

High Density Multi-Family Design

Product, Code, Cost and Density Issues



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Architectural Code Consultation and Drawings by Brian Gobell of **hord | coplan | macht**

ULI FALL
MEETING
DALLAS, TEXAS

THURSDAY,
OCTOBER 27TH
3:00PM-4:15PM

Product Types: Basic Definitions

GARDEN



AKA 'WALKUPS'; MULTI-LEVEL APARTMENTS WITH NO ELEVATORS; ONLY STAIRS; OPEN BREEZEWAYS

DONUT



AKA 'WRAPPERS'; STRUCTURED PARKING GARAGE SURROUNDED BY RESIDENTIAL APARTMENTS

PODIUM



TALL BUILDING OF NON-COMBUSTIBLE CONSTRUCTION

HYBRID



AN ELEVATED STRUCTURAL SLAB SUPPORTING WOOD FRAME APARTMENT CONSTRUCTION ABOVE WITH RESIDENTIAL/RETAIL/PARKING BELOW






HIGH-RISE



MIXTURE OF STRUCTURAL FLOOR AND WALL SYSTEMS THAT OFFER ECONOMICAL ALTERNATIVES FOR NON-COMBUSTIBLE CONSTRUCTION

Multi-Family Ecology

(WASHINGTON METRO AS EXAMPLE)

Rents (\$/SF/mo)	Land Value (for 1 acre)	Multi-Family Product	Product Icon	Average Density (Units/Acre)	Land Price (\$/unit)
\$1.85	\$1,500,000	Garden		20-40	\$50,000
\$2.10	\$3,800,000	Donut		70-120	\$40,000
\$2.60	\$6,500,000	Podium "5 Over 1" "5 Over 2" "5 Over 3"		110-260	\$35,000
\$2.90	\$7,425,000	Hybrid		175-275	\$33,000
\$3.00	\$9,000,000	High-Rise		200+ <i>(Say 300)</i>	\$30,000

HIGHER RENTS DRIVE HIGHER LAND VALUE
HIGHER LAND VALUE DRIVES HIGHER DENSITY PRODUCT

Construction Types (2009 IBC)



TYPE V:

COMBUSTIBLE CONSTRUCTION

[WOOD FRAME GARDENS &
DONUTS]



TYPE IV:

HEAVY TIMBER CONSTRUCTION

(NOT USED FOR MULTI-FAMILY)



TYPE III:

NON-COMBUSTIBLE EXTERIOR WITH COMBUSTIBLE
INTERIOR ELEMENTS [PODIUM]



TYPE II:

NON-COMBUSTIBLE, LIMITED CONSTRUCTION*

[NOT USED]



TYPE I:

NON-COMBUSTIBLE, UNLIMITED CONSTRUCTION*

[HI-RISE]

* *REGARDING BUILDING HEIGHT, NUMBER OF STORIES AND ALLOWABLE AREA*

Products & Construction Types

Multi-Family Product	Avg. Density Units/Acre	IBC Const Type	Applicable Materials	Building Height Limit	Stories Allowed
Garden	20-40				
4 Story Donut	70-90	V _A	Standard Wood	60' or 70' Depending on 13R or 13 sprinkler system	4
4 over 1 Podium	90-110				
5 Story Donut	90-120	III A or B	Exterior – Non-combustible including Fire Retardant Treated Wood (FRTW) Interior – Standard Wood	75' or 85' Depending on IIIB or IIIA	5
"5 over 1" Podium	150-200				
"5 over 2" Podium	175-230				
"5 over 3" Podium	200-260				
Hybrid	275+/-	I _B	Concrete, Steel Metal Studs (proprietary systems)	95' +/-	8-12 Structurally limited
High-Rise	200-600+	I A or B	Concrete, Steel, Metal Studs	Unlimited	12+

Type V_A: 4- Story Donut Product



BUILDING HEIGHT:

