

AI Makes for a Crack Detective

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PHOTO
VIDEO
LiDAR
360
THERMAL
SURFACE &
SUB-SURFACE
SENSORS

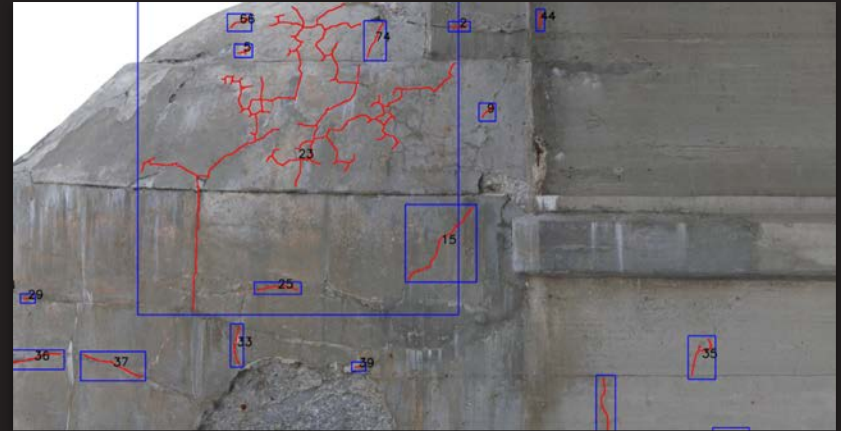


AREN

RECONSTRUCTION

ANALYSIS

QUANTIFICATION
CHANGE IN TIME
PRIORITIZATION



Crack Number	Mean Width (mm)	Length (mm)	Classification
1	1.9731	98.8	CS-3
2	2.6028	138.7	CS-3
3	2.2986	157.7	CS-3
4	2.4504	199.5	CS-3
5	2.0955	129.2	CS-3
6	3.3318	28437.3	CS-3
7	2.861	188.1	CS-3
8	3.264	748.6	CS-3
9	2.2922	131.1	CS-3

Modern Data Collection Tools

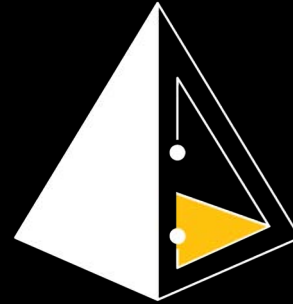




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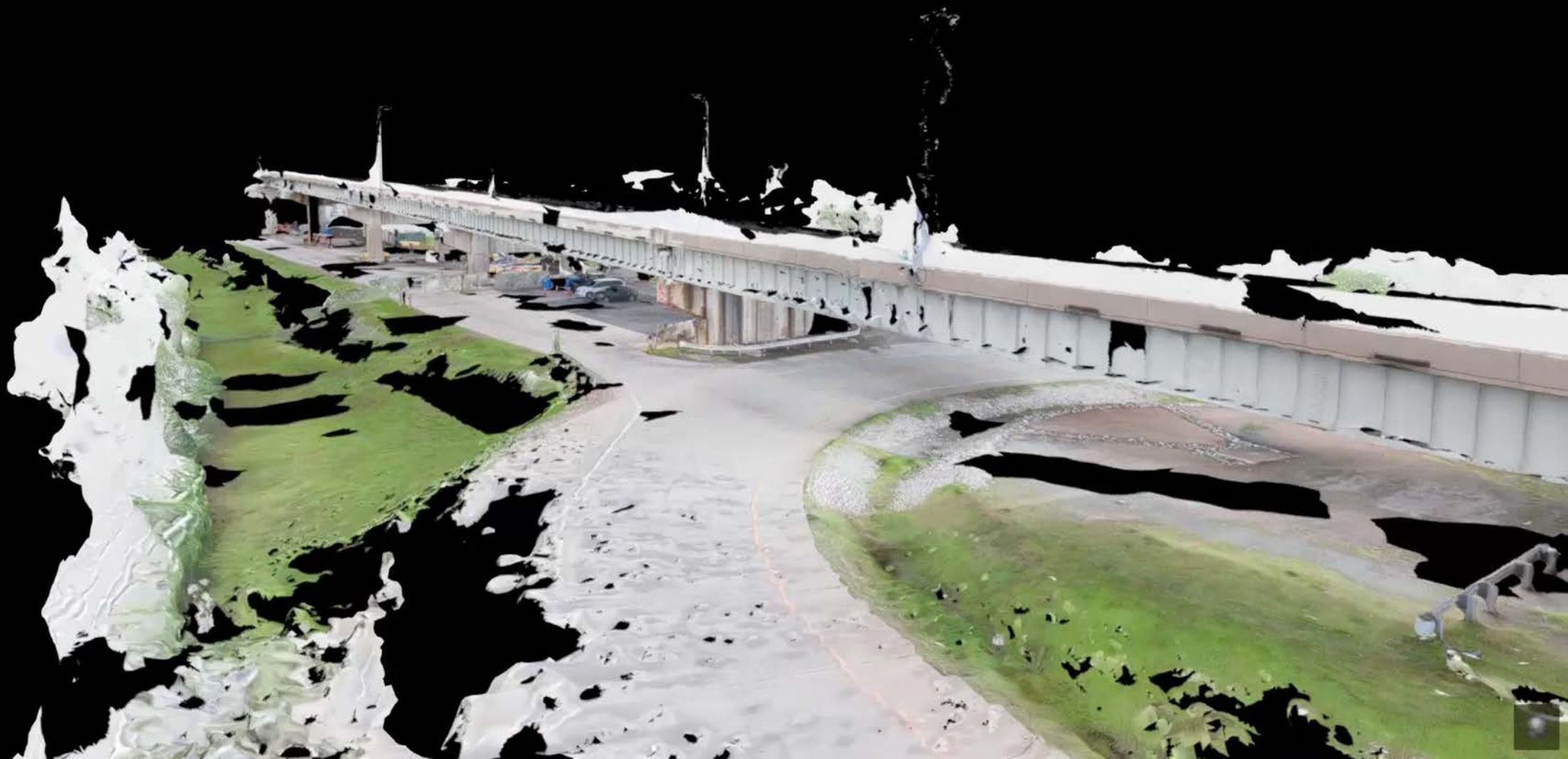
My Files

