

EXPLORING A PATH TOWARDS COST-EFFICIENT,
ENERGY-EFFICIENT AFFORDABLE HOUSING

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Exploring A Path...

- Framing the issues...
 - CLIMATE CHANGE
 - AFFORDABILITY / COST
- Addressing the issues...
 - ENERGY EFFICIENCY
 - COST EFFICIENCY
- Demonstration projects



Orchards at Orenco

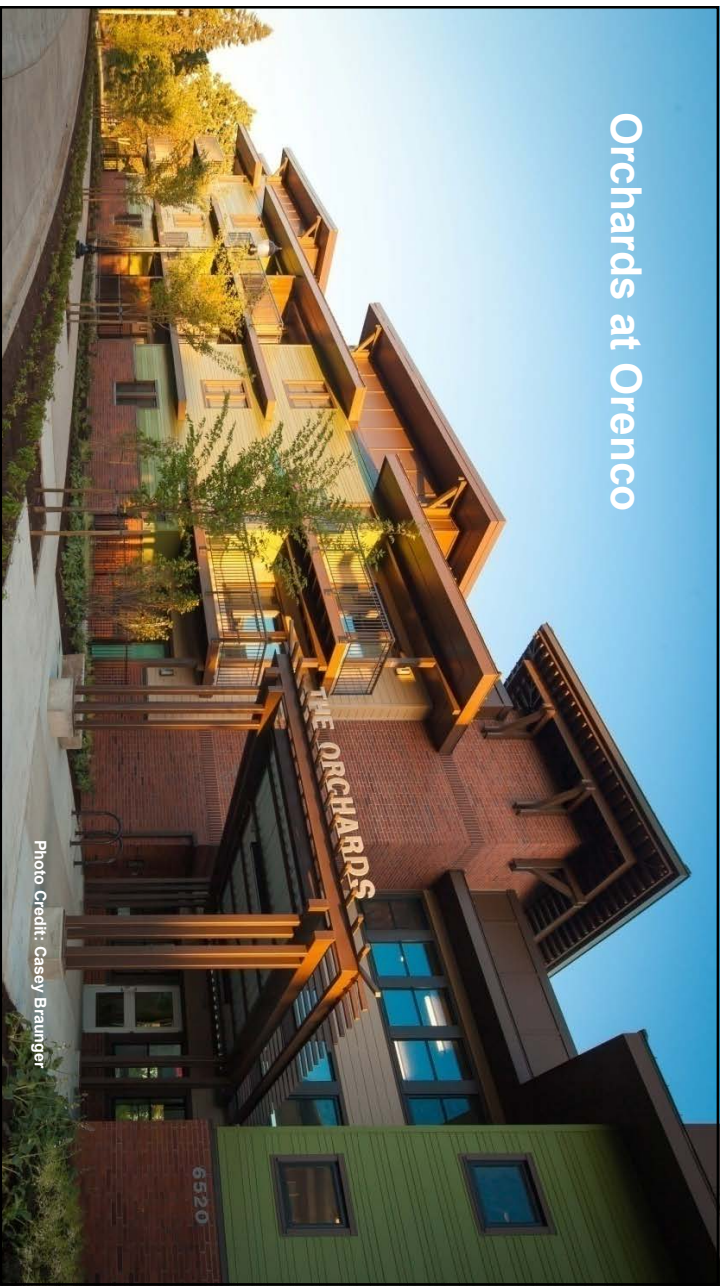
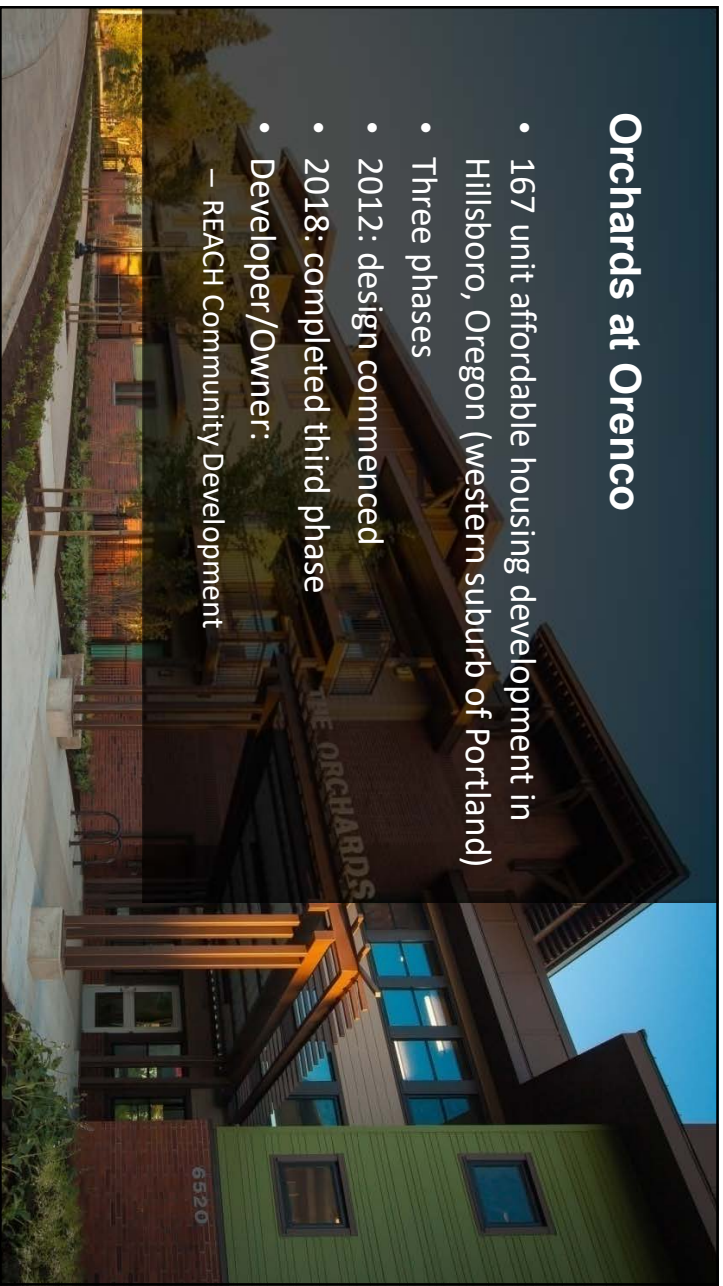