60' – NFPA 13R OR

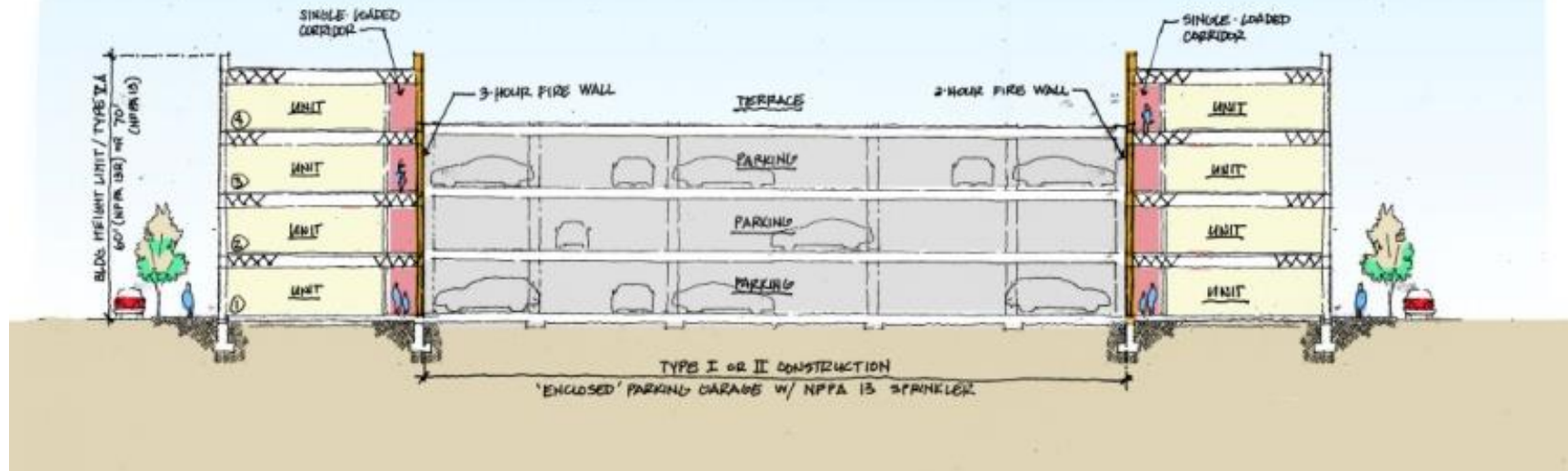
70' – NFPA 13

DENSITY: 70-90 UNITS/ACRE



Key Features:

- Centralized parking garage
- Wrapped with Residential
- Single- and Double-loaded corridors
- Enclosed garage requires 3 hour fire wall
- Precast Garage



Type VA: Podium "4 over 1"



BUILDING HEIGHT:

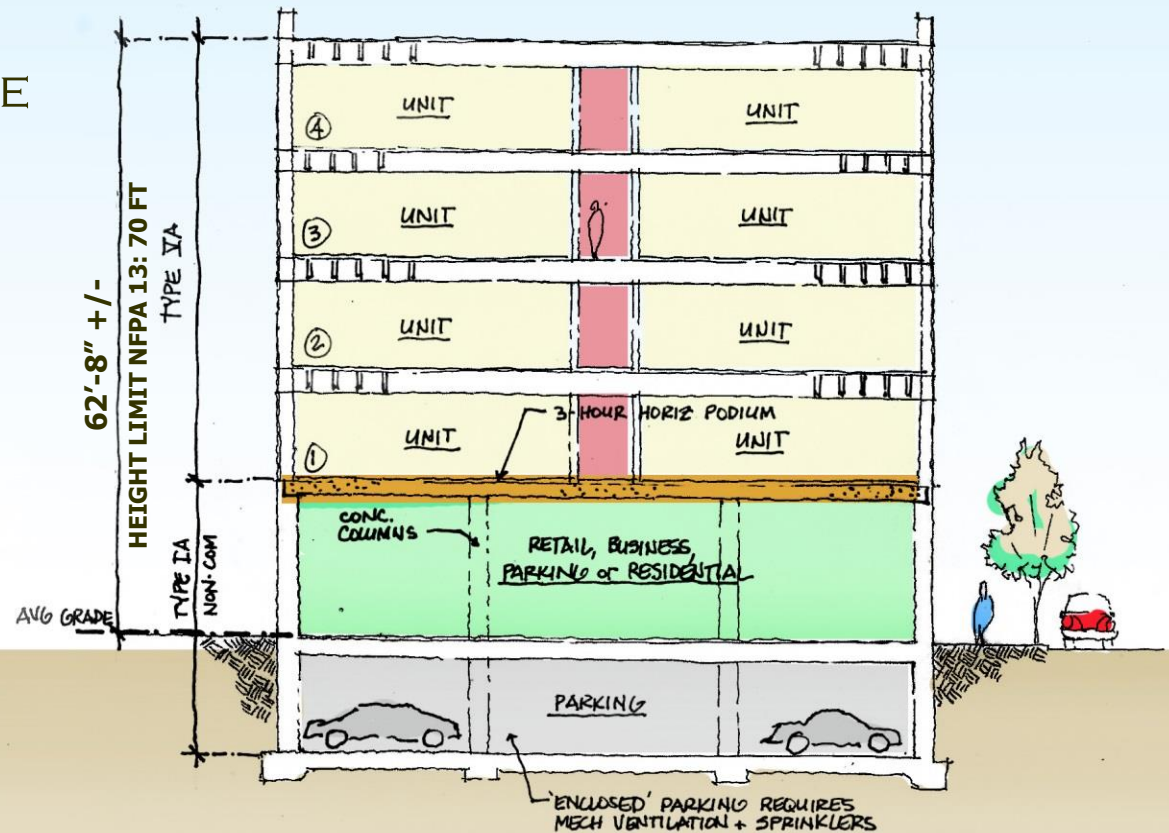
60' – NFPA 13R OR

70' – NFPA 13

DENSITY: 90-110 UNITS/ACRE

Key Features:

