

# **The Corridor Housing Initiative Block Exercise How-To Guide**

Metropolitan Design Center  
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## About this Document

The block exercise was developed by the Corridor Housing Initiative to give community members a greater working knowledge of what makes a higher density or affordable housing project financially viable. This document explains the block exercise in detail, from planning and preparation through the creation of final development guidelines.

## What is the Corridor Housing Initiative?

Led by the Center for Neighborhoods in the Twin Cities, the Corridor Housing Initiative (CHI) demonstrates replicable models of proactive, integrated planning and consensus building among neighborhoods, cities, and counties.

CHI produces economically and politically viable development projects that include affordable housing options and that integrate metro area corridors that meet city goals and neighborhood interests.

In its first phase, from 2003 to 2005, the CHI technical team comprised:

- Center for Neighborhoods (C4N, coordinators)
- Metropolitan Design Center (MDC, urban design, participatory processes specialist)
- Center for Policy Planning and Performance (CPPP, overall facilitation and evaluation)
- Central Community Housing Trust (CCHT, financial feasibility)
- Dewar and Associates (development consultant)

For more information about the Corridor Housing Initiative visit: [www.designcenter.umn.edu](http://www.designcenter.umn.edu). A new website will soon be available at [www.housinginitiative.org](http://www.housinginitiative.org).



The above photographs were taken during block exercises and public participation events conducted in the Twin Cities.

## Overview of the Block Exercise

The block exercise is an interactive, hands-on opportunity for community members to experience the process of property development including the financial viability of various development options. Through the block exercise, participants examine the myriad of choices facing a developer in relation to a specific site, such as mix of residential and commercial uses, surface level or underground parking, amount of green space, number of units, and integration of affordable housing.

The exercise begins by grouping community members at tables with two designers: one to help facilitate the design and one to sketch the result. Working from a large aerial photo of a hypothetical development site, citizens create development options from block models representing standard unit sizes.

Costs and revenues for the proposed developments are calculated according to average local developer fees, construction costs, rental sales prices, and standard subsidies by a development consultant during the workshop.

A model takes about 15-20 minutes to design. Once a model is complete, it is photographed by the designers who sketch the model from the photograph while the next model is built.

Through the block exercise, community members gain a greater understanding of the development process and create a range of development concepts to help guide future development in the area. Residents leave with a deeper understanding about the economic constraints of development, design opportunities in their neighborhood, and issues relating to density, land use, and housing types.

For more information, see the handout “Block Exercise in Brief” at [http://www.designcenter.umn.edu/projects/current/current\\_research\\_areas/housing/corridor\\_housing/block\\_exercise.html](http://www.designcenter.umn.edu/projects/current/current_research_areas/housing/corridor_housing/block_exercise.html)



Top: Blocks used to create development options. Middle: Participants developing a scenario. Bottom: A designer sketching an illustration of a completed model from a Polaroid photograph.

## Creating the Blocks

Blocks are a key component of the exercise. This section explains their design and construction.

### Unit types and sizes

Sizes of the units constructed are relatively large for affordable housing but relatively small for ownership overall. The MDC used a 1" = 20' scale for both the blocks and base map, with individual block sizes as follows:

|   |          |
|---|----------|
| 1 two-story rowhouse – 2 layers sandwiched together, 22' x 30'  | 1320 sqf |
| 2 two-story rowhouses – 2 layers sandwiched together, 44' x 30' | 2640 sqf |
| 4 two-story rowhouses – 2 layers sandwiched together, 88' x 30' | 5280 sqf |
| 4 one-story apartments (hallway end) – 88' x 60'                | 5280 sqf |
| 4 one-story apartments (central hallway) – 88' x 60'            | 5280 sqf |

### Constructing the blocks

MDC used 1/2" medium density fiberboard to construct the blocks which was easy to cut, inexpensive, relatively durable but heavy. For two-story units, two layers of MDF were glued together before cutting. A table saw worked well to cut both the one-story and two-story blocks to precise dimensions.

Sheets containing the printed tops for the blocks (see figure 3.1) are available in appendix A and as a PDF at [www.designcenter.umn.edu](http://www.designcenter.umn.edu). For clarity, the three different housing types — single detached or attached rowhouse, central hallway apartment, and hallway end apartment — were printed on different colors of paper. After cutting the printed tops were easily affixed to their corresponding MDF blocks using glue stick.

