

# Rapid Visual Screening of Buildings for Potential Seismic Hazards

## FEMA P-154 Data Collection Form

Level 1 VERY HIGH Seismicity



AERIAL VIEW (GOOGLE EARTH)

Address: 120 Science Lane  
Arcata, CA Zip: 95521  
 Other Identifiers: SFDB # 003A  
 Building Name: Science A - Addition  
 Use: Classroom, Faculty Offices, Labs  
 Latitude: 40.87534 Longitude: -124.07710  
 Ss: 2.93 S<sub>r</sub>: 1.82  
 Screener(s): Tim Josephs, Maryann Phipps Date/Time: 09/10/2021

No. Stories: Above Grade: 3 Below Grade: 1 Year Built: 1960 ☐ EST  
 Total Floor Area (sq. ft.): 37,700 EST Code Year: 1958 assumed  
 Additions: ☐ None ☐ Yes, Year(s) Built: \_\_\_\_\_

Occupancy: Assembly ☐ Commercial ☐ Emer. Services ☐ Historic ☐ Shelter  
 Industrial ☒ Office ☒ School ☐ Government  
 Utility ☐ Warehouse Residential, # Units: \_\_\_\_\_

Soil Type: ☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☒ DNK  
 Hard Avg Dense Stiff Soft Poor  
 Rock Rock Soil Soil Soil Soil  
 If DNK, assume Type D.

Geologic Hazards: Liquefaction: Yes ☒ No ☒ DNK Landslide: Yes ☒ No ☒ DNK Surf. Rupt.: Yes ☒ No ☒ DNK

Adjacency: ☐ Pounding ☐ Falling Hazards from Taller Adjacent Building

Irregularities: ☒ Vertical (type/severity) Sloping site (moderate), Out-of-plane setback (severe)  
☐ Plan (type)

Exterior Falling Hazards: ☐ Unbraced Chimneys ☐ Heavy Cladding or Heavy Veneer  
☐ Parapets ☐ Appendages  
☐ Other: \_\_\_\_\_

### COMMENTS:

The lateral system consists of concrete slabs spanning to concrete shear walls. The site slopes one story level in the transverse direction. At the subbasement level, there is an out-of-plane setback as one corridor shear wall above does not have shear wall below.

There is substantial amount of concrete shear wall along the double-loaded corridor and at the exterior transverse walls, and ample diaphragm to transfer load to them. The columns in the exterior column-spandrel frames are vulnerable to damage, however, because of the limited movement expected, the gravity load carrying capacity of the columns is expected to be maintained.