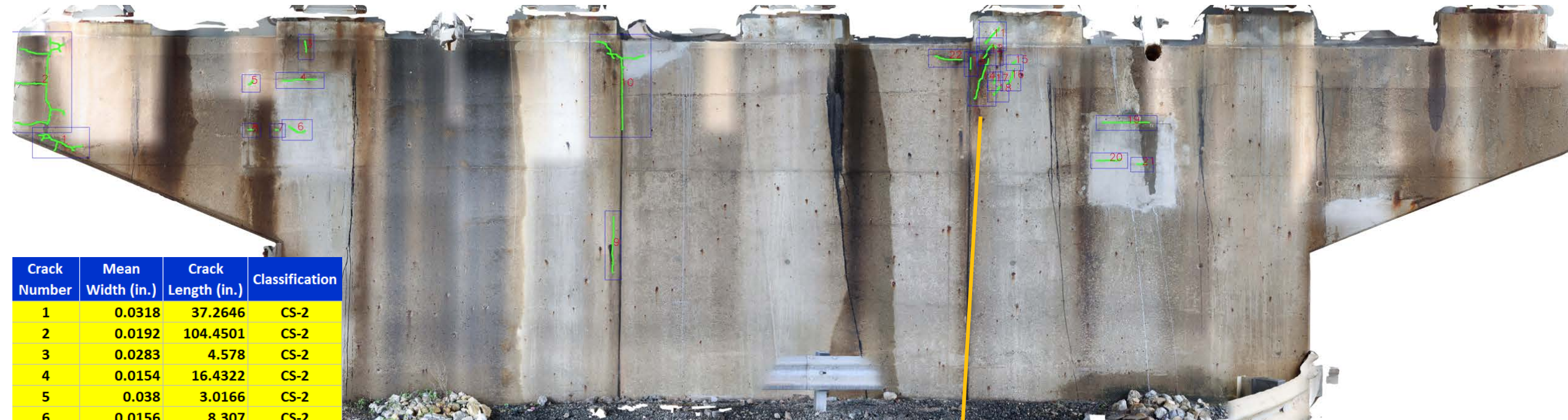
3D Model

Labeled 3D Model (Corrosion)

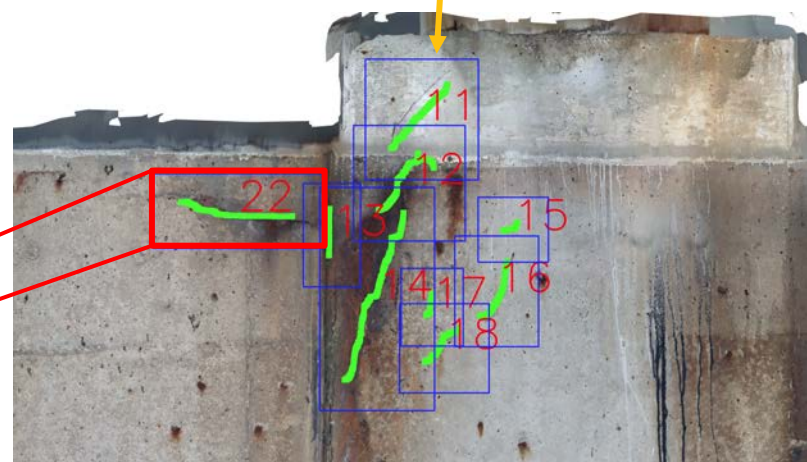
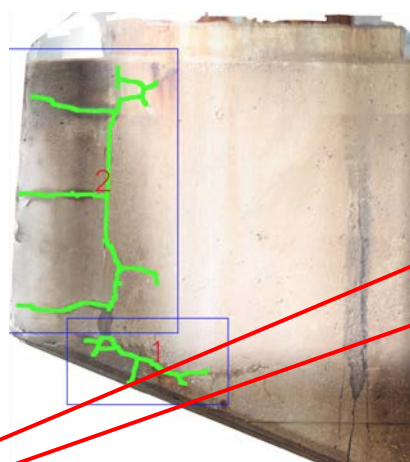
Labeled 3D Model (Cracks)

Deliverables

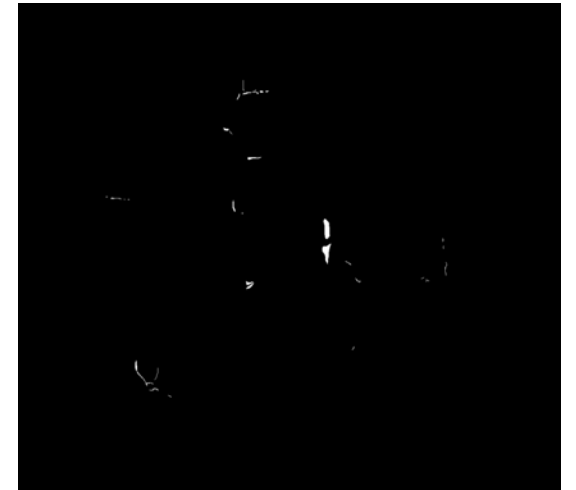
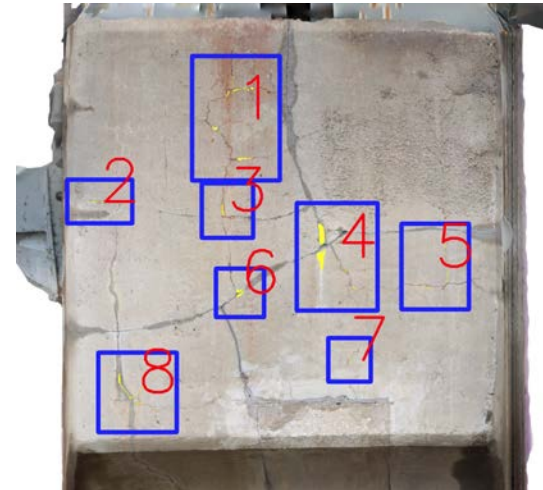
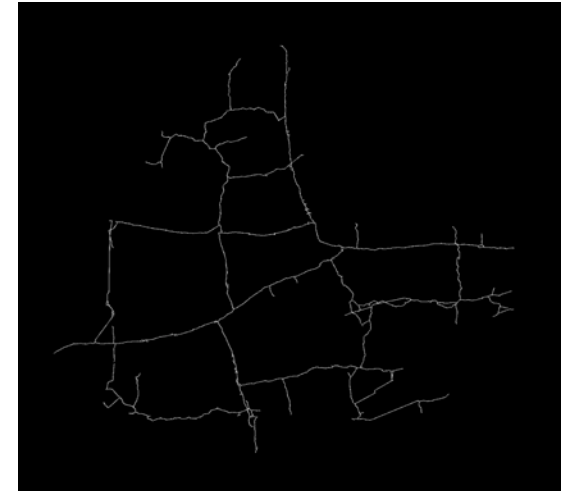
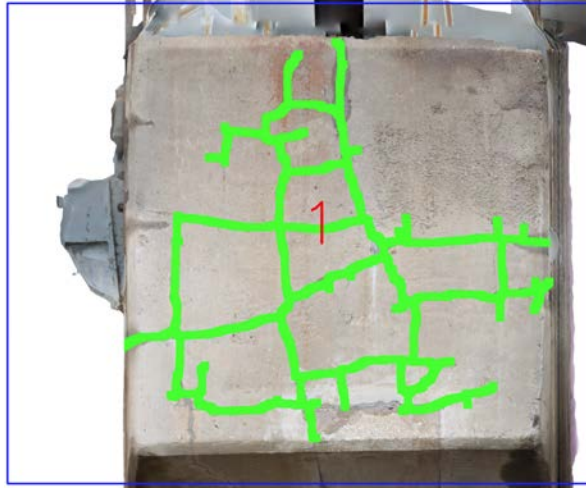




