



SOLUTIONS FOR THE BUILT WORLD

Fall 2015 Iowa DOT Vibration Seminar

Post-Construction Surveying: Techniques and Examples

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Iowa DOT Specifications

Iowa DOT Specifications

- Special Provisions for Pre-Blast Crack and Damage Survey
 - Visually inspect and recording all existing defects in the identified structures
- Special Provisions for Vibration Monitoring (to Protect Historic Structures)
 - Develop a plan which minimizes the potential for vibration damage due to construction and demolition activities
 - Monitor vibrations and crack behavior at the identified structures to protect them from vibration induced damage

Special Provisions

- Post-Construction Condition Survey
 - Survey to determine if any structural changes are the result of the construction activity.
 - Provide post-construction survey report
 - Compares pre- and post- condition
 - Provide daily log summaries for vibration and crack monitors

Interim and Post-Construction Condition Surveying

General Procedures

- Notify building owners/occupants
- Schedule inspection
- Perform Post-construction Survey
 - Assess and document condition
 - Visual inspection
 - Compare observed distress to preconstruction conditions
 - Re-measure (crack widths, offset, existing settlement)
 - Re-photograph distress
 - Overall photographs, video
- Develop survey report
- Solicit review by Contractor and IowaDOT

Interim Surveying

Interim Surveying

Interim Survey: Reevaluate conditions, compare to preconstruction assessment, report changes

Need for Interim Survey:

- Completion of specific project phases
- Post-event assessment
- Damage reported by Owner
- Need to reassess vibration limits

