Seismic Approach to Quality Management of HMA

MnDOT Contract No. 1034287

APPENDIX – 1st Quarter, 2020

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April 22, 2020

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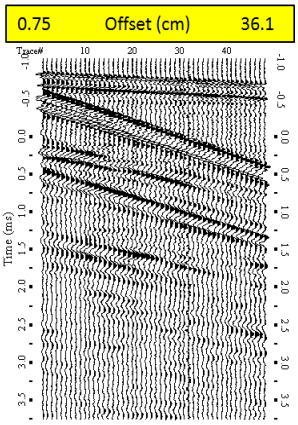
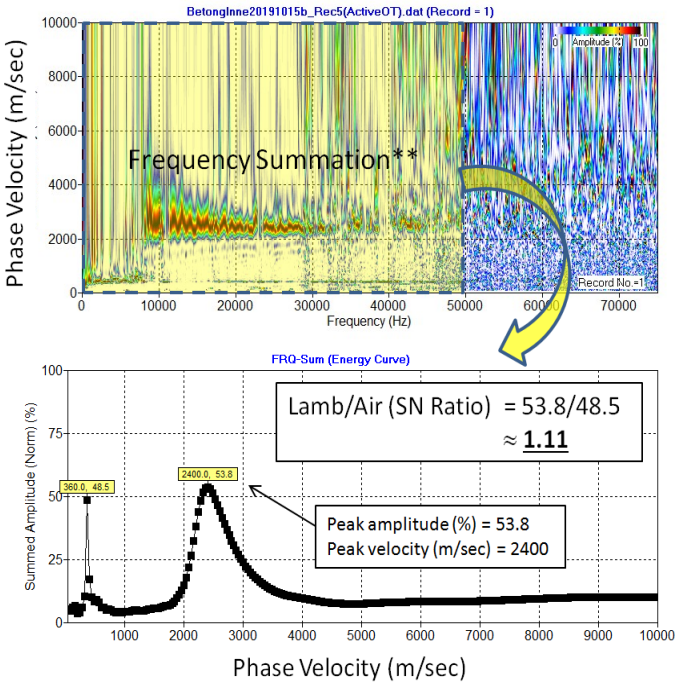
Simple Re-sampling
(Decimation)

Full 48-Channel Record (dx* = 0.75 cm)

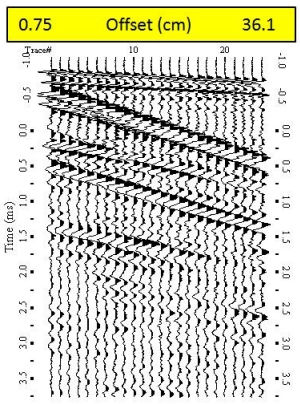


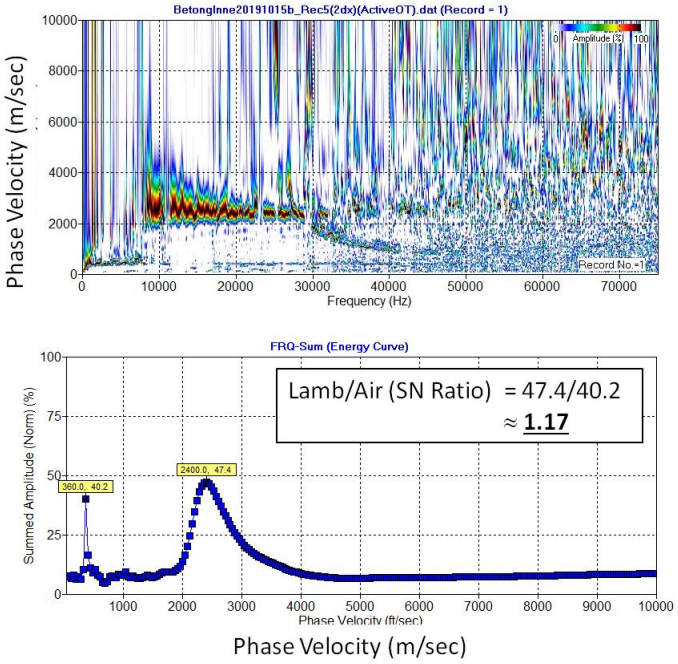


*MEMS microphone spacing.

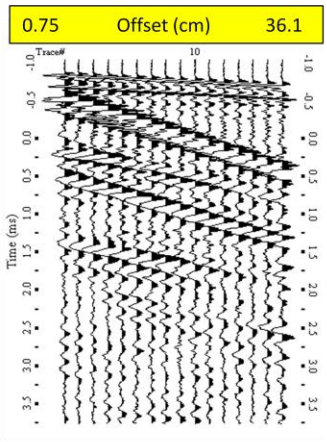
**Summation of wavefield energy along the frequency axis in 0.1 Khz – 50 Khz that generates a "Summed Amplitude" curve displayed on the right.

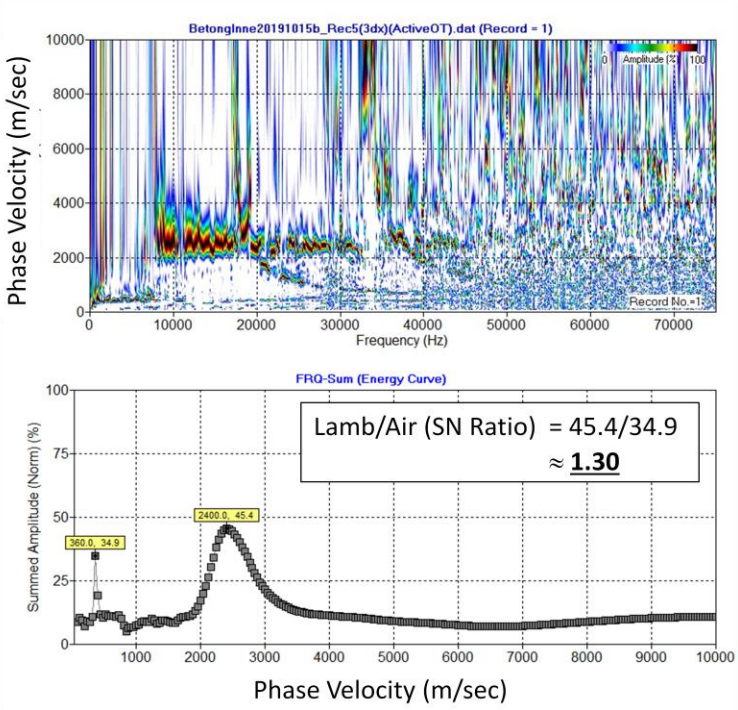
Re-sampled (24-Channel) Record (2dx = 1.5 cm)



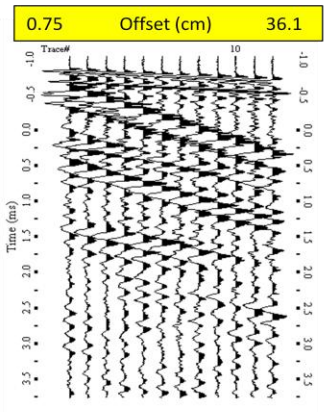


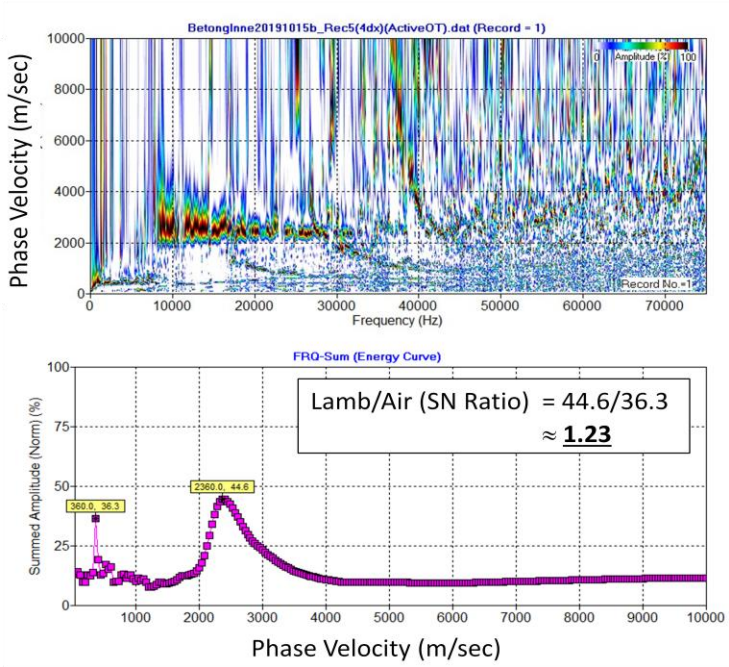
Re-sampled (16-Channel) Record (3dx = 2.25 cm)