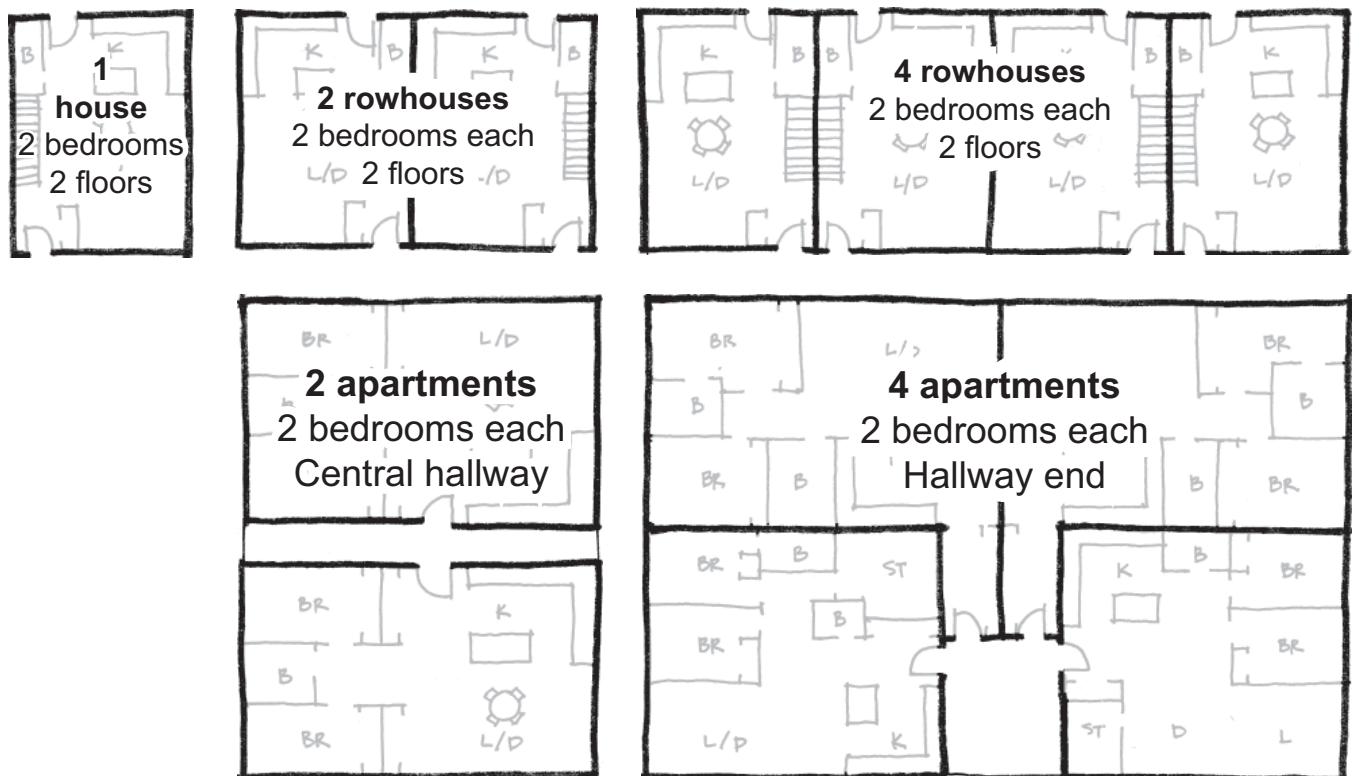


Figure 3.1 Selection of unit types. Other apartment styles are available in the PDF and appendix A.



## Base Maps

During the exercise, unit blocks are placed on base maps of proposed development sites. This section explains how to make a base map.

### Base map using orthophoto

An orthophoto is a high level aerial photo adjusted for the curvature of the earth to work as a map. To make a base map, you will need a very high resolution orthophoto of no more than 1 foot per pixel and preferably less. Plot or print and stitch together the orthophoto of the building site using the same scale as the blocks (see figure 4.1) Base maps are typically 36" x 36" sheets, and can be bigger for large sites.