- Code allows for extra story
- 5 stories effectively
- Combustible construction above podium
- Non-combustible construction below podium
- Residential now allowed below podium



Type III: 5 Story Donut

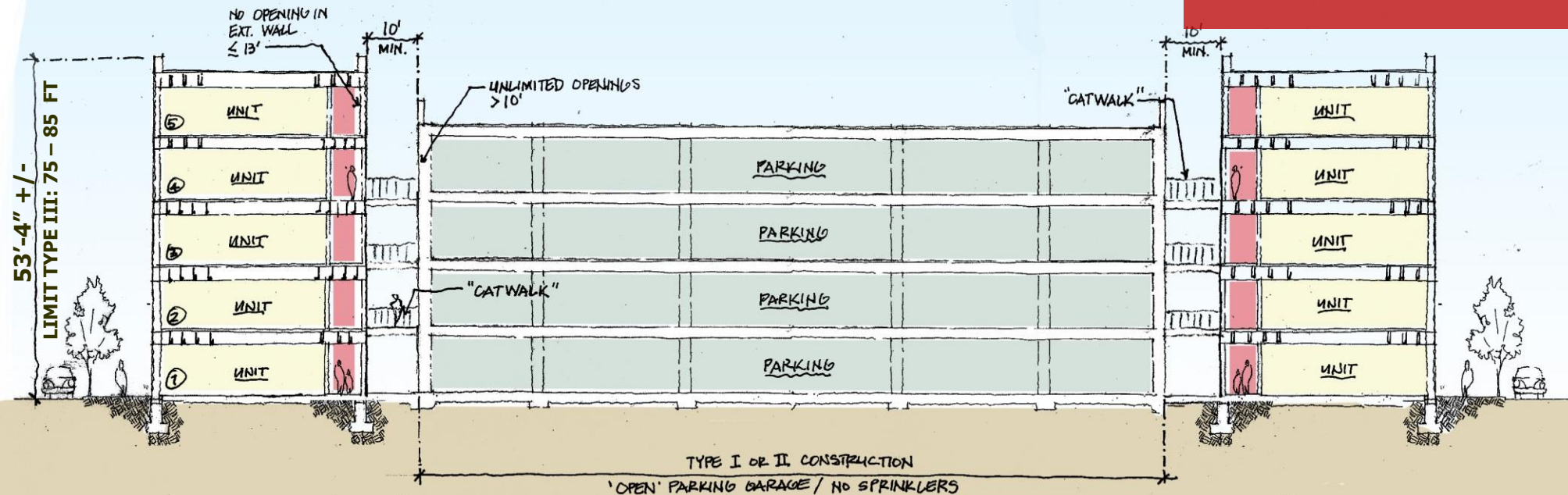


BUILDING HEIGHT: 75' – III B OR
85' – III A

DENSITY: 90-120 UNITS/ ACRE

Key Features:

- Centralized parking garage
- Wrapped with residential
- Single- and Double-loaded corridors
- Open garage better
- Precast Garage
- "Catwalks"



Type III: Podium “5 over 1”



(VINTAGE 2009 AND 2012 IBC CODE)

BUILDING HEIGHT:

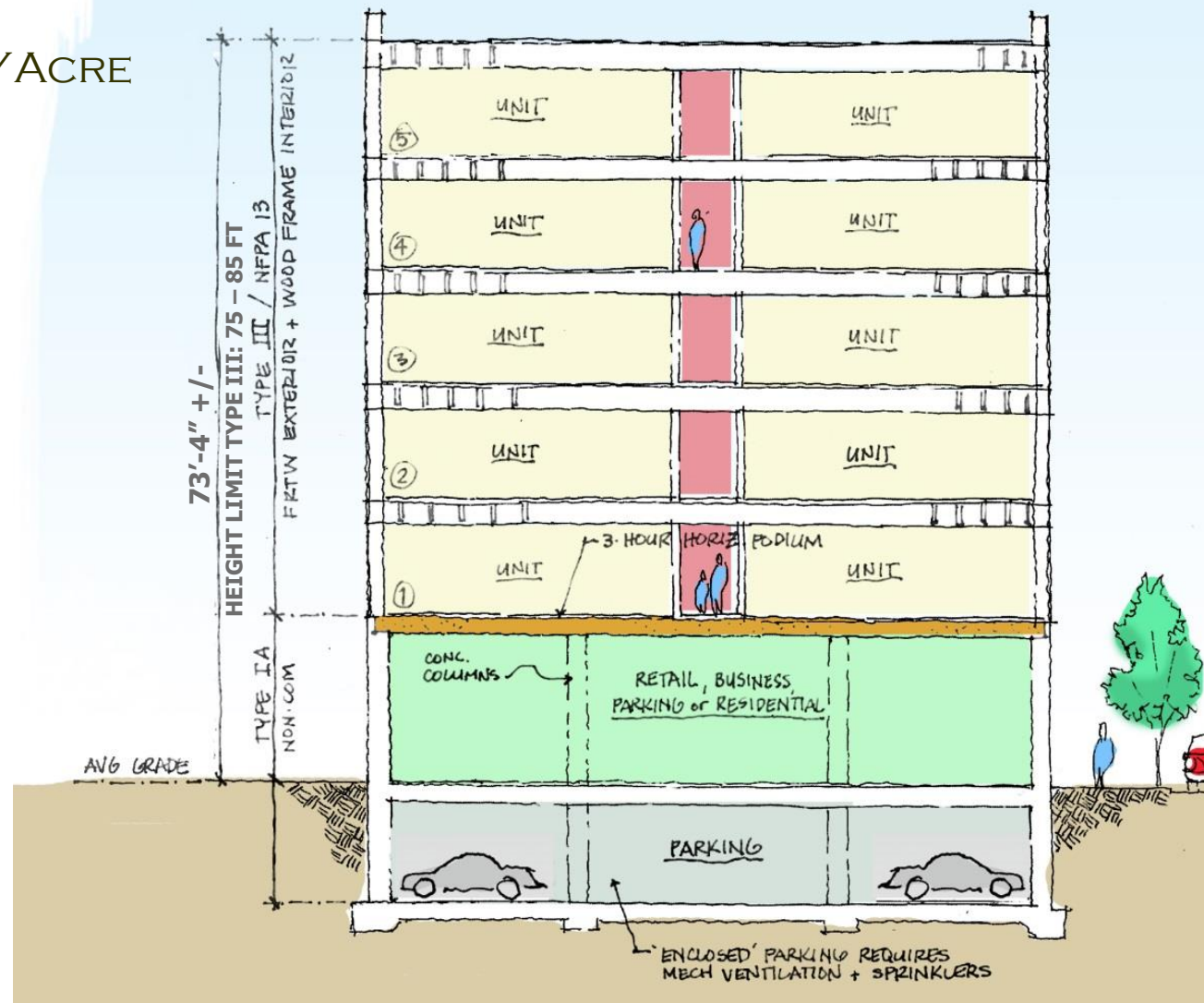
75' – IIIB OR

85' – IIIA

DENSITY: 150 - 200 UNITS/ACRE

Key Features:

- Vintage code allows for extra story
- 6 stories effectively
- Non-combustible exterior walls/combustible interior elements above podium
- Fire Retardant Treated Wood (FRTW)
- Non-combustible construction below podium
- Residential allowed below podium

