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

Image Credit: Derome Mark & Bostad

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- Great place
- Great people
- Great projects

- The heart of our organization…
  - Serving mission driven clients
  - Multi-unit housing, affordable…

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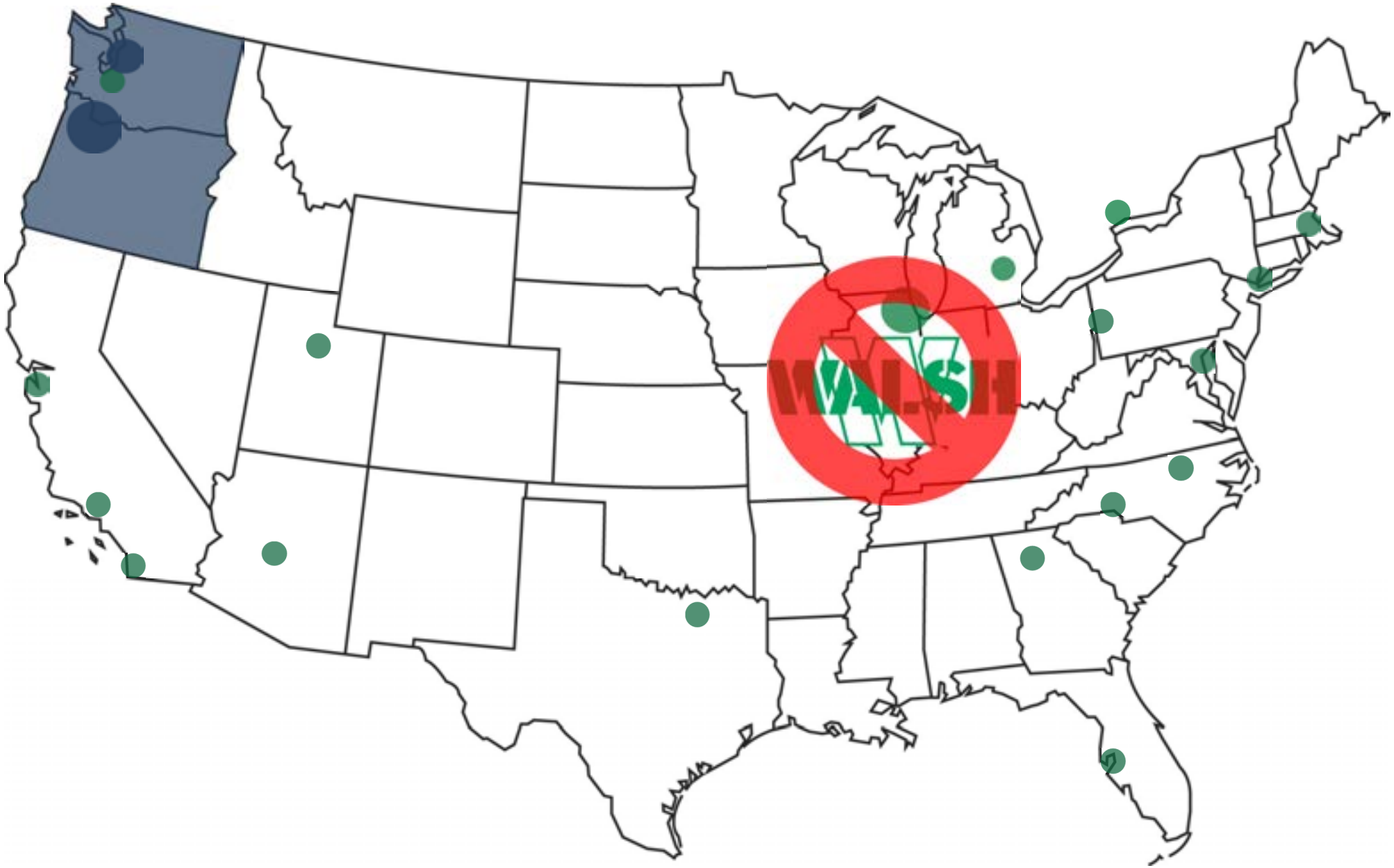


Exploring A Path…

- Framing the issue…
  - → COST / AFFORDABILITY
- Addressing the issue…
  - → COST EFFICIENCY
- “Beta test” projects

Orchards at Orenco

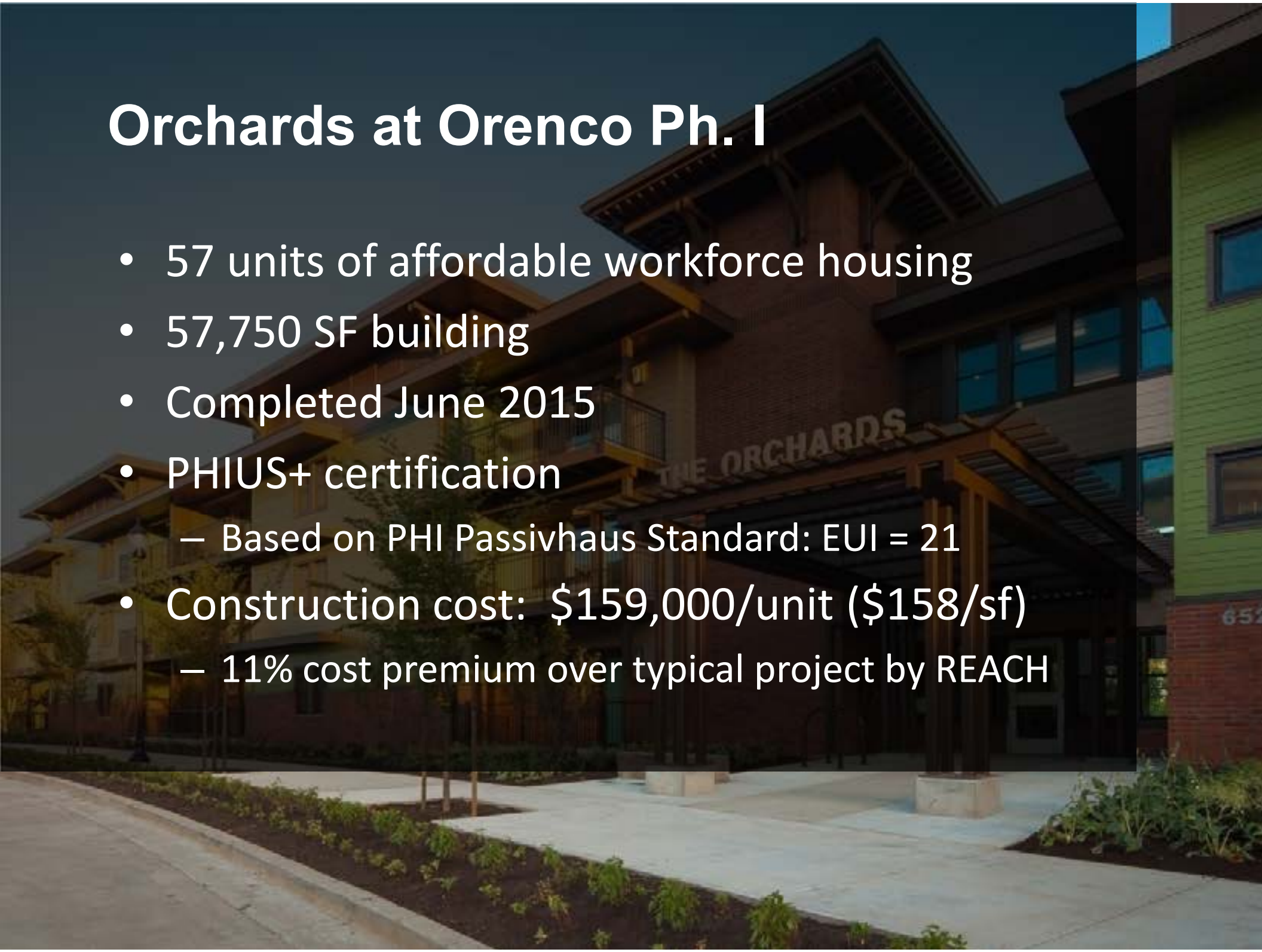
Photo Credit: Casey Braunger

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

Image Credit: Ankrom Moisan Architects

Orchards at Orenco Hillsboro, Oregon



Orchards at Orenco Ph. I

- 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

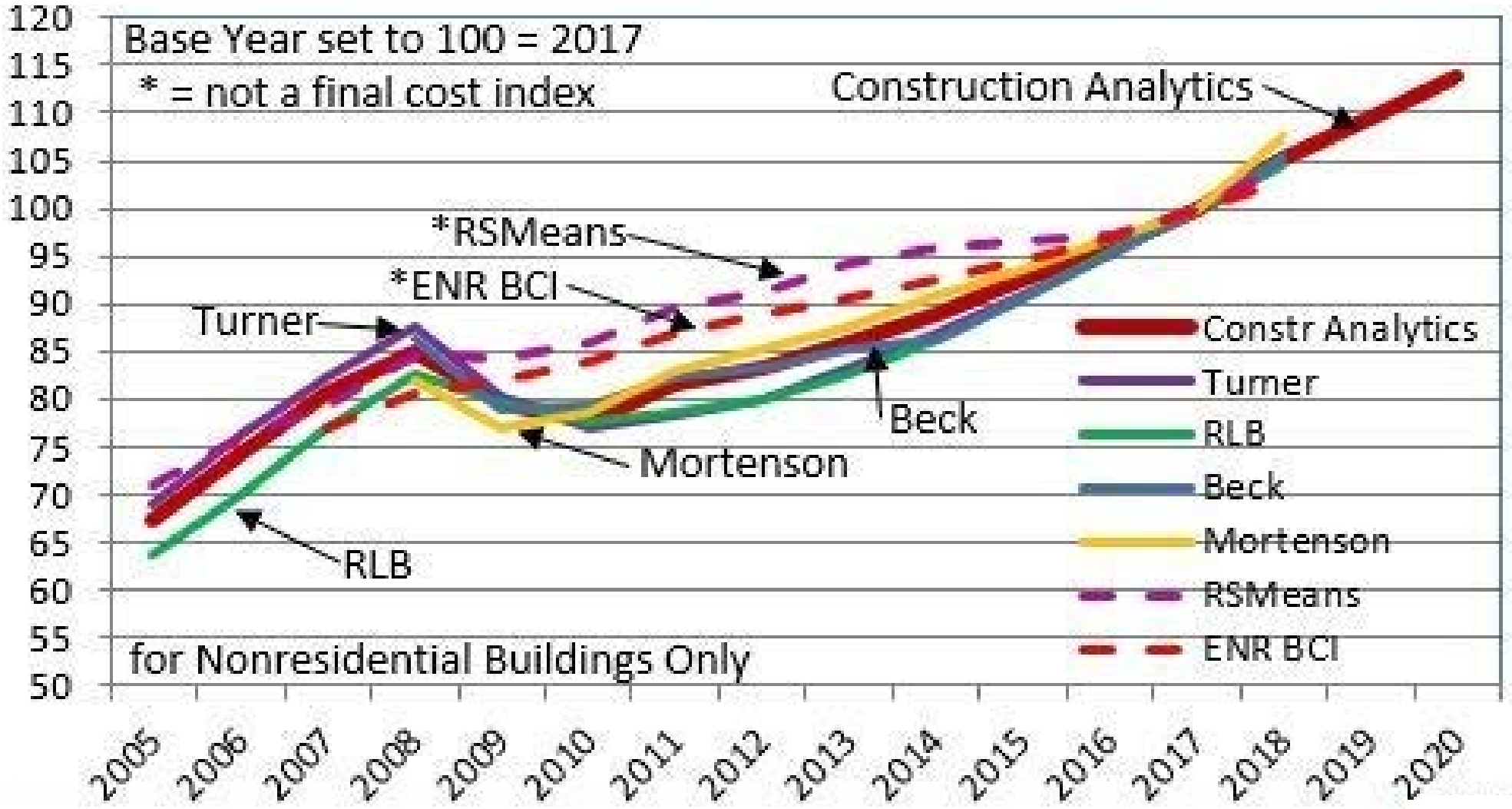
Orchards at Orenco Ph. III

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

- 5-15% cost escalation (annually) in PNW
- Multifamily market activity at all time high
  - Subcontractor books are full
  - Increasing margins
- Severe labor shortage
  - Increasing wages
  - Lower productivity
  - Longer schedules
- Increasing material prices
- Natural events

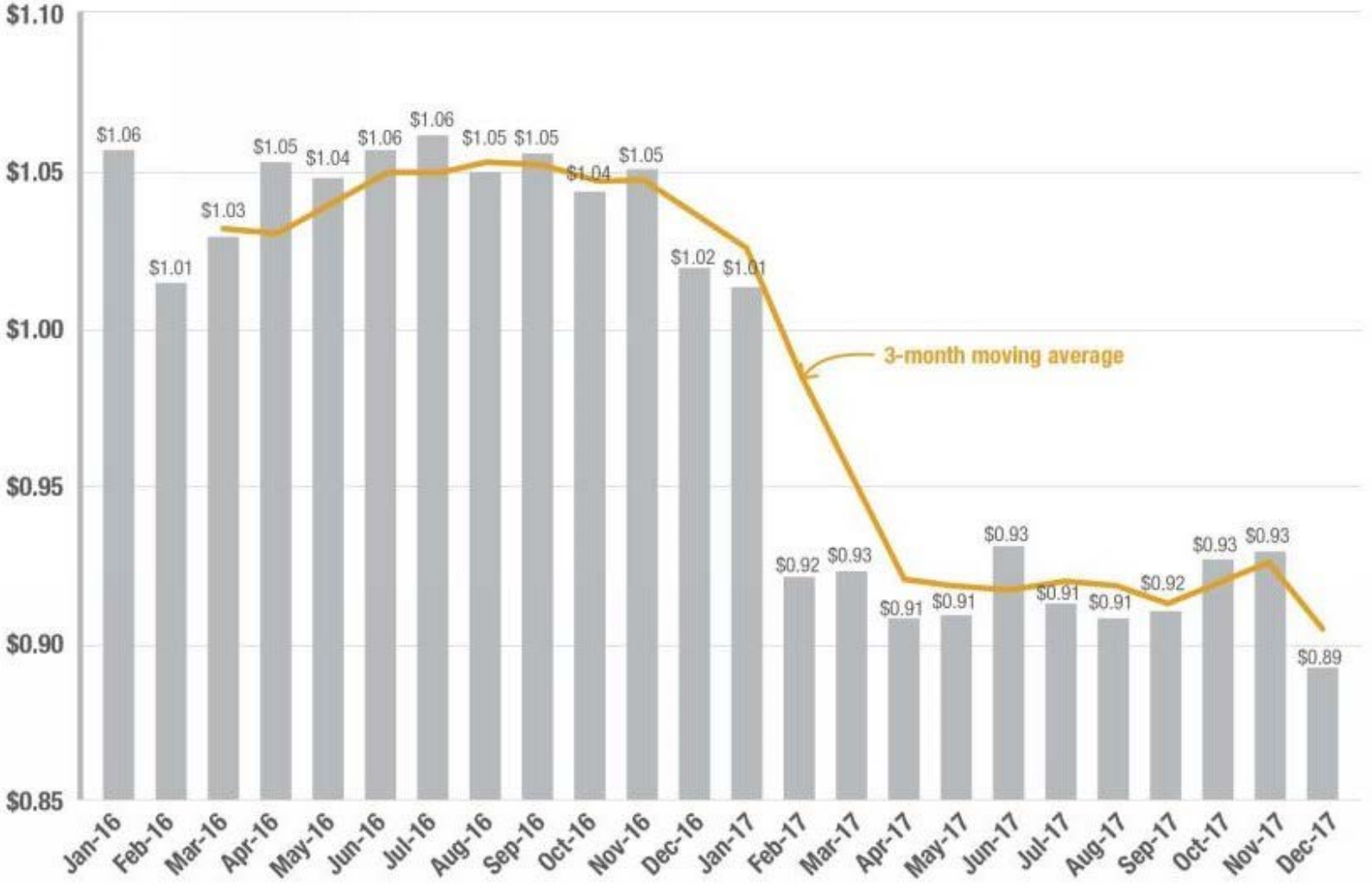


Source: Ed Zarenski, Construction Analytics (edzarenski.com)

Construction Building Cost Indices

Low-Income Housing Tax Credit Equity Pricing per Credit

January 2016-December 2017



This low-income housing tax credit equity pricing chart is presented for general information purposes only. Per credit equity pricing is based on syndicator Letter of Intents (LOIs) provided to Novogradac & Company LLP by market participants. The equity price reported for each month is the average equity price for LOIs issued in that month. No adjustments to equity pricing are made for timing of capital contributions or other considerations. Data labels are rounded to the nearest cent.

Source: Novogradac & Co.

NOVOGRADAC & COMPANY LLP

The Cost of Affordable Housing

- Severe cost escalation in PNW multifamily construction market in recent years
- Tax credit pricing exacerbating the problem…

- Housing providers finding it extremely difficult to finance projects, establish & maintain budgets
- Key stakeholders in affordable housing development raising concerns about escalating costs…established unit price limits to contain costs
- Leading to…

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The Cost of Affordable Housing

- …desire among affordable housing developers and stakeholders alike to identify ways to reduce costs of current and future projects

DISCIPLINE

COST ~~CONTROL~~…NOW

What “Housers” Want

- “Best value”
  - A high level of quality…delivered at a low cost
- Healthy
- Comfortable
- Durable
- Energy Efficient
- Reliable
  - Easy (and low cost) to operate, maintain, repair, replace…

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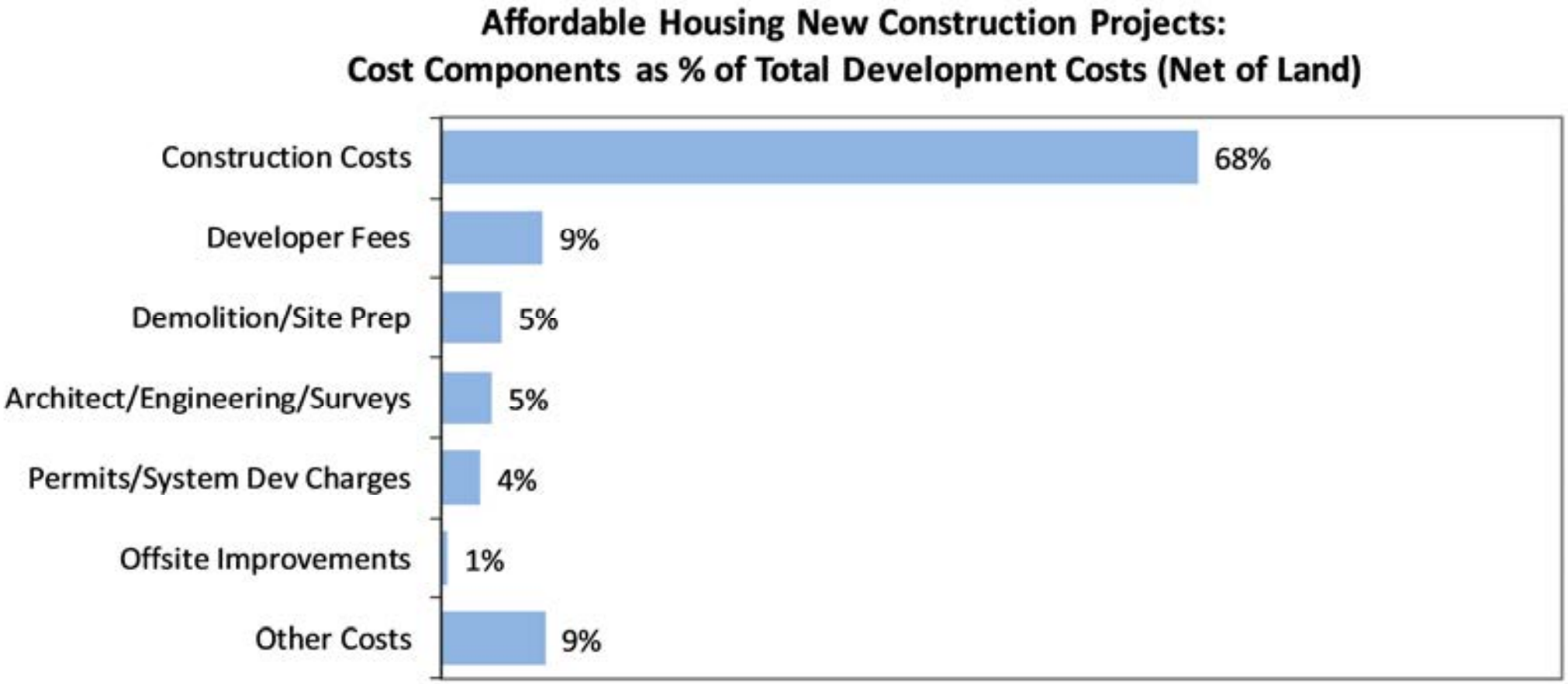


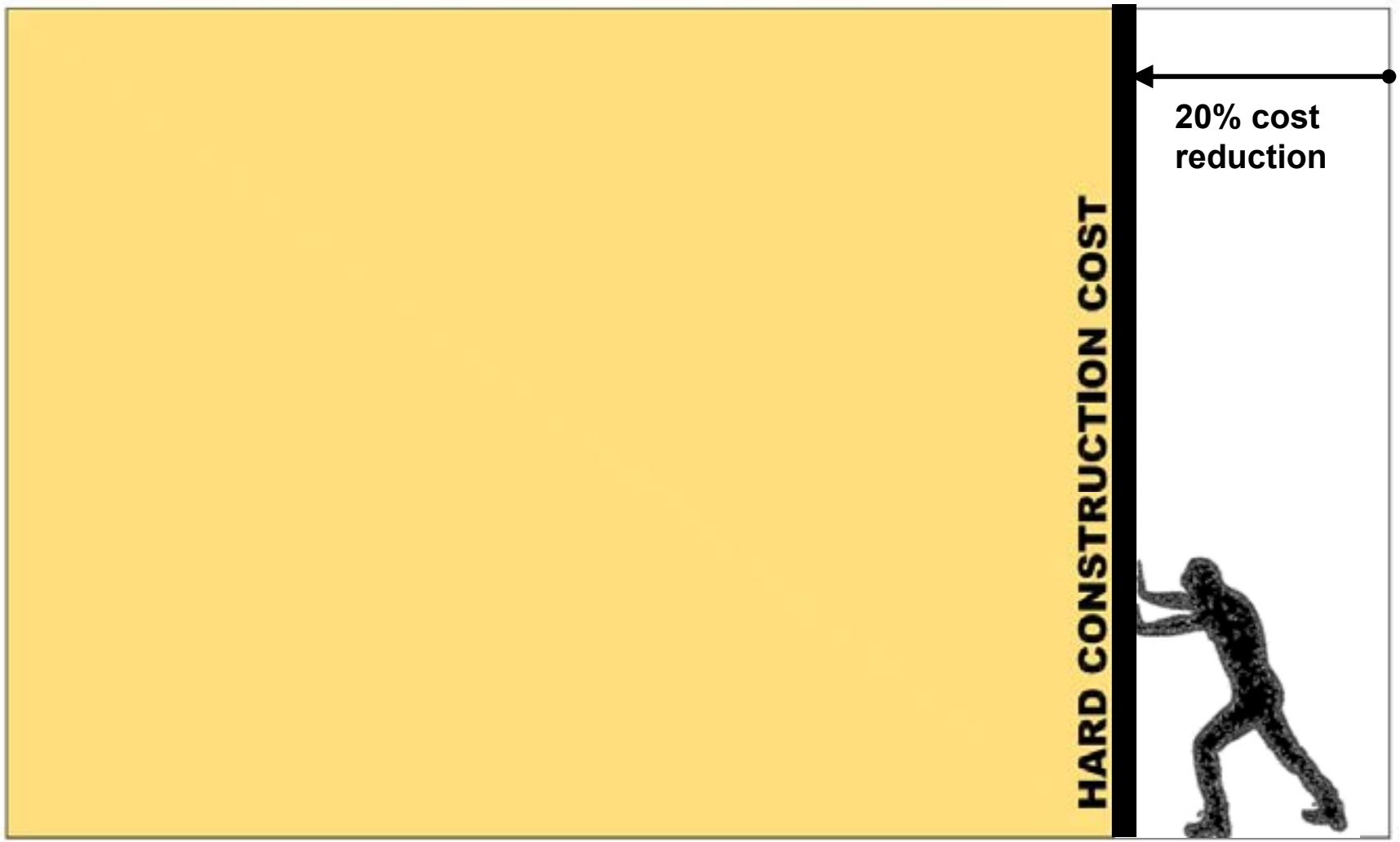
Average calculated by summing (real) cost measures across all affordable projects and dividing by total project costs excluding land.

Source: Blue Sky Consulting Group

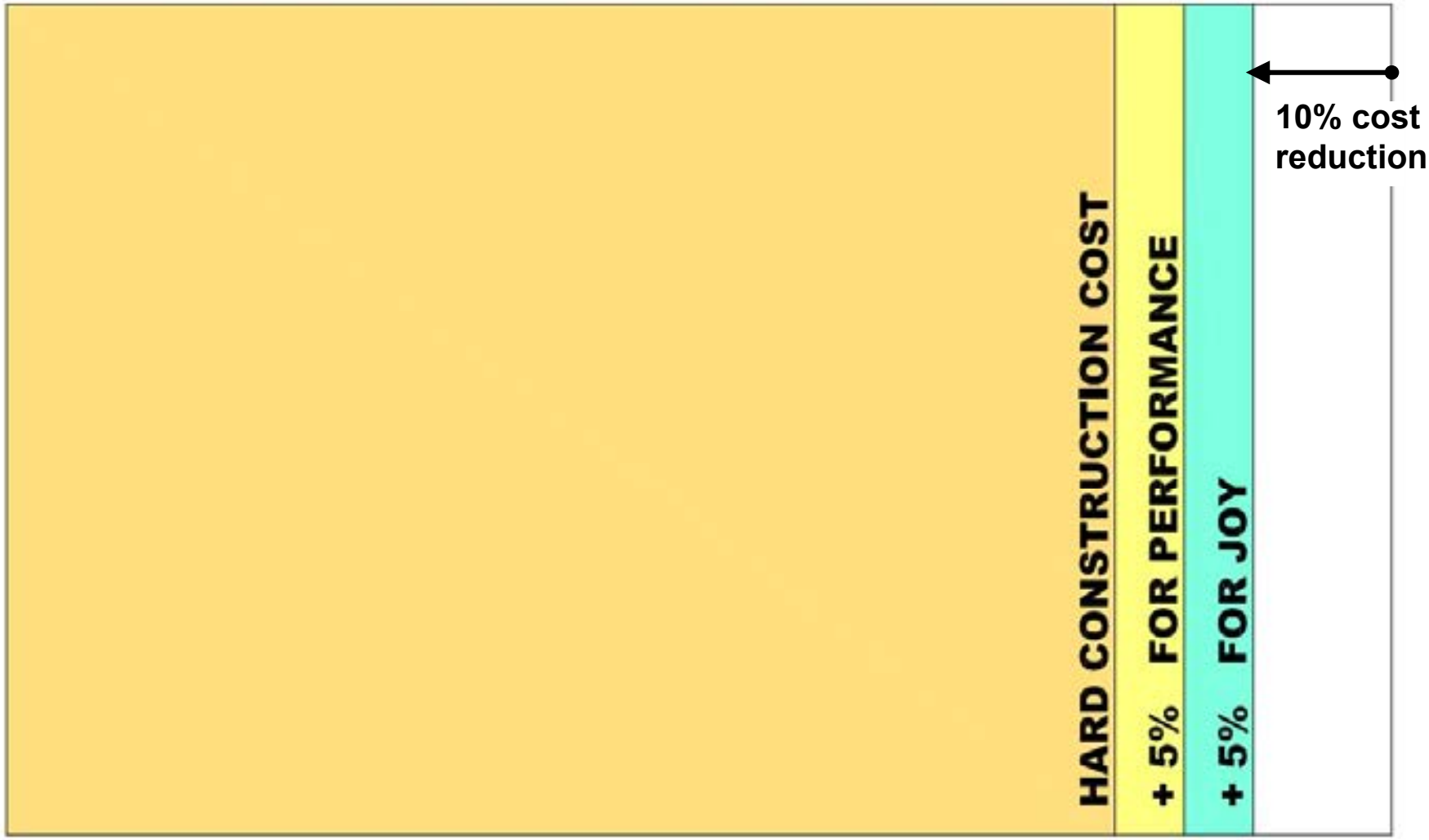
Major Components of Development Cost

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 and Construction (CEDC)
  - Applying cost efficiency principles to overall design of buildings…and to building's sub-systems
  - Utilizing standardization, repetition, prefabrication
  - Utilizing economies of scale whenever possible
- Lean Methods
  - Optimizing the widget (i.e. unit plans) as basic building blocks for efficient building layouts
  - Integration / Collaboration (incl. subs)
  - Target Value Design (TVD)
  - Eliminating waste…

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CEDC – What Is It?

- A different approach…
- Focuses first on achieving most highly efficient building layouts and optimized designs, adapted to each unique site & program
- Focuses next on the largest scopes of work where the cost meter can be moved the furthest
  - Site / Earthwork
  - Concrete
  - Framing
  - Enclosure / Cladding
  - Drywall
  - Flooring
  - HVAC
  - Plumbing
  - Electrical
  - Fire Protection

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CEDC – What Is It?

- Attempts to optimize the 80% of the building that's buried/hidden…

  to maximize opportunities for the 20% that's visible/felt/ experienced

Standardize/Optimize

- Typical unit plans
- Corridors
- Exit stairways
- Foundation system
- Structural system
- Enclosure system
- Windows 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
- Façade design / 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%

CEDC – What It Is Not

- CEDC is **not** a rush to the lowest common denominator, or to poorer quality buildings…

- Ultimate goal of CEDC is **not** to reduce cost to the absolute minimum, but rather to ***generate substantial savings through efficient layout and optimization*** of the basic design of the building…so that value-added, qualitative measures/features – such as exterior or interior finish upgrades, or energy efficiency measures – can be considered and incorporated into the project

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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
- Heights set for drywall (increments of 48” or 54”)

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CEDC - Key Working Principles

- Stack the units (duh!)
- Back to back plumbing
- Avoid cantilevers *
- Avoid steel (yes it is possible…)
- "Disciplined" approach to windows
  - Bigger is not necessarily better…
  - Staggered patterning…really?
- "Responsible" approach to cladding
- Standardize & repeat elements
- Prefab as much as makes sense

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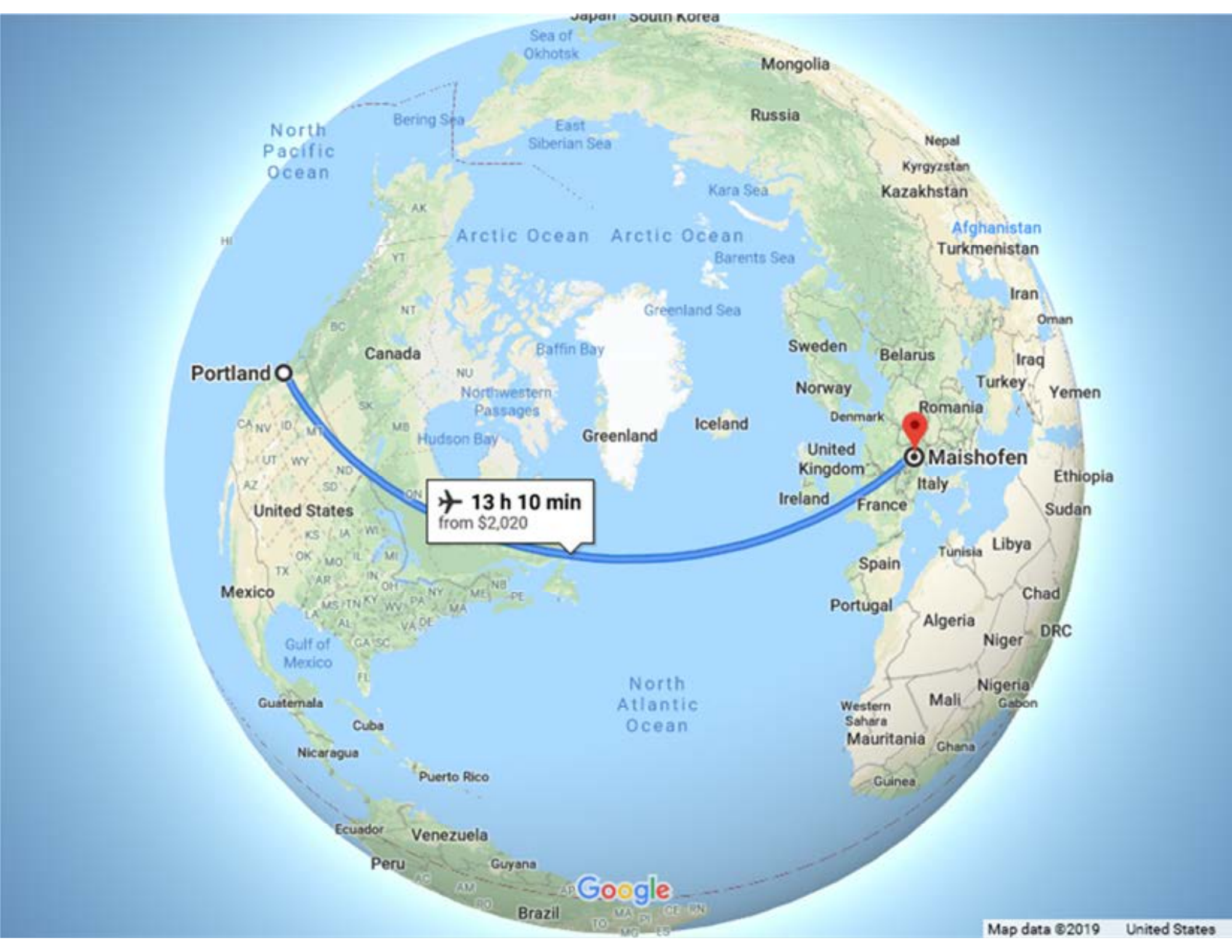
THE LONDON PLANE
London Plane


LOUNAIS-SUOMEN
MAALAISTENTALO


20
20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East Siberian Sea
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Kara Sea
Nepal
Kyrgyzstan
Kazakhstan
Arctic Ocean
Arctic Ocean
Barents Sea
Afghanistan
Turkmenistan
Iran
Oman
Greenland Sea
Canada
Baffin Bay
Sweden
Belarus
Iraq
Turkey
Yemen
Norway
Romania
Denmark
Northwestern Passages
Hudson Bay
Greenland
Iceland
United Kingdom
Ireland
France
Italy
Ethiopia
Sudan
United States
Tunisia
Libya
Spain
Portugal
Algeria
Chad
Niger
DRC
Mexico
Gulf of Mexico
North Atlantic Ocean
Nigeria
Mali
Gabon
Western Sahara
Mauritania
Ghana
Guinea
Guatemala
Cuba
Nicaragua
Puerto Rico
Ecuador
Venezuela
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Why Is Every MURB a 100% Prototype?

Typical Multi-Unit Residential Building

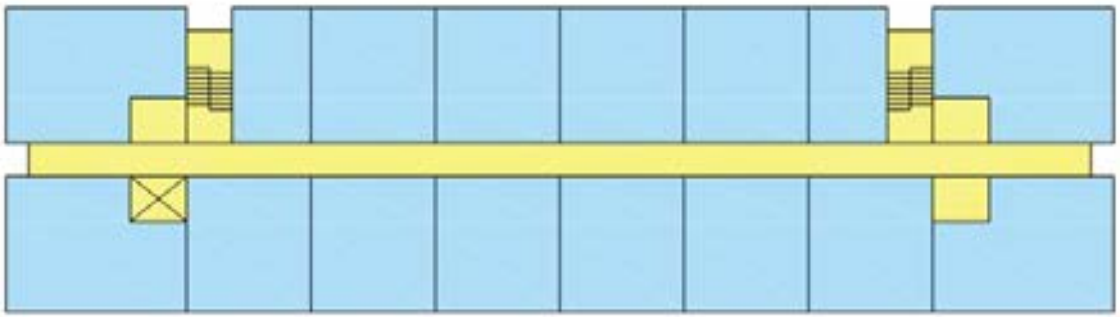
CEDC Project

Kit of Parts – Corridor

CEDC Project

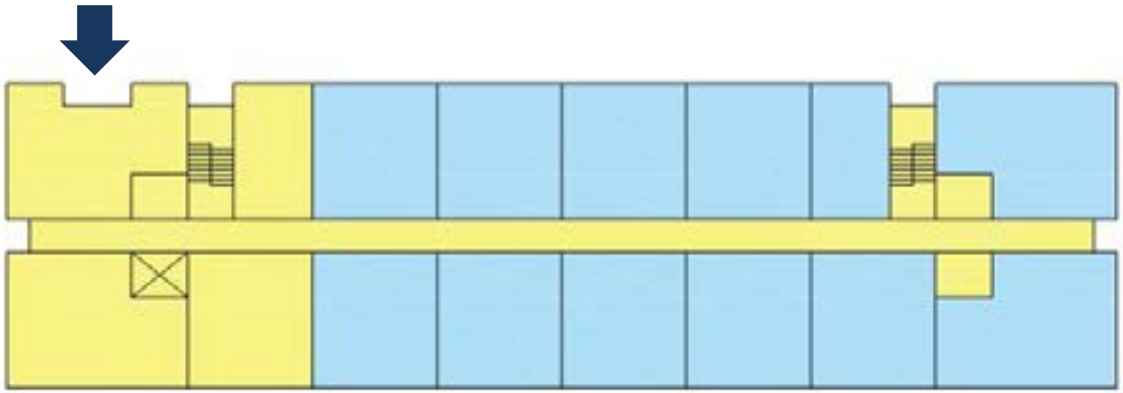
Kit of Parts – Stairs, Elevator(s), Utility

CEDC Project



Kit of Parts – Units

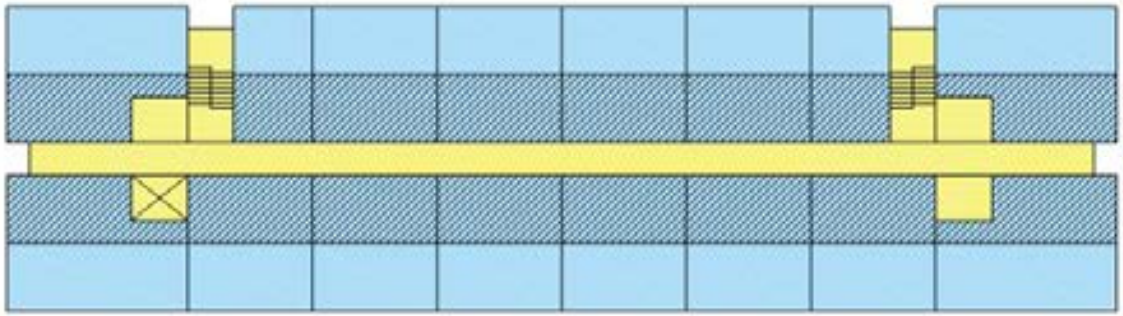
CEDC
Project



Kit of Parts – Entry, Common Spaces

at Ground Floor

CEDC Project



Kit of Parts – Core & Shell

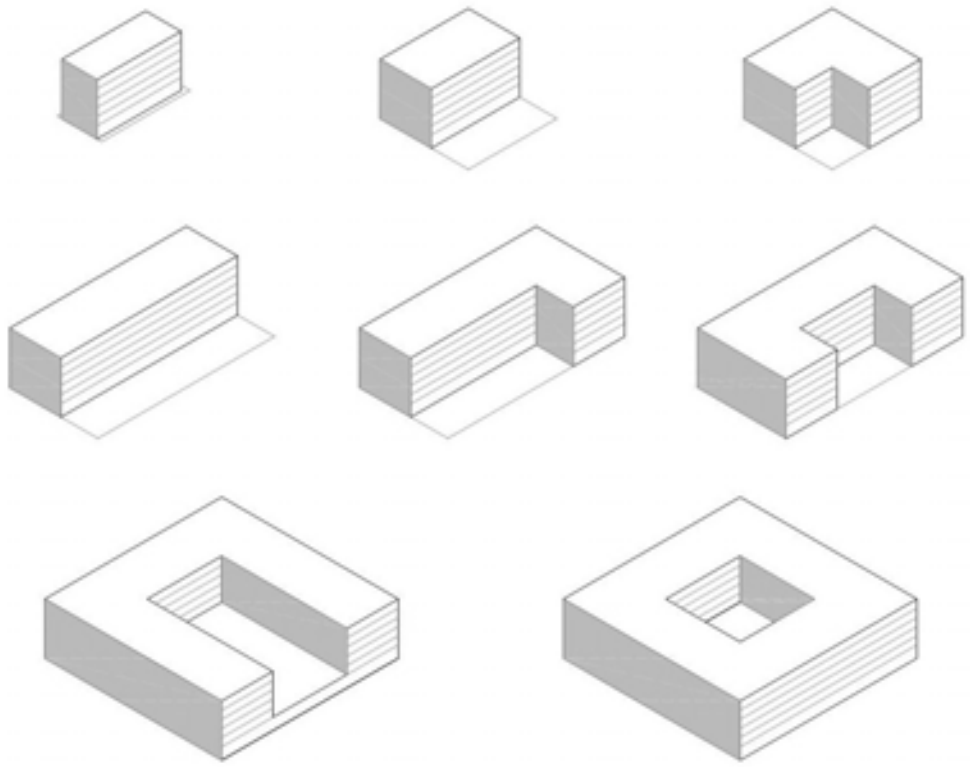
CEDC Project

Kit of Parts – Core & Shell

CEDC
Project

Model Building Types / Plan Types

- Low-rise: 2-4 stories
- Mid-rise: 5-7 stories
- High rise: 8 stories and up…



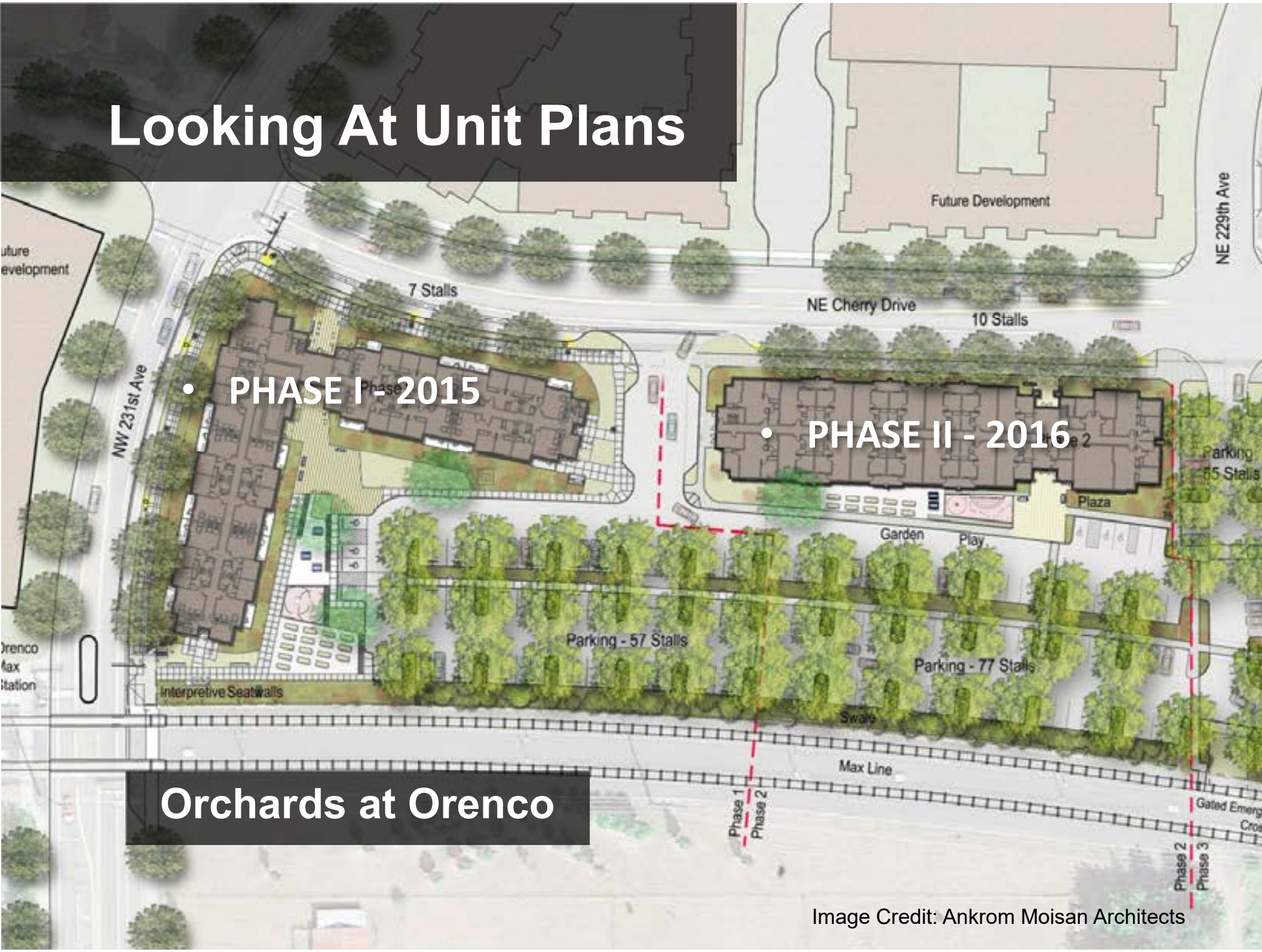
I - L - C - U - O

Unit Plans = Basic Building Blocks

- Comfortable
- Pleasing
- Commodious
- Efficient

Why Is Every Unit Plan Different?

