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July 21, 2020

The Courtyards of Carlisle
c/o Boyd Wilson, LLC
600 Olde Hickory Road, Suite 100
Lancaster, PA 17601

Attention: Samantha Faulstick
Community Manager

Reference: The Courtyards of Carlisle
Moisture Testing and Water Infiltration Investigation
Becht Project Number 20-0338

Dear Samantha:

As per our agreement, Becht Engineering BT performed moisture testing and a water infiltration investigation at the Courtyards of Carlisle community.

Executive Summary:

The referenced community contains twenty-four (24), two-story buildings with one hundred forty-nine (149) residential units. The buildings have either four or six units each. The exterior walls of the buildings are covered with a combination of vinyl siding and stucco and the roofs are covered with asphalt roof shingles. The buildings are wood framed with wood sheathing on the exterior walls. The exterior walls of the center units on the six-unit buildings are covered with stucco. The end units are covered with vinyl siding except for the end units facing Courtyard Drive and Court Lane. These end units have box windows in the gable walls that are covered with stucco.

We performed moisture probes at multiple locations on eighty (80) of the units in the community. The moisture probes included drilling holes in the stucco to insert the moisture meter pin probe and the partial removal of vinyl siding at specific locations to make visual inspections the sheathing. The moisture readings were taken over a two-day period (May 26th and May 27th). The weather on both days was sunny. Two conductive type moisture meters were used by the inspectors to record the moisture levels, including a TRAMEX brand PTM 6005 moisture meter. We also made visual observations at locations where vinyl siding was removed and documented the existing condition of the wall sheathing.

Findings

The stucco appears to be a two-coat stucco system. At test locations two holes were drilled through the stucco to insert the moisture meter probes to obtain moisture readings and the readings were recorded. During our investigations we observed that there was no weep screed at the base of the stucco walls and no casing bead was observed. In addition, we found that there was no caulk sealant installed between dissimilar materials. Since the moisture probes at the stucco were limited to drilling holes in the stucco for the probes, we were not able to verify if a WRB was installed behind the stucco.

At locations where the vinyl siding was removed, Oriented Strand Board (OSB) sheathing was observed. It is presumed that the OSB sheathing was used throughout the community and therefore is the sheathing material used behind the stucco siding as well. At the locations where vinyl siding was removed, we observed the condition of the OSB for evidence of moisture intrusion such as water stains, delamination and rot. At all the vinyl siding locations inspected, we identified the lack of a Weather Resistive Barrier (WRB) such as Tyvek or building paper, as required by current Code.

We recorded elevated to extremely high moisture levels and/or we observed water damage to the OSB sheathing at fifty-one (51) or 64% of the eighty (80) units inspected and at 21 of the 24 buildings.

The moisture meters provide a moisture reading in a percentage. The following are the ranges of the moisture percentages and their meaning.

<15% - Normal level.
15% to 24% - Elevated level, indicated moisture present and rot possible.
25% to 30% - High level, substrate rot likely to occur.
30% and higher – Substrate saturated, rot likely occurring.
NR - NR indicates the substrate gave no resistance and the substrate has failed.

A summary table of the findings has been prepared and included with this report. The table identifies the location (unit number) where the probe was taken, the siding material where the moisture probe was taken, the highest moisture meter reading taken at the unit and/or other visual observations. We have also included in the report, a photograph of each unit that was inspected. The photographs provide the unit number and the location of the probe and the moisture reading and or observations.

Conclusions:

The elevated moisture levels and damage that we observed confirms water infiltration and water damage is occurring to the buildings. We have also concluded that since

water intrusion and elevated moisture readings were recorded at 64% of the units inspected, this is a systemic condition throughout the community. If the deficient conditions are not corrected, water intrusion will continue and cause more damage to the building structure as well as provide an environment for organic growth and water damage inside the units.

Recommendations

Our recommendation is for the complete removal of the stucco and vinyl siding. Based on the widespread nature of elevated moisture probes and water damage observed and the fact there is no WRB behind the siding, complete removal of the siding is necessary to identify and replace all the damage sheathing and structural wall framing. The complete removal of the siding will allow for the installation of the code required WRB on the entire building and for the installation of the proper flashing around the windows, doors and at kickout locations, before new vinyl siding is installed to replace the stucco siding. Since the condition of the existing vinyl siding appears to be good it might be able to reuse at least some of it. We recommend that we be retained by the Association to prepare a set of engineered design drawings for the siding replacement project.

