The University of Texas at San Antonio Institute of Texan Cultures

American Alliance of Museums
Accreditation Feasibility Report

October 17,2023

Prepared by

Dan Bosin Associates

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EXECUTIVE SUMMARY

This report was prepared by Dan Bosin Associates (DBA). DBA are nationally recognized, experienced museum and cultural facilities subject matter experts. DBA was engaged by the University of Texas at San Antonio (UTSA) and WT Partnership (WT) to evaluate the feasibility of advancing the ITC Centennial Process Task Force Recommendation Reports.

The purpose of this document is to summarize the potential feasibility of the three conceptual scenarios for the future of the Institute for Texan Cultures (ITC or Institute) identified by the UTSA appointed Task Forces Reports & Resources | ITC Centennial 2068 | UTSA | University of Texas at San Antonio as defined in the ITC 2068 Centennial ITC Centennial | ITC Centennial 2068 | UTSA | University of Texas at San Antonio. This data is intended to inform UTSA of anticipated requirements for the ITC to achieve American Alliance of Museums (AAM) accreditation in each of the three conceptual scenarios. During the process, the analysis was expanded to include examination of the John H. Wood Federal Courthouse and Adrian Spears Judicial Training Center complex, located in the Hemisfair District, as another potential option for consideration.

It is important to note this report is based on information obtained to date via desk top studies, existing independent consultant reports, and site walks. It is also important to note the milestone schedules, cost estimation, and anticipated requirements documented herein are estimates, and include lists of inclusions, assumptions, and exclusions. This report does not provide an exhaustive list of requirements but rather endeavors to provide insight to the anticipated methodology, planning and budgeting, design, construction, and procurement requirements UTSA would be reasonably expected to perform for each of the three conceptual scenarios by evaluating four potential options. Drawing from this data, the project team and UTSA will be able to ascertain the expected feasibility of each scenario.

This report outlines the potential process, budget, and milestone schedule for the project based on industry standards and precedent studies of similar projects from DBA.

These findings are summarized in the following tables:

OPTIONS	RECOMMENDED REVISED PROGRAM SIZE (SF) TO ACCOMMODATE AAM ACCREDIATION	BUDGET ($)	ANTICIPATED CONSTRUCTION DURATION (MONTH)	ASSUMPTIONS / REQUIRED ACTIONS
1. New Build on Downtown Site	60,000 SF	$71 M	24-36 months	1. This assumes raw land, and does not account for new land acquisition costs, building demolition. 2. Collection storage at separate building. This does not include a build of separate storage facility.
2A. New Build on UTSA's Hemisfair Campus	60,000 SF	$84 M	24-36 months	1. Collection needs to be moved twice – to go into storage, then to be moved back. 2. Need temporary offices for ITC staff. 3. Collection Storage at separate building. This does not include build of separate storage facility.
2B. Renovate Courthouse Complex in Hemisfair District	121,580 SF	$121 M	24-36 months	1. Collection storage at separate building. This does not include a build of separate storage facility. 2. THC to review any proposed changes to building to confirm it meets the deed restrictions
3. Renovate the Texas Pavilion	185,000 SF	$153 M	24-36 months	1. Collection needs to be moved twice – to go into storage, then to be moved back. 2. Need temporary offices for ITC staff. 3. Collection storage at separate building. This does not include a build of separate storage facility.

		4. Potential requirement for THC to review any proposed changes to building if historic designation is approved and historic tax credits are used.

OPTIONS	PROS	CONS
1. New Build on Downtown Site	▪ More operationally efficient than the larger existing building. ▪ 'Purpose built' for the ITC Museum of the Future with climate-controlled loading dock, dedicated security office and staff entrance, and bus drop off with separate school entry. ▪ Easily AAM accredited. ▪ Complementary uses to the site through mixed-use development. ▪ Land acquisition and demolition costs not included in budget. ▪ Potential for a site with more foot traffic and public exposure. ▪ Least expensive option.	▪ Loss of historic connection with the Hemisfair site.
2A. New Build on UTSA's Hemisfair Campus	▪ Remains in the Hemisfair site. ▪ More operationally efficient than the larger existing building. ▪ 'Purpose built' for the ITC Museum of the Future with climate-controlled loading dock, dedicated security office and staff entrance, and bus drop off with separate school entry. ▪ Easily AAM accredited.	▪ More expensive than building on a new site Downtown. ▪ There are options to maintain the Texas Pavilion Building however, for highest and best use of the site in terms of complimentary uses, the project team would recommend further analysis to determine if the site would be more suitable without

	▪ Complementary uses to the site through mixed-use development. ▪ Revenue opportunity through tenant leases of mixed-use development, or Texas Pavilion building.	the Texas Pavilion Building and supporting infrastructure on site.
2B. Renovate Courthouse Complex in Hemisfair District	▪ Remains in the Historic Hemisfair site. ▪ More visible location then Texas Pavilion ▪ Restores a historic building. ▪ Provides a dramatic entry experience. ▪ New climate-controlled loading facility. ▪ Separate Education Building.	▪ Requires a new utility plant. ▪ Not a purpose-built facility. ▪ Historic Restrictions at exterior.
3. Renovate the Texas Pavilion	▪ Maintains the Texas Pavilion, including structure, façade, and fountain. ▪ Remains in the historic Hemisfair site.	▪ Most expensive option. ▪ Limited natural light for non-exhibit spaces however, UTSA has no legal obligations to maintain the historic integrity of Texas Pavilion Building and light could be brought in through new windows or skylights. ▪ New ITC only needs about half the space of the existing building. ▪ Little room on the site for additional development. ▪ Less than ideal locations for mechanical spaces, stairs, and elevators as well as compromised arrangement for loading dock due to working within existing constraints.

It is important to qualify that, notwithstanding any financial or logistical considerations, any of the contemplated options have the opportunity to provide a world class ITC facility that could be AAM accredited. Weighing the available data, the conclusion of the Project Team is to recommend Option 1 as providing UTSA the best opportunity to create a world class ITC museum. This option provides UTSA with the most flexibility, lowest financial obligations as it pertains to the ITC, it would not impact the Texas Pavilion building or impede its adaptive reuse with stringent AAM requirements. In the opinion of the Project Team, this provides the highest opportunity for success. This could be achieved through a purpose-built new museum on land within San Antonio that would qualify to host a world class ITC museum with appropriate modifications.

The new museum options are attractive due to the ability to purpose build a facility for the new ITC. They are also less expensive to build and maintain than the renovated facility. These advantages must be weighed against the loss of the existing Texas Pavilion structure, which is a place that holds special memories for many Texans.

SECTION 1

Background

The UTSA is leading the effort to revitalize the ITC with the goal to establish a new, attractive, appropriately designed facility that accommodates the functions and users of the Institute. The facility needs to comfortably accommodate events and festivals, exhibits, academic facilities, cultural entertainment, dining, and retail. The facility must meet all the AAM requirements for accreditation.

The ITC is currently housed in the Texas Pavilion from the 1968 Hemisfair World Fair. The Texas Pavilion is located at 801 E César E. Chávez Blvd, San Antonio, Texas within UTSA's Hemisfair Campus, which is part of San Antonio's historic Hemisfair District. Based on previous independent studies, UTSA's Steering Committees, and Task Force reports, this building does not easily support the physical requirements for AAM accredited museums. Additionally, UTSA recently obtained R1 Status making the ITC eligible for funding through the National Research University Fund. The ITC also has Smithsonian Affiliate status. This provides opportunities to host traveling Smithsonian exhibits, however the Institute is not able to do so without AAM accreditation. The ITC needs a facility that will support AAM accreditation, research activities, and traveling exhibits, all while enhancing engaging exhibit galleries and inviting new visitor spaces.

UTSA is currently in a research and data gathering process. This will culminate in a Request for Interest (RFI) document to provide private market feedback regarding these scenarios and better support UTSA's decision making process. This report provides supporting data to help UTSA evaluate the three conceptual scenarios through four potential options.

Project Team

The team that produced this report is made up of Architects, Engineers and Project Managers and includes:

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SECTION 2

Methodology

The ITC Centennial 2068 Steering Committee Scenarios Report identified the following three scenarios:

1. Relocate outside of the Hemisfair District
2. Relocate in the Hemisfair District - either by designing a new building or moving to an existing building within Hemisfair
3. Remain in the Texas Pavilion

Based on the these, the Project Team conducted a detailed review of the following options to investigate the feasibility of AAM accreditation in each:

- Option 1: Relocate the ITC museum in Downtown San Antonio
- Option 2A: Build a new ITC museum on the existing UTSA Hemisfair Campus
- Option 2B: Renovate the existing Federal Courthouse and Judicial Training Center in the Hemisfair District
- Option 3: Renovate the existing Texas Pavilion to house a re-imagined ITC

For both Option 1 and 2A, the new facility includes the physical plant amenities necessary for AAM museum accreditation. The program, amenities, mechanical systems, and construction costs for these options are based on similar institutions.

For Option 2B, the team identified what improvements would be required for the existing courthouse building to be renovated to house the ITC and to meet all AAM accreditation standards. This effort included a complete survey and evaluation of the existing buildings. The team also studied drawings of the original structure and the historic deed restrictions for character defining features. The team confirmed the deficiencies, such as needing museum quality temperature and humidity control and a secure loading dock, then proposed possible remedies and prepared diagrammatic plans for the renovation to assist with a pricing exercise. The team also developed detailed Mechanical and Structural Narratives (see Appendix F) to describe the new systems and utility infrastructure needed for each of the options necessary for AAM accreditation.

For Option 3, the team identified what improvements would be required for the existing museum to meet AAM accreditation standards. This effort included a complete survey and evaluation of the existing building. The team also reviewed environmental reports, a floor loading capacity study, an accreditation study, and facility assessments prepared over the last year for UTSA. Those reports identified serious shortfalls that need to be addressed at the existing facility. The team confirmed the deficiencies, such as needing museum quality temperature and humidity control and a secure loading dock, then proposed possible remedies and prepared diagrammatic plans for the renovation to assist with a pricing exercise. The team also developed detailed Mechanical Narratives (see Appendix F) to describe the new systems and utility infrastructure needed for each of the options necessary for AAM accreditation.

Program

A detailed program was developed for consistency between the options and includes the spaces required for a world class museum. As a part of the due diligence, the Project Team met with a group of users to review the vision for the new ITC and understand necessary programming. This group included representatives from ITC Staff, UTSA Space Planning Department, and UTSA Facilities Department. Appendix A shows detailed programmatic assumptions for each of the options. The summary shows the relative balance of the four types of museum spaces:

- Public Non-Collections
- Public Collections
- Non-Public Collections
- Non-Public Non-Collections

The programs that were developed are based on similar museum facilities and the user meeting. The final building program will need to be informed by the final site selection and results of a business planning effort. Regardless of the site, the program will include the following spaces:

- Entry Vestibule - Ticketing
- Public Restrooms
- Orientation Theater
- Gift Shop
- Cafe
- Special Events Space
- Exhibits
- Temporary Exhibits
- Classroom and Education spaces
- Climate controlled exhibit loading and storage
- Support Spaces and Offices
- Outdoor spaces for events

The target program for a new museum is approximately 60,000 SF with an exhibit area of 16,500 SF.

All four options assume that the long-term collections storage and library will move to a climate-controlled location off site. The details of the off-site storage facility are not included in the scope of this report. A cost estimate is provided below based on the need for approximately 10,000 SF of storage space.

Budget

A detailed budget has been developed for each of the four options. The budgets are based on similar museum projects and are informed by current local building costs. Please note that the budget estimates are conceptual and are rough order of magnitude costs based on building areas. Appendix B shows the comparative cost of each option. The estimated total cost of each of the options are as follows:

1. Relocate to Downtown Site - $70,740,000

2A. Build New on UTSA Hemisfair Campus - $83,631,000

2B. Renovate Courthouse Complex in Hemisfair District - $121,068,000

3. Renovate the Texas Pavilion - $153,043,000

The cost of a new offsite storage is not included in any of the four options above. The cost of a new climate-controlled offsite storage facility is estimated to cost $7,722,000.

Schedule

The schedule for each of the options is similar. The first step is business planning for the facility to confirm the scope of the project. Next step is to hire the architectural design team to master plan the site. The architectural design may be funded by UTSA or it may be done by a developer. Then, the exhibit designer will be hired to allow exhibit design to develop simultaneously with and inform the building design. Once design is done, we estimate three (3) years for base building construction and four (4) months for the installation of the exhibits. The option to renovate the existing building or to rebuild on the existing site will be similar to a new facility; however, we will need time to empty out the existing building and store the exhibits during construction. The option to renovate the existing Courthouse Building will have a similar timeline. Appendix C shows how the project might proceed. Grand Opening on this schedule is anticipated in March 2028, based on the current anticipated schedule.

SECTION 3

Options

A summary of each option appears below:

1. New Museum on New Site

- This option involves construction of a new ITC away from the Hemisfair site somewhere in Downtown San Antonio. This study assumes the new museum will be built on land owned by UTSA, so no costs for land acquisition have been included.

  The program for the new museum is approximately 60,000 SF which will include 16,500 SF of exhibits. The program is based on other similar museum projects, AAM accreditation requirements, and museum best practices.

  Estimated Project Cost: $70,740,000

- Pros
  - More operationally efficient than the larger existing building.
  - 'Purpose built' for the ITC Museum of the Future with climate-controlled loading dock, dedicated security office and staff entrance, and bus drop off with separate school entry.
  - Easily AAM accredited.
  - Complementary uses to the site through mixed-use development.
  - Potential for a site with more foot traffic and public exposure.
  - Least expensive option.

- Cons
  - Loss of historic connection with the Hemisfair site.

2A. New Museum on UTSA's Hemisfair Campus

- This option considers the potential to build a new museum on the existing Hemisfair Campus site. Maintaining the site's existing features, including the Texas Pavilion and the berms, would severely limit options for building a new museum on the Hemisfair Campus site. Considering these challenges, the estimated cost of this option includes the demolition cost of the Texas Pavilion, along with site reconfiguration and construction of a new ITC museum within the current lot boundaries.

The program for the new museum is approximately 60,000 SF which will include 16,500 SF of exhibits. The program is based on other similar museum projects, AAM accreditation requirements, and museum best practices.

Estimated Project Cost: $83,631,000

- Pros
  - Remains in the Hemisfair site.
  - More operationally efficient than the larger existing building.
  - 'Purpose built' for the ITC Museum of the Future with climate-controlled loading dock, dedicated security office and staff entrance, and bus drop off with separate school entry.
  - Easily AAM accredited.
  - Complementary uses to the site through mixed-use development.
  - Revenue opportunity through tenant leases of mixed-use development.

- Cons
  - More expensive than building on a new UTSA/UT System owned site Downtown.
  - There are options to maintain the Texas Pavilion Building however, for highest and best use of the site in terms of complimentary uses, the project team would recommend further analysis to determine if the site would be more suitable without the Texas Pavilion Building and supporting infrastructure on site.

2B. Renovate Courthouse Complex in Hemisfair District

- This option is to renovate the John H. Wood Federal Courthouse and Adrian Spears Judicial Training Center, located at 655 E César E. Chávez Blvd in the Hemisfair District. This was also constructed in 1968 for Hemisfair World Fair to house the Confluence Theatre of the United States. Following its original use, the Confluence Theater building was converted into the Federal Courthouse with adjacent Judicial Training Center building, however the buildings are currently vacant and owned by the City of San Antonio.

  This renovation would house the ITC in a facility that meets all the physical AAM requirements for accreditation, so we need to provide temperature and humidity control within museum quality standards for any spaces, public or non-public, that will hold artifacts. The spaces that need museum quality conditions will be located in the half of the building that does not have windows. The proposed concept will provide exit corridors between the exhibit space and the exterior walls, the interior walls can provide temperature and humidity separation for the critical spaces.

There is presently no loading dock, so this plan includes the addition of a new loading dock structure on the back of the building. The new dock will allow a 30 foot long box truck to load and unload in a climate-controlled space and to turn around. It is assumed that any larger trucks will offload at the offsite storage facility and transfer to a box truck. The receiving area and the onsite collections storage will also be climate controlled to museum quality standards. A new service entry drive will be created to allow trucks to get down to the level of the new loading dock from the street. The entire structure will have a green roof to blend into the surrounding landscaping and will be located completely below the first floor as required by the deed covenants for preserving the historic exterior areas of significance.

The plan for the circular courthouse building is to completely remove the new interior structure that was added for the courthouse use and to open up the four-story entry atrium to its original height. The new expanded lobby can be used for special events. The training building across the plaza will become an education center that will contain gathering space, classrooms, offices, and restrooms for the education programs. It can also serve as a stagging space during festivals.

The new scheme assumes we will need to add a new utility building to house chillers, boiler, cooling towers, and the electrical transformer. Locating these items in a separate facility is preferable from a curatorial standpoint.

The new ITC program in the circular courthouse building is 87,780 SF, the loading dock addition is 12,000 SF, the Training Center building is 19,400 SF, and the utility building is 2,400 SF for a total area of 121,580 SF. Appendix D shows potential renovation plans of how the new museum would fit into the existing structure. The exhibit area of 21,580 SF is greatly reduced from the current ITC exhibit area and will rely more on interactive exhibits, linear media, and other audio visual elements to tell the ITC stories in a more compelling, efficient, and immersive way.

Estimated Project Cost: $121,068,000

- Pros
  - Remains in the Historic Hemisfair site.
  - More visible location then Texas Pavilion.
  - Restores a historic building.
  - Provides a dramatic entry experience.
  - Climate Controlled loading facility.
  - Separate Education Building.

- Cons
  - Requires new utility plant.
  - Not a purpose-built facility.
  - Historic restrictions.

3. Renovate Existing Texas Pavilion for new ITC

- This option is to renovate the existing Texas Pavilion to house the ITC in a facility that meets all of the physical AAM requirements for accreditation. One major issue with the existing building is providing temperature and humidity control within museum quality standards for any spaces, public or non-public, that will hold artifacts. A concept for the renovated exhibit space, as shown in the Appendix D, is to build a new interior envelope within the existing two story "Dome Exhibit" space. This will create a controlled environment for the exhibits without renovating the entire building.

  There is presently no loading dock, so this plan includes the addition of a new loading dock structure on the back of the building. The new dock will allow a box truck to load and unload in a climate-controlled space. It is assumed that any larger trucks will offload at the offsite storage facility and transfer to a box truck. The receiving area and the onsite collections storage will also be climate controlled to museum quality standards. The existing service entry drive will be expanded to allow a box truck to turn around and to provide more area for fire department access to the building.

  The Texas Pavilion is approximately 185,000 SF over three floors and the current exhibit area is 45,650 SF. This is more area than is needed for the renovated museum space. The option to reuse the existing building will leave additional area which could be used for other tenants. Appendix D shows potential renovation plans of how the new museum would fit into the existing structure. The exhibit area will be greatly reduced to 20,000 SF and will rely more on interactive exhibits, linear media, and other audio visual elements to tell the ITC stories in a more compelling, efficient, and immersive way.

Estimated Project Cost: $153,043,000

- Pros
  - Maintains the Texas Pavilion, including structure, façade, and fountains.
  - Remains in the Hemisfair site.

- Cons
  - Most expensive option.
  - Limited natural light for non-exhibit spaces however, UTSA has no legal obligations to maintain the historic integrity of Texas Pavilion Building and light could be brought in through new windows or skylights.
  - New ITC only needs about half the space of the existing building.
  - Little room on the site for additional development.
  - Less than ideal locations for mechanical spaces, stairs, and elevators as well as compromised arrangement for loading dock due to working within existing constraints.

SECTION 4

Conclusions

Although AAM accreditation can be achieved in any of the four conceptual scenarios (Appendix E), there are significant financial and logistical disparities.

The Project Team would recommend a purpose-built new museum on land within San Antonio that would qualify to host a world class ITC museum. It is important to note that creating a world class AAM accredited museum on the existing UTSA owned Hemisfair Campus, without removing the Texas Pavilion or berms, would be difficult to have a successful independent museum. If a decision is made to build new or renovate elsewhere and the Texas Pavilion remain in place, the project team would strongly recommend reprogramming the Texas Pavilion building a use that actively supports the new museum.

The Project Team would not recommend renovating the Texas Pavilion Building to host an AAM accredited ITC, due to the anticipated financial obligations on the University being unreasonable, projected logistical constraints, modifications that may jeopardize the integrity of specific historical elements, namely the dome feature, and with regards to both short and long term operations of the facility.

The new museum options are attractive due to the ability to purpose build a facility specifically for the new ITC. They are also less expensive to build and maintain than the renovated facility. These advantages must be weighed against the loss of the existing Texas Pavilion structure which is a place that holds special memories for many Texans.

Next Steps

The next step in the process will be to issue a Request for Information (RFI) to developers to gather information and data from the development industry on the options identified in this report, as well as to gauge interest for potential investment by outside groups. The RFI process will help to further inform the University, via real market data, about which of the options presented in this report will be most appealing to the private sector, inclusive of identifying potential challenges with each option. Ultimately the data collected via the RFI process and the due diligence reporting undertaken to date will enable the University to make the most suitable decision possible to achieve the intended goal of revitalizing the ITC.

APPENDICES

Appendix A: Space Program
Appendix B: Budget
Appendix C: Schedule
Appendix D: Potential Renovation Plans
Appendix E: AAM Accreditation Matrix
Appendix F: Mechanical & Structural Narratives

University of Texas San Antonio

Institute of Texan Cultures

Space Program Comparison
10/17/23

ITC Summary by Zone	ITC Existing Museum		ITC New Museum in Existing Building		ITC New Museum in New Building		ITC in Courthouse Building	
	NSF	%	NSF	%			NSF	%
Zone O: Outdoor			20,000		TBD		22,000	
Zone A: Public Non-Collections	20,200	18%	21,600	32%	10,950	27%	19,630	27%
Zone B: Public Collections	45,650	41%	20,000	30%	16,500	41%	21,580	30%
Zone C: Non-Public Collections	15,600	14%	8,100	12%	4,325	11%	12,300	17%
Zone D: Non-Public Non-Collections	31,180	28%	17,025	26%	8,225	21%	18,720	26%
Total NSF	112,630		66,725		40,000		72,230	
Zone G (.65)*	73,210		43,371				46,950	
Zone G (.50)**					20,000			
Utility Building							2,400	
Total Area - GSF	185,840		110,096		60,000		121,580	

**A gross building factor of 1.65 is assumed for thickness of walls, circulation and mechanical spaces in exisitng buildings*

***A gross building factor of 1.50 is assumed for thickness of walls, circulation and mechanical spaces in new building*

Zone 0 (Outdoors)	Public Non-Collection Space	New ITC in Existing Building	New ITC in New Building	ITC in Courthouse	
	Bus Drop-off				
	Entry Plaza				
	Outdoor Performance and Community Space	20,000		22,000	
Sub-Total		**20,000**	**TBD**	**22,000**	
Zone A	**Public Non-Collection Space**				**Notes:**
Lobby/ Visitor Amenities					
	Vestibule		200		
	Lobby	5,600	2,000	1,080	
	Ticketing/Membership Counter	250	w/above	250	
	First Aid		w/above		
	Cloakroom/Lockers		w/above		
	Stroller/wheelchair storage	50	w/above		
	Public Washrooms, Women's	750	w/gross floor area		
	Public Washrooms, Men's	400	w/gross floor area		
	Family Washrooms	300	w/gross floor area		
	Restrooms Frist Floor		w/gross floor area	1,040	
	Restrooms Second Floor		w/gross floor area	1,040	
	Café	1,500		800	
	Store	1,500	600	800	
Sub-Total		**10,350**	**2,800**	**5,010**	
Theaters/AV					
	Flexible Event Space		3,000	2,500	
	Catering prep	800	w/gross floor		
	Storage for Tables and Chairs and Events		w/gross floor		
	Orientation Theater	2,400	2,000	2,120	
Sub-Total		**3,200**	**5,000**	**4,620**	
Education, Programs & Meetings					
	Classroom/Program spaces				

	School Cloakroom and Storage	250	250	400	
	School Washrooms	400	400	800	
	Education Stations				Distributed through-out the exhibition--classroom type spaces to allow for programs and hands-on activities.
	Classroom 50 people	1,500	1,500	1,500	
	Lecture Hall 100 people	2,500		2,700	
	Preassembly Space	2,800		4,000	
	Digital Humanities Lab 20-30 people	600	1,000	600	
	Library/Reading Room				Will move off site with special collections
	Board Room				Not included
Sub-Total		**8,050**	**3,150**	**10,000**	
Total Zone A		**21,600**	**10,950**	**19,630**	

Zone B	**Public Collection Space**				**Notes:**
Permanent Exhibitions	Permanent Exhibit	16,800	13,500	16,830	
	First Floor Exhibits				
	Second Floor Exhibits				
Temporary Exhibitions	Temporary Exhibition Gallery	3,200	3,000	4,750	
Total Zone 2		**20,000**	**16,500**	**21,580**	
Zone C	**Non-Public Collection Space**				**Notes:**
Storage & Care					
Collections Handling	Collection Storage	2,500	1,000	1,000	
	Collections Workroom	1,400	600	600	Fabrication will be done off site
	Collections Loading Bay	2,800	1,725	5,000	To accommodate box truck in conditioned space
	Shipping/Receiving	1,400	400	1,500	
	Crating/Uncrating				
	Temp Exhibit Storage				
	Crate Storage				Crates can be stored as needed off-site
	"Clean" Exhibit Prep		400	4,000	Shared space for exhibits staff
	Viewing for Exhibit Prep		200	200	
	Staging Area for Temporary Exhibition				Use closed temporary gallery for staging
Total Zone C		**8,100**	**4,325**	**12,300**	

Zone D	Non-Public, Non-Collection Zone				Notes:
Offices					
	Intern/Volunteer Workstations		800		
	Small Meeting Rooms (4-6 people) @ 200 sf each		200		
	Medium Meeting Rooms (8-12 people) @ 400 sf each		400	400	
	Conference Rooms (16-20 people)	3600			
	Open Concept Staff Offices	4600	2000		20 people
	Private Office 150 SF		1200		8 closed offices
	Facilities	2500			
	Visitor Services	1200			
	Staff Lounge	300	300		
	Staff Kitchen	75	75		
	Staff Washrooms	200	200		
	Copy Room	100	100		
	Supply Storage	50	50		
	BMS Office	150	150		
	Security Offices	250	250	400	
	Interpreters Lounge				
	Dressing/Green Rooms	250	250		
	Third Floor Offices			3,570	
	Sccond Floor Offices			1,330	
	Bsement Offices				
	Staff Lockers/Showers				Not included
	Guards' Locker room, Showers & Uniform Storage				Not included
Sub-Total		**13,275**	**5,975**	**5,700**	
Workrooms					
	"Dirty" Exhibit Prep	800	400	400	

	Custodian's Rooms	150	150	150	
	IT Server Room	500	200	200	
	Control Rooms--3 @ 150	450	450	400	
Sub-Total		**1,900**	**1,200**	**1,150**	
Storage					
	Display Case Storage	800			
	Retail Stockroom	500	500	500	
	Maintenance Storage (Lamps, etc.)	300	300	300	
	Custodian's Storage	100	100	100	
	General Storage			10,970	
Sub-Total		**1,700**	**900**	**11,870**	
Service Delivery/ Trash					
	Service/Staff Entrance	150	150		
	Moving Equipment				
	Non-Collection Loading Bay				
	Garbage Room/Dumpsters				
Sub-Total		**150**	**150**	**0**	
Total Zone 4		**17,025**	**8,225**	**18,720**	

Institute of Texan Cultures. Project Cost Estimate Comparison

10/17/23

Option 1		Option 2A		Option 2B		Option 3	
60,000	Gross Building Area	60,000	Gross Building Area	87,780	Federal Courthouse Building	110,000	Museum Area
				12,000	Loading Dock Addition	75,000	Shell Area
13,500	Exhibit Area (incl in gross building area)	13,500	Exhibit Area (incl in gross building area)	19,400	Training Center	20,000	Exhibit Area (incl in museum area)
				21,584	Exhibit Area (incl in courthouse building area)		
				2,400	Utility Building (2,400 SF indoor / 900 SF outdoor)		
60,000	TOTAL	60,000	TOTAL	121,580	TOTAL	185,000	TOTAL

