COMPREHENSIVE CONDITION ASSESSMENT

WOOD CREEK LODGE ROOF

CRESTED BUTTE COLORADO

SGM ENGINEERING/SURVEYING
GUNNISON COLORADO

AUGUST 2014

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Background

Responding to a request for services from the Wood Creek Lodge HOA, SGM was contracted to conduct a comprehensive evaluation of the existing roof condition at the lodge. Assessment services provided by SGM included review of existing documents, interviews with knowledgeable maintenance staff, and onsite investigations of the roof structure and finishes.

Introduction

This document provides the results of SGM services performed which include documentation of deficiencies, estimated costs to correct identified deficiencies, and recommendations for alternative corrective actions.

In addition to providing the comprehensive condition assessment findings and documentation, SGM is submitting up-to-date as-built drawings generated from field measurements taken during the inspection process.

The assessment team for this effort included representatives from Crested Butte Lodging, a crew from Pinnacle Construction and engineering and support staff from SGM. The following identifies team members and roles performed:

- Jean –Luc Fouquet, Maintenance Manager Crested Butte Lodging
- Jerry Burgess representing SGM as the project manager and primary onsite engineer conducting inspection
- Pinnacle Construction: crew of 3 led by Pete – only onsite for the destructive investigation on August 18.

Dates of inspections: August 04, 2014 and August 18, 2014

Document Research

In response to a referral from Mr. Fouquet, a partial set of drawings were secured from Global Linings in Gunnison CO. Disparities were identified between the original drawings and actual current conditions. There was not enough documentation located to understand whether the differences were due to original roof construction failing to conform to construction documents, or if undocumented roofing reconfigurations may have occurred over the years. One critical detail discrepancy noted between original drawings and existing conditions, was the roofing system construction material. The historic drawings indicated that the flat portion of the roof was a metal standing seam

design; specifically identified on the drawings as a MR-24 roofing system. MR-24 is a metal roof specific to the Butler Company. It is suspect that the original design was wisely changed from the metal flat roofing to an EPDM.
Finally, Mr Burgess contacted the Carlisle Warranty department as a possible source for additional roof history information, as well as affirming whether any warranty benefits remained effective. The minimal records that Carlisle was able to locate indicated that the roof was installed in 1988. Because the original construction documents were released for building permit in 1979, and because the 1979 drawings did not include the covered porte-cochere structure at the entry, it is surmised that the roof section covering the entry structure, which was constructed in 1988, is the only roof section Carlisle had on file. That warranty is no longer effective.

Onsite Inspection/Evaluation
On Monday August 04, 2014, Mr Burgess and Mr Fouquet met onsite to begin the assessment process. Mr. Fouquet provided access and then departed. An accounting of the existing roofing system is described below:

> The existing roof consists of both flat sections of roof deck and steeply pitched sections. Pitched sections are metal, and are fairly steep (38-degree slope in some areas). 'Flat' sections consist of a black Carlisle 45 mil single ply membrane EPDM (ethylene propylene diene monomer) and are slightly pitched (1/4" per foot) to allow water to drain while retaining snow.
>
> EPDM has been used in the roofing industry for over 40 years. It is a type of synthetic rubber material formulated for roofing and other sealing applications. The roof structure consists of five distinct EPDM roofing sections (see existing condition's drawing)

The visual inspection by Mr. Burgess began at the highest roof deck (noted "Deck 1" on attached roof drawing). As indicated on the drawing, Roof Deck 1 is on the north (true NW) portion of the building. The progression of inspection moved from this point to each succeeding lower deck and finally to the porte-cochere roof deck where the visual inspection was completed.

After the initial onsite inspection and discussion with the maintenance staff, it was determined that water may have penetrated beneath the single ply membrane at and around the elevator shaft. To assure the roof structure substrate was sound in this location, and throughout the roof assembly, it was agreed that a section of the EPDM, underlayment board and section of wood roof deck would be removed for examination. This task was performed on August 18, 2014 with the work being performed by Pinnacle Construction.

Summary of Findings (detailed notes and photographs can be found in the appendix):

All indications are that the existing EPDM roofing material has served well over its lifetime as a protective barrier. However, visible small cracks and tears can be seen in several areas of the EPDM material signaling that the barrier is at the end of its service life. The deterioration is the result of age and exposure to our climate.

Based on available documentation and inspection of the roof sections, it is reasonable to conclude that the EPDM material on the main building was installed at the time of building construction (approx. 1980). I also suspect that the entry porte-cochere was constructed at a later date as noted above. The main building roof covering has provided a service life in excess of 30 years. Replacing or "recovering" the roofing is timely. Often building owners wait on a project like this until the roof experiences significant leaks and/or the roof deck has been compromised due to water infiltration. Our investigations did find water in the underlayment material. In all cases the plywood roof structure and underlying fiberglass insulation was not wet.