The narrative recommendations provided in this report are not a substitute for engineering construction documents. Engineering construction drawings are necessary for the proper implementation of our recommendations and recommended for contractor bidding. Please be advised that if our narrative recommendations for the siding replacement are implemented without design drawings, we are to be held harmless for deficiencies arising from work proceeding without our direction. Under these conditions, we are to be held harmless for any defects in the work and/or its effects on any property or persons.

The opinions in this report are based on the visual observations and probes made in the field. We reserve the right to amend this report and the opinions, as necessary if additional information becomes available.

If you should have any questions, please do not hesitate to call.

Sincerely,

Michael J. Barlow

Michael J. Barlow, RS
Senior Project Manager
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Moisture Probe Summary Tables and Photographs

Moisture Probe Results Summary Table													
	Unit Address												
Building 1	North West Street			Courtyard Drive									
Unit #	**1320**	**1322**	**1324**	**2**		**4**	**6**						
Siding Material	Stucco	Stucco	Vinyl	Stucco	Vinyl	Stucco	Vinyl						
Sheathing % Moisture/Observation	NR	NR	Rot	20.7%	Rot	NR	Good						
Building 2	Courtyard Drive												
Unit #	**8**	**10**	**12**	**14**		**16**	**18**						
Siding Material	Stucco	Stucco	Vinyl	Stucco		Stucco	Vinyl						
Sheathing % Moisture/Observation	<15%	<15%	<15%	<15%		<15%	Water Stain						
Building 3	Courtyard Drive												
Unit #	**20**		**22**	**24**	**26**		**28**	**30**					
Siding Material	Stucco	Vinyl			Stucco	Vinyl							
Sheathing % Moisture/Observation	31%	Good			NR	Water Stain							
Building 4	Courtyard Drive												
Unit #	**32**	**34**	**36**	**38**	**40**	**42**							
Siding Material	Stucco				Stucco	Vinyl							
Sheathing % Moisture/Observation	NR				17%	Good							
Building 5	Courtyard Drive												
Unit #	**44**		**46**	**48**	**50**	**52**	**54**						
Siding Material	Stucco	Vinyl	Stucco	Vinyl	Stucco	Stucco							
Sheathing % Moisture/Observation	17%	Good	26.8%	Good	26%	<15%							
Building 6	Courtyard Drive												
Unit #	**56**		**58**	**60**	**62**	**64**	**66**						
Siding Material	Stucco	Vinyl	Stucco	Vinyl	Stucco								
Sheathing % Moisture/Observation	27.8%	<15%	15.3%	Rot	NR	NR	Stained						
Building 7	Courtyard Drive												
Unit #	**68**	**70**	**72**	**.74**	**76**	**78**							
Siding Material	Stucco	Stucco		Stucco	Stucco	Vinyl							
Sheathing % Moisture/Observation	22.4%	20.3%		11.7%	<15%	Good							
Building 8	Courtyard Drive												
Unit #	**80**	**82**	**84**	**86**	**88**	**90**							
Siding Material	Stucco	Stucco	Vinyl	Stucco	Stucco								
Sheathing % Moisture/Observation	22%	<15%	Good	28%	<15%								
Building 9	Courtyard Drive			Franklin Street									
Unit #	**92**	**94**	**96**	**1239**	**1241**	**1243**							
Siding Material		Stucco			Stucco	Stucco							
Sheathing % Moisture/Observation		NR			<10%	31.1%							
Building 10	Courtyard Drive												
Unit #	**105**	**107**	**109**	**111**	**113**	**115**							
Siding Material	Stucco	16.9%		Stucco	Stucco								
Sheathing % Moisture/Observation	28.3%			40%	32.4%								

