INTRODUCTION

Warnock Hersey, at the request of Cascade Wood Products Inc. (Turncraft), has conducted testing on fluted wood columns and column bases as submitted to our Coquitlam laboratory.

PRODUCT DESCRIPTION

The following three styles of wood columns were axial load tested:

- Tuscan fluted column 6" nom. base diameter x 4'nom. height (2 tested)
- Fluted house column w/plug 8" nom. base diameter x 4' nom. height (3 tested)
- Fluted house column w/plug 10" nom. base diameter x 4' nom. height (3 tested)

The following five bases were tested in compression:

- Polyurethane 20" House Cap A (one tested)
- Polyurethane 24" House Base A (one tested)
- Fiberglass 22" House Base A (one tested)
- Fiberglass 24" Roman Doric Base B (one tested)
- Fiberglass 24" Roman Doric Base C (Marble) (one tested)

The following three column sections were tested for vacuum pressure delamination:

- Redwood Column Samples A, B, C
  - A - 8" OD nom. round x 1¼" nom. wall thickness 10 sections/glue lines
  - B - 8½" OD octagonal x 2" nom. wall thick. 8 sections/glue lines
  - C - 12¼" OD octagonal x 13¼" nom. wall thick. 12 sections/glue lines
PRODUCT DESCRIPTION - Continued

- Pine Column Samples Old glue
  - Old #1 Top - 7" OD nom. round x 1" nom. wall thick. 9 sections/glue lines
  - Old #1 Bottom - 7" OD nom. round x 1" nom. wall thick. 9 sections/glue lines
  - Old #2 Top - 6½" OD nom. round x 1" nom. wall thick. 12 sections/glue lines
  - Old #2 Bottom - 6½" OD nom. round x 1" nom. wall thick. 12 sections/glue lines
  - Old #3 Top - 6¼" OD nom. round x 1" nom. wall thick. 9 sections/glue lines
  - Old #3 Bottom - 6¼" OD nom. round x 1" nom. wall thick. 9 sections/glue lines

- Pine Column Samples Resorcinol glue
  - New #1 Top - 7½" OD nom. round x 1" nom. wall thick. 11 sections/glue lines
  - New #2 Top - 7½" OD nom. round x 1" nom. wall thick. 11 sections/glue lines
  - New #2 Bottom - 7½" OD nom. round x 1" nom. wall thick. 11 sections/glue lines
  - New #3 Top - 7" OD nom. round x 1" nom. wall thick. 11 sections/glue lines
  - New #3 Bottom - 7" OD nom. round x 1" nom. wall thick. 11 sections/glue lines

TEST RESULTS

Axial Load Tests on Fluted Wood Columns:

<table>
<thead>
<tr>
<th>Sample Description</th>
<th>Ultimate Load (lbs)</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Column - Base Dia. of 5½&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuscan 6&quot; x 44&quot; Sample No. 1</td>
<td>50,000</td>
<td>Samples split vertically as well as top section deformed.</td>
</tr>
<tr>
<td>Sample No. 2</td>
<td>44,100</td>
<td></td>
</tr>
<tr>
<td>Mid-Size Fluted Column - Base Dia. of 7½&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8&quot; x 53&quot; House Column Sample No. 1</td>
<td>10,000</td>
<td>Top section centre shattered.</td>
</tr>
<tr>
<td>Sample No. 2</td>
<td>10,900</td>
<td></td>
</tr>
<tr>
<td>Sample No. 3</td>
<td>12,100</td>
<td></td>
</tr>
<tr>
<td>Large Fluted Column - Base Dia. of 9&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10&quot; x 52&quot; House Column Sample No. 1</td>
<td>20,600</td>
<td>Samples split vertically with top section crushed.</td>
</tr>
<tr>
<td>Sample No. 2</td>
<td>20,600</td>
<td></td>
</tr>
<tr>
<td>Sample No. 3</td>
<td>20,700</td>
<td></td>
</tr>
</tbody>
</table>
TEST RESULTS - Continued

Compressive Load Tests on Bases:

The five column bases were tested in compression over the top surface area of the base to a maximum capacity of 25,000 lbs.