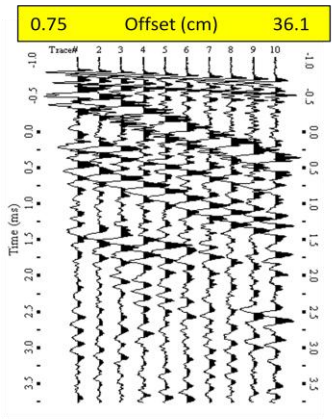


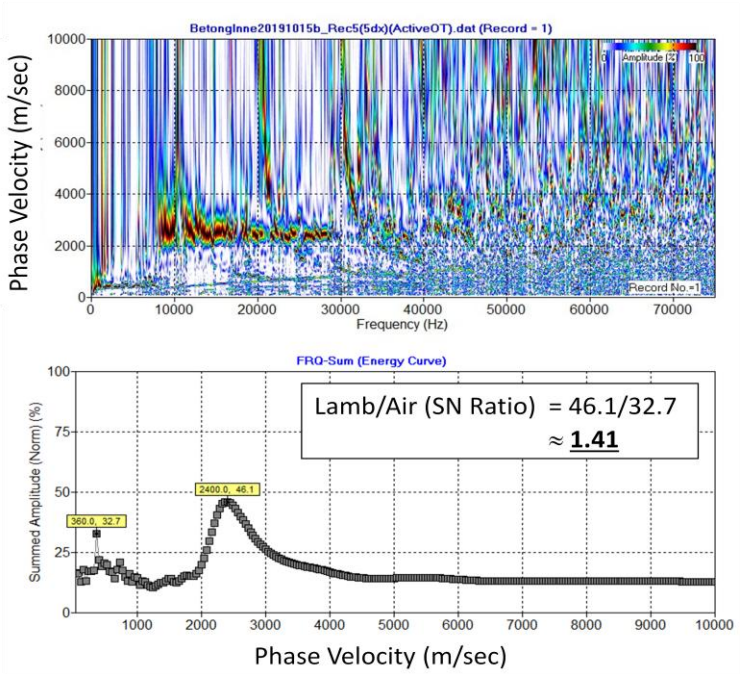
Re-sampled (12-Channel) Record (4dx = 3.0 cm)



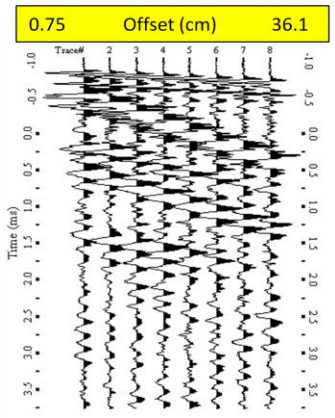


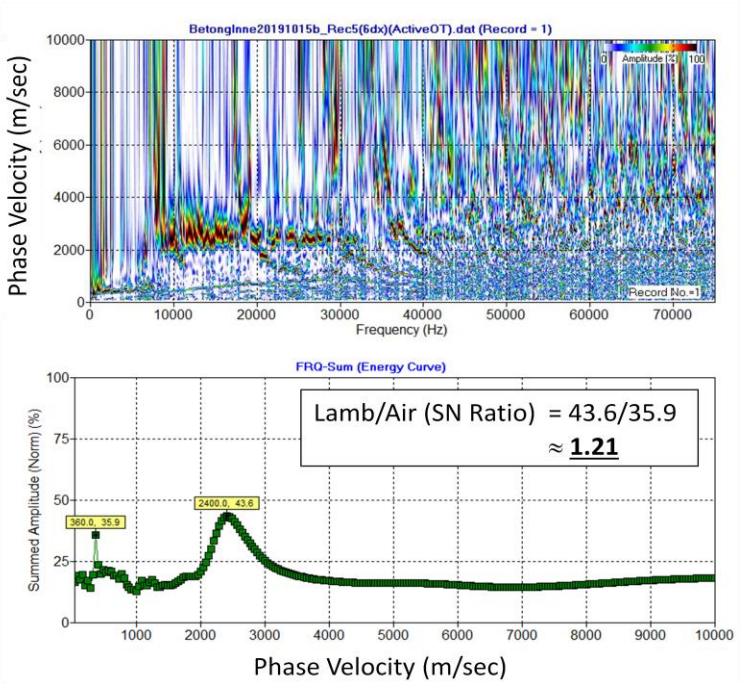
Re-sampled (10-Channel) Record (5dx = 3.75 cm)



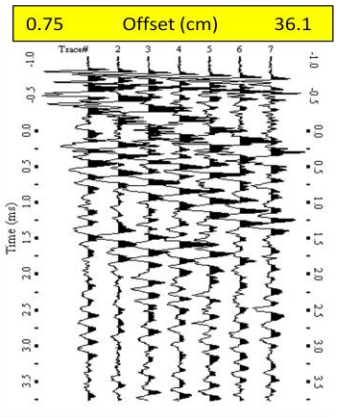


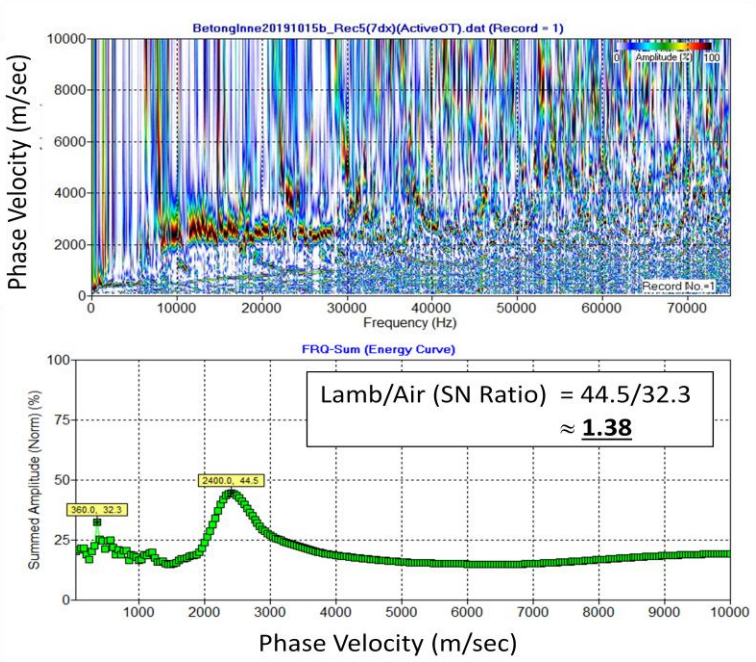
Re-sampled (8-Channel) Record (6dx = 4.5 cm)



