

Green Products and Systems with an EarthCraft Housing Development ... Plus ... Wood Waste and Potential Recycling



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We are pushing wood, green products and green systems!



We are trying to be realistic and
forward thinking and doing ...

Our Path Today

- To cover the following with ties to hardwoods
- A Green housing Development
- The Green Certification Program
- Where and how green products fit or don't
- Some of the Construction
- The "waste products"
- The results at this point of our study
- Some recycling options
- Back to hardwoods and reality

In our study later in this talk we will ...

- Characterize the wood waste generated during the building of “green homes”
- Talk about recycling options
- But let us first look at the “Green” Housing Development



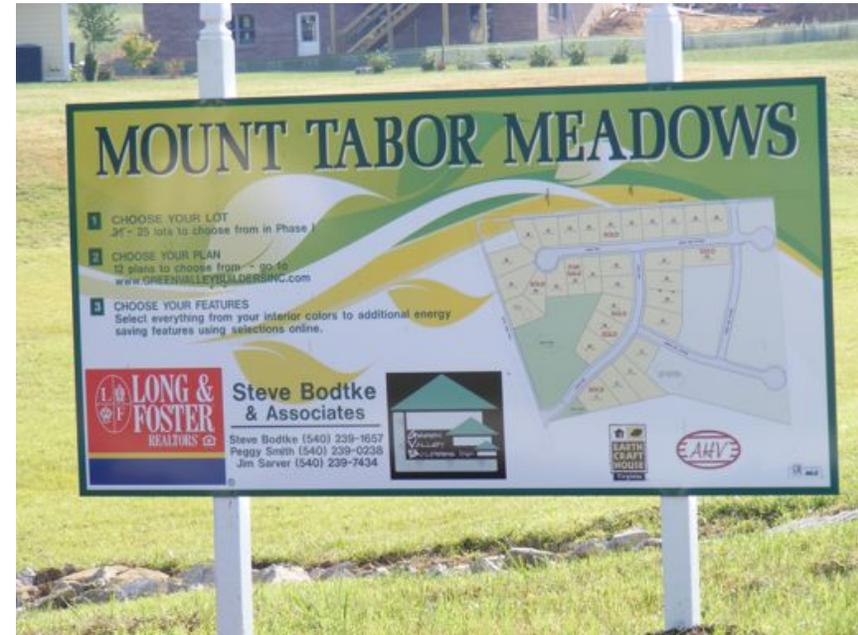
Mount Tabor Meadows

Blacksburg, VA's First "Green Development"



- A brand new housing development in Blacksburg, Virginia with Phase 1 currently under way.
- 49 lots with twelve different house plans to choose from.
- Homes will be certified EarthCraft House with a focus on environmental standards.

Mount Tabor Meadows – Green Valley Builders, Inc.



Development layout showing the 49 lots in Phase 1



Jason Boyle – The Developer/Builder



They are Certified to build EarthCraft Houses



- A voluntary green building program that serves as a blueprint for healthy, comfortable homes that reduce utilities bills and protect the environment.
- Any size and type of home can be an EarthCraft House. The guidelines are flexible enough to allow for a variety of approaches to environmental construction.
- Program was created in 1999 as a partnership between the Greater Atlanta Home Builders Association and Southface Energy Institute. In Virginia, the single family program is administered by a partnership between EarthCraft Virginia and the Home Builders Association of Virginia.

Why buy green?

ADVANCED FRAMING

Most homes with traditional framing have problem areas in the corners and where interior and exterior walls meet due to excess wood. This can create cold or hot spots because there is no insulation in these areas.

We use advanced framing techniques like using 2x6 studs on 24" centers, two-stud corners and ladder framing to allow more insulation in the wall, reduce waste and conserve natural resources. According to the U.S. Department of Energy, advanced framing techniques can save \$500 in material costs per 1,200 square feet of house, shave 3-5% off of labor costs, and reduce annual heating and cooling costs by 5%.



EFFICIENT HVAC EQUIPMENT

Most traditional homes have HVAC equipment located in unconditioned areas such as vented attic, crawlspace or uninsulated utility. Energy Star states that 20% of conditioned air is lost through leaky ductwork in traditional homes.

All of our HVAC equipment is installed in conditioned areas, and we also require that all ductwork is sealed and tested to not leak more than 6%. We also properly size all HVAC equipment for maximum efficiency and comfort, so that you don't have a unit that is too big or small for your home.



BETTER INSULATION & AIR SEALING

While other homes built to code standards offer R-13 fiberglass insulation in the walls, our standard package includes R-21 to make homes healthier, more comfortable and more energy efficient.

We use spray-in insulation products such as cellulose and soy-based foam to offer better thermal performance and stop air infiltration. While these insulation choices can improve energy efficiency by as much as 30%, they also have high recycled and renewable content, which offers a better choice for lower environmental impact.



ENERGY EFFICIENT FIXTURES

All of our windows, doors and appliances are Energy Star. Each home has a Kinul tankless gas water heater, which is extremely efficient because it runs only when hot water is needed unlike traditional water heaters that use energy at all times.

We also offer Energy Star lighting options and a Solar Thermal System as an upgrade. Solar Thermal Systems utilize the warmth of the sun to convert heat to your water. Since heating water accounts for 30% of a home's energy use, this can provide great savings to your monthly electric bill.

Welcome to Mount Tabor Meadows, Blacksburg's first green community!

Each home at Mount Tabor Meadows is built to provide advantages to our homeowners. Some you can see everyday, and others you can see each month on your heating, cooling and electrical bills. We build each home as a whole house system, which gives you a more comfortable, healthier and efficient home for years to enjoy.

Here's a quick look at some of those hidden values that you won't find in other homes.



“Green” Housing – A consumer choice



What they want – why and at what cost

- Levels of green points cost more as points go up
- Could cost between \$10-15,000 more on a \$300,000 house in Blacksburg, VA
- Most of the cost is for building upgrades and things needed for EarthCraft compliance
- The remaining costs are for the EarthCraft inspections and reports

Their Customers Decide ...

- Lot
- House design
- Most have basements – decide on how finished
- Kitchen, bath and flooring options
- Solar water assist
- Solar ready
- Appliances – Energy Star
- High efficiency heating and cooling
- Many material and product choices

Model and Selection House



Some of the 12 home designs to choose from



3382 sq. ft.



2748 sq. ft.



2313 sq. ft.



1598 sq. ft.

Select House Design and Modify



Pick siding, shingles, and brick



Kitchen and Bath Cabinets and Counter Tops (Certified Green Materials?)



