moisture Condition: As Received				
	Average	σt	**2,415**	
	Standard Deviation	S	**575**	

Description of Specimen: Slightly Weathered Sandstone

Test Method: ASTM D3967

Boring:	RC-20-011
Run:	18
Depth, ft:	81.1-82.9
Test Date:	4/23/2021

Failure Type: S = Single Failure Plane, M = Multiple Failure Planes, SH = Shattered, P = Preexisting Plane

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9969 Horn Rd., Sacramento, CA 95827

PROJECT NO.: 20208000
ENTRY BY: J.Carmichael
CHECKED BY: J. Slinkard
DATE: 6/15/2021

SPLITTING TENSILE (BRAZILIAN) TEST

Caltrans D59:
Last Chance Grade Bypass Project
Task Order 1 Phase A_03A2996

FIGURE

Test	Length in.	Diameter in.	L:D	Maximum Load, lbf	Splitting Tensile Strength, psi	Failure Type
1	1.57	2.36	0.66	3,821	660	P/SH
2						
3						
4						
5						
6						
7						
8						
9						
10						

Moisture Condition: As Received	Average	σt	**660**
	Standard Deviation	S	**nm**

Description of Specimen: Argelite

Test Method: ASTM D3967

Boring:	RC-20-011
Run:	33 & 36
Depth, ft:	132.8-133.1 & 140.0-140.5
Test Date:	4/30/2021

Failure Type: S = Single Failure Plane, M = Multiple Failure Planes, SH = Shattered, P = Preexisting Plane

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9969 Horn Rd., Sacramento, CA 95827

PROJECT NO.: 20208000
ENTRY BY: J.Carmichael
CHECKED BY: J. Slinkard
DATE: 6/16/2021

SPLITTING TENSILE (BRAZILIAN) TEST

Caltrans D59:
Last Chance Grade Bypass Project
Task Order 1 Phase A_03A2996

FIGURE

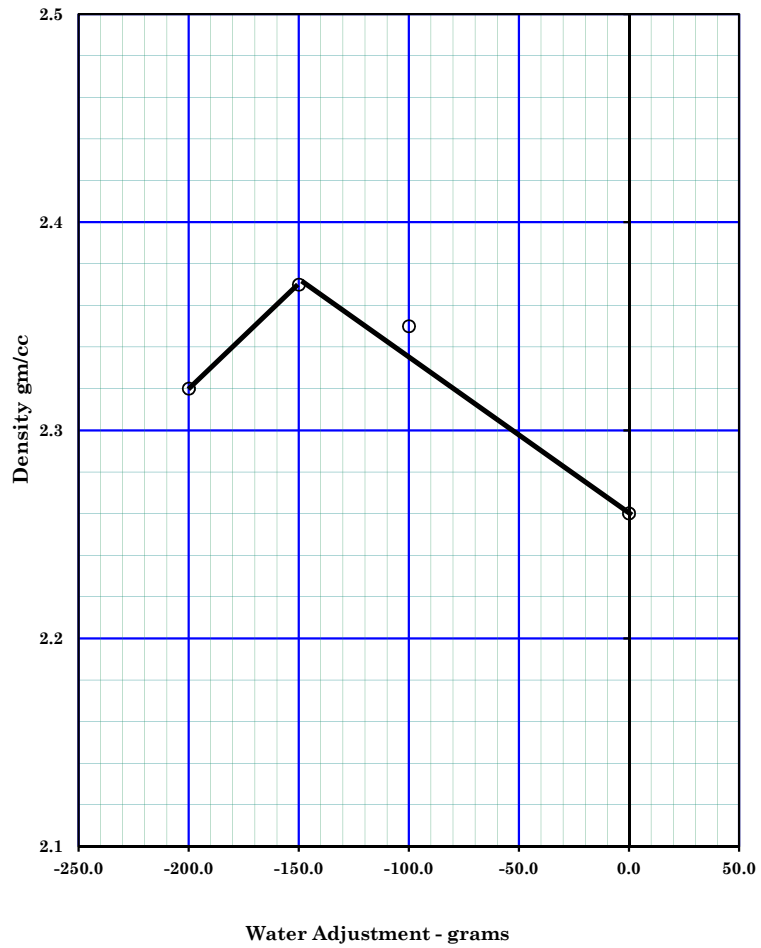
APPENDIX M11 Relative Compaction

COMPACTION TEST

(CAL. TRAN. - 216)

Project Name	: *HNTB, Last Chance Grade Bypass Project*				
Project No.	: *20-103*	**Sampled By :**		**Date :**	
Boring No.	: *RC-20-002*	**Prepared By :**	*EA*	**Date :**	*11/11/20*
Sample No.	: *Composite*	**Tested By :**	*EA*	**Date :**	*11/12/20*
Depth (ft/m)	: *30-70*	**Calculated By :**	*KK*	**Date :**	*11/12/20*
Location	:	**Checked By :**	*JF*	**Date :**	*11/13/20*
Description	: *Dark gray, SILT with SAND (ML)*				

			In-Place Oven Dry		Max. Point Oven Dry		
	Estimated Moisture Content (%)						
	Container Number		*1*		*2*		
	Wt. of Wet Soil + Container (gm)		*244.79*		*221.19*		
	Wt. of Dry Soil + Container (gm)		*233.72*		*216.27*		
	Weight of Container (gm)		*157.33*		*157.33*		
	Moisture Content (%)		***14.49***		***8.35***		
I	**Initial Wet Test Specimen (g)**		*2500.00*	*2500.00*	*2500.00*	*2500.00*	
	Icrement No.		*1*	*2*	*3*	*4*	
	Water Adjustment (g)		*0.00*	*-100.00*	*-150.00*	*-200.00*	
J	**Tamper Reading (inch)**		*10.50*	*10.10*	*10.00*	*10.20*	
K	**Wet Density (gm/cc) from Table 1**	**(G*H/J)**	*2.2600*	*2.3500*	*2.3700*	*2.3200*	
	Dry Density (gm/cc)	**(S+T)**	-	-	-	-	-
	Corrected Dry Density (pcf)						



Rock Correction

	Total Sample Weight (gm)		
L	**Total Dry Sample Weight** (gm)		*27726.00*
M	**Wt. in Air of +3/4"** (gm)		*600.00*
N	**Wt. in Water of +3/4"** (gm)		-
O	**Volume of +3/4"** (pcf)	(M-N)	-
P	**% +3/4" Sieve**	100 (M/L)	*2.16*
Q	**% -3/4" Sieve**	(100-P)	*97.84*
R	**Density of +3/4"**(pcf)	62.43 (M/O)	-
S	**(%+3/4")/Density of 3/4"**	(P/RY)	-
T	**(% -3/4") / Density of -3/4"**	(S+T)	
U	**Sum of S and T**	(100/U)	
V	**Agg. Adj (Y) of +3/4"**		*1.0*

Sample should pass 3/4" sieve. If >10% retained, Correction must be applied

Tamper Weight = 10 lb.

Dropping Height = 18"

Number of Layers = 5

20 blows/first 5 Layer

5 blows on piston

Agg. Adj (Y) of +3/4"	
% +3/4" (P)	**adj.**
20 or less	*1.00*
21 - 25	*0.99*
26 - 30	*0.98*
31 - 35	*0.97*
36 - 40	*0.96*
41 - 45	*0.95*
46 - 50	*0.94*

Maximum Wet Density		**Optimum Moisture**
(gm/cc)	**(kN/m^3)**	**(%)**
2.37		***8.4***

APPENDIX M12 Petrographic Report

CALTRANS Last Chance Grade Project

Petrographic Report # J53

June 22, 2021

for

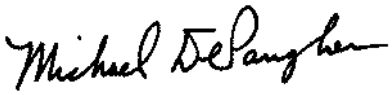
Brian O'Neill, PE, GE

Sr. Principal Geotechnical Engineer

1330 Broadway, Suite 1200

Oakland, CA 94612

by



Michael DePangher, Ph.D.
Spectrum Petrographics, Inc.

Key to Petrographic and Photomicrographic Descriptions - v. 210324

Clay minerals common in altered rocks must often be identified by X-ray diffraction either because their optic properties are not diagnostic or because they are too fine grained to be reliably identified by optical methods. The term "clay" is used herein to denote fine grained phyllosilicates in general. Under ideal conditions, it is often possible to optically discriminate between 4 major groups: kaolinite, smectite, mica (including illite), and chlorite. This is done whenever conditions permit.

The term "sericite" is applied to fine grained colorless phyllosilicates that show upper 2nd order maximum interference colors. These could include muscovite, illite, paragonite, lepidolite, margarite, clintonite, pyrophyllite, and talc. The term "intermediate clay" is applied to fine grained very pale or colorless phyllosilicates that show upper 1st order maximum interference colors. These are probably dominated by chlorite, smectite, and mixed-layer illite/smectite.

The term "opaques" is used to refer to all materials opaque (and sometimes semi-opaque) to transmitted light. The term "FEOH" is herein used to indicate fine grained, yellowish to reddish brown, earthy materials of varying opacity in transmitted light. FEOH is probably mostly Fe oxy-hydroxides but may sometimes include sphalerite, realgar, orpiment, jarosite, a number of Mn oxy-hydroxides, and organic matter.

A question mark after a rock or mineral name in a petrographic description means that there is uncertainty about the identification of that rock or mineral.

Particle size distributions are given as (A-B μm), where A and B are the median and largest particle sizes, respectively, in microns. A question mark (?) in the position of A or B indicates that the value of A or B was indeterminate, probably because of excessively large or small particle size or statistically insignificant numbers of particles.

Mineral abundances are visual estimates for an entire slide. For multi-lithologic materials (cuttings, etc...), mineralogy, textures, and alteration are described only for the dominant lithology.

Section preparation codes are as follows: (1) Format: 27 x 46 mm; 51 x 76 mm; or 1" round; (2) Finish: standard lapping (STD); or polished (POL); (3) Stains: sodium cobaltinitrite (SCN); alizarin red S + potassium ferricyanide (ARSPF); and barium chloride + potassium rhodizonate (BCPR); and (4) Cover: none; permanent Loctite acrylic (PLA); or permanent Norland acrylic (PNA).

Photomicrograph captions contain the following items of information in consecutive order separated by forward slashes: (1) sample identifier; (2) JPG image file name composed of concatenated [job identification code + sequence number]; (3) illumination type; and (4) field of view (FOV). For illumination types: "PPL" indicates plane-polarized light; "XPL indicates cross-polarized light; "R" indicates reflected light. "550" means that a 550 nanometer wavelength plate was inserted in the light path. "C" indicates that the substage condenser was in (sometimes used for Fe-oxides). "O" indicates oblique incident illumination. These various illuminations can be combined. "CON" indicates conoscopic illumination. POL means that a polarizing filter was used with the lens, and DAY means the sample was photographed in diffused daylight. Unless otherwise noted, sequential images are taken in XPL and PPL of a single field of view.

Features on photomicrographs are indicated by the number of the feature in the ALTERATION section of the text or by a mineral name abbreviation, e.g., **Q**uartz, **P**lagioclase, **K**-feldspar, **ser**icite, **b**io**t**ite, **fe**rroan **c**al**c**ite, **act**inolite.

Igneous rock classifications are according to IUGS (1973; 1979); sandstones are classified according to McBride (1963); mudrocks are classified according to Picard (1971); carbonates are classified according to Folk (1959); and metamorphic rocks classified according to IUGS (Fettes and Desmons, 2011).

The term “protolith” is used for the interpreted primary lithology. The term “precursor” is used for a secondary lithology from which the current rock was derived.

SAMPLE # **RC-20-014 (B-29) 87.1** June 22, 2021

ROCK NAME ALTERED SILTSTONE -- probably formed by alteration (secondary quartz + carbonate) from a clayey siltstone protolith.

MINERALS [Quartz + plagioclase] (45%) + clay (40%) + illite (10%) + carbonaceous matter (5%) + carbonate (<1%).

TEXTURES Clastic sedimentary. Very fine laminae define a moderately directed fabric.

Framework Grains (55%) are 25-30 µm, angular, with tangential contacts.

Abiogenic Grains (55%)

Monocrystalline Grains (55%)

[Quartz + Plagioclase] (45%)

Illite (10%)

Polycrystalline Grains (0%)

Biogenic Grains (0%) were not observed.