Photo Credit: Casey Braunger

Orchards at Orenco

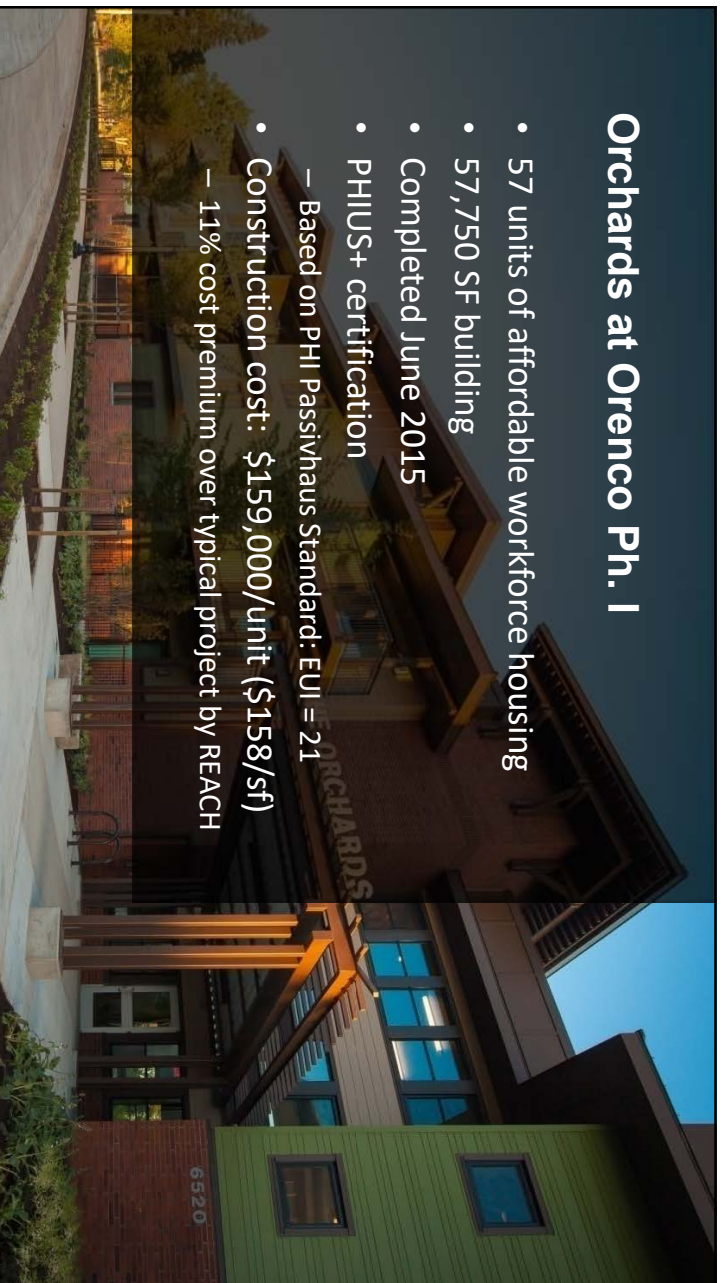
- 167 unit affordable housing development in Hillsboro, Oregon (western suburb of Portland)
- Three phases
- 2012: design commenced
- 2018: completed third phase
- Developer/Owner:
 - REACH Community Development





Orchards at Orenco Hillsboro, Oregon

- 57 units of affordable workforce housing
- 57,750 SF building
- Completed June 2015
- PHIUS+ certification
 - Based on PHI Passivhaus Standard: EUI = 21
- Construction cost: \$159,000/unit (\$158/sf)
 - 11% cost premium over typical project by REACH



