

Worcester Memorial Marketplace Proposal

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Executive Summary

The Worcester Memorial Auditorium was built in 1933 as a memorial to the citizens of Worcester who lost their lives fighting in World War I. Over its lifetime, the building has hosted musical and theatrical performances, NCAA basketball games, and graduation ceremonies. The memorial doors closed in 2007, leaving the building vacant since. Our proposal is to revitalize the space into a commercial marketplace and entertainment venue which will be renamed Worcester Memorial Marketplace. The Worcester Memorial Auditorium is located in a prime location in between several colleges, businesses, and residential areas as well as its proximity to Exit 17 on Route 290. The Voke Lofts are across the street, and the new apartment complex in the old Worcester Courthouse building will provide plenty of foot traffic to the area.

Several changes are necessary to restructure the building for the proposed marketplace. The basement of the building will be turned into a parking garage to allow for some parking onsite. The first floor will be turned into an open marketplace for retail style vendors. The existing second floor and balcony area will become a retail space primarily for food vendors. The upper part of the second floor balcony will be expanded to create a third floor which will host two fine dining restaurants. Additional seating for the restaurants will be available on an outside patio, and each restaurant will have a kitchen on the floor. For the little theater, the old seating will be turned into terraced bar style tables and a bar and dance floor will be added, so it can function as a nightclub as well as host small shows or movies. Historical sections of the building such as the mural in the main entrance area and inscriptions dedicated to WWI soldiers will be preserved.

The Work Breakdown Structure (WBS) was split into three phases: Project Planning Basis, Facility Consolidation, and Facility Development. These three categories were used to further identify the different tasks required to complete the project. Once the WBS was completed, the network diagram was made based on the tasks identified previously. The Critical Path Method (CPM) was used. The early start, early finish, latest start, and latest finish dates were determined for each task. From this the total slack for the project was found. For this project, the total slack was found to be 30 days. Using this slack, a resource leveling diagram was made which utilizes the slack in certain tasks to ensure that the resources available are used efficiently. A linear responsibilities matrix was also made which designates who is responsible for different tasks.

The project is estimated to cost \$94,002,550 for all of the labor and materials. The budget can be split into five parts: general requirements, design and engineering and other allowances, demolition, indoor renovation, and outdoor renovation. General requirements take up 18% of the budget and account for things like the job trailer, temporary utilities, signage, site cleaning, and permits as well as worker salaries. Design and engineering accounts for 21% of the total budget and includes design services, design markup, contingencies, insurance overhead, and profit. Demolition takes up 10% of the budget and is used to demolish existing structures in the basement, first floor, second floor, and third floor. The largest portion of the budget is the indoor renovation which accounts for 49% of the budget. This includes materials, new elevator, plumbing, HVAC, electrical, and all other interior work. The final section, outdoor renovation, accounts for 2% of the total budget and includes new pavement and green space.

A risk assessment was then performed for the project. Two overall categories of risk, technical and external, were identified for this project. The technical risks identified include

asbestos, lead paint, old wiring, structural damage, and water damage. These risks will be mitigated by removing all toxic materials, updating all of the wiring, and carefully checking for any damage to the building or walls. The external risks include traffic, pests, economic recession, and public opinion. The project team will work with Worcester Police to create alternate traffic patterns to reduce that risk. Exterminators will be hired to get rid of any pests in the building. Material prices will be monitored carefully to avoid large deviations from our budget. Organizations like the Architectural Heritage Foundation will be consulted in design to ensure that the revitalization respects the history of the building.

The project organization type that this project will utilize is a projectized organization type. This type of organization is typically used for consulting or contracting companies. Employees work on one or multiple projects at one time and report directly to the project manager who has final say in all decisions. This organization type will work well for this project because it is a complex project which requires collaboration with many contractors and a skilled project manager.