☒ Additional sketches or comments on separate page **Recommendation: No List**

### BASIC SCORE, MODIFIERS, AND FINAL LEVEL 1 SCORE, S<sub>L1</sub>

FEMA BUILDING TYPE	Do Not Know	W1	W1A	W2	S1 (MRF)	S2 (BR)	S3 (LM)	S4 (RC SW)	S5 (URM INF)	C1 (MRF)	C2 (SW)	C3 (URM INF)	PC1 (TU)	PC2	RM1 (FD)	RM2 (RD)	URM	MH
Basic Score		2.1	1.9	1.8	1.5	1.4	1.6	1.4	1.2	1.0	1.2	0.9	1.1	1.0	1.1	1.1	0.9	1.1
Severe Vertical Irregularity, V <sub>L1</sub>		-0.9	-0.9	-0.9	-0.8	-0.7	-0.8	-0.7	-0.7	-0.7	-0.8	-0.6	-0.7	-0.7	-0.7	-0.7	-0.6	NA
Moderate Vertical Irregularity, V <sub>L1</sub>		-0.6	-0.5	-0.5	-0.4	-0.4	-0.5	-0.4	-0.3	-0.4	-0.4	-0.3	-0.4	-0.4	-0.4	-0.4	-0.3	NA
Plan Irregularity, P <sub>L1</sub>		-0.7	-0.7	-0.6	-0.5	-0.5	-0.6	-0.4	-0.4	-0.4	-0.5	-0.3	-0.5	-0.4	-0.4	-0.4	-0.3	NA
Pre-Code		-0.3	-0.3	-0.3	-0.3	-0.2	-0.3	-0.2	-0.1	-0.1	-0.2	0.0	-0.2	-0.1	-0.2	-0.2	0.0	0.0
Post-Benchmark		1.9	1.9	2.0	1.0	1.1	1.1	1.5	NA	1.4	1.7	NA	1.5	1.7	1.6	1.6	NA	0.5
Soil Type A or B		0.5	0.5	0.4	0.3	0.3	0.4	0.3	0.2	0.2	0.3	0.1	0.3	0.2	0.3	0.3	0.1	0.1
Soil Type E (1-3 stories)		0.0	-0.2	-0.4	-0.3	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	0.0	-0.2	-0.1	-0.2	-0.2	0.0	-0.1
Soil Type E (> 3 stories)		-0.4	-0.4	-0.4	-0.3	-0.3	NA	-0.3	-0.1	-0.1	-0.3	-0.1	NA	-0.1	-0.2	-0.2	0.0	NA
Minimum Score, S <sub>MIN</sub>		0.7	0.7	0.7	0.5	0.5	0.5	0.5	0.5	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.2	1.0

FINAL LEVEL 1 SCORE, S<sub>L1</sub> ≥ S<sub>MIN</sub>: **0.4**

### EXTENT OF REVIEW

Exterior: ☐ Partial ☒ All Sides ☒ Aerial  
 Interior: ☐ None ☐ Visible ☒ Entered  
 Drawings Reviewed: ☒ Yes ☐ No  
 Soil Type Source: \_\_\_\_\_  
 Geologic Hazards Source: \_\_\_\_\_  
 Contact Person: \_\_\_\_\_

### LEVEL 2 SCREENING PERFORMED?

☒ Yes, Final Level 2 Score, S<sub>L2</sub> 0.5 ☐ No  
 Nonstructural hazards? ☐ Yes ☒ No

### OTHER HAZARDS

Are There Hazards That Trigger A Detailed Structural Evaluation?  
☐ Pounding potential (unless S<sub>L2</sub> > cut-off, if known)  
☐ Falling hazards from taller adjacent building  
☐ Geologic hazards or Soil Type F  
☐ Significant damage/deterioration to the structural system

### ACTION REQUIRED

#### Detailed Structural Evaluation Required?

☐ Yes, unknown FEMA building type or other building  
☐ Yes, score less than cut-off  
☐ Yes, other hazards present  
☒ No

#### Detailed Nonstructural Evaluation Recommended? (check one)

☐ Yes, nonstructural hazards identified that should be evaluated  
☐ No, nonstructural hazards exist that may require mitigation, but a detailed evaluation is not necessary  
☒ No, no nonstructural hazards identified ☐ DNK

Where information cannot be verified, screener shall note the following: EST = Estimated or unreliable data OR DNK = Do Not Know

Legend: MRF = Moment-resisting frame RC = Reinforced concrete URM INF = Unreinforced masonry infill MH = Manufactured Housing FD = Flexible diaphragm  
 BR = Braced frame SW = Shear wall TU = Tilt up LM = Light metal RD = Rigid diaphragm

# Rapid Visual Screening of Buildings for Potential Seismic Hazards

FEMA P-154 Data Collection Form

Optional Level 2 data collection to be performed by a civil or structural engineering professional, architect, or graduate student with background in seismic evaluation or design of buildings.