Looking At Unit Plans

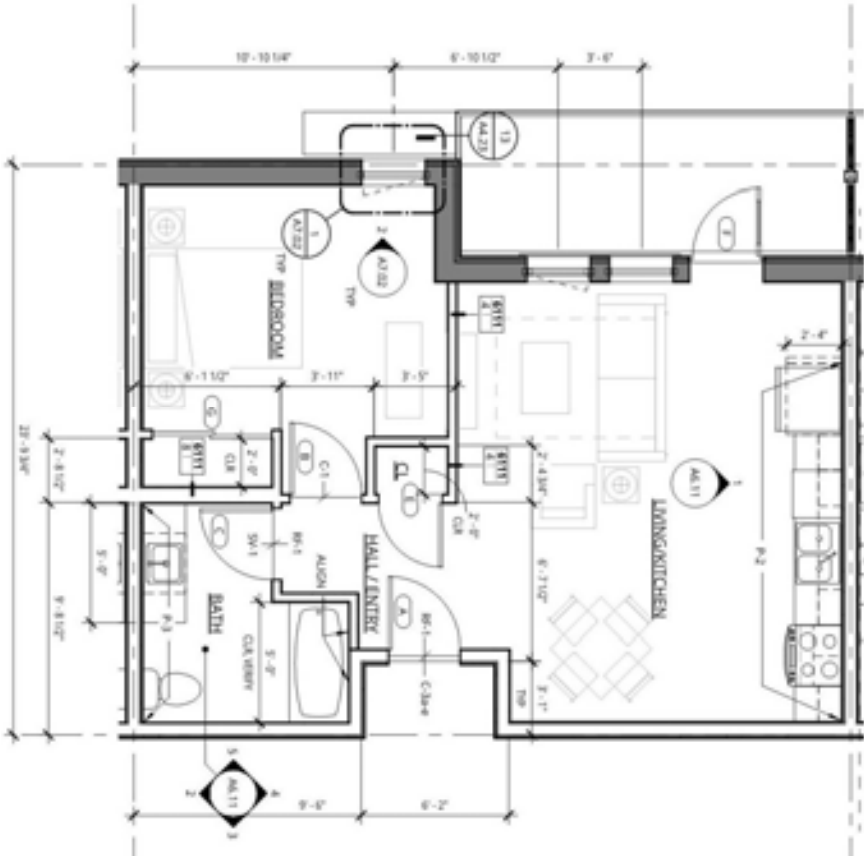


- PHASE I - 2015
- PHASE II - 2016

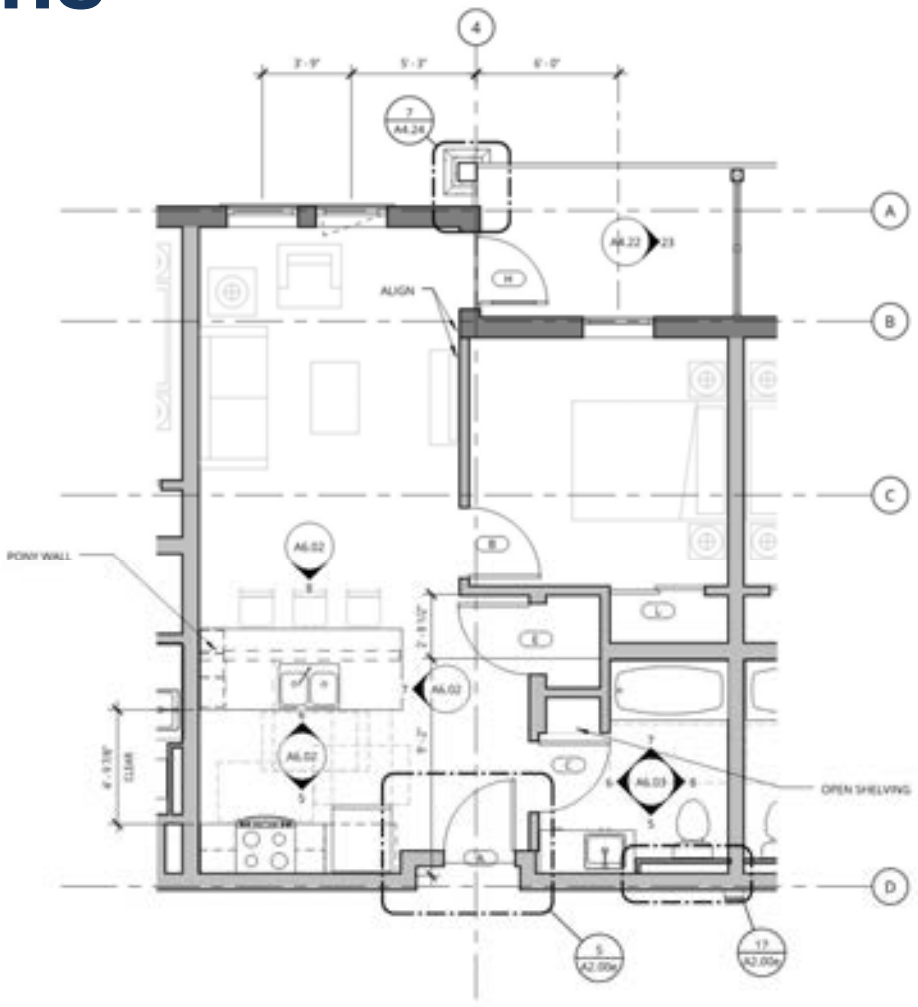
Orchards at Orenco

Image Credit: Ankrom Moisan Architects

Looking At Unit Plans



Orchards Ph. I: 656 square feet
30 feet wide

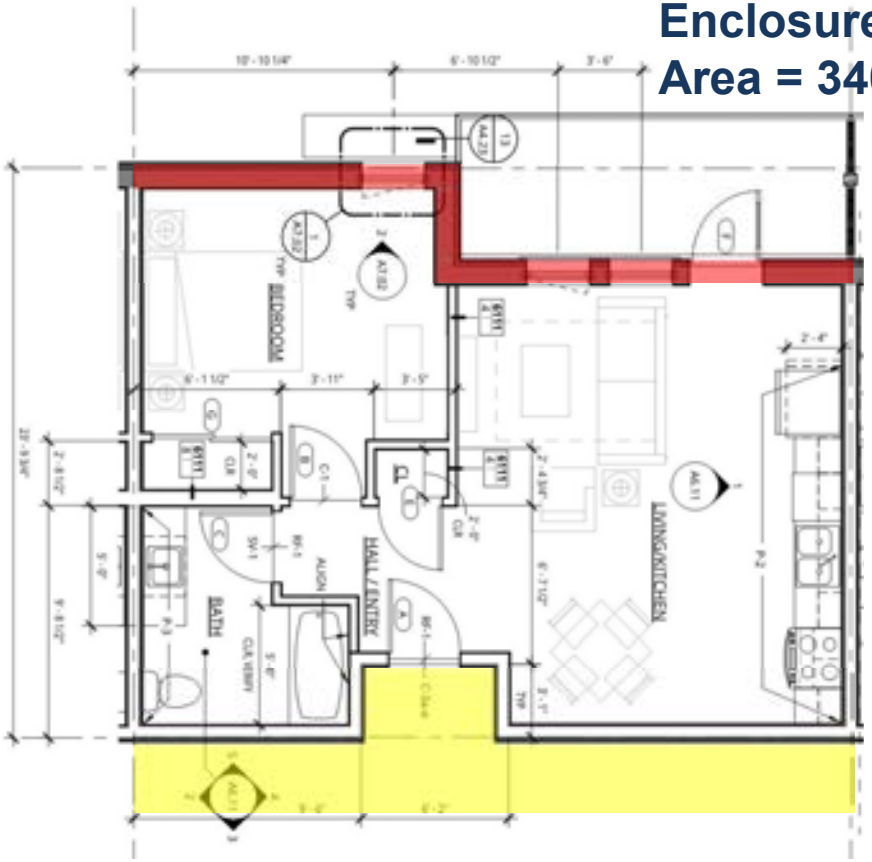


Orchards Ph. II: 608 square feet
23 feet wide

Image Credit: Ankrom Moisan Architects

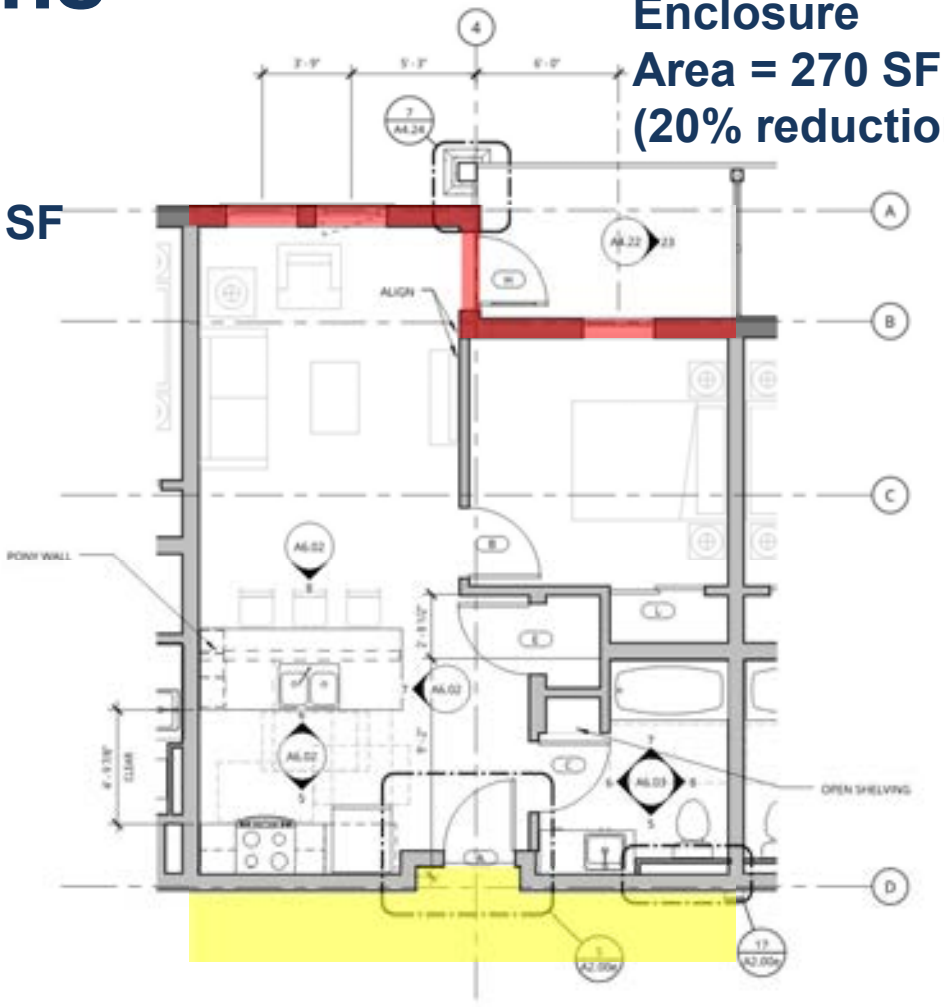
Looking At Unit Plans

Vertical Enclosure Area = 340 SF

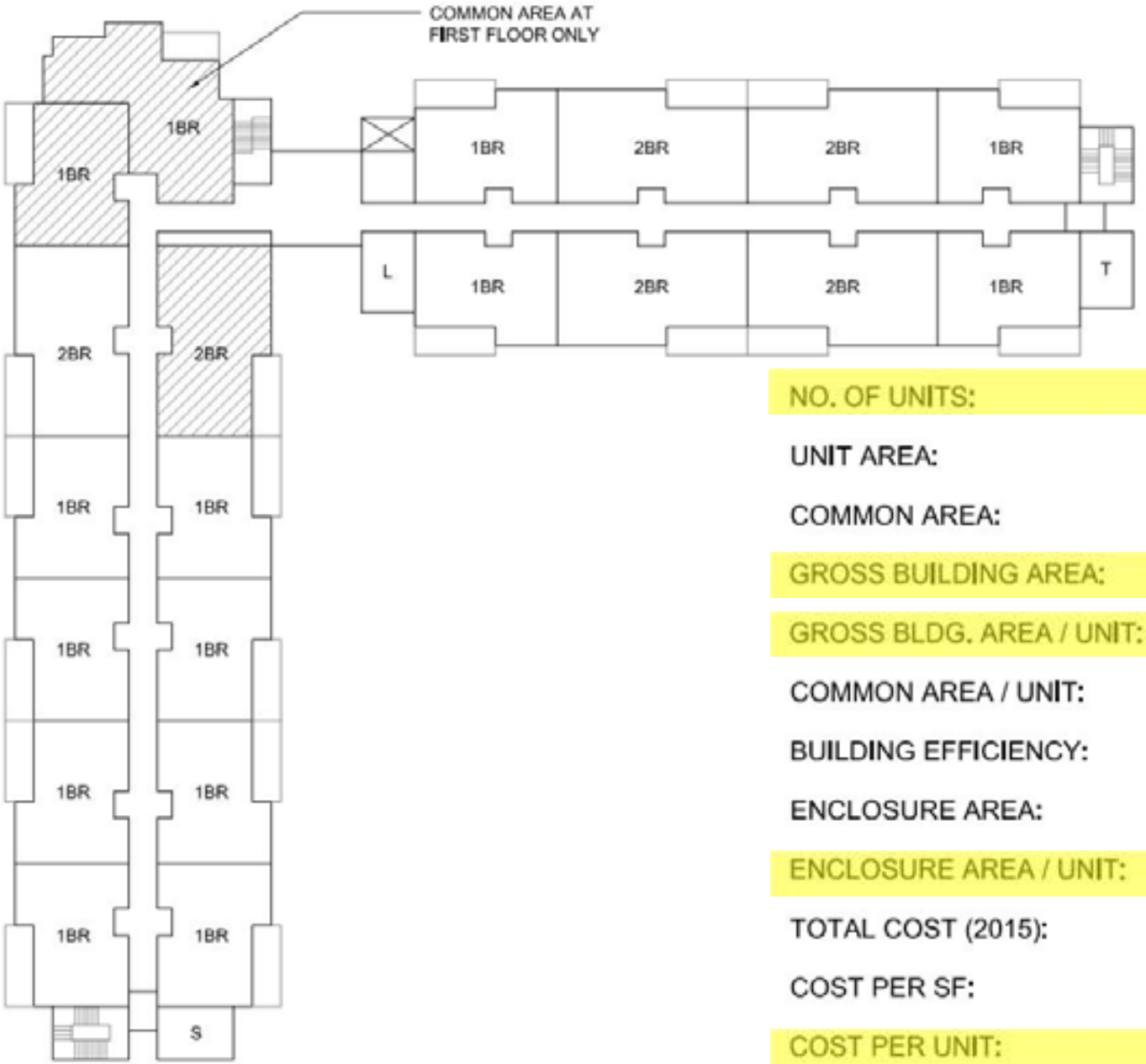


Common Area (Corridor) = 108 SF

Vertical Enclosure Area = 270 SF (20% reduction)



Common Area (Corridor) = 74 SF (32% reduction)

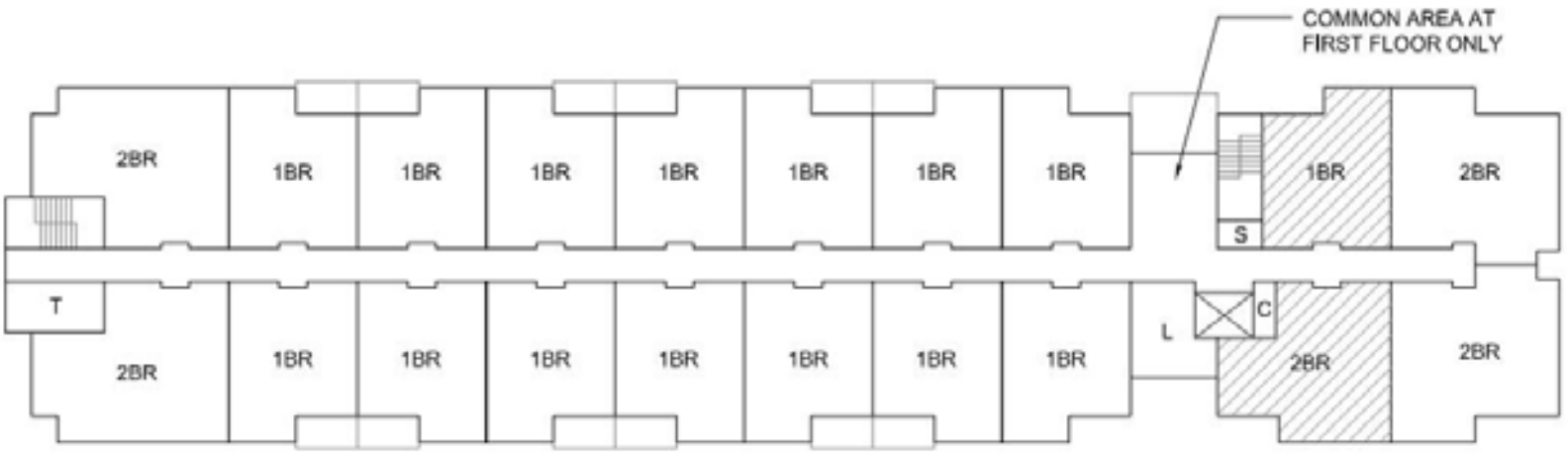


NO. OF UNITS:	57
UNIT AREA:	42,638 SF
COMMON AREA:	15,112 SF
GROSS BUILDING AREA:	57,750 SF
GROSS BLDG. AREA / UNIT:	1,013 SF
COMMON AREA / UNIT:	265 SF
BUILDING EFFICIENCY:	74%
ENCLOSURE AREA:	50,050 SF
ENCLOSURE AREA / UNIT:	878 SF
TOTAL COST (2015):	$9,053,040
COST PER SF:	$158
COST PER UNIT:	$159,527

N

Orchards Phase I

CEDC Project



NO. OF UNITS:	58
UNIT AREA:	40,124 SF
COMMON AREA:	9,776 SF
GROSS BUILDING AREA:	49,900 SF
GROSS BLDG. AREA / UNIT:	860 SF
BUILDING EFFICIENCY:	80%
COMMON AREA / UNIT:	168 SF
ENCLOSURE AREA:	39,712 SF
ENCLOSURE AREA / UNIT:	684 SF
TOTAL COST (2016):	$8,531,624
COST PER SF:	$173
COST PER UNIT:	$147,097

(15% reduction)

(22% reduction)

(8% reduction)

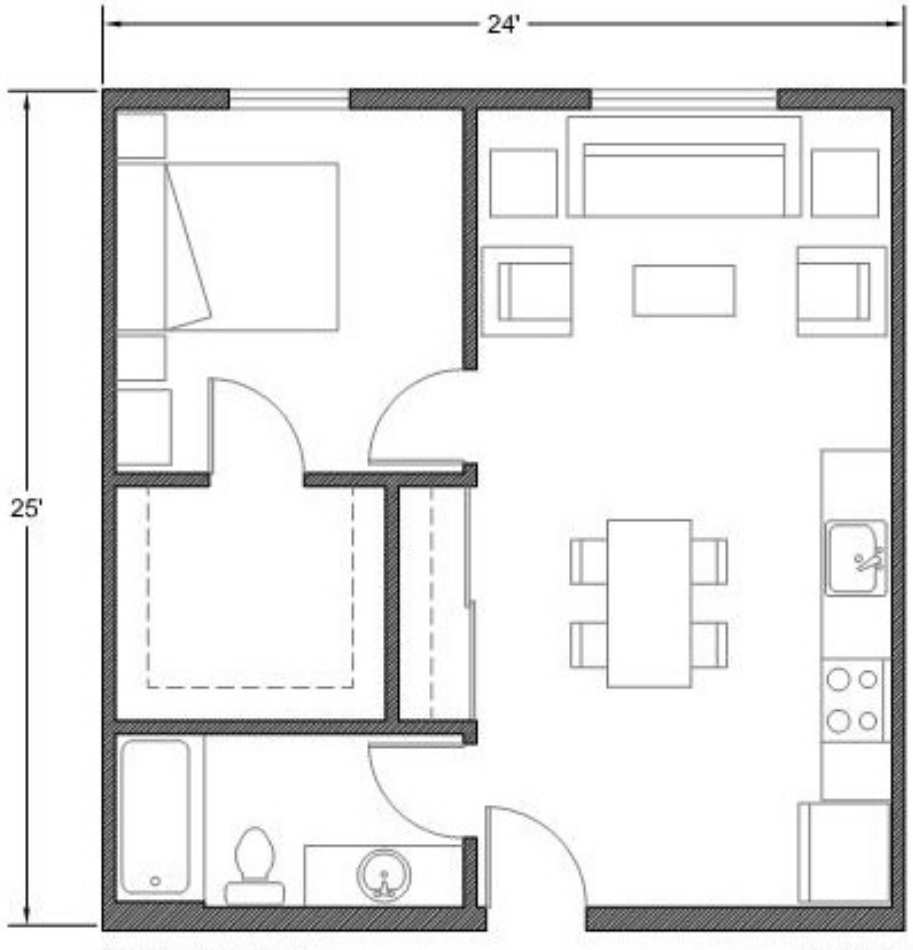
N

Orchards Phase II

CEDC Project

OHCS Minimum Unit Requirements

- 600 SF min. area
- Efficient, flexible layout
- Avoid hallways
- Bedrooms furnishable with 2 twin beds
- Ample storage



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Principles for Unit Plan Design

- Keep it simple, reduce materials, minimize waste…
  - Less can be more
- Optimize width-to-depth (i.e. “aspect ratio”)
- Reduce circulation area
- Provide open space with flexible layout
- Use modular layout
- “Cut corners”
- Reduce walls and doors
- Make every inch count
- Repeat basic unit plans

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Seeking Better Building Blocks for Affordable Housing: Notes on the Design of Unit Plans

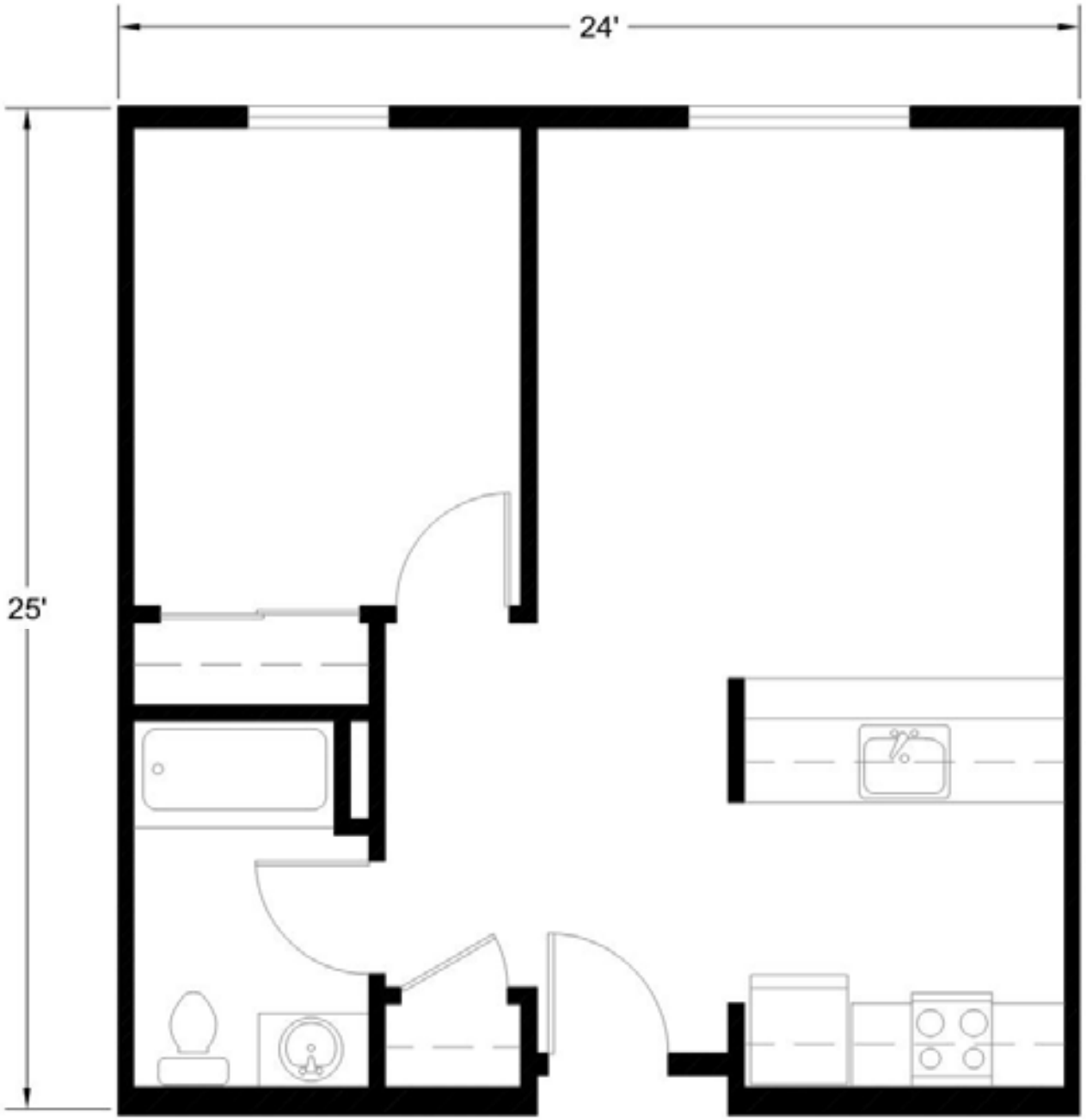
Walsh Construction Co.

Unit plans are the basic building blocks of multi-unit residential building design. Efficient unit plans are the starting point for creating efficient building plans. A well laid out unit plan properly accommodates all the basic functional areas for living, cooking, dining, sleeping and bathing, and does so using a minimum of square footage and building volume. Ideally, spaces should have a loose fit to accommodate multiple activities and a variety of furniture layouts. There should be ample space within the unit for storage and the area dedicated to circulation should be minimized.

Minimum area requirements for dwelling units advocated or required by some project stakeholders exceed what is necessary to provide commodious living space for occupants if the unit layouts are well planned and optimized. The market rate housing delivery system clearly understands this and commonly offers smaller unit sizes, especially in more urban settings where occupants spend much of their daily life outside of the unit. Affordable housing providers should consider challenging the minimum area requirements to create more efficient building plans, reduce overall costs per unit, and thus stretch the resources that are to be invested in the provision of affordable housing. More efficiency = more affordable homes delivered to the community, for less subsidy per unit.

In the process of developing the most optimized unit plans in an effort towards standardization, WALSH recently undertook a series of studies of different unit configurations and sizes for studio, one-bedroom and two-bedroom units, working together with project partners at REACH CDC and Ankrom Moisan Architects. We built a full-size mockup of the units, to allow our team to test assumptions and fine tune the configuration and sizing. The intent of the study was to develop efficient, standardized unit plan layouts that optimize the overall size of the units while not reducing their core functionality and livability. Plan layouts are based on the following principles:

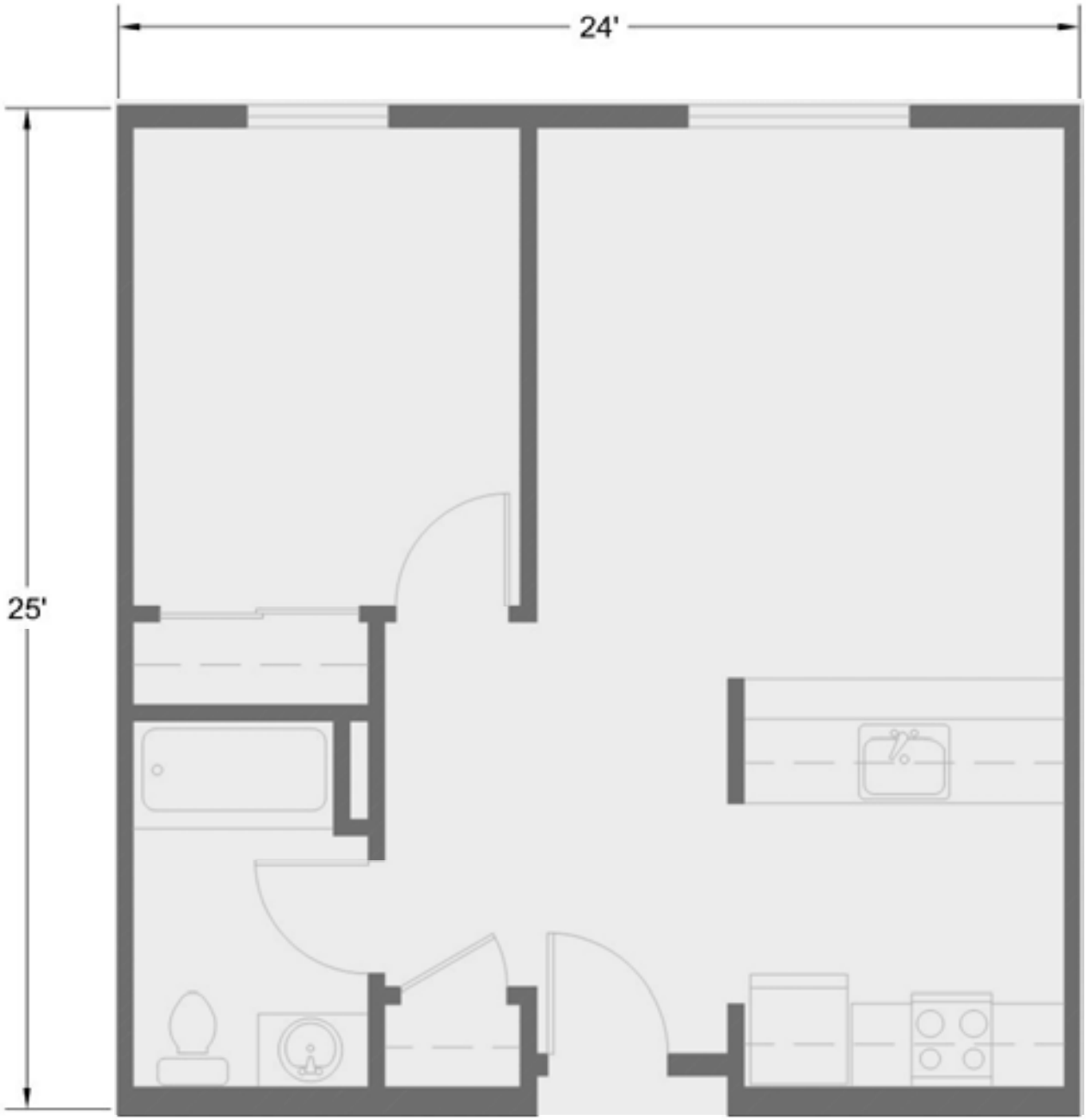

OUTBACK



Typical One Bedroom Unit

0 2' 4' 8' 16'

CEDC
Project

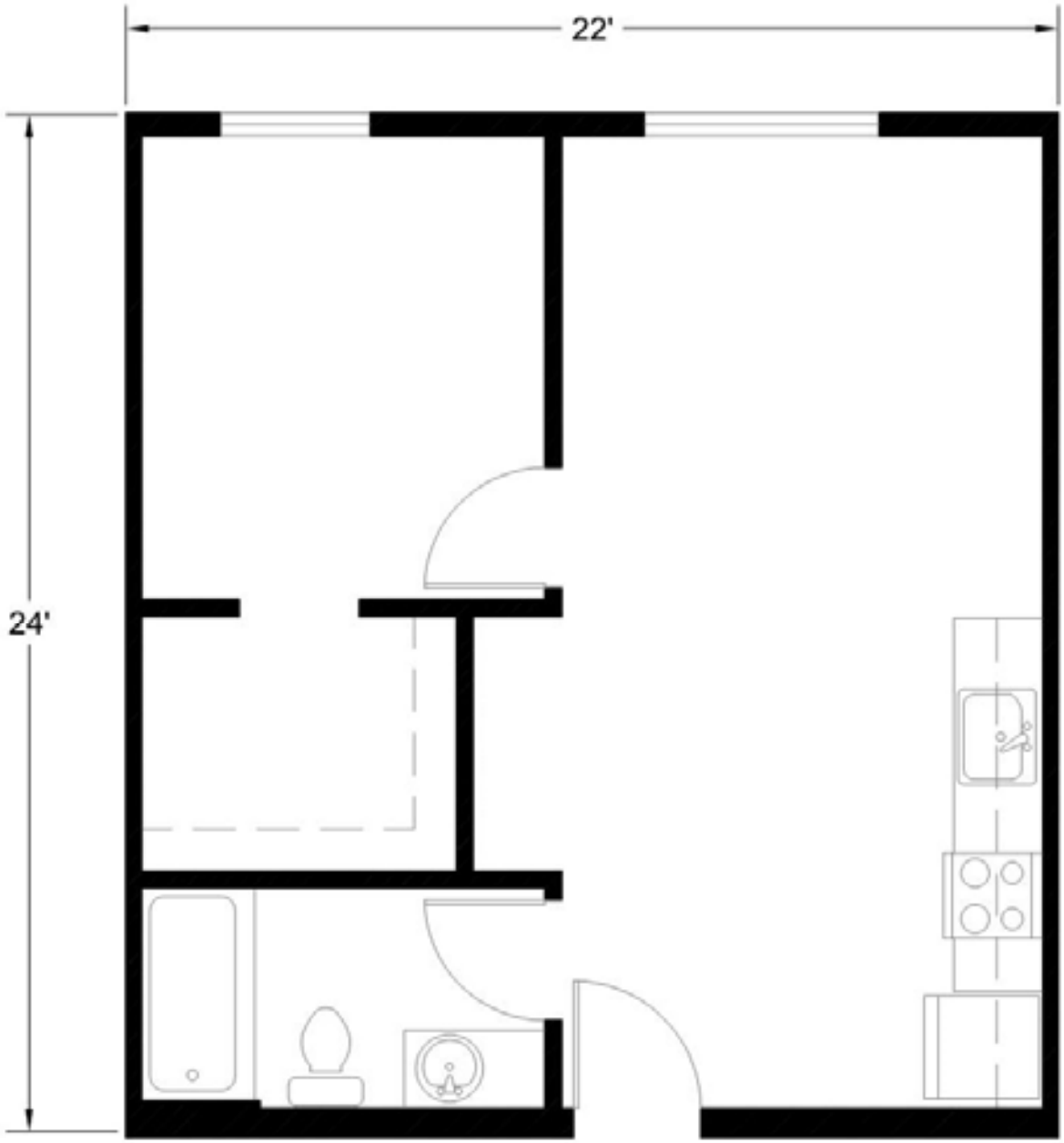


600 square feet

Typical One Bedroom Unit

0 2' 4' 8' 16'

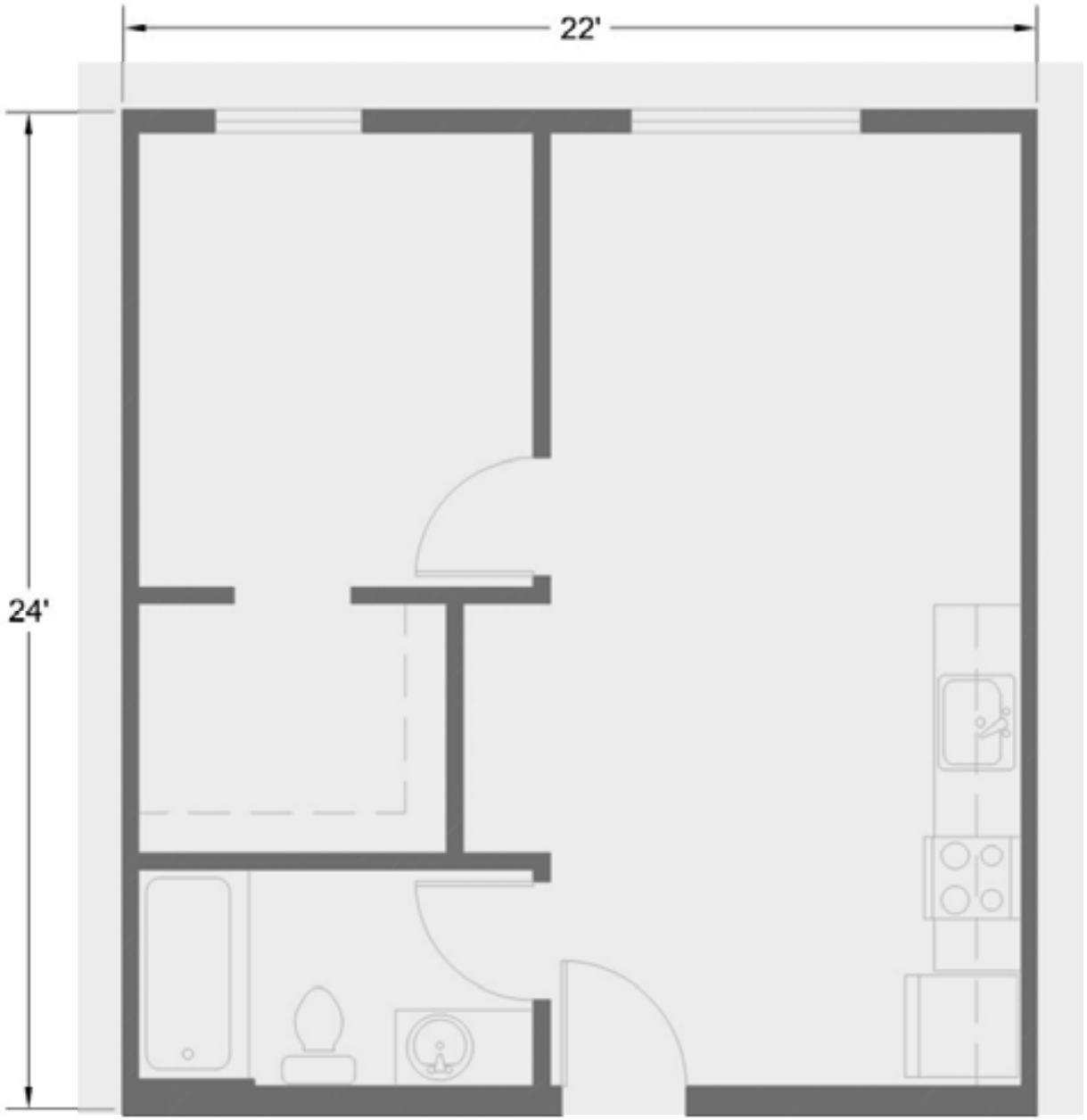
CEDC Project



Optimized One Bedroom Unit

0 2' 4' 8' 16'

CEDC
Project

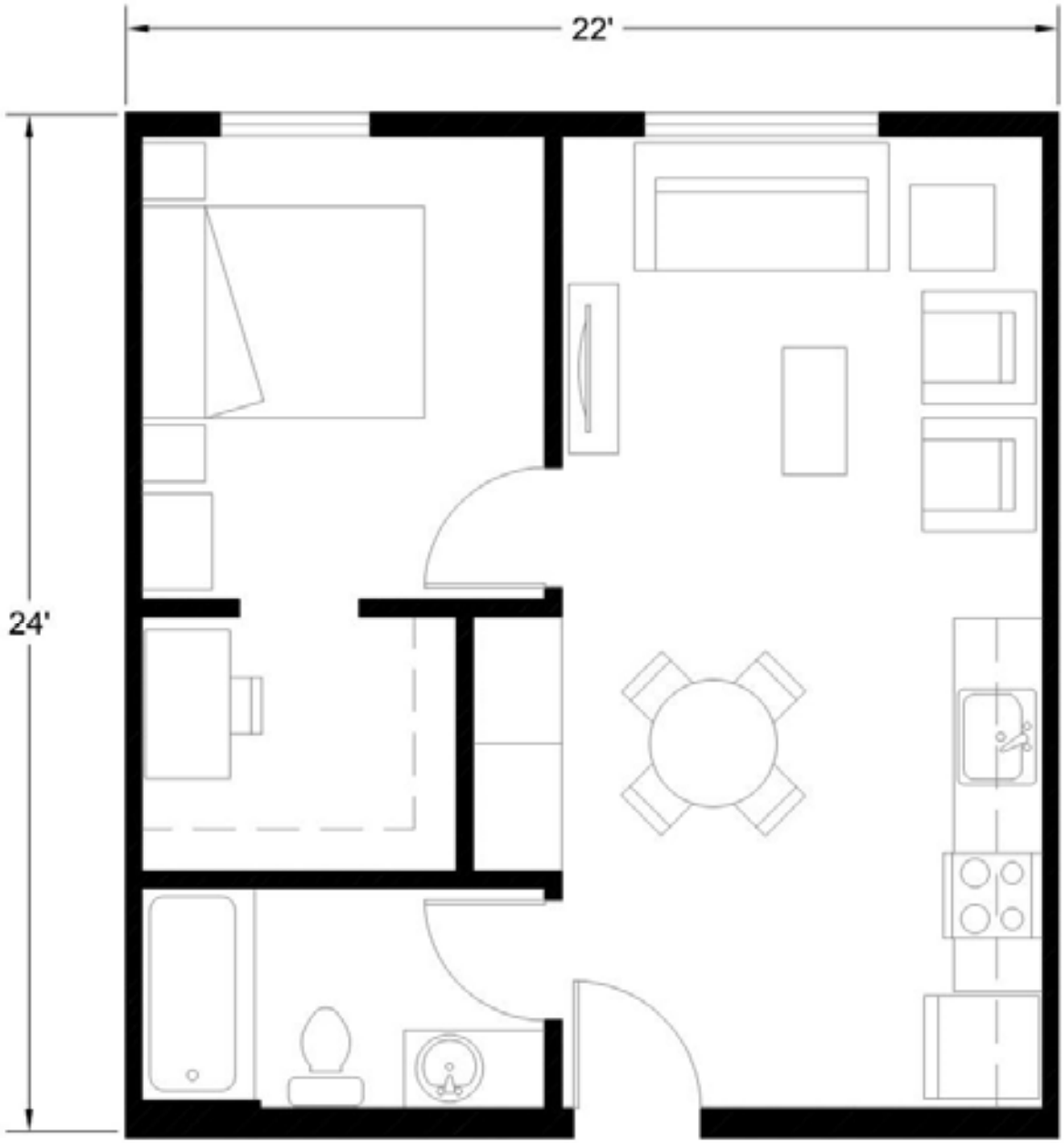


528 square feet

Optimized One Bedroom Unit

0 2' 4' 8' 16'

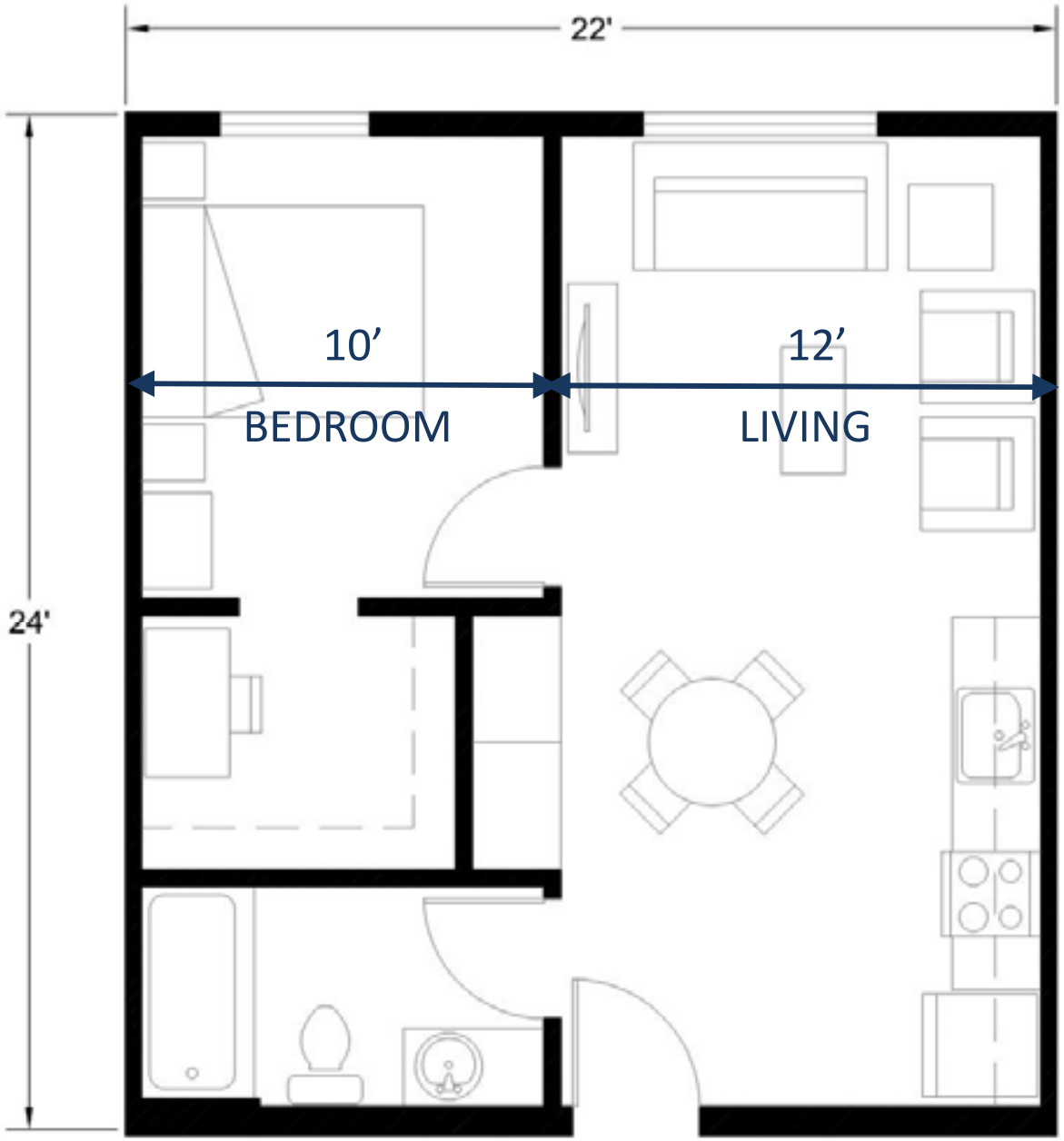
CEDC Project



Optimized One Bedroom Unit

0 2' 4' 8' 16'

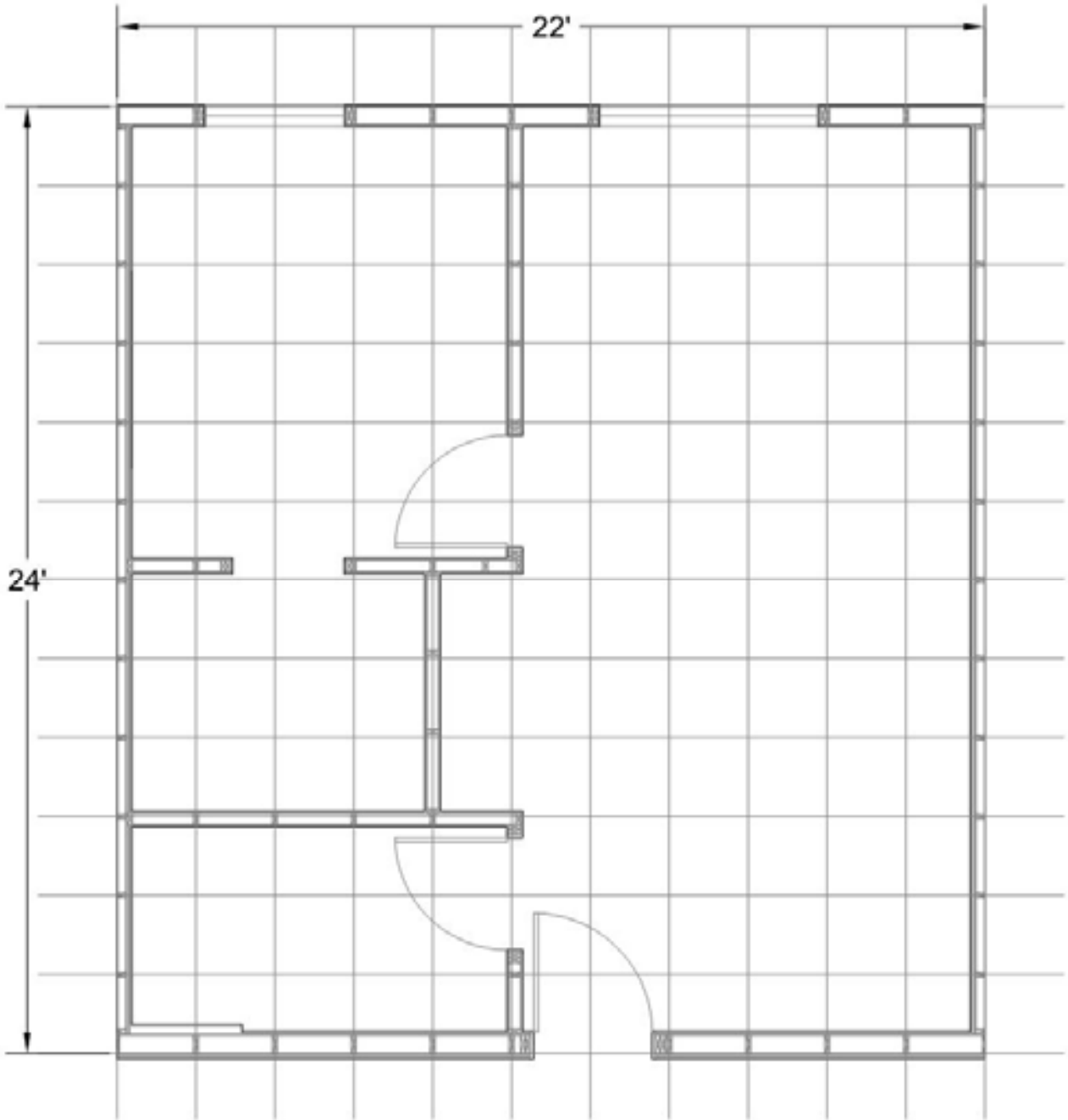
CEDC
Project



Optimized One Bedroom Unit

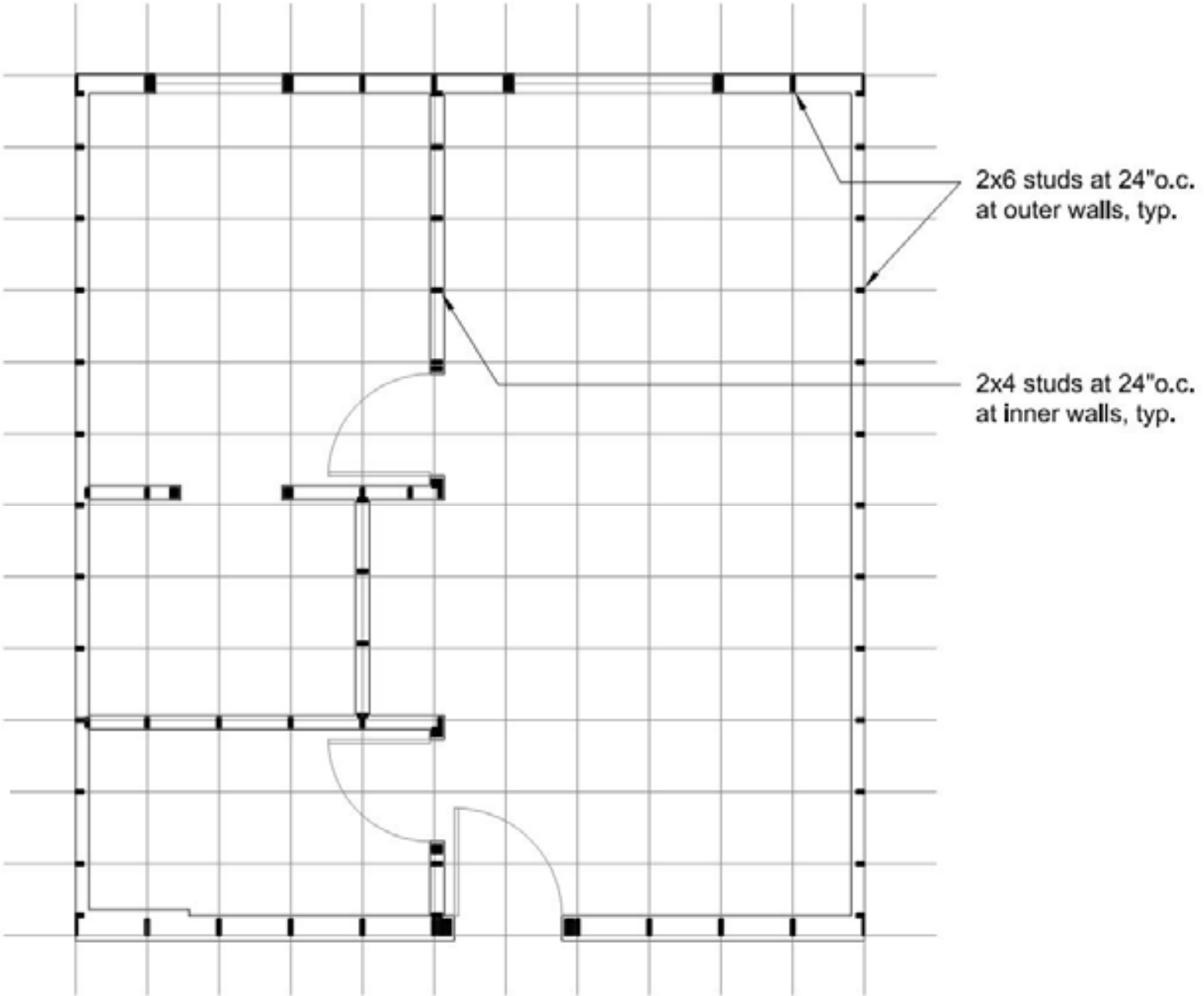
0 2' 4' 8' 16'