A project control process was created which will aid the project management team in organizing and controlling this complex project. The process was split into five parts: project start-up, project planning, project execution, project monitoring and change, and project closing. The most important part of this process is the monitoring and changing part where the project manager will be responsible for monitoring resources and progress and making any changes needed to keep the project within budget and on schedule. To help with the project control process, the project management team will report the work completed, work in progress, and work completed on a weekly basis.

The Worcester Memorial Marketplace will benefit local businesses, Worcester residents and the city of Worcester, because of its focus on business and community. The project, if approved, is scheduled to span a total of 30 months and cost roughly 94 million dollars. The risks associated may include technical risks, potential traffic concerns, historical society pushback, and the potential for an economic downturn. Fortunately, these risks can be mitigated by proper project management, risk mitigation, and quality control. With all the risks in mind, the reward has to be looked at as well. The potential economic boost with a centralized market of this size, the repurposing of a vacant building and its potential to attract people to the city, and the ability for small businesses, local vendors to sell their products. To ensure success the project will have a team of experts in charge of designing, operating and completing the marketplace to the plans that were agreed upon. Worcester is an evolving city, whether that's through new construction, increased population or economic and social trends, it's time to repurpose and reestablish the Worcester Memorial Auditorium. This remarkable city needs a space that will forever change how buildings are repurposed, so why not let that be Worcester Memorial Marketplace.

Introduction

Worcester Massachusetts is home to historic landmarks, top of the line colleges and universities, famous restaurants, great entertainment and the future home of the Worcester Red Sox located at Polar Park. Given the variety of activities in Worcester and the new demand for revitalization, it only seems fair that the Worcester Memorial Auditorium gets transformed. The Worcester Memorial Auditorium served as an arena for college games, shows, and graduations while also hosting a variety of theatrical performances for years, until its doors were shut in

1999, and its official closure in 2007. The Worcester Memorial Auditorium continues to serve as a memorial to the Worcester citizens who lost their lives fighting in World War I.

Worcester Memorial Marketplace will be created in hopes of revitalizing the space to honor the WWI soldiers who lost their lives as well as become an economic powerhouse for the area. The renovation will bring clientele from each college as well as attract families and bring visitors to the area seeing that the marketplace is right off of Exit 17 on route 290. Multiple companies have taken the opportunity to invest in the thriving city of Worcester with the commitment of revitalizing many of Worcester's rundown structures. Each of these classic structures have been rebirthed into new modern multi use spaces. The reconstruction of the Worcester Memorial Marketplace will reflect the history of the city as well as the modern revolution the city is experiencing.

The history of the Worcester Memorial Auditorium can be traced back to the 1900's. Discussion for the auditorium began in 1917 when Mayor Pehr G. Holmes expressed the need for a public gathering place stating, "That is undoubtedly one of the next large activities toward which public sentiment should direct itself" (*History*, 2016). The idea for an auditorium was born during World War 1 (WW1), during a time when the "expression of civic gratitude" was at an all-time high. The people of Worcester wanted to thank the many individuals who went into armed combat for the nation. In particular, the people wanted to thank the 355 Worcester residents who sacrificed their lives in WW1 (*History*, 2016).

In November of 1918 following his speech, Mayor Holmes appointed an Auditorium Committee, consisting of former mayors as well as civic members of the community, to secure an appropriate site for the Worcester Auditorium. He added emphasis on the fact that the site

must be accessible to the majority of Worcester Residents. This task took eight years as finding an appropriate site proved controversial. The first site that was selected was facing Salem Square in Worcester and would have had a Public Library next door to the auditorium. From 1921-1925 progress halted until June of 1925 when the city Council added an additional site as an option for the project. Four years later in November of 1929 a “group of public spirited citizens and the Trustees of the Worcester Art Museum” gifted the final location for the Auditorium (*History*, 2016). After determining the final location for the memorial, the board also encountered difficulties approving an appropriate design for the memorial.