Soft Costs	OPTION 1 New Building on New Site		OPTION 2A Demo & Replace Existing Building in UTSA's Hemisfair Campus		OPTION 2B Renovate Federal Courthouse Building in Hemisfair District		OPTION 3 Renovate Existing Texas Pavilion Building		Comments
Building									
Architecture & Engineering	$ 3,509,000	11% of Constr	$ 3,492,500	11% of Constr	$ 4,275,360	8% of Constr	$ 5,892,000	8% of Constr	Engineering, acoustics, lighting, interiors, landscape
Project Management	$ 1,444,650	3% of Constr	$ 1,731,874	3% of Constr	$ 2,523,769	3% of Constr	$ 3,201,767	3% of Constr	
Builder's Risk Insurance	$ 9,570	0.03% of Constr	$ 9,525	0.03% of Constr	$ 16,033	0.03% of Constr	$ 22,095	0.03% of Constr	
Pre-Con CM	$ 50,000		$ 50,000		$ 50,000		$ 50,000		CM to do estimating, phasing, logistics
Café & food service design		INCL		INCL		INCL		INCL	
Retail design		INCL		INCL		INCL		INCL	
Tel Data/Security consultant		INCL		INCL		INCL		INCL	
Environmental consultant		INCL		INCL		INCL		INCL	
Archeology study		INCL		INCL		INCL		INCL	
Construction Fee	$ 1,685,425		$ 2,020,520		$ 2,944,397		$ 3,735,395		Based on 3.5% on Hard Cost
Exhibit									
Exhibit Design	$ 1,620,000	12% of Exhibits	$ 1,620,000	12% of Exhibits	$ 2,590,080	12% of Exhibits	$ 2,400,000	12% of Exhibits	Graphics, interpretive, lighting, media and acoustics
Signage Design	$ -	INCL ABOVE		INCL ABOVE		INCL ABOVE		INCL ABOVE	Donor signage, wayfinding, tactile maps & exterior
Insurance on Collections									
Conservation and Care									
Other									
Business Planning Services	$ 350,000		$ 350,000		$ 350,000		$ 350,000		budget
Marketing									
Finance/Accounting									
Legal									
Financing Fees									
Developer Fees									
Reimbursable expenses									
Soft Cost Subtotal	$ 8,668,645	$ 144 per SF	$ 9,274,418	$ 155 per SF	$ 12,749,638	$ 105 per SF	$ 15,651,257	$ 85 per SF	
Soft Cost contingency	$ 433,432	5%	$ 463,721	5%	$ 637,482	5%	$ 782,563	5%	
Soft Cost Total	$ 9,102,077	$ 152 per SF	$ 9,738,139	$ 162 per SF	$ 13,387,120	$ 110 per SF	$ 16,433,820	$ 89 per SF	
Hard Costs									
Building									
Demolition			$ 8,674,130		$ 4,639,500	Similar allowance to Pavilion	$ 6,225,000		Option 2A: Demolition and abatement Hard Costs only (per Skanska); Option 3 - Internal demo and abatement
Archeology mitigation	$ 280,000		$ 280,000		$ 280,000		$ 280,000		Assumed for 8 months 'in the ground' construction period @ $35,000 / month
Base Building Construction	$ 30,000,000	$ 500 per SF	$ 30,000,000	$ 500 per SF	$35,112,000	$400 per SF	$ 44,000,000	$ 400 per SF	
Exterior Facade Renovations					$1,875,000	$125 15000 sf	$ 2,000,000	allowance	Option 2B: New glazing, exterior shell, Option 3: Add glazing, allowance for option 3 to add windows to office area façade
Loading Dock Construction					$4,200,000	$350 per SF	$ 4,000,000		Option 2B & 3: Loading Dock
Training Building Construction					$4,850,000	$250 per SF 3300 SF			Option 2B: Training building
Chiller - Boiler Utility Building					$1,155,000	$350			Option 2B: Chiller/Boiler Utility Building - Building only, boiler, chiller and colling tower equipment included in base building SF cost
Shell Space fit out							$ 18,750,000	$ 250 per SF	Shell space fit out - assume warm shell
Fountain repair							$ 3,000,000		
Landscape & sitework	$ 1,000,000		$ 1,000,000		$ 3,000,000	includes historic plaza restoration	$ 1,000,000		Limited to immediate areas around building, not entire site. Option 2B includes cost to restore historic plaza. $1m allowance for landscaping in each option.
Entry Drive to Loading					$ 2,350,000	15,000 SF			Option 2B: New entry drive and retaining walls 500 ft long x 30 ft wide and excavation
Utilities	$ 150,000				$ 150,000		$ 150,000		Based on Skanska Demo
Café & Catering Fit out	$ 500,000		$ 500,000		$ 500,000		$ 500,000		
Gift Shop Fit out	$ 250,000		$ 250,000		$ 250,000		$ 250,000		
FF&E	$ 1,250,000		$ 1,250,000		$ 1,250,000		$ 1,250,000		Furniture, non exhibit AV, POS system, Tel data (Based on comparable museum)
Testing and Inspection	$ 325,000		$ 325,000		$ 250,000		$ 250,000		
Moving costs	$ 150,000		$ 300,000		$ 150,000		$ 300,000		Including Materials to Pack, Move, Store, Maintain, then bring back to museum - Verify with UTSA
Temporary Exhibit Storage			$ 900,000				$ 900,000		$5 per SF per month, assume 5,000 SF for 3 years
Temporary Office Space									Use existing UTSA space
ITC Special collections									Offsite storage facility - not in this budget
Sustainability Efforts	$ 300,000		$ 300,000		$ 351,120		$ 440,000		1% of Base Build
New Roof					$ 1,729,000	49400 SF @ $35/SF	$ 2,475,000		Based on RKI's PCA report
Exhibits									
Exhibit Deferred Maintenance							$505,565		Back forty structural repairs
Exhibit Fabrication	$ 13,500,000	$ 1,000 per SF	$ 13,500,000	$ 1,000 per SF	$ 21,584,000	$ 1,000 per SF	$ 20,000,000	$ 1,000 per SF	Per DBA advice/data
AV Software Production		INCL ABOVE		INCL ABOVE		INCL ABOVE		INCL ABOVE	
AV Hardware Integration		INCL ABOVE		INCL ABOVE		INCL ABOVE		INCL ABOVE	
Loans and Acquisition									Not included
Signage	$ 450,000		$ 450,000		$ 450,000		$ 450,000		Exterior, wayfinding and donor signage
Hard Cost Subtotal	$ 48,155,000	$ 803 per SF	$ 57,729,130	$ 962 per SF	$ 84,125,620	$ 692 per SF	$ 106,725,565	$ 577 per SF	**$751.5 average construction hard cost from 2021 on Museum and Cultural Exhibits from Dallas Data (and other data)**
Hard Cost contingency	$ 4,815,500	10%	$ 5,772,913	10%	$ 8,412,562	10%	$ 10,672,557	10%	
Escalation	$ 8,667,900	6% 3 years	$ 10,391,243	6% 3 years	$ 15,142,612	6% 3 years	$ 19,210,602	6% 3 years	**Assumed average of 6%**
Hard Cost Total	$ 61,638,400	$ 1,027 per SF	$ 73,893,286	$ 1,232 per SF	$ 107,680,794	$ 886 per SF	$ 136,608,723	$ 738 per SF	
Project Subtotal	$ 70,740,477		$ 83,631,426		$ 121,067,913		$ 153,042,543		
Estimating Contingency	$ -	0%	$ -	0%	$ -	0%	$ -	0%	**INCLUDED IN ESTIMATED PRICES ABOVE**
Total Estimated Project Cost	**$ 70,740,477**	**$ 1,179 per SF**	**$ 83,631,426**	**$ 1,394 per SF**	**$ 121,067,913**	**$ 996 per SF**	**$ 153,042,543**	**$ 827 per SF**	
POTENTIAL SCOPE ADDITIONS									
Separate Collections Storage Facility - Hard Costs	$ 7,722,000	$ 500 per SF	$ 7,722,000	$ 500 per SF	$ 7,722,000	$ 500 per SF	ıded in construction above		Assumes 10,000 sf space required, does not include purchase of land, construction and shelving only
CAR space base build	$ 8,775,000	15,000 SF	$ 8,775,000	15,000 SF	INCL	15,000 SF	INCL	15,000 SF	Assumes 15,000 sf per existing CAR programming. CAR space adds to new build total but is included in existing space for 2B & 3 (does not add to total square footage).
CAR space fit out	$ 4,387,500	$ 250 per SF	$ 4,387,500	$ 250 per SF	$ 3,750,000	$ 250 per SF	$ 3,750,000	$ 250 per SF	Assume mix of office and flex space
Total Estimated Project Cost Including Additional Scope	**$ 91,624,977**		**$ 104,515,926**		**$ 132,539,913**		**$ 156,792,543**		

ASSUMPTIONS

Demolition allowance provided by Skanska and includes abatement of hazardous materials and fill to site
Option 2B & 3 includes renovation of the entire building, not just the space that would be required for a new museum
All options assume a AAM accreditation standard facility
Assumed construction start date of fall 2025
Functional areas have not been considered for this estimate (aside from exhibit space)
Parking is handled outside of project costs

INCLUSIONS

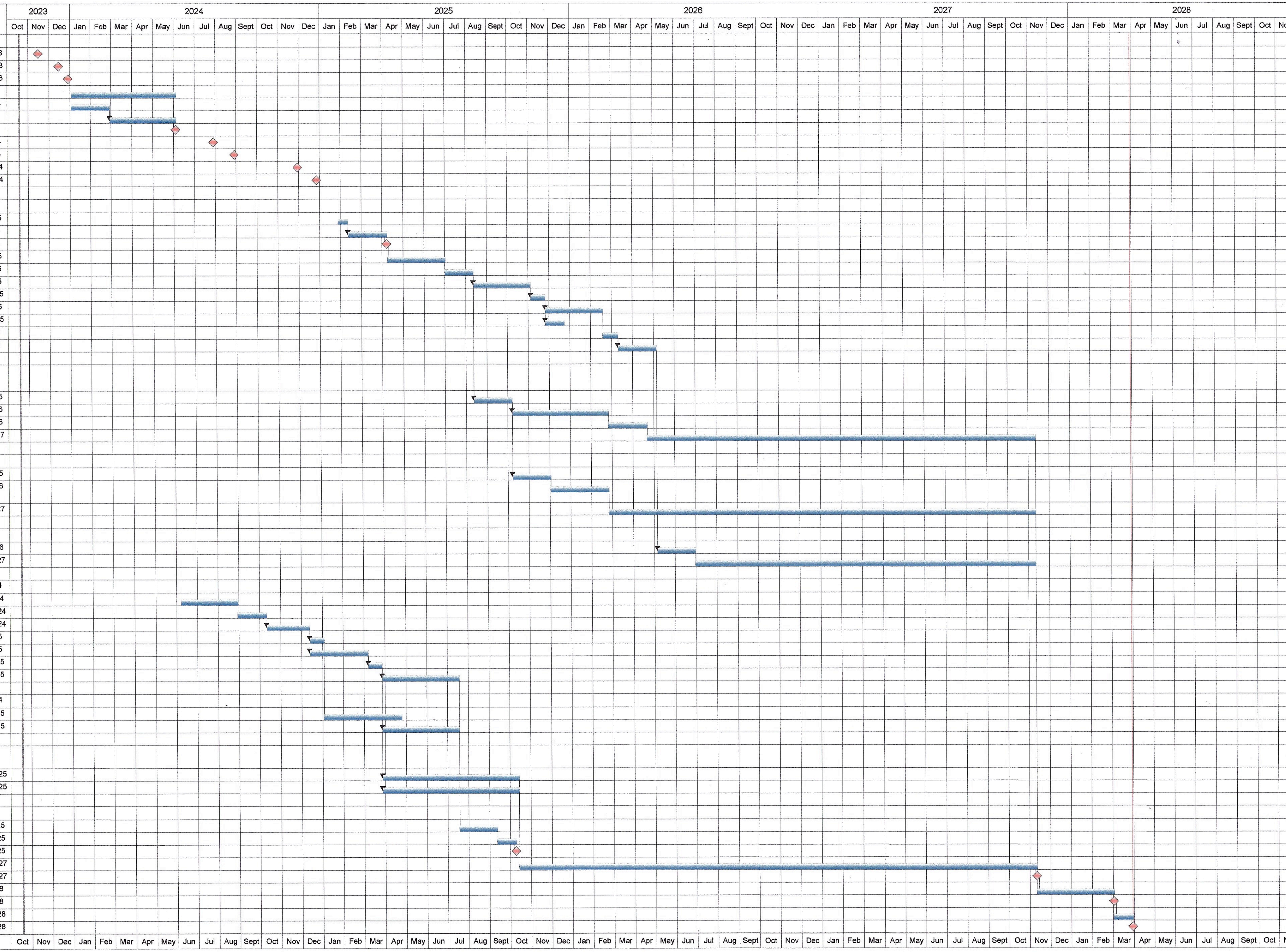
FF&E included (for museum space only)
Including 6% escalation per year for 3 years (to midpoint of construction)
Soft costs contingency of 5% included
Hard costs contingency of 10% included
Extra over allowance included for design and construction of Exhibit spaces (20,000 SF assumed to be required for new museum)
Allowance for sustainability features included (1% of hard costs)
CARS Spaces included in all options (as additional scope option)

EXCLUSIONS

Operational Costs not included
Permanent Remote Storage Facility not included in estimated project total
Fire pump - assume existing pressure is adequate (courthouse building only)
No allowance for exhibit fabrication beyond opening exhibits
Option 2B & 3 does not include allowance to address deferred maintenance (aside from back forty structures & new roof)
Option 1 does not include any demolition / site preparation at a new site
Multiple site mobilizations or demobilizations excluded
Land costs excluded
Contamination, removal of hazardous materials and site remediation excluded
Abnormal and unforeseen ground conditions (e.g. significant rock excavation etc.) excluded
Allowance for Staging of works / work outside of standard working hours
Phasing of the works and accelerated schedule
Project commissioning
Authority fees, development charges
Planning, administrative and financing costs
Legal fees
Any non-construction development costs
Delay and prolongation allowances
Allowance for unusual market conditions / lack of requisite tender returns excluded
Archeological treatment/excavation excluded

UTSA ITC Project Schedule

Activity Name	Duration (Days)	Start Date	Finish Date
Planning			
Issue RFI	0.00	11/15/23	11/15/23
RFI Responses	0.00	12/15/23	12/15/23
Market Interest report	0.00	12/29/23	12/29/23
Programming & Business Plan	109.00	1/3/24	6/3/24
Select MP Arcchitect	40.00	1/3/24	2/27/24
Master planning	69.00	2/28/24	6/3/24
Issue RFQ for Developer Partner	0.00	6/3/24	6/3/24
RFQ Responses	0.00	7/29/24	7/29/24
Issue RFP	0.00	8/29/24	8/29/24
RFP due	0.00	11/29/24	11/29/24
Selection	0.00	12/27/24	12/27/24
Exhibit Design			
Draft RFP	10.00	1/28/25	2/10/25
Request for Proposals	40.00	2/11/25	4/7/25
Select Exhibit Design Team	0.00	4/7/25	4/7/25
Concept Design	60.00	4/8/25	6/30/25
Cost Estimate & Owner review	30.00	7/1/25	8/11/25
Schematic Design	60.00	8/12/25	11/3/25
Cost Estimate and Owner review	15.00	11/4/25	11/24/25
Design Development	60.00	11/25/25	2/16/26
Architectural Coordination package	20.00	11/25/25	12/22/25
Cost Estimate and Owner review	15.00	2/17/26	3/9/26
Construction Documents	40.00	3/10/26	5/4/26
AV Software Design & Media Production			
Select Software Design Consultant()	40.00	8/12/25	10/6/25
AV Software Design	100.00	10/7/25	2/23/26
Prototyping	40.00	2/24/26	4/20/26
AV software production	407.00	4/21/26	11/10/27
AV Hardware Integration			
Select AV hardware Integrator	40.00	10/7/25	12/1/25
Provide AV Hardware for software development	60.00	12/2/25	2/23/26
Fabricate AV hardware	447.00	2/24/26	11/10/27
Exhibit Fabrication			
Select Exhibit Fabricator	40.00	5/5/26	6/29/26
Exhibit Fabrication	357.00	6/30/26	11/10/27
Architectural Design	0.00	3/3/14	3/3/14
Concept Design	60.00	6/7/24	8/29/24
Cost Estimate & Owner review	30.00	8/30/24	10/10/24
Schematic Design	45.00	10/11/24	12/12/24
Cost Estimate and Owner review	15.00	12/13/24	1/2/25
Design Development	60.00	12/13/24	3/6/25
Cost Estimate and Owner review	15.00	3/7/25	3/27/25
Construction Drawings	80.00	3/28/25	7/17/25
Permits	0.00	3/3/14	3/3/14
Zoning	80.00	1/3/25	4/24/25
Building permit	80.00	3/28/25	7/17/25
Temporary Relocations (Existing Building Options)			
Relocate Offices	142.00	3/28/25	10/13/25
Move Exhiibits to conditioned storage	142.00	3/28/25	10/13/25
Construction			
Bid	40.00	7/18/25	9/11/25
Review Bids	20.00	9/12/25	10/9/25
Select Contractor	0.00	10/9/25	10/9/25
Construction	542.00	10/14/25	11/10/27
Building Substantial Completion	0.00	11/10/27	11/10/27
Exhibit Installation	80.00	11/11/27	3/1/28
Exhibits Substantial Completion	0.00	3/1/28	3/1/28
Testing & Exhibit Punch List	20.00	3/2/28	3/29/28
GRAND OPENING	0.00	3/29/28	3/29/28



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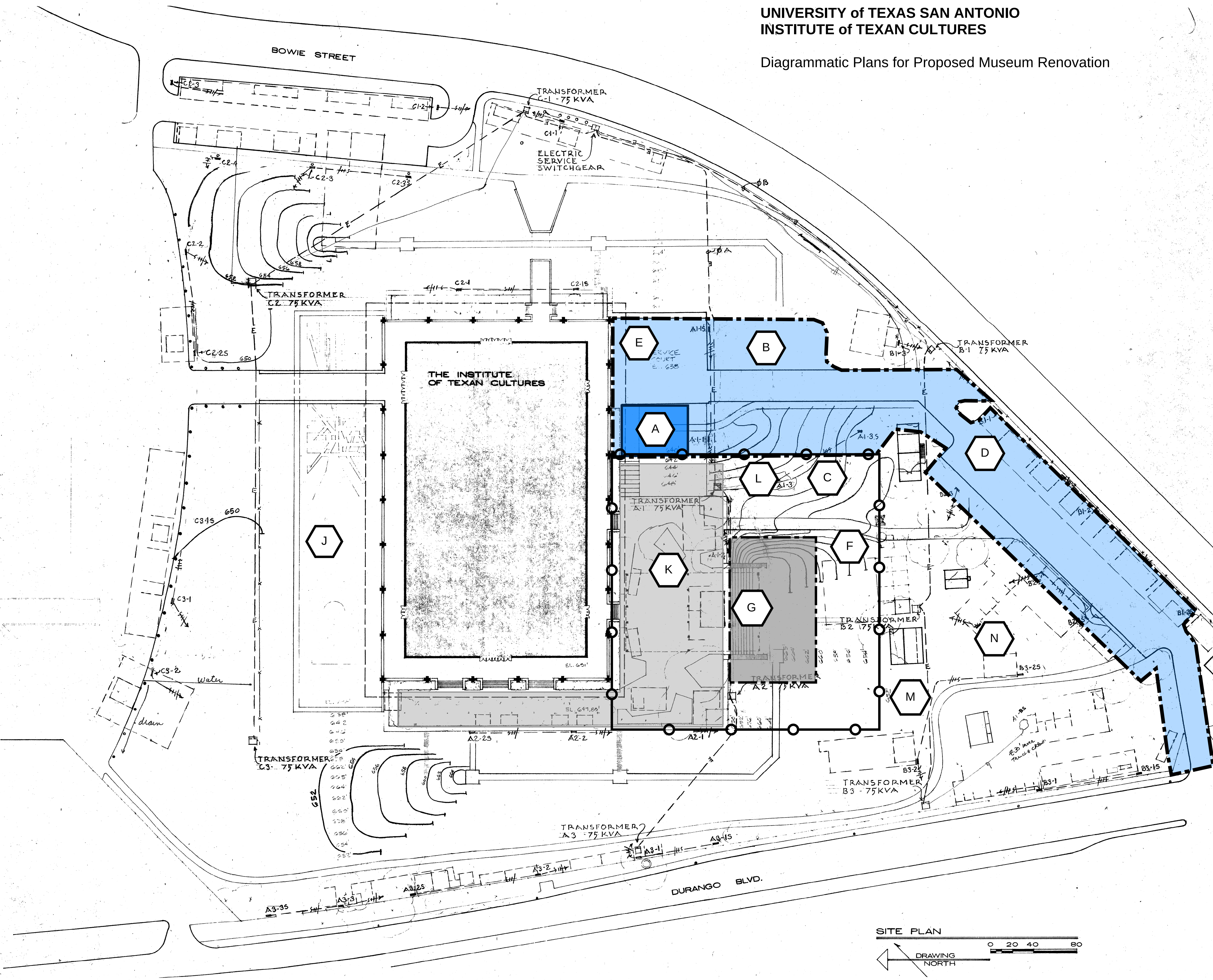
Diagrammatic Plans for Proposed Museum Renovation



KEYNOTES

A NEW ONE STORY ADDITION FOR LOADING DOCK. ASSUME 40ft X 40ft X 25ft TALL W/ PRECAST CONCRETE FAÇADE, 20ft HIGH ROLL UP DOOR, INSULATED AND FULLY AIR CONDITIONED. MAN DOOR NEEDED TO EXIT AT GRADE. INCLUDE HYDRAULIC DOCK LEVELER 10ft WIDE. NO WINDOWS. SECURITY CAMERAS, MOTION SENSORS, CARD ACCESS.

B EXCAVATE TO PROVIDE NEW DRIVEWAY WITH BOX TRUCK TURN AROUND SPACE. EXTRA WIDTH WILL ALLOW EMERGENCY VEHICLE ACCESS

C NEW SITE RETAINING WALLS

D REPAVE AND RESTRIPE THE PARKING LOT

E NEW MECHANICAL & ELECTRICAL EQUIPMENT. SEE MECHANICAL NARRATIVE

F REGRADE AS NECESSARY. PROVIDE NEW LANDSCAPING AND LAWN.

G PROVIDE NEW OUTDOOR EVENT SPACES, COVERED BY A STEEL STRUCTURE WITH SHADE SAILS. LAY NEW 1FT X 1FT SITE PAVERS ON SAND BED

H REMOVE EXISTING OUTDOOR EXHIBIT OUTBUILDING STRUCTURES

I NEW SITE LIGHTING

J PROVIDE NEW FOUNTAIN EQUIPMENT TO REACTIVATE EXISTING FOUNTAIN. REPLACE PUMPS, LIGHTS, PIPING, NOZZLES.

K REPLACE EXISTING CONCRETE PAD

L PROVIDE NEW FIRE HYDRANT

M PROVIDE NEW 6FT ORNAMENTAL BLACK FENCE TO SEPARATE THE FESTIVAL AREA

N PROVIDE NEW SITE LIGHTING THROUGHOUT. INCLUDE (12) NEW POLES IN LAWN AND PARKING AREAS

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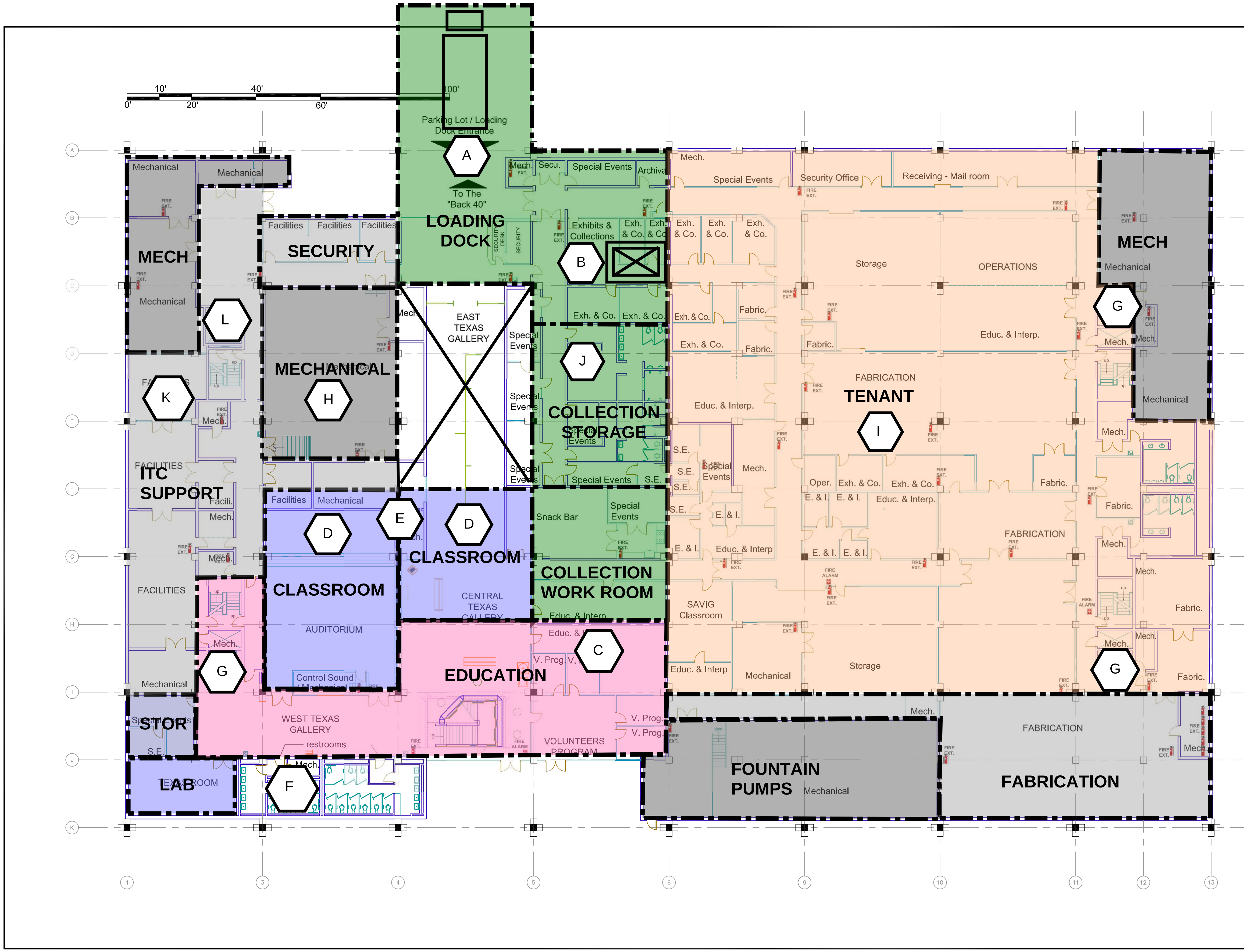
Diagrammatic Plans for Proposed Museum Renovation



KEY NOTES

A PROVIDE NEW OPENING AT LOADING DOCK ADDITION

B NEW FREIGHT ELEVATOR 12ft W X 10ft L X 10ft TALL

C VIEWING WINDOWS AT COLLECTION WORK ROOM

D (2) DOORS OUT OF CLASSROOMS TO CORRIDOR

E MOVABLE PARTITION BETWEEN CLASSROOMS

F FULLY RENOVATE RESTROOMS WITH NEW FINISHES, FIXTURES, PLUMBING, LIGHTING AND HVAC

G NEW PASSENGER ELEVATOR AT EXISTING SHAFT

H SEE MECHANICAL NARRATIVE FOR MECH ROOMS

I REMOVE ALL EXISTING INTERIOR PARTITIONS, PROVIDE HVAC, SPRINKLERS, LIGHTING AND FINISHES TO A WARM GREY SHELL FOR TENANT FIT OUT

J LOADING DOCK, STORAGE AND COLLECTION WORK ROOM ARE BUILT WITHIN A 6" PERIMETER WALL WITH A VAPOR BARRIER TO CONTAIN MUSEUM QUALITY AIR. INSULATE TO R30.

