

MICHIGAN
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CONDITION STUDY OF
MENOMINEE TOURIST LODGE

By

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Conducted by the Research Laboratory
in Cooperation with the Maintenance Division and
the Forestry and Botany Departments of Michigan State College

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CONDITION STUDY OF MENOMINEE TOURIST LODGE

At the request of Mr. Ralph Swan of the Public Relations Division, Mr. B. R. Downey of the Maintenance Division, and Mr. W. W. McLaughlin of the Testing and Research Division, in August 1949 the Research Laboratory undertook a study of the Highway Department's Tourist Information Lodge at Menominee. Research Project 49 G-48 was set up to cover an investigation of the extent and causes of damage to this structure, and recommendations for its restoration.

Circumstances leading to the above requests consisted mainly of a series of individual observations made by Department officials to the effect that various logs in the structure were undergoing deterioration. Within the past 3 or 4 years these observations were made with increasing frequency, and it became apparent that the deterioration was getting worse each year.

This report covers a comprehensive study of the actual condition of the lodge as it exists today. The study includes (1) a preliminary reconnaissance made by the writer, at which time samples were taken for laboratory evaluation; (2) diagnosis and recommendations made by the cooperating departments of Botany and Forestry at Michigan State College; (3) an exhaustive log-by-log survey conducted by the M.S.C. Extension Forester at Marquette; and (4) final recommendations by the Research Laboratory.

Recommendations include the probability that at least ten years of service can be expected from the building as it stands, and since deterioration is so widespread that nothing short of complete replacement would be justified, that nothing be done beyond maintaining the appearance

of the lodge and replacing only those logs which first deteriorate to the point of weakening the structure.

Preliminary Reconnaissance

In accordance with instructions, the writer visited the Tourist Lodge on August 29 and 30 for the purpose of making a preliminary reconnaissance and taking such samples as seemed necessary at the time.

Reference to Figures 1 and 2 shows the typical log construction of the lodge, Figure 1 showing the front (north) aspect and Figure 2 the rear (south) aspect.

Further reference to Figure 2 shows a whitish discoloration of the logs on the south side. This condition became a corollary to the main study, as the discoloration undoubtedly detracted from the appearance of the lodge, and Mr. J. C. Jenkins, Lodge Supervisor, particularly asked the Research Laboratory for a recommendation on restoring the south wall to a more normal rustic appearance.

Accordingly, through the cooperation of Mr. R. F. Rosatti, District Maintenance Engineer, and members of his maintenance crew, arrangements were made for a surface sample to be removed at the point marked "X" in Figure 3. Figures 4 and 5 show the extent of the sample.

Although the surface sample was removed primarily to serve as a laboratory specimen for further study of the whitish discoloration, examination of the residual log under the 1-inch layer removed showed that the interior of the log was rotted to a considerable depth. Figure 5 shows the extent to which a 1-inch wood chisel was pushed into the log with the bare hands.

It is worthy of note at this point that there was no outward indication that this particular log had deteriorated, both it and adjacent logs being hard, firm, and apparently sound from the outside.



Figure 1. Michigan State Highway Department Tourist Information Lodge at Menominee. Front view, facing north.



Figure 2. Rear view, south wall.



Figure 3. Portion of south wall. Sample removed at point marked "X".



Figure 4. Removing sample at point shown in Figure 3.

