

**Capturing and Presenting the Historical Significance of
K-25 & K-27**

Oak Ridge, Tennessee

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100% SUBMISSION

January 7, 2004



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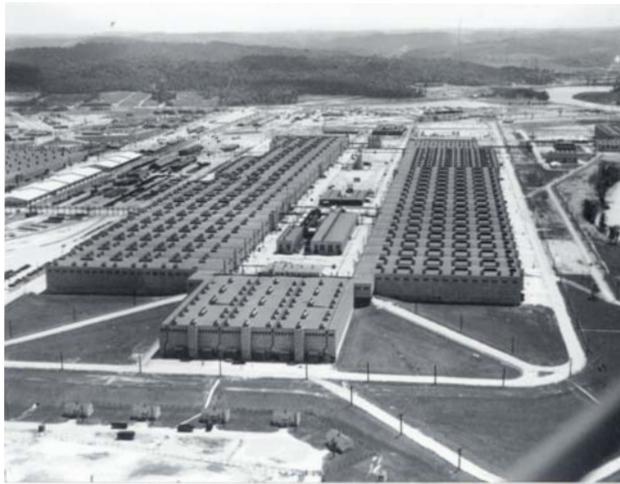


FIG. 1: View of K-25 looking South.



I. EXECUTIVE SUMMARY

Construction of the K-25 Gaseous Diffusion Plant began in 1943. The mission of the plant was to produce enriched uranium-235 during the Manhattan Project. The enormous K-25 Building, the original historic focal point of the plant, contained the converters that processed the uranium. The capacity of the K-25 Plant was increased through the addition of the K-27 Building in 1945.

The K-25 Plant is no longer used to produce enriched uranium. The site is now known as the East Tennessee Technology Park (ETTP), and is in the process of being redeveloped for commercial industrial purposes. The site is referred to as the K-25 Plant, while the building that housed the original converters used in the gaseous diffusion process is referred to as the K-25 Building in this report.

The firm of Ehrenkrantz Eckstut & Kuhn Architects was retained to develop design proposals for capturing and presenting the historical significance of the K-25 and K-27 facilities. The following tasks were included in the project.

- 1) Provide three or more full design options whose implementation will capture the historical significance of the K-25/K-27 buildings, and the historical significance that the site played in the Manhattan Project.
- 2) Each full design option must contain a complete delineation and explanation of all recommended actions with a full cost estimate for implementation of the entire scope of design option.

3) Each full design option must address the plan method and cost to interpret site to convey size/scale of the K-25 Building that conveys the sense of urgency and technology that contributed to winning WWII, preserve portions of Roosevelt Cell and associated equipment, provide 3-D visualizations or mock-ups for the full design options, evaluate the potential impact in terms of regional visitors and revenue to the region for heritage tourism, a full schedule time line of preservation activities that ensures that the K-25/K-27 D&D and ETTP Accelerated Closure Project schedule is not impacted.

4) Each full design option shall provide recommendations with cost estimates for incorporation in the preservation plan of the additional site historic properties that are scheduled for demolition to ensure that their full historic value is adequately portrayed.

5) Provide recommendations and cost estimates for the exhibition of artifacts removed from all historic properties at the East Tennessee Technology Park (ETTP).

6) Provide recommendations on the steps that should be taken to assure that full regional benefit is realized for heritage tourism.

7) Provide a list of potential funding sources available to the DOE for these.

The logistical difficulties in preserving the entire site, or the entire K-25 Building for heritage tourism quickly became obvious. Previous areas in the K-25 Building sampled during a radiological survey

indicated that 10% of the surface areas have contamination levels greater than free release levels. Only a small percentage of the total area, however, has been sampled. For the purposes of this study, a contamination rate of 50% is assumed for all areas in buildings to be decontaminated. The K-25 site is currently undergoing accelerated cleanup. Transfer of ownership of some facilities to other parties for reuse is planned.

In order to ensure that meaningful aspects of the site are preserved, and that the final recommended scope of work will be feasible, the team quickly focused attention on the K-25 Building as the most important structure on the site. The assumption made is that K-27 will be demolished, and interpreted through artifacts and other materials exhibited elsewhere.

Some of the artifacts may be exhibited at the American Museum of Science and Energy (AMSE). AMSE should be the focal point for visitors to Oak Ridge, and ETTP should be the place that provides visitors with an “authentic experience” (i.e. the visitor will be able to glean the original historic character and purpose of the site by experiencing it’s scale and complexity.) The K-25 Gaseous Diffusion Building is the key to this experience since it is the original focal point for the K-25 Plant complex.

The ancillary structures were determined to be valuable in conveying the history of the K-25 Plant, and to an understanding of the gaseous diffusion process. Some of these structures are contaminated and may not be salvageable. The structures that are most important were determined to be those buildings inside the K-25 Building “U”, and the original Portal 4 entry.

Conveyance of the K-25’s historic importance must take precedence over other considerations, but to ensure preservation the design must also be logistically viable. In order to accomplish the seemingly incongruous goals of feasibility and preservation, design principles were first established. The feasibility goals must be met within the framework of the interpretation of the site as guided by the following design principles.

1. The visitor experience is authentic.
2. The entire site is the visitor experience.
3. Technology is explained in simple, clear ways.
4. The main site experience is via bus or vehicle.
5. The pedestrian experience is as compact as possible and limited to 200' radius from stops on the tour.
6. New visitor accommodations are designed to provide an overview of the entire site, visually and thematically.
7. The Roosevelt Cell, or other equivalent representative equipment, is preserved and located for public visits.

The recommended design alternates required a scope of work that could be accomplished within a reasonable time frame with a reasonable expenditure of resources. This approach must be balanced with effective interpretation of the site for the general public. Three basic types of scheme designs were considered. Each of these three scheme types contained various sub-options for addressing the building and equipment. The recombination of these various options resulted in

five different suggested scheme designs. Two of these, Schemes 1d and 2a were rejected.

Scheme 1d was rejected because the original north module is less typical than other areas of the building. The team believed that this area would not adequately stress the repetitive nature of the building features.

Scheme 2a was rejected because the team believed that this project might not be feasible. The enormous scale of K-25 combined with contamination issues made the prospect of saving this structure in its entirety beyond reasonable expectations. According to previous estimates, decontamination and retention of the entire K-25 Building would cost roughly \$1.44 billion.¹ The funding for such a project is not likely to be in the realm of possibility. Furthermore, the maintenance and operational expenses for a clean structure of this size are assumed to be significant, and it is not clear that an organization willing to assume these costs could be found. Therefore, scheme 2 was discarded in favor of developing Schemes 1 and 3. (Alternative schemes developed as part of this study are presented in section VI.)

Three scheme designs were ultimately chosen for further consideration. Scheme 1b was chosen as the most fiscally viable scheme. Furthermore, it is anticipated that this scheme could easily be accomplished within the previously established D&D (decontamination and decommissioning)

¹ *Alternative Study on Avoiding Demolition of the K-25 Building Located at the East Tennessee Technology Park, Oak Ridge, TN.* Bechtel Jacobs Company, May 2001.

schedule. This scheme, however, would not result in an authentic experience for the visitor. Nevertheless, it should be acknowledged that this scheme will resolve many of the contamination and security issues that concern the DOE regarding the proposed interpretation of the site.

Scheme 3a was chosen for consideration since it provides the visitor with a somewhat authentic experience, conveys the size and repetitive nature of the building, and preserves the Roosevelt Cell. The design assumes that the building will be completely decontaminated. The implementation of this design requires complete survey of all areas to remain, and selective removals and replacement of hazardous materials. The result would be a completely cleaned facility that provided an authentic experience for the public.

The main difficulty in implementation of Scheme 3a will be the higher cost and maintaining the D&D schedule. Selective removals are likely to be more labor intensive and it is not clear that this could be accomplished within the existing schedule. It may be possible to engage more workers in order to maintain the decontamination schedule, but DOE must make this determination internally. The completion of building modifications required to make the structure occupiable cannot be made until after decontamination is complete, and therefore these changes are not likely to be completed by 2008 as indicated in the current D&D schedule.

Scheme 3b was chosen for consideration since it provides the visitor with the most authentic experience with the added benefit of a cost savings on selective removals. This scheme assumes that the contaminated materials and equipment would remain in the retained

portion of the structure. Glass Partitions would separate visitors from contaminated areas, while providing a view of the equipment. Platforms on either end of the building slice would provide access to the structure. Glass enclosed walkways passing through the building would connect the platforms on either end.

Scheme 3b has the added benefit of being very flexible. The area shown in the model is simply one possible location for the retained portion. Another area could be chosen based upon other considerations such as constructability.

Although there is a considerable cost savings in terms of selective demolition, the retention of contaminated materials does present a liability issue for the DOE. Scheme 3b assumes that DOE maintains some presence on the site and does not completely divest itself of the K-25 Building. Security issues may be a consideration in terms of any sensitive technology that might be visible through the glass.

The impact of Scheme 3b on D&D will likely be reduced compared with Scheme 3a, and it may be possible to meet the existing D&D schedule for areas of the K-25 Building to be demolished. Some additional effort will be required, however, for selective removals. These tasks will include cutting through the existing structure to separate it from areas to be removed, and replacement of the roof in order to maintain a weather tight envelope. Additional resources will also be required to modify the building slice including the insertion of new platforms with elevators, stair cores, new lighting and other required features.

It may be possible to perform the required modifications for implementation of Scheme 3b simultaneously with the decontamination tasks. Consideration must be given to the need for a construction staging area since this might interfere with the staging areas required for decontamination activities. The DOE must decide internally if it is possible to conduct all of these activities simultaneously, thereby implementing Scheme 3b by the 2008 deadline.

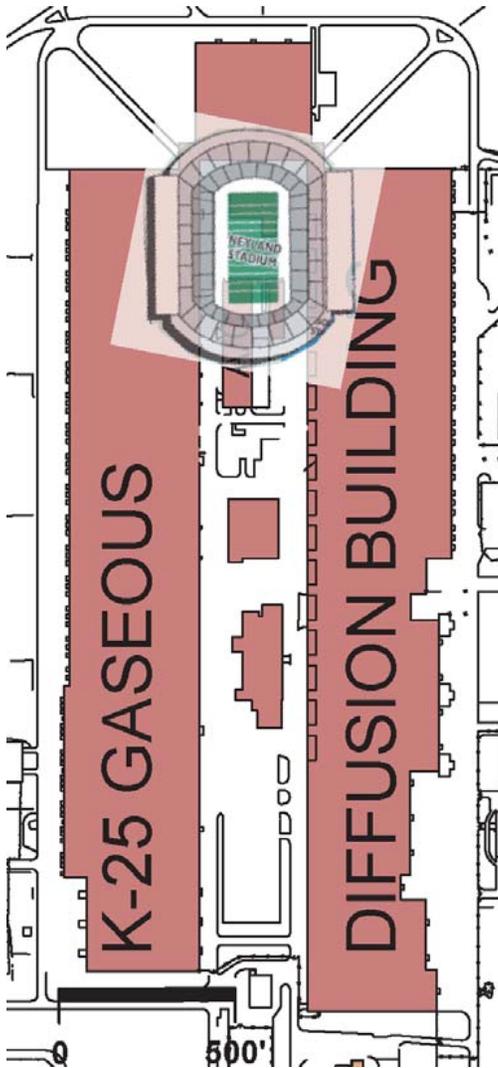


FIG. 2: Scale comparison between University of Tennessee's Neyland Stadium & K-25

II. DESIGN OPTIONS

A. Schemes

A wide range of design options was explored for the K-25 Building. The basic scheme options fell into three categories; 1) demolish the entire structure, 2) retain the entire structure, or 3) retain a portion of the structure. Each of these basic options has numerous sub-options regarding both the building and the equipment [see Appendix A].

Aside from its enormous scale, the K-25 Building is architecturally nondescript [FIG.1]. The main visual impact of the structure is experienced when standing inside the "U" between the two arms. This is its most salient feature. Currently, a visitor standing in the "U" is visually isolated from the surrounding landscape. The walls of the structure completely dominate the view. This experience must somehow be retained in the interpretation of the site, thereby providing future visitors with an Authentic Experience.

The proposed schemes create a focal point inside the "U." The walls or some vestiges of walls are retained, thereby retaining the view corridor inside the "U" while facing north. A portion of the building is retained in schemes 3a and 3b. However, even this portion would be significant in scale, its size exceeding the dimensions of a football field [FIG.2]. If the building portion to be retained is to be decontaminated, it is assumed that approximately 50% of the building materials would require replacement (see section II-B "Cost Estimate").

Some type of orientation building will be required for all schemes in order to ensure a successful

interpretation. A Visitor's Center is assumed to contain about 10,000 square feet. The size of the Visitor's Center will be dependant on the final Interpretive Plan and the role of the American Museum of Science and Energy in the operation and interpretation of the site.

There are a number of possible locations for the Visitor's Center either on or off site [FIG. 3]. Possible options include locating the Visitor's Center in a new building on the site; locating it in a reused building on the site; or locating it at the American Museum of Science and Energy.

The construction of a new building for the Visitor's Center will probably be a more economical solution since an existing structure would require modifications. A new building on site would ideally be located at the entry portal so that the visitor would have access to the exhibits even when tours are not being conducted.

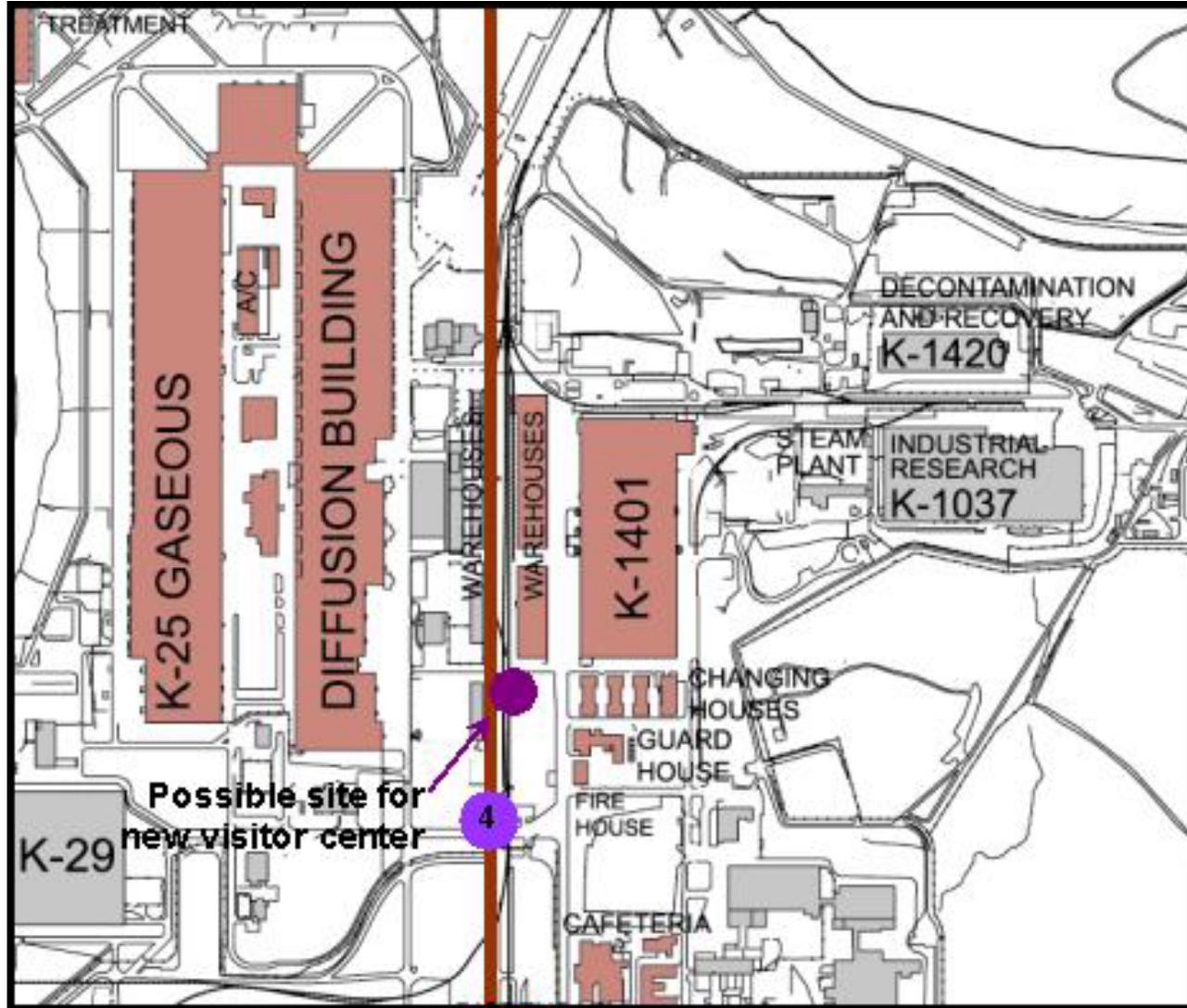


FIG. 3: One of numerous possible locations for the proposed Visitor's Center

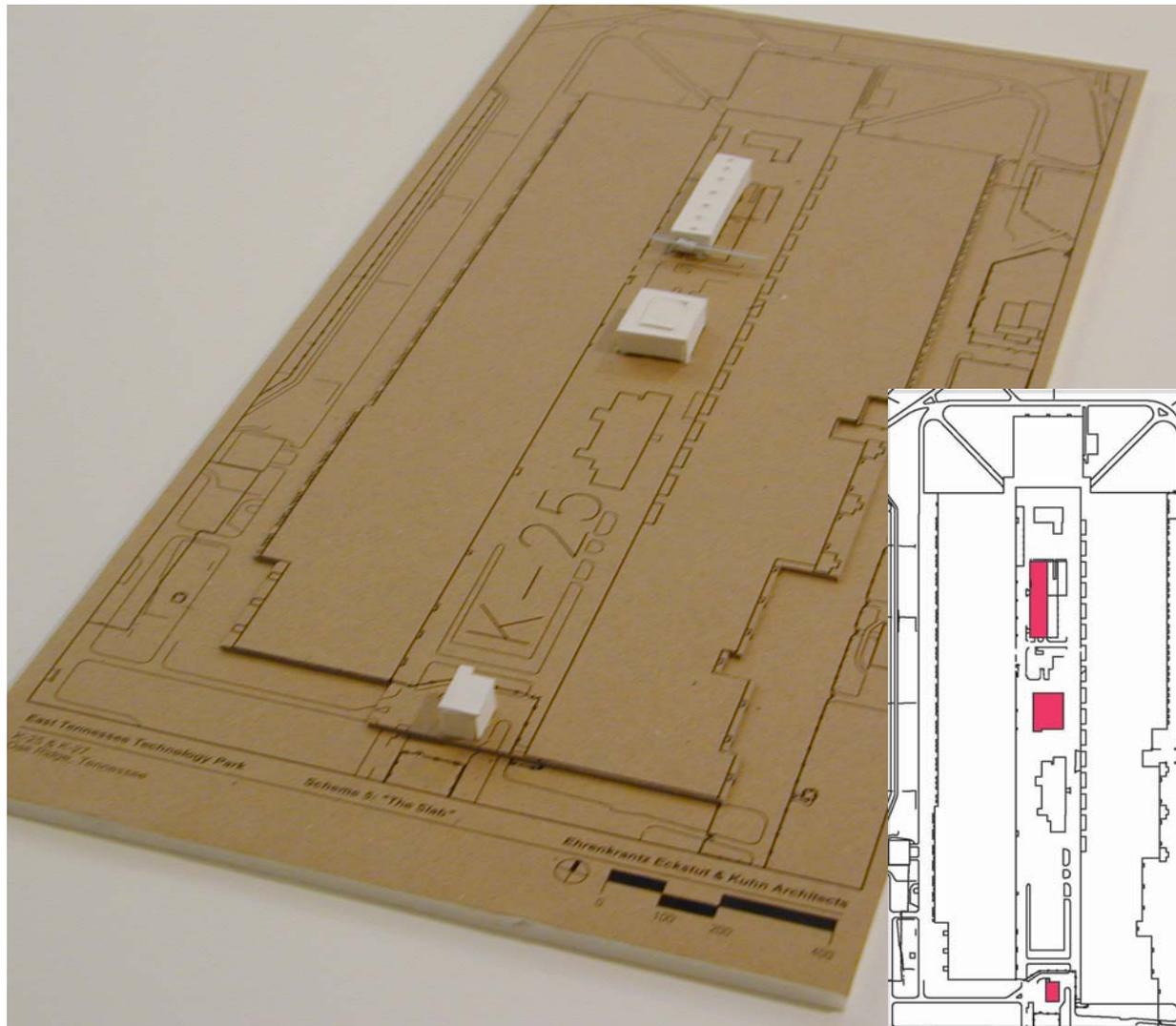


FIG. 4: Model of Scheme 1b

Schemes utilizing the building footprint area and/or selected portions of the K-25 Building plus alternative design options independent from the physical structure of K-25 were selected for further development. These developed options offer a full range of preservation possibilities. The following scopes of work were developed for three building dependant schemes plus alternative independent design options in order to prepare cost estimates.

Scheme 1b, Equipment Option “c”

The first scheme is the least expensive and assumes that the entire structure will be demolished. However, the visitor will not be able to have an authentic experience. The historic fabric is not preserved. A small sample of the original equipment will be saved and displayed elsewhere. The original footprint of the building will be recreated in pavement, and the story of the K-25 site will be told at a new Visitor’s Center.

The following tasks are required in order to realize this scheme:

- Demolish building down to slab.
- Install new pavement to match the historic footprint of the original structure. The pavement shall have an outline showing original equipment sizes and location.
- Provide signage and walking areas to direct visitors.
- Design and construct a new 10,000 square feet Visitor’s Center.

Scheme 3a

This scheme assumes that all of the building except the slab and an 350 Ft. x 400 Ft. section will be demolished (just under 9% of the total structure.) One equipment unit including the Roosevelt Cell and associated piping will be decontaminated and reinstalled. The interior of the structure will be clean and able to accept visitors. Exhibit materials that explain operations at the K-25 Building could be included inside the building. A separate visitor's center is recommended for this scheme for the exhibition of artifacts and materials related to other buildings at the site. This is the minimum scheme for an authentic experience.

The following tasks are required in order to realize this scheme.

- Remove existing roof and replace roof slab (assume 50%). Re-surface the roof of the 350 Ft x 400 Ft section with new 3-ply built-up roofing.
- Repair and/or replace sections of the 350 Ft x 400 Ft floor slab sections (assume 50%), plus 100% of exterior exposed slab.
- Install new "CemBonit" corrugated cement board panels to match original Transite panels as closely as possible. Include new enclosure for wall at end of building section.
- Scrape and paint all remaining exterior doors and window trim.
- Reinstallation of one replicated equipment unit including converters, compressors and process gas piping.
- Install tubular steel armature (4" dia.) at perimeter of slab delineating profile and volume of original building.

Scheme 3, Equipment Option "b"

Remove entire building except for slab and a "slice" measuring approximately 550 Ft. x 400 Ft.