K FULLY RENOVATE ALL INTERIOR SPACES WITH NEW FINISHES, PARTITIONS, HVAC, LIGHTING, SPRINKLERS

L NEW FREIGHT ELEVATOR FOR CATERING USE

1 ITC - FIRST LEVEL FLOOR PLAN (Lower Galleries)
SCALE : 1/16"=1'-0"

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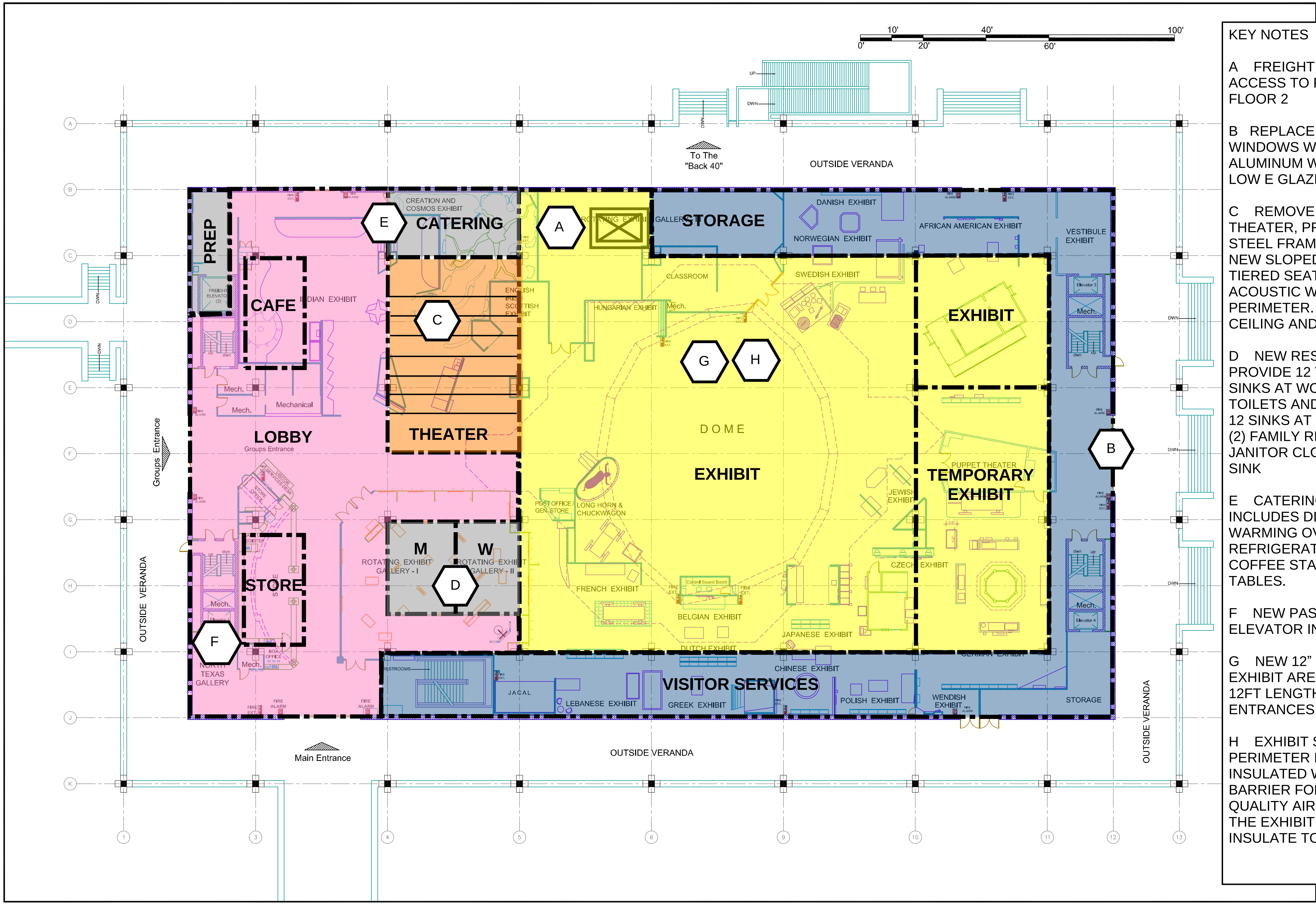
Diagrammatic Plans for Proposed Museum Renovation



KEY NOTES

A FREIGHT ELEVATOR ACCESS TO FLOOR 1 AND FLOOR 2

B REPLACE CLERESTORY WINDOWS WITH INSULATED ALUMINUM WINDOWS WITH LOW E GLAZING

C REMOVE FLOOR AT THEATER, PROVIDE NEW STEEL FRAMING AND POUR NEW SLOPED SLAB FOR TIERED SEATING. NEW ACOUSTIC WALLS AT PERIMETER. ACOUSTIC CEILING AND DOORS.

D NEW RESTROOMS. PROVIDE 12 TOILETS AND SINKS AT WOMENS. PROVIDE 4 TOILETS AND 8 URINALS AND 12 SINKS AT MENS. PROVIDE (2) FAMILY RESTROOMS AND JANITOR CLOSET WITH MOP SINK

E CATERING KITCHEN INCLUDES DISHWASH STATION, WARMING OVENS, REFRIGERATORS, HAND SINK, COFFEE STATIONS, PREP TABLES.

F NEW PASSENGER ELEVATOR IN EXISTING SHAFT

G NEW 12" RAISED FLOOR IN EXHIBIT AREA. ASSUME (3) 12FT LENGTHS OF RAMP AT ENTRANCES

H EXHIBIT SPACES PERIMETER IS A NEW 6" INSULATED WALL WITH VAPOR BARRIER FOR MUSEUM QUALITY AIR CONTAINMENT IN THE EXHIBIT SPACES. INSULATE TO R30.

1 ITC - SECOND LEVEL FLOOR PLAN (Ehibit Floor)

SCALE : 1/16"=1'-0"

TRUE NORTH

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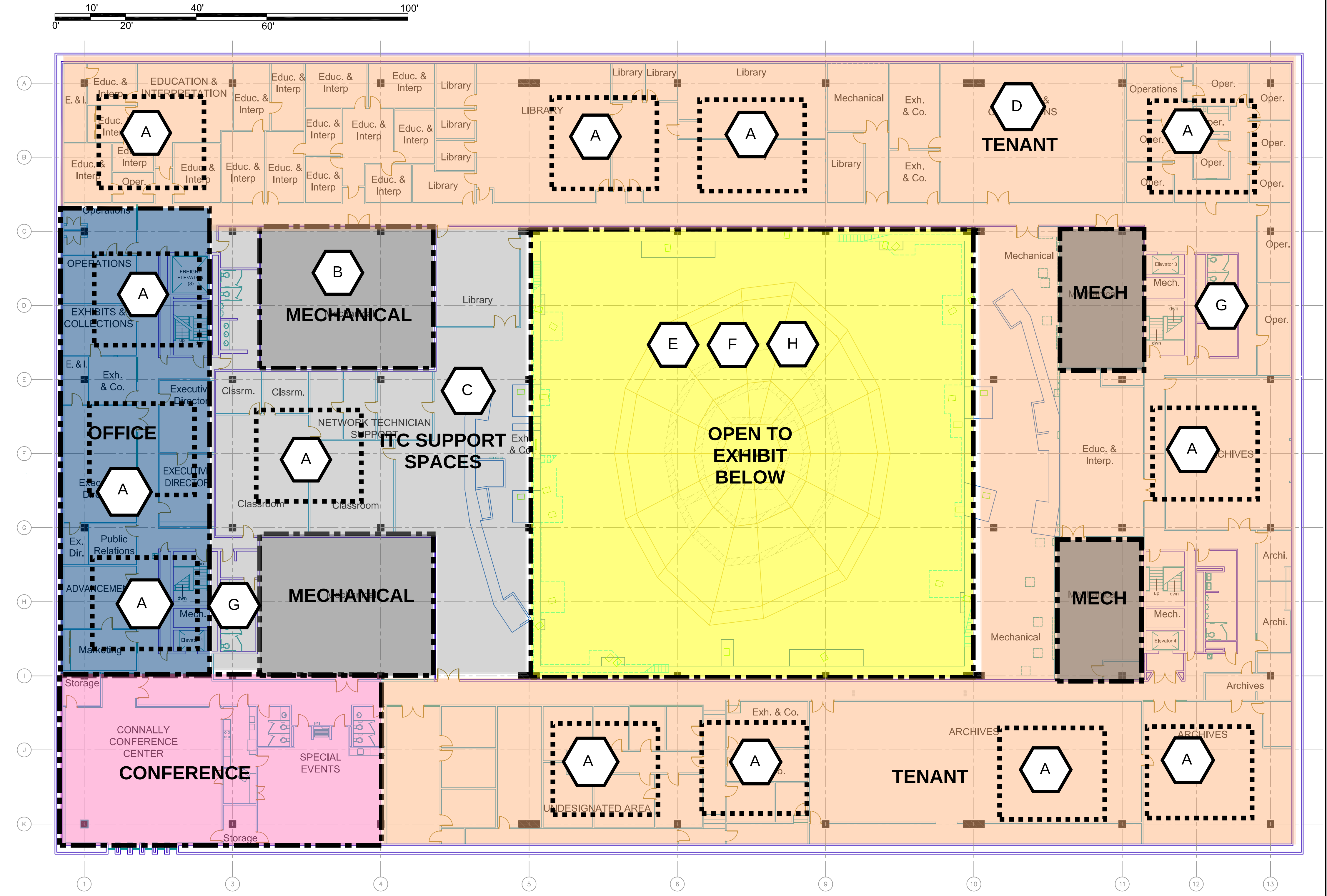
Diagrammatic Plans for Proposed Museum Renovation



KEY NOTES

A NEW SKYLIGHT MONITOR. NEW WINDOW WALLS WITH METAL ROOF TO BRING IN NATURAL LIGHT

B SEE MECHANICAL NARRATIVE FOR EQUIPMENT AND SCOPE OF WORK

C DEMOLISH ALL EXISTING INTERIOR PARTITIONS AND PROVIDE NEW FIT OUT

D DEMOLISH ALL EXISTING INTERIOR PARTITIONS AND HVAC TO PROVIDE NEW FIT OUT TO A WARM GREY SHELL FOR TENANT TO FIT OUT

E REMOVE THE DOME STRUCTURE AND PROVIDE INSULATED, VAPOR BARRIER, ACOUSTIC PARTITIONS TO UNDERSIDE OF ROOF. DOME CEILING PANELS WILL NEED TO BE ABATED AND DISPOSED OF AS ACM.

F PROVIDE NEW STEEL JOISTS FRAMING AND 3.5" FLOOR DECK AS A LID OVER THE EXHIBIT "BOX" TO ALLOW STAFF ACCESS AND CONTAIN THE MUSEUM QUALITY AIR. INSULATE TO R30. PROVIDE VAPOR BARRIER. PROVIDE DROP ACOUSTICAL CEILING ON THE INTERIOR OF THE EXHIBIT SPACE

G FULLY RENOVATE THE RESTROOMS WITH NEW FINISHES, FIXTURES, LIGHTING, PLUMBING AND HVAC

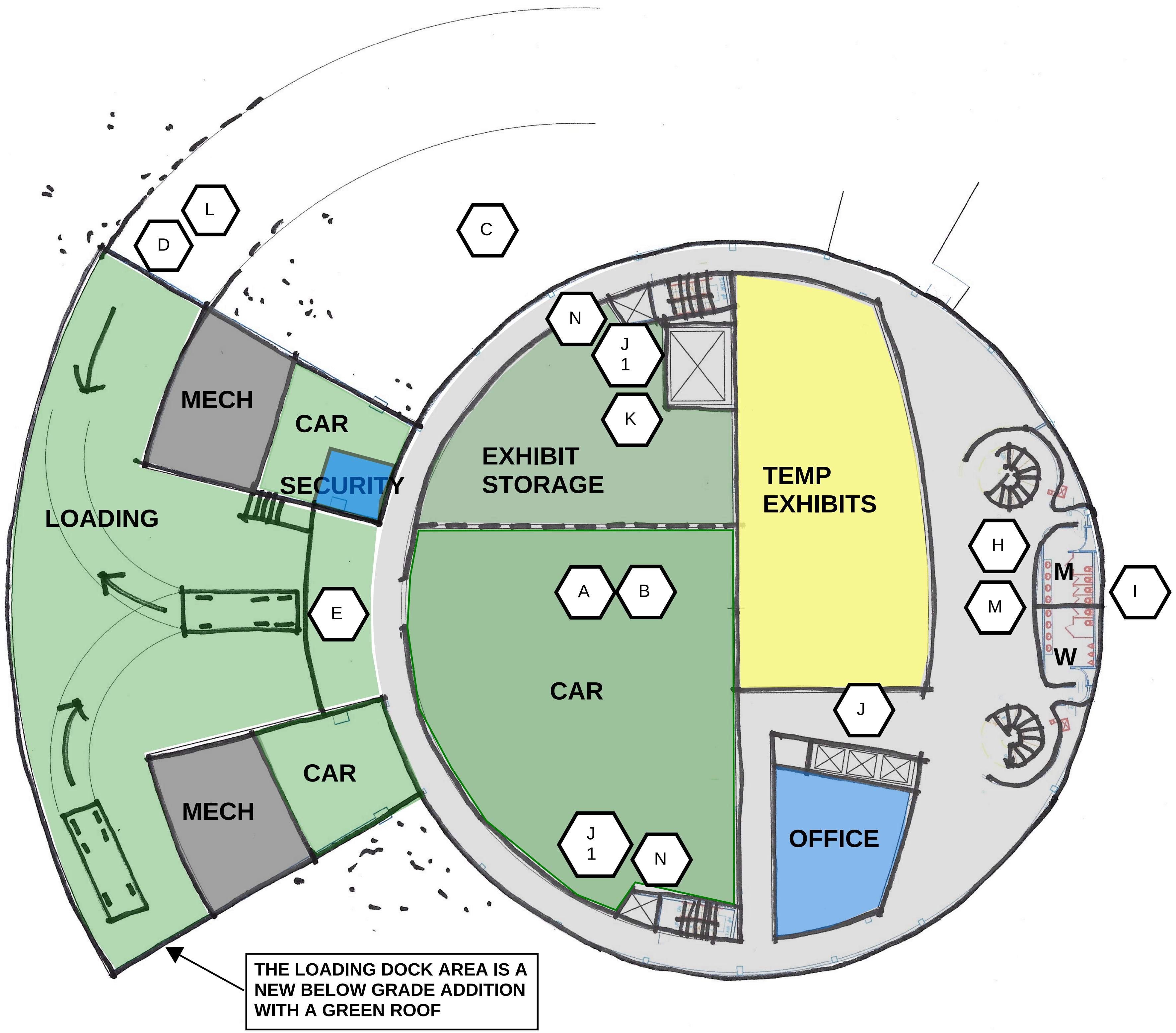
H PROVIDE A SMOKE EVACUATION SYSTEM

.

1 ITC - THIRD LEVEL FLOOR PLAN (Offices & Dome)

SCALE : 1/16"=1'-0"

TRUE NORTH



KEY NOTES

A REMOVE ALL EXISTING STRUCTURE, FLOORS, DOORS, PARTITIONS AND FINISHES TO EXPOSE ORIGINAL EXTERIOR STRUCTURE

B REMOVE ALL EXISTING MECHANICAL, ELECTRICAL, PLUMBING AND PROVIDE NEW SYSTEMS PER THE ENGINEERNG SCOPE

C PROVIDE NEW UTILITY CONNECTIONS PER ENGINEERING SCOPE OF WORK FROM NEW UTILITY BUILDING AT PARKING LOT

D NEW LOADING DOCK DOORS

E NEW LOADING DOCK AND LEVELER

H EXISTING CIRCULAR STAIRS TO REMAIN AND REFURBISH TREADS, RAILINGS.

I EXISTING RESTROOMS TO REMAIN WITH NEW FIXTURES, FINISHES, LIGHTING, PLUMBING IN SAME LOCATION

J PASSENGER ELEVATORS
J-1 NEW STAIRS

K NEW FREIGHT ELEVATOR

L NEW DRIVEWAY WITH NEW RETAINING WALLS TO REACH THE BASEMENT LOADING DOCK. NEW SITE LIGHTING ALONG NEW DRIVEWAY

M NEW TERRAZZO FLOOR IN CIRCULATION SPACES AND ENTRY. CARPET AT OFFICES. CONCRETE SEALED WITH EPOXY AT CAR AND EXHIBIT STORAGE

N SHAFT SPACE FOR MECH DISTRIBUTION

BASEMENT

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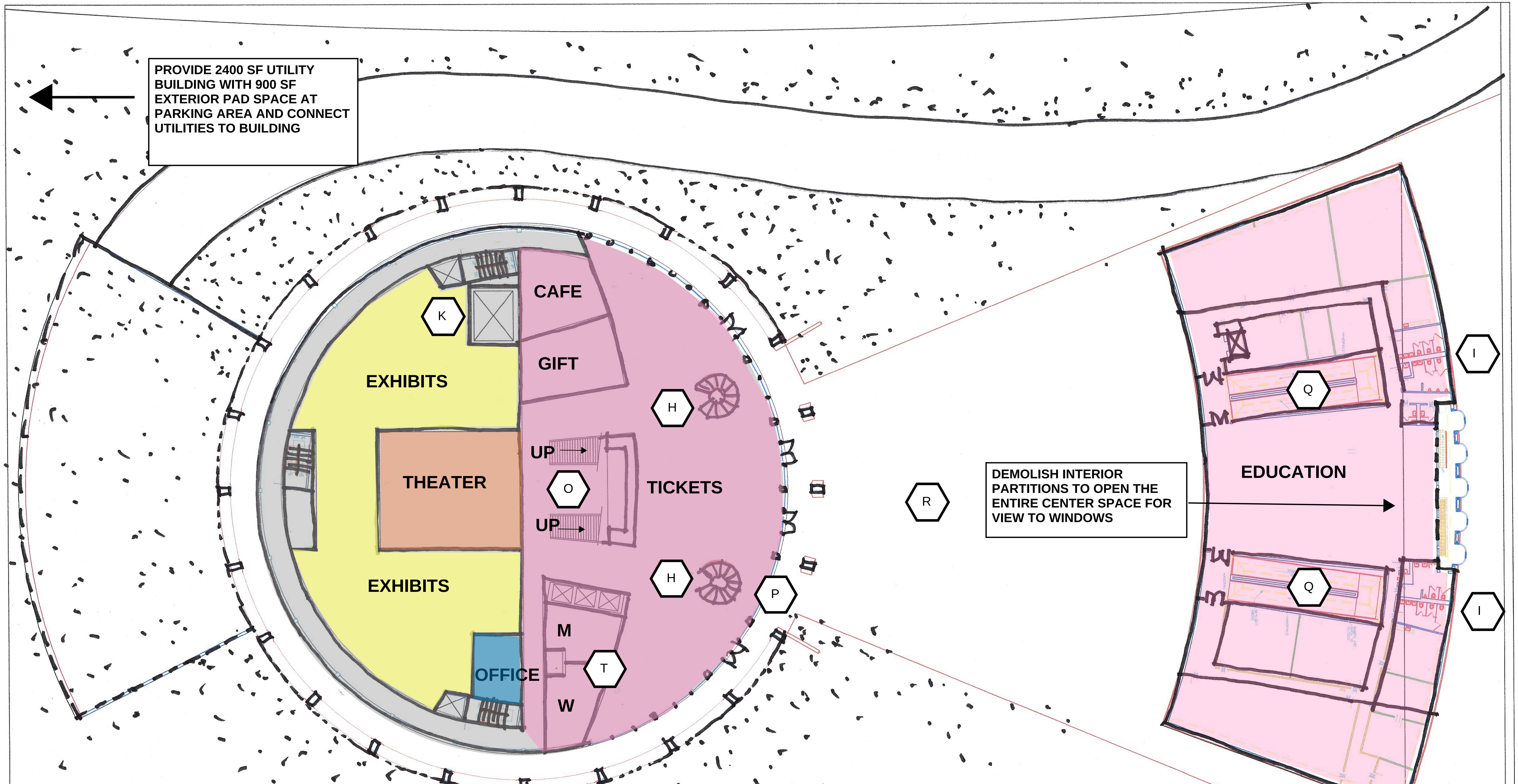
Diagrammatic Plans for ITC Relocation to the Former Federal Courthouse

5 20



KEY NOTES

O NEW MONUMENTAL STAIR AND RAILINGS

P NEW GLASS STOREFRONT AND DOORS

Q EXISTING RAMPS TO REMAIN WITH NEW FINISHES AND RAILING

R NEW PAVING AT PLAZA. EXISTING SITE LIGHTING TO REMAIN AND BE REFURBISHED AS HISTORIC

KEY NOTES

T NEW RESTROOMS

H EXIST STAIR TO REMAIN AND BE REFURBISHED

K NEW FREIGHT ELEVATOR

FIRST FLOOR

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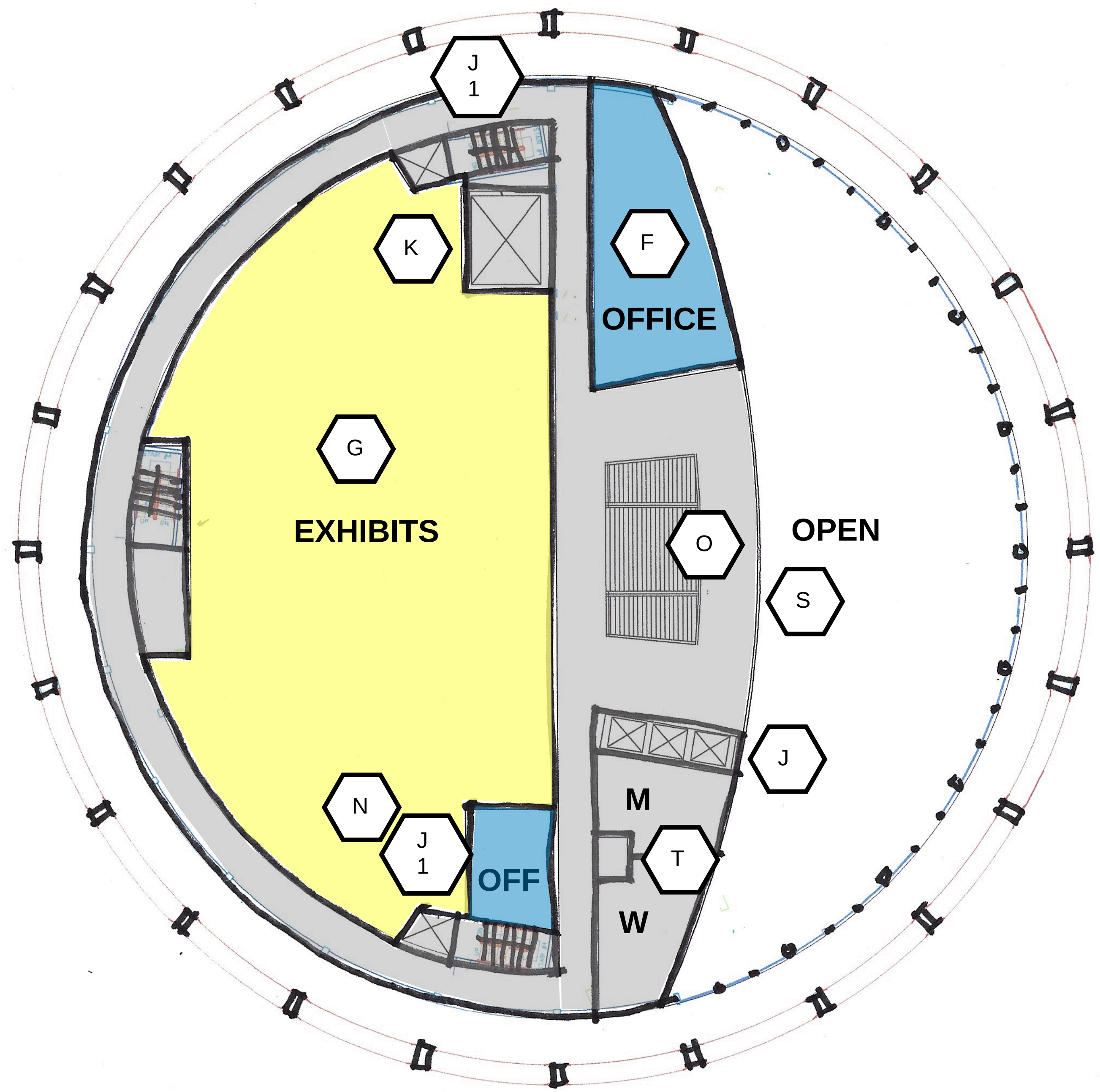
5 20



KEY NOTES

G PROVIDE RAISED FLOOR AT EXHIBIT SPACES

J PASSENGER ELEVATORS

J-1 NEW STAIRS

K NEW FREIGHT ELEVATOR

N SHAFT SPACE FOR MECH DISTRIBUTION

O NEW MONUMENTAL STAIR AND RAILINGS

S NEW FIRE RATED GLASS AT ATRIUM

T NEW RESTROOMS ON FIRST, SECOND, THIRD FLOORS

SECOND FLOOR

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Diagrammatic Plans for ITC Relocation to the Former Federal Courthouse

5 20

KEY NOTES

F PROVIDE NEW DOORS WITH SIDELITES AT ALL OFFICES.

