THE MINNEAPOLIS MILLING DISTRICT ARCHIVE

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BY

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This is to certify that I have examined this copy of a master's thesis by

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and that I have found that it is complete and satisfactory in all respects,
and that any and all revisions required by the final
examining committee have been made.

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December, 1997

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C O N T E N T S

0

This thesis grew from my desire to find, through architectural design, common ground between contemporary information technologies, historic preservation and traditional archaeological documentation.

I propose an adaptive reuse of the historic Columbia Flour Mill near St. Anthony Falls in Minneapolis. The ruined mill, as the new Minneapolis Milling District Archive, will house original, historic artifacts (such as photographs, maps, and drawings) together with digital simulations of those artifacts. The archive will be a place where information and architecture are brought together to make sense of each other.

Making sense out of information and making sense out of architecture are not altogether different tasks. The processes have in common the characteristic that they depend upon the successful translation of individual observation and experience into knowledge by means of established systems of reference. This thesis questions the degree to which such systems must be made explicit.

1

For a scholar to make intelligent use of information, the information must be physically grounded within a specific referential system; it must be ordered. Architecture, by providing the possibility for memorable relationships to exist between information and site, has the capability to ground a particular collection of site-specific information. In so doing, it establishes reference and assists scholars in making intelligent use of the information in the collection.
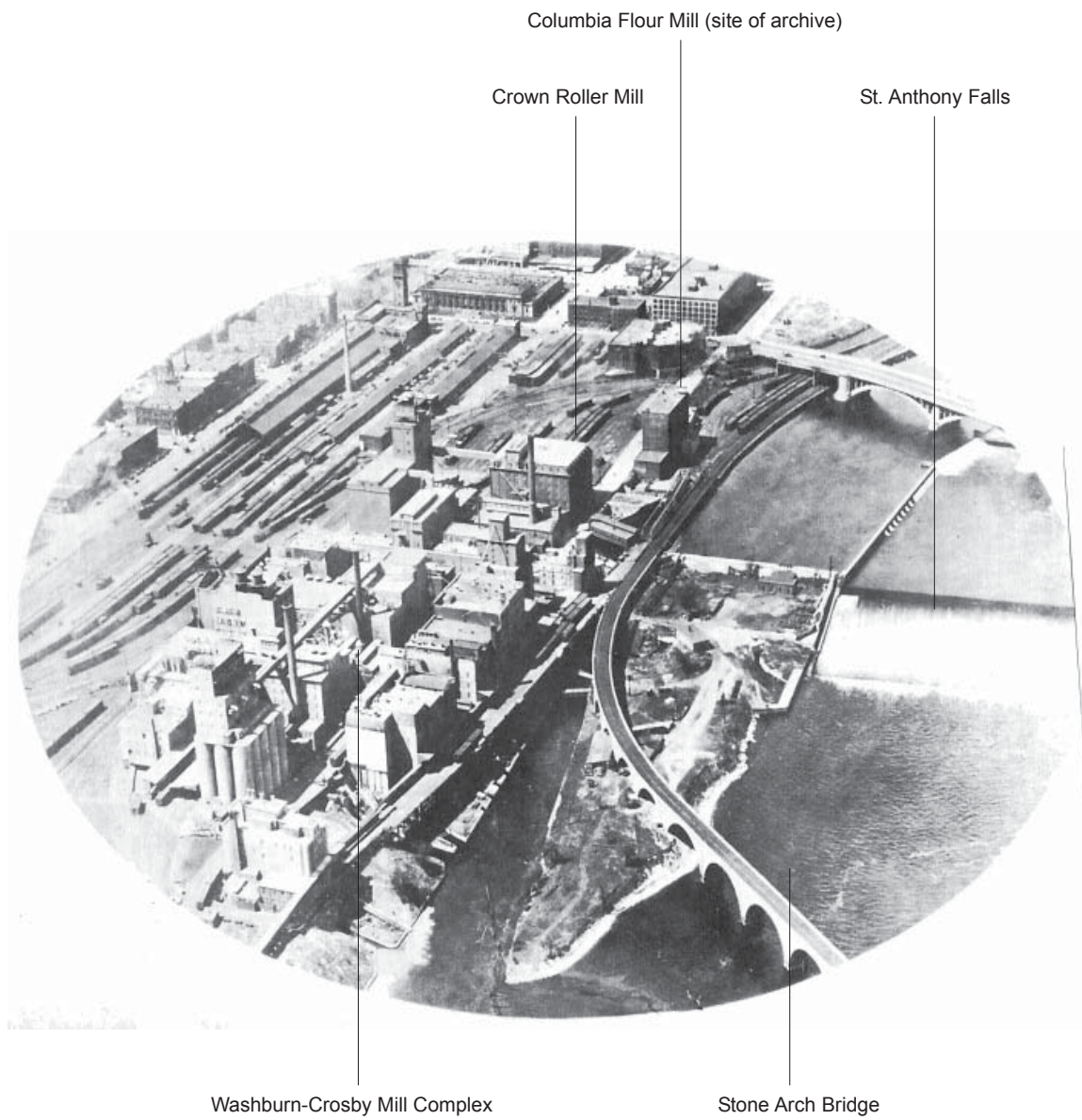
2

I propose an archive for original historical drawings and record artifacts of the Minneapolis Milling District. The archive will be built inside the foundations of an abandoned flour mill at the periphery of the district. It is a small research institution devoted to the preservation of the artifacts and to the development of interpretive computer simulations based on the artifacts.

The Minneapolis Milling District surrounds St. Anthony Falls on both banks of the Mississippi River, and is named for the waterpowered saw- and flour mills built near the falls prior to the turn of the century. An important site in the historical development of the city, the Milling District is the appropriate setting for the Minneapolis History Center, proposed in 1994 as the subject of an architectural design studio project at the University of Minnesota. The archive is a small research annex to that proposed nearby larger institution.
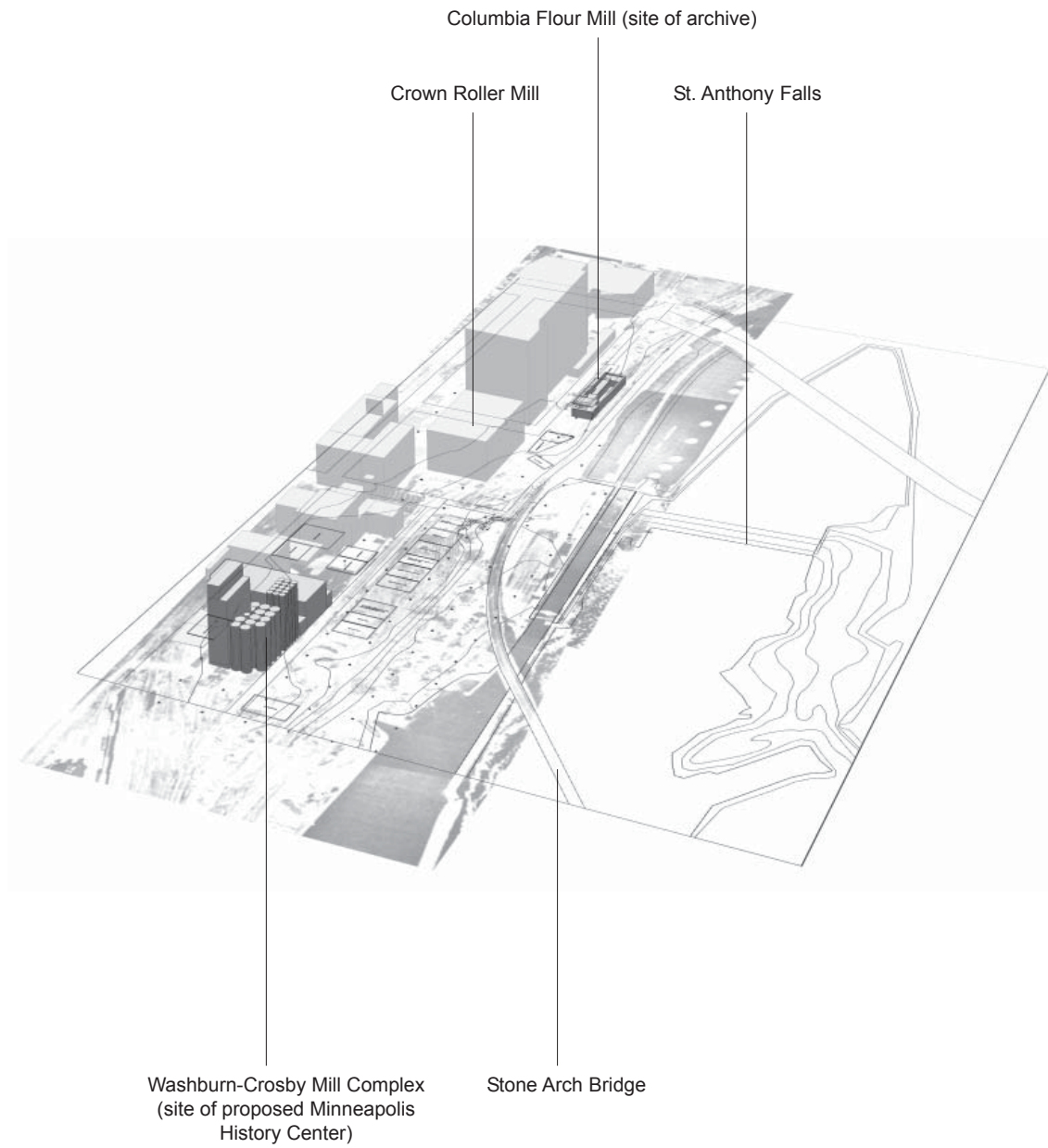
Figures 1-2

The majority of the Minneapolis mills were demolished in the 1930s several years after the peak of the flour- and sawmilling industries.[1] Mills on the west bank of the Mississippi were concentrated along a now-filled-in power canal underneath First Street. Buried foundations and partially exposed ruins of the demolished West Bank mills exist directly adjacent to the site of the proposed Minneapolis History Center. One of these abandoned mills, the Columbia Flour Mill, is currently the site of the vacant Fuji-Ya Restaurant. Its stone foundations provide the site for the Minneapolis Milling District Archive.*

*Also see text accompanying Figures 20-23.

7

Columbia Flour Mill (site of archive)

Crown Roller Mill

St. Anthony Falls

Washburn-Crosby Mill Complex

Stone Arch Bridge

Figure 1. Photographic montage of Minneapolis' West Bank Milling District, showing a 1926 map of the district overlaid on a photograph taken in the early 1920's.

Columbia Flour Mill (site of archive)

Crown Roller Mill   St. Anthony Falls

Washburn-Crosby Mill Complex   Stone Arch Bridge
(site of proposed Minneapolis
History Center)

Figure 2. Present condition (1996) of the West Bank Milling District,
shown in a montage of a contour map, an aerial photograph, and a
three-dimensional computer model of existing buildings.

The Milling District has great potential for historical interpretation, and is at the center of an ongoing archaeological research effort. Existing collections of historical and archaeological information concerning the site, including original maps, photographs, and contemporary archaeological record drawings, will be preserved and organized in the archive.[2] The archive is intended for the use of scholars and History Center staff who must work with the original artifacts, whether as part of individual research efforts or for preparation of multimedia presentations intended for use in the History Center. The specific mission of the archive is to promote a public recognition of the work of organizing the information contained in the original artifacts. The computer plays a central role in organizing the collection; for example, historical maps and photographs may be digitized and overlaid to examine physical changes in the district over time.

Figures 1-2

Much of the work of organizing the site-specific information occurs on the site, as archaeologists work to uncover the ruins and relate their discoveries to an established reference grid. Because the archive as an institution is concentrated on promoting a public recognition of the work of organizing this information, it is important to consider the site as well as the building as a means of facilitating public awareness of the ruins and the work of organizing them as information. I suggest as part of the ongoing archaeological research effort that markers be placed at the intersections of the archaeologists' grid. The system of markers in the landscape is intended both to recognize the archaeologists' scheme for organizing information, and to provide a built system of reference for the archaeologists who, as they dig, must constantly relate unknown site features to known ones. Simple concrete pads, three feet across, with orientation maps on each, would suffice as markers. As the recording work advances, I propose that the ruins be left exposed to a depth of two feet below the

Figs. 3, 30-32

surface, allowing visitors to see traces of the location and size of the old mills and power canal.

Visitors approach the site along West River Parkway or off of the pedestrian Stone Arch Bridge through the field of ruins. The archive, at the upriver terminus of that field, appears first as a solid block of stone with a glass and steel room on top. In general, the building is laid out within and atop the old foundations with more public rooms at the near (or downriver) end — an entry gallery on the first floor, one level below First Street, and at street level, a glass-and-steel computer room. More private rooms are located at the far (upriver) end of the old foundation — a staff workroom and at the end, the archival storage room.

Figure 4

Figures 5-14

Stepping into the first room of the archive, the entry gallery, is the first time that visitors step inside of old mill foundations. The walls are three-foot-thick local limestone, the floor is existing poured concrete, and the ceiling is an existing historical steel-beam and tile-arch system. The entry gallery is used by archive staff to display work in progress; overlaid digitized maps and photographs are typical of the work displayed. Visitors and scholars can gain a sense from this public display of the kind of work produced at the archive from the raw material of the original artifacts, kept elsewhere in the building. The reception desk is staffed full-time by an assistant who can answer questions if necessary.