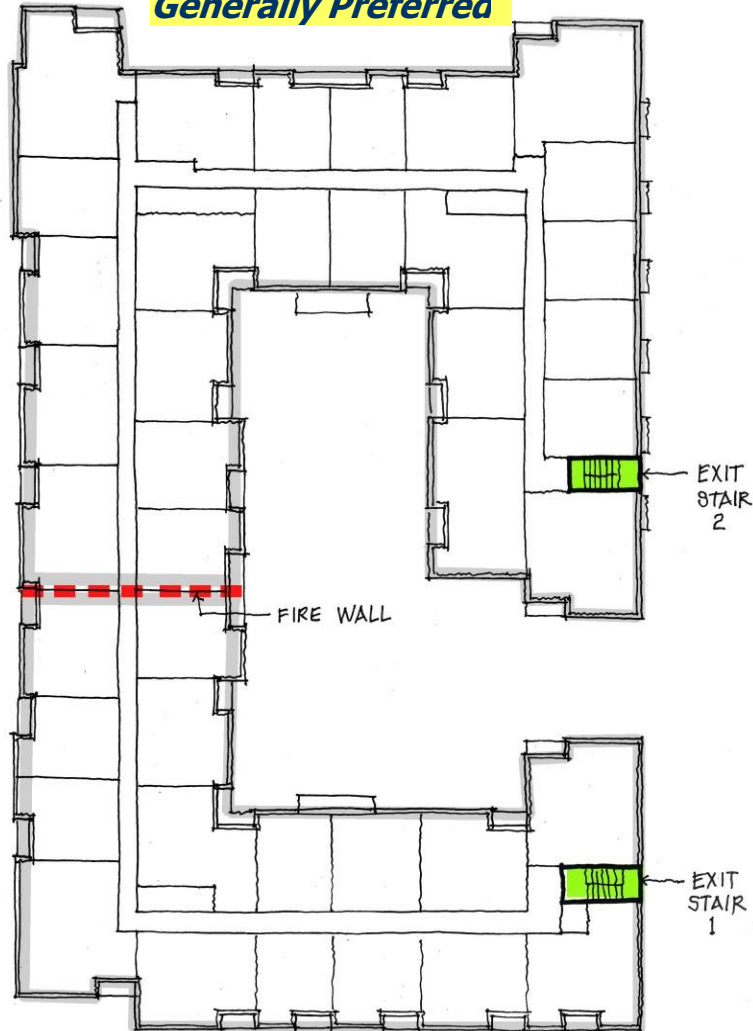


Type III: IIIA vs. IIIB



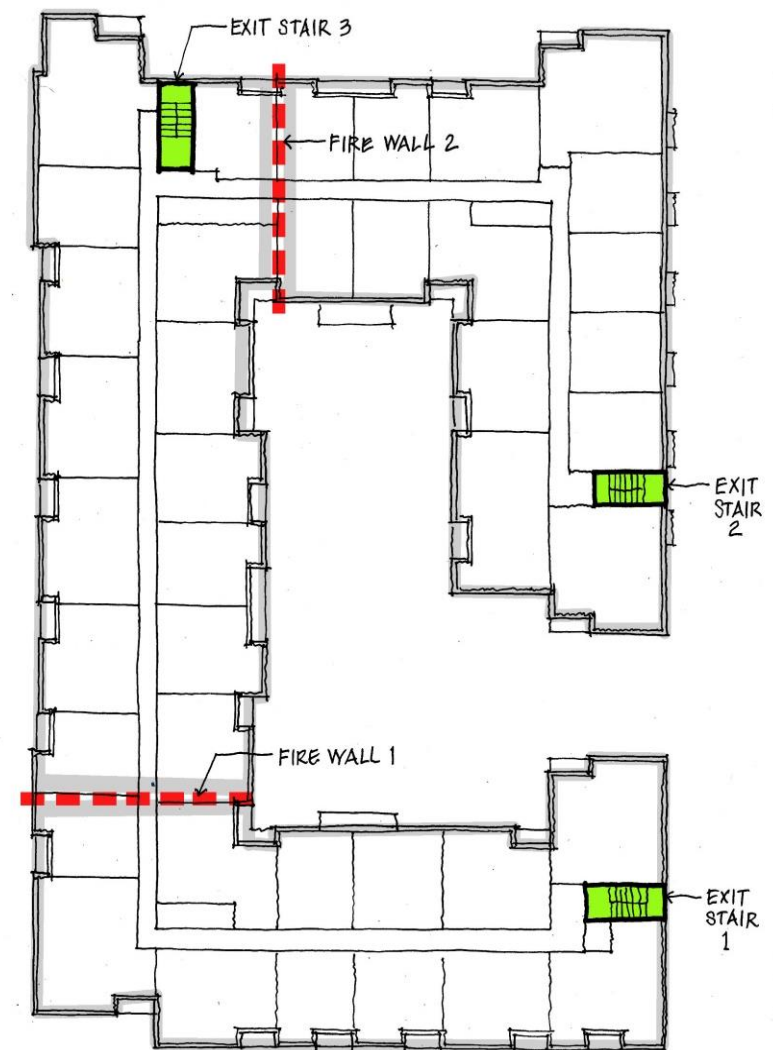
IIIA

Generally Preferred



- MORE ALLOWABLE AREA — 72,000 S.F.
- 85' ALLOWABLE HEIGHT
- LESS EXTERIOR STAIRS & FIREWALLS
- INTERIOR BEARING WALLS AND ROOF ASSEMBLIES: 1 HOUR