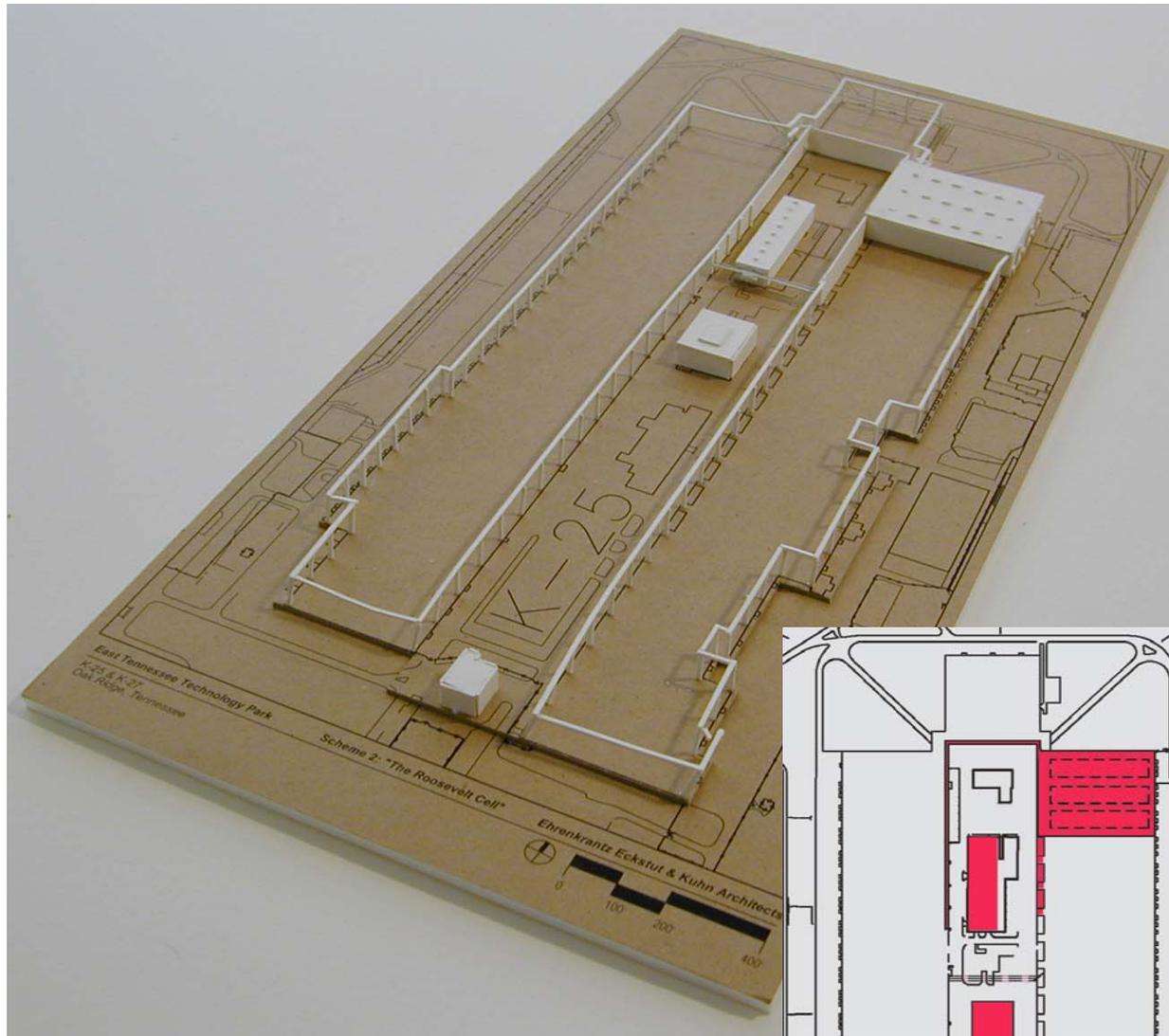


FIG. 5: Model for Scheme 3a, including optional tubular steel armature

(approximately 13% of the total structure.) Retain wall at complete length of "U." Remaining structure will not be decontaminated. Visitors will be able to view building and equipment through special glass barriers. A separate visitor's center will be required for this scheme. The following tasks are required in order to realize this scheme.

- Cap off piping and leave equipment in place.
- Seal off ends of structure with glass wall.
- Remove damaged areas of 550 Ft. x 400 Ft. roof slab (assume 50%). Re-surface the entire roof with new 3-ply built-up roofing.
- Replace 100% of exposed exterior slab. Interior 550 Ft. x 400 Ft. floor slabs shall remain.
- Coat remaining Transite panels with ethyl-silicate consolidant.
- Scrape and paint all remaining exterior doors and window trim.
- Install hermetically sealed glass observation walkways inside building. There will be two walkways traveling through and perpendicular to the glass ends of the building, thereby connecting the observation decks at both ends of the structure.
- Build observation decks (10' deep) with expanded metal platform at both glass ends of structure. Provide two levels above slab.
- Provide two ADA accessible exterior glass elevators, one at each glass end of the structure. Also provide stair cores
- Install restroom structure alongside one of elevators.

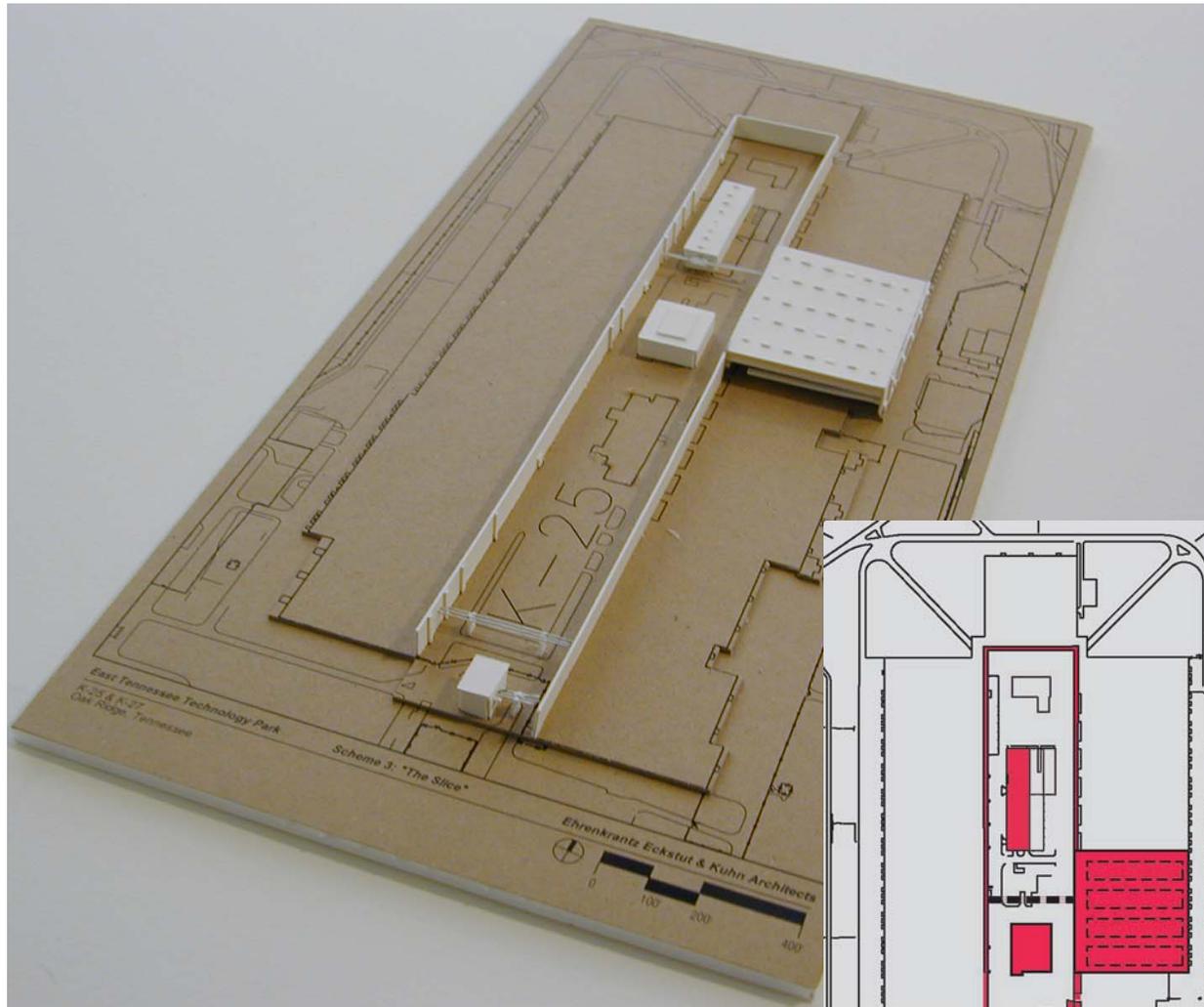


FIG. 6: Model of Scheme 3

Additional Non K-25/K-27 Building Dependant Design Options

In addition to the design schemes utilizing the building footprint area and/or selected portions of the K-25 Building, there are additional options that can be developed to commemorate the historical significance of the K-25 site. These alternative options could be implemented either in conjunction with or independent from Scheme 1b, Scheme 3a and 3b. The alternative options can be coupled together in a composite manner by selection of one of the permanent “monument” type structures supported by written accounts, oral histories, and preservation of documentation that will allow the historical significance of the K-25 Site to be preserved. Additional design options include:

- Design and install a “Cold War” monument to be located at the K-25 Overlook. It is assumed for the purposes of this study, that the monument would be fabricated from polished granite (a 10’x 10’x 10’ block) with some type of etching or inscription in the stone. The monument would be planar in design without any 3-dimensional figural representations. Some landscaping would be included.
- Construct three “kiosks.” These structures were previously proposed by Laine Communications in April of 2002. The kiosks are meant to be outdoor exhibits that convey the history of the site. Laine has proposed locating two kiosks at the overlook, and one at the administrative area. The kiosks could include maps, site models, artifacts and interactive displays.
- Revise the display at the K-25 Overlook Building to include a more media-intensive exhibit.
- Create a new K-25 exhibit in an existing space at the American Museum of Science and Engineering (AMSE). This is assumed to be a media-intensive exhibit occupying approximately 2000 square feet of museum space.
- Create a scale model of the K-25 site to be located at the AMSE. The model is assumed to have a fifteen-foot square base.
- Replicate the Roosevelt Cell and display at the new Southern Appalachia Railway Museum. This option assumes that there is existing space at the museum large enough to accommodate the replicated equipment (approximately 750 square feet). The currently proposed design includes a 5000 square foot facility.
- Conduct oral history study including research and interviews with former K-25 workers.
- Compile photographs and drawings. The drawings and photographs are assumed to be extensive. An assessment and listing of all the items in the collection is first required. The security status of these materials must be assessed in order to determine if it is appropriate to make these images available to the public. Security clearance issues are not included in this proposal and should be factored into the schedule and cost estimate separately. The images should be digitized in order to ensure their preservation, and to provide a format that can be easily made available to researchers and the general public.
- Fund the publication of a book on the K-25 site. Such a book is currently being researched and written by William Wilcox, a former employee of the K-25 plant.

B. Cost Estimate

The unit costs presented in the cost estimate assume a significant amount of required remediation during the construction phase due to unknown conditions and change orders. Additionally, site restrictions and special conditions that will complicate the projects are anticipated. The 20% design contingency, 2.5% escalation contingency and 7% overhead and profit are conservative industry norms. Although the General Conditions are typically 6% to 8% on a large commercial project, a much more conservative figure of 14% has been used to accommodate site restrictions and the difficulties imposed by radiological contaminants. A construction contingency of 15% is very conservative, but within the industry norm. The 15% Owner Soft Costs was provided by Bechtel Jacobs based upon regional costs for this type of site.

The schemes described in this report represent a range of prices, reflecting the amount of selective replacement required in response to removals of decontaminated building materials. According to Bechtel Jacobs, approximately 50% of the building surface area is assumed to have contamination levels greater than free release levels. This information applies to both vertical and horizontal surfaces. The cost estimate presented here assumes that approximately 50% of all surfaces of the K-25 Building are radiologically contaminated. Therefore, in schemes where retention and decontamination of existing surfaces are indicated, all surfaces to be decontaminated will be surveyed. The contamination and required selective removals of these areas are assumed to be 50%. Therefore 50% of the area will require resurvey upon completion of the removals. The full extent of the contamination in the areas retained is to be verified by subsequent intensive sampling and surveying of the building surfaces and

contents. The following estimated quantities are assumed for the K-25 Building.

Roof Surface = 1,641,000 SF
 Gross Floor Area = 4,756,000 SF
 Length of each Side = 0.5 mile (Approx. 2,640 Ft)
 Length of Building around "U" = 4,975 Ft
 Building Perimeter = Approximately 12,800 LF
 Height = Approx. 58 Ft
 Max. Width = 400 Ft
 Exterior Wall Surface = Approximately 742,400 SF
 Total Surface Area = Approximately 27,500,000 SF

Scheme 1b represents complete demolition and disposal, while Scheme 3b represents encapsulation of contaminated material where possible. Scheme 3a takes the middle road, and includes retention of a small part of the structure with radiological survey and selective decontamination in order to achieve a clean site. Conversely, Scheme 3b assumes that contaminants will be contained, but not necessarily cleaned. The cost for continued monitoring of radiological materials in Scheme 3b must be taken into consideration [see Table 4].

The base decontamination estimates are taken from estimates previously calculated by Betchel-Jacobs. These numbers were used to calculate quantities for the Cost Estimate [Table 1]. Scheme 1b was assumed to represent 100% of the base cost of demolition (\$471 million) plus a few additional items. Scheme 3a was assumed to include only 91.5% of the original base cost since approximately 8.5% of the building would not be demolished. Similarly, Scheme 3b was assumed to include only 87% of the original base price since 13% of the building would not be demolished. The disposal of

selectively removed building materials from the portion of the building to be decontaminated is included as a separate line item. A fundamental assumption of this report is that the radiological and hazardous materials associated with retention of facilities, portions of facilities, and artifacts/equipment can be managed within the appropriate federal and state regulations and within the budgets defined herein.

The cost for decontamination of historic artifacts is a currently unknown, and probably major cost factor. A range of lump sum figures have been suggested for Excess Material Removal including retrieval, packaging and staging of loose historic preservation artifacts. Current bids for this range from \$300,000 to \$1 million. This figure does not include the additional cost for the Rad Con organization to wipe down and survey the equipment.

The proposed decontamination of one unit of equipment and piping is not recommended by Bechtel Jacobs since it would not be practical. The costs and complexity in addressing various contaminated components in order to achieve final decontamination could well exceed the cost for reconstruction of the equipment. A figure of \$6 million has therefore been included for the replication of a unit of converters and associated piping.

It has been assumed that original contaminated examples of the converters will be retained in storage on the K-25 site. The cost for removal of four converters to storage is estimated at \$64,560. This includes \$2,500 each for wooden crates for four converters (the largest measuring 8' wide x 12' long x 8' high). Moving the converters is assumed

to require a rigging crew of six men for two days. Typically, each rigger would cost approximately \$90 per hour. The rental of equipment for two days could be expected to cost about \$5,000.

The estimate for removal and storage of the converters assumes that a crew of six will be adequate to move the weight of the converters, which is currently unknown. Furthermore, this price assumes that special training for handling radioactive materials is not required. The costs incurred for special conditions relating to removal and storage of the converters may be significant. Storage costs for the converters is not included in this estimate. The storage facility will need to be a secured building that is suitable for radioactive materials and classified technology. Storage in an adjacent section of the K-25 Building is therefore the preferable solution if parts of the structure are to remain. An expert in radiologic removals should be consulted to determine special handling and security requirements for these objects.

The square footage price provided for exhibits assumes a media-intensive exhibit. The unit price of \$650 per square foot includes both design and installation. Although this may seem like a high figure, it is an appropriate amount for a high-quality installation. The K-25 subject matter is highly technical, and merits a media-intensive approach.

A high definition film typically costs, for example, a few million dollars. This does not include the media control room with computer servers and electronic equipment necessary for screening the film. A "low-tech exhibit" runs about \$300 to \$350 per square foot installed. The services of the exhibit designer typically costs about \$100 per square foot, lighting about \$50 per square foot, and graphics about \$75 per square foot.

Scenic treatments such as dioramas run between \$600 and \$700 per square foot installed. A moderate price of about \$500 per square foot would permit a moderately priced installation with some media exhibits. The use of lower numbers is not recommended.

The most important artifacts will include the K-25 building itself, and any ancillary buildings which are preserved for interpretive purposes. The site should therefore be augmented by interpretive exterior signage. A lump sum fee of about \$400,000 in 2003 prices is a reasonable allocation for site signage.

The outlined scope of work does not include tour design, development or marketing studies. The costs for ancillary buildings will vary according to the tour design, which will influence which structures are retained, and condition of these buildings.

Nine ancillary structures from a previous list (agreed to by the SHPO and DOE) are included in the Cost Estimate. These nine were based upon their relationship to the Critical Area (see Section VII), with consideration of decontamination issues as per evaluations made by Bechtel Jacobs. The exteriors of these structures appear to be reasonably good and are assumed to require little work beyond a coat of paint and minor repairs to roofs. However, those buildings that contain radiological and/or chemical contaminants will require decontamination. Some of the ancillary structures also have exterior asbestos-cement siding. The siding is assumed to be encapsulated below layers of paint, and at this time it is not believed that removal of this material is required. The asbestos panels should remain encapsulated

by regular painting. Alternatively, these panels should be replaced with modern cement siding to match the appearance of the original.

The interior of the ancillary structures was not evaluated during this study, and access to the interiors is not required for tours. It is assumed that the interiors of these buildings would continue to function for various light commercial purposes (i.e. offices or light commercial use). A figure of about \$60 to \$70 per square foot is suggested as a reasonable expected cost for renovation of interior spaces including renewal of basic finishes, and some moderate systems work. This does not include the cost for removal of hazardous materials and replacement of building materials, which is provided as a separate figure.

Estimates of required material replacements in ancillary buildings were made based upon the same assumptions used for the K-25 Building (i.e. 50% of all surfaces are assumed to be contaminated and will be removed and replaced.) This assumption was only made, however, for buildings that are indicated in Table 10 to have contaminated materials as per information supplied by Bechtel-Jacobs Corporation (also see "Safety Hazards Documentation and Photographs of Historic Properties Scheduled for Transfer or Decontamination and Decommissioning Located at the ETTP in Oak Ridge, TN," May 2003).

The potential contamination of soil below the ancillary buildings is a distinct possibility. At this time, the location and extent of this condition is not clear. It may be possible to move a building off its foundation to permit removal of the contaminated soil while retaining the building. The price for the

move will vary based upon the condition and type of construction, as well as the size of the building and distance moved. However, a cost of \$24 per square foot is suggested for smaller wood frame structures with no basement. This price is assumed to include moving plus a new foundation. An additional figure of \$10,000 per building is suggested for reconnection of utilities, assuming that the utility connections are not far from the relocated building. It may be possible to also move larger more complex structures, and these would require a case-by-case evaluation. The Cost Estimate assumes that, of the nine structures included, only the Changing House will be moved off its foundation.

The costs presented in Table 1 are provided as unit prices. The unit price assumptions including escalation and other costs are outlined in Appendix D.

Although many of the elements included in the Cost Estimate apply to all schemes, some of these costs are interchangeable. The combinations of unit cost items presented here are the ones that were deemed the most appropriate for conveying the authentic experience. However, there may be other considerations that will become apparent during the final design development that will suggest alternative approaches.

The armature presented in Scheme 3a, for example, could also be used in the other schemes. The cost for the inclusion of armature in other schemes can be estimated by modification of the appropriate square footages for a specific scheme.

Furthermore, the quantities presented in this Cost Estimate are illustrative and are designed to be flexible. Additional square footage is illustrated for Scheme 3b in order to demonstrate the impact that avoiding selective

decontamination has on the final figure. Scheme 3b includes considerably less replacement material in the section of building to be retained since selective decontamination is avoided. The result is that, despite retaining approximately 4.5% more of the structure in Scheme 3b, the cost decreases approximately 7% from that of Scheme 3a. It should be noted, however, that the projected annual operating expenditures for Scheme 3b are approximately 20% more than for Scheme 3a (see Table 4).

Scheme 3a represents only about 12% more in construction costs than Scheme 1b. Again, however, there is a significant difference in the projected operating costs. Scheme 3a will require approximately 48% more in annual operating costs.

The area preserved in Scheme 3b could be reduced to the approximately 140,000 square feet illustrated in Scheme 3a. However, enough of the building must be retained in order for the visitor to understand the gaseous diffusion process and the repetition of the equipment. Reduction of the square footage below the amount illustrated in Scheme 3a, therefore, is not recommended.

Operation Costs have been calculated based upon operations at the American Museum of Science and Energy (AMSE). AMSE currently operates fully burdened at \$28 per square foot, per year. Operation costs were assumed to be similar for Schemes 3a and 3b. However, this assumption should be confirmed by a maintenance expert. We have also assumed that there will be some maintenance and operational costs for slabs, although it should be significantly lower. We have

assumed that this cost would be approximately \$5 per square foot per year.

A construction cost for the ancillary buildings is included in Table 2. The curation of artifacts, exhibit design, and construction and design of a 10,000 square foot Visitor's Center is included in Table 3. Tables 5, 6 and 7 summarize information presented in Tables 1 through 4, thereby indicating a total expenditure required for implementation of Heritage Tourism at the K-25/ETTP site. Table 6 is of particular interest because the final line item indicates the estimated cost of preservation beyond the projected cost for D&D. This information should be weighed against the final line item in Table 7, which indicates the site-wide annual operating costs for a Heritage Tourism destination.

Table 8 delineates estimated costs for the alternatives described at the end of Section II.A. The cost for the "Cold War Monument" is a rough order-of-magnitude recommended budget. It is very difficult to offer an estimate without a design. However, if one considers that the construction of the Vietnam Memorial in Washington, DC is estimated to be worth approximately \$20 million in 2003 costs, then \$250,000 seems like a reasonable budget for a much smaller monument.

The design of three outdoor exhibit "kiosks" were proposed by Laine Communications in April 2002. Their estimates for the design and construction of the kiosks with exhibits, markers and landscaping are included.

Estimated costs for the displays at the existing K-25 Overlook (Building K1547), AMSE exhibit and display of the replicated Roosevelt Cell at the future

Southern Appalachia Railway Museum (SARM) are based upon unit costs previously described. The main difference between these venues is that the K-25 Overlook is assumed to be a small, but media-intensive exhibit space. The existing exhibit already includes a video. Additional media would be the most effective method of expanding the exhibit given the space limitations.

The AMSE exhibit is also assumed to be media-intensive since this type of format is already in use at the museum. Conversely, the exhibit at the SARM is assumed to be less media-intensive because most of the budget will be focused on the reproduction of the Roosevelt Cell. The estimated cost assumes that a museum shell has been constructed and is available.

The construction of a professional model of the K-25 site is presented as a separate line item. This type of model would be used to illustrate the scale and magnitude of the K-25 Plant. The skills and materials used in museum dioramas are very similar to those used in model building, and similar unit prices can be anticipated. The price is assumed to include a base, explanatory text and special lighting.

An oral history book was included in the Memorandum of Agreement between the SHPO and DOE. This item was previously estimated by Laine Communications to cost \$120,000.

The compilation of photographs and drawings is a complex and involved undertaking assumed to involve a large collection of both black-and-white photographs and large format architectural/engineering drawings. These items are already located in various repositories within the Department of Energy. However, in order for these collections to have any meaning, they must be

catalogued and accessible within a centralized location. The cost estimate assumes that an archivist will require three months to sort and list all the images. One archivist at \$100 per hour for a period of three months would cost \$48,000.

The sensitive nature of some of these images may require security review in order to separate documents that can be made available to the general public from classified materials that must remain restricted. The cost for security review is not included in this cost estimate.

The extent, format and condition of the collection associated with the K-25 Plant is currently unknown. This cost estimate assumes a collection of approximately 5,000 images that would be catalogued and digitized for future access. The cost for digitizing a given image is dependant on the size and condition of the original document, and the final product being created (i.e. black-and-white versus grayscale, electronic format and image resolution.)

The potential cost for an in-house operation was considered. A single piece of equipment (assuming that this would be adequate for all documents regardless of size) can be estimated to minimally cost \$250,000 (e.g. "IBM Pro 3000" digital scanning system). Additional requirements would include a light-controlled dark room with flat black surfaces in order to house the scanner (assumed to cost approximately \$15,000). A computerized editing station with software for calibration interface with the scanner, and a graphics program such as 'Adobe PhotoShop' would be required (total cost estimated at approximately \$2,000.)

The project is assumed to require approximately three years to execute, with a limited staff including an Image Specialist (\$100 per hour) and one assistant (\$50 per hour). The three-year time frame is based upon ten minutes of initial scanning time for each image, plus digital correction of damaged or faded images. The correction can require from ten minutes to two or three hours for more deteriorated images.

The total cost for an in-house operation as described above is estimated at \$1,179,000. This price was compared against sending the images to an outside specialist (unit prices were provided by OCLC Preservation Service Centers). The time frame for the consultant to do this work is assumed to be considerably shorter than an in-house operation since they have greater resources, perhaps about twelve months. Assuming grayscale images with 300 d.p.i. resolution, and bit depth of 8, the following unit prices were assumed:

B&W photos (8"x 10") - \$.91 each
 Architectural Dwgs (18"x 24") - \$ 2.22 each
 Architectural Dwgs (36"x 24") - \$11.76 each

The architectural drawings are assumed to include miscellaneous blueprints on linen, blacklines on mylar and paper diazo prints. Assuming 500 drawings measuring 36"x 24", 500 drawings measuring 18"x 24", and 4,000 black-and-white photos, the services of an outside digitizing service are estimated at \$10,630. However, one full-time in-house staff person will be required to manage the collection and direct the consultant. An archivist for one year is assumed to cost \$200,000. The

total estimated cost for an outside digitization service (\$210,630) is considerably less than an in-house operation.

