Mixed use urban buildings often combine parking and retail uses on the ground level with residential uses above. Wood construction can help maximize value to the community, the environment and the development team. This case study looks at a recently completed mixed use podium style building that utilizes wood Type VA Construction.

- The Story behind the Design
- Wood use Drivers
- Code analysis including opportunities and constraints
- Green/Sustainable benefits
- Dimensional Drivers associated with different uses
- Structural issues associated with a wood podium
- Design for management of wood for the long term

Presented by Michael F. Malinowski, AIA, principal of 30 year old Applied Architecture Inc in Sacramento. Mike specializes in residential, mixed use and historic adaptive reuse work. He is a member of the Woodworks Advisory Panel, aecKnowledge Editorial Committee, 2009/2010 AIACC VP Communications/Public Affairs, founded the long running AIACV Code Conversation program, and has served over a decade on Sacramento’s Development Oversight, Preservation and Design Review Commissions. www.appliedarchitecture.net
Learning Objectives

At the end of this program, participants will be able to:

1. Participants will analyze the code study including the opportunities and challenges for wood use in this project and be able use that knowledge to specify this type of system in the future.
2. Attendees will learn the motivational drivers associated with the use of wood for this project and why they may consider it on future projects vs. typically specified systems.
3. Participants will discover the structural challenges associated with a wood podium as designed in this project and gain a better understanding of the collaboration necessary with the structural engineer.
4. Participants will understand how the building was designed for durability and longevity using non-traditional systems and methods.

What is the Story?

Design should start with the place and the story. What is the story of Galt?

Welcome to Galt ...

Railroad was the Beginning; the Heart
Most residents believe the 'heart' of Galt is the intersection of Lincoln and C Street. What is the Character to that Heart???

Downtown Revitalization and Historic Preservation Specific Plan

Adopted by Resolution No. 95-120, September 5, 1995

Prepared For:
CITY OF GALT

...then came the highways...
Citizens felt the Heart of Galt was at Lincoln and C Street.

The Street Grid defined the ‘Heart’ of Galt.

The Original Heart of Galt

The Original Stories of Galt
Downtown Galt presented an ideal location for a public/private partnership driven mixed use project including Senior Affordable Housing and retail/restaurant/commercial uses.

From the August 2007 General Plan workshop:

• **Restore the Downtown**

• **High Quality Design that respects the image and character of Downtown**

• **Foster a Unique sense of PLACE**
Site Selection

• “Guthmiller Auto Repair” : an ideal candidate for redevelopment and revitalization

Site Usage Geography

- Services
- Residential
- Project Area
- Key Retail
- Parking
- Storefronts

Financial Drivers

Affordable Housing versus ‘Typical Development’

• Typical Development: More Project area = more units - means lower unit costs (fixed costs like land are spread over more project area) and increasing feasibility
• Affordable Housing: more project units and area typically means higher total costs (each unit requires a public investment) which can lower feasibility
Ground Level Plan

Code Check
Section 1026 Emergency Escape and Egress

2007 Code: 1026.1
Basements and Sleeping Rooms below the fourth story above grade must have at least one exterior emergency escape and rescue opening such openings shall open directly into a public way or to a yard or court that opens to a public way.

Exceptions:
- Atrium balcony
- Basements with less than 80 inches height
- High rise
- Where there is an exit door that opens directly into a public way, yard, court or exterior exit balcony that provides access to a public way
- Non-habitable basements

2010 Code: Section 1029
Added a new exception
For groups R1 and R2 constructed of Type I, IIa, IIIa or IV with sprinklers throughout.

It appears that apartment buildings with no windows are possible using this exception as long as the provisions in Chapter 12 for mechanical ventilation and artificial light have been complied with.

Need a specific layout for detailed feasibility investigations.
The Real Price of Lumber is The Lowest in History, Thanks To Advanced Time-Saving Technology
Jan 26, 2009

Dr. Mark J. Perry

Real Price of Lumber, 1891 - 2000

Lumber Pricing making

DMk J P

Included with permission of author

509.2 Conventional type I podium level (one story) with ‘separate building’ above; max height as per 503 for ‘the building having the smaller allowable height’

509.3 Two parking levels; no other occupancy (N/A)

509.4 Parking of Type I or open parking of type IV (one story above grade) Number of Stories measured from to podium

509.5 R-2 building of type IIIa Construction: 6 story allowed and 75 feet; first floor above basement requires fire rating of 3 hours and the floor area is subdivided by 2 hour walls into areas less than 3000 sq ft

509.6 Type IIA construction: allows up to 9 stories/100ft with 50’ separation and other provisions

509.7 Open parking below Group R Height and area above the open parking garage per section 503; height measured from grade plane including both the garage and the building above the garage. Garage area / height per 406.3 Open parking garages must be of construction types I, II or IV

Two levels residential over parking/commercial “Podium”: look at Section 509 “Special Provisions”

Consider Wood

and other values

- Value to environment: sustainability contribution
- Value to community: help achieve the social objective
- Value to development team: saving time and money
- Value to design team: contribute to project success

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- Value to environment: sustainability contribution
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- Value to design team: contribute to project success
Will the parking work?

