Urban Housing and Aggregation
Reconciling Urban Design Goals and the Metrics that Frame Housing Design

ARC 5110 Urban Housing Studio: Syllabus, Fall 2011, Tuesday + Friday 1:35pm – 5:05pm

Site and Context

This semester, the housing studio will focus on two large blocks in Dudley Square, in the Roxbury neighborhood of Boston. The commercial heart of one of the city’s most vibrant African American communities, Dudley Square has benefited from reinvestment in recent years as the result of coordinated efforts by the City of Boston and local community development corporations (CDCs).

Initially proposed and defined by the Roxbury Strategic Master Plan, developed between 2002-2004, a series of projects are falling into place that will bring a much-needed new socio-economic diversity and street level activity to the area. Significant near-term projects include the Dudley Municipal Building, located in the heart of Dudley Square and incorporating the historic Ferdinand Building. This game-changing project is the result of a decision to disaggregate a significant number of City of Boston employees from Downtown to a new state-of-the-art office building. This large structure will also contain significant ground-level retail at a scale that will attract national brand restaurants and stores. In June 2011, the City of Boston selected the Dutch firm Mecanoo as the architects for the 150K SF project (with Sasaki as local architect).

In July of this year, developers submitted competing proposals for Parcels 9 and 10, located at the intersection of Melnea Cass Boulevard and Washington Street and only two blocks east of the Dudley Municipal Building. The proposals for Parcels 9 & 10 are primarily comprised of ground-level of retail with three-to-nine stories of residential uses above, depending on the specific characteristics of each of the project proponents. Any of the potential developments will bring a significant new population of people within the walkable core of Dudley Square.

Given this background, the City of Boston and area CDCs are interested in exploring a few key Dudley Square sites to understand how redevelopment opportunities can leverage and complement the Dudley Municipal Building and development on Parcels 9 & 10. As a result, our studio will focus on two large underdeveloped blocks on the south side of Washington Street and located between the Dudley Municipal Building and Parcel 10 (see attached map). Multi-family housing is the predominate proposed use for the sites, but a continuous edge of ground level retail and/or
community programs (such as day care centers, community organizations, etc.) are required along the Washington Street frontage. Single-family rowhouses can also be proposed in specific places, when warranted by the abutting neighborhood context.

**Studio Methodology**

Rather than begin the design process by looking at the site, the studio will begin with the development of housing prototypes that can then be used as a tool kit for site-specific interventions. This is necessary, because housing, of almost all building types, is the most constrained by building code, construction approaches, and expectations of the real estate market.

Of all of the legal, physical, and economic determinants that influence the design of housing, the building code is the most impactful. The code shapes the design of housing in two important ways: a) by establishing the maximum allowable height of certain construction systems, and b) by establishing configuration and dimensional requirements for all vertical (egress stairs and elevators) and horizontal (shared corridors) circulation in the building. In fact, the prevalent building code is so restrictive in terms of the options for circulation systems, it is usually advantageous to begin with the design of the circulation armature (the shared circulation system) when doing initial design scenarios when testing a site very early in the design process.

**Task 1 – Research and Synthesis**

As a first exercise, students will learn about and graphically communicate research on one of four research topics that directly impact the organization of multi-family residential housing. Sub-topics will be distributed to teams of two students, with the final deliverables packaged into a single format that can be shared by the studio in the next phases of the course.

A. Typology: collect precedents of multi-family buildings (walk-up, row house and high rise) and create a series of diagrams that clarify their internal organization, primary circulation strategy, the symbolic/iconographic strategy, and relationship to the larger urban context (introverted courtyard, low-rise cluster development, double loaded bar over parking, etc.). The study should also address the history of infill housing in the area, and uncover regional differences based on prevailing code, social expectations, and/or material cultures.

B. Code: through a series of diagrams, explore the range of options for solving for the egress and circulation for a typical floor, as permitted by the most recent addition of the IBC. Graphically communicate the sections of the building code and accessibility guidelines that directly impact the organization of multi-family residential housing both in plan and section. Produce a complementary diagram for the ground level/lobby level that shows required egress paths, ADA accessible routes and other code-driven solutions. Also frame the accessibility issues for units within a multi-family building using the same code (which is more stringent than ADA).