Crack Number	Mean Width (in.)	Crack Length (in.)	Classification
1	0.0318	37.2646	CS-2
2	0.0192	104.4501	CS-2
3	0.0283	4.578	CS-2
4	0.0154	16.4322	CS-2
5	0.038	3.0166	CS-2
6	0.0156	8.307	CS-2
7	0.0152	1.046	CS-2
8	0.0159	2.2587	CS-2
9	0.0153	25.1009	CS-2
10	0.041	56.5291	CS-2
11	0.015	7.2696	CS-2
12	0.0339	8.762	CS-2
13	0.0632	3.9005	CS-3
14	0.0251	18.0214	CS-2
15	0.0113	1.5263	CS-1
16	0.0113	5.2346	CS-1
17	0.0143	1.8881	CS-2
18	0.0116	5.0198	CS-1
19	0.0173	22.5181	CS-2
20	0.011	11.4772	CS-1
21	0.0136	5.0583	CS-2
22	0.0512	9.3192	CS-3



3D Quantification Cracks & Efflorescence





Crack Classification

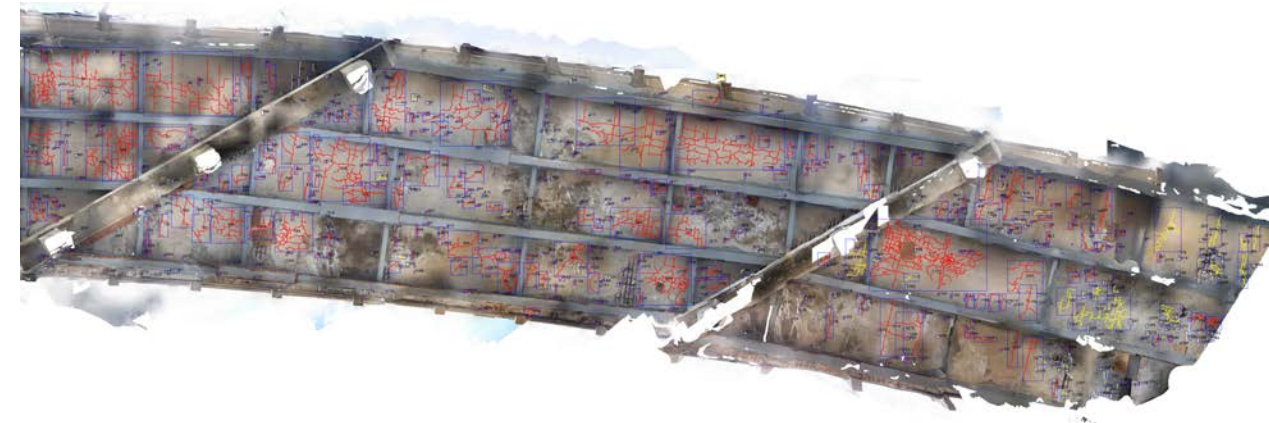
CS1 – Good
(width < 0.012 in)

CS2 - Fair
(width 0.012-0.05 in)

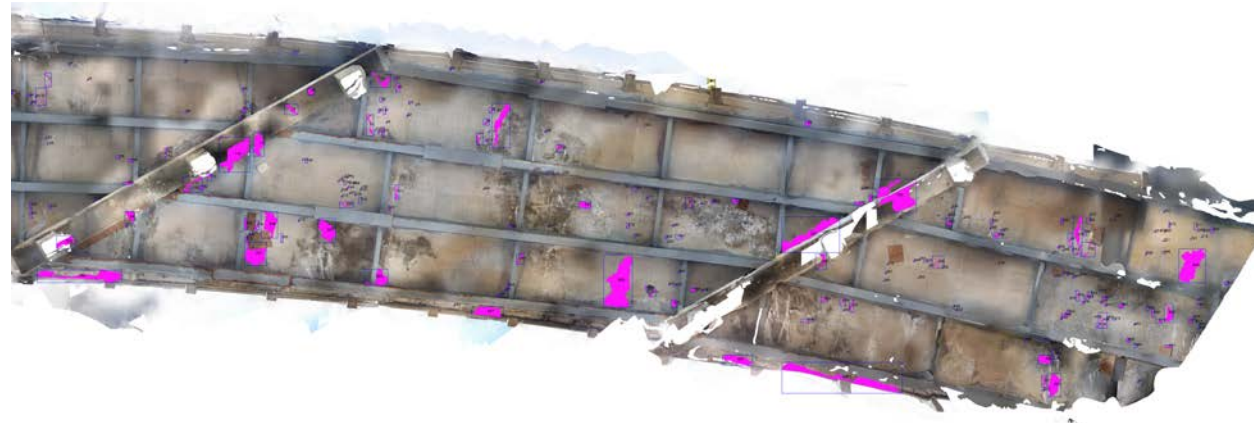
CS3 - Poor
(width > 0.05 in)

Number of Cracks	Width (Avg)	Length (Avg)	Number of Cracks	Width (Avg)	Length (Avg)	Number of Cracks	Width (Avg)	Length (Avg)
1	0.009 Inches	0.409 inches	543	0.038 inches	6.354 inches	803	0.065 inches	61.548 inches