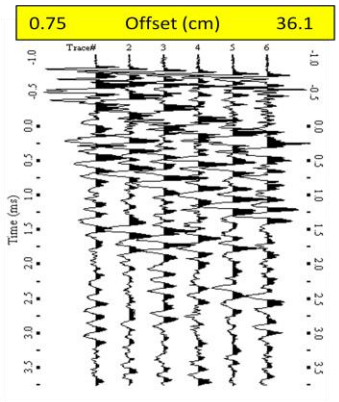


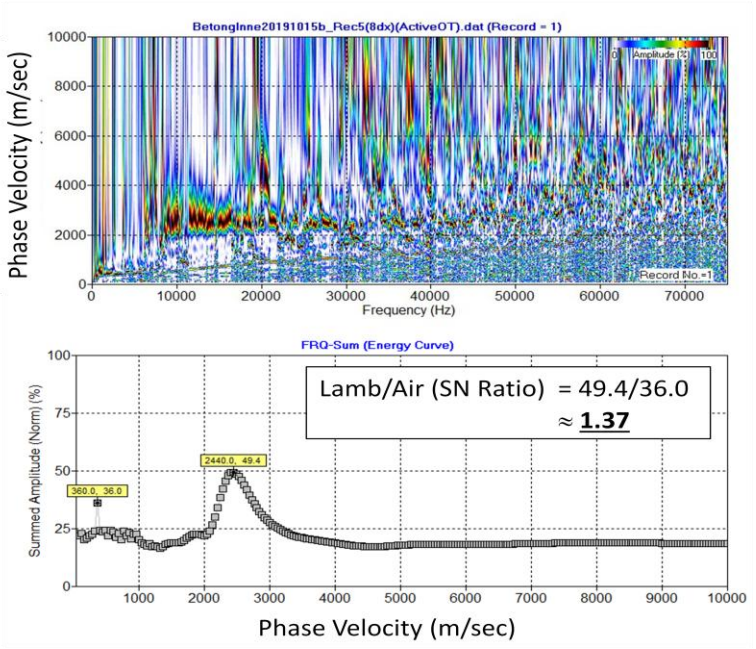
Re-sampled (7-Channel) Record (7dx = 5.25 cm)



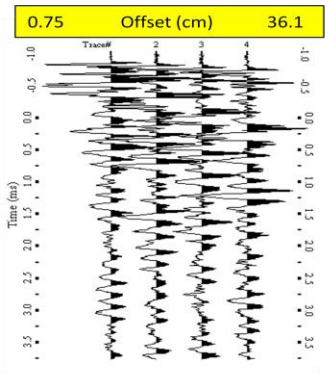


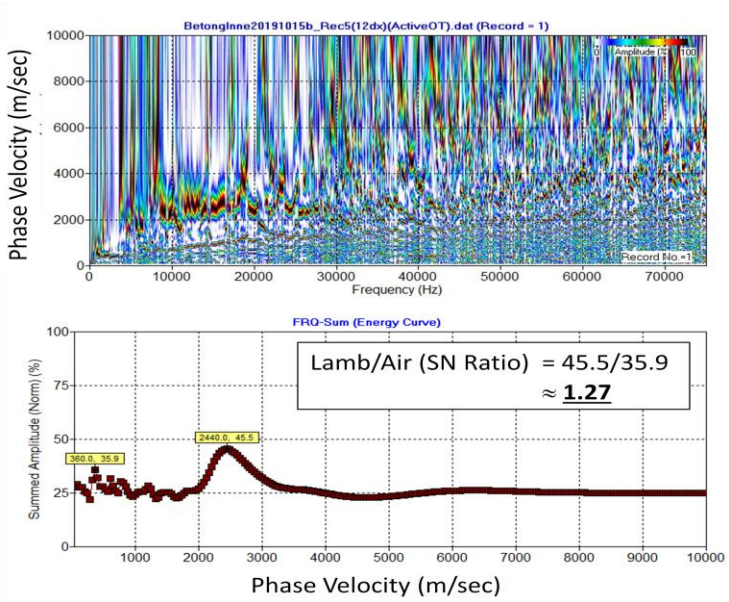
Re-sampled (6-Channel) Record (8dx = 6.0 cm)





Re-sampled (4-Channel) Record (12dx = 9.0 cm)

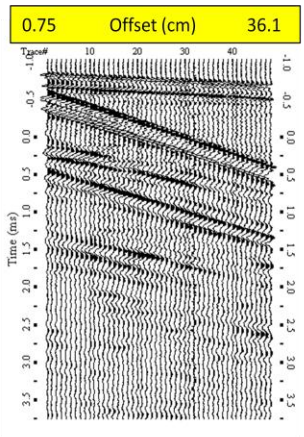


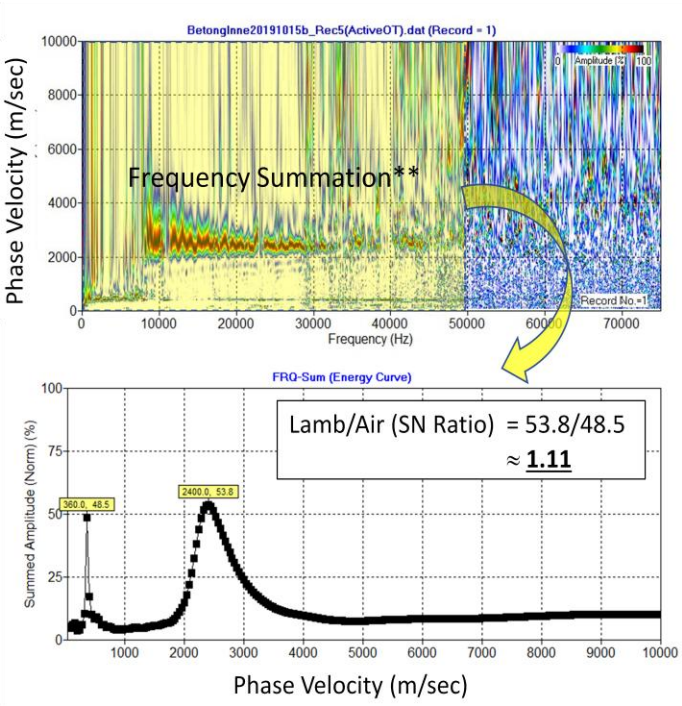


Appendix II:

Stack-Re-sampling

Full 48-Channel Record (dx* = 0.75 cm)

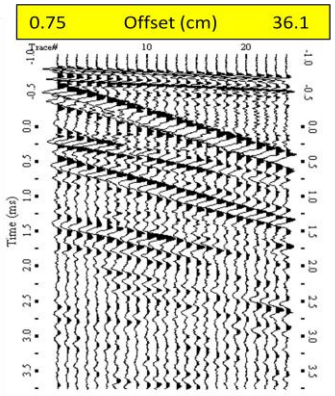


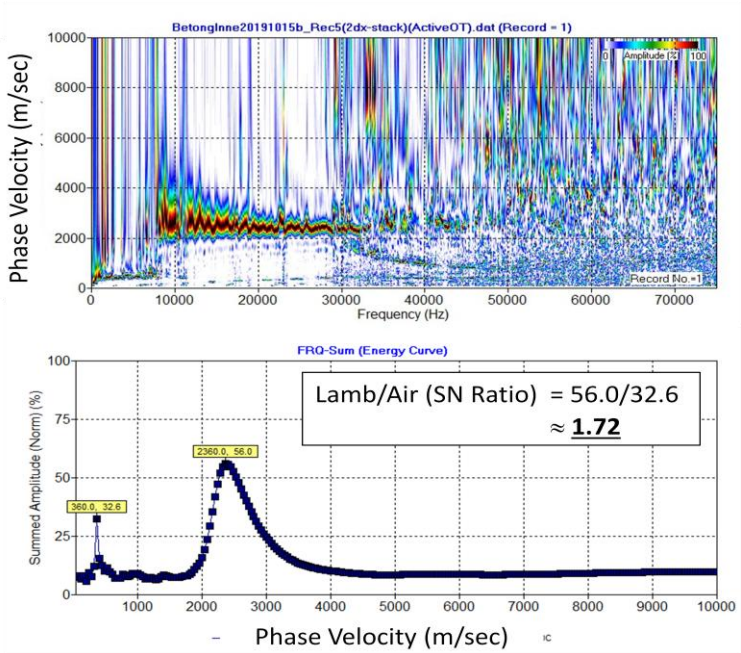


*MEMS microphone spacing.

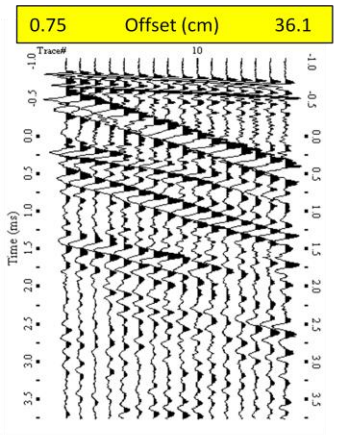
**Summation of wavefield energy along the frequency axis that generates a "Summed Amplitude" curve displayed on the right.