Orchards at Orenco Ph. II

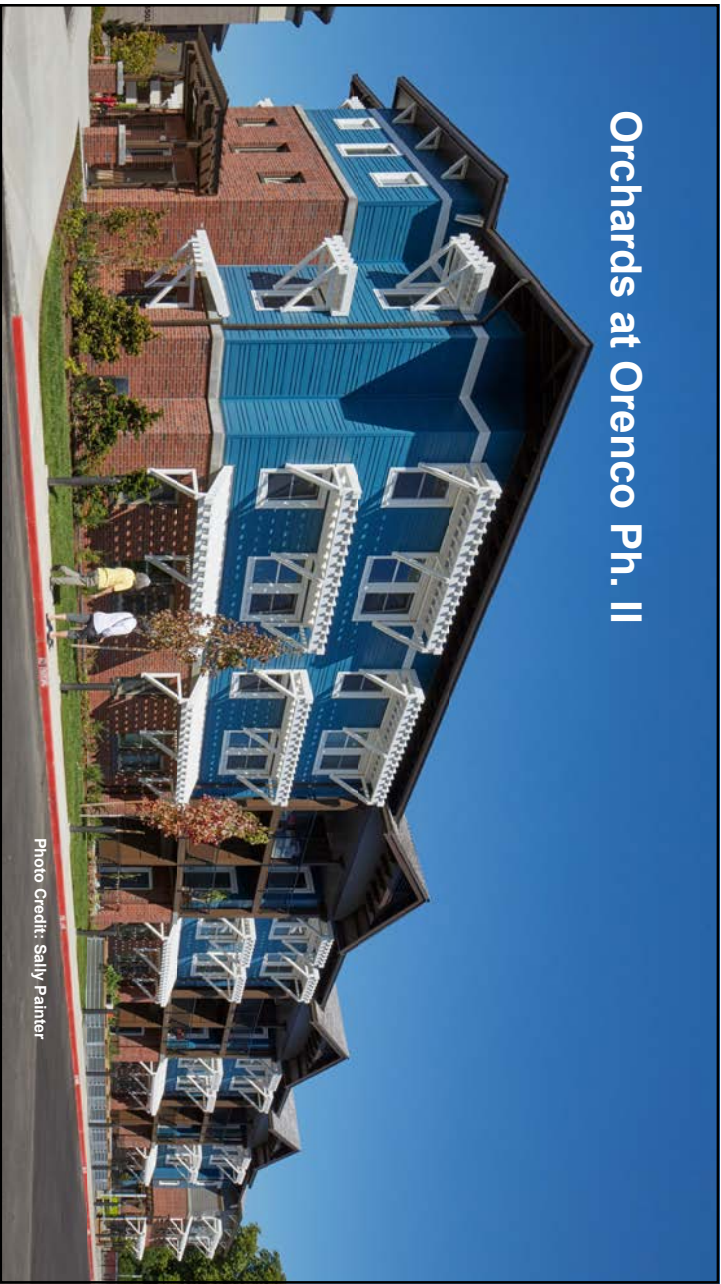


Photo Credit: Sally Painter

Orchards at Orenco Ph. II

- 58 units of affordable workforce housing
- 49,900 SF building
- Completed July 2016
- PHIUS+ certification
 - Based on PHIUS+ 2015 Passive Building Standard (North America): EUI = 22
- Construction cost: \$147,000/unit (\$173/sf)
 - 8% cost/unit reduction from Phase I (15%+ cost reduction if factoring in market escalation...)
 - 5% cost premium to achieve Passive House



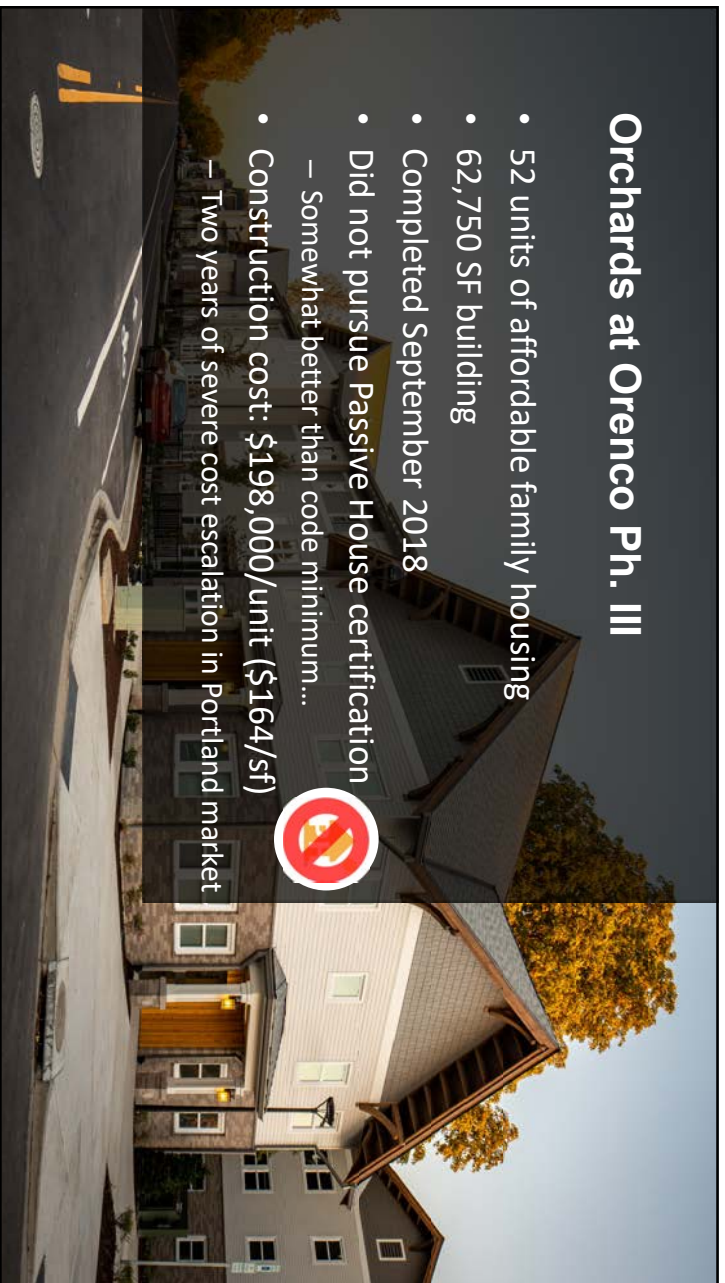
Orchards at Orenco Ph. III



Photo Credit: Ankrom Moisan

Orchards at Orenco Ph. III

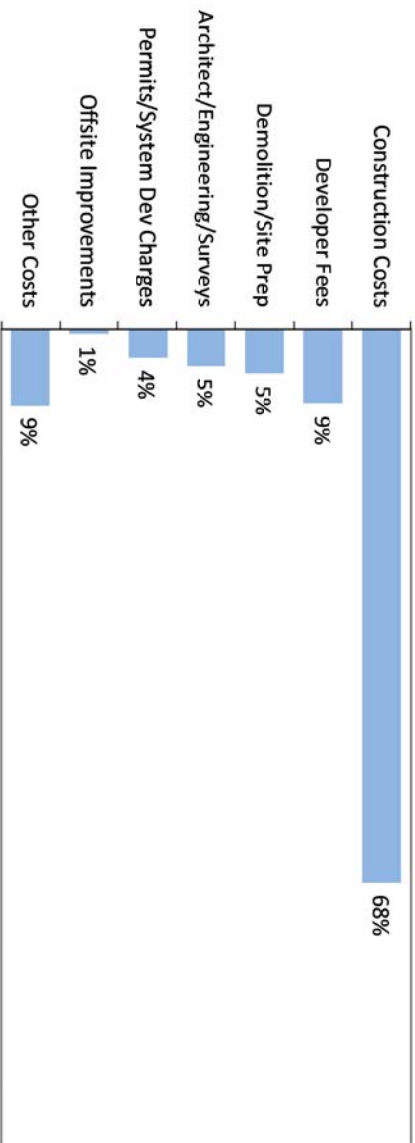
- 52 units of affordable family housing
- 62,750 SF building
- Completed September 2018
- Did not pursue Passive House certification
 - Somewhat better than code minimum...
- Construction cost: \$198,000/unit (\$164/sf)
 - Two years of severe cost escalation in Portland market