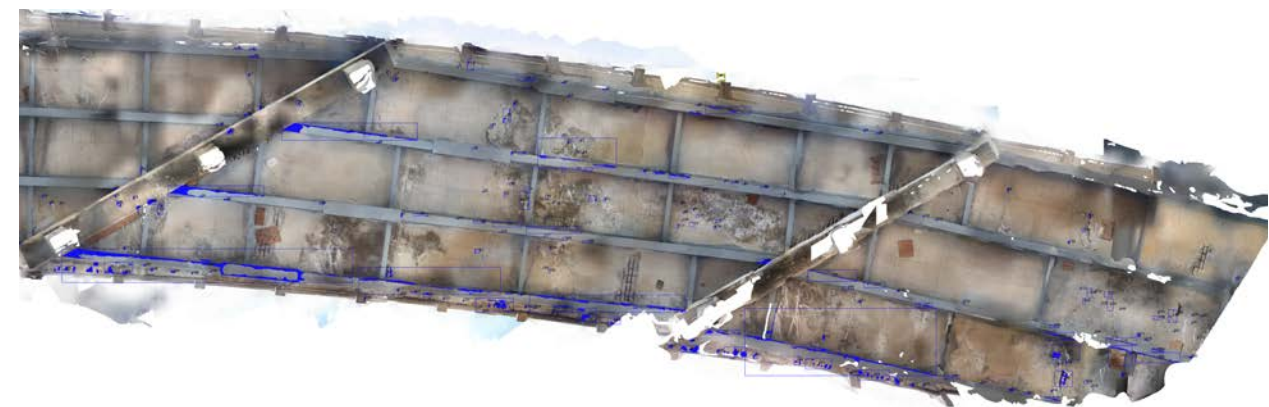
Cracks



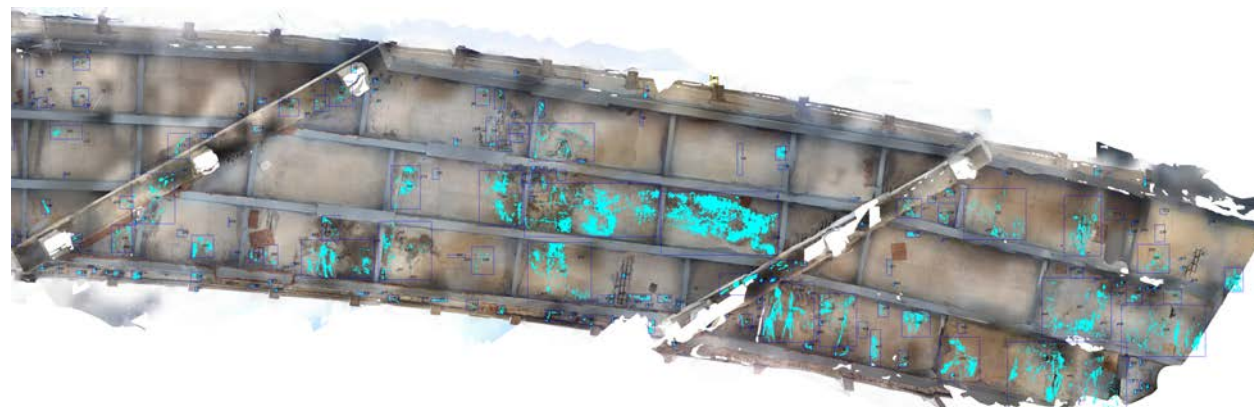
Spalls



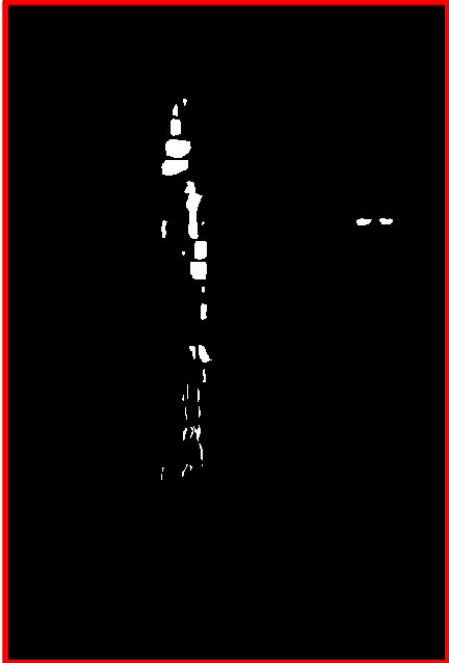
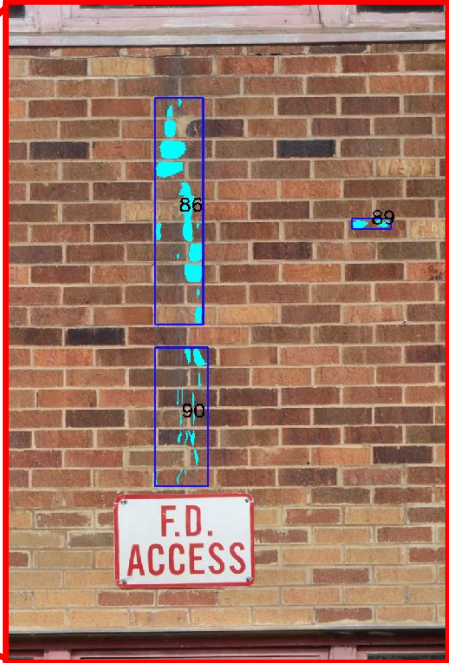
Rust