The visitor or scholar steps out of the solid stone box of the entry room into a glass-and-steel stair tower. The elevator is to the right through an opening in a new wall. The openness of the construction permits a long view into the existing historic foundation of the Columbia Flour Mill — now just a stone shell. View is also up above the horizon of that stone shell to the sky.

Figure 15

As visitors ascend the stairs and come to the landing, the view of the horizon of the Columbia Flour Mill foundation is ever more apparent. The stairs turn at the landing to complete the climb to the upper, or street level. In the last few steps, the visitor begins to regain some long views of the site. At the top of the stairs, directly above the entry room, is a glass-and-steel computer room. This room contains five high-end computers which allow digital access through a computerized catalog to all of the artifacts in the archive. This permits on-screen viewing and comparing of computerized scans and photographs of the original pieces, a process far more public than viewing the original, fragile artifacts stored elsewhere in the building. This is a room where what is seen on the computer screen can be related visually to the site — the site that people walked through and drove through to get to the building. The whole room is a place where the collection of artifacts can be related through the medium of the computer and the medium of the building back to the site. I expect the room to be used by scholars who need a place to organize information, to gain a sense of the collection as a whole, to relate that collection visually to the site, and to prepare, if necessary, requests to access the original artifacts. I expect further that any visitors with casual scholarly interests who have come this far into the building would spend at least half an hour searching for and viewing artifacts, and comparing what they see on the screen to what is visible on the site below and beyond them.
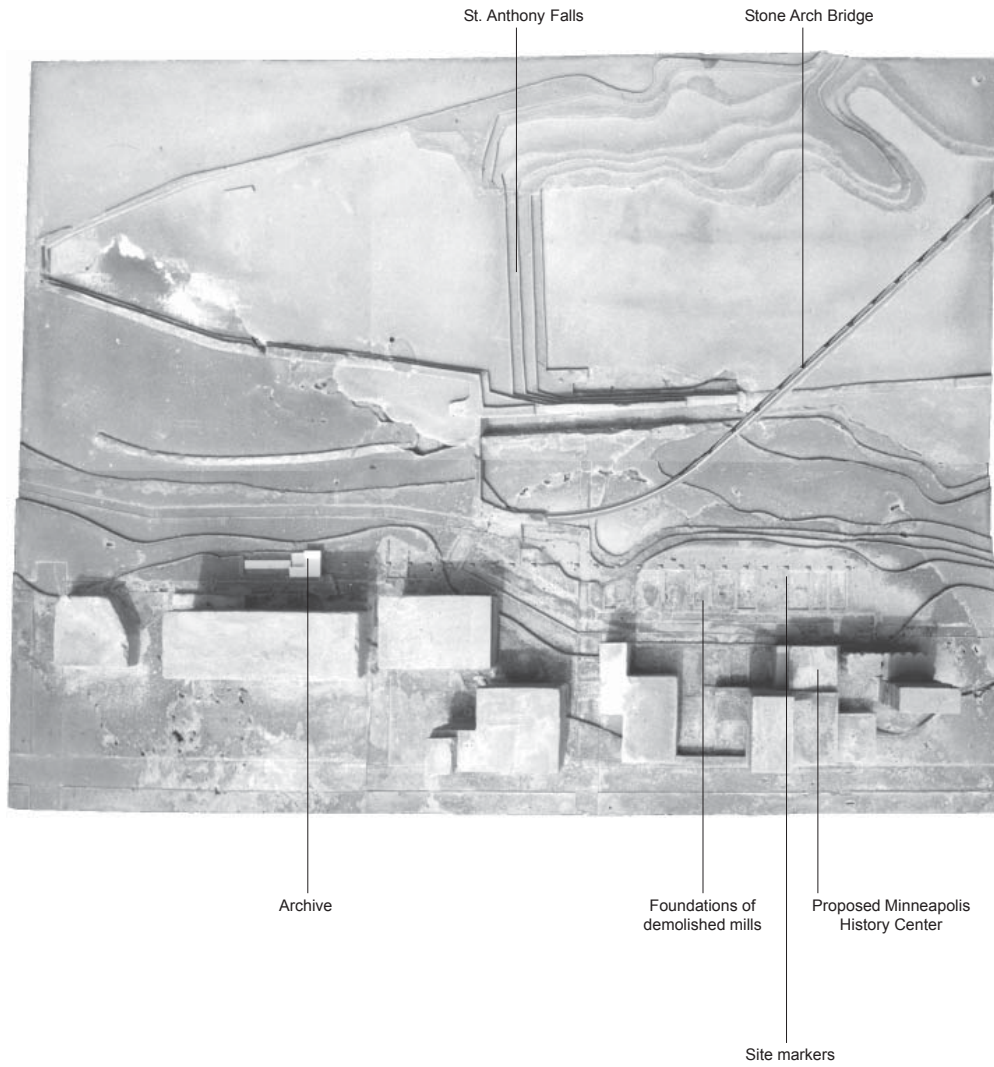
Figure 16

Figure 18

Figure 19

Leaving this room requires turning back, away from the site, to the view over the top of the Columbia Flour Mill foundation. Within this founda- tion, and visible from above, is a long glass-and-steel staff and scholarly workroom and a storage room for artifacts at the far end of the shell foun- dation. Entering this considerably more private space requires descend- ing the stairs, turning away from the main entry space through a com- paratively darker, closed hallway, past the service block containing the archive office, mechanical rooms, and bathrooms.

Being inside the workroom is once again to be within the old foundation, but unlike the entry room, which is simply the occupiable basement of an old mill, the workroom is suspended within the empty, roofless space of the old foundation. The old foundation can be seen to the left and right beyond the glass wall of the workroom. The workroom is that place in the archive which is the most directly about the ongoing process of record- ing, researching, and organizing the original records of the site. The work- room is staffed by three or four part-time research assistants or student interns hired to work on a by-project basis. The archive's permanent full- time director has an office located in the service block at the near end of the workroom. The room includes workspace for the collation of archaeo- logical field notes and the production of archaeological record drawings which are added to the existing collection as work progresses. The work- room includes high-end computer equipment for the production of multi- media interpretations of the district and for the maintenance of the com- puterized catalog. It includes the facility to scan or otherwise digitally record all artifacts in the archive into a computerized database. This facil- ity, along with the artifacts themselves, is located in the new stone-veneer box at the far end of the workroom which is strictly light- and climate- controlled.

Figure 20. Site model of the West Bank Milling District.

St. Anthony Falls

Stone Arch Bridge

Archive

Foundations of
demolished mills

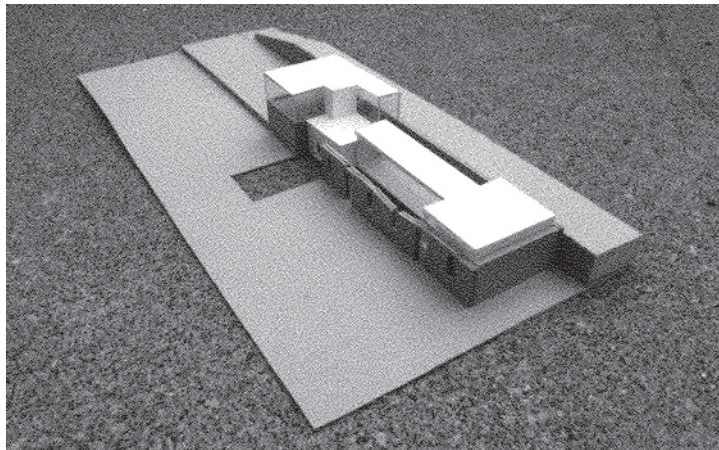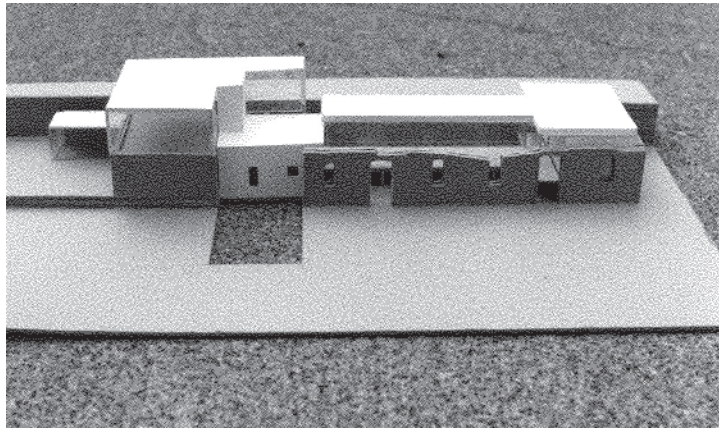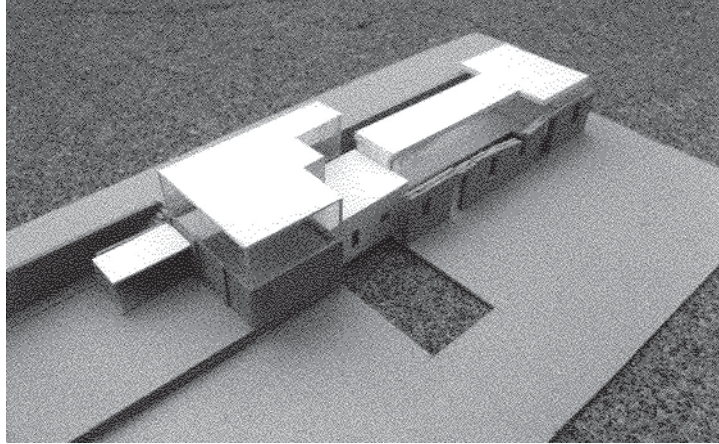Proposed Minneapolis
History Center

Site markers

Model by Mike Empson.