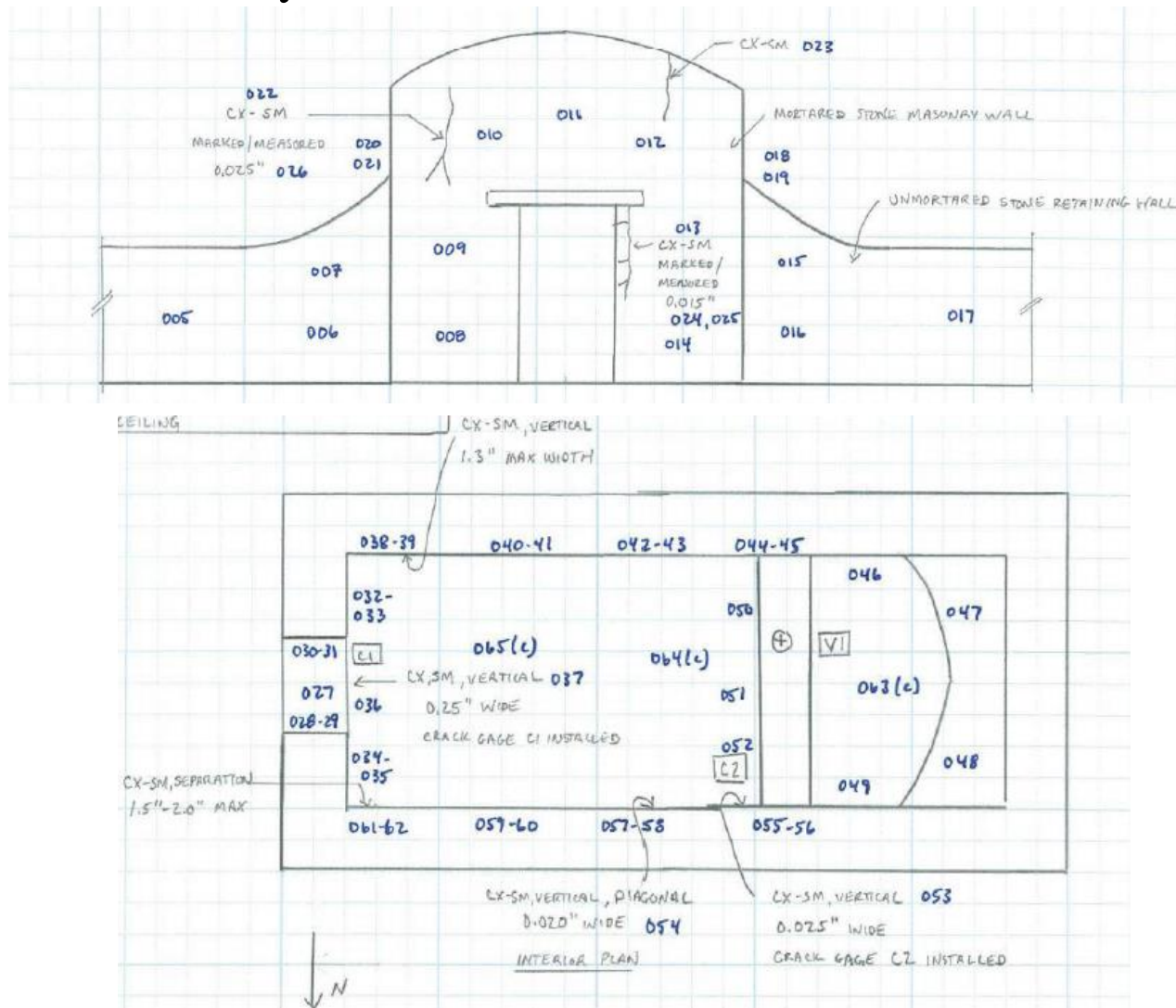
Interim Survey Example

Iowa Route 26 (IA-26) in Allamakee County, Iowa



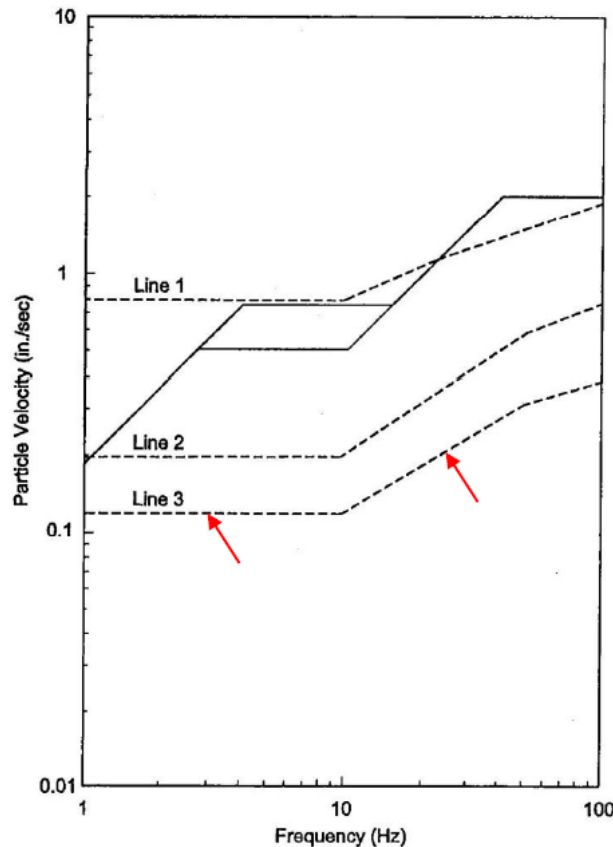
Interim Survey Example

Preconstruction Survey



Interim Survey Example

Originally Recommended Vibration Limit



(Adapted from DIN 4150)

Line	Type of Structure
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design
2	Dwelling and buildings of similar design and/or use
3	Structures that, because of their particular sensitivity to vibration, do not correspond to those listed in lines 1 and 2, and are of great intrinsic value (e.g., buildings that are under a preservation order)

Vibration Guidelines—USBM RI 8507 (Solid Line) Compared to DIN 4150 (Dashed Line)

Interim Survey Example

Blasting and Excavation



Interim Survey Example

Vibration Data – Blast Vibration Event



Triggered Vibration Event

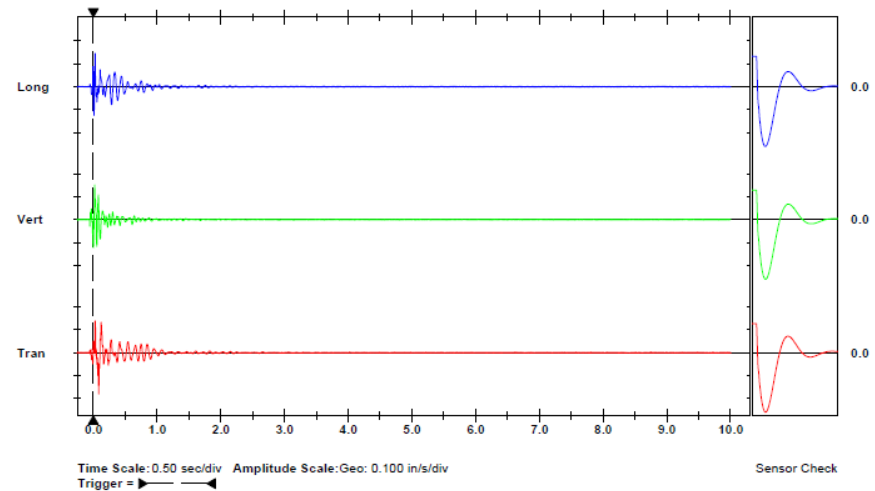
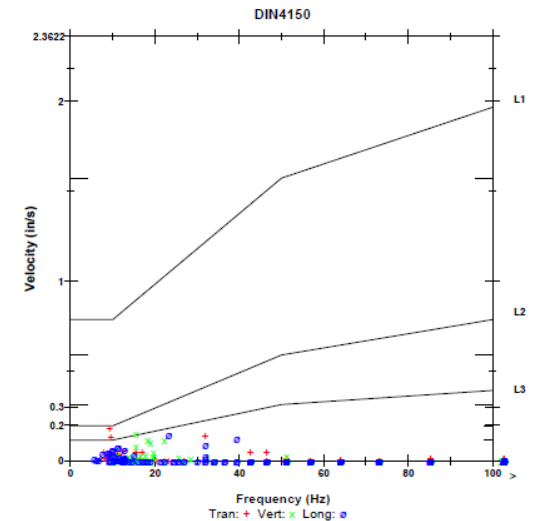
Date/Time Vert at 08:04:49 September 22, 2015
Trigger Source Geo: 0.120 in/s
Range Geo: 1.250 in/s
Record Time 10.0 sec at 1024 sps

Serial Number BE11950 V 10.72-8.17 MiniMate Plus
Battery Level 6.8 Volts
Unit Calibration June 8, 2015 by InstanTel
File Name M950G189.410W

Notes
Location: IA-26 Monitoring - 681 N Front St.
WJE Project: 2015.2484
Property: 681 N Front St. Lansing IA
Location: West Wall with Root Cellar