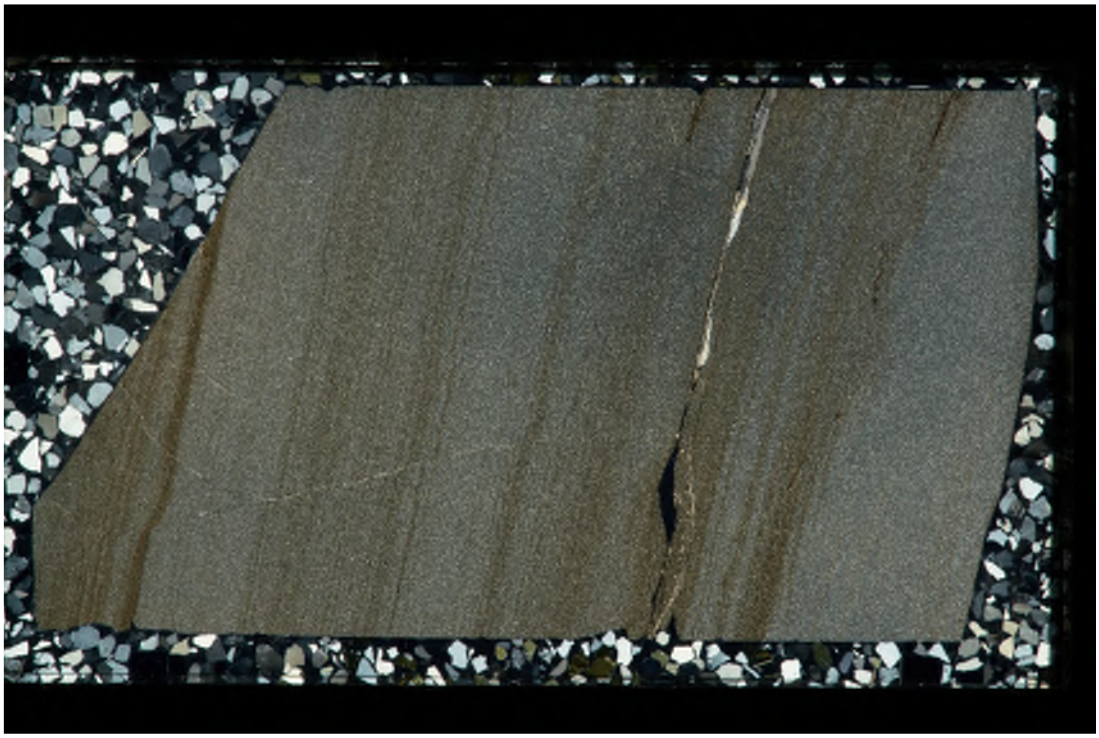
Matrix (45%) is composed of clay + carbonaceous matter.

Cement (0%) was not observed.

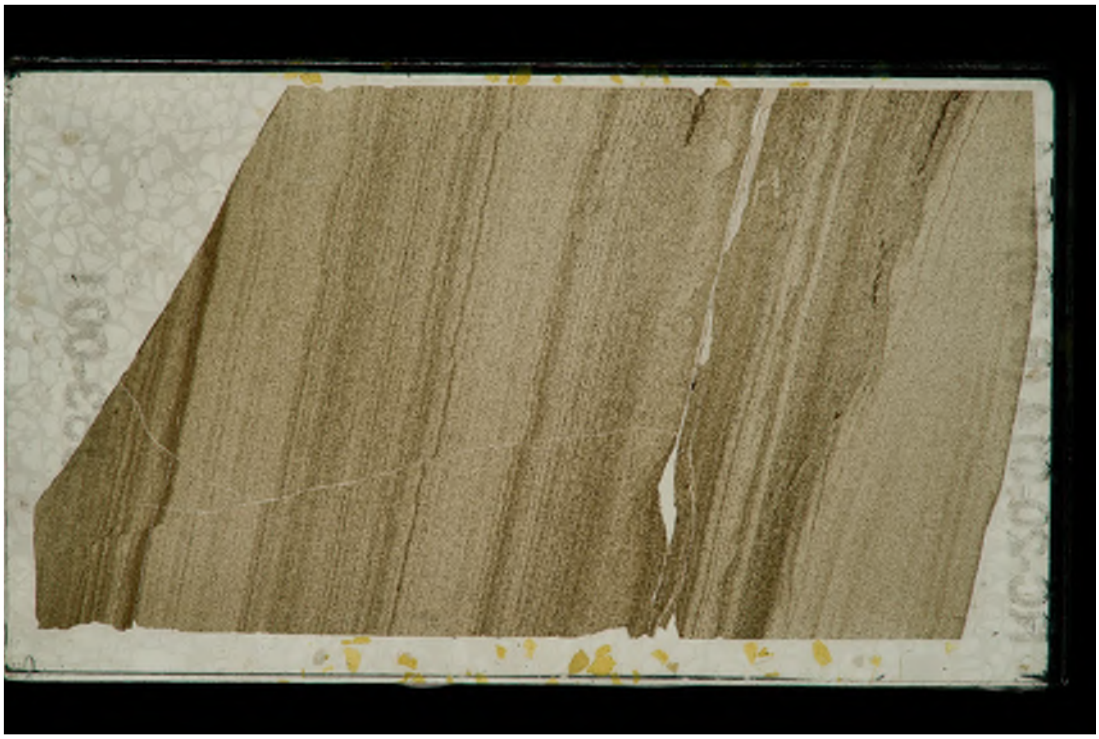
ALTERATION Alteration features of indeterminate relative ages: (1) veins of carbonate + quartz.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN (top 2/3) + ARSPF (none) Cover: PNA

IMAGES RC-20-014 (B-29) 87.1 J53-001.jpg/XPL/FOV = 27x46 mm ALTERED SILTSTONE showing typical appearance.

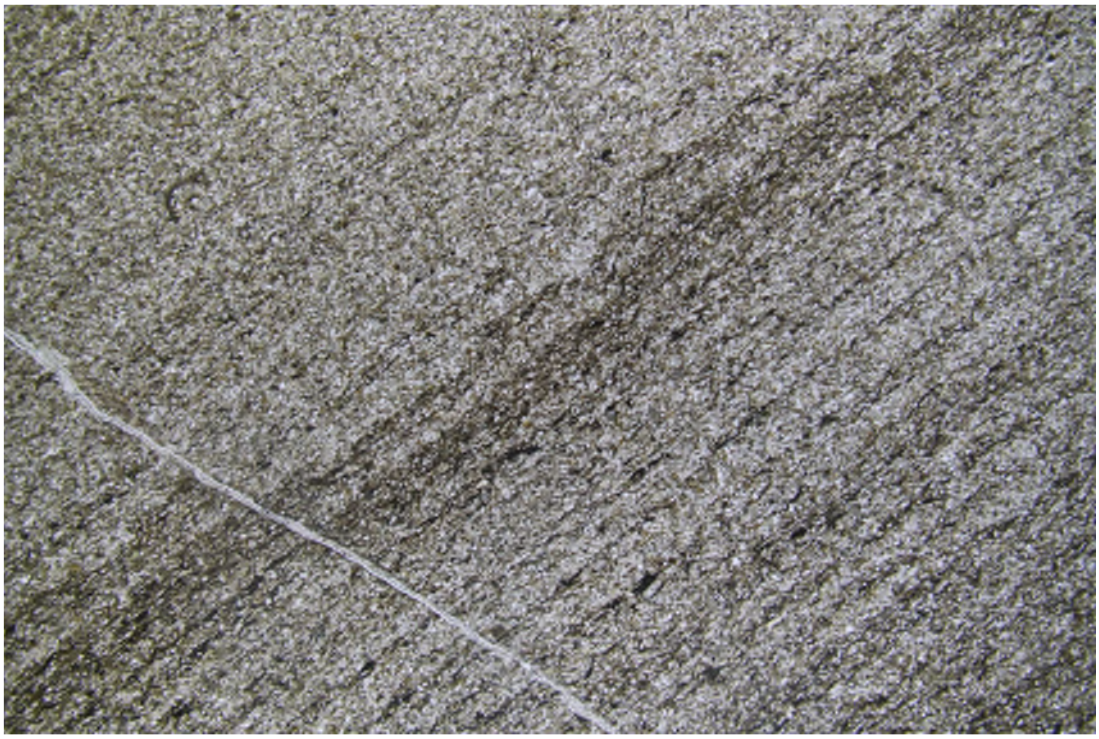


RC-20-014 (B-29) 87.1 J53-002.jpg/PPL/FOV = 27x46 mm Same.



RC-20-014 (B-29) 87.1 J53-017.jpg/XPL/FOV = 4.00x5.83 mm ALTERED SILTSTONE showing typical appearance.

RC-20-014 (B-29) 87.1 J53-018.jpg/PPL/FOV = 4.00x5.83 mm Same.



SAMPLE # **RC-20-014 (B-29) 270** June 22, 2021

ROCK NAME ALTERED SANDSTONE -- probably formed by alteration (secondary quartz + carbonate) from a lithic arkose protolith.

MINERALS Plagioclase (70%) + quartz (20%) + clay (6%) + clinozoisite (3%) + biotite (<1%) + illite (<1%) + carbonate (<1%) + opaques (<1%).

TEXTURES Clastic sedimentary; non-directed fabric.

Framework Grains (95%) are 320-600 µm, angular, with tangential contacts.

Abiogenic Grains (95%)

Monocrystalline Grains (70%)

Plagioclase] (50%)
Quartz (20%)
Illite (<1%)
Biotite (<1%)

Polycrystalline Grains (20%)

Intermediate Volcanic Rock Fragments (20%) are composed of very fine grained, mostly aphyric, dacite/andesite.

Biogenic Grains (0%) were not observed.

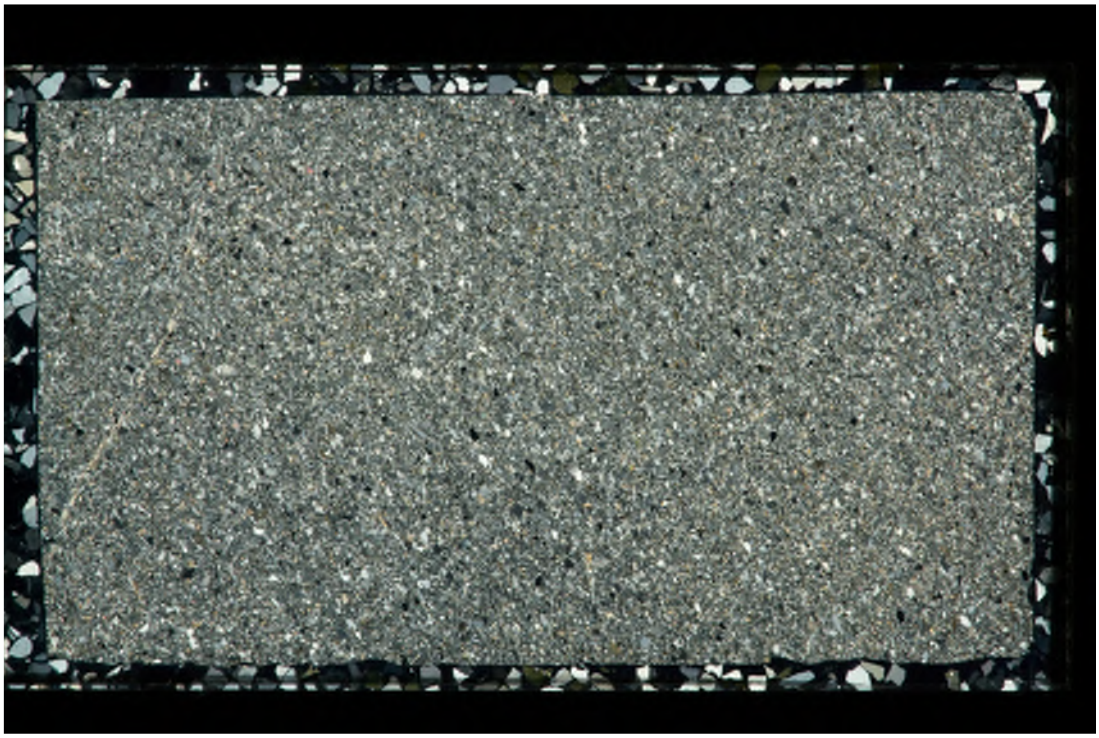
Matrix (5%) is composed of clay.

Cement (0%) was not observed.