Figure 4. Photographic montage looking upriver towards the proposed Minneapolis Milling District Archive. The Crown Roller Mill is on the left.
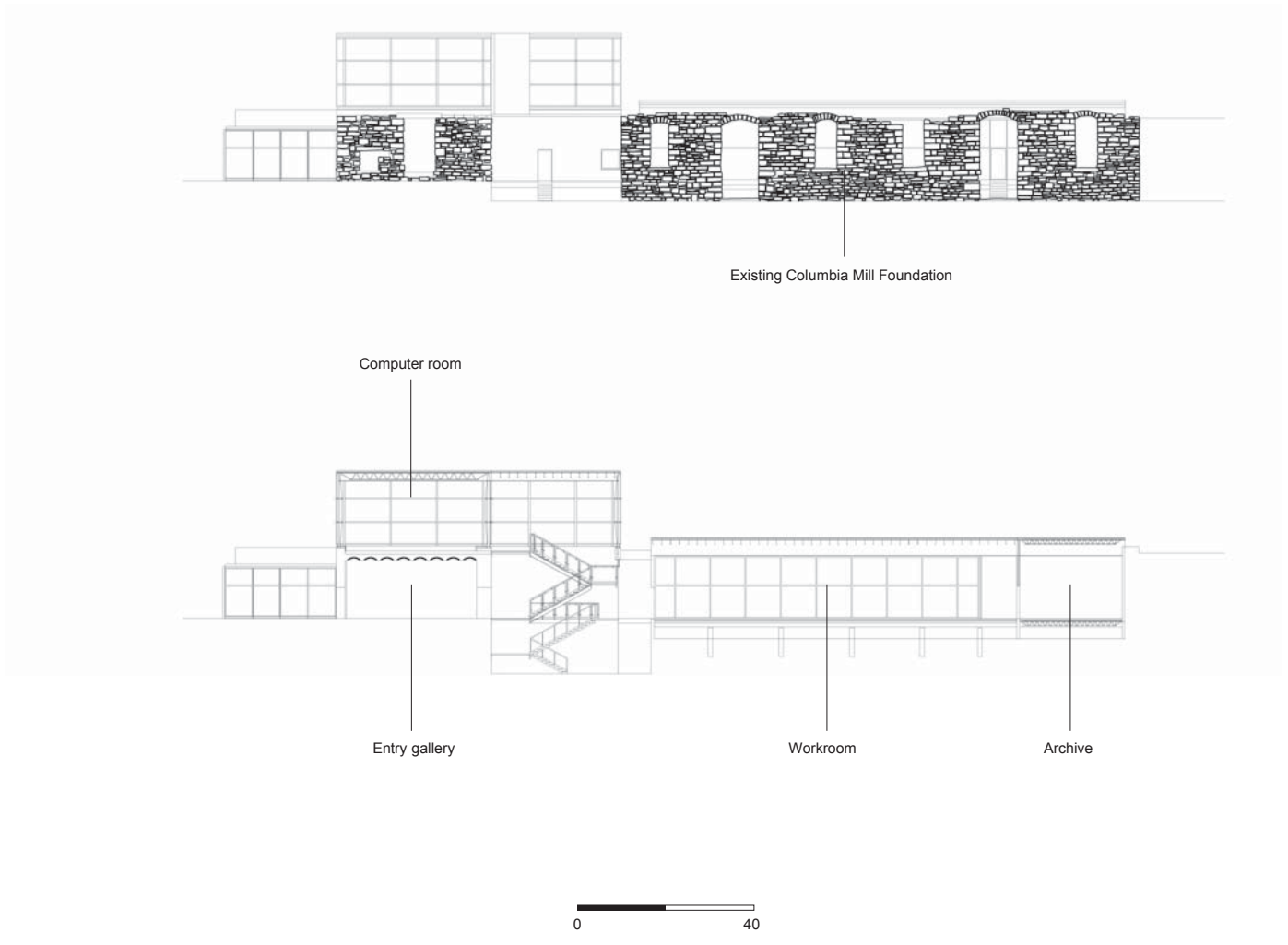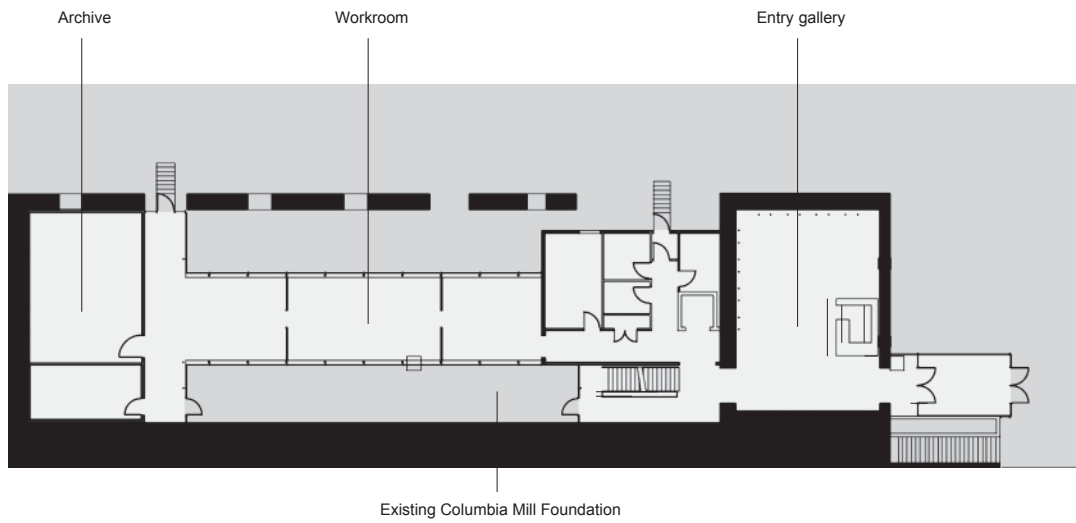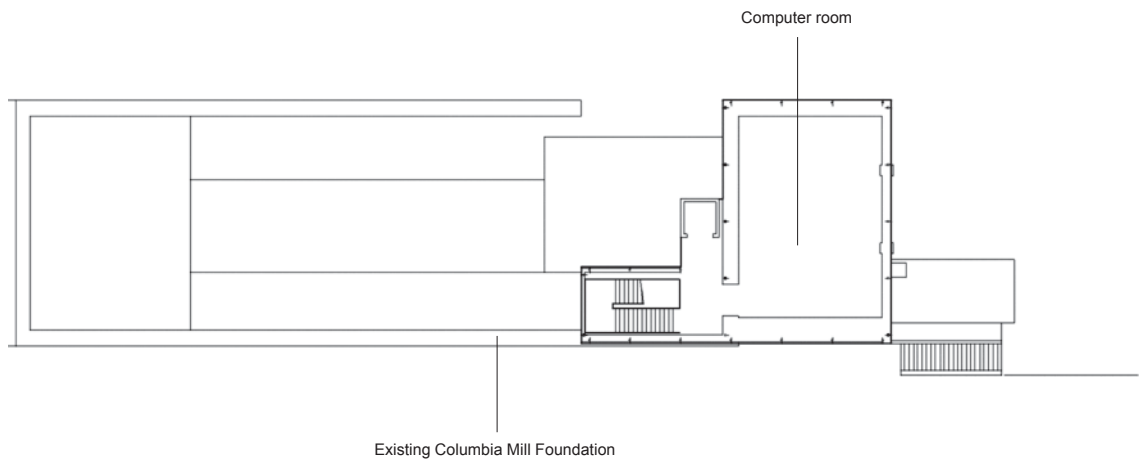
Figures 5, 6, 7. Model of the archive. Top to bottom: view from east, view from northeast, and view from north.

Model by Malini Srivastava and Virajita Singh.

Existing Columbia Mill Foundation

Computer room

Entry gallery   Workroom   Archive

0   40

Figures 8, 9. Elevation and longitudinal section of the archive.

Computer room

Existing Columbia Mill Foundation

Archive   Workroom   Entry gallery

Existing Columbia Mill Foundation

0   40

Figures 10,11. Ground and upper floor plans of the archive.

Grade level: 1st Street

Grade level: W. River Road

Grade level: 1st Street

Grade level: W. River Road

Grade level: 1st Street

Grade level: W. River Road
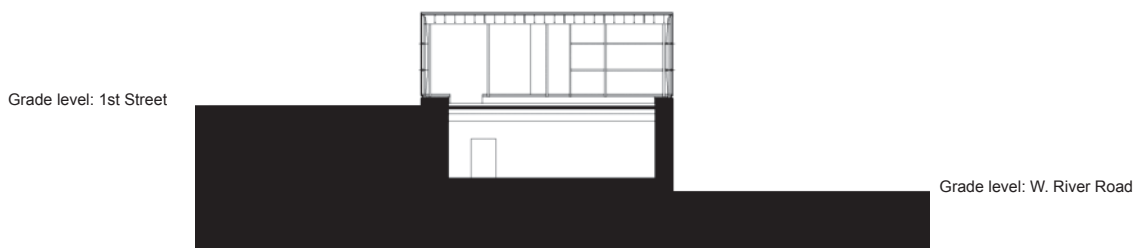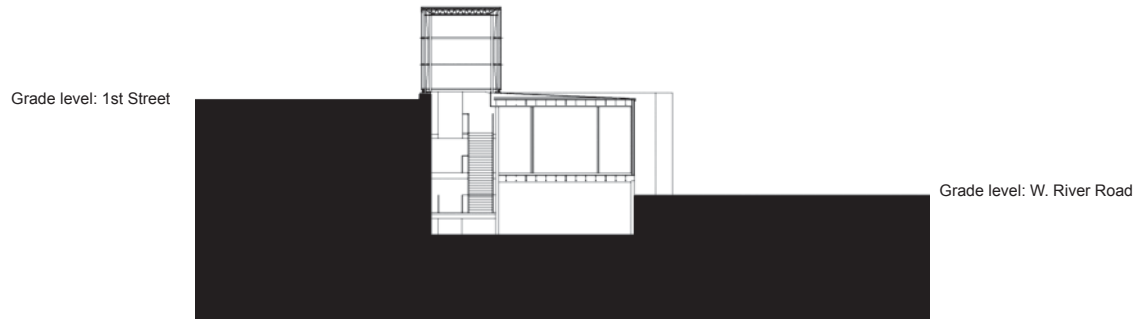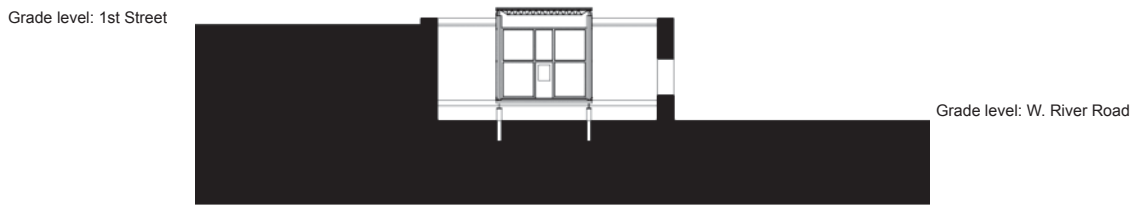
Figure 14: Transverse section through entry gallery
and computer room

0   40
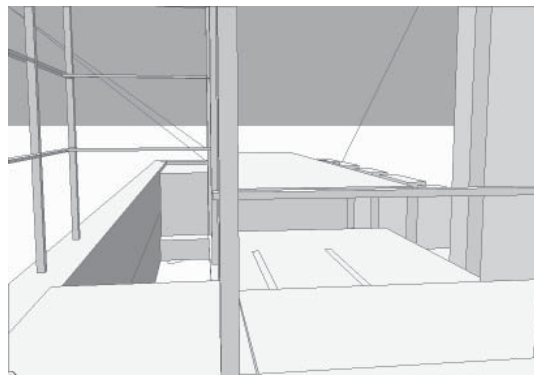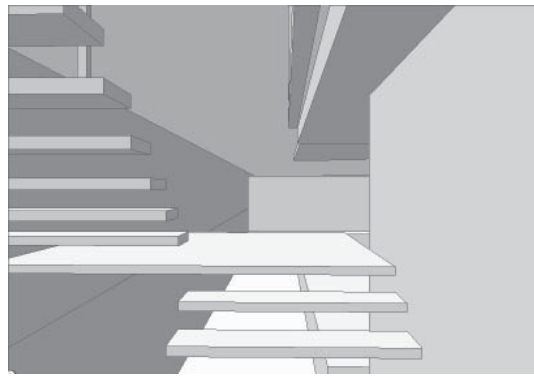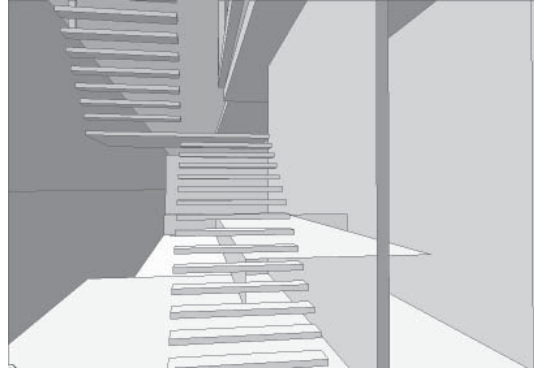
Figures 15, 16, 17. Top to bottom: Stair hall, looking into the Columbia Mill foundation; stair landing; Columbia foundation viewed from the top of the stairs.

Figure 18. Computer room, looking downriver towards the
Washburn-Crosby Mill Complex.
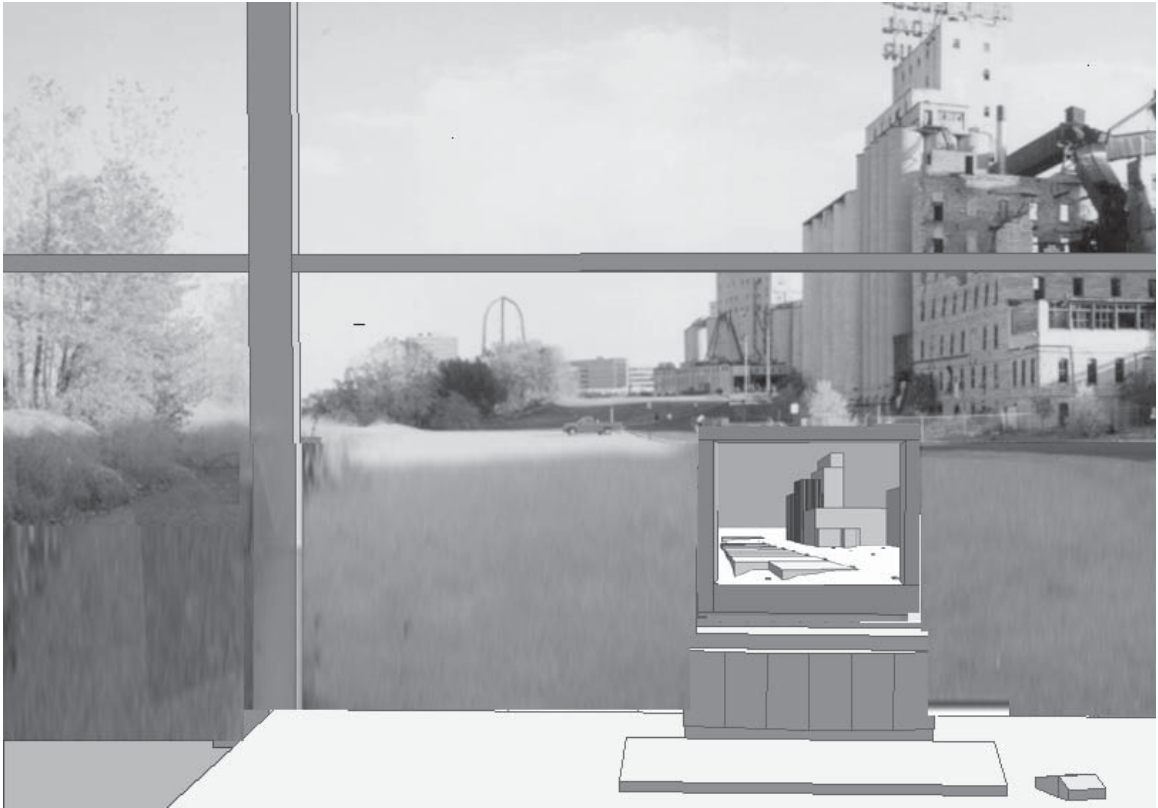
Figure 19. Detail view of on-screen multimedia simulation of the Washburn-Crosby Mill Complex. The mill complex is visible through the windows behind the computer.

3

The design process presented me with two opportunities. First, to identify potential referential connections that could exist between the collection and the site. Second, to design a building and site which could make certain of those relationships more apparent or visible to scholars and visitors. I intended to establish references to the site, through the medium of the building, which would aid scholars in making intelligent use of the information in the archive's collection.