CEDC Project



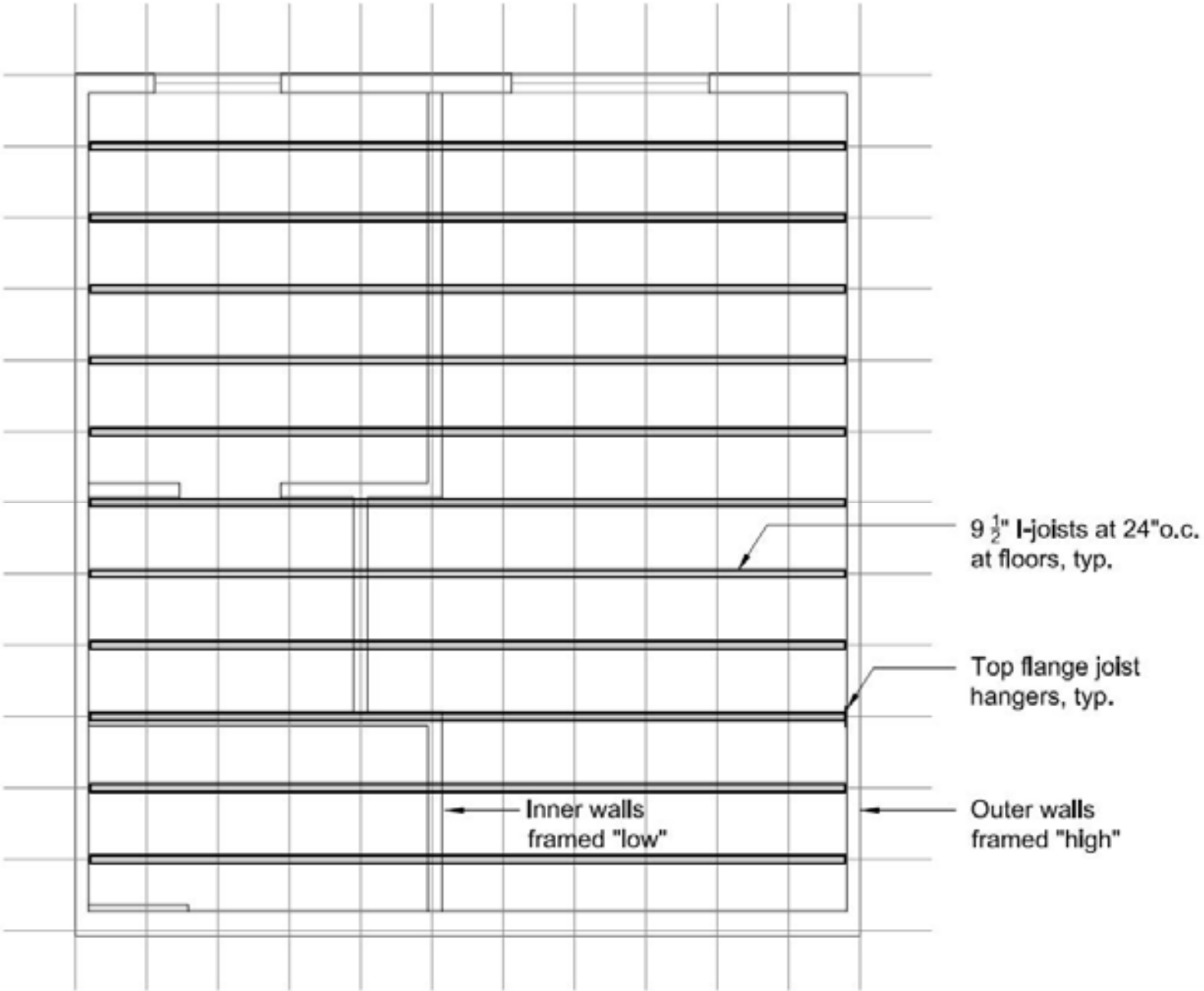
2 Foot Grid Layout

CEDC
Project



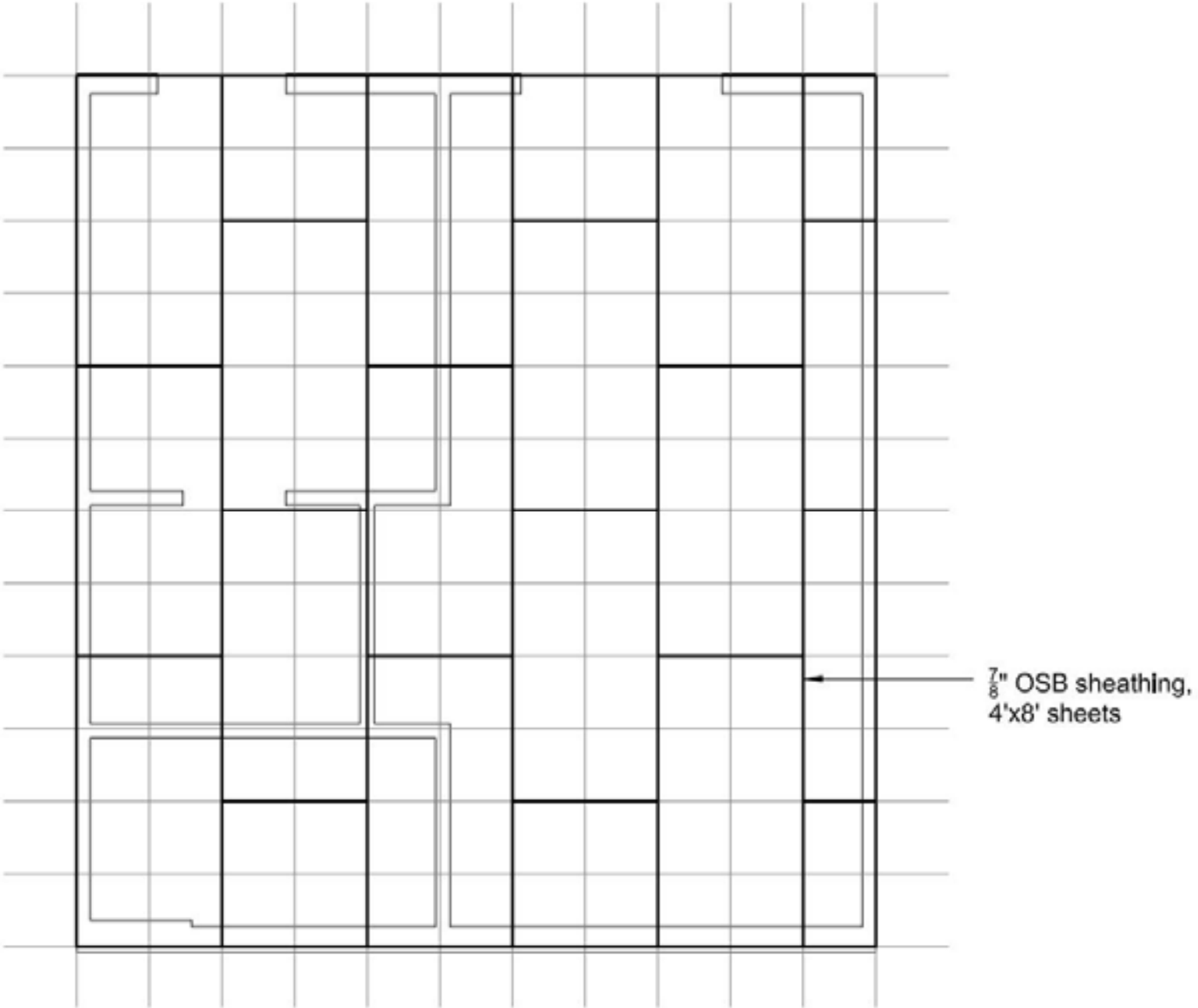
Wall Framing

CEDC
Project



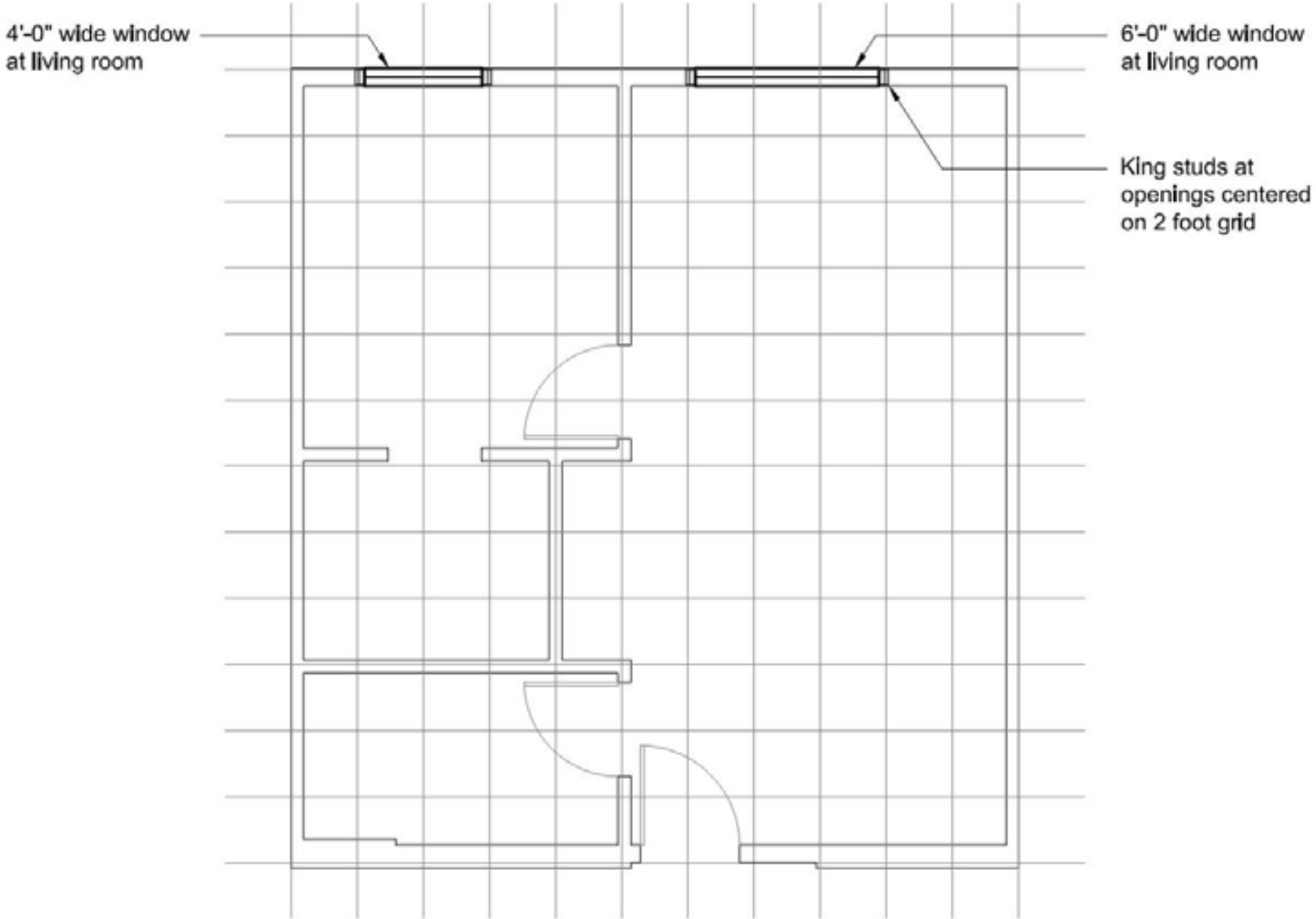
Floor Framing

CEDC
Project



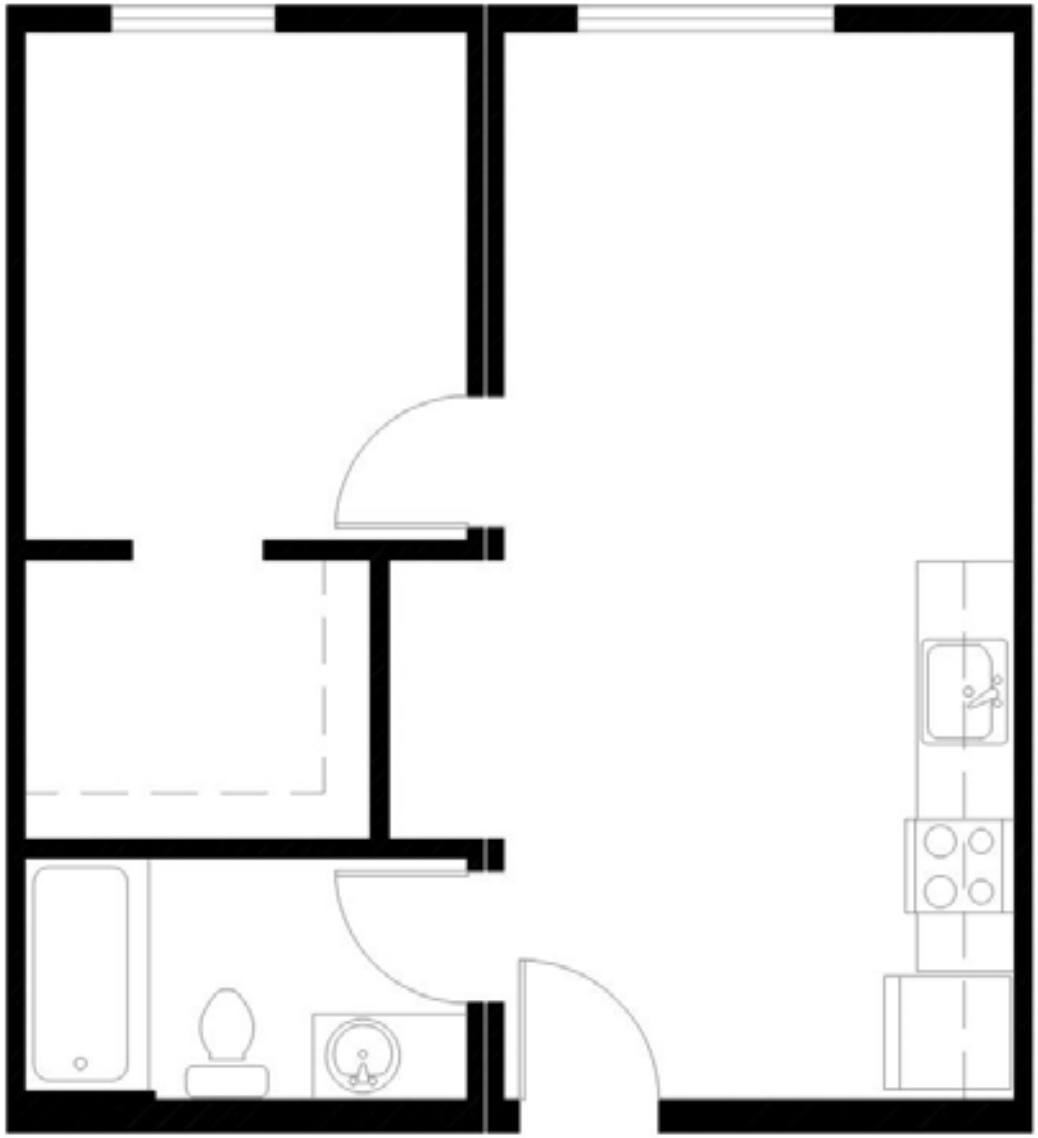
Floor Sheathing

CEDC
Project



Window Layout

CEDC
Project



Optimized One Bedroom Unit (Modular Option)

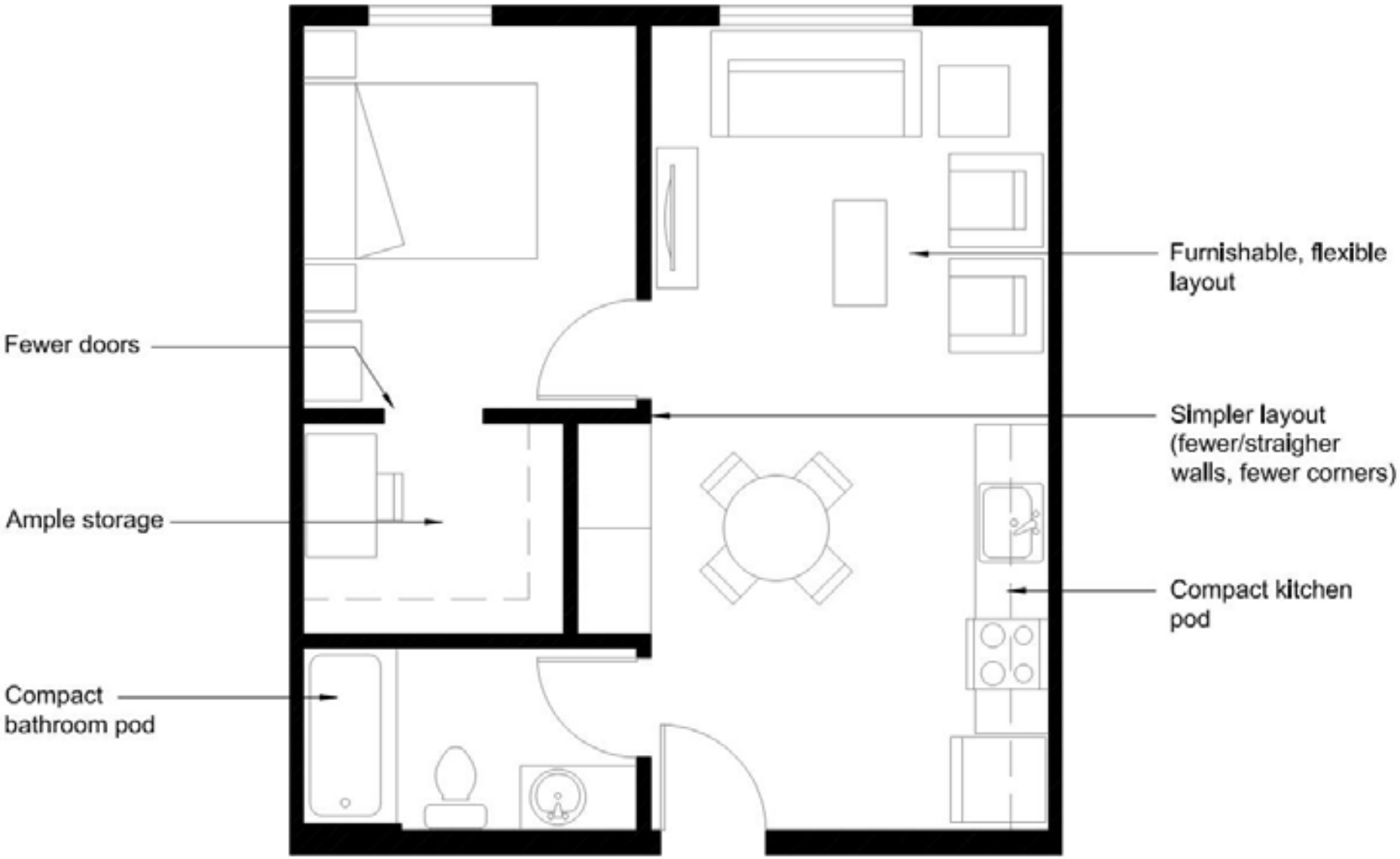
CEDC
Project

Optimized One Bedroom Unit (Modular Option)

CEDC
Project

Optimized One Bedroom Unit (Modular Option)