C. Marketing: Research two kinds of market issues. The first set of issues involves the range of residential units in the surrounding Boston context. Consider size (area), dimensions (typical living room and bedroom width, etc.), unit types (1-bed, 2-bed, etc.), and unit layout (roommate friendly, family oriented, views as a priority, etc.). The second set of issues involves surrounding program. What uses are currently unavailable or oversaturating the market? What additional program (public) or amenities (private to the building) are desired or expected? The source of information will primarily come from the marketing websites of new and recently built developments but also can come from newspaper articles, and face-to-face meetings with brokers, real-estate developers, and property management companies. Information graphics, maps and diagrams should be produced to make general observations about the findings.
D. Building Systems and Operations: Research issues to explore include typical bay sizes, innovative servicing strategies, floor-to-floor heights, the typical dimensions and accommodations required for parking and for the building core (or just stairs for walk-ups and row houses), etc. Use precedent study to carefully consider and demonstrate internal organizational logics that are integrated into the design of multi-family housing in innovative ways.

At the conclusion of Phase 1, a workshop will be held to share the findings with the entire class. Students groups will make ppt presentations and experts in each of the categories will be invited to the review. Each group will upload their presentations for use by the entire housing studio.

Task 2 - Housing Prototypes

The second step of the studio will be the design of housing that can serve as prototypes for site-specific interventions. Buildings with walk-up units will be a priority of the studio, because wood frame buildings without elevators are a relatively unexplored low-cost high-density alternative to urban development. The advantage of promoting this model of development is more affordable market-rate (as opposed to publicly subsidized) units. In addition, there may be potential social benefits in residential buildings that are not predicated on the conventional elevator-and-corridor circulation model.

The strategic integration of either high-rise or single-family row house prototypes may be considered as an addition to the walk-up units where appropriate. In total, three categories of housing prototypes will be developed across the studio: a) high-rise buildings (taller than 70’) organized by a bank of elevators, a double-loaded corridor, and the required two means of vertical egress and b) walk-up wood-frame buildings (less than 65’), organized by a wider variety of circulation solutions including point-load, corridor based, and stacked-duplex arrangements, and c) single-family rowhouses. Several versions of each of these types will be developed during the few weeks of the semester and then packaged into a single handbook to be used by the entire studio section.

Task 3 - Urban Design Analysis and Synthesis

Before specific prototypes are tested on the blocks, students working in teams of two will do a comprehensive urban design analysis of the parcels and surrounding area. Issues to explore include pedestrian and vehicular movement, the location of active storefronts and entrances along adjacent streets, land uses, the massing/façade strategy/materiality of nearby buildings, solar orientation, and view corridors. The analysis will be presented graphically as a series of map layers culminating in two diagrams that summarize the opportunities and constraints of the sites. In addition, each team needs to propose an idealized massing scenario that is fully derived from a reading of the existing context. The massing proposal should include recommendations for the ground level façade along every edge – through the use of a keyed color coding (indicating entrances, lobbies, retail, blank walls, landscaped walls, etc.) and a different graphic strategy that indicates the general material strategy for each component of the scenario. Your proposal should aim for the maximum contextual fit and post-rationalize the relatively heterogeneity of the surrounding neighborhood.

Task 4 - Design proposals

In the final phase of the studio, students will work in pairs on design proposals for one of two the sites being developed within the studio. The paired sites share a block; and as a result, each student will need to communicate and collaborate with one other (assigned) student developing a proposal on the adjacent site. While the projects will be conceived and designed as individual projects (and evaluated as such), a visual dialogue should be developed
between the proposals and urban design connections and relationships should be established and reinforced. Projects are expected to include a variety of housing prototypes proposed in Task 1 of the studio, but synthesize the combination to achieve a cohesive overall urban vision. Proposals will be rapidly prototyped for the mid-term review and then developed to a high level of resolution for the balance of the semester.

**Design Considerations**

**Considering dwelling units in double-loaded corridor buildings**

Housing prototypes will need to be developed that consider the size, layout, and amenities of the individual units as well as the overall logic of their aggregation. There are two ways to begin to design units. For buildings with a double-loaded corridor organization, it is best to propose a provisional circulation armature and building perimeter first, to launch the design investigation. In a double-loaded corridor building, units are typically 25-30’ deep, yielding (with a 6’ corridor) buildings that are 60’ wide.

With this framework established, units should be generated by subdividing the plan and testing individual units. The best way to maintain control over the relationship between the design of the unit and the opportunities of jigsaw puzzle-like aggregation is to draw three units together as a series. That way, the potential benefits of piggy-backed L-shaped units, book-matched units and shared service/water walls can be explored.