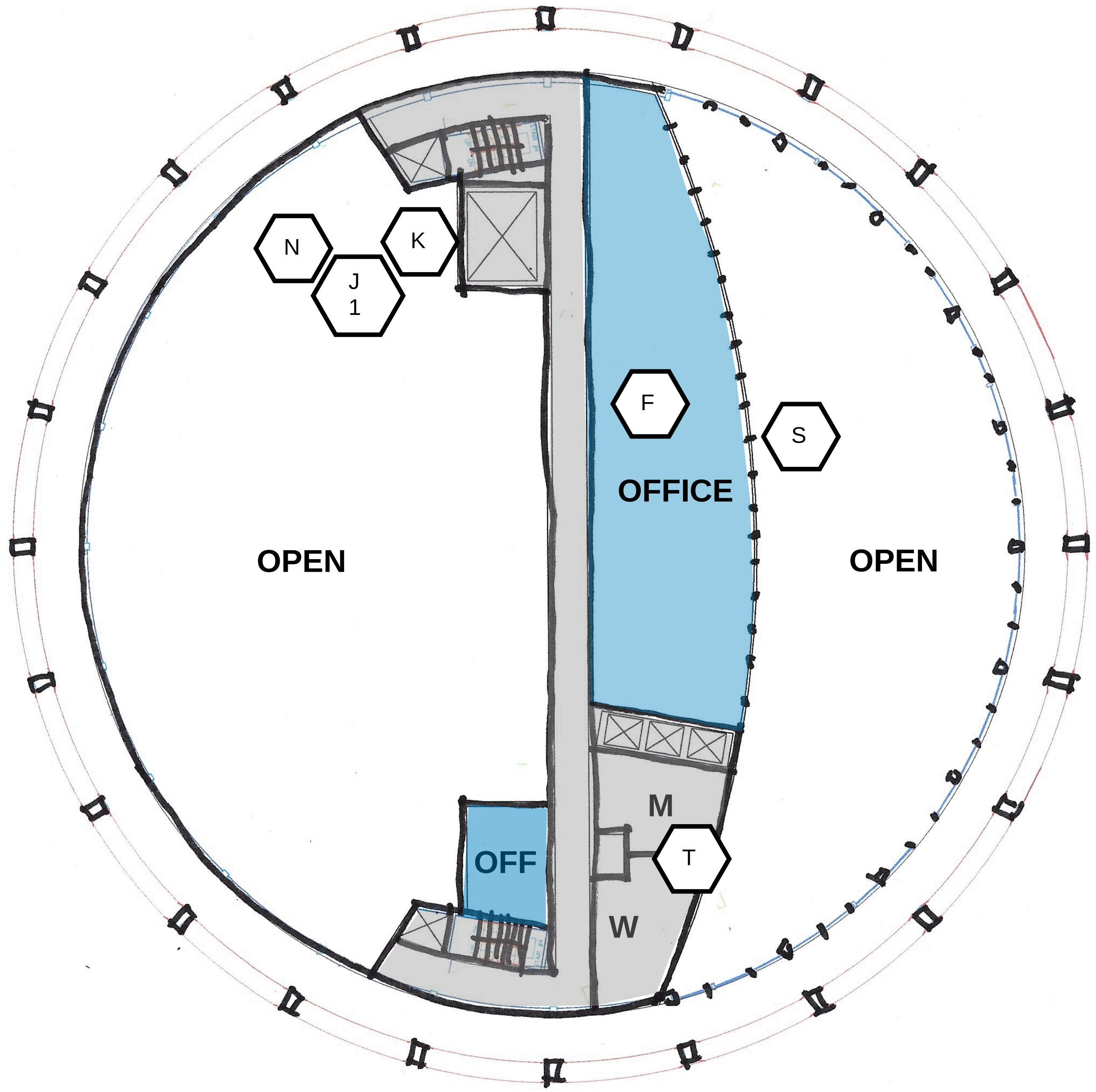
J-1 NEW STAIRS

K NEW FREIGHT ELEVATOR

N SHAFT SPACE FOR MECH DISTRIBUTION

S NEW FIRE RATED GLASS ENCLOSURE

T NEW RESTROOMS ON FIRST, SECOND, THIRD FLOORS



THIRD FLOOR

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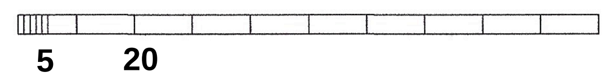
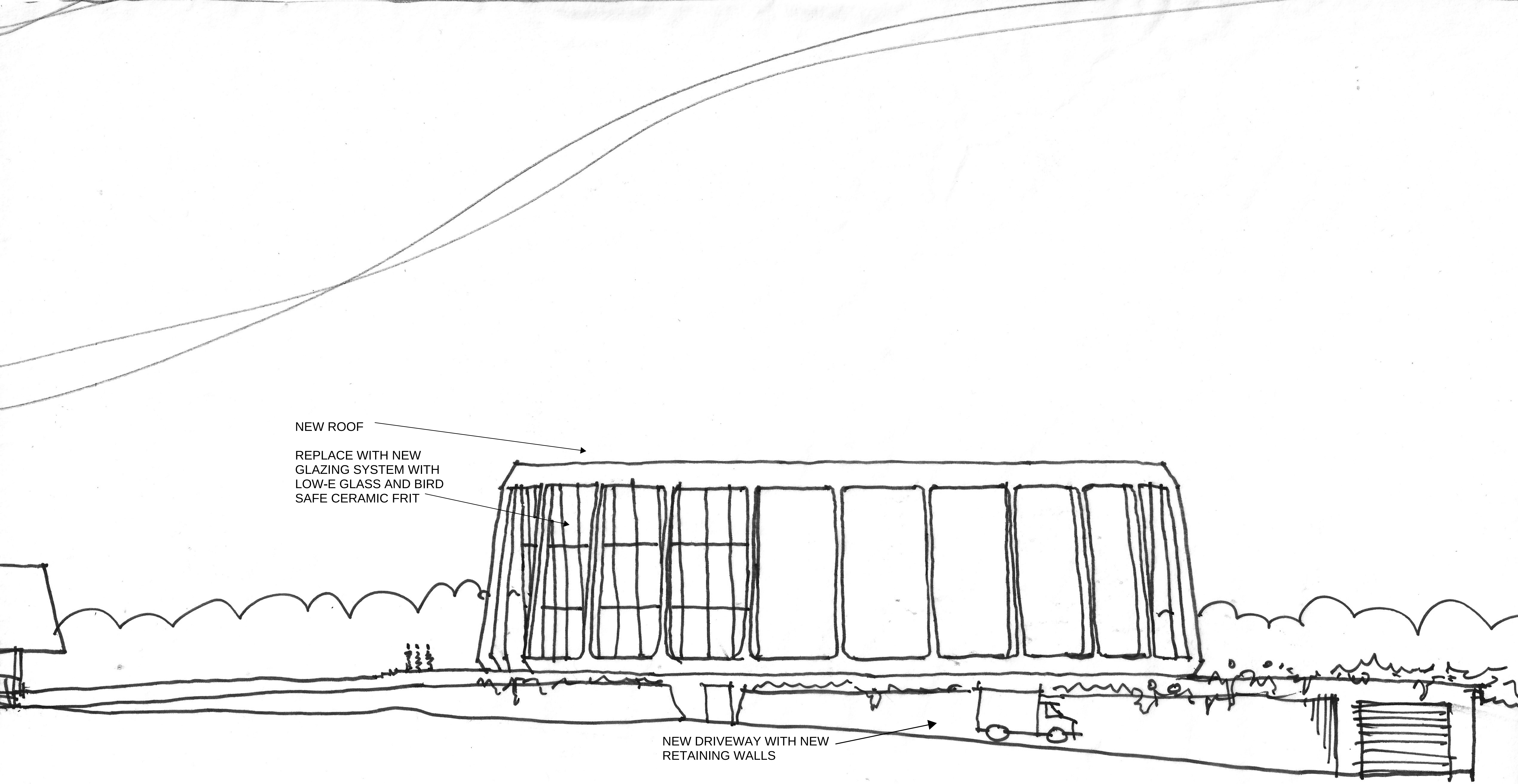
Diagrammatic Plans for ITC Relocation to the Former Federal Courthouse





ELEVATION

UNIVERSITY of TEXAS SAN ANTONIO
INSTITUTE of TEXAN CULTURES
Diagrammatic Plans for ITC Relocation to the Former Federal Courthouse

UTSA Institute of Texan Cultures
AAM Accreditation Summary for Texas Pavilion

4/4/23

AAM Accreditation Report Concerns	EXISTING FACILITY DEFICIENCY	SOLUTION	REFERENCE
Not Envisioned as Collecting Institution	Structural evaluation determined that only limited areas on the First Floor are capable of supporting a high density storage system	Move collection storage to an off-site Collection Storage facility.	Clarifications and Assumptions
Spaces not designed for Museum Standards	Existing Structure uses large columns on a 40ft grid that are difficult for creating open exhibit spaces	Reduce the size of the Exhibit Space footprint by redesigning and renovating to take advantage of AV and immersive experiences. Locate the exhibit and temporary exhibit spaces within the current dome space where already a column-free space and have higher ceilings on the accessible visitor level.	First Floor Plan Notes G & H
	Loading Dock is not sufficient for securely receiving collection items or large objects	Construct an addition to provide an enclosed loading dock area sized for a box truck. Excavate to provide sufficient turn around space for the box truck within a new paved drive	Site Plan and First Floor Plan
	Sprinkler System not customized for the types of objects located in the spaces and no zoning for future flexibility	Provide new sprinkler system throughout the building with specialty systems as needed for collection and exhibit areas	See Mechanical Narrative
Limited Revenue- production spaces	No food or beverage areas provided in the building	Provide a catering kitchen and food prep area on the Second Floor. Provide an area for a Café on the Second Floor. ITC would like to consider local pop up food vendors to exhibit a variety of cultural food sources. Use the existing freight elevator to provide service to these areas.	First Floor and Second Floor Plans
	No Event Rental Space. Used the Exhibit Area in the past, jeopardizing the collection	Provide a flexible lobby space on the Second Floor that can be used for event rentals, served by the catering kitchen. Provide outdoor spaces suitable for rental	Site Plan and Second Floor Plan
	Insufficient School Group education areas and no dedicated school group route within the building	Assign a Second Floor entrance as the School Group Entrance. Provide Education classrooms, Lab, Storage and Prep spaces on the First Floor to be accessed by the large open circulation stair near the Exhibits	First and Second Floor Plans
	Store not positioned to encourage visitation. Store products not supporting the ITC mission	Create a new Store near ticketing and the entrance. This can be open during event rentals	Second Floor Plan
AAM Accreditation Report Concerns	**EXISTING FACILITY DEFICIENCY**	**SOLUTION**	**REFERENCE**

NO Collection Storage provisions	The ITC Third Floor does not have structural capacity or museum quality air conditions to adequately store the Collection	Move the Collection off site to a separate Storage facility with high density shelving. Provide new collection storage spaces at the First Floor near the loading dock for items being prepared to go on exhibition. These collection areas will have a vapor barrier on the perimeter walls to provide museum quality air.	First and Second Floor Plan
	Collection Work Room not located in a space that can support education opportunities	Create a Collection Work Room that faces the Education spaces with a glass wall for student viewing and interaction	First Floor Plan
	Support Spaces need separate Storage from secure collection areas	The existing building is larger than the ITC program needs and additional storage can be provided on the First and Third Floors	First and Third Floor plans
Lacking Museum-quality features and Construction	Building was built without a vapor barrier, necessary to contain the museum quality air under temperature and humidity controls	Create a "box within the box" for the Collection spaces to have museum quality air. This avoids the full ACM abatement needed at the exterior walls if a new vapor barrier were to be provided at the exterior and provides an interstitial space that provides additional insulation. The existing dome area can be rebuilt to be a 2 story box with a vapor barrier for all exhibit areas.	Second and Third Floor Plans
	Ceiling heights on First and Third Floor are not adequate for auditorium or Exhibit uses	Move the exhibit space to be within the Dome experience area where a double height space will provide adequately high ceilings	Second and Third Floor Plans
	Exisitng roof needs to be replaced to ensure a watertight environment	Replace the roof and incorporate skylights and insulation to provide energy efficiency and natural light	See Third Floor Plan
No Museum standard loading dock	The ITC does not have a loading dock.	Construct an addition to provide an enclosed loading dock area sized for a box truck.	Site Plan and First Floor Plan
	There is not space approaching the building for a tractor trailer delivery	Move deliveries requiring the tractor trailer delivery to an off-site storage facility. Excavate to provide sufficient turn around space for the box truck within a new paved drive	First Floor and Site Plans
	The freight elevator is not large enough nor is there a doorway and travel path large enough for large objects to the freight elevator.	Provide a new freight elevator that is 12ft x 10ft x 10ft and connects the loading area to the exhibit area within a secure and museum air space.	First and Second Floor Plan
	There is not floor loading at a delivery area that would support a forklift.	Provide adequate floor loading capacity with the new slab provided in the addition and renovations at the loading area.	First Floor Plan
AAM Accreditation Report Concerns	**EXISTING FACILITY DEFICIENCY**	**SOLUTION**	**REFERENCE**
	Deliveries cannot be observed outside of normal business hours 8am-5pm	Provide a new security control center with 24 hour staff to directly observe the loading dock and staff entrance	First Floor Plan
Flooding / water intrusion	Accreditation report noted past incidents of water intrusion and First floor is located 6ft below the water table	Revise site grading to move water away from First floor entrance and provide a site drainage system. Building is outside of the Flood Plain	See Site Plan

	Building fountains were designed to absorb the rain run off, but pumps are disconnected and fountains not functioning.	Install new pumps and reconnect the Fountain to be operational. Reuse the exisitng pump room	First Floor Plan
Fire & Life Safety	There are limited pre-action systems or other specialty systems at collection areas	Provide a new sprinkler system throughout the building, zoned and designed for items in the the specific rooms	Mechanical Narrative
	Response time limited by no on-site security and monitoring systems or personnel	Provide 24 hr security staff	Operations
	Fire Department access is limited by the existing berms on all sides of the building	Expand the staff parking lot and drive to allow emergency vehicle access	Site Plan
	The nearest fire hydrant is over 200ft away	Provide a new hydrant	Site Plan
	Fire and smoke detection system has reached the end of its useful life.	Provide new fire and smoke detection system throughout the building	Mechanical Narrative
	Dome theater space is a smoke chimney and needs a working smoke evacuation system.	Remove the existing Dome structure and provide new double space exhibit area	First and Second Floor Plan
	Dome theater construction poses several construction material and electrical fire hazards as well as safety hazards related to the antiquated technology and viewing experience.	Include stair access to the lid on the exhbiit space to allow access to systems and technology	First and Second Floor Plan
	Stairwells are not ADA compliant and have tripping hazards at landings to finished floor transitions	Provide transitions at stair wells. Provide a raised floor at the Exhibit area with ramps to address floor level issues	First and Second Floor Plan
Asbestos	The existing walls at the entire perimeter have ACM on the existing walls	Building a "box within the box" will allow a vapor barrier to be added at the spaces where museum quality air is needed and avoid the full ACM abatement	First and Second Floor Plan
	Dome construction likely contains ACM	Remove the dome and abate the materials	First and Second Floor Plan
	Mechanical Equipment and piping elbows may contain ACM and/or PCBs	Provide all new mechanical equipment and related pipiing or ductwork. Abate all materials being	Mechanical Narrative
Pest Control	Vermin and insect infestations in past	Provide routine inspections and pest control treatments	Operations
Elevators	All the ITC elevators have exceeded their life span	Replace all the elevators	Floor Plans
AAM Accreditation Report Concerns	**EXISTING FACILITY DEFICIENCY**	**SOLUTION**	**REFERENCE**
	Freight Elevator is not sufficient size for large objects nor located in a secure area that accesses the collection areas within a conditioned space	Provide a new freight elevator	First and Second Floor Plan
Electrical Issues	The ITC electrical system needs to be replaced	Replace the electrical	Mechanical Narrative
Structural Columns	Existing Structure uses large columns on a 40ft grid that are difficult for creating open exhibit spaces	Reduce the size of the Exhibit Space footprint by redesigning and renovating to take advantage of AV and immersive experiences. Locate the exhibit and temporary exhibit spaces within the current dome space where already a column-free space and have higher ceilings on the accessible visitor level.	First Floor Plan Notes G & H

Water Sources above galleries	Public restrooms are located over exhbiit and collection spaces	Move Collection and Exhibit Areas to be stacked and centralized in the building away from perimeter restrooms. Provide collection pans under any piping over the collection area with water detection monitors	Floor Plans and Mechanical Narrative
	Piping and mechanical spaces are located over the exhibit and collection areas	Replace all the mechanical and route piping away from Collections	Mechanical Narrative
Security	No separate and secure Security Control center to monitor entrances and deliveries	Provide a dedicated new Security control center at the Staff Entrance and Loading Dock to monitor both	First Floor Plan
	No dedicated security panel	Locate in the security control center	First Floor Plan
	No dedicated security network closet	Locate in the security control center	First Floor Plan
	Insufficient cameras and card access	Provide card access and locate cameras to monitor entire museum then display at security control center for 24 hour monitoring	First Floor Plan
	Exhibit and Collection areas are difficult or impossible to secure	Stack Exhibit and Collection areas centralized in the middle of the building and provide access control for entrance	First and Second Floor Plan
	No emergency phones	Provide a DAS system to ensure that cell reception works throughout the building. Provide emergency buttons to security control center at ticketing, education, store and café areas	Mechanical Narrative
	Exterior lighting is insufficient	Provide new exterior site lighting	Site Plan
	Limited perimeter control, especially during exterior events	Provide new fencing at "Back 40"	Site Plan
Environmental Control	The current HVAC system does not support the temperature and humidity control needed for museum and collection environments.	Replace the HVAC system with new equipment and distribution	Mechanical Narrative
Carpentry Workshop	The existing shop does not have an exterior exhaust	Provide new exterior exhaust at renovated existing shop	First Floor Plan
	The existing shop does not have fire separation construction to current codes	Provide new 2 hr rated enclosure at the renovated shop	First Floor Plan

UTSA Institute of Texan Cultures

AAM Accreditation Summary for the Former Federal Courthouse

4/4/23

AAM Accreditation Report Concerns	EXISTING FACILITY DEFICIENCY	SOLUTION	REFERENCE
Not purpose-built for Collections	Insufficient space after renovation for housing the entire collection	Move collection storage to an off-site Collection Storage facility.	Clarifications and Assumptions
Limited Revenue- production spaces	No food or beverage areas provided in the building	New Café provided on the First Floor.	First Floor and Second Floor Plans
	No Event Rental Space	Provide a flexible lobby space for event rentals. Provide outdoor spaces suitable for rental.	Site Plan and Second Floor Plan
	Insufficient School Group education areas and no dedicated school group route within the building	Renovate the adjacent building into an education space with ample school group queing, orientation spaces, classroom and lab areas.	First Floor Plan
	No gift shop or merchandise storage	New Gift Shop provided on the First Floor and storage in basement	First & Basement Floors
	No Clear Entrance or visitor pathway through the building	The renovation will create a distinct entrance, marked by large windows and a plaza. A new monumental central stair and a 4 story atrium helps orient visitors within the building and orchestrates circulation around the exhibit spaces.	

AAM Accreditation Report Concerns	EXISTING FACILITY DEFICIENCY	SOLUTION	REFERENCE
Lacking Museum-quality features and Construction	Building was built without a vapor barrier, necessary to contain the museum quality air under temperature and humidity controls	Build a corridor around the entire building perimeter in order to create museum quality air boxes within the building.	Floor plans

	Existing structure was added to support additional floors at office use occupancies. The structural system does not support the large open spaces needed for exhibits and gathering	Existing structure added for the Federal Courthouse use will be removed and a new structural system that allows larger spans will be provided. The original building structure designed for the confluence theater works well with the new structural system	See Structural Narrative
	Sprinkler System not customized for the types of objects located in the spaces and no zoning for future flexibility	Provide new sprinkler system throughout the building with specialty systems as needed for collection and exhibit areas	See Mechanical Narrative
	Ceiling heights are not adequate for tall objects on exhibit	The new structure and floor to floor heights will provide ample space for exhibits	Second and Third Floor Plans
	Existing roof needs to be replaced for a watertight environment	Replace the Roof	Floor plans
No Museum standard loading dock	Loading Dock is not sufficient for securely receiving collection items or large objects	Provide a new loading dock and truck turn around by excavating a long driveway, adding site retaining walls for the grade changes and building an addition with collection storage spaces, dock, security	Site Plan and First Floor Plan
	There is not space approaching the building for a tractor trailer delivery	Move deliveries requiring the tractor trailer delivery to the off-site storage facility. Excavate to provide sufficient turn around space for the box truck within a new paved drive	First Floor and Site Plans
	The freight elevator is not large enough nor is there a doorway and travel path large enough for large objects to the freight elevator.	Provide a new freight elevator that is 12ft x 10ft x 10ft and connects the loading area to the exhibit area within a secure and museum air space.	First and Second Floor Plan

	There is not floor loading at a delivery area that would support a forklift.	Provide adequate floor loading capacity with the new slab provided in the addition and renovations at the loading area.	First Floor Plan
	Deliveries cannot be observed outside of normal business hours 8am-5pm	Provide a new security control center with 24 hour staff to directly observe the loading dock and staff entrance	First Floor Plan
Flooding / water intrusion	Inadequate water intrusion prevention and sump pump systems	Revise site grading to move water away from the building, add waterproofing at the addition and add a sump pump Building is outside of the Flood Plain	Floor Plans and Mechanical Narrative
Fire & Life Safety	There are limited pre-action systems or other specialty systems at collection areas	Provide a new sprinkler system throughout the building, zoned and designed for items in the the specific rooms	Mechanical Narrative
	Response time limited by no on-site security and monitoring systems or personnel	Provide 24 hr security staff and dedicated security room	Operations and Basement Plan
	Fire Hydrant not close enough	Provide a new hydrant	Site Plan
	Fire and smoke detection system has reached the end of its useful life.	Provide new fire and smoke detection system throughout the building	Mechanical Narrative
		New Atrium will have a smoke evacuation system	Floor Plans
	Stairwells are not sufficient spaces or ADA compliant	Provide new stairwells that exit directly to grade	Floor Plans
Asbestos	Existing construction likely has asbestos and lead paint	Full abatement for all ACM will happen prior to interior demolition. All MEP piping and equipment is being removed	Floor Plans
Pest Control	Vermin and insect infestations in past	Provide routine inspections and pest control treatments.	Operations

Elevators	Elevators have exceeded their life span	Replace all the elevators	Floor Plans
	Freight Elevator is not sufficient size for large objects nor located in a secure area that accesses the collection areas within a conditioned space	Provide a new freight elevator	First and Second Floor Plan
Electrical Issues	Electrical system outdated	Replace the entire electrical system	Mechanical Narrative
Water Sources above galleries	Restrooms, piping and mechanical spaces shall not be located over collection spaces	New layout provides distinct areas for restrooms and mechanical spaces to be separate and stacked away from collection areas	Floor Plans and Mechanical Narrative
Security	No separate and secure Security Control center to monitor entrances and deliveries	Provide a dedicated new Security control center at the Staff Entrance and Loading Dock to monitor both	First Floor Plan
	No dedicated security panel	Locate in the security control center	First Floor Plan
	No dedicated security network closet	Locate in the security control center	First Floor Plan
	Insufficient cameras and card access	Provide card access and locate cameras to monitor entire museum then display at security control center for 24 hour monitoring	First Floor Plan
		Stack Exhibit and Collection areas centralized in the middle of the building and provide access control for entrance	First and Second Floor Plan
	No emergency phones	Provide a DAS system to ensure that cell reception works throughout the building. Provide emergency buttons to security control center at ticketing, education, store and café areas	Mechanical Narrative
	Exterior lighting is insufficient	Provide new exterior site lighting	Site Plan
	Limited perimeter control, especially during exterior events	Provide fencing at the plaza and perimeter as needed	Site Plan

Environmental Control	The current HVAC system does not support the temperature and humidity control needed for museum and collection environments.	Replace the HVAC system with new equipment and distribution	Mechanical Narrative

MEP Engineering Report

University of Texas San Antonio Institute of Texan Cultures - Feasibility Study Comparison of Renovation vs. New Building

San Antonio, TX

UTSA INSTITUTE OF TEXAN CULTURES
A Smithsonian Affiliate

Submitted to:

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January 15, 2023

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1. INTRODUCTION

The Institute of Texan Cultures (ITC) at the University of Texas at San Antonio (UTSA) is a museum located in the Texas Pavilion at HemisFair Park in Downtown San Antonio. It currently functions as a multicultural education center with exhibits, programs, and special events. The current ITC building is composed of three floors.

This report outlines the recommended schematic design strategies for the mechanical and electrical scope of work specifically related to two proposed alternatives for ITC upgrade. The general design criteria for each system are explained, followed by the more detailed scope of work that is being presented.

The first alternative includes renovating the ITC and restoring it into a mixed-use facility within approximately 185,000 square feet (SF) of the existing shell. The proposed architectural design will still consist of three floors and will be programmed to include a Museum Class A Space, Learning Spaces, Library, Offices, Performance Spaces, Café and Retail, and Tenant Spaces. As a part of the renovation, a small addition will be added to the main building to provide an interior loading dock for panel trucks.

The second alternative proposes a new building on a new site, possibly on this property. The new ITC building will be approximately 80,000 SF over the two (2) above-ground levels with similar space programming described in alternative 1, with the only exception that there will be no Tenant Spaces.

Mechanical systems include heating, ventilation, air conditioning (HVAC), plumbing, and fire protection systems. Electrical systems include power distribution (normal and emergency), lightning protection, lighting (normal and emergency), fire alarm, telecommunications, security, and audio-visual systems.

A Site visit to the building was conducted on December 6th, 2022. The spaces within the building, mechanical rooms, and rooftop equipment locations were surveyed in support of this Schematic Design.

2. HVAC SYSTEMS

A. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

The demolition scope will include all existing mechanical systems, including multi-zone units, ductwork, air devices, chillers, cooling towers, boilers, pumps, piping, and controls (down to bare structure with exterior walls).

After renovation, the spaces within the building will be divided into three major sections including Museum Class A, General and Tenant spaces. There will be vestibules between Museum space and all other areas.

The design of the HVAC system will be based on the following criteria:

- The interior design conditions will be for archival storage (70 degrees +/- 4 degrees; 50% Relative Humidity +/- 10%) in Museum Class A spaces. All other areas will be maintained at comfort conditions (70 degrees +/- 4 degrees; uncontrolled Relative Humidity)
- The equipment is sized based on the anticipated ventilation, cooling, and heating block loads.
- The dedicated spaces are required for the HVAC equipment to protect occupants and equipment.
- Where needed, equipment spaces will include adequate fire ratings, ventilation, and acoustic treatments.

The primary source of heating will be electricity. Cooling for the renovated ITC building will be provided by two new water-cooled chillers, 250 tons each (sized at 67% of load). The chillers will be located outside in the southeast garage. A three-cell cooling tower, each cell sized at 250 tons, will be located adjacent to the chillers.

The following sections describe the proposed HVAC work to accommodate the space programming drawings presented in the Diagrammatic Plans for Proposed Museum Renovation and received on December 19, 2022.

Museum Class A

Museum Class A, with a total of 46,000 SF, includes Exhibits, Collection Storage, Ante-Room, and a Loading Dock. These areas are designed for archival storage conditions and will be served by two 70-ton air handling units (AHU1 and AHU2). The 3rd floor has four mechanical rooms, two on the southeast and southwest side will house AHU1 and AHU2. Two dedicated gas fired steam boilers will also be provided in the mechanical rooms on the 3rd floor for humidification. Base scope would include extending natural gas piping to the new boilers. We assumed that the existing natural gas service capacity is adequate.

The space loads will be split between AHU1 and AHU2, with one unit serving the areas on the east wing and the other one serving the areas on the west wing. There will be outside air ductwork going directly from the roof to AHUs. The required airflow at the peak load for thermal is estimated to be 55000 cubic feet per minute (CFM). The discharged primary air will be ducted throughout to serve all the Museum Class A spaces on the second floor via a traditional overhead distribution system.

Moveable walls allow for flexible exhibit design of the available interior spaces within the museum. This added feature may cause thermal stratification in double-height areas. To overcome this problem, floor return grilles through a raised floor plenum are being specified. . This combination of high, zoned supply and underfloor plenum return creates an overall hybrid system that utilizes the best features of both systems to meet the unique needs of museum spaces with movable boundaries. Minimum 12-inch deep raised floor plenums will be provided in the areas on the second floor with flexible walls. . The position of return grilles and routing will be flexible to accommodate the proposed architectural design. The underfloor plenum also provides a flexible pathway for electrical and low-voltage cabling.

Exhibits and Collection Storage spaces will be divided into 23 control zones. Airflow, humidity and the zone temperature and pressure will be controlled by a DDC controller. Ante-room and loading dock will each be served by a dedicated VAV box with electric reheating and humidification. All VAV boxes with humidifiers will be located in mechanical rooms.

A new smoke evacuation and control system in double height space may also be required depending on the local code requirements.

Condensate piping for all mechanical equipment shall be provided and handled via a gravity condensate system.

The new direct digital Building Automation System (BAS) system will be furnished and installed throughout the building. All equipment will be provided with BACnet or LonWorks cards for intercommunication. The system will be web-based and provide alarms and control through mobile platforms (e.g., smartphones). Occupiable spaces will be provided with carbon dioxide (CO2) sensors. The use of CO2 sensors will allow for demand-controlled ventilation (DCV) and facilitate reductions in the amount of outside air brought into the spaces being served when they are underutilized.

Special acoustic considerations will be taken, such as separate return air takeoffs and sound traps, as will be recommended by the acoustician. Adequate precautions must be taken to prevent leakage by inspecting and sealing all openings in the walls where electrical, plumbing, or other items may pass from the plenum into the wall.

General Spaces

Learning spaces, library, offices, performance spaces, café, and retail are all classified as general spaces with a total of 62,700 SF. These areas are designed for comfort conditions and will be served by two 65-ton VAV air handling units (AHU3 and AHU4) with energy recovery. AHUs will also be located in 3rd-floor mechanical rooms, and outside air will be ducted to these units. The space's thermal load will be split between AHU3 and AHU4.

The required airflow at the peak load is estimated to be 54000 CFM. General spaces will be provided with a traditional overhead air distribution system and transfer ducts as needed to direct return air from isolated spaces.

The spaces will be divided into 32 control zones with electric reheat. Each zone would have occupancy sensors, thermostats, and CO2 sensors. When the spaces are unoccupied (based on schedule), they will maintain setback temperatures of 60°F (heating) and 85°F (cooling). When occupied (by schedule), but vacant (based on occupancy sensor), the temperature setpoints would be 65°F (heating) and 80°F (cooling). When occupied (by schedule) and occupied (by occupancy sensor), the temperature setpoints would be 70°F (heating) and 75°F (cooling). The amount of fresh air provided to the space would be based on the CO2 measurement, which would adjust the outside air VAV box.