Efflorescence



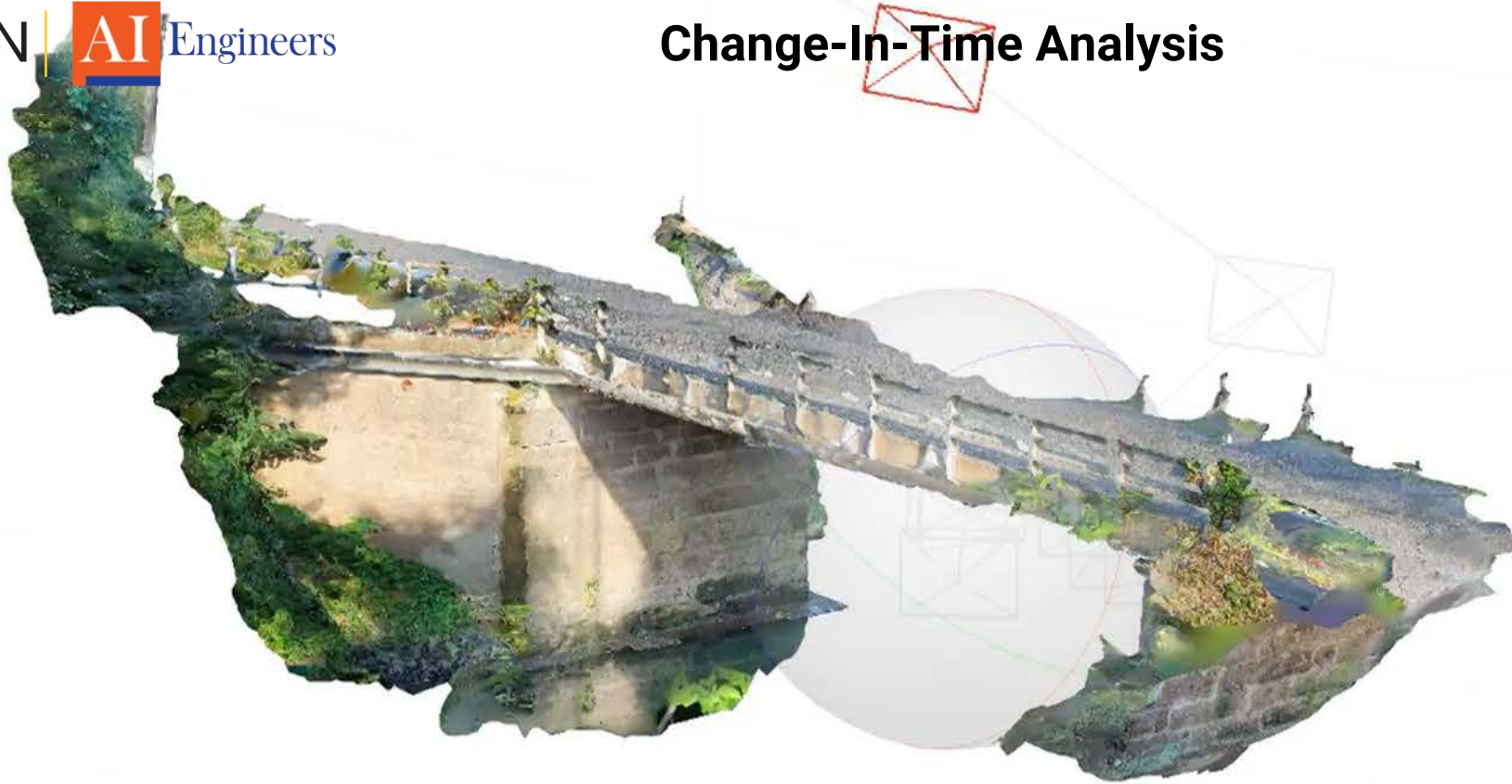




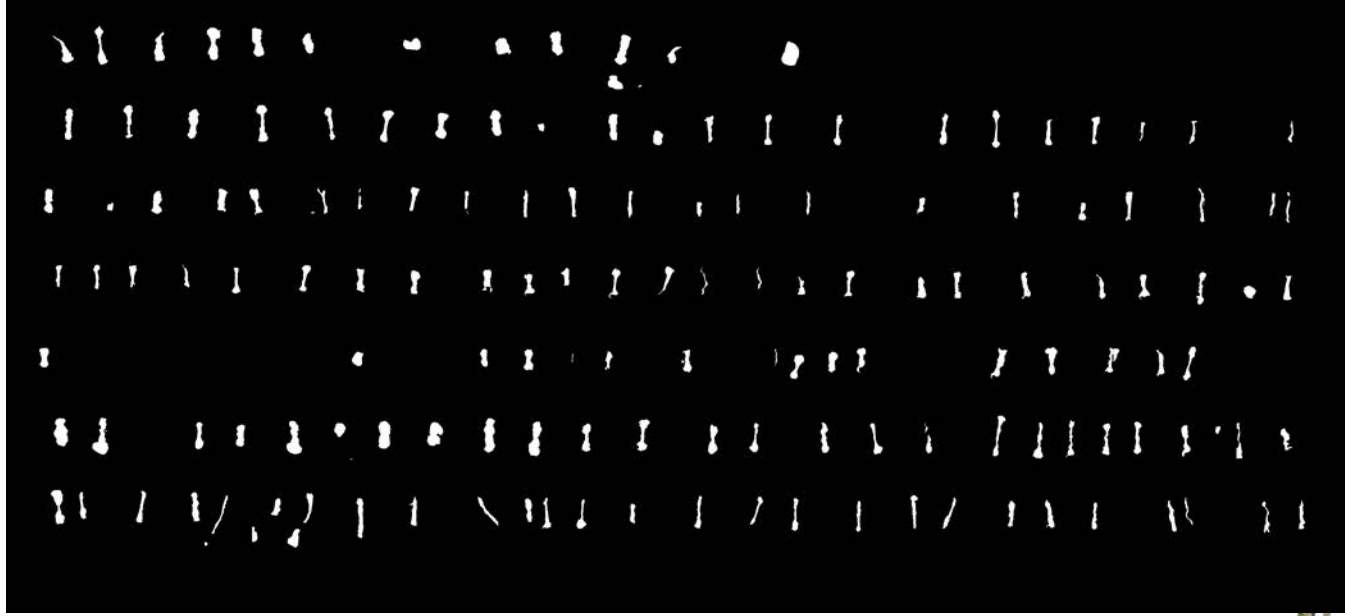
#	Area (sq-in)	X Location	Y Location	Z Location	Classification
86	30.81	40.512388	73.535067	20.554	Safe
87	1.49	40.512198	73.535088	20.164	Safe
88	0.89	40.512174	73.535081	19.395	Safe
89	2.19	40.512992	73.535171	20.291	Safe
90	6.50	40.512411	73.535187	18.784	Safe



