

#### Fall 2015 Iowa DOT Vibration Seminar Vibration Monitoring Costs

W. Robert Hannen <u>rhannen@wje.com</u>

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS Wiss, Janney, Elstner Associates, Inc.



- Purpose for the Cost Estimate Spreadsheet
  - DOT requires preconstruction surveys and vibration monitoring on selected historic structures
  - Contractors include Specialty Vibration Contractor in their bids to perform the required work
  - Allows DOT to develop a preliminary rough estimate of cost to expect in contractor bids
- Development of the workbook was requested by Iowa DOT in February 2014 under previous 3-year on-call contract NHSN-000-S(490)—2R-00 #12919



- Based on WJE experience on Iowa DOT projects dating back to Kingsway Cathedral and I-235 bridge replacement work
  - Performing preconstruction surveys
  - Monitoring vibrations
  - Included churches and office buildings in other states
- Reviewed proposed costs and final billed fees & expenses on many projects
- Costs based on WJE standard rates.



- Excel Workbook Consists of 7 sheet
- **1**. Pre-Condition Survey
  - May include Vibration Control Plan
- 2. Post-Condition Survey
- 3. Installations
- 4. Monthly (monitoring)
- 5. Removal (de-installation of equipment)
- 6. Troubleshooting trip
- 7. Summary

Shaded cells are locked (password protected)

	А	В	С	D	E	F	G	Н	I	J	K	L	М	N	0	P
Precons	struction Survey															
		Field W	ork (1st p	erson ex	amines											Hourly
			d person			.	Project Ma									Rate
		<u> </u>	e Principal	-	used	-	Principal	-	used	EXPENSE			0	Not use	4	\$0
		Associat	205	0	0	Associate 3	205	0	0	EAPENSE	S FEE			Senior F		\$295
DESCRIPT	10N	HOURS	COST	HOURS	COST	HOURS	COST	HOURS	COST		TOTAL			Principa		\$255
		HUUKS	<u>cosi</u>	HUUKS	0031										te Principal	\$205
Proposal/P	lanning	6	£4.030	6	\$0	2	\$410	2	\$0		\$410				te Principal	\$205
Travel		-	\$1,230	-	+-	-					\$1,230			Associa		
	ruction Survey Field Work*	4	\$820	1	\$0	0	\$0 \$820	0.5	\$0 \$0		\$820 \$820			Associa		\$160 \$140
	Survey Report* Control Plan					4	\$2,460	4	\$0 \$0		\$820			Associa		\$140
Vibration (	Control Plan					0	\$2,460	2	\$0 \$0		\$2,460				Specialist	\$120
						0	\$0 \$0	0	\$0 \$0		\$0			Speciali		\$130
						0	\$0	0	\$0		\$0				echnician	\$100
						0	\$0	0	\$0	-	\$0			Technici		\$90
						0	\$0	0	\$0	-	\$0			Technici		\$70
EXPENSES		Qty	Cost	Qty	Cost	, v		•					12	reenne	ann	\$10
Taxi	•	2.9	\$30	0						\$60						
Airfare			\$700	0	\$700					\$700						
Lodging		1	\$100	0	\$100					\$100						
Meals		1	\$50	0	\$50					\$50						
Rental Car		1	\$80	0	\$80					\$80						
		-								\$0						
Miscellane	ous expenses	0	\$50	0	\$50					\$0						
										\$0						
	TOTALS=	14	L	7		18		8.5		\$990	\$5,740	\$6,730				
* Based on	the number of buildings															
		Number o	f Structure	s to Exam	ine											
		Home	Church	Office (50	' x 75')											
	Number of buildings	1	0	0												
	Basement	1	0	0												
	1st Floor	1	0	0												
	2nd Flooor	1	0	0												
	3rd Floor	0	0	0												
	Exterior	1	0	0												
Time allot	ment based on 4 hours to examin	e a 2-story	house wit	h a baseme	ent											
< >	Pre-Condition Survey Po	st-Conditio	n Survey	Installat	ions N	/onthly	Removal	Trouble	shoot trip	Summa	ary (	÷	: •			

Α	В	С	D	E	F	G	Н		J	K	L	M	N	0	P
Preconstruction Survey															
	Field W	ork (1st p	ercon ev	amines										-	Hourly
		d person (				and Ma									Rate
						Project Ma			EXPENSE				0 Not use		\$0
4	3	Principal 205		used 0	Associate 3	Principal 205		used 0	EXPENSE	S FEE			1 Senior I		\$295
DESCRIPTION	HOURS	COST	HOURS	COST	HOURS	COST	HOURS	COST		TOTAL			2 Principa		\$295
	HOURS	COST	HOURS	COST											+
Proposal/Planning	-		-		2	\$410	2	\$0		\$410				ate Principal Associate	\$205
Travel	6	\$1,230	6	\$0	-					\$1,230					\$180
Pre-Construction Survey Field Work*	4	\$820	1	\$0	0	\$0	0.5	\$0		\$820			5 Associa		\$160
Condition Survey Report*	-				4	\$820	4	\$0		\$820			6 Associa 7 Associa		\$140
Vibration Control Plan					12	\$2,460 \$0	2	\$0 \$0		\$2,460 \$0			_	specialist	\$120 \$130
					0	\$0 \$0	0	\$0 \$0		\$0 \$0			9 Special		\$130
					0	\$0 \$0	0	\$0 \$0		\$0			•	Technician	\$100
					0	\$0	0	\$0		\$0			1 Technic		\$90
					0	\$0 \$0	0	\$0		\$0			2 Technic		\$90
EXPENSES (	Qty	Cost	Qty	Cost	v	- VÇ	•	30		30			2 recimic	lan	\$10
Taxi	21.y 2	\$30	0						\$60						
Airfare	4	\$700	0	+					\$700						
Lodging	1	\$100		\$100					\$100						
Meals		\$50	0	+					\$50						
Rental Car	1	\$80	0						\$80						
	-								\$0						
Miscellaneous expenses	0	\$50	0	\$50					\$0						
									\$0						
<u>TOTALS=</u>	14		7		18		8.5		\$990	\$5,740	\$6,730				
* Based on the number of buildings															
	Number o	f Structure	s to Exami	ine											-
H	Home	Church	Office (50	' x 75')		ст пол/п	020-0	)2 <b>/</b> \_	o≉cu	MICO	nical	1)	ELIN7D	(D30:D	12/11
Number of buildings	1	0	0			DIMIC	DOU.D	ээ4ј⊤	z 50	MICO	0.034	+) = -	SOIVI	(D20.D	/54]
Basement	1	0	0				1								
1st Floor	1	0	0												
2nd Flooor	1	0	0												
3rd Floor	0	0	0												
Exterior	1	0	0												