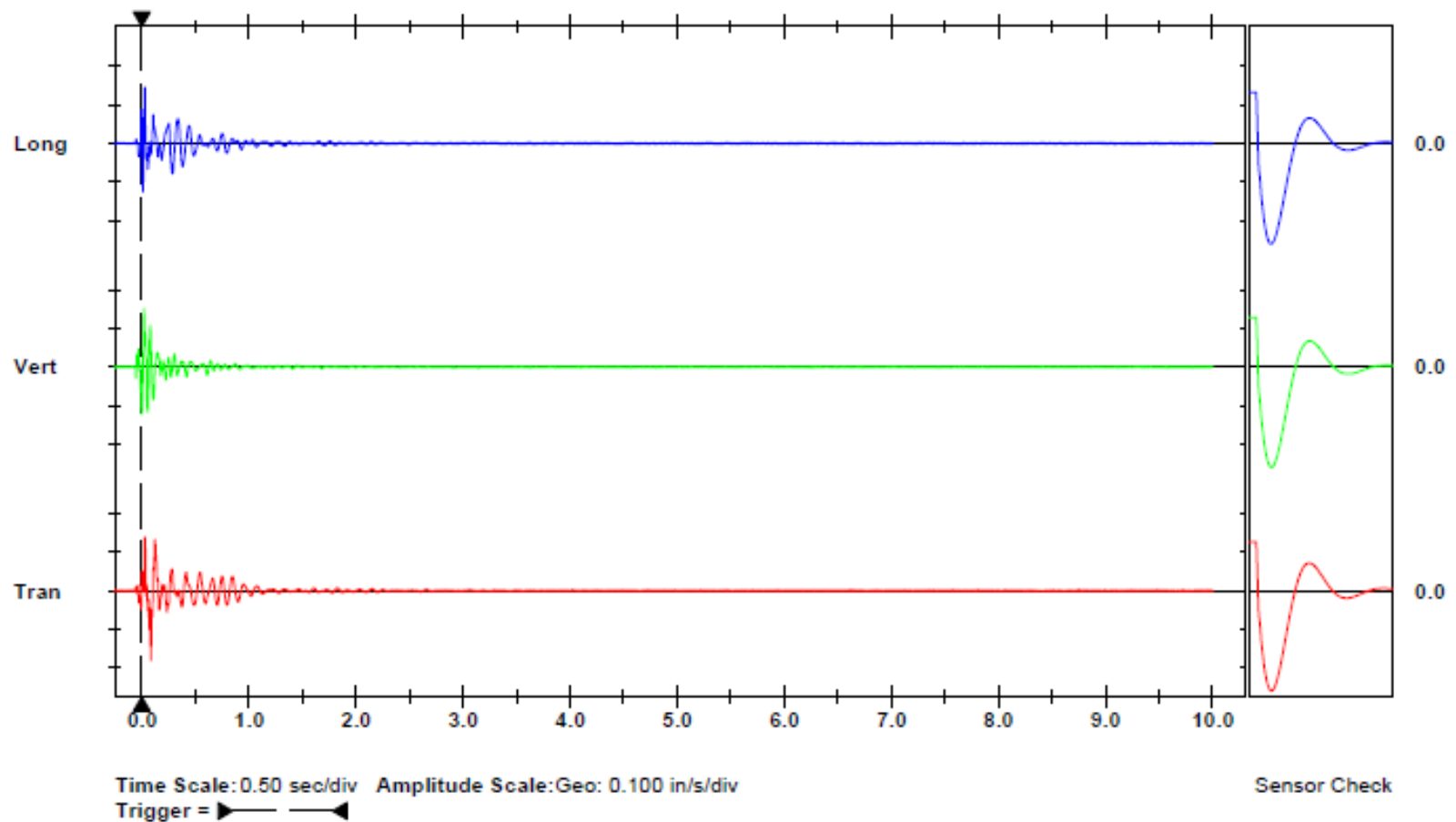
	Tran	Vert	Long	
PPV	0.180	0.151	0.146	in/s
ZC Freq	9.3	16	23	Hz
Time (Rel. to Trig)	0.083	0.021	0.027	sec
Peak Acceleration	0.086	0.063	0.085	g
Peak Displacement	0.002	0.001	0.001	in
Sensor Check	Passed	Passed	Passed	
Frequency	7.8	7.7	7.7	Hz
Overswing Ratio	3.7	3.9	3.9	