CEDC
Project

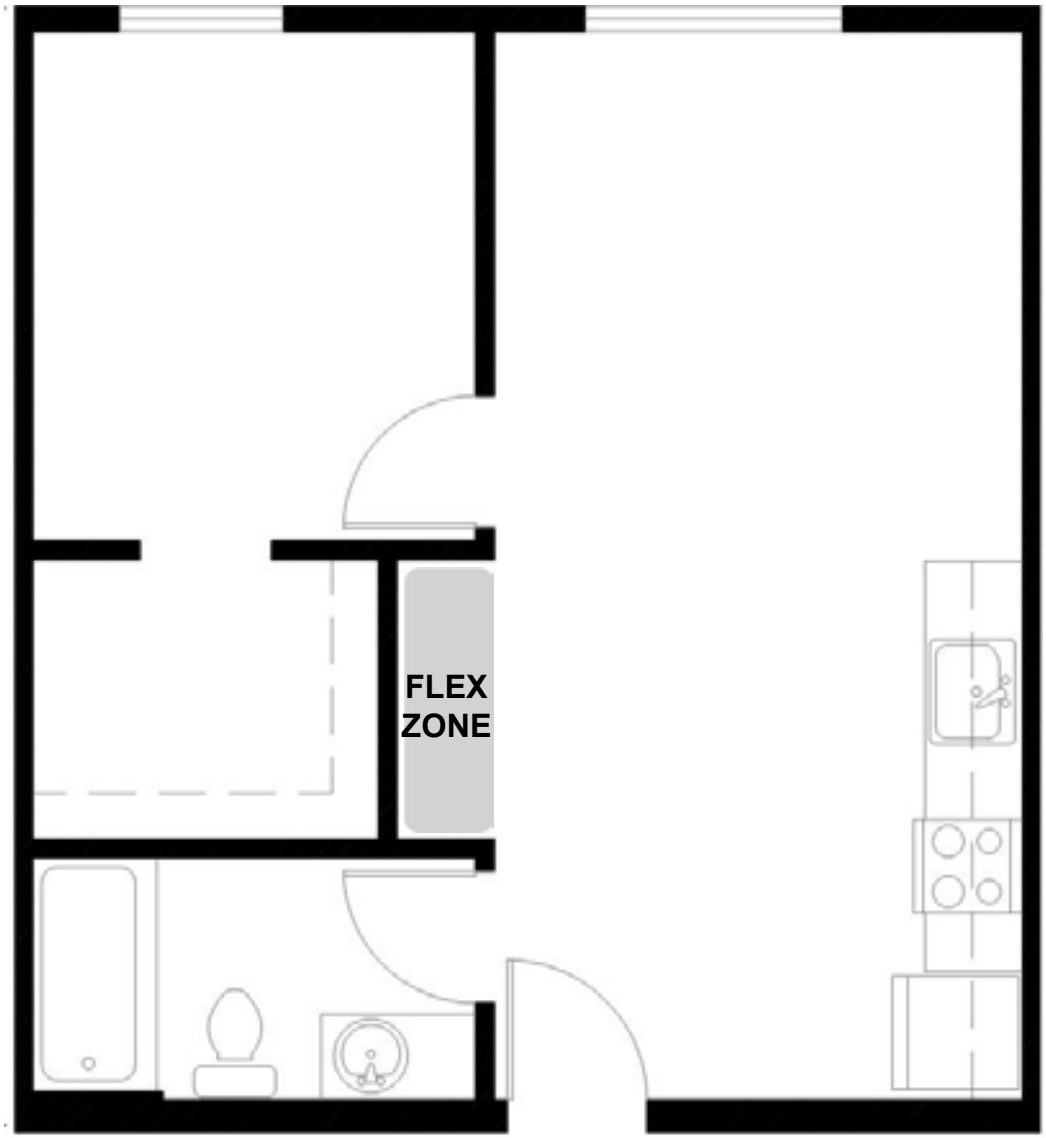


Optimized One Bedroom Unit

CEDC Project

Optimized One Bedroom Unit

CEDC
Project

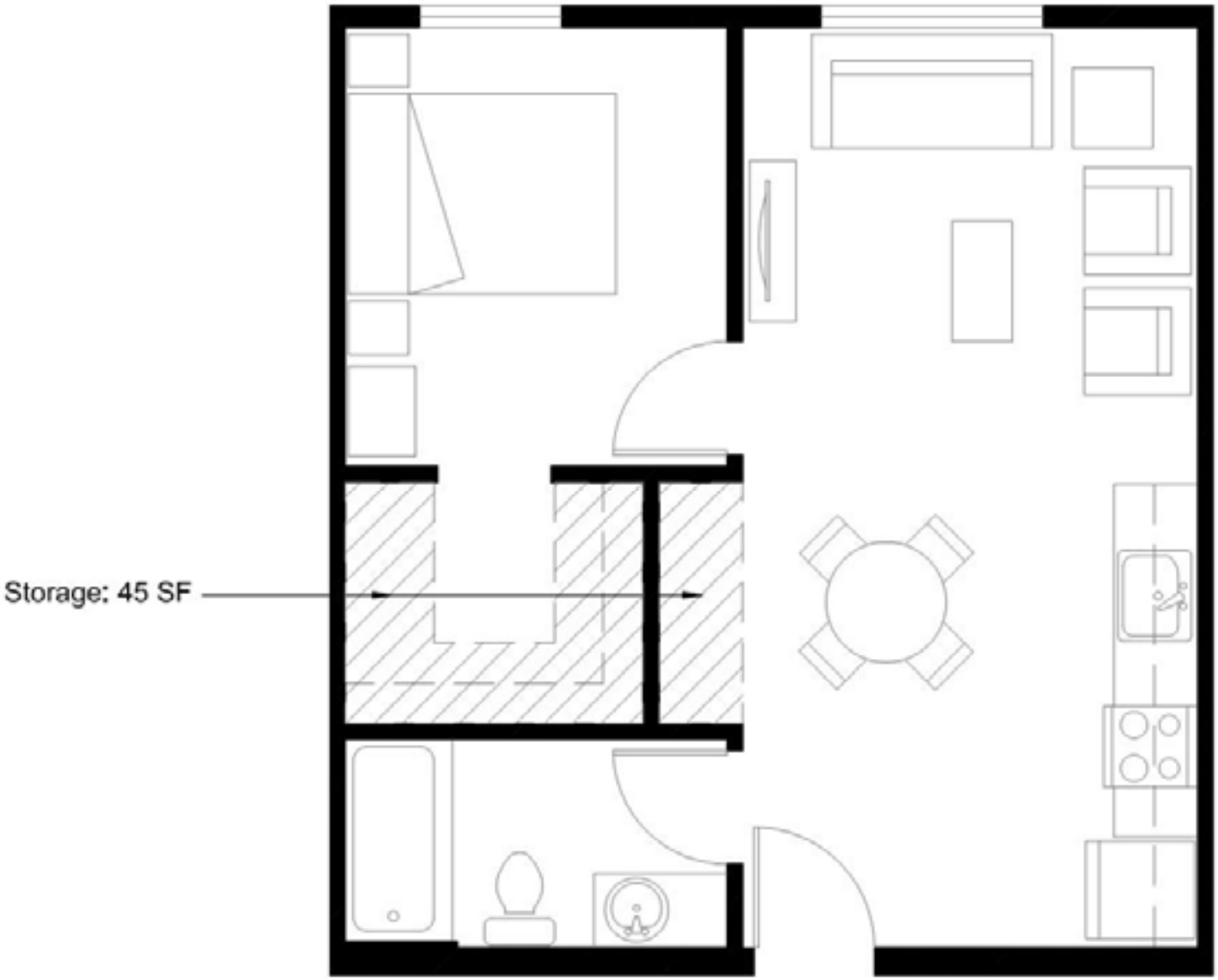


2’ x 6’ “Flex Zone” in each unit

- Bike storage
- Closet / cabinets
- Additional living space

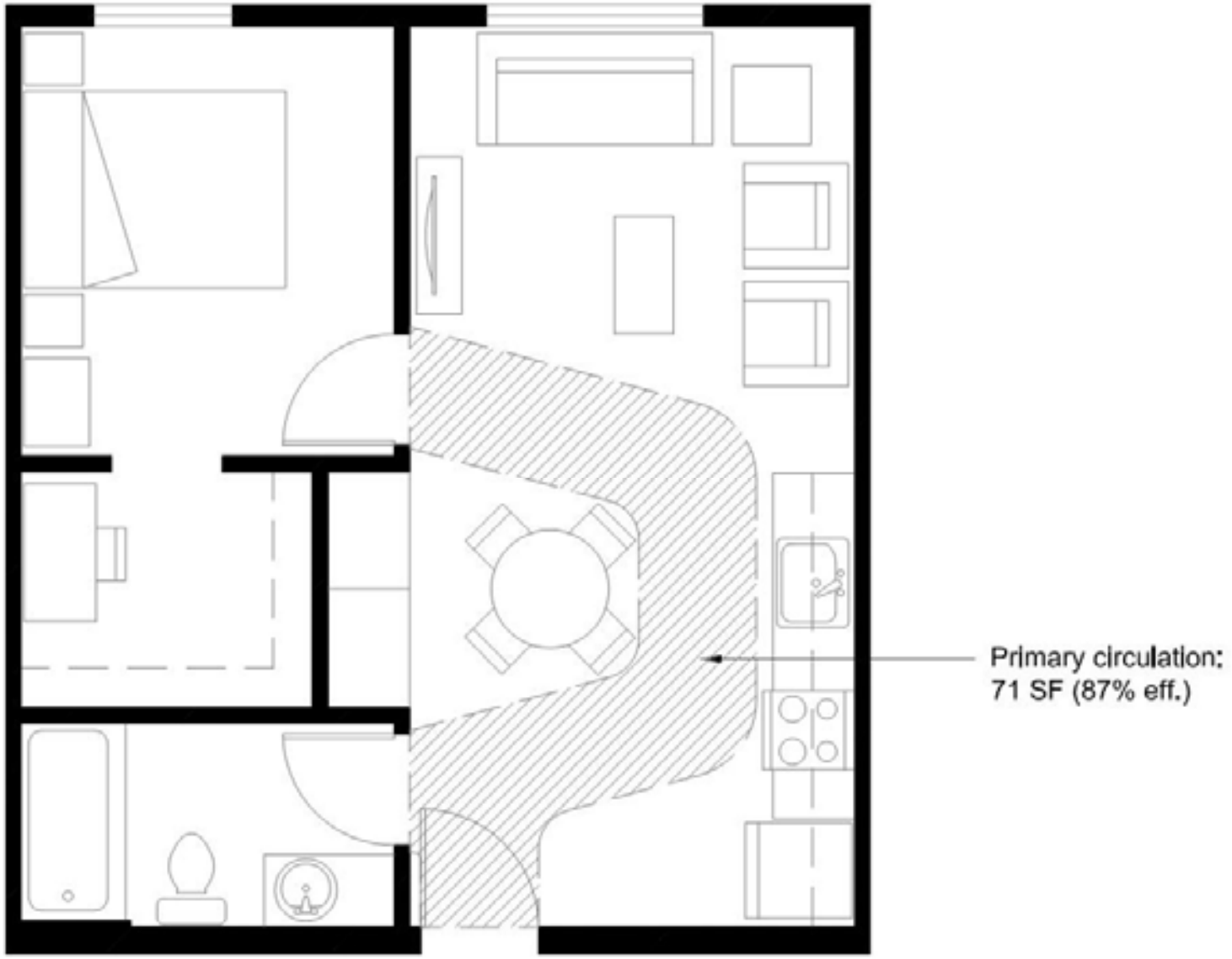
Optimized One Bedroom Unit

CEDC Project



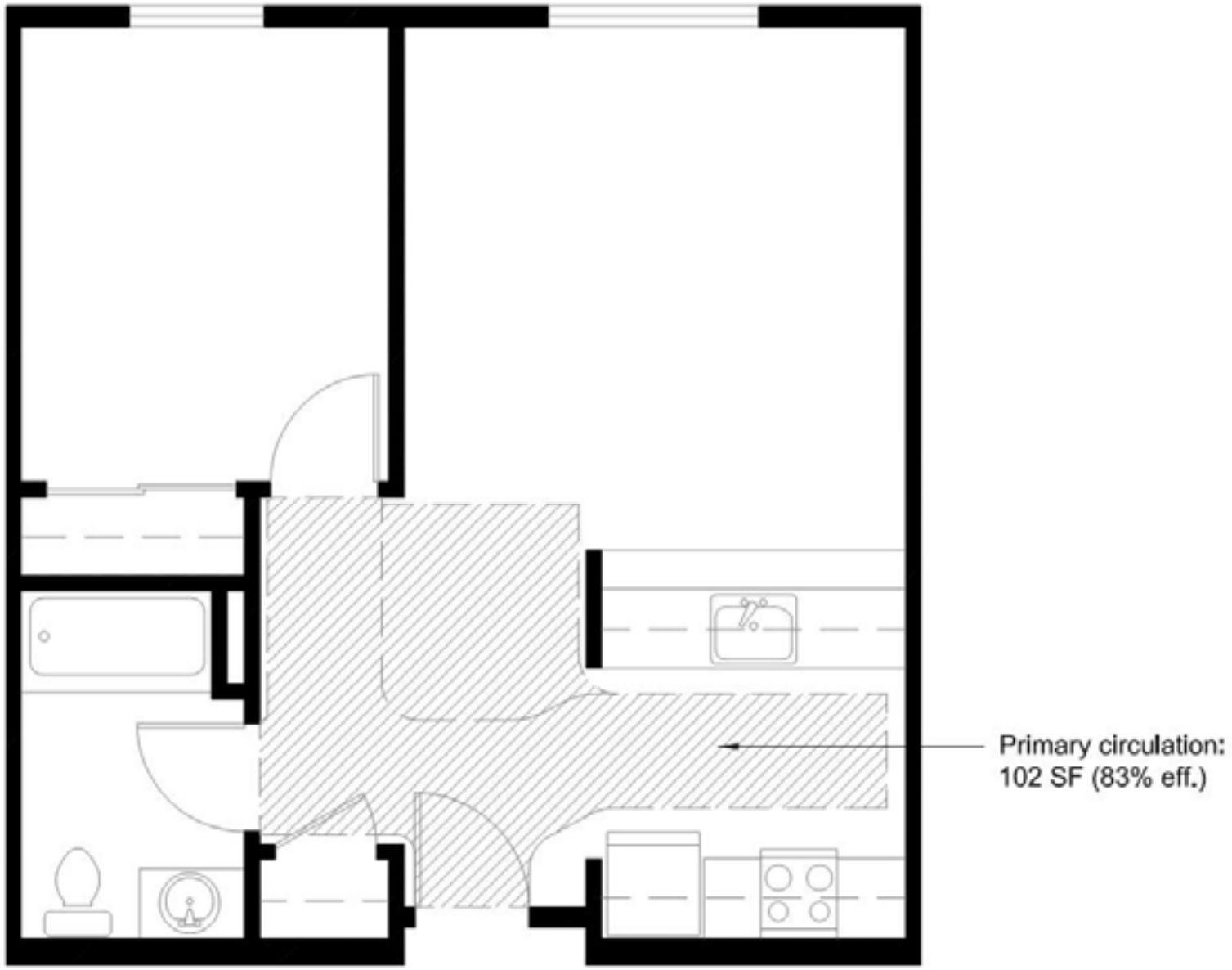
Optimized One Bedroom Unit

CEDC
Project



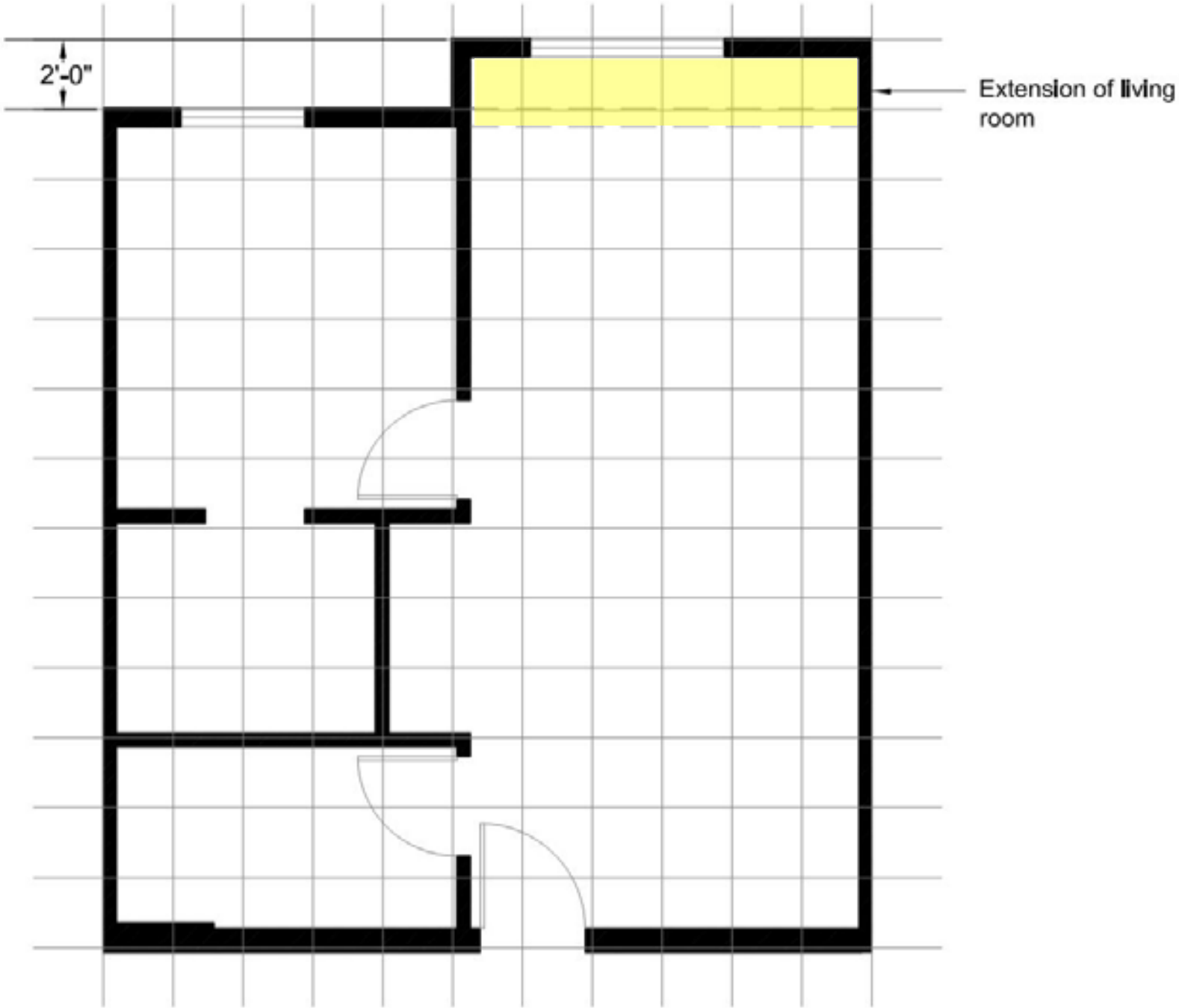
Optimized One Bedroom Unit

CEDC
Project



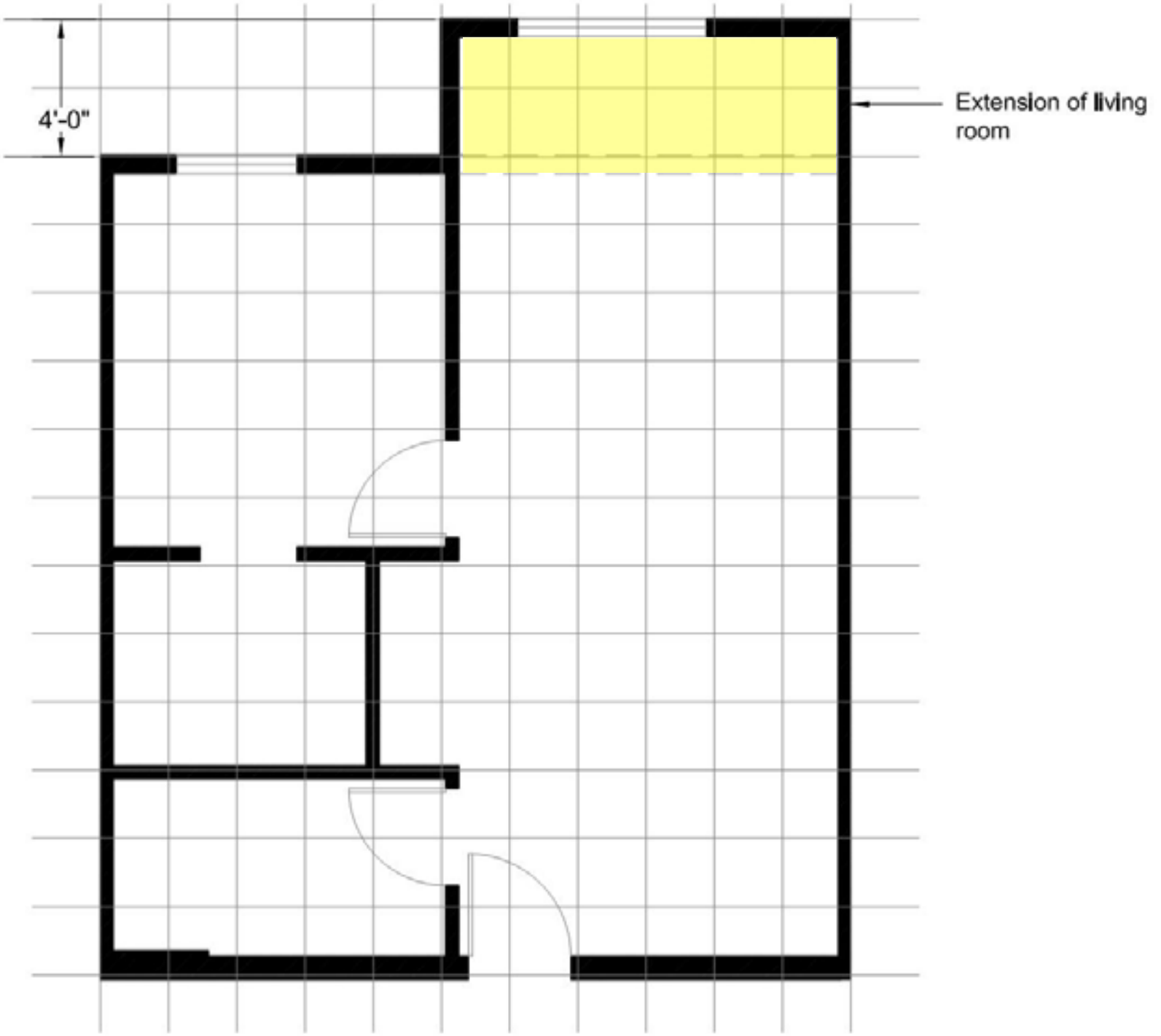
Typical One Bedroom Unit

CEDC
Project



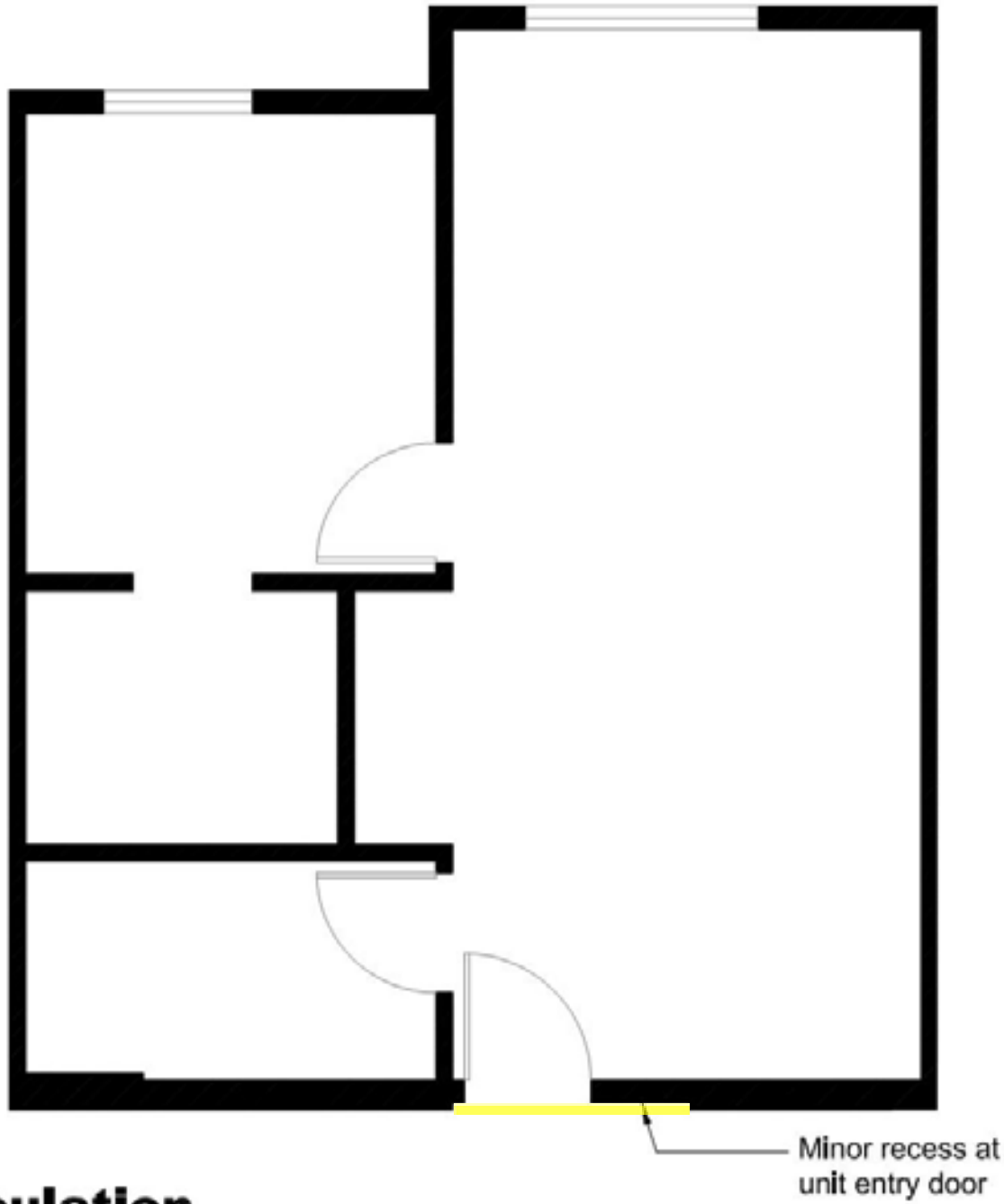
Exterior Articulation

CEDC
Project



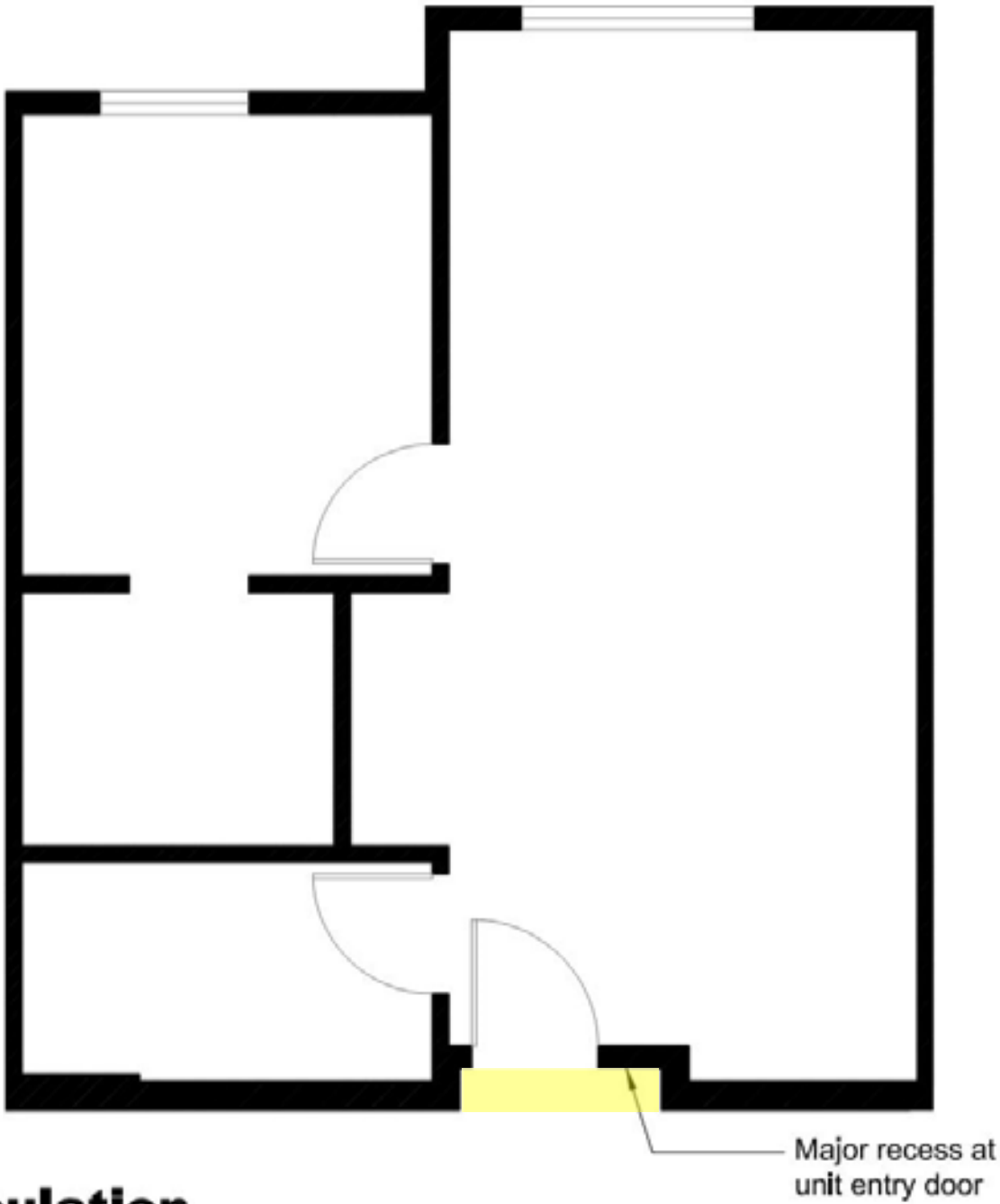
Exterior Articulation

CEDC
Project



Interior Articulation

CEDC
Project

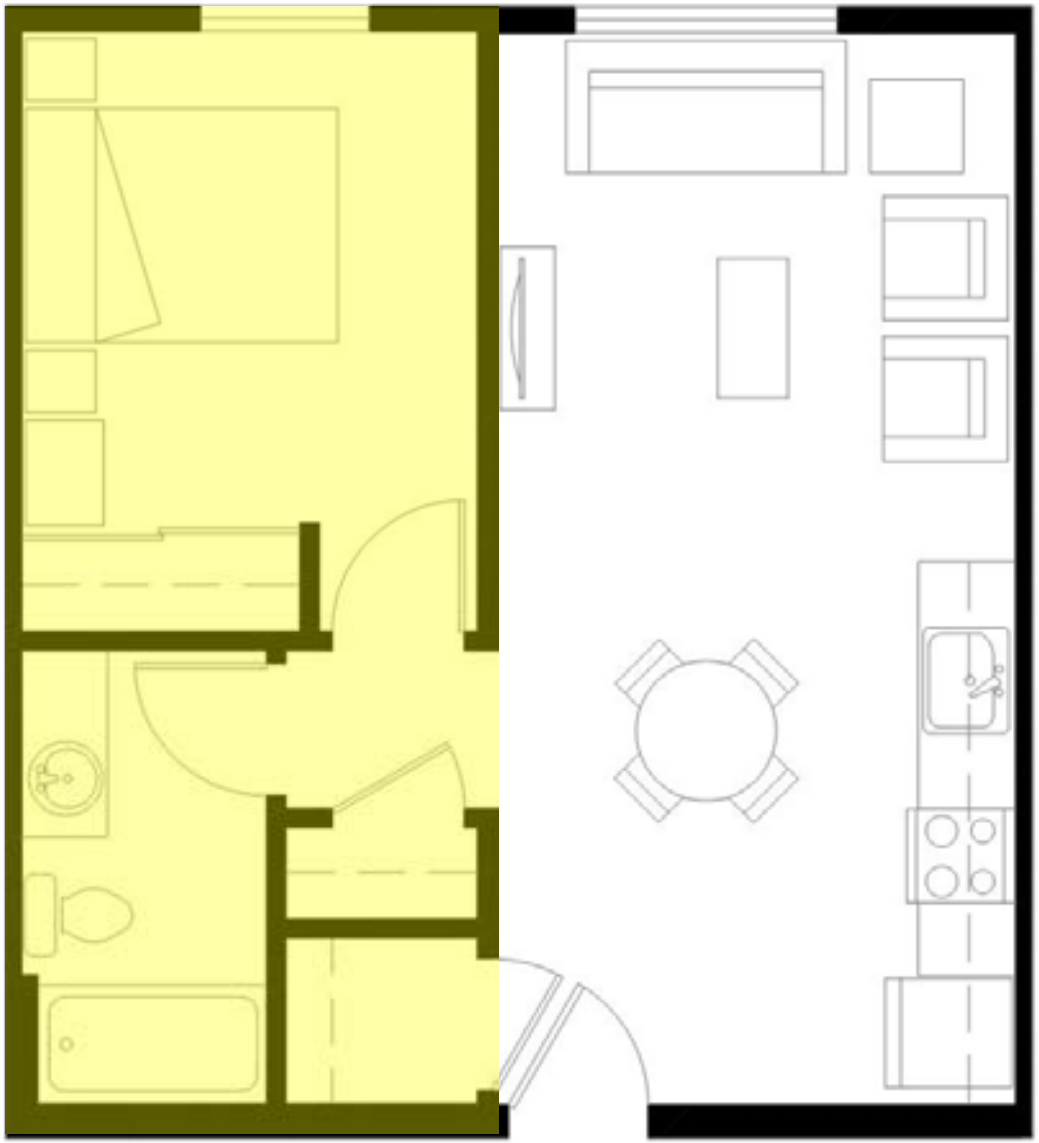


Interior Articulation

CEDC
Project

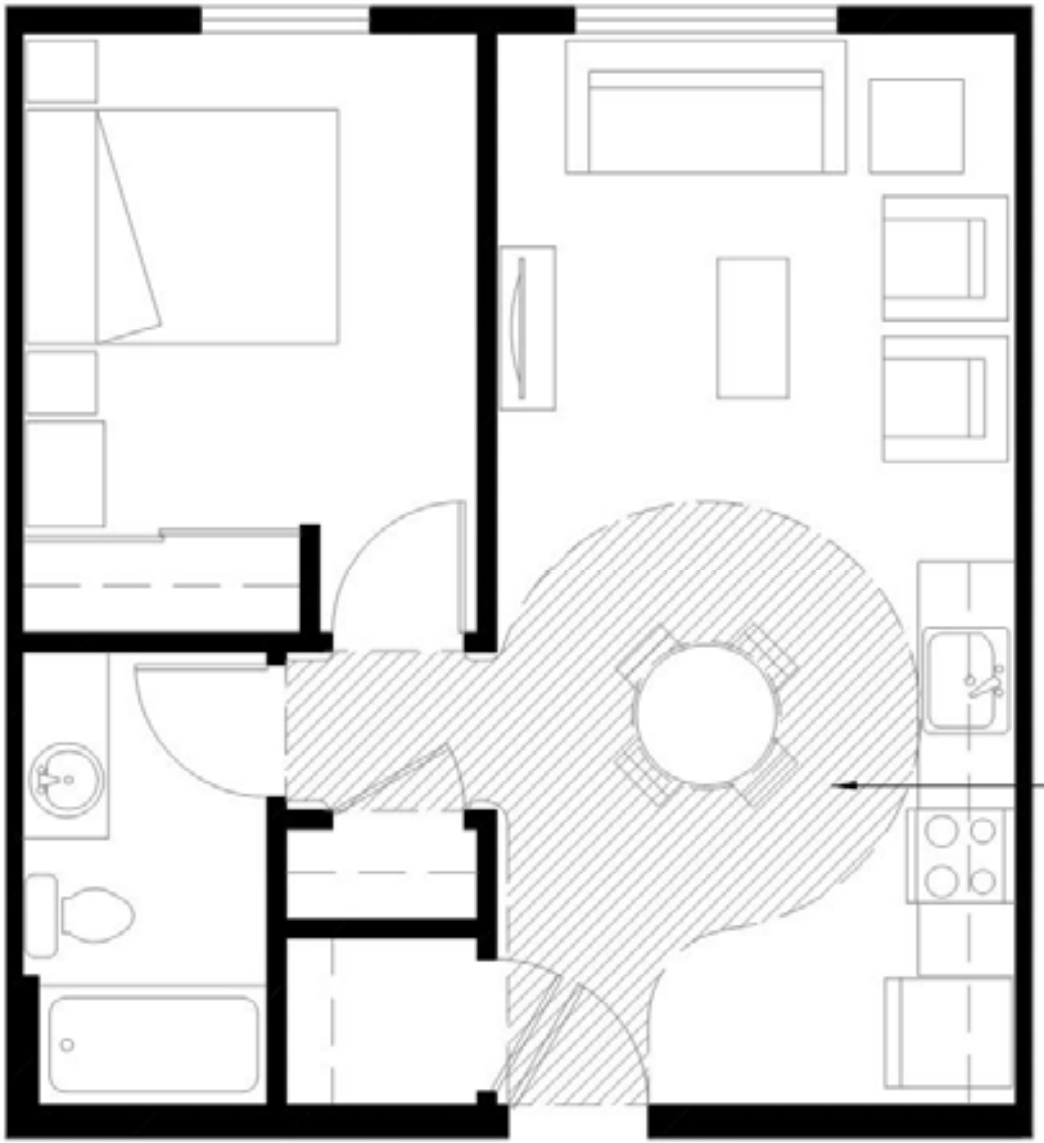
Kitchen Option

CEDC Project



Bedroom/Bathroom/Storage Option

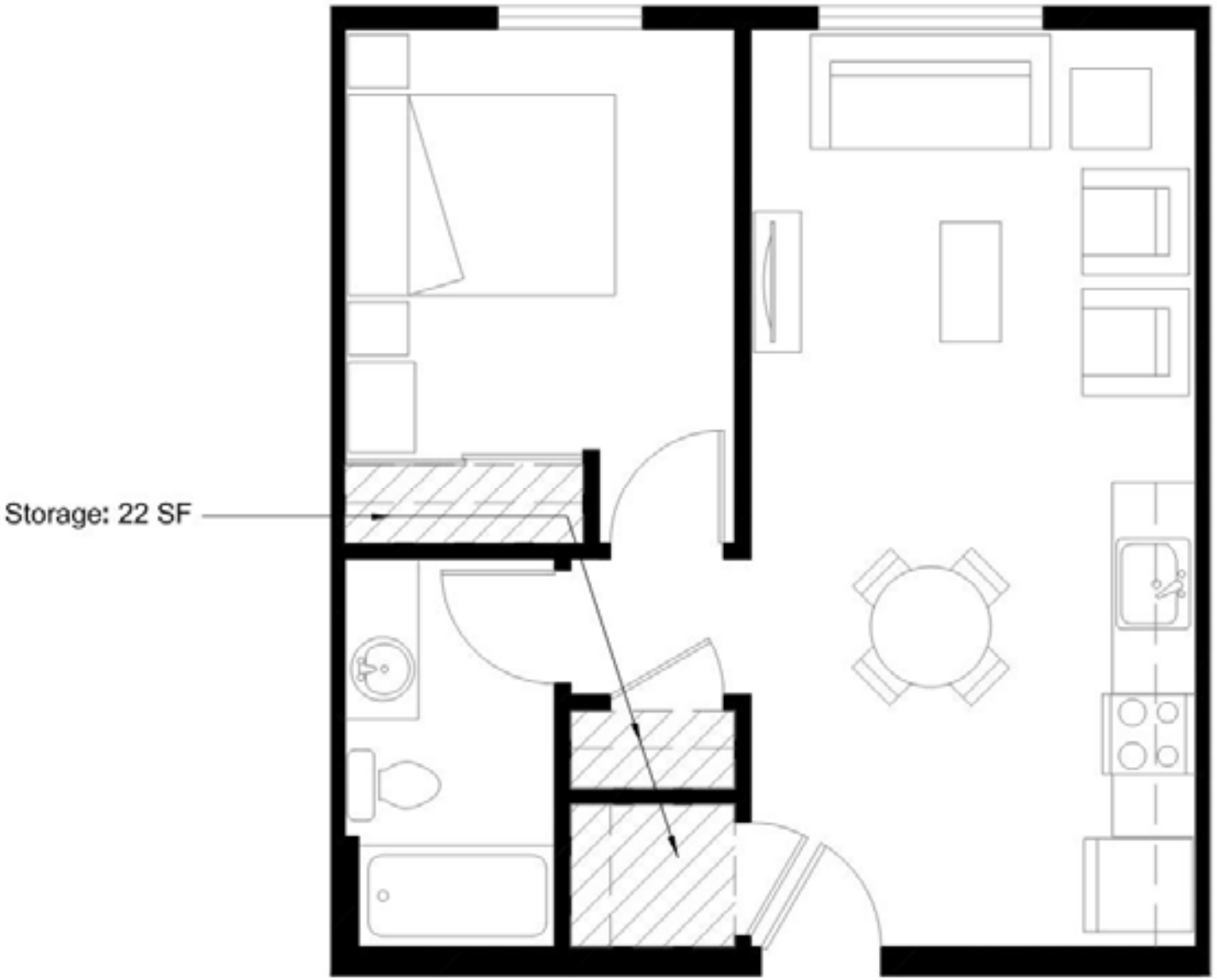
CEDC
Project



25% increase in area dedicated to primary circulation

Bedroom/Bathroom/Storage Option

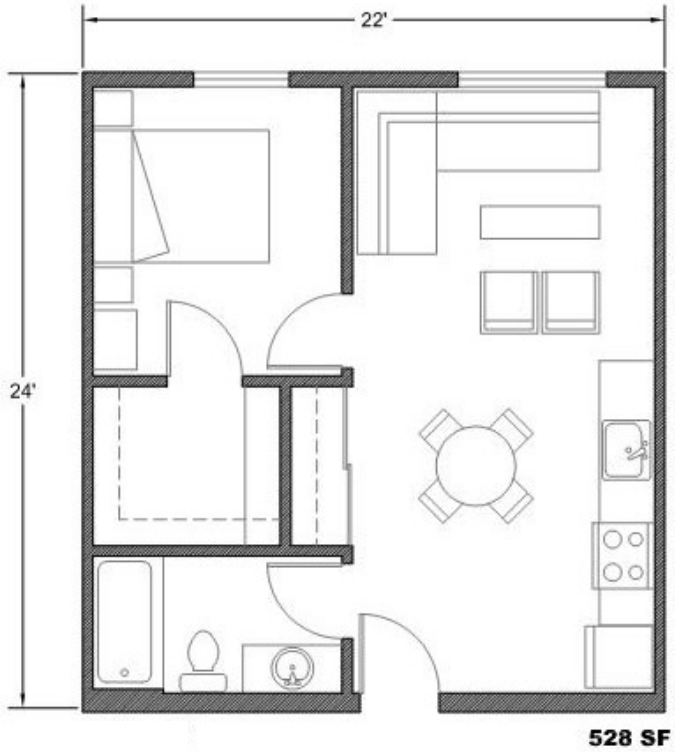
CEDC Project



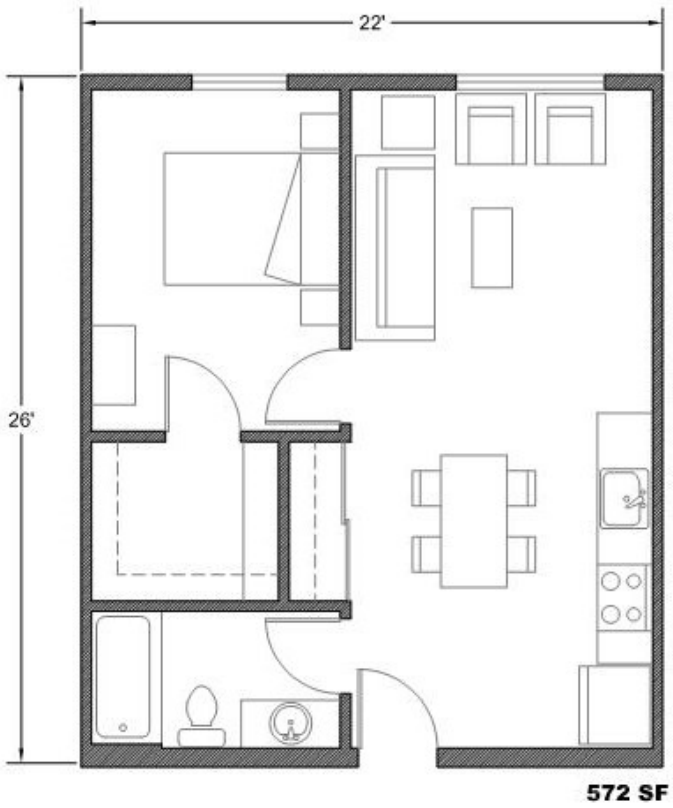
51% decrease in storage area

Bedroom/Bathroom/Storage Option

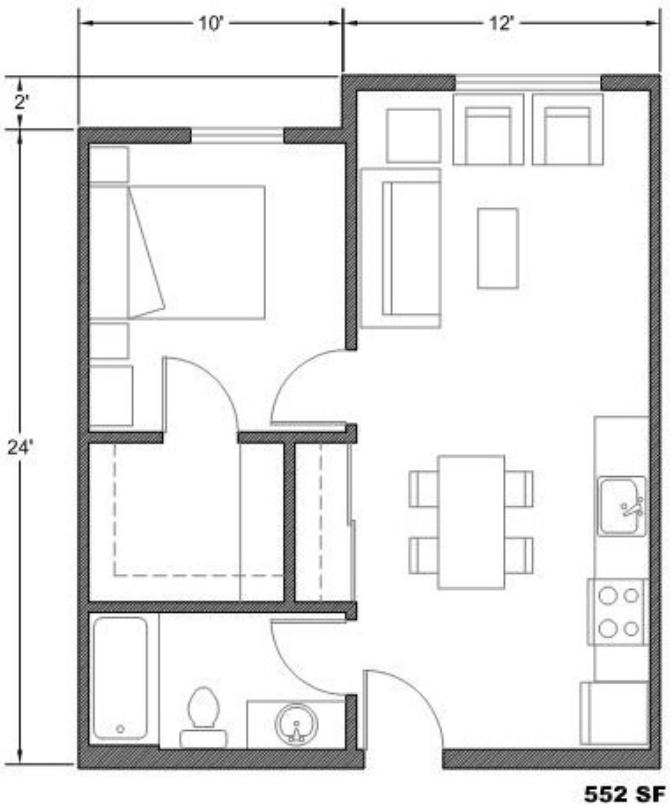
CEDC Project



Unit Plans – 1 Bedroom



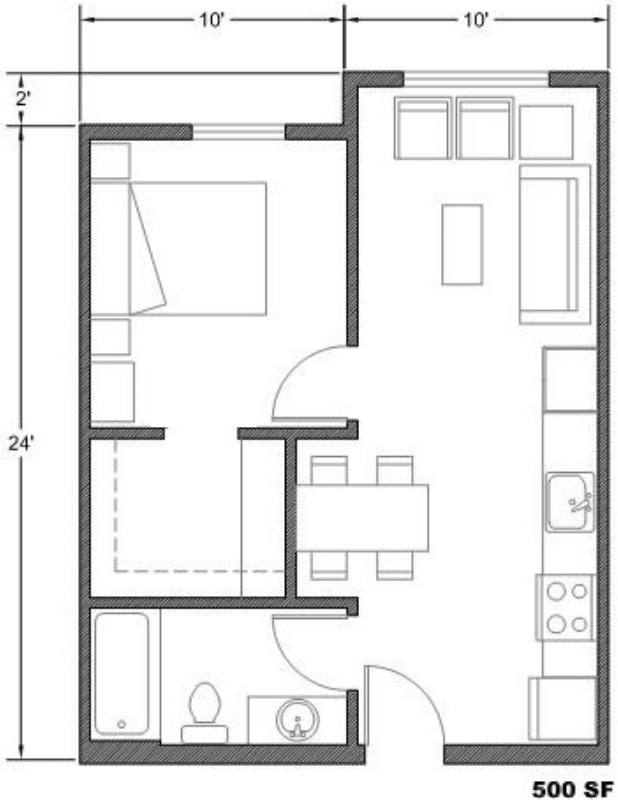
572 SF



552 SF

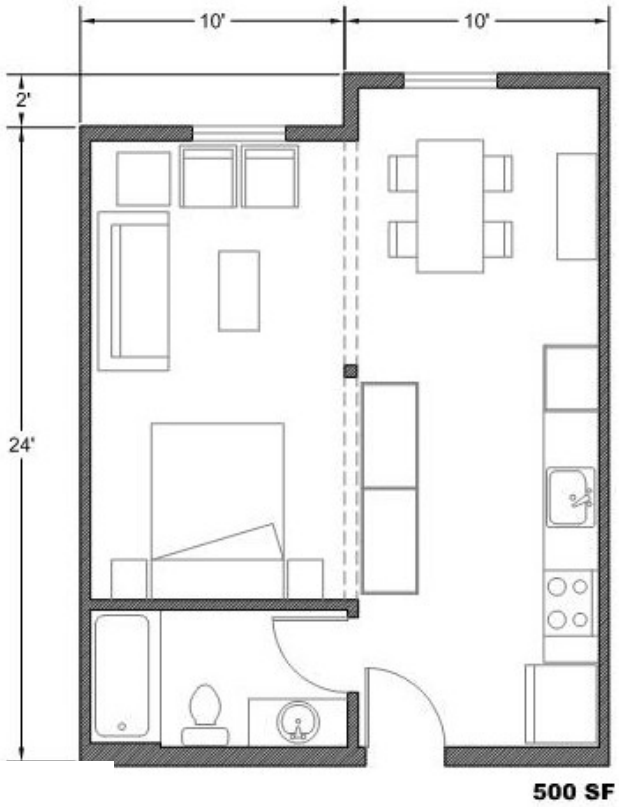
Unit Plans – 1 Bedroom

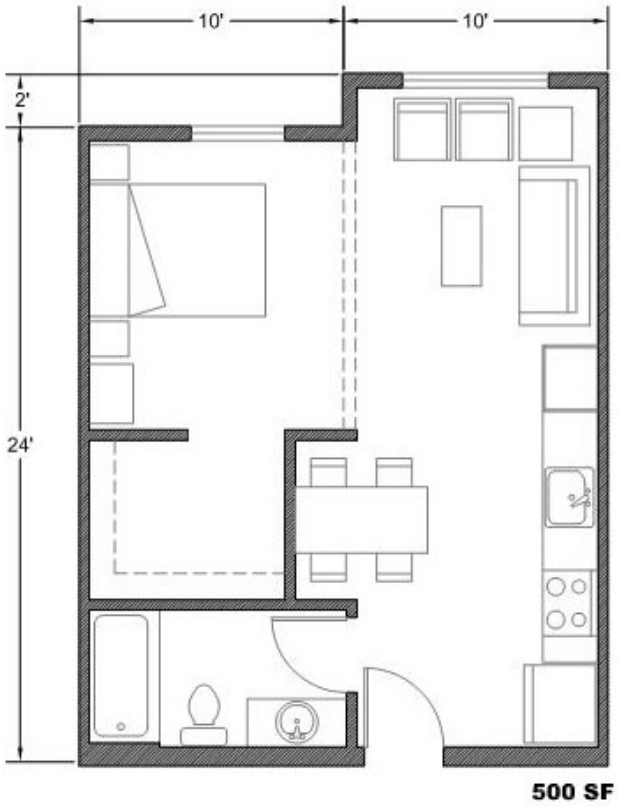
528 SF



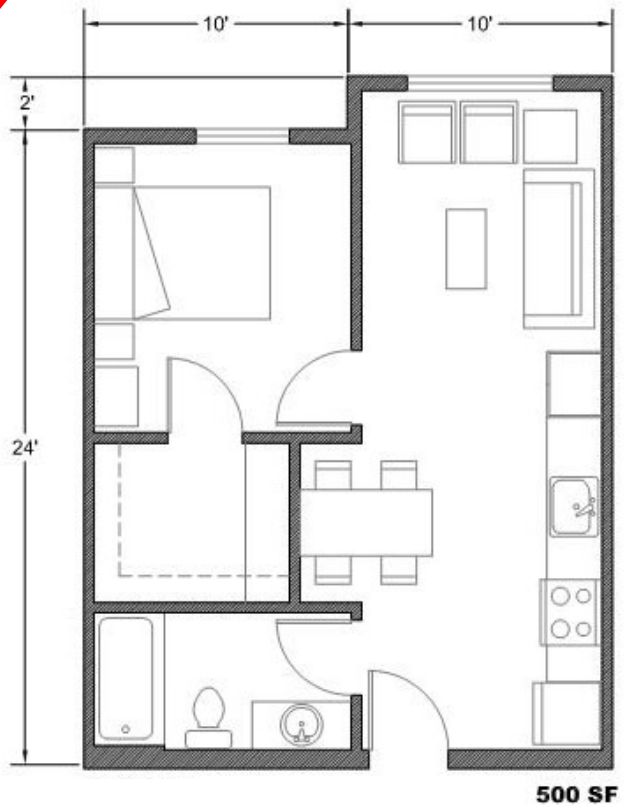
500 SF

Unit Plans – 1 Bedroom (“Skinny” Option)



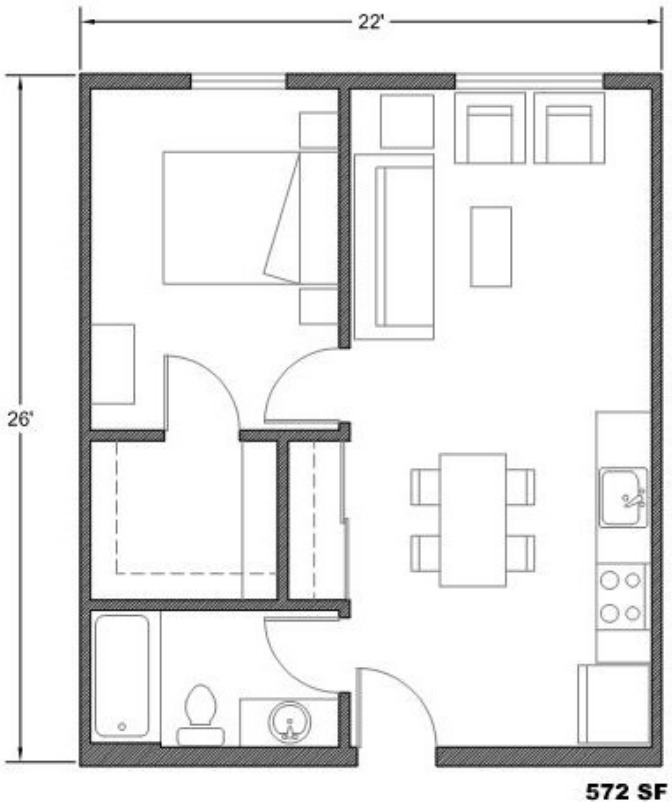


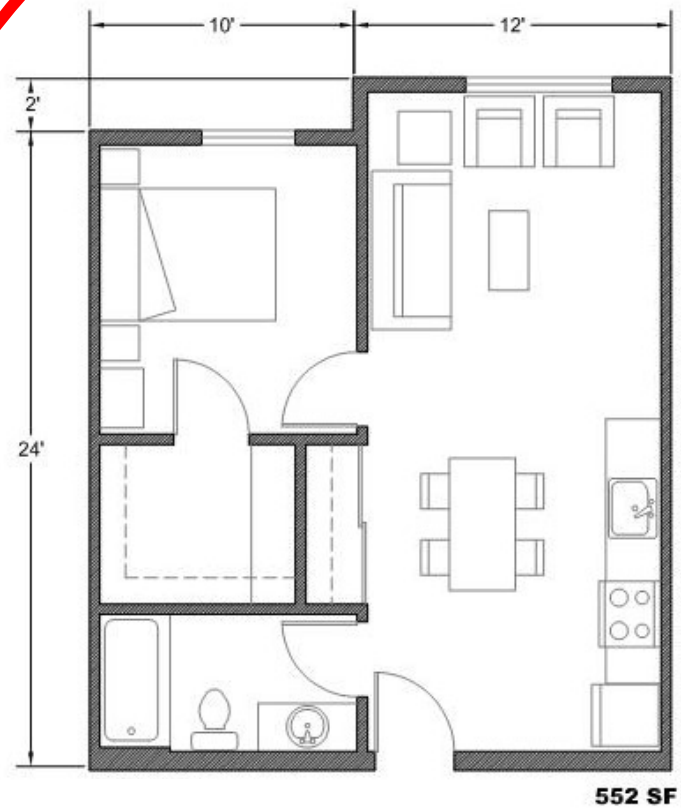
Unit Plans – 1 Bedroom (“Skinny” Option)



Option 1

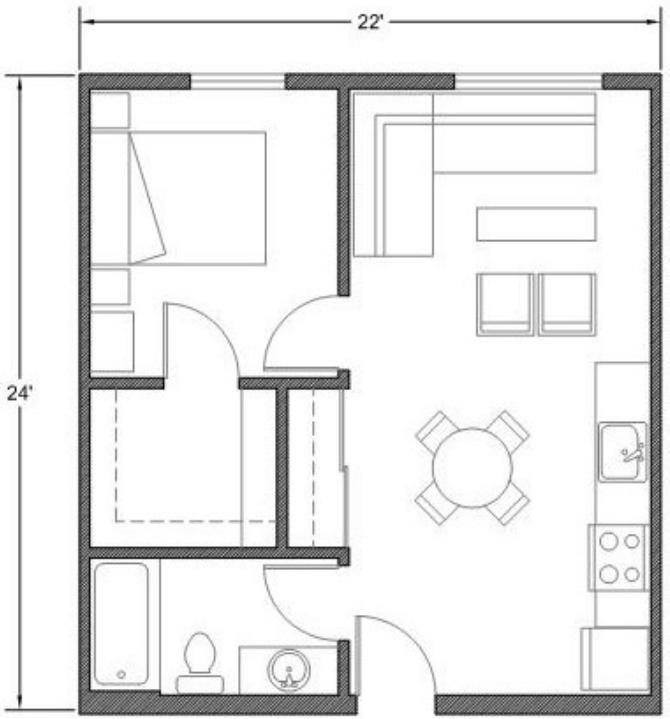
Options for Mockup



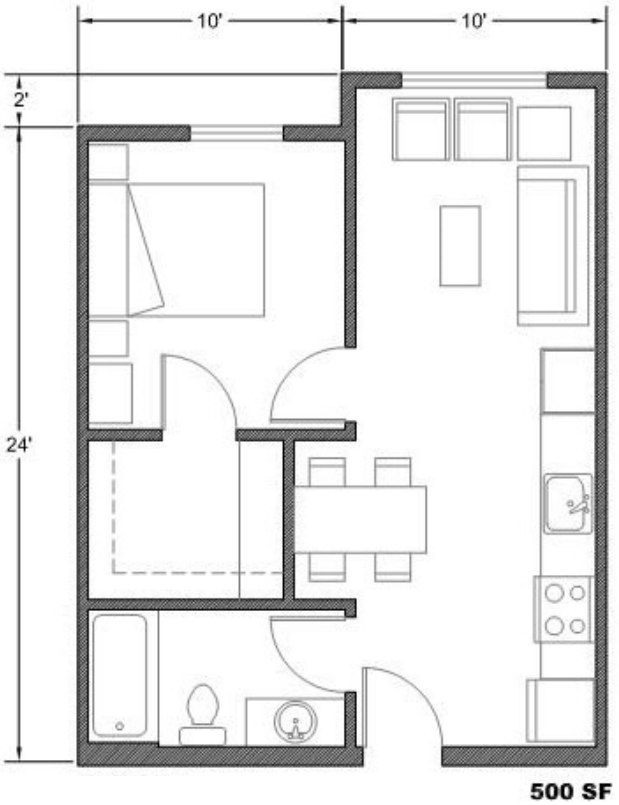


Option 2

Options for Mockup



Option 3



Options for Mockup

1 BR Unit – Option 1

Image courtesy of
Ankrom Moisan Architectsc

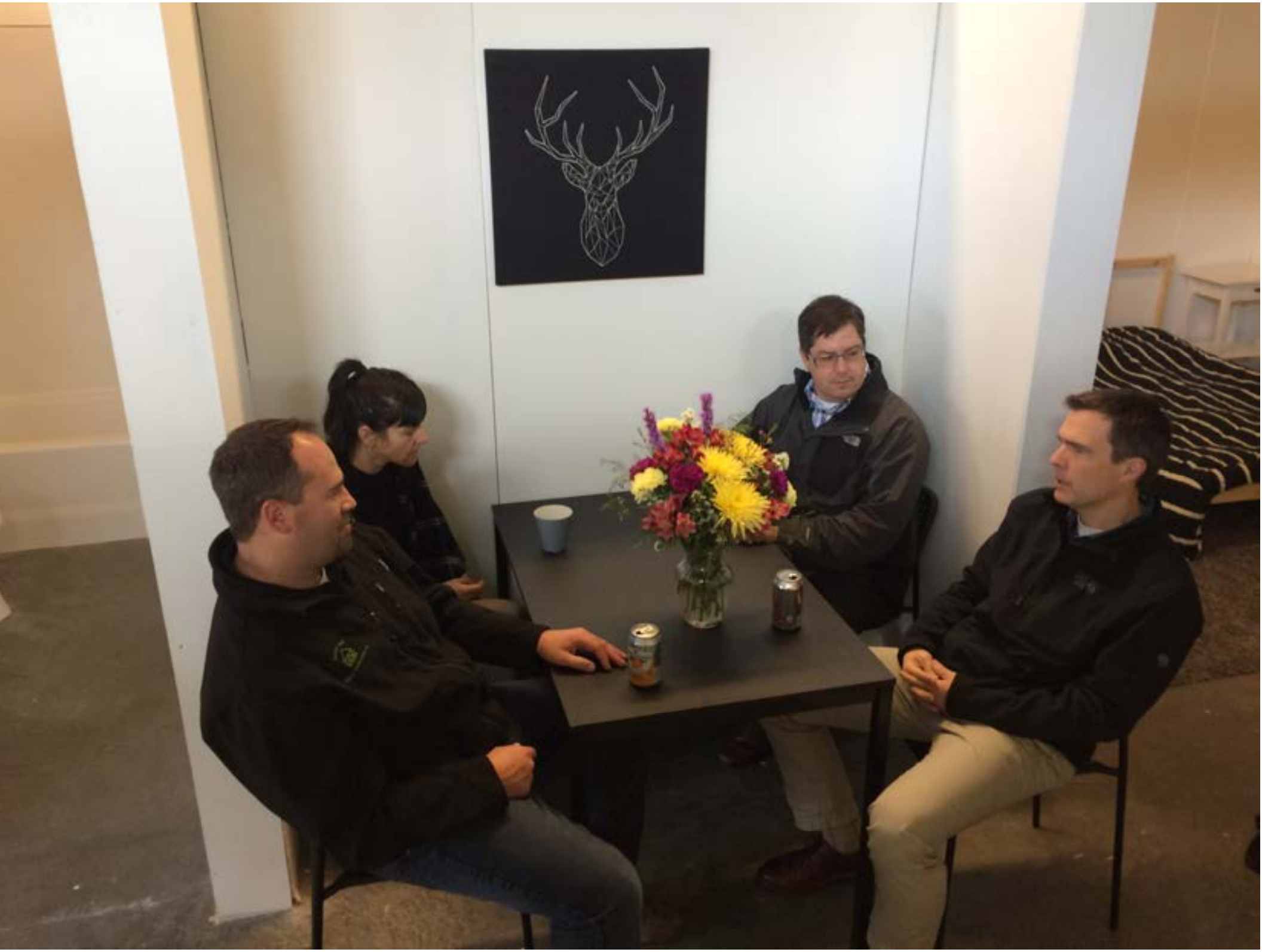
1 BR Unit – Option 2

Image courtesy of
Ankrom Moisan Architectsc

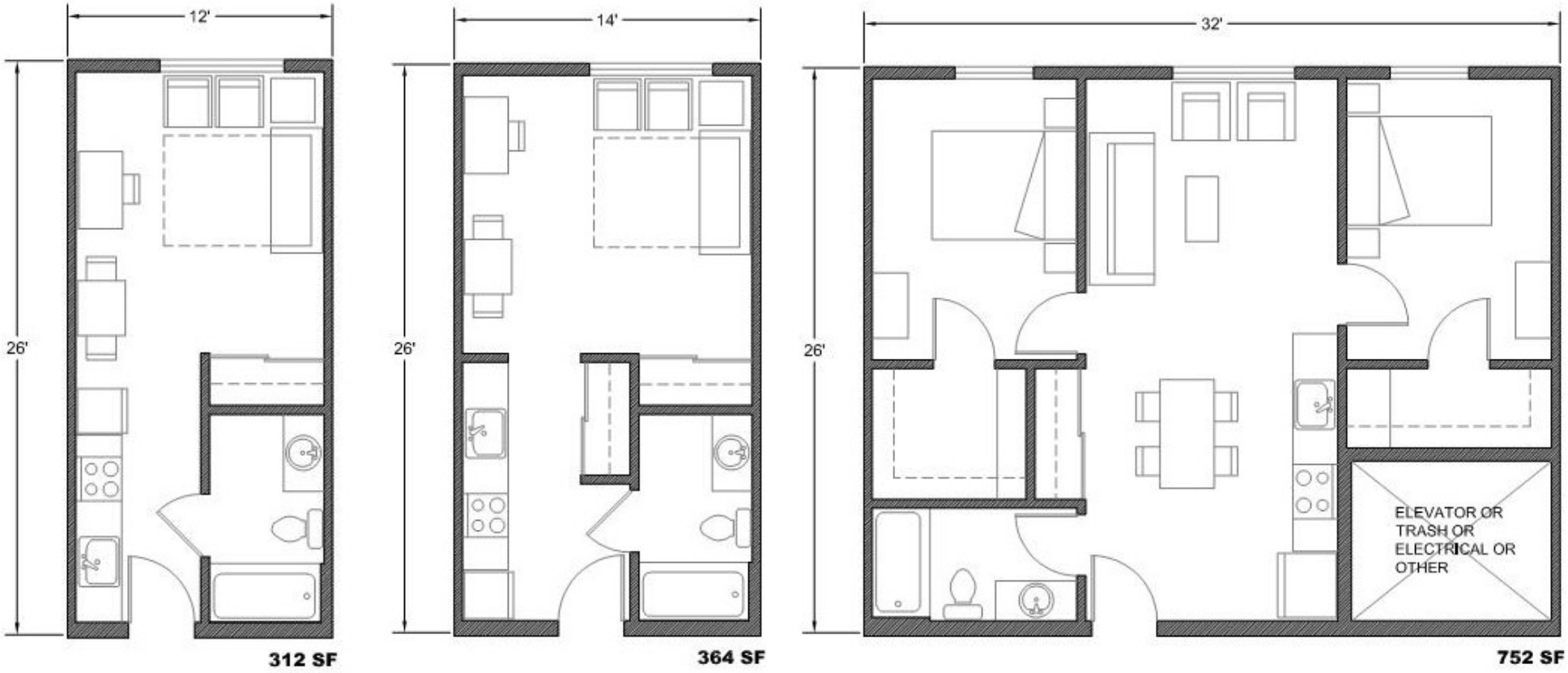
1 BR Unit – Option 3

Image courtesy of
Ankrom Moisan Architectsc


#1
ALL WE NEED IS YOU
TO START BUILDING NOW!
FUNDING
INITIATIVE
REACH
PIPELINE

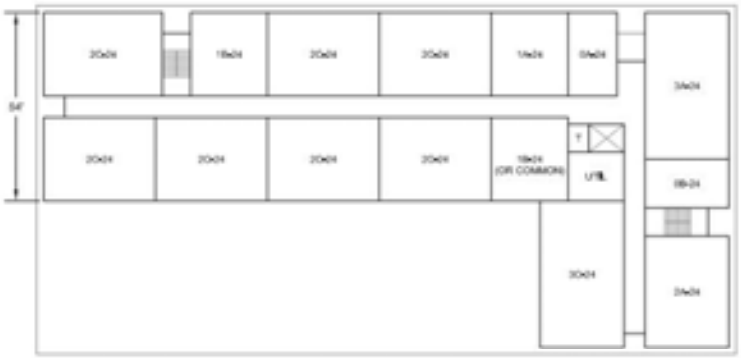



#1 reason for family homelessness is a lack of affordable housing



Unit Plan Options – Studios / 2 Bedroom

Model Unit Plans
Series 1
(24' depth)



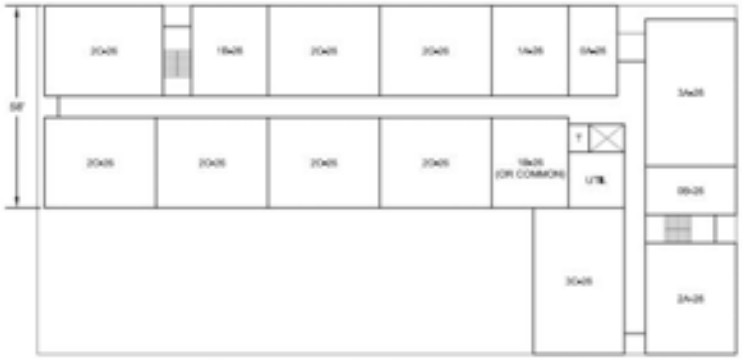
SAMPLE BUILDING PLAN LAYOUT FOR WORKFORCE / FAMILY HOUSING ON 100' X 200' LOT

SAMPLE BUILDING PLAN LAYOUT FOR WORKFORCE / SENIOR HOUSING ON 100' X 200' LOT

CEDC
Project

Walsh Construction Co.

Model Unit Plans
Series 2
(26' depth)

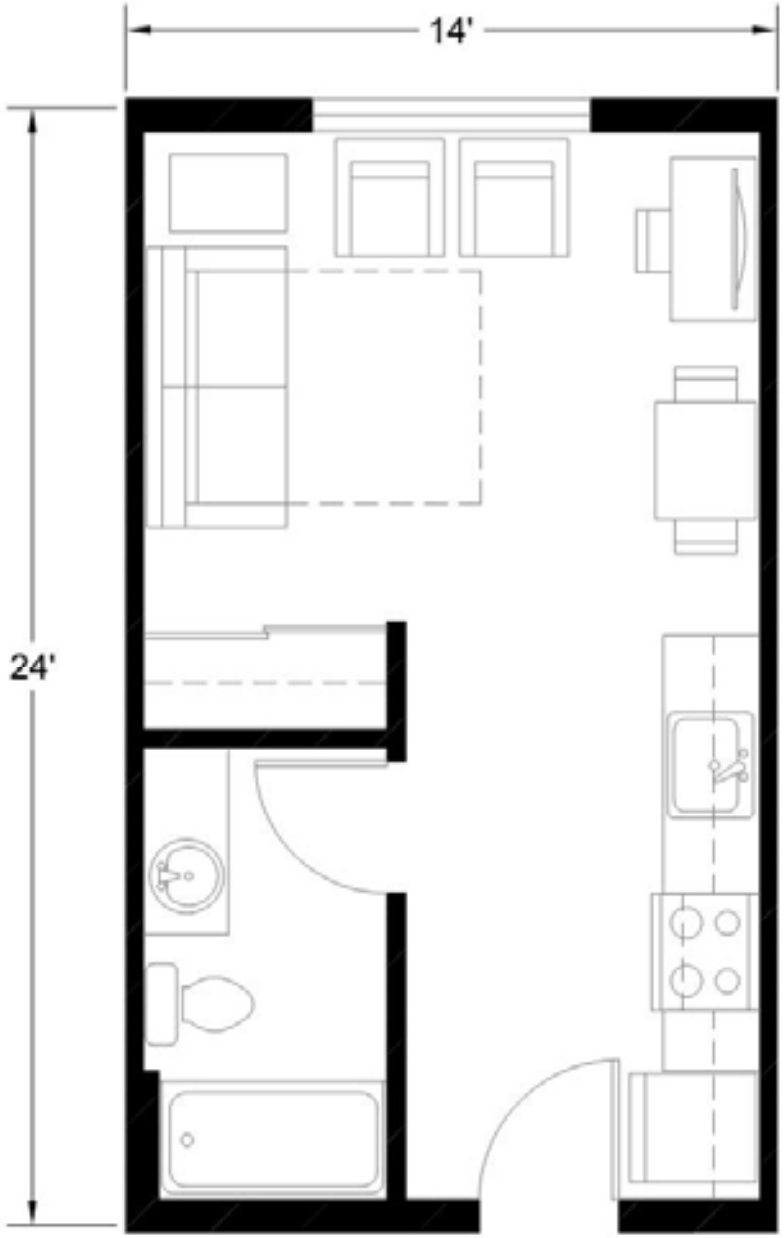


SAMPLE BUILDING PLAN LAYOUT FOR WORKFORCE / FAMILY HOUSING ON 100' X 200' LOT

SAMPLE BUILDING PLAN LAYOUT FOR WORKFORCE / SENIOR HOUSING ON 100' X 200' LOT

CEDC
Project

Walsh Construction Co.

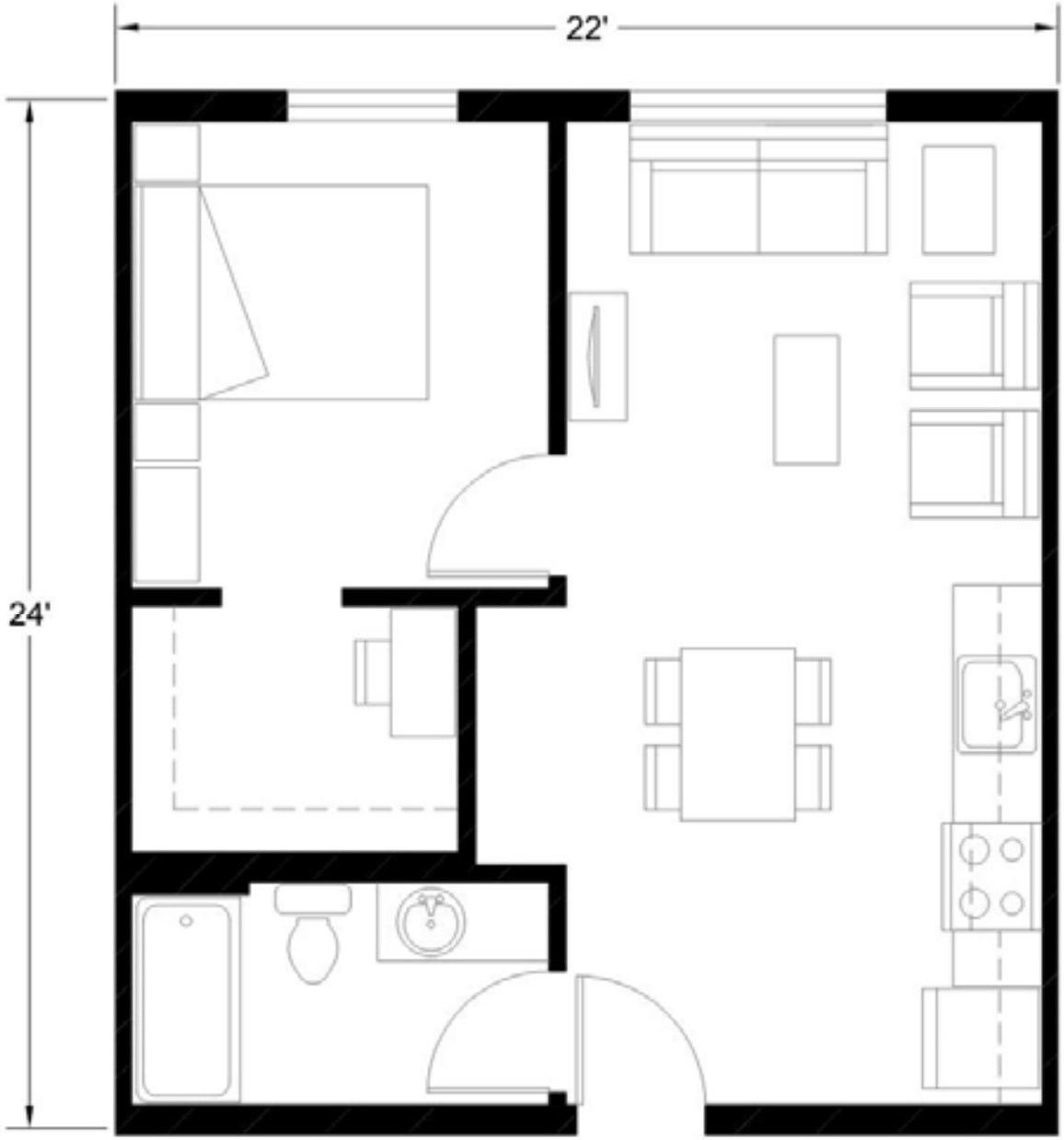


TYPE 0B-24 336 SF

Studio Unit Plan

0 2' 4' 8' 16'

CEDC Project



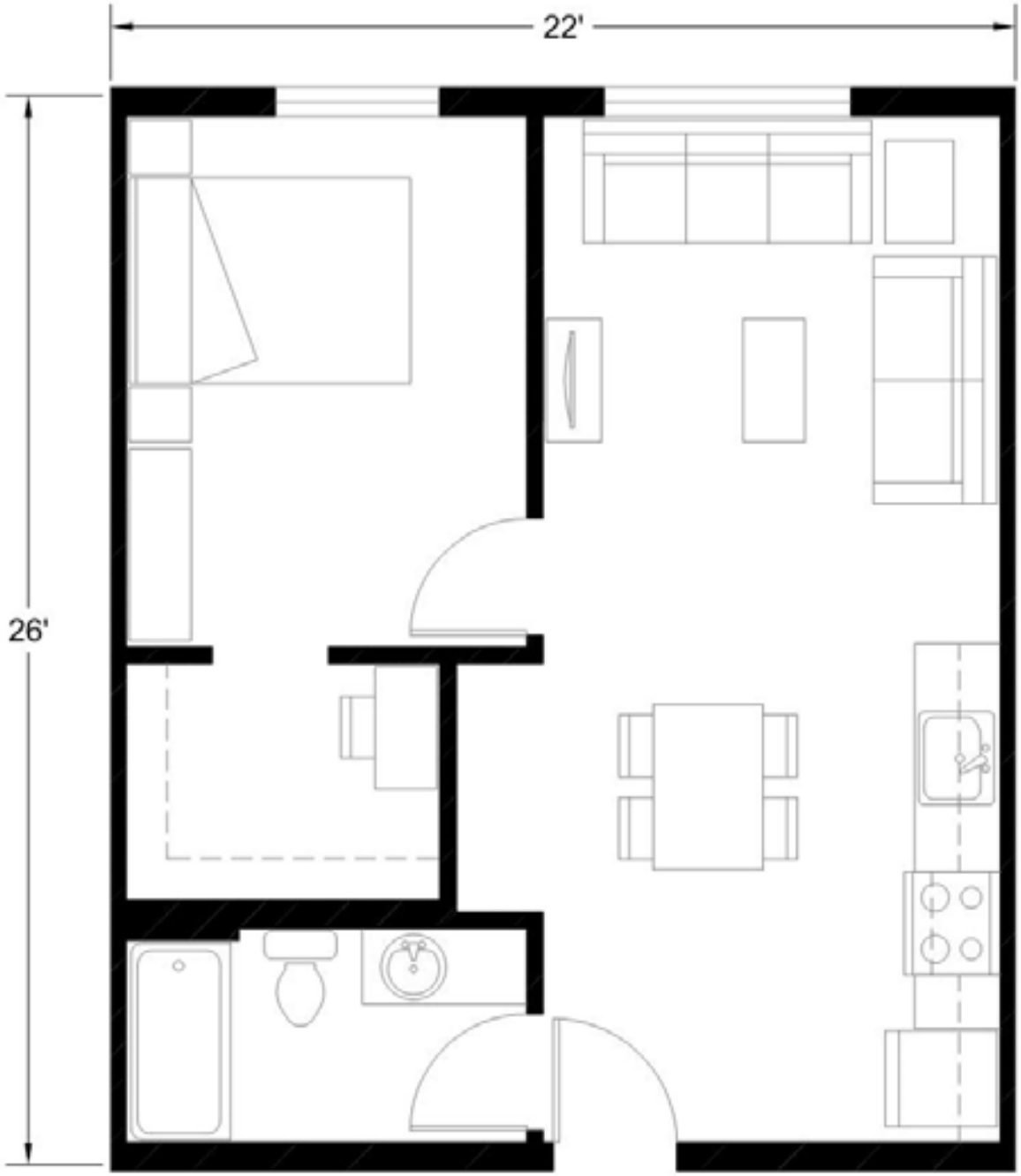
TYPE 1B-24

528 SF

One Bedroom Unit Plan

0 2' 4' 8' 16'