9

Affordable Housing New Construction Projects:
Cost Components as % of Total Development Costs (Net of Land)



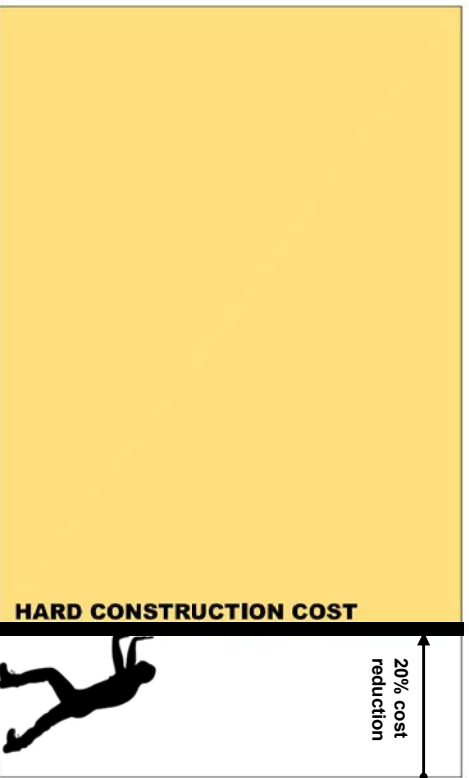
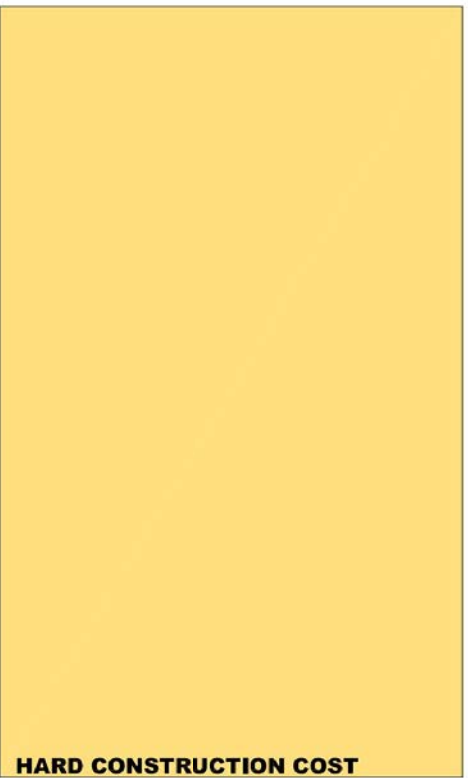
Source: Blue Sky Consulting Group

Major Components of Affordable Housing Development Cost

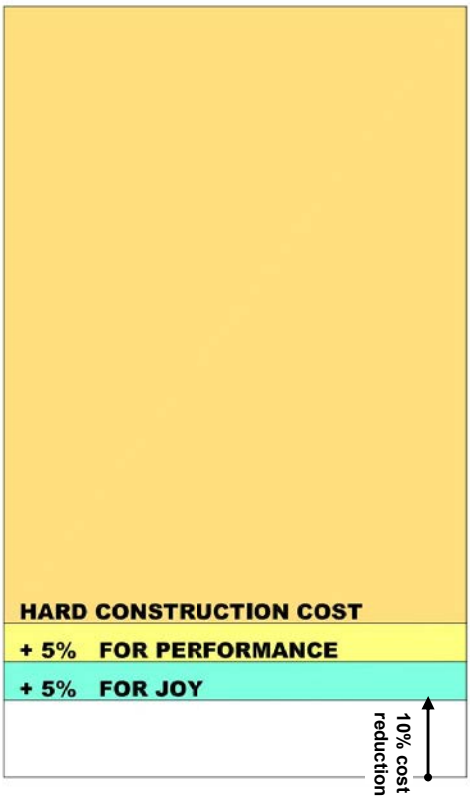
DIV 01	GENERAL
DIV 02	SITE WORK
DIV 03	CONCRETE
DIV 04	MASONRY
DIV 05	STEEL
DIV 06	WOOD
DIV 07	THERMAL & MOISTURE
DIV 08	DOORS & WINDOWS
DIV 09	FINISHES
DIV 10	SPECIALITIES
DIV 11	EQUIPMENT
DIV 12	FURNISHINGS
DIV 14	CONVEYING SYSTEMS
DIV 15	MECHANICAL
DIV 16	ELECTRICAL
DIV 17	OTHER
OVERHEAD & PROFIT / INSURANCE	

Major Components of Construction Cost

Major Components Added Up = Hard Cost



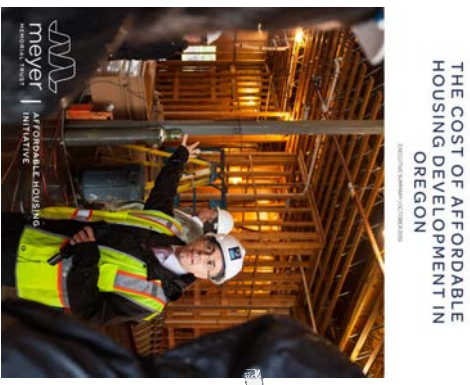
Pushing Cost Back to Achieve Better Buildings



Pushing Cost Back to Achieve Better Buildings

HOW?

- Cost Efficient Design & Construction (CEDC)
- Lean Construction Methods



Cost-Efficient Design and Construction of Affordable Housing

Walsh Construction Co.