IIIB



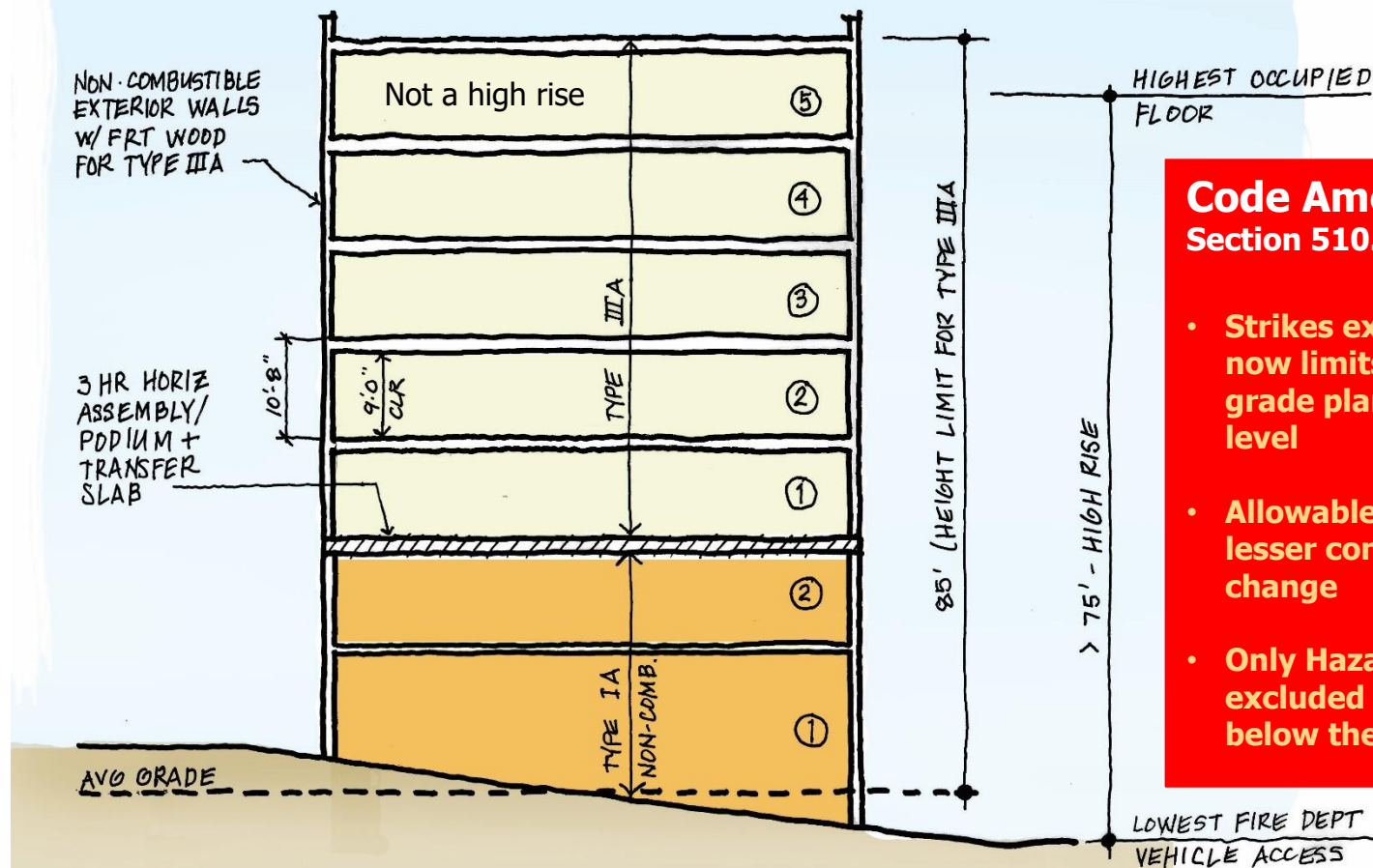
- LESS ALLOWABLE AREA — 48,000 S.F.
- 75' ALLOWABLE HEIGHT
- MORE FIRE STAIRS & FIRE WALLS
- INTERIOR BEARING WALLS AND ROOF ASSEMBLIES: 0 HOUR

Type IIIA: Potential Podium "5 over 2"

2015 IBC



DENSITY: 175-230 UNITS/ACRE



Code Amendment (IBC Section 510.2):