CEDC
Project

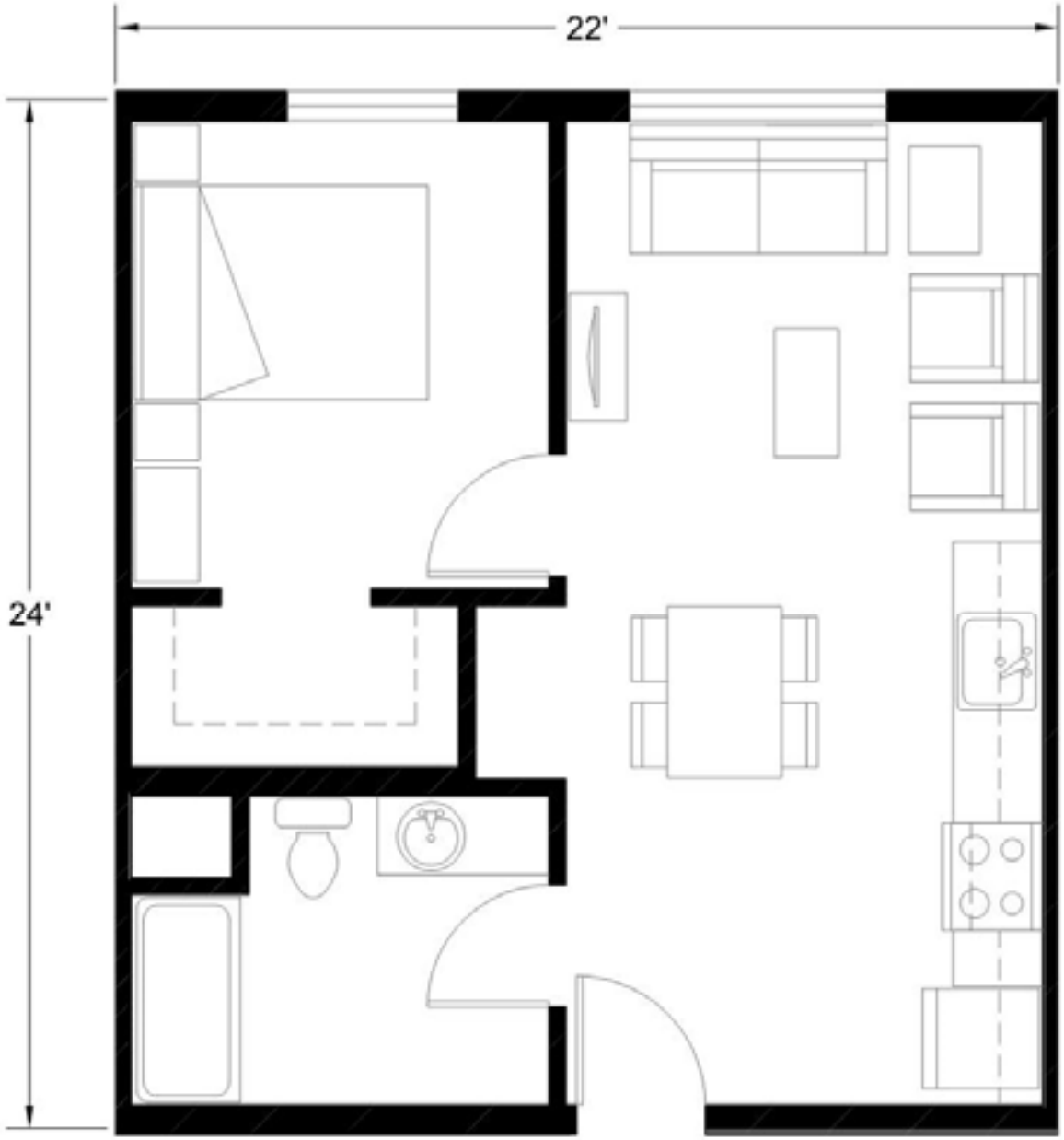


TYPE 1B-26 **572 SF**

One Bedroom Unit Plan

0 2' 4' 8' 16'

CEDC Project

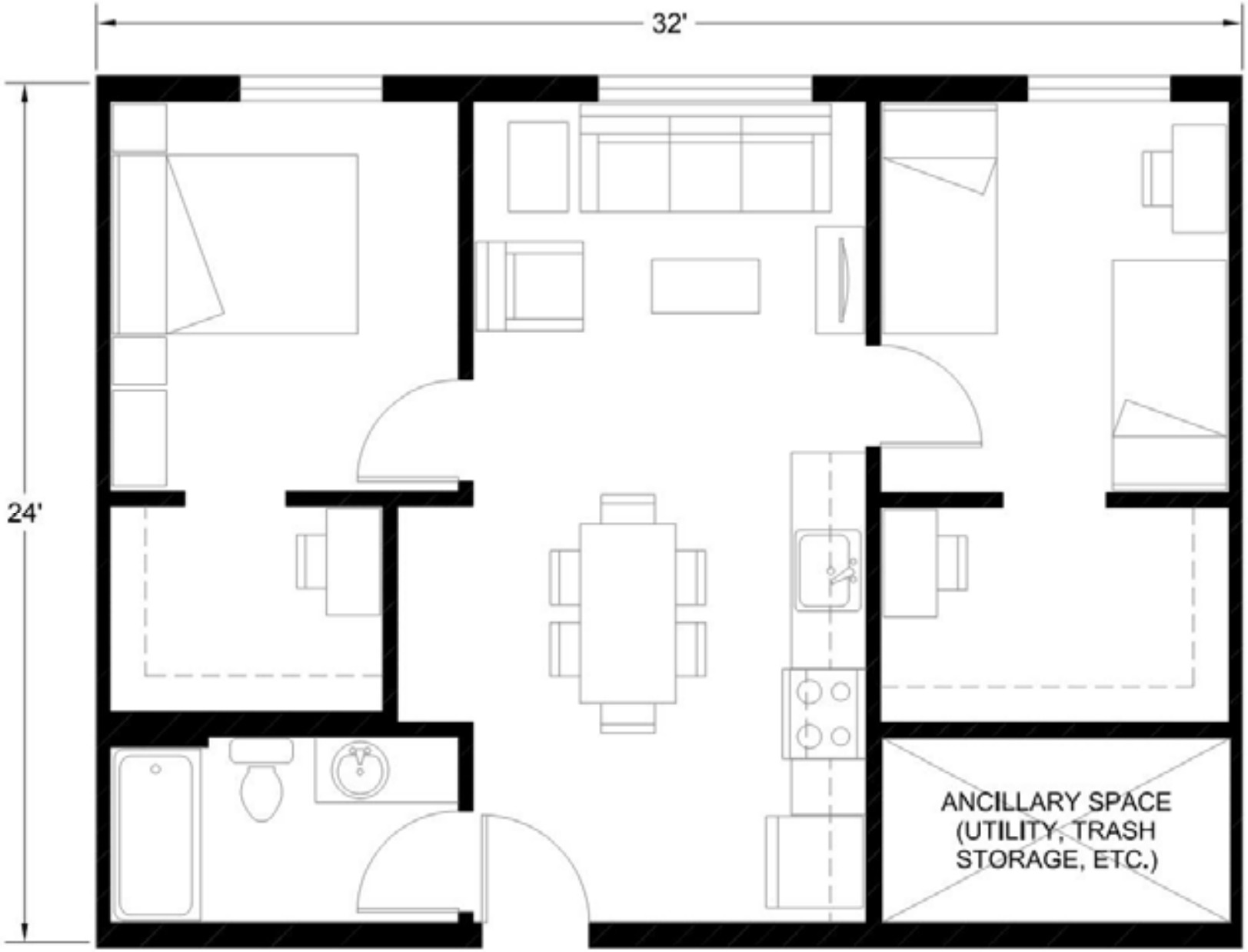


TYPE 1A-24 (Accessible) **528 SF**

One Bedroom Unit Plan

0 2' 4' 8' 16'

CEDC Project



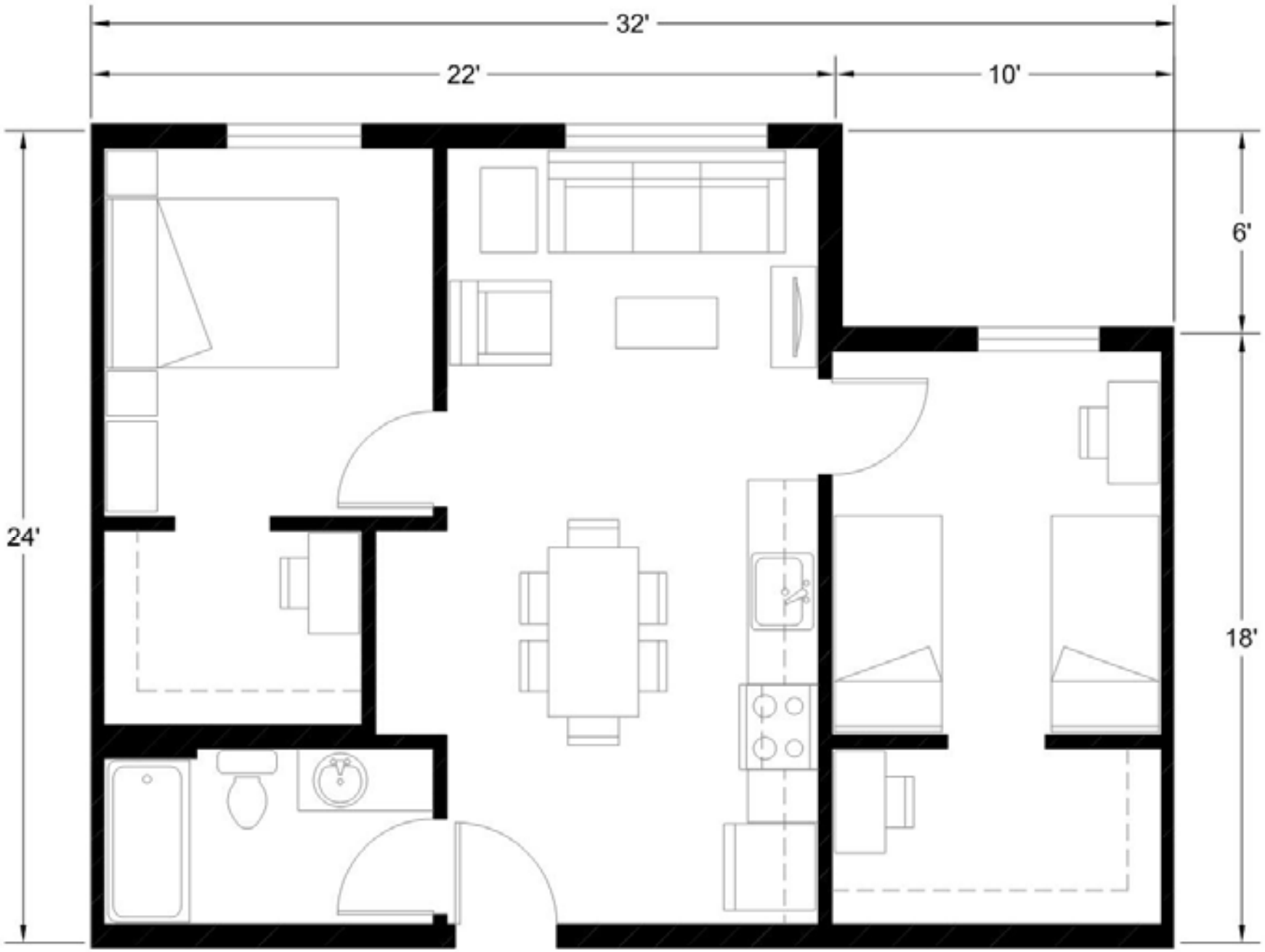
TYPE 2B-24

708 SF

Two Bedroom Unit Plan

0 2' 4' 8' 16'

CEDC
Project

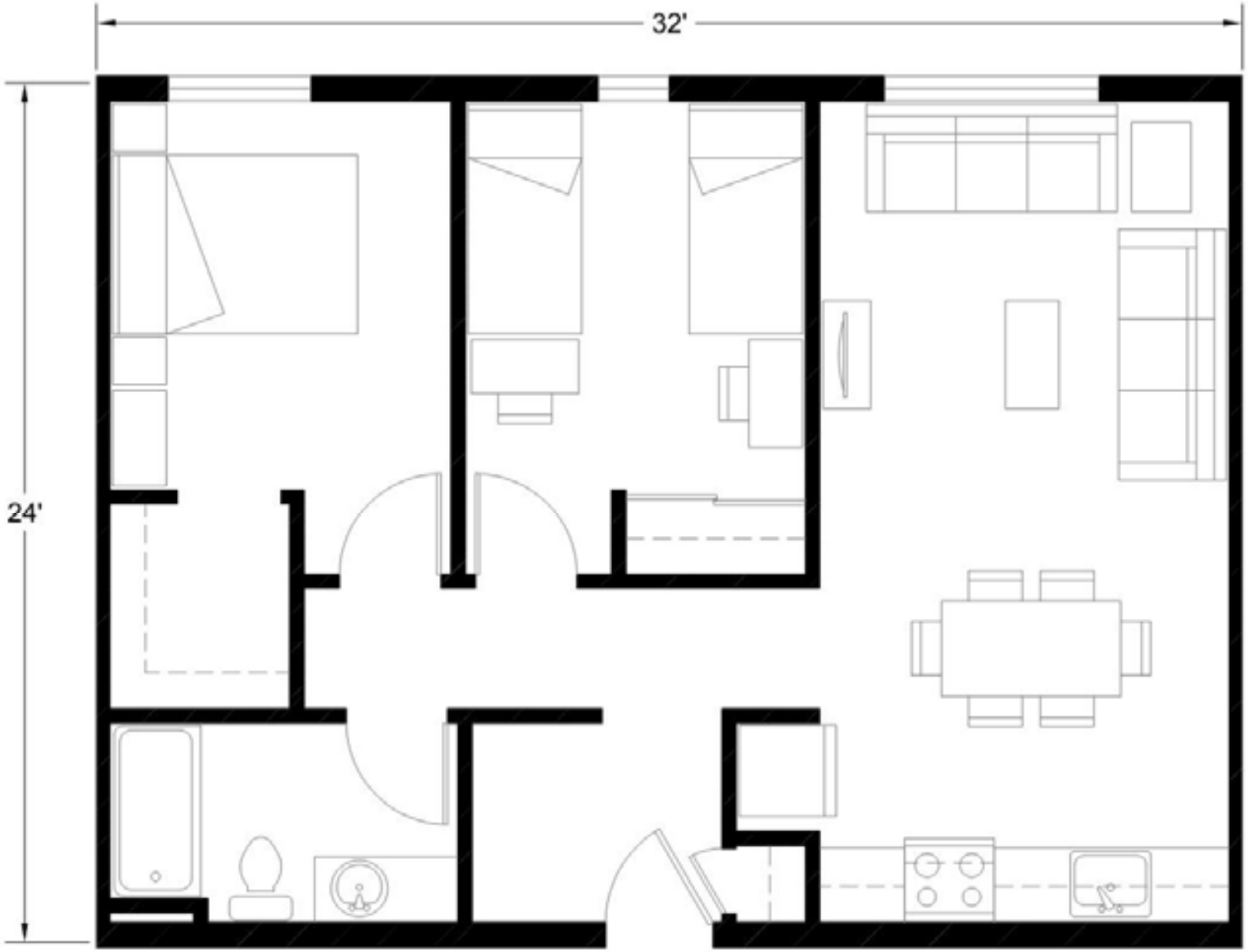


TYPE 2B1-24 **708 SF**

Two Bedroom Unit Plan

0 2' 4' 8' 16'

CEDC Project

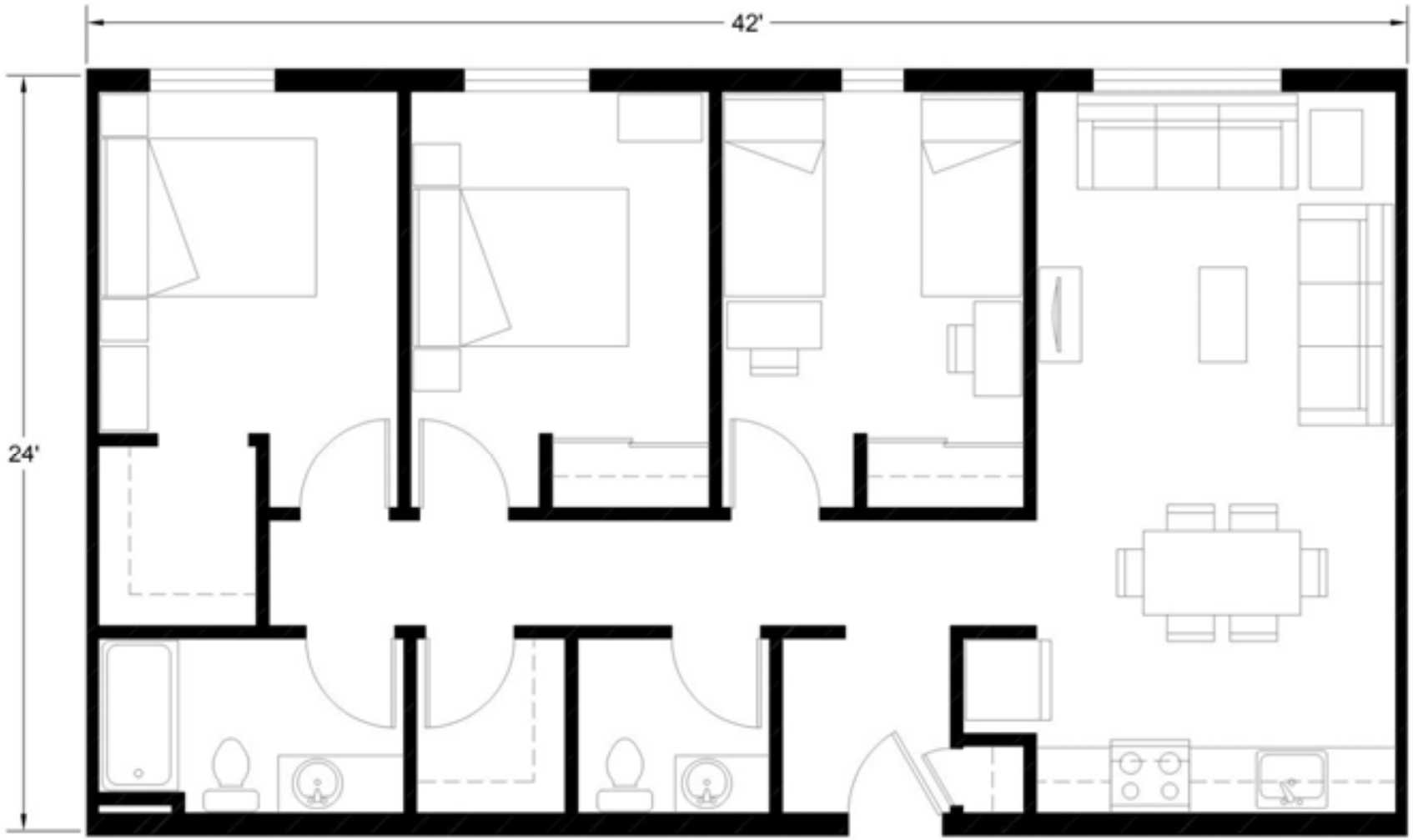


TYPE 2C-24 **768 SF**

Two Bedroom Unit Plan

0 2' 4' 8' 16'

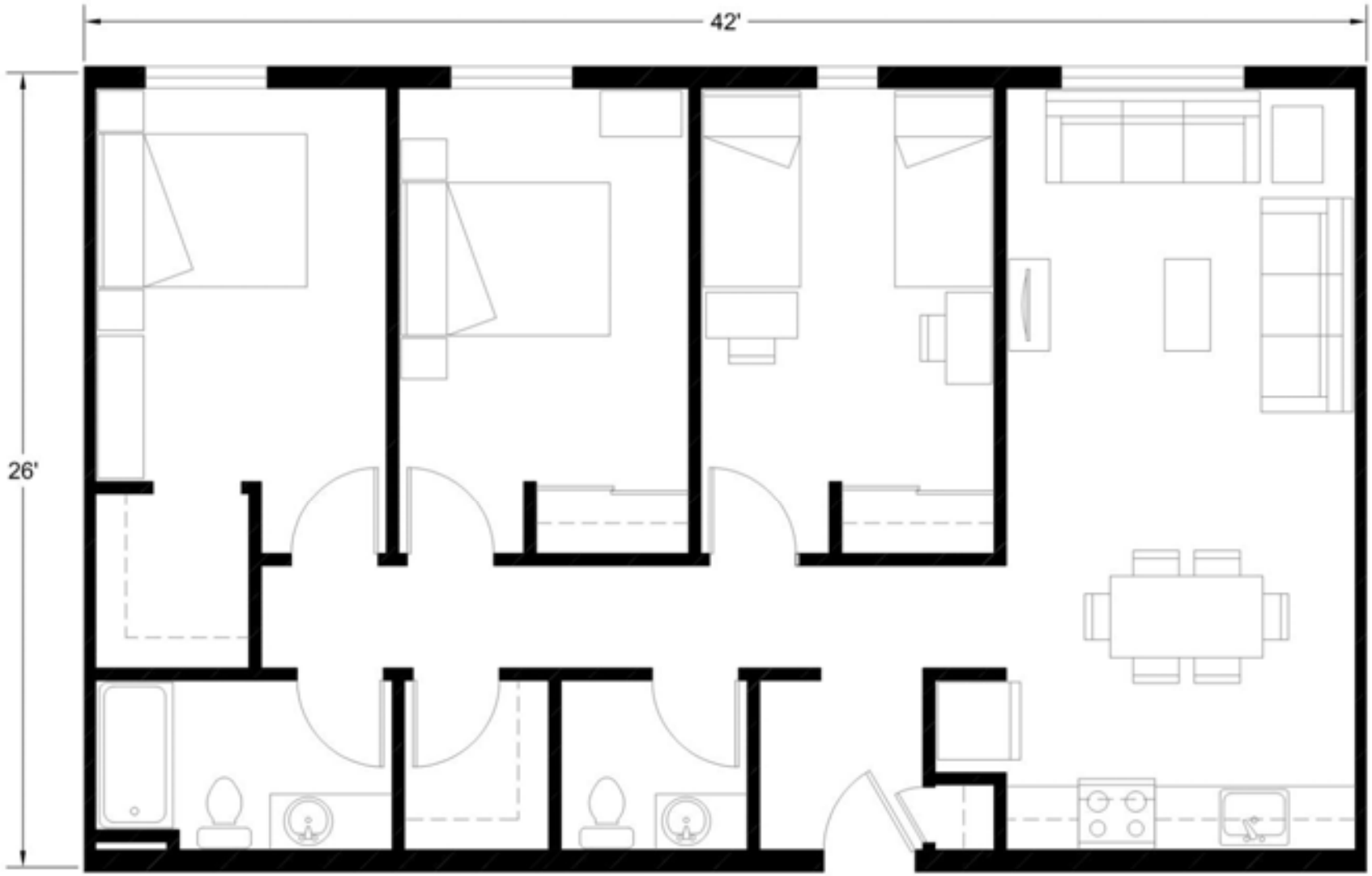
CEDC Project



Three Bedroom Unit Plan

0 2' 4' 8' 16'

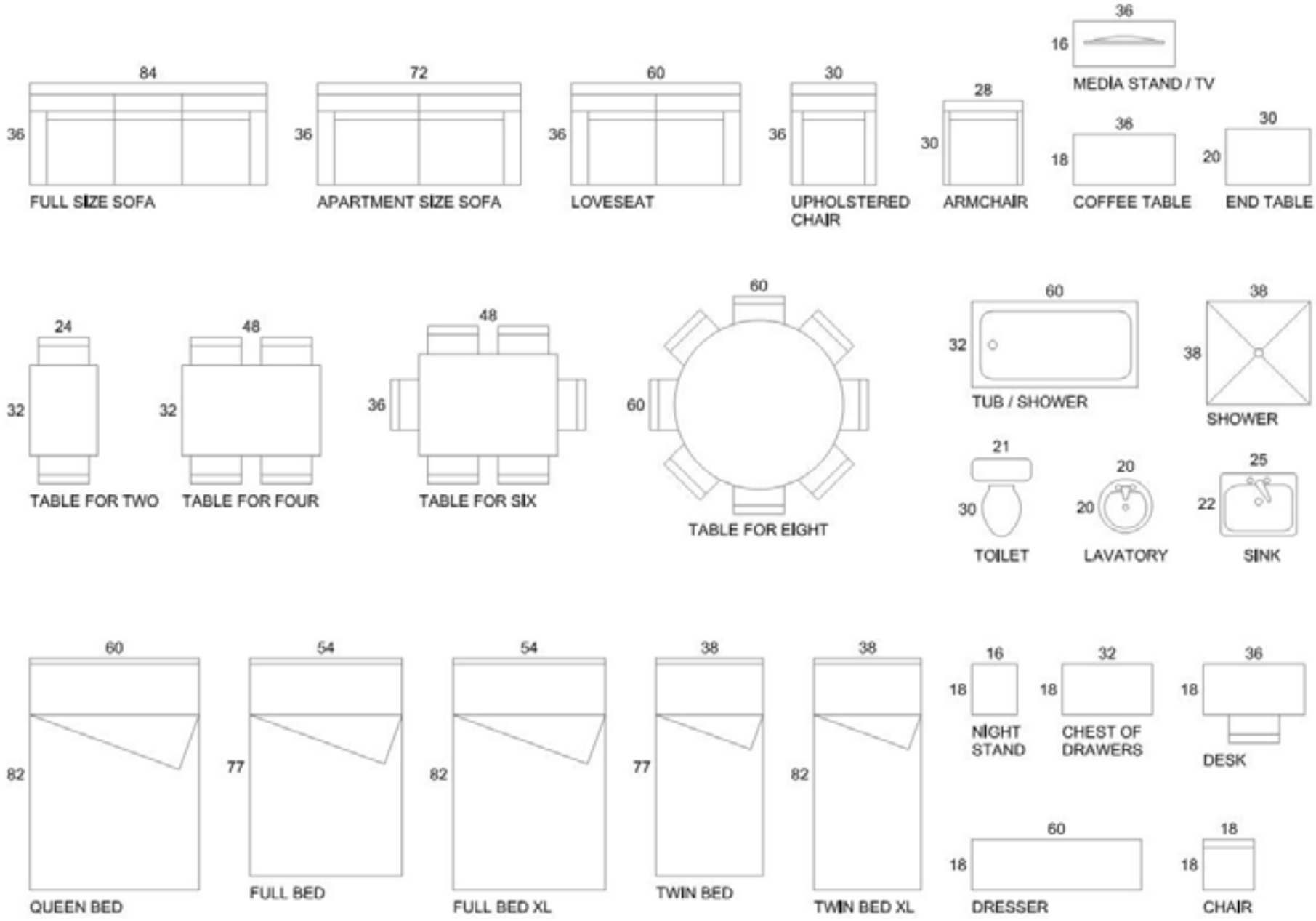
CEDC
Project



Three Bedroom Unit Plan

0 2' 4' 8' 16'

CEDC
Project



Furniture & Fixtures

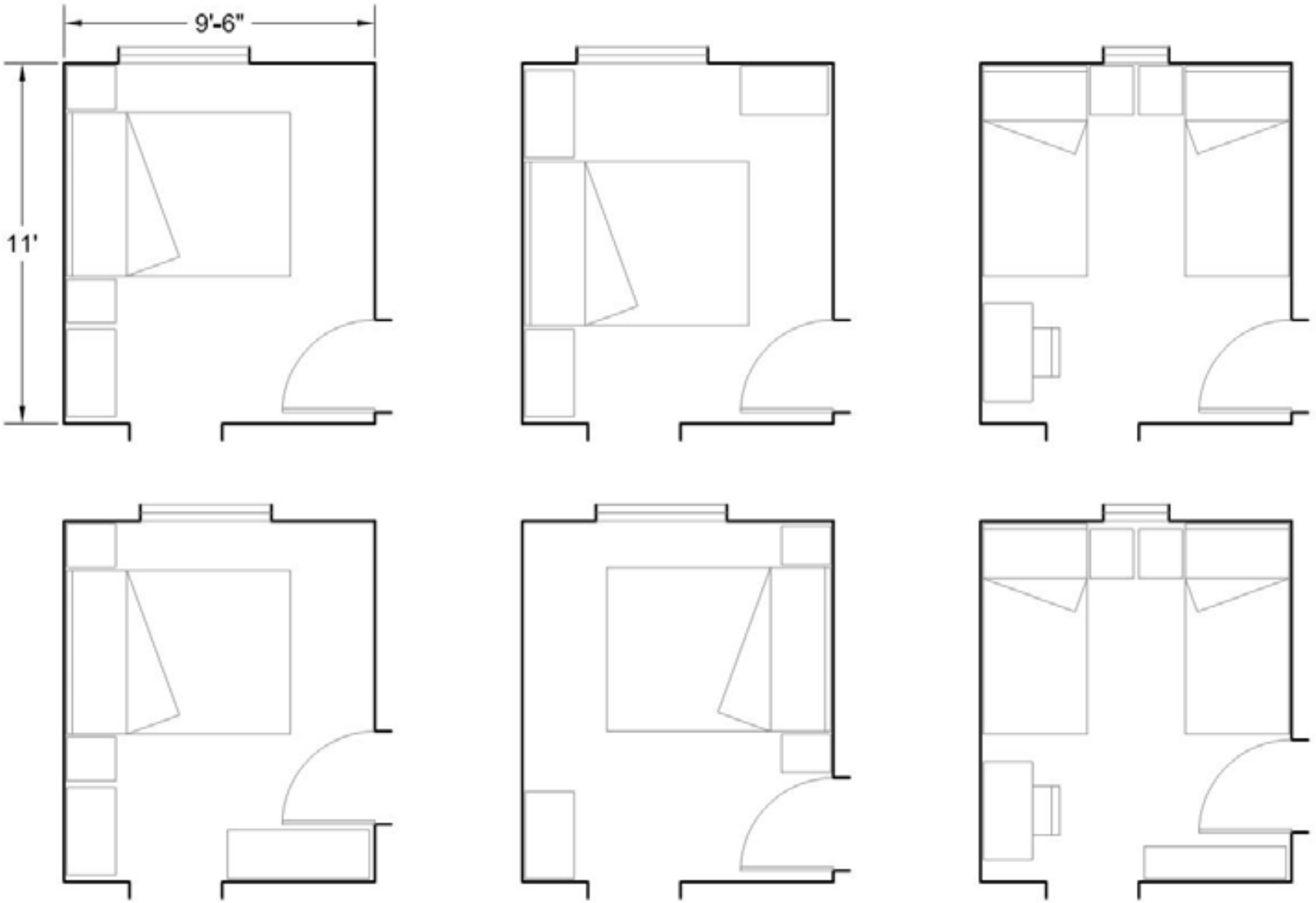
CEDC Project

Living Room Layouts - 11’ x 11’

CEDC Project

Living Room Layouts - 11’ x 13’

CEDC Project



Bedroom Layouts - 9’-6” x 11’

CEDC Project

Bedroom Layouts - 9’-6” x 13’

CEDC Project

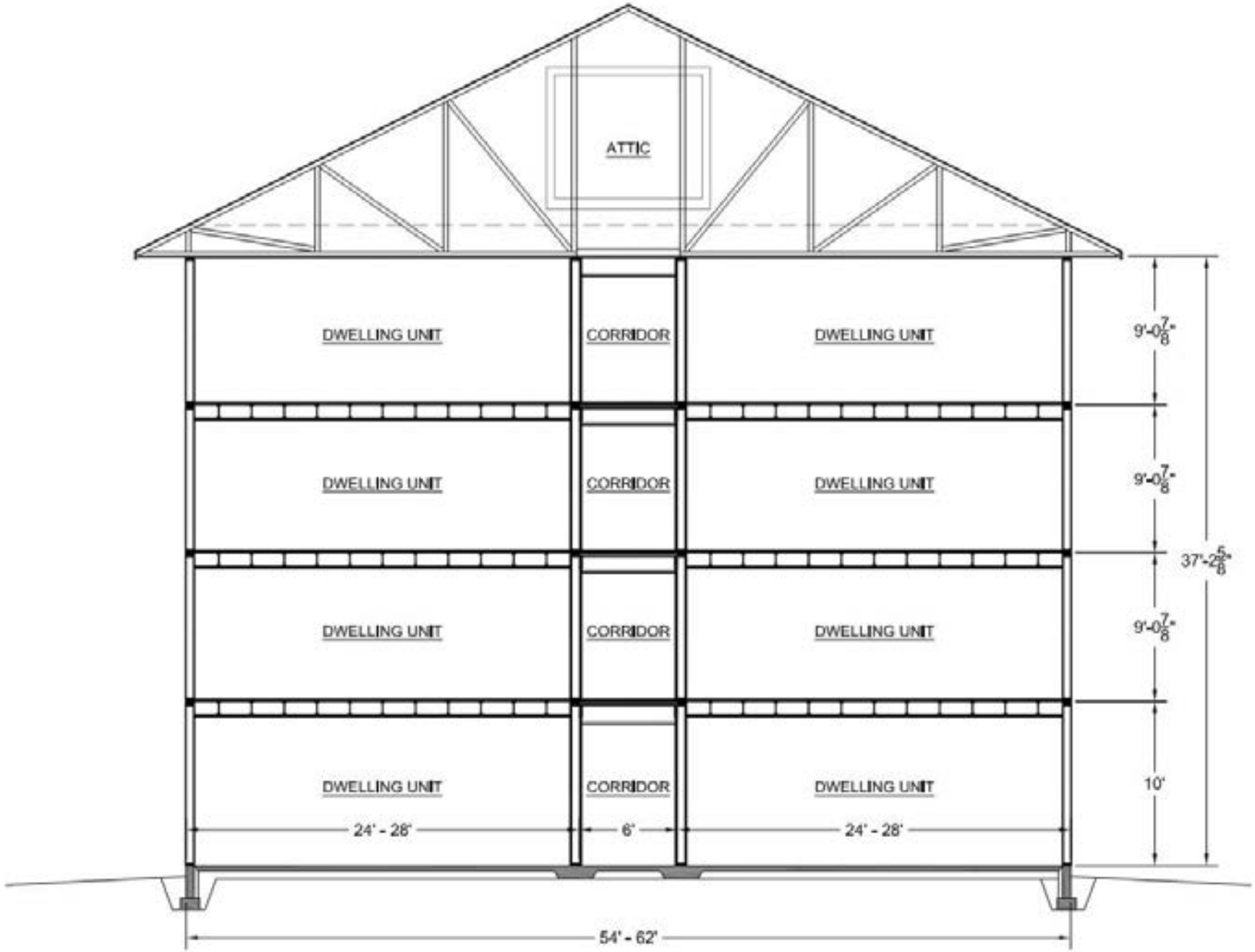
Bedroom Layouts - 9’-6” x 13’

CEDC Project

Optimization Potential

- Unit Plans → Building Plans
- Structure
- Enclosure
- MEP
- Bathrooms
- Kitchens
- Cabinets
- Appliances
- Windows

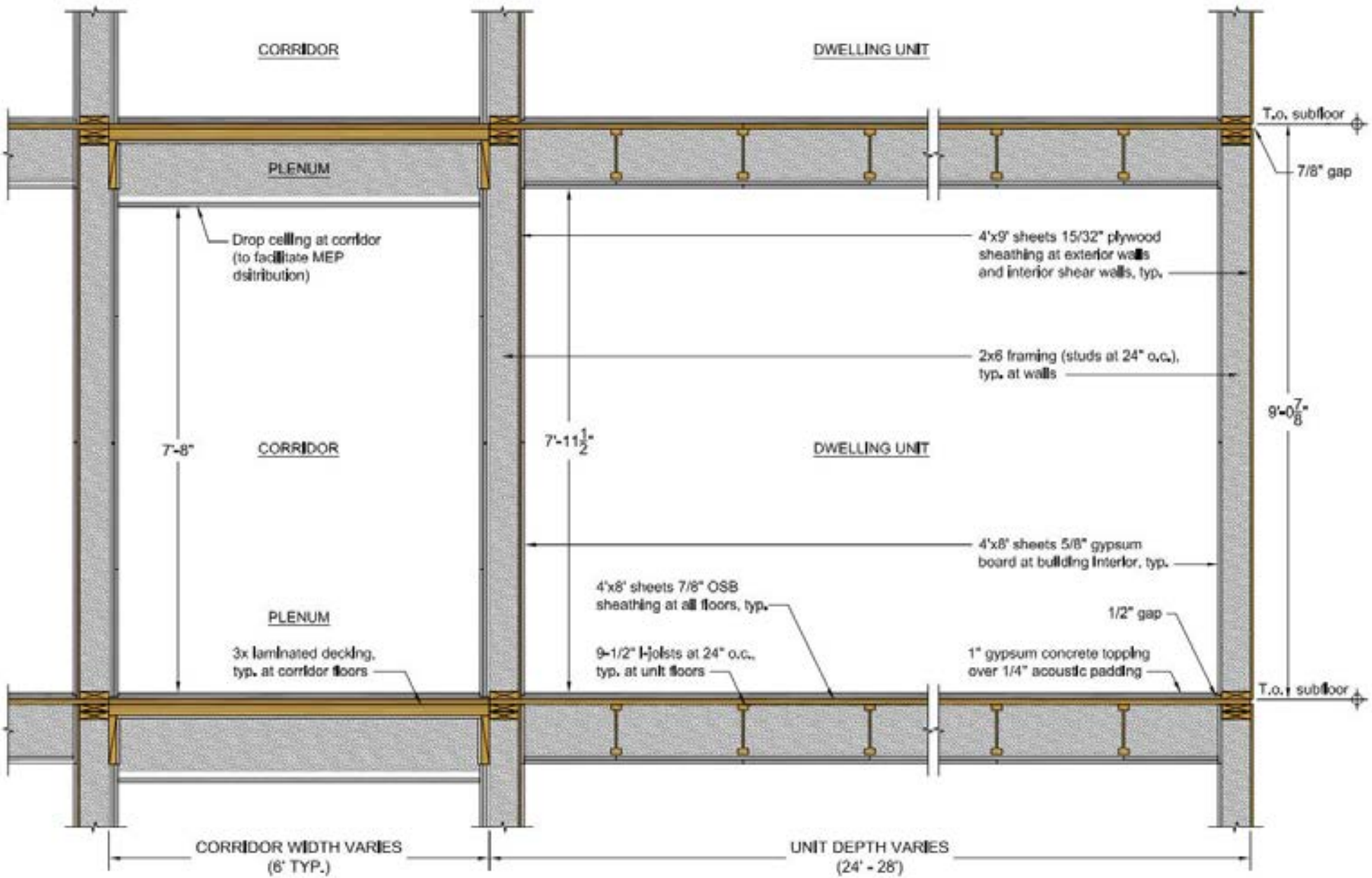
WALSH CONSTRUCTION CO.



Optimized Building Section

0 4' 8' 16' 32'

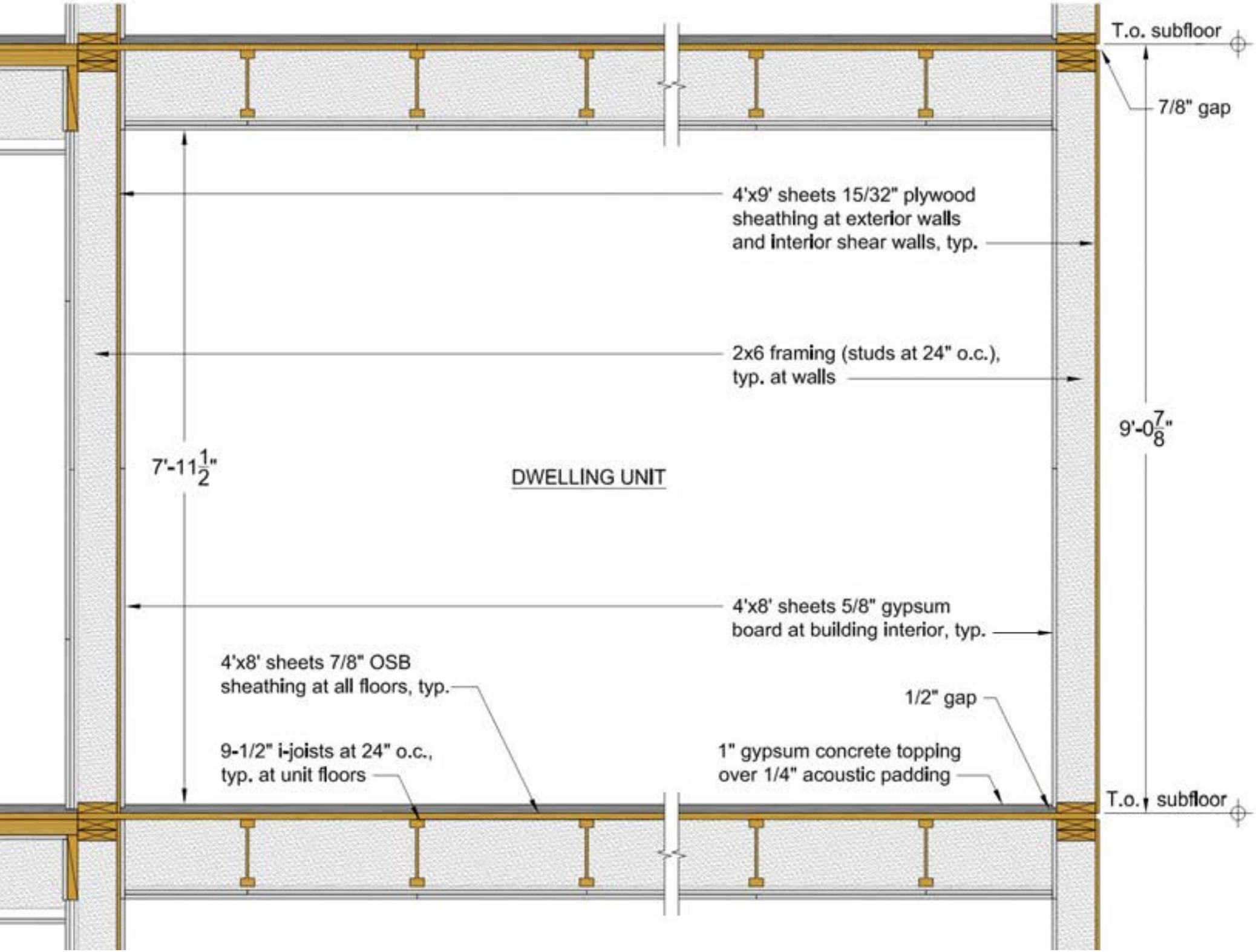
CEDC Project

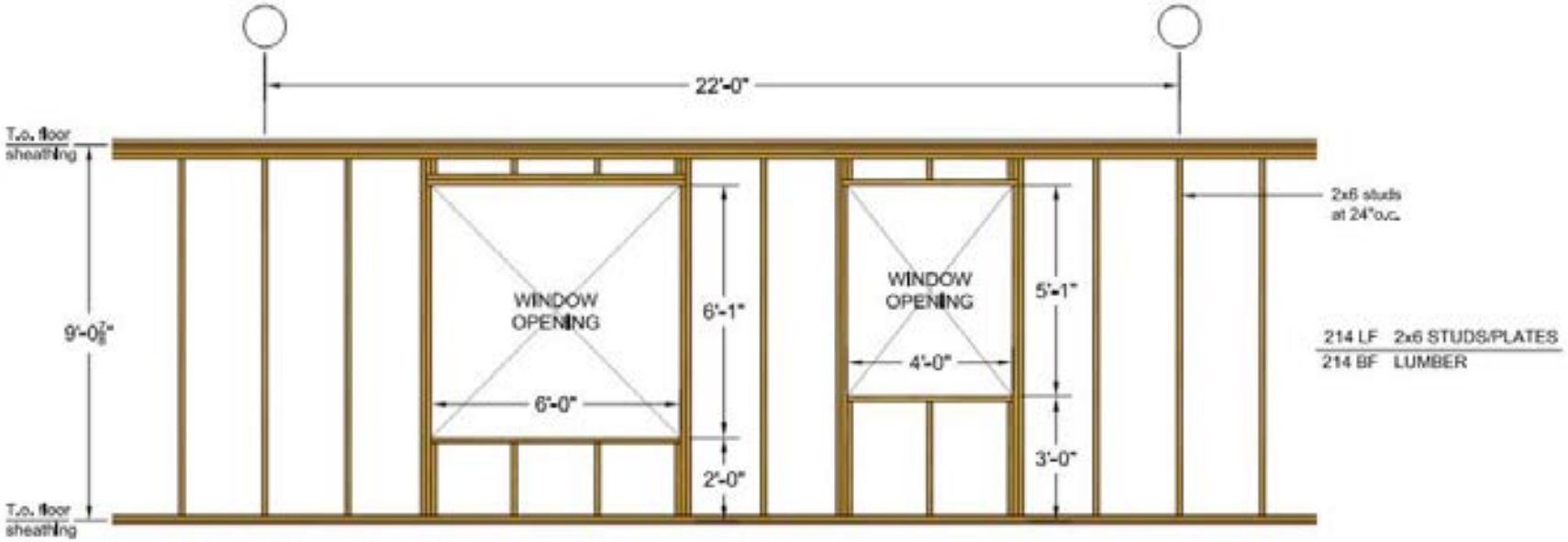


Section through Optimized Unit and Corridor

0 1' 2' 4' 8'

CEDC
Project


T.o. subfloor
7/8" gap
4'x9' sheets 15/32" plywood sheathing at exterior walls and interior shear walls, typ.
2x6 framing (studs at 24" o.c.), typ. at walls
9'-0 7/8"
7'-11 1/2"
DWELLING UNIT
4'x8' sheets 5/8" gypsum board at building interior, typ.
4'x8' sheets 7/8" OSB sheathing at all floors, typ.
1/2" gap
9-1/2" i-joists at 24" o.c., typ. at unit floors
1" gypsum concrete topping over 1/4" acoustic padding
T.o. subfloor



Exterior Wall Framing Elevation (Optimized Design)

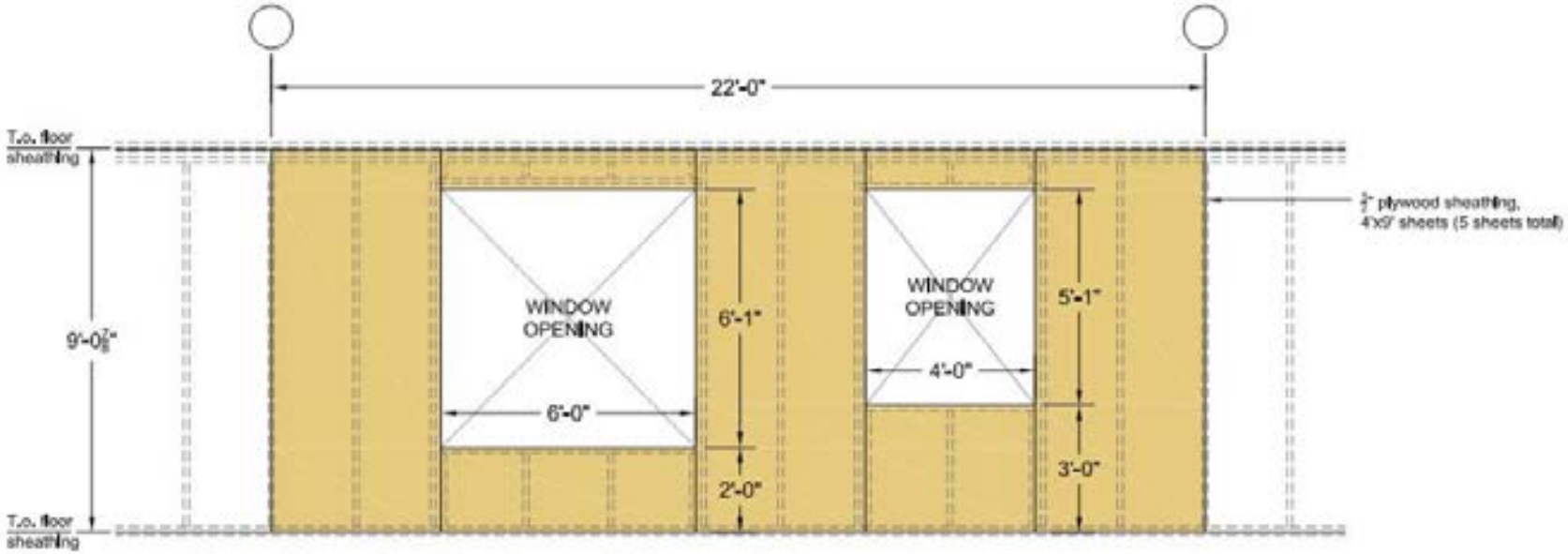
42% reduction in framing material

Exterior Wall Framing Elevation (Typical Design)

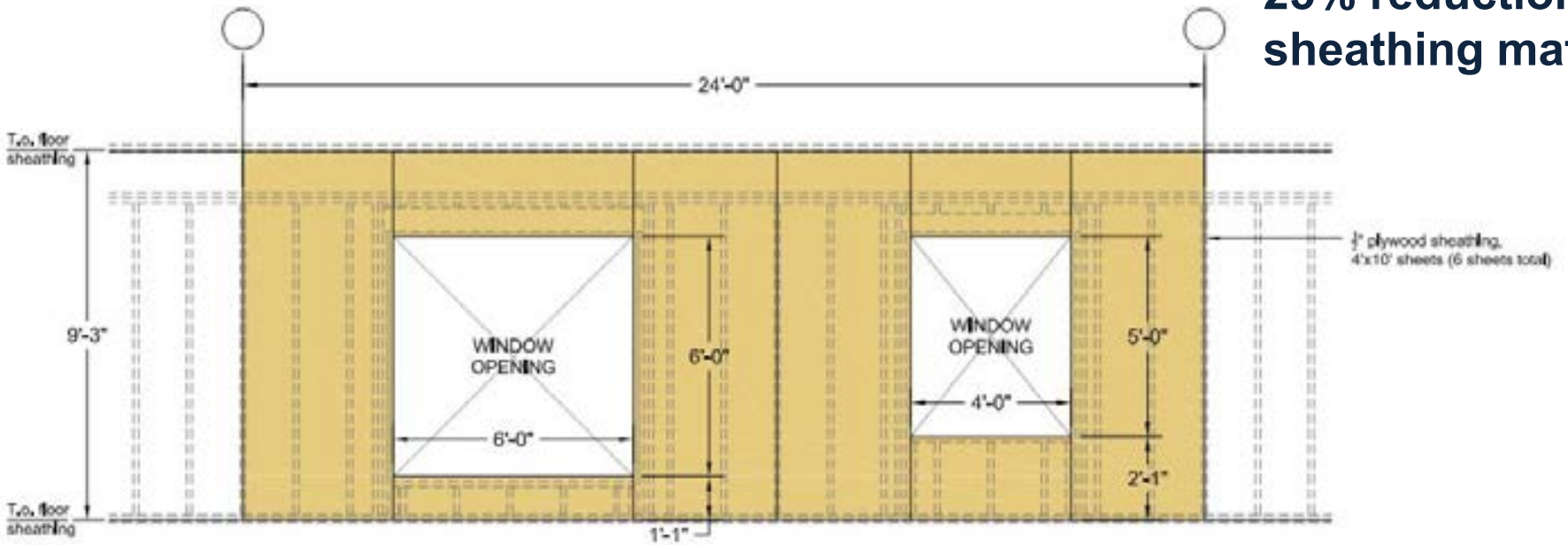
Exterior Wall Framing

3/10/2018

CEDC Project



Exterior Wall Framing Elevation (Optimized Design)



