

**Kennedy/Jenks Consultants**  
**Engineers & Scientists**

303 Second Street, Suite 300 South  
San Francisco, California 94107  
415-243-2150  
FAX: 415-896-0999

31 January 2017

Michael Hassett, P.E.  
Senior Manager - Remediation  
Georgia-Pacific LLC  
133 Peachtree Street, NE  
Atlanta, GA 30303

Subject: Structural Assessment of Storm Damage  
Dry Shed No. 4  
Georgia-Pacific  
Fort Bragg, California  
K/J 1665018\*04

Dear Mr. Hassett:

Kennedy/Jenks Consultants is pleased to be able to provide engineering services associated with a limited structural condition assessment following the early January 2017 storm related damage to the Georgia-Pacific Dry Shed No. 4 in Fort Bragg, California. Summarized below are results of key observations and preliminary recommendations regarding the condition and safety of the building.

### Purpose and Scope

The purpose of this letter report is to document observations and recommendations related to the evaluation of the Dry Shed No. 4 building structure following recent storm related damage. This letter provides initial information regarding the current condition of the existing building structure and its suitability to perform its intended function of storing materials in the south half of the building until approximately the end of April 2017. During that time the building may be subject to additional distress from environmental factors that may further change and degrade the condition of the building. Persons who enter the building or the area around the building should use care to be aware of further changes to the building condition that may require additional assessment or actions to protect personnel. The recommendations in this report reflect the judgement of Kennedy/Jenks Consultants and the engineer responsible for the evaluation.

The report is provided to evaluate damage resulting specifically from the recent storm activity. The evaluation of all past problems and distress to portions of the building resulting from

Michael Hassett, P.E.  
Georgia-Pacific LLC  
31 January 2017  
Page 2

exposure conditions, weathering, or inadequate maintenance are beyond the scope of this report. Seismic evaluation of the existing building structure is considered beyond the scope of this report. It should be recognized that there is no absolute measurement of structural safety in an existing building, particularly in buildings that have deteriorated due to prolonged exposure to the environment.

## Review of Background Documents

No background documents (drawings, specifications, construction records) were received or reviewed as part of the assessment. Georgia-Pacific indicated detailed structural drawings of the building were not identified among accessible records. If Georgia-Pacific is able to provide drawings of the existing building structural capacity checks on the framing members of the walls or roof could be performed. It is believed the building was constructed in the late 1970's or early 1980's. No information was reviewed associated with design of the building in conformance with building code requirements applicable at the time of construction. No soils or foundations information was reviewed and no review was made of the building foundations or floor slab.

## Observations of Building Conditions and Storm Damage

A walk-through of Dry Shed No. 4 was performed by Donald L. Barraza, P.E. with Kennedy/Jenks Consultants on 24 January 2017. Access to the site and building was provided by Mr. James Gross, Site Coordinator, for Georgia-Pacific. Based on input received from Mr. Gross the building is approximately 450'-0" long by 150'-0" wide and has approximately 75,000 square feet of floor area. The building was constructed in the late 1970's or early 1980's (approaching 40 years in age). The building is of wood framed construction with plywood sheathing. The building has an M-shaped modified gambrel roof configuration with a roof drain cricket running the length of the building to direct interior rainwater drainage to the north and south ends of the building. Observations were made of the interior and exterior of the building and portions of the roof were observed from the drain cricket. Based on observations made at the time of the assessment, the following deficiencies were observed:

1. The physical properties of the construction materials have degraded significantly with water related damage to the plywood sheathing and wall and roof structural wood framing members. The modified bitumen roof waterproofing material has blown off of many areas of the south half of the building.
2. An approximately 16'-0" x 8'-0" damaged open area in the plywood sheathing and roof purlins was observed in the roof of the building near the southeast corner of the building. See Photos 2, 3, 4, 5, 7, 8, and 9. The damaged section of plywood sheathing and 2x4 roof purlins is still lying on the roof and could blow off the roof in the next storm.