Peak Vector Sum 0.218 in/s at 0.027 sec



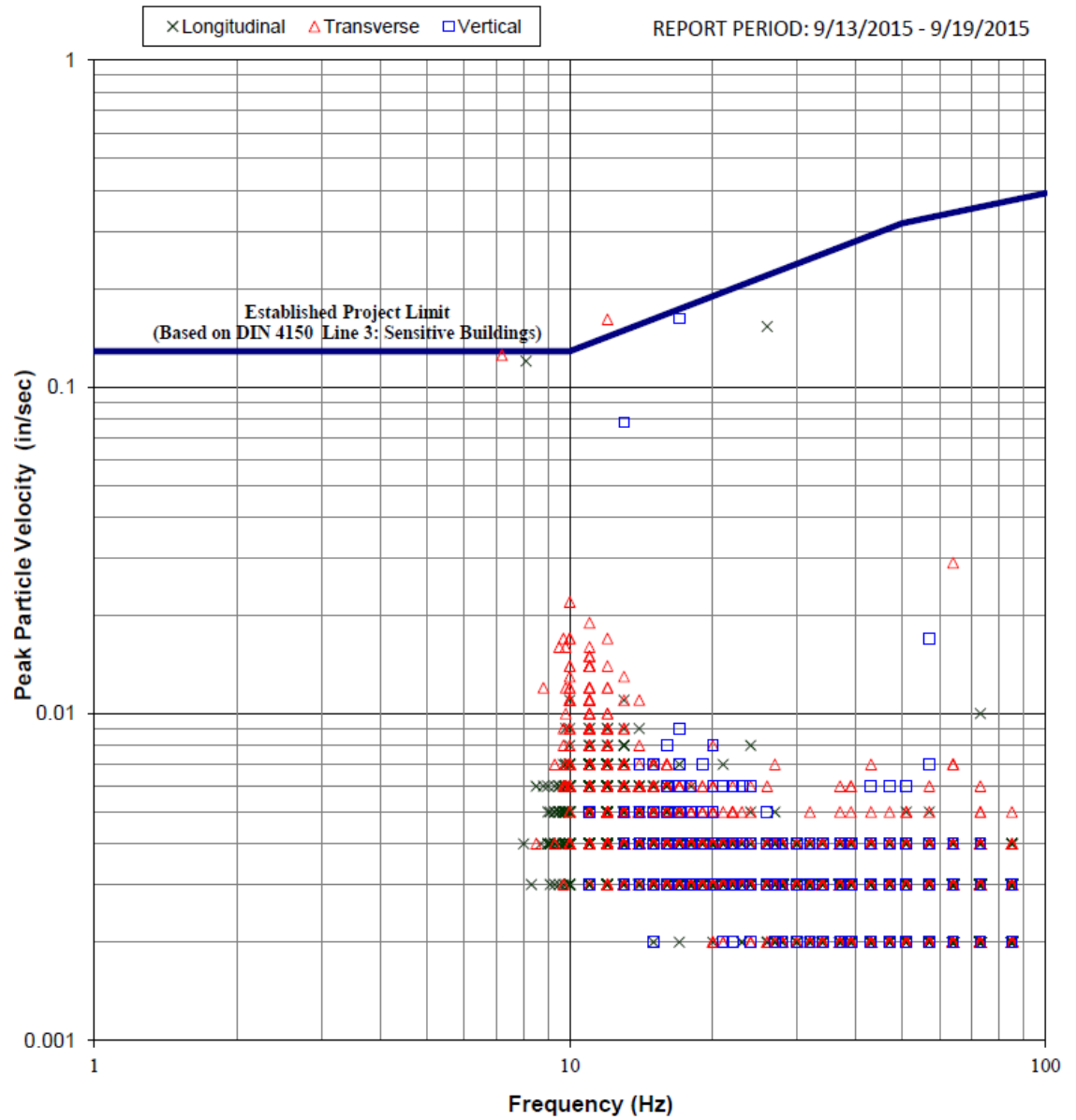
Interim Survey Example

Vibration Data – Blast Vibration Event



Interim Survey Example

Vibration Data



Interim Survey Example