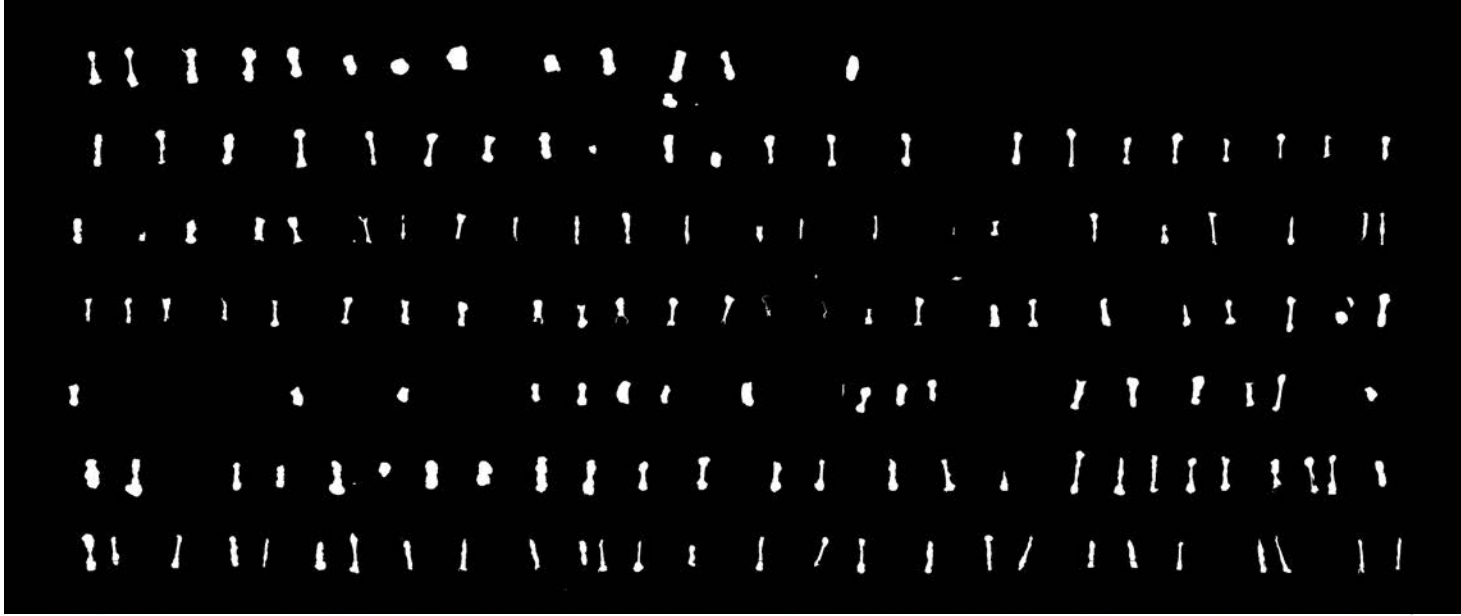
Change-In-Time Analysis



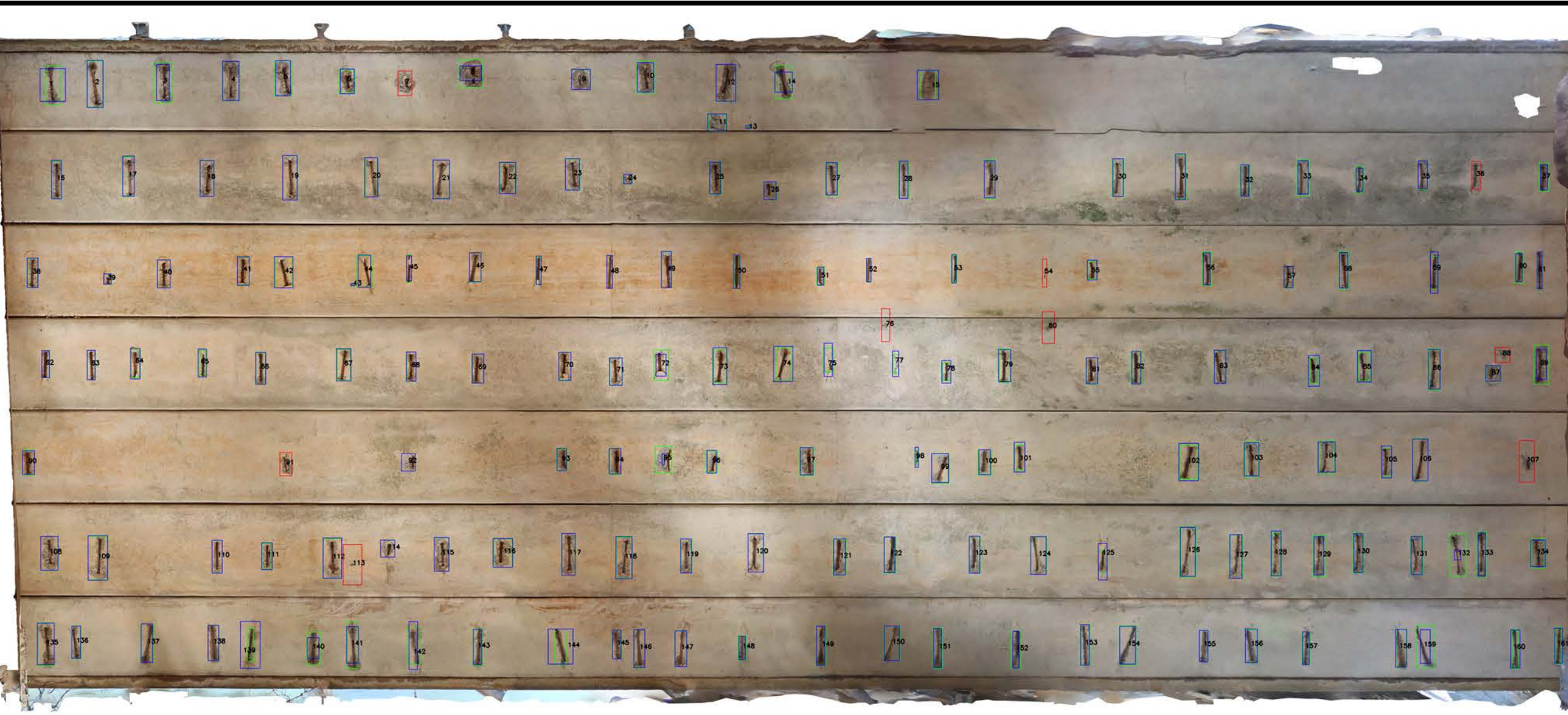
2021



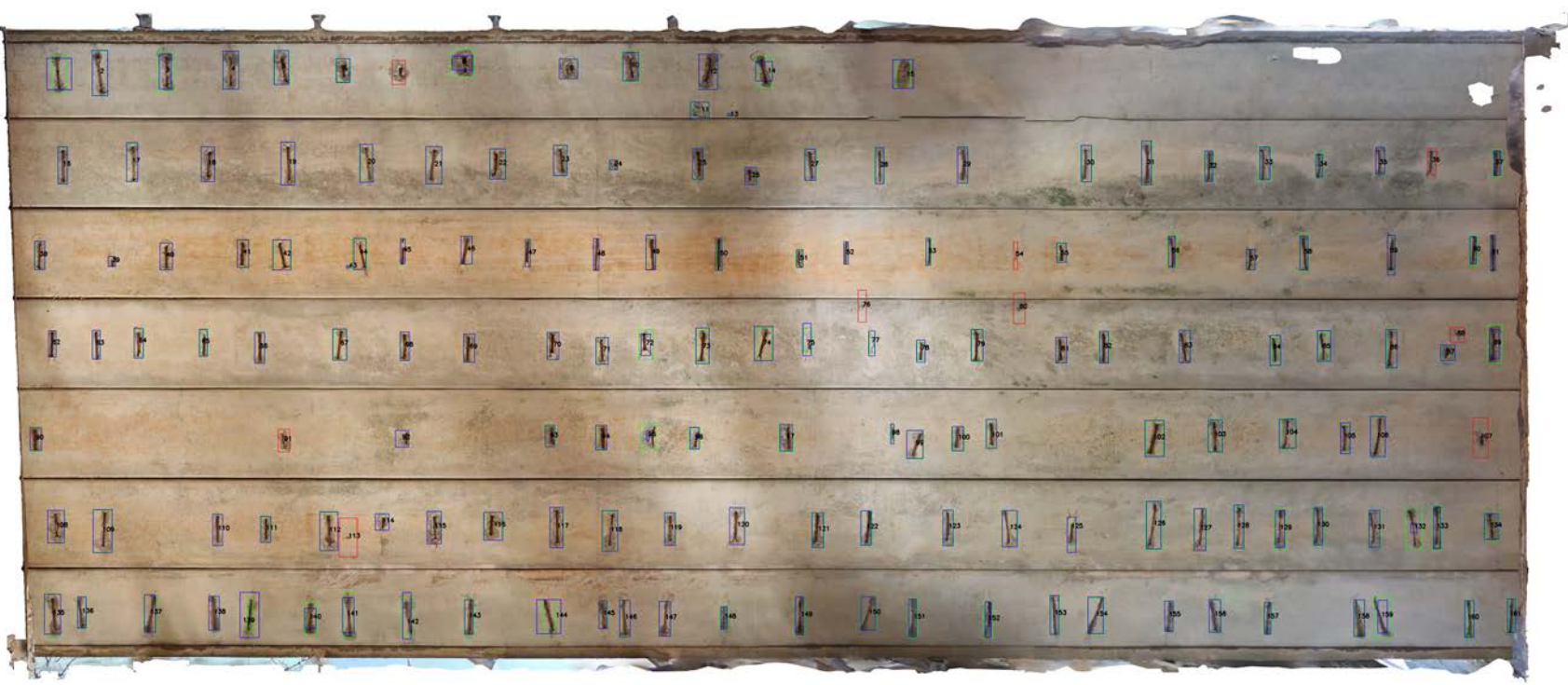
2022



Change-In-Time Analysis