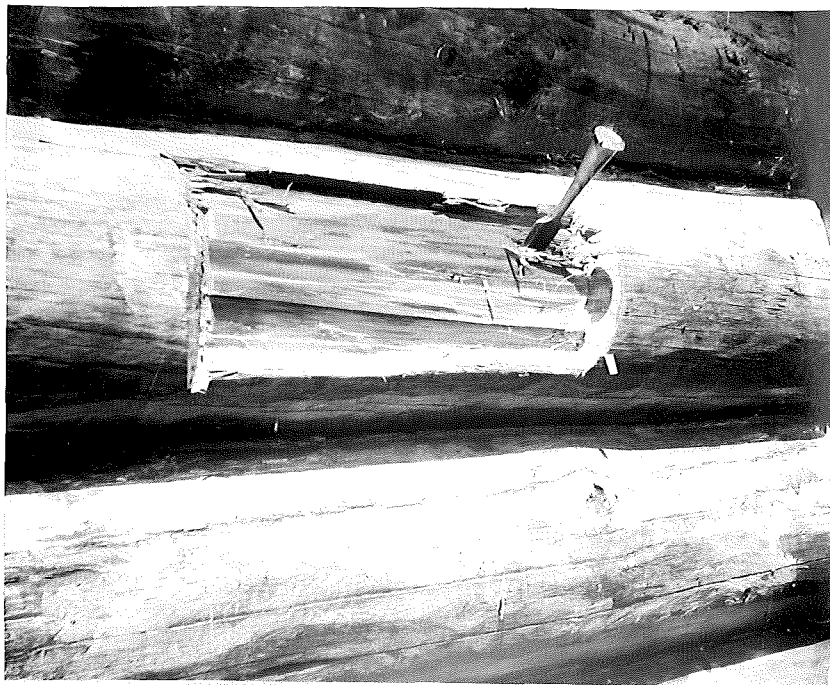


Figure 5. Condition of log after removal of 1-inch thick surface sample. Interior of log rotted to unknown depth.

There were, however, several logs whose outer layers were definitely yielding on pressure, possessing apparently hollow spaces near the surface "skin", and sounding "dead", "flat", or "hollow" on percussion. One such log was that located directly under the window sill in Figure 6, and this was typical of several of the worst logs in this respect. The same log seemed sound when examined from the interior of the building, as was true of every log in the structure.

It was decided to remove an approximately 3-foot section of this log between the points shown in Figure 6 and to submit the entire section to the Forestry, Entomology, and Botany Departments of Michigan State College for study and appraisal.

Removal of the section disclosed at once the extent of deterioration of the log. The outer, upper and lower third of the log consisted in the



Figure 6. Portion of north wall showing point at which section of log was removed for study at Michigan State College.

main of disintegrated punk, held together loosely by an outer 1/4-inch layer or skin, this skin being all that maintained the original contour of the log. Figures 7 and 8 show the cross-section of the log adjacent to the section removed.

As shown in the photographs, the central third of the log, and the third facing the interior of the building were in relatively sound condition.

As already mentioned, the logs facing the inside of the lodge were apparently all sound. There were scattered areas showing insect holes, as in Figure 9, but the logs themselves were hard and sound on percussion. Except for these few insect borings, no sign of deterioration could be found anywhere in the building.



Figure 7. Log adjacent to east end of section removed.



Figure 8. Log adjacent to west end of section removed.

Insect borings of the same type, however were visible with much greater frequency along the surfaces of logs composing the outside walls of the structure. Figure 10, taken later in the laboratory of a portion of the section removed for study, shows several such holes.



Figure 9. View of inside wall showing insect borings, sole evidence of any deterioration within the lodge.

The presence of insect borings and a history which included observations by many persons of the intermittent presence of insects in the building led the writer to consider insect infestation as a possible causal agency responsible for the widespread deterioration of the logs. Accordingly, a careful search was made for the presence of insects during the August visit, but only the long dead carcass of a single long horn wood borer could be found in the entire structure.

Diagnosis and Appraisal by M.S.C. Departments of Botany and Forestry

As soon as possible after the August visit, the samples were submitted to various cooperating departments of Michigan State College for appraisal.



Figure 10. Portion of section removed for study showing insect borings in exterior wall surface.

Entomology Department experts diagnosed the problem as being not one of insects, but rather one of fungus rot, stating that in recent years invasion of the timbers and logs by insects had been secondary to infestation by fungus organisms.

Inspection of the section of log by Dr. Strong, Forest Pathologist of the Botany Department, showed the destructive agent to be the fungus LENZITES SAEPIARIA. It was Dr. Strong's opinion that all of the deterioration in the building must have been the result of infestation by this fungus.

Dr. A. J. Panshin, Professor of Forestry, concurred with Dr. Strong in his diagnosis, and identified the section of log as spruce, consisting only of sapwood. The surface sample, taken to show the white discoloration, he identified as Norway pine.

On Dr. Panshin's recommendation and following a Highway Department

request, Professor P. A. Herbert, Head of the Forestry Department, agreed to instruct Mr. Roy E. Skog, M.S.C. Extension Specialist in Forestry at Marquette, to conduct a log-by-log survey of the entire building. Such a survey was considered necessary in order to determine the extent of the damage, so that the Forestry Department would have sufficient data to warrant making a recommendation regarding preservation of the structure.

