

Creating  
Generative Code for  
A New  
Neighborhood of  
Houses in Strood

UNFINISHED WORKING DRAFT Version 12, Sept 6, 2005

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Generative Code text and Strood sketch designs © 2005 Center for Environmental Structure

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GENERATIVE CODE FOR STROOD HOUSING



*Strood, on the River Medway, across the river from Rochester*

WORKSHEET FOR  
**Site Diagnosis**

1. Finding Special Places on the Site

**Process** Participants walk the site, alone, looking for those places, and stopping, where there is something special in the air: a view, a feeling, a place which should be made more precious, or preserved or enhanced in its importance. After identifying these things individually, in the peace of mind of their own private observation, the participants then go round again, this time together, marking those places which are agreed, and also listing those not agreed.

**Participants** Architect Planner Local Neighbors Incoming Families

**Timescale**

**Deliverables** Plot on a map, each of the special places with notes about what makes it special.

WORKSHEET FOR  
**Site Diagnosis**

## 2. Beautiful Views

**Process** Participants look for view corridors -- beautiful views to distant sights; and locally pleasant views, especially views which bring a particular spot to life.

**Participants** Architect Local Neighbors Incoming Families

**Timescale** 1 week

**Deliverables** Each important view is to be recorded on a topo by the place or places from which it is most easily seen, or seen to the best effect, together with an arrow showing the direction in which it is seen and *the view corridor it requires*.

WORKSHEET FOR  
**Site Diagnosis**

### 3. Natural Ways in and Out

**Process** To find the most natural ways in and out, participants walk in and out of the site, looking for the most comfortable paths to come in by, and the most comfortable ways to leave. The emphasis is on the feeling that is created by the detail of each path. An example would be to search for a way through the back corner, that leads to the park above the site.

Another way would be to look at the approach under the railway bridge at the south end of the site, and ask how this could take on more feeling.

**Participants** Architect Planner Local Neighbors Incoming Families

**Timescale**

**Deliverables** Approaches are recorded as very specific arrows on map showing best ways to approach and *best ways to leave*.

WORKSHEET FOR

Density Calculations

4. Establish range of house sizes

**Process** A decision has to be made for the statistics of dwellings available, according to size; garden yes/no; price; rental or ownership.

**Participants** Developer Focus groups of families

**Timescale**

**Deliverables** Average size (SF)  
Range of sizes  
How many have their own garden  
How many have parking near house if it costs xx  
How far do they want to be from other parked cars  
What percentage will be owner occupied  
How many will be subsidized  
How many rental



WORKSHEET FOR

Density Calculations

5. Percentages of Pedestrian Land, Green Land, Building Footprints, and Cars

**Process** In order to find the right balance of things in the neighborhood, we need to allocate relative amounts of the ground surface, to the following six categories. It is these percentages which do most to influence the feeling in a neighborhood. Studies suggest that ideal percentages are roughly those shown in the third column.<sup>1</sup>

Types of land	Ideal Percent of total square ft	Nature of Order
Public green space	20%	Together more than 30%
Private green space (private gardens or terraces)	10%	
Pedestrian space in public walks/paths	17%	About 17%
House footprint, of built land	19%	Less than 28%
Parking	18%	Less than 25%
Vehicular roads	6%	together

**Participants** Architect Planner Developer Local Neighbors Incoming Families

**Timescale** 2 weeks

**Deliverables** Fill out percentages and areas in the following table

Types of land	Allocated Percent of total square ft	Allocated sf	Allocated acres (total about 21 acres)
Public green space	17%		5
Private green space (private gardens or terraces)	17%	30*30*280 =250000	6
Pedestrian space in walks and paths	17%	60000+	3
House footprint, interior of all foundations	17%	1000*280/3 = 93000	3.5
Parking	17%	90000	2.25
Vehicular roads	17%		2

<sup>1</sup> *The Nature of Order*, Book 3, *A Vision of a Living World*, chapter 9, pages 288-95.

WORKSHEET FOR  
Formation of Large-Scale Positive Space  
6. Contained Space

**Process** Inspect the site, walk about, and standing in various places, try to visualize the way that land might be shaped, by buildings, so as to form beautiful outdoor space that is “positive” – that means, contained emotionally and physically, and comfortable as a place to inhabit – yet also looking out (so you don’t feel trapped, as you do, for example, inside the nearby housing project). Each piece of land will create different opportunities for this kind of atmosphere. Definitions of positive space can be found in *Pattern Language* and in *Nature of Order*.<sup>2</sup>

**Participants** Architect Planner Local Neighbours Incoming Families

**Timescale**

**Deliverables** Very rough sketch diagrams suggesting how this might be done on the site, and what kinds of positive space would make sense with the land-form, slopes and vistas.