For more than 50 years Walsh Construction Co. has partnered with public housing agencies, non-profit community development organizations and various for-profit entities across the Pacific Northwest to deliver more than 15,000 units of affordable housing to our communities. Each of those units is still standing today and is serving as affordable housing. We have learned a few things along the way about how to design and construct affordable housing in the most cost-efficient manner. We do not believe design quality and cost-efficiency are mutually exclusive. We believe it is a matter of including cost-efficiency as a valid constraint in the design of affordable housing and doing the best to give simpler, "leaner" designs a sense of place, character and distinction. To start the conversation with project teams, WALSH has developed the following list of important considerations for cost efficient design and construction.

Project Approach / Concept / Scale

- Strive at all times for simplicity. Applying a discipline to "keep it simple" will go a long way towards helping to reduce costs so that important architectural and performance features can be included in the project, even when working with limited budgets.
- Consider developing a larger project. All things being equal, larger projects are more cost-efficient. There are roughly the same number of components to design, specify and construct in a 20-unit building as in a 200-unit building. On larger projects, the cost of design services and construction management can be spread over a greater number of units and thus the cost per unit can be brought down significantly.

CEDC - Key Working Principles

- Strive to "keep it simple"
- Larger projects = economy of scale
- Seek out "unencumbered" sites
- Efficient building plans (net to gross area > 80%)
- Efficient unit plans (narrow "aspect ratio")
- Simple and compact forms
- Layouts on 2 foot module



CEDC - Key Working Principles

- Efficient structural layout (i.e. advanced framing: studs @ 24" o.c.)
- Floor to floor heights set for drywall (increments of 48", 54", 96")
- Stack the units (duh!)
- Back to back plumbing
- Avoid cantilevers
- Avoid steel (yes it is possible...)
- "Disciplined" approach to windows



Standardize/Optimize

- Typical unit plans
- Corridors
- Exit stairways
- Foundation system
- Structural system
- Enclosure system
- Floor joist and doors
- MEP systems
- Typical interior finishes
- Cabinets
- Appliances
- Lighting
- Elevator(s)
- Laundry facilities

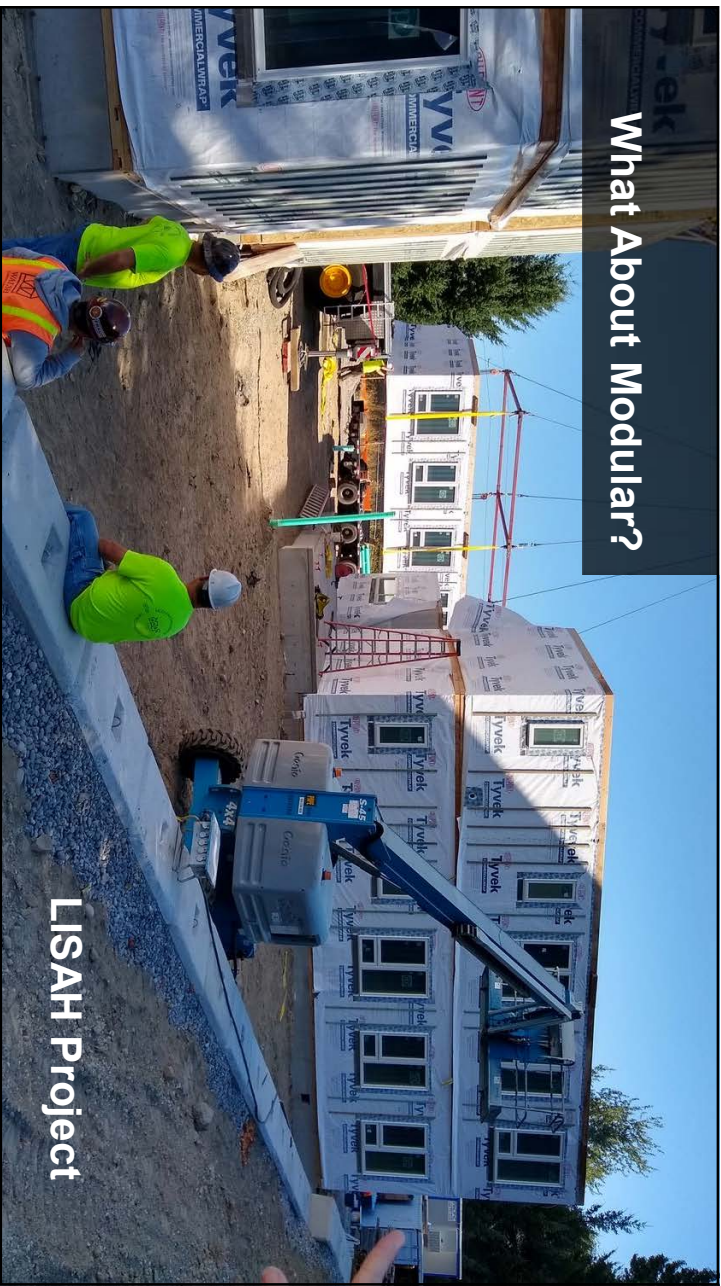
80%

Customize

- Response to the site
- Interface with the street
- The space between buildings
- Building plan / layout
- Building form / massing
- Facade material / expression
- Building entry / lobby
- Community room(s)
- Public stairway
- Select common area finishes
- A few select unit plans
- A few select windows
- Balconies (if any)
- Roof deck amenity (if any)

20%

What About Modular?



LISAH Project

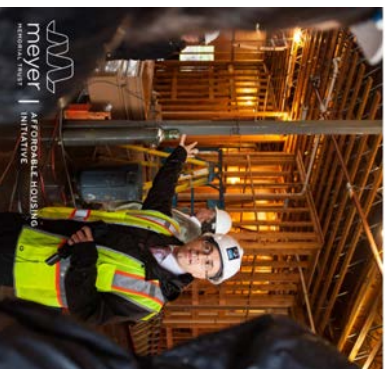
What About Modular?