Log-by-Log Survey of Lodge

The log-by-log survey was conducted on September 21 and 22 by Roy E. Skog, assisted by R. F. Rosatti and personnel of the Maintenance Division. The following findings were reported by Mr. Skog.

Procedure: An 8-inch long increment borer was used to make 150 borings into logs to detect decay. Soundings were made to supplement borings. All borings were taken from the outside of the lodge and so distributed as to obtain a good sampling of all walls, window casings, and door casings. Borings were made to a depth of half the diameter of the log, or slightly deeper in smaller logs. No borings were taken from the inside of the lodge to avoid marring the natural finish in the lounge and the plaster in the restrooms. When borings were made the holes were slanted upward and plugged with dry cedar to prevent them from collecting water and causing further decay. The survey commenced at the south-west corner of the lodge with the foundation log and progressed counter-clockwise. Each log was numbered consecutively with a lumber crayon. Where a log was cut into sections by a door or window the sections were considered together as one log. The results of borings and soundings were recorded in detail by Mr. Skog.

Summary of Findings

1. Decay is confined almost entirely to the exposed outside half of the log.
2. The protected indoor half of even the most decadent logs are sound.
3. Twenty logs are decadent to the extent that a portion of the exposed half is covered only with a shell that can be pressed in with the hand.
4. Twenty-three per cent of all wall logs are decadent to some extent.
5. The west and south sides are the most decadent, but all wall sections, except two, show some decay.
6. Decay is worst in the exposed upper quarter of a log where water can run down into open cracks.
7. Logs in the upper third of the wall, that are protected by eaves, are less decadent than the lower, more exposed logs.
8. Decadent logs are not always adjacent--some are separated by sound logs.
9. Window and door casings are sound, except for the casings of the basement door and the south double window.

Restoration Recommendations

The only way in which the lodge can be restored to soundness is by replacing the decadent logs. However, in the opinion of the person making the survey, this is too costly to be practical because the decay is so widespread and scattered. Furthermore, it is doubtful whether the added years of service that could be obtained by replacing decadent logs would offset the cost of such replacement. It is believed that it would

be less costly to use the building in its present condition, and when it is no longer serviceable replace it with another structure. Without any log replacement the lodge should be useable for at least another 10 years. This contention is based on the fact that the indoor half of even the most decadent logs are still sound.

The only effective method by which further decay can be checked is to treat the decadent logs with preservative under pressure, or by soaking the logs bodily in preservative for an extended period of time. These methods cannot, of course, be used because it is impractical to remove logs from the structure for this kind of treatment. Merely applying the preservative with a brush has little or no preservative value because the preservative does not penetrate deep enough to kill the fungi that cause decay.

At some time or other, cracks in logs have been filled with putty, and possibly other materials. It is questionable whether filling cracks in this manner has any preservative value. In fact, it might tend to hasten decay by trapping moisture and creating conditions favorable for decay.

The above findings reported by Mr. Skog have been reviewed by Professors Herbert and Panshin and have the approval and official sanction of the M.S.C. Department of Forestry. The full text of Mr. Skog's report will be found in the appendix.

Conclusions and Recommendations

In view of the findings and suggestions by Mr. Skog, the following recommendations are offered for the future maintenance of the building:

1. Only such surface treatments should be authorized as will tend to preserve or enhance the appearance of the lodge. This will in general consist of replacing, from time to time, the worst of the rotten logs, or portions thereof, as their continued

deterioration tends to weaken the structure or affect its appearance, and to apply only linseed oil for surface treating the logs.

2. The use of varnish or other special seal materials which impede the evaporation of moisture from rain or snow should be discontinued.
3. The whitish surface coatings on the south, east, and west walls, caused by the bleaching action of the sun's rays on resins in varnish materials, can be removed by wire brushing and scraping after preliminary softening with trichlorethylene.
4. Subsequent surface treatment for the scraped logs and for future exterior surface maintenance of the lodge should consist of successive applications of linseed oil only, rubbed into the wood. Linseed oil treatments should be continued until desired finish is attained. For better penetration on first coat, the linseed oil may be cut 50-50 with turpentine. Pentachlorophenol may also be added to the linseed oil in a concentration of about 5 per cent to prevent any surface mould. This would tend to preserve the outer portions of the logs and keep the skin intact. A stain material consisting of burnt umber may be added to the linseed oil, if desired, to produce harmony in the coloring of the logs.