As a rule of thumb, units should fall into the following ranges:

- **Studios:** 500-700 SF
- **One bedroom:** 700-900 SF
- **Two bedroom:** 900-1250 SF
- **Three bedroom:** 1250-1475 SF

Since the building code requires that all habitable spaces (bedrooms and living spaces) need to be against a window wall, achieving the necessary length of window wall can be the most challenging aspect of multi-family housing design. Bedrooms can be no smaller than 9’x10’ (per the code) and living areas do not want to be any thinner than 12’, meaning that the smallest possible one bedroom unit requires at least 22’ of exposure. In addition to the typical run of the aggregate, transformations of the typical unit will need to be made for corner units and/or buildings, mid-block conditions, etc.

Schemes should be explored that include units with full-floor or partial floor level changes (duplexes, etc.). The accessibility code restricts the options for the duplex layouts in elevator accessed units. The specific code for multi-level units will be discussed in class.

**The design of rowhouses**

Rowhouses share blank load-bearing walls (party walls) with their neighbors and in Boston’s historic neighborhoods, are anywhere between 17 and 26 feet wide. For the purposes of initial planning, a 20 foot width is a good place to start. Key to the layout of a rowhouse is the location of the stair and stacked functions requiring plumbing (kitchen and bathrooms). A stacked single-direction stairs along one party wall typically yields the most efficient overall layout. Rowhouses tend to be three or four stories and can include an embedded garage accessed from a rear alley. It is unacceptable to embed a garage on the front of the house. Three bedroom rowhouses should not exceed 2500 SF.
Units should engage exterior spaces (balconies, terraces, patios, etc.)
Ideally units should have private exterior spaces, whether they are embedded within a larger multi-family building or they are single-family rowhouse. In multistory walk-up housing, ground level units will have a different set of relationships to exterior space than upper floor units. Some or all upper floor units may connect to terraces (over housing units below) or balconies cantilevered from the building volume. Upper level units may also have stair connection to gardens at ground level or stairs up to roof decks.

Urban design and open space
In addition to the private open spaces that are directly associated with individual units (see above), the larger open space strategy need to be considered. This is particularly important for any semi-public space within a parcel including the setback zone between the back of the sidewalk and the building face, the zone typically occupied by front stoops and narrow private garden spaces. Many kinds of spaces exist in cities that are ambiguous in terms of their public role. Examples include pedestrian alleyways between the back yards of houses, sidewalks that do not parallel streets, driveways that serve multiple units and linear parks with small frontages facing public streets. Every effort should be made to clarify whether such spaces are meant to be public, semi-public, semi-private, or private (see below).

Spatial territories
Well conceived multi-family housing needs to organize space into precisely defined psychological, social and even political territories:

Public Space / the Urban realm (publicly owned and clear public access is implied) – sidewalks that parallel public street, public parks (with appropriate symbolic and spatial clues)

Publicly accessible space (privately owned, but public access is implied) – spaces for engaging the private realm such as stoops to access a door bell/mailbox and lobbies to access a buzzer system, pathways through private property that, through their visual cues and layout, suggest that all are invited to use them (for example, the pathways in Harvard Yard)

Semi-public space (residents and guests only) – spaces that are collectively accessible by the residents of a building and their guests such as lobbies, corridors, social spaces

Semi-private space (residents only) – behind the scenes functional rooms such as laundry and trash rooms, building managers office

Private space – spaces that belong exclusively to the unit including the interior of the unit and any exterior spaces that are an extension of the unit such as gardens, patios, terraces and balconies.

Smart Growth objectives
The site and program for this studio is consistent with the embrace of Smart Growth policy objectives by the Northeastern University School of Architecture. Smart Growth policy attempts to steer new development away from “Greenfield” sites on the edges of cities (typically farmland or undeveloped open space) and towards transit-oriented development (TOD) infill sites in metropolitan areas. Several overlapping social goals are achieved with this kind of development including: a) reduced reliance on private automobiles because new development sites are near existing mass transit; b) the rehabilitation of former industrial sites (‘brownfield’ sites) because most large available sites were formerly used for industrial and commercial uses; and c) increased mix-income housing production.