Observed Changes



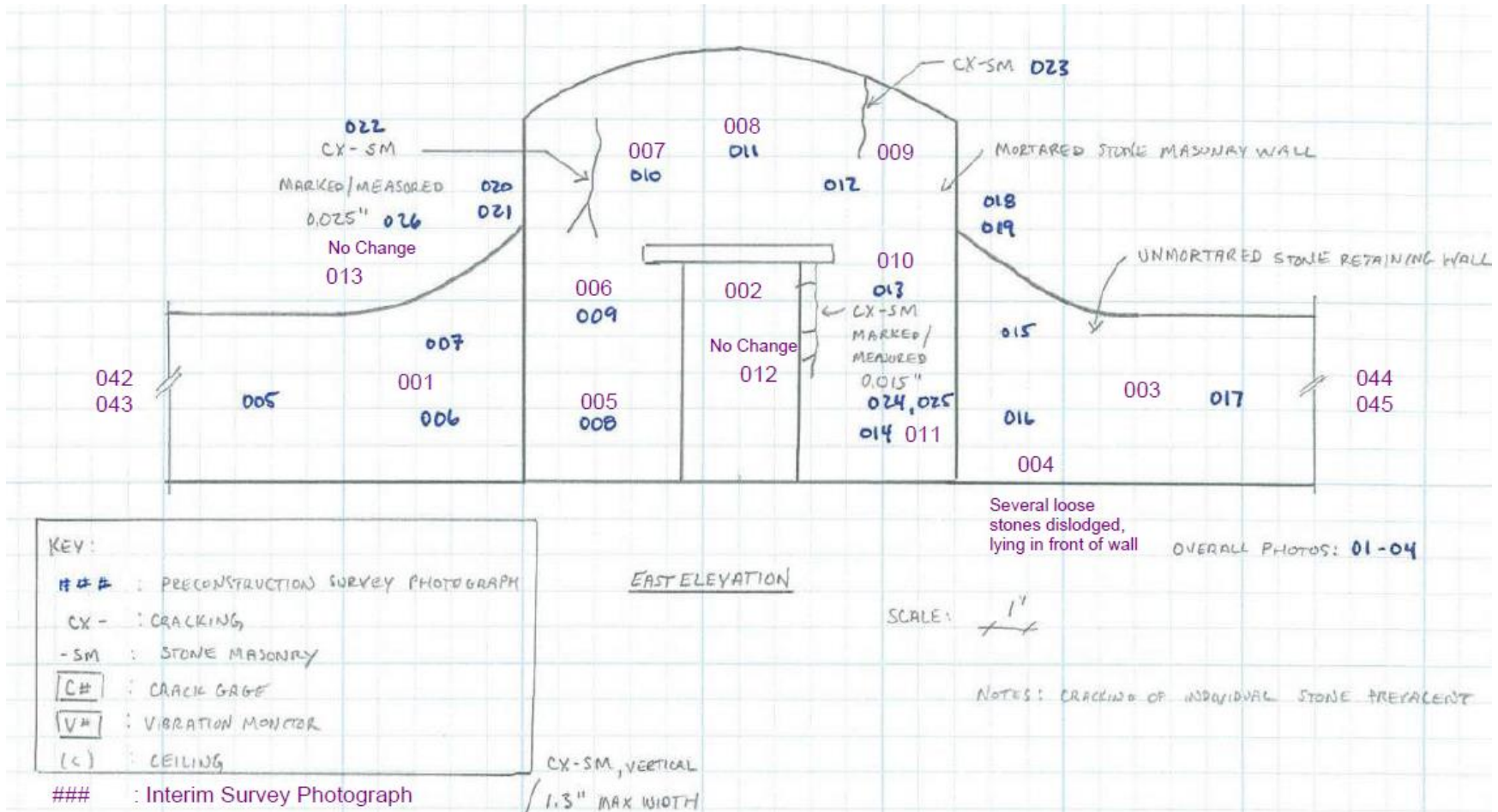
Interim Survey Example

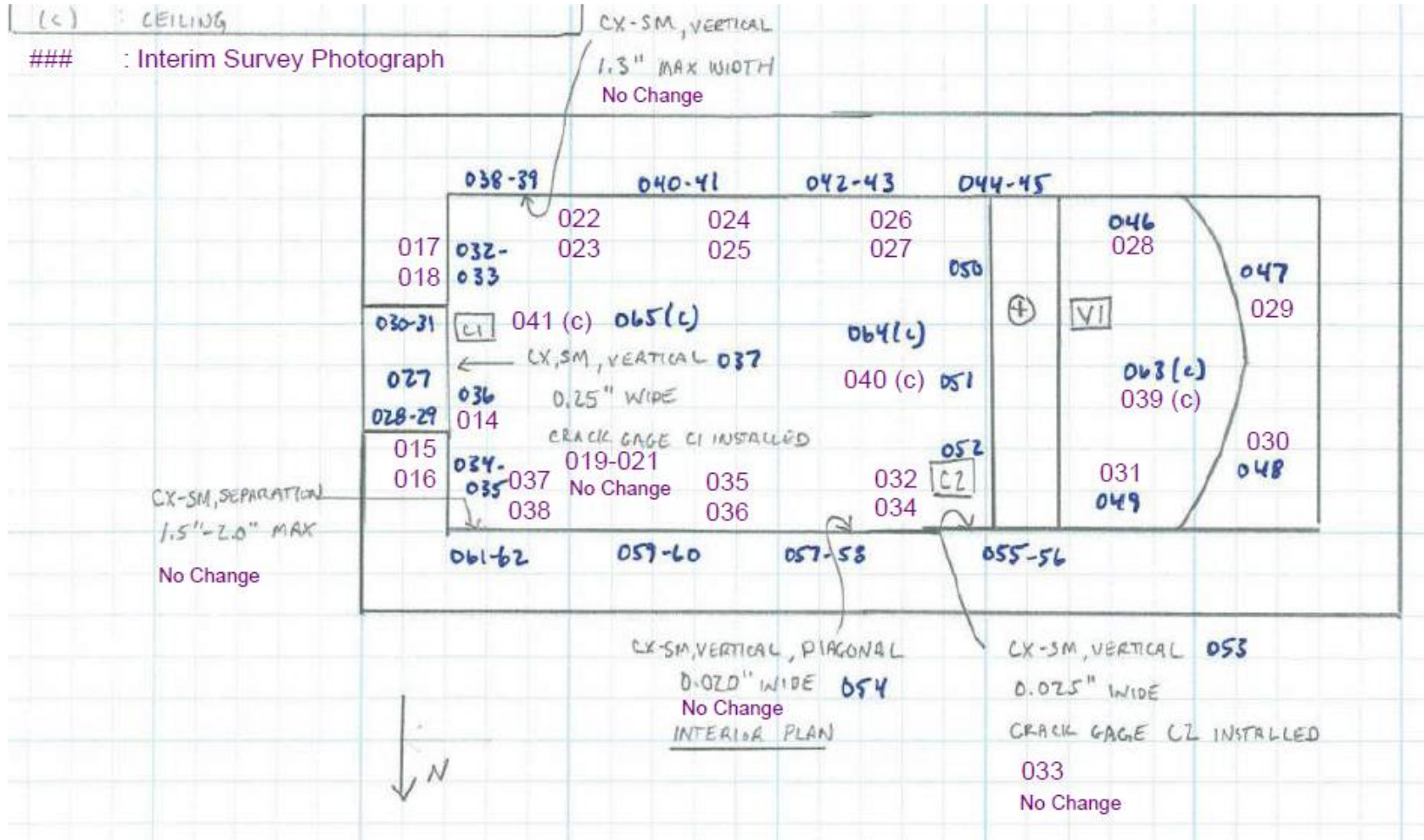
Crack Measurement



Interim Survey Example

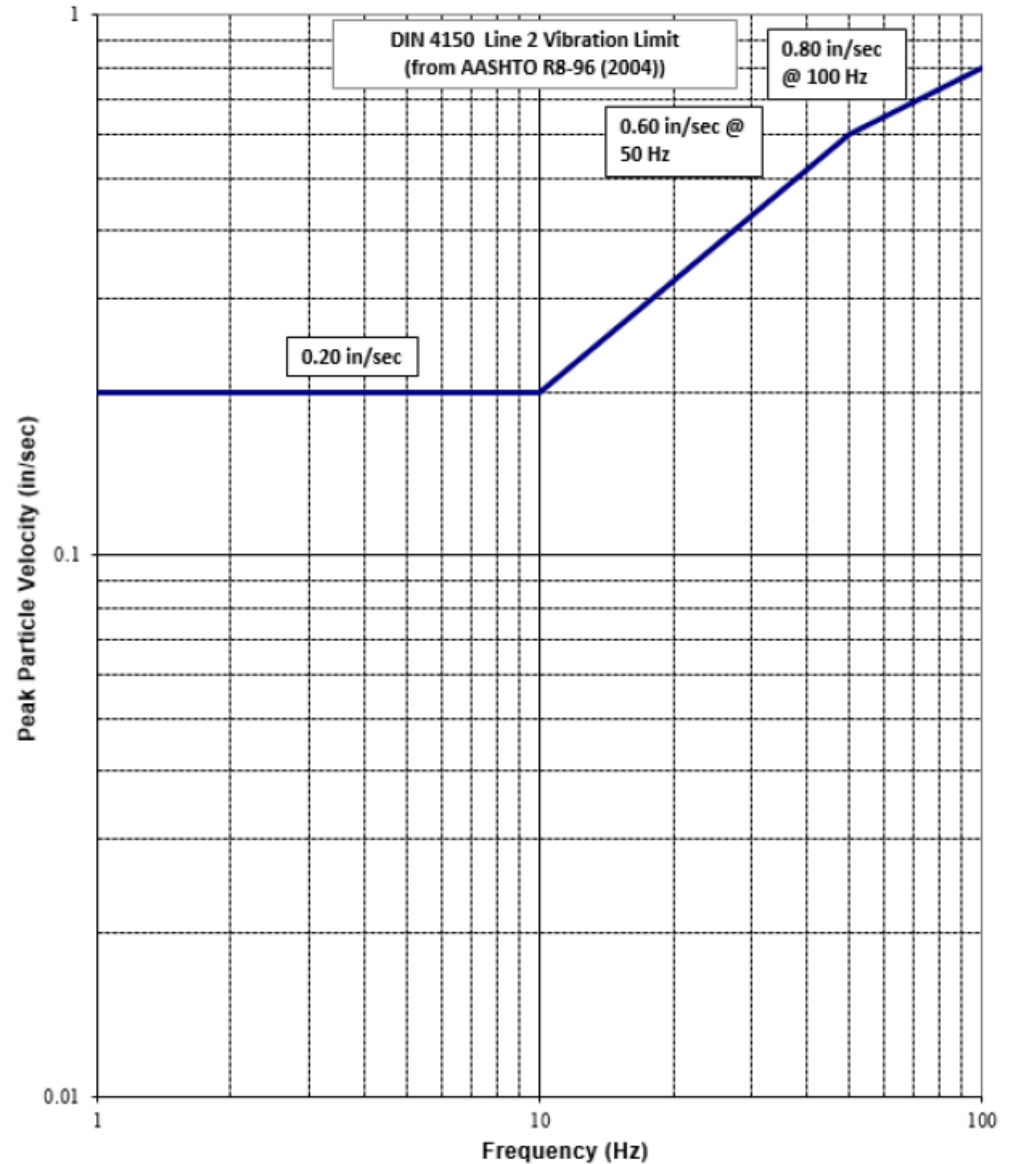