L	M	N	0	Р	
				Hourly Rate	
	0	Not use	d	\$0	
	1	Senior F	Principal	\$295	
	2	Principa		\$250	
	3	Associa	te Principal	\$205	
	4	Senior A	ssociate	\$180	
	5	Associa	te III	\$160	
	6	Associa	te II	\$140	
	7	Associa	te I	\$120	
	8	Senior S	Specialist	\$130	
		Speciali		\$110	
	<u> </u>		echnician	\$100	
		Technici		\$90	
	12	Technici	an I	\$70	

27				Number o	of Structure	es to Exami	ine
28				Home	Church	Office (50	' x 75')
29		Number of buildings		1	0	0	
30		Basement		1	0	0	
31		1st Floor		1	0	0	
32		2nd Flooor		1	0	0	
33		3rd Floor		0	0	0	
34		Exterior		1	0	0	
35	Time allotm	ent based on 4 hours to ex	amine	a 2-story	house wit	h a baseme	ent 🖉
	4 ×	Pre-Condition Survey	Pos	st-Conditio	n Survey	Installat	ions 🛛 🛚

	А	В	С	D	E	F	G	Н	I	J	K	L	М	N	0	P
Precons	struction Survey															
		Field W	ork (1st p	erson ex	amines											Hourly
			d person			.	Project Ma									Rate
		<u> </u>	e Principal	-	used	-	Principal	-	used	EXPENSE			0	Not use	4	\$0
		Associat	205	0	0	Associate 3	205	0	0	EAPENSE	S FEE			Senior F		\$295
DESCRIPT	10N	HOURS	COST	HOURS	COST	HOURS	COST	HOURS	COST		TOTAL			Principa		\$255
		HUUKS	<u>cosi</u>	HUUKS	0031										te Principal	\$205
Proposal/P	lanning	6	£4.030	6	\$0	2	\$410	2	\$0		\$410				te Principal	\$205
Travel		-	\$1,230	-	+-	-					\$1,230			Associa		
	ruction Survey Field Work*	4	\$820	1	\$0	0	\$0 \$820	0.5	\$0 \$0		\$820 \$820			Associa		\$160 \$140
	Survey Report* Control Plan					4	\$2,460	4	\$0 \$0		\$820			Associa		\$140
Vibration (	Control Plan					0	\$2,460	2	\$0 \$0		\$2,460				Specialist	\$120
						0	\$0 \$0	0	\$0 \$0		\$0			Speciali		\$130
						0	\$0	0	\$0		\$0				echnician	\$100
						0	\$0	0	\$0	-	\$0			Technici		\$90
						0	\$0	0	\$0	-	\$0			Technici		\$70
EXPENSES		Qty	Cost	Qty	Cost	, v		•					12	reenne	ann	\$10
Taxi	•	2.9	\$30	0						\$60						
Airfare			\$700	0	\$700					\$700						
Lodging		1	\$100	0	\$100					\$100						
Meals		1	\$50	0	\$50					\$50						
Rental Car		1	\$80	0	\$80					\$80						
		-								\$0						
Miscellane	ous expenses	0	\$50	0	\$50					\$0						
										\$0						
	TOTALS=	14	L	7		18		8.5		\$990	\$5,740	\$6,730				
* Based on	the number of buildings															
		Number o	f Structure	s to Exam	ine											
		Home	Church	Office (50	' x 75')											
	Number of buildings	1	0	0												
	Basement	1	0	0												
	1st Floor	1	0	0												
	2nd Flooor	1	0	0												
	3rd Floor	0	0	0												
	Exterior	1	0	0												
Time allot	ment based on 4 hours to examin	e a 2-story	house wit	h a baseme	ent											
< >	Pre-Condition Survey Po	st-Conditio	n Survey	Installat	ions N	/onthly	Removal	Trouble	shoot trip	Summa	ary (	÷	: •			