Separate new rooftop exhaust fans will be installed to serve the catering kitchen, café, and toilet rooms. Condensate piping for all mechanical equipment shall be provided and handled via a gravity condensate system.

All equipment will be connected to the new BAS system including CO_2 sensors which will allow for demand-controlled ventilation (DCV), which will facilitate reductions in the amount of outside air brought into the building when the space is underutilized.

Tenant Spaces

Tenant spaces with a total of 76,000 SF will be designed for comfort conditions and served by two 80-ton VAV air handling units (AHU5 and AHU6) with energy recovery. AHUs will be located in the lower-level mechanical rooms, and outside air will be brought in and ducted to the units.

The required airflow at the peak load is estimated to be 64000 CFM. Tenant's spaces will be provided with a traditional overhead air distribution system and transfer ducts as needed to direct return air from isolated areas.

The spaces will be divided into 38 control zones with electric reheat. Airflow and the zone temperature e will be controlled by a DDC controllers connected to the BAS system. Each zone would have occupancy sensors, thermostats, and CO_2 sensors. When the spaces are unoccupied (based on schedule), they will maintain setback temperatures of 60°F (heating) and 85°F (cooling). When occupied (by program) but vacant (based on occupancy sensor), the temperature setpoints would be 65°F (heating) and 80°F (cooling). When occupied (by schedule) and occupied (by occupancy sensor), the temperature setpoints would be 70°F (heating) and 75°F (cooling). The amount of fresh air provided to the space would be based on the CO_2 measurement, which would adjust the outside air VAV box.

Condensate piping for all mechanical equipment shall be provided and handled via a gravity condensate system.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

Clearly, no demolition scope will be included, but instead, the second alternative proposes a new construction on a new site. In this plan, the future ITC building will consist of two floors totaling 80,000 SF with similar space programming described in alternative 1. The spaces within the building will be divided into two major sections, including Museum Class A and General areas. Several Vestibules will physically and thermally separate the spaces within Museum Class A and all other areas.

The design of the HVAC system will be based on the following criteria:

- The interior design conditions will be for archival storage (70 degrees +/- 4 degrees; 50% Relative Humidity +/- 10%) in Museum Class A Spaces. All other spaces which will be maintained at comfort conditions (70 degrees +/- 4 degrees; uncontrolled Relative Humidity)
- The equipment is sized based on the anticipated ventilation, cooling, and heating block loads.
- The dedicated spaces are required for the HVAC equipment to protect occupants and equipment.
- Where needed, equipment spaces will include adequate fire ratings, ventilation, and acoustic treatments.

The primary source of heating will be electricity. Cooling for the renovated ITC building will be provided by two new water-cooled chillers, 175 tons each (sized at 100% of load). The chillers will be located outside in the designated location as per future architectural drawings. A three-cell cooling tower, with each cell sized at 175 tons, will be located adjacent to the chillers

The following sections describe the proposed HVAC work to accommodate the anticipated space programming.

Museum Class A

Museum Class A, with a total of 42,000 SF includes Exhibits, an Ante-Room and a Loading Dock (total of 38000SF), plus a Collection Storage (4000SF). These areas are designed for archival storage conditions and will be served by two 65-ton air handling units (AHU1 and AHU2). Two mechanical rooms will be provided to house AHU1 and AHU2. Two dedicated gas fired steam boilers will also be provided in the same mechanical rooms for humidification. Natural gas piping will be provided to the new boilers.

The units are sized to meet the peak thermal and ventilation loads. There will be outside air ductwork going directly from the roof to AHUs. The required airflow at the peak load \ is estimated to be 54000 CFM. The discharged primary air will be ducted throughout to serve all the Museum Class A spaces on the two floors via a traditional overhead distribution system.

Moveable walls allow for flexible usage of the available interior spaces within the museum, which is architecturally desired. Floor returns through a raised floor plenum similar to the system envisioned for the Alternate A scope of work. ls. The 12" underfloor plenum creates a certain level of flexibility for the HVAC system and provide flexible routing for s electrical and low-voltage cabling.

Exhibits and Collection Storage spaces will be divided into 21 control zones. Airflow, humidity, and the zone temperature and pressure will be controlled by a DDC controller. Ante-room and loading dock will each be served by a dedicated VAV box with electric reheating and humidification. All VAV boxes with humidifiers will be located in mechanical rooms.

Special acoustic considerations will be taken, such as separate return air takeoffs and sound traps, as will be recommended by the acoustician. Adequate precautions must be taken to prevent leakage by inspecting and sealing all openings in the walls where electrical, plumbing or other items may pass from the plenum into the wall.

A building wide BAS system will be furnished and installed. All equipment will be provided with BACnet or LonWorks cards for intercommunication. The system will be web-based and provide alarms and control through mobile platforms (e.g., smartphones). Occupiable spaces will be provided with carbon dioxide (CO_2) sensors. CO2 sensors will allow for demand-controlled ventilation (DCV) and facilitate reductions in the amount of outside air brought into the building when the space is underutilized.

Condensate piping for all mechanical equipment shall be provided and handled via a gravity condensate system.

General Spaces

Learning spaces, library, offices, performance spaces, café, and retail are all classified as general spaces with a total of 62,700 SF. These areas are designed for comfort conditions and will be served by two 70-ton VAV air handling units (AHU3 and AHU4) with energy recovery. AHUs will be located in designated areas per future architectural drawings, and outside air will be ducted to the units.

The required airflow at the peak load for thermal is estimated to be 55000 cubic feet per minute (CFM). General spaces will be provided with a traditional overhead air distribution system and transfer ducts as needed to direct return air from isolated spaces.

The spaces will be divided into 32 control zones with electric reheat. Each zone would have occupancy sensors, thermostats, and CO2 sensors. When the spaces are unoccupied (based on schedule), they will maintain setback temperatures of 60°F (heating) and 85°F (cooling). When occupied (by the program), but vacant (based on the occupancy sensor), the temperature setpoints would be 65°F (heating) and 80°F (cooling). When occupied (by schedule) and occupied (by occupancy sensor), the temperature setpoints would be70°F (heating) and 75°F (cooling). The amount of fresh air provided to the space would be based on the CO2 measurement, which would adjust the outside air VAV box.

Separate new rooftop exhaust fans will be installed to serve the catering kitchen, café, and toilet rooms.

All equipment will be connected to the BAS system with CO_2 sensors to l allow for demand-controlled ventilation (DCV), which will facilitate reductions in the amount of outside air brought into the building when the space is underutilized.

Condensate piping for all mechanical equipment shall be provided and handled via a gravity condensate system.

B. PROPOSED EQUIPMENT

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

Two Water-Cooled Chillers

- Each 250 TON

A Three Cell Cooling Tower,

- Each cell sized at 250 tons

Three Chilled Water Pumps (CHWP-1, CHWP-2 & CHWP-3)

The pumps are matched to the chillers capacity but will operate in primary/standby mode. Pumps provide chilled water to all AHUs (AHU1, AHU-2, AHU-3, AHU4, AHU-5, AHU-6). Each has characteristics as follows:

- 600 GPM,
- Base-mounted end-suction pump
- Variable Frequency Drive

Air Handling Unit (AHU-1 & 2)

These units serve Museum Class A as part of Alternative A only. They are double wall drawn-thru air handler (each 70 Ton) and arranged as follows:

- Chilled water cooling Coil
- Electric heating coil
- Centrifugal supply fan
  - 55000 CFM
  - Variable Frequency Drive
- Centrifugal return fan
  - 53000 CFM
  - Variable Frequency Drive
- Electric reheat coil
- MERV 8 primary filters with MERV 13 final filters

Air Handling Unit (AHU-3 & 4)

These units serve general spaces as part of Alternative A only. They are double wall drawn-thru air handler (each 65 Ton) with energy recovery and arranged as follows:

- Chilled water cooling Coil
- Electric heating coil (HW)
- Enthalpy Wheel
- Centrifugal supply fan
  - 54000 CFM
  - Variable Frequency Drive
- Centrifugal return fan
  - 52000 CFM
  - Variable Frequency Drive

- Electric reheat coil
- MERV 8 primary filters with MERV 13 final filters

Air Handling Unit (AHU-5 & 6)

These units serve tenant spaces as part of Alternative A only. They are double wall drawn-thru air handler (each 80 Ton) with energy recovery and arranged as follows:

- Chilled water cooling Coil
- Electric heating coil (HW)
- Enthalpy Wheel
- Centrifugal supply fan
  - 64000 CFM
  - Variable Frequency Drive
- Centrifugal return fan
  - 61000 CFM
  - Variable Frequency Drive
- Electric reheat coil
- MERV 8 primary filters with MERV 13 final filters

Steam Boilers (B-1&2)

These units serve AHUs as part of Alternative A only. They are as follows:

- High Efficiency Steam Boiler
- Natural Gas
- Low NOx Emissions
- Direct or Conventional Vent
- Front Access for Serviceability Natural gas fired
- Capacity to be determined later during the design development phase

Flue Piping and Control Damper: Enervex Chimney Stack System with mechanical draft controller, flue sensor, and panel.

Catering Kitchen Exhaust Fan (EF-1)

- Downblast rooftop fan
- Centrifugal type
- EC Motor
- Roof curb

Toilet room Exhaust Fan (EF-2)

- Downblast rooftop fan
- Centrifugal type
- EC Motor
- Roof curb

Cafe General Exhaust Fan (EF-3)

- Downblast rooftop fan
- Centrifugal type
- Direct drive EC Motor
- Roof curb

Acoustic Treatment

- Required acoustic treatment will be studied in future design phases. Preliminary areas of concern are Air handling units (AHU-1 and AHU-2), Located above ceilings in finished spaces.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

Two Water-Cooled Chillers

- Each 175 TON

A Three Cell Cooling Tower,

- Each cell sized at 175 tons

Three Chilled Water Pumps (CHWP-1, CHWP-2 & CHWP-3)

The pumps are matched to the chillers capacity but will operate in primary/standby mode. Pumps provide chilled water to all AHUs (AHU1, AHU-2, AHU-3, AHU4, AHU-5, AHU-6). Each has characteristics as follows:

- 420 GPM,
- Base-mounted end-suction pump
- Variable Frequency Drive

Air Handling Unit (AHU-1 & 2)

These units serve Museum Class A as part of Alternative B only. They are double wall drawn-thru air handler (each 65 Ton) and arranged as follows:

- Chilled water cooling Coil
- Electric heating coil
- Centrifugal supply fan
  - 54000 CFM
  - Variable Frequency Drive
- Centrifugal return fan
  - 52000 CFM
  - Variable Frequency Drive
- Electric reheat coil
- MERV 8 primary filters with MERV 13 final filters

Air Handling Unit (AHU-3 & 4)

These units serve general spaces as part of Alternative B only. They are double wall drawn-thru air handler (each 70 Ton) with energy recovery and arranged as follows:

- Chilled water cooling Coil
- Electric heating coil (HW)
- Enthalpy Wheel
- Centrifugal supply fan
  - 55000 CFM

  - Variable Frequency Drive
- Centrifugal return fan
  - 53000 CFM
  - Variable Frequency Drive
- Electric reheat coil
- MERV 8 primary filters with MERV 13 final filters

Steam Boilers (B-1&2)

These units serve AHUs as part of Alternative B only. They are as follows:

- High Efficiency Steam Boiler
- Natural Gas
- Low NOx Emissions
- Direct or Conventional Vent
- Front Access for Serviceability Natural gas fired
- Capacity to be determined later during the design development phase

Flue Piping and Control Damper: Enervex Chimney Stack System with mechanical draft controller, flue sensor, and panel.

Catering Kitchen Exhaust Fan (EF-1)

- Downblast rooftop fan
- Centrifugal type
- EC Motor
- Roof curb

Toilet room Exhaust Fan (EF-2)

- Downblast rooftop fan
- Centrifugal type
- EC Motor
- Roof curb

Cafe General Exhaust Fan (EF-3)

- Downblast rooftop fan
- Centrifugal type
- Direct drive EC Motor
- Roof curb

Acoustic Treatment

- Required acoustic treatment will be studied in future design phases. Preliminary areas of concern are Air handling units (AHU-1 and AHU-2), Located above ceilings in finished spaces.

3. PLUMBING SYSTEMS

A. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

The demolition scope will include removing all the existing plumbing systems, including fixtures, fittings, hot water heaters, pumps, valves, and fountain equipment (down to bare structure with exterior walls). Under-slab sanitary and storm drainage lines shall be video scoped and confirmed suitable for reuse. The contractor is to carry allowance for concrete cutting & patching and replacement of all under-slab piping. Refer to the architect's demolition plan and new work plans for the extent of saw cutting and patching based on the extension of existing below-grade sanitary mains.

As part of the renovation project, all above-grade domestic cold, and hot water, roof drains, overflow roof drains, rainwater, sanitary, and vent piping will be removed and replaced with new piping. New catering and café fixtures and fittings, toilet rooms, duplex constant pressure pumps, and dual height drinking fountain with bottle filler will be provided in new locations as per architectural drawings for ITC spaces. New rough-in should be considered in the Tenant section.

Floor drains will be provided for all toilet rooms, mechanical and maintenance rooms. Ante-room will be supplied with a stainless-steel sink. Piping connection to the irrigation system with backflow prevention will also be required. Two (2) hose bibs will be installed per façade.

All sanitary piping shall be standard-weight cast-iron piping with no-hub connectors above grade. SDR PVC piping will be used below grade. Piping from sinks and plumbing fixtures shall be DWV copper unless below grade. New piping shall be provided throughout all toilets and appropriate plumbing fixtures. Water heaters will be provided to locally serve the new catering kitchen, café, and toiler rooms. The provided electric water heater will have a storage capacity of 5 gallons. All cold-water piping will be copper, insulated with pre-formed fiberglass insulation. The hot water system will provide 140°F hot water to the building and all new hot water supply piping will be copper, insulated with pre-formed fiberglass insulation.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

New domestic cold and hot water, roof drains, overflow roof drains and rainwater, sanitary and vent piping will be provided. New duplex constant pressure pumps, catering and café fixtures and fittings, toilet rooms, and dual-height drinking fountain with bottle filler will all be installed in the designated locations as per architectural drawings for the new ITC building. .

Floor drains will be provided for all toilet rooms, mechanical and maintenance rooms. Ante-room will be provided with a stainless-steel sink in the ante-room. Piping connection to the irrigation system will also be required. Two (2) hose bibs will be installed per façade.

All sanitary piping shall be standard-weight cast-iron piping with no-hub connectors above grade. SDR PVC piping will be used below grade. Piping from sinks and plumbing fixtures shall be DWV copper unless below grade. New piping shall be provided throughout all toilets and appropriate plumbing fixtures. Water heaters will be provided to locally serve the new catering kitchen, café, and toiler rooms. The provided electric water heater will have a storage capacity of 5 gallons. All cold-water piping will be copper, insulated with pre-formed fiberglass insulation. The hot water system will provide 140°F hot water to the building, and all new hot water supply piping will be copper, insulated with pre-formed fiberglass insulation.

B. PROPOSED EQUIPMENT

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

New duplex constant pressure pumps

- Capacity to be determined later during the design development phase

Three (3) Domestic Water Heater

- Storage tank
- Non-simultaneous element
- Basis: Bradford White LD-80R3-3
- Capacity to be determined later during the design development phase

Water Closet

- Wall Mounted
- Sensor Operated Flush Valve
- Accessible
- 1.28 GPF
- Basis: Toto CT705ELN with Toto Exposed Battery-Powered Dual Flush Flushometer

Lavatory

- Countertop mounted
- ADA Approved
- Sensor Operated Faucet
- Flow Rate 0.5 GPM
- Thermostatic Mixing Valve (ASSE 1070)
- Basis: American Standard Aqualyn
- Sloan SF2450

Sink

- Countertop mounted
- Stainless Steel
- Gooseneck swing spout faucet
- 4" blade handles
- Basis: Elkay Dayton Elite Stainless-Steel Single Bowl

Janitor Sink

- Wall Mounted
- Manual Faucet
- Basis: Elkay ESSB2520

Drinking Fountain

- Bi-level design (accessible to those seated and standing)
- Bottle filler
- Vandal-resistant pushbuttons

- Contoured Basin
- One piece vandal-resistant drain
- Integral P-trap
- Basis: Elkay Two Level ADA Model LZSTL8WSLC

Hose bibs

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

New duplex constant pressure pumps

- Capacity to be determined later during the design development phase

Three (3) Domestic Water Heater

- Storage tank
- Non-simultaneous element
- Basis: Bradford White LD-80R3-3
- Capacity to be determined later during the design development phase

Water Closet

- Wall Mounted
- Sensor Operated Flush Valve
- Accessible
- 1.28 GPF
- Basis: Toto CT705ELN with Toto Exposed Battery-Powered Dual Flush Flushometer

Lavatory

- Countertop mounted
- ADA Approved
- Sensor Operated Faucet
- Flow Rate 0.5 GPM
- Thermostatic Mixing Valve (ASSE 1070)
- Basis: American Standard Aqualyn
- Sloan SF2450

Sink

- Countertop mounted
- Stainless Steel
- Gooseneck swing spout faucet
- 4" blade handles
- Basis: Elkay Dayton Elite Stainless-Steel Single Bowl

Janitor Sink

- Wall Mounted
- Manual Faucet
- Basis: Elkay ESSB2520

Drinking Fountain

- Bi-level design (accessible to those seated and standing)
- Bottle filler
- Vandal-resistant pushbuttons
- Contoured Basin
- One piece vandal-resistant drain
- Integral P-trap
- Basis: Elkay Two Level ADA Model LZSTL8WSLC

Hose bibs

4. FIRE PROTECTION SYSTEMS

A. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

The demolition scope will include removing all the existing sprinkler heads and branch piping. Bulk mains will remain unless they interfere with the architectural program (Assume 50% replacement).

The building will be fully sprinklered per NFPA 13 and will have a manual standpipe system to provide firefighting hose valves and supply the sprinklers on each floor. All exhibits, collection storage, loading dock, and the ante-room will be equipped with a new dry pipe pre-action system with cross-zoned smoke and heat detectors and other spaces will be covered by a wet-pipe automatic sprinkler system.

Fire protection system design guidelines are as follows:

Occupancy Hazard Classifications:

- Building Service Areas: Ordinary Hazard, Group 1.
- Electrical Equipment Rooms: Ordinary Hazard, Group 1.
- General Storage Areas: Ordinary Hazard, Group 1.
- Office and Public Areas: Light Hazard.

Minimum Density for Automatic-Sprinkler Piping Design:

- Light Hazard Occupancy: 0.10 GPM over 1,500 square feet.
- Ordinary Hazard, Group 1: 0.15 GPM over 1,500 square feet.

New sprinkler branch mains and heads will be provided throughout the building. Flow testing and hydraulic calculations will be necessary for determining pipe sizes. Within the heated building envelope, a wet pipe system will consist of a schedule of 40 black steel pipes. Exposed pendent, concealed pendent, and upright heads shall be used as required to accommodate the ceiling type. A new fire pump, jockey pump, and controller will be provided.

Each floor will be its sprinkler zone with a zone control valve and flow switch located at the standpipe connection, with flow switch test fitting and dedicated drainage riser. All existing standpipes will be existing to remain and incorporated into the new fire protection system as needed.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

The building will be fully sprinklered per NFPA 13 and will have a manual standpipe system to provide firefighting hose valves and supply the sprinklers on each floor. All exhibits, collection storage, loading dock, and the ante-room will be equipped with a new dry pipe pre-action system with cross-zoned smoke and heat detectors and other spaces will be covered by a wet-pipe automatic sprinkler system.

Fire protection system design guidelines are as follows:

Occupancy Hazard Classifications:

- Building Service Areas: Ordinary Hazard, Group 1.
- Electrical Equipment Rooms: Ordinary Hazard, Group 1.

- General Storage Areas: Ordinary Hazard, Group 1.
- Office and Public Areas: Light Hazard.

Minimum Density for Automatic-Sprinkler Piping Design:

- Light Hazard Occupancy: 0.10 GPM over 1,500 square feet.
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New sprinkler branch mains and heads will be provided throughout the building. Flow testing and hydraulic calculations will be necessary for determining pipe sizes. Within the heated building envelope, a wet pipe system will consist of a schedule of 40 black steel pipes. Exposed pendent, concealed pendent, and upright heads shall be used as required to accommodate the ceiling type. A new fire pump, jockey pump, and controller will be provided.

Each floor will be its sprinkler zone with a zone control valve and flow switch located at the standpipe connection, with flow switch test fitting and dedicated drainage riser. All existing standpipes will be existing to remain and incorporated into the new fire protection system as needed. All exhibits, collection storage, loading dock, and the ante-room will be equipped with a new dry pipe pre-action system with cross-zoned smoke and heat detectors.

B. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

Fire Pump (requirements may change based on flow test data)

- Capacity to be determined later during the design development phase
- With jockey pump
- 208V/3Ø/60Hz.

Dry Pipe Air Compressor

- Oil-less piston compressor
- Capacity to be determined later during the design development phase208V/3Ø/60Hz

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

Fire Pump (requirements may change based on flow test data)

- Capacity to be determined later during the design development phase
- With jockey pump
- 208V/3Ø/60Hz.

Dry Pipe Air Compressor

- Oil-less piston compressor
- Capacity to be determined later during the design development phase208V/3Ø/60Hz

5. POWER DISTRIBUTION SYSTEMS

A. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

The design of the power distribution system will be based on the following criteria:

- Size new electrical equipment based on anticipated demand load.
- Apply energy conservation measures where feasible.
- Protect occupants and electrical equipment by locating equipment within dedicated spaces, accessible only to qualified personnel. Equipment spaces will include adequate fire ratings, ventilation, and acoustic treatments.
- Maintain electrical service to circuits and equipment outside the project areas as required during construction.

All existing electrical systems including panels, service, devices, lighting, IT/ low voltage fire alarm, including associated busway, wiring and raceways, to be disconnected and removed.

Normal Power Distribution System

The existing electrical service is delivered to the site via an existing transformer vault exterior of the main electrical room at the SE corner of the building. Pending confirmation from the local Utility (CPS), the project will reuse primary cable and conduit; vault and transformer(s). A new secondary electrical service will be provided. While the existing service is to be replaced based on age and condition, its capacity – at 480/277-volt 3-phase 4-wire, 4000-amp, is believed to be adequate for the renovation/ addition. The actual demand load for the existing building shall be confirmed via latter stages of design to validate schematic assumptions.

New secondary electrical service will be supplied at 480/277-volt 3-phase 4-wire via a 3000-amp service entrance duct bank and main circuit breaker main switchboard 'MSB'. The MSB shall include arc flash reduction, owner metering, surge protection and solid state main and branch devices. New utility metering shall also be provided. Shall the existing 4000-amp service be in adequate condition, it may be reused.

The MSB shall power dedicated panelboards for general lighting (480/277-volt), receptacles (208/120-volt), and IT rooms(208/120-volt). A 1200-amp 480/277-volt sub -distribution panel and dedicated branch panels will also be required for all mechanical loads. Each mechanical room will receive individual electrical panels and step-down transformers. The MSB shall also include feeders for the fire pump and emergency power systems – Refer to the Emergency power section of this report.

Branch panelboards for lighting and receptacles shall be located in dedicated electrical closets, two per floor, with the associated 480:208/120-volt step-down transformers. The power distribution system upgrade will include Isolation transformer and dedicated panels for exhibit lighting and AV, roughly one (1) panel per AV equipment room will be required. The food service area will also receive a dedicated transformer and panels. Local/ rack mount UPS will be provided for IT equipment. For tenant spaces, separate metering will be installed. Feeders will be in EMT conduit, branch wiring (MC), and devices.

The electrical distribution system will include grounding for both the current carrying and non-current carrying components of the electrical system to ensure both personnel safety and equipment performance. All metal enclosures will be bonded to the equipment ground. All feeders and branch circuits will be provided with separate equipment grounding conductors as the ground path. Current building codes require electricity metering for individual load types (HVAC systems, interior lighting, exterior lighting, and receptacles circuits). All electrical panels, including main and secondary panels will be equipped with customer electricity metering.

Branch Wiring and Devices

For branch wiring and devices, in general, the existing wiring devices and wiring will be removed and replaced.

New wiring devices and electrical receptacles will be provided throughout based on equipment layout and program. All outlets shall be 5-20R type, with special connections where required per the equipment. The outlet locations and distribution strategies will be designed to maximize flexibility and user connectivity without impeding space function. Branch circuits will be provided for all convenience power, mechanical equipment, staff workstations, AV/ exhibit equipment and all lighting systems. Automatic receptacle control, via occupancy or time clock/ scheduling, shall be provided for at least 50% of receptacles located in private offices, open office, open office, conference rooms, print/ copy rooms, break rooms, classrooms, and at least 25% of furniture mounted individual work stations. Receptacles within conference rooms, meeting rooms and similar spaces less than 1000SF shall be provided for a total receptacle count based on a maximum spacing of 12' on center, although exact locations may be determined by the design. In addition, such spaces shall include a minimum of one (1) floor mounted outlet shall be located within such spaces. At all raised floor areas, in-floor outlets and underfloor distribution shall be used.

Routing of the branch circuits will be concealed in the walls and/or ceilings where possible. Metal-Clad cabling, type MC, will be permitted for branch circuit wiring where concealed within partitions and above ceilings for lighting fixtures. Dedicated neutrals for each branch circuit will be provided. Liquid-tight flexible metal conduit will be used at motor and other vibration transmissive locations.

Variable frequency drives (VFDs) minimize energy consumption by modulating speed and torque as required to match the load on the equipment. Therefore, VFDs are recommended on all integral horsepower (HP) mechanical equipment to minimize energy consumption due to motors.

Emergency Power Systems

There is an existing, relatively new and in fair condition emergency generator and automatic transfer switch (ATS). The existing equipment is Generac, 150KW, diesel sub-based tank, bypass isolation ATS. At owner option, pending capacity, location and coordination with new work, this may be reused to power all new branch panels and circuits as described below. If not reused, it shall be disconnected and removed.

The following shall scope a emergency power system and be applicable to the reuse of the existing:

Building codes will require an on-site emergency power supply system (EPSS) be provided for this project. This is based on code mandated back up power to the smoke evacuation and tentative needs for the fire pump and elevator(s). The EPSS will consist of a generator located on grade to serve life safety, legally required and standby loads in the event normal power is lost.

Dedicated automatic transfer switches (ATS) and panel(s) will be required for each branch – Life safety, legally required and standby. In this project, life safety shall include egress lighting and fire alarm; legally required shall include fire pump, smoke evacuation, elevators – pending configuration of egress and accessibility, and other loads to be determined. Standby loads are optional and as selected by the Owner.

A preliminary load assessment has designated the following as potential standby back up power loads:

- IT/Security equipment, including supporting HVAC systems

- Freeze protection/minimal heat
- Domestic and hot water, in support of food service and laundry, including booster pumps and gas water heater
- Food service refrigeration equipment and minimal serving
- Sump pumps and sewage ejectors
- Building Automation Systems to support equipment noted

Emergency standby loads are yet to be determined. Diesel fuel is recommended by to be confirmed by the Owner and local jurisdiction. For planning purposes, the following generator sizes may be used:

- Code minimum – egress lighting only: 50KW. Reuse 150KW possibly.
- Code minimum with fire pump and smoke evac: 200-300KW.
- Enhanced/ select areas or systems: 500-800KW
- Entire building: 2000KW
- In each option- The emergency power supply system (EPSS) shall also include dedicated ATS, panels and step-down transformers, plus an emergency distribution panelboard. These shall be dedicated per life safety and optional loads.

All emergency panelboards will be provided with transient voltage surge protection devices (SPDs).

Renewable Energy

At this time, renewable energy/ photovoltaic (PV) systems have not been discussed. An onsite PV system is not currently foreseen but may be included if directed by the Owner. Inclusion will impact the service entrance ratings, disconnects, metering, and need to meet utility requirements.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

Generally, the Alternate B power distribution will be similar to those of Alternate A systems; however, differences are noted below. Refer to Alternate A systems description for this work. All other schematic design proposed work shall apply but modified for the smaller building.

Generally Alternate B shall require a new CPS electrical service and will require lower equipment ratings. For new electrical utility connections, the new primary electrical service will be delivered from nearby CPS electrical lines to pad mount/ utility transformer. The project shall provide primary cable, conduit, and transformer foundation.