The board finally came to a consensus on how to determine the final design months later. The board decided to host a competition, with a prize, where architects from across the country took part. Of the many architects that took part, the three finalists were from Worcester. First prize went to Lucius Briggs who collaborated with Frederick C. Hirons from New York City, second prize went to Joseph B. Leland, and third prize went to Adolph Johnson (*History*, 2016). Lucius Briggs and Frederick Hirons winning design was a “combination of Classical Revival with large Doric columns on the front facade with a strong Art Deco influence both inside and out” (*History*, 2016). The auditorium was designed to consist of 110,668 square feet on 2.42 acres at Lincoln Square, off the north end of Main Street (Kotsopoulos, 2019). The completed product was revealed in 1933 on September 26th at 8:00 P.M. The big reveal included a week of celebration which began with concerts and special programs. Since the auditorium's completion, the building has been utilized as an entertainment and sports venue hosting musical performances, NCAA basketball games, and graduation ceremonies among many other events until 2007 (*History*, 2016).

A building filled with history and the memories of soldiers who lost their lives fighting for the United States will not be lost when the renovation takes place. Instead, the completion of the marketplace will bring new life to the memorial and provide a space for locals to socialize.

Statement of Work

In order to maximize the memorial's potential economic impact, the proposed plan aims to commercialize the Worcester Memorial Auditorium by adding markets, restaurants and a multi-purpose entertainment space. The memorial will attract Worcester citizens and provide an opportunity for new-business owners within the area. In addition, the foot traffic should be high as the site is in close proximity to many businesses, schools and residential areas. Many of Worcester's sites need remodeling as much of the city's attractions are dwindling and have lost their purpose. An example of a successful revitalization project is the Worcester Vocational school. Today, the building is now Voke Lofts, a high-end apartment complex, attracting young working people to experience loft living. Moreover, the old Worcester Courthouse is being transformed into an apartment complex allowing for additional residents in the area. The revitalization of the Auditorium will allow for additional retail, dining, and entertainment within an ideal market setting.

The first major alteration the Worcester Memorial Auditorium will undergo is the conversion of the basement to a parking garage. The basement currently has a large open area serving no designated purpose. Converting the basement to a parking garage will be extremely beneficial as the site has no parking spaces. From the basement, customers will be able to access the first floor of the marketplace through both an elevator and staircase. This parking garage will not fully solve the issue of parking, but it will allow for some people to park onsite. It is assumed

that many of the customers will be walking to the marketplace because of its close proximity to apartments and schools. Customers who require additional parking will have to park on the street or in one of the many parking lots within the city of Worcester.

Upon entering through the main entrance off of Salisbury street, the existing main stage and theater area will be transformed into a new open marketplace for retail style vendors. The entire project will be built as speculation construction to allow for future tenant build outs depending on how the vendor would like to utilize the space. The project is being funded by investors and the city of Worcester, with the assumption that the main marketplace on the first floor will include vendors like craftsmen, artists, small retail shops, etc. selling products that range from gifts to clothing to handmade crafts and more. The marketplace becomes a centralized gathering spot for many small businesses, helping the city and individuals prosper.

The existing second floor and balcony area will become an additional marketplace area predominantly for food related vendors. This can be small dining options, chefs, fresh produce and meats, cooking instruments or appliances. Since the area is close to many work facilities, schools, and homes, it is important to have a focus on food and community. The small dining options that can be available will allow for people to fill the space during the week at lunch as well as add an option for additional dining options in the evening. Since the project is being built under the intention that the vendor will fill the space, the vendor spaces will get power and water but will not be finished, allowing for each vendor to customize their stand based on their business. There will be storage and cooler space on this floor for all vendors to utilize. The second floor can be compared to small grocery stores and a food court all in one with each vendor selling different food related items.

What was once the upper balcony of the second floor now becomes its own dedicated floor which will be transformed into space for two fine dining restaurants. The space is to be built with kitchens next to each other, a shared waiting area at the top of the stairs, and options for indoor or outdoor seating for each restaurant. The two spaces will be built to be the same, allowing for the potential client to decorate or design the space to fit their style. In addition, the detail of outdoor fine dining will attract many Worcester residents as very few restaurants offer this feature within Worcester.