Interim Survey Documentation





Interim Survey Example

Modified Vibration Limit



Post-Construction Surveying

Condition Documentation

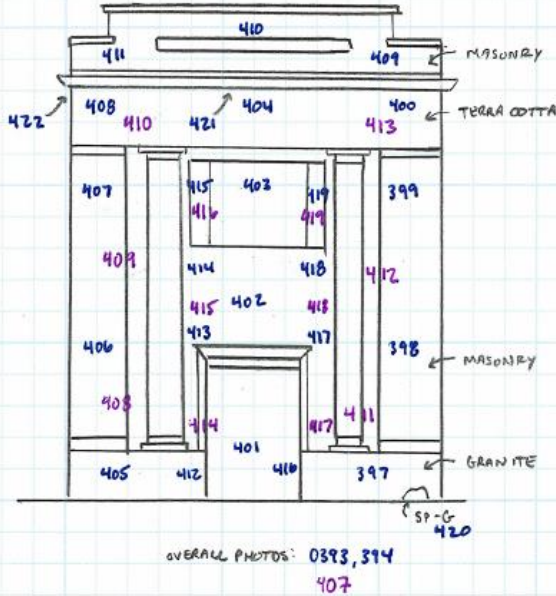
US-59 Reconstruction - Cherokee County, Iowa