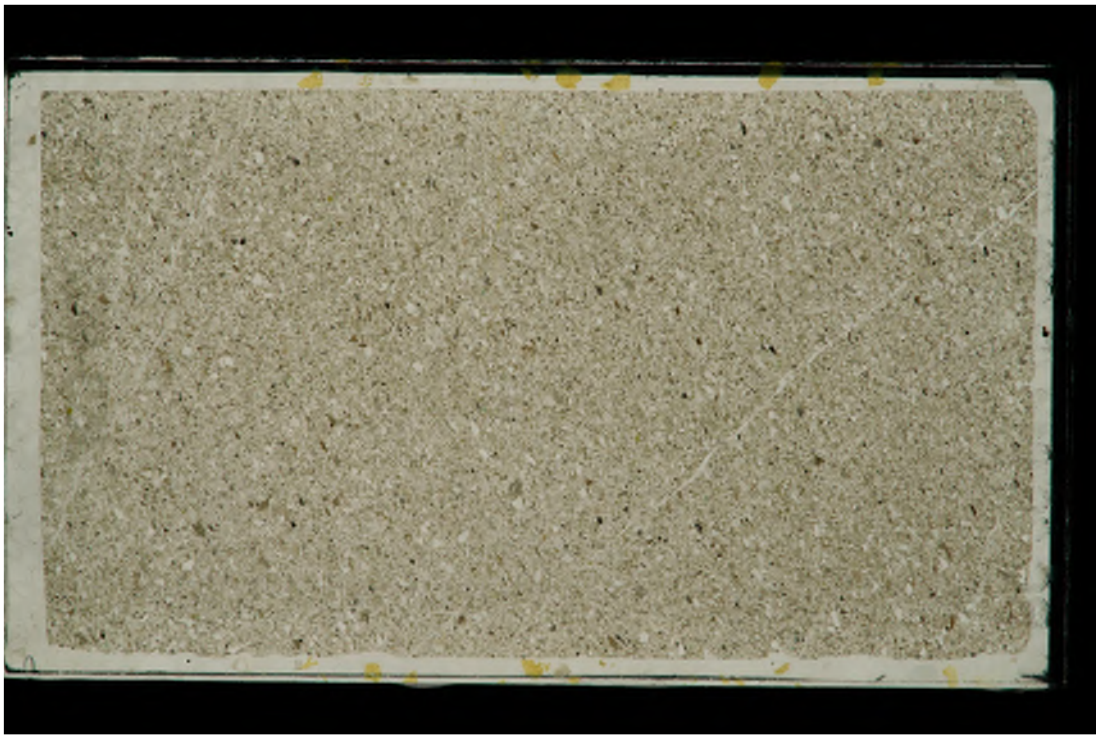
ALTERATION Alteration features of indeterminate relative ages: (1) multiple cataclastic brecciation; and (2) veins of carbonate.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN (top 2/3) + ARSPF (none) Cover: PNA

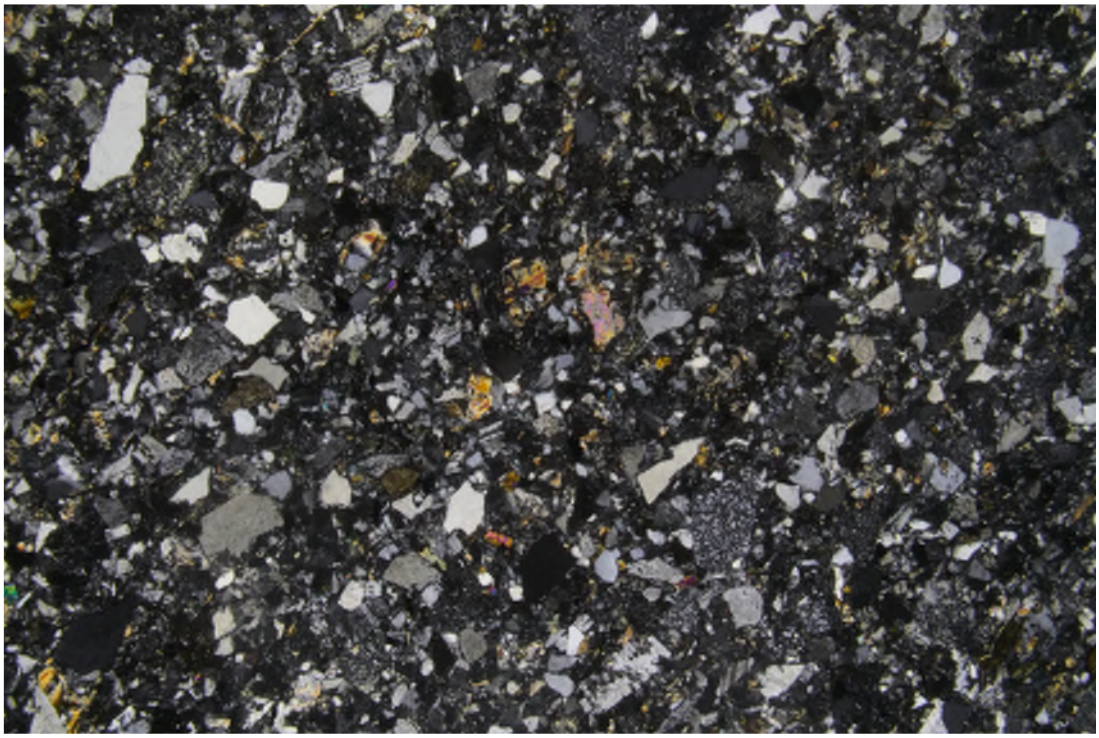
IMAGES RC-20-014 (B-29) 270 J53-003.jpg/XPL/FOV = 27x46 mm ALTERED SANDSTONE showing typical appearance.



RC-20-014 (B-29) 270 J53-004.jpg/PPL/FOV = 27x46 mm Same.



RC-20-014 (B-29) 270 J53-019.jpg/XPL/FOV = 4.00x5.83 mm ALTERED SANDSTONE showing typical appearance.



RC-20-014 (B-29) 270 J53-020.jpg/PPL/FOV = 4.00x5.83 mm Same.

SAMPLE # **RC-21-001 (B-47) 99.9-100** June 22, 2021

ROCK NAME ALTERED HETEROLITHIC MULTIPLE BRECCIA -- probably formed in a fault zone by multiple cataclasis and alteration (secondary carbonate) of interbedded arkose and silty claystone protoliths.

MINERALS Clay (mostly smectite) (70%) + [quartz + plagioclase] (26%) + carbonaceous matter (3%) + carbonate (1%).

TEXTURES Multiple episodes of cataclasis/brecciation of interbedded arkose and silty claystone protoliths has produced a weakly directed fabric.

Porphyroclasts (?%) are composed of cataclastically brecciated, 1600-8000 µm, arkose and silty claystone fragments with floating to tangential contacts.

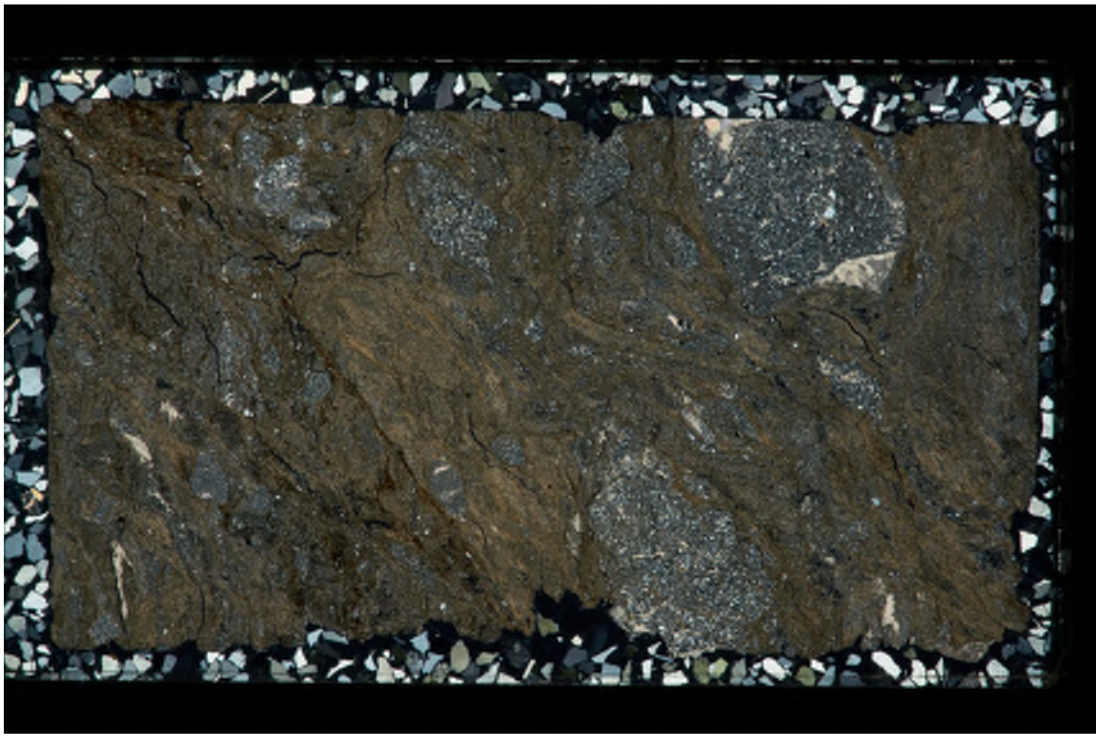
Matrix (?%) is composed of the comminuted equivalent of the silty claystone porphyroclasts, suggesting a dominantly cataclastic mechanism of brecciation.

Cement (0%) was not observed.

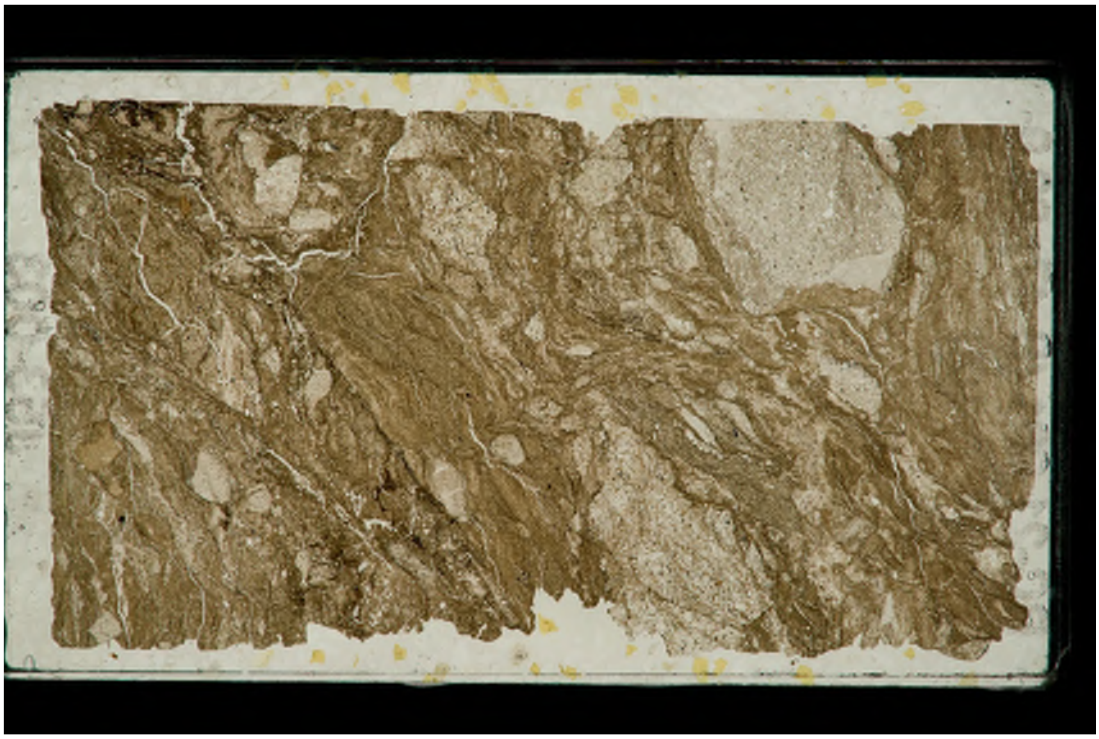
ALTERATION Alteration features of indeterminate relative ages: (1) veins of carbonate; and (2) multiple cataclastic brecciation.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN (top 2/3) + ARSPF (none) Cover: PNA