Level 2 (Optional) VERY HIGH Seismicity

PW25-1  
Exhibit O.2  
Page 2 of 4

Bldg Name: <u>Science A - Original Building</u>	Final Level 1 Score: <u><math>S_{L1} = 0.4</math></u> (do not consider $S_{MIN}$ )
Screener: <u>Tim Josephs, Maryann Phipps</u>	Level 1 Irregularity Modifiers: <u>Vertical Irregularity, <math>V_{L1} = -0.8</math></u> <u>Plan Irregularity, <math>P_{L1} = 0.0</math></u>
Date/Time: <u>09/10/2021</u>	ADJUSTED BASELINE SCORE: <u><math>S' = (S_{L1} - V_{L1} - P_{L1}) = 1.2</math></u>

STRUCTURAL MODIFIERS TO ADD TO ADJUSTED BASELINE SCORE					
Topic	Statement (If statement is true, circle the "Yes" modifier; otherwise cross out the modifier.)		Yes	Subtotals	
Vertical Irregularity, $V_{L2}$	Sloping Site	W1 building: There is at least a full story grade change from one side of the building to the other.	-0.9	$V_{L2} = \underline{-0.9}$ (Cap at -0.9)	
		Non-W1 building: There is at least a full story grade change from one side of the building to the other.	-0.2		
	Weak and/or Soft Story (circle one maximum)	W1 building cripple wall: An unbraced cripple wall is visible in the crawl space.	-0.5		
		W1 house over garage: Underneath an occupied story, there is a garage opening without a steel moment frame, and there is less than 8' of wall on the same line (for multiple occupied floors above, use 16' of wall minimum).	-0.9		
		W1A building open front: There are openings at the ground story (such as for parking) over at least 50% of the length of the building.	-0.9		
		Non-W1 building: Length of lateral system at any story is less than 50% of that at story above or height of any story is more than 2.0 times the height of the story above.	-0.7		
		Non-W1 building: Length of lateral system at any story is between 50% and 75% of that at story above or height of any story is between 1.3 and 2.0 times the height of the story above.	-0.4		
		Setback	Vertical elements of the lateral system at an upper story are outboard of those at the story below causing the diaphragm to cantilever at the offset.		-0.7
	Vertical elements of the lateral system at upper stories are inboard of those at lower stories.		-0.4		
	There is an in-plane offset of the lateral elements that is greater than the length of the elements.		-0.2		
	Short Column/ Pier	C1,C2,C3,PC1,PC2,RM1,RM2: At least 20% of columns (or piers) along a column line in the lateral system have height/depth ratios less than 50% of the nominal height/depth ratio at that level.	-0.4		
		C1,C2,C3,PC1,PC2,RM1,RM2: The column depth (or pier width) is less than one half of the depth of the spandrel, or there are infill walls or adjacent floors that shorten the column.	-0.4		
	Split Level	There is a split level at one of the floor levels or at the roof.	-0.4		
	Other Irregularity	There is another observable severe vertical irregularity that obviously affects the building's seismic performance.	-0.7		
There is another observable moderate vertical irregularity that may affect the building's seismic performance.		-0.4			
Plan Irregularity, $P_{L2}$	Torsional irregularity: Lateral system does not appear relatively well distributed in plan in either or both directions. (Do not include the W1A open front irregularity listed above.)		-0.5	$P_{L2} = \underline{0.0}$ (Cap at -0.7)	
	Non-parallel system: There are one or more major vertical elements of the lateral system that are not orthogonal to each other.		-0.2		
	Reentrant corner: Both projections from an interior corner exceed 25% of the overall plan dimension in that direction.		-0.2		
	Diaphragm opening: There is an opening in the diaphragm with a width over 50% of the total diaphragm width at that level.		-0.2		
	C1, C2 building out-of-plane offset: The exterior beams do not align with the columns in plan.		-0.2		
	Other irregularity: There is another observable plan irregularity that obviously affects the building's seismic performance.		-0.5		
Redundancy	The building has at least two bays of lateral elements on each side of the building in each direction.		+0.2	$M = \underline{0.2}$	
Pounding	Building is separated from an adjacent structure by less than 1.5% of the height of the shorter of the building and adjacent structure and:	The floors do not align vertically within 2 feet.	(Cap total		-0.7
		One building is 2 or more stories taller than the other.	pounding		-0.7
		The building is at the end of the block.	modifiers at -0.9)		-0.4
S2 Building	"K" bracing geometry is visible.		-0.7		
C1 Building	Flat plate serves as the beam in the moment frame.		-0.3		
PC1/RM1 Bldg	There are roof-to-wall ties that are visible or known from drawings that do not rely on cross-grain bending. (Do not combine with post-benchmark or retrofit modifier.)		+0.2		
PC1/RM1 Bldg	The building has closely spaced, full height interior walls (rather than an interior space with few walls such as in a warehouse).		+0.2		
URM	Gable walls are present.		-0.3		
MH	There is a supplemental seismic bracing system provided between the carriage and the ground.		+0.5		
Retrofit	Comprehensive seismic retrofit is visible or known from drawings.		+1.2		
FINAL LEVEL 2 SCORE, $S_{L2} = (S' + V_{L2} + P_{L2} + M) \geq S_{MIN}$ : 0.5				(Transfer to Level 1 form)	