Michael Hassett, P.E.  
Georgia-Pacific LLC  
31 January 2017  
Page 3

3. An approximately 8'-0" x 8'-0" damaged open area in the plywood sheathing and roof purlins was observed in the roof of the building near the southeast corner of the building. See Photos 6, 7, 8, and 10.
4. Besides the loss of the plywood sheathing and purlins one of the girders supporting and attaching the south transverse wall to the building has pulled out of its beam hanger and has failed. See Photo 11.
5. The loss of the plywood at two openings in the roof as well as the loss of the girder in the beam seat on the southeast corner of the building removes the strength of the roof diaphragm connection to the south wall of the building in the southeast corner. It also appears that another approximately 16'-0" x 8'-0" section of roof is about to be lost from the building in the southeast corner. The remaining roof girders appeared to be in adequate condition still supporting and attaching the south gable wall to the remainder of the roof.
6. The 10x12 posts and the 4x12 walers supporting the 2x4 studs and plywood sheathing in the south gable end wall were intact with no observed splitting.
7. An approximately 20'-0" x 16'-0" damaged open area in the plywood sheathing, wall studs, and walers was observed on east wall of the building near the northeast corner of the building. See Photos 16, 17, and 18. This area was reportedly not damaged in the recent storms. The area is missing one 3x10 waler and the second 3x10 waler is split. The 2x4 studs and plywood sheathing have been lost in this area.
8. There is a large area on the south half of the building where the modified bitumen roof material has blown off and has collected and blocks the roof drainage depression between the two roofs. There is extensive modified bitumen roofing material debris along the entire length of the south half of the roof drain cricket. The APP Modified Bitumen roofing material used on the building roof was manufactured by Dibiten. See Photo 12.
9. There is extensive loss of the modified bitumen roofing material over the south half of the building. The roofing material has been removed from both the east and west halves of the building with more extensive loss on the areas of the roof exposed to the west (ocean) side. Water has ponded in the roof drain cricket on the south half of the building and is prevented from freely draining to the downspout on the south end of the building.
10. There is minimal debris in the roof drain cricket on the north half of the building. Water was freely draining to the downspout on the north end of the building. The roofing

Michael Hassett, P.E.  
Georgia-Pacific LLC  
31 January 2017  
Page 4

material on the north half of the building did not show observable signs of damage or deterioration as observed from the roof drain cricket area.

11. The interior redwood trusses did not show observable signs of significant damage or deterioration. The gable end truss on the south side of the building near the roof damage appeared to be intact with connections to the posts and roof girders supporting the truss.
12. Water damage was observed over many areas of the interior roof to plywood and 2x4 purlins and girders with some holes in the plywood sheathing where the modified bitumen roofing material had blown off.
13. There is plywood and 2x4 roof purlin debris over the southeast corner of the roof which could blow off the roof in the next storm.

A photo contact sheet with all 114 photographs taken during the observations of building conditions is enclosed with the letter.

## Limitations and Further Investigations

The structural assessment of recent storm related damage to the building was limited in its scope and is not considered to be a comprehensive structural or seismic condition assessment of the building structure. Field measurements and member dimensions were limited to those areas of observed damage in the southeast corner of the building and accessible from the ground. The evaluation of all past problems and distress to portions of the building resulting from exposure conditions, weathering, or inadequate maintenance are beyond the scope of this report. No nondestructive testing, exploratory removal, sampling, testing or physical measurements of the overall structure were performed. Based on the remaining useful life of the building, intent to terminate lease of the building for storage of materials by April 2017, it is not recommended that further or more detailed investigations be performed. If the Owner is concerned about the wind load capacity of the roof or wall framing in deteriorated areas additional structural capacity checks could be performed; however, it is unlikely that the existing wall and roof wood framing would be judged to be adequate using typical design loads and contemporary analysis methods and building codes.

## Conclusions and Recommendations

The recent storm related roof damage in the southeast corner of the building has seriously weakened the roof framing in the southeast corner of the building and support for the gable end at the southeast corner of the building. The loss of roof framing in the southeast corner and the potential for future loss of roof and wall framing in the southeast corner of the building pose an unsafe and potential hazardous condition to operations, personnel, equipment, and vehicles

Michael Hassett, P.E.  
Georgia-Pacific LLC  
31 January 2017  
Page 5

inside and outside the building in the general vicinity. The loss of additional roof framing or damage to wall framing could cause the south wall of the building to become unstable requiring shoring or bracing. The Owner should take measures to restrict activities in the general vicinity shown in Figure 1. Do to the limited intended remaining use of the building we would not recommend further non-destructive testing of building materials or exploratory removal, sampling, testing or physical measurements of the overall structure. As previously noted, it is clear that the physical properties of the construction materials have degraded significantly with water and wind related damage to the plywood sheathing and wall and roof structural wood framing members. The loss of the modified bitumen roof waterproofing material from many areas of the south half of the building has contributed to the degradation of the wood roof framing.

If you have any questions or need additional information please call Don Barraza at (415) 243-2483 or Jeremie Maehr at (415) 243-2472.

Very truly yours,

KENNEDY/JENKS CONSULTANTS



Donald L. Barraza, P.E.  
Principal / Structural Department Head



Enclosure (2)

1. Appendix with 18 photographs.
2. Photo contact sheet with all 114 photographs taken on 01/24/2017.

cc: Jeremie Maehr, Kennedy/Jenks Consultants

Michael Hassett, P.E.  
Georgia-Pacific LLC  
31 January 2017  
Page 6

Figure 1: Building Restriction Area





**Photo #1:**  
Dry Shed #4



**Photo #2:**  
Dry Shed #4 East Side with  
Roof Damage in Southeast  
Corner



**Photo #3:**  
Dry Shed #4 East Side with  
Roof Damage in Southeast  
Corner; 16'-0" x 8'-0"  
Opening



**Photo #4:**

Dry Shed #4 East Side with  
Roof Damage in Southeast  
Corner; 16'-0" x 8'-0"  
Opening



