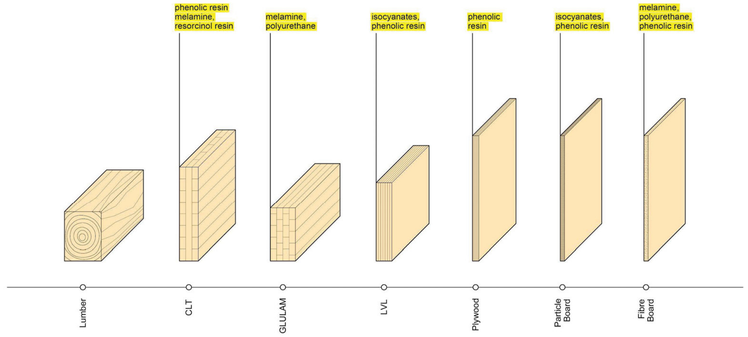
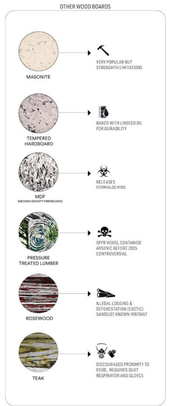
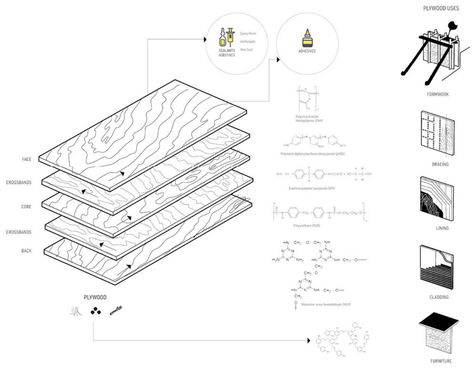
COMPOSITE WOOD PRODUCTS

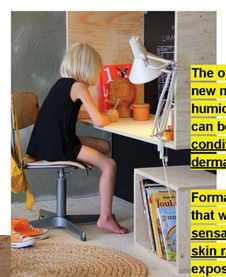
RESEARCH







Urea Formaldehyde (UF)
Conventional plywood uses formaldehyde resins to bond together thin veneers of wood into panels. This type of formaldehyde that off gases at high rate and for variable periods of time.



The off-gassing rate is especially intense in new materials and is exacerbated in hot, humid weather. Additionally, this process can be accelerated with habitation and conditioning of newly finished spaces and dermal contact.

Formaldehyde is a potent primary irritant, that when touched can cause burning sensations in the eye, nose and throat and skin rashes. Frequent or prolonged exposure may cause hypersensitivity.

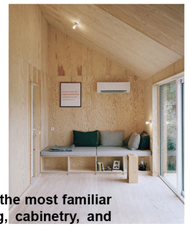
- **Choose products with Soy-Based Glue.**
- **Use CARB2, E1 (or E0), Greenguard (or Greenguard Gold) rated plywood.**
- **Seal plywood with non toxic sealant when used in high contact scenarios.**
- **Perform VOC cookout upon project delivery.**
- **Ventilate and control temperature and humidity, especially in first 6 to 18 months after instillation.**

ANALYSIS CRITERIA

Studying composite wood products led us to understand health through different scales of the production, installation and use cycle. A healthy wood product starts with a sustainable tree farming and harvesting, sourcing locally-grown wood for lesser carbon footprint, and the use of as many parts of the tree as is possible.

While the general consensus in the industry is to highlight FSC farming techniques, species of wood can also become problematic because of illegal deforestation and logging (such as for the exotic rosewood). Manufacturing of wood boards is quite energy intensive and requires a multitude of machinery and treatments from cutting to laminating and gluing. The general observation looking at different laminates from mass timber (CLT, Glulam, LVL) to laminates and fiber boards is no doubt the adhesives and binders used for manufacturing the product and their chemical components, but also their assembly (tongue and groove assembly as opposed to gluing wood planks down).

Out of all wood composites researched, the ones that stand out most are MDF (medium-density fiberboard) known for high releases of formaldehyde, pressure-treated lumber for its use of arsenic prior to 2005, and plywood. Plywood is an often used material in timber construction and otherwise. It spans the widest category of uses: from sheathing and bracing, to finishes and cladding, and as furniture. Plywood's aesthetic qualities are sought by the average buying consumer, and its availability as a structural material make it all the more appealing.



Out of the many composite wood products, it is the most familiar and accessible. Its common use for furnishing, cabinetry, and finishes make it a very high-touch surface. This aspect of usage particularly affects children, who are more prone to high contact interaction and airborne particles released since they are at higher risk for asthma.

Plywood's multi-use scales and manufacturing techniques make it transportable by the average customer and could even fit in an elevator, making it a great candidate for pre-fabricated designs for ease of assembly and disassembly.