I began the design process in summer 1996 by carefully documenting the history of the existing Fuji-Ya/Columbia Mill building and the history of the West Bank Milling District site. The artifacts I produced while documenting the site are typical of the artifacts which would be produced in the archive, in that they consist of digitized historical artifacts, brought into relation with each other and with new artifacts by means of the computer. As a means of documenting the history of the site, I constructed on computer a series of layered historical and contemporary maps. The most important aspect of the site revealed by these maps is that the site itself is an artifact -- that is to say, there is little if any of the site's surface (and subsurface) which has not been rebuilt at some time in the last 120 years. As I worked through the site documentation process, certain relationships became evident. The position of the building with reference to the field of ruins suggested a path the visitor would follow to arrive at the building. This in turn suggested an entry location and the possibility of a linear spatial organization to build a continuation of this site path into the building.

Figures 20-23

I documented the existing Fuji-Ya building archaeologically by building a complete and accurate three-dimensional computer model based on original architect's plans and my own site observations. I coded elements in the computer model according to their material and age such that I could generate views of the building showing its built condition at several defined points in its history, or show only those elements made of stone, concrete, wood, or steel. This method allowed me to experiment with selective removal of building elements added since 1968 (the date of the first Fuji-Ya addition onto the historic foundations), and ultimately to envision the building at its minimum: the simple stone shell of the Columbia Mill foundation.

Figures 24, 25

I developed three design alternatives using the computer model of the Fuji-Ya as a base. All three schemes have a linear spatial organization: a series of rooms or a circulation spine leads from downriver to upriver through the building. All three schemes also contained a "wall of drawings," or a public display of reproduced archaeological record drawings. I had some ideas about how such a display could mediate between visitors' memory of walking through the site and their work with the original artifacts in the archive, or with their reproductions.

Figures 27-29

I presented my building and site research, along with my three design schemes, at a juried review on October 14. The review was attended by my advisory committee chair, Andrzej Piotrowski, committee members Kate Solomonson and Lee Anderson, and thesis studio director Todd Rhoades.

Figure 20. 1873 map of the West Bank Milling District, superimposed on a 1996 map.

Columbia Flour Mill
(site of archive)   Canal gatehouse   Covered   Tailrace
                                        waterpower canal
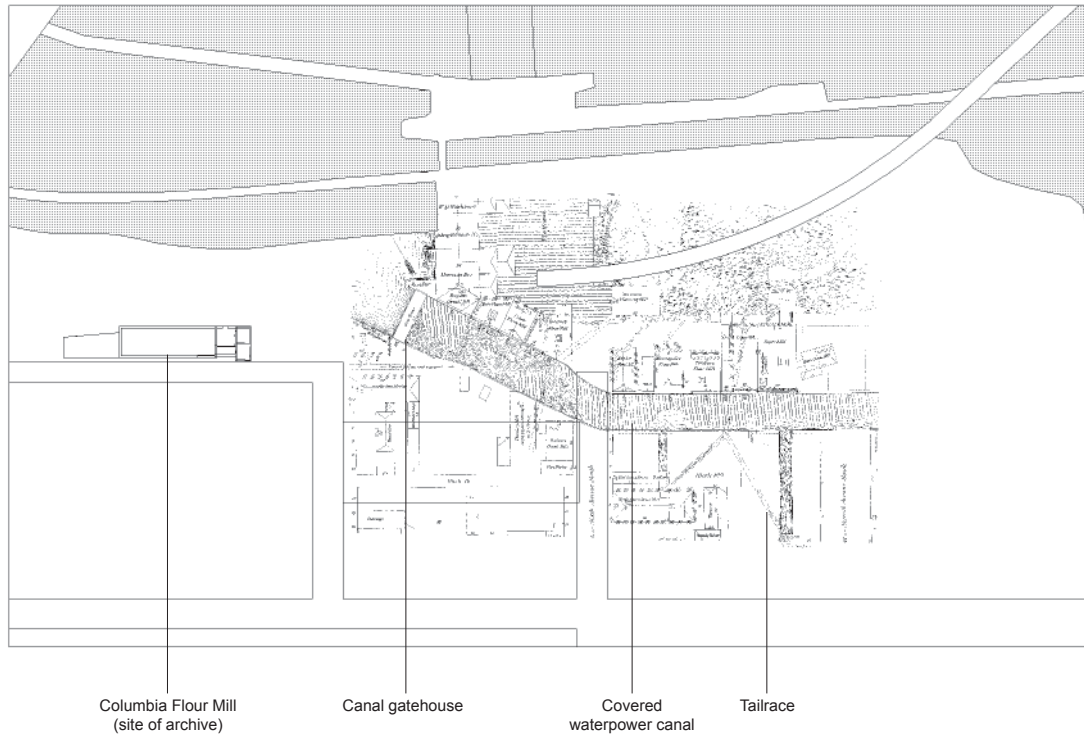
The 1873 map illutrates the relative location of the archive site to the waterpower canal beneath First Street. The canal, begun in 1857 and extended in 1865, provided power to the adjacent flour mills. Water entered the mill basements from the canal, and after dropping vertically past the turbines, returned to the river through underground tunnels or tailraces. The canal was closed in 1960; it and many of the tailraces remain intact underground. (See Anfinson 1989, Kane)

Figure 21. 1885 map of the West Bank Milling District, superimposed on a 1996 map.

Columbia Flour Mill   Crown Roller Mill   Stone Arch Bridge
(site of archive)
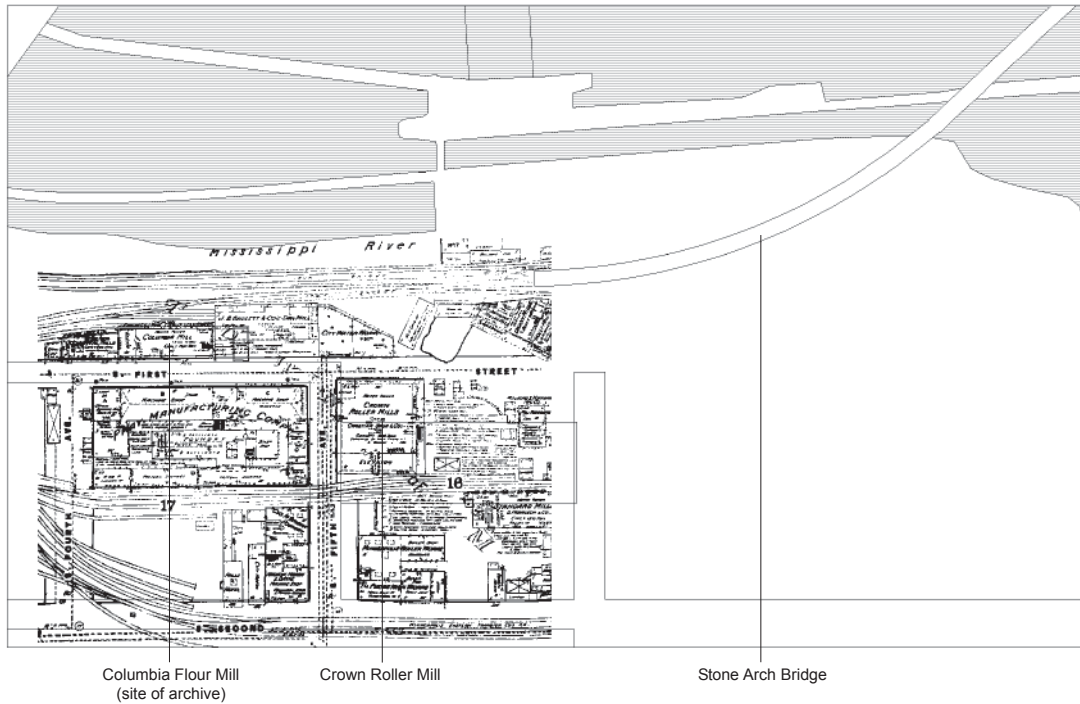
The 1885 map illustrates the buildings immediately surrounding the archive site. The brick Columbia Mill stood five stories high above a limestone foundation. The two-story Occidental Mill stood just upriver from the Columbia Mill, towards the Third Avenue Bridge, while Bassett's Sawmill and the Minneapolis CIty Waterworks stood downriver. Although the Columbia, Occidental, and Bassett's mills have been demolished in whole or in part, the Crown Roller Mill (across First Street from the City Waterworks) remains a prominent landmark.

The Stone Arch Bridge, completed in 1883 for the St. Paul, Minneapolis, and Manitoba Railroad, was converted in 1995 to predestrian use.

Figure 22. 1900 map of the West Bank Milling District, superimposed on a 1996 map.

Columbia Flour Mill
(site of archive)

St. Anthony, Union,
Holly, and Cataract
Mills

Washburn-Crosby Mill Complex
(site of proposed Minneapolis
History Center)

Standard Mill

North Star
Woollen Mill

Main Tailrace
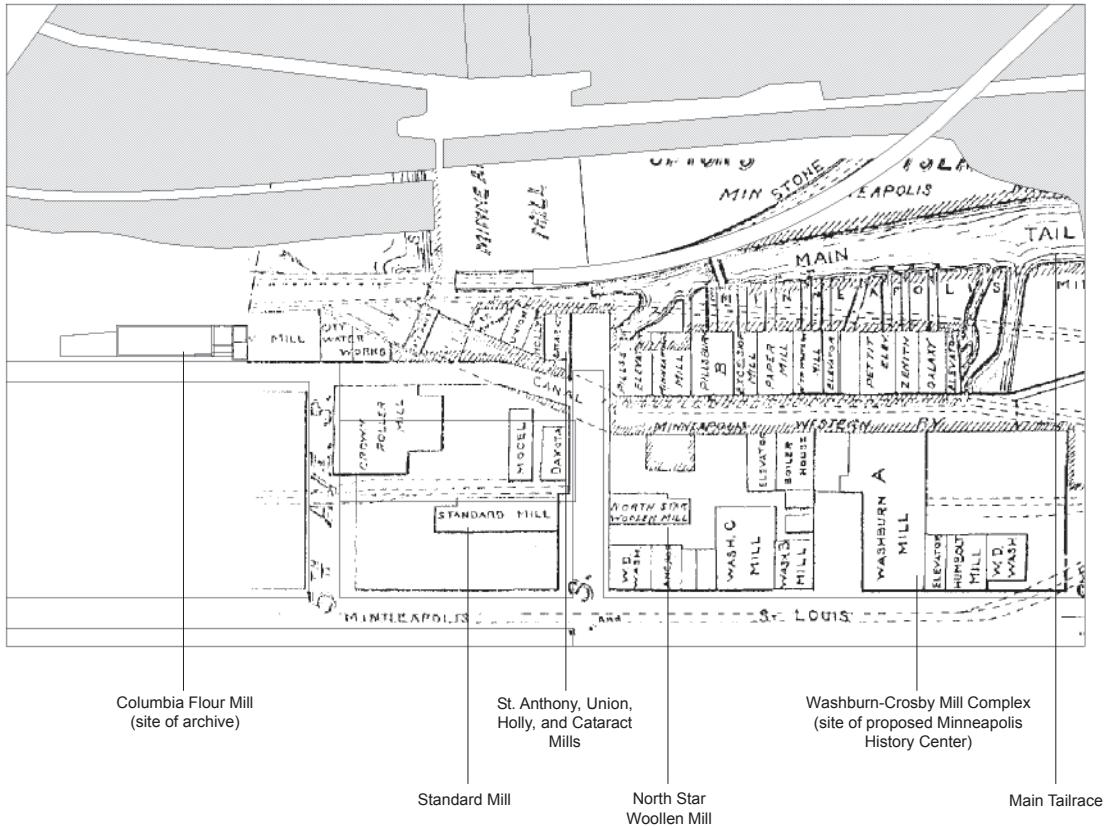
The 1900 map diagrams the layout of flour mills downriver from the archive site. The Standard Mill was incorporated into the Whitney Hotel (1987); the foundations of the St. Anthony, Union, Holly, and Cataract mills remain visible near West River Parkway; the North Star Woollen Mill and the Washburn-Crosby Mill Complex remain vacant as of this writing.

Figure 23. 1926 map of the West Bank Milling District, superimposed on a 1996 map.