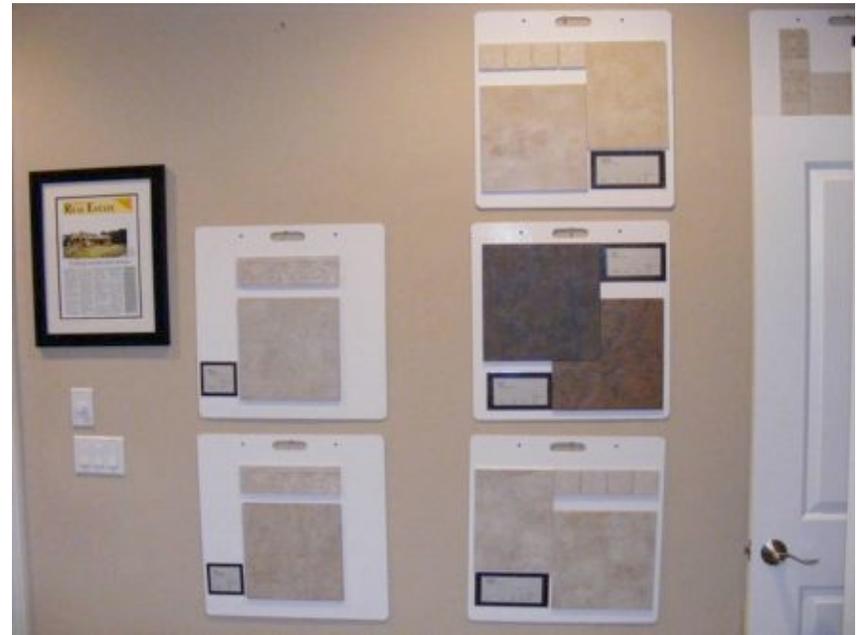
Flooring (Hardwood, cork, carpet, vinyl, or bamboo?)



Windows and Insulation (Materials?)



Fixtures and Tiles



What the customers want --

- Well built home
- Energy efficient
- Clean air
- Sustainable materials (Certified – what is the difference between certified and sustainable?)
- Certified wood is an option presented by the builder – builder won't push because he has major problems getting the material

A home under construction



More looks – see solar panels



Foam and cellulose insulation

Foam



Cellulose



Every house to be certified must meet the following requirements:

- Each house must score at least 150 points on the scoring worksheet and certify as ENERGY STAR
- Each house must have the plans and Manual J based on orientation submitted, and have a pre-drywall inspection performed by an EarthCraft House inspector with sign off on Pre-drywall inspection form.
- Each house must pass a final inspection by an EarthCraft House inspector and builder submits final scoring worksheet.
- LEED for homes does not require

EarthCraft House Green Checklist

SITE PLANNING

- Excavated topsoil protected from erosion

ENERGY EFFICIENT BUILDING ENVELOPE & SYSTEMS

Required Air Sealing Measures

- Chases sealed and insulated
- Stud cavities blocked at change in ceiling height
- Attic kneewall has sealed attic-side, rigid sheathing
- Joist cavities under attic kneewall blocked
- Penetrations through top and bottom plates sealed
- Window and door rough openings sealed
- Bottom plate sealed to floor or foundation
- Gaps in exterior wall sheathing sealed
- Sheathing penetrations sealed
- Penetrations through band sealed
- Exterior walls of fireplace chase sealed
- Penetrations through insulated subfloor sealed
- Seal all HVAC boots to subfloor or drywall
- Shower and tub drains sealed
- Cantilevered floor sealed above supporting wall
- All recessed can lights in insulated ceilings must be airtight and IC-Rated
- Penetrations through insulated ceilings sealed
- No polyethylene shall be used on exterior walls or foundation walls
- Air barrier installed behind tubs and showers on exterior walls

Additional Air Sealing Measures

- Seams in band joist between conditioned floors sealed
- Ceiling drywall sealed to top plates
- Attic access sealed attic-side cover or access outside building envelope
- Housewrap installed with all seams and edges taped

Blower Door Test

- Test result <0.40 cfm/square foot of building envelope

Windows

- Maximum window U-factor 0.4, SHGC 0.45
- Window is NFRC certified with label
- Window U-factor <0.35
- Window, skylight and glass door SHGC <0.40

Required Insulation

- Slab edge insulation R10
- Foundation walls R10 cont./R13 cavity (if basement/crawl inside building envelope)
- Framed floors R19 (if basement/crawl outside building envelope)
- Cantilevered floors R19 (blocking between joists required)
- Exterior walls & band joist R13
- Flat ceiling R38 (required baffles and blocking in vented attics)
- Sloped/vaulted ceilings R30
- Insulated sheathing R3 on metal-framed exterior walls thermal break
- Attic kneewall R19 and attic side air barrier
- Attic pull-down or scuttle hole R5 (compressed batt not acceptable)

Additional Insulation

- Foundation walls insulated instead of floor over basement (no paper faced batts)
- Cantilevered floors R30 (blocking between joist required)
- 2-stud corners with drywall clips or alternative framing building corners
- T-walls or alternative framing for insulation coverage improvements in wall field
- Band joist insulated R19
- Loose-fill attic insulation card and rulers
- Attic insulation extended over wall cavity (energy heel trusses or raised top plate)
- Attic kneewall door R8
- Attic pull-down or scuttle hole R19 (compressed batt not acceptable)

EarthCraft House Green Checklist (cont.)

Heating and Cooling Equipment

- Manual J calculation for sizing of heating and cooling equipment
- Manual J calculation based on actual building orientation
- Installed cooling equipment and/or heatpump oversized by no more than 15% of Manual J
- Adaptive recovery for programmable thermostat(s) when used with heat pump(s)
- No electric resistance heat as primary heat source for any portion of conditioned space
- ENERGY STAR rated programmable thermostat (all systems)

Ductwork/Air Handle

- Duct work insulated to R6 or greater
- Air handlers & duct systems sealed with mastic or mastic tape
- Code approved solid connector for all flex to flex connections
- Air handler located within conditioned space (all systems)
- Duct located within conditioned space
- All supply duct take-offs within 6" of supply plenum or trunk cap
- No duct take-off within 6" of supply plenum or trunk cap
- Rigid ductwork or all flex duct pulled tight with no pinches
- Rigid metal supply trunk

Duct Blaster Test

- Duct blaster test result <6% of floor area served

ENERGY EFFICIENT LIGHTING / APPLIANCES

- 5 or more ENERGY STAR ventilation fans, light fixtures, ceiling fans with light fixtures, appliances (excluding dishwasher and refrigerator)
- ENERGY STAR dishwasher
- ENERGY STAR refrigerator

RESOURCE EFFICIENT DESIGN

- Floor joist at 24-in. centers (all floors)
- Non-load bearing wall studs at 24-in centers
- All wall studs at 24-in. centers
- 2-stud corners with drywall clips or alternative framing building corners
- T-walls or alternative framing for insulation coverage improvements in wall field

INDOOR AIR QUALITY

- Combustion Safety
- No unvented combustion fireplaces or space heaters
- No duct runs from house system serving garage
- Attached garage - seal bottom plate, penetrations, and band area
- Heat pump located inside conditioned space (all units)

Moisture Control

- Foundation drain on top of footing
- Drainage board for below grade walls
- Gravel bed beneath slab
- Vapor barrier beneath slab

Ventilation

- Bathroom exhaust fans & clothes dryers must be ducted to outside
- Passive radon/soil gas vent system
- Kitchen range hood or downdraft vented to exterior
- Ceiling fans (minimum of 3 fans)

Materials

- Ducts in floor protected until floor finishing
- Ducts protected until construction is completed

EarthCraft House Green Checklist (cont.)