The publication of a book about K-25 is estimated based upon the following assumptions. It is assumed that there would be a cost associated with the research of the book, which has already been begun by William Wilcox. An allowance of \$10,000 has been included in the cost estimate for miscellaneous research expenses. This allowance will pay for photocopies, telephone calls, photography, technical review, editing, and travel to research facilities located outside of the Oak Ridge area. A lump sum allowance of \$5,000 has been included in the cost estimate for graphic design and layout of the final manuscript as an electronic file (e.g. Adobe 'PageMaker' or similar).

The finished layout would be provided to the Government Printing Office as an electronic file on CD. The completed text with photos is assumed to be 100 pages. The final book will be an 8-1/2" x 11" format, printed in black-and-white on coated stock. The cover will be of a slightly heavier coated stock in black-and-white with the addition of one color. The pages will be bound to the cover with adhesive (i.e. "Perfect Bind" or similar). The estimate cost for printing and binding is \$3,250 for 500 copies, or \$5,200 for 1000 copies. The cost estimate assumes that 1000 copies will be printed.

Task	Direct Price	Unit	Scheme 1b		Scheme 3a		Scheme 3b	
			Quantity	Cost	Quantity	Cost	Quantity	Cost
Radiological Survey	\$ 2.00	SF	n/a		3,506,250	\$ 7,012,500.00	330,000	\$ 660,000.00
Selective Removals	\$ 17.00	SF	n/a		1,168,750	\$ 19,868,750.00	110,000	\$ 1,870,000.00
Equipment Unit replication	\$ 6,000,000.00	ea	n/a		1	\$ 6,000,000.00	n/a	
A. SubTotal: Decontamination						\$ 32,881,250.00		\$ 2,530,000.00
Replace roof deck (50%)	\$ 4.14	SF	n/a		70,000	\$ 289,800.00	110,000	\$ 455,400.00
Replace roof membrane (100%)	\$ 7.25	SF	n/a		140,000	\$ 1,015,000.00	220,000	\$ 1,595,000.00
Replace Elev. Floor Structure (50%)	\$ 19.25	SF	n/a		140,000	\$ 2,695,000.00	n/a	
Replace Roof Framing & Mtl Deck (50%)	\$ 11.72	SF	n/a		70,000	\$ 820,400.00	n/a	
New Tubular Steel Armature at slab perimeter	\$ 8.40	SF	n/a		10,350	\$ 86,940.00	n/a	
Replace/Patch floor slab	\$ 1.50	SF	1,641,000	\$ 2,461,500.00	1,571,000	\$ 2,356,500.00	1,421,000	\$ 2,131,500.00
Coat transite panels (100%, two facades)	\$ 3.50	SF	n/a		n/a		46,400	\$ 162,400.00
Coat transite panels ("U" wall)	\$ 3.50	SF	n/a		n/a		4,975	\$ 17,412.50
Replace concrete panels (100% four facades)	\$ 10.20	SF	n/a		87,000	\$ 887,400.00	n/a	
Replace concrete panels (remaining "U" wall)	\$ 10.20	SF	n/a		1,700	\$ 17,340.00	n/a	
Paint all exterior wood	\$ 1.70	SF	n/a		3,500	\$ 5,950.00	4,500	\$ 7,650.00
Replace Interior Partitions - CMU	\$ 9.20	SF	n/a		7,500	\$ 69,000.00	n/a	
Replace Interior Partitions - Gyp. Bd.	\$ 5.50	SF	n/a		5,000	\$ 27,500.00	n/a	
Replace Exterior Wall Assembly (50% building section)	\$ 37.00	SF	n/a		20,300	\$ 751,100.00	n/a	
Replace Exterior Wall Assembly (50% remaining "U" wall)	\$ 37.00	SF	n/a		850	\$ 31,450.00	2,490	\$ 92,130.00
Install new curtain wall	\$ 60.00	SF	n/a		n/a		63,800	\$ 3,828,000.00
Observation Deck	\$ 34.00	SF	n/a		n/a		3,800	\$ 129,200.00
Sealed Glass Walkway	\$ 1,848.00	LF	n/a		n/a		1,100	\$ 2,032,800.00
New HVAC	\$ 30.00	SF	n/a		404,260	\$ 12,127,800.00	618,280	\$ 18,548,400.00
New Power & Lighting	\$ 12.40	SF	n/a		404,260	\$ 5,012,824.00	618,280	\$ 7,666,672.00
New Fire & Life Safety	\$ 4.30	SF	n/a		404,260	\$ 1,738,318.00	618,280	\$ 2,658,604.00
ADA accessible elevator	\$ 165,600.00	ea	n/a		2	\$ 331,200.00	2	\$ 331,200.00
New Toilet Room	\$ 12,331.25	ea	n/a		1	\$ 12,331.25	1	\$ 12,331.25
New Stair Cores	\$ 23,362.00	ea	n/a		2	\$ 46,724.00	2	\$ 46,724.00
New Teledata & Security	\$ 4.80	SF	n/a		404,260	\$ 1,940,448.00	618,280	\$ 2,967,744.00
B. SubTotal: Direct Construction Cost				\$ 2,461,500.00		\$ 30,263,025.25		\$ 42,683,167.75
C. SubTotal: Decon & Construction (A+B)				\$ 2,461,500.00		\$ 63,144,275.25		\$ 45,213,167.75
Design Contingency 20%				\$ 492,300.00		\$ 6,052,605.05		\$ 8,536,633.55
General Conditions 14%				\$ 344,610.00		\$ 4,236,823.54		\$ 5,975,643.49
GC Overhead & Profit 7%				\$ 172,305.00		\$ 2,118,411.77		\$ 2,987,821.74
D. SubTotal: Indirect Construction Cost				\$ 1,009,215.00		\$ 12,407,840.35		\$ 17,500,098.78
E. SubTotal (C+D)				\$ 3,470,715.00		\$ 75,552,115.60		\$ 62,713,266.53
Escalation (6 yrs. @ 2.5% ppa)				\$ 86,767.88		\$ 1,888,802.89		\$ 1,567,831.66
F. SubTotal w/ Escalation (Add w/ "E")				\$ 3,557,482.88		\$ 77,440,918.49		\$ 64,281,098.19
Construction Contingency 15%				\$ 533,622.43		\$ 11,616,137.77		\$ 9,642,164.73
Owners Soft Costs 15%				\$ 533,622.43		\$ 11,616,137.77		\$ 9,642,164.73
G. SubTotal: Owners Costs				\$ 1,067,244.86		\$ 23,232,275.55		\$ 19,284,329.46
H. SubTotal (F+G)				\$ 4,624,727.74		\$ 100,673,194.04		\$ 83,565,427.65
ADD Base Cost of D&D of K-25 Building	\$ 471,000,000.00	lump sum	100%	\$ 471,000,000.00	91.5%	\$ 430,965,000.00	87%	\$ 409,770,000.00
I. SubTotal (Add w/ "H")				\$ 475,624,727.74		\$ 531,638,194.04		\$ 493,335,427.65
Disposal in Land Fill (from selective demo)	\$ 200.00	CF	n/a		27,000	\$ 5,400,000.00	39,000	\$ 7,800,000.00
TOTAL PROJECT COST				\$ 475,624,727.74		\$ 537,038,194.04		\$ 501,135,427.65

Table 1. Estimated Cost Comparison for Schemes

Measurements for this cost estimate were taken from records provided by Betchel-Jacobs. The estimates are designed as rough order-of-magnitude. EE&K did not have direct access to scaled architectural plans. A more precise estimate should be initiated after the final design for the K-25 monument and Visitor Center has been completed.

Table 2: Estimated Costs for Repairs to Ancillary Buildings

A general price was included for each building based upon the total estimated square footage of the structure. An additional cost was assumed for those structures that have been identified as radiologically contaminated. Fifty percent of floor slabs, roofing materials and exterior wall assemblies are assumed to be contaminated for structures where contamination is indicated in Table 10. Building materials that are removed will require replacement with new materials. The cost for the identification and removal of radiological materials is also included.

Task		Direct Price	Unit	Quantity	Cost
K-1003	Dispensary Radiologic Survey	\$ 1.00	SF	22,875	\$ 22,875.00
K-1008-C	Changing House Radiologic Survey	\$ 1.00	SF	17,325	\$ 17,325.00
	-Move Building/Replace on new foundation	\$ 24.00	SF	11,550	\$ 277,200.00
	-Reconnect utilities	\$ 10,000.00	ea	n/a	\$ 10,000.00
K-601	Depleted Tail Removal Bldg Radiologic Survey	\$ 1.00	SF	24,300	\$ 24,300.00
K-1024	Filter Test Facility Radiologic Survey	\$ 1.00	SF	35,700	\$ 35,700.00
	Removal of hazardous materials	\$ 5,000,000.00	lump sum		\$ 5,000,000.00
A. Subtotal Decontamination of Ancillary Buildings					\$ 5,387,400.00
K-1002	Cafeteria Repairs	\$ 70.00	SF	50,000	\$ 3,500,000.00
K-1003	Dispensary Repairs (general)	\$ 70.00	SF	15,250	\$ 1,067,500.00
	-New/Patch floor slab	\$ 1.50	SF	7,625	\$ 11,437.50
	-New roof framing	\$ 4.14	SF	9,200	\$ 38,088.00
	-New roof shingles	\$ 7.25	SF	9,200	\$ 66,700.00
	-New Exterior wall assembly	\$ 37.00	SF	3,000	\$ 111,000.00
K-1008-C	Changing House Repairs (general)	\$ 70.00	SF	11,550	\$ 808,500.00
	-New/Patch floor slab	\$ 1.50	SF	5,800	\$ 8,700.00
	-New roof framing	\$ 4.14	SF	7,000	\$ 28,980.00
	-New roof shingles	\$ 7.25	SF	700	\$ 5,075.00
	-New Exterior wall assembly	\$ 37.00	SF	2,300	\$ 85,100.00
K-1019-5A	Portal Bus Station	\$ 70.00	SF	400	\$ 28,000.00
K-1021	Fire House Repairs	\$ 70.00	SF	7,000	\$ 490,000.00
K-1028-45	Portal 4 Restoration	\$ 70.00	SF	2,700	\$ 189,000.00
K-601	Depleted Tail Removal Bldg Repairs (general)	\$ 70.00	SF	16,200	\$ 1,134,000.00
	-New/Patch floor slab	\$ 1.50	SF	8,100	\$ 12,150.00
	-New roof deck	\$ 4.14	SF	2,700	\$ 11,178.00
	-New roof membrane	\$ 7.25	SF	5,400	\$ 39,150.00
	-New Exterior wall assembly	\$ 37.00	SF	7,500	\$ 277,500.00
K-1024	Filter Test Facility Repairs (general)	\$ 70.00	SF	23,800	\$ 1,666,000.00
	-New/Patch floor slab	\$ 1.50	SF	11,900	\$ 17,850.00
	-New roof framing	\$ 4.14	SF	12,500	\$ 51,750.00
	-New roof shingles	\$ 7.25	SF	12,500	\$ 90,625.00
	-New Exterior wall assembly	\$ 30.00	SF	4,700	\$ 141,000.00
K-1101	Air Conditioning Building Repairs	\$ 70.00	SF	28,800	\$ 2,016,000.00
B. SubTotal for Repairs to Ancillary Buildings					\$ 11,895,283.50
C. SubTotal (A + B)					\$ 17,282,683.50
Design Contingency 20%					\$ 3,456,536.70
General Conditions 14%					\$ 2,419,575.69
GC Overhead & Profit 7%					\$ 1,209,787.85
D. SubTotal (Indirect Const. Cost)					\$ 7,085,900.24
E. SubTotal (C+D)					\$ 24,368,583.74
Escalation (6 yrs. @ 2.5% ppa)					\$ 609,214.59
F. SubTotal w/ Escalation					\$ 24,977,798.33
Construction Contingency 15%					\$ 3,746,669.75
Owners Soft Costs 15%					\$ 3,746,669.75
G. SubTotal (Owners Costs)					\$ 7,493,339.50
TOTAL PROJECT COST					\$ 32,471,137.83

Table 3: Estimated Costs for Curation, Interpretation & Exhibits

The costs presented in this table include construction of a new Reception/Visitor's Center, curation of artifacts, exhibit design/installation and signage. Costs relating to radiological issues for artifacts and equipment are not included. The economic development and marketing study or heritage tourism plan recommended in Section IV are also not included.

Task	Direct Price	Unit	Quantity	Cost
New Reception/Visitor's Center	\$ 239.11	SF	10,000	\$ 2,391,100.00
Remove Converters to Storage Facility	\$ 64,560.00	lump sum	4 items	\$ 64,560.00
Collection Curation (3 years)	\$ 300,000.00	lump sum	n/a	\$ 300,000.00
Exhibit Design/Installation	\$ 650.00	SF	10,000	\$ 6,500,000.00
Site Interpretive Signage	\$ 400,000.00	lump sum	n/a	\$ 400,000.00
A. SubTotal for Curation & Exhibits				\$ 9,655,660.00
Design Contingency 20%				\$ 1,931,132.00
General Conditions 14%				\$ 1,351,792.40
GC Overhead & Profit 7%				\$ 675,896.20
B. SubTotal (Indirect Construction Costs)				\$ 3,282,924.40
C. SubTotal (A+B)				\$ 12,938,584.40
Escalation (6 yrs. @ 2.5% ppa)				\$ 323,464.610
D. SubTotal w/ Escalation				\$ 13,262,049.01
Construction Contingency 15%				\$ 1,989,307.35
Owners Soft Costs 15%				\$ 1,989,307.35
E. SubTotal (Owners Costs)				\$ 3,978,614.70
TOTAL PROJECT COST				\$ 17,240,663.71

Task	Direct Price	Unit	Scheme 1b		Scheme 3a		Scheme 3b	
			Quantity	Cost	Quantity	Cost	Quantity	Cost
Annual Operations Cost for K-25 Building (2003 \$)	\$ 28.00	SF	n/a		404,260	\$ 11,319,280.00	618,280	\$ 17,311,840.00
Annual Operations Cost for K-25 Slab (2003 \$)	\$ 5.00	SF	1,641,000	\$ 8,205,000.00	1,236,740	\$ 6,183,700.00	1,022,720	\$ 5,113,600.00
Annual cost for Radiologic Monitoring of k-25 Building	\$ 350,000.00	lump sum	n/a	n/a	n/a	n/a	n/a	\$ 350,000.00
Annual Operations Cost for Ancillary Buildings (2003 \$)	\$ 10.00	SF	155,700	\$ 1,557,000.00	155,700	\$ 1,557,000.00	155,700	\$ 1,557,000.00
Annual Operating Costs for Visitor's Center (2003 \$)	\$ 28.00	SF	10,000	\$ 280,000.00	10,000	\$ 280,000.00	10,000	\$ 280,000.00
Total Annual Operational Cost				\$ 10,042,000.00		\$ 19,339,980.00		\$ 24,612,440.00

Table 4: Comparison of Estimated Annual Operational Costs for Proposed Schemes

This estimate assumes that there are two categories of operational costs. The building section that is retained is assumed to have a cost of \$28 per square foot per year. This is based upon the fully-loaded operational costs currently carried by the nearby American Museum of Science and Energy. The slab is also assumed to be associated with some minimal annual operational cost. A figure of \$5 per square foot per year has been used to accommodate the need for special lighting, public access, security and minor repairs to the slab. Scheme 3b will also require specialized monitoring and security since this scheme would not include full decontamination of the structure. Annual operating costs for ancillary buildings and the proposed Visitor's Center are also included.

Project	Scheme 1b	Scheme 3a	Scheme 3b
Implementation of the K-25 Building Preservation Scheme	\$ 475,624,727.74	\$ 537,038,194.04	\$ 501,135,427.65
Site-wide Curation, Interpretation & Exhibits	\$ 17,240,663.71	\$ 17,240,663.71	\$ 17,240,663.71
Preservation of Ancillary Buildings	\$ 32,471,137.83	\$ 32,471,137.83	\$ 32,471,137.83
A. SubTotal for Implementation of Heritage Tourism	\$ 525,336,529.28	\$ 586,749,995.58	\$ 550,847,229.19
Site-wide Annual Operating Costs	\$ 10,042,000.00	\$ 19,339,980.00	\$ 24,612,440.00
TOTAL Implementation + first year operation	\$ 535,378,529.28	\$ 606,089,975.58	\$ 575,459,669.19

Table 5: Total Estimated Costs for Implementation of Heritage Tourism & First Year of Operation

This table summarizes the costs presented in the previous tables and indicates the level of expenditure to initiate operation of a heritage park at the K-25/ETTP site.

Task	Scheme 1b (\$)	Scheme 3a (\$)	Scheme 3b (\$)
D&D plus construction of K-25 Building Option	\$ 475,624,727	\$ 537,038,194	\$ 501,135,427
Preservation of Ancillary Buildings plus Curation & Creation of Exhibits	\$ 49,711,800	\$ 49,711,800	\$ 49,711,800
Total Non-Recurring Costs	\$ 525,336,527	\$ 586,749,994	\$ 550,847,227
Less K-25 D&D Cost	\$ (471,000,000)	\$ (471,000,000)	\$ (471,000,000)
Less Ancillary Building D&D Cost	\$ (10,660,000)	\$ (10,660,000)	\$ (10,660,000)
Cost of Preservation Over Full D&D Path (Non-Recurring)	\$ 43,676,527	\$ 105,089,994	\$ 69,187,227

Table 6: Implementation Costs (Non-Recurring)

This table summarizes the one-time costs for creation of Heritage Tourism at the K-25/ETTP site.

Task	Scheme 1b (\$)	Scheme 3a (\$)	Scheme 3b (\$)
Annual Operating Cost Associated with the K-25 Area	\$ 8,205,000	\$ 17,502,980	\$ 22,775,440
Annual Operating Cost Associated with 155,700 SF of Ancillary Buildings @ \$10/SF	\$ 1,557,000	\$ 1,557,000	\$ 1,557,000
Annual Operating Cost Associated with 10,000SF Visitor Center	\$ 280,000	\$ 280,000	\$ 280,000
Total Annual Operating Cost	\$ 10,042,000	\$ 19,339,980	\$ 24,612,440

Table 7: Annual Operating Costs (Recurring)

This table summarizes the estimated costs in 2003 dollars for the annual operation of a heritage park at the K-25/ETTP site.

Task	Direct Price	Unit	Quantity	Cost	Operation Unit Cost	Unit	Quantity	Total Annual Operation Cost
1. Design and construct a Cold War monument	\$ 250,000	lump sum	1	\$ 250,000	\$ 5.00	SF	5,000	\$ 25,000
2. Revise and renovate the display at the Site Overlook Building K1547	\$ 650	SF	300	\$ 195,000	\$ 28.00	SF	300	\$ 8,400
3. Laine Kiosk Proposal				\$ 440,000	\$ 15.00	SF	3,000	\$ 45,000
a) Design and construct three outdoor kiosk displays	\$110,000	lump sum	1					
b) Exhibit design for kiosks	\$25,000	lump sum	1					
c) Historic Markers for kiosks	\$20,000	lump sum	1					
d) Landscaping for kiosks	\$35,000	lump sum	1					
e) Exhibit Installation	\$250,000	lump sum	1					
4. Design and construct exhibit at the AMSE	\$650	SF	1000	\$ 650,000	n/a		n/a	n/a
5. Design and construct a model of the K-25 Plant at the AMSE	\$700	SF	15	\$ 10,500	n/a		n/a	n/a
6. Design and construct a display of the Roosevelt Cell at the new train museum				\$ 6,262,500	\$ 28.00	SF	750	\$ 21,000
a) Lighting, exhibit text, etc.	\$ 350	SF	750					
b) Replication of Roosevelt cell	\$ 6,000,000	lump sum	1					
7. Fund publication of a book about the K-25 site by W. Wilcox		lump sum		\$ 20,200	n/a		n/a	n/a
a) Miscellaneous research expenses, including editing and technical review	\$ 10,000	lump sum	1					
b) Graphic design and and layout in electronic format	\$ 5,000	lump sum	1					
c) Printing & Binding (1000 copies by GPO)	\$ 5,200	lump sum	1					
8. Conduct oral histories	\$120,000	lump sum	1	\$120,000	n/a		n/a	n/a
9. Compile photos and drawings				\$ 258,630	n/a		n/a	n/a
a) Sort and produce list of photos and drawings (1 archivist for 3 months)	\$ 48,000	lump sum	1					
b) Outside digitization service	\$ 10,630	lump sum	1					
c) Management for collection (1 year)	\$ 200,000	lump sum	1					

Table 8: Estimated Cost for Alternative Options:

This table summarizes the costs for alternatives to the K-25 Building schemes. Annual operation costs for Item 1 assumes that the monument will include a small plot beyond the footprint of the monument that is landscaped. Items 4 and 5 assume that operation costs are included in the AMSE annual operation budget.

C. Recommended Schedule & Implementation

The schedule for implementing any of the proposed schemes must not adversely impact the decontamination and decommissioning (D&D) schedule [Table 9]. Nevertheless, the scope of work for the D&D may require modification in order to implement the final design of the K-25 site. Selective demolition may be required in some areas of the building and may be more labor intensive than overall demolition. An evaluation of the impact of the new design on D&D activities will be required including additional resources for keeping the schedule on track while still accomplishing the preservation goals.

The proposed implementation schedule for the preservation and interpretation tasks are based upon the following assumptions. The decontamination of the K-25 Building is scheduled for completion in FY08. This work is already on an accelerated schedule and it is probably unrealistic to expect that it can be done any faster. The K-25 "D&D" schedule was therefore established as a baseline that must be accommodated during the preservation and interpretive work.

Fund-raising is a continuous process that must begin as soon as possible and continue throughout and beyond the work. Funding requirements must be anticipated at least 18 months ahead in order to allow time for the planning and execution of fund-raising activities. A list of potential funding agencies is presented in Section V.

The Economic Development and Market Study should also begin as soon as possible. This type of study will establish visitor requirements for facilities, and suggest what aspects of K-25 will be of interest to visitors. The design teams will then be able to respond to these needs and interests more effectively.

The research and curation of the artifacts must be at an advanced stage when the exhibit design begins. The head curator and exhibit designer will need to interact in order to decide which objects are the most appropriate artifacts for interpretation. The overall Interpretive Plan (recommended as part of the Heritage Tourism Plan) should be completed before the exhibit design. The schedule for completion of the Heritage Tourism Plan and curation of the artifacts should ideally overlap since the curator will be able to provide guidance for the design of an interpretive plan. Conversely, the Interpretive Plan will help the curator identify the type of historic research that may be most useful for the final exhibit theme. The exhibit design cannot be completed until the final design for spatial configurations at the Visitors Center and K-25 monument have been completed.

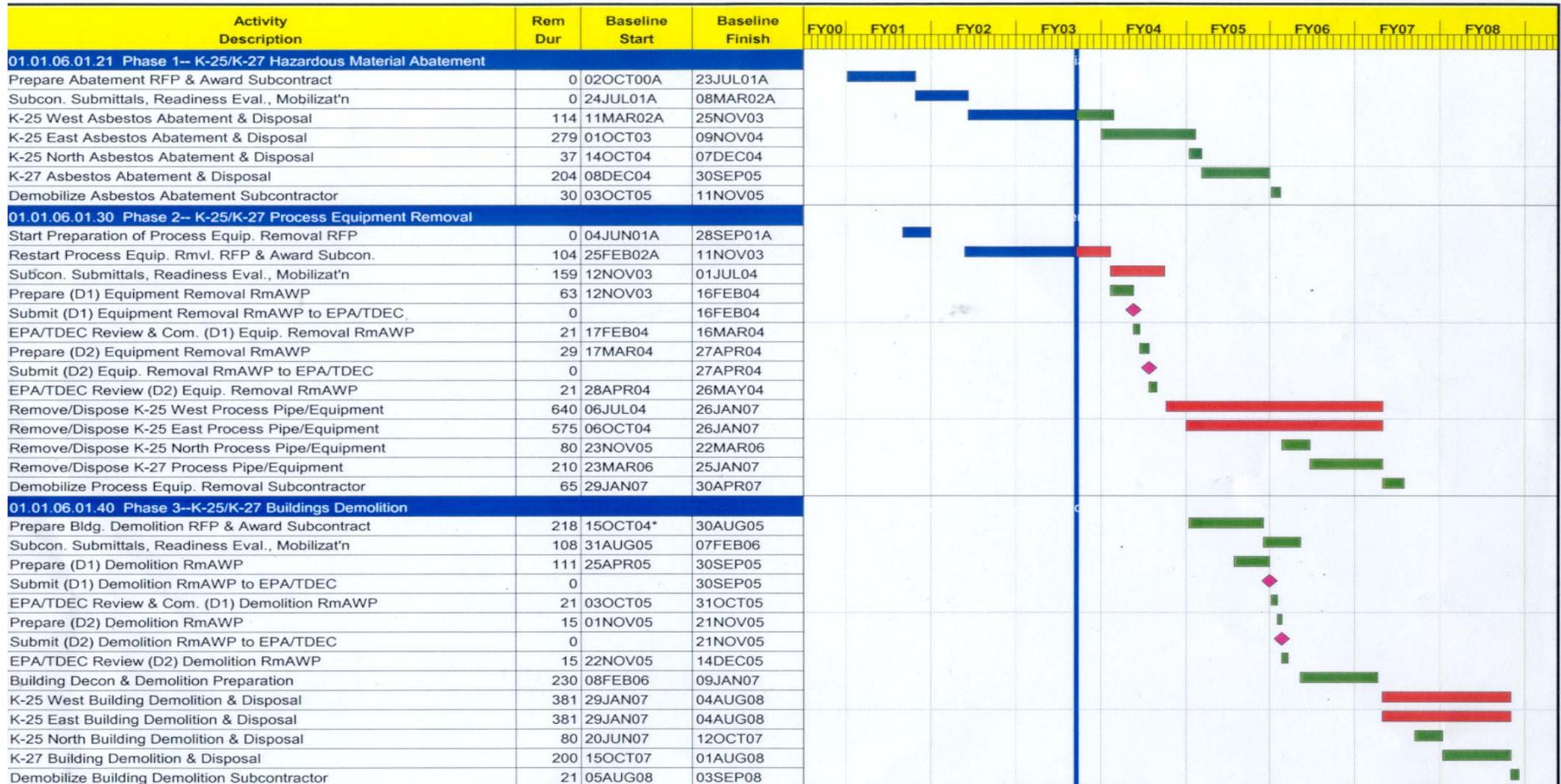
Construction of the K-25 Building scheme cannot begin until the decontamination/demolition process is completed. This restriction will push the date for completion of implementation of the final monument design past FY08 for all except Scheme 1b.