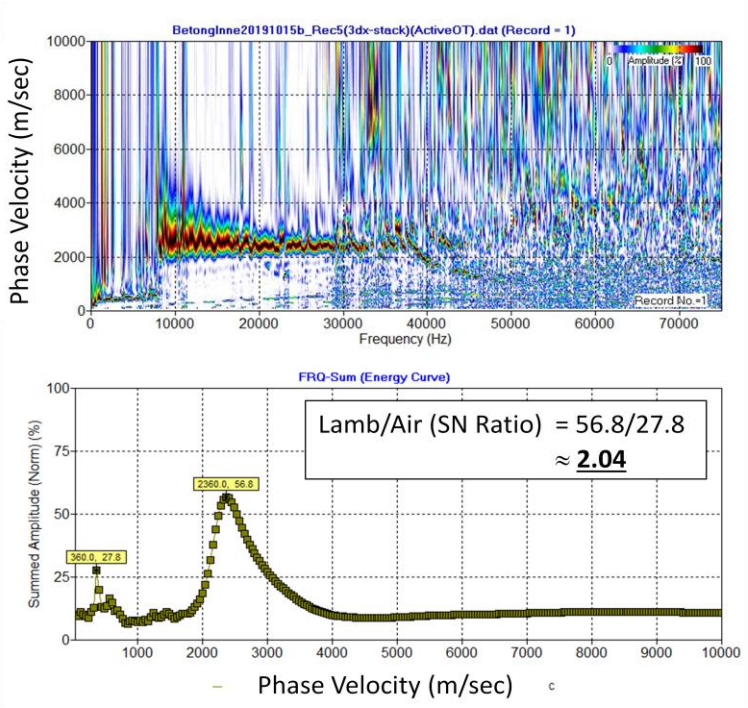
Stack-Re-sampled (24-Channel) Record (2dx = 1.5 cm)



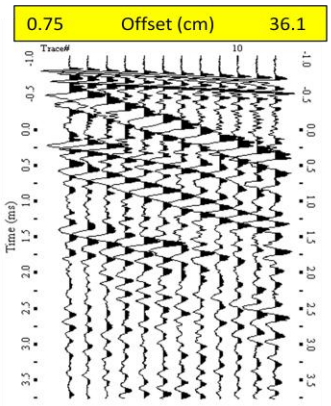


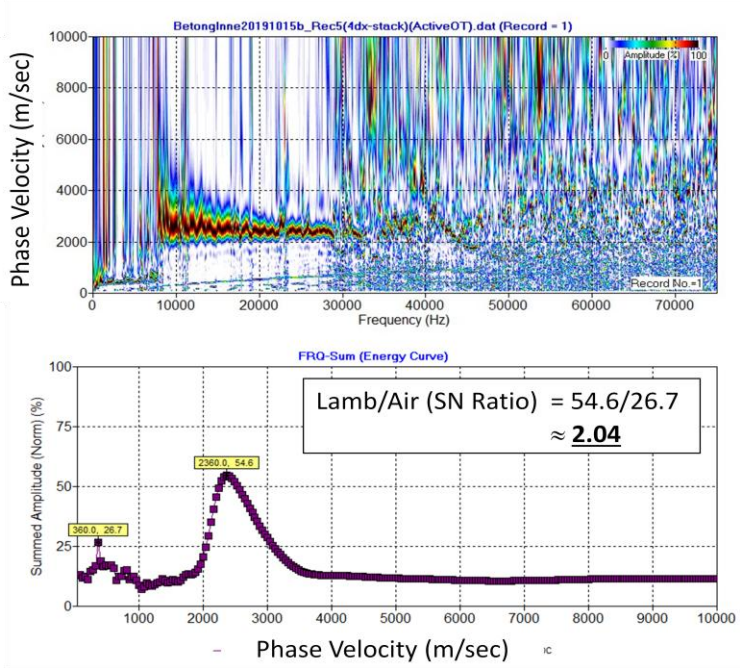
Stack-Re-sampled (16-Channel) Record (3dx = 2.25 cm)



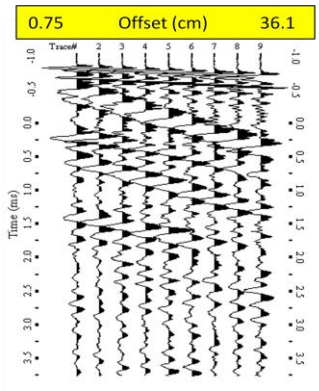


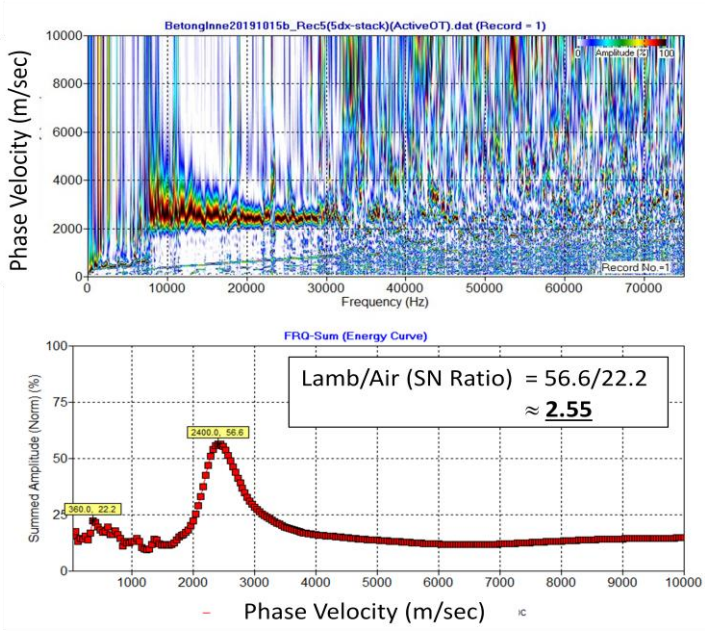
Stack-Re-sampled (12-Channel) Record (4dx = 3.0 cm)



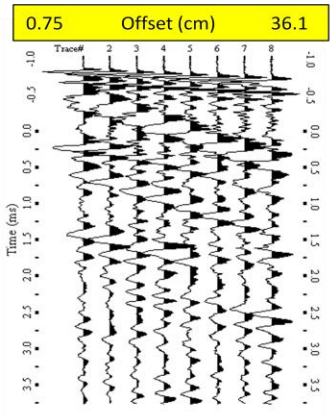


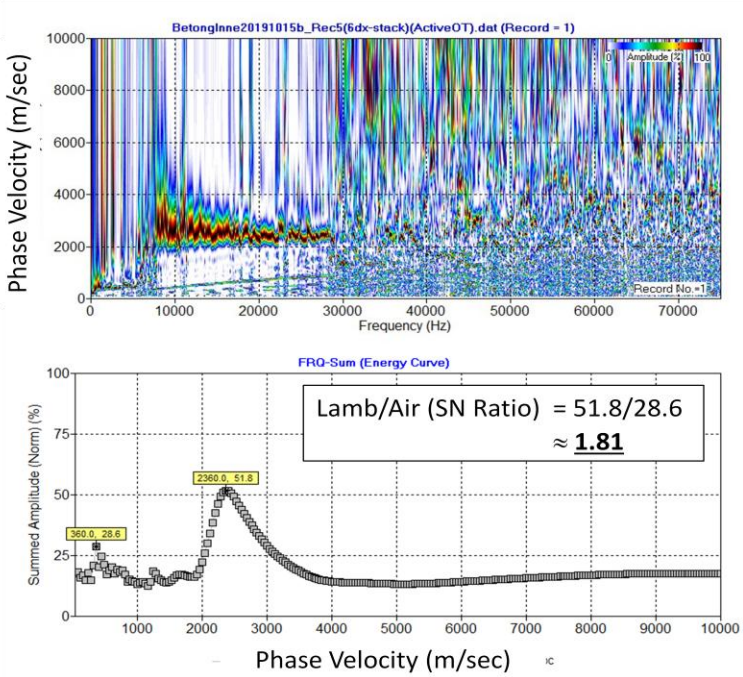
Stack-Re-sampled (9-Channel) Record (5dx = 3.75 cm)