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<sup>2</sup> *APL*, pages 517-23, and *The Nature of Order*, Book 1, *The Phenomenon of Life*, pages 173-78.

WORKSHEET FOR  
**Formation of Large-Scale Positive Space**  
**7. Looking Out**

**Process** Further study given to the ways that each of these large positive spaces can successfully look out onto other large spaces, sometimes to an even larger space.

**Participants** Architect Planner Local Neighbors Incoming Families

**Timescale**

**Deliverables** Diagram of possible schematic arrangement of spaces and openings that would fit the site.

WORKSHEET FOR

Formation of Positive Space

8. Chains of Space: Enclosure of Space and Degree of Enclosure

**Process** The balance of enclosure and openings around a given outdoor space, in relation to the size of the space, is of critical importance determining how positive a particular bit of space is, and how it is perceived and felt. Trying to visualize how this can happen is more difficult on this site, than usual, since there are so many industrial buildings still standing there. One really has to stand in a place, eyes shut, and imagine what kind of space, and to what extent enclosed and surrounded, will make you feel well and happy there.

That is what we are trying to find out.

**Participants** Architect Planner Local Neighbors Incoming Families

**Timescale**

**Deliverables**

WORKSHEET FOR

## Rough Positions of Building Footprints

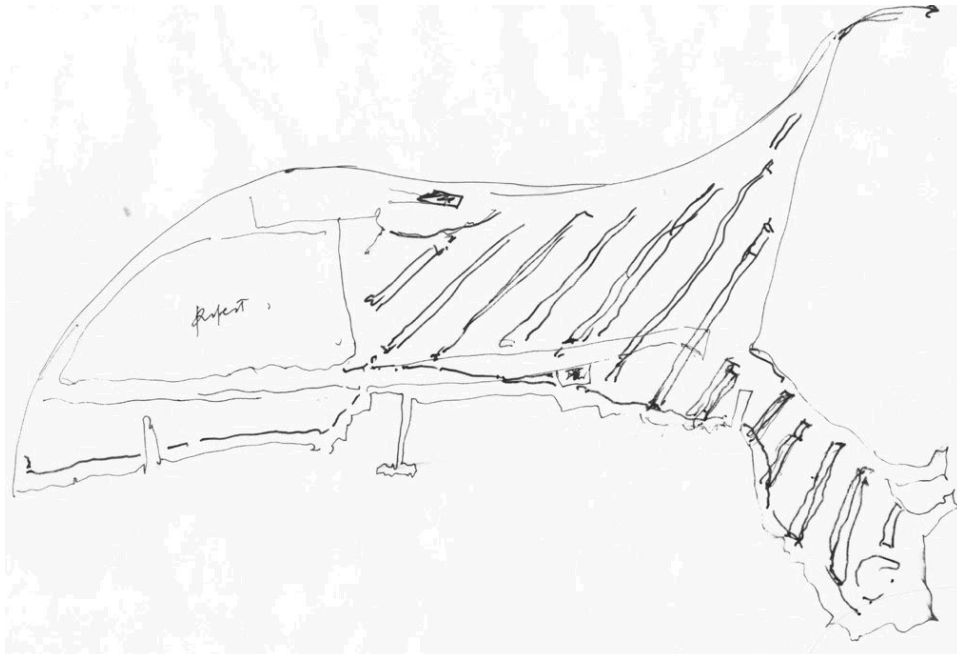
### 9. Roughly Arrange Rows of Housing Some 20 to 25 foot deep to Surround Chains of Positive Space

**Process** Using the inspiration of the overall positive space scheme, where the outdoor spaces have a good chance of being pleasant, desirable and beautiful for families living there, it is now necessary to start placing potential locations for houses. At high densities the houses will probably need to be attached in row-house forms. Research and experience suggest that the rows of houses will create more desirable living circumstances if they are shallow with long frontage, rather like old-fashioned cottages, instead of narrow frontage, and deep (which is the typical modern version of the row-house form).<sup>3</sup>

**Participants** Architect Planner Local Neighbors Incoming Families

#### Timescale

**Deliverables** A rough sketch on a site map, showing how rows of houses might enclose beneficial positive space.



<sup>3</sup> These long narrow cottage-like condominiums have been described at length in *The Nature of Order*, Book 3, *A Vision of a Living World*, chapter 10, pages 311-32.