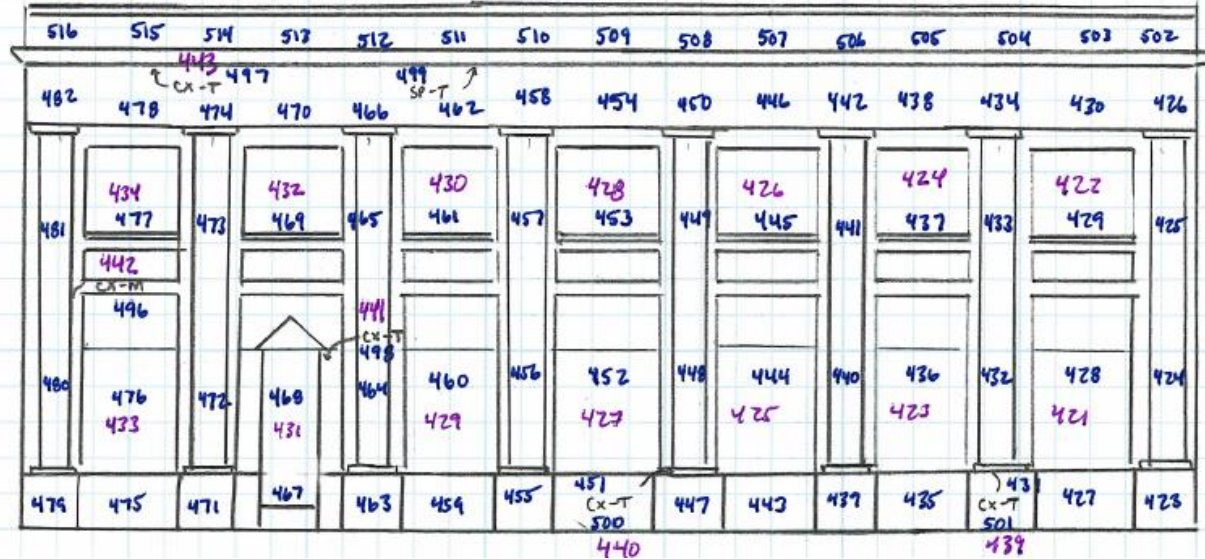
Condition Documentation

US-59 Reconstruction - Cherokee County, Iowa

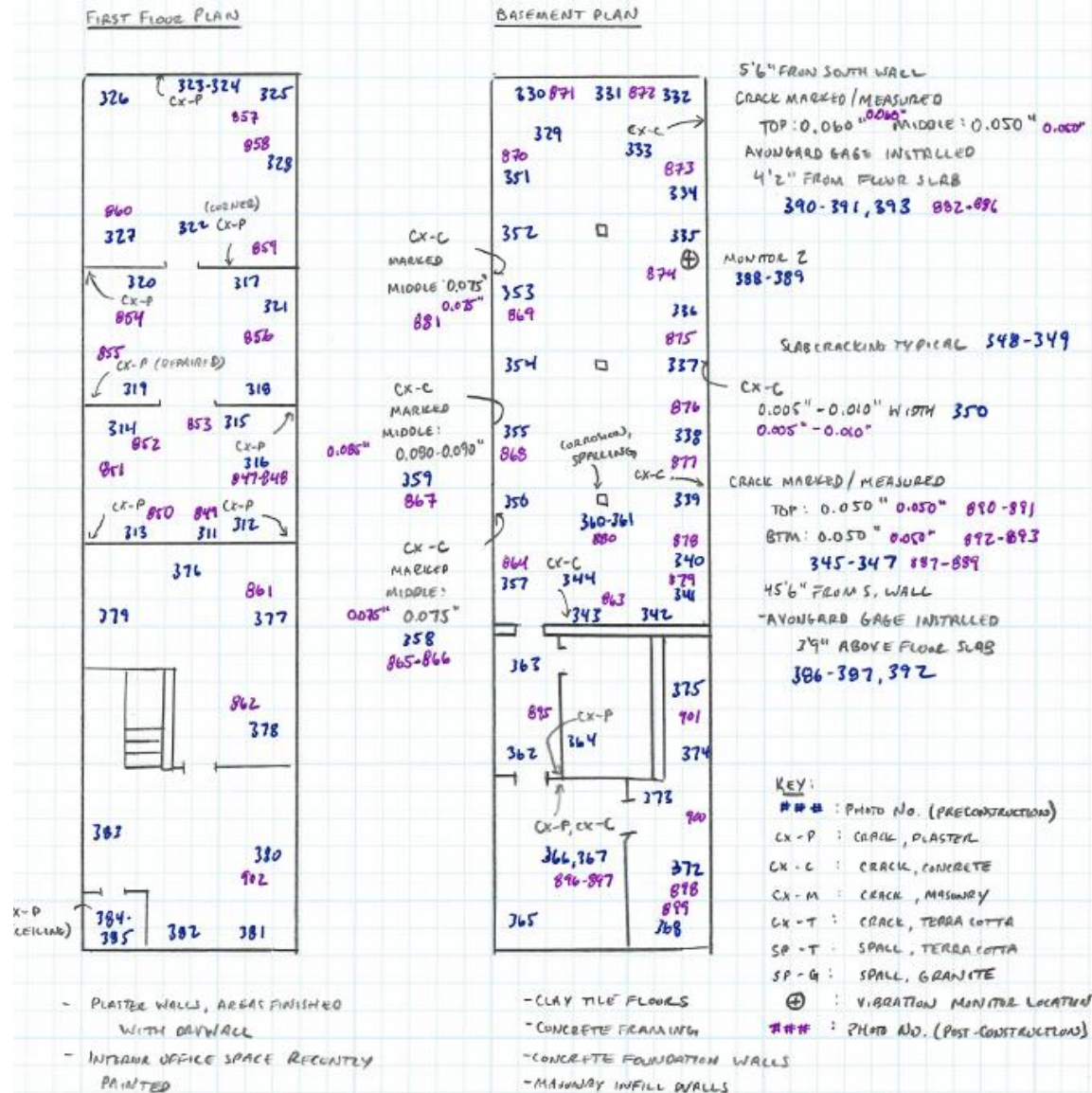
SOUTH ELEVATION



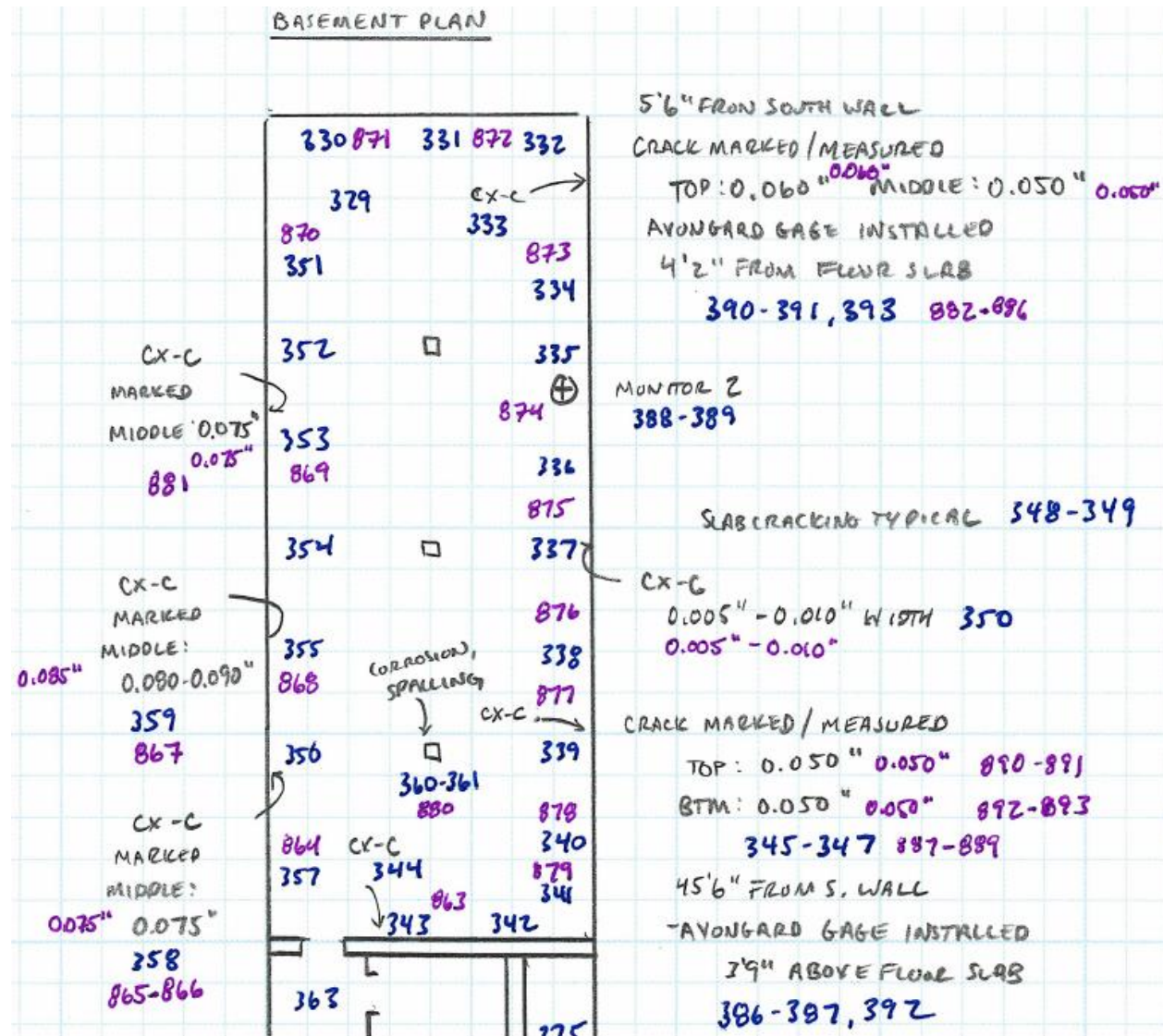