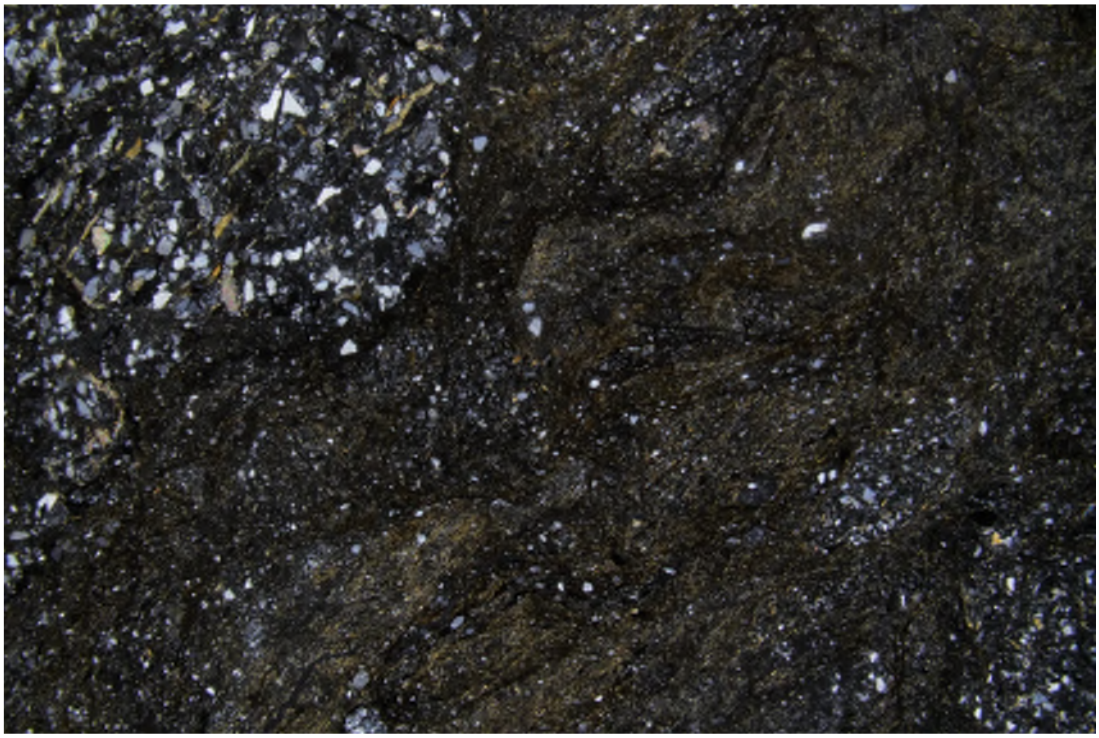
IMAGES RC-21-001 (B-47) 99.9-100 J53-005.jpg/XPL/FOV = 27x46 mm ALTERED HETEROLITHIC MULTIPLE BRECCIA showing typical appearance.



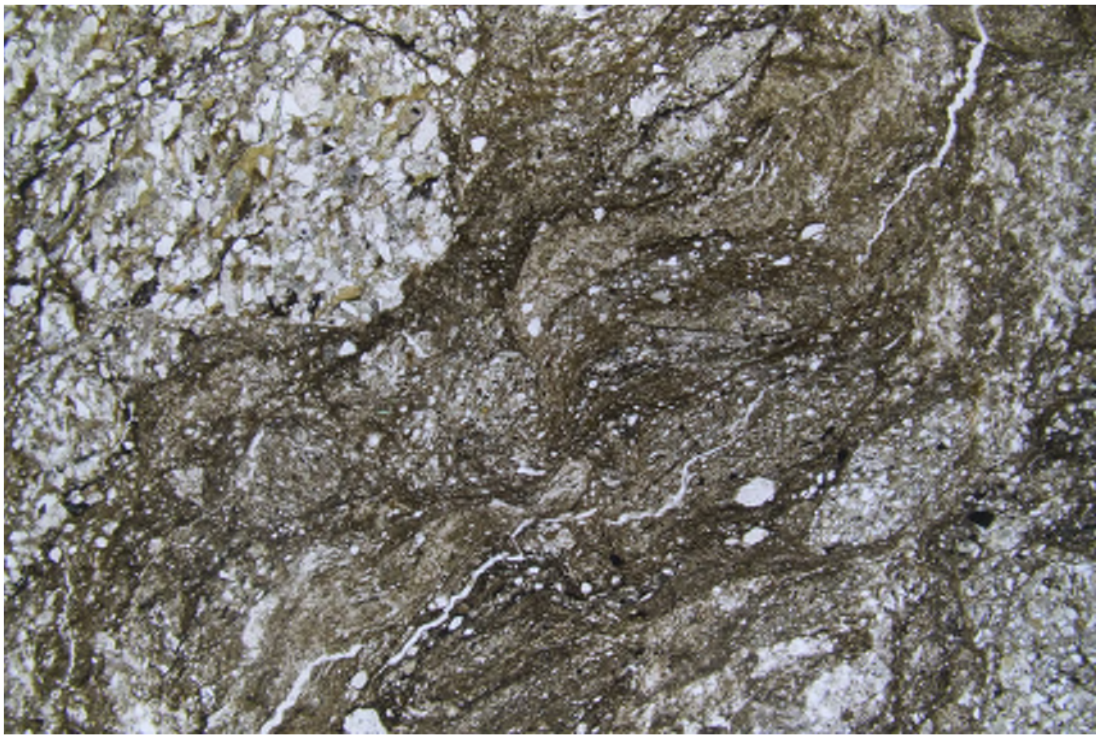
RC-21-001 (B-47) 99.9-100 J53-006.jpg/PPL/FOV = 27x46 mm Same.



RC-21-001 (B-47) 99.9-100 J53-021.jpg/XPL/FOV = 4.00x5.83 mm ALTERED HETEROLITHIC MULTIPLE BRECCIA showing typical appearance.



RC-21-001 (B-47) 99.9-100 J53-022.jpg/PPL/FOV = 4.00x5.83 mm Same.



SAMPLE # **RC-20-019 (B-50) 55.0** June 22, 2021

ROCK NAME ALTERED HETEROLITHIC MULTIPLE BRECCIA -- probably formed in a fault zone by multiple cataclasis and alteration (secondary carbonate) of interbedded arkose and claystone protoliths.

MINERALS [Quartz + plagioclase] (80%) + clay (mostly smectite) (10%) + carbonate (10%) carbonaceous matter (<1%).

TEXTURES Multiple episodes of cataclasis/brecciation of interbedded arkose and claystone protoliths has produced a weakly directed fabric.

Porphyroclasts (?%) are composed of cataclastically brecciated arkose and claystone fragments with floating to tangential contacts.

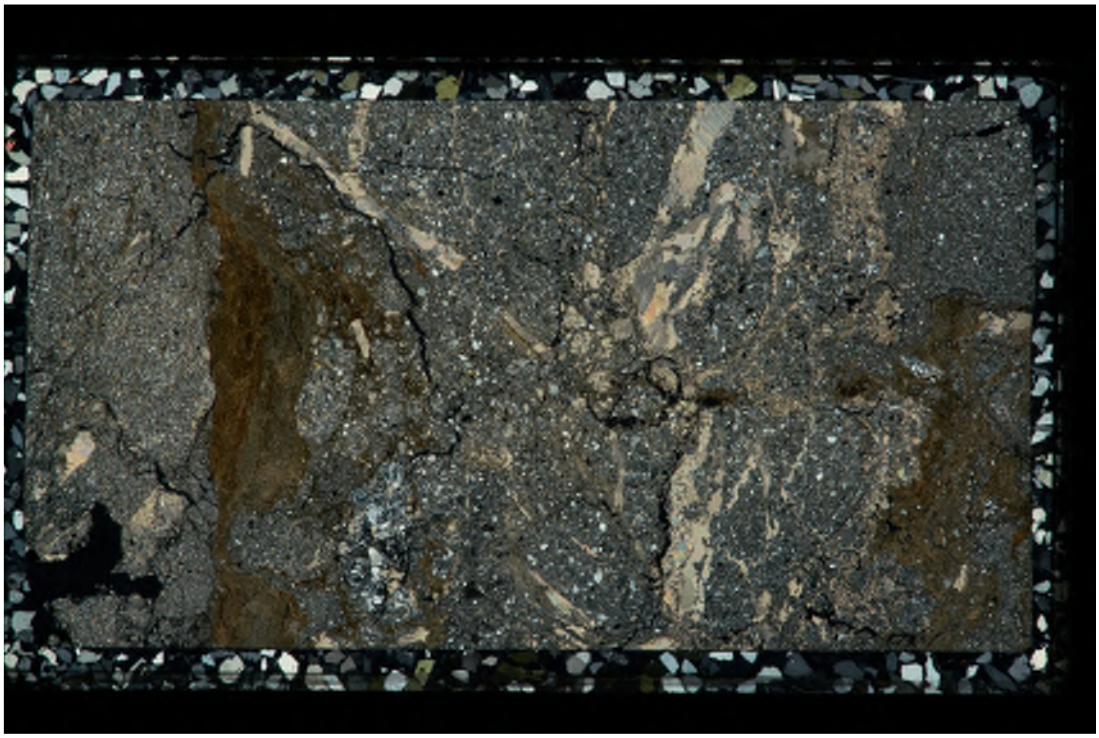
Matrix (?%) is composed of the comminuted equivalent of the porphyroclasts, suggesting a dominantly cataclastic mechanism of brecciation.

Cement (0%) was not observed.

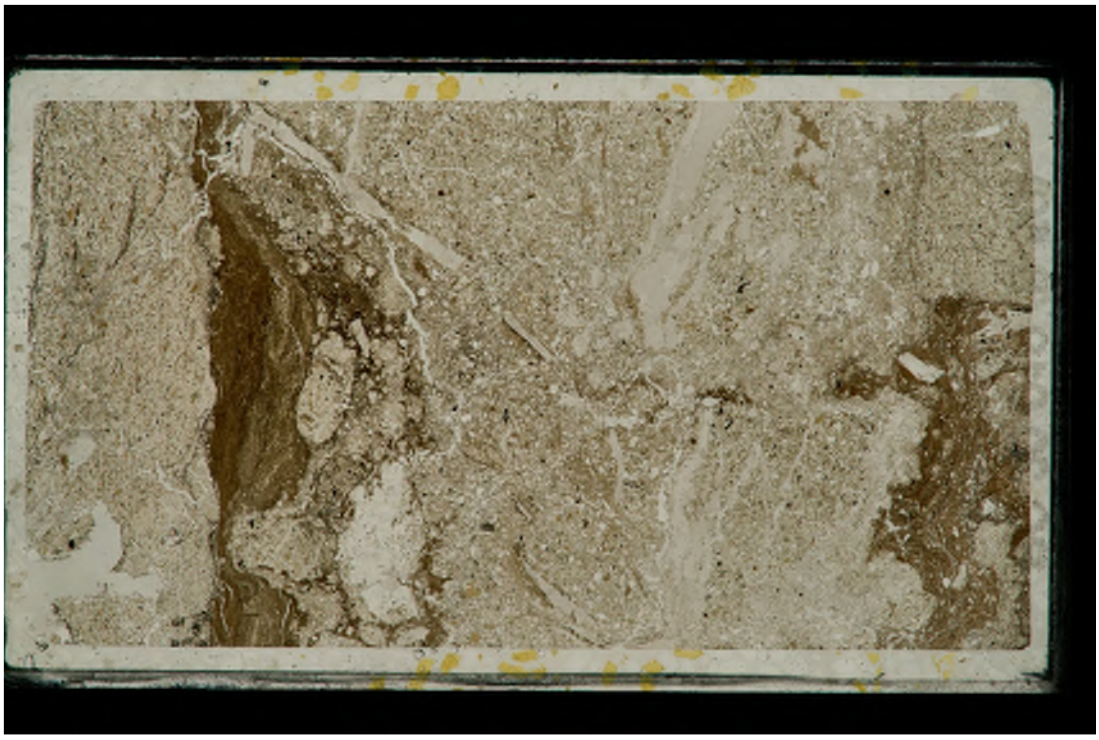
ALTERATION Alteration features of indeterminate relative ages: (1) veins of carbonate; and (2) multiple cataclastic brecciation.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN (top 2/3) + ARSPF (none) Cover: PNA