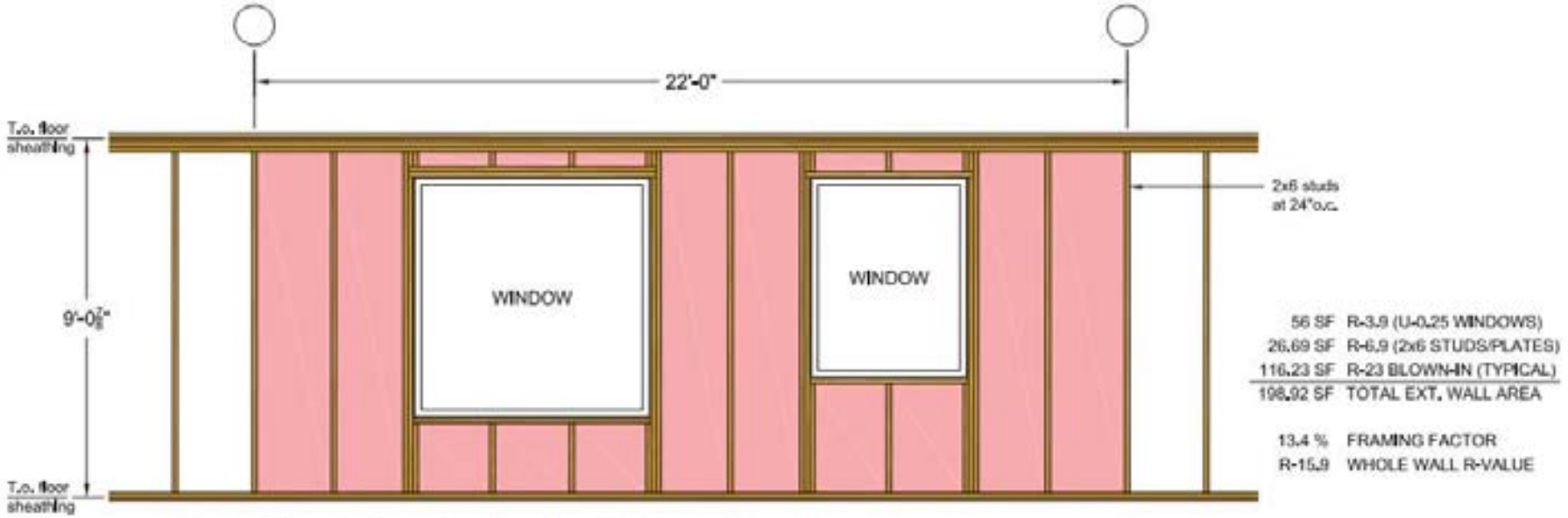
Exterior Wall Framing Elevation (Typical Design)

25% reduction in sheathing material

Exterior Wall Sheathing

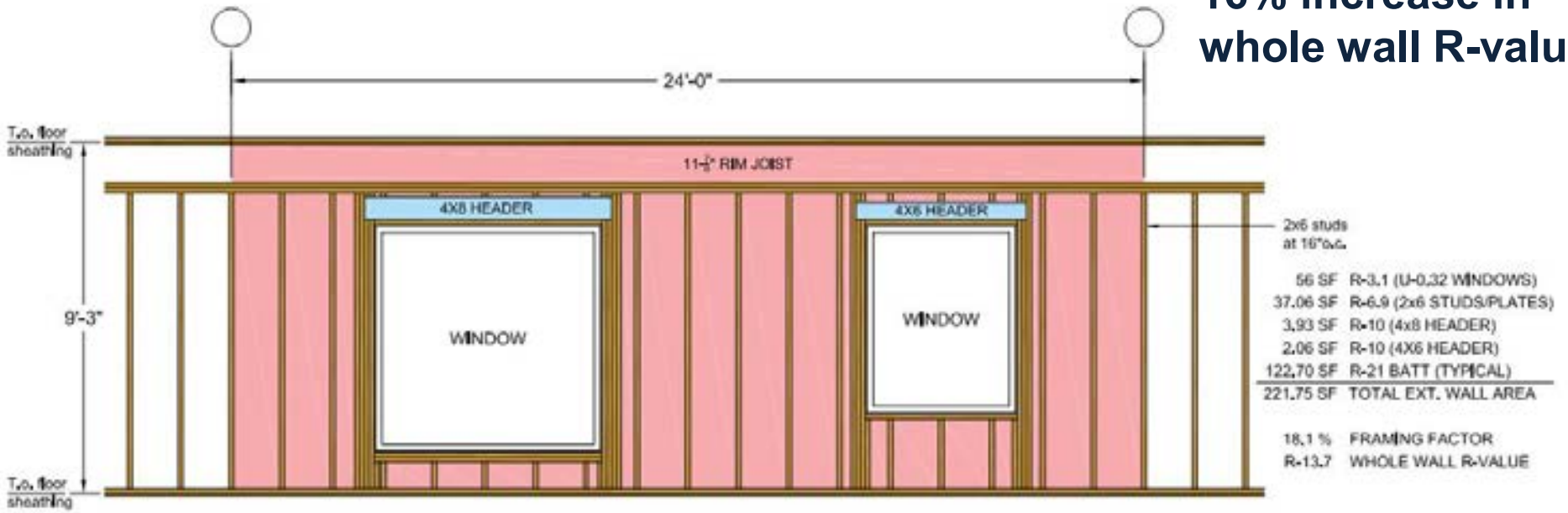
3/10/2018

CEDC Project



Exterior Wall Insulation Elevation (Optimized Design)

16% increase in whole wall R-value

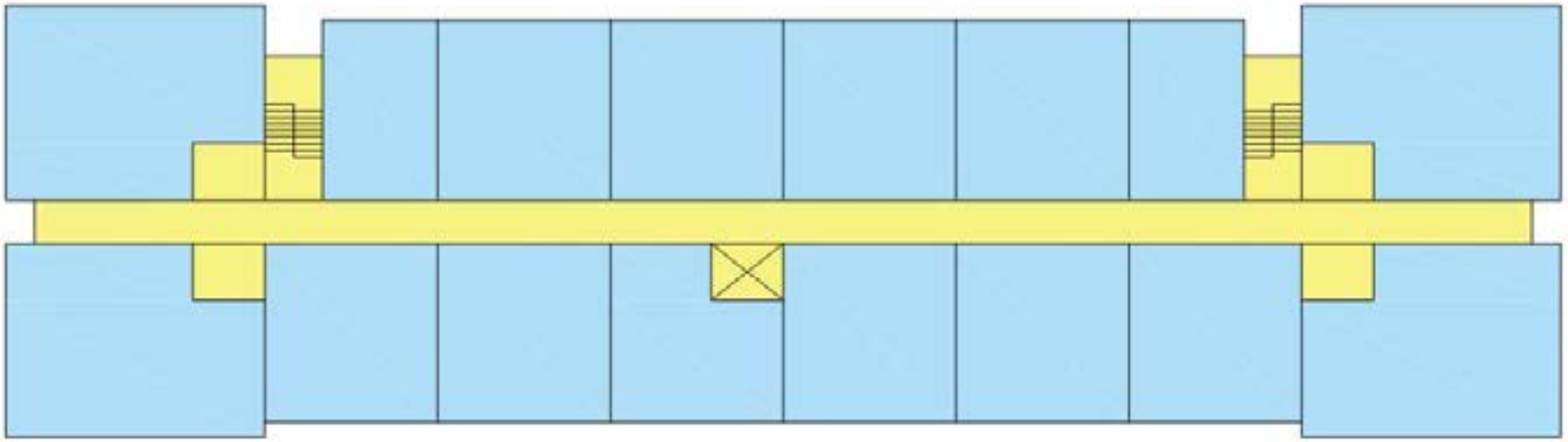


Exterior Wall Insulation Elevation (Typical Design)

Exterior Wall Insulation

3/10/2018

CEDC Project

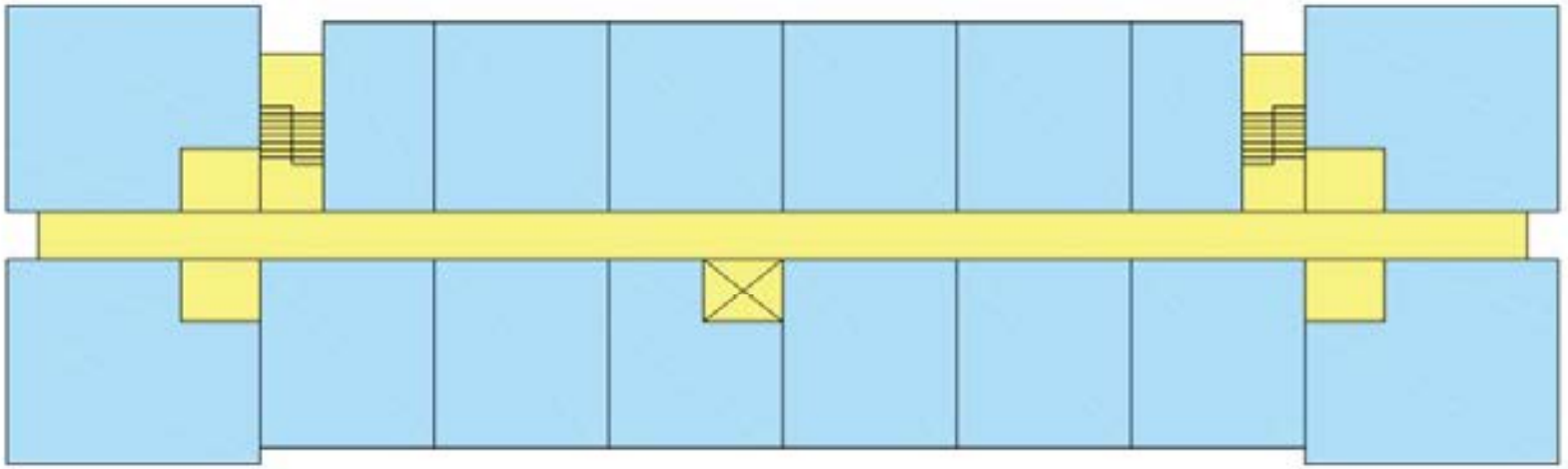


24’ x 25’ 1BR apartments

36’ x 27’ 2BR apartments

Typical MURB - Plan

CEDC
Project



22’ x 24’ ~~24’ x 25’~~ 1BR apartments

32’ x 26’ ~~36’ x 27’~~ 2BR apartments

Optimized MURB - Plan

CEDC Project

Typical MURB - Elevation

CEDC Project


10’-3”
(yields 9’
ceiling)

24’ x 25’ 1BR apartments

36’ x 27’ 2BR apartments

10’-3” floor to floor height

Typical MURB - Elevation

CEDC Project

22’ x 24’ ~~24’ x 25’~~ 1BR apartments

32’ x 26’ ~~36’ x 27’~~ 2BR apartments

9’- 0 7/8” ~~10’-3”~~ floor to floor height

Optimized MURB - Elevation

CEDC Project

22% reduction in building volume

(Form factor: ~~1.029~~ 0.998)

13% reduction in gross floor area

19% reduction in vertical enclosure

22’ x 24’ ~~24’ x 25’~~ 1BR apartments

32’ x 26’ ~~36’ x 27’~~ 2BR apartments

9’- 0 7/8” ~~10’-3”~~ floor to floor height

Optimized MURB - Elevation

CEDC Project

CAN WE LIVE WITH 8 FOOT CEILINGS?

Standardize/Optimize

- Typical unit plans
- Corridors
- Exit stairways
- Foundation system
- Structural system
- Enclosure system
- Windows 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
- Façade design / 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%

Residential Building Types

- Multi-Unit Residential Buildings (MURBs)
  - Double-loaded, interior corridor
  - Single-loaded, exterior walkway
  - Stacked flats, walk-up
  - Rowhouses
  - Four-unit residential building (fourplex)
  - Three-unit residential building (triplex)
  - Two-unit residential building (duplex)

- Single-Family Houses

WALSH CONSTRUCTION CO.

RANDOM THOUGHTS SEGMENT

Think hard about “TRADEOFFS”…

COLOR is cheap…

Perhaps **EVOLUTION is better than revolution…**

Should housing be BIG “A” or little “a”?

Just because we can doesn’t mean we should

CEDC = Radical Simplicity

Demonstration ("Beta Test") Projects

- 124th & Ash
  - 175 units workforce housing
- Glisan Gateway
  - 162 units workforce housing
- Pleasant Avenue
  - 24 units family housing for veterans

WALSH CONSTRUCTION CO.

Image Credit: Ankrom Moisan Architects

124th & Ash

- Developer/ Owner: REACH Community Development
- Architect: Ankrom Moisan Architects
- Contractor: Walsh Construction Co.

- New construction project in REACH pipeline
- Awarded MMT grant to support innovation in production of cost efficient affordable housing
- Programmed as 150-190 unit project (final unit count is 175)

WALSH CONSTRUCTION CO.

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*
- Trade partners involved early
- Optimizing the widget(s)
  - The unit plan is our basic building block…
- *Pull Planning*

WALSH CONSTRUCTION CO.

124th & Ash - The Goal

124th + Ash Meeting 17:
Dev Continue: Progress Review

Team Goal: 30% reduction of total costs from OHCS cost/unit baseline

Date/Time: Thursday, November 9, 2017, 3 pm – 5 pm
Location: Ankrom, 38 NW Davis St #300, Portland, OR 97209
Attendees: Michael Bonn (Ankrom), Mike Steffen (Walsh), Jay Nees (Walsh), Wendy Klein (REACH), Tania Feliciano (Ankrom), Jason Roberts (Ankrom), Regina Corbin (Ankrom), Janet Turner (Janet Turner Engineering), Scott Nyseth (Stonewood), Eric Esqueda (Stonewood), Aaron West (SDLA), Steve Shapiro (SDLA), Jessica Woodruff (REACH)

Review Meeting Minutes 16 (10.26.17)

Continue Review of Unit Plans

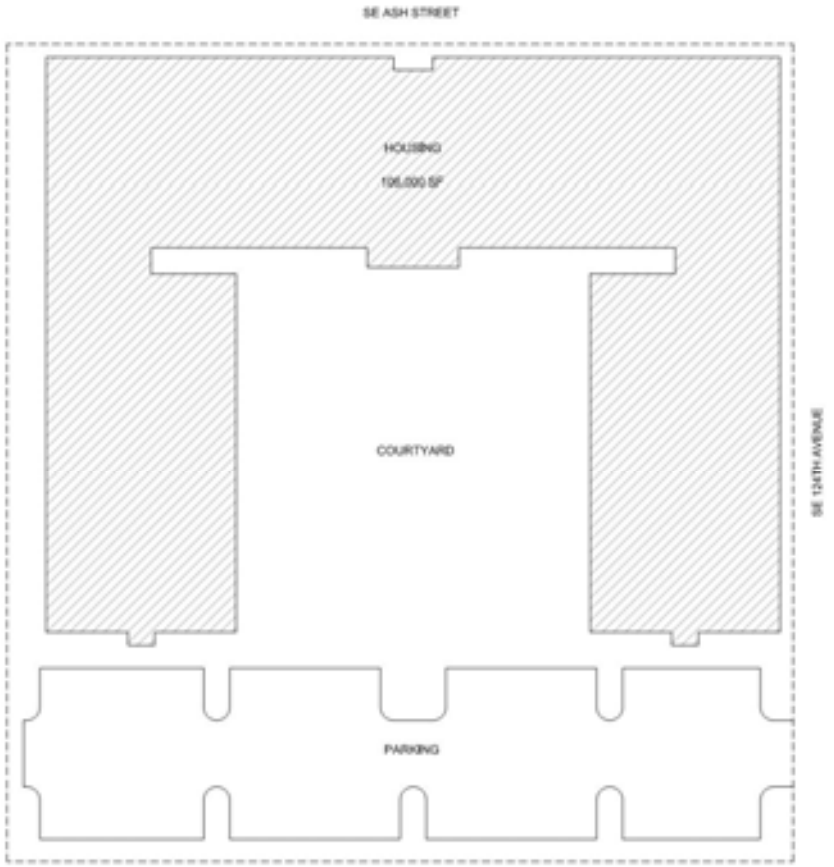
Specifications

- Narrative or Condensed Standard

Follow-up on Progress Review

- Architect
- Structural
- Civil
- Landscape
- GC

SE 124th & Ash - Site (East Portland)



SE 124TH & SE ASH

CEDC
Project

124th & Ash - Site Design Concept

NO. OF UNITS:	144
UNIT AREA:	81,856 SF
COMMON AREA:	24,000 SF
GROSS BUILDING AREA:	105,856 SF
GROSS BLDG. AREA / UNIT:	735 SF (37% REDUCTION FROM ORCHARDS I)
COMMON AREA / UNIT:	167 SF (37% REDUCTION FROM ORCHARDS I)
BUILDING EFFICIENCY:	78%
ENCLOSURE AREA:	76,064 SF
ENCLOSURE AREA / UNIT:	528 SF (40% REDUCTION FROM ORCHARDS I)
TOTAL COST (2017):	$18,676,174 (TARGET)
COST PER SF:	$176
COST PER UNIT:	$129,696 (19% REDUCTION FROM ORCHARDS I)

N

CEDC
Project

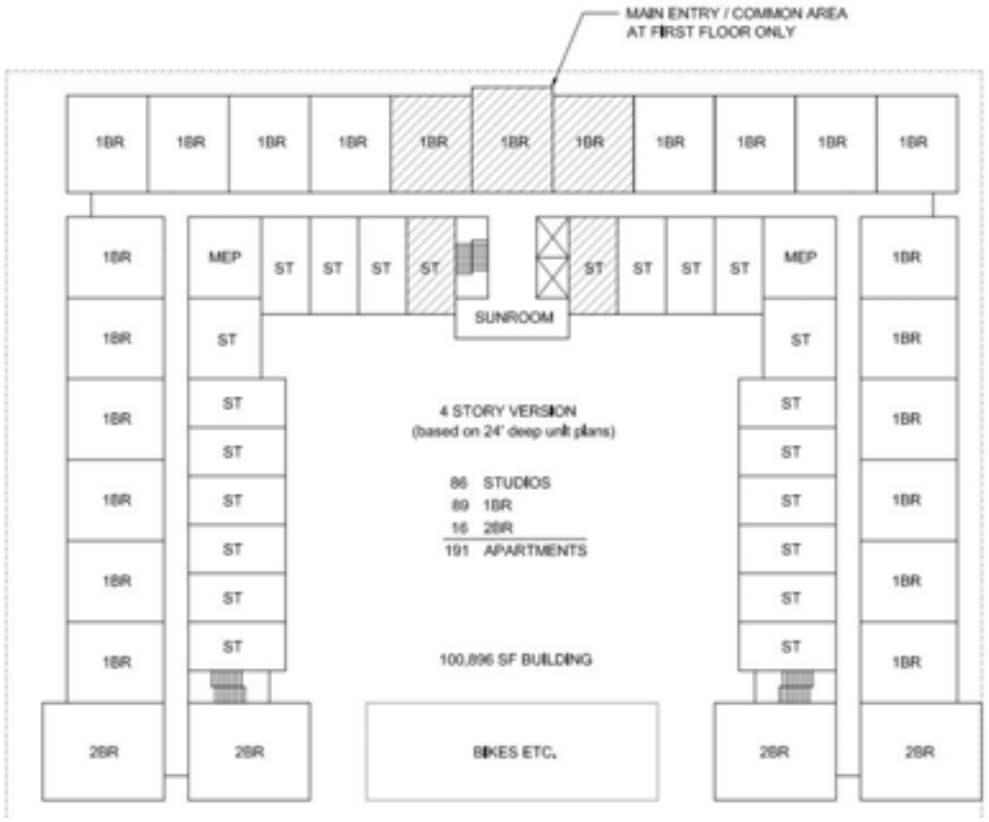
124th & Ash - Early Studies

NO. OF UNITS:	191
UNIT AREA:	83,576 SF
COMMON AREA:	21,000 SF
GROSS BUILDING AREA:	104,576 SF
GROSS BLDG. AREA / UNIT:	548 SF (46% REDUCTION FROM ORCHARDS I)
COMMON AREA / UNIT:	110 SF (58% REDUCTION FROM ORCHARDS I)
BUILDING EFFICIENCY:	80%
ENCLOSURE AREA:	76,064 SF
ENCLOSURE AREA / UNIT:	398 SF (55% REDUCTION FROM ORCHARDS I)
TOTAL COST (2017):	$18,450,344 (TARGET)
COST PER SF:	$176
COST PER UNIT:	$96,599 (40% REDUCTION FROM ORCHARDS I)

N

CEDC Project

124th & Ash (with smaller units)



NO. OF UNITS:	191
UNIT AREA:	79,704 SF
COMMON AREA:	21,192 SF
GROSS BUILDING AREA:	100,896 SF
GROSS BLDG. AREA / UNIT:	528 SF (45% REDUCTION FROM ORCHARDS I)
COMMON AREA / UNIT:	111 SF (58% REDUCTION FROM ORCHARDS I)
BUILDING EFFICIENCY:	80%
ENCLOSURE AREA:	72,424 SF
ENCLOSURE AREA / UNIT:	379 SF (57% REDUCTION FROM ORCHARDS I)
TOTAL COST (2017):	$17,757,696 (TARGET)
COST PER SF:	$176
COST PER UNIT:	$92,972 (42% REDUCTION FROM ORCHARDS I)

N

CEDC Project

124th & Ash (with 24’ deep units)

Efficiency Comparison

	Orchards I	Orchards II	124th & Ash A	124th & Ash B	124th & Ash C
Number of Units	57	58	144	191	191
Unit Area	42,628 SF	40,124 SF	81,856 SF	83,576 SF	79,704 SF
Common Area	15,112 SF	9,776 SF	24,000 SF	21,000 SF	21,192 SF
Gross Building Area	57,750 SF	49,900 SF	105,856 SF	104,576 SF	100,896 SF
Gross Building Area Per Unit	1,013 SF	860 SF	735 SF	548 SF	528 SF
Common Area Per Unit	265 SF	168 SF	167 SF	110 SF	111 SF
Building Efficiency	74%	80%	78%	80%	80%
Enclosure Area	50,050 SF	39,712 SF	76,064 SF	76,064 SF	72,424 SF
Enclosure Area Per Unit	878 SF	684 SF	528 SF	398 SF	379 SF
Total Construction Cost	$9,053,040	$8,531,624	$18,676,174*	$18,450,344*	$17,757,696*
Construction Cost Per SF	$158	$173	$176	$176	$176
Construction Cost Per Unit	$159,527**	$147,097 **	$129,696 **	$96,599**	$92,972**

*Target Cost for 124th & Ash schemes based on $176/SF

**Orchards I cost in 2014 dollars, Orchards II cost in 2015 dollars, 124th & Ash costs in 2016 dollars

Efficiency Comparison

	Orchards I	Orchards II	124th & Ash A	124th & Ash B	124th & Ash C
Number of Units	57	58	144	191	191
Unit Area	42,628 SF	40,124 SF	81,856 SF	83,576 SF	79,704 SF
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Gross Building Area	57,750 SF	49,900 SF	105,856 SF	104,576 SF	100,896 SF
Gross Building Area Per Unit	1,013 SF	860 SF	735 SF	548 SF	528 SF
Common Area Per Unit	265 SF	168 SF	167 SF	110 SF	111 SF
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Enclosure Area	50,050 SF	39,712 SF	76,064 SF	76,064 SF	72,424 SF
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Construction Cost Per SF	$158	$173	$176	$176	$176
Construction Cost Per Unit	$159,527**	$147,097 **	$129,696 **	$96,599**	$92,972**

*Target Cost for 124th & Ash schemes based on $176/SF

**Orchards I cost in 2014 dollars, Orchards II cost in 2015 dollars, 124th & Ash costs in 2016 dollars

Image Credit: Shapiro / Didway

124th & Ash - Site Plan

PLANS - LEVEL 1

GROUND FLOOR PLAN NOTES:

- RECESSED PORCH AT MAIN ENTRANCE
- ALL RESIDENT AMENITIES IN THE GROUND FLOOR
- 40 UNITS
- LAUNDRY ROOM WITH 11 TOP LOAD WASHERS, 12 STACKED DRYERS, 1 SINK AND TABLE
- TRASH ROOM AND RECYCLING AREA AT END OF SE CORRIDOR

STUDIO UNITS
1 BEDROOM UNITS
2 BED ROOM UNITS
COMMON AREAS
MEP/ TRASH

LEVEL 1
SCALE: 1" = 20'

Image Credit: Ankrom Moisan Architects

124th & Ash - First Floor Plan

Image Credit: Ankrom Moisan Architects

124th & Ash - Typical Floor Plan

UNIT PLANS

UNIT PLAN NOTES:

- PROVIDE BLOCKING AT WALL FOR FOLDABLE BIKE RACK, ONE LOCATION PER UNIT

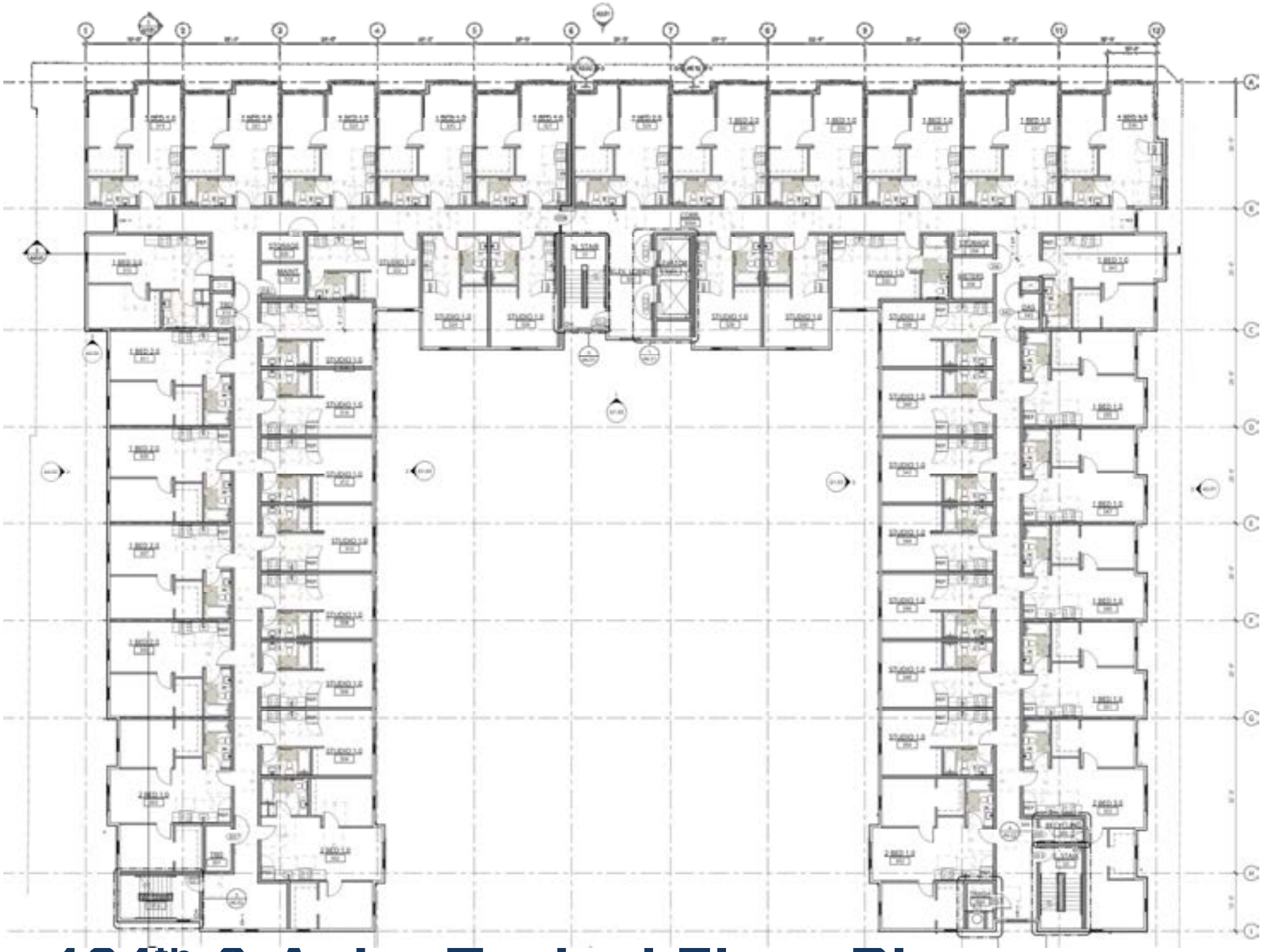
STUDIO A - 336 SF (78 UNITS)

1 BEDROOM A - 500 SF (56 UNITS)

SCALE: 1/4" = 1' - 0"

Image Credit: Ankrom Moisan Architects

124th & Ash - Typical Unit Plans



124th & Ash - Typical Floor Plan

Image Credit: Ankrom Moisan Architects

124th & Ash - Units (Living Rooms, Bedrooms, etc.)

Kit of Parts - Core & Shell

CEDC
Project

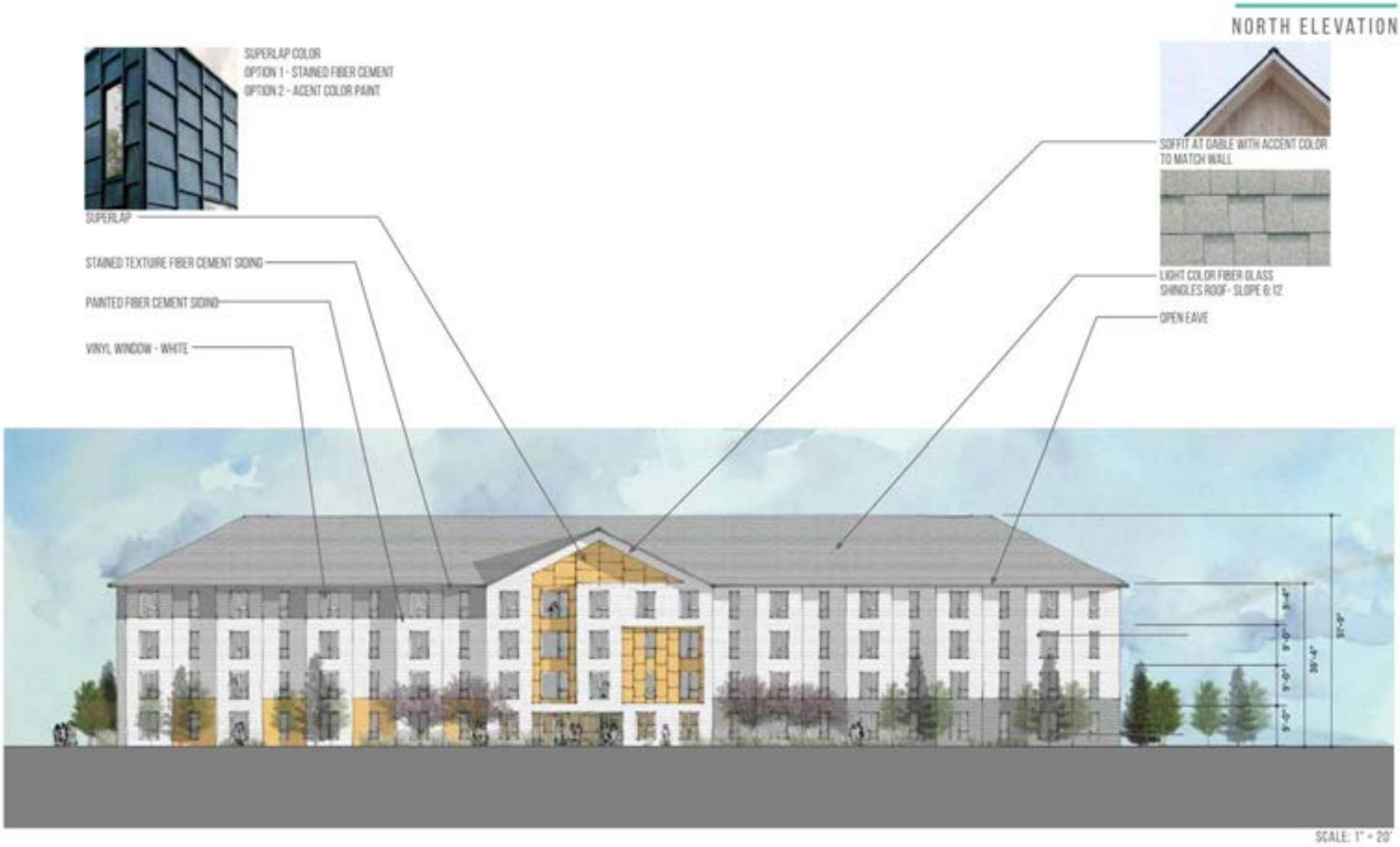
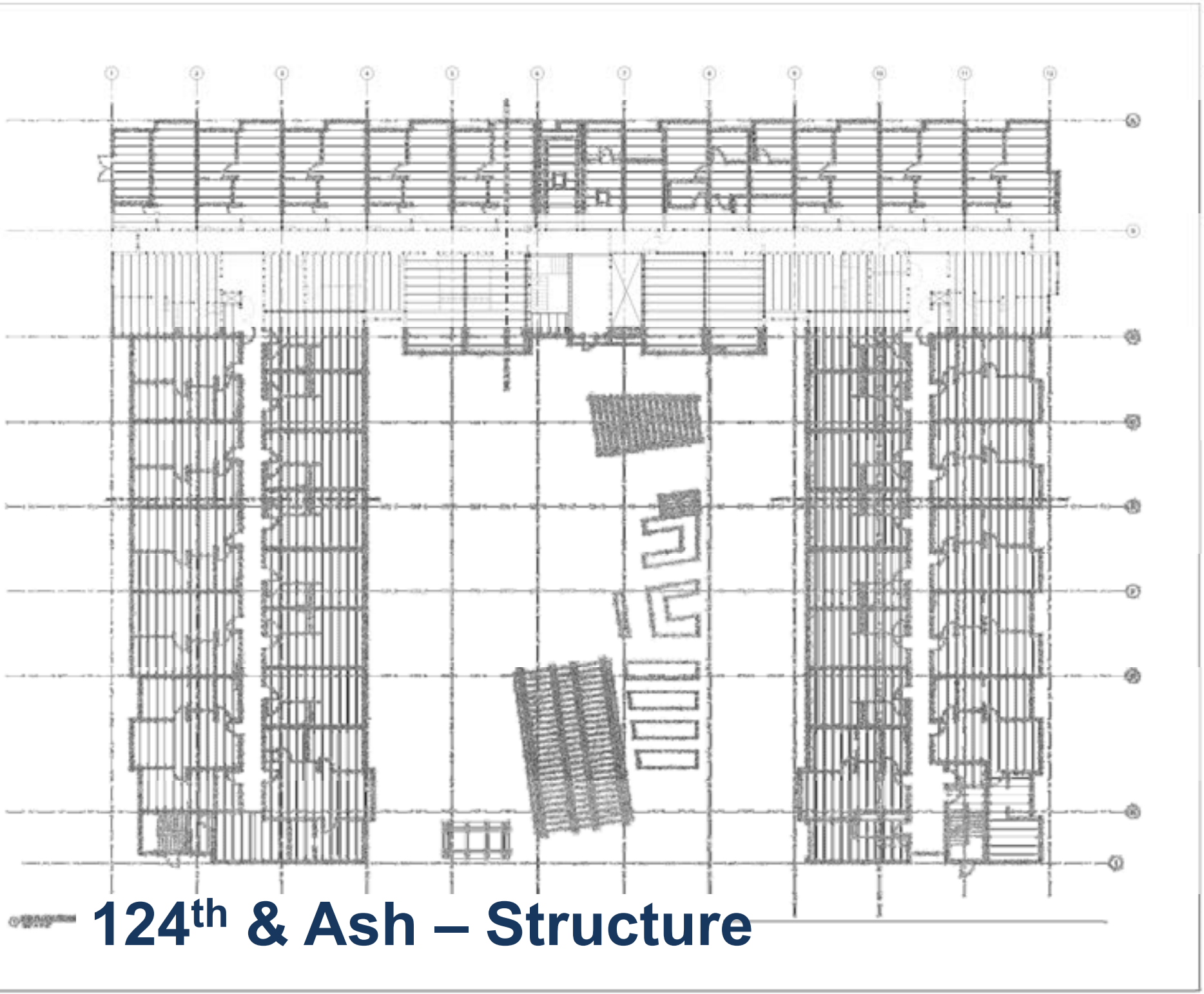
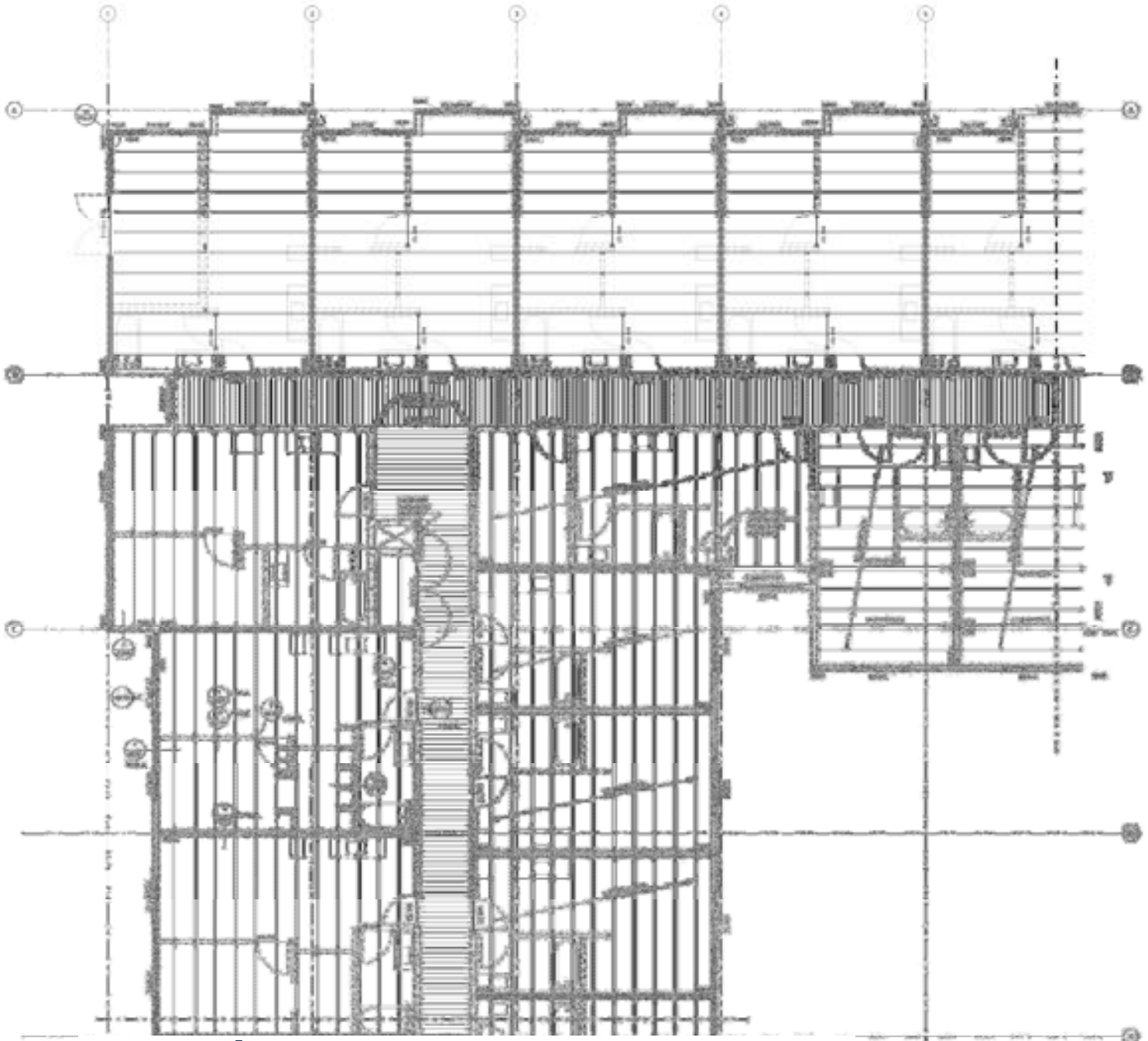