<table>
<thead>
<tr>
<th>SAMPLE DESCRIPTION</th>
<th>SURFACE AREA (IN²)</th>
<th>LOAD (LBS)</th>
<th>OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyurethane House Cap A</td>
<td>109</td>
<td>25,000</td>
<td>No signs of failure.</td>
</tr>
<tr>
<td>20&quot; x 20&quot; x 6&quot; High nom.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyurethane House Base A</td>
<td>171</td>
<td>25,000</td>
<td>No signs of failure.</td>
</tr>
<tr>
<td>24&quot; x 24&quot; x 6&quot; High nom.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibreglass House Base A</td>
<td>80</td>
<td>25,000</td>
<td>No signs of failure.</td>
</tr>
<tr>
<td>22&quot; x 22&quot; x 6&quot; High nom.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibreglass Roman Doric Base B</td>
<td>106</td>
<td>25,000</td>
<td>No signs of failure.</td>
</tr>
<tr>
<td>24&quot; x 24&quot; x 9¾&quot; High nom.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibreglass Roman Doric Base C</td>
<td>106</td>
<td>25,000</td>
<td>No signs of failure.</td>
</tr>
<tr>
<td>24&quot; x 24&quot; x 9¾&quot; High nom.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vacuum-Pressure Cycle Test:

The submitted column specimens for the vacuum-pressure cycle were tested in accordance with CAN/CSA-O177-M89 Structural Glued-Laminated Timber as follows:

1. The specimens were immersed in water at room temperature (18°-27°C) in the autoclave.
2. A vacuum of 0.085 MPa (25" mercury) was drawn and held for 2 hours.
3. A pressure of 0.515 MPa (75 psi) was applied for 2 hours.
4. The 2 hour vacuum and 2 hour pressure cycles were repeated.
5. The specimens were dried for a period of 88 hours in air at 27° ± 3°C and 25 - 30% Rh moving at a velocity of 60-90 m/min (approx. 200-300 feet/min).
6. The above steps 1 through 5 were repeated twice constituting three complete cycles.

Following the first cycle the following observations were made:

Redwood Column Samples A, B, C:

A - no delamination of glue joints
B - no delamination of glue joints
C - no delamination of glue joints
May 10, 1991

Turncraft
A Division of Cascade Wood Products Inc.
P.O. Box 2429
White City, Oregon 97503
U.S.A.

Attention: Mr. Forrest Collins

Dear Sir,

Re: Axial Load Capacity of Turncraft 10 inch Diameter Columns

Warnock Hersey has conducted Compressive Axial Load testing on Turncraft 10 inch diameter Ponderosa Pine Wood columns. The test results are included in our report to Turncraft dated April 10, 1991, (see attachment).

Based on the test results obtained by Warnock Hersey, we have determined a load capacity for the Turncraft 8 foot high, 10 inch diameter Ponderosa Pine wood columns.

AXIAL COMPRESSIVE LOAD CAPACITY - 10,575 lbs.

The load capacity is based on the lowest test result obtained divided by a safety factor of (4). The columns tested were made of Ponderosa Pine staves laminated together using National Casien Type I waterproof adhesive.

If you have any questions or require any further information, please contact us.

Yours truly,

WARNOCK HERSEY PROFESSIONAL SERVICES LTD.

Lawrence Gibson, P.Eng.
Laboratory Manager

LG/cr

Encl.
Axial Load Testing

Coquitlam Laboratory

50484-C7-766500

Turncraft
A Division of Cascade Wood Products Inc.
P.O. Box 2429
White City, Oregon 97503
Revised: April 26, 1991
Attention: Mr. Forrest Collins

INTRODUCTION

As requested, we have conducted Axial Load tests on seven wood columns of varying diameter and length submitted to our Coquitlam Laboratory by Turncraft.