RESIDENT EDUCATION

- Review energy operations with homeowner
- Environmental features checklist for walk through

RESOURCE EFFICIENT BUILDING MATERIALS

- Recycled & Natural Content Materials
- Outdoor decking and porches (min. 40% recycled content)

Advanced Products

- Engineered floor framing (min. 80%)
- Engineered roof framing (min. 80%)
- OSB roof decking (min. 80%)
- All beams are steel, engineered wood, or trusses (min. 80%)
- Interior trim finger jointed or MDF (min. 80%)

Durability

- Roofing, min. 30-year warranty
- Roof drip edge
- Walls covered with builder paper or housewrap (drainage plane)
- Windows and door pan & sill flashing integrated with drainage plane

WASTE MANAGEMENT

- Waste Management Practices
- No construction materials shall be burned or buried on job site or anywhere but a state-approved landfill
- Donation of excess materials or re-use (min, \$500/job)

Recycle Construction Waste

- Posted and enforced job site waste management plan - recycle 75% of 3 materials
- Cardboard
- Metal

WATER - INDOOR

- All fixtures must meet National Energy Policy Act low flow standards
- Heat traps on all water heaters

EarthCraft House -- Points for Resource Efficient Design

RESOURCE EFFICIENT DESIGN

total floor area of house <1800 square feet

total floor area of house 1800-2100 square feet

total floor area of house 2100-2500 square feet

outside dimensions of floor plan adheres to 2-ft dimensions

floor joists @ 24-in. centers (all floors)

floor joists @ 19.2-in. centers (all floors)

non-load bearing wall studs @ 24-in. centers

all wall studs @ 24-in. centers

window rough openings eliminate jack stud

non-structural headers in non-load bearing walls

single top plate with stacked framing

2-stud corners with drywall clips or alternative framing

T-walls with drywall clips or alternative framing

job site framing plan with cut list

job site framing plan with locations of studs, joists, and roof structure with cut list

EarthCraft House -- Resource efficient building materials

RESOURCE EFFICIENT BUILDING MATERIALS

RECYCLED AND NATURAL CONTENT MATERIALS

sustainably harvested lumber (50%)

25% of cement in concrete replaced with fly ash or slag

recycled concrete used as aggregate

insulation (min 25% recycled content)

reclaimed wood flooring

recycled content tiles (min 30% recycled)

cork or bamboo flooring (min 10% of total floor area)

carpet (min 50% recycled)

biodegradable carpet and backing (wool, hemp, etc.)

outdoor decking and porches (min 40% recycled content)

air conditioner condensing unit pad (min 50% recycled content)

composite roofing shingle with recycled content (min 25% recycled)

cabinet faces are reused, MDF, local species, or FSC certified wood

EarthCraft House -- Advanced Products

ADVANCED PRODUCTS

engineered floor framing (80%)

use of open web trusses to run ductwork

engineered roof framing

all beams are steel, engineered wood, or trusses

all structural headers are steel or engineered wood

engineered wall framing (25% of studs)

engineered wall framing (80% of studs)

interior trim finger jointed, MDF, or HDF

engineered exterior trim including soffit, fascia, and trim

steel interior wall framing

panelized wall construction delivered to the job site pre-framed

modular construction for the entire house

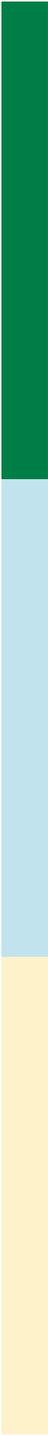
Precast Autoclaved Aerated Concrete

Structural Insulated Panels for exterior walls

Structural Insulated Panels for roof

Insulated Concrete Forms for foundation walls

Insulated Concrete Forms for exterior walls



EarthCraft House -- Durability – wood related items

non-toxic pest treatment of all lumber in contact with foundation

non-toxic pest treatment applied to all lumber

non-toxic mold inhibitor with warranty applied to lumber

plants installed to maintain minimum 2 foot distance from home to maturity

outdoor deck material (min 25-year warranty)



Additional Points are Possible for Special Products or Processing

- Wood products can fit here

Wood related building features and points earned under EarthCraft House guidelines

EarthCraft House™

Sensibly Built for the Environment

NORTHERN MIXED HUMID CLIMATE WORKSHEET

IECC 2004 Climate Zone 4

A completed worksheet must be submitted to EarthCraft House for each home to be certified. An EarthCraft House certification requires a minimum of 150 points. Point requirements for each Tier are listed below and throughout the worksheet. In addition to having a completed worksheet, each home must also have appropriate documentation, ENERGY STAR certification and Pre-drywall and Final Inspections by an EarthCraft House Inspector.

EarthCraft House (I)	150 points
EarthCraft House Select (II)	200 points
EarthCraft House Premium (III)	230 points

EarthCraft House -- Waste and Waste Management

- Divert 75% of wood
- Donation of excess materials or re-use (min \$500/job)
- **This is where we come in to**
 - **Study wood waste for each house**
 - **Develop and evaluate recycling options to**
 - **Keep the wood out of landfills**

EarthCraft Waste Management suggestions for points

- **On-site grinding of wood and drywall waste**
- **Central cutting area for framing**
- **We add Central Recycling area for framing and OSB**

Construction waste study at Mt. Tabor Meadows



U.S. Forest Service
Southern Research Station



Virginia Tech
Department of Wood Science and Forest Products

Purpose of study – OSB, LVL, and treated lumber

- Quantify the amount of OSB, LVL, and treated lumber waste generated per house.
- Determine potential uses for waste material as an alternative to landfilling.
- Salvage material where possible for reuse and/or recycle into other products.

Purpose of study – spruce (SPF) structural material

- Quantify the amount of useable non-treated 2-by structural lumber waste generated per house.
- Determine potential uses for waste material as an alternative to landfilling.
- Salvage material where possible for reuse and/or recycle into other products.