The construction of the K-25 Building scheme could be considerably complex. Demolition must be informed by the final scheme design so that material to be retained is first identified. Material to be selectively removed must be identified before or

concurrently with the removal of contaminated materials. However, the structural impact of removing individual elements will not be fully understood until these elements are identified. The removal of certain elements may require a special mobilization effort (e.g. special shoring, etc.)

Design and construction of the Visitor's/Reception Center will be considerably less complicated. The recommended schedule for this work is as early as possible. The Visitor's/Reception Center is assumed to contain exhibits and interpretive materials that might provide a vehicle for education and fund-raising even before the K-25 Building has been completed. However, it cannot be designed without first completing the Economic Development & Market Study, and the Heritage Tourism Plan. The design of the Visitor's/Reception Center must also be informed by the final design for the K-25 Building. The final design for the K-25 Building should therefore be completed first, even though the Visitor's/Reception Center will be constructed first.

The preservation activities including interpretive tasks, fund-raising and building tasks are presented in Table 10. Further reduction of the tasks shown into smaller projects is not recommended since this may result in an inefficient process. Conversely, bundling these tasks into larger projects is recommended where it is possible within budgetary constraints. The schedule presented here can be modified as a phased plan to meet the budgetary and funding needs of the DOE. However, due consideration must be given to required consecutivities as described in this narrative.



Start Date 01MAY00
 Finish Date 29OCT08
 Data Date 16JUN03
 Run Date 20JUN03 14:51

Baseline Bar
 Progress Bar
 Critical Activity

GOS7 Sheet 1 of 1

Bechtel Jacobs Company LLC
 K-25 & K-27 Buildings D&D
 Summary Schedule
 Accelerated Closure Plan



© Primavera Systems, Inc.

TABLE 9: Current Decontamination and Decommissioning Schedule for K-25/K-27 Buildings

	Planned Site Closure																																																																							
	FY04				FY05				FY06				FY07				FY08				FY09				FY10																																															
	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
Fundraising	[Shaded]																																																																							
Interpretative Tasks																																																																								
Tour Design																																																																								
Curation of Objects																																																																								
Exhibit Design																																																																								
Economic Development and Market Study																																																																								
Heritage Tourism Plan																																																																								
Building Tasks																																																																								
Visitor/Reception Center Design Development																																																																								
Visitor/Reception Center CD's																																																																								
Visitor/Reception Center Bidding/Award																																																																								
Visitor/Reception Center Construction																																																																								
K-25 Existing Conditions Survey																																																																								
K-25 Final Design Development/Cost Estimate																																																																								
K-25 CD's/Cost Estimate																																																																								
K-25 Biding/Award																																																																								
K-25 Monument Construction																																																																								
K-25 Equipment Installed																																																																								
Scheduled D&D Tasks																																																																								
*K-25 Demolition: Jan 07-Aug 08																																																																								
*K-25 Equipment Removal: Jul 04-Feb 07																																																																								

TABLE 10: Proposed schedule for completion of Heritage Tourism tasks

III. RECOMMENDATIONS for ARTIFACTS

The artifacts at K-25 are a subject of some urgency. These artifacts are located in areas where decontamination procedures are either in process or planned. There is a possibility that important materials could be inadvertently lost during the decontamination process.

Avoiding the loss of historic objects as a result of demolition is mandated by *Executive Order 11593* ("Protection and Enhancement of the Cultural Environment," 13 May 1971.) Under this order, Federal agencies must proactively ensure that "any federally owned property that might qualify for nomination [to the National Register] is not inadvertently transferred, sold, demolished or substantially altered."

A secure storage facility must be identified for the K-25 artifacts, and each artifact must be properly packed and tagged. Ideally, the handling of these artifacts should be performed by a trained museum professional. However, in the interest of salvaging important objects and removing them to a secure area quickly, the removal of the objects could be done by a contractor with historic preservation experience. This is not a simple matter and requires a substantial commitment of time and effort due to the constraints imposed by the operational and safety procedures at the site.

A museum professional should ultimately complete the processing of the artifacts. This could be an individual hired specifically for a limited term project. Alternatively, there may already be someone in the

AMSE organization who is qualified and able to perform the required work.

The handling and treatment of artifacts is regulated by a number of federal guidelines, including the *Secretary of Interior Standards and Guidelines for Historic Preservation*, and *Curation of Federally Owned and Administered Archaeological Collections* (36 CFR, Part 79). These standards and guidelines should be consulted regarding the K-25 artifacts. Relevant federal publications include a number of briefs available from the National Park Service including *NPS-28: Cultural Resource Management Guideline* and *The Museum Handbook*.

A. Research & Registration

An inventory of historic artifacts and equipment in K-25 was compiled in May 2002². This inventory may serve as the starting point for future exhibits interpreting the K-25 Building. However, further curation of the objects is required before they can be exhibited. Each object must be given a unique registration number, and the development of an electronic catalogue is recommended. The National Park Service uses a database called the *Automated National Catalogue System (ANCS+)*. The utilization of this database would be appropriate for the registration and cataloguing of K-25 artifacts.

The relative importance of each artifact must be determined. During this process, the following questions must be answered.

² *Inventory of Historic Artifacts/Equipment in K-25 Building*. Bechtel Jacobs, May and July 2002.



Historic photo of K-25 under construction.

1. *What period of significance does the Object date from?* The Inventory of Historic Artifacts does not include a date for the individual objects. Are these objects from the WWII period, or a later period? Those objects from the WWII period should be considered most important, but later ones also contribute to the story of the site. The importance of any given artifact cannot be determined without some sense of when the artifact was first used at the K-25 site.

2. *Why is the Object significant?* What potential role would each object have in an exhibit? Does the artifact convey information regarding social or technological history?

In order to decide which objects can tell any of these stories, their use at K-25 must be understood. Objects in the inventory can be classified according to their use.

The following categorization of the artifacts is suggested:

- a) Architectural artifacts from the building
- b) Objects that played a vital role in the operation of the plant (i.e. major equipment).
- c) Objects used in support of plant operations including office furniture, hand tools, bicycles used for interplant transportation etc.
- d) Objects used purely for the safety, comfort and service of plant occupants such as toilet seats, etc.

e) Artifacts reflecting social history of the plant occupants (such as graffiti).

3. *Is the Object Contaminated?* Given the contamination issue, is it feasible to save the artifact?
4. *What are the special requirements for the conservation or preservation of the artifact?* Damaged artifacts may require restoration before display. Some artifacts may also be susceptible to deterioration, requiring special protective measures during storage and/or display. A common conservation problem, for example, is the protection of photosensitive materials from UV light.

An example of the type of artifact included in the existing K-25 inventory list is the large number of bicycles. Delineating the level of effort for this particular object is presented here in order to convey the type of research that may be required for a given artifact. The bicycles were chosen for this discussion simply because they are the type of object that is easily and widely understood by the general public. More specialized and technical information may be required for equipment, such as the K-25 mass spectrometer.

The bicycles found at K-25 could potentially represent an interesting micro-collection illustrative of bicycle manufacturing between circa 1940 and the close of K-25. Bicycle manufacturing was brought to a halt after 1941 as factories began production of supplies for the war effort. Thus, we can probably assume that the earliest bikes at K-25 predate the war. Production of the same pre-

war models continued after the war since the factories had not had time to retool equipment during the sudden surge in demand for new post-war consumer goods. Therefore, the typological differences between bicycles used during the war and the period immediately following are minimal.

These artifacts are one of the few types of items that have the potential for humanizing the site. Since employees were bused to their various work destinations inside the complex, these bicycles were probably used exclusively inside the plant. Were the bicycles owned by employees, or by the Federal Government? Did the government purchase the bicycles? Were any of them donated by ordinary citizens as part of the war effort?

A full collection of these objects may not be necessary to telling the K-25 story. These artifacts may, however, present some other opportunities for fund-raising. Bicycle models from this period are highly collectable, and might have value on the collectibles market even with condition problems. An unrestored model from the 1930s with all of its parts could be worth \$500. Restored versions could fetch thousands of dollars.

Each bicycle in the collection should be photographed and recorded, including notations of any manufacturer's marks or serial numbers. A number of reference books on collectable bicycles are currently in print. Lists of historic serial numbers, with corresponding manufacturer models are available on the internet, and there are experts on these types of objects. The *Bicycle Museum* in upstate New York (718-662-3853) focuses specifically on American bicycle history. There are a number of bicycle clubs in Tennessee, some of

which are local to the Knoxville and Oak Ridge areas.

Exhibits cannot be designed until the objects are properly curated. This means creating an informational resource that properly describes each artifact and its historic context at the K-25 site. Where possible, the K-25 Site Cultural Resources Survey should be cross-referenced. The following steps will be required for more adequate curation.

- Review electronic data base
- Interview people to answer following questions:
 - a) What is date of artifact?
 - b) Who manufactured it?
 - c) Where did it come from? Did it have a previous use?
 - d) Why was it brought to the site?
 - e) What was it used for?
 - f) How was it used?
- If the DOE has unclassified records relating to these items, these should be copied into a reference file
- Digital photos of these items were taken recently. If there are historic photos showing item during plant operation, this should be incorporated into the database.
- Combine the resulting information into one complete electronic data.
- Archive non-electronic materials
- Create an index for both electronic and non-electronic information.

It is assumed that the artifacts will go to an intermediate storage facility before they are used in any exhibits. Identification of an appropriate and

secure temporary facility in one of the buildings on the K-25 site is recommended.

The original K-25 converters are included in the list of objects that could be put into storage. There are four standard sizes of the converters as follows.

- 8' wide x 12' long x 8' high
- 6' wide x 8' long x 8' high
- 4' wide x 6' long x 6' high
- 6' wide x 8' long x 4' high

The converters are highly contaminated with radioactive materials. Contamination of this and other artifacts presents an obstacle to their curation. Currently, the level of contamination is not known for some artifacts. A process needs to be established in order to decide if these items can be retained. The Department of Energy's environmental team and project managers will need to participate in the development of procedures for dealing with the artifacts. However, in the absence of further information, the following process is suggested:

- 1) Establish in situ whether or not the artifact is contaminated.
- 2) If the artifact is not contaminated, remove it to the storage facility.
- 3) If the artifact is contaminated, evaluate the level and type of contamination present.
- 4) Determine the feasibility of decontamination.
- 5) Determine the method and cost of decontamination.

- 6) Determine the relative importance of the artifact to the site's historic context.
- 7) After all of the above information is established, compile a chart illustrating the cost of decontamination for both individual items and the entire group. The total project cost should be compared to the currently available budget for decontamination of these items.
- 8) A proposed list of items should be recommended for decontamination and retention based upon both the importance of the artifact, technical feasibility and budgetary considerations.
- 9) If it is not possible to decontaminate an artifact, it should be documented before it is destroyed. Documentation must include black and white photography since this is archivally stable. Permanent paper work must be kept in the archival file with a thorough explanation of the artifact's destruction, including date of disposal.
- 10) Decontamination area(s) should be set up on site specifically for dealing with the artifacts. The decontamination should be done in an orderly manner, taking care to retain the paper work (e.g. identification tags, etc.) associated with that object.
- 11) Remove the object to storage, ensuring that its current location is noted in the curatorial file associated with that object.

The curation efforts described above can be reasonably assumed to require a small curation team. The recommended approach is to stagger the effort over a period of three years. This may include three people the first year (one senior person with two assistants), a reduction to two people in the second year, and the final completion of the project by one person in the third year. The efforts related to contamination issues are not included in this recommendation and should be considered separately.

B. Exhibition

Once the objects are curated, the exhibits can be designed utilizing the artifacts. Exhibit design is typically done by a specialist who interfaces with the curator. Themes are chosen, the exhibits are design and constructed. This effort, including design fees and installation, can reasonably be assumed to be about \$650 per square foot in 2003 prices.

A new Visitor's Center is recommended for exhibition of the artifacts. A 10,000 square foot facility is proposed for use in the Cost Estimate. The actual square footage, however, cannot be determined until the Interpretive Plan has been completed, and the role of the American Museum of Science and Energy in the administration and interpretation of the site has been fully defined. The current recommendation for square footage takes the five different sizes of compressors into account since these may be included in a Visitor's Center exhibit. The remaining space would accommodate exhibits of other artifacts, including media-intensive exhibits. An auditorium for film screening would probably require a somewhat larger facility.

The exhibition of artifacts must consider security issues. Although generalities of the work that has transpired at the K-25 Plant have been part of the public domain for a number of years, some of the technical information related to these artifacts is still classified. This is especially true for the converters. The DOE must determine if it is appropriate to exhibit an object, and if so, what type of information should be available to the general public.

The most important artifacts will include the K-25 building itself, and any ancillary buildings which are preserved for interpretive purposes. The site should therefore be augmented by interpretive exterior signage.

IV. ASSURING ECONOMIC BENEFIT for HERITAGE TOURISM

The ability of the K-25 site to attract tourism to a certain extent hinges on the ability of Oak Ridge itself to become a magnate. The existence of one isolated site will not be sufficient to sustain a tourism industry. Therefore, a holistic view of K-25 as one element within a larger economic context is required. The following steps are recommended in order to assure that full regional economic benefit is realized for heritage tourism.

A. Economic Development & Marketing Study

An Economic Development & Marketing study is needed for the Eastern Tennessee region. The study must center on tourism and specifically include K-25 as a key site in the formulation of a development strategy. Relevant information is available in the "Market Assessment and Advertising Strategy" completed in June 2001 for the American Museum of Science and Energy. Other planned studies that may contain relevant information include the "Oak Ridge Reservation Manhattan Project Strategic Plan" (forthcoming by Museums + More) and a development study that is being planned by the Oak Ridge Convention and Visitor's Bureau with HUD funding. A regional study should expand the information presented in these documents. The following assets should be taken into account for the regional economic development study.

- Analyze the proximity of K-25 to other regional attractions such as the Great Smokey Mountains National Park, the TVA and associated projects. Examine the number of visitors these sites attract annually and determine the potential percentage of this market that might realistically be captured at Oak Ridge.
- Identify and analyze the current annual number of visitors to Oak Ridge. Determine the percentage of these that are business related visits, and the percentage that are specifically tourism related. What percentage of this market will be specifically interested in K-25?
- Analysis of potential tourist activity related to regional transportation network such as airport hubs, interstate highways, etc.
- Identification of target market for Oak Ridge and K-25 tourism, and proposed duration of a typical visit.
- Identify the connection between heritage tourism and necessary amenities such as the number of hotel rooms, transportation systems, etc.
- Evaluate name recognition, and determine the best way to represent the K-25 site and associated venues for heritage tourism. Currently, the Oak Ridge Convention and Visitors Bureau is marketing the "Secret City" with a driving tour of Manhattan



Historic photo of door to cell 309-2, K-25 building.

- Analyze the proximity of K-25 to the University of Tennessee, and its associated cultural and athletic events.

Project sites. However, there is no data regarding the name recognition of “Secret City” or “K-25.” The marketing study should also evaluate the impact of the name, “East Tennessee Technology Park” and how the potential for heritage tourism is impacted. After such a study, the area should market heritage tourism under one name or motto for all sites associated with the Manhattan project.

- Evaluate the most effective means of reaching a target market through advertising and public relations. Establish cost estimates for an annual advertising budget and make recommendations for funding the recommended budget.
- Determine a feasible project including realistic short and long-term goals based upon the resulting analyses presented. Evaluate the potential economic impact of the proposed project.

B. Development of a Heritage Tourism Plan

The K-25 site itself presents unique challenges for heritage tourism. The implementation of a regional Heritage Tourism Plan for development of the entire area is recommended. This plan must be based upon a sound economic and philosophical approach. Successful implementation of a Heritage Tourism Plan will ensure the realization and sustainability of full regional benefits.

The Heritage Tourism Plan should respond to the demographics and statistics gathered in the Economic Development & Marketing Study, thereby informing the types of attractions that would interest

visitors, and aid in developing an interpretive program for K-25 that would maximize its draw as a destination. The Heritage Tourism Plan should include devices for facilitating access to hotel rooms, improving infrastructure such as transportation systems, etc.

Short and long-term goals must be organized into a phased schedule of smaller projects. The culmination of these smaller projects will ultimately result in the implementation of the overall Heritage Tourism Plan. Cost analysis must be determined for each of these projects. The following items should be included in the Heritage Tourism Plan:

- *Site Plan*
Develop a Site Plan for preserving and developing K-25 and the surrounding site. Establish preservation zones and development zones. How the site is experienced on first entering the critical area is key to a positive visitor experience and enhanced sense of authenticity. Determine what types of limitations are appropriate for ensuring that development does not adversely impact preservation, thereby preserving an authentic visitor experience. Also include planning for the expansion of the East Tennessee Technology Park in order to ensure continued economic viability of the project. Identify the steps required to ensure that new construction does not obliterate the historic K- 25 site and that future development is designed in a complementary manner.
- *Interpretive Plan*
Develop an Interpretive Plan for K-25 and its ancillary buildings. Include the identifi-

cation of exhibit themes, research and curation of individual artifacts, and exhibit design.

- *Marketing Plan*
Develop package tours in response to typical visitor interests as modeled for diverse demographic groups. Tours should be designed for targeted length of stays to maximize potential economic benefits.

Develop a marketing and advertising campaign for the tours. This campaign should respond to the information gathered in both the Economic Development Study & Marketing Study.

V. POTENTIAL FUNDING SOURCES

There are a number of pre-requisites for the establishment of heritage tourism at K-25. Generally these include preservation, access and interpretation of the site. The preservation of the site includes the obvious physical conservation of the K-25 Building and artifacts, but also the economic revitalization of the site. The K-25 site is too large to be supported solely through tourism. The successful reindustrialization of the site, carefully balanced with good stewardship will ensure its continued preservation. This foundation must be augmented by informational and physical access to K-25 so that it becomes a destination. The site must then be explained and presented in a way that can be digested and understood by the average visitor.

Grants are a potential funding source for the development of heritage tourism at K-25. Heritage tourism projects may include architectural restoration, conservation of artifacts, educational programs for site interpretation, infrastructure, and economic redevelopment for reuse of the site.

Although volunteers can play a significant role in fund-raising, the focused guidance of a professional paid fund-raising staff will be more effective in establishing and achieving fund-raising targets for the K-25 project. The types of fund-raising activities and target donors will change throughout the next several years based on what types of work require funding at any given point in the project. Funding requirements must be anticipated at least 18 months ahead in order to allow time for the planning and execution of fund-raising activities.

The following is a list of potential grant sources. The list does not include grass roots efforts (i.e. solicitation of individual donors) that may yield more immediate incremental benefits. The incremental nature of such an effort should not be dismissed since the cumulative results of such a campaign can be significant. A combination of successful grant applications and individual donations are typically an effective funding approach, especially if a funding agency provides matching grants.

Some of the following grants are administered and awarded directly by the funding institution. Other grants are channeled through intermediate agencies, such as the State Historic Preservation Office, which make final decisions regarding the use and award of the grant monies. These sources are by no means all-inclusive. The availability of these sources may change annually. The funding institution should be contacted directly in order to confirm current availability, eligibility, and application requirements.



Historic photo of Oak Ridge residents celebrating end of WWII.

Betchel Foundation
P.O. Box 193965
San Francisco, CA 94119-3965

Programs: Community Involvement Grants (supports volunteer efforts of employees).

Department of Commerce
Economic Development Administration
Herbert C. Hoover Building
Washington, DC 20230
(202) 482-2659

Programs: 11.300-Grants for Public Works and Economic Development Facilities (includes redevelopment of brownfields); 11.307-Economic Adjustment Assistance (includes “areas that have experienced or are under threat of serious structural damage to the underlying economic base” such as localities impacted by “reduction in defense expenditures.”)

DuPont Center for Collaborative Research & Education
P.O. Box 80030/1370
Wilmington, DE 19880-0030

Programs: various grants supporting education

Humanities Tennessee
1003 18th Avenue South
Nashville, TN 37212-2104
(615) 320-7001

Programs: Planning Grants (plan project furthering goals of Tennessee Community Heritage Program); Consultant Grants (pay expenses of consultants to assist in organization of specific problem related to furtherance of Tennessee Community Heritage Program); Community Research Project Grants (research to present a sustained historical or cultural narrative or analysis); Community Development Project Grants (create and implement a comprehensive community planning partnership incorporating history, culture and interpretation); Interpretation Project Grants (designed to produce major exhibitions and interpretive materials); Media Grants (produce films, videotapes, audio, etc.); Conference and Workshop Grants.

The J. Paul Getty Trust
The Getty Grant Program
1200 Getty Center Drive, Suite 800
Los Angeles, CA 90049-1685
(310) 440-7320

Programs: Conservation Survey Grants; Conservation Treatment Grants; Architectural Conservation Planning Grants; Architectural Conservation Implementation Grants; Museum Interpretation Grants

The National Endowment for the Humanities
1100 Pennsylvania Avenue, NW
Room 426
Washington, DC 20506
(202) 606-8269

Programs: Implementation Grants - Museums and Historical Organizations

The National Park Service
Heritage Preservation Services
1201 “Eye” Street, NW
6th Floor (ORG. 2255)
Washington, DC 20005
(202) 513-7270, x6

Programs: Save America’s Treasures (provides grants for restoration and conservation of buildings and objects); Historic Preservation Fund Grants-In-Aid (administered to SHPO in order to provide advise and assistance to local governments)

The National Science Foundation
Directorate for Education & Human Resources
4201 Wilson Boulevard
Arlington, VA 22230
(703) 292-8600

Programs: Offers a wide range of education-related grants that may be applicable for the development of interpretive science programs, especially those targeting children.

Tennessee Department of Economic & Community Development
William R. Snodgrass TN Tower
10th Floor
312 Eighth Avenue, N
Nashville, TN 37243-0405
(615) 741-2373

Programs: Community Development Block Grant Program (supports economic development with grants for industrial infrastructure, industrial

buildings and equipment); Tennessee Industrial Infrastructure Program (funds water and wastewater systems, transportation and site improvements.)

Tennessee Department of Transportation
Office of Local Programs
505 Deaderick Street, Suite 700
Nashville, TN 37243
(615) 532-3184

Programs: Surface Transportation Program (protect and enhance the scenic, cultural, natural and archaeological integrity as well as view/visitor appreciation of a scenic or historical highway and adjacent scenic area; rehabilitate and operate historic transportation buildings, structures or facilities; rehabilitate, restore, stabilize and/or protect historic sites.)

Tennessee Valley Authority
TVA Corporate Contributions
400 E. Summit Hill Drive, ET6A-K
Knoxville, TN 37902
(865) 632-8867
or Community Development Programs
(615) 232-6059

Programs: Economic Development Loan Fund (infrastructure projects for development of speculative buildings and industrial Parks); Special Opportunities Counties Fund (buildings, plants and equipment).