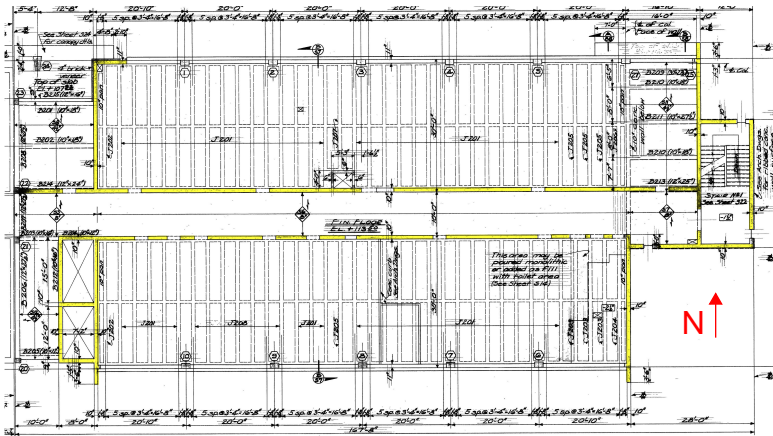
There is observable damage or deterioration or another condition that negatively affects the building's seismic performance: ☐ Yes ☐ No  
If yes, describe the condition in the comment box below and indicate on the Level 1 form that detailed evaluation is required independent of the building's score.

OBSERVABLE NONSTRUCTURAL HAZARDS				
Location	Statement (Check "Yes" or "No")	Yes	No	Comment
Exterior	There is an unbraced unreinforced masonry parapet or unbraced unreinforced masonry chimney.		X	
	There is heavy cladding or heavy veneer.		X	
	There is a heavy canopy over exit doors or pedestrian walkways that appears inadequately supported.		X	
	There is an unreinforced masonry appendage over exit doors or pedestrian walkways.		X	
	There is a sign posted on the building that indicates hazardous materials are present.		X	
	There is a taller adjacent building with an unanchored URM wall or unbraced URM parapet or chimney.		X	
	Other observed exterior nonstructural falling hazard:		X	
Interior	There are hollow clay tile or brick partitions at any stair or exit corridor.		X	
	Other observed interior nonstructural falling hazard:		X	
Estimated Nonstructural Seismic Performance (Check appropriate box and transfer to Level 1 form conclusions)				
<input type="checkbox"/> Potential nonstructural hazards with significant threat to occupant life safety →Detailed Nonstructural Evaluation recommended				
<input type="checkbox"/> Nonstructural hazards identified with significant threat to occupant life safety →But no Detailed Nonstructural Evaluation required				
<input type="checkbox"/> Low or no nonstructural hazard threat to occupant life safety →No Detailed Nonstructural Evaluation required				