WORKSHEET FOR

## Rough Positions of Building Footprints

### 10. Now Modify Positions of Housing Rows To Improve Views And the Positive Quality Of Exterior Connected Space

**Process** Look at the spaces created by the housing strips in the previous process, and examine how the space can be improved. To find the most beautiful space, pay attention to the beautiful views already recorded, and to the feeling of walking through the space on your way home. Check this carefully on the site, at different times of day and different weather.

In the following diagram, the trumpet shape of the outdoor spaces, as they look toward the water, comes from the combination of regard for the view of the Medway, and the opening out of the space towards the end of the view. In addition the curved shape of the space, as one looks towards the view, makes the walk to the water endlessly fascinating, and draws you to the water.

**Participants** Architect Local Neighbors Incoming Families

**Timescale** 2 weeks

**Deliverables** A modified plan drawing at 1 inch = 240 feet, over an aerial photograph, shows modified positive space.



*Scale of this drawing as reproduced here is about 1 inch to 500 feet*

WORKSHEET FOR

Use GPS or Total-Station Surveying

11. To Read Field Positions Of Stakes and Proposed Building Edges To Map Positions

**Process** The real places which suggest themselves for buildings, open spaces etc, are always influenced by the site and context, and by the feelings one experiences walking on the land. It is therefore essential to transfer these positions, while still fresh and freshly marked, onto a topo map, so that one can then judge the real configurations which on-site work dictates, and incorporate the result of this knowledge in the calculations and refinements which must follow.

One must therefore make a maximum effort, no matter how hard it seems, to stand on the land, and visualize whatever sketches and positions have been visualized, in actual places that seem fitting and appropriate, while on the land.

The result of this work is then marked by flags, stones, chalk marks, whatever is useful and appropriate, and these marks are then, immediately record by a GPS method, to the topographic maps. The results will be surprising, but it is this surprising configuration that arises which must be trusted, and which must then become the basis of future work.

**Participants** Architect Surveyor

**Timescale** 1 week

**Deliverables** Direct electronic feed of GPS survey into topo map.

WORKSHEET FOR

## Preliminary Calculation of Number of Dwellings

### 12. Use The Following Assumptions

**Process** Each long rectangular narrow strip represents a long thin row of houses (arranged lengthwise), on 1, 2 or 3 stories. Each dwelling will be on a single floor, 1<sup>st</sup> and 2<sup>nd</sup> floors accessed from an exterior stair. The long rows will now be subdivided into units. The party walls which divide the row into units will go through all two or three floors. Making these subdivisions is essentially making the decision about the size of houses. If your strip is 6 meters wide, and you make a house 12 meters long, this house and the flats above it, will have about 72 square meters, if 20 meters long, then 120 square meters. Neighbouring houses do not need to have equal lengths.

With this drawing above, a first calculation of the total length of possible building footprint can be made. In the drawing shown below this total length is about 26 inches, representing about 5800 feet, times 3 stories makes some 17,000 feet of dwelling length, or  $17,000 \times 20$  feet = 340,000 sf of built space – a little short of 300 dwellings.

**Participants** Architect Developer

**Timescale**

**Deliverables**



WORKSHEET FOR

Parking Calculation and Positions

13. Calculate and Place The Total Area Of Parking Needed for the Neighborhood, In Relatively Small Lumps, Located In The Least Pleasant Places

**Process** Use as a basis, a figure of 1 parking space per dwelling (justified by proximity to station).

Place the parking in those positions which are least desirable as living space, and arrange the parking lots to be, as broken up, in small parking lots. Do not assume that parking must be close to the house. It may be necessary to provide locked or roofed group space.

In the instance of this site, I would imagine the least pleasant places will be towards the back of the site, near the railway line, and in small triangular sections between the trumpet shaped spaces. Above all we do not want parking to stand between the houses and the waterfront. It is vital to place, and shape, the parking lots in such a way that all remaining space is **positive**.

**Participants** Architect Developer

**Timescale**

**Deliverables** Approximate parking areas, totalling the required 300\*300 or 90,000 square feet, must be shown roughed in on the aerial photograph and plan, reaching the 90,000 total.