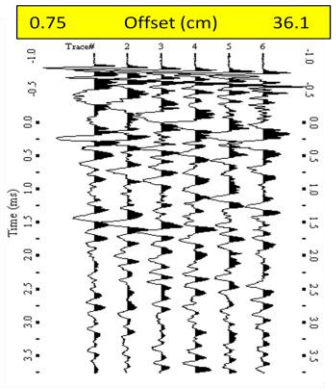


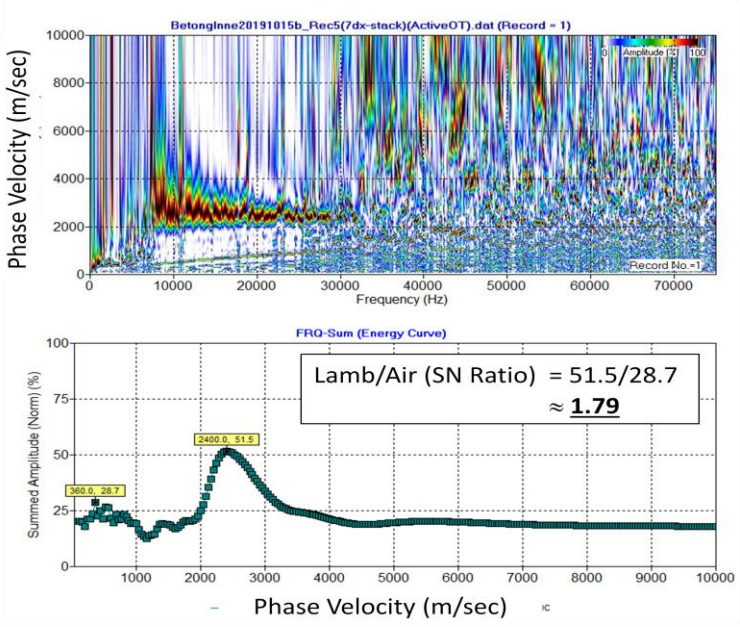
Stack-Re-sampled (8-Channel) Record (6dx = 4.5 cm)



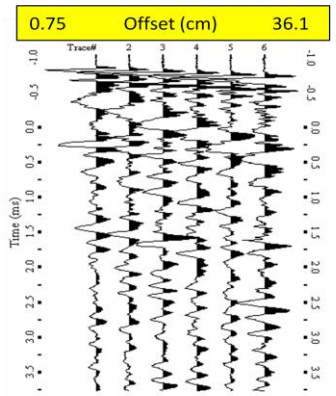


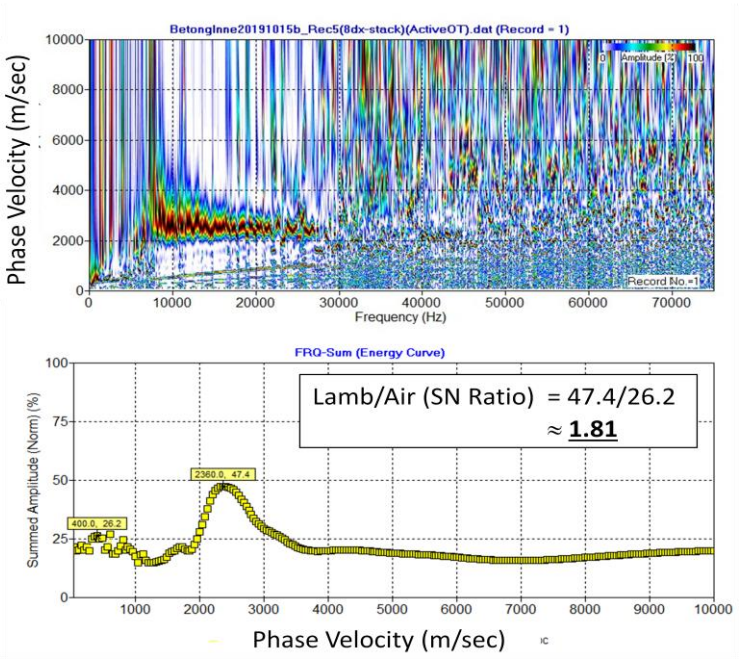
Stack-Re-sampled (6-Channel) Record (7dx = 5.25 cm)



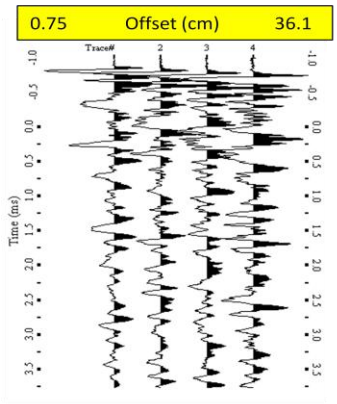


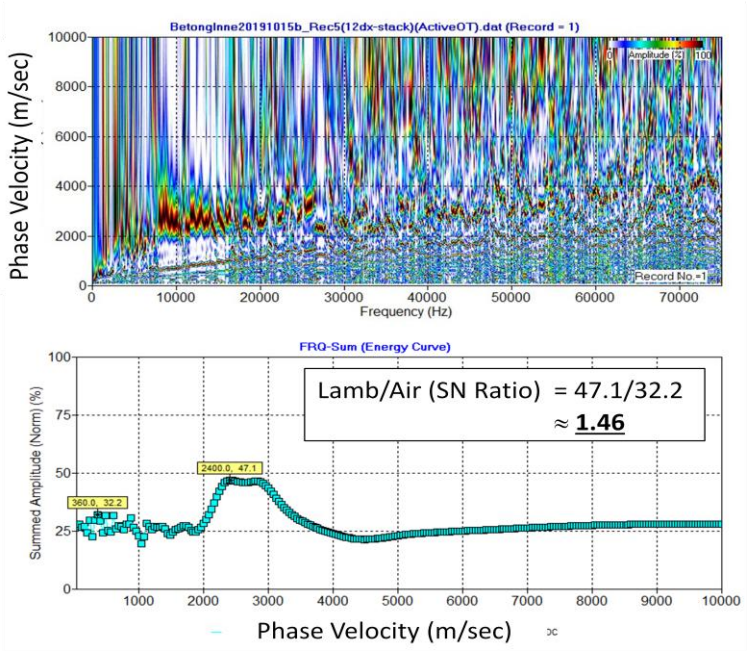
Stack-Re-sampled (6-Channel) Record (8dx = 6.0 cm)





Stack-Re-sampled (4-Channel) Record (12dx = 9.0 cm)



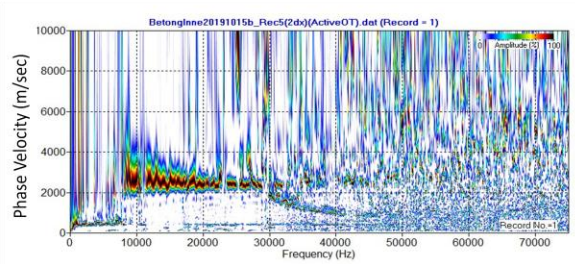


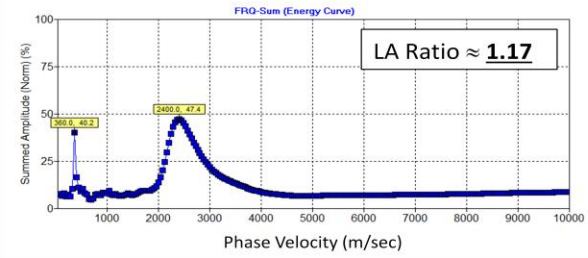
Appendix III:

Comparison of Simple Re-sampling (Decimation) and Stack-Re-Sampling

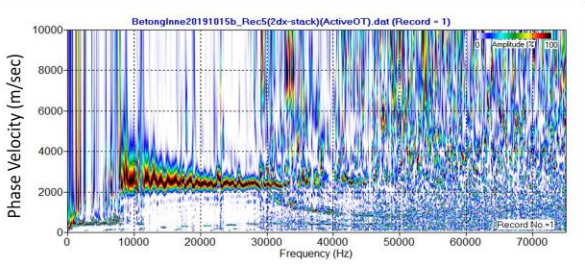
Re-sampled (24-Channel) Record (2dx = 1.5 cm)

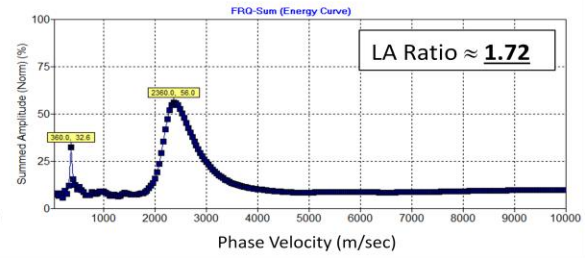
Simple Re-sample





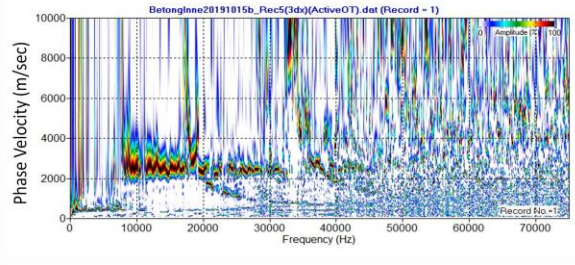
Stack-Re-sample

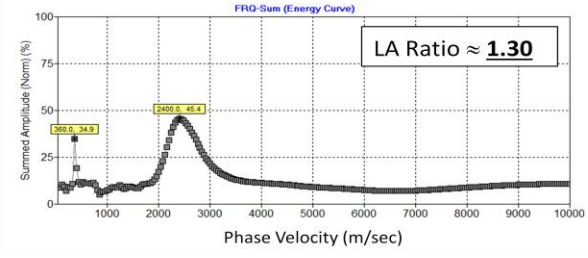




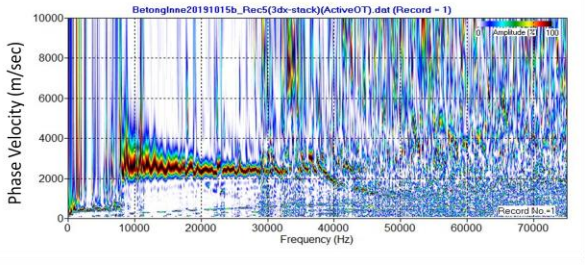
Re-sampled (16-Channel) Record (3dx = 2.25 cm)

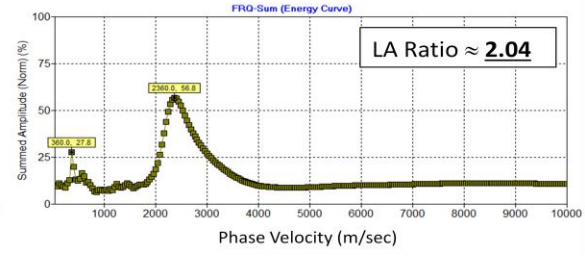
Simple Re-sample





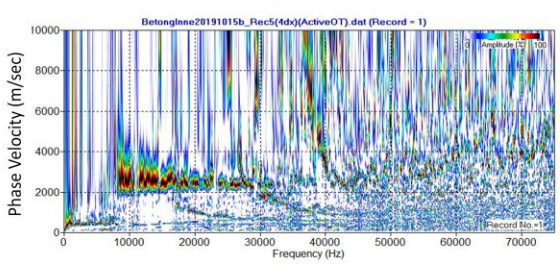
Stack-Re-sample

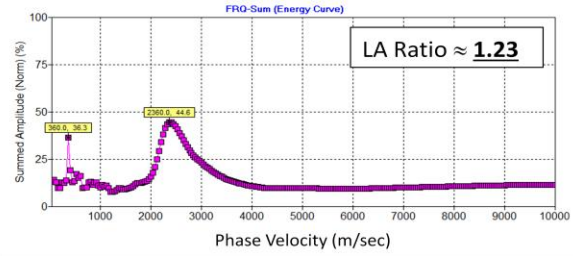




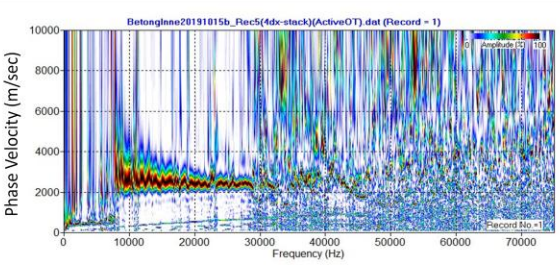
Re-sampled (12-Channel) Record (4dx = 3.0 cm)

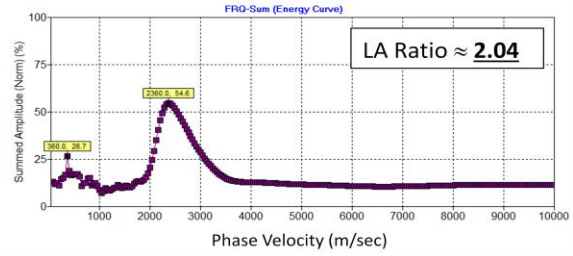
Simple Re-sample





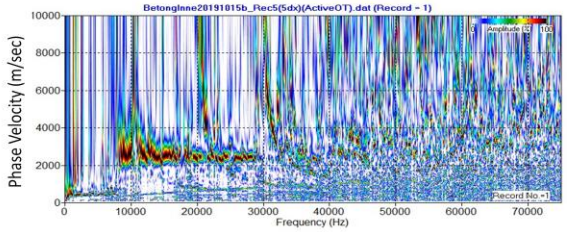
Stack-Re-sample

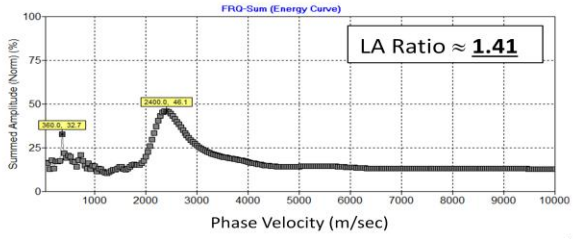




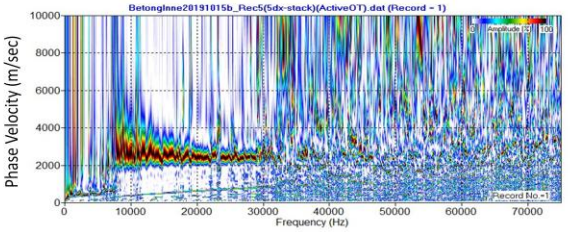
Re-sampled (9-Channel) Record (5dx = 3.75 cm)