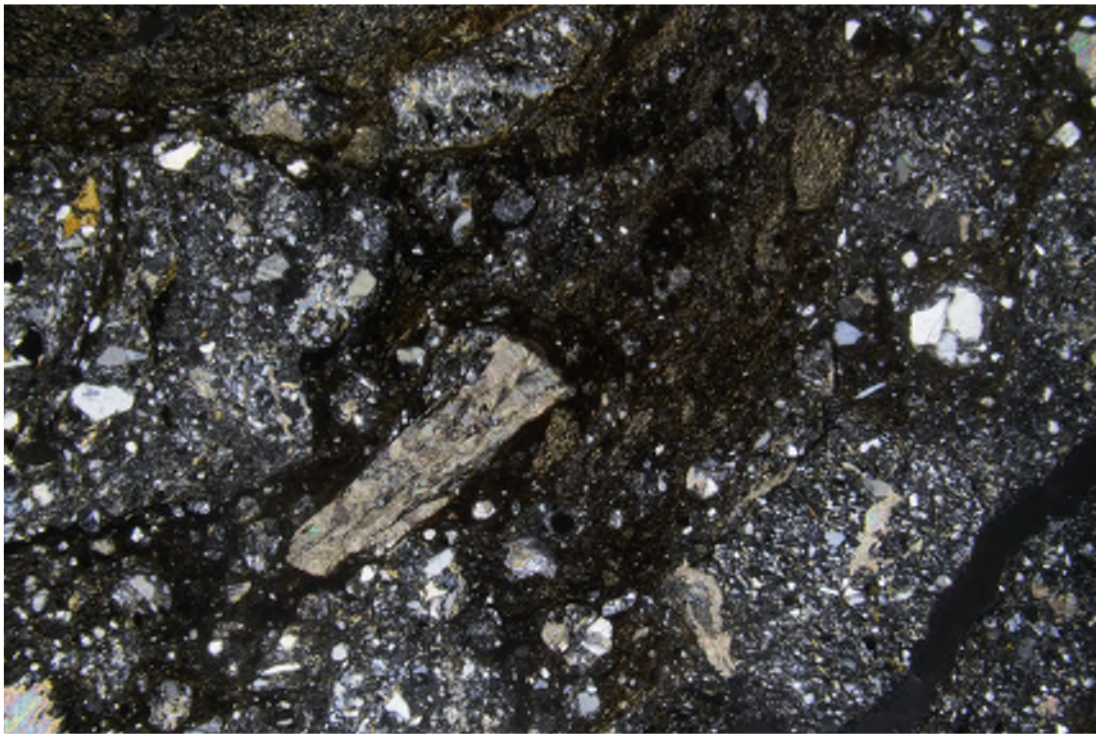
IMAGES RC-20-019 (B-50) J53-007.jpg/XPL/FOV = 27x46 mm ALTERED HETEROLITHIC MULTIPLE BRECCIA showing typical appearance.



RC-20-019 (B-50) J53-008.jpg/PPL/FOV = 27x46 mm Same.



RC-20-019 (B-50) J53-023.jpg/XPL/FOV = 4.00x5.83 mm ALTERED HETEROLITHIC MULTIPLE BRECCIA showing typical appearance.



RC-20-019 (B-50) J53-024.jpg/PPL/FOV = 4.00x5.83 mm Same.

SAMPLE # **RC-20-011 (B-32)168.8-169** June 22, 2021

ROCK NAME ALTERED SANDSTONE -- probably formed by alteration (secondary clay + clinozoisite) from a lithic arkose protolith.

MINERALS Plagioclase (74%) + quartz (20%) + clay (5%) + clinozoisite (1%) + biotite (<1%) + illite (<1%) + opaques (<1%).

TEXTURES Clastic sedimentary; non-directed fabric.

Framework Grains (95%) are 360-3400 µm, angular, with tangential contacts.

Abiogenic Grains (95%)

Monocrystalline Grains (75%)

Plagioclase] (55%) weakly altered to clinozoisite + carbonate.
Quartz (20%)
Illite (<1%)
Biotite (<1%)

Polycrystalline Grains (20%)

Intermediate Volcanic Rock Fragments (20%) are composed of very fine grained, mostly aphyric, dacite/andesite.

Claystone (<1%)

Biogenic Grains (0%) were not observed.

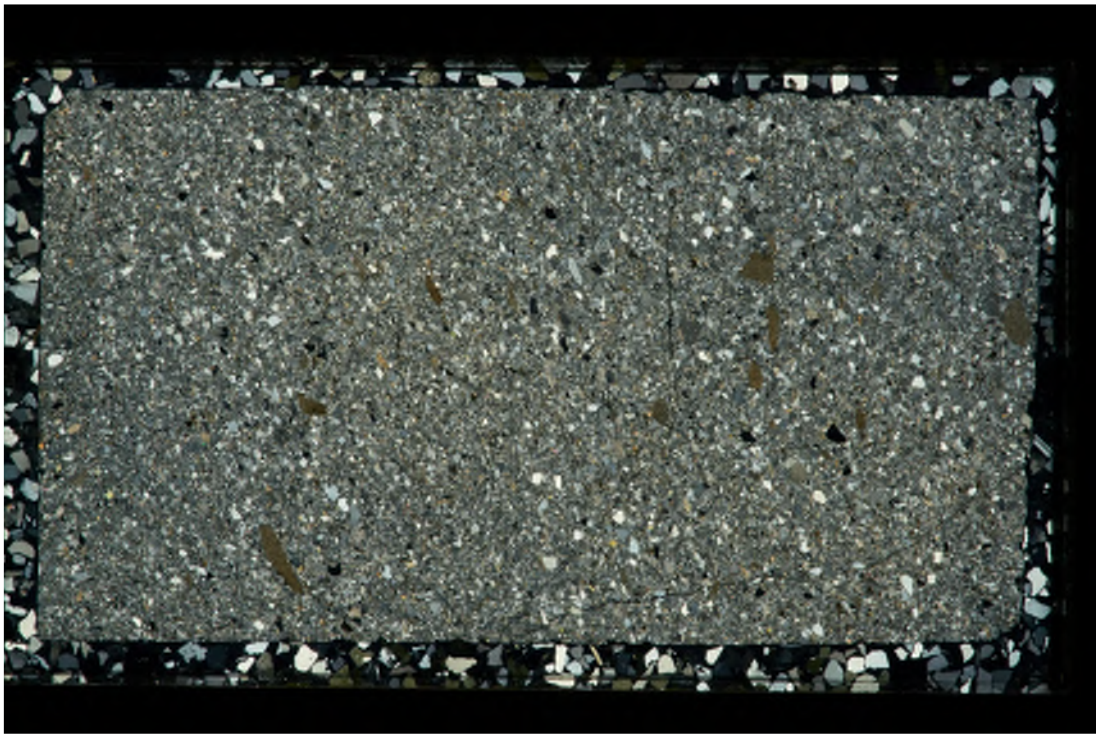
Matrix (5%) is composed of clay.

Cement (0%) was not observed.

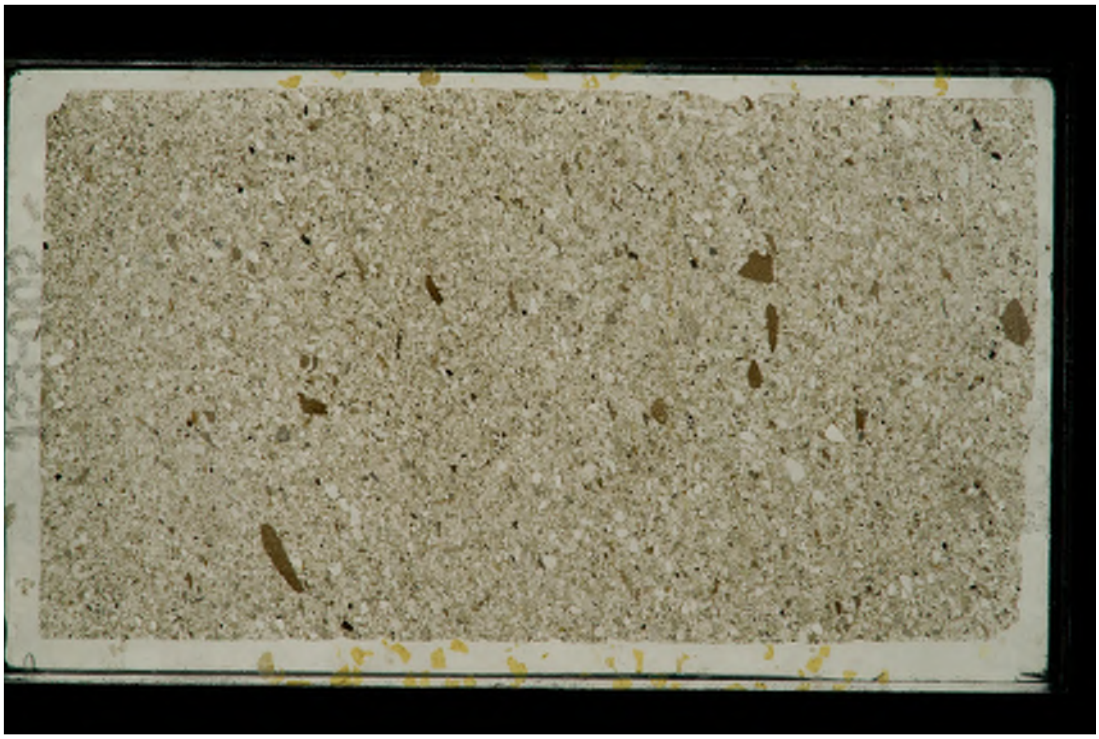
ALTERATION Alteration features of indeterminate relative ages: (1) veins of clay.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN (top 2/3) + ARSPF (none) Cover: PNA

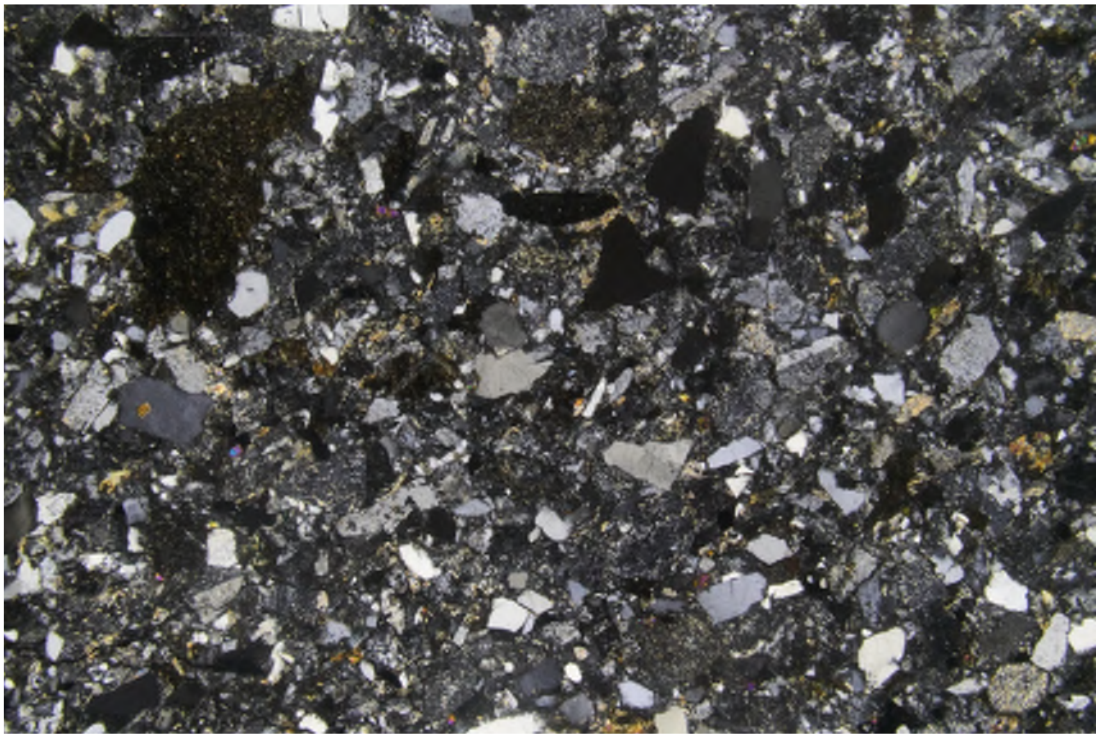
IMAGES RC-20-011 (B-32)168.8-169 J53-009.jpg/XPL/FOV = 27x46 mm ALTERED SANDSTONE showing typical appearance.