Parking
A major factor in the configuration of proposals will be the location, access, and configuration of the required parking. Given recent the larger policy objectives of the development (see above), the nearby Dudley Silver Line / bus intermodal station, and recent parking policy reform, proposals will require only 0.5 parking spaces per unit (1.0 space/unit for single-family rowhouses). Given the economic parameters of development in Dudley Square, below ground parking is not feasible. Instead, parking should be accommodated in an open air lot or a single-story at-grade garage covered by a landscaped deck and/or buildings. The parking can be up to 4’ below ground without incurring the cost penalties of a below grade parking solution. Variable grades around the perimeter of the proposed sites may allow for some edges of the parking area to be below grade.

In addition to vehicular parking, enclosed bicycle parking, at a ratio of one bicycle per unit, is now required in the neighborhood.
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Urban Housing and Aggregation

Bibliography and Precedents

On Housing:


On Sustainability:


On Marketing:

On Code:
*International Building Code*:
A hard copy and CD-ROM of the 2009 International Building Code (IBC) can be found in the Snell Reference Stacks at call # K3538.A1515

The online addition can be accessed online at the following URL:

Massachusetts amendments to the IBC (August 2010):
http://www.mass.gov/?pageID=eopsterminal&L=4&L0=Home&L1=Consumer+Protection+%26+Business+Licensing&L2=License+Type+by+Business+Area&L3=Construction+Supervisor+License&sid=Eeops&b=terminalcontent&f=dps_bbrs_code_8th_edition&csid=Eeops
Precedents:

**Clustered Low-rise**
Galgebakken, Copenhagen
Tapachstrasse Terrace Apartments, Stuttgart
Faller, Peter & Hermann Schröder, 1974
Quinta da Malagueira, Evora
Alvaro Siza, 1977
Hollainhof, Ghent
Neutelings Riedijk, 1993

**Perimeter Block**
Spangen Quarter Housing, Rotterdam
Michiel Brinkman, 1918-21
Inneuble Villas, Paris (prototype)
Le Corbusier, 1922-1929
Casa Rustici, Milan
Giuseppe Terragni, Pietro Lingeri, 1936
Westerdok Island/La Grande Cour, Amsterdam
Meyer + Van Schooten, Architekten, 2007
8 House, Copenhagen
BIG, 2010

**Courtyard**
Casa Girasole, Rome
Luigi Moretti, 1949
Dona María Coronel St., Sevilla
Cruz y Ortiz, 1974
Nexus World Housing, Fukuoka
OMA/Koolhaas, 1991
De Meaux, Paris
Renzo Piano, 1991
Trolley House, Boston
Utile, Inc., 2005

**Row House**
Weissenhof Siedlung, Stuttgart
J.J.P. Oud, 1927
São Victor, Porto
Alvaro Siza, 1974
Millennium Village Phase 2, London
Proctor and Matthews, 1989

**Bar/Slab**
Unite d’Habitation, Marseilles
Le Corbusier, 1945-52
Bouça, Porto
Alvaro Siza, 1973-77
855 Folsom Street, Yerba Buena Lofts, San Francisco
Stanley Saitowitz/Natoma Architects, Inc., 1998
Gifu Kitagata Apartment Building, Gifu
Kazuyo Sejima, 1998

Slither Housing, Gifu
Diller + Scofidio, 2000

De Dukaat + Zorro, Amsterdam
Tangram Architecture, 2002

Sildam, Amsterdam
MVRDV, 2002

230 Dwellings in Orestad, Copenhagen
PLOT, 2005

Tower
Hansaviertel Tower
Bakema, 1960

Peabody Terrace, Cambridge
Sert, Jackson and Courley, 1962-64

Twin Parks Northwest, Site 4, New York
Prentice, Chan Ohlhausen, 1970

I-J Tower, Amsterdam
Neutelings Riedijk Architecten, 1998

Mirador, Madrid
MVRDV, 2005
Task 2: Housing Prototypes

Project Brief

Each student is required to develop proposal for a prototypical residential scheme for Dudley Square, an urban context that, with only a few exceptions, is between four and eight stories in height. Buildings with walk-up units will be a priority of the studio, because wood frame buildings without elevators are a relatively unexplored low-cost high-density alternative to urban development. The advantage of promoting this model of development is more affordable market-rate (as opposed to publicly subsidized) units. In addition, there may be potential social benefits in residential buildings that are not predicated on the conventional elevator-and-corridor circulation model.

