

NRRA MnROAD Sensor Costs (Plan/Purchase/Build/Install)

Study	Group	Cell	Sensor Equipment Costs	Sensor Labor Costs	Design	NRRA Team	Dynamic Response				Environmental Response						Additional Equipment Required	MnROAD Labor Estimate (Plan/Purchase/Build/ Calibrate/Install)															
							Long Strain	Trans Strain	Pressure Gauge	Strain	Vibrating Wire strain	Joint Opening	Humidity	Maturity	Temperature - Thermal Couple (Length) 4, 8, 12 is # sensors/wire			Moisture Decagon	Moisture Water Mark	data loggers, wire, pipe, multiplexers, ...	Engineer Days	Tech Days	Student Days										
							HMA	HMA	Unbound	PCC	PCC	PCC	PCC	PCC	Both			Both															
LE	TE	PG	CE	VW	HC?	MH	IK	TC 4	TC 8	TC 12	EC	WM																					
HMA over PCC	Flex 1 and 2	1st Control 0" HMA	5,750	1,323	HMA Overlays of PCC	Flex													3			250					3000	1.5	1.5	0.75			
		2nd																															
		3rd 1.5" HMA	5,750	1,494																	3			250					3000	1.5	1.5	1.75	
		4																															
		5																															
		6 4" HMA	5,750	1,494																	3			250					3000	1.5	1.5	1.75	
		7																															
		8																															
		9																															
		10																															
		11																															
		12																															
		13																															
		14																															
Cold Central Plant Recycling	Flex 3	133	2,245	1,181	Thin HMA and 2X Chip Seal over CCPR layers	Flex																	80		80			1125	1	1.5	1.25		
		233	-	-		Flex																											
		135	11,845	1,181		Flex	4	4	2																80		80			1125	1	1.5	1.25
		235	-	-		Flex																											
Recycled Base	Geo 1	185	3,095	1,650	HMA / Recycled Base	Geo			2																80	5		1125	1.75	1.75	1.5		
		186	3,095	1,650		Geo			2																80	5		1125	1.75	1.75	1.5		
		188	10,295	1,650		Geo	4	4	2																80	5		1125	1.75	1.75	1.5		
		189	3,095	1,650		Geo			2																80	5		1125	1.75	1.75	1.5		
Large Stone Subbase	Geo 2	127	-	-	HMA / Large Subbase	Geo																											
		227	6,625	1,650		Geo			2															120		10		1125	1.75	1.75	1.5		
		128	-	-		Geo																											
		228	13,825	1,650		Geo	4	4	2															120		10		1125	1.75	1.75	1.5		
Maintaining Poor Roadways	PM 1	101	1,850	740	Thin HMA Overlay and Microsurfacing	PM																				150			500	0.5	1	1	
		201	1250	726		PM																				150			500	0.75	0.75	0.75	
		115	1,580	740		PM																				120			500	0.5	1	1	
		215	1,100	726		PM																		120				500	0.75	0.75	0.75		
		8	3,600	968		PCC Maintenance	PM				8	8					10											120			500	1	1
Fiber Reinforced ML	PCC 1	705	6,820	3,529	Fiber PCC Overlay of PCC	Rigid				4	8	4																2500	4	3	4		
		805	6,580	3,870		Rigid				4	8	4														120			2500	4	4	4	
		506	12,860	3,585	Fiber PCC over Base	Rigid				4	8	6															120	16	32	2500	3	4.5	4
		606	13,100	3,585		Rigid				4	8	6															120	16	32	2500	3	4.5	4
Fiber Reinforced City Street	Rigid 4	124	7,600	3,529	Thin Fiber PCC Street	Rigid				4	4	4														60	6	6	2500	4	3	4	
		224	7,600	3,870		Rigid				4	4	4															60	6	6	2500	4	4	4
Compacted PCC city Street	Rigid 5	132	4,470	2,447	Compacted Concrete Pavement	Rigid				8	8															90			2500	2	3	3	
		232	5,370	2,447		Rigid				8																	90	6		2500	2	3	3
PCC Early Loading	Rigid 2	138	13,560	2,903	PCC Early Loading	Rigid				32	16															10	400	100	6	4500	3	3	3
PCC Optimized cement	Rigid 3	139	5,870	1,935	PCC Optimized cement	Rigid				8	8															10			2500	2	2	2	
		239	4,770	1,935		Rigid				8	8																150			2500	2	2	2

Units	12	12	14	96	88	37	0	30	2180	240	1570	96	64	50000	53.5	58.5	57.25
Cost/Unit	900	900	1,200	70	120	500	100	50	5	7	9	250	40	1	455	341	171
Total Cost	10,800	10,800	7,200	6,720	10,560				10,900	1,680	14,130	24,000	2,560	50,000	24,358	19,976	9,775

*Note
 UTEP Partnership will buy 8 pressure plates
 List contains the numbers but the cost was reduced

Cost Summary		
Sensors/Equipment	\$ 149,350	Purchase Orders
Labor	\$ 54,109	3 months of work
Total Costs	\$ 203,459	