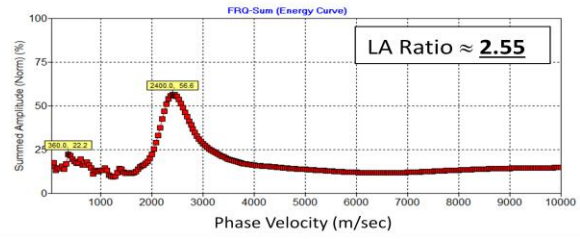
Simple Re-sample





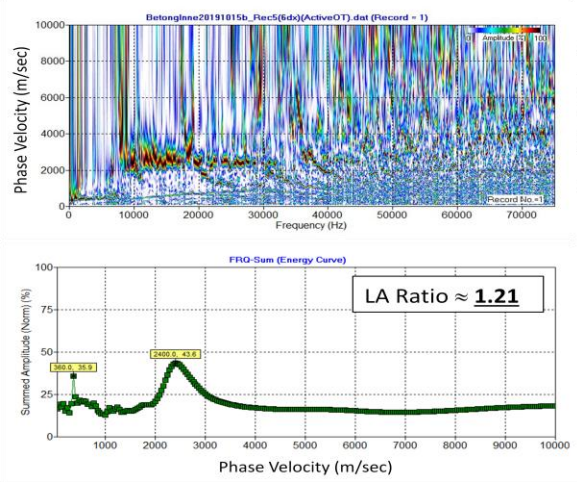
Stack-Re-sample



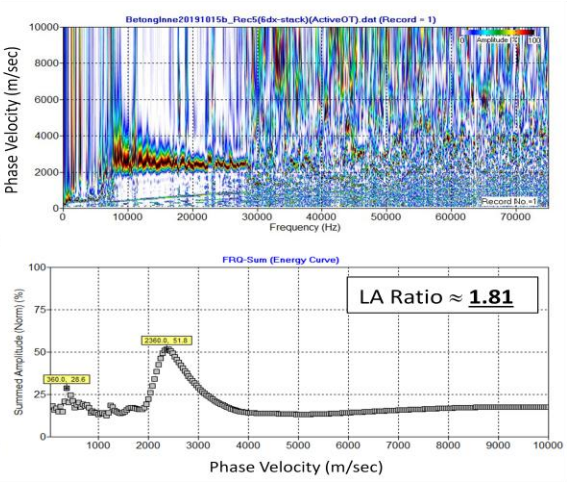


Re-sampled (8-Channel) Record (6dx = 4.5 cm)

Simple Re-sample

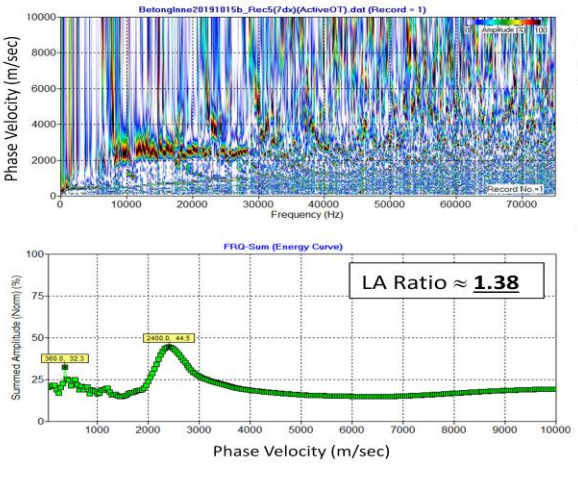


Stack-Re-sample

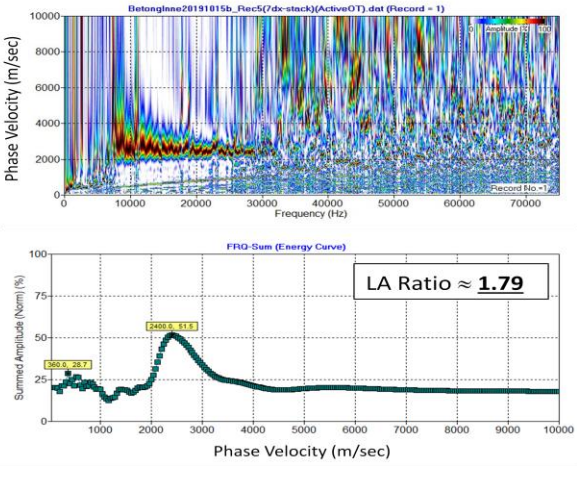


Re-sampled (7-Channel) Record (7dx = 5.25 cm)

Simple Re-sample

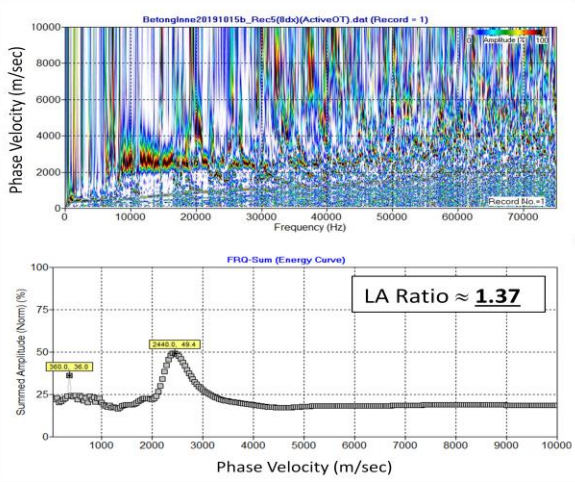


Stack-Re-sample

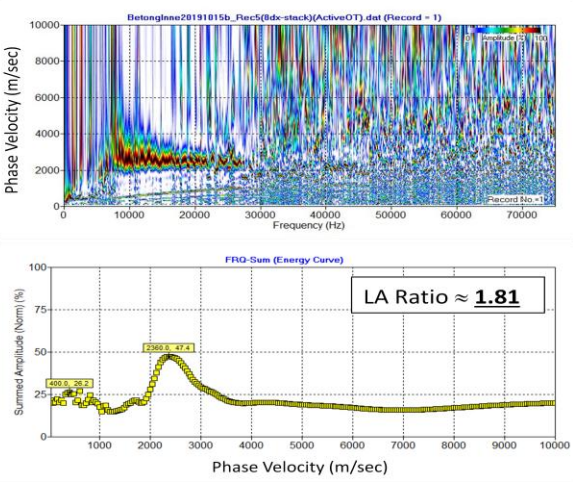


Re-sampled (6-Channel) Record (8dx = 6.0 cm)

Simple Re-sample

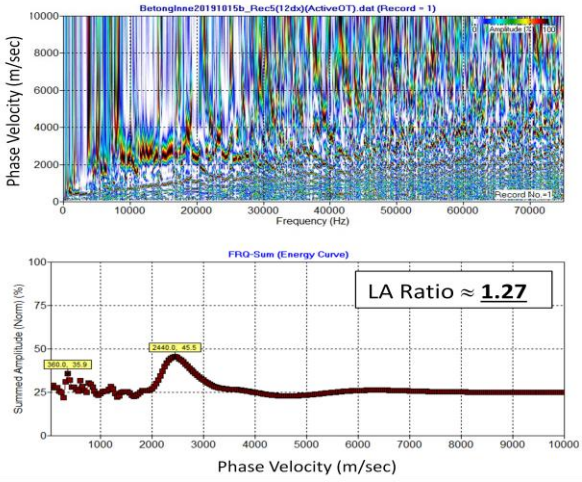


Stack-Re-sample

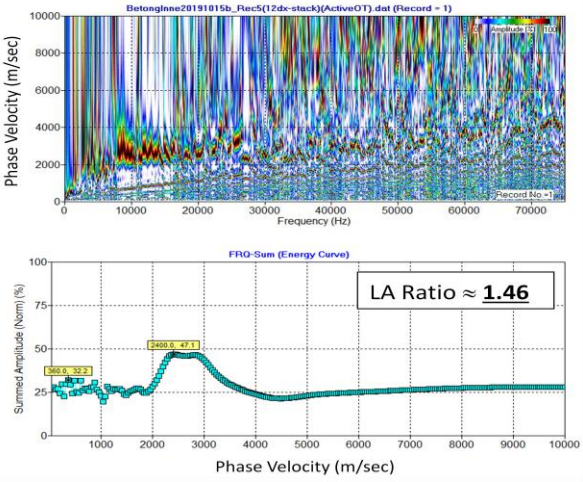


Re-sampled (4-Channel) Record (12dx = 9.0 cm)

Simple Re-sample



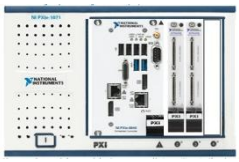
Stack-Re-sample



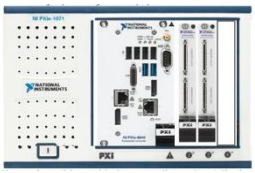
Appendix IV:

Specifications of Hardware Items Procured To Build the HMA System ("SYS-HMA")