Α	В	С	D	E	F	G	Н		J	K	L	M	N	0	P
Preconstruction Survey															
	Field W	ork (1st p	ercon ev	amines										-	Hourly
		d person (				and Ma									Rate
						Project Ma			EXPENSE				0 Not use		\$0
4	3	Principal 205		used 0	Associate 3	Principal 205		used 0	EXPENSE	S FEE			1 Senior I		\$295
DESCRIPTION	HOURS	COST	HOURS	COST	HOURS	COST	HOURS	COST		TOTAL			2 Principa		\$295
	HOURS	COST	HOURS	COST											+
Proposal/Planning			-		2	\$410	2	\$0		\$410				ate Principal Associate	\$205
Travel	6	\$1,230	6	\$0	-					\$1,230					\$180
Pre-Construction Survey Field Work*	4	\$820	1	\$0	0	\$0	0.5	\$0		\$820			5 Associa		\$160
Condition Survey Report*	-				4	\$820	4	\$0	-	\$820			6 Associa 7 Associa		\$140
Vibration Control Plan					12	\$2,460 \$0	2	\$0 \$0		\$2,460 \$0				specialist	\$120 \$130
					0	\$0 \$0	0	\$0 \$0		\$0 \$0			9 Special		\$130
					0	\$0 \$0	0	\$0 \$0		\$0			•	Technician	\$100
					0	\$0	0	\$0		\$0			1 Technic		\$90
					0	\$0 \$0	0	\$0		\$0			2 Technic		\$90
EXPENSES (	Qty	Cost	Qty	Cost	v	- VÇ	•	30		30			2 recinic	lan	\$10
Taxi	21.9	\$30	0						\$60						
Airfare	4	\$700	0	+					\$700						
Lodging	1	\$100		\$100					\$100						
Meals		\$50	0	+					\$50						
Rental Car	1	\$80	0						\$80						
	-								\$0						
Miscellaneous expenses	0	\$50	0	\$50					\$0						
									\$0						
<u>TOTALS=</u>	14		7		18		8.5		\$990	\$5,740	\$6,730				
* Based on the number of buildings															
	Number o	f Structure	s to Exami	ine											-
H	Home	Church	Office (50	' x 75')		ст пол/п	020-0	)2 <b>/</b> \_	o≉cu	MICO	nical	1)	ELIN7D	(D30:D	12/11
Number of buildings	1	0	0			DIMIC	DOU.D	ээ4ј⊤	z 50	MICO	0.034	+) = -	SOIVI	(D20.D	/54]
Basement	1	0	0				1						1		
1st Floor	1	0	0												
2nd Flooor	1	0	0												
3rd Floor	0	0	0												
Exterior	1	0	0												

	Α	В	С	D	E	F	G	Н	1	J	К	L	Μ	N	0	Р	
1	Post-Construction Survey																
		Field W	ork (1et r	berson ex	aminec												
2				coordina		I .	Project Ma										
2			e Principal		used		e Principal		used	EXPENSE							
J 1		3	205	0	0	3	205	0	0	EAPENSE	FEE						
4 5	DESCRIPTION			-													
ž		HOURS	COST	HOURS	COST	HOURS	COST	HOURS	COST		TOTAL						
6	Proposal/Planning			-		2	\$410	0	\$0		\$410						
1	Travel	6	\$1,230	6	\$0	-					\$1,230						
8 9	Post-Construction Survey Field Work*	2	\$410	0.5	\$0	0	\$0	0.5	\$0		\$410						
9 10	Condition Survey Report*					0	\$410 \$0	4	\$0 \$0		\$410 \$0						
11						0	\$0	0	\$0 \$0		\$0 \$0						
12						0	\$0	0	\$0		\$0						
13						6	\$0	0	\$0		\$0						
14		<u> </u>				0	\$0	0	\$0		\$0						
15						0	\$0	0	\$0		\$0						
	EXPENSES	Qty	Cost	Qty	Cost			-									
		2	\$30	0	\$30					\$60							
18	12. Airfare	1	\$700	0	\$700					\$700							
19	13. Lodging	1	\$100	0	\$100					\$100							
20	14. Meals	1	\$50	0	\$50					\$50							
21	15. Rental Car	1	\$80	0	\$80					\$80							
22										\$0							
23	16. Miscellaneous expenses	0	\$50	0	\$50					\$0							
24										\$0							
25	TOTALS:	12		6.5		4	L	4.5		\$990	\$2,460	\$3,450					
26	* Based on the number of buildings																
27				es to Exam													
28		Home		Office (50	' x 75')												
29	Number of buildings	1	0	0													
30	Basement	1	0	0													
31	1st Floor	1	0	0													
32	2nd Flooor	1	0	0													
33 34	3rd Floor	1	0	0													
	Exterior Time allotment based on 2 hours to examin		-	-													
20		-				d a mathetic	Demenuel	Tanakta		Current		2					1
	Pre-Condition Survey     Pos	t-Conditio	n Survey	Installat	ions I	vionthly	Removal	Trouble	shoot trip	Summa	iry (	Ð	÷ •				►

1	Monitor Installations		1							1					
		Field W	ork (1st p	erson ex	amines.		1								
2			d person				Project Ma	anademe	nt						
3			e Principal		used		e Principal		used	EXPENSE	5				
4		3	205	0	0	3	205	0	0		FEE				
5	DESCRIPTION	HOURS	COST	HOURS	COST	HOURS	COST	HOURS	COST		TOTAL				
6	Proposal/Planning					0.5	\$103	0.25	\$0		\$103			-	
7	Travel	6	\$1,230	6	\$0						\$1,230				
8	Post-Construction Survey Field Work*	1	\$205	0.5	\$0	0	\$0	0	\$0		\$205				
9	Condition Survey Report*					0	\$0	0	\$0		\$0				
10						0	\$0	0	\$0		\$0				
11						0	\$0	0	\$0		\$0				
12						0	\$0	0	\$0		\$0				
13						0	\$0	0	\$0		\$0				
14						0	\$0	0	\$0		\$0				
15						0	\$0	0	\$0		\$0				
16		Qty	Cost	Qty	Cost										
17		2								\$60					
18		1	\$700							\$700					
	13. Lodging	1	\$100	-	4					\$100					
20		1	\$50							\$50				 	
21	15. Rental Car	1	\$80		\$80					\$80				 	
22		1	\$20							\$20				 	
23	16. Miscellaneous expenses	0	\$50	0	\$50					\$0					
24										\$0		*			
25	<u>TOTALS=</u>	11		6.5		0.5	5	0.25		\$1,010	\$1,538	\$2,548			
26	* Based on the number of buildings														
27 28		Number o Home	f Structures Church	Office (50											
20 29	Number of buildings	nome 1													
30	Basement	1	-	-											
31	1st Floor	1	-											 	
32	2nd Flooor	1	-												
33	3rd Floor	0	-	_										-	
34	Exterior	1	-	_											
35		a 2-story	house with												
		st-Conditio		Installati		onthly	Removal	Troubles	a oot trip	Summar	/ +				<u> </u>
	Pre-Condition Survey Pos	st-conditio	ii Survey	Installati	UIS IVIC	Jinniy	Removar	roublesi	loot trip	Summar		:	4		