To help orient participants, it is useful to include some context around the site; use plain or overturned blocks to represent the buildings in the context area (see figure 4.2).

Other helpful map notations include labeled streets, a north arrow, and a scale. MDC typically labelled the base maps prior to printing, using GIS software or InDesign (See figure 4.4); maps can also be hand labelled. The perimeter of the potential development area should be outlined, and MDC adopted a solid white line for areas within the development parcel and a dashed white line for areas that could be acquired if necessary. Outlines can be done in advance with the other labeling. White correction tape works well to modify the outline during the exercise itself if needed.

### Base map without orthophoto

Orthophotos are preferred because they give the map a sense of the place that is nearly impossible to reproduce in a line map. But if orthophotos are not available for the area, draw as much information as is available on a large sheet of paper at a 1" = 20' scale.

### How many development sites?

One to three development sites were typically provided to participants. For areas where there is only one viable site, one development site is appropriate. In areas where it is more important



Figure 4.1 Orthophoto base map including neighborhood context with labeled streets, scale, and north arrow.



Figure 4.2 Upside down blocks used to show context of surrounding buildings.

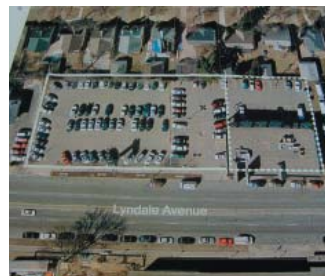


Figure 4.3 Expanded site labeled using correction tape.



Figure 4.4 Expanded site labeled using GIS during initial layout.

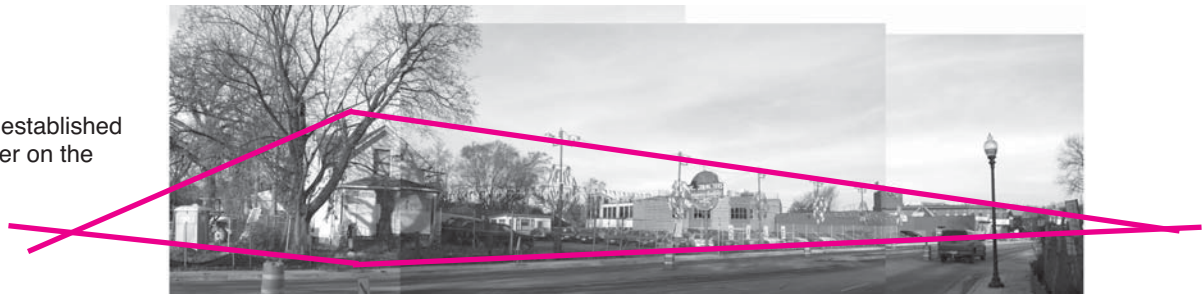
to get a feel for the overall development environment, MDC found that three options showing a range of site sizes and locations worked well.

## Perspectives

Perspective drawings from street level can help participants accurately envision potential development scenarios. These can be relatively easily constructed by creating a template grid and using a tracing paper overlay to sketch on (See figures 5.1, 5.2, and 5.3).

To produce these perspective drawings, visit the site before the workshop. Photograph a panorama of the entire site from that point. Find a position that will enable you to photograph the entire site generally a point across the street from or opposite corner. Piece these photographs, together into a panorama either digitally or manually (MDC typically does this step digitally using layers in Photoshop). Print or photocopy the panorama onto 11" x 17" pages. Using existing buildings, curbs, street furniture, or cars to find the vanishing point(s) to the site. Construct a grid over the site with 22' horizontal intervals to match the blocks, a 15' ground floor to accommodate commercial use, and 10' subsequent vertical stories (See figures 5.1, 5.2, and 5.3). This process invariably involves some approximation to yield the best result but it is possible to reference the orthophoto to find the dimensions and distances of various features in the photos and to use these to draw in the lines. These lines can be placed digitally on the image, it may be quicker, however, to draw the grid by hand using a brightly colored pencil to make the grid easier to see. Photoshop can be used to create equal vertical