The secondary electrical service for Alternate B shall be rated 1600-amp, 480/277-volt 3-phase 4-wire. The generator may not be reused and has lower capacities as noted below.

For planning purposes, the following generator sizes may be used:

- Code minimum – egress lighting only: 50KW.
- Code minimum with fire pump: 150-250KW.
- Enhanced/ select areas or systems: 300-600KW
- Entire building: 1000KW
- In each option- The emergency power supply system (EPSS) shall also include dedicated ATS, panels and step down transformers, plus an emergency distribution panelboard. These shall be dedicated per life safety and optional loads. .

B. PROPOSED EQUIPMENT

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

- 3000-amp 480/277V Service entrance and main distribution switchboard MSB with integral SPD and demand metering
- 1200-amp 480/277V mechanical sub-distribution panel and branch panels with step down transformers in each mechanical room
- 480/277-volt and 208/120-volt panels for sub-distribution and branch circuit loads
- Multiple 480:208-volt step down transformer(s), six (6) branch closet distribution locations with 480/277-volt and 208/120-volt
- Dedicated step down transformers and branch panels for each of food service and AV equipment location
- VFDs on all integral horsepower mechanical equipment
- Branch circuits, wiring devices, and equipment connections as required
- Arc flash labeling of all equipment
- Generator, fuel supplies, ATS's, panelboards with SPD
- Electricity metering
- Receptacle control

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

- 1600-amp 480/277V Service entrance and main distribution switchboard MSB with integral SPD and demand metering
- 800-amp 480/277V mechanical sub-distribution panel and branch panels with step down transformers in each mechanical room
- 480/277-volt and 208/120-volt panels for sub-distribution and branch circuit loads
- Multiple 480:208-volt step down transformer(s), four (4) branch closet distribution locations with 480/277-volt and 208/120-volt
- Dedicated step-down transformers and branch panels for each of food service and AV equipment location
- VFDs on all integral horsepower mechanical equipment
- Branch circuits, wiring devices, and equipment connections as required
- Arc flash labeling of all equipment
- Generator, fuel supplies, ATS's, panelboards with SPD
- Electricity metering
- Receptacle control

6. LIGHTING SYSTEMS

A. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

In general, the existing lighting and controls will be removed and replaced.

New lighting and control systems will be provided throughout and incorporate high color rendering and efficient light emitting diode (LED) technology. A combination of ambient and decorative fixtures will be used in public spaces while the back of house and utility rooms will be provided with linear fixtures. Exhibits will be supplemented by special accent exhibit lighting, as determined by the Exhibit designer.

New automated lighting controls will also be provided for all public, staff and exhibit spaces. Controls will be per code, including a network control system for open areas and local controls for smaller spaces. Vacancy sensors with manual on/off/ dimming will be provided in individual offices, and small conference rooms. Larger conference rooms and audio-visual spaces will use dimming scene stations that recall preset scenes and allow for user raise/ lower/ on/ off override. Incidental use rooms such as storage and utility rooms will utilize occupancy sensors and/ or timers. For circulation, public spaces and work areas, a networked lighting control system will be provided. The networked system will use a combination of centralized panel-based and distributed relays and inputs via time clock, the BAS, occupancy/ vacancy and photo sensors to determine lighting status. The networked system. The distributed relays minimize zone wiring back to the central location and are easily expanded for rooms with multiple zones and/ or dimming in addition to switching control. Panel based relays will be used where a room/ area requires a large quantity of zones.

It is expected exhibit spaces will require an architectural dimming system inclusive of time of day scheduling, multi-scene presets, wall station over-rides and occupancy / vacancy sensing.

Egress Lighting

Emergency egress lighting will be provided via selected fixtures connected to the generator/ emergency power system and branch panelboards. These fixtures will be provided in all corridors and large work areas, as well as stairways, bathrooms and outside all exterior egress doors as required by the Code. Fixtures that are illuminated at all times to serve as security “night lights” may also be included, if desired. Exit signs will be of the red or green LED type.

Site and Landscape Lighting

Exterior lighting will be selected and located to meet the architectural program and enhance safety and security at night. At minimum, egress fixtures will be located outside all egress doors. Embellished exterior lighting

The target lighting level will be a balance between the need for increased light levels to support enhanced safety and security, and, the desire to minimize light trespass and glare issues per Township regulations. All exterior lighting fixtures will be selected with consideration given to minimizing light pollution and trespass, including full cutoff reflectors. Exterior lighting will be automatically controlled via photosensor on/ time clock off that incorporates astronomical sun rise/sunset data for on/off. All lighting control programming, presets, and scheduling must be confirmed by the Owner.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

It is not expected that Alternate B lighting to be significantly different than Alternate A systems, just reduced for the smaller building size. Refer to Alternate A systems description for this work.

B. PROPOSED EQUIPMENT

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

- Ambient, accent, and decorative interior lighting fixtures
- Egress lighting fixtures and exit signs
- Building mounted exterior lighting fixtures
- Pole and bollard building mounted exterior lighting fixtures for parking and pathways
- Automated controls including vacancy, occupancy, photosensors and override switches
- Central/ distributed modular control systems
- Networked controls where multiple control inputs are required
- Manual dimmers/ preset scene selectors for space control where multiple zones are provided

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

- See above.

7. FIRE ALARM SYSTEMS

A. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

There is an existing and in fair condition fire alarm system. The existing equipment is Simplex 4100U addressable type with speaker/ mass notification devices. Several VESDA systems were also observed. At owner option, pending capacity, location and coordination with new work, this may be reused and reconfigured to protect all spaces. Generally, head end equipment would be reused with new wiring and devices. If not reused, it shall be disconnected and removed.

The following shall scope a new fire alarm system and be applicable to the reuse of the existing:

The design of the Fire Alarm System will be based on the following design criteria:

- Comply with Codes based on intended occupancy of the building.
- Alert building personnel of alarm conditions.
- Ease of maintenance, expansion, and flexibility for future space changes.

The building will be protected via a new addressable type alarm and detection system. The control panel will be located at the Basement level with an annunciator panel at the Main Entry. The system shall include audio-visual notification in all common areas and restrooms, automatic smoke and heat detectors, elevator recall, and interfaces to HVAC, fire protection and security systems. Interfaces will also be provided at kitchen equipment where required by code. A voice evacuation system is not code required but doing so would provide added functionality as compared.

Based on the existing building capabilities, a new voice system with mass notification, and, multiple VESDA systems, are recommended.

Current codes require minimal levels of emergency responder radio coverage (ERRC) throughout the majority of the structure. Signal strength is impacted by the below grade areas and amount of concrete impeding signal strength, which is not known until construction is significantly underway / mostly complete. Coordination with the local EMS responders is also required to determine exact ERRC signal requirements. Therefore, for schematic design, the base scope shall be installation of the infrastructure for a future system and signal strength testing. An alternative bid shall be provided shall the signal testing determine signal amplification is required to meet minimum levels.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

It is not expected that Alternate B fire alarm to be significantly different than Alternate A systems, just reduced for the smaller building size. Refer to Alternate A systems description for this work. Note the option to reuse is no longer available for Alternate B. It is recommended new equipment interface with the existing building, either via direct communication or, at minimum, be of similar make and model for future compatibility.

B. PROPOSED EQUIPMENT

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

- New FACP, control equipment and annunciators, as required.
- Manual pull stations, smoke and heat detectors - addressable type
- ADA compliant audio/strobe units.

- System interfaces
- VESDA
- Mass notification
- ERRC infrastructure

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

- See above.

8. TELECOMMUNICATIONS SYSTEMS

A. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

In general, the existing telecommunications, security and AV equipment will be removed and replaced. If deemed appropriate and per coordination with new work, the existing utility connections may be reused at Owner option.

The existing building IT services are not in dedicated spaces. We expect the renovation will incorporate dedicated equipment spaces per industry standard. IT and security are expected to share space, while AV will be in dedicated spaces.

It is anticipated that the telecommunications utility interface will be via a new underground ductbank routed to a utility tie in point on the site. An underground ductbank will be required from the tie in point to the Building Distribution Frame (BDF), tentatively located on the lowest level with intermediate distribution frames/ closet (IDF) on each floor. Two (2) 4"C with innerduct are recommended for the utility interface and the backbone riser. Empty conduit/ IT connectivity will also be required for each AV closet.

The location of the service and distribution cabling shall be arranged to provide minimum separation from electrical cables, most notable medium voltage (over 1000-volt) vs. copper backbone, to limit interference. Power distribution cables in close proximity to telecommunications cables have the potential to disrupt signals via electromagnetic interference (EMI) on copper IT wiring. Fiber is not impacted by proximity electrical power lines.

Head end equipment, device jacks, and cabling will be provided as required by the program. At the BDF and each IDF, floor mounted equipment racks, plywood backboards, cable tray and cooling/ ventilation will also be provided. UPS will be rack mounted within each equipment rack.

Devices will be located to provide telephone and data connections at each office, commons space, wifi-antennae and classroom, as required, and will include an outlet box and conduit to accessible ceilings.

A distributed antennae system (DAS) will also be required. Selection of a system (fiber based or Cat6) will drive cost and system requirements.

The UTSA and ITC will need to commission an IT Integrator to evaluate the telecommunication infrastructure needs for the ITC. That IT integrator will identify the needed head end network system, devices and wireless antennae distribution needs as well as cabling type (fiber or cat6e or cat 6A) appropriate for the final facility design. The following is a summary of what is needed, at minimum, to inform the building construction cost estimate:

- Telecomm service: Two (2) new fiber services from the street into the building. Each new fiber line shall be from a different supplier to offer redundancy. With ticketing, security and building systems dependent on internet access, a back-up is suggested, should a vendor experience a significant outage.
- A wireless distribution system with a separate network switch in a distinct rack. Assume a WAP located every 40ft within the building.
- A voice network switch and server in a distinct rack shared only with the computer network. Include (50) voice cat6 ports to accommodate staff desks, conference rooms, mechanical rooms, lounges and education areas.
- A telecommunication IDF shall be located on each floor sized approximately 6ft x 8ft. Fiber backbone to each closet.
- A data server and network switch in a distinct rack or shared with voice network only. Include (100) data cat 6 ports to accommodate staff desks, printers and other devices outside of the exhibit area.
- Dedicated power panel and 480:208/120-volt transformer.

- Racks, backboards and grounding. UPS to be rack mounted, one per rack.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

It is not expected that Alternate B IT and security to be significantly different than Alternate A systems, just reduced for the smaller building size. Refer to Alternate A systems description for this work. Note the option to reuse is no longer available for Alternate B. It is recommended new equipment interface with the existing building, either via direct communication or, at minimum, be of similar make and model for future compatibility.

B. PROPOSED EQUIPMENT

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

- Head end IT, wifi, CCTV, access control and DAS
- Conduit to site interface, including spare.
- Plywood backboards as required.
- Power connections to all head end equipment.
- Outlet box and conduit with pullstring from accessible ceiling to device locations.
- Devices and cabling to all peripherals and patch panels
- Equipment racks with fiber/ copper connectivity, switches and patch panels.
- UPS at each equipment rack, mounted local to the rack.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

- See above.

9. SECURITY SYSTEMS

A. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

The UTSA and ITC will need to commission a risk assessment by a reputable security company who has completed several similar institutions within the past 5 years. That risk assessment will identify the needed system, devices and type of personnel for the final facility design. The following is a summary of what is needed, at minimum, to inform the building construction cost estimate:

- Dedicated security office of at least 200 SF where security staff will be stationed between patrols.
- Security system head end shall be located in this room. System shall be connected to (6) 36" LCD monitors to rotate views of all active cameras in vignettes.
- Include (10) exterior PTZ cameras.
- Include (10) interior PTZ cameras and (30) dome cameras between the floors for monitoring stairwells, elevators, corridors, entrances and public spaces.
- Include motion detection at all exterior entrances or openings.
- Include glass break monitors on all first floor windows or glass doors.
- Include card reader access at all exterior doors.
- Include card reader access to the elevators.
- Include card reader access to offices, storage, ticketing, store, café, exhibit, collection and education areas. Key locks are suitable for mechanical spaces, closets, theaters, restrooms.
- Provide a panic button at the ticketing desk, cashier stations, collection work room, loading dock.
- Racks, backboards and grounding. UPS to be rack mounted, one per rack.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

It is not expected that Alternate B Security Systems to be significantly different than Alternate A systems, just reduced for the smaller building size. Refer to Alternate A systems description for this work.

B. PROPOSED EQUIPMENT

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

- Conduit and fiber to main IT room site interface.
- Equipment racks, grounding plywood backboards.
- Power connections to all head end equipment.
- Outlet box and conduit with horizontal cable to device locations.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

- See above.

10. LIGHTNING PROTECTION SYSTEMS

A. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

While not required by code, providing a Lightning Protection Systems (LPS) system should be considered to mitigate damage shall a lightning strike hit the building. Considerations include minimizing damage to sensitive electronics or expensive equipment and to protect the structure. If desired by the Owner, the building should be provided with a lightning protection system.

Solid air terminals of at least ½ thickness will be provided as appropriate for the roof(s) and all roof top equipment. Main and bonding conductors will be provided as will down conductors to multiple separate driven ground rods around the building perimeter. Test wells are required at each rod location.

Horizontal and down conductors shall be routed exposed. Down conductors shall be either interior or exterior to the building. Mounting, supports, and conductor type will be coordinated with the roof layout and material. The use of copper vs aluminum will be coordinated with roofing material to minimize catalytic action.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

It is not expected that Alternate B Lightning Protection Systems to be significantly different than Alternate A systems, just reduced for the smaller building size. Refer to Alternate A systems description for this work.

B. PROPOSED EQUIPMENT

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

- Air terminals (CU or AL)
- Ground rods (CU or AL)
- Interconnecting conductor (CU or AL)
- Test wells

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

- See above.

11. TELECOMMUNICATIONS SYSTEMS

A. PROPOSED WORK

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

It is not expected that Alternate B Telecommunications Systems be significantly different than Alternate A systems, just reduced for the smaller building size. Refer to Alternate A systems description for this work.

B. PROPOSED EQUIPMENT

1. ALTERNATIVE A: ADAPTIVE REUSE OF EXISTING BUILDING

- Conduit and fiber to site interface, including spare conduit and innerduct.
- Equipment racks, grounding plywood backboards.
- Power connections to all head end equipment.
- Outlet box and conduit with horizontal cable to device locations.
- Cable tray in the equipment rooms and for cabling distribution.

2. ALTERNATIVE B: NEW BUILDING ON NEW SITE

- See above.

12. APPENDICES

A. CODES AND STANDARDS

B. HVAC DESIGN CRITERIA

C. PLUMBING DESIGN CRITERIA

D. FIRE PROTECTION DESIGN CRITERIA

E. GLOSSARY

APPENDIX A — CODES AND STANDARDS

All mechanical and electrical systems will be designed in accordance with applicable provisions of the following (effective October 1, 2018):

- 2018 International Building Code, IBC
- 2018 International Existing Building Code, IEBC
- 2018 International Mechanical Code, IMC
- 2018 International Plumbing Code, IPC
- 2018 International Fuel Gas Code, IFGC
- 2018 International Energy Conservation Code, IECC
- 2018 International Fire Code, IFC
- NFPA 13, Standard for the Installation of Sprinkler Systems, 2016 Edition.
- NFPA 14, Standard for the Installation of Standpipe and Hose Systems, 2016 Edition.
- NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, 2016 Edition.
- 2017 National Electrical Code, NEC
- NFPA 72, National Fire Alarm and Signaling Code, 2016 Edition.
- 2018 San Antonio Property Maintenance Code (based on the 2018 International Property Maintenance Code)

APPENDIX B — HVAC DESIGN CRITERIA

The outdoor design climactic conditions are based on Trenton Mercer Airport weather data from the 2017 ASHRAE Handbook – Fundamentals

Summer (Peak-cooling):	98.1°F DB/73.6°F WB (ASHRAE 0.4% cooling design)
	The HVAC systems can provide air at 55°F dew point at this peak-cooling day. During peak-dehumidification conditions the dew point will rise to 57°F.
Dehumidification:	77.4°F WB/81.1°F DB (ASHRAE 0.4% dehumidification design)
Winter (Peak-Heating):	26.7° F DB (ASHRAE 99.6% design)

The design for comfort conditions for all occupied spaces are as follows:

Temperature:	70° F DB heating (occupied) 75° F DB cooling (occupied)
Relative Humidity:	uncontrolled, typically
Ventilation Rate:	Per IMC
Exhaust Rate:	75 CFM per toilet/urinal
Airflow Rate:	As required for cooling load
Pressurization:	Positive with respect to outdoors
Occupancy:	Per architectural plans
Lighting load:	1.0 watts per square foot
Equipment load:	1.5 watts per square foot

The design for archival conditions for all spaces are as follows:

Temperature:	70° F DB heating (occupied) 75° F DB cooling (occupied)
Relative Humidity:	50%
Ventilation Rate:	Per IMC
Exhaust Rate:	75 CFM per toilet/urinal
Airflow Rate:	As required for cooling load
Pressurization:	Positive with respect to outdoors
Occupancy:	Per architectural plans
Lighting load:	1.0 watts per square foot
Equipment load:	1.5 watts per square foot

Acoustic design criteria, is taken from 2019 ASHRAE Handbook – HVAC Applications, Chapter 49 *Noise and Vibration Control* and is as follows:

Executive & Private Offices	NC/RC 30
Conference/ Meeting Rooms	NC/RC 30
Teleconference Rooms	NC/RC 25
Open Plan Offices	NC/RC 40
Corridors/ Lobbies	NC/RC 40
Drama Theaters, concert, recital hall	NC/RC 20
Music Teaching Studios	NC/RC 25
Music Practice Rooms	NC/RC 30

Testing/ Research Lab	NC/RC 50
Lab with extensive communication	NC/RC 45
Group Teaching Lab	NC/RC 35
General Assembly w/ Music	NC/RC 25
Classrooms	NC/RC 30
Large Lecture with Speech Amp	NC/RC 30
Large Seating capacity spaces	NC/RC 50
Service/Support Areas	NC/RC 40
Auditorium	NC/RC 35

The design conditions for electrical and mechanical areas are as follows:

Temperature:	65° F DB minimum
Airflow Rate:	Ventilated for 10° F above ambient maximum, or, 5 air changes per hour minimum
Relative Humidity:	Uncontrolled
Pressurization:	Positive or neutral with respect to outdoors and adjacent areas

The sizing criteria for the following system components will be:

Equipment Selection:	10% safety factor applied to cooling coils and airflow 30% safety factor applied to heating equipment
Supply Duct:	Pressure drop not more than 0.08 inch w.c./100 feet
Return Duct:	Pressure drop not more than 0.08 inch w.c./100 feet
Exhaust Duct:	Pressure drop not more than 0.08 inch w.c./100 feet
Outside Air Duct:	Pressure drop not more than 0.08 inch w.c./100 feet
Duct connected directly to inlets and outlets:	Velocity not more than 500 ft/min
Inlets and Outlets:	Devices selected for not more than NC-20 in offices Devices selected for not more than NC-30 in other areas
Piping:	Velocity not more than 6 ft/sec

Relative humidity will be uncontrolled except in Exhibits, Archives & Special Collections (2nd floor) and the Ante-Room. In these areas, additional equipment will be provided to limit the maximum humidity in the warmer weather as well as to add humidity in cooler weather. Building pressurization will be positive with respect to the outdoors.

APPENDIX C — PLUMBING DESIGN CRITERIA

The minimum pressure available at shower heads, installed 6'-6" AFF shall be 40 psig

The minimum pressure available at water closet and urinal flush valves will be 35 psig.

The maximum system pressure at plumbing fixtures shall be 80 psig at no-flow conditions.

The maximum flow rate in supply piping in general shall be limited to 8 fps.

The maximum flow rate in supply piping serving quick close devices (washing machines, flush valves, etc.) shall be limited to 5 fps.

The maximum velocity through systems with continuous flow, such as recirculation systems, is 2 fps.

APPENDIX D — FIRE PROTECTION DESIGN CRITERIA

Occupancy Hazard Classifications:

- Building Service Areas: Ordinary Hazard, Group 1.
- Electrical Equipment Rooms: Ordinary Hazard, Group 1.
- General Storage Areas: Ordinary Hazard, Group 1.
- Office and Public Areas: Light Hazard.

Minimum Density for Automatic-Sprinkler Piping Design:

- Light Hazard Occupancy: 0.10 gpm over 1,500 square feet.
- Ordinary Hazard, Group 1: 0.15 gpm over 1,500 square feet.

Maximum Protection Area per Sprinkler:

- Office Spaces: 225 sq. ft.
- Storage Rooms: 130 sq. ft.
- Mechanical Equipment Rooms: 130 sq. ft.
- Electrical Equipment Rooms: 130 sq. ft.
- Other Areas: According to NFPA 13 recommendations.

Additional considerations:

- The system utilizes a dry pipe to protect and serve the attic as such the more remote area will be increased by 30% while still maintaining the density.
- The attic has a peaked roof and as such the more remote area will be increased by 30% while still maintaining the density.
- Concealed spaces will require sprinkler protection.

The following list of fire extinguishing systems, and their descriptions are as follows, and are taken from NFPA 914, 2019 edition:

Wet-pipe automatic sprinkler system

Description:

- A permanently piped water system under pressure, using heat-actuated sprinklers. When a fire occurs, the sprinklers exposed to the high heat operate and discharge water individually to control of extinguish the fire.

Comments:

- This system automatically detects and controls fire. It should not be installed in spaces subject to freezing and might not be the best choice in spaces where the likelihood of mechanical damage to sprinklers or piping is high, such as in low-ceiling areas, and could result in accidental discharge of water. Where there is a potential for water damage to contents, such as books, works of art, records, and furnishings, the system can be equipped with mechanically operated on-off or cycling heads to minimize the amount of water discharged. In most instances, the operation of only one sprinkler will control a fire until the arrival of fire fighters. Often the operation of a sprinkler system will make the use of hose lines by fire fighters unnecessary, thus reducing the amount of water put onto the fire and the subsequent amount of water damage.

Dry-pipe automatic sprinkler system

Description:

- A system that employs automatic sprinklers attached to a piping system containing air under pressure. When a sprinkler operates, the air pressure is reduced, thus allowing the dry-pipe valve to open and to allow water to flow through any opened sprinklers.

Comments:

- This system can protect areas subject to freezing. Water supply must be in a heated area.

Standpipe and hose system

Description:

- A piping system in a building to which hoses are connected for emergency use by building occupants or by the fire department.

Comments:

- This system is a desirable complement to an automatic sprinkler system. Staff must be trained to use hoses effectively.

APPENDIX E — GLOSSARY

AHU – Air Handling Unit – A piece of mechanical equipment usually connected to ductwork, to move air, which may also clean and condition the air.

Air Terminal – in lightning protection systems, a strike termination device that is a receptor for lighting strikes and tied into the lighting protection system to ultimately dissipate the strike to the earth through a ground terminal.

BTU – British Thermal Unit – an I-P unit of heat energy, roughly equivalent to the energy produced by a single wooden match.

BTU/h – British Thermal Unit per Hour – in the I-P system the amount of heat energy produced or consumed in an hour.

CFM – Cubic Feet per Minute – an I-P measure of volumetric flow rate of a fluid in a conduit. CFM is typically used to denote airflow.

EMT – Electrical Metallic Tubing – thin-wall coasted steel electrical conduit. EMT is not threaded but threaded couplings can be clamped to it such as to connect to FMC.

FMC – Flexible Metallic Conduit – flexible electrical conduit made by the helical coiling of a self-interlocked ribbed strip of aluminum or steel. FMC is not water proof, but there is a waterproof version LFMC.

GPM – Gallons per Minute – an I-P measure of volumetric flow rate of a fluid in a conduit. GPM is typically used to denote water flow.

MBH – Thousands of BTU per Hour – In the I-P system of measurement Roman numerals are used as prefixes. In this case M is the Roman numeral for 1000.

Fc- Foot-candle. Lighting level/density within a space.

fpm – feet per minute – an I-P measure of velocity of a fluid in a conduit. Often fpm is related to air flow in duct.

fps – feet per second – an I-P measure of velocity of a fluid in a conduit. Often fps is related to water flow in a pipe.

Ground Terminal – in lightning protection systems a ground rod plate or conductor that is installed to connect the air terminals and lightning protection system to ground to dissipate a strike.

IDF – Intermediate Distribution Frame – A cable rack that interconnects and manages the telecommunications wiring between an MDF and workstation devices.

I-P – Inch-Pounds – system of measurement which utilizes English units for length, mass, volume, temperature, etc. the units of which are inches, pounds, gallons, and degrees Fahrenheit respectively. This system is typically used in mechanical systems, as opposed to SI which is used in electrical systems.

kW – Kilowatt – In the SI system of measurement prefixes are used to indicate multiples of units in lieu of using scientific notation. In this case a kW is equal to 1,000 W.

LFMC – Liquidtight Flexible Metallic Conduit – flexible electrical conduit made by the helical coiling of a self-interlocked ribbed strip of aluminum or steel as is FMC but is coated with a waterproof plastic coating.

MC – Metal Clad Cable.

MDF – Main Distribution Frame – A cable rack that interconnects and manages the telecommunications wiring between itself and any number of IDFs.

MDP – Main Distribution Panel – A component of the electrical distribution system which divides the electrical power feed in to subsidiary circuits, and protecting each circuit with a circuit breaker and enclosed within a common enclosure.

MW – Megawatt – In the SI system of measurement prefixes are used to indicate multiples of units in lieu of using scientific notation. In this case a MW is equal to 1,000,000 W.

SI – from Le **S**ystème **I**nternational d'Unités – system of measurement which utilizes metric units for length, mass, volume, temperature, etc. the units of which are meters, grams, cubic centimeters, and degrees Centigrade respectively. This system is typically used in electrical systems, as opposed to I-P which is used in mechanical systems.

Ton – 12,000 BTU/h – in the refrigeration industry a Ton is a measure of cooling load or capacity, and was at one time related to the cooling capacity provided by 1 ton (2,000 lbs.) of ice. 1 ton of ice could provide 288,000 BTU of cooling in a 24 hour period, which in turn became 12,000 BTU/h.

TVSS – Transient Voltage Surge Suppressor – An electric surge protection device listed to protect the electrical system of a building, or portions thereof, from surges produced upstream of the TVSS.

VA – Volt-Ampere – a unit of apparent power produced or consumed and is typically used in alternating current electrical systems. In direct current systems VA equals W.

W – Watt – a SI unit of power produced or consumed and is typically used in electrical systems or equipment. This unit include time as part of its definition and can be directly converted to BTU.

MEP Engineering Report

University of Texas San Antonio Institute of Texan Cultures - Feasibility Study Comparison of Renovation vs. New Building

San Antonio, TX

UTSA INSTITUTE OF
TEXAN CULTURES
A Smithsonian Affiliate

Submitted to:

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March 06, 2023

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Table of Contents

1. INTRODUCTION

The Institute of Texan Cultures (ITC) at the University of Texas at San Antonio (UTSA) is a museum located in the Texas Pavilion at HemisFair Park in Downtown San Antonio. It currently functions as a multicultural education center with exhibits, programs, and special events. The current ITC building is composed of three floors.

This report outlines the recommended schematic design strategies for the mechanical and electrical scope of work specifically related to a third proposed location for the new Institute of Texan Cultures facility.

This alternative includes renovating the US District Courthouse and Training Center located on 655 E César E. Chávez Blvd. to restore them into a mixed-use facility within approximately 102,000 square feet (SF) of the existing shells. The proposed architectural design will still consist of four levels and feature a combined quadruple-height atrium in the Courthouse and single floor educational center in the exiting Training Center.

The interior spaces will be programmed to include an Atrium, Museum Class A spaces (includes Center for Archeological Research (CAR), Permanent and Temporary Exhibit, Theater, Offices, Education Center, Café, and Retail. As a part of the renovation, two below-grade sections and one covered loading dock will be added at the back of the Courthouse building. The loading dock and the two new sections will add another 12,000 and approximately 5000 SF to Museum Class A spaces, respectively. The new work will also include building an approximately 3400 SF of local utility plant (2500 SF indoor and 900 outdoor) in the parking area at the back of the Courthouse building.