Scan Results Summary Table								
Building 11	**Courtyard Drive**							
Unit #	**93**	**95**	**97**	**99**	**101**	**103**		
Siding Material	Stucco	Stucco		Stucco	Stucco	Vinyl		
Sheathing % Moisture/Observation	34%	18%		23%	13% Dry Rot	12%		
Building 12	**Courtyard Drive**							
Unit #	**81**	**83**	**85**	**87**	**89**	**91**		
Siding Material	Vinyl	Stucco		Stucco	Stucco			
Sheathing % Moisture/Observation	Good	18.5%		37.6%	24.5%			
Building 13	**Courtyard Drive**							
Unit #	**73**	**75**	**77**	**79**				
Siding Material	Stucco							
Sheathing % Moisture/Observation	NR							
Building 14	**Courtyard Drive**							
Unit #	**61**	**63**	**65**	**67**	**69**	**71**		
Siding Material					Stucco			
Sheathing % Moisture/Observation					40%			
Building 15	**Courtyard Drive**							
Unit #	**43**	**45**	**47**	**49**	**51**	**53**		
Siding Material		Stucco			Stucco			
Sheathing % Moisture/Observation		9.7%			16%			
Building 16	**Courtyard Drive**			**Court Lane**				
Unit #	**55**	**57**	**59**	**24**	**26**	**28**		
Siding Material	Stucco		Stucco		Stucco			
Sheathing % Moisture/Observation	19.6%		NR 26.6%		NR 40%			
Building 17	**Courtyard Drive**			**Court Lane**				
Unit #	**37**	**39**	**41**	**2**	**4**	**6**		
Siding Material		Stucco			Stucco			
Sheathing % Moisture/Observation		10.3%			39.4%			
Building 18	**Court Lane**							
Unit #	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**22**
Siding Material		Stucco	Stucco			Stucco	Stucco	
Sheathing % Moisture/Observation		15.5%	34.4%			35.2%	22.8%	
Building 19	**Court Lane**							
Unit #	**19**	**21**	**23**	**25**	**27**	**29**	Severely cracked stucco was observed at the bay windows of Units 19 and 25. Stucco needs to be replaced	
Siding Material	Stucco	Stucco		Stucco	Stucco			
Sheathing % Moisture/Observation	9.5% Wood Rot	17.9%		10.5% Wood Rot	12.5%			
Building 20	**Court Lane**							
Unit #	**7**	**9**	**11**	**13**	**17**	**19**	Severely cracked stucco was observed at the bay window of Unit 7. Stucco need to be replaced	
Siding Material	Stucco							
Sheathing % Moisture/Observation	10.7%							
Building 21	**Court Lane**		**Courtyard Drive**					
Unit #	**1**	**3**	**31**	**33**				
Siding Material	Stucco		Stucco					
Sheathing % Moisture/Observation	8.3%		8.5%					

Building 22	**Courtyard Drive**						
Unit #	**19**	**21**	**23**	**25**	**27**	**29**	
Siding Material		Stucco	Stucco			Vinyl	
Sheathing % Moisture/Observation		9.2%	10%			11.3% Stain	
Building 23	**Courtyard Drive**						
Unit #	**7**	**9**	**11**	**13**	**15**	**17**	
Siding Material					Stucco		
Sheathing % Moisture/Observation					NR		
Building 24	**Courtyard Drive**			**North West Street**			
Unit #	**1**	**3**	**5**	**1326**	**1328**	**1330**	
Siding Material	Stucco			Stucco	Stucco		
Sheathing % Moisture/Observation	7.4%			7.9%			

Building 1 - 1320 Northwest Street

Building 1 - 1322 Northwest Street

Building 1 - 1324 North West Street

Building 1 - 1324 North West Street. Rot under window.

Building 1 - 6 Courtyard Drive and 1324 North West Street. No Damage at 6 Courtyard Drive

Building 1 - 1324 North West Street. Rot under window.