LISAH Project

Demonstration (“Beta Test”) Projects

- THE COST OF AFFORDABLE HOUSING DEVELOPMENT IN OREGON
- 124th & Ash
 - 175 units workforce housing
- Glisan Gateway
 - 159 units workforce housing



124th & Ash

- Developer/ Owner: REACH Community Development
- Architect: Ankrom Moisan Architects
- Contractor: Walsh Construction Co.
- Awarded MMT grant to support innovation in production of cost efficient affordable housing
- Programmed as 150-190 unit project → final unit count is 175
- Construction start: August 2019; completion November 2020



124th & Ash - Lean Construction Process

- Owner sets clearly defined goals / targets
 - **Goal → 30% reduction in total development cost compared to OHCS baseline**
- High degree of team collaboration
 - WALSH / AMA / REACH
- *Target Value Design*
 - *Estimate the concept...then design to the estimate*
- Optimizing the widget(s)
 - The unit plan is our basic building block...
- Trade partners involved early





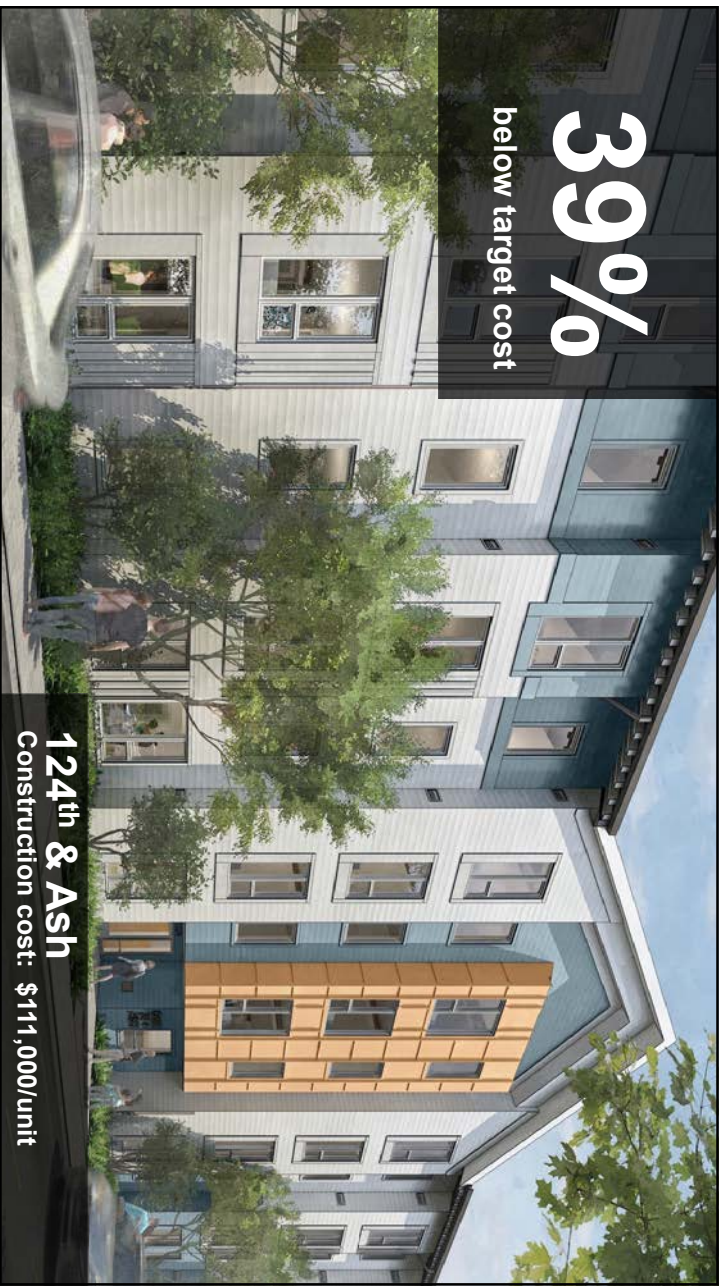
124th & Ash - Site (East Portland)



Image Credit: Shapiro / Didway

124th & Ash - Site Plan

ANKROM MOI



Menu of Performance Upgrades

- Balanced ventilation system
- Heat recovery at ventilation
- Shading elements at windows
- Increased airtightness (roof, windows, exterior walls)
- Increased R-value (roof, windows, exterior walls, slab)
- Lighting: (LED fixtures, lighting controls)
- Plumbing: (water heater, low flow fixtures, pipe insulation)
- MEL: appliances (CEE Tier II/III), elevators (MRL traction)



Menu of Architectural Upgrades

- Increased articulation
- Premium cladding or roofing materials
- Enhanced entry / lobby / common areas
- Balconies / patios
- Roof deck / courtyard
- Sunspaces / social nooks
- “Irresistible” stairway
- Enhanced landscape



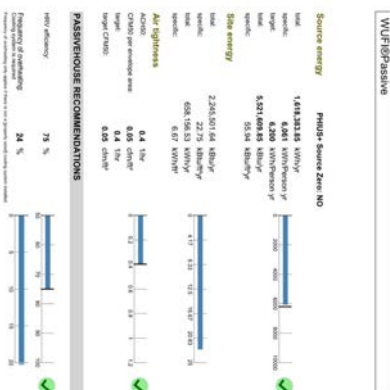
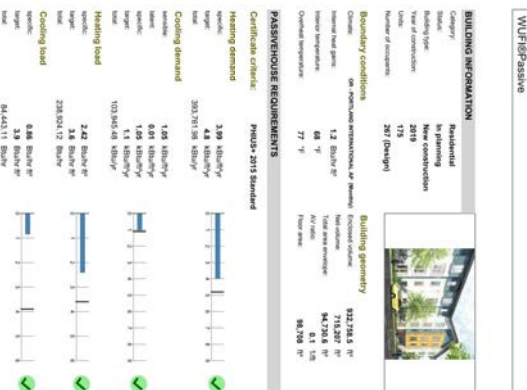
Performance Upgrades → PH / ZE Ready

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- Increased airtightness (roof, windows, exterior walls)
- Increased R-value (roof, windows, exterior walls, slab)
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**TARGET EUI =
15-23 kBtu/sf/yr**