The destructive investigation performed on August 18, 2014 has determined the following:

- The roof section consists of the black EPDM over a fiber underlayment board, a layer of 3/8" gravel on ¾" plywood over 2"x12" roof joist. A plastic vapor barrier followed by drywall is located on the bottom of the roof joists. Fiberglass insulation is located between the 2x12 joists. The gravel was adhered to the plywood with a black asphaltic material.

- The roof deck was opened and exposed to the vapor barrier at three locations. In all locations, the fiber underlayment board was saturated with water. The saturation was more prevalent where the EPDM was cracked or torn. However, in one area where no tears were evident, the underlayment was wet. The plywood roof deck was dry as was the insulation and roof joist at all locations investigated.

Recommendations/considerations

At this point in time, replacing the roof single ply covering is imminent. This work needs to be performed in the near future. The timing should be this fall (2014) or spring of 2015. If the work is deferred past this fall some maintenance is recommended. At minimum, the small cracks and tears should be sealed with an elastomeric roof sealant. Sealant should also be applied at the EPDM termination bars (where needed) and where flashing has come loose.

After our evaluation of the roofing material and underlying materials it is our recommendation to remove the EPDM, underlayment, and gravel to the plywood roof deck. Our recommendation is to replace with a similar black EPDM product. We recommend upgrading the underlayment with a polyisocyanurate (polyiso) board for added insulation with a cover board (dens-deck) followed by the EPDM. The polyiso

product provides an R value of 5.7 per inch. For the Wood Creek lodge we recommend a minimum of 1.5". However, we will provide a cost estimate for an upgrade to 3".

Opinion of Construction Costs
(note: cost estimates based on information from 3 different roofing contractors. They include Pinnacle Construction, B&M Roofing and Topline Installers. All are qualified and would provide competitive bids.

Option 1:

- Remove and dispose of the EPDM membrane, underlayment, loose gravel, and BUR roofing down to the wood deck. Complete tear off and removal.
- Furnish and install new 2x6 wood nailers at the perimeter.
- Mechanically attach 1.5" polyiso using fasteners and plates.
- Adhere ½" thick Dens-Deck Prime using manufacturer's two part urethane adhesive.
- Adhere 90 MIL Black EPDM membrane using solvent based bonding adhesive.
- Furnish and install 24 gauge prefinished steel drip edge with 22 gauge hook at roof edges.
- Furnish and install 24 gauge prefinished steel counter-flashing at walls
- Remove and replace rain gutters where they currently exist
- Install new ice/snow melt on roof edges and in rain gutters
- Remove and replace metal roofing on steeper slopes, includes ice and water shield, flashing, color to match existing.
- 20 year full system manufacturers warranty for EPDM. (30 year available for additional cost of about $1,500)
- 10 year installers warranty on metal and EPDM installation.
- The bid documents will include an item for roof deck removal and replacement. This is for the situation where we find a section of plywood roof deck that has been damaged by water and needs to be replaced. We will include this bid item and only use it if absolutely needed. It is always better to get this price up front when contractors are bidding competitively.

Total budgetary cost: $ 86,000.00

Option 2

- Same as option 1
- Increase polyiso from 1.5" thickness to 3" thickness. Increases additional R value from 8.5 to 17.

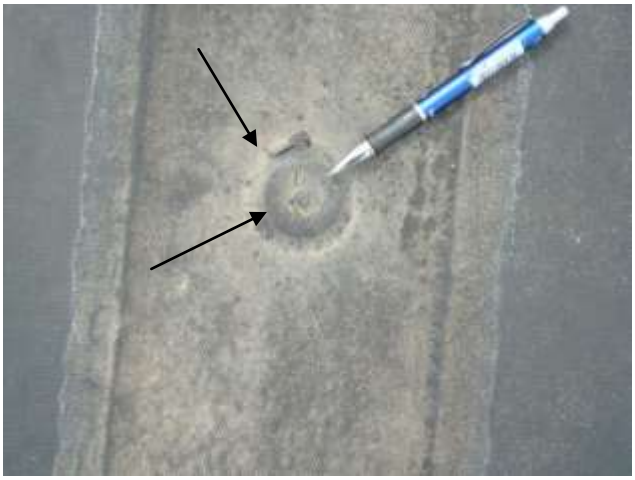
Total budgetary cost: $103,000.00

APPENDIX A – PHOTOS & SITE OBSERVATIONS

Observations Roof Deck #1

Roof Deck 1 overall photo. Photo depicts seams in the EPDM single ply roofing material, two of the three plumbing vents and the wireless LAN access point in the upper left corner.

PHOTO 1



Round spots are the EPDM over fasteners that attach underlayment board to the roof deck. Cracking and small cuts are depicted in this photo at the tip of the arrows. They are about a ¼" in length.