Mechanical systems include heating, ventilation, air conditioning (HVAC), plumbing, and fire protection systems. Electrical systems include power distribution (normal and emergency), lightning protection, lighting (normal and emergency), fire alarm, telecommunications, security, and audio-visual systems.

A Site visit to the building was conducted on January 10th, 2023. The spaces within the building, mechanical rooms, and rooftop equipment locations were surveyed in support of this Schematic Design Report.

2. HVAC SYSTEMS

A. PROPOSED WORK

The demolition scope in the main courthouse will remove all existing mechanical systems, including multi-zone units, ductwork, air devices, pumps, piping, and controls (down to bare structure with exterior walls). The demolition plan in the adjacent Training Center is limited to removing major Air Handling Units (AHUs), boilers and pumps currently serve the Training Center. The main ductwork, and risers are existing to remain with modifications. The ductwork distribution system will be reworked and reconfigured to the extent required to serve the renovated areas properly and efficiently, to be determined in the next design phases.

After renovation, the interior spaces will be divided into four major sections including Museum Class A, Entrance Atrium, General spaces (Offices, Theater, Café, and Retail), and Education Center. There will be thermal transition zones between Museum spaces and all other adjacent areas.

The design of the HVAC system will be based on the following criteria:

- The interior design conditions will be for archival storage (70 degrees +/- 4 degrees; 50% Relative Humidity +/- 10%) in Museum Class A spaces. All other areas will be maintained at comfort conditions (70 degrees +/- 4 degrees; uncontrolled Relative Humidity)
- The equipment is sized based on the anticipated ventilation, cooling, and heating block loads.
- The dedicated spaces are required for the HVAC equipment to protect occupants and equipment.
- Where needed, equipment spaces will include adequate fire ratings, ventilation, and acoustic treatments.

A summary of the intended space programming, allocation and the proposed HVAC design in the circular courthouse building is provided in Table 1:

Table 1 - Summary of the intended space programming in the circular, allocation and the proposed HVAC design

	Circular Courthouse Building							
	70 degrees, RH 50%	70 degrees, RH Uncontrolled						
	Museum Class A	Atrium	Offices	RR	Café	Retail	Theater	Total SF
Basement	40400	0	0	520	0	0	0	40920
1st Floor	7334	7890	760	1040	800	800	2120	20744
2d Floor	9500	0	1730	1040	0	0	0	12270
3rd floor	0	0	3970	1040	0	0	0	5010
Total SF	57234	7890	6460	3640	800	800	2120	78944

While Training Center has a dedicated boiler room, the Courthouse building currently relies on an outsourced central utility plant for its heating loads. The cooling source for both Courthouse and Training Center is the chilled water supplied by the central plant. The future accessibility to the current central heating and cooling resources is unknown.

In light of unclear availability, the future ITC building and Education Center will be disconnected from the central system and connected to a new, dedicated local plant. The local utility plant will be built in the parking area at the back of the Courthouse. The heating source for the renovated ITC buildings will be hot water generated by a set of Four (4) gas fired condensing hot water boilers with an individual capacity of 1200 MBh. The efficiency of new boilers can be over 90%, significantly reducing energy use and fossil fuel emissions.

Cooling for the renovated ITC building will be provided by two (2) new water-cooled chillers, 300 tons each (sized at 67% of load). All chillers will be installed in the future utility room in the parking area. A three-cell cooling tower, each cell sized at 300 tons, will be located outside and adjacent to the future utility room.
New gas and domestic cold-water lines will be extended from the nearest existing service point to the future utility room to serve the equipment installed in the future utility room. We assumed that the existing natural gas and water service capacity is adequate.

Furthermore, the future building will add two below-grade sections at the back of the Courthouse, one on the east, and one on the west, separated by a covered loading dock. Spaces will be dedicated to building in-house mechanical rooms within these two below-grade sections. This way, the buildings will have a centralized equipment room that houses the major mechanical and electrical equipment. All air handling units (AHUs) will be located in designated areas per future mechanical drawings. The outside fresh air will be brought in through drilling wells or louvers on the below-grade external retaining walls and ducted to each AHUs. The same methodology will be applied to exhaust air from AHUs and other equipment in the future mechanical rooms.

Museum Class A

Museum Class A, with a total of approximately 57,000 SF, includes Loading Dock, CAR, Permanent and Temporary Exhibits. These areas are designed for archival storage conditions and will be served by three (3) 70-ton air handling units (AHU-1, AHU-2, and AHU-3). The future below-grade mechanical rooms, will house all AHUs, including AHU1, AHU2, and AHU3. Three dedicated gas fired steam boilers will also be provided in the same locations for humidification. Base scope would include extending natural gas piping to the new boilers. We assumed that the existing natural gas service capacity is adequate.

The Museum space loads throughout the building will be split between the three units. AHU1 and AHU2 will serve the Loading Dock, CAR spaces, Exhibit Storage, and Temp Exhibits spaces on the basement level, AHU3 will serve the exhibit areas on the first and second floors. The outside air will be ducted to each unit.

The discharged primary air will be ducted throughout to serve all the Museum Class A spaces via a traditional overhead distribution system. Ceiling return registers will be provided for the museum spaces on the basement and first floors. In the exhibit on the second floor, which is double-height, floor return grilles through a raised floor plenum are being specified to overcome thermal stratification. This combination of high zoned supply and underfloor plenum return creates an overall hybrid system that utilizes the best features of both systems to meet the unique needs of double-height areas in the museum spaces. Minimum 12-inch deep raised floor plenums will be provided in the areas on the second floor with flexible walls. The position of return grilles and routing will be flexible to accommodate the proposed architectural design. The underfloor plenum also provides a flexible pathway for electrical and low-voltage cabling.

Exhibits and loading spaces will be divided into 16 control zones. CAR and Loading dock spaces will each be divided into 6 control zones. Airflow, humidity and the zone temperature and pressure will be controlled by a DDC controller. Each control zone will be served by a Variable Air Volume (VAV) box with electricr reheat g coil and humidification. All VAV boxes with humidifiers will be located in the future mechanical rooms.

Special acoustic considerations will be taken, such as separate return air takeoffs and sound traps, as will be recommended by the acoustician. Adequate precautions must be taken to prevent leakage by inspecting and sealing all openings in the walls where electrical, plumbing or other items may pass from the plenum into the wall.

A building wide BAS system will be furnished and installed. All equipment will be provided with BACnet or LonWorks cards for intercommunication. The system will be web-based and provide alarms and control through mobile platforms (e.g., smartphones). Occupiable spaces will be provided with carbon dioxide (CO_2) sensors. CO2 sensors will allow for demand-controlled ventilation (DCV) and facilitate reductions in the amount of outside air brought into the building when the space is underutilized.

Condensate piping for all mechanical equipment shall be provided and handled via a gravity condensate system.

Atrium

The proposed architectural design features a quadruple-height entrance atrium of approximately 7,900 SF. The atrium is designed for comfort and will be served by a 50-ton VAV AHU (AHU4) with energy recovery. AHU4 will be located in one of the future below-grade mechanical rooms, and outside air will be ducted to the unit. The outside fresh air will be brought in and exhausted through a combination of air wells and louvers on the below-grade external retaining walls.

The required airflow at the peak load is estimated to be 20000 cubic feet per minute (CFM). The primary supply air in the atrium will be delivered and distributed with a traditional overhead air distribution system and transfer ducts as needed to direct return air from isolated spaces.

A new smoke evacuation and control system will be required in the atrium as it directly connects with three floor levels.

The spaces will be divided into 4 control zones with electric reheat. Each zone would have occupancy sensors, thermostats, and CO2 sensors. When the spaces are unoccupied (based on schedule), they will maintain setback temperatures of 60°F (heating) and 85°F (cooling). When occupied (by the program), but vacant (based on the occupancy sensor), the temperature setpoints would be 65°F (heating) and 80°F (cooling). When occupied (by schedule) and occupied (by occupancy sensor), the temperature setpoints would be70°F (heating) and 75°F (cooling). The amount of fresh air provided to the space would be based on the CO2 demand control, which would adjust the outside air VAV box.

All equipment will be connected to the BAS system with CO2 sensors to allow for demand-controlled ventilation (DCV), which will facilitate reductions in the amount of outside air brought into the building when the space is underutilized.

Condensate piping for all mechanical equipment shall be provided and handled via a gravity condensate system.

General Spaces

Offices, theater, café, and retail are all classified as general spaces with a total of 13,900 SF. These areas are designed for comfort conditions and will be served by two (2) 25-ton VAV AHUs (AHU-5 and AHU-6) with energy recovery. AHUs will be located in the future below-grade mechanical rooms, and outside air will be ducted to each unit.

The required airflow at the peak load for thermal is estimated to be 20000 cubic feet per minute (CFM). General spaces will be provided with a traditional overhead air distribution system and transfer ducts as needed to direct return air from isolated spaces.

Offices spaces will be divided into 4 control zones. Theater, café, and retail will each be served by a dedicated VAV box with electric reheat. Each zone would have occupancy sensors, thermostats, and CO2 sensors. When the spaces are unoccupied (based on schedule), they will maintain setback temperatures of 60°F (heating) and 85°F (cooling). When occupied (by the program), but vacant (based on the occupancy sensor), the temperature setpoints would be 65°F (heating) and 80°F (cooling). When occupied (by schedule) and occupied (by occupancy sensor), the temperature setpoints would be70°F (heating) and 75°F (cooling). The amount of fresh air provided to the space would be based on the CO2 demand controlt, which would adjust the outside air VAV box.

Separate new rooftop exhaust fans will be installed to serve the catering kitchen, café, and toilet rooms.

All equipment will be connected to the BAS system with CO_2 sensors to allow for demand-controlled ventilation (DCV), which will facilitate reductions in the amount of outside air brought into the building when the space is underutilized.

Condensate piping for all mechanical equipment shall be provided and handled via a gravity condensate system.

Education Center

Education center, with a total of approximately 19,400 SF, includes main entry, classrooms, offices and storages. These areas are designed for comfort conditions and will be served by two (2) 40-ton VAV AHUs (AHU-7 and AHU-8) with energy recovery. AHUs will be located in the attic space and existing ductwork will be reused where feasible. s.

The required airflow at the peak load for thermal is estimated to be 320000 cubic feet per minute (CFM). Spaces in the future education center will be provided with a traditional overhead air distribution system and transfer ducts as needed to direct return air from isolated spaces. The existing ductwork system will be preserved, but it will be reworked and reconfigured to the extent required to serve the renovated areas properly, to be determined in the following design phases.

The spaces will be divided into 10 control zones with electric reheat. Each zone would have occupancy sensors, thermostats, and CO2 sensors. When the spaces are unoccupied (based on schedule), they will maintain setback temperatures of 60°F (heating) and 85°F (cooling). When occupied (by the program), but vacant (based on the occupancy sensor), the temperature setpoints would be 65°F (heating) and 80°F (cooling). When occupied (by schedule) and occupied (by occupancy sensor), the temperature setpoints would be70°F (heating) and 75°F (cooling). The amount of fresh air provided to the space would be based on the CO2 measurement, which would adjust the outside air VAV box.

A new rooftop exhaust fans will be installed to serve the toilet rooms.

Special acoustic considerations will be taken, such as separate return air takeoffs and sound traps, as will be recommended by the acoustician. Adequate precautions must be taken to prevent leakage by inspecting and sealing all openings in the walls where electrical, plumbing or other items may pass from the plenum into the wall.

A dedicated BAS system will be furnished and installed in the future Education center. All equipment will be provided with BACnet or LonWorks cards for intercommunication. The system will be web-based and provide alarms and control through mobile platforms (e.g., smartphones). All equipment will be connected to the BAS system with CO_2 sensors to allow for demand-controlled ventilation (DCV), which will facilitate reductions in the amount of outside air brought into the building when the space is underutilized.

Condensate piping for all mechanical equipment shall be provided and handled via a gravity condensate system.

B. PROPOSED EQUIPMENT

Two Water-Cooled Chillers

- Each 300 Ton

A Three Cell Cooling Tower

- Each cell sized at 300 Ton

Three Chilled Water Pumps (CHWP-1, CHWP-2 & CHWP-3)

The pumps are matched to the chillers capacity but will operate in primary/standby mode. Pumps provide chilled water to all AHUs (AHU1, AHU-2, AHU-3, AHU4, AHU-5, AHU-6, AHU-7, and AHU-8). Each has characteristics as follows:

- 720 GPM,
- Base-mounted end-suction pump
- Variable Frequency Drive

Condensate Water Pump

- Capacity to be determined during the design development phase

Hot Water Condensing Boilers (4)

- Natural gas fired – high efficiency condensing type
- 1200 MBh output
- 20:1 turndown ratio

Boiler Controls

Flue Piping and Control Damper: Chimney Stack System with mechanical draft controller, flue sensor, and panel.

Primary Loop Pumps (one per boiler)

- In-line
- 120 GPM

Secondary Loop Pumps (HWHP-1, HWHP-2 & HWHP-3)

The pumps are matched to the boilers capacity but will operate in primary/standby mode. Pumps provide chilled water to all AHUs and most VAV boxes. Each has characteristics as follows:

- Base mounted
- 360 GPM

Back flow preventer valve

Hot water expansion tank

- Capacity to be determined during the design development phase

Air Separator

- Air and dirt separation
- Air vent and flush valve

Air Handling Unit (AHU-1-3)

These units serve Museum Class A spaces throughout the circular building. They are double wall drawn-thru air handler (each 70 Ton) and arranged as follows:

- Chilled water cooling Coil
- Hot water heating coil
- Centrifugal supply fan
  - 28000 CFM
  - Variable Frequency Drive
- Centrifugal return fan
  - 26000 CFM
  - Variable Frequency Drive
- MERV 8 primary filters with MERV 13 final filters

Air Handling Unit (AHU-4)

This unit serves Atrium in the circular building. It is 50-Ton double wall drawn-thru air handler and arranged as follows:

- Chilled water cooling Coil
- Hot water heating coil
- Centrifugal supply fan
  - 20000 CFM
  - Variable Frequency Drive
- Centrifugal return fan
  - 18000 CFM
  - Variable Frequency Drive
- MERV 8 primary filters with MERV 13 final filters

Air Handling Unit (AHU-5 & 6)

These units serve general spaces throughout the circular building. They are double wall drawn-thru air handler (each 25 Ton) with energy recovery and arranged as follows:

- Chilled water cooling Coil
- Hot water heating coil
- Centrifugal supply fan
  - 12000 CFM
  - Variable Frequency Drive
- Centrifugal return fan
  - 10000 CFM

- Variable Frequency Drive
- MERV 8 primary filters with MERV 13 final filters

Air Handling Unit (AHU-7 & 8)

These units serve all spaces in the training center building. They are double wall drawn-thru air handler (each 40 Ton) with energy recovery and arranged as follows:

- Chilled water cooling Coil
- Hot water heating coil
- Centrifugal supply fan
  - 16000 CFM
  - Variable Frequency Drive
- Centrifugal return fan
  - 14000 CFM
  - Variable Frequency Drive
-
- MERV 8 primary filters with MERV 13 final filters

Base Variable Air Volume (VAV) Boxes (approximately 46 boxes throughout)

- Single Duct Terminal Boxes
- DDC Controls
- Hot Water Reheat Coils
- Motor operator dampers
-

Steam Boilers (B-1&2)

These units serve AHU -1-3. They are as follows:

- Cast Iron Steam Boiler
- Natural Gas
- Low NOx Emissions
- Direct or Conventional Vent
- Front Access for Serviceability Natural gas fired
- Capacity to be determined during the design development phase

Flue Piping and Control Damper:Chimney Stack System with mechanical draft controller, flue sensor, and panel.

Catering Kitchen Exhaust Fan (EF-1)

- Downblast rooftop fan
- Centrifugal type
- EC Motor
- Roof curb

Toilet room Exhaust Fan (EF-2) (x2)

- Downblast rooftop fan
- Centrifugal type
- EC Motor
- Roof curb

Cafe General Exhaust Fan (EF-3)

- Downblast rooftop fan
- Centrifugal type
- Direct drive EC Motor
- Roof curb

Acoustic Treatment

Required acoustic treatment will be studied in future design phases. Preliminary areas of concern are two future mechanical room, Located in the basemen next to CAR spaces.

3. PLUMBING SYSTEMS

A. PROPOSED WORK

The demolition scope will remove all the existing plumbing systems, including fixtures, fittings, hot water heaters, pumps, valves, and fountain equipment (down to bare structure with exterior walls). Under-slab sanitary and storm drainage lines shall be video scoped and confirmed suitable for reuse. The contractor is to carry allowance for concrete cutting & patching and replacement of all under-slab piping. Refer to the architect’s demolition plan and new work plans for the extent of saw cutting and patching based on the extension of existing below-grade sanitary mains.

As part of the renovation project, all above-grade domestic cold, and hot water, roof drains, overflow roof drains, rainwater, sanitary, and vent piping will be removed and replaced with new piping. New catering and café fixtures and fittings, toilet rooms, duplex constant pressure pumps, and dual height drinking fountain with bottle filler will be provided in new locations as per architectural drawings for ITC spaces.

Floor drains will be provided for all toilet rooms, mechanical and maintenance rooms. Piping connection to the irrigation system with backflow prevention will also be required. Two (2) hose bibs will be installed per façade.

All sanitary piping shall be standard-weight cast-iron piping with no-hub connectors above grade. SDR PVC piping will be used below grade. Piping from sinks and plumbing fixtures shall be DWV copper unless below grade. New piping shall be provided throughout all toilets and appropriate plumbing fixtures. Water heaters will be provided to locally serve the new catering kitchen, café, and toiler rooms. The provided electric water heater will have a storage capacity of 5 gallons. All cold-water piping will be copper, insulated with pre-formed fiberglass insulation. The hot water system will provide 140°F hot water to the building and all new hot water supply piping will be copper, insulated with pre-formed fiberglass insulation.

B. PROPOSED EQUIPMENT

New duplex constant pressure pumps

- Capacity to be determined r during the design development phase

Three (3) Domestic Water Heater

- Storage tank
- Non-simultaneous element
- Basis: Bradford White LD-80R3-3
- Capacity to be determined during the design development phase

Water Closet

- Wall Mounted
- Sensor Operated Flush Valve
- Accessible
- 1.28 GPF
- Basis: Toto CT705ELN with Toto Exposed Battery-Powered Dual Flush Flushometer

Lavatory

- Countertop mounted
- ADA Approved

- Sensor Operated Faucet
- Flow Rate 0.5 GPM
- Thermostatic Mixing Valve (ASSE 1070)
- Basis: American Standard Aqualyn
- Sloan SF2450

Sink

- Countertop mounted
- Stainless Steel
- Gooseneck swing spout faucet
- 4” blade handles
- Basis: Elkay Dayton Elite Stainless-Steel Single Bowl

Janitor Sink

- Wall Mounted
- Manual Faucet
- Basis: Elkay ESSB2520

Drinking Fountain

- Bi-level design (accessible to those seated and standing)
- Bottle filler
- Vandal-resistant pushbuttons
- Contoured Basin
- One piece vandal-resistant drain
- Integral P-trap
- Basis: Elkay Two Level ADA Model LZSTL8WSLC

` *Hose bibs*

4. FIRE PROTECTION SYSTEMS

A. PROPOSED WORK

The demolition scope will include removing all of the bulk mains, branch piping and sprinkler heads.

The building will be fully sprinklered per NFPA 13 and will have a manual standpipe system to provide firefighting hose valves and supply the sprinklers on each floor. All exhibits, collection storage, loading dock, and CAR will be equipped with a new dry pipe pre-action system with cross-zoned smoke and heat detectors and other spaces will be covered by a wet-pipe automatic sprinkler system.

Fire protection system design guidelines are as follows:

Occupancy Hazard Classifications:

- Building Service Areas: Ordinary Hazard, Group 1.
- Electrical Equipment Rooms: Ordinary Hazard, Group 1.
- General Storage Areas: Ordinary Hazard, Group 1.
- Office and Public Areas: Light Hazard.

Minimum Density for Automatic-Sprinkler Piping Design:

- Light Hazard Occupancy: 0.10 GPM over 1,500 square feet.
- Ordinary Hazard, Group 1: 0.15 GPM over 1,500 square feet.

New sprinkler branch mains and heads will be provided throughout the building. Flow testing and hydraulic calculations will be necessary for determining pipe sizes. Within the heated building envelope, a wet pipe system will consist of a schedule of 40 black steel pipes. Exposed pendent, concealed pendent, and upright heads shall be used as required to accommodate the ceiling type. A fire pump is not required with today's incoming water pressure of 85 psi. Provide allowance for a fire pump if the future available water source does not generate adequate hydraulic pressure to meet the demand for fire protection. Each floor will be its sprinkler zone with a zone control valve and flow switch located at the standpipe connection, with flow switch test fitting and dedicated drainage riser. All existing standpipes will be existing to remain and incorporated into the new fire protection system as needed.

B. PROPOSED EQUIPMENT

Fire Pump (requirements may change based on flow test data)

- Capacity to be determined during the design development phase
- With jockey pump
- 208V/3Ø/60Hz.

Dry Pipe Air Compressor

- Oil-less piston compressor
- Capacity to be determined during the design development phase208V/3Ø/60Hz

5. ELECTRICAL POWER DISTRIBUTION SYSTEMS

A. PROPOSED WORK

The design of the power distribution system will be based on the following criteria:

- Size new electrical equipment based on anticipated demand load.
- Apply energy conservation measures where feasible.
- Protect occupants and electrical equipment by locating equipment within dedicated spaces, accessible only to qualified personnel. Equipment spaces will include adequate fire ratings, ventilation, and acoustic treatments.
- Maintain electrical service to circuits and equipment outside the project areas as required during construction.

All existing electrical systems including electrical service, distribution, site work/ lighting, panels, devices, lighting, IT/ low voltage fire alarm, including associated busway, wiring and raceways, to be disconnected and removed.

Normal Power Distribution System

A new CPS electrical service will be required. The new primary electrical service will be delivered from nearby CPS electrical lines to pad mount/ utility transformer. The project shall provide primary cable, conduit, and transformer foundation.

From the utility transformer, new secondary electrical service will be supplied at 480/277-volt 3-phase 4-wire via a 3000-amp service entrance duct bank and main circuit breaker main switchboard 'MSB'. The MSB shall include arc flash reduction, owner metering, surge protection and solid state main and branch devices. New utility metering shall also be provided. The MSB shall be located at the Mechanical Plant.

The MSB shall power dedicated panelboards for general lighting (480/277-volt), receptacles (208/120-volt), and IT rooms(208/120-volt). A 1200-amp 480/277-volt sub -distribution panel and dedicated branch panels will also be required for all mechanical loads. Each mechanical room will receive individual electrical panels and step-down transformers. The MSB shall also include feeders for the fire pump, smoke control and emergency power systems – Refer to the Emergency power section of this report.

Branch panelboards for lighting and receptacles shall be located in dedicated electrical closets, two per floor, with the associated 480:208/120-volt step-down transformers. The power distribution system upgrade will include Isolation transformer and dedicated panels for exhibit lighting and AV, roughly one (1) panel per AV equipment room will be required. The food service area will also receive a dedicated transformer and panels. Local/ rack mount UPS will be provided for IT equipment. Dedicated feeders and panels for the Education Center will also be provided.

The electrical distribution system will include grounding for both the current carrying and non-current carrying components of the electrical system to ensure both personnel safety and equipment performance. All metal enclosures will be bonded to the equipment ground. All feeders and branch circuits will be provided with separate equipment grounding conductors as the ground path. Current building codes require electricity metering for individual load types (HVAC systems, interior lighting, exterior lighting, and receptacles circuits). All electrical panels, including main and secondary panels will be equipped with customer electricity metering.

Branch Wiring and Devices

For branch wiring and devices, in general, the existing wiring devices and wiring will be removed and replaced.

New wiring devices and electrical receptacles will be provided throughout based on equipment layout and program. All outlets shall be 5-20R type, with special connections where required per the equipment. The outlet locations and distribution strategies will be designed to maximize flexibility and user connectivity without impeding space function. Branch circuits will be provided for all convenience power, mechanical equipment, staff workstations, AV/ exhibit equipment and all lighting systems. Automatic receptacle control, via occupancy or time clock/ scheduling, shall be provided for at least 50% of receptacles located in private offices, open office, open office, conference rooms, print/ copy rooms, break rooms, classrooms, and at least 25% of furniture mounted individual work stations. Receptacles within conference rooms, meeting rooms and similar spaces less than 1000SF shall be provided for a total receptacle count based on a maximum spacing of 12' on center, although exact locations may be determined by the design. In addition, such spaces shall include a minimum of one (1) floor mounted outlet shall be located within such spaces. At all raised floor areas, in-floor outlets and underfloor distribution shall be used.

The level 2 exhibit is proposed to use a raised floor and underfloor wiring distribution. This will include below floor cabling and infloor outlets fed via flexible whips.

Routing of the branch circuits will be concealed in the walls and/or ceilings where possible. Metal-Clad cabling, type MC, will be permitted for branch circuit wiring where concealed within partitions and above ceilings for lighting fixtures. Dedicated neutrals for each branch circuit will be provided. Liquid-tight flexible metal conduit will be used at motor and other vibration transmissive locations.

Variable frequency drives (VFDs) minimize energy consumption by modulating speed and torque as required to match the load on the equipment. Therefore, VFDs are recommended on all integral horsepower (HP) mechanical equipment to minimize energy consumption due to motors.

Emergency Power Systems

The existing emergency generator and automatic transfer switch (ATS) and panels shall be disconnected and removed. A new emergency power system shall be provided.

Building codes will require an on-site emergency power supply system (EPSS) be provided for this project. This is based on code mandated back up power to the smoke evacuation and tentative needs for the fire pump and elevator(s). The EPSS will consist of a generator located on grade adjacent to the new mechanical plant to serve life safety, legally required and standby loads in the event normal power is lost.

Dedicated automatic transfer switches (ATS) and panel(s), located in the new mechanical plant building will be required for each branch – Life safety, legally required and standby. In this project, life safety shall include egress lighting and fire alarm; legally required shall include fire pump, smoke evacuation, elevators – pending configuration of egress and accessibility, and other loads to be determined. Standby loads are optional and as selected by the Owner.

A preliminary load assessment has designated the following as potential standby back up power loads:

- IT/Security equipment, including supporting HVAC systems
- Freeze protection/minimal heat
- Domestic and hot water, in support of food service and laundry, including booster pumps and gas water heater
- Food service refrigeration equipment and minimal serving
- Sump pumps and sewage ejectors
- Building Automation Systems to support equipment noted

Emergency standby loads are yet to be determined. Diesel fuel is recommended by to be confirmed by the Owner and local jurisdiction. For planning purposes, the following generator sizes may be used:

- Code minimum – egress lighting only: 50KW. Reuse 150KW possibly.
- Code minimum with fire pump and smoke evac: 200-300KW.
- Enhanced/ select areas or systems: 500-800KW
- Entire building: 2000KW
- In each option- The emergency power supply system (EPSS) shall also include dedicated ATS, panels and step-down transformers, plus an emergency distribution panelboard. These shall be dedicated per life safety and optional loads.

All emergency panelboards will be provided with transient voltage surge protection devices (SPDs).

Renewable Energy

At this time, renewable energy/ photovoltaic (PV) systems have not been discussed. An onsite PV system is not currently foreseen but may be included if directed by the Owner. Inclusion will impact the service entrance ratings, disconnects, metering, and need to meet utility requirements. Maintaining the historical character and building appearance will likely prohibit approval of an on-site PV system.

B. PROPOSED EQUIPMENT

- 3000-amp 480/277V Service entrance and main distribution switchboard MSB with integral SPD and demand metering
- 1200-amp 480/277V mechanical sub-distribution panel and branch panels with step down transformers in each mechanical room
- 480/277-volt and 208/120-volt panels for sub-distribution and branch circuit loads
- Multiple 480:208-volt step down transformer(s), six (6) branch closet distribution locations with 480/277-volt and 208/120-volt
- Dedicated step down transformers and branch panels for each of food service and AV equipment location
- VFDs on all integral horsepower mechanical equipment
- Branch circuits, wiring devices, and equipment connections as required
- Arc flash labeling of all equipment
- Generator, fuel supplies, ATS's, panelboards with SPD
- Electricity metering
- Receptacle control

6. LIGHTING SYSTEMS

A. PROPOSED WORK

In general, the existing lighting and controls will be removed and replaced. Historical fixtures that are protected will be reused as noted below.