Columbia Flour Mill
(site of archive)

Washburn-Crosby Mill Complex
(site of proposed Minneapolis
History Center)
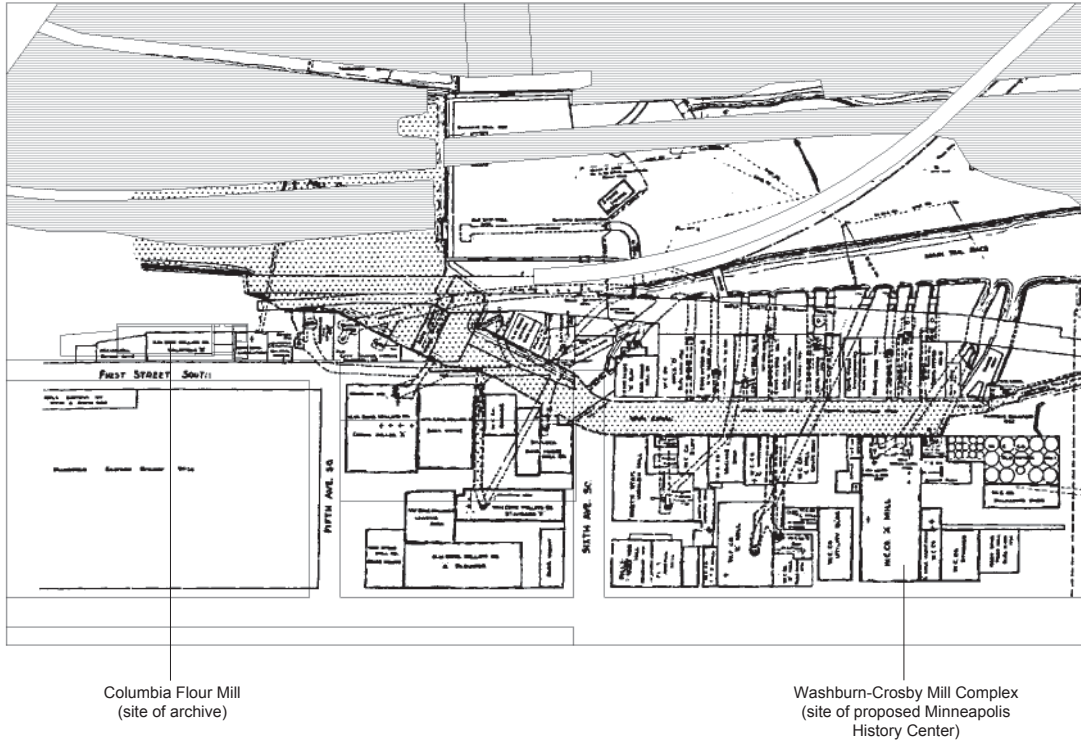
Individual mill owners leased waterpower from two holding companies, one controlling each bank of the river. These two companies (the Minneapolis Mill Company and the St. Anthony Falls Water Power Company) were purchased by the Northern States Power Company (NSP) in 1923. The 1926 map was drawn for NSP at the beginning of the gradual conversion of the west bank mills from flour milling to hydroelectric power generation. (Note that this map is also reproduced in Figure 1.)

Roof structure added 1968 - 1975

Added 1975

Added 1968

Columbia Mill foundation
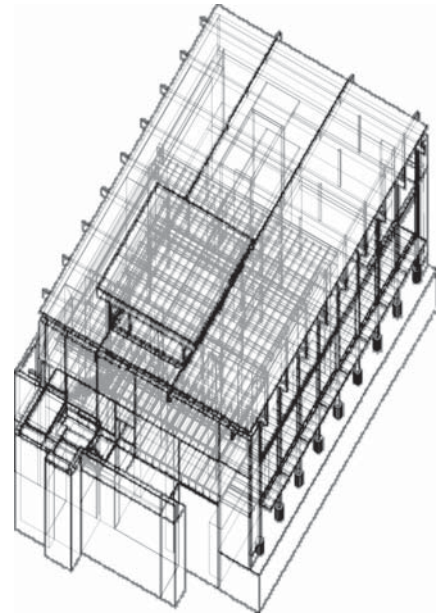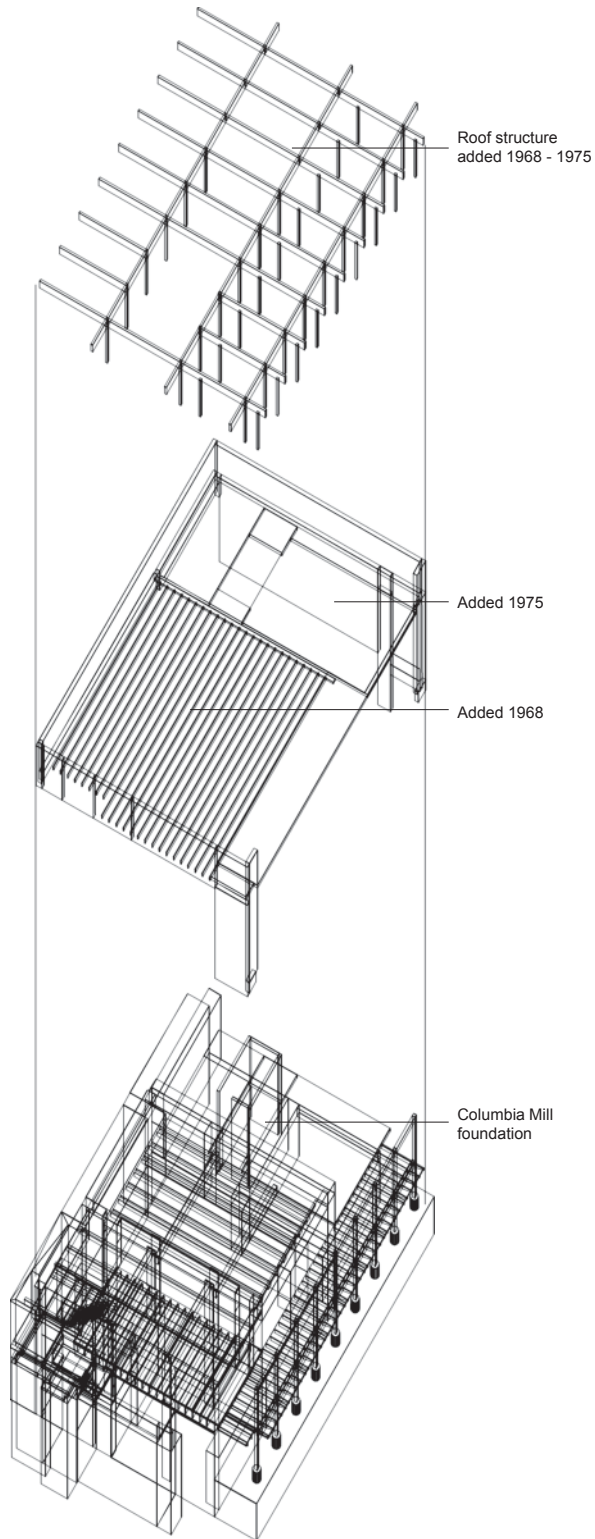
Figures 24, 25, 26. Top right: Existing Fuji-Ya building. Left: Fuji-Ya disassembled. Bottom right: Fuji-Ya site photograph.
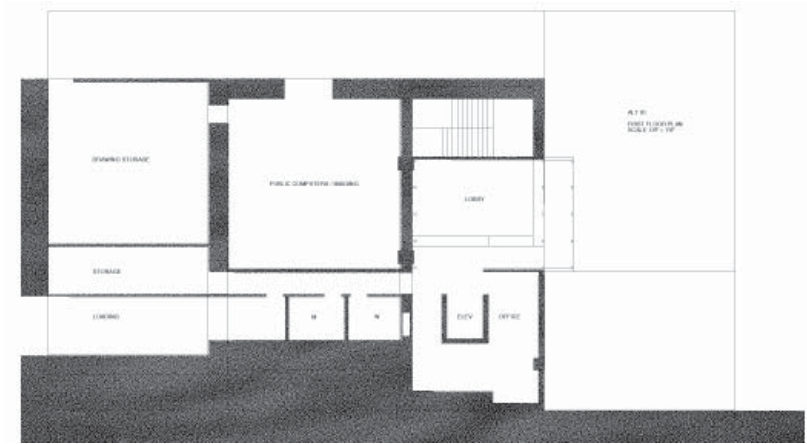
Figures 27, 28, 29. Design schemes presented at first committee review.

The jury commented on this presentation as follows:

Kate Solomonson: To what degree is your project about literally teaching or explaining the morphology of the site and/or archaeological research methodology? To what degree is it about making people aware of the ongoing processes involved in the making of the site and its subsequent recording? Do you propose to fix a moment of historical significance as part of the design?

Andrzej Piotrowski: You should explicitly state your intention to design the site. Think about designing the site not as an archaeologist, but instead ask how should the site be left after the archaeologist has finished work. How will your project take into account the perceived historical value of pieces in the site and of the site itself? To what degree is it about explaining the urban machine of the site?

Lee Anderson: Your introduction of the computer into the domain of the museum moves the design into a new area of questioning. What is your attitude about housing reproductions within an original, material building? How does your project propose to educate people through the use of material?

Todd Rhoades: What are the boundaries of the site? Where does it end? What are the key site issues you want or need to make apparent? Your drawings overall require a greater degree of clarity. Also, consider pushing what you can do with the computer in terms of pulling drawings apart into layers; think of drawing datum lines and grids. Draw in section as well as in plan and consider the role (and size) of text within or on the drawings. Finally, look at Scarpa's drawings, especially regarding his distinctions between old and new building elements. Consider his attitude toward demolishing pieces of old buildings.

Following the juried review, I developed a specific site design. This design directly influenced the design of the archive. During this phase of the project, I developed the idea of forwarding site references to assist scholars in making intelligent use of the information in the collection.

The site design began with two ideas. First, that the design should in some way emphasize the strong linearity of the demolished milling complex which lined the now-filled-in power canal. Second, that the design should reveal in built form the process of recording of the site, as a recognition of the effort that has gone into documenting and cataloging its history and physicality. From these ideas I developed a scheme of archaeological drawings placed on a regular grid in the landscape, the grid to be based on one established by state archaeologists to assist in site reconnaissance. I narrowed my initial grid of drawings into a spine, to emphasize the linear nature of the demolished milling complex.

Figures 30-32

The site design directly influenced that of the building in two ways. I determined that the linearity of my site design was influenced strongly by the Mississippi River, itself the most important physical and cultural referential feature on the site. I believe that the most important characteristic of the river is simply that it is a *continuous* site feature, that it continues on in both directions, upstream and downstream, farther than anything else perceivable on site. I felt that by mediating views of the river through the building, attention to its importance as a feature could be heightened. I developed several models which dealt generally with circulation off of the site into the building, and specifically with views of the river and site. I did not yet identify the role of these views in the design, nor their relative priority, only their general importance to the scheme.