Image Credit: Ankrom Moisan Architects

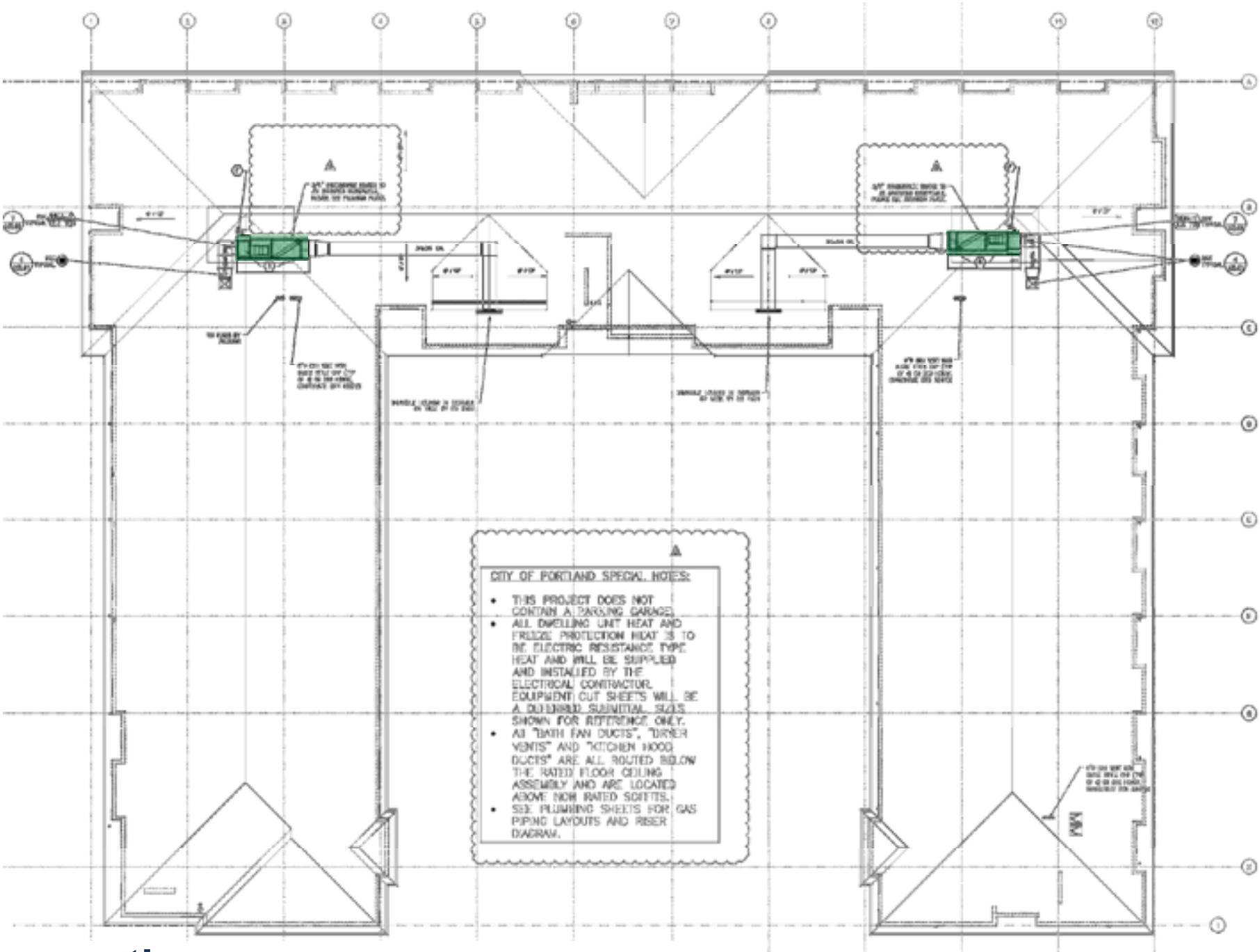
124th & Ash – Early Form Studies



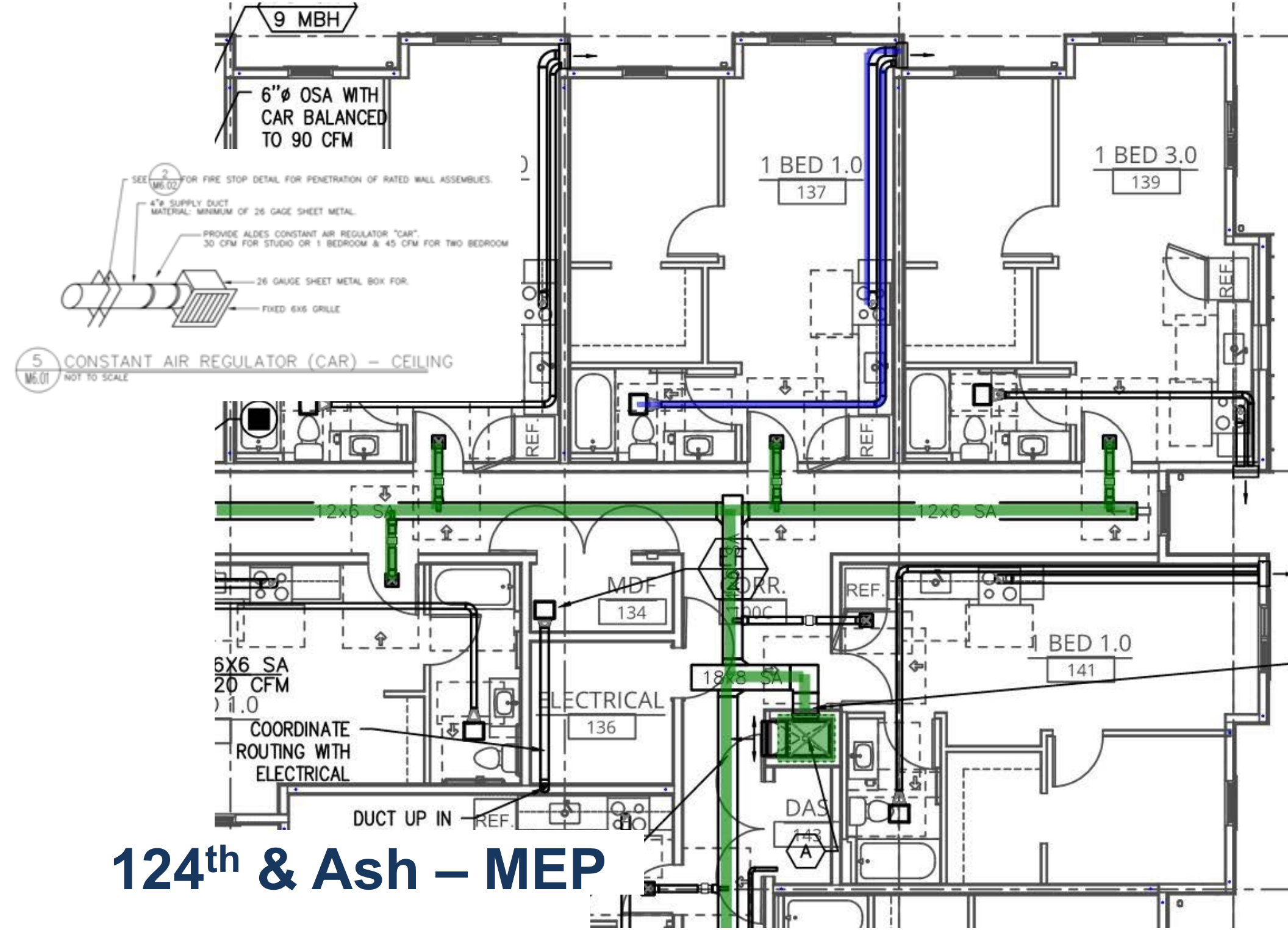
124th & Ash – Structure



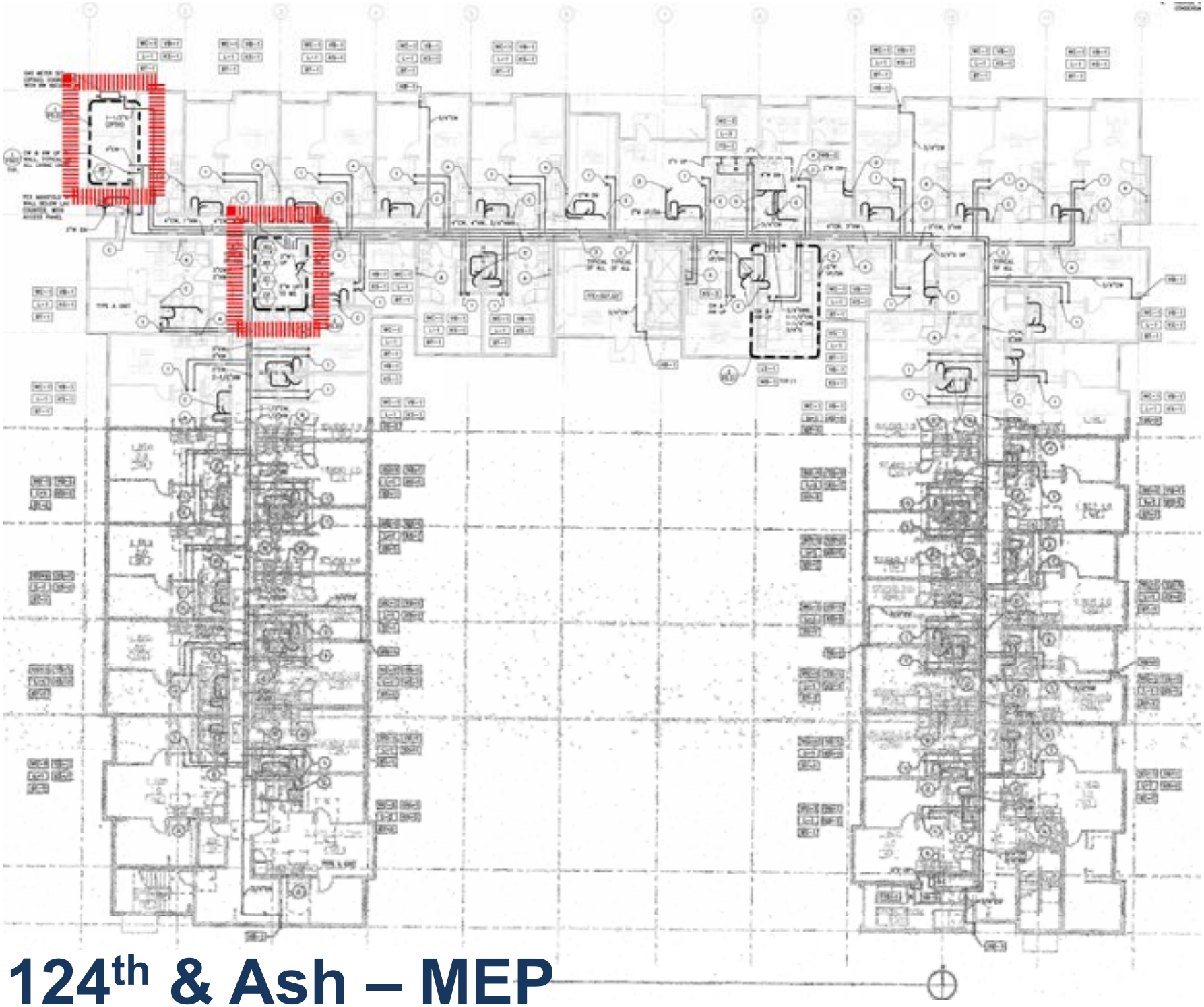
124th & Ash – Structure



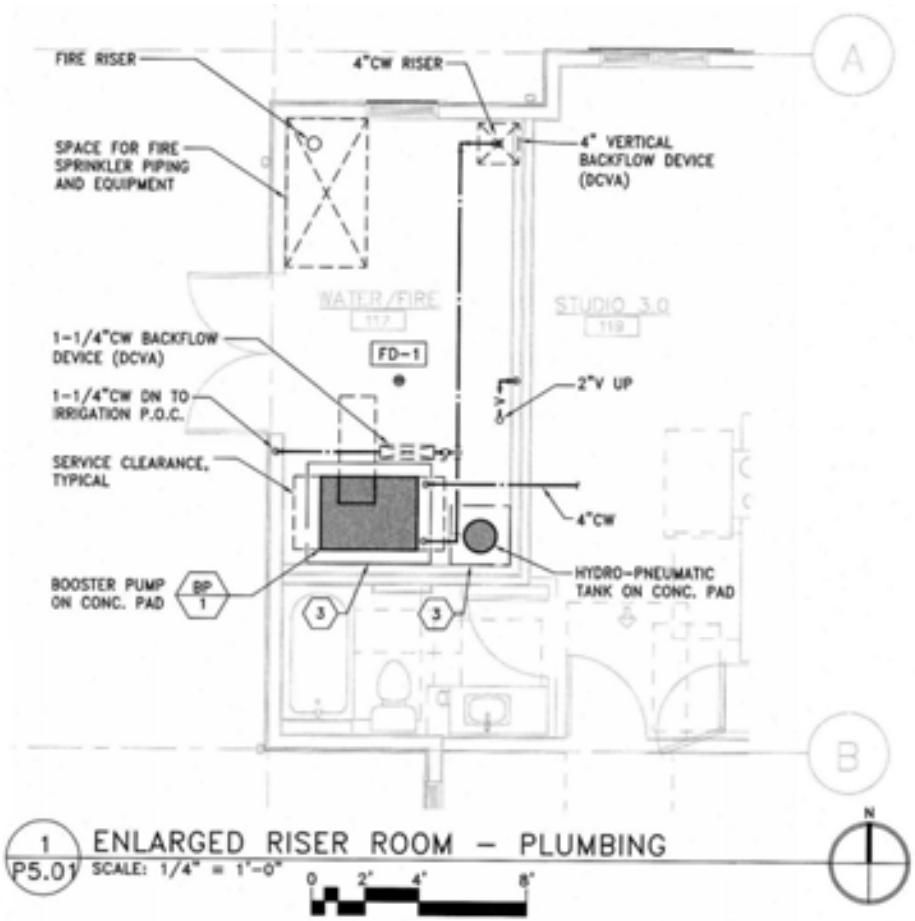
124th & Ash – MEP



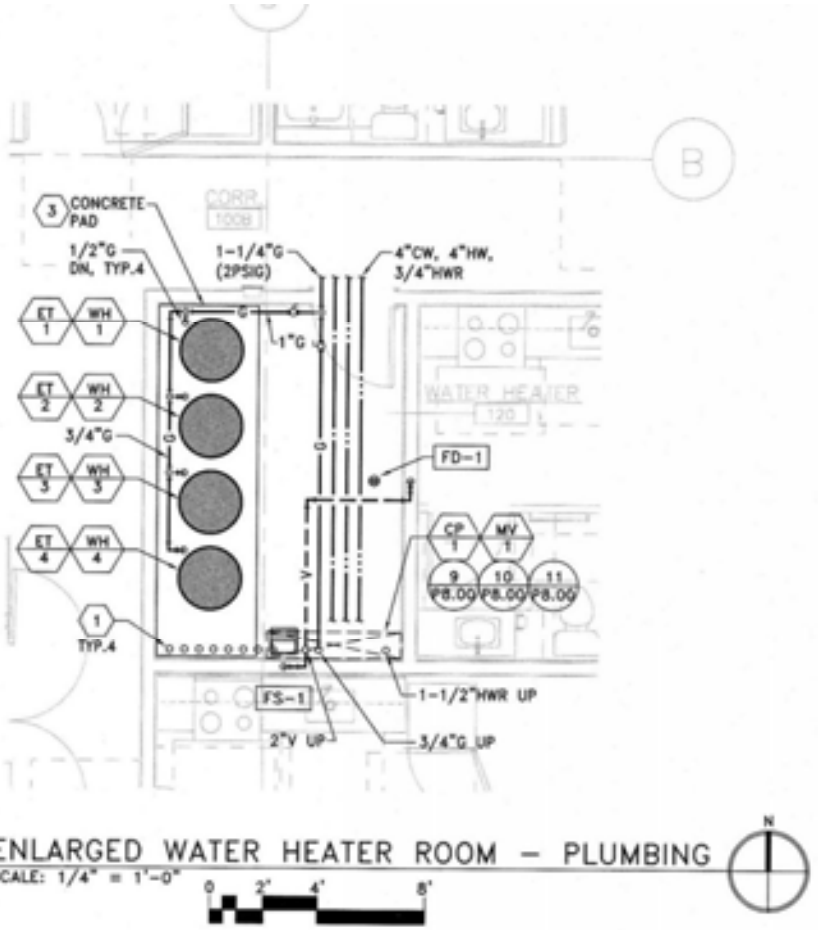
124th & Ash – MEP



124th & Ash – MEP



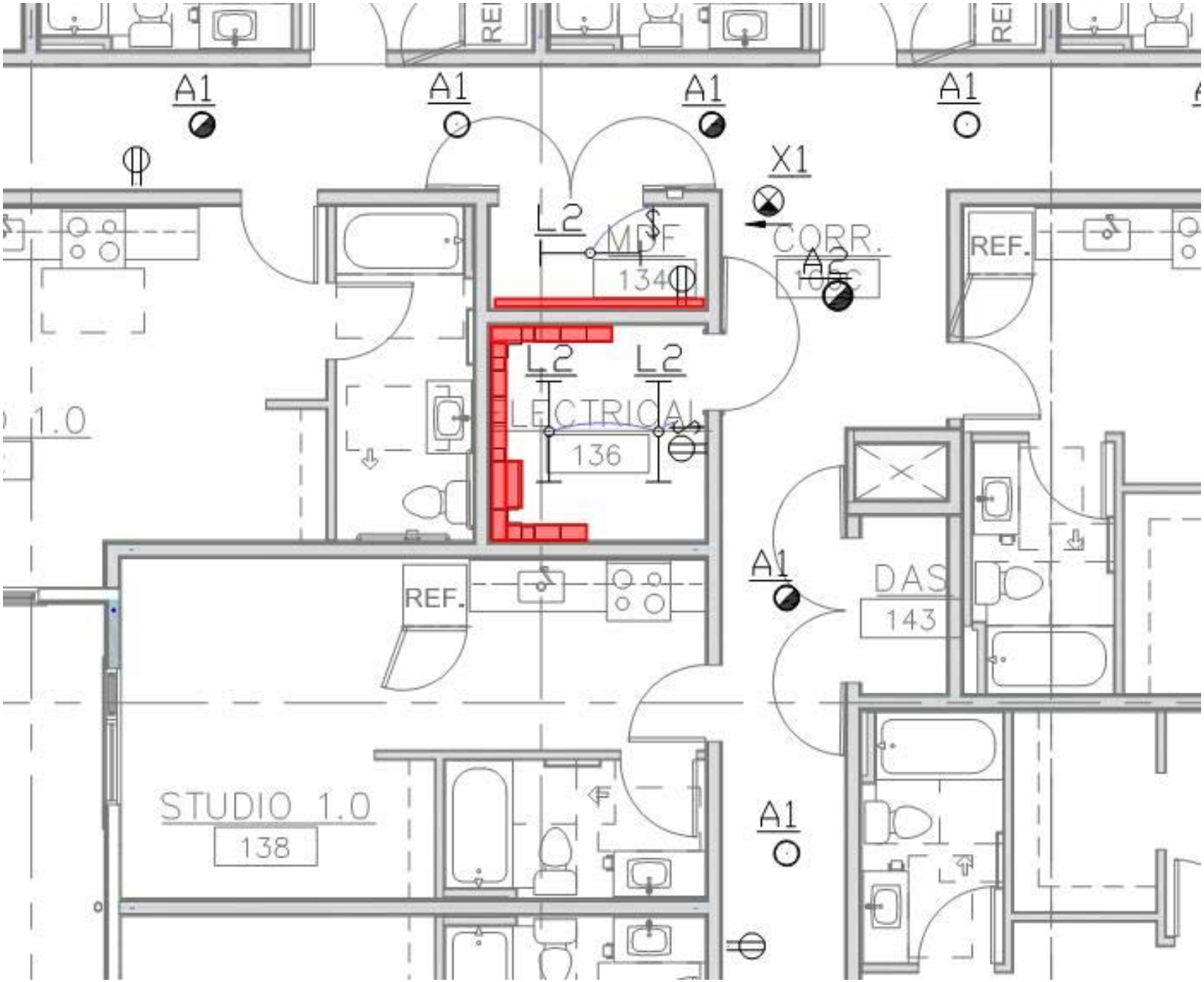
1 P5.01 ENLARGED RISER ROOM – PLUMBING
SCALE: 1/4" = 1'-0"



2 P5.01 ENLARGED WATER HEATER ROOM – PLUMBING
SCALE: 1/4" = 1'-0"

124th & Ash – MEP

124th & Ash – MEP



124th & Ash – MEP

124th & Ash – Current Status


39%
below target cost
124th & Ash
Construction cost: $111k/unit
Image Credit: Ankrom Moisan Architects

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)

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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

WALSH CONSTRUCTION CO.

Performance Upgrades → PH / ZE Ready

TARGET EUI = 15-23 kBtu/sf/yr

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

WALSH CONSTRUCTION CO.

124th & Ash - PH Feasibility Studies

WUFI®Passive

BUILDING INFORMATION

Category:	**Residential**
Status:	**In planning**
Building type:	**New construction**
Year of construction:	**2019**
Units:	**175**
Number of occupants:	**267 (Design)**

Boundary conditions

Climate: **OR - PORTLAND INTERNATIONAL AP (Monthly)**

Internal heat gains:	**1.2**	Btu/hr ft²
Interior temperature:	**68**	°F
Overheat temperature:	**77**	°F

Building geometry

Enclosed volume:	**932,758.5**	ft³
Net-volume:	**715,207**	ft³
Total area envelope:	**94,730.6**	ft²
AV ratio:	**0.1**	1/ft
Floor area:	**98,708**	ft²

PASSIVEHOUSE REQUIREMENTS

Certificate criteria: **PHIUS+ 2015 Standard**

Heating demand

specific:	**3.99**	kBtu/ft²yr
target:	**4.8**	kBtu/ft²yr
total:	393,761.98	kBtu/yr

Cooling demand

sensible:	**1.05**	kBtu/ft²yr
latent:	**0.01**	kBtu/ft²yr
specific:	**1.05**	kBtu/ft²yr
target:	**1.1**	kBtu/ft²yr
total:	103,945.48	kBtu/yr

Heating load

specific:	**2.42**	Btu/hr ft²
target:	**3.6**	Btu/hr ft²
total:	238,924.12	Btu/hr

Cooling load

specific:	**0.86**	Btu/hr ft²
target:	**3.9**	Btu/hr ft²
total:	84,443.11	Btu/hr

WUFI®Passive

Source energy

PHIUS+ Source Zero: NO

total:	**1,618,383.85**	kWh/yr
specific:	**6,061**	kWh/Person yr
target:	**6,200**	kWh/Person yr
total:	**5,521,609.85**	kBtu/yr
specific:	55.94	kBtu/ft²yr

Site energy

total:	2,245,501.64	kBtu/yr
specific:	22.75	kBtu/ft²yr
total:	658,156.53	kWh/yr
specific:	6.67	kWh/ft²

Air tightness

ACH50:	**0.4**	1/hr
CFM50 per envelope area:	**0.05**	cfm/ft²
target:	**0.4**	1/hr
target CFM50:	**0.05**	cfm/ft²

PASSIVEHOUSE RECOMMENDATIONS

HRV efficiency:	**75**	%
Frequency of overheating: Cooling system is required	**24**	%

esco energy systems consulting

WALSH CONSTRUCTION CO.

Enhanced Envelope / HRV / 18% FF / CI

PASSIVEHOUSE REQUIREMENTS

Certificate criteria: **PHIUS+ 2015 Standard**

Heating demand

specific:	**3.99**	kBtu/ft²yr
target:	**4.8**	kBtu/ft²yr
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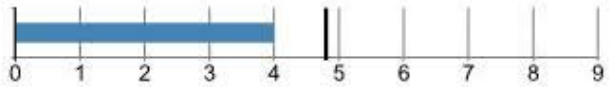

Cooling demand

sensible:	**1.05**	kBtu/ft²yr
latent:	**0.01**	kBtu/ft²yr
specific:	**1.05**	kBtu/ft²yr
target:	**1.1**	kBtu/ft²yr
total:	103,945.48	kBtu/yr

Heating load

specific:	**2.42**	Btu/hr ft²
target:	**3.6**	Btu/hr ft²
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specific:	**0.86**	Btu/hr ft²
target:	**3.9**	Btu/hr ft²
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Enhanced Envelope / HRV / 18% FF / CI

Source energy

PHIUS+ Source Zero: NO

total:	**1,618,383.85**	kWh/yr
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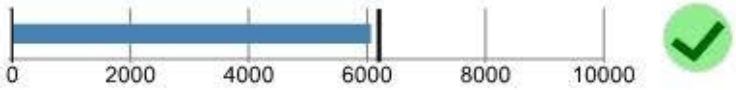

Site energy

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specific:	22.75	kBtu/ft²yr
total:	658,156.53	kWh/yr
specific:	6.67	kWh/ft²

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ACH50:	**0.4**	1/hr
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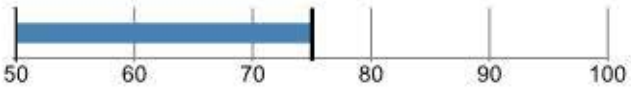
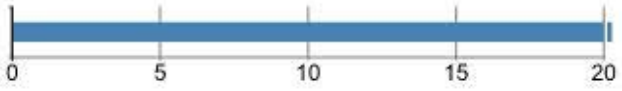
target:	**0.4**	1/hr
target CFM50:	**0.05**	cfm/ft²

PASSIVEHOUSE RECOMMENDATIONS

HRV efficiency:	**75**	%
Frequency of overheating: Cooling system is required	**24**	%





Frequency of overheating only applies if there is not a [properly sized] cooling system installed.

Performance Upgrades → PH / ZE Ready

$19,487,763 x .05 = $974,388 budget

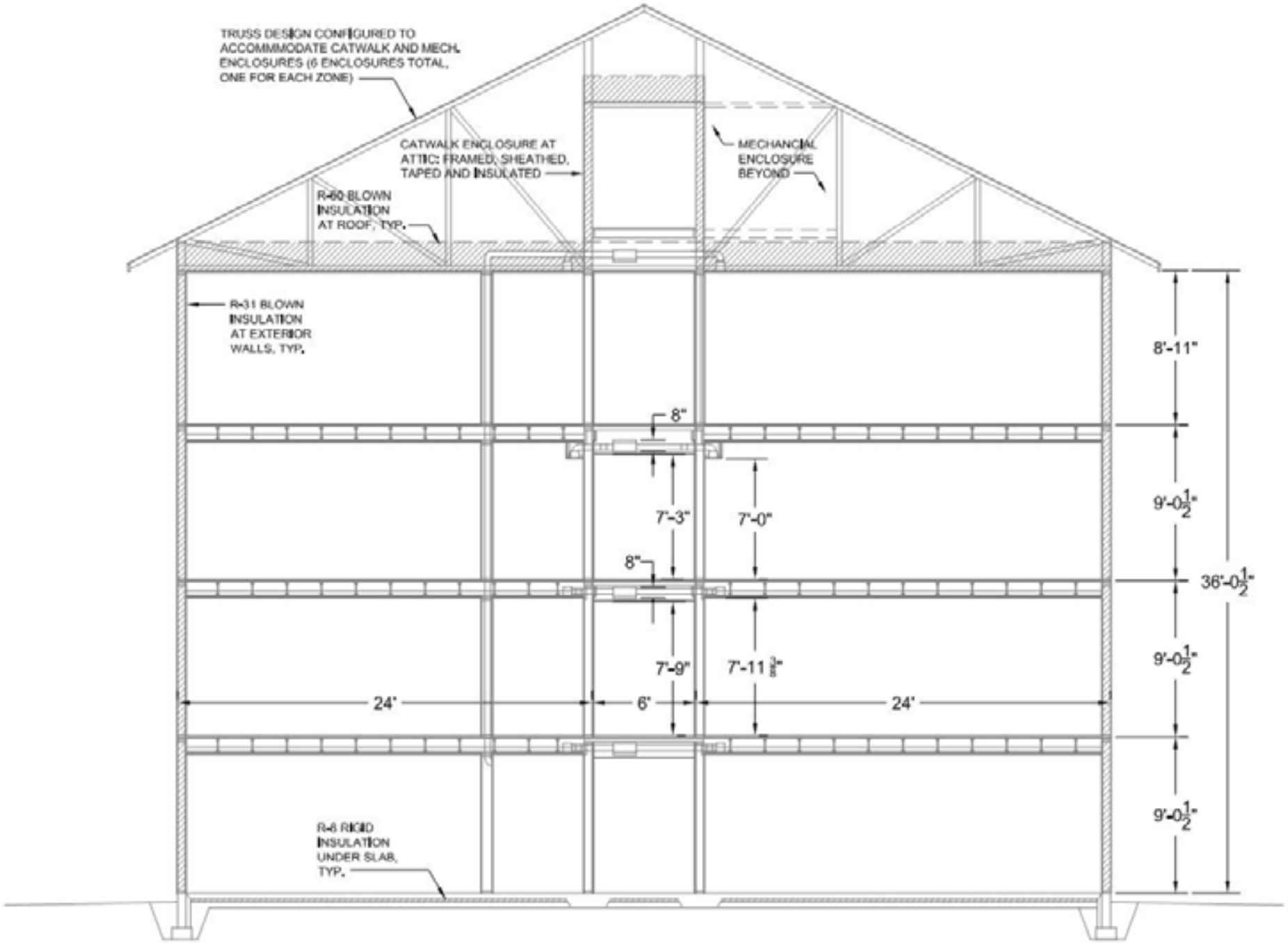
TARGET EUI = 15-23 kBtu/sf/yr

$6k/unit

- Balanced ventilation system
  $0 (already in)
- 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)**

WALSH CONSTRUCTION CO.



124th & Ash - Ventilation Routing Concept

Performance Upgrades → PH / ZE Ready

$19,487,763 x .05 = $974,388 budget

TARGET EUI = 15-23 kBtu/sf/yr

$8k/unit

- Balanced ventilation system
  $0 (already in) → + $260,000
- Heat recovery at ventilation
  $440,000 ($280k HRVS, $130k "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, 28k walls, 78k ci, 17k roof, 33k slab) → + $28,000
- Lighting: (LED fixtures, lighting controls)
  $0 (already in) → + $40,000
- 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/refrigerator x 175 refrigerators)
  $32,000 (elevators - $4k/stop)

$967,000 + 328,000 = 1,293,000 **(6.6% premium)**

WALSH CONSTRUCTION CO.

Performance Upgrades → PH / ZE Ready

$19,487,763 x .05 = $974,388 budget

TARGET EUI = 15-23 kBtu/sf/yr

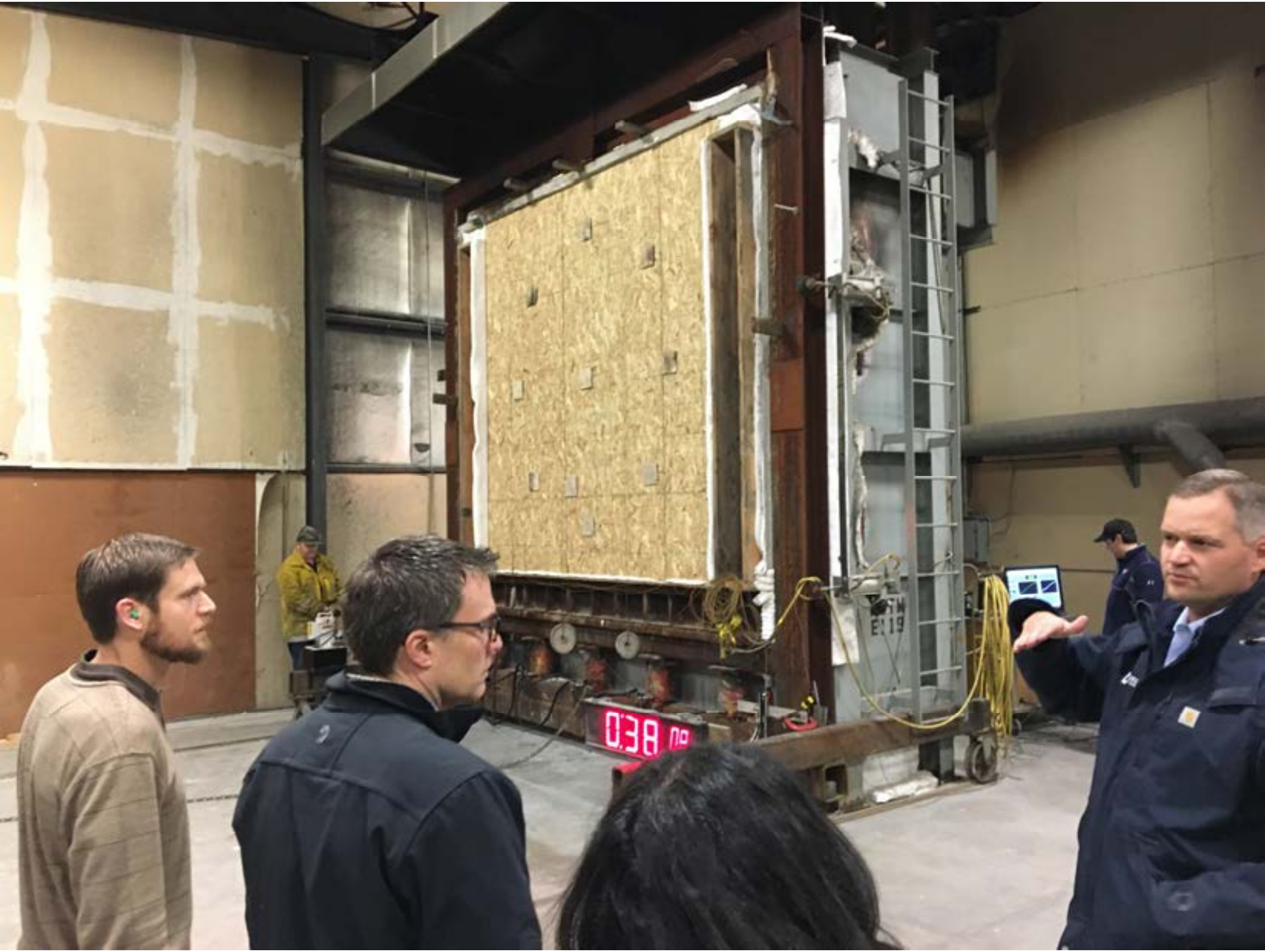
$15k/unit

- Balanced ventilation system
  $0 (already in) → + $260,000
- Heat recovery at ventilation
  $440,000 ($280k HRVS, $130k "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, 28k walls, 78k ci, 17k roof, 33k slab) → + $28,000
- Lighting: (LED fixtures, lighting controls)
  $0 (already in) → + $40,000
- 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/refrigerator 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

WALSH CONSTRUCTION CO.

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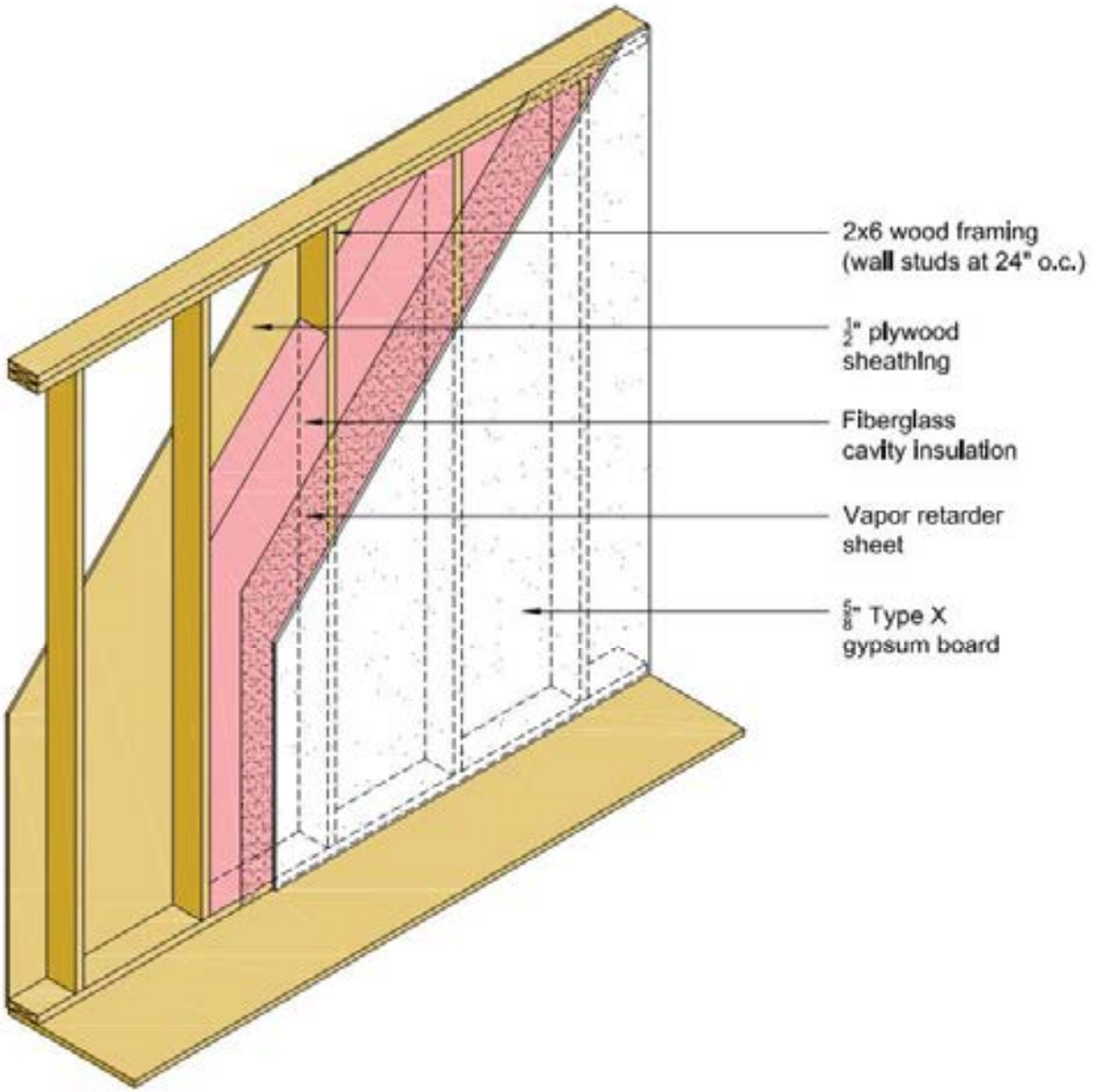


One Hour Rated Advanced Framed Exterior Wall

CEDC
Project

Design for Code Acceptance

3

Fire-Resistance-Rated Wood-Frame Wall and Floor/Ceiling Assemblies

Building Code Requirements

For occupancies such as stores, apartments, offices, and other commercial and industrial uses, building codes commonly require floor/ceiling and wall assemblies to be fire-resistance rated in accordance with standard fire tests. This document is intended to aid in the design of various wood-frame walls and wood-frame floor/ceiling assemblies, where such assemblies are required by code to be fire-resistance-rated.

Depending on the application, wall assemblies may need to be fire-resistance-rated for exposure from either one side or both sides. Exterior walls are required to be rated for both interior and exterior fire exposure where the wall has a fire separation distance of 10 feet or less. For exterior walls with a fire separation distance of greater than 10 feet, the required fire-resistance-rating applies only to exposure from the interior. The designer should note that some state and local building code amendments may require fire resistance rating for exposure from both sides of exterior walls, regardless of fire separation distance; however, the solutions and example details provided in this document are based on compliance with national model building codes.

Code recognition of one and two-hour wood-frame wall systems is also predicated on successful fire and hose stream testing in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction Materials*.

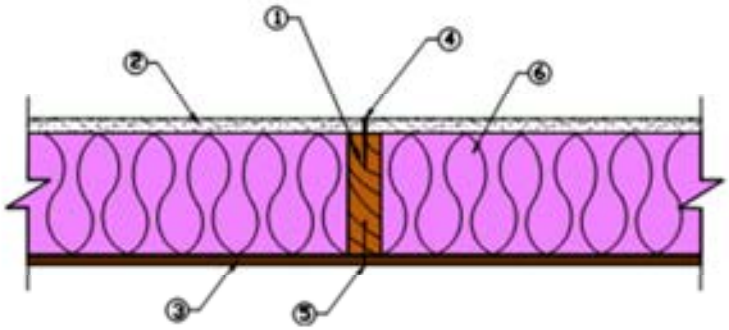
Fire Tested Assemblies

Fire-resistance-rated wood-frame assemblies can be found in a number of sources including the *International Building Code (IBC)*, Underwriters Laboratories (UL) *Fire Resistance Directory*, Intertek Testing Services' *Directory of Listed Products*, and the Gypsum Association's *Fire Resistance Design Manual* (GA 600). The American Wood Council (AWC) and its members have tested a number of wood-frame fire-resistance-rated assemblies (see photos). Descriptions of successfully tested lumber wall assemblies are provided in Table 1 for one-hour fire-resistance-rated wall assemblies and Table 2 for two-hour fire-resistance-rated wall assemblies. Lumber shall be identified by the grade mark of a lumber grading or inspection agency that has been approved by an accreditation body that complies with the *American Softwood Lumber Standard (PS 20)*. The fire-resistance-rated assemblies described in this document, as well as those listed in other sources are not species- or grade-specific unless specifically noted as such.

Descriptions of successfully tested I-joist floor assemblies are provided in Table 3 for one-hour fire-resistance-rated floor/ceiling assemblies and Table 4 for two-hour fire-resistance-rated floor/ceiling assemblies. I-joists are required to comply with ASTM D5055, *Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists*.

WS6-1.6 One-Hour Fire-Resistance-Rated Wood-Frame Wall Assembly (Rated from gypsum wallboard side)

2x6 Wood Stud Wall – 100% Design Load – ASTM E 119/NFPA 251



1. Framing - Nominal 2x6 wood studs, spaced 24 in. o.c., double top plates, single bottom plate
2. Interior Sheathing - 5/8 in. Type X gypsum wallboard, 4 ft. wide, applied vertically. All panel edges backed by framing or blocking.
3. Exterior Sheathing - Minimum 15/32 in. wood structural panels, applied vertically, horizontal joints blocked
4. Gypsum Fasteners - 2-1/4 in. #6 Type S drywall screws, spaced 7 in. o.c.
5. Panel Fasteners - 6d common nails (bright) - 12 in. o.c. in the field, 6 in. o.c. panel edges
6. Insulation - minimum R-19 fiberglass insulation
7. Joints and Fastener Heads - Wallboard joints covered with paper tape and joint compound, fastener heads covered with joint compound

Tests conducted at Western Fire Center
Test No: WFCi Report #18090r1 (Fire Endurance & Hose Stream) February 22, 2019

Third Party Witness: Western Fire Center, Inc.

This assembly was tested at 100% design load, calculated in accordance with the 2018 *National Design Specification® for Wood Construction*. The authority having jurisdiction should be consulted to assure acceptance of this report.

Image Credit: American Wood Council

Glisan Gateway

Image Credit: MWA Architects

Glisan Gateway Workforce Housing

- Developer/ Owner: Northwest Housing Alternatives
- Architect: MWA Architects
- Contractor: Walsh Construction Co.

- New construction project in NHA pipeline
- Awarded MMT grant to support innovation in production of cost efficient affordable housing
- Programmed for 120-160 units (final unit count is 159)

WALSH CONSTRUCTION CO.

- Low scale residential
- Low scale commercial
- Density changing with new mixed use
- Low visibility from 205 for our site
- Heavy car traffic
- Not pedestrian friendly
- Culturally diverse neighborhood

Images Credit: MWA Architects

Glisan Gateway - Site (East Portland)

Glisan Gateway - Initial Site Concepts

2 LEVEL 2-4 FLOOR PLAN OPT 1
SCALE: 1" = 20'-0"

1 GROUND FLOOR PLAN OPT 1
SCALE: 1" = 20'-0"

Image Credit: MWA Architects

Glisan Gateway - Plan Development

Glisan Gateway - Budget Challenges

- City Requirements / Enhancements
  - Street dedication along NE Glisan
  - Bikeway (10 foot width along east property line) with pavement, landscape and lighting features
- Design Review (Portland Design Commission)
  - Tall first floor (12 feet clear to structure) at Glisan Street frontage…to accommodate potential commercial uses
  - Premium cladding materials at exterior
  - Landscape treatment / detailing at street and bikeway frontages

WALSH CONSTRUCTION CO.

Image Credit: MWA Architects

ILLUSTRATIVE SITE PLAN

NHA GLISAN HOUSING NE 99TH AVE & NE GLISAN ST, PORTLAND, OR 97217 DESIGN REVIEW APPLICATION 6/26/18 LU 18-177124 DZ mwa architects

Glisan Gateway - First Floor Plan

Image Credit: MWA Architects

Glisan Gateway - Typical Floor Plan

Image Credit: MWA Architects

Glisan Gateway - Typical Unit Plans

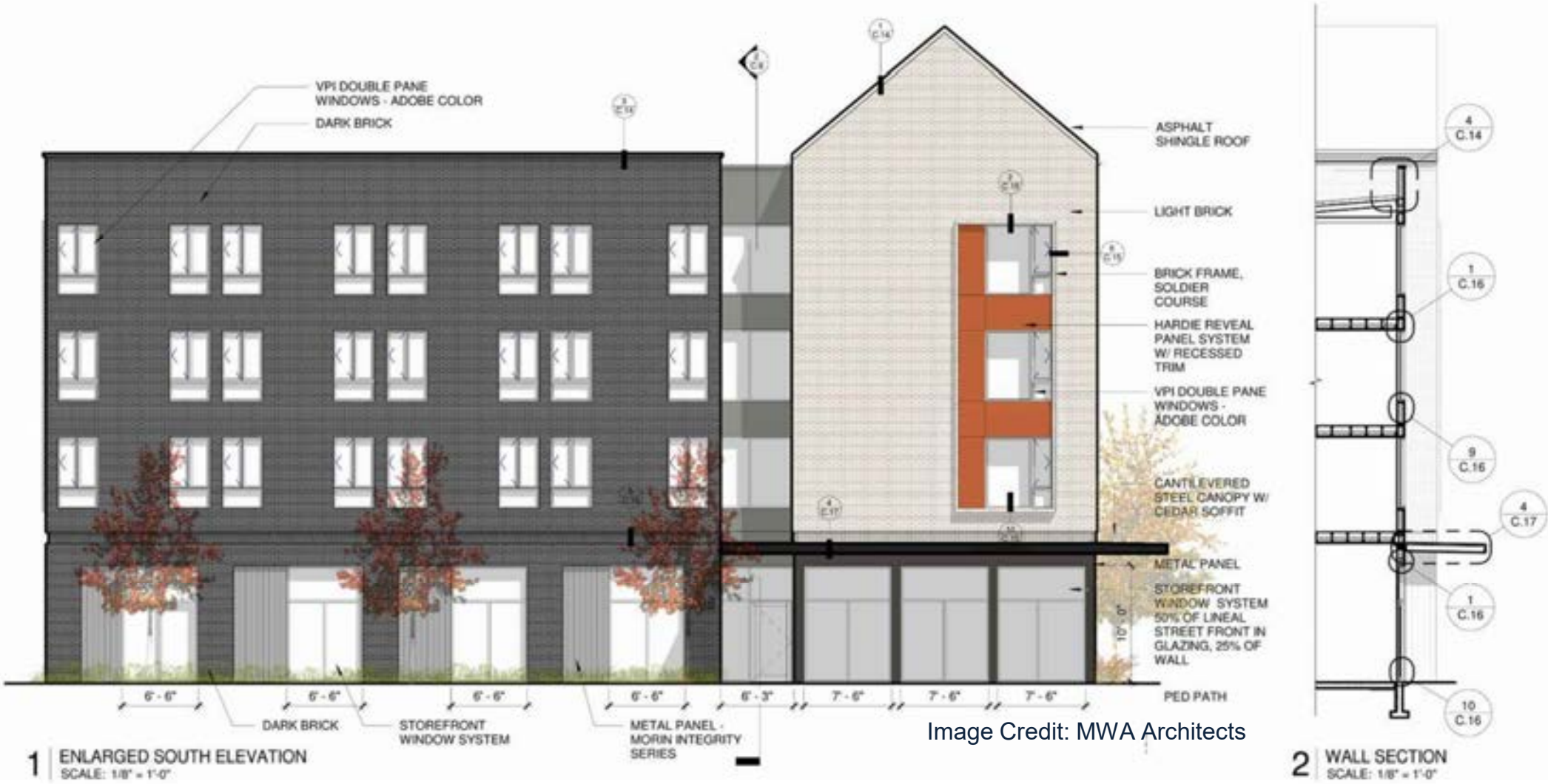


Image Credit: MWA Architects

Glisan Gateway - Elevation & Section

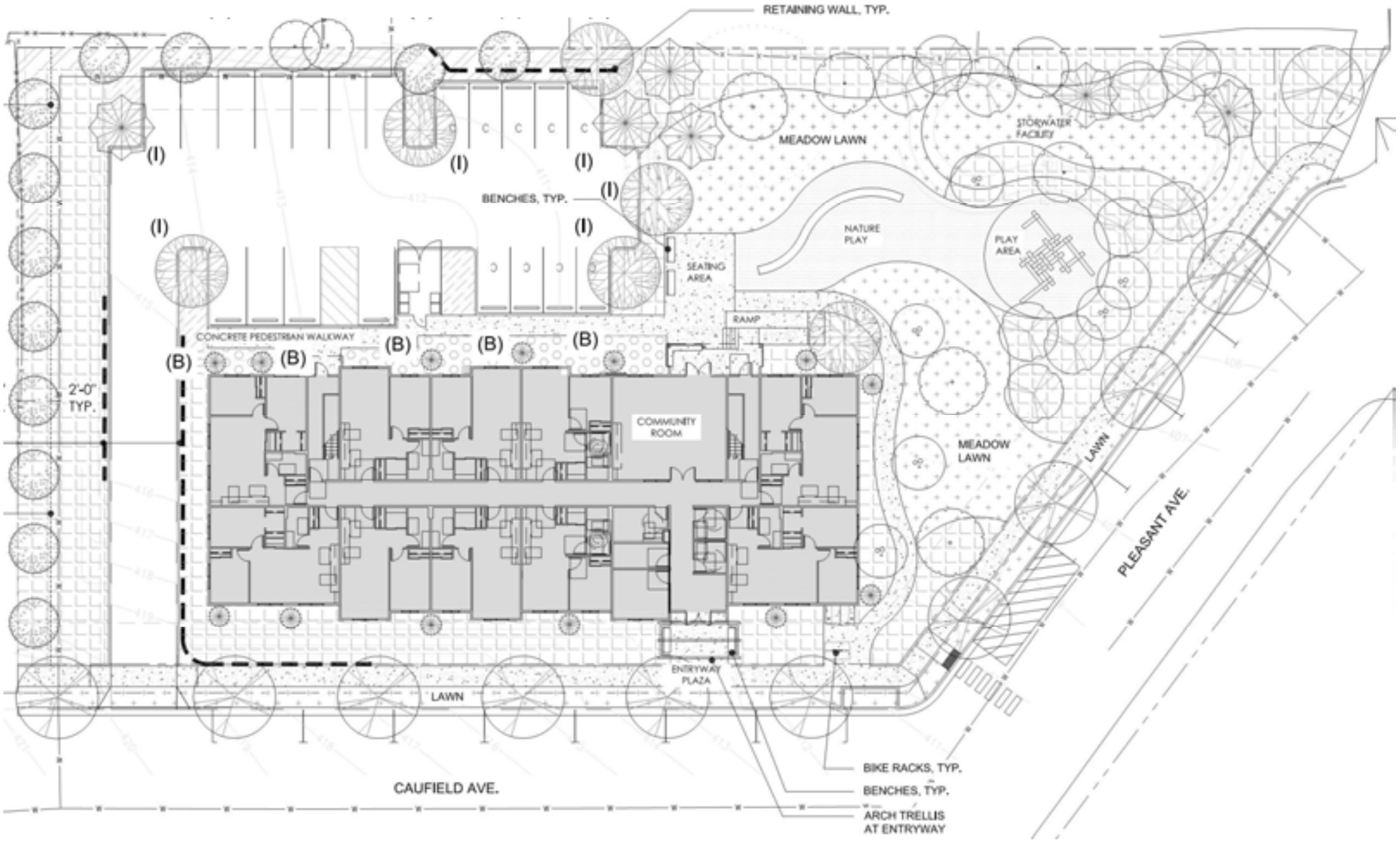
Image Credit: MWA Architects

Glisan Gateway - Bird’s Eye View

Glisan Gateway

Construction cost: $123k/unit

Image Credit: MWA Architects



Pleasant Avenue - Site (Oregon City)

Image Credit: KASA Architects

Construction cost: $179k/unit

Pleasant Avenue

WALSH CONSTRUCTION CO.

Portland Area Affordable Housing Pipeline

Affordable Housing Project Pipeline - Portland Metro Area
2016-2019

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	HCC/Bedroom	Construction Type	Start Date	Prevailing Wage
Low Income Single Adult Hsg	TPI	HOLST	Walsh	24,600	72	72	$11,597,968.00	$161,082.89	$161,082.89	$7,433,507.00	$302.18	$103,243.15	$103,243.15	3 story wood	Mar. '19	BOLI
124th & Ash	REACH	AMA	Walsh	98,822	175	190	$28,337,287.00	$161,927.35	$149,143.62	$19,367,463.00	$195.98	$110,671.22	$101,934.02	4 story wood	Jun. '19	No
Gateway Housing	NHA	MWA	Walsh	91,554	159	165	$28,050,765.00	$176,418.78	$170,001.61	$20,039,403.00	$218.88	$126,033.98	$121,450.93	4 story wood	Jan. '19	D-B
Stark Street Apartments*	CCC	AMA	Team	92,067	153	214	$29,197,817.00	$190,835.41	$136,438.40	$20,484,012.00	$222.49	$133,882.43	$95,719.68	4 story wood	Nov. '17	D-B
Interstate Apartments*	CCC	Circosta	Silco	30,823	51	68	$9,756,805.00	$191,309.90	$143,482.43	$5,991,815.00	$194.39	$117,486.57	$88,114.93	4 story wood	Nov. '17	No
Eastside Campus Apartments*	CCC	AMA	Walsh	63,045	124	124	$24,629,280.00	$198,599.03	$198,599.03	$18,238,194.00	$289.29	$147,082.21	$147,082.21	4 story wood / 2 story conc	Nov. '17	BOLI
St. Francis Park Apartments*	Catholic Charities	MWA	OWCB	74,005	106	107	$23,250,483.00	$219,344.18	$217,294.23	$14,291,211.00	$193.11	$134,822.75	$133,562.72	3 story wood / 1 story conc	Feb. '16	D-B
Alphabet District Housing	NHA	CHA	Bremik	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	$107,675.79	4 story wood	Aug. '18	?
72nd & Foster*	REACH	HOLST	LMC	79,549	101	131	$24,356,329.00	$241,151.77	$185,926.18	$16,272,959.00	$220.83	$161,118.41	$124,221.06	3 story wood / 1 story conc	Sep. '17	BOLI
Willow Creek Crossing Apts	GSL	TVA	Walsh	98,294	120	131	$29,744,546.00	$247,871.22	$227,057.60	$21,640,053.00	$220.16	$180,333.78	$165,191.24	5 story wood / 1 story conc	Aug. '18	BOLI
New Meadows*	Bridge Meadows	CHA	Walsh	10,700	15	15	$3,850,183.00	$256,678.87	$256,678.87	$2,415,500.00	$225.75	$161,033.33	$161,033.33	2 story wood	Sep. '17	No
Red Rock Creek Commons	CPAH	CHA	?	?	48	48	$12,954,501.00	$269,885.44	$269,885.44	?	?	?	?	?	?	?
Argyle Apartments*	REACH	MWA	Walsh	153,998	189	272	$51,758,869.00	$273,856.45	$190,289.96	$35,962,337.00	$233.52	$190,276.92	$132,214.47	4 story wood / 1 story conc	Jan. '19	No
Hill Park Apartments*	CCC	CHA	Colas	25,384	39	39	$10,840,188.00	$277,953.54	$277,953.54	$6,538,253.00	$242.00	$167,647.00	$167,647.51	3 story wood	Apr. '16	No
Isabella Court - Phase II	REACH	MWA	Team	47,679	49	64	$13,909,492.00	$283,867.18	$217,335.81	$9,152,253.00	$191.96	$186,780.67	$143,003.95	4 story wood	Sep. '18	?
Orchards at Orenco - Phase III	REACH	AMA	Walsh	62,771	52	123	$14,820,447.00	$285,008.60	$120,491.44	$10,318,405.00	$164.38	$198,430.87	$83,889.47	3 story wood	Oct. '17	No
Pleasant Ave Veterans Housing	NHA	KASA	Walsh	18,040	24	32	$7,077,430.00	$294,892.92	$221,169.69	$4,430,308.00	$245.58	$184,596.17	$138,447.13	2 story wood	Oct. '18	D-B
Magnolia Apartments - Phase II	IHI	CHA	Bremik	?	50	93	$15,126,249.00	$302,524.98	$162,647.84	?	?	?	?	3 story wood / 1 story conc	Nov. '18	?
91st & Foster*	Prosper Portland	Hacker	Bremik	?	54	78	$16,565,025.00	$306,759.72	$212,372.12	?	?	?	?	3 story wood / 1 story conc	Feb. '17	?
Block 45*	Home Forward	LRS	OWCB	186,000	240	283	$73,770,121.00	$307,375.50	$260,671.81	$47,831,797.00	$257.16	$199,299.15	$169,016.95	12 story concrete	Jan. '18	BOLI
Beatrice Morrow*	PCRI	CHA	Colas	?	80	132	$25,131,244.00	$314,140.55	$190,388.21	$18,526,938.00	$294.09	$231,586.73	$140,355.59	4 story wood / 1 story conc	May '17	?
Oliver Station*	Palindrome	AMA	Urban Edge	?	126	204	$40,011,635.00	$317,552.66	$196,135.47	?	?	?	?	4 story wood / 1 story conc	Nov. '16	?
106 Halsey*	Human Solutions	HOLST	LMC	?	40	47	$12,946,427.00	$323,660.68	$275,455.89	?	?	?	?	3 story wood / 1 story conc	?	?
Cedar Grove	CPAH	CHA	LMC	?	44	58	$14,321,892.00	$325,497.55	$246,929.17	?	?	?	?	4 story wood	?	?
The Jade*	ROSE	SERA	OWCB	47,798	48	66	$15,660,784.00	$326,266.33	$237,284.61	$11,831,841.00	$247.53	$246,496.27	$179,262.74	5 story wood / 1 story conc	Jan. '18	BOLI
Meriwether Place	VHA	ENV	Walsh	24,708	30	30	$9,900,000.00	$330,000.00	$330,000.00	$5,947,648.00	$240.72	$198,254.93	$198,254.93	4 story wood	Jul. '17	BOLI
Woody Guthrie Apartments*	ROSE	CHA	Walsh	60,878	64	90	$21,551,152.00	$336,736.75	$239,457.24	$14,374,848.00	$236.13	$224,607.00	$159,720.53	4 story wood	Mar. '18	D-B
King Park Apartments*	PCRI	Merryman	Colas	?	70	132	$23,946,973.00	$342,099.61	$181,416.46	?	?	?	?	3 story wood / 1 story conc	?	?
NHA Campus Housing	NHA	MWA	OWCB	30,201	28	57	$10,620,846.00	$379,315.93	$186,330.63	$8,778,600.00	$290.67	$313,521.43	$154,010.53	3 story wood	May '18	D-B
14th & Raleigh*	IHI	LRS	Bremik	?	93	188	$35,842,665.00	$385,405.00	$190,652.47	$24,689,479.00	$315.29	$265,478.27	$131,327.02	12 story concrete	Nov. '17	BOLI
North Williams*	BRIDGE	AMA	Colas	?	61	129	$23,635,556.00	$387,468.13	$183,221.36	?	?	?	?	3 story wood / 1 story conc	?	?
Riverplace Parcel 3*	BRIDGE	AMA	Hoffman	?	203	260	$79,695,058.00	$392,586.49	$306,519.45	$56,907,984.00	$283.87	$280,334.90	$218,876.86	5 story wood / 1 story conc	Feb. '18	BOLI
				Total units =	3121											

Notes:

Projects are sorted based on Total Development Cost Per Unit. Lowest cost per unit at top of sheet, highest cost per unit at bottom of sheet.

