BBFM Engineers Inc.

510 L Street, Suite 200
Anchorage, AK 99501-1949
(907) 274-2236
(907) 274-2520 Fax

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City & Borough of Sitka
Department of Public Works
113 Jarvis Street
Sitka, AK 99835

Attn: Chris Wilbur

Re: SMC Pulp Dock Warehouse

Mr. Wilbur:

We have completed our investigation into the condition of the SMC Pulp Dock Warehouse. Our investigation included a site visit to the building and examination of a number of drawings that you provided to us. They include four large drawings (72-3-032833-32 to 72-3-032833-35), ten 11x17 sheets of Butler's typical details, and six 8½x11 sheets of additional Butler typical details.

The facility is a Butler pre-engineered metal building originally constructed in 1972. It is 100' x 480' in plan with an eave height of 28'. It was designed for a 30 pound per square foot (psf) snow load and for the 20 psf wind load pressure map. The structure consists of metal roof deck and wall sheathing panels spanning between roof purlins and wall girts. The purlins and girts span between large built-up steel moment frames at the interior column lines (20 feet on center) and beams and built-up steel wide flange columns at the end walls. The corners have two columns: one is a vertical load bearing wide flange steel column and the other is a light gauge C-shaped wind column.

Current Condition

The main structure of the building appears to be in generally good shape but there are many members that are showing significant rust deterioration. The main moment frames have some scale but no major rusting is apparent. One of the moment frames has obviously been run into as the flange near the base is warped. The end wall columns, except at the corners, appear to be in acceptable shape. The corner columns are showing extensive signs of rust and several of the C-shaped columns no longer reach the ground. Most of the purlins are showing some signs of oxidization but no major rusting. A few purlins, predominately at the eaves, show some major rust deterioration. In many cases the lower flange is almost totally gone. In others, major sections are gone. Several of the wall girts have been replaced and many others have major rust problems, especially at the corners.

The foundation is generally in good shape with a single type of exception. Several of the concrete column bases along the dock side have lost concrete through spalling and the top rebar is exposed

and corroded. Unless repaired, the piers will continue to degrade and a catastrophic failure could occur.

It is our understanding that the roofing has numerous leaks. The siding also has numerous holes and signs of major damage. They are both past a reasonable life. These are the main causes of water infiltration which leads to rusting of the members.

Design Loads

Current design loads are significantly different than when this building was constructed. We have examined the design loads based on the 1970 Uniform Building Code (UBC) and the 2003 International Building Code (IBC). While the building code does not require that a building be brought up to current code, any new or replacement members will have to be designed for current code design forces.

Snow loads were not specifically called out in the 1970 UBC but we believe that the 30 psf for which they designed was the standard for Sitka at that time. In the 2003 IBC, the ground snow load for Sitka is specified as 50 psf. This results in a roof snow load of 34 psf for this building based on the fact that it is in an Exposure D area (C_e=0.8), is an unheated building (C_t=1.2), and is of standard importance (I=1.0).

The 1970 UBC Wind-Pressure-Map Area Table gives, for the 20psf zone, a design wind pressure of 15 psf for buildings less than 30' tall. Under the 2003 IBC, the building would be designed for a 120 mile per hour 3-second gust wind speed. This wind speed results in a typical (i.e., non-corner) design wind pressure of 25 psf for the Exposure D condition with a mean roof height of 30 feet. At the corners (i.e., within 20' of a corner), the wind pressure is 38 psf. This is a significant increase in wind pressure. In addition, current code takes into account wind suction on the roof, where the 1970 code did not.

Seismic loads have also significantly increased. Under the 1970 UBC, the building would have been designed for Seismic Zone 3 forces. The design base shear would have been .067W in the transverse direction (moment frames) and 0.10W in the longitudinal direction (braced frames). The seismic weight (W) would have included the dead load (7 psf) only, as the 1970 UBC did not mention snow load as part of the seismic weight. The allowable stress design base shear under the 2003 IBC is .146W in the transverse direction and .102W in the longitudinal direction. These loads are significantly higher than in 1970, especially when one considers that W will consist of the dead load and 20% of the snow load (7 psf). The allowable stress design base shears for the building would be as follows:

Direction	1970 UBC	2003 IBC	Frame Type
Transverse	24.8 kips	108 kips	Ordinary Moment Frame
Longitudinal	37.0 kips	75.4 kips	Ordinary Braced Frame

These loads are significantly higher than the original design. However, only new, replacement members will have to be designed for the current loads. Any existing member that we do not alter will be acceptable as is.

Recommendations

We recommend that the following repair work be completed:

1. Replace all rusted girts, purlins, and columns that show loss of material, as opposed to merely scale. For estimating purposes, we have assumed that this includes all purlins at the wall to roof juncture and half of the purlins in the overhang, all the wall girts in the corner bays, and all the C-shaped columns at the corners. We estimate that this will cost between $50,000 and $75,000.
2. Repair the tops of the concrete column piers that are showing spalling. We estimate that this will cost approximately $5000.
3. Replace the existing roofing and siding. We estimate that replacing the roofing would cost between $300,000 and $450,000, depending on the roofing selected. Replacing the siding would cost between $175,000 and $250,000, depending on the siding selected. We recommend retaining an architect to develop this portion of the project.
4. We also would recommend that the entire structure get a new paint job. This would entail removing the scale that has developed and applying a new paint system. We recommend retaining an architect to develop this recommendation.

We note that demolition of the existing building and construction of a new building would cost approximately $2.5 million.

Conclusion

While the main members of the structure show some scale, they are in good condition and only need a good coat of paint. However, there are a number of members, including purlins, girts, and wind columns that have been severely damaged by rust and need to be replaced. The rust is due to water infiltration through roofing and siding that is well past its design life and needs to be replaced. The only other work that needs to be done is to repair a few concrete piers that have lost concrete at their tops. If this work is completed and the building is properly maintained, it should be a useful structure for many years to come.

Respectfully yours,

BBFM Engineers Inc.

Colin Maynard, PE
Vice President