Figures 33-35

The second point which came from the site design back to the building was my attention to the degree of allowable vertical movement through the site. The spine of archaeological drawings near the power canal would exist on an almost completely flat site. The archive would provide visitors and scholars a direct opportunity to move vertically and to gain new perception of the field of ruins. I paid particular attention in my models to the development of a stairway and viewing platform. What began as a
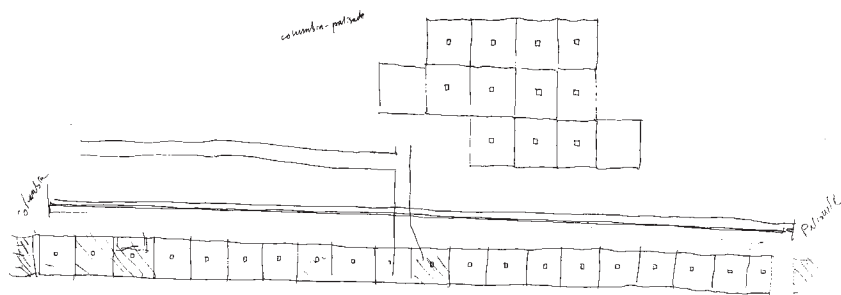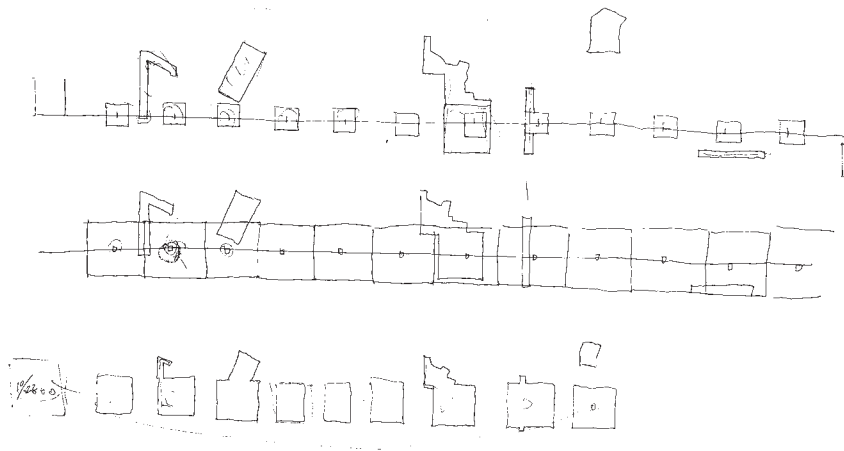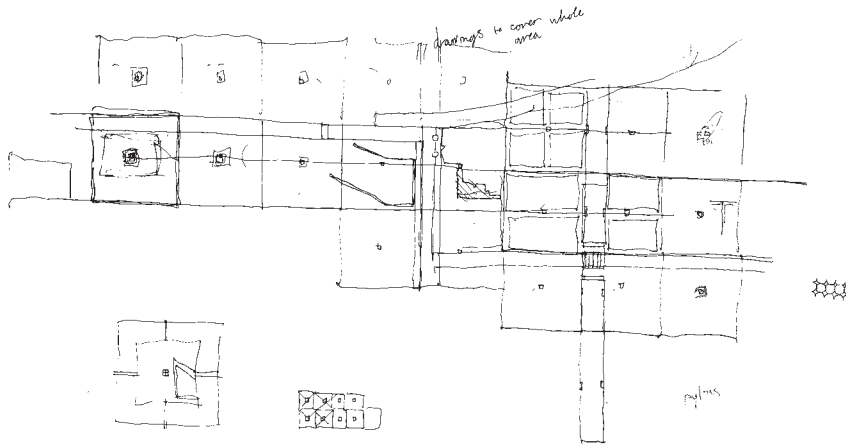
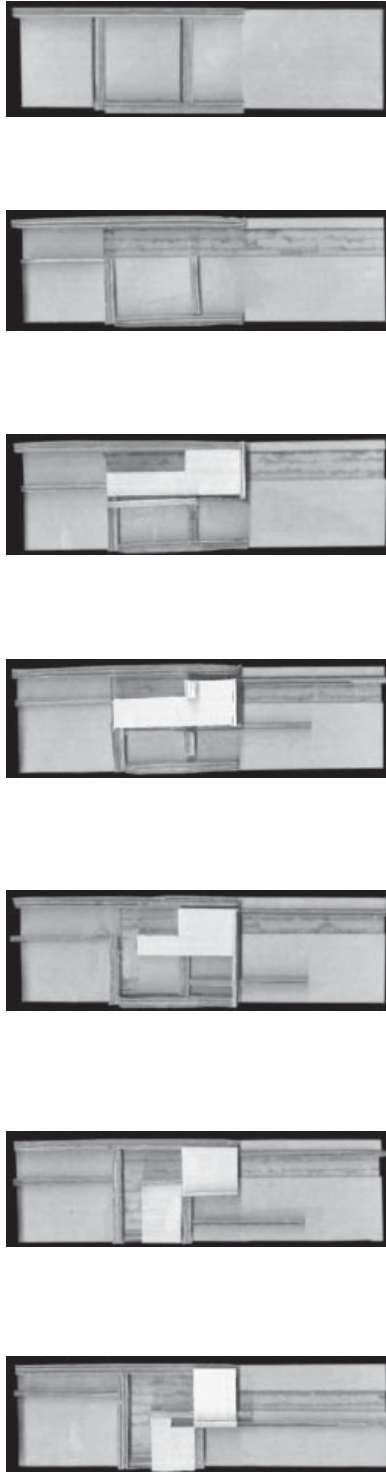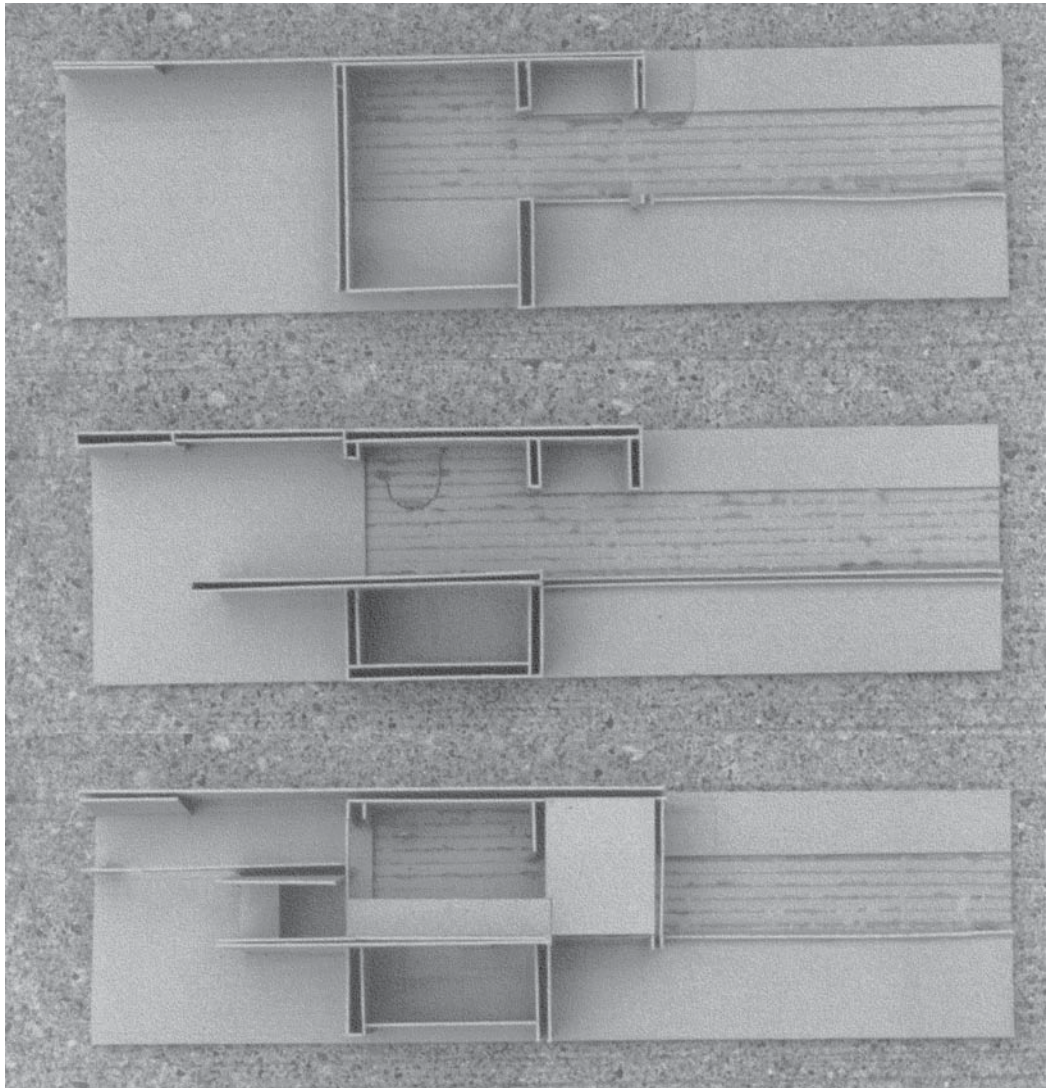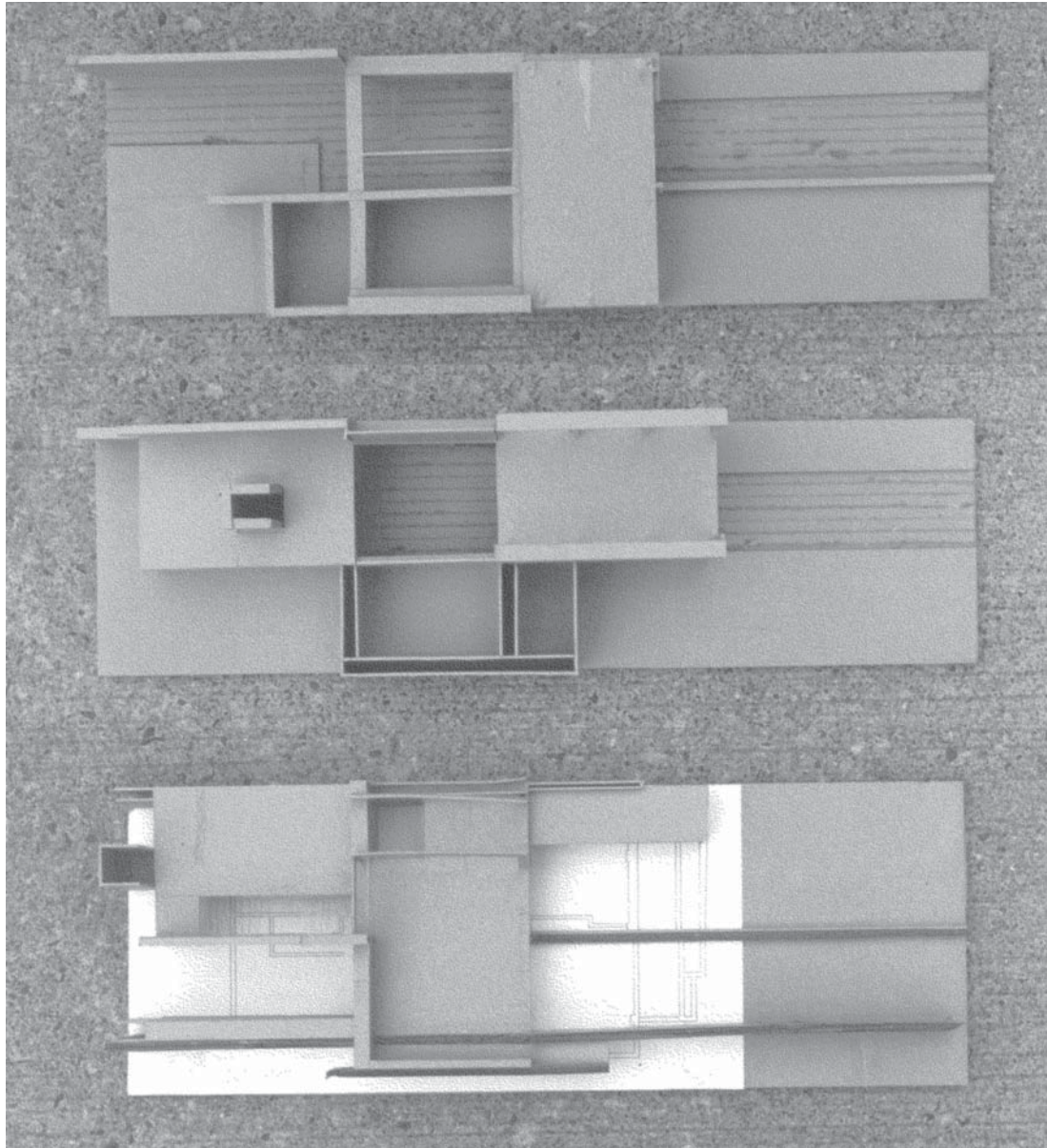*Figures 30, 31, 32.* Development of site design.

Figure 33. Small models illustrating development of upper-level viewing platform.

Figure 34. Process models.

Figure 35. Process models.

simple idea — entering the building, climbing stairs and turning around, and then arriving at a high point from which the site could be seen in its entirety — proved ultimately to be promising in terms of providing built, referential ground for the information in the archive.

At a committee review on November 11, I presented my scheme for site design along with my revised building design. A selection of comments from the reviewers is as follows:

> *Kate Solomonson: How does the grid become more than a means of organizing the site? How does it become meaningful for people who see the site without entering the building? The arbitrary order you impose with the grid is done at the expense of recognizing the randomness of archaeological discoveries.*
>
> *Lee Anderson: Archaeologists establish grids so that a single discovery can be made of what would otherwise be many small, chaotic discoveries. Does your proposed grid respect this attitude? The site investigation appears to have been done separately from the building models. You should develop an overall attitude: is it okay to build atop old foundations? Does your building make a statement about historical building methods? Your proposed viewing platform is not an especially profound resolution of the ideas you proposed to me in writing.*
>
> *Todd Rhoades: You should make an effort to recognize the grid squares in the plan of the building. Also, give more background regarding approach, and specifically parking. Tell us the criteria by which you evaluate your design decisions. How do you know one decision to be better than another? Develop and state your attitude regarding preference of different kinds of views from the building. Finally, your models should be more clear regarding what is old and what is new.*
>
> *Andrzej Piotrowski: The archaeological artifacts in the site could be bronze casts — scaled-down versions of the buried and demolished mills. These could be straightforwardly understood by passersby. Certain of the squares could be excavated to a specified distance and the model placed within the excavated area. This would reinforce the relation of the model to the underground artifacts.*

The most important realization to come out of this review was that of the importance of the Columbia Mill foundation, which I had included in its entirety for the first time in my drawings. As I worked with the foundation, my attitude towards views from the building to the site began to take shape. If the foundation were excavated fully, it would consist of solid stone walls on three sides, a wall punctured by regularly spaced arched openings on the river side, and no roof or ceiling structure. I determined that the river wall provided an excellent opportunity to emphasize the *continuity* of the river — if I could somehow structure the views through that wall in such a way that the river would always be seen through several openings at once. Second, I realized the importance of the artificial horizon created by the top of the Columbia foundation. Heightening the perception of this horizon seemed to be a simple way of reminding scholars of the importance of artificial horizons and datum lines in the work of understanding the site. I began to see the idea of making this horizon apparent working together with my earlier ideas about vertical movement through the building.

Over the next two weeks, I repeatedly brought the building to a precise, drafted conclusion and then broke it down into diagram. I worked in plan, *Figures 36-56* section, elevation, and axonometric drawings in an attempt to bring the varying influences (the stone wall and its artificial horizon, vertical movement through the site and the building, perception of the site and particularly the river) together into a coherent overall scheme.

I developed the Columbia Mill foundation into a three-dimensional frame for two of the archive's rooms. The workroom exists in the final scheme as a glass-and-steel box or cage suspended just above grade within the old stone foundation. Almost as a counterpoint, the artifact storage room is placed firmly at the far end of the stone shell. The two rooms, by reacting to the old walls so differently, provide a referential context for that

type of scholarly work which will directly address the issue of adding onto historic buildings in the milling district. The idea is not to educate scholars about a *correct* way to add on to old buildings, but simply to raise the question.

The final weeks of the quarter were spent crafting the presentation itself, the presented text of which is given in this volume relatively unaltered as chapter 2. The final drawings appear in a finished form throughout the present volume. The project was formally reviewed by the full commit- *Figs. 1, 2, 8-19* tee, along with Arthur Chen, Gunter Dittmar, Steve Weeks, and Tom Fisher. Following the presentation, I received written comments from two of the jury members.