Our Collection Trailer



Potential uses - OSB, LVL, and treated lumber

- OSB
 - Shelving
 - Ground up and remanufactured into other composite products
 - Pallet deck material
- Treated Lumber
 - Shorts finger-jointed into structural lumber
 - Pallet stringers
 - Larger pieces used for any outdoor application (landscaping, garbage bins, porch swings, etc...)
- LVL
 - Ground up and remanufactured into composite products
 - Pallet material

Some of the engineered material to be used in construction

LVL



OSB



Engineered material in use



Engineered material in use – Plated open-joists



Finger Jointed Open-joists



I-joists and open-joists



House 1 Truss System



The Waste ...



Waste OSB, LVL, SPF, and treated lumber material left over after construction



Inside view of storage trailer with waste OSB, LVL and treated lumber



Waste Spruce (SPF) material left over after construction



Lumber waste after measured for a house that will be weighed and reduced to mulch



Spruce (SPF) structural material

- All useable discarded material is being tallied for each house based on the following criteria.
 - Must be a full 2x4, 2x6, 2x8, 2x10, or 2x12
 - Must be at least 12 inches long
 - Must be free of unsound defects and nails
- Some of the material that is deemed useable will be collected and remanufactured into other products.

Potential uses – spruce (SPF) material

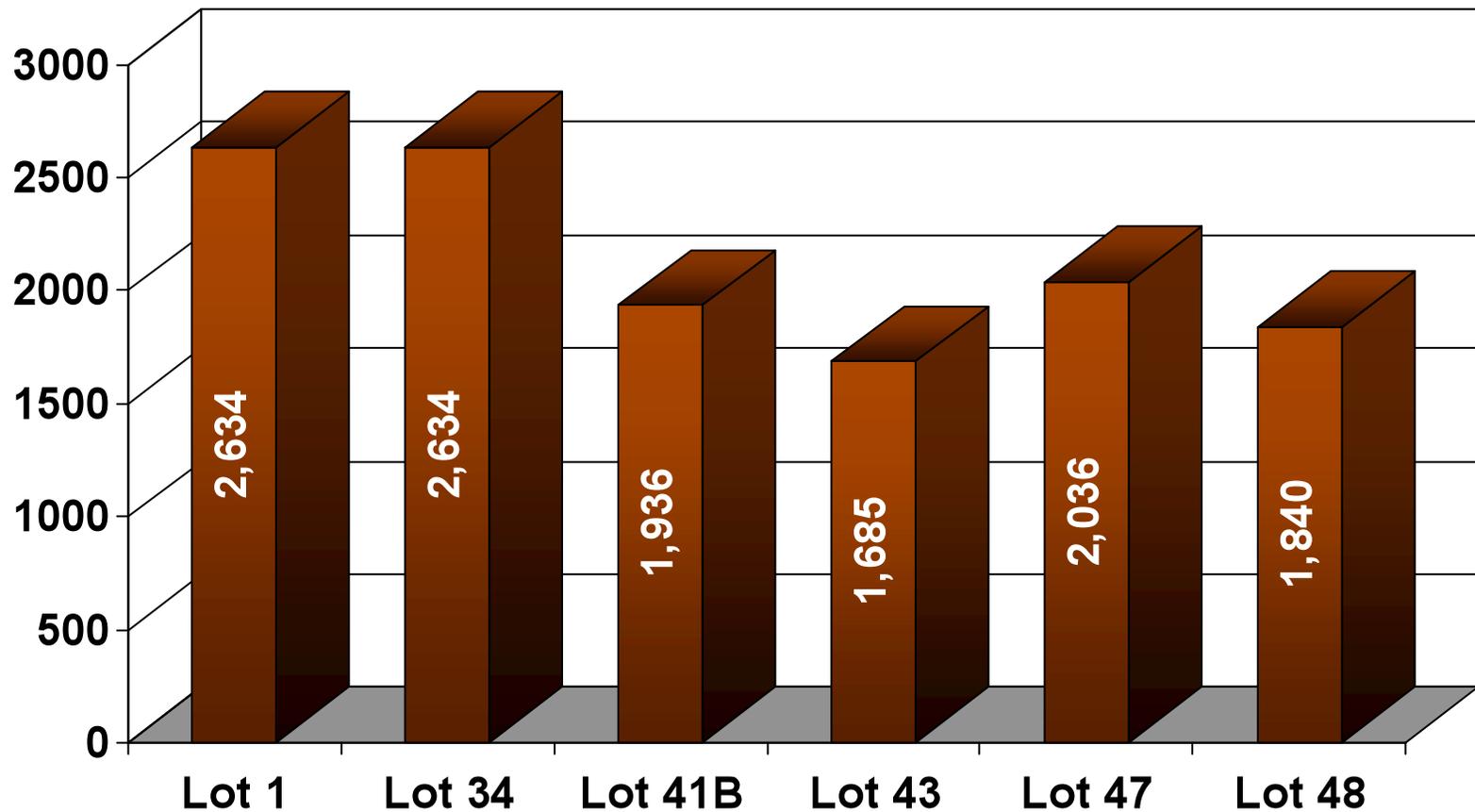
- Potential uses for the spruce material include interior finger-jointed molding and structural lumber.
- Procedure for interior products
 - Kiln dry the lumber to desired moisture content (~12%)
 - Finger-joint the short material into longer pieces.
 - Remanufacture the lumber into molding (base, crown, etc...) or into structural lumber.
 - Prime molding with white primer

Current study results

- Six of the first eight homes



Square Footage of Homes Used in Study



Panel Sizes Produced from Waste 1/2" OSB Material

Pallet Deckboards

- 5.5" x 36"
- 5.5" x 40"
- 7" x 36"
- 7" x 40"
- 10" x 36"
- 10" x 40"

Shelving Boards

- 12" x 24"
- 12" x 36"
- 12" x 48"
- 16" x 24"
- 16" x 36"
- 16" x 48"
- 18" x 24"
- 18" x 36"
- 18" x 48"
- 24" x 24"
- 24" x 36"
- 24" x 48"

Additional Panel Sizes Produced from Waste $\frac{3}{4}$ " OSB Material

Stair Treads

- 11.25" x 36"
- 11.25" x 42"
- 11.25" x 48"

Stair Risers

- 7.25" x 36"
- 7.25" x 42"
- 7.25" x 48"