APPENDIX

Survey of Decay in Menominee Tourist Lodge*

By Roy E. Skog, Sept. 21-22, 1949

South Side - West Section (30 ft. long)

Log No.	Log Dia. Inches	Species	Borings taken 3 ft. from west end of wall	Borings taken at middle of wall	Borings taken 3 ft. from east end of wall	Remarks
1	18	W. Pine	1. Punky to center	Punky to center	Sound	Foundation log
2	14	"	Sound	Punky 1st 2", then sound	Sound	
3	15	"	2. Sound 1st 7", then rot	Sound	Sound	Log below windows
4	13	N. Pine	Sound	Punky 1st 2", then sound	Sound	
5	14	W. Pine	Sound	Sound	Sound	
6	12	"	Punky 1st 2-1/2" then sound	Sound	Sound	
7	12	"	Sound	Sound	Sound	
8	12	"	Sound	Sound	Sound	
9	10	"	Sound	Sound	Sound	Log above windows
10	13	"	Sound	Sound	Sound	

1. Term "punky" means early stages of decay.
2. Term "rot" means decay so far advanced that the decadent wood can be crumbled in the hand into a powder.

* In a subsequent letter to Dr. Panshin, Mr. Skog admits the possibility that a few spruce logs may be present. B.W.P.

South Side - Gable entrance section (9 ft. wide). Nearly all the logs in this 3-walled entrance are 5 feet or less in length. Borings were taken at the mid-point of logs.

Log No.	Diameter	Species	Borings	Remarks
31	15	W. Pine	Sound	Foundation log
32	14	"	Sound	
33	14	"	Rot 1st 4", then sound	
34	12	"	Sound	
35	11	"	Sound	
36	11	"	Sound	
37	11	"	Sound	
38	15	N. Pine	Sound 1st 1", then rot	Foundation log
39	14	W. Pine	Sound	
40	13	"	Sound	
41	13	"	Sound	
42	12	"	Sound	
43	12	"	Sound	
44	13	"	Sound	
45	10	"	Sound	
46	10	"	Sound	
47	10	"	Sound	
48	17	"	Sound	
49	17	N. Pine	Sound 1st 1", then rot	Foundation log
50	16	W. Pine	Sound	
51	15	"	Sound	
52	13	"	Sound	
53	14	"	Sound	
54	12	"	Sound	
55	10	"	Sound	

South Side - East Section - (9 feet long)

Log No.	Diameter	Species	Borings and Soundings	Remarks
56	16	W. Pine	Sound	Foundation Log
57	13	"	Sound	
58	14	"	Sound	
59	14	"	Sound	
60	13	"	Sound	
61	14	"	Sound	
62	10	"	Sound	Over window
63	10	"	Sound	
64	12	"	Sound	

East Wing - East Wall (13 ft. long) Borings were staggered throughout the walls.

Log No.	Diameter (inches)	Species	Borings	Remarks
65	15	W. Pine	Punky 1st 1", then sound	Foundation log
66	13	N. Pine	Sound 1st 4", then rot	
67	13	W. Pine	Sound 1st 5", then punky	
68	13	N. Pine	Sound	Log below window
69	13	W. Pine	Sound	
70	13	"	Sound	
71	13	"	Sound	
72	12	"	Sound	
73	12	"	Sound	Log above window
74	10	"	Sound	
75	10	"	Sound	
76	8	"	Sound	
77	8	"	Sound	
78	8	"	Sound	
79	8	"	Sound	

East Wing - North Wall (Wall 10 ft. long). Borings were staggered throughout the wall.

Log No.	Diameter (inches)	Species	Borings	Remarks
80	16	W. Pine	Sound	Foundation log
81	15	"	Sound	
82	13	N. Pine	Sound	
83	13	W. Pine	Sound	
84	14	W. Pine	Sound	
85	14	W. Pine	Sound	
86	12	W. Pine	Sound	
87	9	W. Pine	Sound	
88	10	W. Pine	Sound	

East Side - Wall facing east adjacent to chimney (11-1/2 ft. long).
Borings staggered throughout the wall.

Log No.	Diameter (inches)	Species	Borings	Remarks
89	15	W. Pine	Sound 1st 4", then rot	Foundation log
90	14	"	Sound 1st 4", then punky	
91	12	"	Punky 1st 3", then sound	
92	15	"	Sound	
93	12	N. Pine	Sound	
94	12	W. Pine	Sound	
95	11	W. Pine	Sound	
96	13	"	Sound	
97	12	"	Sound	
98	12	"	Sound	

North Side - East Section (30 feet long). Borings were staggered throughout the wall.