PHOTO 2

NW corner of upper roof deck. Photo attempts to depict a condition where the stucco at the corner is deteriorated to the point that water could penetrate (lower arrows). Attempts have been made to seal the stucco on these corners. Likewise, the seal between the edge metal and EPDM is starting to deteriorate (top arrow). Due to steepness of metal roof deck, unable to closely inspect the vertical corner or flashing. The metal roof deck appeared to be in fair condition.

PHOTO 3

Observations Roof Deck #2

Overall photo of Roof Deck 2 from Roof Deck 1. Patching from previous repairs are visible.

PHOTO 4

Roof Deck 2. Photo depicts snowmelt cable at roof edges and in rain gutters. This detail will be carried over into the replacement roofing.

PHOTO 5

This photo shows Roof Deck 2 from Roof Deck 1. There is a 10" step down from Roof Deck 2 to Roof Deck 3.

PHOTO 6

Same type of crack/cut at the covered fastener as noted on Roof Deck1. All roof sections had this condition at various locations.

PHOTO 7

Observations Roof Deck #3

Photo depicts snowmelt cable at eaves and rain gutters. Shown in PHOTO 11 below is "checking" in the EPDM surface. This was noted in this area.

PHOTO 8

A little more pronounced cut/crack. This IS an area where a cut was made into the roof deck to determine if water intrusion has caused problems.

PHOTO 9

Photo shows loose seams between EPDM. To avoid further damage these seams were not probed. They should not be loose.

PHOTO 10

Photo depicts loose seam and checking. Checking is hard to see in the photo but is a sign of aging EPDM subjected to conditions prevalent in Mt Crested Butte. This area will be investigated to the wood deck.

PHOTO 11

Observations Elevator Shaft Roof Deck

Recently installed elevator power ventilation unit. Photo shows temporary "ice and water shield" flashing between sheet metal vent and roof deck. This needs proper flashing.

PHOTO 12

Photo shows loose flashing below wood fascia. Also, metal edging with exposed fasteners. Single ply roofing manufactures today still use the edge metal to hold the single ply along edges but the edge metal is sealed with an adhesive applied membrane strip. Fasteners and metal (termination bars) are not exposed in more modern installations.

PHOTO 13

Observations Roof Deck #4

Roof Deck 4 exhibited similar small cracks as other roof decks.

PHOTO 14

Observations Porte-cochere Roof Deck

PHOTO 15

PHOTO 16

The entry porte-cochere roof deck exhibits minor ponding and similar small cracks as noted elsewhere. The ponding is not ideal but not overly concerning for this type of roofing material not over living space. This indicates that the other roof decks drain well. Often times flat roof decks will not drain and ponding can be problematic or allow water to sit over small cracks and seep into the deck underlayment.

Miscellaneous Observations

Top of wood column exposed to elements.

PHOTO 17

Photo depicts slope on roofing for drainage along with gutters, down-spouts and snowmelt cables. Good details that we will want to maintain.

PHOTO 18

Miscellaneous Observations

Weathered wood fascia and trim. Re-staining should be performed soon. Also, photo depicts aged metal deck.

PHOTO 19

Corner flashing damage.

PHOTO 20

Weathered fascia and trim. Re-staining should happen soon.

PHOTO 21

Roof downspout could bring significant water to this area. Is this problematic? Other downspouts could potentially drain water to areas where not wanted. This will be studied further as part of the building and grounds assessment.

PHOTO 22

Destructive Investigations of Roof Sections

Roof deck 3. Directly under the EPDM is a black underlayment that looks like a "celo-tex" material with a 3/8" gravel below. The underlayment material is identified by the arrows.

PHOTO 23

Same location as photo 23. Photo depicts EPDM pulled back, underlayment board, gravel, asphaltic material, plywood and insulation. The underlayment is wet. The underside of plywood, insulation and 2x12 joist are dry.

PHOTO 24

Roof deck 1. Underlayment was wet as was the gravel.

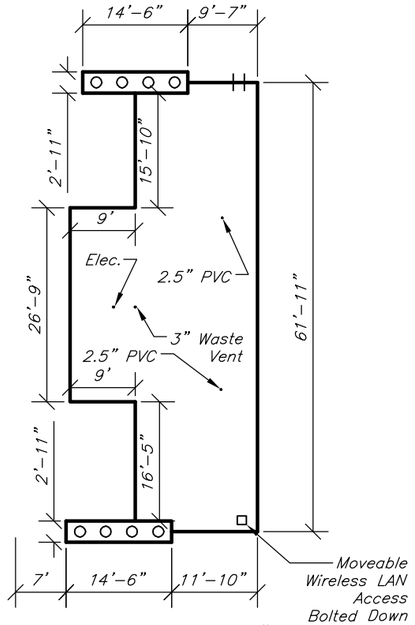
PHOTO 25

Same location as photo 23. Can't really tell in this photo but the underlayment board is completely saturated with water. Underside of Plywood, roof joist and insulation are dry.