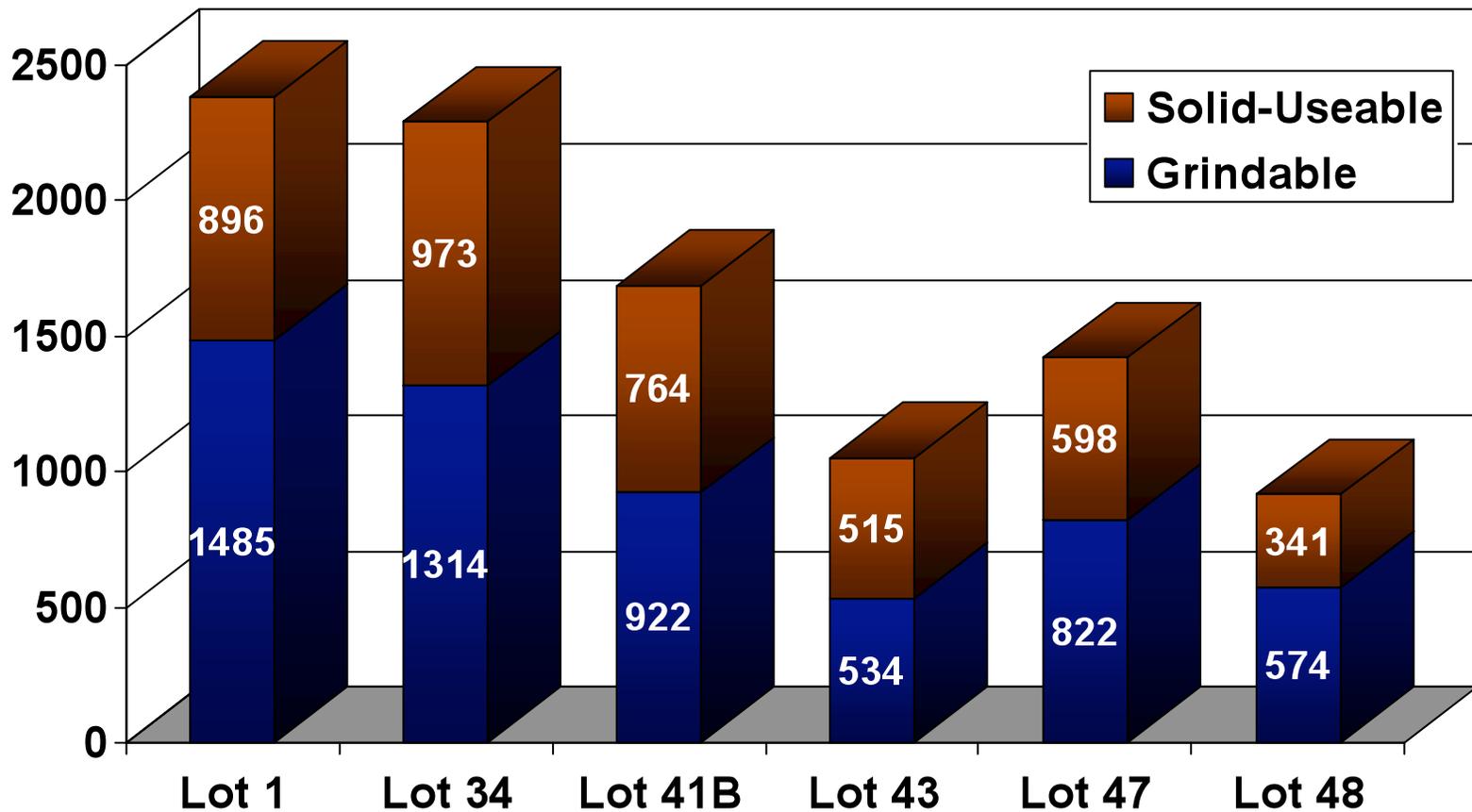
Solid-Useable OSB Products



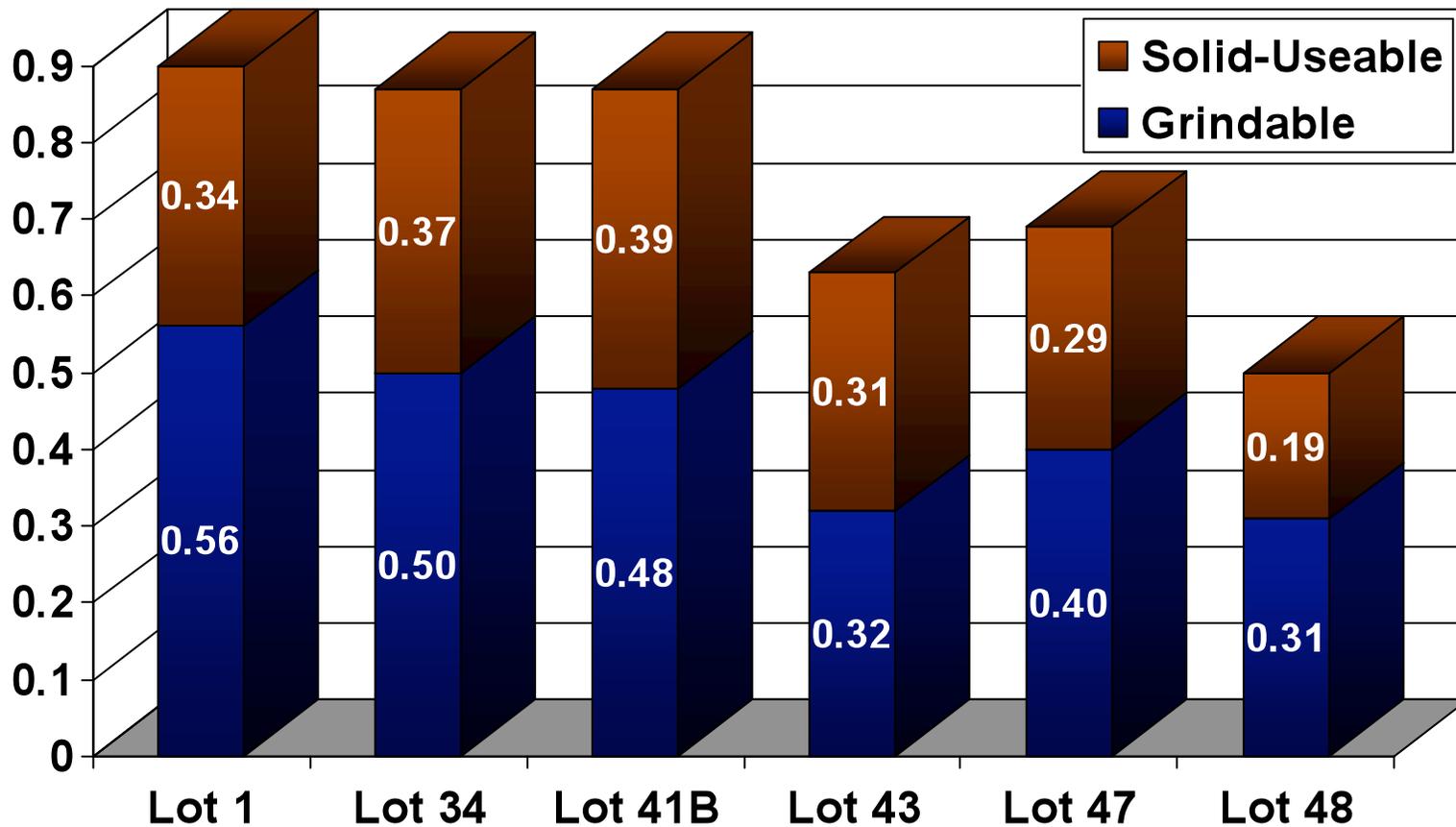
Solid-Useable OSB Products



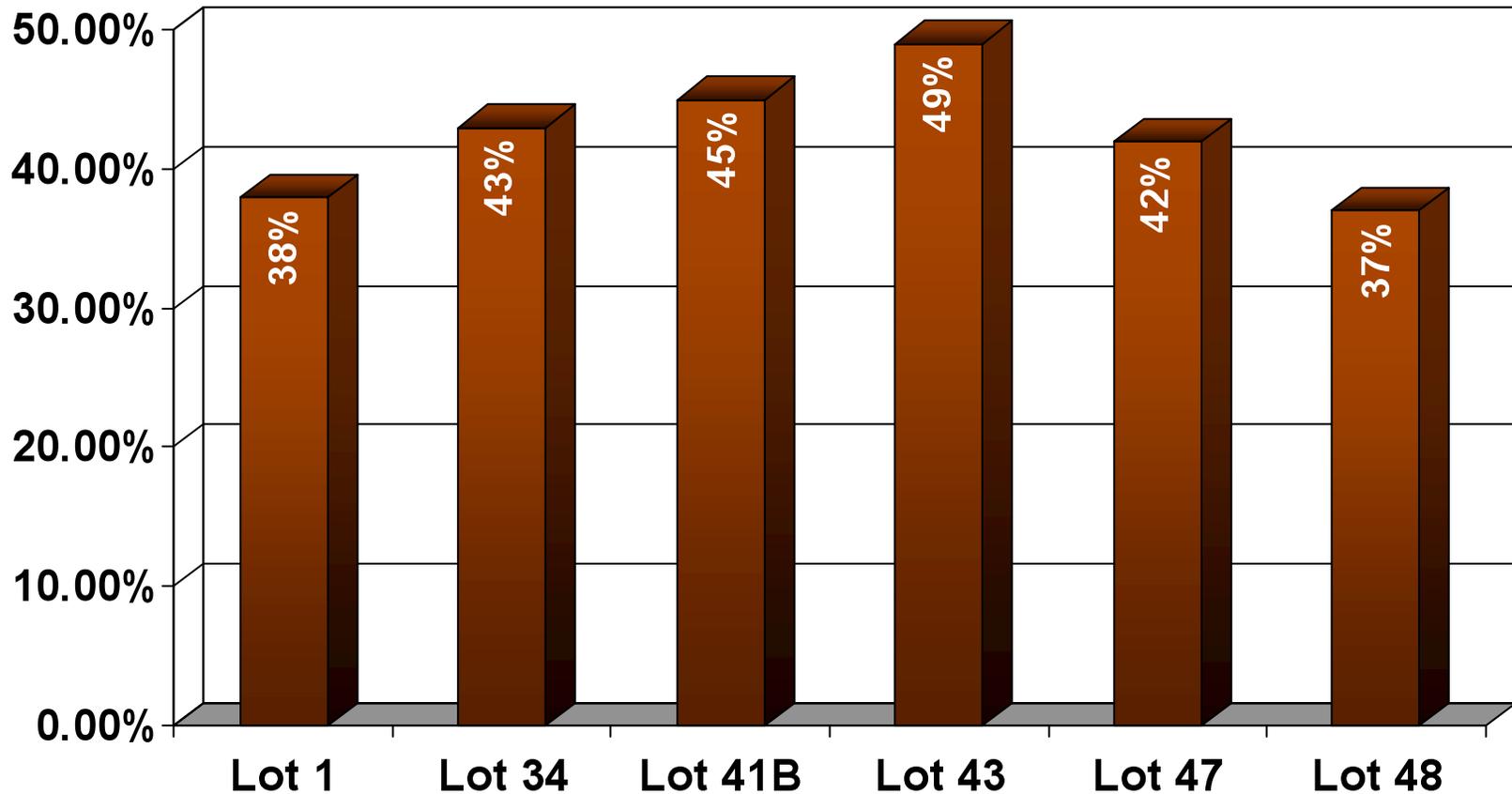
Weights (lbs) of Solid-Useable and Grindable OSB Material



Weights of Solid-Useable and Grindable OSB Material Per Square Foot of Living Space (lbs/ft²)