WEST ELEVATION



Condition Documentation



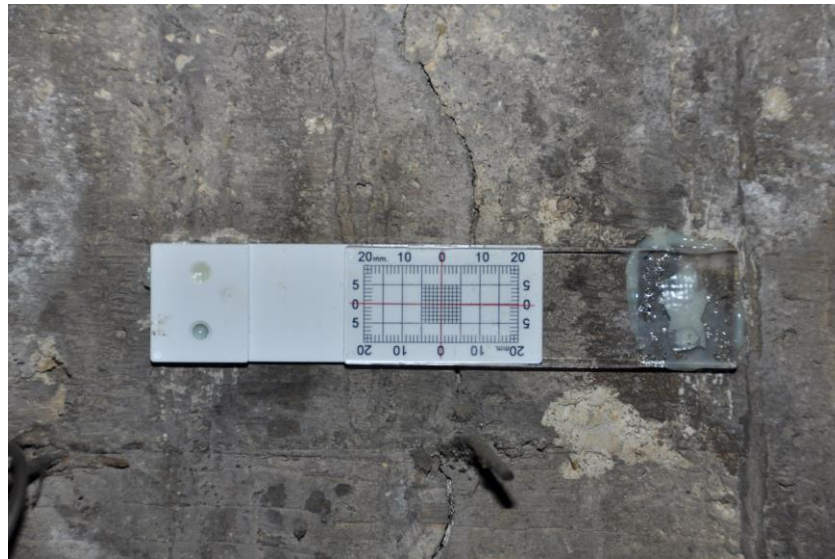
Condition Documentation



Condition Documentation



Condition Documentation



Questions?