The Union Carbide Foundation
39 Old Ridgebury Road
Section L4
Danbury, CT 06817-0001

Programs: Offers grants in education and environmental protection, priority given to program applicants impacting communities where Union Carbide employees live.

U.S. Department of Housing and Urban Development
451 7th Street, SW
Washington, DC 20410
(202) 708-1112

Programs: Brownfields Economic Development Initiative (BEDI) Grants (assist cities with the redevelopment of brownfields, used only with Section 108 Loan Guarantee Program.)

U.S. Environmental Protection Agency
Office of Brownfields Cleanup and Redevelopment
Mail Code 5105 T
1200 Pennsylvania Avenue, NW
Washington, DC 20460
(202) 566-2777

Programs: Brownfields Assessment, Revolving Loan Fund, and Cleanup Grants (assist in the redevelopment of brownfields, specifically includes historic industrial sites).

VI. OTHER ALTERNATIVES CONSIDERED

As previously mentioned, a number of schemes were considered, but ultimately some were rejected. The rejected schemes are presented here in order to present a record of the full analysis conducted during this study.

Scheme 1d, Equipment Option “c”

This scheme represents a replication of the original. Remove entire building down to the slab (assume \$471 million). Replicate the north module only (approximately 350 Ft x 350 Ft) to match exterior appearance of original. This structure is to be used as a new museum. Examples of equipment will be retained from various facilities without associated piping. A visitor’s center will not be required for this scheme.

The following tasks would be required to realize this scheme:

- Repair and/or replace sections of floor slab (assume 50%).
- New “CemBonit” corrugated cement board panels to match original Transite panels as closely as possible.
- Decontaminate equipment from various periods for display.

Reason for Elimination of this Scheme:

Scheme 1d was seriously considered, but since the original north module is less typical than other areas of the building, this scheme was set aside. The team believed that this area would not adequately stress the repetitive nature of the building features.

Unique features of this structure, including the control room, have already been removed. The adoption of this scheme would require replication of numerous elements if it were chosen. The design team responded to the large amount of missing historic fabric by proposing the demolition of the structure, and its subsequent replication as a museum facility. A replicated structure with replicated elements, however, would ultimately result in a less authentic visitor experience.

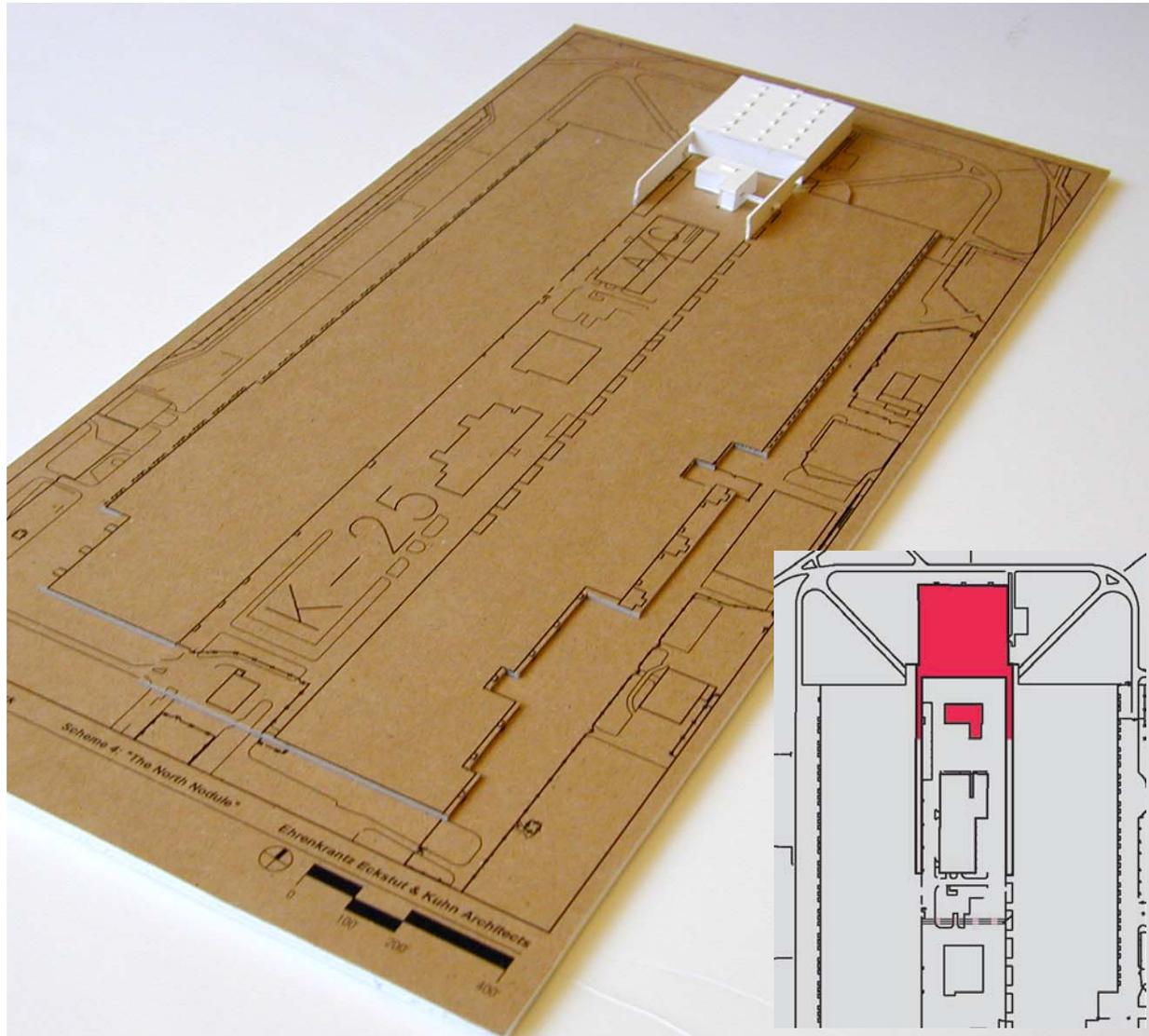


FIG. 7: Model of alternative scheme with new museum building.

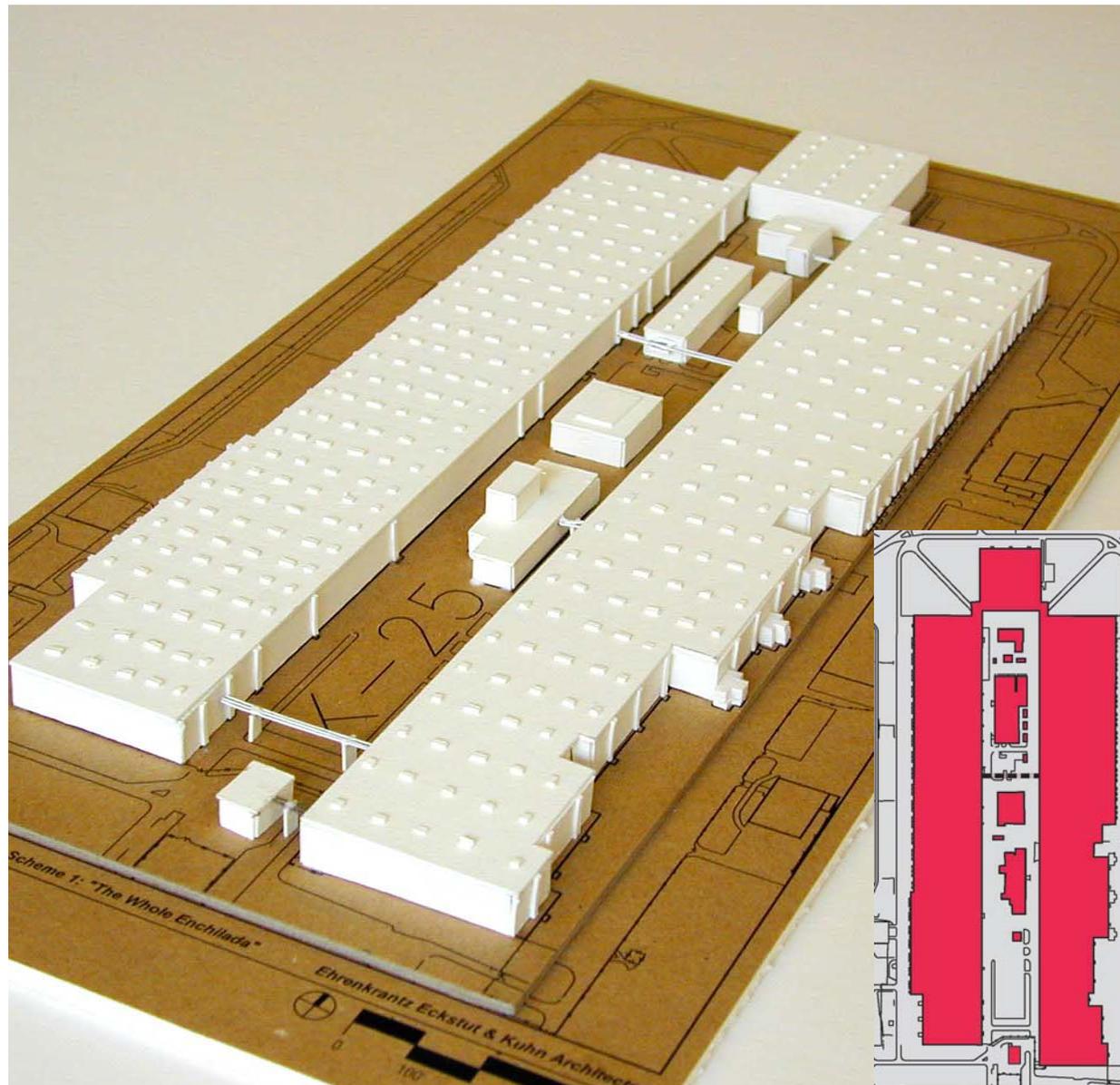


FIG. 8: Model of alternative scheme with entire structure retained.

Scheme 2, Equipment Option "a"

The entire structure will be retained. Elements that must be removed due to radiologic contamination shall be replaced in kind. All equipment will be removed from the building, except for representative equipment and artifacts to be identified.

The following tasks would be required in order to realize this scheme.

- Remove any remaining roof surface down to the supporting roof deck. Remove deteriorated sections of the roof deck (assume 50%) and replace with new roof panels. Re-surface the entire roof with new 3-ply built-up roofing.
- Option: Coat Transite panels with ethyl-silicate consolidant (100%).
- Option: Install new "CemBonit" corrugated cement board panels to match original Transite panels as closely as possible (100%).
- Scrape and paint all exterior doors and window trim.

Reason for Elimination of this Scheme:

According to previous estimates, decontamination and retention of the entire K-25 building would cost roughly \$1.44 billion.¹ The funding for such a project is not likely to be in the realm of possibility. Furthermore, the maintenance and operational expenses for a clean structure of this size are assumed to be significant, and it is not clear that an organization willing to assume these costs could be found. Scheme 2 was eliminated in response to the above considerations.

VII. INTERPRETATION

The most effective interpretive tool for conveying the history of K-25 is the site itself. The physical experience of standing on the site, and seeing the buildings and equipment in combination with a didactic narrative will result in an authentic experience for the visitor, thus enabling the visualization of historic activities. In summary, the focal point of the K-25 interpretation would be a tour of the site. There is no potential for Heritage Tourism without a tour.

Theoretical tours were developed for the purpose of understanding the potential for Heritage Tourism. These are not necessarily the specific tours that will be developed, but are used as illustrative examples of the possibilities for site interpretation. However, we believe that the buildings included in these schemes make the most sense for the visitor in terms of understanding the site. The tour may alternatively include less or more stops, different buildings, or alternative locations for the Visitor's Center. The only constant is that the K-25 Gaseous Diffusion building must be the focal point in order for the tour to have any meaning.

The tour does not require full development at this time. It would be more appropriate to develop the tour design during or after completion of the recommended Interpretive Plan (see section IV "Assuring Economic Benefit for Heritage Tourism".)

A. Telling the Story

The narrative that the visitor hears and/or reads at the site must tell a story that is easily understood and remembered. This story must have a theme.

Three Thematic Ideas were identified for the K-25 site; 1) Life at K-25, 2) The Sequential History of K-25, 3) The Scientific Advances at K-25. These themes overlap in areas, and can also be combined in different ways for the interpretive plan. The potential use of these themes was explored by creating "imaginary tours" that a visitor could take of the K-25 site [See Appendix B].

1) *Life at K-25*

This theme focuses on the experience of the WWII K-25 employee. Sub-themes include the worker's arrival at the front gate, his passage through security, and his transformation from ordinary citizen to a member of the work force participating in the war effort. The Oak Ridge community's commitment to the war effort, and the social life of workers after hours are also possible sub-themes that may be explored.

The modern visitor to the site could experience the site through role-play. An imaginary identity could be assigned to the visitor at the front portal. Like the WWII employee, a number for a bus is assigned. No final destinations are publicized. The visitor/employee boards a bus and is taken on the tour. During this tour, he must discover his secret job description.

2) *The Sequential History of the Site*

This theme focuses on the chronological history of the site's development. It includes the initiation of the K-25 construction and operation, the changes resulting from the Post-War and Cold-War periods, the shift from wartime to domestic production of

fissionable materials for use in energy production reactors, and the final cessation of nuclear production at the site.

The tour for this theme could begin outside the site, perhaps in the Wheat Community. Buildings predating the construction of K-25 could be highlighted in a discussion of the forcible removal of previous inhabitants from their farms and homes. The visitor would then enter the same portal as the WWII employee. The stops to the various buildings would follow the chronological order of the site's development and use from WWII, through the Cold War and into the present.

3) *The Scientific Advances*

This theme focuses on the history of nuclear science and the Gas Diffusion process. It is less dependant on the buildings and site environment, but more dependant on the equipment. The sub-themes include the equipment at K-25 and K-27 (such as the "Roosevelt cell" K-303-7-1), understanding the cascade system, the changes in the equipment and production during the Cold War (including K-29 and other period structures), and the three incarnations of the Gas centrifuge process.

This tour might begin by entering the gate, and proceeding to a laboratory building. The laboratory would provide a staged setting for discussion of the scientific process and the beginnings of nuclear science that ultimately resulted in the WWII efforts at K-25. The tour would proceed to production facilities demonstrating various improvements to the Gas Diffusion process, and ultimately ending with modern scientific research and its future potential.

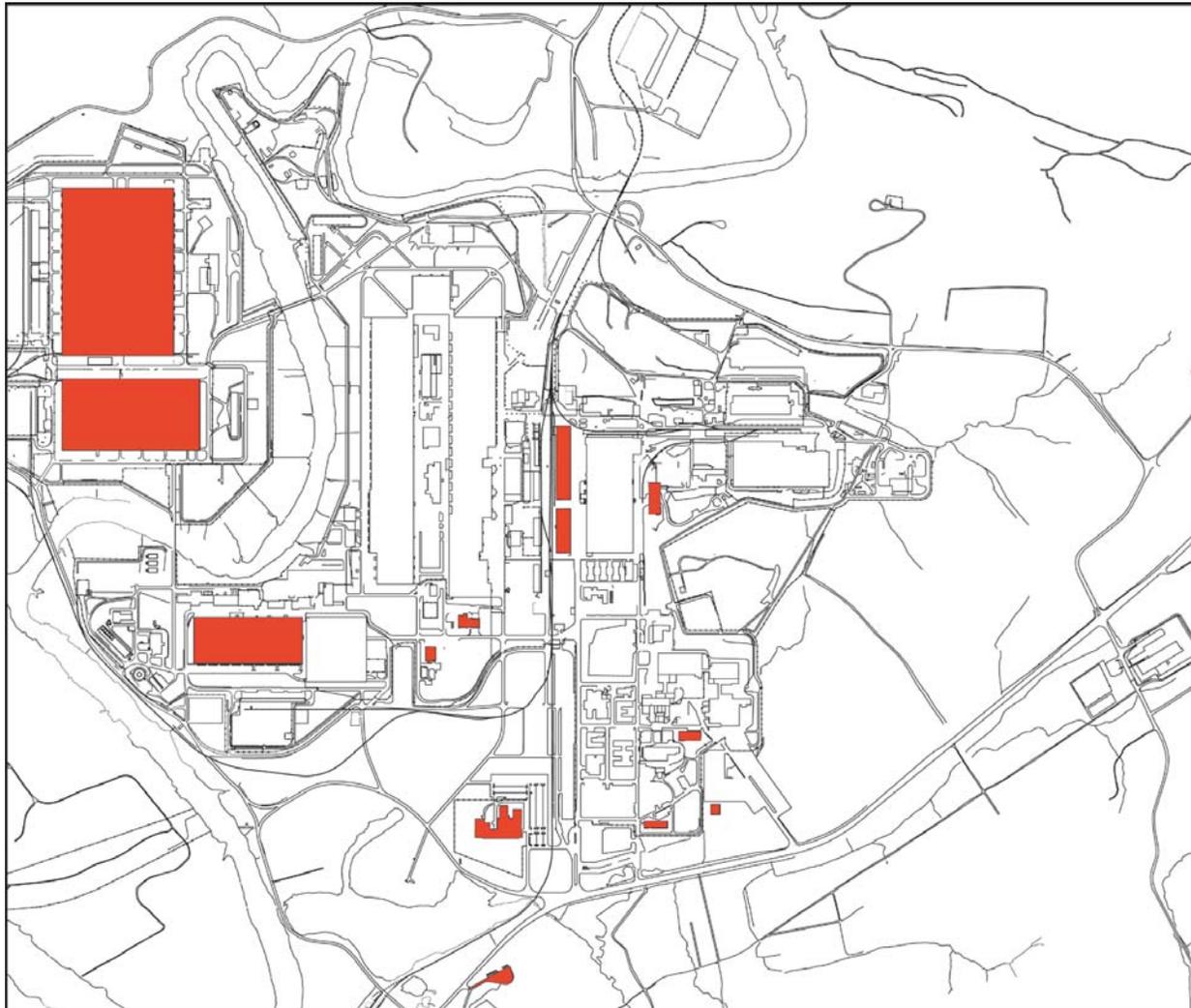


FIG. 10: Buildings scheduled for CROET transfer.

3. The Critical Area provides a framework for creating a site management strategy that will guide future decisions regarding the preservation, reuse and reindustrialization of the site.

A number of assumptions apply to the Critical Area. Firstly, it isn't possible, nor is it necessary to save every building intact, and not every structure will be publicly accessible. Therefore, the critical area may include converted and demolished structures. Secondly, the critical area should be maintained as a "special development" zone with established design guidelines regarding exterior renovation and new construction, thus facilitating the retention of authenticity. Those structures slated for preservation should meet minimal requirements; specifically the structure must have integrity (i.e. it is in relatively original condition, and is structurally sound.)

The identification of a Critical Area provides focus for the visitor experience by eliminating distractions, and by concentrating the interpretation into an area that is compact and easily understood. The critical area should include as many intact original buildings as possible. These buildings should ideally be collocated and demonstrate a range of historic activities that took place at K-25.

A number of other considerations must be given to the structures in the critical area. Several structures have been identified for transfer to the Community Reuse Organization of East Tennessee (CROET) [FIG. 10]. The transfer effort should be considered in light of what areas may be the most effective areas of the site for Heritage Tourism. Covenants delineating limitations on touristic site

Building Number	Building Name	Inside Critical Area	Contaminated Materials			
			asbestos	radiologic	chemical	plume below
K-1002	Cafeteria	Yes	X			
K-1003	Dispensary	Yes	X	X		
K-1004L	Pilot Plant Lab	No	X	X	X	X
Process Tie Lines	K-25 & K-27	Yes	X	X		n/a
K-0131	K-27 Feed Purification	No	X	X	X	X
K-0413	K-27 Product Withdrawal	No	X	X	X	
K-0631	Process Tails Facility	No	X	X	X	X
K-0633	Compressor Test Loop	No	X	X	X	
K-1231	Machine Shop	No	X	X	X	X
K-1008-C	Changing House	Yes	X	X	X	X
K-1021	Fire House	Yes	X			
K-1028-45	Portal 4	Yes				
K-1401	Conditioning Building	Yes	X	X	X	X
K-1402	Control House	Yes			X	
K-1414	Garage	No	X		X	X
K-1420	Decontamination Bldg	No		X	X	X
K-601	Depleted Tail Removal	Yes	X	X	X	
K-1024	Filter Test Facility	Yes	X	X	X	
K-1034A	Office Building	No	X			
K-1101	Air Conditioning Building	Yes	X		X	
K-1019-5A	Portal Bus Shelter	Yes				
K-1028-57	Portal 2	No				
K-1028-59	Gate House Portal 2 East	No				
K-1206-D	Firewater Tank & Valve	No				
K-1501	Steam Plant	No	X		X	

activities are recommended to maintain the historic setting in the Critical Area while avoiding potential conflicts with tenants activities.

There are 24 structures that have been previously identified for further interpretation [Table 11].³ Some of these structures lay outside the Critical Area identified in this exercise. Furthermore, some of the structures in the Critical Area have previously been slated for demolition due to contamination issues. This should not, however, preclude the inclusion of these buildings in the final interpretation of the K-25 site. There may be viable alternatives to demolition depending on the building and nature of the contamination. If only the soil below a structure is contaminated, for example, it may be possible to move the building off its existing foundations, and reset it onto a new foundation after the clean up is completed. Prices for this are explained in the Cost Estimate narrative. It is also possible to remove and replace limited amounts of contaminated building materials. A contamination rate of 50% of all building materials has been assumed for ancillary buildings in this study.

Twelve of the 24 structures previously identified for further interpretation relate to the Critical Area. These twelve structures would make the most effective contribution to heritage tourism out of the 24 because, in addition to their relevancy to the

³ Letter to Dr. Joseph Y. Garrison, TN Historical Commission, from Gary S. Hartman, DOE; dated July 23, 2003; attachment 1.

⁴ "Safety Hazards Documentation and Photographs of Historic Properties Scheduled for Transfer or Decontamination and Decommissioning Located at the ETTP in Oak Ridge, TN" (Bechtel-Jacobs, May 2003)

Table 11: The 24 Facilities Previously Slated for Further Interpretation

The DOE and Tennessee State Historic Preservation Office have agreed that the role of these facilities in the Manhattan Project will be interpreted for the public.

history of the site, they can provide a compact and authentic experience for the visitor. However, as indicated in Table 11, a number of these structures have contamination issues.⁴ The preservation of some of the twelve may not be feasible due to the cost of removals of radioactive materials. The Cost Estimate assumes that it is feasible to retain nine structures [see Table 2]. These nine are the minimal recommended for preservation.

Buildings that no longer exist should be interpreted as part of exhibits in the Visitor Center, or at AMSE. These exhibits can include artifacts, equipment, diagrams, photographs and models of buildings. Structures that are not publicly accessible, or are not centrally located inside the Critical Area could also be interpreted in this manner. The K-27 facility, for example, is not in the Critical Area and is currently slated for demolition in response to severe contamination of the structure. The K-27 facility was an important element in the evolution of the K-25 Plant, and should be interpreted through exhibits.

There are two stops in the Critical Area that should be included on all tours. The absence of either of these stops will diminish the Authentic Experience of the visitor. The most important point on any tour is the inside of the K-25 “U.” The importance of this is described in the Design Options above (section II).

The second most important point in the tour is the entry portal. The portal historically served as a division between the classified and the unclassified; it provided a physical barrier that protected American secrets. The original portals are therefore significant and important site features. The original portals establish the historic limitations of the K-25 security perimeter. Passing

through the portal must have had a psychological impact on the K-25 workers. Some sense of this impression might be recreated for the modern visitor, thereby imparting the Authentic Experience. The entry through the K-25 site was reportedly the most popular point on the Southern Appalachia Railway tour. Visitors apparently responded to watching the gates being opened to allow passage of the train.

There is more than one portal located at various points around the K-25 site [FIG. 11]. The portal chosen as the entry point for the tour should meet certain requirements. These are as follows:

1. The visitor must pass through an original portal in order to access the site.
2. The portal must be located in, or immediately adjacent to the critical area.
3. The portal must be obvious and easily located from the Oak Ridge Turnpike.
4. The rail must pass within easy walking distance (preferably no more than 200 feet) of the entry portal.

The most logical point of entry for tours would be Portal 4 [FIG. 12]. This portal meets all the above requirements. It is also the portal that was historically used by most of the WWII workers to access the site. The original turnstiles and check-in windows still exist. The following tasks are recommended for the interpretation and reuse of Portal 4.

1. Research the original WWII processing procedures for K-25 workers passing through security.
2. Identify the original elements and features of the portal during WWII. Also identify those features that are later modifications.
3. Restore original features, remove later modifications that are inconsistent with interpretation of the portal, and/or replicate any missing original elements.
4. Create an orientation area in or adjacent to Portal 4, or in a nearby existing building renovated for the purpose of housing interpretive exhibits.