Percentage of OSB Material Classified as Solid-Useable

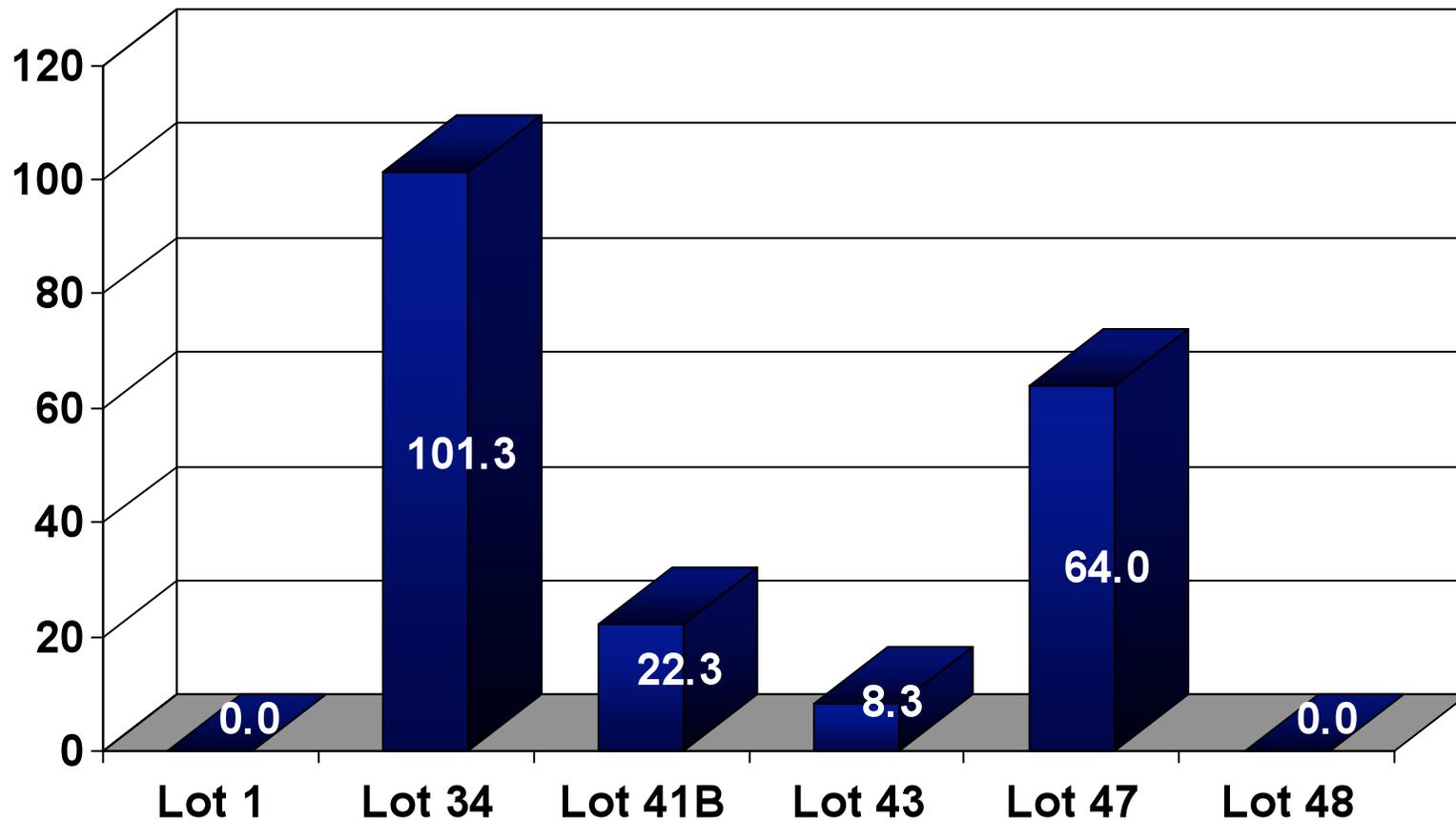


Weights of Solid-Useable and Non-Useable Treated Lumber from Each Home

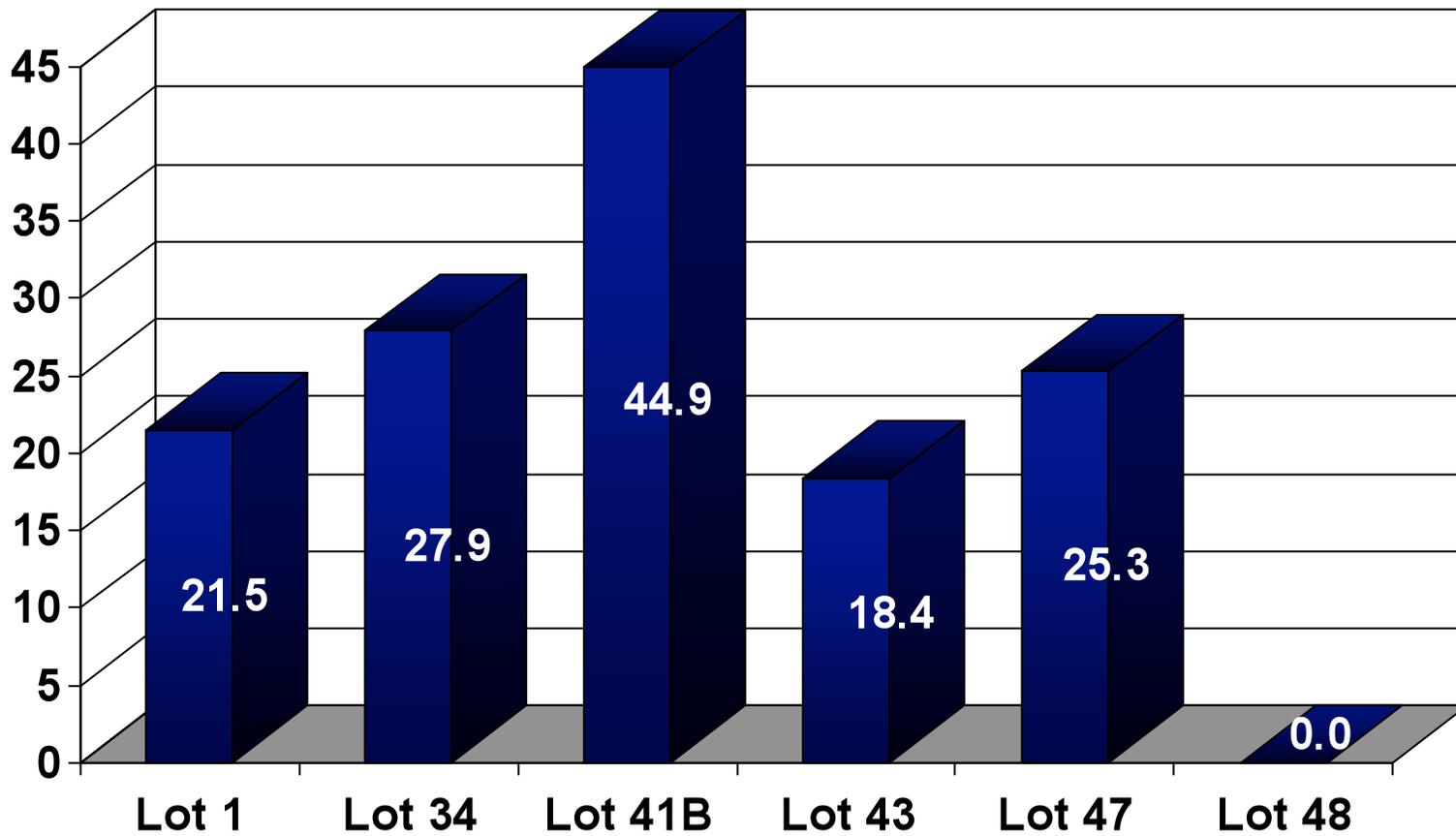
Lot #	Sq. Footage	Weight (lbs)			Percentage	
		Solid-Useable	Not Useable	Total	Solid-Useable	Not Useable
1	2,634	75.0	138.5	213.5	35.1%	64.9%
34 (No Deck)	2,634	35.0	36.4	71.4	49.0%	51.0%
41B	1,936	178.9	195.8	374.7	47.7%	52.3%
43	1,685	244.1	252.1	496.2	49.2%	50.8%
47	2,036	191.3	225.6	416.9	45.9%	54.1%
48	1,840	143.1	249.0	392.1	36.5%	63.5%

Material was considered useable if at least 8" long and of standard width and thickness.