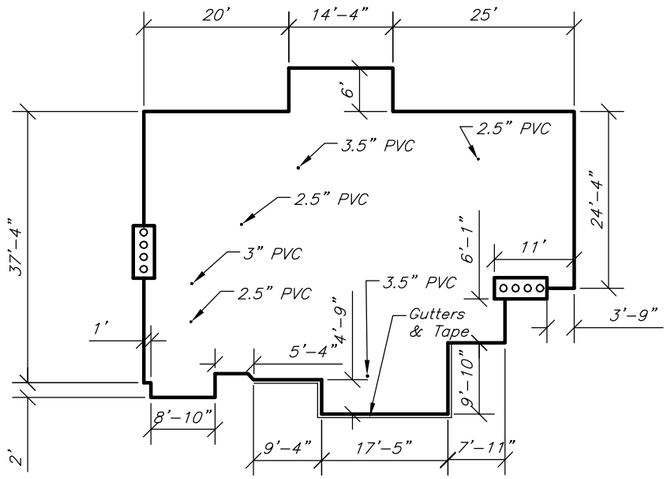
PHOTO 26

This is roof deck 2, at a location where no cuts or tears were visible. The underlayment and gravel was wet but not as saturated as locations where cuts were present. The dark areas on the underlayment is water brought up by the saw. The gravel in this photo is wet.

PHOTO 27

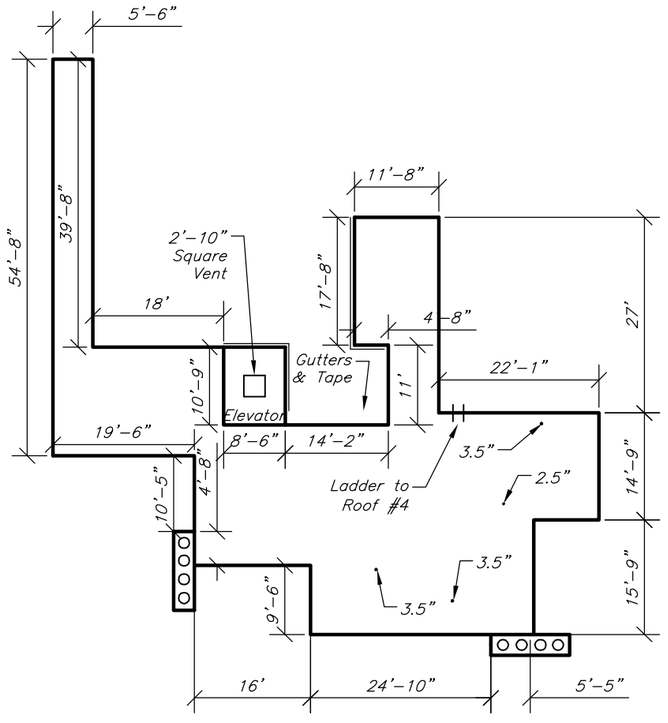


TOP ROOF DECK #1
AREA = 1265 SF

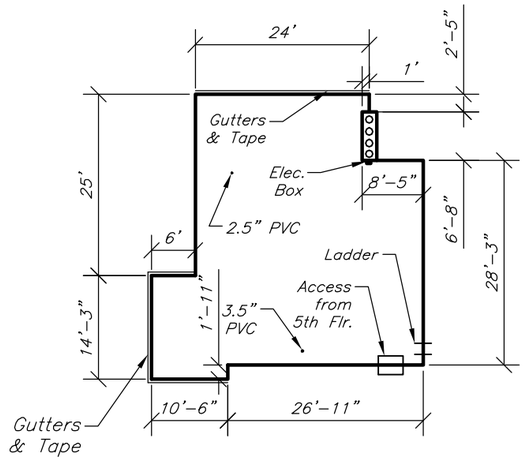


ROOF DECK #2
AREA = 2196 SF

PORTE COCHERE ROOF DECK #5
AREA = 691 SF



STEP DOWN ROOF DECK #3
AREA = 2278 SF



TOP ROOF DECK #4
AREA = 1193 SF

NOTES
1. Metal roof not shown.
2. All dimensions and areas are approximate.

Preliminary
Not For
Construction

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Wood Creek Lodge
Mt. Crested Butte

#	Revision	Date	By
1			

EPDM Roofing Replacement Layout

Job No.	2014 - 223		
Drawn by:	TW		
Date:	08/12/2014		
QC: JB	PE: JB		
File:	WoodCreek_BMarch		

1 Of 1

I:\2014\2014-223-Woodcreek Lodge\H_Dwgs\WoodCreek_BMarch.dwg Plotted: 8/28/2014 9:33 AM By: Tammy Warrick