An “Essential Tour” was developed using the above considerations (see Appendix C). This tour is a theoretical design meant to provide guidance for the interpretive plan. The final Heritage Tourism Plan should be informed by decisions made regarding the interpretation of the site, and practical decisions regarding site clean-up.

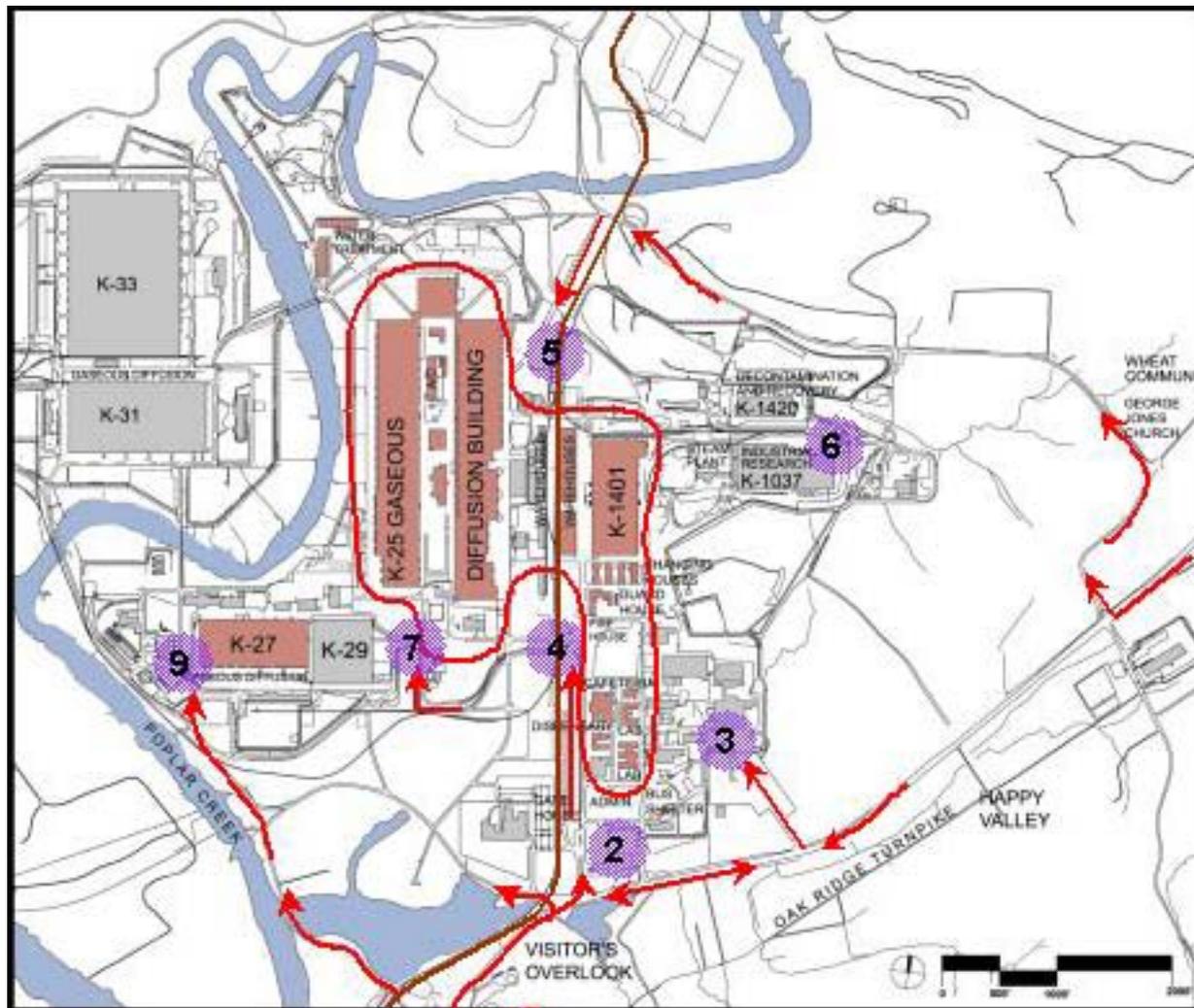


FIG. 11: The various portals in relation to access from adjacent roads.

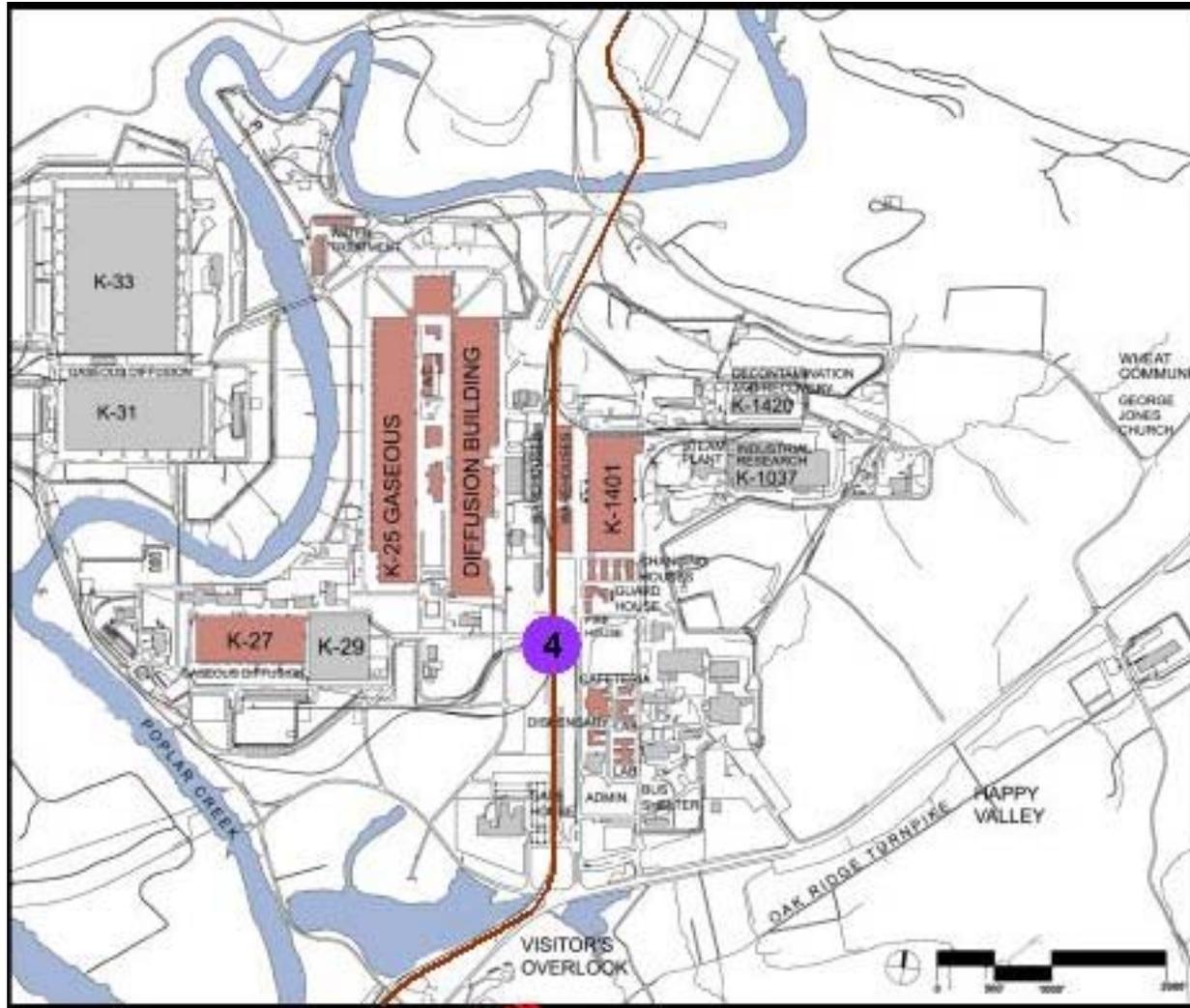


FIG. 12: Portal 4, historic location of the WWII worker's entrance, is the ideal origin point for a tour.

VIII. Appendices

A. Scheme Options

The following charts represent the possible options considered during the early part of the project. These were utilized in the development of the K-25 designs.

SCHEME 1: DEMOLISH K-25 & K-27

ASSUMPTIONS: Scheme one will entail the complete removal of the entire structure down to the slab. All equipment will be removed, some of which will be relocated.

SITE OPTIONS

- a) Retain existing slab with historic footprint
- b) Install new pavement with historic footprint and outline / display equipment
- c) Outline frame of building (e.g.. Ben Franklin house, Philadelphia)
- d) Build new Building as museum on part of footprint.

EQUIPMENT OPTIONS

- a) Relocate equipment at K-31
 - Roosevelt Cell and other pieces of WWII equipment representing 5 Sizes
 - Representative equipment from WWII through Cold War
- b) Relocate equipment to American Museum of Science and Technology
 - Roosevelt Cell and other pieces of WWII equipment representing 5 Sizes
 - Representative equipment from WWII through Cold War
- c) Relocate equipment to new Visitors Center in central location
 - Roosevelt Cell and other pieces of WWII equipment representing 5 Sizes
 - Representative equipment from WWII through Cold War
- d) Box and store equipment.

PROS

- Resolution of contamination issues will facilitate decommissioning of the property
- Some equipment is retained
- No future maintenance costs
- Site is substantially ready for further development using currently available funds
- Operating and maintenance costs of retaining existing facilities are not required.

CONS

- Original building fabric is lost and entire K-25 site complex is no longer eligible for the National Register for Historic Places
- Difficult to express original building size and magnitude in an obvious and meaningful manner
- Original context for equipment is lost

SCHEME 2: Retain Entire K-25

ASSUMPTIONS: The building superstructure will be retained including foundation and floor slabs, steel frame, and as many of the interior feature as possible. The roof would be replaced and deteriorated areas of the floor slabs would be repaired. The existing exterior transite panels would be removed and replaced with a modern material closely resembling the original.

SITE OPTIONS

- a) Reuse entire building as a museum
- b) Reuse entire building as an industrial space
- c) Reuse part of building as industrial space and part as museum

EQUIPMENT OPTIONS

- a) Retain part of equipment
 - Relocate equipment to K-31
 - Relocate equipment to American Museum of Science and Technology
 - Box and store equipment
- b) Retain all equipment in situ

PROS

- Historic integrity of building and entire K-25 complex is retained.
- Visitors can quickly and easily understand the size and magnitude of the original gas diffusion process
- Original context for equipment could be retained
- Easiest Historic Preservation Section 106 Review process. Comparatively little mitigation will be required

CONS

- Contamination of asbestos, radiation and toxic materials must be resolved.
- The roof must be replaced
- Security may become an issue, thus hindering decommissioning of the structure
- Selective demolition is labor intensive, and thus more costly than total demolition
- Maintenance costs would be significant
- Currently available D&D funding not fully used
- Maintenance and operating costs of retained existing buildings at maximum expense

SCHEME 3: Retain portion of K-25 building

ASSUMPTIONS: A large portion of the structure would be demolished to the slab. The visitor will be able to view a full-height section through the building with cells and all associated equipment. An engineering analysis may be required in order to assess the methods for retention of a structurally sound section.

SITE OPTIONS

- a) Retain section of building at Roosevelt Cell area
- b) Retain section of building where representative equipment is located
- c) Retain one complete wing with view corridor
- d) Retain north end of building for museum

EQUIPMENT OPTIONS

- a) Retain Roosevelt Cell and associated piping in situ
- b) Retain typical wing unit with cells and associated equipment
- c) Retain equipment at north end including piping, and recreate control room

PROS

- Equipment can retain some of its original context within the architecture of the structure
- Building portion will contribute towards the interpretation of the site
- Elimination of major roff and asbestos contamination is achieved

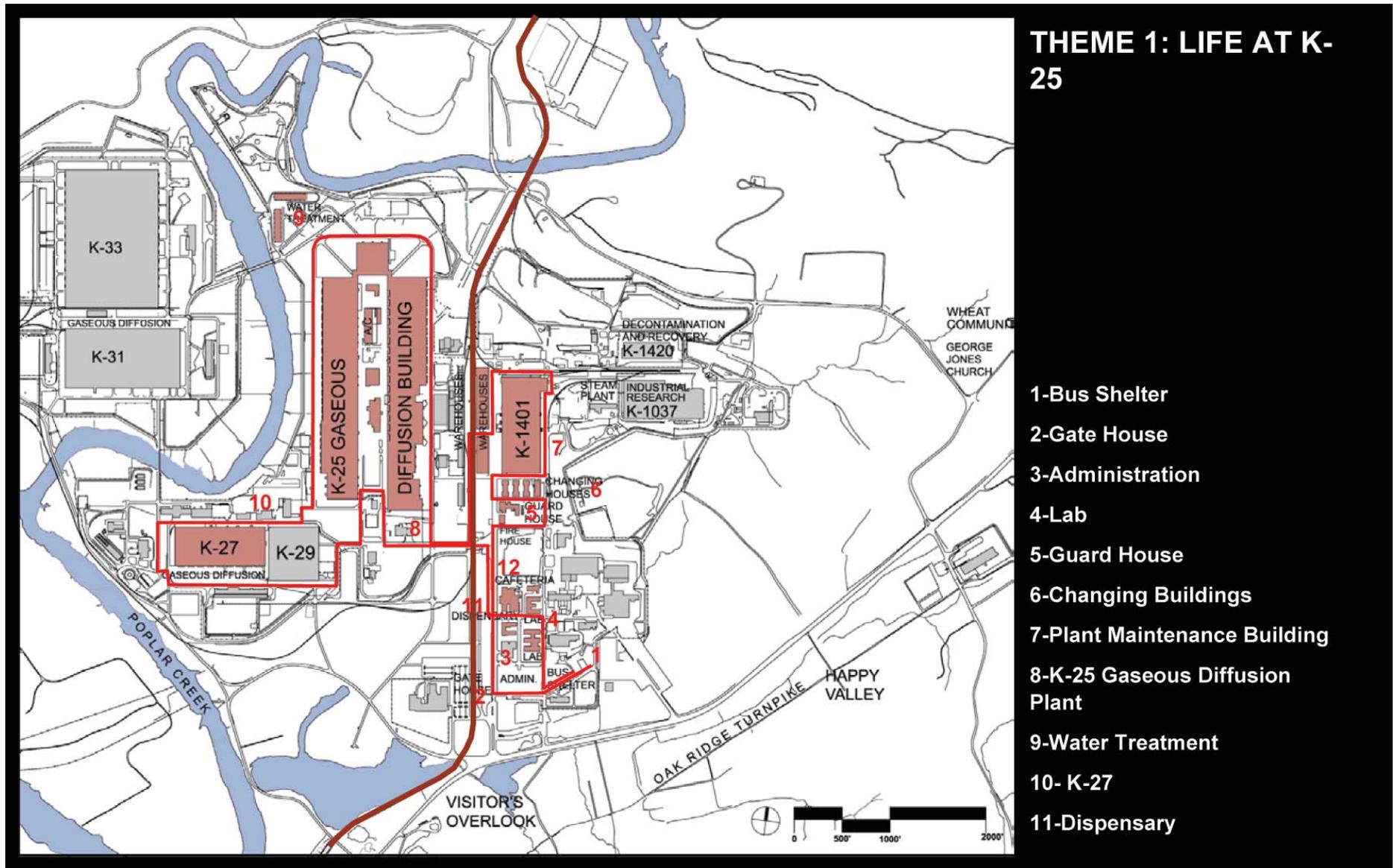
CONS

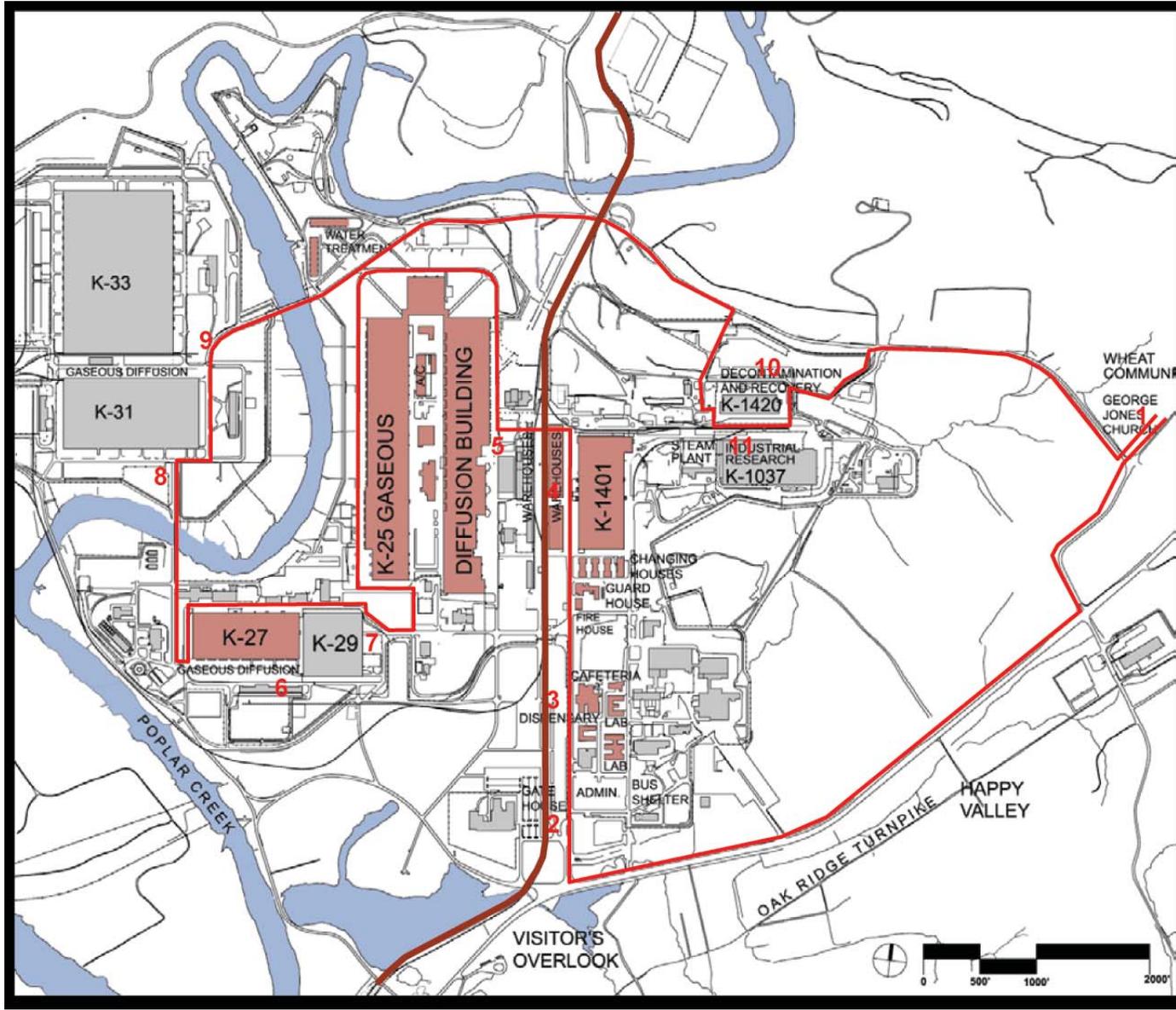
- View corridor is important of the understanding of the original building size and scale. Demolition of part of the structure will result in considerable loss of historic fabric, thus negatively impacting the historic integrity of the entire K-25 complex
- Portion must be expressed as representative of a larger structure
- Security may become an issue, thus hindering decommissioning of the structure
- Selective demolition is labor intensive, and thus more costly than total demolition
- Contamination of asbestos, radiation and toxic materials must be resolved.

VIII. Appendices

B. Thematic Tours

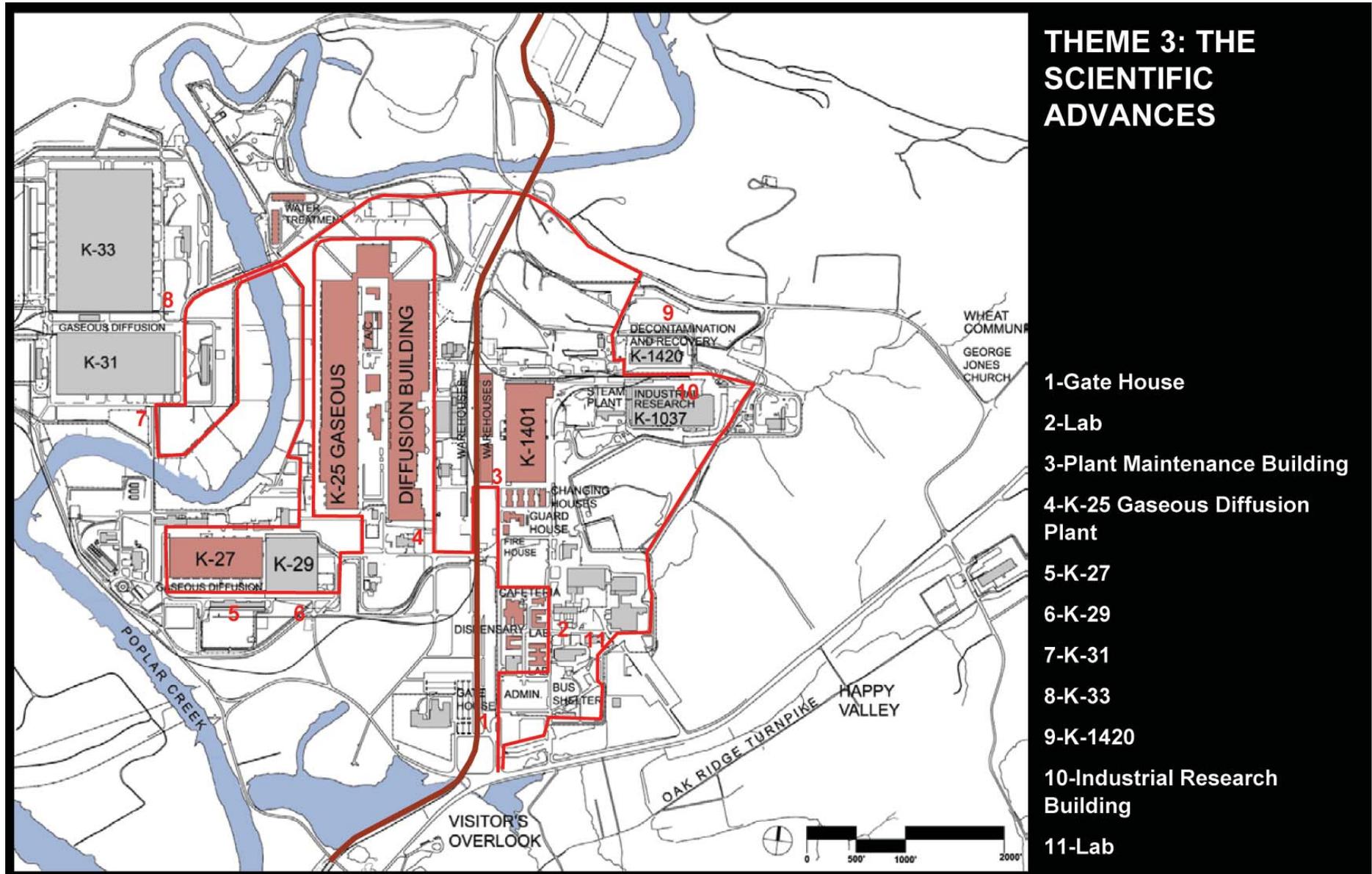
The following tours were utilized as a tool for initiating a discussion on site interpretation and its implications for the preservation of salient site features. These tours are for illustrative purposes only, and do not represent a final design. The final design for a tour should be completed either concurrent with, or after completion of the Interpretive Plan.