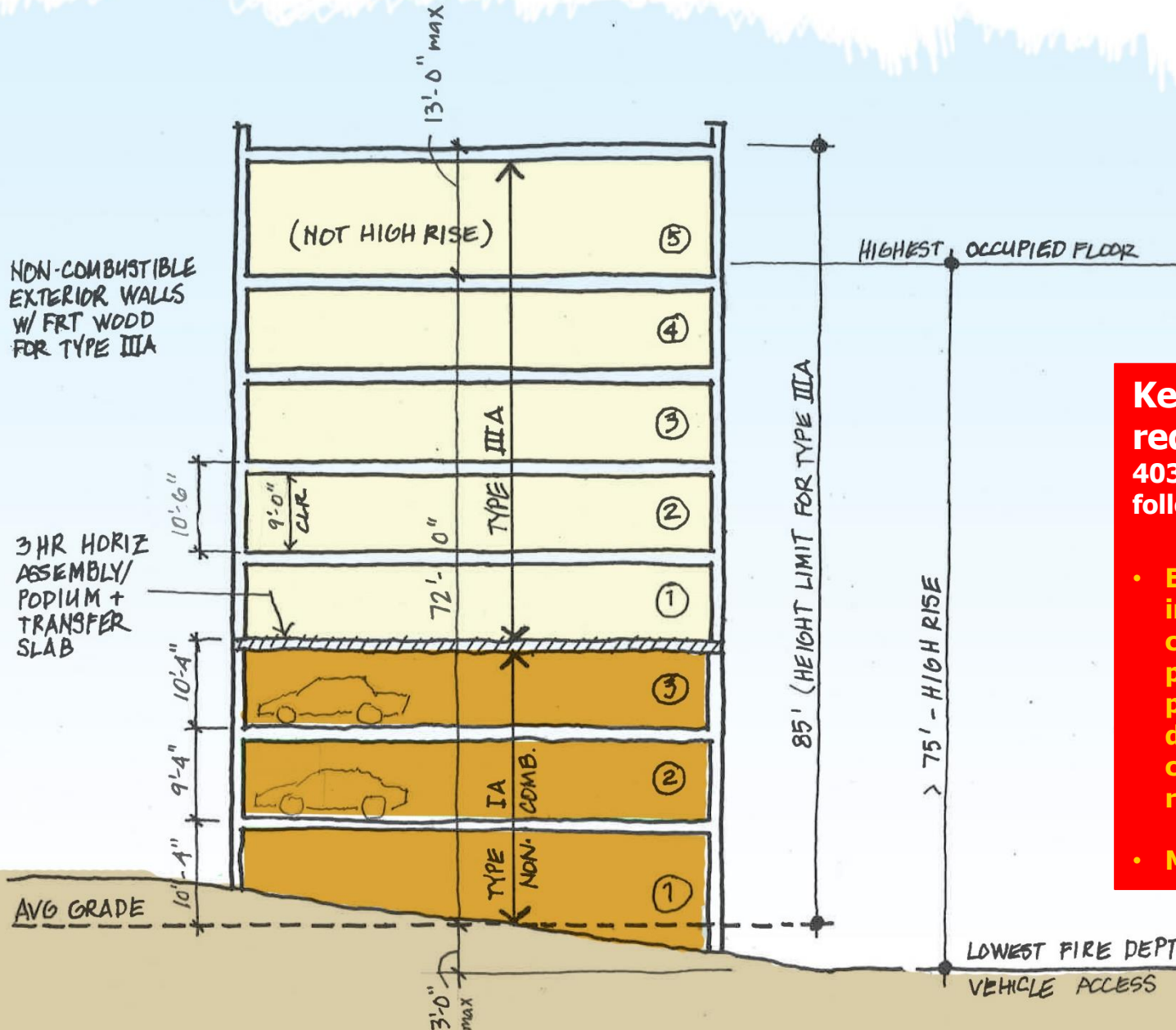
- Strikes existing Condition 2 that now limits only one story above grade plane below the 'podium' level
- Allowable height still limited by lesser construction type- no change
- Only Hazardous use group is excluded from being allowed use below the podium

Type IIIA: Podium "5 over 3"

2015 IBC



DENSITY: 200-260 UNITS/ACRE



Key: Avoid high rise requirements (IBC Section 403) otherwise subject to the following:

- Enhanced emergency systems including: standpipes, fire command center, stair pressurization, standby power, fire alarm, smoke detection, voice/alarm communication, responder radio and fire pump (likely)
- Maybe others?

Type I: High-Rise

BUILDING HEIGHT:

CODE: 75 FEET MIN –
UNLIMITED

SWEET SPOT: 12 – 17
STORIES

DENSITY: 200 – 600+
UNITS/ ACRE



Type Ib: Hybrid - 175-275 Units/Acre

HYBRID: A MIXTURE OF STRUCTURAL FLOOR AND PANELIZED WALL SYSTEMS THAT OFFER ECONOMICAL ALTERNATIVES FOR HIGH-RISE CONSTRUCTION

WHEN IS A HYBRID SYSTEM APPROPRIATE FOR CONSIDERATION?

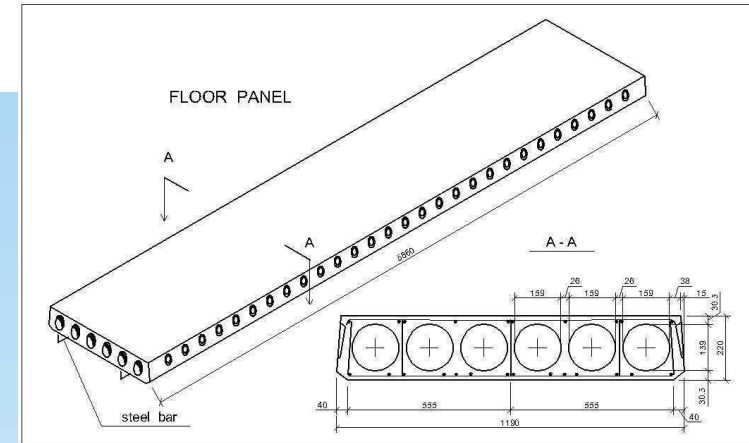
- NEED MORE HEIGHT THAN A “5 OVER 2” AND LESS THAN A HIGH-RISE
- RENTS HIGHER THAN STICK BUT LESS THAN HIGH-RISE
- HEIGHT RANGE: 8 TO 12 STORIES (STRUCTURALLY LIMITED)
- LIGHTER STRUCTURAL ALTERNATIVE
- ALLOWS COST SAVINGS OVER HIGH-RISE
- SPEED AND DESIGN BENEFITS (?)