*Some possible parking areas. Obviously not enough yet.*

WORKSHEET FOR

Pedestrian Connectivity

14. Main Pedestrian Lines Of Movement

**Process** Mark the principal lines of pedestrian movement, including, of course, the main lines of movement. These should be beautiful and enticing places to walk. An obvious one goes along the waterfront (roughly shown below). Another goes to the back corner of the site, thus connected to the little park up on the hill and its view of Rochester; others are needed, too.

**Participants** Architect and families Developer

**Timescale**

**Deliverables** Mark the principal lines of intuitively obvious pedestrian movement on the map



*Yellow shows first stab at pedestrian along the waterfront*

WORKSHEET FOR

**Pedestrian Connectivity**

**15. Movement from Parking to Houses. Put In  
Pedestrian Paths From Each Parking Lot To The  
Houses It Serves**

**Process** Lines of movement from parking lots, to the positive space which the houses surround. These paths need not be heavy, perhaps quite narrow and inexpensive. However, they can serve double duty for emergency vehicles.

**Participants** Architect ; Neighboring families ; Potential incoming families

**Timescale**

**Deliverables**

WORKSHEET FOR

## Pedestrian Connectivity

### 16. Loops, Gaps, and Cross Paths

#### Make Sure There Are Many Pedestrian Loops

**Process** A neighborhood or community relies on a richness of pedestrian connections. Every time you take a walk, it can be a different walk. Hillier and Hanson have proved that the level of community attained in a neighborhood is directly linked to the number of loops in the pedestrian path system.<sup>4</sup>

In the preliminary layout of houses, one therefore seeks to make occasional gaps between the houses, interrupting the length of the row, so that one can walk, easily, from one main green to the next. In addition, arched tunnels may run through the house row, making a similar connection. These arched ways should be pleasant and airy.

All in all the cross ways and archways created in this fashion should form an abundance of possible loops in the path system. Important note: Any path coming from one space to another, will be most effective if there is a target, in the middle of the green space, which draws you through the tunnel, or through the gap – such a target might be a tree, a well-placed bench, a fountain, a small house where children might play, a pond.

**Participants** Architect Families

#### **Timescale**

**Deliverables** A drawing of the pedestrian system, showing all paths, and all loops, and all targets which animate the small cross paths by providing something to walk towards..

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<sup>4</sup> Hillier and Hanson, ... pages xxx.

WORKSHEET FOR

## Rough Positions of Individual Houses

### 17. Subdivide Rows Crosswise to Form Rough House-volumes

**Process** Each long rectangular narrow strip represents a long thin row of houses (arranged lengthwise), on 1, 2 or 3 stories. Each dwelling will be on a single floor, 1<sup>st</sup> and 2<sup>nd</sup> floors accessed from an exterior stair. The long rows will now be subdivided into units. The party walls which divide the row into units will go through all two or three floors. Making these subdivisions is essentially making the decision about the size of houses. If your strip is 6 meters wide, and you make a house 12 meters long, this house and the flats above it, will each have about 72 square meters; similarly, if 20 meters long, then each will have 120 square meters. Neighboring houses do not need to have equal lengths.

**Participants** Architect Developer

#### **Timescale**

**Deliverables** Houses may be indicated by lines on the footprint. For the moment these houses are represented as simple short rectangles. They may indicate 1-story, 2-story or 3-story building. The houses on the ground floor are one story high, and have, over them, either one or two flats of the same rough floor plan and area, access from exterior stairs.

The short rectangular strips do not, at this stage, include information about private gardens, or about entrance positions and stairs. They also do not yet show possible break outs of additional space attached to the main rectangle, or to possible deviations from the rigid envelope of the rectangle.

WORKSHEET FOR

Enrich The Pedestrian Network in the Neighborhood

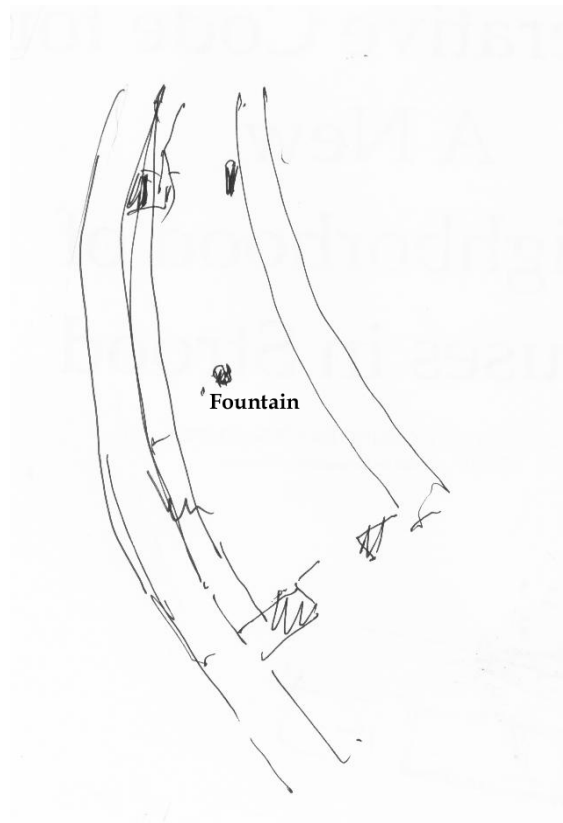
18. Locate The Small Spots and Functional Centers  
Which Are Nice to Be In and to Walk Towards