509.7 Open parking below Group R
Height and area above the open parking garage per section 503; height measured from grade plane including both the garage and the building above the garage.
Garage area / height per 406.3

Enclosed Garages: 406.4
Height and area as per table 503 as modified by sections 504, 506, and 507
Type V is OK for S2 Occupancy per table 503

So Parking Garage is OK in Type VA construction as long as it is ENCLOSED
For enclosed garages: Ventilation must be provided as per the California Mechanical Code

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Ventilation Systems required for Enclosed Garages

- Mech Code: 403.8 Exhaust Ventilation for Enclosed Parking Garages. Exhaust airflow for enclosed parking garages shall be provided in accordance with the requirements in Table 4-4 and this Section. Exhaust makeup air shall be permitted to be any combination of outdoor air or transfer air.

Table 4-4
Parking garages 0.75 cfm / sq ft

- 403.8.2 Alternative Exhaust Ventilation for Enclosed Parking Garages. Mechanical ventilation systems used for enclosed parking garages shall be permitted to operate intermittently where the system is arranged to operate automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices.

- Part natural and part mechanical ventilation permitted by code

Final result: 10,000 cfm system ...cost about 10K
**Section 506.4.1 Mixed Occupancies: CA amendments**

**Wording in 2007**

CA code was not very clear: SFM occupancies limited to 2; others limited to 3.

**Wording in 2010**

CA code less ambiguous: SFM occupancies limited to 2; others limited to 3.

---

For other than Group A, E, I, L and R occupancies, high-rise buildings, and other applications listed in Section 1.11 regulated by the Office of the State Fire Marshal, buildings with more than three stories above grade plane, the total building area shall be such that the aggregate sum of the ratios of the actual area of each story divided by the allowable area of such stories based on the applicable provisions of Section 508.1 shall not exceed 3.

For Group A, E, I, L and R occupancies, high-rise buildings, and other applications listed in Section 1.11 regulated by the Office of the State Fire Marshal, buildings with more than two stories above grade plane, the total building area shall be such that the aggregate sum of the ratios of the actual area of each story divided by the allowable area of such stories based on the applicable provisions of Section 508.1 shall not exceed 2.

**Note:**

- A = A tabular + At * frontage increase
- (.5672) + At * sprinkler increase 2 for multistory
- Ratio for any floor can’t exceed 1
- Ratio for entire building can’t exceed 2 In California
- For State Fire Marshall Occupancies (3 under IBC)

**Exception:** Unlimited area buildings in accordance with Section 507.
Area: probably includes what is bound by outside face of exterior walls. Include open areas covered by roof ... but ok to exclude ‘vent shafts and courts’ per definition in 502.1
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The criteria for "heavy timber" (E7) construction are based on the past performance of historical structures, not on the scientific estimates contained in ASTM E 136 and E 195. These buildings have a good empirical performance record in fires. The insurance industry promoted the construction of this type of buildings during the late 1880s and into the 1890s to limit their fire losses.

Illustration used with permission of author

A key element of heavy timber construction is that there are no concealed spaces in the building elements. This prevents the fire spreading through concealed areas, and propagating unchecked. This is part of the system of this type of construction to prevent a sudden structural collapse.

Illustration used with permission of author

Another valuable resource

Illustrations used with permission of author
Illustration used with permission of author

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Area Increase Due to Frontage (506.2)

\[ I_r = \frac{F - 0.25 \times W}{P} \times \frac{30}{W} \]

1. If \( I_r > 1.5 \)
   - WRONG!

2. If \( 0.75 < I_r < 1.5 \)
   - Check Sec. 507, then \( I_r \)

3. If \( I_r \leq 0.75 \)
   - Check \( I_r \) Calculation

Slide used with permission of Ara Sargsyan

Advantages of putting your own code check spreadsheet together

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What does Success Look Like?

- **Functional** success: Safe, comfortable, and attractive affordable housing for active seniors
- **Commercial** success for business at street edge
- **Social** success: a return on public investment. Streetfront vitality; revitalization of the area; rediscovery by citizens of Galt’s heart
- **Management** success: long term vitality and viability of use
- Inspire more improvements: a spreading “good” in contrast to spreading “blight”

Why Wood?

