

# TEST PROCEDURES

**Tentative, may change before and during testing.**

## ***3.1 Define test protocol***

LA22y from the FEMA/SAC Steel Project is used as the input ground motion. The magnitude of the input ground motion is increased for each test until reaching the capacity of the shaking table. In each test, the magnitude of the input ground motion is selected to produce new damage on a different structural component. Before and after an earthquake simulation test, white noise test with PGA equal to 0.05g is performed to identify the dynamic properties of the tested structure. Table 1 is the test protocol.

## ***3.2 Define test schedule & repetitions***

The duration for the time history of LA22y is less than 1 minute. All the channels for data acquisition need to be checked before a test begins. Therefore 15 minutes is scheduled for each test. Table 2 shows the schedule of the test.

## ***3.3 Design and develop data monitoring plan & checking during testing***

Table 3 shows the data monitoring plan. The channel at first floor column of zipper frame is always monitored to make sure the increase of the response of the tested structure. Also, the third floor acceleration and the story drift are checked during testing. Table 3.4 presents the expected values from analytical calculations, simulating the process of scaled input motion. A quick comparison between the target and the achieved value can be performed during the test.

## ***3.4 Prepare plan and roles of test attendees***

Four members of our group are in charge of the following tasks, respectively, during the test:

- (1) record the test results from monitoring channels;
- (2) check the results and discuss with professor and other group members to confirm the magnitude of input ground motion for next test;
- (3) check all channels before a test begins;
- (4) photograph;

**Table 1 Test protocol**

<b>Test Number</b>	<b>Test Label</b>	<b>Scale</b>	<b>Ground Motion</b>	<b>PGA (g)</b>	<b>Note</b>
#1	WHN1		White Noise	0.05	System Identification
#2	LA22_15	15%	LA22yy	0.138	Elastic Range
#3	WHN2		White Noise	0.05	System Identification
#4	LA22_30	30%	LA22yy	0.276	Elastic Range
#5	WHN3		White Noise	0.05	System Identification
#6	LA22_45	45%	LA22yy	0.46	First story braces buckle
#7	WHN4		White Noise	0.05	System Identification
#8	LA22_60	60%	LA22yy	0.552	Second story braces buckle
#9	WHN5		White Noise	0.05	System Identification
#10	LA22_80	80%	LA22yy	0.736	First story columns yield
#11	WHN6		White Noise	0.05	System Identification
#12	LA22_100	100%	LA22yy	0.92	
#13	WHN7		White Noise	0.05	System Identification
#14	LA22_120	120%	LA22yy	1.104	Third story zipper column yields
#15	WHN8		White Noise	0.05	System Identification
#16	LA22_150	150%	LA22yy	1.38	Second story zipper column yields
#17	WHN9		White Noise	0.05	System Identification

**Table 2 Test schedule**

<b>Test Number</b>	<b>Time</b>	<b>Test Label</b>	<b>Scale</b>	<b>Ground Motion</b>	<b>PGA (g)</b>	<b>Note</b>
#1	9:30 – 9:45	WHN1		White Noise	0.05	
#2	9:45 – 10:00	LA22_15	15%	LA22yy	0.138	
#3	10:00 – 10:15	WHN2		White Noise	0.05	
#4	10:15 – 10:30	LA22_30	30%	LA22yy	0.276	
--	<i>10:30 – 10:45</i>			<i>15 minutes break</i>		
#5	10:45 – 11:00	WHN3		White Noise	0.05	
#6	11:00 – 11:15	LA22_45	45%	LA22yy	0.46	
#7	11:15 – 11:30	WHN4		White Noise	0.05	
#8	11:30 – 11:45	LA22_60	60%	LA22yy	0.552	
--	11:45 – 13:30			<i>Lunch</i>		
#9	13:30 – 13:45	WHN5		White Noise	0.05	
#10	13:45 – 14:00	LA22_80	80%	LA22yy	0.736	
#11	14:00 – 14:15	WHN6		White Noise	0.05	
#12	14:15 – 14:30	LA22_100	100%	LA22yy	0.92	
--	14:30 – 14:45			<i>15 minutes break</i>		
#13	14:45 – 15:00	WHN7		White Noise	0.05	
#14	15:00 – 15:15	LA22_120	120%	LA22yy	1.104	
#15	15:15 – 15:30	WHN8		White Noise	0.05	
#16	15:30 – 15:45	LA22_150	150%	LA22yy	1.38	
#17	15:45 – 16:00	WHN9		White Noise	0.05	