Type IB: Hybrid

HYBRID SYSTEMS	PRACTICAL BUILDING HEIGHT LIMITATIONS
HALLOW CORE PLANK	8 STORIES
PRESCIENT	12 STORIES
EPICORE / INFINITY	8 STORIES
HAMBRO	9 STORIES W/ METAL STUDS

Type IB: Hybrid - Hollow Core Plank



PRECAST HOLLOW CORE PLANK: STRUCTURAL CONCRETE FLOOR SYSTEM

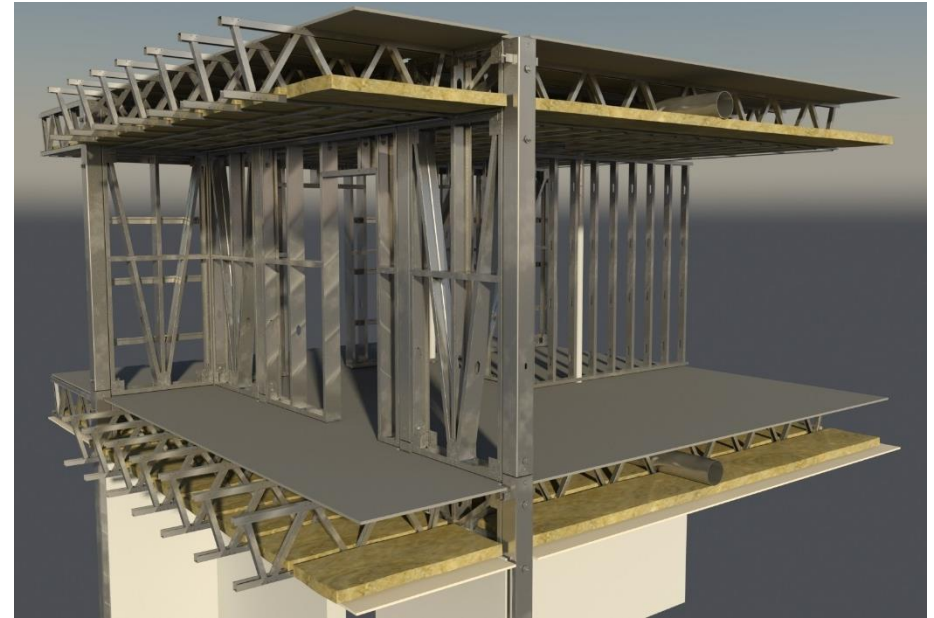
Prescient

KEY FEATURES:

- 1 1/2" CEMENT BOARD FLOOR DECKING WITH GYPSUM CONCRETE UNDERLAYMENT TOPPING
- PANELIZED LOAD BEARING METAL STUD WALL SYSTEM USING STEEL COLUMNS AT ENDS
- TURNKEY SOLUTION
- LIGHTWEIGHT BUILDING CAN REDUCE FOUNDATION COSTS

CHALLENGES:

- PRODUCTION CAPACITY
- ALL LOAD BEARING ELEMENTS MUST BE ON A 2'X2' GRID
- BALCONY SOLUTION NOT OPTIMAL



Type IB: Hybrid – Infinity & Epicore

KEY FEATURES:

- CONCRETE SLAB BETWEEN 3 1/2" TO 6" THICK
- PANELIZED METAL STUD BEARING WALLS ALLOW FOR SPEEDY ERECTION TIME
- THINNER SLABS ALLOWS FOR REDUCED BUILDING HEIGHTS

CHALLENGES:

- FINISH OF METAL DECK CEILING
- STC RATING OF THE FLOOR SYSTEM
- LIMITED SPANS LIMITS
POSSIBILITY OF OPEN FLOOR PLANS



Hambro

KEY FEATURES:

- STEEL BAR JOISTS SPACED 49.25" WITH SHEAR CONNECTORS ON CENTER
- REUSABLE 4' PLYWOOD FORMS FOR USE ON LOAD BEARING METAL WALL SYSTEM
- 2 1/2 - 5" CONCRETE FLOOR SLAB
- OPEN PLENUM SPACE ALLOWS EASY MECHANICAL INSTALL






CHALLENGES:

- ACOUSTICAL PERFORMANCE W/O GYPCRETE TOPPING SLAB LESS THAN OTHER SYSTEMS
- DEEPER FLOOR SYSTEM COMPARED TO OTHER SOLUTIONS ADDS TO BLDG. HEIGHT



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