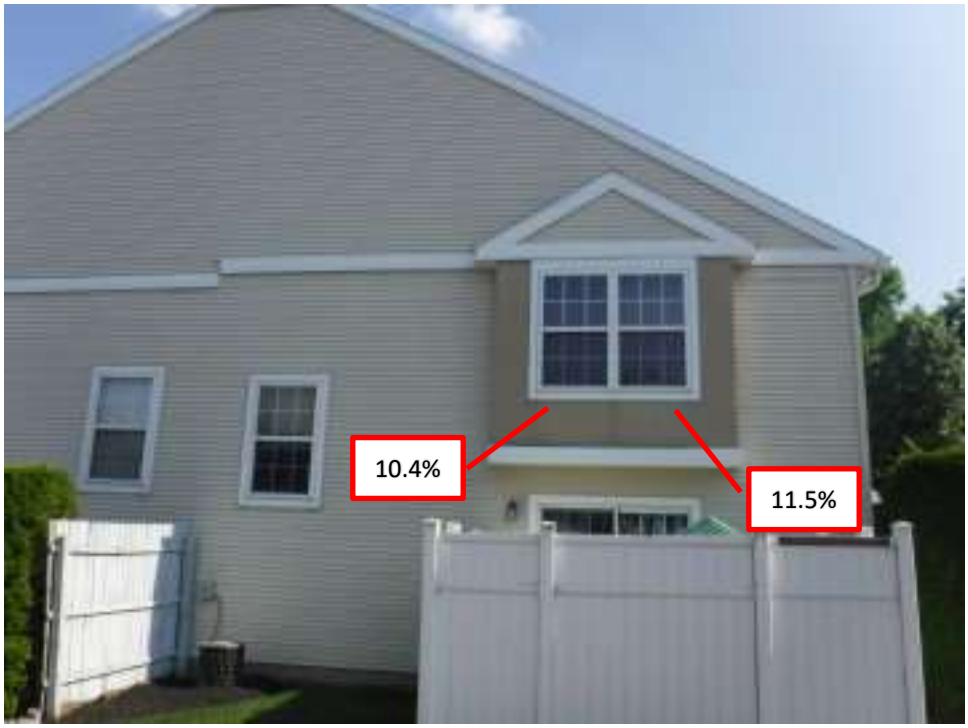
Building 1 - 2 Courtyard Drive

Building 1 - 2 Courtyard Drive. Rot under window.

Building 2 - 8 Courtyard Drivedrive

Building 2 - 10 Courtyard Drive

Building 2 - 12 Courtyard Drive



Building 2 - 14 Courtyard Drive

Building 2 - 16 Courtyard Drive

Building 2 - 18 Courtyard Drive

Building 2 - 18 Courtyard Drive. Stain under right window.

Building 2 - 18 Courtyard Drive. Stain under right window.

Building 3 - 20 Courtyard Drive

Building 3 - 26 Courtyard

Building 3 - 26 Courtyard. Sheathing stained and flaking under 2nd floor window.