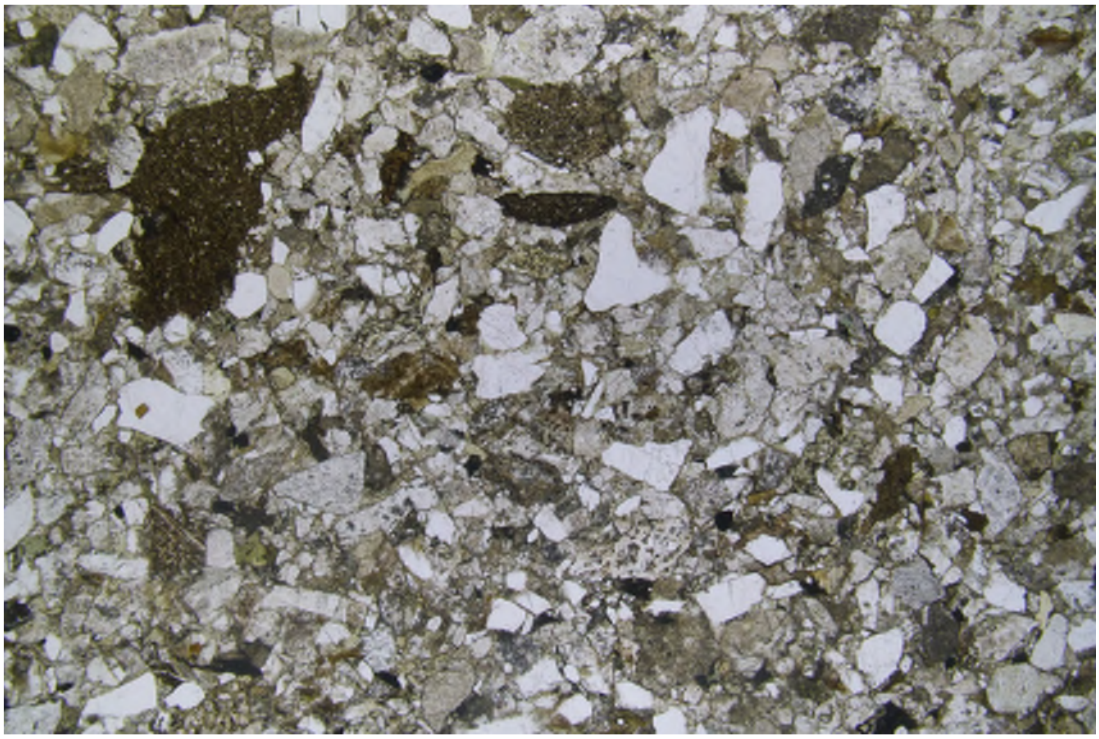
RC-20-011 (B-32)168.8-169 J53-010.jpg/PPL/FOV = 27x46 mm Same.



RC-20-011 (B-32)168.8-169 J53-025.jpg/XPL/FOV = 4.00x5.83 mm
ALTERED SANDSTONE showing typical appearance.



RC-20-011 (B-32)168.8-169 J53-026.jpg/PPL/FOV = 4.00x5.83 mm Same.



SAMPLE # **RC-20-014 280.4-280.9** June 22, 2021

ROCK NAME ALTERED SANDSTONE -- probably formed by alteration (secondary clay + clinozoisite + carbonate + chlorite) from a lithic arkose protolith.

MINERALS Plagioclase (72%) + quartz (20%) + clay (8%) + clinozoisite (<1%) + biotite (<1%) + illite (<1%) + K-feldspar (<1%) + carbonate (<1%) + chlorite (<1%) + opaques (<1%).

TEXTURES Clastic sedimentary; non-directed fabric.

Framework Grains (92%) are 280-2400 µm, angular, with tangential contacts.

Abiogenic Grains (92%)

Monocrystalline Grains (72%)

Plagioclase] (52%) weakly altered to clinozoisite + carbonate.
Quartz (20%)
Illite (<1%)
Biotite (<1%) moderately altered to chlorite.
K-feldspar (<1%)

Polycrystalline Grains (20%)

Intermediate Volcanic Rock Fragments (20%) are composed of very fine grained, mostly aphyric, dacite/andesite.

Claystone (<1%)

Biogenic Grains (0%) were not observed.

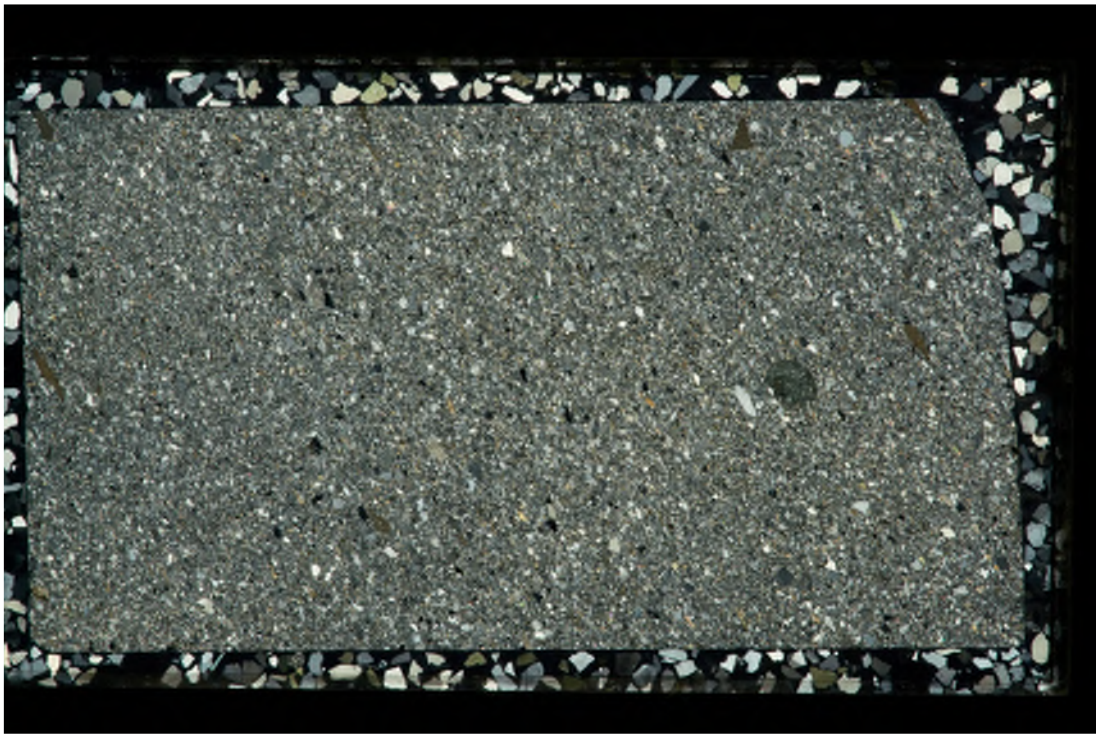
Matrix (8%) is composed of clay.

Cement (0%) was not observed.

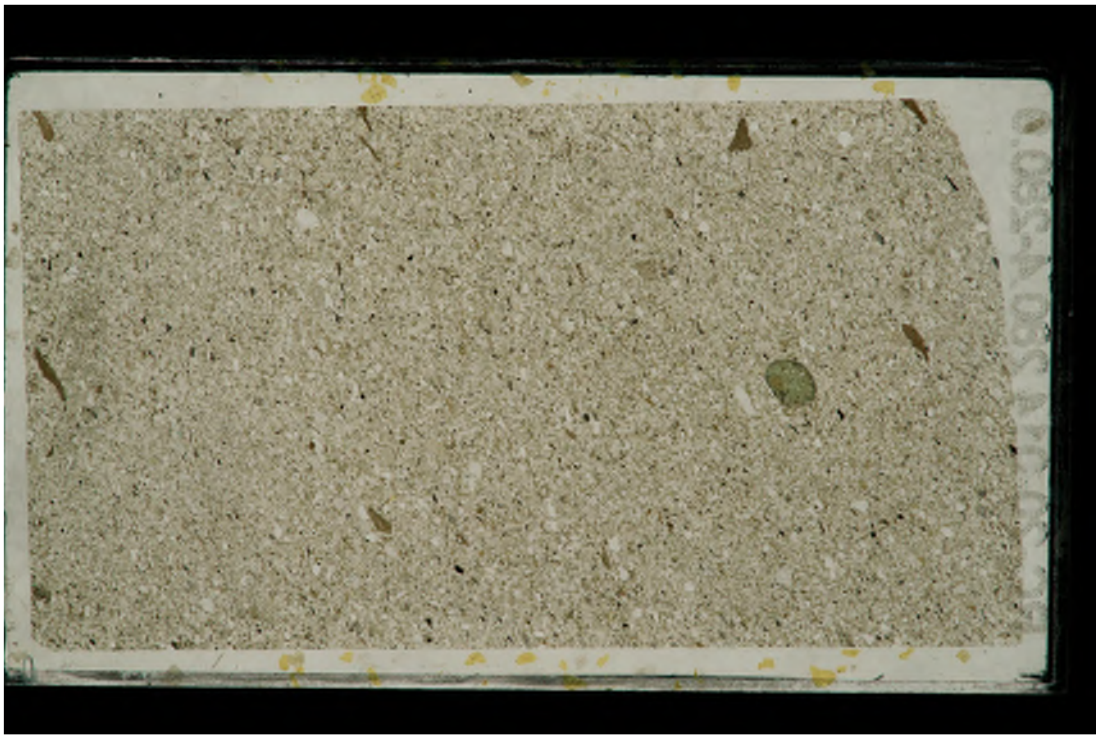
ALTERATION No other alteration features were observed.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN (top 2/3) + ARSPF (none) Cover: PNA

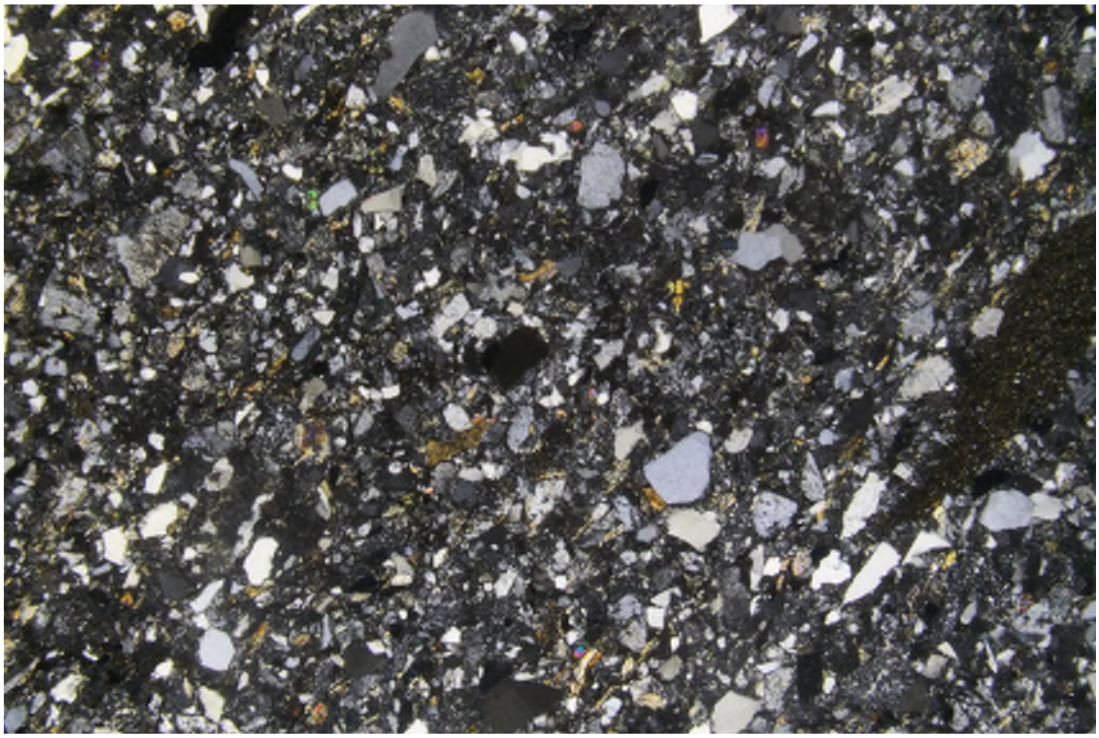
IMAGES RC-20-014 280.4-280.9 J53-011.jpg/XPL/FOV = 27x46 mm ALTERED SANDSTONE showing typical appearance.