New lighting and control systems will be provided throughout and incorporate high color rendering and efficient light emitting diode (LED) technology. A combination of ambient and decorative fixtures will be used in public spaces while the back of house and utility rooms will be provided with linear fixtures. Exhibits will be supplemented by special accent exhibit lighting, as determined by the Exhibit designer.

New automated lighting controls will also be provided for all public, staff and exhibit spaces. Controls will be per code, including a network control system for open areas and local controls for smaller spaces. Vacancy sensors with manual on/off/ dimming will be provided in individual offices, and small conference rooms. Larger conference rooms and audio-visual spaces will use dimming scene stations that recall preset scenes and allow for user raise/ lower/ on/ off override. Incidental use rooms such as storage and utility rooms will utilize occupancy sensors and/ or timers. For circulation, public spaces and work areas, a networked lighting control system will be provided. The networked system will use a combination of centralized panel-based and distributed relays and inputs via time clock, the BAS, occupancy/ vacancy and photo sensors to determine lighting status. The networked system. The distributed relays minimize zone wiring back to the central location and are easily expanded for rooms with multiple zones and/ or dimming in addition to switching control. Panel based relays will be used where a room/ area requires a large quantity of zones.

It is expected exhibit spaces will require an architectural dimming system inclusive of time of day scheduling, multi-scene presets, wall station over-rides and occupancy / vacancy sensing.

The six (6) historical chandeliers will be disconnected, removed, refurbished and re-installed.

Egress Lighting

Emergency egress lighting will be provided via selected fixtures connected to the generator/ emergency power system and branch panelboards. These fixtures will be provided in all corridors and large work areas, as well as stairways, bathrooms and outside all exterior egress doors as required by the Code. Fixtures that are illuminated at all times to serve as security “night lights” may also be included, if desired. Exit signs will be of the red or green LED type.

Site and Landscape Lighting

The façade and parking/ site lighting are protected by the deed restrictions. Therefore, in compliance with the deed restriction, scope for the existing parking area pole lighting and façade canopy downlights will be limited to relamp/ retrofit in place. New wiring and controls will be required.

Exterior lighting will be selected and located to meet the architectural program and enhance safety and security at night. At minimum, egress fixtures will be located outside all egress doors.

Also, enhanced decorative façade lighting may be desired, either in accent lighting and/or DMX color changing. The decision for enhanced site lighting will be made in latter phases of design.

The target lighting level will be a balance between the need for increased light levels to support enhanced safety and security, and, the desire to minimize light trespass and glare issues per Township regulations. All exterior lighting fixtures will be selected with consideration given to minimizing light pollution and trespass, including full cutoff reflectors. Exterior lighting will be automatically controlled via photosensor on/ time clock off that incorporates astronomical sun rise/sunset data for on/off. All lighting control programming, presets, and scheduling must be confirmed by the Owner.

B. PROPOSED EQUIPMENT

- Ambient, accent, and decorative interior lighting fixtures
- Retrofit of existing fixtures
- Egress lighting fixtures and exit signs
- Building mounted exterior lighting fixtures, including retrofit
- Pole mounted exterior lighting fixtures for parking and pathways, retrofit
- Automated controls including vacancy, occupancy, photosensors and override switches
- Central/ distributed modular control systems
- Networked controls where multiple control inputs are required
- Manual dimmers/ preset scene selectors for space control where multiple zones are provided

7. FIRE ALARM SYSTEMS

A. PROPOSED WORK

There is an existing fire alarm system (in fair condition) but this system will not be reused. All fire alarm shall be disconnected, removed and replaced.

The design of the new Fire Alarm System will be based on the following design criteria:

- Comply with Codes based on intended occupancy of the building.
- Alert building personnel of alarm conditions.
- Ease of maintenance, expansion, and flexibility for future space changes.

The building will be protected via a new addressable type alarm and detection system. The control panel will be located at the Mechanical Plant with an annunciator panel at the Main Entry. The system shall include audio-visual notification in all common areas and restrooms, automatic smoke and heat detectors, elevator recall, and interfaces to HVAC, fire protection and security systems. Interfaces will also be provided at kitchen equipment where required by code. A voice evacuation system is not code required but doing so would provide added functionality as compared.

Based on the existing building capabilities, a new voice system with mass notification, and, multiple VESDA systems, are recommended.

Current codes require minimal levels of emergency responder radio coverage (ERRC) throughout the majority of the structure. Signal strength is impacted by the below grade areas and amount of concrete impeding signal strength, which is not known until construction is significantly underway / mostly complete. Coordination with the local EMS responders is also required to determine exact ERRC signal requirements. Therefore, for schematic design, the base scope shall be installation of the infrastructure for a future system and signal strength testing. An alternative bid shall be provided shall the signal testing determine signal amplification is required to meet minimum levels.

B. PROPOSED EQUIPMENT

- New FACP, control equipment and annunciators, as required.
- Manual pull stations, smoke and heat detectors - addressable type
- ADA compliant audio/strobe units.
- System interfaces
- VESDA
- Mass notification
- ERRC infrastructure

8. TELECOMMUNICATIONS SYSTEMS

A. PROPOSED WORK

In general, the existing telecommunications, security and AV equipment will be removed and replaced. If deemed appropriate and per coordination with new work, the existing utility connections may be reused at Owner option.

The existing building IT services are not in dedicated spaces. We expect the renovation will incorporate dedicated equipment spaces per industry standard. IT and security are expected to share space, while AV will be in dedicated spaces.

It is anticipated that the telecommunications utility interface will be via a new underground ductbank routed to a utility tie in point on the site. An underground ductbank will be required from the tie in point to the Building Distribution Frame (BDF), tentatively located on the lowest level with intermediate distribution frames/ closet (IDF) on each floor. Two (2) 4"C with innerduct are recommended for the utility interface and the backbone riser. Empty conduit/ IT connectivity will also be required for each AV closet.

The location of the service and distribution cabling shall be arranged to provide minimum separation from electrical cables, most notable medium voltage (over 1000-volt) vs. copper backbone, to limit interference. Power distribution cables in close proximity to telecommunications cables have the potential to disrupt signals via electromagnetic interference (EMI) on copper IT wiring. Fiber is not impacted by proximity electrical power lines.

Head end equipment, device jacks, and cabling will be provided as required by the program. At the BDF and each IDF, floor mounted equipment racks, plywood backboards, cable tray and cooling/ ventilation will also be provided. UPS will be rack mounted within each equipment rack.

Devices will be located to provide telephone and data connections at each office, commons space, wifi-antennae and classroom, as required, and will include an outlet box and conduit to accessible ceilings.

A distributed antennae system (DAS) will also be required. Selection of a system (fiber based or Cat6) will drive cost and system requirements.

The UTSA and ITC will need to commission an IT Integrator to evaluate the telecommunication infrastructure needs for the ITC. That IT integrator will identify the needed head end network system, devices and wireless antennae distribution needs as well as cabling type (fiber or cat6e or cat 6A) appropriate for the final facility design. The following is a summary of what is needed, at minimum, to inform the building construction cost estimate:

- Telecomm service: Two (2) new fiber services from the street into the building. Each new fiber line shall be from a different supplier to offer redundancy. With ticketing, security and building systems dependent on internet access, a back-up is suggested, should a vendor experience a significant outage.
- A wireless distribution system with a separate network switch in a distinct rack. Assume a WAP located every 40ft within the building.
- A voice network switch and server in a distinct rack shared only with the computer network. Include (50) voice cat6 ports to accommodate staff desks, conference rooms, mechanical rooms, lounges and education areas.
- A telecommunication IDF shall be located on each floor sized approximately 6ft x 8ft. Fiber backbone to each closet.
- A data server and network switch in a distinct rack or shared with voice network only. Include (100) data cat 6 ports to accommodate staff desks, printers and other devices outside of the exhibit area.
- Dedicated power panel and 480:208/120-volt transformer.
- Racks, backboards and grounding. UPS to be rack mounted, one per rack.

B. PROPOSED EQUIPMENT

- Head end IT, wifi, CCTV, access control and DAS
- Conduit to site interface, including spare.
- Plywood backboards as required.
- Power connections to all head end equipment.
- Outlet box and conduit with pullstring from accessible ceiling to device locations.
- Devices and cabling to all peripherals and patch panels
- Equipment racks with fiber/ copper connectivity, switches and patch panels.
- UPS at each equipment rack, mounted local to the rack.

9. SECURITY SYSTEMS

A. PROPOSED WORK

The UTSA and ITC will need to commission a risk assessment by a reputable security company who has completed several similar institutions within the past 5 years. That risk assessment will identify the needed system, devices and type of personnel for the final facility design. The following is a summary of what is needed, at minimum, to inform the building construction cost estimate:

- Dedicated security office of at least 200 SF where security staff will be stationed between patrols.
- Security system head end shall be located in this room. System shall be connected to (6) 36" LCD monitors to rotate views of all active cameras in vignettes.
- Include (10) exterior PTZ cameras.
- Include (10) interior PTZ cameras and (30) dome cameras between the floors for monitoring stairwells, elevators, corridors, entrances and public spaces.
- Include motion detection at all exterior entrances or openings.
- Include glass break monitors on all first floor windows or glass doors.
- Include card reader access at all exterior doors.
- Include card reader access to the elevators.
- Include card reader access to offices, storage, ticketing, store, café, exhibit, collection and education areas. Key locks are suitable for mechanical spaces, closets, theaters, restrooms.
- Provide a panic button at the ticketing desk, cashier stations, collection work room, loading dock.
- Racks, backboards and grounding. UPS to be rack mounted, one per rack.

B. PROPOSED EQUIPMENT

- Conduit and fiber to main IT room site interface.
- Equipment racks, grounding plywood backboards.
- Power connections to all head end equipment.
- Outlet box and conduit with horizontal cable to device locations.
- .

10. LIGHTNING PROTECTION SYSTEMS

A. PROPOSED WORK

While not required by code, providing a Lightning Protection Systems (LPS) system should be considered to mitigate damage shall a lightning strike hit the building. Considerations include minimizing damage to sensitive electronics or expensive equipment and to protect the structure. If desired by the Owner, the building should be provided with a lightning protection system.

Given the historical significance of this structure, LPS is recommended.

Solid air terminals of at least ½ thickness will be provided as appropriate for the roof(s) and all roof top equipment. Main and bonding conductors will be provided as will down conductors to multiple separate driven ground rods around the building perimeter. Test wells are required at each rod location.

Horizontal and down conductors shall be routed exposed. Down conductors shall be either interior or exterior to the building. Mounting, supports, and conductor type will be coordinated with the roof layout and material. The use of copper vs aluminum will be coordinated with roofing material to minimize catalytic action.

B. PROPOSED EQUIPMENT

- Air terminals (CU or AL)
- Ground rods (CU or AL)
- Interconnecting conductor (CU or AL)
- Test wells

11. APPENDICES

A. CODES AND STANDARDS

B. HVAC DESIGN CRITERIA

C. PLUMBING DESIGN CRITERIA

D. FIRE PROTECTION DESIGN CRITERIA

E. GLOSSARY

APPENDIX A — CODES AND STANDARDS

All mechanical and electrical systems will be designed in accordance with applicable provisions of the following (effective October 1, 2018):

- 2018 International Building Code, IBC
- 2018 International Existing Building Code, IEBC
- 2018 International Mechanical Code, IMC
- 2018 International Plumbing Code, IPC
- 2018 International Fuel Gas Code, IFGC
- 2018 International Energy Conservation Code, IECC
- 2018 International Fire Code, IFC
- NFPA 13, Standard for the Installation of Sprinkler Systems, 2016 Edition.
- NFPA 14, Standard for the Installation of Standpipe and Hose Systems, 2016 Edition.
- NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, 2016 Edition.
- 2017 National Electrical Code, NEC
- NFPA 72, National Fire Alarm and Signaling Code, 2016 Edition.
- 2018 San Antonio Property Maintenance Code (based on the 2018 International Property Maintenance Code)

APPENDIX B — HVAC DESIGN CRITERIA

The outdoor design climactic conditions are based on Trenton Mercer Airport weather data from the 2017 ASHRAE Handbook – Fundamentals

Summer (Peak-cooling):	98.1°F DB/73.6°F WB (ASHRAE 0.4% cooling design)
	The HVAC systems can provide air at 55°F dew point at this peak-cooling day. During peak-dehumidification conditions the dew point will rise to 57°F.
Dehumidification:	77.4°F WB/81.1°F DB (ASHRAE 0.4% dehumidification design)
Winter (Peak-Heating):	26.7° F DB (ASHRAE 99.6% design)

The design for comfort conditions for all occupied spaces are as follows:

Temperature:	70° F DB heating (occupied) 75° F DB cooling (occupied)
Relative Humidity:	uncontrolled, typically
Ventilation Rate:	Per IMC
Exhaust Rate:	75 CFM per toilet/urinal
Airflow Rate:	As required for cooling load
Pressurization:	Positive with respect to outdoors
Occupancy:	Per architectural plans
Lighting load:	1.0 watts per square foot
Equipment load:	1.5 watts per square foot

The design for archival conditions for all spaces are as follows:

Temperature:	70° F DB heating (occupied) 75° F DB cooling (occupied)
Relative Humidity:	50%
Ventilation Rate:	Per IMC
Exhaust Rate:	75 CFM per toilet/urinal
Airflow Rate:	As required for cooling load
Pressurization:	Positive with respect to outdoors
Occupancy:	Per architectural plans
Lighting load:	1.0 watts per square foot
Equipment load:	1.5 watts per square foot

Acoustic design criteria, is taken from 2019 ASHRAE Handbook – HVAC Applications, Chapter 49 *Noise and Vibration Control* and is as follows:

Executive & Private Offices	NC/RC 30
Conference/ Meeting Rooms	NC/RC 30
Teleconference Rooms	NC/RC 25
Open Plan Offices	NC/RC 40
Corridors/ Lobbies	NC/RC 40
Drama Theaters, concert, recital hall	NC/RC 20
Music Teaching Studios	NC/RC 25
Music Practice Rooms	NC/RC 30

Testing/ Research Lab	NC/RC 50
Lab with extensive communication	NC/RC 45
Group Teaching Lab	NC/RC 35
General Assembly w/ Music	NC/RC 25
Classrooms	NC/RC 30
Large Lecture with Speech Amp	NC/RC 30
Large Seating capacity spaces	NC/RC 50
Service/Support Areas	NC/RC 40
Auditorium	NC/RC 35

The design conditions for electrical and mechanical areas are as follows:

Temperature:	65° F DB minimum
Airflow Rate:	Ventilated for 10° F above ambient maximum, or, 5 air changes per hour minimum
Relative Humidity:	Uncontrolled
Pressurization:	Positive or neutral with respect to outdoors and adjacent areas

The sizing criteria for the following system components will be:

Equipment Selection:	10% safety factor applied to cooling coils and airflow 30% safety factor applied to heating equipment
Supply Duct:	Pressure drop not more than 0.08 inch w.c./100 feet
Return Duct:	Pressure drop not more than 0.08 inch w.c./100 feet
Exhaust Duct:	Pressure drop not more than 0.08 inch w.c./100 feet
Outside Air Duct:	Pressure drop not more than 0.08 inch w.c./100 feet
Duct connected directly to inlets and outlets:	Velocity not more than 500 ft/min
Inlets and Outlets:	Devices selected for not more than NC-20 in offices Devices selected for not more than NC-30 in other areas
Piping:	Velocity not more than 6 ft/sec

Relative humidity will be uncontrolled except in Exhibits, Archives & Special Collections (2nd floor) and the CAR spaces. In these areas, additional equipment will be provided to limit the maximum humidity in the warmer weather as well as to add humidity in cooler weather. Building pressurization will be positive with respect to the outdoors.

APPENDIX C — PLUMBING DESIGN CRITERIA

The minimum pressure available at shower heads, installed 6'-6" AFF shall be 40 psig

The minimum pressure available at water closet and urinal flush valves will be 35 psig.

The maximum system pressure at plumbing fixtures shall be 80 psig at no-flow conditions.

The maximum flow rate in supply piping in general shall be limited to 8 fps.

The maximum flow rate in supply piping serving quick close devices (washing machines, flush valves, etc.) shall be limited to 5 fps.

The maximum velocity through systems with continuous flow, such as recirculation systems, is 2 fps.

APPENDIX D — FIRE PROTECTION DESIGN CRITERIA

Occupancy Hazard Classifications:

- Building Service Areas: Ordinary Hazard, Group 1.
- Electrical Equipment Rooms: Ordinary Hazard, Group 1.
- General Storage Areas: Ordinary Hazard, Group 1.
- Office and Public Areas: Light Hazard.

Minimum Density for Automatic-Sprinkler Piping Design:

- Light Hazard Occupancy: 0.10 gpm over 1,500 square feet.
- Ordinary Hazard, Group 1: 0.15 gpm over 1,500 square feet.

Maximum Protection Area per Sprinkler:

- Office Spaces: 225 sq. ft.
- Storage Rooms: 130 sq. ft.
- Mechanical Equipment Rooms: 130 sq. ft.
- Electrical Equipment Rooms: 130 sq. ft.
- Other Areas: According to NFPA 13 recommendations.

Additional considerations:

- The system utilizes a dry pipe to protect and serve the attic as such the more remote area will be increased by 30% while still maintaining the density.
- The attic has a peaked roof and as such the more remote area will be increased by 30% while still maintaining the density.
- Concealed spaces will require sprinkler protection.

The following list of fire extinguishing systems, and their descriptions are as follows, and are taken from NFPA 914, 2019 edition:

Wet-pipe automatic sprinkler system

Description:

- A permanently piped water system under pressure, using heat-actuated sprinklers. When a fire occurs, the sprinklers exposed to the high heat operate and discharge water individually to control of extinguish the fire.

Comments:

- This system automatically detects and controls fire. It should not be installed in spaces subject to freezing and might not be the best choice in spaces where the likelihood of mechanical damage to sprinklers or piping is high, such as in low-ceiling areas, and could result in accidental discharge of water. Where there is a potential for water damage to contents, such as books, works of art, records, and furnishings, the system can be equipped with mechanically operated on-off or cycling heads to minimize the amount of water discharged. In most instances, the operation of only one sprinkler will control a fire until the arrival of fire fighters. Often the operation of a sprinkler system will make the use of hose lines by fire fighters unnecessary, thus reducing the amount of water put onto the fire and the subsequent amount of water damage.

Dry-pipe automatic sprinkler system

Description:

- A system that employs automatic sprinklers attached to a piping system containing air under pressure. When a sprinkler operates, the air pressure is reduced, thus allowing the dry-pipe valve to open and to allow water to flow through any opened sprinklers.

Comments:

- This system can protect areas subject to freezing. Water supply must be in a heated area.

Standpipe and hose system

Description:

- A piping system in a building to which hoses are connected for emergency use by building occupants or by the fire department.

Comments:

- This system is a desirable complement to an automatic sprinkler system. Staff must be trained to use hoses effectively.

APPENDIX E — GLOSSARY

AHU – Air Handling Unit – A piece of mechanical equipment usually connected to ductwork, to move air, which may also clean and condition the air.

Air Terminal – in lightning protection systems, a strike termination device that is a receptor for lighting strikes and tied into the lighting protection system to ultimately dissipate the strike to the earth through a ground terminal.

BTU – British Thermal Unit – an I-P unit of heat energy, roughly equivalent to the energy produced by a single wooden match.

BTU/h – British Thermal Unit per Hour – in the I-P system the amount of heat energy produced or consumed in an hour.

CFM – Cubic Feet per Minute – an I-P measure of volumetric flow rate of a fluid in a conduit. CFM is typically used to denote airflow.

EMT – Electrical Metallic Tubing – thin-wall coasted steel electrical conduit. EMT is not threaded but threaded couplings can be clamped to it such as to connect to FMC.

FMC – Flexible Metallic Conduit – flexible electrical conduit made by the helical coiling of a self-interlocked ribbed strip of aluminum or steel. FMC is not water proof, but there is a waterproof version LFMC.

GPM – Gallons per Minute – an I-P measure of volumetric flow rate of a fluid in a conduit. GPM is typically used to denote water flow.

MBH – Thousands of BTU per Hour – In the I-P system of measurement Roman numerals are used as prefixes. In this case M is the Roman numeral for 1000.

Fc- Foot-candle. Lighting level/density within a space.

fpm – feet per minute – an I-P measure of velocity of a fluid in a conduit. Often fpm is related to air flow in duct.

fps – feet per second – an I-P measure of velocity of a fluid in a conduit. Often fps is related to water flow in a pipe.

Ground Terminal – in lightning protection systems a ground rod plate or conductor that is installed to connect the air terminals and lightning protection system to ground to dissipate a strike.

IDF – Intermediate Distribution Frame – A cable rack that interconnects and manages the telecommunications wiring between an MDF and workstation devices.

I-P – Inch-Pounds – system of measurement which utilizes English units for length, mass, volume, temperature, etc. the units of which are inches, pounds, gallons, and degrees Fahrenheit respectively. This system is typically used in mechanical systems, as opposed to SI which is used in electrical systems.

kW – Kilowatt – In the SI system of measurement prefixes are used to indicate multiples of units in lieu of using scientific notation. In this case a kW is equal to 1,000 W.

LFMC – Liquidtight Flexible Metallic Conduit – flexible electrical conduit made by the helical coiling of a self-interlocked ribbed strip of aluminum or steel as is FMC but is coated with a waterproof plastic coating.

MC – Metal Clad Cable.

MDF – Main Distribution Frame – A cable rack that interconnects and manages the telecommunications wiring between itself and any number of IDFs.

MDP – Main Distribution Panel – A component of the electrical distribution system which divides the electrical power feed in to subsidiary circuits, and protecting each circuit with a circuit breaker and enclosed within a common enclosure.

MW – Megawatt – In the SI system of measurement prefixes are used to indicate multiples of units in lieu of using scientific notation. In this case a MW is equal to 1,000,000 W.

SI – from Le **S**ystème **I**nternational d'Unités – system of measurement which utilizes metric units for length, mass, volume, temperature, etc. the units of which are meters, grams, cubic centimeters, and degrees Centigrade respectively. This system is typically used in electrical systems, as opposed to I-P which is used in mechanical systems.

Ton – 12,000 BTU/h – in the refrigeration industry a Ton is a measure of cooling load or capacity, and was at one time related to the cooling capacity provided by 1 ton (2,000 lbs.) of ice. 1 ton of ice could provide 288,000 BTU of cooling in a 24 hour period, which in turn became 12,000 BTU/h.

TVSS – Transient Voltage Surge Suppressor – An electric surge protection device listed to protect the electrical system of a building, or portions thereof, from surges produced upstream of the TVSS.

VA – Volt-Ampere – a unit of apparent power produced or consumed and is typically used in alternating current electrical systems. In direct current systems VA equals W.

W – Watt – a SI unit of power produced or consumed and is typically used in electrical systems or equipment. This unit include time as part of its definition and can be directly converted to BTU.

University of Texas San Antonio Institute of Texan Cultures

Structural Feasibility Study – Federal Courthouse

IMEG #23001401.00

1.0 Introduction

The purpose of this study is the determine the structural feasibility and requirements for upgrading the existing Federal Courthouse at the University of Texas San Antonio HemisFair Park from a Federal Courthouse to a museum. The original structure was constructed in 1968 as the United States Pavilion Confluence Theater at HemisFair '68. A subsequent renovation transformed the space from Theater to Federal Courthouse.

2.0 Available Information

The structural information available as the basis of this study includes:

1. Full set of original structural drawings for the United States Pavilion Confluence Theater by Reynolds & Morgan Associates Structural Engineers dated March 1, 1967.
2. A single structural sheet labeled Drawing No 7-2-11 showing a cross section of the revised structure from the Federal Courthouse renovation.
3. A site visit performed on February 10, 2023. The structure was not exposed.

3.0 Basis of Study

1. The structure would be designed in accordance with the 2021 International Building Code.
2. The structure would be designed as a Risk Category II structure.
3. The base building design *Live Loads* would be as follows:
   a. Roof 20 psf reducible
   b. Assembly Spaces 100 psf unreducible
   c. Exhibit Spaces 150 psf unreducible
   d. Office 50 psf reducible + 15 psf partitions unreducible
   e. Truck Dock 250 psf unreducible
   f. Mechanical Areas150 psf unreducible
4. Seismic Loads
   a. Design Category A
5. Wind Loads
   a. The existing building's envelope and lateral system has not been revised. No wind upgrade is expected.

4.0 Existing Structure

The original construction consisted of a cast-in-place beam and slab system on the lower level with a cast in place pan joist main theater level. Steel columns from the main level to the roof support the roof truss and truss joist framing.

The original foundation system consisted of concrete drilled and underreamed piers.

In the subsequent renovation for the courthouse conversion, the existing lower level was demolished. A new cast-in-place concrete floor was cast on top of the existing piers at a lower elevation. Steel columns were added to support the floors above, which were framed floors with composite concrete on metal deck and steel beams. Modifications were made to the roof truss.

5.0 New Museum Structure

The proposed new configuration may not match with the existing floor levels. Additionally, there is no documentation of the existing floor construction on which to base calculations of the existing floor's capacity. The proposed museum occupancies require new live load capacities that exceed standard design for a courthouse. It is reasonable to assume that the existing floors would not have the capacity required for the new construction. Therefore, a demolition and re-construction approach is proposed.

5.1 Demolition

It is expected that the interior construction from the courthouse renovation will be demolished. The original exterior shell, the roof and concrete flying buttresses, will be left in place. Around the perimeter, the outboard flying precast concrete columns will remain. The perimeter steel columns and the roof they support will also remain. The interior elevated slab with associated steel framing will be removed. The lower-level concrete beam and joists will also be demolished. Care will be required to leave the existing piers undistributed while removing the cast-in-place basement. Additionally, the perimeter foundation wall will require shoring against earth pressures during the lower-level demolition and reconstruction.

5.2 New Foundations

The new structure will attempt to use the existing drilled piers where possible. New drilled piers will be required where new columns do not align with existing pier foundations and around the new elevator pits. The new basement floor will be cast over a crawl space and tie into the existing foundations. This floor system will be a beam and slab system using a 7" thick slab spanning to 30" deep concrete beams. Assume 6.0 psf of mild steel reinforcement.

5.3 New Columns

At least one or two new lines of interior columns will be required to support the new interior floors which do not always engage to the existing perimeter columns. Where possible, the existing perimeter steel columns will be used for support. Reinforcing of the existing columns may be required, and will be determined by future analysis.

5.4 New Elevated Floor Framing

The new elevated decks will use steel beams supporting composite concrete on metal deck. The floor slabs will be 4.5" of normal weight concrete on top of a 2" – 20 gage galvanized composite metal deck. The slab will be reinforced with a 6x6 w2.1 x w2.1 welded wire fabric. Assume 12 psf of steel framing. Temporary rigging will be required for steel erection. Rigging should not be anchored to the existing roof joists.

5.5 Lateral System

The existing buildings wind envelope will not change. As there is no discernable distress to the existing structure; no upgrade to the building's lateral system is proposed.

The structure will be in Seismic Design Category A. No seismic loading is required, though stability bracing of the new floors will be required. This will be achieved with periodic diagonal bracing of the floors.

6.0 New Loading Dock

The proposed new loading dock is to be constructed below existing grade and covered with plaza space. This will require new cast-in-place concrete perimeter foundation walls with new interior concrete columns. It is assumed these walls and columns will bear upon new drilled and underreamed piers or spread footings, pending a new geotechnical exploration. The plaza level will be a cast-in-place beam and slab system using a 12" thick slab and 30" deep concrete beams. Assume 15 psf mild steel reinforcement for this structure.

The slab at the bottom of the loading dock will be slab on grade outside of the dock and framed concrete beam and slab system for the elevated dock. The elevated section will be framed and constructed in the same manner as the museum lower level.

7.0 New Central Utility Plant

The layout of the new central utility plant building is not yet defined. It is assumed it will be a single-story building using tilt-wall, precast, or concrete masonry exterior walls. The roof will be steel framed with beams at 6' on center, supporting a 1.5" deep, 20 gage galvanized roof deck. Assume 8 psf steel roof framing.

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