Building 4 - 32 Courtyard Drive

Building 4 - 42 Courtyard Drive

Building 5 - 44 Courtyard Drive

Building 5 - 44 Courtyard Drive

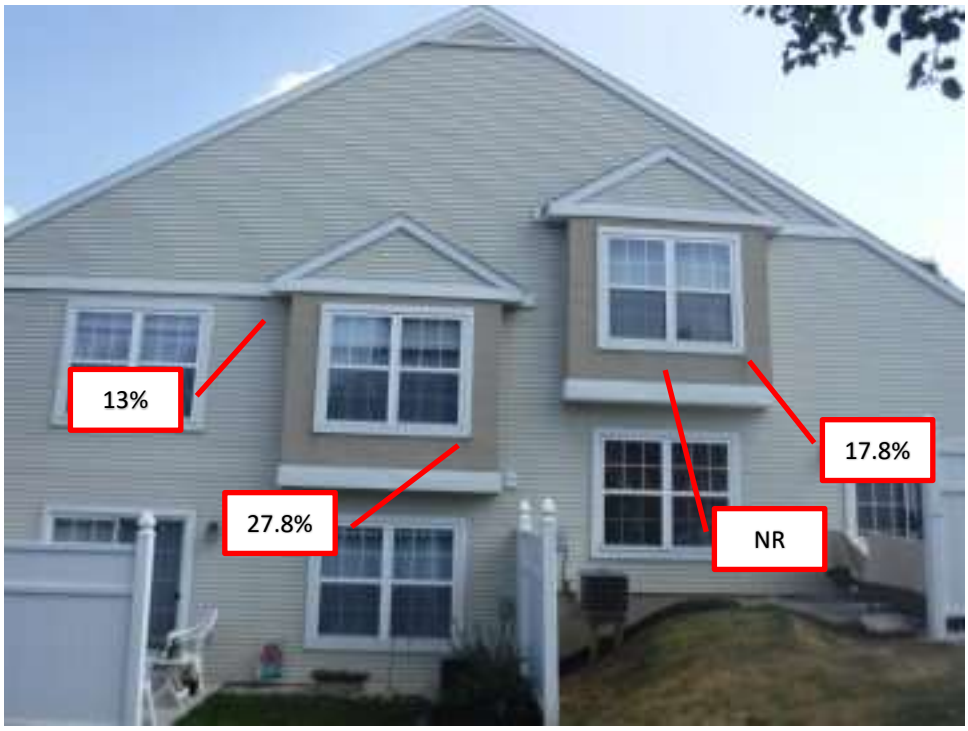
Building 5 - 46 Courtyard Drive

Building 5 - 48 Courtyard Drive

Building 5 - 48 Courtyard

Building 5 - 50 Courtyard Drive

Building 5 - 52 Courtyard Drive



Building 6 - 56 & 62 Courtyard

Building 6 - 56 Courtyard

Building 6 - 58 Courtyard Drive

Building 6 - 60 Courtyard

Building 6 - 64 Courtyard

Building 6 - 66 & 60 Courtyard

Building 6 - 60 Courtyard. Sheating rotted under window.

Building 6 - 66 Courtyard

Building 6 - 66 Courtyard. Water stains, mold and ants observed.