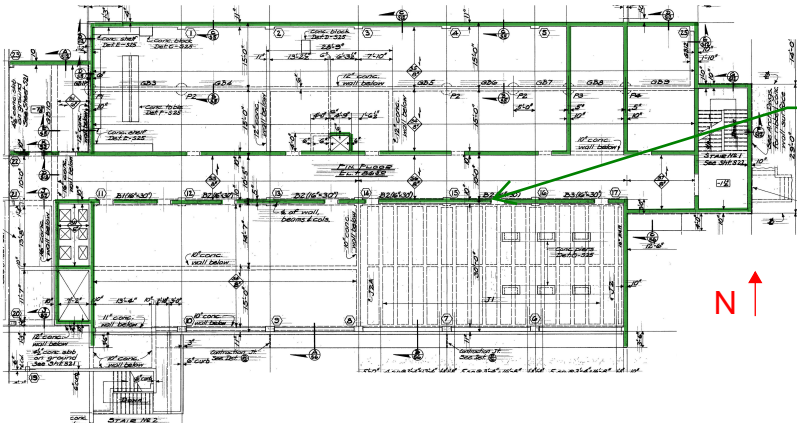
Comments:

## ADDITIONAL IMAGES

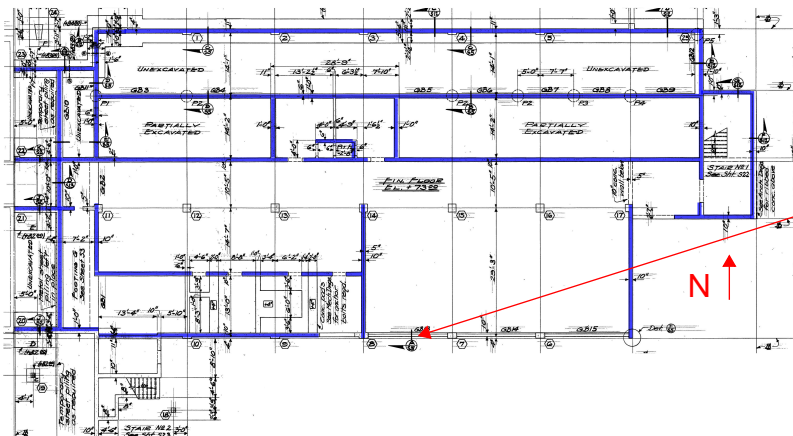
### Science A - Addition



2ND FLOOR PLAN, CONCRETE SHEAR WALLS HIGHLIGHTED  
(1ST FLOOR SIM)