> *I am fascinated with your thesis. It is really getting into issues that are at the forefront of architecture and which architecture will have to get into. As I understand it you are dealing with 3 issues that need to be resolved: (1) the physical reality represented by the ruins, (2) the scientific/technical reality of exploring and understanding the past, and (3) the new dimension brought by the computer — allowing us to create a new reality, both through simulation (virtual reality) and by breaking open the reality of a chronological linear reality, and how this new reality finds a physical, architectural order. What I don't understand is why this ends up in a Miesian building inserted into the remaining walls of an old building, that is, a more or less conventional building in an old envelope?*
>
> *Polished, logical, clear presentation — raises and resolves good questions regarding site relationships and the production of knowledge. Excellent use of computer as medium as well as object of inquiry.*
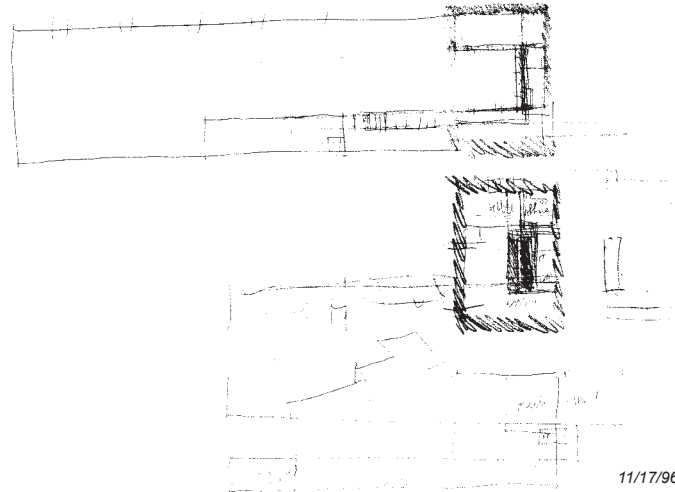
11/17/96
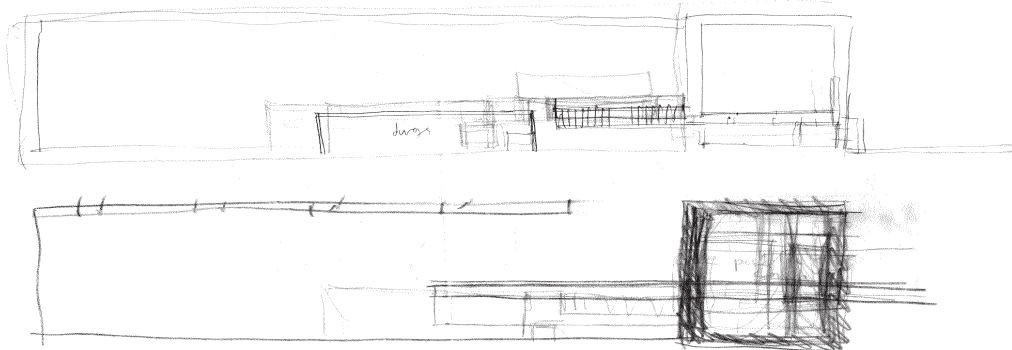
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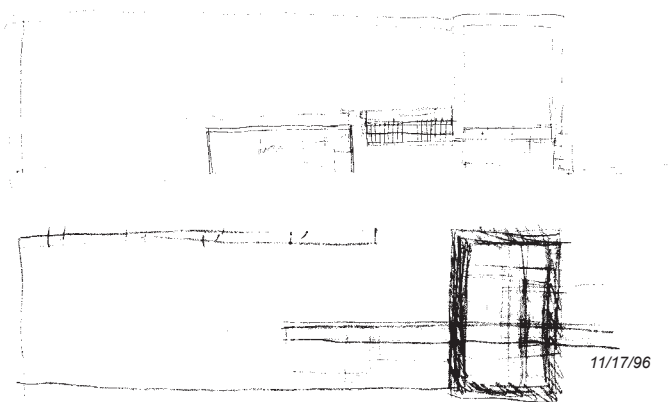
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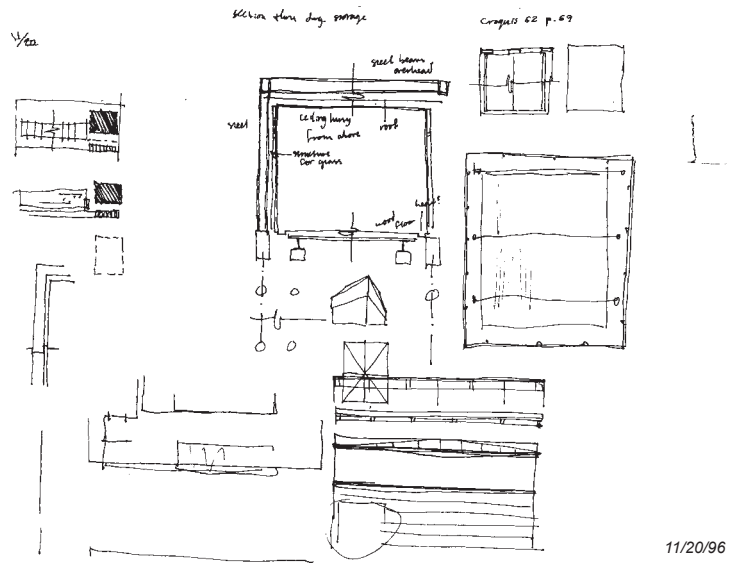*Figures 36, 37, 38.* Schemes placing workshop against rear wall of the
Columbia Mill foundation.

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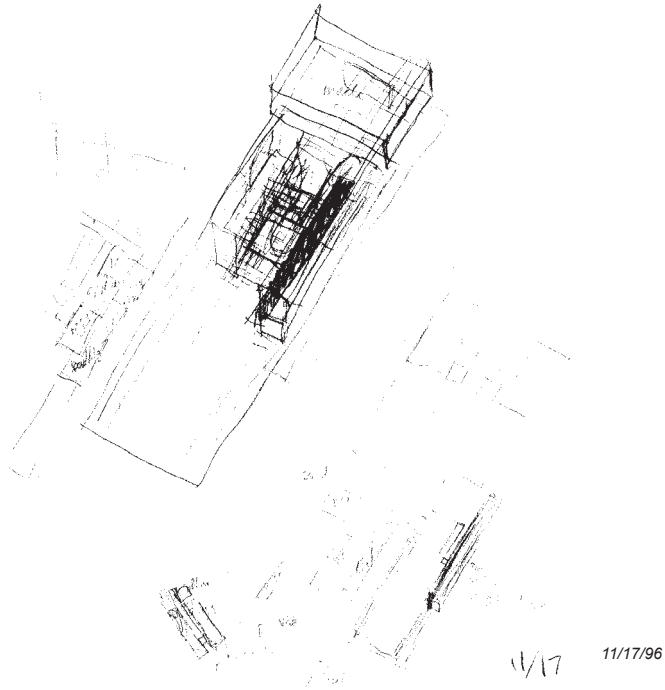
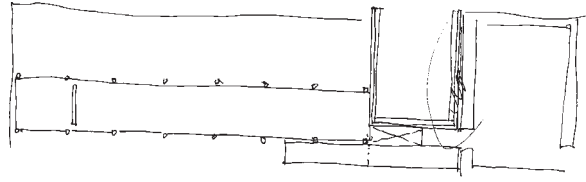*Figure 39.* Sketches of archive within the Columbia Mill foundation.
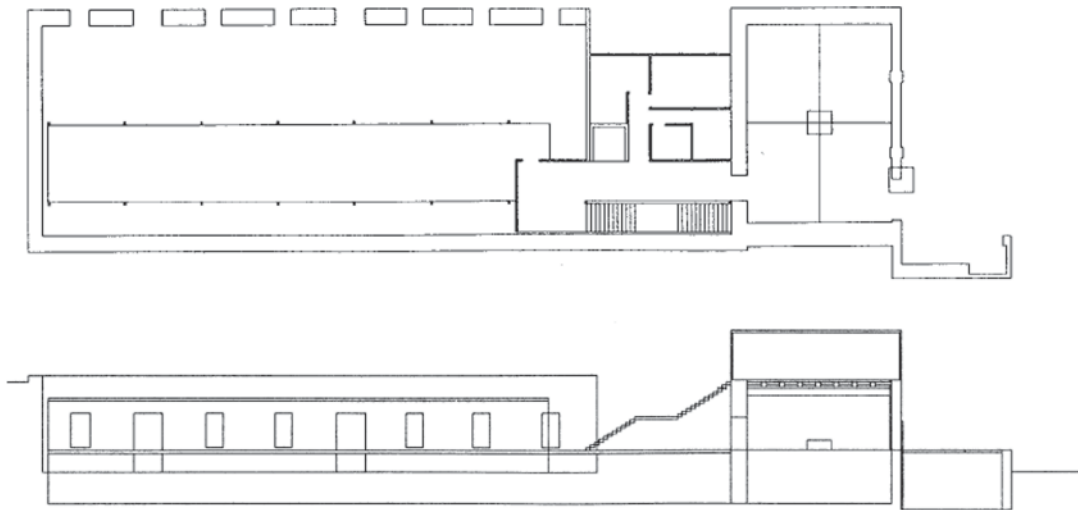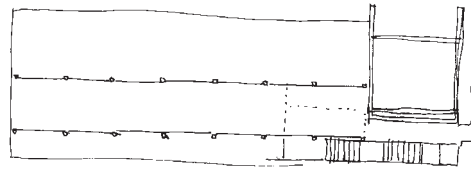

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Figures 40, 41. Workroom becomes suspended within
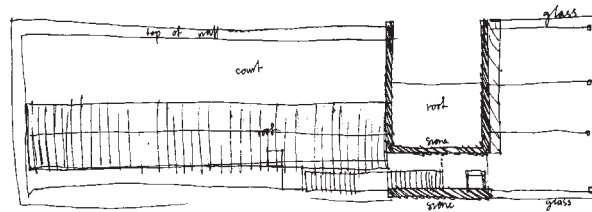Columbia Mill foundation.
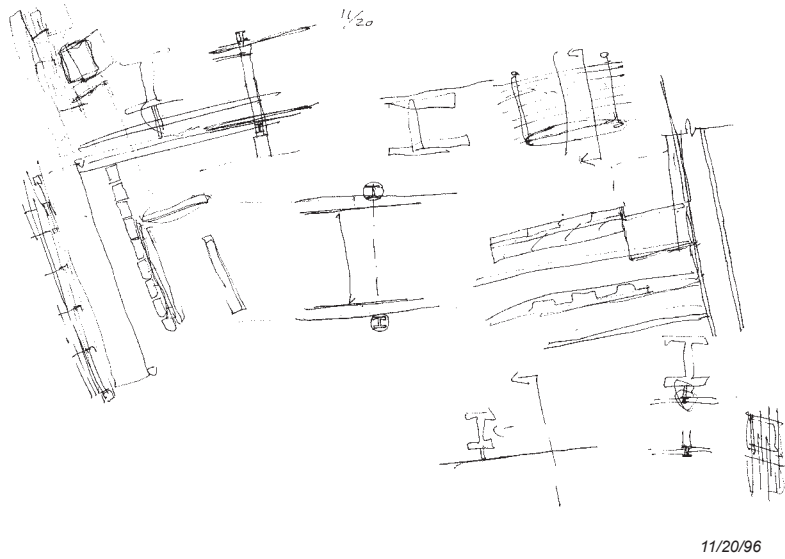
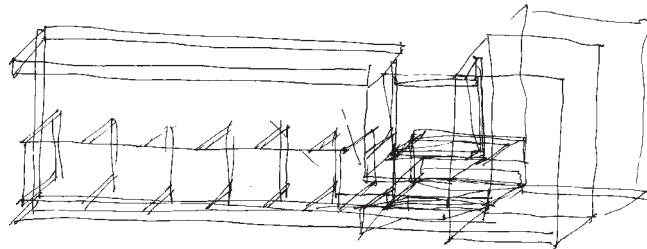*Figures 42, 43.* Structural details for workroom and computer room.
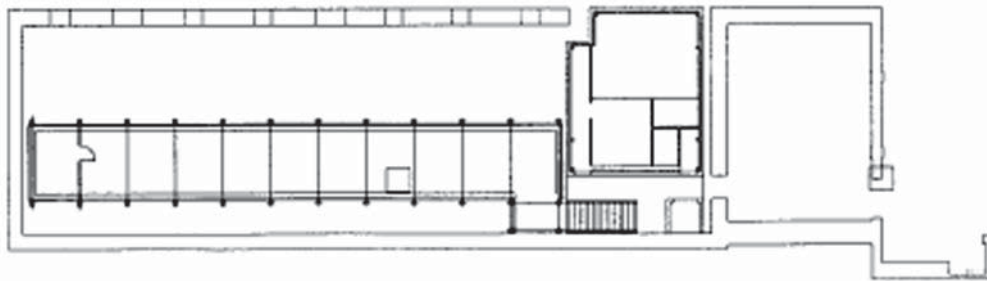
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Figures 44-48. Structural scheme for suspended workroom.