**Table 3 Channels to monitor during the test**

Test Number	Test Label	Scale	PGA (g)	Monitor Channel	Note
#1	WHN1		0.05		System Identification
#2	LA22_15	15%	0.138	<ul style="list-style-type: none"> <li>▪ Channel at the base of column</li> <li>▪ Third floor acceleration.</li> <li>▪ Story drift.</li> </ul>	Elastic Range
#3	WHN2		0.05		System Identification
#4	LA22_30	30%	0.276	<ul style="list-style-type: none"> <li>▪ Channel at the base of column</li> <li>▪ Third floor acceleration.</li> <li>▪ Story drift.</li> </ul>	Elastic Range
#5	WHN3		0.05		System Identification
#6	LA22_45	45%	0.46	<ul style="list-style-type: none"> <li>▪ Channel at the base of column</li> <li>▪ Third floor acceleration.</li> <li>▪ Story drift.</li> </ul>	First story braces buckle
#7	WHN4		0.05		System Identification
#8	LA22_60	60%	0.552	<ul style="list-style-type: none"> <li>▪ Channel at the base of column</li> <li>▪ Channel at the second floor brace</li> </ul>	Second story braces buckle
#9	WHN5		0.05		System Identification
#10	LA22_80	80%	0.736	<ul style="list-style-type: none"> <li>▪ Channel at the base of column.</li> <li>▪ Third floor acceleration.</li> <li>▪ Story drift.</li> </ul>	First story columns yield
#11	WHN6		0.05		System Identification
#12	LA22_100	100%	0.92	<ul style="list-style-type: none"> <li>▪ Channel at the base of column</li> <li>▪ Third story acceleration.</li> <li>▪ Story drift.</li> </ul>	
#13	WHN7		0.05		System Identification
#14	LA22_120	120%	1.104	<ul style="list-style-type: none"> <li>▪ Channel at the base of column</li> <li>▪ Third floor acceleration.</li> <li>▪ Story drift.</li> </ul>	Third story zipper column yields
#15	WHN8		0.05		System Identification
#16	LA22_150	150%	1.38	<ul style="list-style-type: none"> <li>▪ Channel at the base of column</li> <li>▪ Third story acceleration.</li> <li>▪ Story drift.</li> </ul>	Second story zipper column yields
#17	WHN9		0.05		System Identification

**Table 3-4 Table for recording monitoring data during the test**

Test Number	Test Label	Scale	PGA (g)		Monitor Channel	Quantity	
			Target	Achieved		Target	Achieved
#1	WHN1		0.05				
					▪ Channel at the base of column	0.02%	
#2	LA22_15	15%	0.138		▪ Third floor acceleration	0.38	
					▪ Story drift	0.05	
						0.03	
#3	WHN2		0.05				
					▪ Channel at the base of column	0.04%	
#4	LA22_30	30%	0.276		▪ Third floor acceleration	0.76	
					▪ Story drift.	0.11	
						0.05	
#5	WHN3		0.05				
					▪ Channel at the base of column	0.09%	
#6	LA22_45	45%	0.46		▪ Third floor acceleration	1.06	
					▪ Story drift	0.08	
						0.05	
#7	WHN4		0.05				
					▪ Channel at the base of column	0.27%	
#8	LA22_60	60%	0.552		▪ Third floor acceleration	1.37	
					▪ Story drift	0.67	
						0.07	
#9	WHN5		0.05				
					▪ Channel at the base of column	0.30%	
#10	LA22_80	80%	0.736		▪ Third floor acceleration	1.88	
					▪ Story drift	1.04	
						0.09	
#11	WHN6		0.05				

#12	LA22_100	100%	0.92	▪ Channel at the base of column	0.33%	
				▪ Third floor acceleration	1.95	
				▪ Story drift	1.10	
					0.11	
#13	WHN7		0.05			
#14	LA22_120	120%	1.104	▪ Channel at the base of column	0.37%	
				▪ Third floor acceleration	2.13	
				▪ Story drift	1.27	
					0.11	
#15	WHN8		0.05			
#16	LA22_150	150%	1.38	▪ Channel at the base of column	0.46%	
				▪ Third floor acceleration	2.52	
				▪ Story drift	1.55	
					0.12	
#17	WHN9		0.05			