	A	B	С	D	E	F	G	Н	J	K	L	M	N	0	P
	Monthly Monitoring														
		Week	ly Reports	and 4 tri	ggered										
2			eve	ents											
}		Associa	te Principal	Not	used	EXPENSES									
Ļ		3	205	0	0		FEE								
5	DESCRIPTION	HOURS	COST	HOURS	COST		TOTAL								
;			-				\$0								
7							\$0								
3	Weekly Reports*	1	\$205				\$205								
)	Triggered Events	1	\$205				\$205								
0							\$0								
1							\$0								
2							\$0								
13							\$0								
4							\$0								
5							\$0								
6	EXPENSES	Qty	Cost												
7			1 \$550			\$550									
8			1 \$115			\$115									
9						\$0									
0		_				\$0									
1		_				\$0									
2		_				\$0									
3						\$0	-								
24		_				\$0		**							
5		5=	4	C		\$665	\$410	\$1,075							
6															
7			of Structure												
8 9		Home	Church 1 0	Office (50											
0			1 0	U U	, 										
1															
2															
3															
34															
35															
-	Pre-Condition Survey		on Survey	Installati		Ionthly Re	moval	Froublesho	Summary	•	:	•			

	A	В	С	D	Е	F	G	Н	I	J	К	L	М	N	0	Р
1	Monitor Removals															
2		Field W	ork (1st p	erson ex	amines.		Project Ma	anademe	nt							
3			e Principal		used		e Principal		used	EXPENSE	5					
4		3	205	0	0	3	205	0	0		FEE					
5	DESCRIPTION	HOURS	COST	HOURS	COST	HOURS	COST	HOURS	COST		TOTAL					
6	Proposal/Planning					1	\$205	0	\$0	)	\$205					
7	Travel	6	\$1,230	6	\$0						\$1,230					
8	Post-Construction Survey Field Work*	1	\$205	0.5	\$0	0	\$0	0	\$0	)	\$205					
9	Condition Survey Report*					0	\$0	0	\$0	)	\$0					
10						0	\$0	0	\$0	)	\$0					
11						0	\$0	0	\$0	)	\$0					
12						0	\$0	0	\$0	-	\$0					
13						0	\$0	0	\$0	-	\$0					
14						0	\$0	0	\$0		\$0					
15						0	\$0	0	\$0	)	\$0					
	EXPENSES	Qty	Cost		Cost											
	11. Taxi	2			+					\$60						
	12. Airfare	1	\$700	_						\$700						
	13. Lodging	0								\$0						
	14. Meals	1	\$50	-	+					\$50						
	15. Rental Car	1	\$80	0	\$80					\$80						
	Avongard Crack Gages									\$0						
	16. Miscellaneous expenses	0	\$50	0	\$50					\$0						
24										\$0						
25	<u>TOTALS=</u>	10	)	6.5		1	1	0	)	\$890	\$1,640	\$2,530				
26	* Based on the number of buildings															
27			f Structures													
28		Home 1		Office (50												
29	Number of buildings	1	-													
30	Basement	1	-													
31 32	1st Floor 2nd Flooor	1	-													
33	3rd Floor	0	· ·	_												
34	Exterior	1	-													
	Time allotment based on 4 hours to examine		· ·	-												
36	The anoment pased on 4 hours to examine		nvuse with	a vascinei												
			-				-									
	Pre-Condition Survey     Po:	st-Conditio	n Survey	Installatio	ons Mo	onthly	Removal	Troubles	hoot trip	Summary	<mark>/</mark> 🕀		•			•