Change-In-Time Analysis

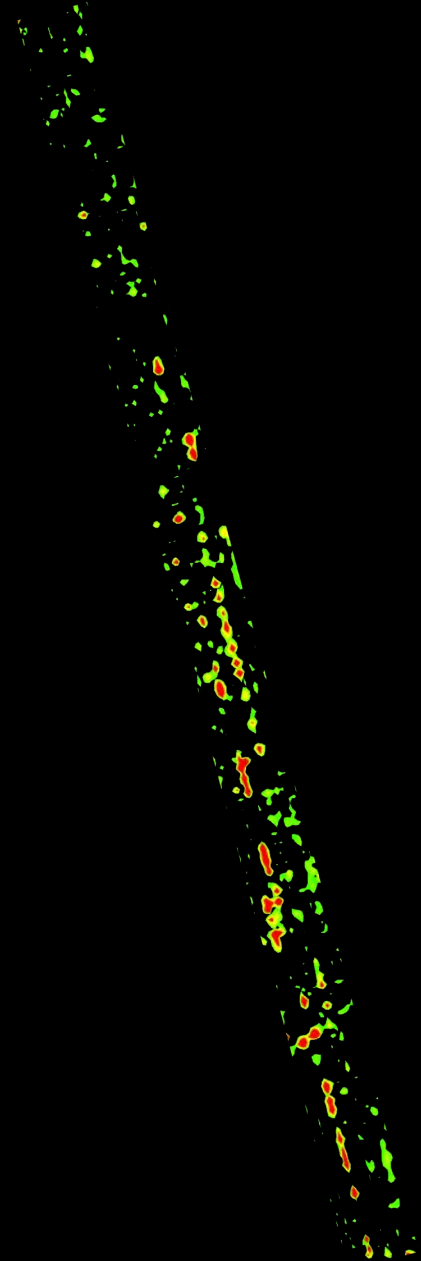
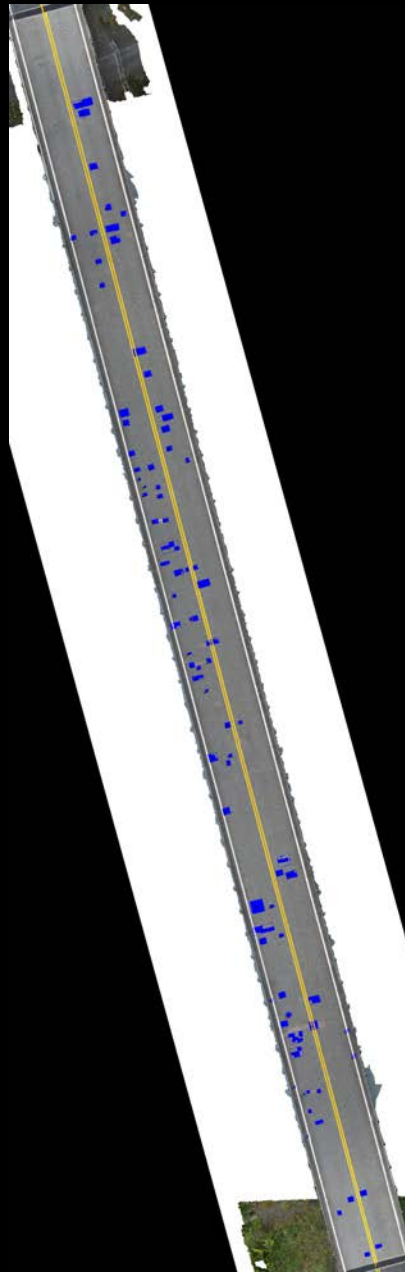
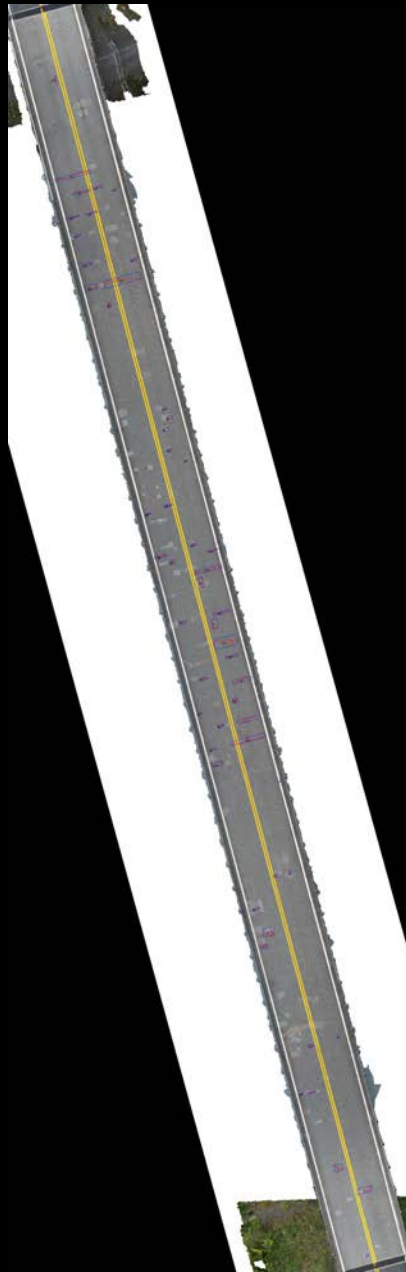
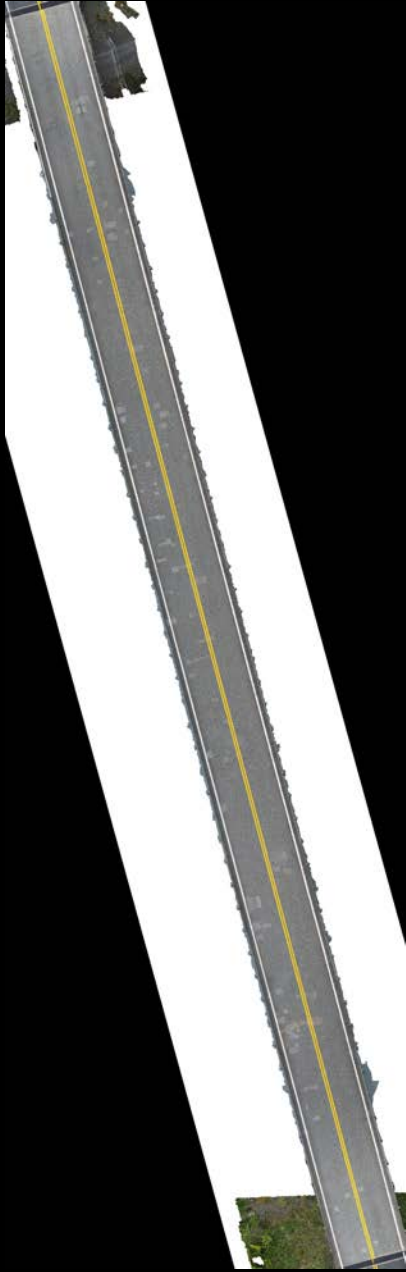