Weights (lbs) of Waste LVL Material



Weights (lbs) of Waste Paralaram Material



Weights of Waste Spruce Structural Lumber from Each Home

Lot #	Sq. Footage	Spruce Weight (lbs)
1	2,634	3,100
34	2,634	1,540
41B	1,936	2,770
43	1,685	1,985
47	2,036	3,134
48	1,840	3,641

Weights of Solid-Useable and Grindable SPF Structural Lumber from Each Home

Lot #	Solid-Useable Material		Total Weight of All SPF Waste (lbs)	Estimated Solid-Useable Percentage
	Total Volume (ft ³)	Estimated Weight (lbs)		
43	11.8	359.9	1,970	18.3%
47	8.0	244.0	3,110	7.8%
48	21.2	646.6	3,630	17.8%

Material was considered useable if at least 12" long, of standard width and thickness, and free of unsound defects.

Summary of Waste Material Weights for Lot 1

- **Solid-Useable OSB** – 896 lbs. (38%)
- **Grindable OSB** – 1,485 lbs. (62%)
- **Solid-Useable Treated Lumber** – 75 lbs. (35%)
- **Non-Useable Treated Lumber** – 139 lbs. (65%)
- **LVL** – 0 lbs.
- **Paralam** – 22 lbs.



2,634 Sq. Ft.

Summary of Waste Material Weights for Lot 34

- **Solid-Useable OSB** – 973 lbs. (43%)
- **Grindable OSB** – 1,314 lbs. (57%)
- **Solid-Useable Treated Lumber** – 35 lbs. (49%)
- **Non-Useable Treated Lumber** – 36 lbs. (51%)
- **LVL** – 101 lbs.
- **Paralam** – 28 lbs.
- **Total Spruce Structural Lumber** – 1,540 lbs.



2,634 Sq. Ft.

Summary of Waste Material Weights for Lot 41B

- **Solid-Useable OSB** – 764 lbs. (45%)
- **Grindable OSB** – 922 lbs. (55%)
- **Solid-Useable Treated Lumber** – 179 lbs. (48%)
- **Non-Useable Treated Lumber** – 196 lbs. (52%)
- **LVL** – 22 lbs.
- **Paralam** – 45 lbs.



1,936 Sq. Ft.

Summary of Waste Material Weights for Lot 43

- **Solid-Useable OSB** – 515 lbs. (49%)
- **Grindable OSB** – 534 lbs. (51%)
- **Solid-Useable Treated Lumber** – 244 lbs. (49%)
- **Non-Useable Treated Lumber** – 252 lbs. (51%)
- **LVL** – 8 lbs.
- **Paralam** – 18 lbs.
- **Solid-Useable Spruce Structural Lumber** – 360 lbs. (18%)
- **Grindable Spruce Structural Lumber** – 1,610 lbs. (82%)



1,685 Sq. Ft.

Summary of Waste Material Weights for Lot 47

- **Solid-Useable OSB** – 598 lbs. (42%)
- **Grindable OSB** – 892 lbs. (58%)
- **Solid-Useable Treated Lumber** – 191 lbs. (46%)
- **Non-Useable Treated Lumber** – 226 lbs. (54%)
- **LVL** – 64 lbs.
- **Paralam** – 25 lbs.
- **Solid-Useable Spruce Structural Lumber** – 244 lbs. (8%)
- **Grindable Spruce Structural Lumber** – 2,866 lbs. (92%)



2,036 Sq. Ft.

Summary of Waste Material Weights for Lot 48

- **Solid-Useable OSB** – 341 lbs. (37%)
- **Grindable OSB** – 574 lbs. (63%)
- **Solid-Useable Treated Lumber** – 143 lbs. (37%)
- **Non-Useable Treated Lumber** – 249 lbs. (63%)
- **LVL** – 0 lbs.
- **Paralam** – 0 lbs.
- **Solid-Useable Spruce Structural Lumber** – 647 lbs. (18%)
- **Grindable Spruce Structural Lumber** – 2,983 lbs. (82%)

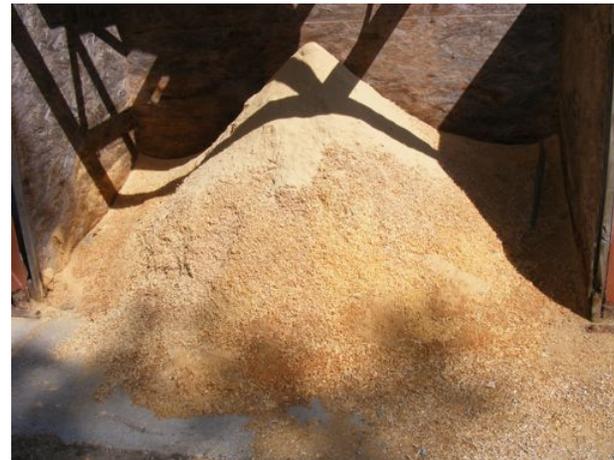


1,840 Sq. Ft.

EarthCraft Waste Management suggestions for points

- On-site grinding of wood and drywall waste
- Central cutting area for framing
- We add Central Recycling area for framing and OSB

Recycling Options



Potential use – web material



Potential Grinding Uses -- Wood Based Mulch



Grinding – SPF and OSB

- General mulch for landscaping
- Mulch berms – erosion control
- Soil enhancer for lawns
- Temporary walkways and roads for crews



Grinders

- Tub grinder
- Small horizontal grinder
- Larger horizontal grinder



Grinding location options

- On-site
 - Developer/builder
 - Service provider
- Landfill recycling area
- Independent recycler



PS – This is also a teaching facility for VT classes and local tours



VT and Green Housing Education – Is this a familiar ‘Wood’ Building ?



Learning and Growing Commercial

- The next generation of builders, specifiers and manufacturers must understand residential construction and the use of green materials
- A New Option in Wood Science and Forest Products is called **Housing and Wood Structures**
- The goal is to prepare students for working in the area of residential construction as builders, specifiers, manufacturers
- This program is the ONLY option at Virginia Tech specifically focused on the construction of housing

Housing and Wood Structures Option

- Wood Science Classes include --
 - Basic Wood Structures class
 - Green Building Systems – discusses green building and various certification systems which apply to housing
 - Housing Field Study – explores different housing structures and their uses
 - Manufactured Housing (planned) – overview of both structural and management challenges in manufactured housing
- Option includes several classes from --
 - AHRM (Apparel, Housing and Resource Management) including house design, interior design, energy use

Employment Opportunities

- Project Management of residential construction
 - Suggest that students also include management classes
- Designing trusses, wall panel, manufactured housing, or other elements
 - Working closely with an engineer
 - Understanding the material and use of software
- Owning or Managing a Company involved in construction
 - Suggest students include management, human resources work

We are pushing wood, green products and green systems!



We are trying to be realistic and forward thinking and doing ...

We will work with EarthCraft, Southface, and NAHB to improve the acceptance and points for wood

Any Questions?