Building 7 - 68 & 74 Courtyard

Building 7 - 70 Courtyard Drive

Building 7 - 78 & 72 Courtyard

Building 7 - 76 Courtyard

Building 7 - 78 Courtyard

Building 8 - 80 Courtyard

Building 8 - 82 Courtyard

Building 8 - 84 Courtyard

Building 8 - 86 Courtyard

Building 8 - 88 Courtyard

Building 9 - 94 Courtyard

Building 9 - 1241 Franklin Street

Building 9 - 92 & 1243 Franklin Street

Building 10 - 107 Courtyard

Building 10 - 105 & 111 Courtyard Drive

Building 10 - 113 Courtyard Drive

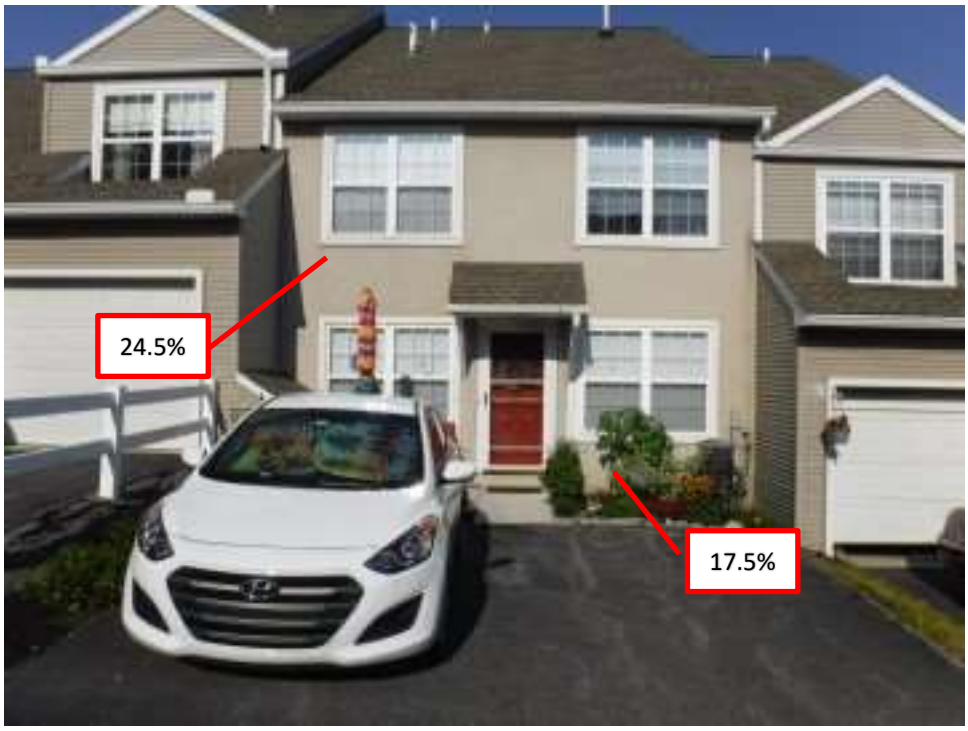
Building 11 - 97 & 103 Courtyard

Building 11 - 101 Courtyard Drive

Building 11 - 99 Courtyard

Building 11 - 93 Courtyard

Building 11 - 95 Courtyard

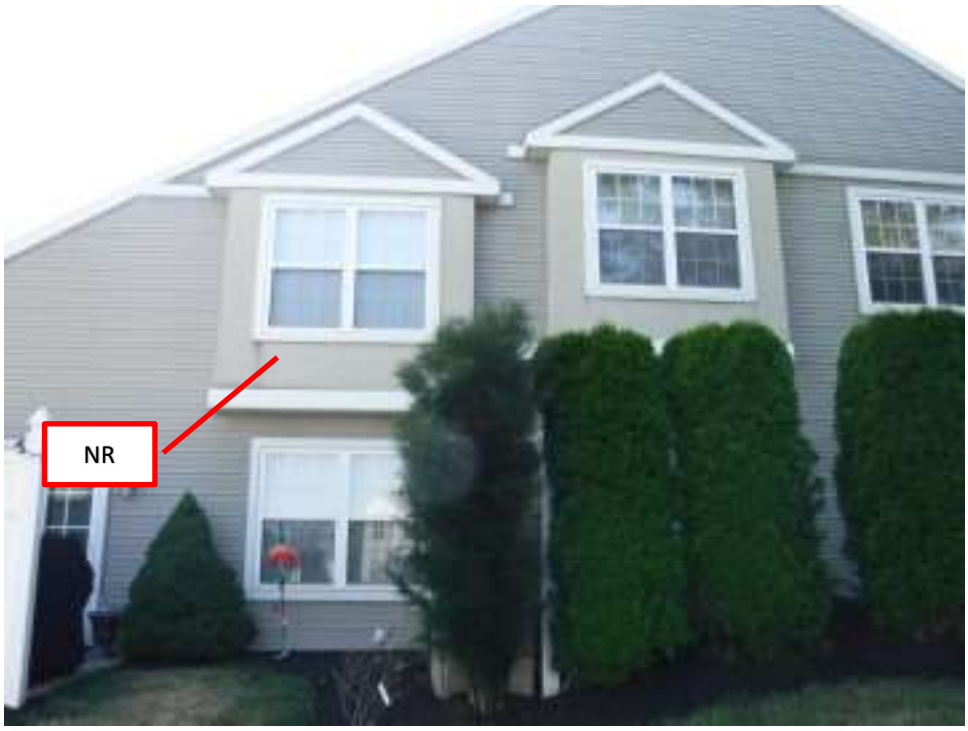


Building 12 - 89 Courtyard

Building 12 - 87 Courtyard Drive

Building 12 - 83 Courtyard Drive

Building 12 - 81 Courtyard Drive