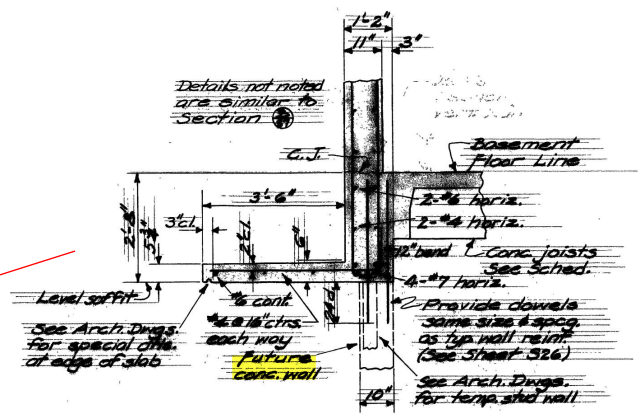


BASEMENT PLAN, CONCRETE SHEAR WALLS HIGHLIGHTED



SUB-BASEMENT PLAN, CONCRETE SHEAR WALLS HIGHLIGHTED

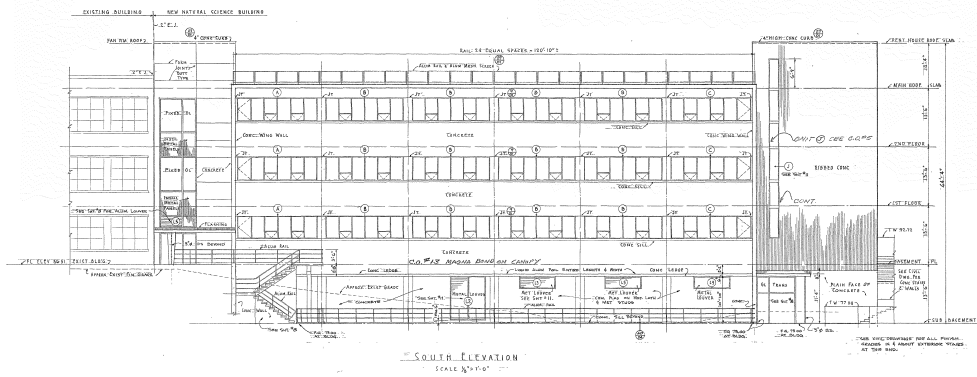
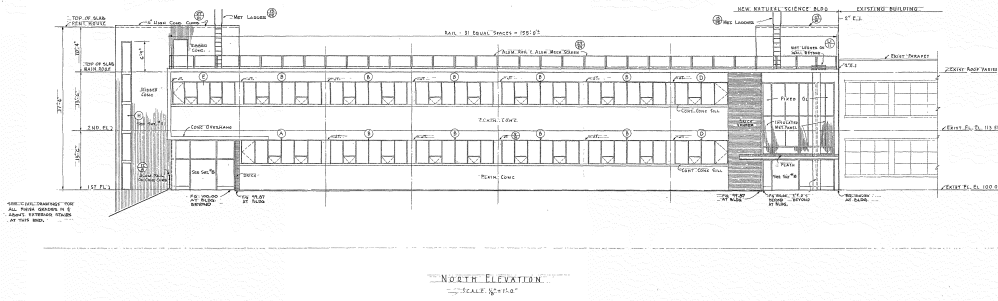
NOTE: THIS LINE OF WALL IS  
DISCONTINUOUS AT  
SUB-BASEMENT



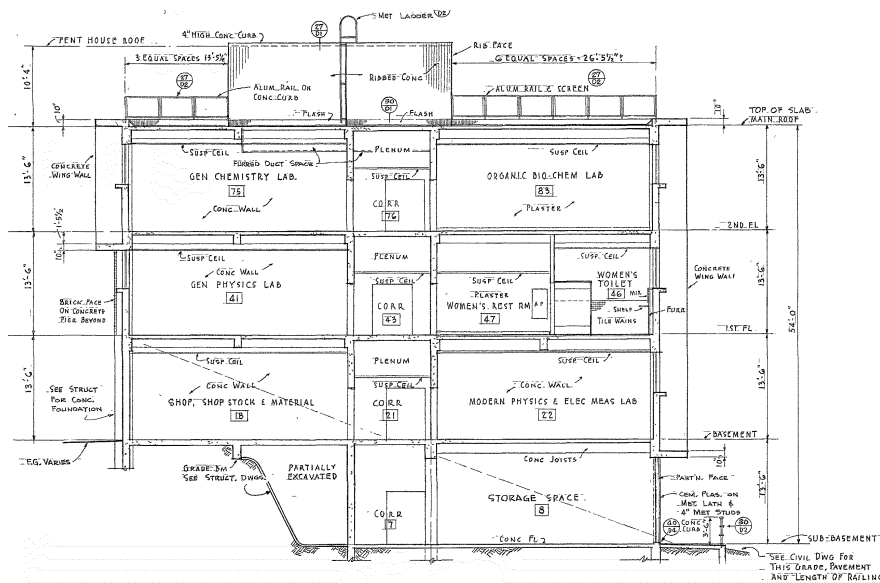
DETAIL SHOWING FUTURE WALL NOT  
BUILT AT SUB-BASEMENT LEVEL, TEMP  
STUD WALL STILL REMAINS

# ADDITIONAL IMAGES

## Science A - Addition



EXTERIOR ELEVATIONS



TRANSVERSE SECTION