The strategic integration of either high-rise or single-family row house prototypes may be considered as an addition to the walk-up units where appropriate. In total, three categories of housing prototypes will be developed across the studio: a) high-rise (slab or tower) buildings taller than 70,’ organized by a bank of elevators, a double-loaded corridor, and the required two (or more) means of vertical egress, b) walk-up wood-frame buildings organized by a wider variety of circulation solutions including point-load, corridor based, and stacked-duplex arrangements, and c) single-family rowhouses. Several versions of each of these types will be developed during the few weeks of the semester and then packaged into a single handbook to be used by the entire studio section.

It is recommended that students start with a pointed line of questioning when developing their prototypes – generative ideas may include internal circulation logics, innovative unit aggregation strategies, a pointed social agenda, etc. Given that we are engaged in a pursuit that relies on past precedent for future innovation, the studio’s precedent studies may be used as catalysts for productive thought and direct critique. A strong thesis should be built up and clearly illustrated by the conclusion of the Prototype exercise.

The design agendas should be driven by the research, synthesis, and discussions during the first phase of the studio and may incorporate one of the following demographics:

1. Workforce housing: designed to attract young people who work at area medical centers and institutions.
2. Live/work: designed for professionals who use their home as a work and meeting space.
3. Housing for Urban families: designed for people who are committed to raising their children in an urban environment.
A prototypical site has been created to house your projects (see attached diagram). The street and sidewalk widths are givens but the precise size and proportion of the site is up to each designer. This is meant to allow for a wide variety of building proportions. Proposals must cover more than 80% of the total site area at the ground floor.

Given the nature of the exercise, the studio critics will offer general guidance but will not interject their own ideas or recommendations. It is also expected that designers will establish their own rigorous schedule to both allow for open-ended design exploration and adequate time to create a convincing final presentation of their proposals. The grade for this assignment is worth 15% of your overall grade.

**Prototype Review and Requirements**

Each studio section will hold their own independent review with a 30 minute wrap-up discussion that includes all three sections at the end of the day.

1. A PPT presentation of the proposal no longer than 7 minutes (the presentations will be timed with a strict cut-off)
2. The PPT must contain the following drawings:
   a. Floor plans: all typical levels with key dimensions clearly marked. Ground plan must clearly illustrate the given context (see attached) and any proposed exterior spaces.
   b. Typical unit(s): plans and sections
   c. Key axonometric views
   d. Diagrams that clearly represent the thesis of your prototype
3. A final physical model (white board or foam core).
4. A comprehensive set of study models that clearly illustrates your design process (the models may be an exploration of unit aggregation, circulation armatures, or the integration of two different housing types). The study models should be used as design tools throughout the exercise – not produced in retrospect.
5. Building program presented on appropriate drawings and within a single comprehensive table:
   a. Unit mix (size and number of each unit type broken down by number of bedrooms)
   b. Program list and areas of lobby, service areas, and other common building functions
   c. Total GFA (Gross Floor Area) of building
   d. Total area of parcel (project site within boundaries of the back of sidewalks)
   e. GFA of a typical floor
   f. Net-gross ratio of a typical floor
   g. GFA of ground floor
   h. Lot coverage = GFA of ground floor/Total parcel area
   i. FAR (Floor Area Ratio) = Total GFA/Total parcel area
**Task 5: Housing Prototypes Revisited**

**Project Brief**

In this final exercise students will revisit their prototypes to distill the final housing strategy. Coming full circle, the goal is to show the generic version of the otherwise site-specific project. Similar to the first prototype exercise, this will primarily be a representation of the unit aggregation strategy and the circulation armature. It may in fact be exactly what was reviewed initially or dramatically re-calibrated to reflect lessons learned over the course of the semester. The product of this exercise should be a concise set of drawings that serve as a reference for strategic approaches to prototypical housing archetypes and urban conditions.

**Prototype Requirements-**

1. Floor plans: ground plan and key upper level plans with key dimensions clearly marked. Plans must clearly indicate any proposed exterior spaces.
2. Building Sections: Longitudinal and Transverse
3. Axonometric view(s)
4. Diagrams that clearly represent the thesis of your prototype
5. Building program presented on appropriate drawings and within a single comprehensive table:
   a. Urban context (party wall, commercial street, deep site, residential fabric, etc.)
   b. Base building prototype (courtyard, low rise, double loaded, slab, etc.)
   c. Unit mix (size and number of each unit type broken down by number of bedrooms)
   d. Program list and areas of lobby, service areas, and other common building functions
   e. Total GFA (Gross Floor Area) of building
   f. GFA of a typical floor
   g. Net-gross ratio of a typical floor