124th & Ash - PH Feasibility Studies



Enhanced Envelope / HRV / 18% FF / CI

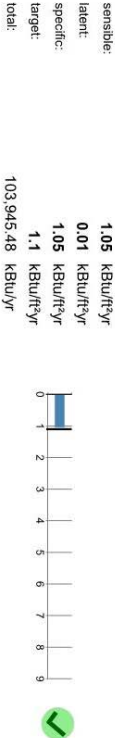
PASSIVEHOUSE REQUIREMENTS

Certificate criteria: PHUS+ 2015 Standard

Heating demand



Cooling demand



Heating load



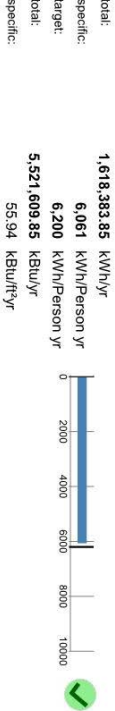
Cooling load



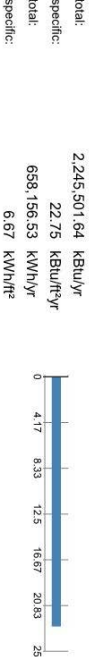
Enhanced Envelope / HRV / 18% FF / CI

Source energy

PHUS+ Source Zero: NO



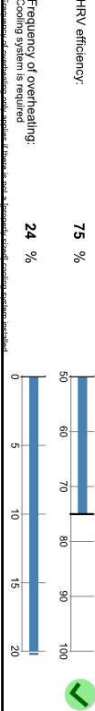
Site energy



Air tightness



PASSIVEHOUSE RECOMMENDATIONS



Enhanced Envelope / HRV / 18% FF / CI

Performance Upgrades → PH / ZE Ready

$\$19,487,763 \times .05 = \$974,388$ budget

- Balanced ventilation system **TARGET EU1 = 15-23 kBtu/sf/yr**
- Heat recovery at ventilation
- Shading elements at windows
- Increased airtightness (roof, windows, exterior walls)
- Increased R-value (roof, windows, exterior walls, slab)
- Lighting: (LED fixtures, lighting controls)
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Performance Upgrades → PH / ZE Ready

$\$19,487,763 \times .05 = \$974,388$ budget

- Balanced ventilation system **TARGET EU1 = 15-23 kBtu/sf/yr**
 - Heat recovery at ventilation **\$440,000 (\$290k HRVS, \$150k "ancillary")**
 - Shading elements at windows **\$108,000 (\$1200/window x 90 windows)**
 - Increased airtightness (roof, windows, exterior walls) **\$131,000 (\$48k spray foam, 83k taped sheathing)**
 - Increased R-value (roof, windows, exterior walls, slab) **\$193,000 (\$37k framing, 0k windows, 28k walls, 78k ci, 17k roof, 33k slab)**
 - Lighting: (LED fixtures, lighting controls) **\$0 (already in)**
 - Plumbing: (water heater, low flow fixtures, pipe insulation) **\$14,000 (\$0k 95% eff. boiler, 0k faucets/showerheads, 14k pipe insulation)**
 - MEL: appliances (CEE Tier II/III), elevators (MRL traction) **\$49,000 (\$280/refr x 175 refrigerators)**
- \$32,000 (elevators - \$4k/stop)**
- \$967,000 (4.9% premium)**



Performance Upgrades → PH / ZE Ready

$\$19,487,763 \times .05 = \$974,388$ budget

• Balanced ventilation system
 \$0 (already in) **TARGET EUI =**
 • Heat recovery at ventilation **15-23 kBtu/sf/yr**
 \$440,000 (\$290k HRVS, \$150k "ancillary")
 • Shading elements at windows **\$15k/unit**
 \$108,000 (\$1200/window x 90 windows)

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- MEI: appliances (CEE Tier II/III), elevators (MRL traction)
\$49,000 (\$280/refr x 175 refrigerators)
\$32,000 (elevators - \$4k/stop)

$\$967,000 + 328,000 + 1,380,000 = \$2,675,000$ (13.7% premium)

VRF heating/cooling + HPWH →



Glisan Gateway

Image Credit: MWA Architects

Glisan Gateway Workforce Housing

- Developer/ Owner: Northwest Housing Alternatives
- Architect: MWA Architects
- Contractor: Walsh Construction Co.
- Awarded MMT grant to support innovation in production of cost efficient affordable housing
- Programmed for 120-160 units → final unit count is 159
- Construction start: April 2019; completion: July 2020



Image Credit: MWA Architects

ILLUSTRATIVE SITE PLAN

NWA GLISAN HOODING

NE 35TH AVE & NE GLISAN ST, PORTLAND, OR 97217

GLISAN HOODING APPLICATION #2020-18

10/18/2020



Glisan Gateway - First Floor Plan

Image Credit: MVA Architects

Affordable Housing Project Pipeline - Portland Metro Area

Notes:

Project data has been gathered primarily by WACI or has been gathered from documents at the project domain used by Portland Housing Bureau (PHB), Oregon Housing and Community Services (OHCS), or Washington State Department of Commerce. Projects involving Walsh Construction Co. (WCCI) or Chisholm-Walsh Commercial Builders (CWB) are highlighted in green. Total number of units and No. of bedrooms figures are derived from PHB project profile sheets.

** Where Building Area cannot be determined, Hard Construction Cost / SF figure has been obtained from CHCS State Housing Council approval documents where provided.