5.1 Vanishing points are established by overlaying tracing paper on the panorama photograph.



5.2 Floor lines are drawn next, followed by vertical lines at approximately 22' spacing.



5.3 Completed block perspective is now ready to be used to develop building sketches.





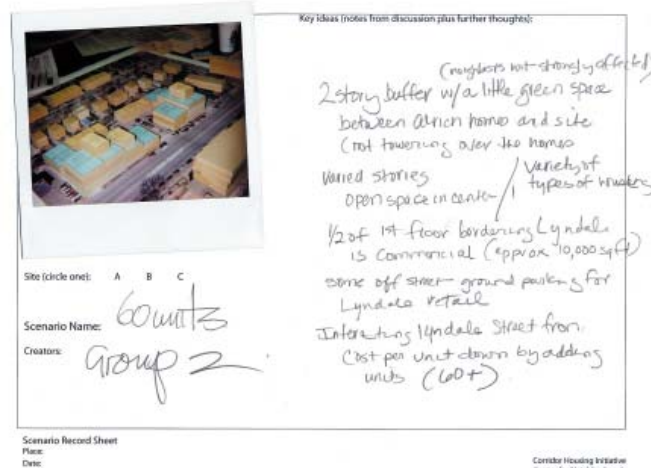
divisions that appear in perspective by drawing a rectangle with the correct number of 22' divisions for the total length desired and then transforming and skewing it appropriately. Typically, two perspective views are created for each potential development site to allow the sketcher the ability to choose which view suits the scenario best.

## Completing a Scenario

During the exercise, it is helpful to have one designer sketch while another facilitates the discussion and moves the group on to creating another scenario. Before dismantling a scenario, use a Polaroid camera to photograph the block configuration from a similar angle to that of the perspective grid; this



5.4 From right to left: Table facilitator, sketcher, and exercise participants.



5.5 Scenario Record Sheet documenting number of units and detailed description of proposed development.



5.6 Perspective sketches of multiple styles for the same site.



is helpful for sketching. Query participant(s) who created the scenario about their preferred architectural style, (e.g. Modern, Shaker, New Urbanist) so the sketch can be tailored to represent this style. Take a digital photograph that shows the entire arrangement and some context for use in the summary handout that will be created after the exercise. Count the units in the scenario and record this on the Scenario Record sheet (figure 5.5) note key ideas and comments from the discussion, and attach the Polaroid to this sheet.

## Development pro forma

Originally created by the Central Community Housing Trust, the pro forma is a dynamic spreadsheet that helps participants understand the financial feasibility of various development scenarios.

The pro forma is an Excel workbook with multiple work areas and assumptions about unit and site character, parking, developer fees, construction costs, and potential subsidies.

During the exercise, participants refer to a paper version of the pro forma that includes the key variables. Variables illustrated in the paper version include; site square footage, estimated land cost, units per acre, commercial square footage, parking configuration, ownership mix, and affordable/market rate mix. The figure in the final line indicates the capital excess or gap per unit (See figure 6.1).

## Typical results

Exercise participants soon discover that results vary for each individual site. In general, more units yield more income but there are some exceptions. Understanding the following points can help facilitators interpret results.

- For one-to two-story buildings, surface parking can be used to reduce construction costs, and there are sites for which a two-