NI PXI System
Konfigurations ID: PX6127036



No.	Serial No.	Specification	Amount	Price (SEK)	Total (SEK[1])	Total ($) (USD)
Rad nr.	**Artikelnr.**	**Specification**	**Antal**	**a-pris (SK)**	**Summa (SK)**	**Summa (USD)**
1.1	781368-01	NI PXIe-1071, 4-Slot 3U PXI Express Chassis 	1	10.820,00	10.820,00	1,109.56
1.2	960903-01	Basic Assembly Service	1	,00	,00	
1.3	783001-8192	8 GB RAM for PXIe-8840, PXI-8840, and PXIe-8821 	1	7.830,00	7.830,00	802.95
1.4	785782-01	NI PXIE-8840 Core I5-4400E 2.7GHZ,Dual-Core,No ECard,Windows 10 64-BIT (MULTILANGUAGE) 	1	43.680,00	43.680,00	4,479.26
1.5	787269-03	Windows 10 IoT Enterprise USB Recovery Media for PXI, Multilanguage		464,00	464,00	47.58
1.6	785808-01	PXIe-6349 Multifunction I/O Module: 32 Simultaneous AI (16-bit, 500kS/s/ch), 2 AO, 24	2	64.480,00	128.960,00	13,224.50

		DIO. 				
1.7	782536-01	SCB-68A Noise Rejecting, Shielded I/O Connector Block 	4	4.070,00	16.280,00	1,669.47
1.8	192061-02	SHC68-68-EPM Shielded Cable, 68-D-Type to 68 VHDCI Offset, 2 m 	2	1.772,00	3.544,00	363.43
1.9	191945-02	SHC68-68, Twisted Pair Cable with Basic Shielding, 2 m	2	1.309,00	2.618,00	268.47
1.10	763067-01	Power Cord, 240V, 10A, Euro, Right Angle	1	93,00	93,00	9.54
2	776678-35WM	LabVIEW Professional Development System, Windows, All Languages, With Media part of the PX6127036 ID configuration New Single Seat License(s) With 1 YR LABVIEW STANDARD SERVICE PROGRAM Standard Service Program (SSP) is included for the first year of service (or the term agreed by	1	57.480,00	57.480,00	5,894.42

		the parties) and will AUTOMATICALLY RENEW on the anniversary of your original invoice at 25% of the then-current list price of your software. This automatic renewal does not apply to purchases made by any Federal or State Agency.				
		Subtotal:			**271.769,00 SEK**	***27, 869.17**
		****Moms:**			**67.942,25 SEK**	**0**
		Totalt:			**339.711,25 SEK**	**27, 869.17**

[1]*Swedish Krona*
** Based upon the currency rate of Swedish Krona vs. Us Dollars as of 3/16/2020 (1 kr = $ 0.102547)*
***Moms = Taxes, tax has been exempted@ since the buyer, Norrfee Tech, AB, is a company not an individual.*

	price/item	Price (Swedish Krona)	Price (USD)	Exchange rate
1.1	10.820,00	10,820.00 kr	$ 1,109.56	
1.2	,00	- kr	$ -	
1.3	7.830,00	7,830.00 kr	$ 802.95	
1.4	43.680,00	43,680.00 kr	$ 4,479.26	
1.5	464,00	464.00 kr	$ 47.58	
1.6.	64.480,00	128,960.00 kr	$ 13,224.50	
1.7	4.070,00	16,280.00 kr	$ 1,669.47	
1.8	1.772,00	3,544.00 kr	$ 363.43	
1.9	1.309,00	2,618.00 kr	$ 268.47	
1.10	93,00	93.00 kr	$ 9.54	
2	57.480,00	57,480.00 kr	$ 5,894.42	
total		271,769.00 kr	$ 27,869.17	0.102547

Appendix V:

Monthly Progress Reports

Monthly Progress Report
(January, 2020)

Prime Contractor (Park Seismic LLC)

Task	% of Total Contract	ENGINEERING ESTIMATE				Hours Budget	Hours Accrued This Period	Total Hours Accrued To Date	*% of Budget Hours Used
		% Work Completed This Period	% Work Completed To Date	Weight % Completed This Period	Weight % Work Completed to Date				
1	2	3	4	5	6	7	8	9	10
Task 1	25%	9.6	9.6	2.4	2.4	260	25	25	9.6
Task 2	2%	0.0	0.0	0.0	0.0	20	0.0	0.0	0.0
Task 3	63%	2.3	2.3	1.5	1.5	640	15	15	2.3
Task 4	2%	0.0	0.0	0.0	0.0	20	0.0	0.0	0.0
Task 5	8%	0.0	0.0	0.0	0.0	84	0.0	0.0	0.0
TOTALS:	100%				3.9	1024			

Sub Contractor (Norrfee Tech, AB)

Task	% of Total Contract	ENGINEERING ESTIMATE				Hours Budget	Hours Accrued This Period	Total Hours Accrued To Date	*% of Budget Hours Used
		% Work Completed This Period	% Work Completed To Date	Weight % Completed This Period	Weight % Work Completed to Date				
1	2	3	4	5	6	7	8	9	10
Task 1	5%	**30**	**30**	**1.3**	**1.3**	40	**12**	**12**	**30**
Task 2	82%					742			
Task 3	3%					30			
Task 4	7%					64			
Task 5	3%					30			
TOTALS:	100%					906			

Monthly Progress Report
(January, 2020)

Prime Contractor (Park Seismic LLC)

Task	% of Total Contract	ENGINEERING ESTIMATE				Hours Budget	Hours Accrued This Period	Total Hours Accrued To Date	*% of Budget Hours Used
		% Work Completed This Period	% Work Completed To Date	Weight % Completed This Period	Weight % Work Completed to Date				
1	2	3	4	5	6	7	8	9	10
Task 1	25%	9.2%	18.8%	2.4%	4.8%	260	24	49	18.9%
Task 2	2%					20			
Task 3	63%	4.7%	7.0%	2.9%	4.4%	640	30	45	7.0%
Task 4	2%					20			
Task 5	8%					84			
TOTALS:	100%	13.9%	25.8%	5.3%	9.2%	1024	54	94	9.2%

Sub Contractor (Norrfee Tech, AB)

Task	% of Total Contract	ENGINEERING ESTIMATE				Hours Budget	Hours Accrued This Period	Total Hours Accrued To Date	*% of Budget Hours Used
		% Work Completed This Period	% Work Completed To Date	Weight % Completed This Period	Weight % Work Completed to Date				
1	2	3	4	5	6	7	8	9	10
Task 1	5%	5%	35%	0.2%	1.5%	40	2	14	35%
Task 2	82%	1.9%	1.9%	1.5%	1.5%	742	14	14	1.9%
Task 3	3%					30			
Task 4	7%					64			
Task 5	3%					30			
TOTALS:	100%			1.7%	3.1%	906	16	28	3.1%

Monthly Progress Report
(January, 2020)

Prime Contractor (Park Seismic LLC)

Task	% of Total Contract	ENGINEERING ESTIMATE				Hours Budget	Hours Accrued This Period	Total Hours Accrued To Date	*% of Budget Hours Used
		% Work Completed This Period	% Work Completed To Date	Weight % Completed This Period	Weight % Work Completed to Date				
1	2	3	4	5	6	7	8	9	10
Task 1	25%	5.4%	24.2%	1.4%	6.2%	260	14	63	24.2%
Task 2	2%					20			
Task 3	63%	7.5%	14.5%	4.7%	9.1%	640	48	93	14.5%
Task 4	2%					20			
Task 5	8%					84			
TOTALS:	100%			6.1%	15.2%	1024	62	156	15.2%

Sub Contractor (Norrfee Tech, AB)

Task	% of Total Contract	ENGINEERING ESTIMATE				Hours Budget	Hours Accrued This Period	Total Hours Accrued To Date	*% of Budget Hours Used
		% Work Completed This Period	% Work Completed To Date	Weight % Completed This Period	Weight % Work Completed to Date				
1	2	3	4	5	6	7	8	9	10
Task 1	5%	**5.0%**	**40%**	**0.2%**	**1.8%**	40	**2**	**16**	**40%**
Task 2	82%	**0.8%**	**2.7%**	**0.7%**	**2.2%**	742	**6**	**20**	**2.7%**
Task 3	3%					30			
Task 4	7%					64			
Task 5	3%					30			
TOTALS:	100%			**0.9%**	**4.0%**	906	**8**	**36**	**4.0%**