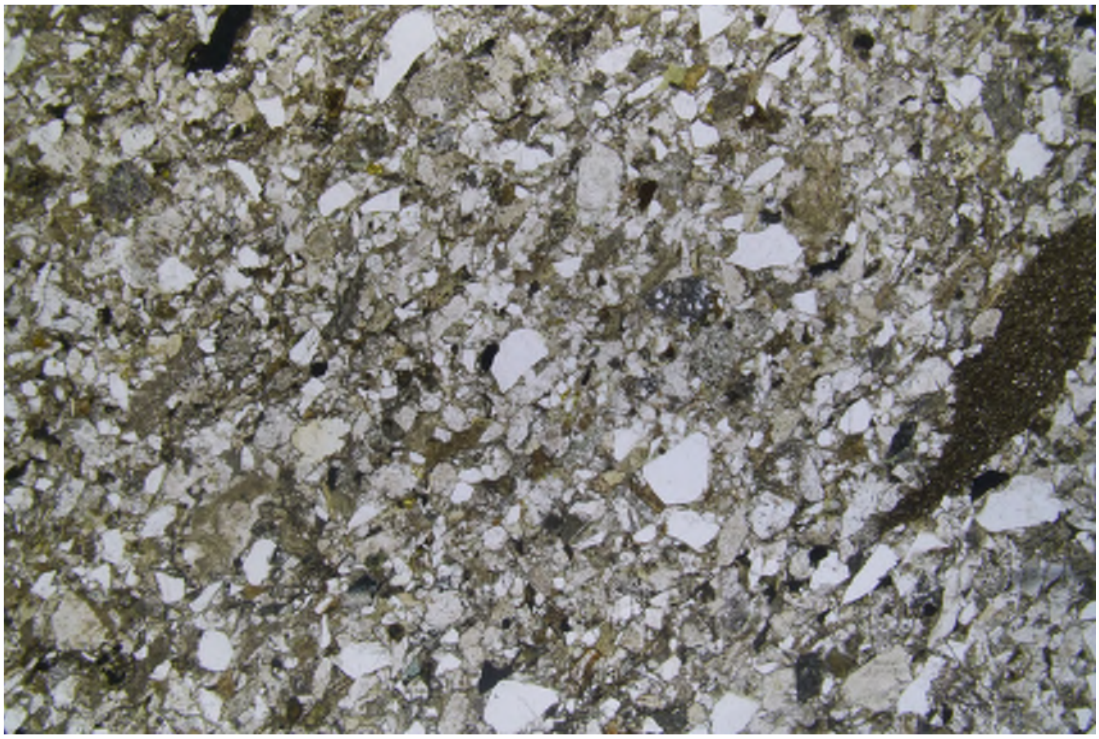
RC-20-014 280.4-280.9 J53-012.jpg/PPL/FOV = 27x46 mm Same.



RC-20-014 280.4-280.9 J53-027.jpg/XPL/FOV = 4.00x5.83 mm ALTERED SANDSTONE showing typical appearance.



RC-20-014 280.4-280.9 J53-028.jpg/PPL/FOV = 4.00x5.83 mm Same.



SAMPLE # **RC-20-014 (B-29) 111.6** June 22, 2021

ROCK NAME ALTERED SANDSTONE/SILTSTONE -- probably formed by alteration (secondary clay + clinozoisite + chlorite + opaques) from interbedded lithic arkose sandstone and siltstone protoliths.

MINERALS Plagioclase (70%) + quartz (20%) + clay (10%) + clinozoisite (<1%) + biotite (<1%) + illite (<1%) + chlorite (<1%) + opaques (<1%).

TEXTURES Clastic sedimentary; poorly developed bedding defines a weakly directed fabric.

Framework Grains (90%) are 240-4600 µm, angular, with tangential contacts.

Abiogenic Grains (90%)

Monocrystalline Grains (75%)

Plagioclase] (55%) weakly altered to clinozoisite + clay.
Quartz (20%)
Illite (<1%)
Biotite (<1%) moderately altered to chlorite.

Polycrystalline Grains (15%)

Intermediate Volcanic Rock Fragments (15%) are composed of very fine grained, mostly aphyric, dacite/andesite.

Claystone (<1%)

Biogenic Grains (0%) were not observed.

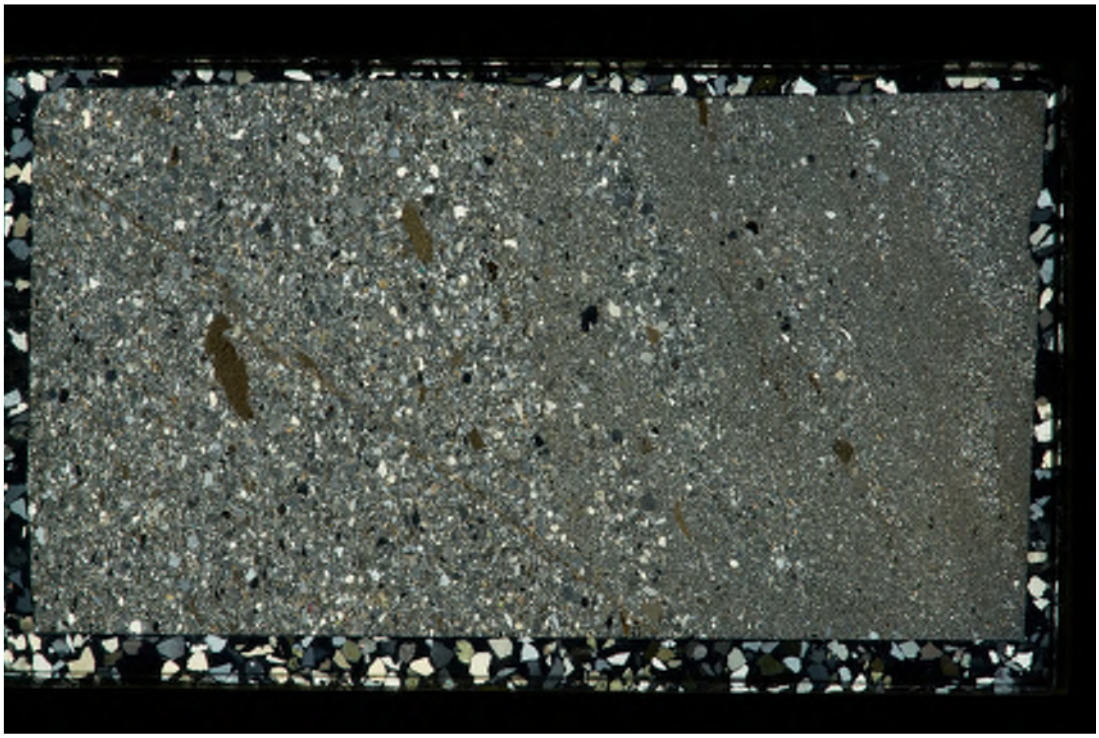
Matrix (10%) is composed of clay.

Cement (0%) was not observed.

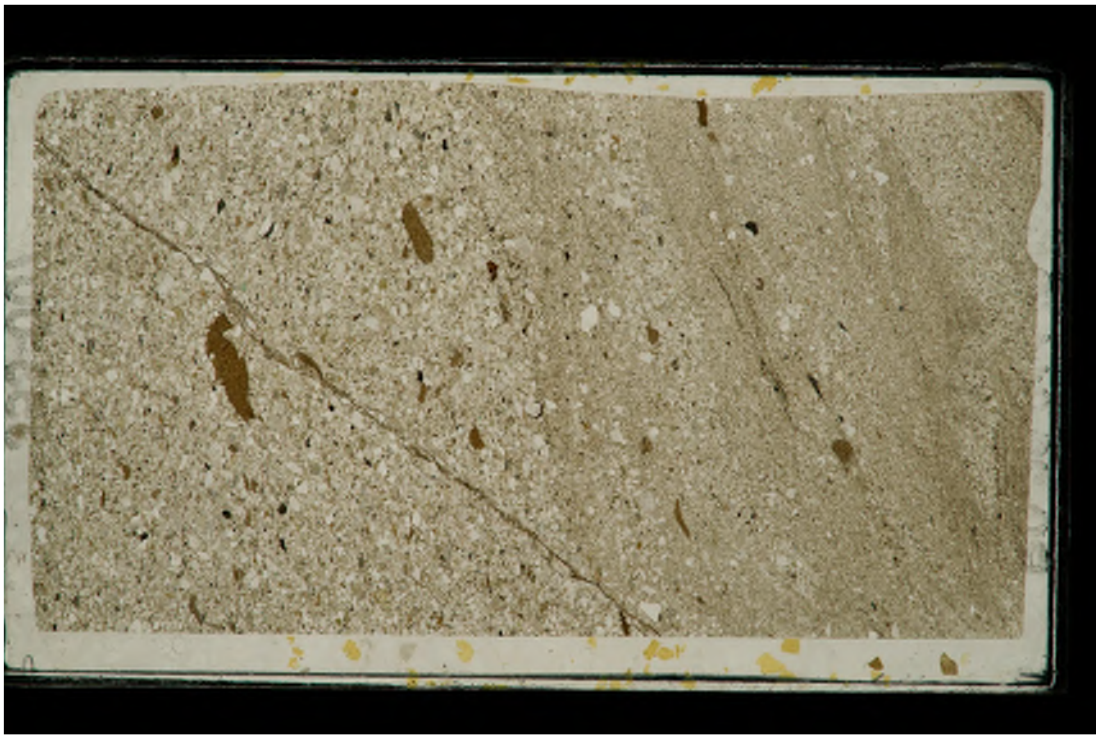
ALTERATION Alteration features of indeterminate relative ages: (1) weak cataclasis; and (2) cataclastic structure mineralized by opaques.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN (top 2/3) + ARSPF (none) Cover: PNA

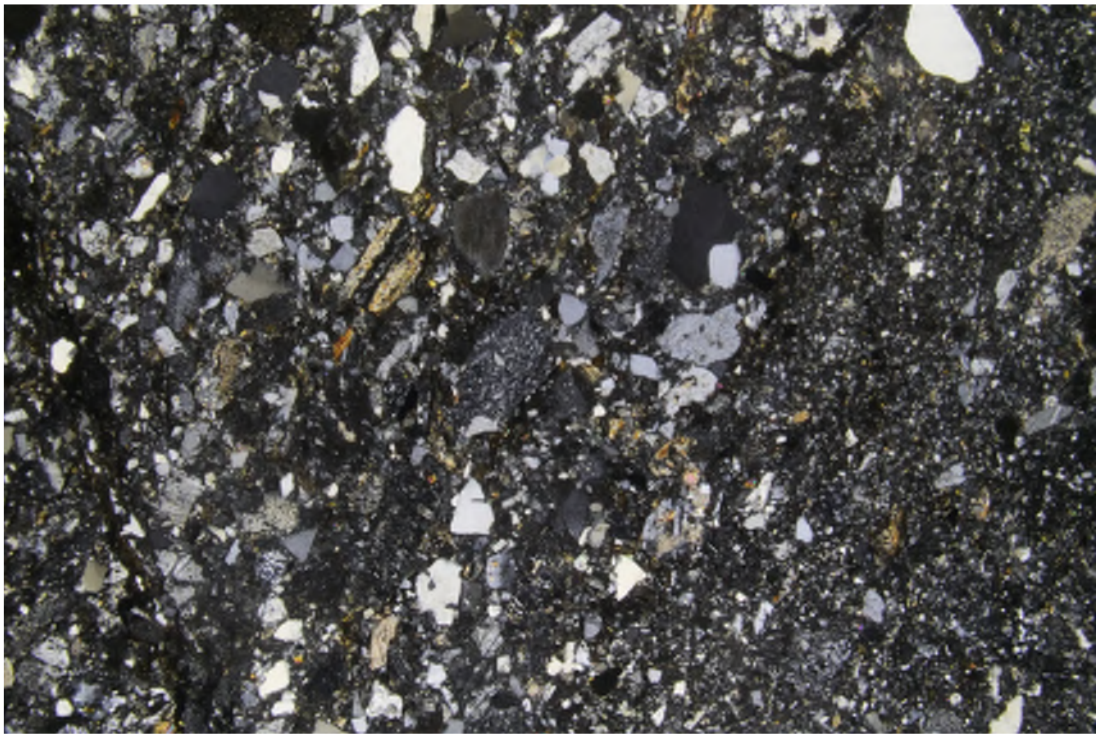
IMAGES RC-20-014 (B-29) 111.6 J53-013.jpg/XPL/FOV = 27x46 mm ALTERED SANDSTONE/SILTSTONE showing typical appearance.