TEST RESULTS

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>PRODUCT CODE</th>
<th>SIZE</th>
<th>FAILURE LOAD (lbs)</th>
<th>WOOD TYPE</th>
<th>ORDER OF TESTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1068</td>
<td>6&quot; dia. x 8' 1g</td>
<td>26,100</td>
<td>Ponderosa Pine</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>1068</td>
<td>6&quot; dia. x 8' 1g</td>
<td>18,100</td>
<td>Ponderosa Pine</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>1088</td>
<td>8&quot; dia. x 8' 1g</td>
<td>26,100</td>
<td>Ponderosa Pine</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>1088</td>
<td>8&quot; dia. x 8' 1g</td>
<td>76,800</td>
<td>Red Fir</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1110</td>
<td>10&quot; dia. x 8' 1g</td>
<td>52,500</td>
<td>Ponderosa Pine</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>1110</td>
<td>10&quot; dia. x 8' 1g</td>
<td>42,300</td>
<td>Ponderosa Pine</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>1112</td>
<td>10&quot; dia. x 12' 1g</td>
<td>44,400</td>
<td>Ponderosa Pine</td>
<td>7</td>
</tr>
</tbody>
</table>

OBSERVATIONS

Column bases were crushed when loaded to approximately 80% of the failure load. Columns failed when cracks developed between staves and wood split longitudinally.

WARNOCK HERSEY PROFESSIONAL SERVICES LTD.

Ken Zeleschuk
Technician
Materials Testing Division

K2/cr
United States Testing Company, Inc.
Engineering Services Division
291 FAIRFIELD AVENUE - FAIRFIELD, NEW JERSEY 07006 - 201-575-5252

REPORT OF TEST

CLIENT: Fypon, Inc.
P.O. Box 365
22 West Pennsylvania Ave.
Stewartstown, PA 17363

SUBJECT: Physical Properties

REFERENCE:

SAMPLE IDENTIFICATION:
Three (3) samples of caps and bases were submitted and identified by the Client as:

1) 16" Cap and Base
2) 18" Cap and Base
3) 20" Cap and Base

TEST PERFORMED:
The submitted samples were tested for Compression Properties in accordance with Standard Laboratory Procedure.

Testing Supervised by: SIGNED FOR THE COMPANY

Frank De Santis
Project Engineer

Frank Pepe
Assistant Vice President

Laboratories in - New York - Chicago - Los Angeles - Richland - Tulsa - Modesto - Orlando
United States Testing Company, Inc.

Engineering Services Division
291 FAIRFIELD AVENUE - FAIRFIELD, NEW JERSEY 07006 - 201-575-5252

REPORT OF TEST

CLIENT: Fypon, Inc.
P.O. Box 365
22 West Pennsylvania Ave.
Stewartstown, PA 17363

Number - 94177A
September 8, 1986

TEST RESULTS

<table>
<thead>
<tr>
<th>Sample</th>
<th>Ultimate Compressive Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) a) Base</td>
<td>46,050 lbs</td>
</tr>
<tr>
<td>b) Cap</td>
<td>47,200 lbs</td>
</tr>
<tr>
<td>2) a) Base</td>
<td>51,400 lbs</td>
</tr>
<tr>
<td>b) Cap</td>
<td>52,400 lbs</td>
</tr>
<tr>
<td>3) a) Base</td>
<td>66,800 lbs</td>
</tr>
<tr>
<td>b) Cap</td>
<td>72,200 lbs</td>
</tr>
</tbody>
</table>

Pg. 2
REPORT OF: Axial Load Tests

AT: Coquitlam Laboratory

PROJECT: Porch Posts

REPORTED TO: B.W. Creative Wood Ind. Ltd.
23282 River Road
Maple Ridge, B.C.
V2X 7H6

DATE April 6, 1987

INTRODUCTION:

As requested, we have conducted Axial Load tests on nine samples of Wooden Porch Posts submitted to our laboratory by B.W. Creative Wood Ind. Ltd.