Project data has been gathered internally at WALSH or has been gathered from documents in the public domain issued by Portland Housing Bureau (PHB), Oregon Housing and Community Services (OHCS), or Washington State Department of Commerce.

Projects involving Walsh Construction Co. (WCC) or O'Neill/Walsh Community Builders (OWCB) are highlighted in green.

*PHB funded project. TDC, No. 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 OHCS 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
Low Income Single Adult Hsg.	TPI	HOLST	Walsh	24,600	72	72	$11,597,968.00	$161,082.89	$161,082.89
124th & Ash	REACH	AMA	Walsh	98,822	175	190	$28,337,287.00	$161,927.35	$149,143.62
Gateway Housing	NHA	MWA	Walsh	91,554	159	165	$28,050,265.00	$176,416.76	$170,001.61
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Interstate Apartments*	CCC	Circosta	Silco	30,823	51	68	$9,756,805.00	$191,309.90	$143,482.43
Eastside Campus Apartments*	CCC	AMA	Walsh	63,045	124	124	$24,626,280.00	$198,599.03	$198,599.03
St. Francis Park Apartments*	Catholic Charities	MWA	OWCB	74,005	106	107	$23,250,483.00	$219,344.18	$217,294.23
Alphabet District Housing	NHA	CHA	Bremik	73,177	149	149	$33,307,000.00	$223,536.91	$223,536.91
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Willow Creek Crossing Apts	GSL	TVA	Walsh	98,294	120	131	$29,744,546.00	$247,871.22	$227,057.60
New Meadows*	Bridge Meadows	CHA	Walsh	10,700	15	15	$3,850,183.00	$256,678.87	$256,678.87
Red Rock Creek Commons	CPAH	CHA	?	?	48	48	$12,954,501.00	$269,885.44	$269,885.44
Argyle Apartments*	REACH	MWA	Walsh	153,998	189	272	$51,758,869.00	$273,856.45	$190,289.96
Hill Park Apartments*	CCC	CHA	Colas	25,384	39	39	$10,840,188.00	$277,953.54	$277,953.54
Isabella Court - Phase II	REACH	MWA	Team	47,679	49	64	$13,909,492.00	$283,867.18	$217,335.81
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Pleasant Ave Veterans Housing	NHA	KASA	Walsh	18,040	24	32	$7,077,430.00	$294,892.92	$221,169.69
Magnolia Apartments - Phase II	IHI	CHA	Bremik	?	50	93	$15,126,249.00	$302,524.98	$162,647.84
91st & Foster*	Prosper Portland	Hacker	Bremik	?	54	78	$16,565,025.00	$306,759.72	$212,372.12
Block 45*	Home Forward	LRS	OWCB	186,000	240	283	$73,770,121.00	$307,375.50	$260,671.81
Beatrice Morrow*	PCRI	CHA	Colas	?	80	132	$25,131,244.00	$314,140.55	$190,388.21
Oliver Station*	Palindrome	AMA	Urban Edge	?	126	204	$40,011,635.00	$317,552.66	$196,135.47
106 Halsey*	Human Solutions	HOLST	LMC	?	40	47	$12,946,427.00	$323,660.68	$275,455.89
Cedar Grove	CPAH	CHA	LMC	?	44	58	$14,321,892.00	$325,497.55	$246,929.17
The Jade*	ROSE	SERA	OWCB	47,798	48	66	$15,660,784.00	$326,266.33	$237,284.61
Meriwether Place	VHA	EW	Walsh	24,708	30	30	$9,900,000.00	$330,000.00	$330,000.00
Woody Guthrie Apartments*	ROSE	CHA	Walsh	60,878	64	90	$21,551,152.00	$336,736.75	$239,457.24
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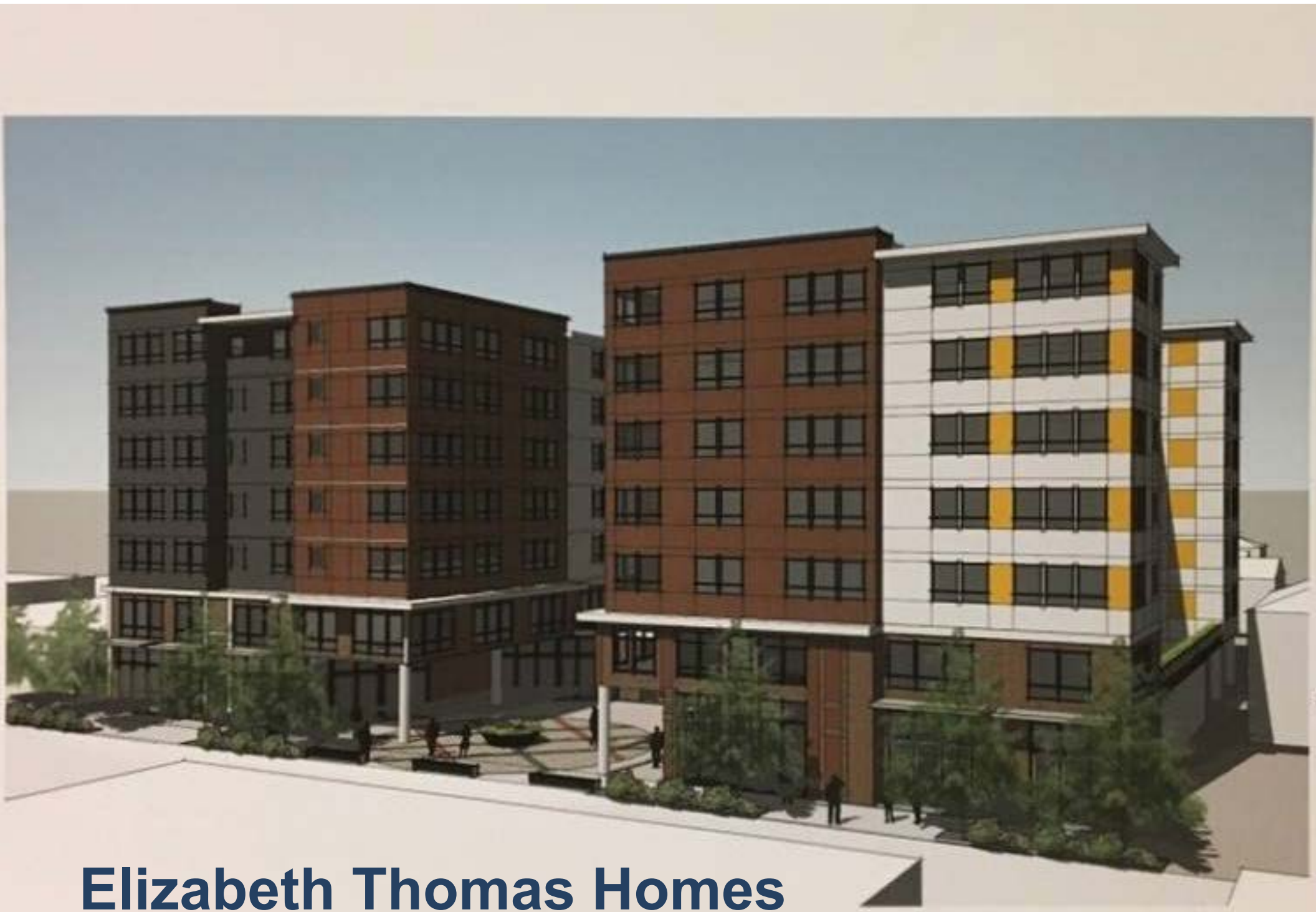
14th & Raleigh*	IHI	LRS	Bremik	?	93	188	$35,842,665.00	$385,405.00	$190,652.47
North Williams*	BRIDGE	AMA	Colas	?	61	129	$23,635,556.00	$387,468.13	$183,221.36

Seattle

Seattle Area Projects

- Othello Park (Low Income Housing Institute)
  - 107 units workforce/family housing ($215k/unit)
- Bitter Lake (Bellwether Housing)
  - 208 units workforce/family housing ($230k/unit)
- Elizabeth Thomas Homes (Catholic Housing Services)
  - 120 units family housing ($251k/unit)
  - $315k/unit prior to CEDC based re-design…
- Skagit County PSH (Catholic Housing Services)
  - 74 units permanent supportive housing, in Mt. Vernon ($161k/unit)

WALSH CONSTRUCTION CO.



Elizabeth Thomas Homes

Image Credit: Environmental Works

LEGEND

- RESIDENTIAL UNITS
- RESIDENTIAL SUPPORT SPACES
- LEASABLE AREA
- UTILITY & MISCELLANEOUS
- HORIZONTAL CIRCULATION
- VERTICAL CIRCULATION
- HARDSCAPED SITE AREAS
- LANDSCAPED SITE AREAS
- NEW WALLS
- BUILDING ENTRY

environmental WORKS
Community Design Center
402 15th Avenue East
Seattle, Washington 98112
206.329.8300
206.329.5494 fax

Elizabeth Thomas Homes

Affordable Family Housing

4529 S. Henderson Street
Seattle, WA 98118

13 August 2018

Proj. No. 17-055A

A2.3

Third - Seventh Floor Plan

Scale: 1/16" = 1'-0"

16,020 SQ.FT.

Image Credit: Environmental Works

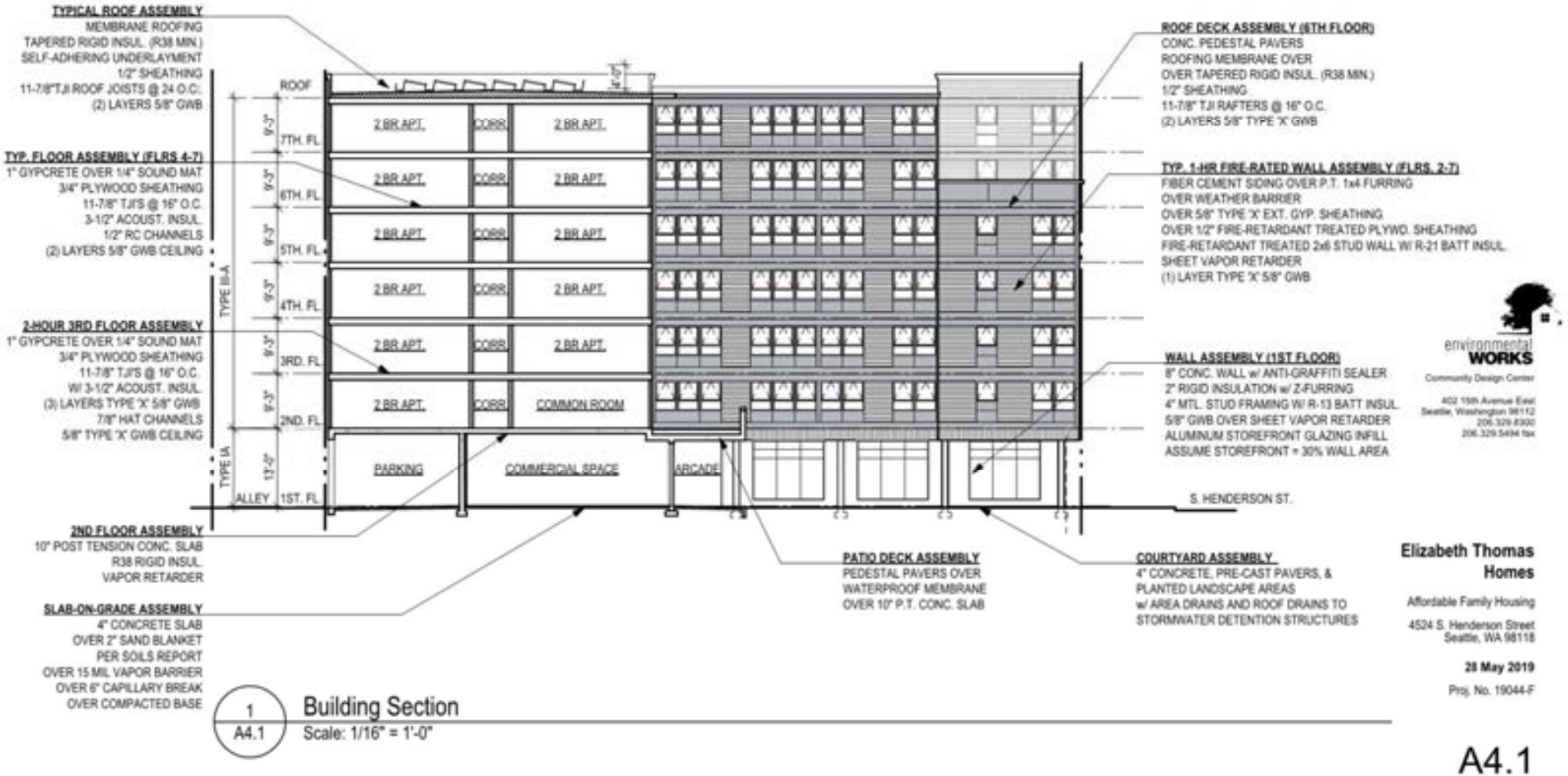


Image Credit: Environmental Works

LEGEND

- RESIDENTIAL UNITS
- RESIDENTIAL SUPPORT SPACES
- LEASABLE AREA
- UTILITY & MISCELLANEOUS
- HORIZONTAL CIRCULATION
- VERTICAL CIRCULATION
- HARDSCAPED SITE AREAS
- LANDSCAPED SITE AREAS
- NEW WALLS
- BUILDING ENTRY

environmental WORKS
Community Design Center
402 15th Avenue East
Seattle, Washington 98112
206.329.8300
206.329.5494 fax

Elizabeth Thomas Homes

Affordable Family Housing

4524 S. Henderson Street
Seattle, WA 98118

28 May 2019

Proj. No. 19044-F

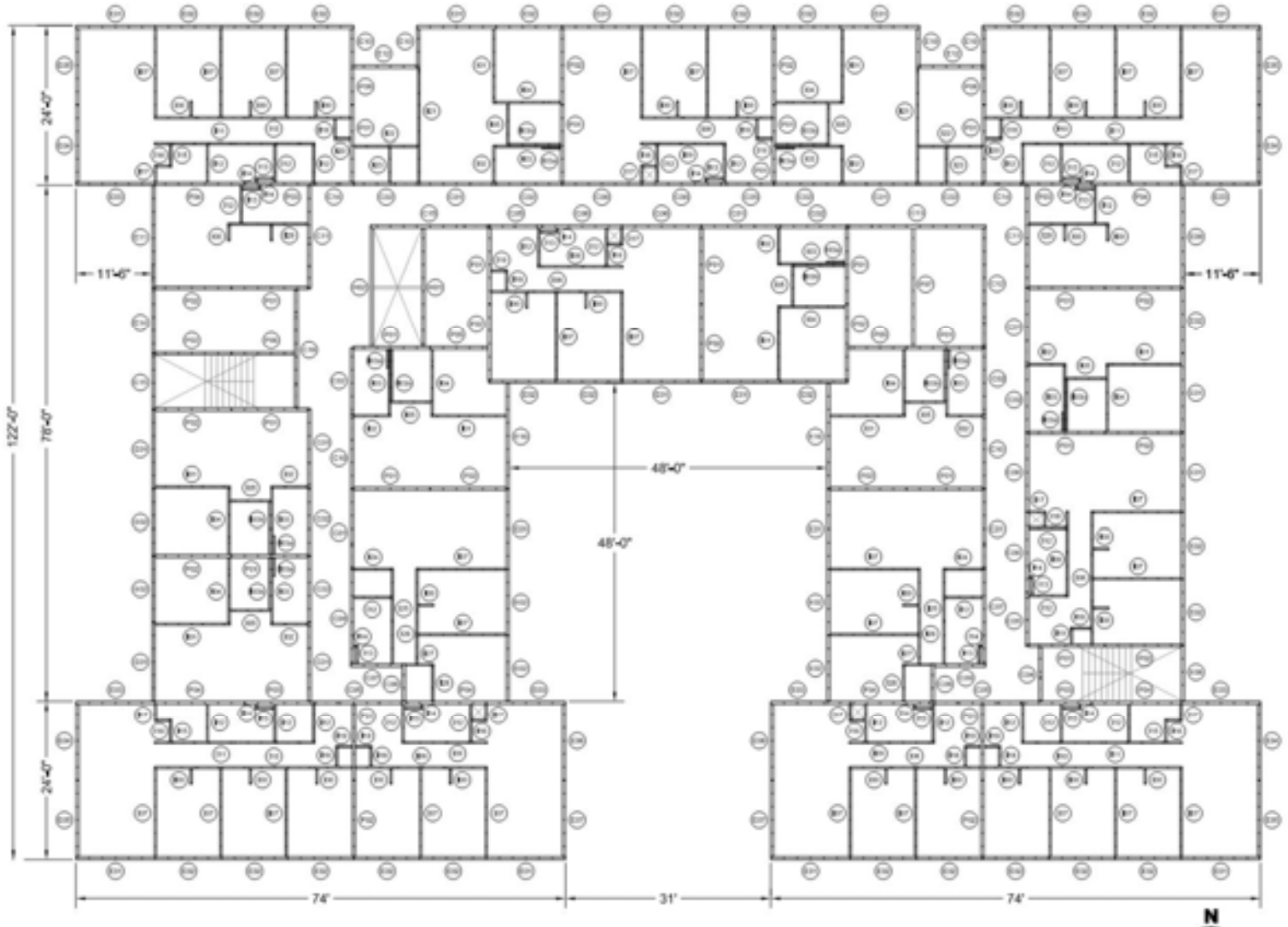
Third - Fifth Floor Plans

Scale: 1/16" = 1'-0"

17,616 SQ.FT.
FAR AREA = 17,187 SQ.FT.

A2.3

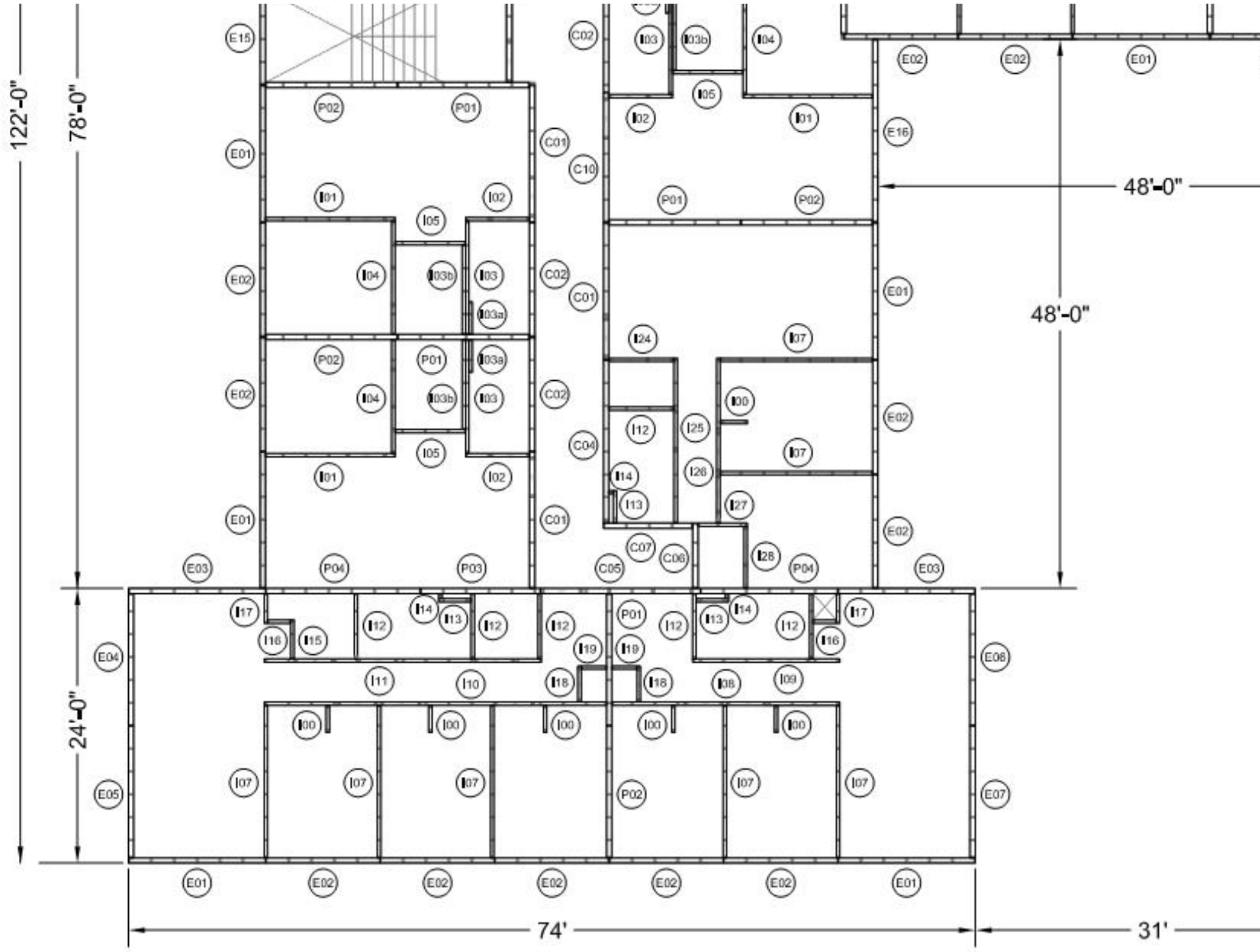
Image Credit: Environmental Works

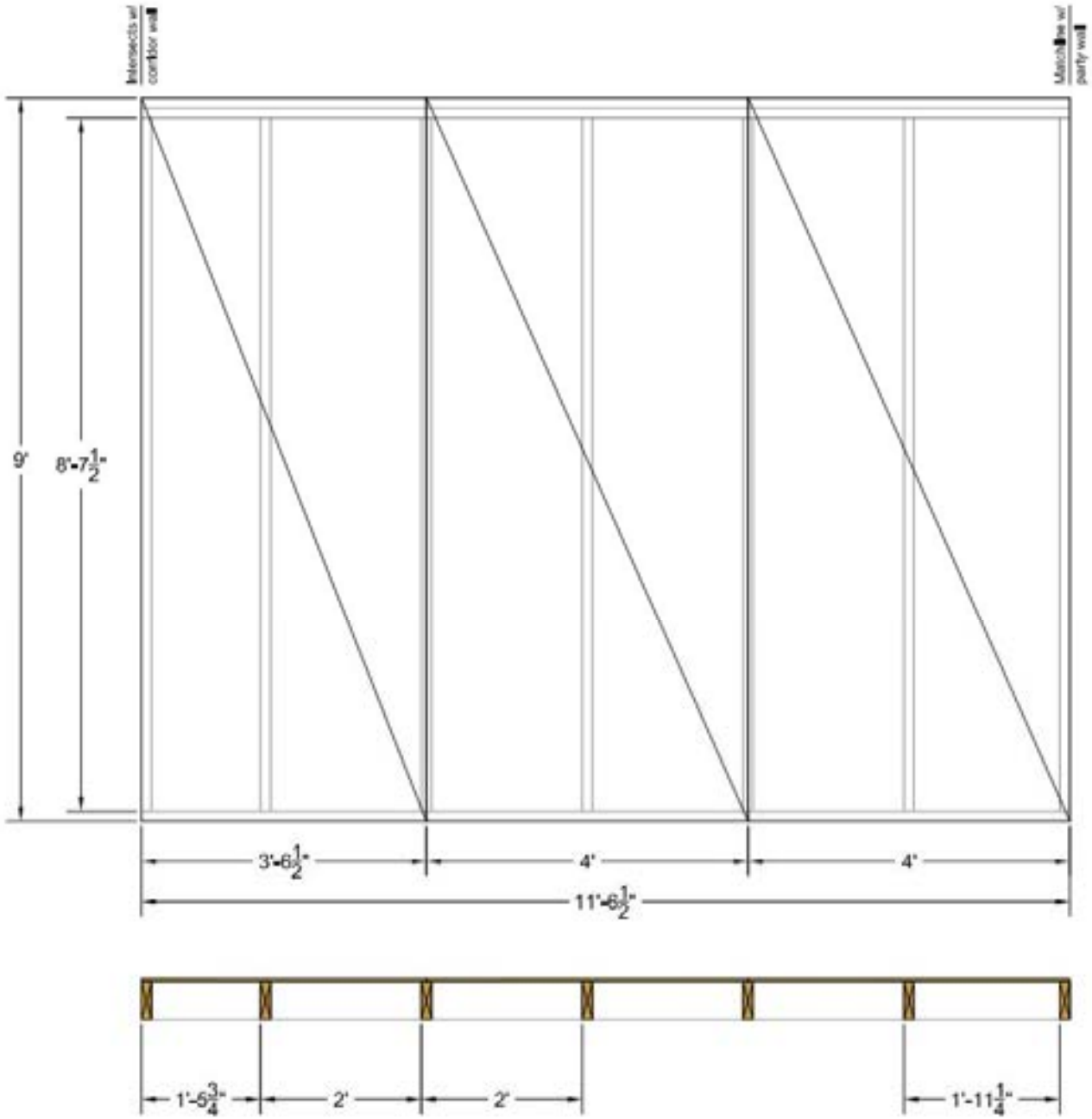


ELIZABETH THOMAS HOMES
Catholic Housing Services of Western Washington

TYPICAL FRAMING PLAN - WALL PANELS (FLOORS 3-7)
1/16" = 1'-0"

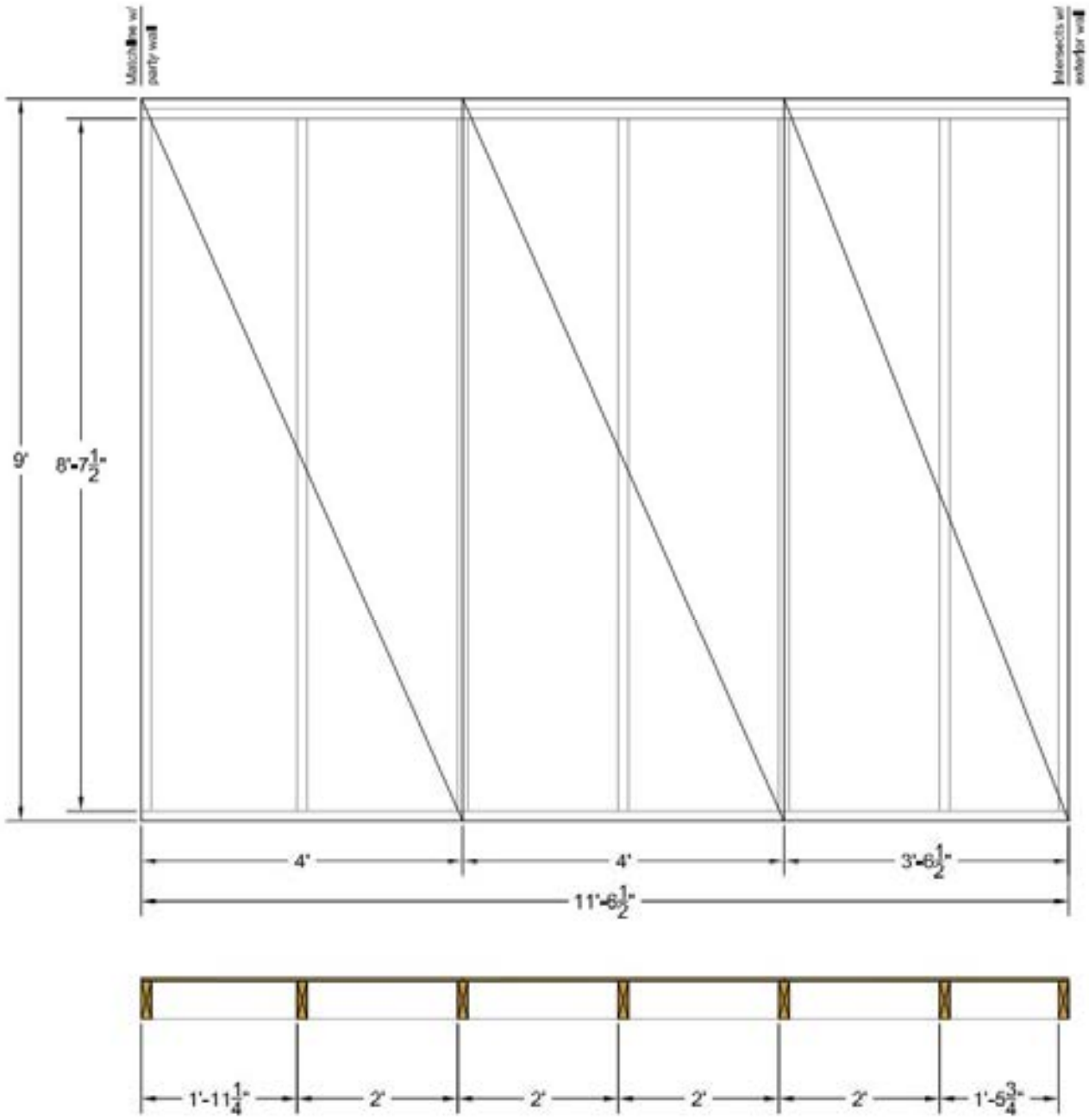
CEDC
Project
6/24/2019


122'-0"
78'-0"
24'-0"
48'-0"
48'-0"
74'
31'



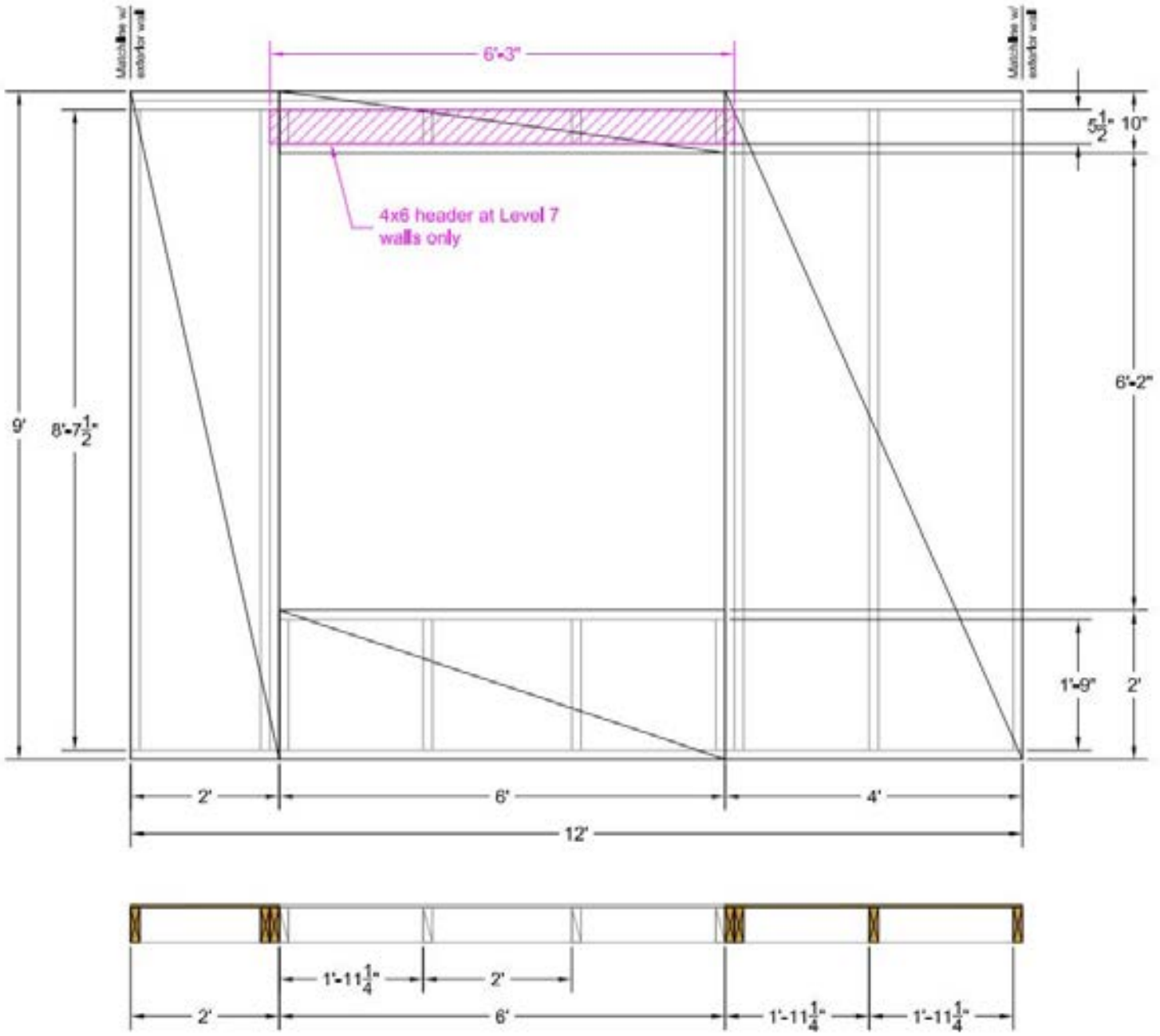
Wall Panel:

P01 (Party Wall 01)



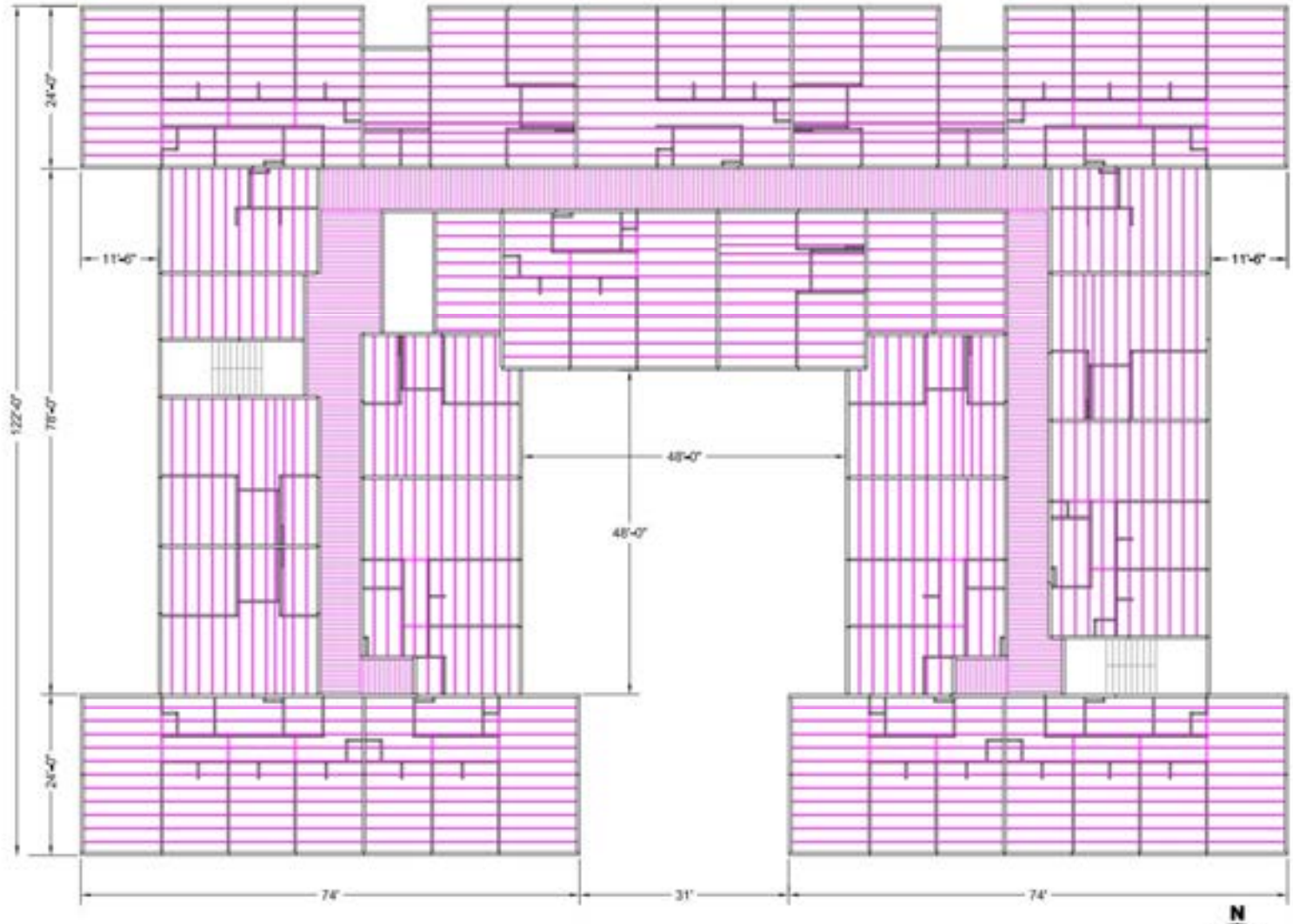
Wall Panel:

P02 (Party Wall 02)



Wall Panel:

E01 (Exterior Wall 01)



ELIZABETH THOMAS HOMES
Catholic Housing Services of Western Washington

TYPICAL FRAMING PLAN - FLOOR JOISTS (FLOORS 3-7)
1/16" = 1'-0"

CEDC
Project
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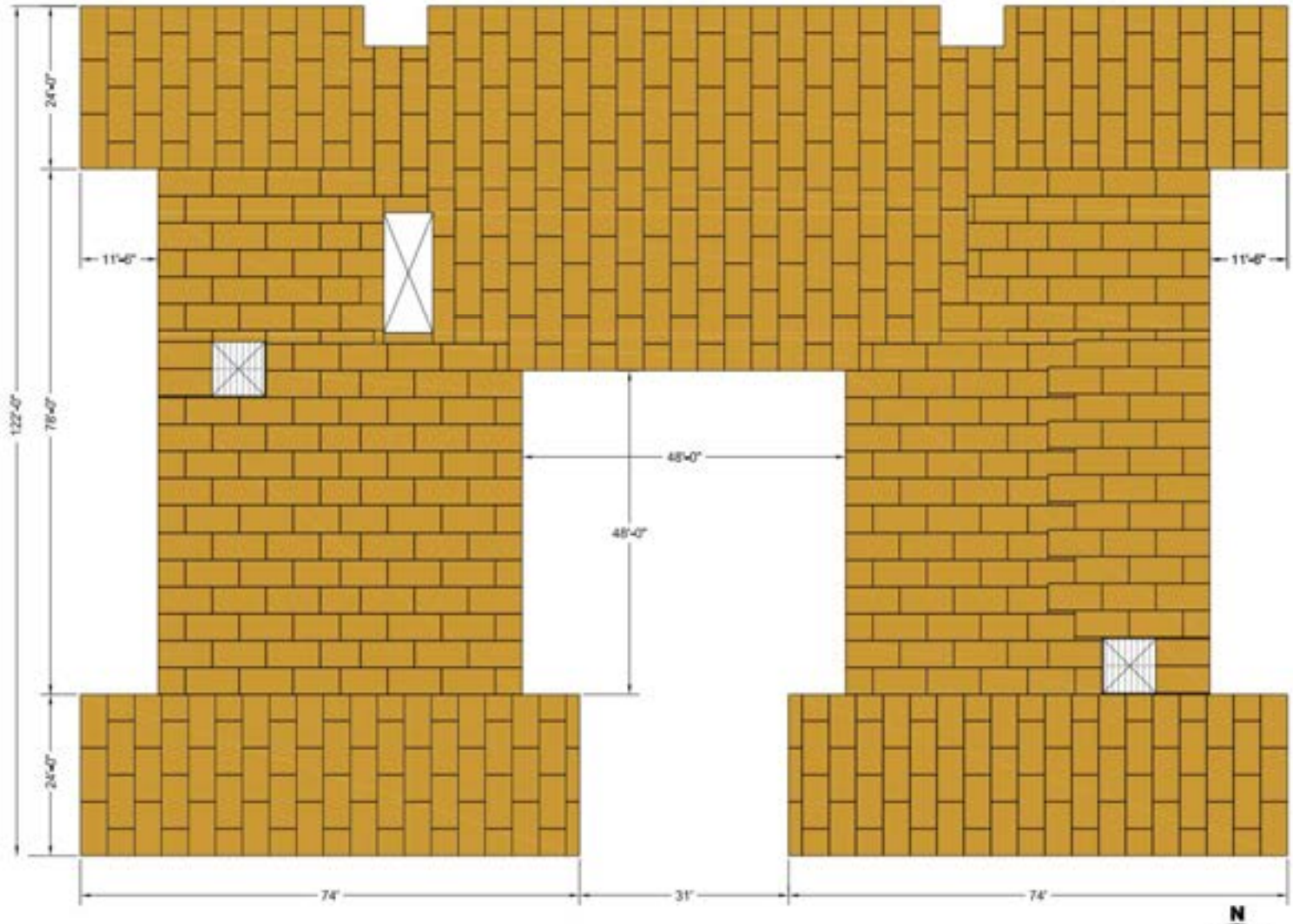

ELIZABETH THOMAS HOMES
Catholic Housing Services of Western Washington

TYPICAL FRAMING PLAN - FLOOR SHEATHING (FLOORS 3-7)
1/16" = 1'-0"

CEDC
Project
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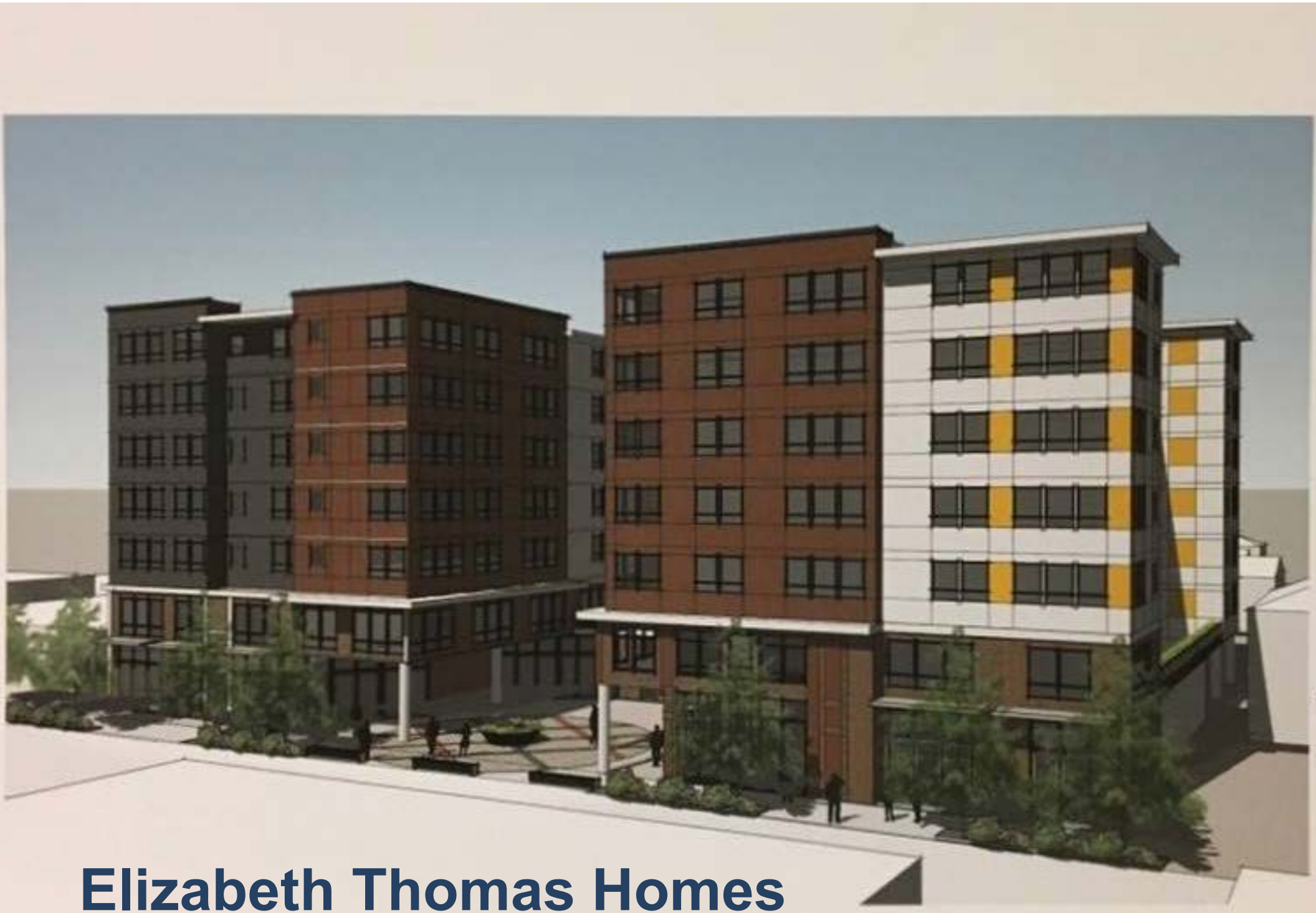

Elizabeth Thomas Homes

Construction Cost (estimated): $251k/unit (22% reduction from Sept. ‘18 scheme)

Conclusion

- We need more homes → 3,900 x 1.1 = 4,300 (yes!)
- We need better homes
  - Low energy (PH, NZE) should be the standard not the exception…
- We have the technology, we have the discipline... (or do we?)
- What are we waiting for?

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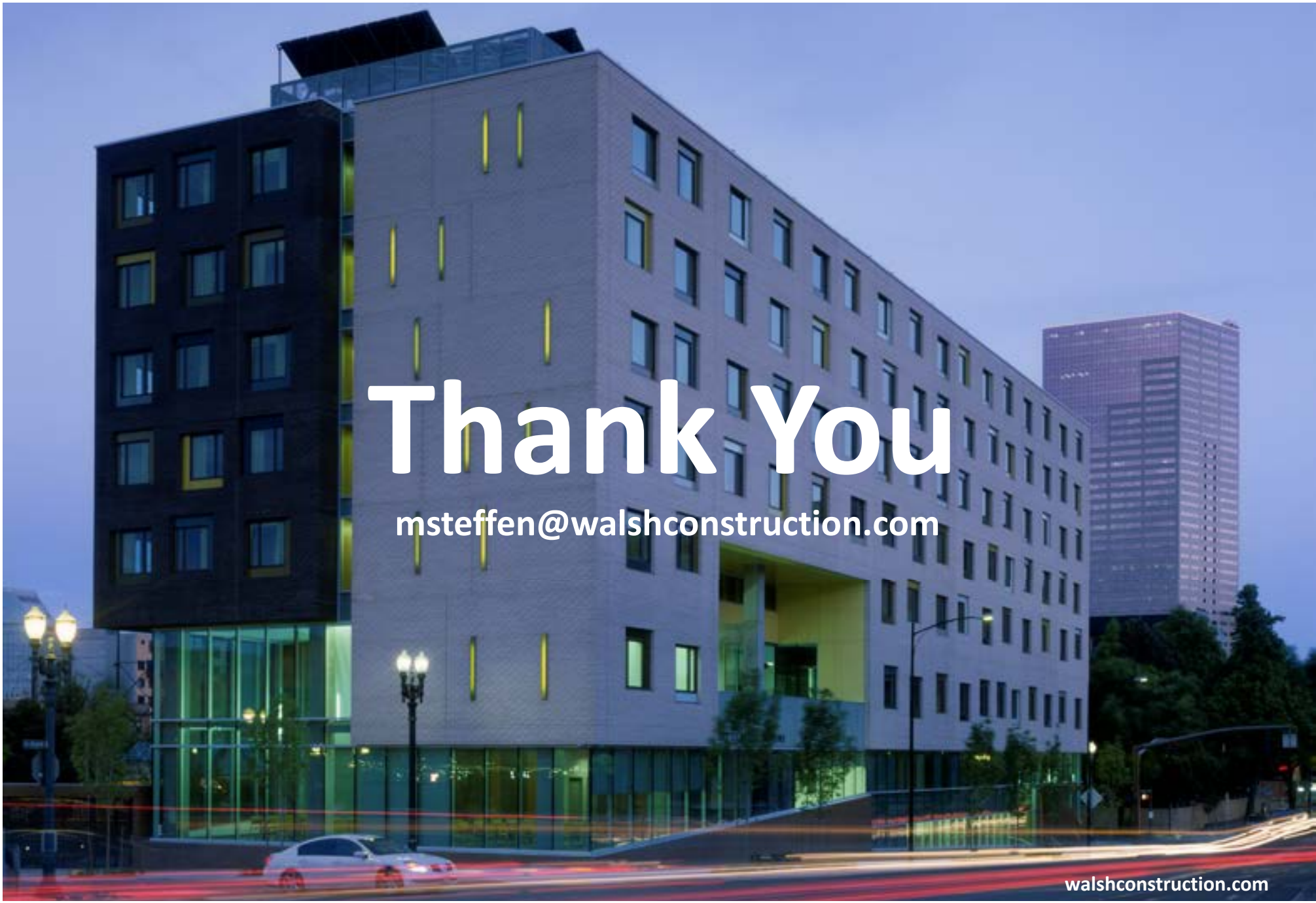

Thank You

msteffen@walshconstruction.com