Portland Area Affordable Housing Pipeline

Project Name	Sponsor	Architect	Contractor	Gross Building Area (SF)	No. of Units	No. of BR	Total Development Cost (TDC)	TDC/unit	TDC/Bedroom	Hard Construction Cost (HCC)	HCC/SF**	HCC/unit
Low Income Single Adult Hsg	TH	HOLST	Walsh	24,000	72	72	\$15,597,896.00	\$215,413.89	\$1,453,507.00	\$19,697,403.00	\$272.75	\$105,243.15
2121 B Ave	REACH	AMA	Walsh	96,822	175	190	\$28,337,287.00	\$161,927.35	\$149,143.82	\$19,697,403.00	\$272.75	\$105,243.15
Midtown Housing	NHA	MWA	Walsh	91,534	159	165	\$28,030,265.00	\$176,416.78	\$170,001.61	\$20,039,402.00	\$272.68	\$126,013.08
Grant Street Apartments*	CCC	AMA	Team	92,067	153	214	\$29,197,817.00	\$190,855.41	\$136,438.40	\$20,484,015.00	\$272.49	\$133,882.43
Interstate Apartments*	CCC	Crocota	Slico	30,823	51	68	\$9,796,805.00	\$191,209.90	\$143,482.43	\$5,991,915.00	\$194.39	\$117,486.57
Eastside Campus Apartments*	CCC	AMA	Walsh	63,045	124	124	\$24,606,280.00	\$198,398.03	\$198,599.03	\$18,238,194.00	\$289.29	\$147,082.21
St. Francis Park Apartments*	MWA	MWA	OWCB	74,005	106	107	\$23,250,483.00	\$219,344.18	\$217,294.23	\$14,291,211.00	\$193.11	\$134,892.75
Alphabet District Housing	NHA	CHA	Brenik	73,177	149	149	\$33,307,000.00	\$223,536.91	\$223,536.91	?	?	?
The Fields Apartments	GSL	?	?	243,400	264	396	\$62,986,117.00	\$238,583.78	\$159,055.85	\$42,639,612.00	\$175.18	\$161,513.68
72nd & Foster*	REACH	HOLST	LMC	79,549	101	131	\$24,356,329.00	\$241,151.77	\$185,926.18	\$16,272,993.00	\$220.83	\$161,118.41
Yellow Creek Crossing Apts	GSL	CHA	Walsh	98,234	120	131	\$29,744,546.00	\$247,871.22	\$227,057.60	\$21,640,001.00	\$220.16	\$180,133.78
New Meadows*	CHM	CHA	Walsh	10,200	15	15	\$3,850,181.00	\$256,678.82	\$346,678.82	\$2,415,500.00	\$275.75	\$161,033.33
Red Rock Creek Commons	CHM	CHA	?	?	48	48	\$13,954,501.00	\$288,855.44	\$269,885.44	?	?	?
Wine Apartments*	REACH	MWA	Walsh	153,998	169	272	\$31,156,689.00	\$175,626.48	\$190,283.68	\$15,462,331.00	\$273.52	\$190,276.92
Hill Park Apartments*	CCC	CHA	Colas	25,344	39	39	\$10,840,188.00	\$277,293.54	\$277,293.54	\$8,538,331.00	\$282.69	\$180,467.00
Isabella Court - Phase II	REACH	MWA	Team	42,679	49	64	\$19,909,492.00	\$271,353.81	\$0,157,253.00	\$0,157,253.00	\$191.96	\$186,780.67
Overseas St Corridor - Phase III	NHA	KASA	Walsh	62,771	52	123	\$14,820,447.00	\$285,008.60	\$270,493.44	\$10,318,405.00	\$164.38	\$196,430.87
Overseas Ave Veterans Housing	NHA	KASA	Walsh	18,040	24	32	\$7,077,230.00	\$294,892.92	\$221,169.69	\$4,430,308.00	\$245.58	\$184,596.17
Magnum Apartments - Phase II	HH	CHA	Brenik	?	54	93	\$15,176,248.00	\$302,524.98	\$162,647.84	?	?	?
91st & Foster*	Prosper Portland	Hucker	OWCB	186,000	240	283	\$72,770,121.00	\$300,275.50	\$246,671.81	\$47,831,797.00	\$257.16	\$199,299.15
Brook 45*	REACH	URS	OWCB	?	80	132	\$24,131,244.00	\$301,420.55	\$190,388.21	\$18,526,938.00	\$294.09	\$231,586.73
Beatrice Morrow*	PCRI	AMA	Colas	?	126	204	\$40,011,635.00	\$317,552.66	\$196,135.47	?	?	?
Oliver Station*	Palindrome	AMA	Urban Edge	?	40	47	\$12,946,427.00	\$323,660.68	\$275,455.89	?	?	?
106 Halsey*	Human Solutions	HOLST	LMC	?	44	58	\$14,321,892.00	\$325,497.55	\$246,929.17	?	?	?
Cedar Grove	CPAH	CHM	CHM	?	48	66	\$15,660,784.00	\$326,466.33	\$237,284.61	\$11,831,341.00	\$242.53	\$248,486.27
The Jade*	BOGE	SEBA	OWCB	47,738	48	66	\$15,660,784.00	\$326,466.33	\$237,284.61	\$5,947,448.00	\$240.72	\$198,254.03
Metropolitan Place*	NHA	EW	Walsh	24,708	30	30	\$9,900,000.00	\$330,000.00	\$320,000.00	?	?	?
Westside Culture Apartments*	BOGE	CHA	Walsh	60,878	64	90	\$21,551,157.00	\$336,284.75	\$239,457.24	\$14,374,848.00	\$276.13	\$224,607.00
King Park Apartments*	PCRI	Merriman	Colas	?	70	132	\$23,546,972.00	\$342,099.61	\$183,416.46	?	?	?
West Campus Housing	NHA	MWA	OWCB	30,201	28	37	\$10,620,846.00	\$380,319.93	\$280,310.63	\$6,778,600.00	\$290.67	\$113,543.43
14th & Halpert*	HH	LKS	Brenik	?	93	188	\$33,842,665.00	\$363,905.00	\$190,652.47	\$24,689,417.00	\$315.29	\$265,478.27
North Williams*	BRIDGE	AMA	Colas	?	61	129	\$23,635,556.00	\$387,468.13	\$183,271.36	?	?	?

Conclusion

- We need more homes → 3,900 x 1.1 = 4,300 (yes!)
- We need better homes
 - Low energy / low emission (PH, NZE) should be the standard not the exception...
- We have the technology, we have the discipline...(or do we?)
- We had it ten years ago...





Conclusion

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- We need better homes
 - Low energy / low emission (PH, NZE) should be the standard not the exception...
- We have the technology, we have the discipline...(or do we?)
- We had it ten years ago...
- WHAT ARE WE WAITING FOR?!



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