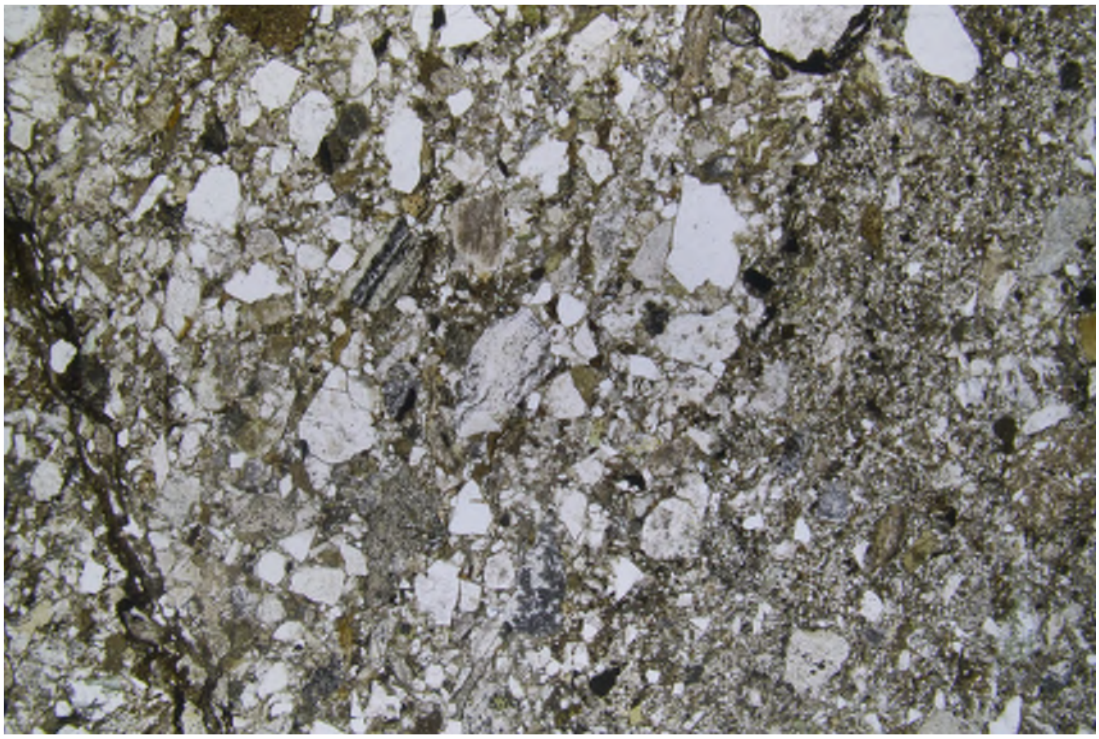
RC-20-014 (B-29) 111.6 J53-014.jpg/PPL/FOV = 27x46 mm Same.



RC-20-014 (B-29) 111.6 J53-029.jpg/XPL/FOV = 4.00x5.83 mm ALTERED SANDSTONE/SILTSTONE showing typical appearance.



RC-20-014 (B-29) 111.6 J53-030.jpg/PPL/FOV = 4.00x5.83 mm Same.



SAMPLE # **RC-20-013 (VWP-6) 27-28** June 22, 2021

ROCK NAME ALTERED SANDSTONE/SILTSTONE -- probably formed by alteration (secondary clay + clinozoisite + chlorite) from interbedded lithic arkose sandstone and siltstone protoliths.

MINERALS Plagioclase (70%) + quartz (20%) + clay (10%) + clinozoisite (<1%) + biotite (<1%) + illite (<1%) + chlorite (<1%) + carbonaceous matter (<1%) + opaques (<1%).

TEXTURES Clastic sedimentary; non-directed fabric.

Framework Grains (90%) are 280-800 µm, angular, with tangential contacts.

Abiogenic Grains (90%)

Monocrystalline Grains (75%)

Plagioclase] (55%) weakly altered to clinozoisite + clay.
Quartz (20%)
Illite (<1%)
Biotite (<1%) moderately altered to chlorite.

Polycrystalline Grains (15%)

Intermediate Volcanic Rock Fragments (15%) are composed of very fine grained, mostly aphyric, dacite/andesite.

Claystone (<1%)

Biogenic Grains (0%) were not observed.

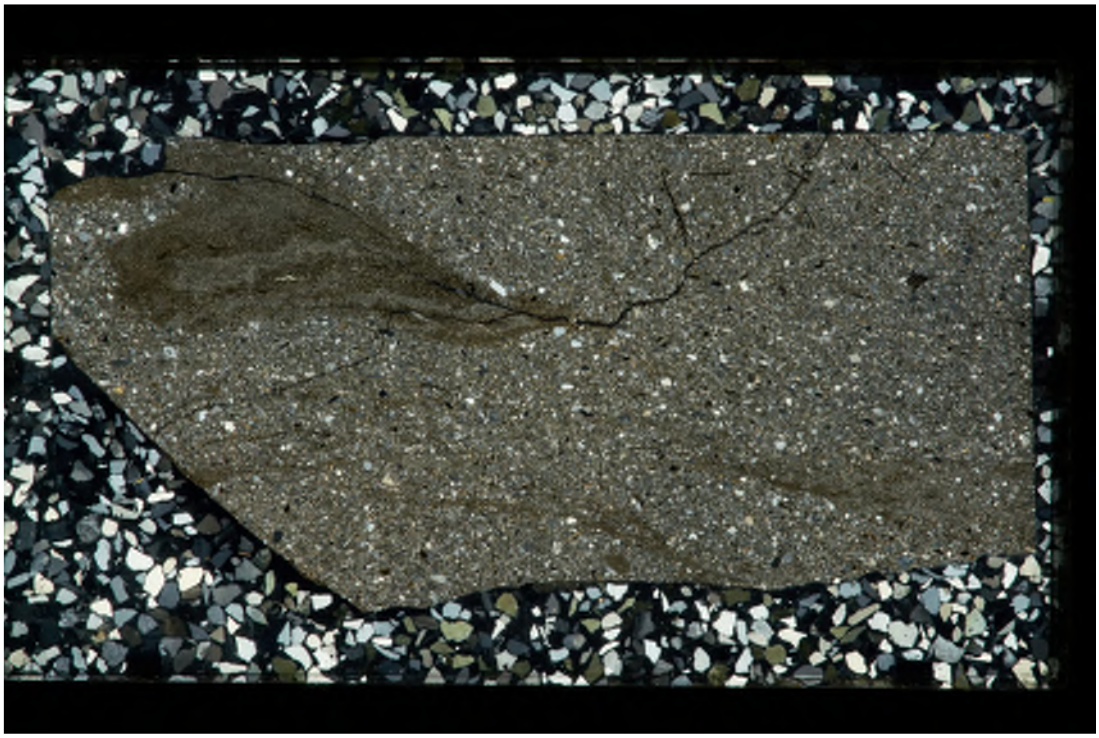
Matrix (10%) is composed of clay.

Cement (0%) was not observed.

ALTERATION No other alteration features were observed.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN (top 2/3) + ARSPF (none) Cover: PNA

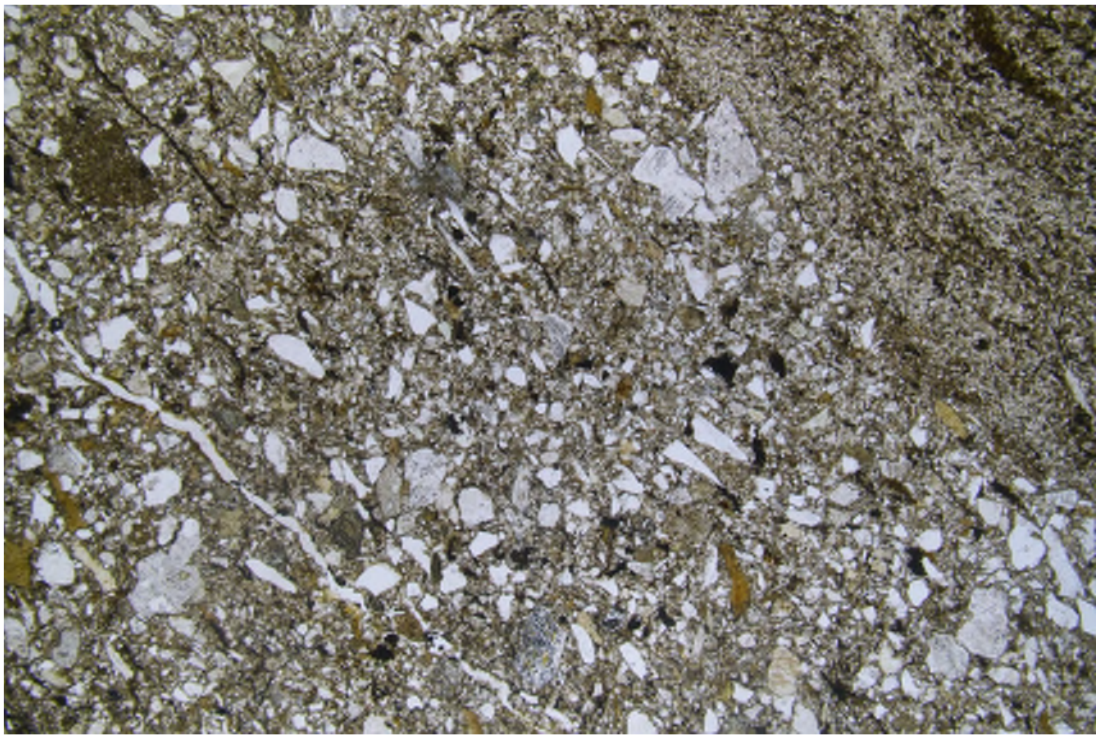
IMAGES RC-20-013 (VWP-6) 27-28 J53-015.jpg/XPL/FOV = 27x46 mm ALTERED SANDSTONE/SILTSTONE showing typical appearance.



RC-20-013 (VWP-6) 27-28 J53-016.jpg/PPL/FOV = 27x46 mm Same.

RC-20-013 (VWP-6) 27-28 J53-031.jpg/XPL/FOV = 4.00x5.83 mm ALTERED SANDSTONE/SILTSTONE showing typical appearance.

RC-20-013 (VWP-6) 27-28 J53-032.jpg/PPL/FOV = 4.00x5.83 mm Same.



Summary of Thin Section Petrographic Analyses

Sample Number	Borehole Identification Number	Initial ID	Depth (feet)	Laboratory-Assigned Rock Name	Boring Log Description	plagioclase	quartz	qtz + plag	clay	illite	smectite	clinozoisite	carbonaceous	carbonate	opaques	biotite	K-feldspar	chlorite	BULK HARDNESS
MOHS HARDNESS						**6.0**	**7.0**	**6.5**	**2.5**	**2.5**	**2.5**	**6.5**	**4.0**	**3.5**	**6.0**	**3.0**	**6.0**	**2.5**	
						mineral abundance, percent													
RC-20-011 (B-32) 168.8-169.0	RC-20-011	B-32	168.8	Altered Sandstone	Sandstone	74	20	---	5	0	---	1	---	---	0	0	---	---	6.0
RC-20-013 (VWP-6) 27.0-28.0	RC-20-013	VWP-6	27.0	Altered Sandstone/Siltstone	Sandstone	70	20	---	10	0	---	0	0	---	0	0	---	0	5.8
RC-20-014 (B-29) 111.6	RC-20-014	B-29	111.6	Altered Sandstone/Siltstone	Sandstone with abundant argillite clasts	70	20	---	10	0	---	0	---	---	0	0	---	0	5.8
RC-20-014 (B-29) 270.0	RC-20-014	B-29	270.0	Altered Sandstone	Sandstone	70	20	---	6	0	---	3	---	0	0	0	---	---	6.0
RC-20-014 (B-29) 87.1	RC-20-014	B-29	87.1	Altered Siltstone	Sandstone	---	---	45	40	10	---	---	5	0	---	---	---	0	4.4
RC-20-014 280.4-280.9	RC-20-014	B-29	280.4	Altered Sandstone	Sandstone with few argillite clasts	72	20	---	8	0	---	0	---	---	0	0	0	0	5.9
RC-20-019 (B-50) 55.0	RC-20-019	B-50	55.0	Altered Heterolithic Multiple Breccia	Sandstone with thinly bedded argillite	---	---	80	---	---	10	---	0	10	---	---	---	---	5.8
RC-21-001 (B-47) 99.9-100.0	RC-21-001	B-47	99.9	Altered Heterolithic Multiple Breccia	Argillite	---	---	26	---	---	70	---	3	1	---	---	---	---	3.6

NOTES:
1. Mineral abundances reported as <1% were asumed to be 0.01 percent and rounded to zero.
2. Mineral abundances for samples in which quartz and plagioclase were not differentiated are shown as "qtz + plag."
3. Analysis details are presented in Appendix M.