**Process**

**Participants** Architect ; Neighboring families ; Potential incoming families

**Timescale**

**Deliverables** Sketches or diagrams of possible places to put such small landmarks on the site plan, together with notes against each one, suggestion what it could be.



WORKSHEET FOR  
**Emergency Vehicles**

**19. Verify Access for Fire Vehicles, Construction Vehicles, and Other Emergency Vehicles, on the Pedestrian Paths**

**Process**

**Participants** Architect ; Neighboring families ; Potential incoming families

**Timescale**

**Deliverables**

WORKSHEET FOR

**Second Level Positive Space**

**20. Start Searching For Positive Spaces At The Local Level**

**Process** We are now looking for the smaller areas of public space which are on the order of, say, 50 feet across and smaller – especially to see how these smaller kinds of spaces break out from larger ones, or are attached to them, or are subtly defined within the larger ones, so people experience something of a smaller scale to identify with and belong to.

These smaller spaces should not be too obvious –they may almost be virtual, caused for example, by the effect of a tree, and a bench, generating a perceived and felt space, but without having large and decisive boundaries.

**Participants** Architect Families

**Timescale**

**Deliverables** A subtle drawing showing how such smaller spaces may come into being, without being too emphatic.



WORKSHEET FOR

**Second Level Positive Space**

**21. Identify Breaks In The Row House Footprints**

**Process**

**Participants** Architect Families

**Timescale**

**Deliverables**

WORKSHEET FOR

**Settle The Positions Of Individual Houses**

**22. Get Sizes Right, Variation Where Needed By  
Gradients, And Allow Gradients To Be Formed By  
Variation Of Height**

**Process**

**Participants** Architect Families

**Timescale**

**Deliverables**

WORKSHEET FOR

Encourage Families To Plan Their Individual Houses

23. Identify Families Who Wish To Lay Out Their  
Own House

**Process**

Decide whether these families want to arrange the inside of the house (nearly free of charge) or whether they wish to go outside the rectangular envelope and pay extra for unusual square footage, walls, windows, steps, balcony, terrace or special furnishings.

WORKSHEET FOR

**A Family Plan Their Individual House**

**24. Family Members Decide The Position and Scope of the Garden Or Terrace They Want**

**Process**

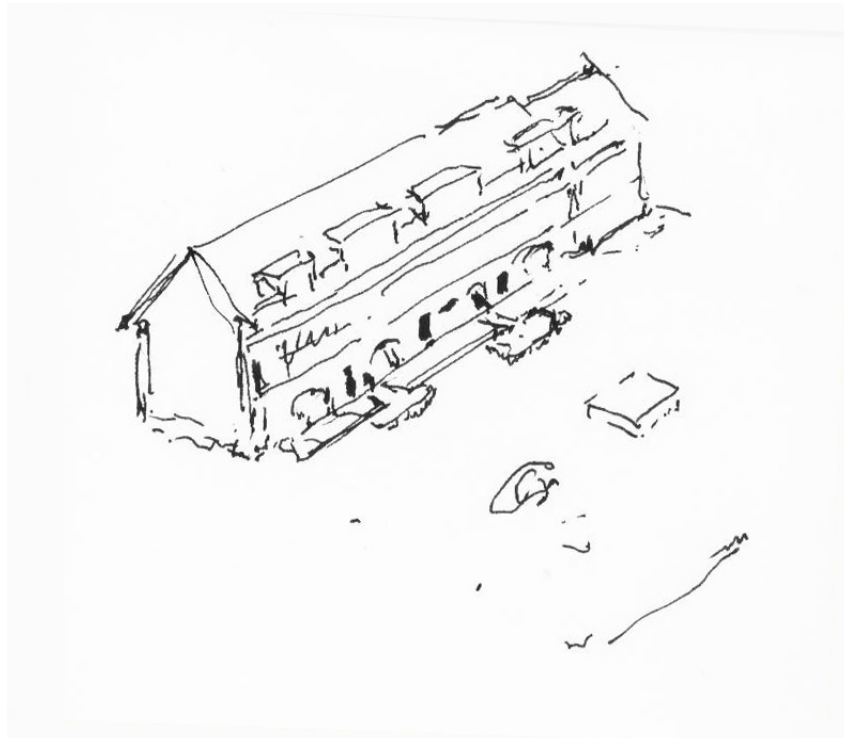
This process takes place while buildings are under construction, preferably when the foundation is in, and not much more. For those families who wish to do it, the architect will provide sticks and string, so people can work on where they want to be, outdoors.