In the context of an affordable housing proposal, it is also worth considering that the ubiquity of plywood in its many uses ultimately can pose a significant threat to the vulnerable populations such projects aim to serve. When thinking about the air quality of Hunts Point and the South Bronx, it is important to ensure that any and all new construction does not add to existing stressors of air quality and unhealthy spaces that have historically been applied to these communities. In line with this mission of environmental justice and affording new units of housing; the careful, and thoughtful, selection of plywood products in distinct use categories can help to restore the dignity of these peoples' homes and public spaces.

PRODUCT RECOMMENDATIONS

Sheathing/Bracing

Given the proposed intervention needs to be craned into its final position atop an existing building, it is important that the modules be self-supporting structurally. To achieve this a standard OSB board meeting CARB II standards can be used to brace the structure.

Formwork

For any cast in place concrete necessary for the structure of the proposed intervention, the use of a standard classic core Plywood is acceptable. While appropriate safety standards should be observed for the labour working with this material to make formwork to mitigate risk of particle inhalation, it does not transpose any potential harm from the plywood's glues into the cured concrete and aids to meet project feasibility as a highly cost effective, reusable material.

Interior Finish

Plywood can offer biophilic benefits and is easily maintained when used as an interior finish. Given the constraints of working with affordability it is also a readily available and cost effective material. To ensure healthy indoor air quality and durability, a formaldehyde-free product such as SoyStrong Plywood is recommended for this use category.

High Touch Surface

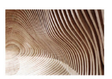
For use in common spaces in scenarios that require high touch surfaces such as counters, ancillary walls or desks, NOVA plywood is recommended. It is formaldehyde-free and has a non-toxic UV cured coating making the surface highly durablWe and easy to clean without harmful solvents.

Objects

Furniture and architectural features can also be rendered in plywood for this proposal. For the wide variety of wood species available and being formaldehyde-free to reduce the risk of dermal and respiratory risks, the best product for this use category is Purebond Plywood. Ideally these objects should be constructed with metal fasteners or wood joinery to avoid tertiary glues or adhesives.

COMPOSITE WOOD PRODUCTS - PLYWOOD

Risk Populations: immigrant communities, minority religious communities, vulnerable rural communities
Product Category: composite wood

	 **PUREBOND PLYWOOD** Columbia Forest Products	 **SOYSTRONG PLYWOOD** Chesapeake Plywood LLC	 **PLYBOO BAMBOO PLYWOOD** Smith & Fong	 **NOVA** States Industry	 **OSB** Weyerhaeuser	 **CLASSIC CORE PLYWOOD** Columbia Forest Products
HUMAN HEALTH	formaldehyde-free	formaldehyde-free 0.009 PPM - 75% better than industry standards	formaldehyde-free	formaldehyde-free	contains formaldehyde	contains formaldehyde
INDOOR CLIMATE	soy-based adhesive does not emit VOCs	soy-based adhesive does not emit VOCs	soy-based adhesive does not emit VOCs	requires no surface treatment emit no volatile organic compounds during manufacture or in use	best if used for sheathing purposes	best if used for purposes other than interior finishes to reduce direct exposure to VOCs
ENVIRONMENT ENERGY	natural material stock	natural material stock	natural & renewable material stock	natural material stock	natural material stock	natural material stock
ENVIRONMENT CARBON	local transport low carbon footprint	20% of materials extracted regionally	high carbon footprint for sourcing & transport	high carbon footprint for sourcing & transport	higher carbon footprint than plywood	local transport low carbon footprint
AFFORDABILITY	higher standard price for comparable product $32 4' x 4' x 1/4"	cost effective for comparable product #32 4' x 8' x 1/4"	higher standard price for comparable product	standard cost for comparable product	cost effective for comparable product	standard cost for comparable product
MAINTENANCE	finished with UV cured coating can be cleaned w/ soap & water moisture resistent	maintenance as approrpiate to its coating	maintenance as approrpiate to its coating	UV cured coatings are extremely durable, showing no effects from solvents or household chemicals	requires weather proofing & barrier conditions	provides an improved surface over softwood veneer core, reducing the potential for core telegraphing
DISSASSEMBLY / RECYCLING	can be recycled & reused 50 year life expectancy	can be recycled & reused	can be recycled & reused	no waste created in finishing process	can be recycled & reused	can be recycled & reused
ACCREDITATIONS	LEED, CARB 2, FSC DECLARE available	LEED, CARB 2, FSC	LEED, CARB 2, FSC	LEED, CARB 2	LEED, CALGreen,	LEED, CARB 2
MATERIAL SOURCING LOCATION	North America	North America (Pacific Northwest)	Asia & North America (California)	North America (Pacific Northwest)	North America	North America
RECOMMENDED USE	interior finish	interior finish	interior finish	high touch surfaces	sheating	framework

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