11/25/96

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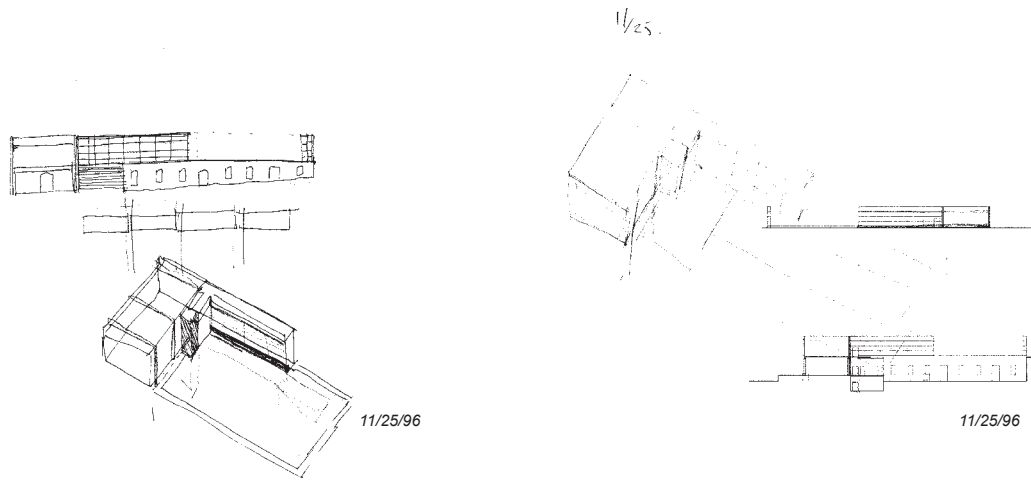
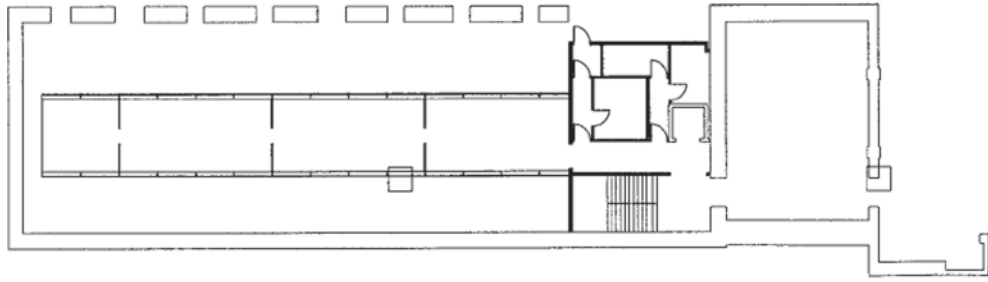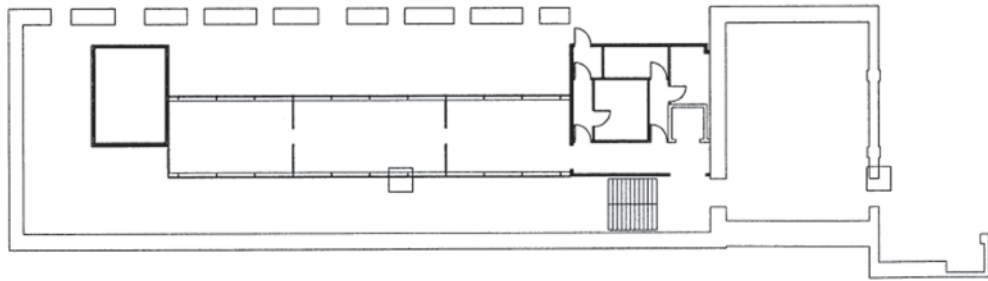*Figures 49, 50.* Development of computer room.

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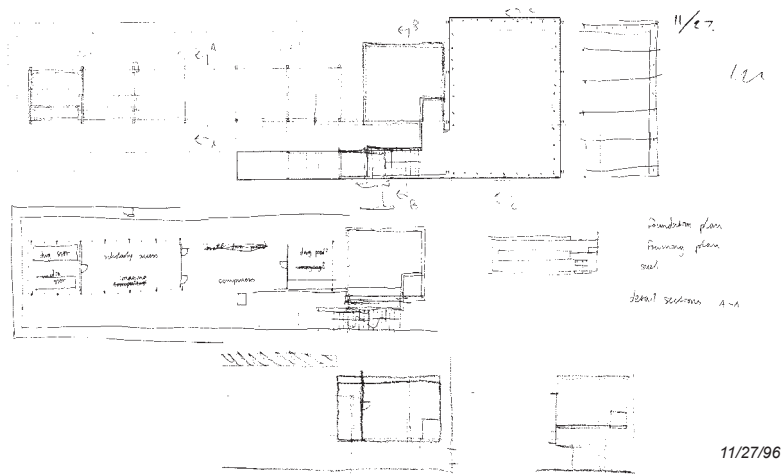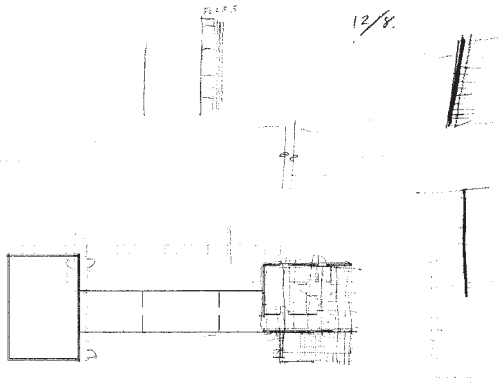
Figure 51. Development of workroom.
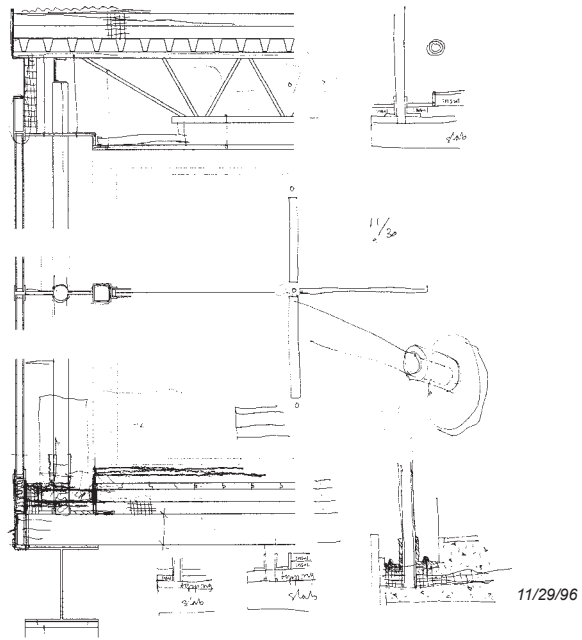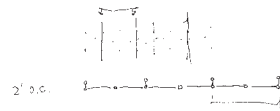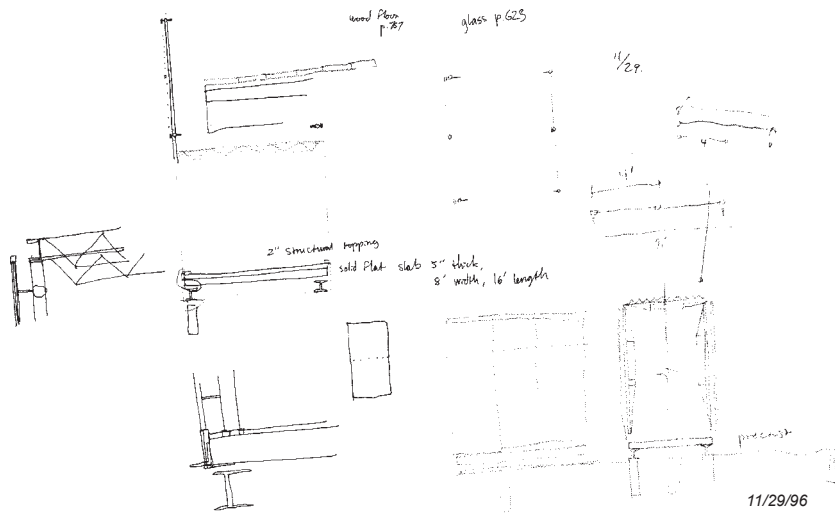
Figures 52, 53. Structural details for workroom and computer room.

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Figures 54, 55, 56. Development of archive storage room.

4

Scholars come to the Minneapolis Milling District Archive to make sense of information. That information resides in the original, historic artifacts, it resides in the site, and it resides in digital artifacts.

The archive does not provide an explicit, didactic system of reference between site and information. It rather promotes simple recognition of ground, sky, horizon, and the river; of linearity and movement; of stone, glass, and steel; of computers and computer simulations as part of an overall site experience mediated through architecture. Its architecture provides a site-focused context within which well-informed decisions can be made about the use of the digitized and original historic artifacts stored within. Architecture is the medium through which sense is made of information.

Figure 1. I scanned the photograph and map from Anfinson (1989, 1990). I opened the photograph in Photoshop and set up a second layer, into which I imported the scanned map. I distorted the map (using Photoshop's Distort command) to align with the photograph. For this and all other images reproduced in this book, I reduced the overall image sizes and converted the grayscales to bitmaps using Photoshop's Diffusion Dither method.

Figure 2. I scanned the aerial photograph from Anfinson (1990). This was an orthogonal map and I distorted it to align with the oblique photograph in the previous figure. Onto this, in a separate layer, I imported a contour map drawn in Canvas (saved as a TIFF for export to Photoshop). In a third layer, I imported an exported PICT bitmap from upFRONT. To align the perspective correctly, I used the Photoshop image as a background in upFRONT and then used the tumble tool to set up a specific view.

Figure 3. I took four photographs (quadrants) from directly above the site model. I scanned the photographs and assembled them in Photoshop. The Stone Arch Bridge -- itself not built as part of the site model -- was scanned from an aerial photograph and superimposed on the composite photographs of the site model.

Figure 4. I built a model of the archive in form-Z and upFRONT, then exported a PICT bitmap view of the model at an angle approximating that of an existing site photograph. I superimposed the bitmap view of the upFRONT model onto the site photograph in Photoshop.

Figures 5, 6, 7. Scanned photographs of the final model, taken in the back yard of the Architecture Building on a rainy Saturday in April.

Figures 8-14. I produced the final drawings in AutoCAD and exported them as 2D DXF files. I crossed to the Macintosh platform to import the DXF files into Canvas 3.5.4. I converted the DXF files into 600 dpi TIFF files in Canvas 5.0 and then into PICT files using Photoshop. I added poche in Photoshop; the text is from PageMaker.

Figures 15-17. The model was built in form-Z and upFRONT; views were generated in upFRONT and exported as PICT bitmaps.

Figure 18. I exported the model view as a PICT bitmap and brought it into Photoshop. I pasted a scanned site photograph of the Washburn-Crosby Mill Complex into the empty spaces in the bitmap image corresponding to windows.

Figure 19. I exported the model view as a PICT bitmap from upFRONT. In Photoshop, I pasted onto this view the scanned Washburn-Crosby Mill Complex

photograph, and then I pasted a view of the upFRONT model of the complex onto the computer screen.

Figures 20-23. I scanned the maps from Anfinson (1989, 1990) and imported them into Canvas 3.5.4 as separate layers. I brought a contour map drawn in Canvas into an additional layer. For inclusion in this book, Canvas maps were exported as 600 dpi TIFF files.

Figures 24, 25. I built the 3d model in AutoCAD and form-Z. I exported the axonometric views as PICT bitmaps from form-Z. I used Canvas to combine several PICTs of the building elements. For inclusion in this book, I exported the Canvas drawings as 600 dpi TIFF files and opened them in Photoshop, where I saved them as PICT files.

Figure 26. Scan of a site photograph.

Figures 27-29. I used form-Z to cut plans of a 3D model. I exported them as drawPICT files and opened them in Canvas, where I underlaid them with poche produced in Photoshop.

Figures 30-32. I scanned ink-on-trace originals as 300 dpi, 50% scale, black-and-white drawings (bitmaps).

Figure 33. I placed the small models face-down on a flatbed scanner and scanned them as 72 dpi PICT files.

Figures 34-35. Scanned photographs of the models.

Figures 36-56. I scanned all ink-on-trace sketches as 300 dpi bitmaps at 50% original size; pencil-on-trace sketches as 300 dpi grayscale PICT files, changed to black-and-white bitmaps using Photoshop's Diffusion Dither method. I drew the building sections and plans in AutoCAD r13, printed them at 1" = 40', and scanned them in as 300 dpi PICT files. This method proved more efficient than converting each file to a DXF and subsequently to a TIFF or PICT bitmap (as I did for figures 8-14).

NOTES AND BIBLIOGRAPHY

1   This design studio was led by Andrzej Piotrowski. Several of the ideas which made their way into the design for the Minneapolis Milling District Archive were initially discussed as part of the Minneapolis History Center project.

2   Several excellent discussions of the history of the Minneapolis Milling District are available. Anfinson (1989, 1990), Berman (1980), and Kane (1987) are particularly notable.

3   I assume for purposes of the present project that items in the collections of the Minnesota Historical Society would be transferred to the new archive for storage. These include an existing collection of archaeological record drawings of the Milling District, some of which are reproduced in Anfinson (1990).

Anfinson, Scott F. (1989) "Archaeology of the Central Minneapolis Riverfront Part 1: Historical Overview and Archaeological Potentials" In *The Minnesota Archaeologist,* v. 48, nos. 1-2.

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Kane, Lucile M. (1987) *The Falls of St. Anthony: The Waterfall That Built Minneapolis.* St. Paul: The Minnesota Historical Society Press.

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A C K N O W L E D G E M E N T S