B	С	D	E	F	G	H		J	K	L	M	N	0	Р
Field V	Vork (1st p	erson ex	amines.		Project Ma	anageme	nt							
_					-	_		EXPENSES	5					
3	205	0	0	3	205	0	0		FEE					
HOURS	COST	HOURS	COST	HOURS	COST	HOURS	COST		TOTAL					
				1	\$205	0	\$0	)	\$205					
6	\$1,230								\$1,230					
2	\$410			0	\$0	0	\$0	)	\$410					
				0	\$0	0	\$0	)	\$0					
				0	\$0	0	\$0	)	\$0					
				0	\$0	0	\$0	)	\$0					
				0	\$0	0	\$0	)	\$0					
				0	\$0	0	\$0	)	\$0					
				0	\$0	0	\$0	)	\$0					
				0	\$0	0	\$0	)	\$0					
Qty	Cost													
:	2 \$30							\$60						
	1 \$700							\$700						
(								\$0						
	1 \$80													
	1 \$50	<u> </u>												
<b>-</b>	В	0		1	1	0		\$920	\$1,845	\$2,765				
	1 0	0												
	<u> </u>						1							
	Field V Associat 3 HOURS 6 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Field Work (1st principal         3       205         HOURS       COST         6       \$1,230         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$410         2       \$30         1       \$50         2       \$30         1       \$50         2       \$8         3       \$9         3       \$1         5       \$2         8       \$30         3       \$1         5       \$2         8       \$30         3       \$30         3	Field Work (1st person ex Associate Principal Not         3       205       0         HOURS       COST       HOURS         6       \$1,230       -         6       \$1,230       -         2       \$410       -         2       \$410       -         2       \$410       -         2       \$410       -         2       \$410       -         2       \$410       -         2       \$410       -         2       \$410       -         2       \$410       -         2       \$410       -         2       \$30       -         2       \$30       -         1       \$30       -         1       \$50       -         2       8       0         1       \$50       -         2       8       0         1       \$50       -         2       8       0	Field Work (1st person examines, Associate Principal         Associate Principal       Not used         3       205       0       0         HOURS       COST       HOURS       COST         6       \$1,230       -       -         6       \$1,230       -       -         2       \$410       -       -         2       \$410       -       -         4       -       -       -         2       \$410       -       -         2       \$410       -       -         2       \$410       -       -         2       \$410       -       -         2       \$30       -       -         2       \$30       -       -         2       \$30       -       -         3       1       \$700       -         3       1       \$30       -         4       -       -       -         5       8       0       -         4       -       -       -         5       8       0       -         5       8       0	Field Work (1st person examines, Associate Principal 3       Not used       Associat Associate         3       205       0       0       3         HOURS       COST       HOURS       COST       HOURS         2       5410       0       0         2       5410       0       0         2       5410       0       0         2       5410       0       0         2       5410       0       0         2       5410       0       0         2       5410       0       0         2       5410       0       0         3       0       0       0         3       0       0       0         3       0       0       0         3       0       0       0         4       5700       0       0         3       1       530       0         3       1       530       0         4       1       550       0         3       1       550       0         4       1       550       1         5       8       0 </td <td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal           3         205         0         0         3         205           HOURS         COST         HOURS         COST         HOURS         COST           6         \$1,230         1         \$205         0         0         \$0           2         \$410         0         \$0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0         \$0           1         \$1,00         1         \$0         \$0         \$0         \$0         \$0           1         50         1         \$0<td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not           3         205         0         0         3         205         0           HOURS         COST         HOURS         COST         HOURS         COST         HOURS           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           4         1         \$0         \$0         \$0         \$0         \$0           4         1         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0</td><td>Field Work (1st person examines, Associate Principal         Project Management           Associate Principal         Not used         Associate Principal         Not used           3         205         0         0         3         205         0         0           HOURS         COST         HOURS         COST         HOURS         COST         HOURS         COST         HOURS         COST           2         S410         0         50         0         50</td><td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         Associate Principal         Not used         EXPENSE:           3         205         0         0         3         205         0         0           HOURS         COST         HOURS         COST         HOURS         COST         HOURS         COST           6         \$1,230         1         \$205         0         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           4         0         \$00         \$00         \$00         \$00         \$00           4         1         0         \$00         \$00         \$00         \$00           4         1         0         \$00         \$00</td><td>Field Work (1st person examines,         Project Management         EXPENSES           3         205         0         0         3         205         0         0         EEE           3         205         0         0         3         205         0         0         EEE           40urs         COST         HOURS         COST         HOURS         COST         HOURS         COST         TOTAL           6         \$1,230         1         \$205         0         50         \$50         \$50           6         \$1,230         0         0         \$50         0         \$50         \$51,230           2         \$410         0         0         \$50         0         \$50         \$51,230           2         \$410         0         0         \$50         \$50         \$50         \$50           1         0         50         0         \$50         \$50         \$50         \$50           1         1         0         50         \$50         \$50         \$50         \$50           1         5700         1         0         \$50         \$50         \$50         \$50</td><td>Field Work (1st person examines, Associate Principal         Project Management         EXPENSES           3         205         0         0         3         205         0         0         FEE           3         205         0         0         3         205         0         0         FEE           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL           1         \$205         0         0         50         \$205           6         \$1,230         1         \$205         0         \$31,230           2         \$410         0         \$30         0         \$30           2         \$410         0         \$30         0         \$30           2         \$410         0         \$30         0         \$30           2         \$410         0         \$30         0         \$30           3         0         50         50         \$50         \$50           4         0         \$50         0         \$50         \$50           4         0         \$50         0         \$50         \$50           4         5700         <t< td=""><td>Field Work (1st person examines,         Project Management         EXPENSEs           Associate Principal         Not used         Associate Principal         Not used         EXPENSEs           3         205         0         0         3         205         0         0           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL          </td><td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         EXPENSES           3         205         0         0         3         205         0         0         FEE           3         205         0         0         3         205         0         0         FEE           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL           -         1         S205         0         50         S205           6         \$1,230         -         -         51,230         -           2         \$410         0         50         0         50         5410           2         \$410         0         50         0         50         50           -         0         0         50         0         50         50           -         0         0         50         0         50         50           -         0         0         50         50         50         50           -         0         0         50         50         50         50           -         -</td><td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         Second Principal         Not used           3         205         0         0         3         205         0         0         Field Work (1st person examines, Associate Principal         Not used         EXPENSES           3         205         0         0         0         FEE        </td></t<></td></td>	Field Work (1st person examines, Associate Principal         Not used         Associate Principal           3         205         0         0         3         205           HOURS         COST         HOURS         COST         HOURS         COST           6         \$1,230         1         \$205         0         0         \$0           2         \$410         0         \$0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0         \$0           1         \$1,00         1         \$0         \$0         \$0         \$0         \$0           1         50         1         \$0 <td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not           3         205         0         0         3         205         0           HOURS         COST         HOURS         COST         HOURS         COST         HOURS           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           4         1         \$0         \$0         \$0         \$0         \$0           4         1         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0</td> <td>Field Work (1st person examines, Associate Principal         Project Management           Associate Principal         Not used         Associate Principal         Not used           3         205         0         0         3         205         0         0           HOURS         COST         HOURS         COST         HOURS         COST         HOURS         COST         HOURS         COST           2         S410         0         50         0         50</td> <td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         Associate Principal         Not used         EXPENSE:           3         205         0         0         3         205         0         0           HOURS         COST         HOURS         COST         HOURS         