| Corridor Housing Initiative - May 1, 2004 Planning Event<br>Site Plan and Financial Implication Scenarios and Comparisons<br>Powderhorn Neighborhood / East Lake Street Opportunity Sites   |                  |                   |                   | Site C     |
|---|------------------|-------------------|-------------------|------------|
| The Physical Shape of Development Opportunities   |                  |                   |                   |            |
| Variables   | Scenario 1       | Scenario 2        | Scenario 3        | Scenario 4 |
| 2-story base site footprint   | 38,743           | 38,743            | 31,908            | 45,500     |
| 3.5 story base site footprint   |                  |                   |                   |            |
| 3.5 story expanded site footprint   |                  |                   |                   |            |
| GROUP MODEL   |                  |                   |                   |            |
| <b>Building Scale/Massing/Shape</b>   |                  |                   |                   |            |
| Floor-to-Area Ratio (FAR)   | 56.00%           | 55.00%            | 50.00%            |            |
| Building Height (including basement level)  | 2.00             | 4.50              | 4.50              |            |
| % of site "green"   | 0.87%            | 31.50%            | 27.85%            |            |
| % of site "paved" (parking, sidewalks, etc.)  | 38.13%           | 13.50%            | 22.05%            |            |
| <b>Building Uses and Corresponding Needs</b>  |                  |                   |                   |            |
| <b>Residential Unit Mix/Type:</b>   |                  |                   |                   |            |
| Efficiencies/Studios  | 6                | 8                 | 8                 |            |
| One-Bedroom   | 8                | 10                | 8                 |            |
| Two-Bedroom   | 22               | 40                | 43                |            |
| Three-Bedroom   | 5                | 10                | 9                 |            |
| <b>Total Units</b>  | <b>39</b>        | <b>66</b>         | <b>68</b>         | <b>6</b>   |
| Units per Acre  | 46.24            | 78.29             | 84.53             |            |
| Bedrooms per Acre   | 64               | 148               | 122               |            |
| People per Acre   | 127              | 218               | 184               |            |
| <b>Commercial Uses:</b>   |                  |                   |                   |            |
| Commercial Space (Yes/No)   | no               | no                | yes               |            |
| Commercial Square Footage   | 0                | 0                 | 6,422             |            |
| <b>Parking:</b>   |                  |                   |                   |            |
| Preliminary Parking Stalls per Unit Ratio Class   | 1:1 ratio        | 1:1 ratio         | 1:1 ratio         |            |
| # of Parking Stalls at Grade  | 39               | 0                 | 14                |            |
| # of Parking Stalls Below Grade   | 0                | 0                 | 70                |            |
| Actual Parking Stalls to Unit Ratio   | 0.92             | 0.92              | 1.24              |            |
| <b>The Financial Shape of Development Opportunities</b>   |                  |                   |                   |            |
| Variables   | Scenario 1       | Scenario 2        | Scenario 3        | Scenario 4 |
| 2-story base site footprint   |                  |                   |                   |            |
| 3.5 story base site footprint   |                  |                   |                   |            |
| 3.5 story expanded site footprint   |                  |                   |                   |            |
| GROUP MODEL   |                  |                   |                   |            |
| <b>What Does it Cost?</b>   |                  |                   |                   |            |
| Site Assembly Costs   | 734,860          | 734,860           | 1,167,460         |            |
| Cost per square foot  | 36.20            | 36.20             | 26.43             |            |
| Creation of Residential   | 5,813,000        | 9,840,240         | 10,225,800        | ACWOP      |
| Creation of Commercial  | 0                | 0                 | 1,309,670         | 0          |
| Creation of Parking   | 61,776           | 1,810,000         | 1,889,356         | 0          |
| Creation of Green Space Improvements  | 24,203           | 85,979            | 85,315            | 0          |
| <b>Total Development Cost</b>   | <b>6,633,840</b> | <b>12,371,079</b> | <b>14,687,941</b> | <b>0</b>   |
| Cost per Residential Unit (includes pro-rated share of green space)   | 168,015          | 185,215           | 185,215           | ACWOP      |
| Cost per Parking Stall (does NOT include acquisition of property)   | 1,718            | 26,303            | 36,084            | ACWOP      |
| Cost per residential/unit, including accommodation for parking  | 170,008          | 185,928           | 186,734           | ACWOP      |
| <b>Unit Mix &amp; Uses Information</b>  |                  |                   |                   |            |
| # of Rental Units   | 39               | 66                | 68                |            |
| # of "Market Rate" Rental Units   | 22               | 36                | 33                |            |
| # of "Affordable Rate" Rental Units   | 10               | 31                | 35                |            |
| # of Home-Ownership Units (see previous section below for home-ownership info)  | 0                | 0                 | 0                 |            |
| <b>Capital Sources</b>  |                  |                   |                   |            |
| Mortgage (includes additional support by TIF)   | 2,739,368        | 5,225,952         | 7,250,514         | 0          |
| Equity (includes credits and/or developer fees)   | 2,568,402        | 3,772,408         | 4,154,871         | 0          |
| GOAP Resources (includes typical pop amounts & sources, such as CPED, MNFA, NRP, HMA, Co. and other public/private affordable housing sources)  | 1,843,000        | 2,747,000         | 2,919,000         | 0          |
| <b>Total Capital Sources</b>  | <b>6,547,791</b> | <b>11,745,360</b> | <b>14,284,445</b> | <b>0</b>   |
| <b>Total Capital Excess (GAP) For This Scenario</b>   | <b>(86,083)</b>  | <b>(625,713)</b>  | <b>(403,496)</b>  | <b>0</b>   |
| GAP per unit  | -2,207           | -7,965            | -5,929            | 0          |
| <b>Pro's &amp; Con's for Each Scenario</b>  |                  |                   |                   |            |
| <b>Scenario 1</b>   |                  |                   |                   |            |
| Insufficient usable green space due to surface parking. Cost of land too high to support low-density development. Also, the project is small, and "impact" level is important in order to attract necessary public resources necessary to build the project. Limited ability to incorporate amenities (like functional, usable green space) to attract market rate renters to this site. If project was a "for-sale" development, average sale price per sq. ft. would need to be approximately \$172/SF.   |                  |                   |                   |            |
| <b>Scenario 2</b>   |                  |                   |                   |            |
| The higher density requires below-grade parking in order to have a quality living environment with functional and green space. The below-grade parking costs more than surface parking, but is an amenity that many urban dwellers will seek. Higher density allows the cost of site acquisition to be shared by more units (than the 2-story option). The "impact" issue is similar to Scenario 1. Impact level is important and critical to attracting necessary public sector resources. Developers seek advantages in production. If "for-sale" development, average sale price per square foot would need to be at least \$178/SF. |                  |                   |                   |            |
| <b>Scenario 3</b>   |                  |                   |                   |            |
| Accomplishes multiple goals of producing quality urban design and in-fill development. This scenario has the least amount of gap per unit, and provides the most significant impact. However, added component of commercial aspect would require the commercial rent @ approx. \$16-\$17/SF in triple-net rent to the owner to break-even. If residential context was "for-sale" units, break-even point is approx. \$102/SF.   |                  |                   |                   |            |