Log No.	Diameter (Inches)	Species	Borings	Remarks
99	15	N. Pine	Sound	Foundation log
100	12	W. Pine	Punky 1st 1", then sound	
101	15	"	Sound	
102	10	"	Sound	
103	13	"	Sound	Log below windows
104	12	"	Sound 1st 4", then punky	
105	12	"	Sound	
106	12	"	Sound	
107	10	"	Sound 1st 3", then rot	
108	10	"	Sound	
109	10	"	Sound 1st 2", then punky 2", then sound	
110	10	"	Sound	
111	10	N. Pine	Sound	
112	10	W. Pine	Sound	
113	10	"	Sound	
114	10	"	Sound	
115	10	"	Sound	
116	10	"	Sound	
117	10	"	Sound	
118	10	"	Sound	

North Side - East Wall of Office Wing (9 ft. long). Borings staggered throughout wall.

Log No.	Diameter (inches)	Species	Borings	Remarks
119	17	N. Pine	Sound	Foundation log
120	14	W. Pine	Sound	
121	15	"	Sound	
122	12	"	Sound	
123	15	"	Shell, then rot to center	
124	11	"	Sound	Below window
125	12	"	Sound	
126	10	"	Sound	Above window
127	9	"	Sound	
128	12	"	Sound	

North Side - North Wall of office wing (11 feet long). Borings staggered throughout wall.

Log No.	Diameter (inches)	Species	Borings	Remarks
129	16	N. Pine	Sound	Foundation log
130	15	W. Pine	Sound 1st 5", then rot	
131	13	"	Shell, then rot	Log below window
132	13	N. Pine	Sound	
133	12	W. Pine	Sound	
134	12	"	Sound	
135	12	"	Sound	
136	11	"	Sound	
137	10	"	Sound	
138	10	"	Sound	
139	10	"	Sound	
140	10	"	Sound	
141	10	"	Sound	
142	10	"	Sound	
143	10	"	Sound	

North Side - West wall of office wing (11 ft. long). Boring made only where sounding indicated rot as this wall under porch appears sound.

Log No.	Diameter (inches)	Species	Borings & Soundings	Remarks
144	16	N. Pine	North end of log, 1" shell then rot	Foundation log
145	13	W. Pine	Sound	
146	13	"	Sound	Log below window
147	12	N. Pine	Sound	
148	12	"	Sound	
149	12	"	Sound	
150	13	"	Sound	
151	12	W. Pine	Sound	
152	10	"	Sound	Log above window
153	11	"	Sound	

North Side - Wall section under Porch (20 ft. long). Borings made only where soundings indicated rot as this wall under the porch appears sound.

Log No.	Diameter (inches)	Species	Borings and Soundings	Remarks
154	16	W. Pine	Shell, then rot at extreme west end of log	Foundation log
155	13	"	Shell, then rot at extreme west end of log	
156	15	"	Shell, then rot at extreme west end of log.	
157	12	"	Sound	
158	14	"	Sound	
159	13	"	Sound	
160	12	"	Sound	
161	13	"	Sound	
162	11	"	Sound	
163	12	"	Sound	

West side - Fireplace wall (20 ft. long). The fireplace and chimney extends up through center of wall. Borings were taken on each side of the chimney.

Log No.	Diameter (inches)	Species	Borings North of Chimney	Borings South of Chimney	Remarks
164	15	W. Pine	Punky	Sound	Foundation log
165	16	"	Shell, then rot	Punky and rot	
166	13	N. Pine	Shell, then rot	Rot 1st 6", then sound	
167	14	"	Rot 1st 5", then sound	Shell then rot	
168	13	"	Punky 1st 4", then sound	Punky 1st 4", then sound	
169	12	"	Sound 1st 2", then 2" rot, then sound	Rot & punky 1st 4", then sound	
170	12	W. Pine	Punky 1st 4", then sound	Rot 1st 3", then sound	
171	13	"	Sound	Sound	
172	13	"	Sound	Sound	
173	13	"	Sound	Sound	
174	11	"	Sound	Sound	
175	11	"	Sound	Sound	
176	10	"	Sound	Sound	
177	10	"	Sound	Sound	
178	10	"	Sound	Sound	
179	10	"	Sound	Sound	