COST         HOURS         COST           6         \$1,230         1         \$205         0         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           4         0         \$00         \$00         \$00         \$00         \$00           4         1         0         \$00         \$00         \$00         \$00           4         1         0         \$00         \$00</td> <td>Field Work (1st person examines,         Project Management         EXPENSES           3         205         0         0         3         205         0         0         EEE           3         205         0         0         3         205         0         0         EEE           40urs         COST         HOURS         COST         HOURS         COST         HOURS         COST         TOTAL           6         \$1,230         1         \$205         0         50         \$50         \$50           6         \$1,230         0         0         \$50         0         \$50         \$51,230           2         \$410         0         0         \$50         0         \$50         \$51,230           2         \$410         0         0         \$50         \$50         \$50         \$50           1         0         50         0         \$50         \$50         \$50         \$50           1         1         0         50         \$50         \$50         \$50         \$50           1         5700         1         0         \$50         \$50         \$50         \$50</td> <td>Field Work (1st person examines, Associate Principal         Project Management         EXPENSES           3         205         0         0         3         205         0         0         FEE           3         205         0         0         3         205         0         0         FEE           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL           1         \$205         0         0         50         \$205           6         \$1,230         1         \$205         0         \$31,230           2         \$410         0         \$30         0         \$30           2         \$410         0         \$30         0         \$30           2         \$410         0         \$30         0         \$30           2         \$410         0         \$30         0         \$30           3         0         50         50         \$50         \$50           4         0         \$50         0         \$50         \$50           4         0         \$50         0         \$50         \$50           4         5700         <t< td=""><td>Field Work (1st person examines,         Project Management         EXPENSEs           Associate Principal         Not used         Associate Principal         Not used         EXPENSEs           3         205         0         0         3         205         0         0           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL          </td><td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         EXPENSES           3         205         0         0         3         205         0         0         FEE           3         205         0         0         3         205         0         0         FEE           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL           -         1         S205         0         50         S205           6         \$1,230         -         -         51,230         -           2         \$410         0         50         0         50         5410           2         \$410         0         50         0         50         50           -         0         0         50         0         50         50           -         0         0         50         0         50         50           -         0         0         50         50         50         50           -         0         0         50         50         50         50           -         -</td><td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         Second Principal         Not used           3         205         0         0         3         205         0         0         Field Work (1st person examines, Associate Principal         Not used         EXPENSES           3         205         0         0         0         FEE        </td></t<></td>	Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not           3         205         0         0         3         205         0           HOURS         COST         HOURS         COST         HOURS         COST         HOURS           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           2         \$410         0         \$0         \$0         \$0         \$0           4         1         \$0         \$0         \$0         \$0         \$0           4         1         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0         \$0	Field Work (1st person examines, Associate Principal         Project Management           Associate Principal         Not used         Associate Principal         Not used           3         205         0         0         3         205         0         0           HOURS         COST         HOURS         COST         HOURS         COST         HOURS         COST         HOURS         COST           2         S410         0         50         0         50	Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         Associate Principal         Not used         EXPENSE:           3         205         0         0         3         205         0         0           HOURS         COST         HOURS         COST         HOURS         COST         HOURS         COST           6         \$1,230         1         \$205         0         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           2         \$410         0         \$00         \$00         \$00         \$00           4         0         \$00         \$00         \$00         \$00         \$00           4         1         0         \$00         \$00         \$00         \$00           4         1         0         \$00         \$00	Field Work (1st person examines,         Project Management         EXPENSES           3         205         0         0         3         205         0         0         EEE           3         205         0         0         3         205         0         0         EEE           40urs         COST         HOURS         COST         HOURS         COST         HOURS         COST         TOTAL           6         \$1,230         1         \$205         0         50         \$50         \$50           6         \$1,230         0         0         \$50         0         \$50         \$51,230           2         \$410         0         0         \$50         0         \$50         \$51,230           2         \$410         0         0         \$50         \$50         \$50         \$50           1         0         50         0         \$50         \$50         \$50         \$50           1         1         0         50         \$50         \$50         \$50         \$50           1         5700         1         0         \$50         \$50         \$50         \$50	Field Work (1st person examines, Associate Principal         Project Management         EXPENSES           3         205         0         0         3         205         0         0         FEE           3         205         0         0         3         205         0         0         FEE           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL           1         \$205         0         0         50         \$205           6         \$1,230         1         \$205         0         \$31,230           2         \$410         0         \$30         0         \$30           2         \$410         0         \$30         0         \$30           2         \$410         0         \$30         0         \$30           2         \$410         0         \$30         0         \$30           3         0         50         50         \$50         \$50           4         0         \$50         0         \$50         \$50           4         0         \$50         0         \$50         \$50           4         5700 <t< td=""><td>Field Work (1st person examines,         Project Management         EXPENSEs           Associate Principal         Not used         Associate Principal         Not used         EXPENSEs           3         205         0         0         3         205         0         0           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL          </td><td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         EXPENSES           3         205         0         0         3         205         0         0         FEE           3         205         0         0         3         205         0         0         FEE           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL           -         1         S205         0         50         S205           6         \$1,230         -         -         51,230         -           2         \$410         0         50         0         50         5410           2         \$410         0         50         0         50         50           -         0         0         50         0         50         50           -         0         0         50         0         50         50           -         0         0         50         50         50         50           -         0         0         50         50         50         50           -         -</td><td>Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         Second Principal         Not used           3         205         0         0         3         205         0         0         Field Work (1st person examines, Associate Principal         Not used         EXPENSES           3         205         0         0         0         FEE        </td></t<>	Field Work (1st person examines,         Project Management         EXPENSEs           Associate Principal         Not used         Associate Principal         Not used         EXPENSEs           3         205         0         0         3         205         0         0           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL	Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         EXPENSES           3         205         0         0         3         205         0         0         FEE           3         205         0         0         3         205         0         0         FEE           HOURS         COST         HOURS         COST         HOURS         COST         TOTAL           -         1         S205         0         50         S205           6         \$1,230         -         -         51,230         -           2         \$410         0         50         0         50         5410           2         \$410         0         50         0         50         50           -         0         0         50         0         50         50           -         0         0         50         0         50         50           -         0         0         50         50         50         50           -         0         0         50         50         50         50           -         -	Field Work (1st person examines, Associate Principal         Not used         Associate Principal         Not used         Second Principal         Not used           3         205         0         0         3         205         0         0         Field Work (1st person examines, Associate Principal         Not used         EXPENSES           3         205         0         0         0         FEE