Damage Number	Increase in Size (sq-in)	Increase in Size (sq-mm)	New Damage
1	1.72515	1113	FALSE
2	0.39215	253	FALSE
3	4.4764	2888	FALSE
4	0.4371	282	FALSE
5	1.08655	701	FALSE
6	1.0292	664	FALSE
7	11.253	7260	TRUE
8	10.68415	6893	FALSE
9	0.434	280	FALSE
10	2.5885	1670	FALSE
11	0	0	FALSE
12	0.91295	589	FALSE
13	0	0	FALSE
14	5.1646	3332	FALSE
15	0	0	FALSE
16	0	0	FALSE
17	0	0	FALSE
18	0.27125	175	FALSE
19	0.55025	355	FALSE
20	0.40765	263	FALSE
21	0.23095	149	FALSE
22	0	0	FALSE
23	0	0	FALSE
24	0.24025	155	FALSE
25	0.7533	486	FALSE
26	0.36425	235	FALSE
27	1.73755	1121	FALSE
28	1.3733	886	FALSE
29	2.7094	1748	FALSE
30	1.87085	1207	FALSE
31	0.33945	219	FALSE
32	0.6386	412	FALSE
33	1.4508	936	FALSE
34	2.18085	1407	FALSE
35	1.0106	652	FALSE
36	4.40975	2845	TRUE
37	3.9866	2572	FALSE
38	0.0744	48	FALSE
39	0	0	FALSE
40	0.09145	59	FALSE

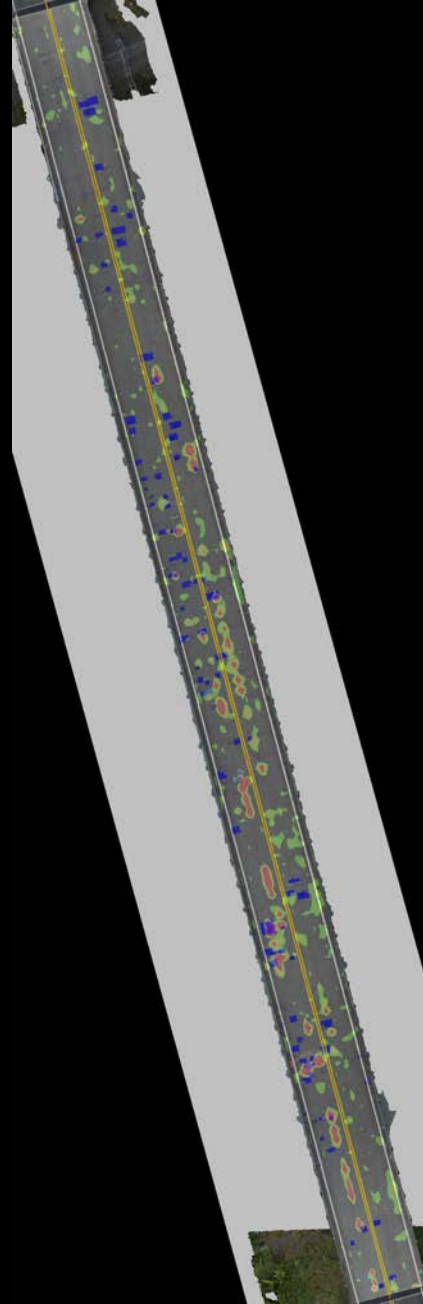
Data Fusion (Images + Acoustic Response)

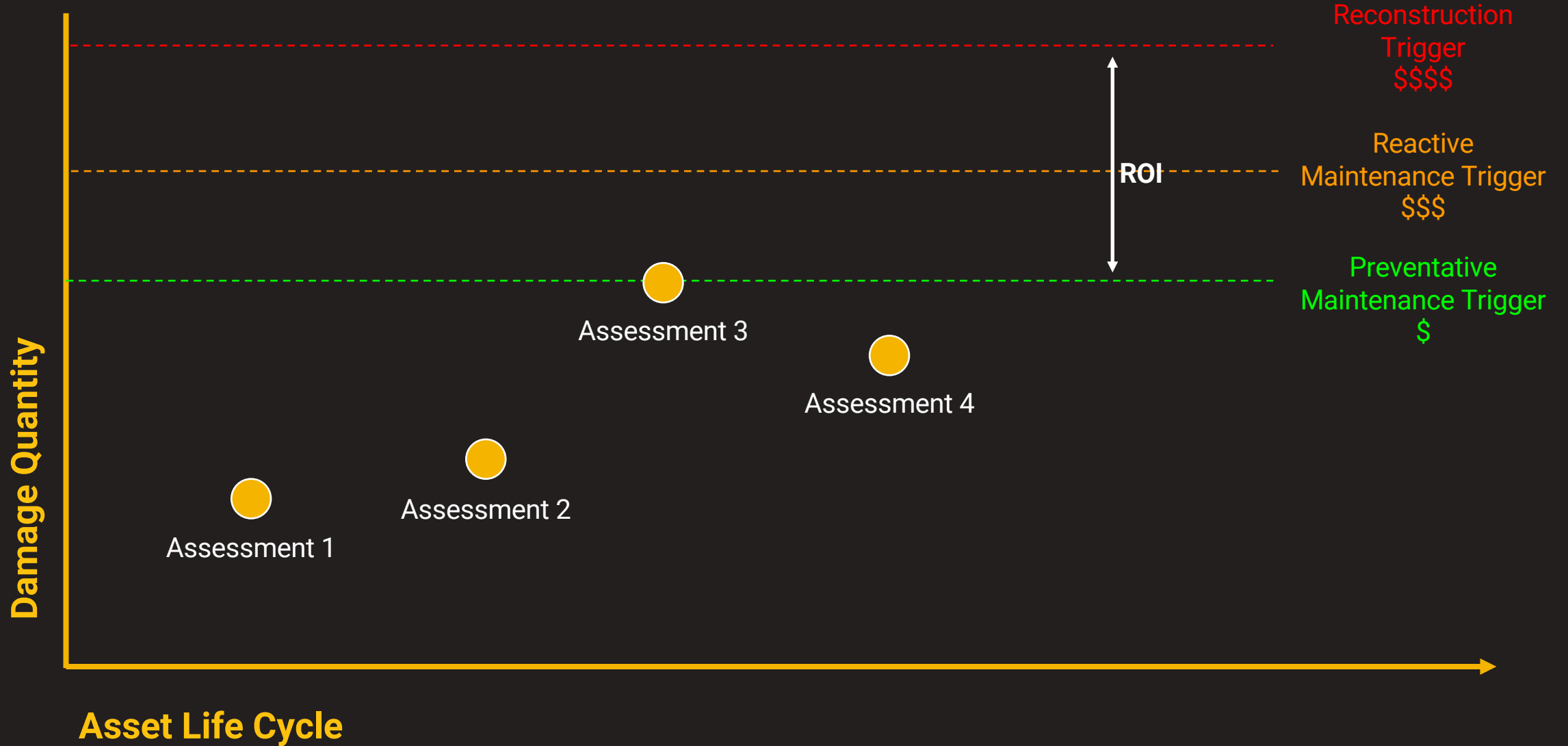


Data Fusion (Images + Acoustic Response)



Data Fusion (Images + Acoustic Response)





Future of **AI Analysis**



Thank You

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Engineering News-Record

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