The procedure depends on the floor on which this family lives. If they live on the ground floor, they have direct access to the outdoors, and may put a garden or terrace on the sunny side of the house. The length of the garden depends on the length of the house and the wishes of the families who live on the upper stories.

**Participants**

Family members Architect Developer's accountant and project manager

**Deliverables**



*Sketch of a row of 2½ story houses from the garden side, emphasizing the way the different gardens and terraces can serve ground-floor, 1<sup>st</sup> -floor, and attic-floor flats, all looking into the larger public garden.*

WORKSHEET FOR

**A Family Plans Their Individual House**

**25. The Position and Size of the Living Room in  
That Physical Place Where The Family Most Like To  
Be**

**Process**

The family go, together, to the site where the house will stand, with someone who can show them how far away the opposite houses are, and the angle the house makes with the land. Given that context, they ask themselves which part of their house, would be the place where they would like to be. It is very likely that this may also require a decision about the front door, so that they can place the living room, in the way they like, to that front door.

If possible, the living room needs to be looking out towards a pleasant place, facing the sun some of the day, hidden in the house so it has a sheltered feeling, and connecting easily to the garden or terrace which has been settled so far.

**Participants**

Family members Architect

**Deliverables** a rough position diagram, showing approx length and breadth, and position, of the living room.

WORKSHEET FOR

**A Family Plans Their Individual House**

**26. Placing Minor Rooms and Completing Floor Plan**

**Process**

This process happens, floor by floor, as the buildings go up.

Ground floor dwellings. It starts on the ground floor, at a time when the foundation is in, and floor slab is in. The family go, together, to the house, and use concrete blocks by placing blocks on the floor, to try the subdivision of rooms. There will be reaction, feedback, and changes prompted by the reality of the layout. The blocks are moved around, until the family members are settled. (maximum time allowed, one week). Once they have, what seems the right size and shape of each room, that is comfortable when they walk through it, they mark the block positions with permanent paint on the concrete slab. Door positions are also marked at this time.

First floor dwellings. After ground floor walls are built, and 1<sup>st</sup> floor slabs are in, the same procedure is followed for the families on the first floors.

Attic floor dwellings. After 1<sup>st</sup> floor walls are built, and 2<sup>nd</sup> floor slabs are in, the same procedure is followed for the families on the attic (2<sup>nd</sup>) floors.

**Participants**

Family members Architect Project manager

**Deliverables** Plan sketch at 1:100, hand drawn, for the contractor.

WORKSHEET FOR  
**A Family Plans Their Individual House**  
**27. Placing Windows**

**Process**

This process happens, floor by floor, as the buildings go up. Again, it happens floor by floor. After the rooms have been defined, the exterior walls are started, and go up to sill height – 18 to 24 inches. With sticks and tape, and cardboard, the families are now able to decide the window openings they want, doing it room by room, and judging the size and position of the windows which will create beautiful light in the rooms.

As each set of window openings are decided, the brickwork on either side goes up, and the headers across the openings are put in, according to rule of thumb structural rules. Any unusual conditions are also dealt with, structurally, by rule of thumb, to stiffen the walls as needed.

**Participants**

Family members Architect

**Deliverables** On the basis of the family's choices, marks are made on the floor, to indicate the opening size for each window, and windows are then ordered according to the needed sizes, choosing from a table of available sizes.

In special cases of window size or configuration, a few windows may be special ordered, to make certain room particular special.

GENERATIVE CODE FOR STROOD HOUSING



*View of 12<sup>th</sup> century Rochester across the river, from the site in Strood*