Building 13 - 73 Courtyard Drive

Building 14 - 69 Courtyard Drive

Building 15 - 45 Courtyard Drive

Building 15 - 51 Courtyard Drive

Building 16 – 55 Courtyard Drive & 24 Court Lane

Building 16 - 26 Court Lane

Building 17 - 39 Courtyard Drive

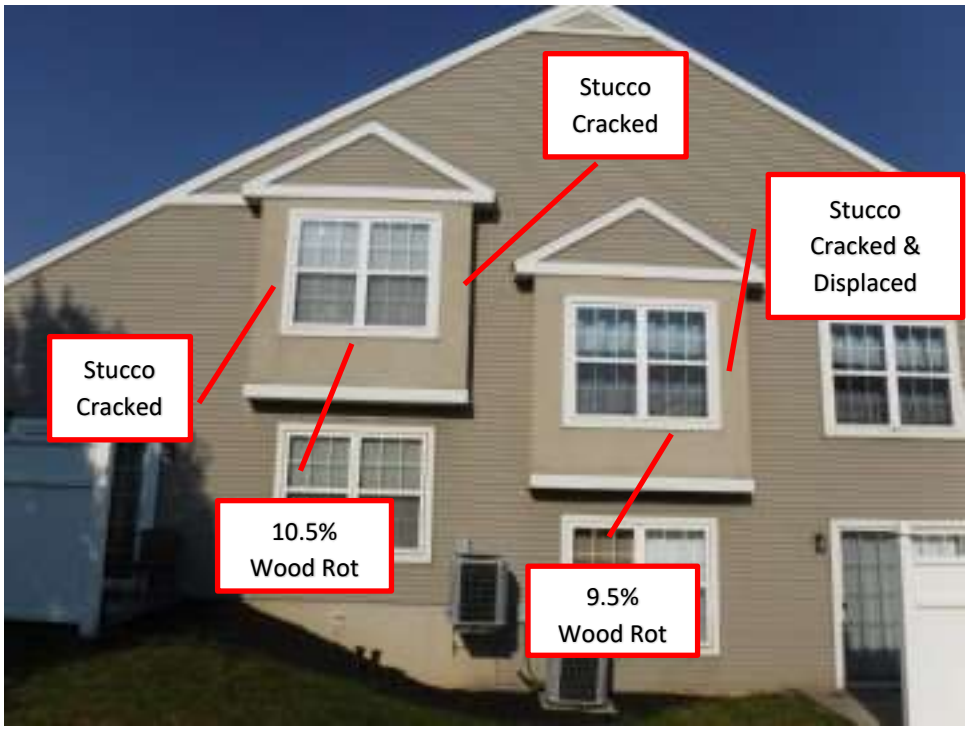
Building 17 - 4 Court :Lane

Building 18 – 20 Court Lane

Buildng 18 – 10 & 12 Court Lane-

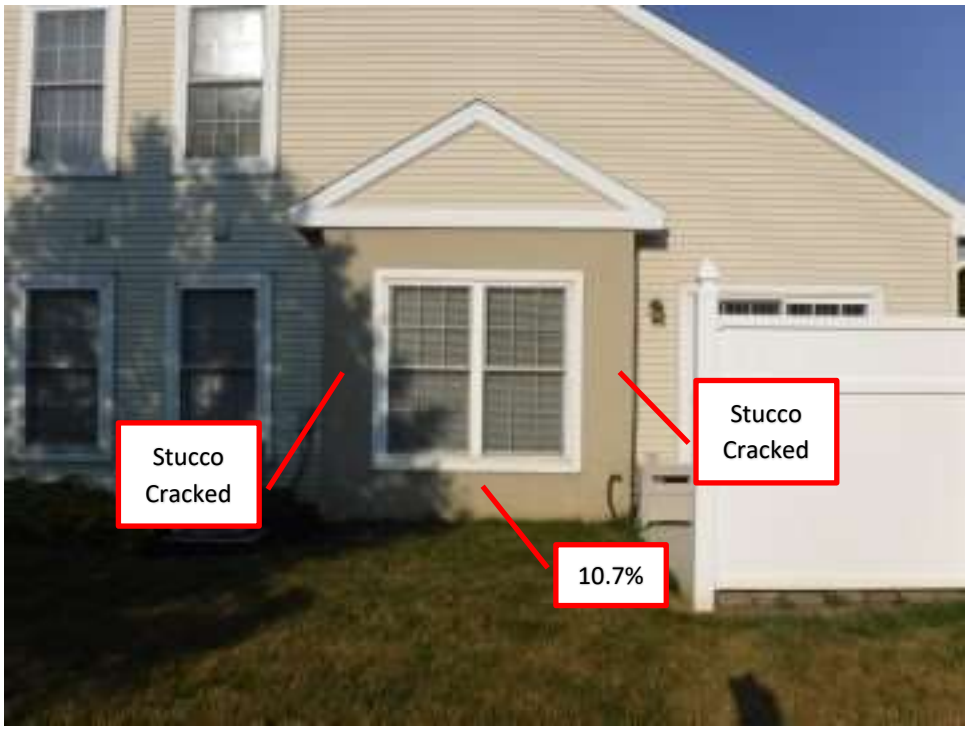
Building 18 – 20 & 18 Court Lane

Building 19 - 27 Court Lane



Building 19 – 25 & 19 Court Lane

Building 19 - 21 Court Lane



Building 20 - 7 Court Lane

Building 21 – 1 Court Lane & 31 Courtyard Drive

Building 22 –21 Courtyard Drive

Building 22 –23 Courtyard Drive

Building 22 –29 Courtyard Drive

Building 22 –29 Courtyard Drive

Building 23 –15 Courtyard Drive

Building 24 –1 Courtyard Drive and 1326 North West Street