**Photo #5:**

Dry Shed #4 East Side with  
Roof Damage in Southeast  
Corner; 16'-0" x 8'-0"  
Opening



**Photo #6:**

Dry Shed #4 Roof Damage  
and 16'-0" x 8'-0" Opening  
in Southeast Corner



**Photo #7:**

Dry Shed #4 East Side with Roof Damage in Southeast Corner; Two Opening in Roof, Loss of 2x4 Purlins, Plywood Sheathing, and Modified Bitumen Roofing Material



**Photo #8:**

Dry Shed #4 East Side with Roof Damage in Southeast Corner; Two Opening in Roof, Loss of 2x4 Purlins, Plywood Sheathing, and Modified Bitumen Roofing Material



**Photo #9:**

Dry Shed #4 Roof Damage and 16'-0" x 8'-0" Opening in Southeast Corner; Loss of Plywood Sheathing and 2x4 Purlins



**Photo #10:**

Dry Shed #4 Roof Damage and 8'-0" x 8'-0" Opening in Southeast Corner; Loss of Plywood Sheathing and 2x4 Purlins



**Photo #11:**

Dry Shed #4 East Side with Roof Damage in Southeast Corner; Rafter Pullout from Beam Seat



**Photo #12:**

Dry Shed #4 West Side with Loss of Modified Bitumen Material on Half of Roof



**Photo #13:**

Dry Shed #4 South Half  
Roof with Modified Bitumen  
Material in Roof Drain  
Cricket



**Photo #14:**

Dry Shed #4 South Half  
Roof with Modified Bitumen  
Material in Roof Drain  
Cricket and Blocked  
Downspout Inlet



**Photo #15:**

Dry Shed #4 Roof Damage  
and 16'-0" x 8'-0" Plywood  
and 2x4 Purlin Debris on  
Roof



**Photo #16:**

Dry Shed #4 East Side with Wall Damage in Northeast Corner; 20'-0" x 16'-0" Opening; Loss of Plywood Sheathing, 2x4 Studs



**Photo #17:**

Dry Shed #4 East Side with Wall Damage in Northeast Corner; 20'-0" x 16'-0" Opening; Loss of Plywood Sheathing, 2x4 Studs



**Photo #18:**

Dry Shed #4 East Side with Wall Damage in Northeast Corner; 20'-0" x 16'-0" Opening; Loss of Plywood Sheathing, 2x4 Studs; Split 3x10 Waler





DSC00792.JPG



DSC00793.JPG



DSC00794.JPG



DSC00795.JPG



DSC00796.JPG



DSC00797.JPG



DSC00798.JPG



DSC00799.JPG



DSC00800.JPG



DSC00801.JPG



DSC00802.JPG



DSC00803.JPG



DSC00804.JPG



DSC00805.JPG



DSC00806.JPG



DSC00807.JPG



DSC00808.JPG



DSC00809.JPG



DSC00810.JPG



DSC00811.JPG



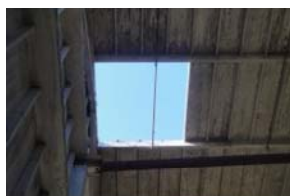
DSC00812.JPG



DSC00813.JPG



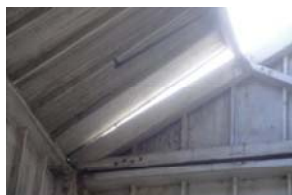
DSC00814.JPG



DSC00815.JPG



DSC00816.JPG



DSC00817.JPG



DSC00818.JPG



DSC00819.JPG



DSC00820.JPG



DSC00821.JPG



DSC00822.JPG



DSC00823.JPG



DSC00824.JPG



DSC00825.JPG



DSC00826.JPG



DSC00827.JPG



DSC00828.JPG



DSC00829.JPG



DSC00830.JPG



DSC00831.JPG



DSC00832.JPG



DSC00833.JPG



DSC00834.JPG



DSC00835.JPG



DSC00836.JPG



DSC00837.JPG



DSC00838.JPG



DSC00839.JPG



DSC00840.JPG



DSC00841.JPG



DSC00842.JPG



DSC00843.JPG



DSC00844.JPG



DSC00845.JPG



DSC00846.JPG



DSC00847.JPG



DSC00848.JPG



DSC00849.JPG



DSC00850.JPG



DSC00851.JPG



DSC00852.JPG



DSC00853.JPG



DSC00854.JPG



DSC00855.JPG



DSC00856.JPG



DSC00857.JPG



DSC00858.JPG



DSC00859.JPG



DSC00860.JPG



DSC00861.JPG



DSC00862.JPG



DSC00863.JPG



DSC00864.JPG



DSC00865.JPG



DSC00866.JPG



DSC00867.JPG



DSC00868.JPG



DSC00869.JPG



DSC00870.JPG