**Value**

- Value to environment: sustainability contribution
- Value to community: help achieve the social objective
- Value to development team: saving time and money
- Value to design team: contribute to project success

Understanding the carbon footprint of wood and paper products

Presented to:
State of California, Department of General Services
EPP Task Force PCRC Paper Forum
Wednesday, June 24, 2009

By: Reid Miner
NCASI, Research Triangle Park, NC, USA
With significant contributions from
Kenneth Skog, Linda Heath, and James Smith of the USDA Forest Service
And Brad Upton, Jay Unwin, and Van Maltby of NCASI

![Carbon stocks in US Forests are stable or increasing](chart.png)

Almost all industry wood comes from these forests.

Environmental Values
Bob Chase AIA LEED AP, Green Rater, Former Sacramento Chief Building Official

Galt Place is a great example of
Smart Growth

• Mixed Use
• Infill and Urban
• Encourages transportation choice - car, bus, walk, bicycle
• High in Resource Efficiency: low energy and land use, support existing infrastructure
• Quality Design that creates a sense of place

Jason Behrmann
Galt City Manager

comments

ProForma Drivers

Public/Private Partnership can put the numbers in a different perspective

• In this case: income from the users does not carry the project proforma alone. Some uses (commercial) discounted; and the residential use is ‘cash flow’ neutral.

• Lowering Construction Cost decreases subsidy needed and/or increases the number of units/public benefit.
Design Numbers

- Over 13,000 +/- sq feet of ground level retail, restaurant, commercial and lobby/residential multipurpose spaces
- 64 - 1 bedroom apartments of 550 sq ft +/-
- 17 - 2 bedroom apartments of 790 sq ft +/-
- 81 total apartments (includes one on-site manager unit)
- Rents from approximately $329 to $849 per month
- 70 parking spaces on site - consistent with city standards for this type of development.

Financing

- Affordable housing requires Public-Private partnership

<table>
<thead>
<tr>
<th>Galt Place</th>
<th>Tracy Place</th>
<th>Sacramento</th>
<th>Elk Grove</th>
<th>Stockton</th>
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<tbody>
<tr>
<td>Loan per Unit</td>
<td>$31,250</td>
<td>$88,000</td>
<td>$108,200</td>
<td>$89,000</td>
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<tr>
<td>Number of Units</td>
<td>81</td>
<td>50</td>
<td>147</td>
<td>84</td>
</tr>
<tr>
<td>Total Loan</td>
<td>$2,500,000</td>
<td>$4,400,000</td>
<td>$15,905,400</td>
<td>$7,476,000</td>
</tr>
</tbody>
</table>
Talking about the Engineering Effort

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Jason Rikard Project Superintendent
Talking about some things to keep in mind

Talking about coordination issues and impact on project timeline

Talking about inspection issues

Talking about initial concerns with the wood based design approach
Challenges

- **Fire:** biggest risk is during construction
  - Activation of sprinkler system progressively during the course of construction is important; floor by floor system activation while construction continues
- **Durability:** monitoring the condition of wood
  - One advantage of leaving major members visible
- **Finding Weak Links in the Chain**
  - Parking area columns for example
- **Higher? Larger?**

Looking down the road:

- A new look at Type IV: testing for more mainstream use and basis for alternate means
- Code analysis tools including public domain
- Database of case studies and alternate means approaches on a web platform like aecKnowledge
- Your ideas? Contact Woodworks.org!
GALT PLACE SENIOR APARTMENTS
55+ Active Retirement Living

Qualified households must be 55 years of age or older AND consist of income within the following ranges:

<table>
<thead>
<tr>
<th></th>
<th>1 Person</th>
<th>2 Person</th>
<th>3 Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>60% Income Level</td>
<td>$23,500</td>
<td>$36,900</td>
<td>$40,500</td>
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<tr>
<td>55% Income Level</td>
<td>$23,950</td>
<td>$37,950</td>
<td>$37,180</td>
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<tr>
<td>50% Income Level</td>
<td>$26,300</td>
<td>$40,050</td>
<td>$38,800</td>
</tr>
<tr>
<td>30% Income Level</td>
<td>$33,740</td>
<td>$46,330</td>
<td>$32,380</td>
</tr>
</tbody>
</table>

Current rents:

- 1 Bedroom: $754
- 2 Bedroom: $802
- 3 Bedroom: $819

Apartment Amenities:
- Ceiling fans in bedrooms & living room
- Central AC & heat

Jason Behrmann
Galt City Manager
Comments on Downtown Revitalization

Now Open 891-244-7755
**Resources**

- Building Codes Illustrated (Winkel/Ching)
- Ara4help.com (Courtesy of Ara Sargsyan)
- Woodworks.org: using wood in large structures

- Mike Baker structural  
  – mikeb@bakerguptil.com
- Mike Malinowski AIA  
  – office@appliedarts.net
Questions?

This concludes The American Institute of Architects Continuing Education Systems Course.

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Mike Baker Engineer  mikeb@bakerguptil.com