The maximum axial load capacities were determined for the following samples of porch posts:

1. #3049 - 3 3/8 inch square base, 9 foot post
   3 samples

2. #3059 - 4 1/4 inch square base, 9 foot post
   3 samples

3. #3069 - 5 1/4 inch square base, 9 foot post
   2 samples

4. #3168 - 5 1/4 inch square base, 8 foot post
   1 sample

.../2
### TEST RESULTS:

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>ULTIMATE LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>3049-1</td>
<td>11,400 lbs.</td>
</tr>
<tr>
<td>3049-2</td>
<td>10,255 lbs.</td>
</tr>
<tr>
<td>3049-3</td>
<td>10,535 lbs.</td>
</tr>
<tr>
<td>3059-1</td>
<td>20,360 lbs.</td>
</tr>
<tr>
<td>3059-2</td>
<td>22,600 lbs.</td>
</tr>
<tr>
<td>3059-3</td>
<td>19,800 lbs.</td>
</tr>
<tr>
<td>3069-1</td>
<td>27,100 lbs.</td>
</tr>
<tr>
<td>3069-2</td>
<td>25,400 lbs.</td>
</tr>
<tr>
<td>3168-1</td>
<td>22,045 lbs.</td>
</tr>
</tbody>
</table>

**Note:** These results are the maximum ultimate compressive axial load, no safety factor has been applied.

---

**WARNOCK HERSEY PROFESSIONAL SERVICES LTD.**

**Reported by:**

P. Arnold,  
Technician

**Reviewed by:**

F. Mawani, P. Eng.,  
Manager  
Field Inspections and Physical Testing

PA/tr/87.04.08  
430.D1.FC  
cc: Charlie Chow
INTRODUCTION

As requested, we have conducted Wood Column testing on twelve wood columns submitted to our Coquitlam Laboratory by Turncraft.

TEST RESULTS

<table>
<thead>
<tr>
<th>SAMPLE IDENTIFICATION</th>
<th>LENGTH</th>
<th>BREAKING STRENGTH (LBS)</th>
<th>OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N148</td>
<td>8'</td>
<td>11,200</td>
<td>Spindle/wood joint failure</td>
</tr>
<tr>
<td>2. N148</td>
<td>8'</td>
<td>10,100</td>
<td>Spindle failure</td>
</tr>
<tr>
<td>3. N158</td>
<td>8'</td>
<td>22,300</td>
<td>Spindle failure</td>
</tr>
<tr>
<td>4. N158</td>
<td>8'</td>
<td>22,800</td>
<td>Spindle/wood joint failure</td>
</tr>
<tr>
<td>5. N168</td>
<td>8'</td>
<td>26,000</td>
<td>Stave failure</td>
</tr>
<tr>
<td>6. N168</td>
<td>8'</td>
<td>26,600</td>
<td>Cracking between staves</td>
</tr>
<tr>
<td>7. N149</td>
<td>9'</td>
<td>3,800</td>
<td>Wood joint failure</td>
</tr>
<tr>
<td>8. N149</td>
<td>9'</td>
<td>5,900</td>
<td>Spindle failure</td>
</tr>
<tr>
<td>9. N159</td>
<td>9'</td>
<td>16,000</td>
<td>Cracking between staves</td>
</tr>
<tr>
<td>10. N159</td>
<td>9'</td>
<td>12,300</td>
<td>Spindle failure</td>
</tr>
<tr>
<td>11. N169</td>
<td>9'</td>
<td>21,300</td>
<td>Spindle failure</td>
</tr>
<tr>
<td>12. N169</td>
<td>9'</td>
<td>20,200</td>
<td>Spindle failure</td>
</tr>
</tbody>
</table>

WARNock HERSEY PROFESSIONAL SERVICES LTD.

Ken Zeleschuk, A.Sc.T.
Technologist
Materials Testing Division

KZ/gr