6.1 Paper version of the pro forma showing a limited number of variables. Arrows point to key variables for discussion such as numbers of units.

| Variables            | Scenario 1  | Scenario 2  | Scenario 3               |
|----------------------|-------------|-------------|--------------------------|
| Height               | 2 story     | 3.5 story   | 3.5 story, expanded site |
| Units                | 17          | 31          | 49                       |
| % site green         | 9%          | 32%         | 32%                      |
| % site paved         | 36%         | 14%         | 14%                      |
| On ground parking    | 17          | 0           | 0                        |
| Below ground parking | 0           | 29          | 46                       |
| # market rate rental | 9           | 16          | 25                       |
| # affordable rental  | 8           | 15          | 24                       |
| Gain (loss)          | (\$205,054) | (\$297,711) | (\$215,487)              |
| Gain (loss)/unit     | (\$12,062)  | (\$9,604)   | (\$4,398)                |

6.2 Simplified version of pro forma designed for Power Point that highlights key variables from the spreadsheet.



story building is financially preferable.

- A building of three stories or more require underground parking. The building should include as many units as possible. Since wood frame construction is only feasible to four residential stories (up to a total building height of five stories if there is a masonry commercial level), there are very few financially viable three story buildings. Typically, four story buildings are viable.
- In some areas, land prices are so high that either units must be very expensive, or buildings must be taller to accommodate more units, yet more stories require steel or concrete construction. This increase in construction costs means a building may need to be 10 or more stories to make money, unless sales prices or rental amounts are extremely high.
- Commercial development is often not financially viable as it is more expensive than residential and generates less income in many cases. Although some residential developers subsidize a coffee shop, this is not always possible. It is important to be able provide good examples of residential-only development along corridors.

### Typical base scenarios

Given the above considerations, MDC typically uses the following base scenarios when developing the pro formas:

- Two-story base site footprint
- Three-and-a-half story base site footprint, i.e. a mix of three and four story parts of the building

### Final development guidelines

The final product is a set of guidelines developed by community participants, not the technical team (see examples in appendix B). The process of creating the guidelines helps the neighborhood clarify their aims, and the guidelines resulting communicate those aims to developers.