		С	D	E		G	H		J	K	L	M	N	0	P
Summary of Estimated Cos	sts														
Based on 4 trips															
	Fees	Expenses	<b>Total Cost</b>												
Pre-Construction Survey	\$5,740	\$990	\$6,730												
Post-Condition Survey	\$2,460	\$990	\$3,450												
Installation	\$1,538	\$1,010	\$2,548												
Monthly Monitoring	\$410	\$665	\$1,075	(per month)											
Removal	\$1,640	\$890	\$2,530												
Total	\$11,788	\$4,545	\$16,333												
Based on 2 trips (Installati	ion & Remo	val performe	ed while on-s	site)											
	Fees	Expenses	<b>Total Cost</b>												
Pre-Construction Survey	\$5,740	\$990	\$6,730												
Post-Condition Survey	\$2,460	\$990	\$3,450												
Installation	\$769		\$769												
Monthly Monitoring	\$410	\$665	\$1,075	(per month)											
Removal	\$820		\$820												
Total	\$10,199	\$2,645	\$12,844												
Additional Months of Monit	toring														
2															
	÷.,020	\$1,000	4.2,000												
						_									
	Based on 4 trips Pre-Construction Survey Post-Condition Survey Installation Monthly Monitoring Removal Total Based on 2 trips (Installati Pre-Construction Survey Post-Condition Survey Installation Monthly Monitoring Removal Total Additional Months of Moni 2 4 6 8 10 12	Based on 4 trips       Fees         Pre-Construction Survey       \$5,740         Post-Condition Survey       \$2,460         Installation       \$1,538         Monthly Monitoring       \$410         Removal       \$1,640         Total       \$11,788         Based on 2 trips (Installation & Removal       \$2,460         Installation       \$769         Post-Condition Survey       \$2,460         Installation       \$769         Monthly Monitoring       \$410         Removal       \$820         Total       \$10,199         Additional Months of Monitoring       \$10,199         Additional Months of Monitoring       \$3,280         10       \$4,100         6       \$2,460         8       \$3,280         10       \$4,920	Based on 4 trips         Fees         Expenses           Pre-Construction Survey         \$\$,740         \$990           Post-Condition Survey         \$2,460         \$990           Installation         \$1,538         \$1,010           Monthly Monitoring         \$410         \$665           Removal         \$1,640         \$890           Total         \$11,788         \$4,545           Based on 2 trips (Installation & Removal performed fees         Expenses           Pre-Construction Survey         \$5,740         \$990           Post-Condition Survey         \$2,460         \$990           Installation         \$769         \$900           Installation         \$769         \$820           Monthly Monitoring         \$410         \$665           Removal         \$10,199         \$2,645           Additional Months of Monitoring         \$1,300         \$4,920           Additional Months of Monitoring         \$3,280         \$5,320           8         \$3,280         \$5,320           6         \$2,460         \$3,990           10         \$4,920         \$7,980           11         \$4,920         \$7,980	Based on 4 trips         Fees         Expenses         Total Cost           Pre-Construction Survey         \$5,740         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$3,450           Installation         \$1,538         \$1,010         \$2,548           Monthly Monitoring         \$410         \$665         \$1,075           Removal         \$1,640         \$890         \$2,530           Total         \$11,788         \$4,545         \$16,333           Based on 2 trips (Installation & Removal performed while on-set reset	Based on 4 trips         Fees         Expenses         Total Cost           Pre-Construction Survey         \$5,740         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$3,450           Installation         \$1,538         \$1,010         \$2,548           Monthly Monitoring         \$410         \$665         \$1,075           Removal         \$1,640         \$890         \$2,530           Based on 2 trips (Installation & Removal performed while on-site)         Fees         Expenses         Total Cost           Pre-Construction Survey         \$2,460         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$6,730           Pre-Construction Survey         \$2,460         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$3,450           Installation         \$769         \$769           Monthly Monitoring         \$410         \$665         \$1,075           Removal         \$820         \$820         \$820           Additional Months of Monitoring         \$2,460         \$3,990         \$6,450           10         \$4,100         \$6,650         \$10,750           2	Based on 4 trips         Fees         Expenses         Total Cost           Pre-Construction Survey         \$\$2,460         \$990         \$\$6,730           Post-Condition Survey         \$2,460         \$990         \$3,450           Installation         \$1,538         \$1,010         \$2,548           Monthly Monitoring         \$410         \$665         \$1,075           Removal         \$1,640         \$890         \$2,530           Total         \$11,788         \$4,545         \$16,333           Based on 2 trips (Installation         & Removal         performed while on-site)           Fees         Expenses         Total Cost           Pre-Construction Survey         \$2,460         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$6,730           Pre-Construction Survey         \$2,460         \$990         \$6,730           Pre-Condition Survey         \$2,460         \$990         \$6,730           Removal         \$1,610         \$665         \$1,075           Removal         \$10,199	Based on 4 trips         Fees         Expenses         Total Cost           Pre-Construction Survey         \$5,740         \$990         \$3,450           Installation         \$1,538         \$1,010         \$2,548           Monthly Monitoring         \$410         \$665         \$1,075           Removal         \$1,640         \$890         \$2,530           Total         \$11,788         \$4,545         \$16,333           Based on 2 trips (Installation & Removal performed while on-site)         Fees         Expenses         Total Cost           Pre-Construction Survey         \$2,740         \$990         \$6,730           Post-Condition Survey         \$2,740         \$990         \$6,730           Pre-Construction Survey         \$2,740         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$3,450           Installation         \$769         Monthly Monitoring         \$410         \$665         \$1,075           Removal         \$820         \$13,30         \$2,150         \$10,199         \$2,660         \$4,300           Removal         \$10,199         \$2,660         \$4,300         \$6,450         \$10,750           Additional Months of Monitoring         \$10,199	Based on 4 trips         Fees         Expenses         Total Cost           Pre-Construction Survey         \$5,740         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$3,450           Installation         \$1,538         \$1,010         \$2,548           Monthly Monitoring         \$410         \$665         \$1,075           Removal         \$1,640         \$890         \$2,530           Total         \$11,788         \$4,545         \$16,333           Based on 2 trips (Installation & Removal performet while on-site)         Fees         Expenses         Total Cost           Pre-Construction Survey         \$5,740         \$990         \$6,730            Post-Condition Survey         \$2,460         \$990         \$3,450           Installation         \$769         \$769            Monthly Monitoring         \$410         \$665         \$1,075 (per month)           Removal         \$820         \$820         \$12,844           Additional Months of Monitoring         \$410         \$2,665         \$12,844           Additional Months of Monitoring         \$12,900         \$4,300         \$4,920           10         \$4,920         \$7,380         \$	Based on 4 trips         Fees         Expenses         Total Cost         Image: Cost of the cost of th	Based on 4 trips         Fees         Expenses         Total Cost           Pre-Construction Survey         \$5,740         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$3,450           Installation         \$1,538         \$1,010         \$2,548           Monthly Monitoring         \$410         \$665         \$1,075           Removal         \$1,640         \$890         \$2,530           Total         \$11,788         \$4,545         \$16,333           Based on 2 trips (Installation         & Removal performed while on-site)         Image: Construction Survey         \$5,740           Pre-Construction Survey         \$5,740         \$990         \$6,730           Post-Condition Survey         \$2,460         \$990         \$3,450           Installation         \$769         \$769           Monthly Monitoring         \$410         \$665         \$1,075           Removal         \$820         \$1,330         \$2,150           Additional Months of Monitoring         \$1,401         \$2,660         \$4,300           4         \$1,401         \$6,65         \$10,750           12         \$4,920         \$7,980         \$12,900           1         \$4,920	Fees         Expenses         Total Cost         Image: Cost of the cost of	Based on 4 trips         Fees         Expenses         Total Cost         Image: Cost of the cost of th	Fees         Expenses         Total Cost           Pre-Construction Survey         \$5,740         \$990         \$6,730           Post-Condition Survey         \$2,460         \$3990         \$2,548           Monthly Monitoring         \$410         \$665         \$1,075           Removal         \$1,538         \$1,040         \$2,548           Still,788         \$4,545         \$16,333         \$1640           Based on 2 trips (Installation         \$ Removal         \$11,788         \$4,545           Still,788         \$4,545         \$16,333         \$16,730           Pre-Construction Survey         \$ \$2,740         \$990         \$ \$6,730           Post-Condition Survey         \$ \$ \$2,740         \$ \$990         \$ \$ \$ \$,730           Post-Condition Survey         \$ \$ \$ \$,740         \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	Based on 4 trips         Fees         Expenses         Total Cost           Pre-Construction Survey         53,740         5990         53,450           Installation         51,538         51,010         52,546           Removal         51,645         510,750         (per month)           Removal         51,740         5990         53,450           Based on 2 trips (Installation         84,545         516,333           Based on 2 trips (Linstallation         8 Removal performed while on-site)           Fees         Expenses         Total Cost           Pre-Construction Survey         52,460         5990           S4,740         S990         56,730           Post-Condition Survey         52,460         S990           S4,740         S990         58,6730           Post-Condition Survey         52,460         S990           Installation         8 Stop         54,730           Removal         50,264         510,640           Codd         S980         58,730           Post-Condition Survey         52,640         S16,00           S16,40         S2,640         S16,00           6         52,460         S18,00           6         S2,4	Fees         Expenses         Total Cost           Pre-Construction Survey         \$5,740         \$990         \$6,730 <td< td=""></td<>

 The workbook described here provides a method to roughly estimate a cost for condition surveys and vibration control

Questions?