THEME 2: SEQUENTIAL HISTORY OF THE SITE

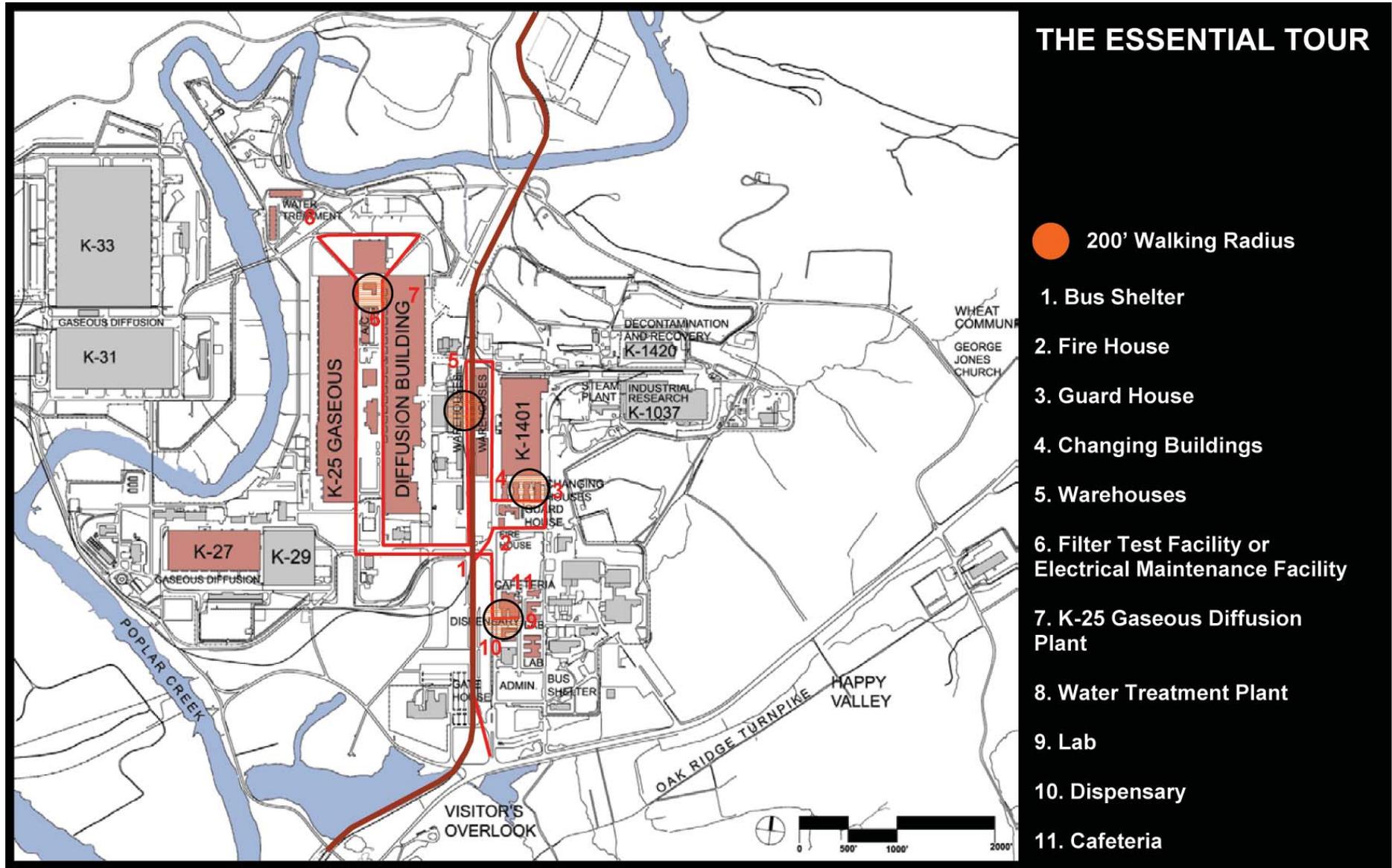
- 1-Wheat Community
- 2-Gate House
- 3-Administration Area
- 4-Plant Maintenance Building
- 5-K-25 Gaseous Diffusion Plant
- 6-K-27
- 7-K-29
- 8-K-31
- 9-K-33
- 10-K-1420
- 11-Industrial Research Building

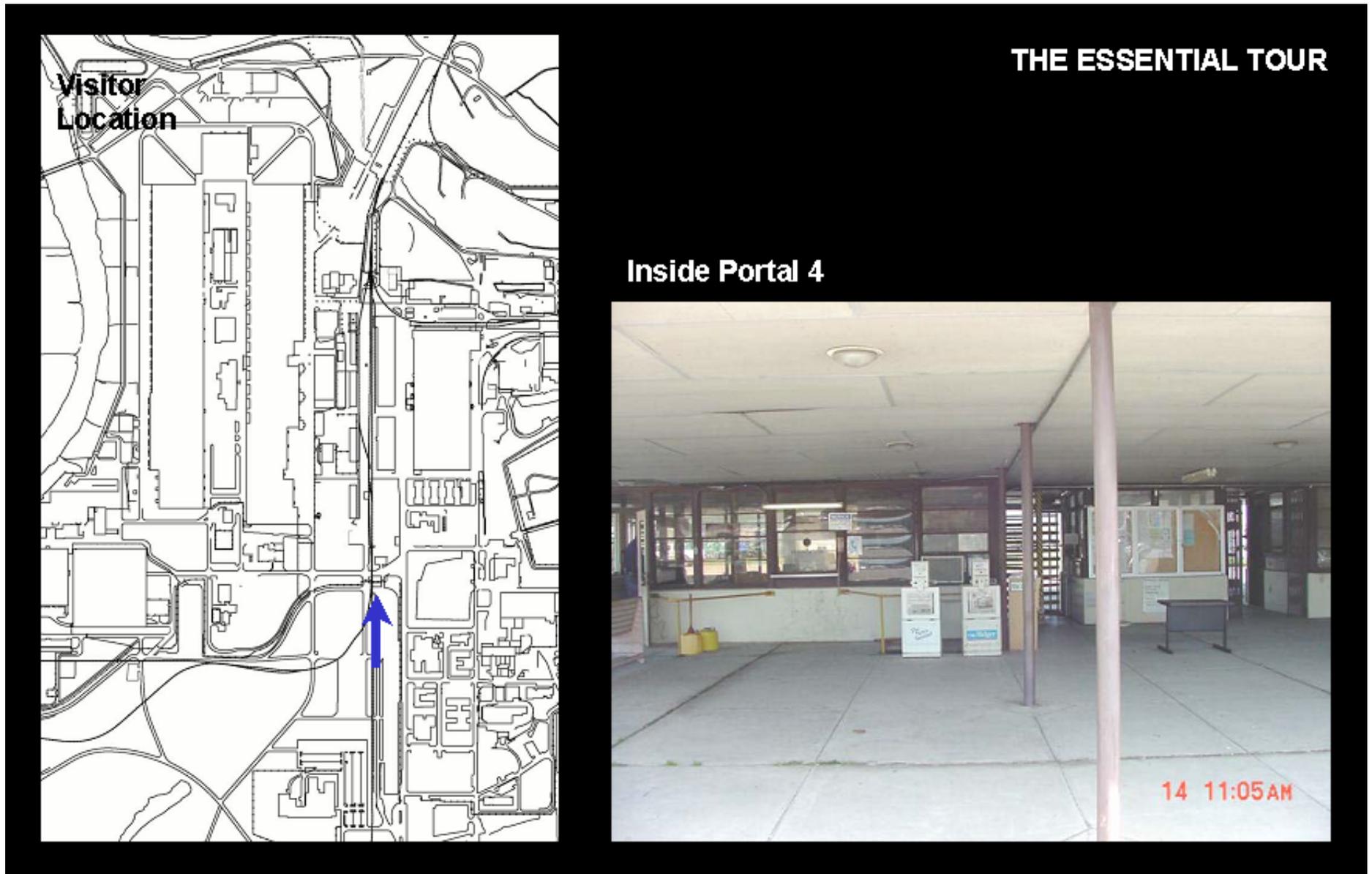


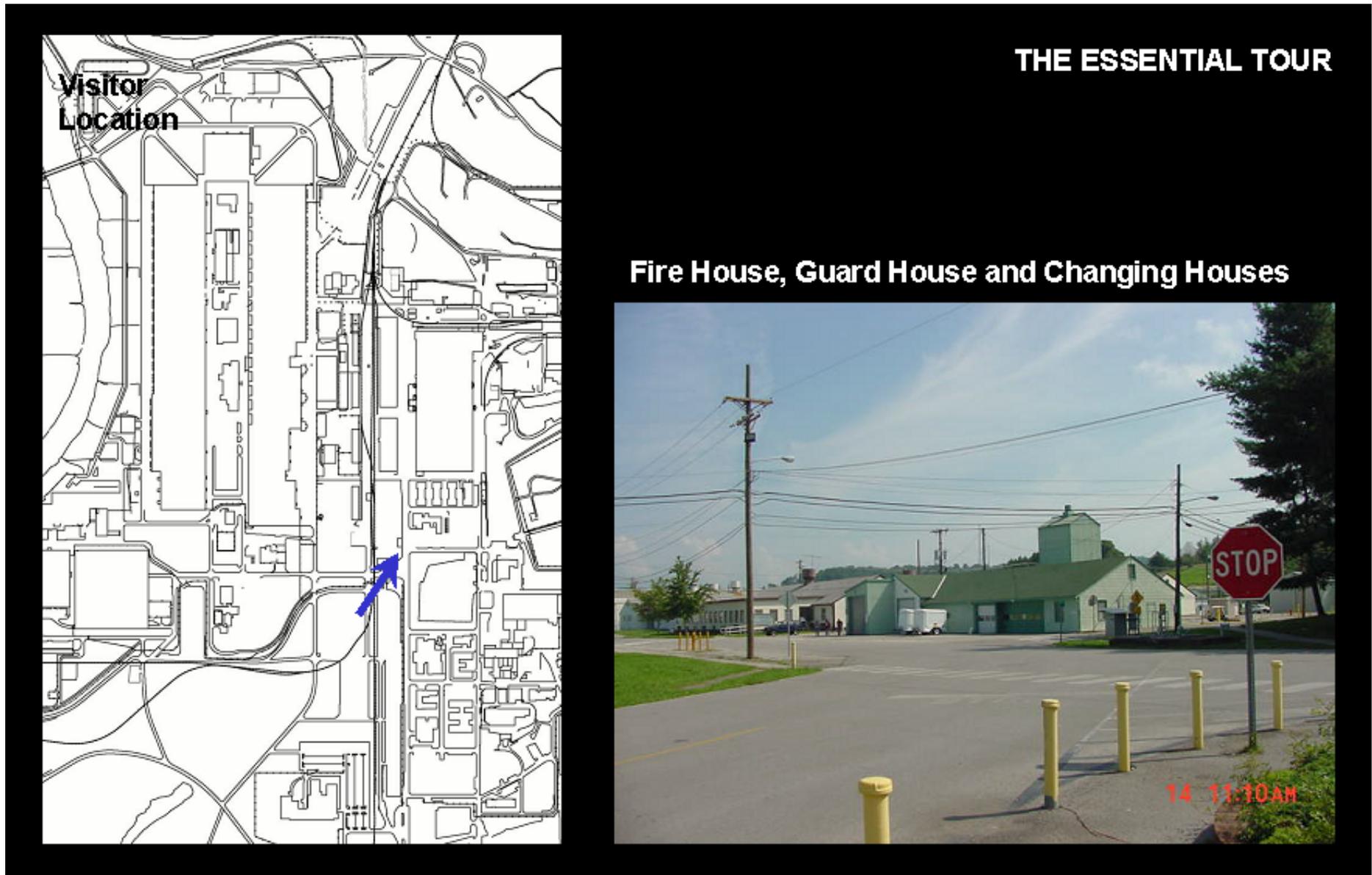
VIII. Appendices

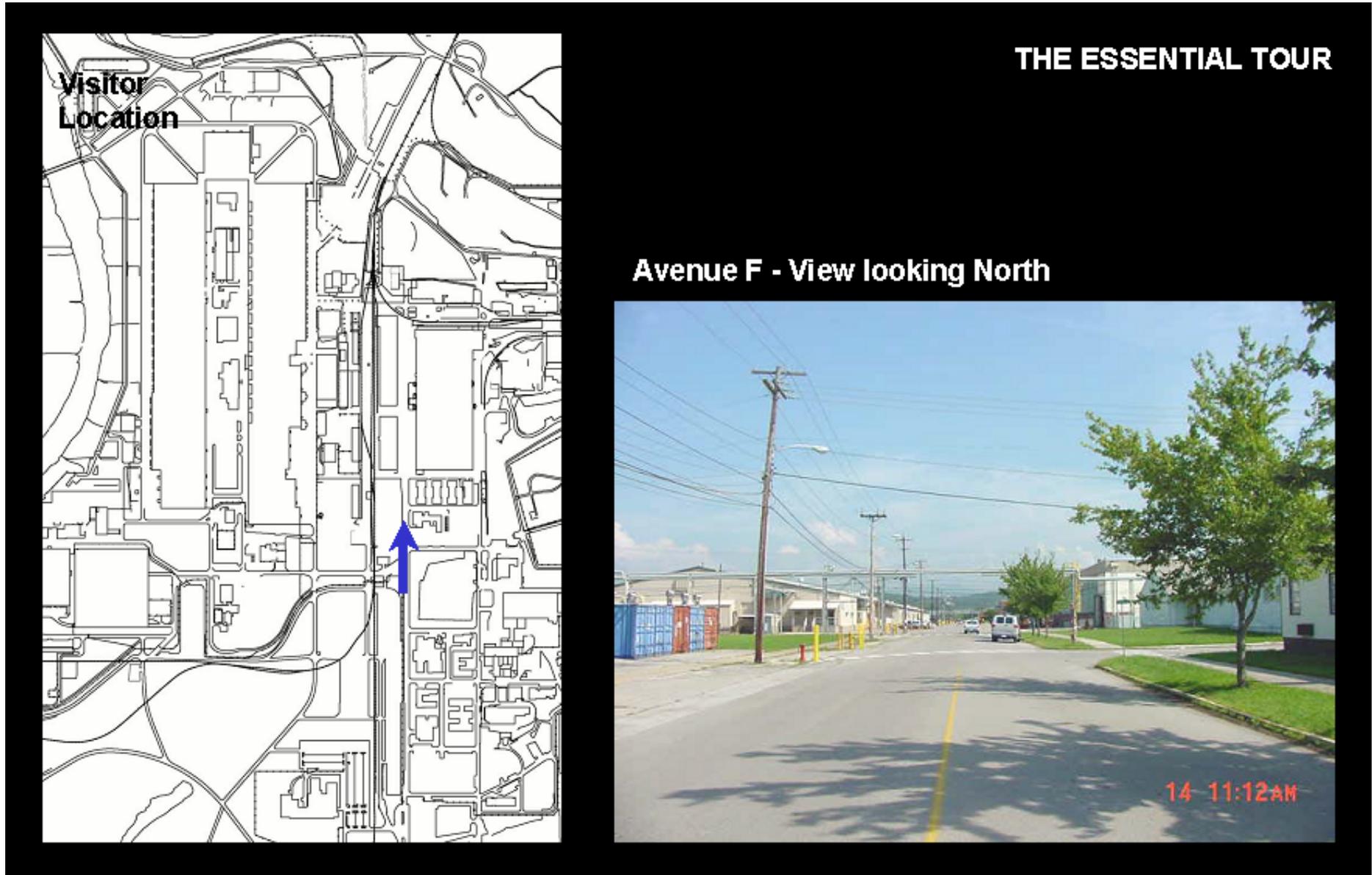
C. The Essential Tour

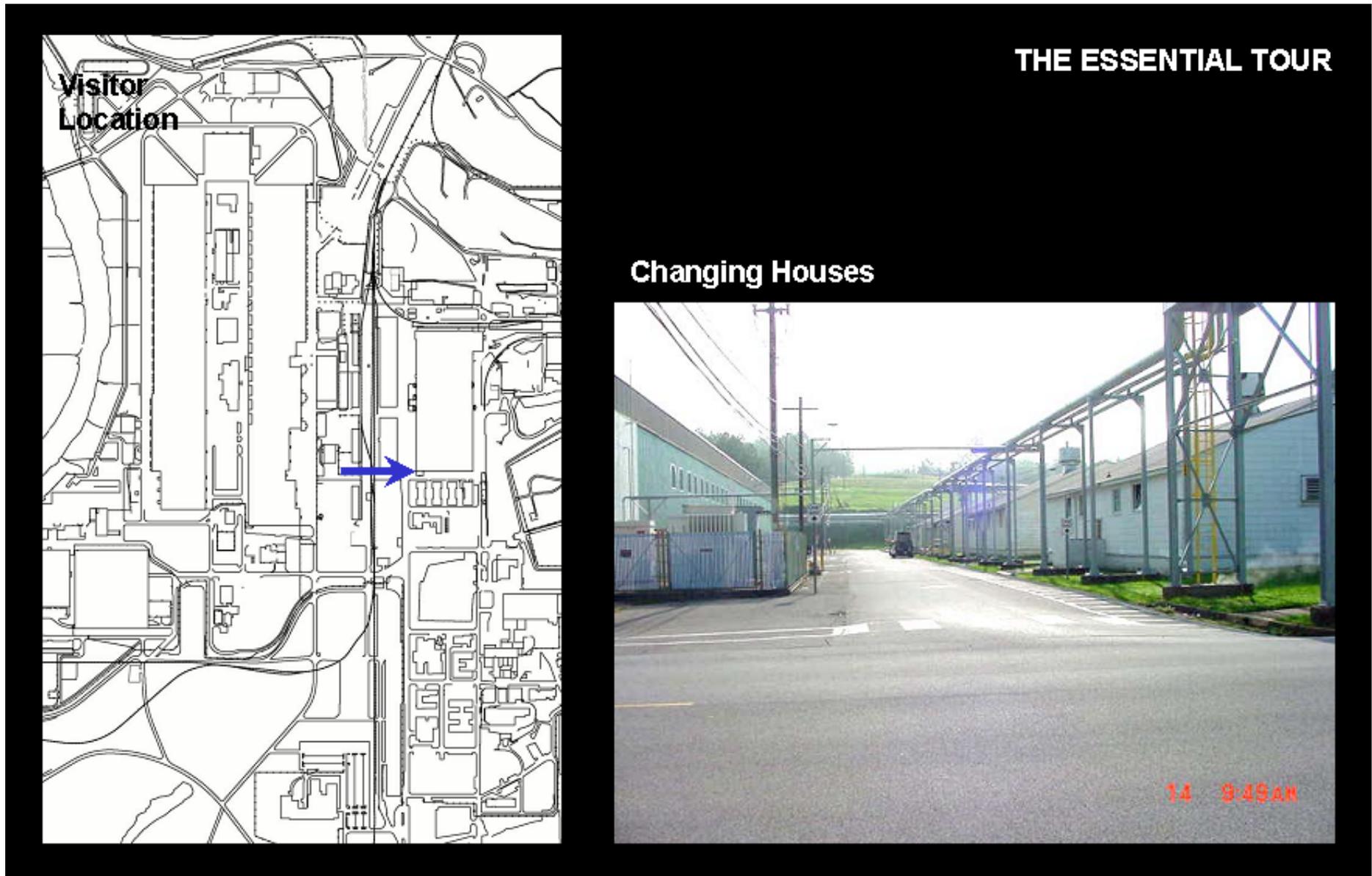
The following tour scheme was developed in order to further discussion about site interpretation, and to identify those salient site features that were the most effective areas for interpretive activities.