6.1 Development feasibility team compiling data and completing pro forma.



6.2 Proposed block arrangement with stepped back building.

## Staffing

The block exercise requires a number of people to prepare and staff the exercise.

Preparation for the exercise requires people in the following roles:

- Work with the client group to select the site and the base scenarios
- Photograph the site and set up the perspective
- Make the base map, GIS or other mapping knowledge is useful
- Articulate development feasibility for various scenarios
- Interact with the development feasibility folks

At the block exercise people are needed to serve as:

- Meeting facilitator (this person can double as a table facilitator)
- Table facilitator (needs basic design knowledge which can be acquired at preparatory workshops)
- Perspective drawer (must be quick, and skilled with tracing paper and felt tip pen (Computer graphics are too slow))
- General photographer (someone to take photos of the exercise and run around finding equipment and posting designs)

## Equipment checklist

### For group:

- Pens for participants' use
- Broad-tipped markers for flip charts
- Sign-in sheet
- Name tags
- Post-it ® notes
- Note pad
- White correction tape (quickly and easily change development site borders)
- Masking tape
- Glue stick (fix broken blocks)
- Scissors
- Polaroid ®camera and film
- Digital camera for documenting process
- Power strip, Extension cord
- Easels

### For each table:

- Blocks
- Key to block sizes
- Pro forma sheets



- Scenario record sheets
- Sketch Pack:
  - Copies of perspective grid
  - Extra fine, Ultra fine, and “Razor Point” Super fine markers for drawing perspectives
  - Pencils
  - Tracing paper
  - Engineering scale
  - Colored pencils (to make it easier to discern photocopied lines through tracing paper)
  - Transparent tape
  - Colored paper (to make green space, parking lots, etc.)

**Informational materials:**

- Flier explaining Block Exercise overall process
- Packets
  - Housing Density Packet
  - Housing Design Issues Packet
  - Housing Types Packet
- Posters
  - New Affordable Housing in the Twin Cities Poster
  - Housing Density Poster
  - Housing Types Poster
  - Mixed-Use Developments Poster
  - Design Strategies for Housing on Corridors Poster
  - Building Heights Poster

## **Other decisions**

### **Is food needed?**

Yes. The exercise is intense and involves a lot of steps. Moments to step away for a bit of sugar or caffeine help fuel participants and people involved in leading the exercise.

### **Is it a worthwhile summary?**

Yes. A takeaway product is important, particularly since only a few people can do the exercise at one time. Raw products from the exercise (the sketches, pro formas, record sheets) are more comprehensible when summarized.

### **Is the pro forma essential?**

Without the pro forma, the block exercise may still be a valuable technique for eliciting public opinion regarding development. However, the pro forma adds the important component of educating the public about the difficulties inherent in creating financially feasible developments. It's easy enough to do architectural renderings of hypothetical designs; what makes the exercise compelling is the involvement in determining which of the hypothetical scenarios are realistic.

## **Block exercise summary handouts**

The final handouts are typically 11" x 17" sheets. They include:

- The orthophoto with site boundaries and other annotations
- Process pictures from the workshop
- Perspective sketches that can either stand alone or be overlaid onto the site panoramas
- Photographs of the actual block scenarios (MDC has typically scanned the Polaroids® taken during the exercise.)
- Information about each scenario, including the number of units and, if desired, the financial data

Templates of the handouts are available as InDesign templates at <http://www.designcenter.umn.edu>.

A PowerPoint version of the final handout can also be useful. A template Power Point slide is available.

## **Credits:**

This kit was developed by Ann Forsyth, Sam Kellerman, Ian Kaminski-Coughlin, Katie Thering, Chelsea Johnson, and Eve Wolf. The Block Exercise is based on a process developed and refined by many people: Tom Leighton from the City of Minneapolis invented the block model; Sarah Huss from the Central Community Housing Trust developed the real estate pro forma; Ann Forsyth, Dan Markel, and Nathan Burt created the earliest version of the exercise.

Members of the Corridor Initiative are listed at [http://www.designcenter.umn.edu/projects/current/current\\_research\\_areas/housing/corridor\\_housing/corridor\\_housing.html](http://www.designcenter.umn.edu/projects/current/current_research_areas/housing/corridor_housing/corridor_housing.html).