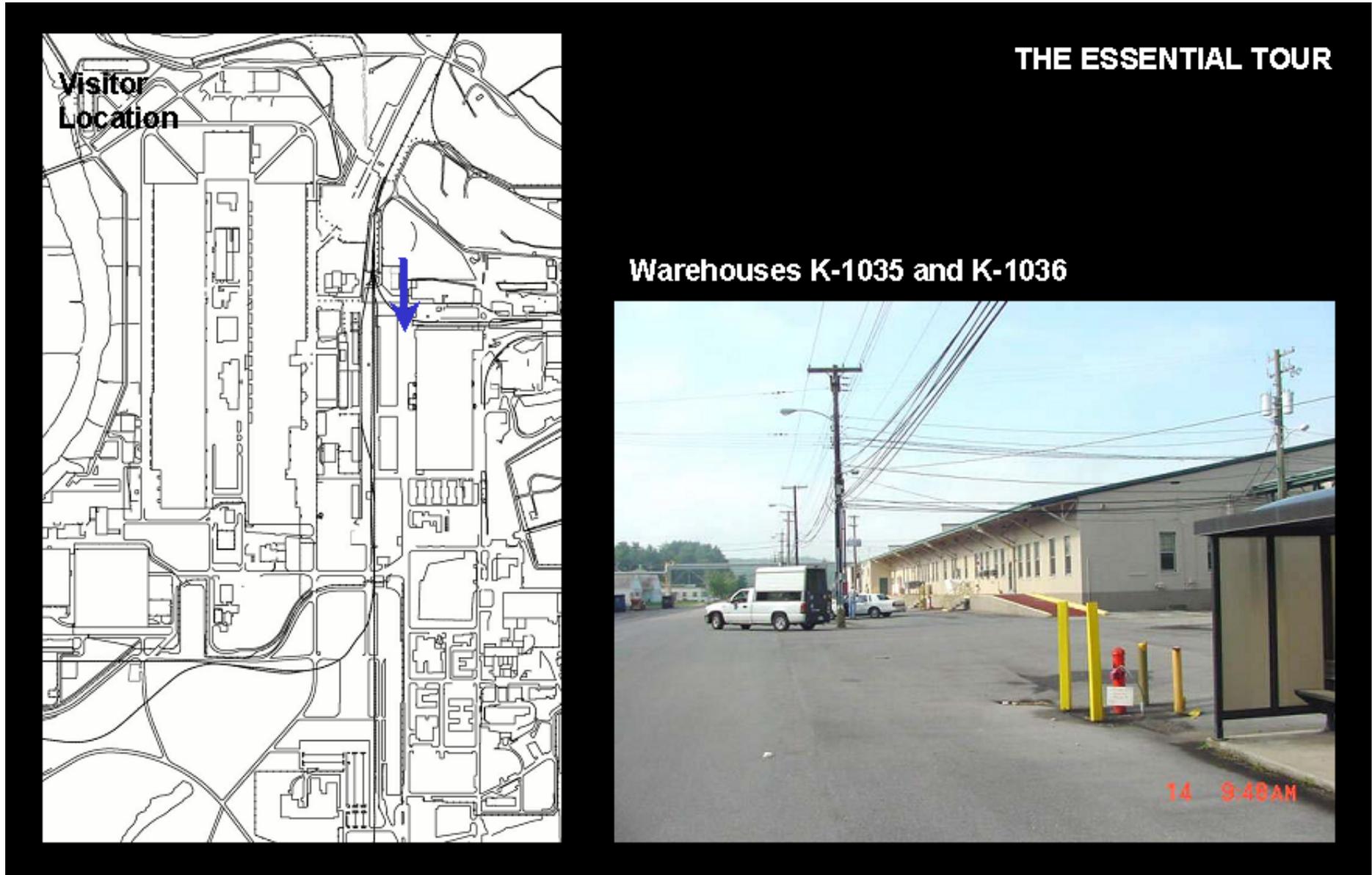




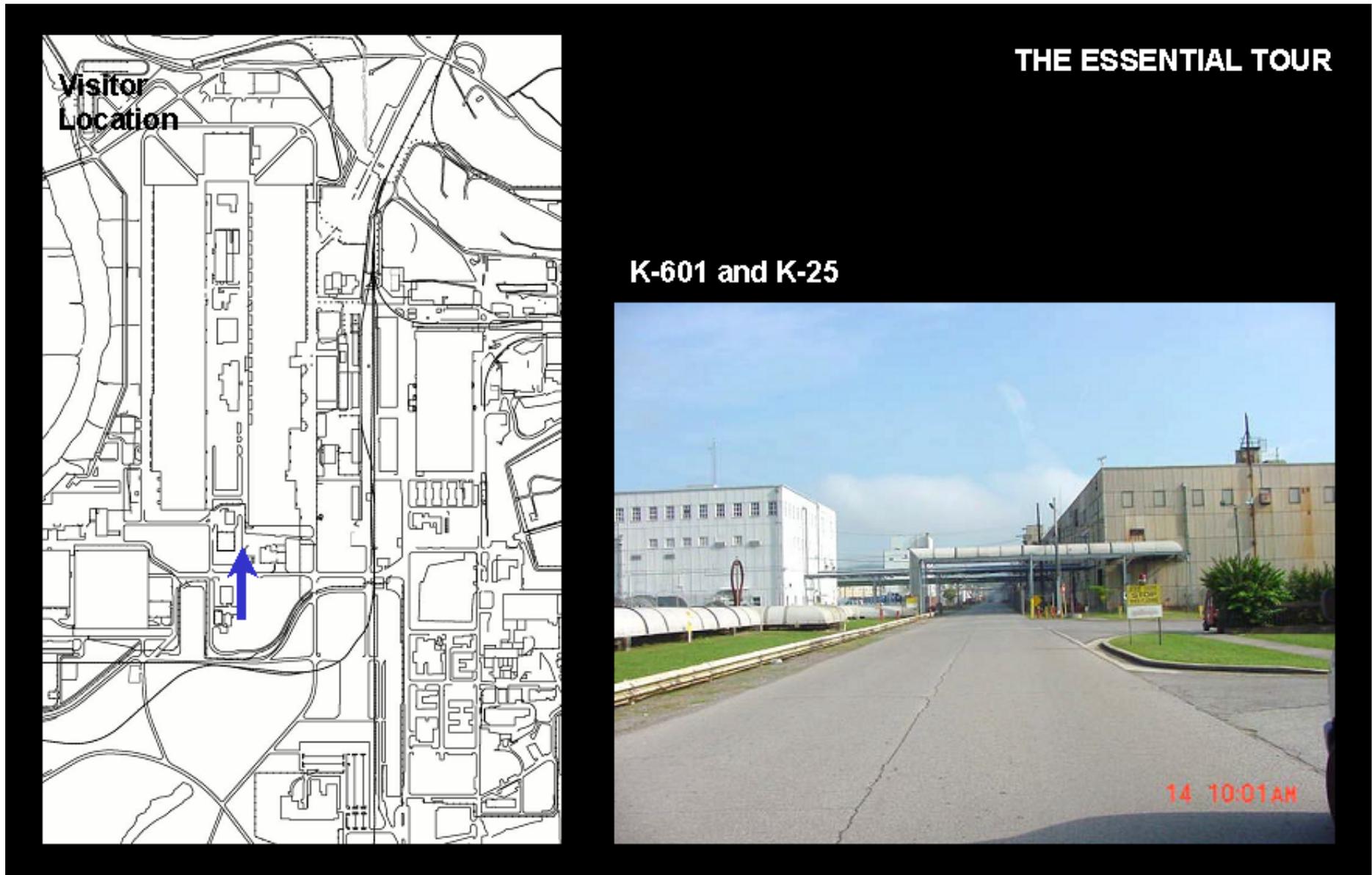


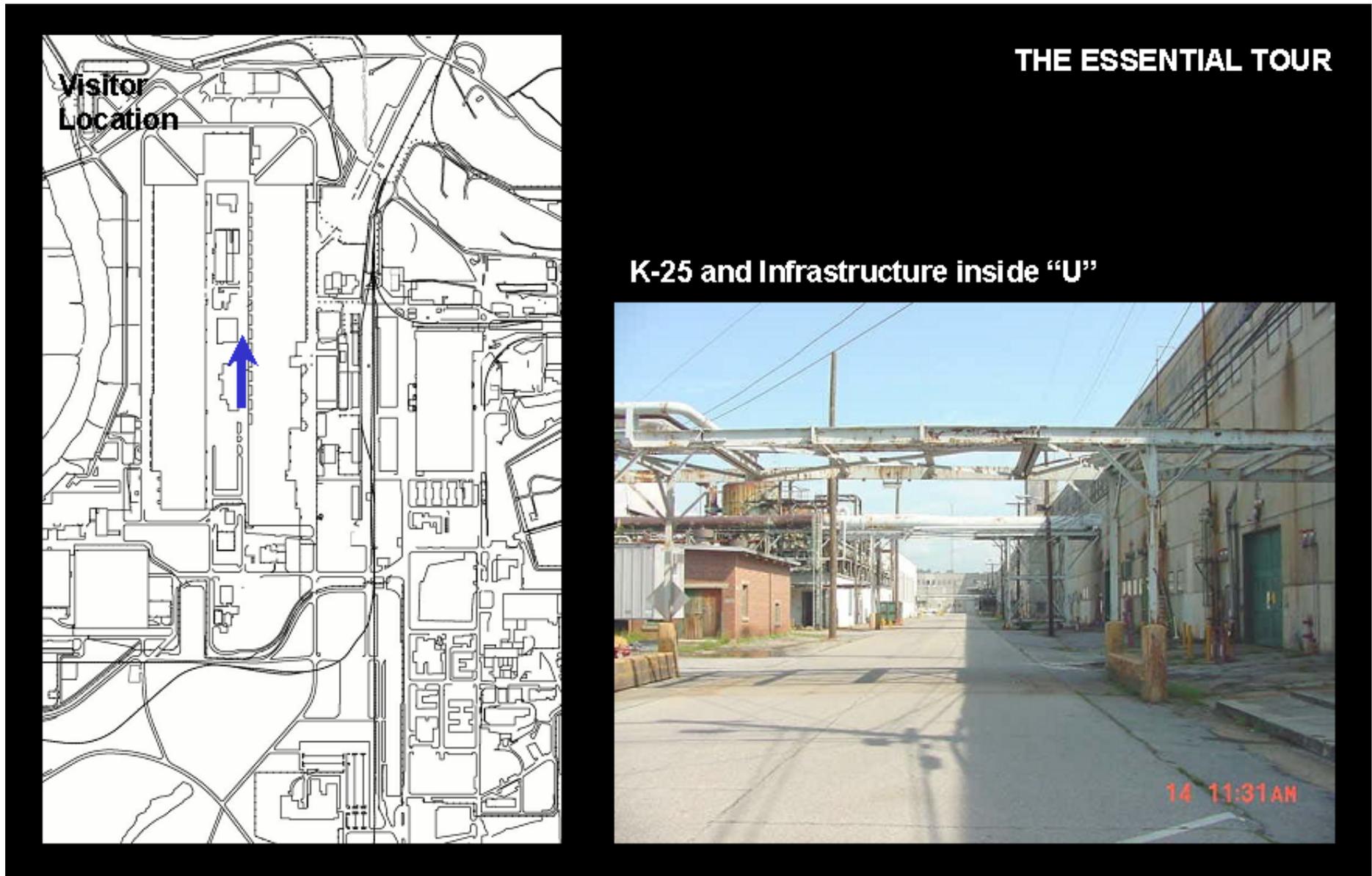


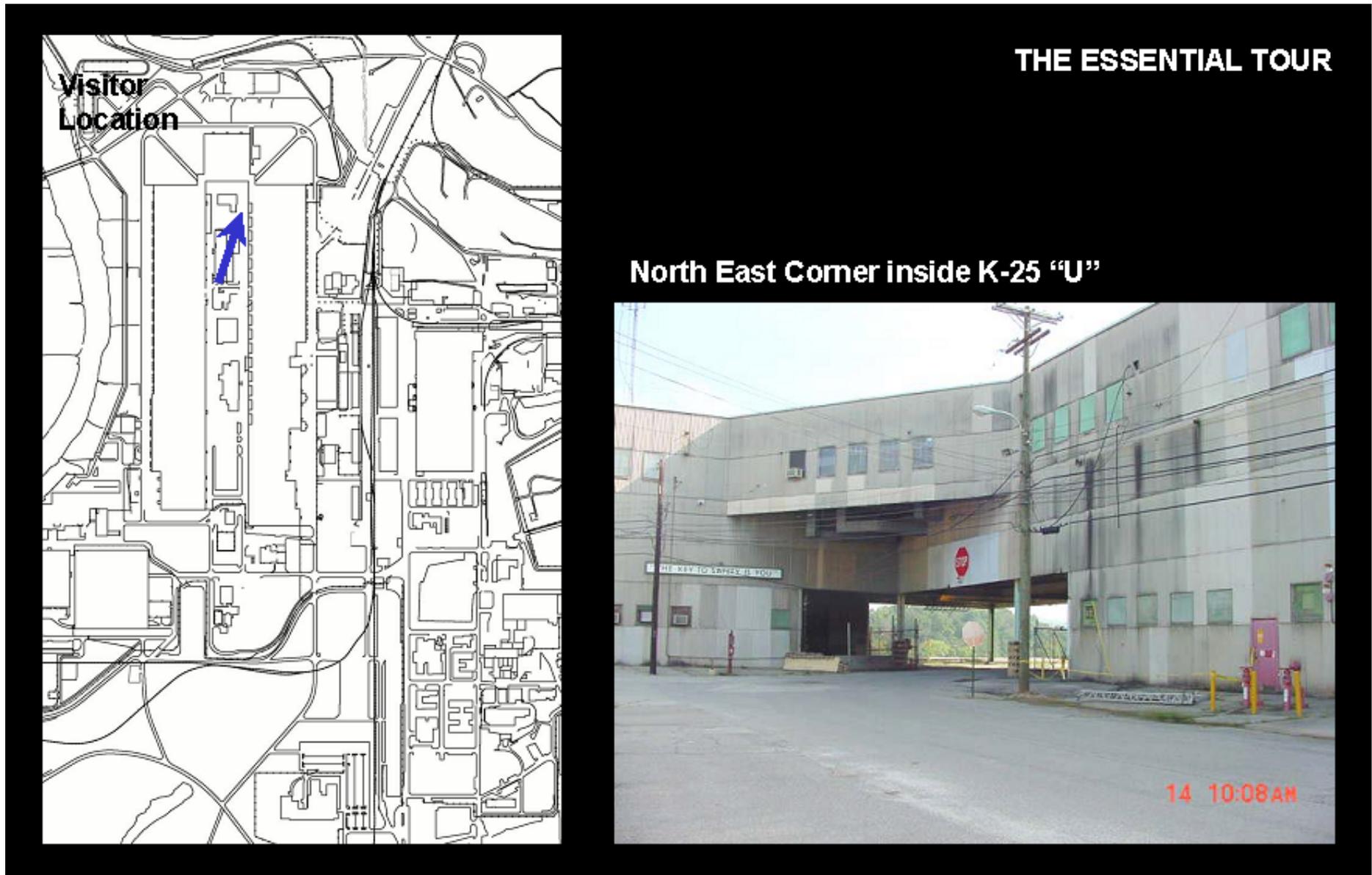


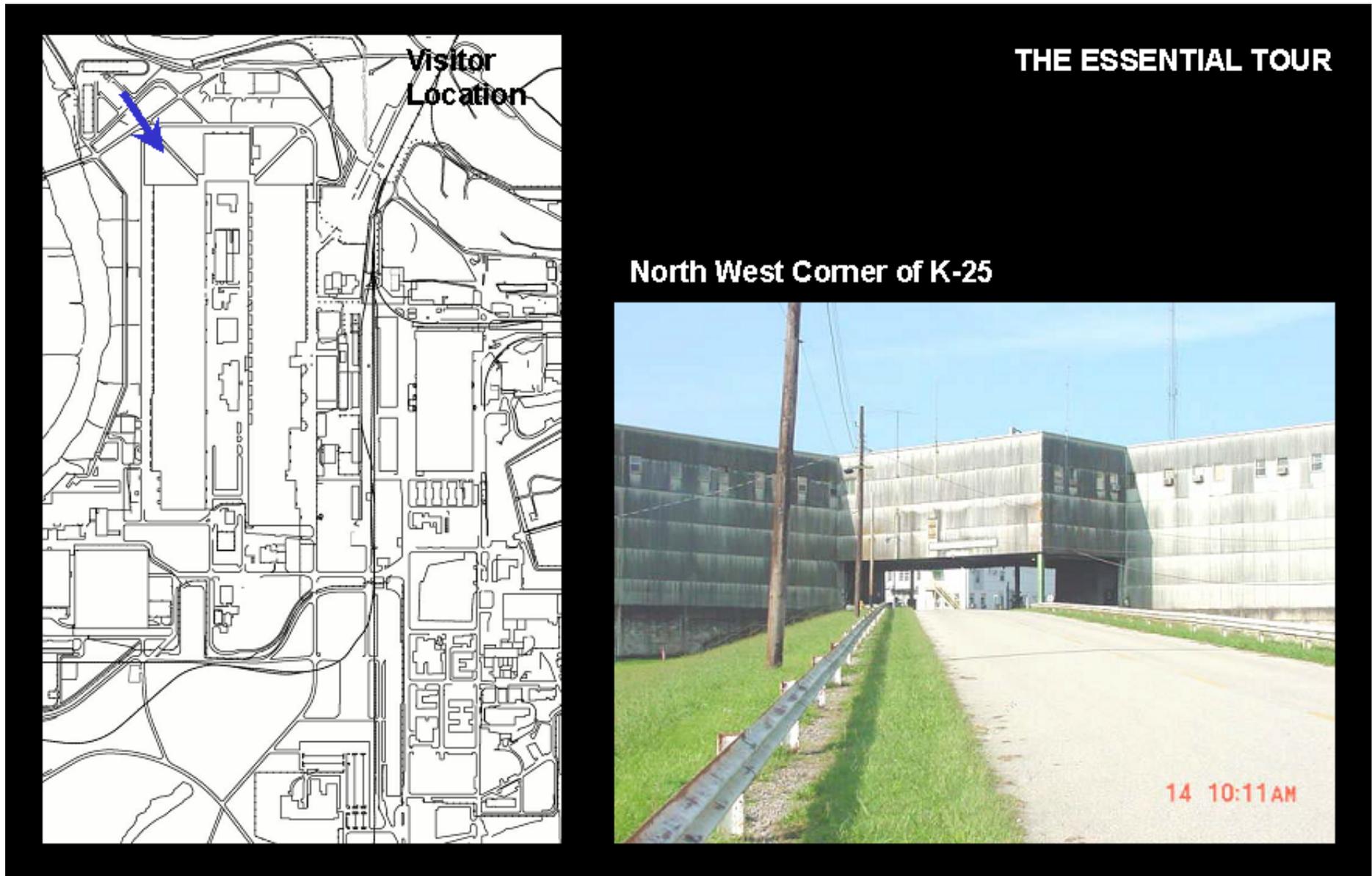


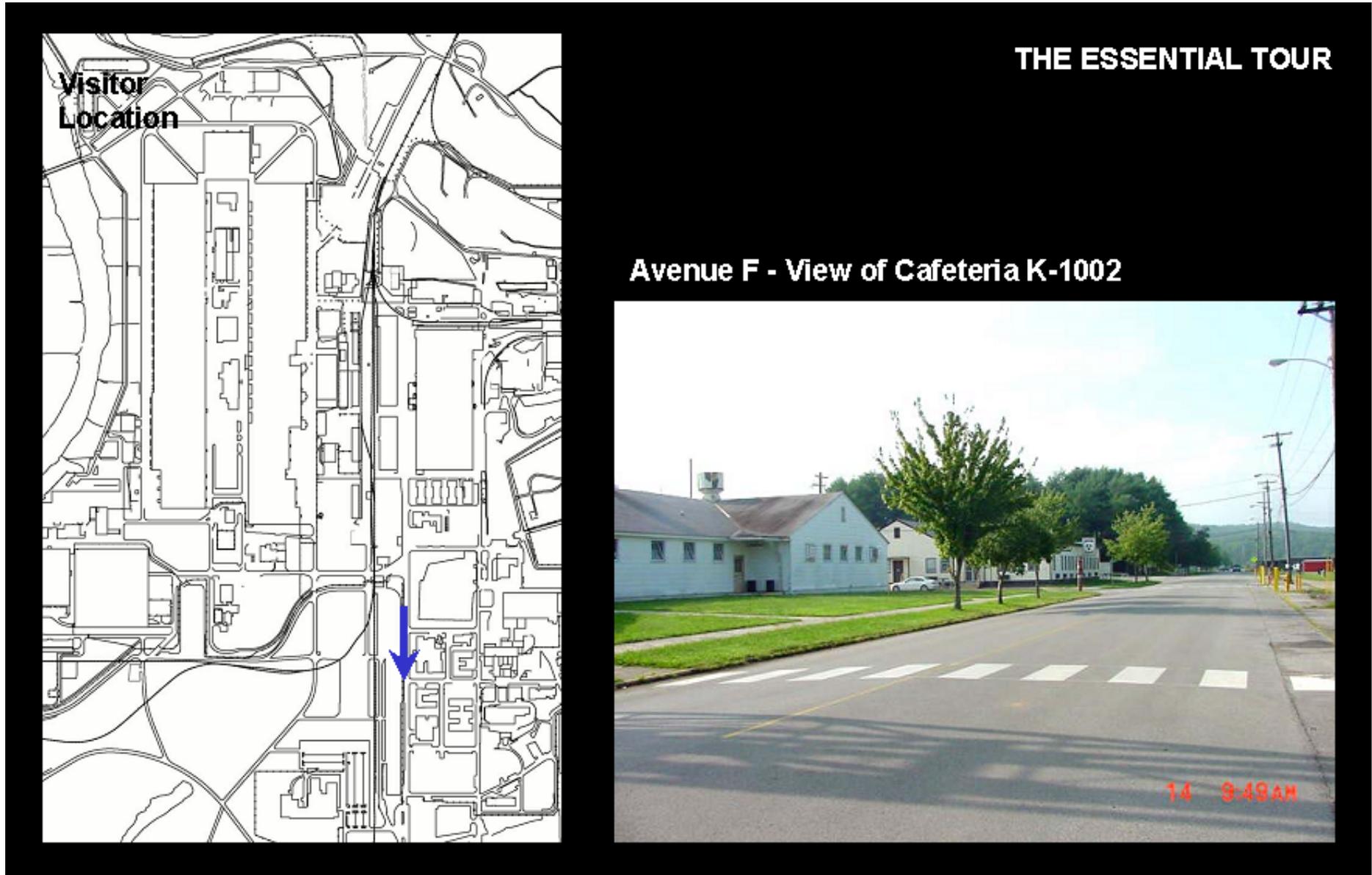












VIII. Appendices

D. Cost Estimate Unit Price Guide

The following spread sheets provide the recommended breakdown of unit prices, plus multipliers for associated costs.

CONSTRUCTION COSTS

Indirect Construction Costs	
Design Contingency	20.0%
General Conditions	14.0%
General Contractors OH & P	7.0%
Present Day Multiplier	146.4%
Escalation - assume 6 yrs @2.5%/ppa	16.0%
Escalated Multiplier	169.8%
Owners Costs	
Construction Contingency	15.0%
Owners Soft Costs	23.4%
Project Multiplier	241.0%

Project Cost Inc.

Item	Unit	Present Day Construction Costs		Escalated	
		Direct	Incl Indirects	Incl Indirects	Project Cost
New roof deck		4.14	6.06	7.03	9.98
Demolish existing roof deck	sf	0.82	1.20	1.39	1.98
Prep beams and girders	sf	0.25	0.37	0.42	0.60
New metal roof deck	sf	1.72	2.52	2.92	4.14
New roof drains	sf	0.15	0.22	0.25	0.36
New roof drain leaders	sf	1.20	1.76	2.04	2.89
New roof membrane assembly		7.25	10.61	12.31	17.47
Strip existing roofing system	sf	1.65	2.42	2.80	3.98
New roofing system	sf	5.60	8.20	9.51	13.49
New steel structure					
Elevated floor slab		19.25	28.18	41.24	60.37
Structural steel	sf	12.00	17.57	25.71	37.63
Deck	sf	1.75	2.56	3.75	5.49
Concrete fill	sf	5.50	8.05	11.78	17.25
Roof framing and deck		11.72	17.16	24.35	35.51
Structural steel	sf	10.00	14.64	21.43	31.36
New metal roof deck	sf	1.72	2.52	2.92	4.14
New steel armature		8.40	12.30	18.00	26.34
Footings	sf	1.20	1.76	2.57	3.76
Tubular steel framing - footprint	sf	6.00	8.78	12.86	18.82
Paint	sf	1.20	1.76	2.57	3.76

Project Cost Inc.

Item	Unit	Present Day Construction Costs		Escalated	
		Direct	Incl Indirects	Incl Indirects	Project Cost
Patch concrete floor slab	sf	1.50	2.20	3.21	4.70
Coat transite panels with encapsulant	sf	3.50	5.12	7.50	10.98
New transite panels		10.20	14.93	21.85	31.99
Remove existing panels and disposal	sf	4.00	5.86	8.57	12.54
Install new cementitious corrugated panels	sf	6.20	9.08	13.28	19.44
Paint existing exterior wood		1.70	2.49	3.64	5.33
Prepare and spot prime	sf	0.90	1.32	1.93	2.82
Two coats paint	sf	0.80	1.17	1.71	2.51
Interior partitions - CMU		9.20	13.47	19.71	28.85
8" CMU	sf	8.00	11.71	17.14	25.09
Paint both sides	sf	1.20	1.76	2.57	3.76
Interior partitions - drywall		5.50	8.05	11.78	17.25
Drywall lining on metal stud framing	sf	4.50	6.59	9.64	14.11
Paint both sides	sf	1.00	1.46	2.14	3.14
New door, frame and hardware		1,025.00	1,500.35	2,196.16	3,214.65
Frame	leaf	145.00	212.25	310.68	454.76
Door	leaf	260.00	380.58	557.07	815.42
Hardware	leaf	550.00	805.07	1,178.43	1,724.93
Paint	leaf	70.00	102.46	149.98	219.54
New exterior wall assembly	sf	37.00	54.16	79.28	116.04

Project Cost Inc.

Item	Unit	Present Day Construction Costs		Escalated	
		Direct	Incl Indirects	Incl Indirects	Project Cost
Install new curtain wall	sf	60.00	87.83	128.56	188.17
Observation deck structure	sf	34.00	49.77	72.85	106.63
Footings	sf	4.50	6.59	9.64	14.11
Framing	sf	12.00	17.57	25.71	37.63
Expanded metal deck	sf	8.50	12.44	18.21	26.66
Railings	sf	8.00	11.71	17.14	25.09
Paint	sf	1.00	1.46	2.14	3.14
Sealed glass walkway - assumed 10' wide	lf	1,848.00	2,705.03	3,137.83	4,452.90
Footing	lf	80.00	117.10	135.84	192.77
Structural framing	lf	225.00	329.35	382.04	542.15
Metal floor deck	lf	18.00	26.35	30.56	43.37
Concrete deck fill	lf	55.00	80.51	93.39	132.53
Window wall	lf	1,000.00	1,463.76	1,697.96	2,409.58
Roof - drywall	lf	160.00	234.20	271.67	385.53
Floor finish	lf	70.00	102.46	118.86	168.67
HVAC	lf	160.00	234.20	271.67	385.53
Lighting	lf	80.00	117.10	135.84	192.77
New HVAC system	sf	30.00	43.91	50.94	72.29
New power and lighting	sf	12.40	18.15	21.05	29.88
New fire and life safety	sf	4.30	6.29	7.30	10.36
Sprinkler system	sf	2.20	3.22	3.74	5.30
Fire alarm system	sf	2.10	3.07	3.57	5.06
New tele data and security	sf	4.80	7.03	8.15	11.57

Project Cost Inc.

Item	Unit	Present Day Construction Costs		Escalated	
		Direct	Incl Indirects	Incl Indirects	Project Cost
ADA accessible elevator		165,600.00	242,398.66	281,182.44	399,026.00
Pit	ea	6,000.00	8,782.56	10,187.77	14,457.46
Shaft enclosure - glass	ea	69,600.00	101,877.70	118,178.13	167,706.58
Equipment room	ea	10,000.00	14,637.60	16,979.62	24,095.77
Elevator	ea	80,000.00	117,100.80	135,836.93	192,766.18
New toilet per WC		12,331.25	18,049.99	20,937.99	29,713.10
2 Fixtures including rough-in	ea	5,600.00	8,197.06	9,508.58	13,493.63
Toilet cubicle	ea	900.00	1,317.38	1,528.17	2,168.62
Toilet room accessories	ea	906.00	1,326.17	1,538.35	2,183.08
Room enclosure	ea	1,134.00	1,659.90	1,925.49	2,732.46
Door	ea	256.25	375.09	435.10	617.45
Floor finish	ea	594.00	869.47	1,008.59	1,431.29
Ceiling finish	ea	363.00	531.34	616.36	874.68
Wall finish	ea	1,428.00	2,090.25	2,424.69	3,440.88
Power and light	ea	350.00	512.32	594.29	843.35
HVAC	ea	400.00	585.50	679.18	963.83
Water heater allowance	ea	150.00	219.56	254.69	361.44
Water cooler	ea	250.00	365.94	424.49	602.39
New stair core - per flight	ea	23,362.00	34,196.36	39,667.78	56,292.55
Enclosure - interior 2 hr	ea	5,904.00	8,642.04	10,024.77	14,226.14
Risers	ea	6,300.00	9,221.69	10,697.16	15,180.34
Landings	ea	4,400.00	6,440.54	7,471.03	10,602.14
Railings	ea	2,430.00	3,556.94	4,126.05	5,855.27
Handrail	ea	480.00	702.60	815.02	1,156.60
Tread and riser finish	ea	1,008.00	1,475.47	1,711.55	2,428.85
Soffit finish	ea	1,440.00	2,107.81	2,445.06	3,469.79
Door frame and hardware	ea	1,400.00	2,049.26	2,377.15	3,373.41
Visitors Center (NOTE: not institutional quality)	sf	239.11	350.00	406.00	576.15

Project Cost Inc.