The little theater will remain as a theater type space, with minor adjustments to make the space a multi-purpose entertainment area. The changes will include the addition of a DJ booth area and a dance floor, the reduction of the size of the existing stage, an added bar and the old seating will become terraced bar top style seating. The venue can be used for shows (i.e. small performances), comedy shows, movies, or concerts as well as be transformed into a nightclub or large party area. The option to book the area for other purposes may be offered depending on the vendors use. This can be beneficial to the many universities as the memorial is in close proximity to the many nearby universities as clubs and organizations often need a space to host fundraising events.

Work Breakdown Structure

The project can be split into three major phases: Project Planning Basis, Facility Consolidation, and Facility Development. The goal of the marketplace is to have the existing memorial and history of the auditorium site preserved and refurbished while constructing new facilities to provide an improved city environment and economy and supporting further development plans for the future of the city of Worcester. To organize the Marketplace project's

efforts for development and historical preservation, a basic work breakdown structure (WBS) has been developed and is presented in **Appendix A**. This diagram defines the hierarchical scope breakdown of various milestones and requirements to be executed by various groups represented within the project team. Changes to the current work breakdown structure may occur with changes in project scope and risk response as required to accommodate project execution and timely completion. Furthermore, all major and minor issues are addressed in the project planning basis phase.

Project Planning Basis

The project planning step within the work breakdown structure occurs first within the project plan and is designed to capture all of the upper-level planning for the project, to the point that strategic decisions permit project execution within the following steps in the same hierarchy, consolidation and development. Within the Project Planning Basis, the overall construction plan and contract is prepared as well as the financial budget discussion and management structure for the Marketplace construction. The project planning step requires investment and communication from the entire project team as well as representatives from stakeholder investors and the city of Worcester.

City of Worcester Building Construction

As the Worcester Memorial Auditorium remains a historical landmark to the city of Worcester, any potential development and revitalization projects must go through the city of Worcester Building Construction team's approval. Should this team not approve of the proposed changes, the project may never begin. However, given the existing status of the nearby buildings

facing revitalization and the new developments occurring within the downtown district of the city, the increased traffic and residents within the vicinity could utilize the marketplace as a central gathering hub. It would also provide a much-needed boost to small business owners that may have difficulty maintaining more expensive storefront properly. Discussions between the project team and the city of Worcester would continue until approval is achieved before moving forward with the building consolidation.

Financing

The step for financial investment and budgeting is almost as important as approval from the city of Worcester. Without the finances to conduct the construction project, the team could not optimize the facility properly and safely. Stakeholders and financial support will be conducted via communication with the city of Worcester, city council, and various institutions local to Worcester such as MCPHS. Future value for the facility will be gained as the building resides around Lincoln Square, one of the larger junctions for traffic within the city of Worcester.

Project Management Plan

Before beginning construction work, the project team will meet with managers and supervisors to define appropriate timelines and finalize locations and commodities to add to the building. These meetings will also discuss any outstanding documentation for the preservation of the auditorium as the building remains a historical landmark for the city of Worcester. The plan will incorporate milestones, a formal reporting structure, and change control board should delay, or scope changes occur during the construction. Staffing and scheduling will be designed to accommodate for Northeastern weather and mitigating disruption of traffic around Lincoln

Square. Finally, the project will discuss contracting with the city of Worcester on organizing and developing leases for small businesses and event hosting.

Facility Consolidation

The Consolidation branch captures the project's consolidation efforts and identifies historical murals and commodities that preexist within the auditorium. This will include the documentation of uses and conditions before and after the marketplace construction. For a building that has remained unused over the last decade, two primary elements are used to distinguish the consolidation construction, the repurposing and transition elements.

Building Repurposing

Currently the Worcester Memorial Auditorium is designated for two primary spaces, the main auditorium and the little theater area. Repurposing the building during construction will involve converting the basement to a designated parking space as the existing parking space for the location is limited for 3 small class D vehicles. Secondly, the main auditorium space will be wiped for space used for small stalls and restaurants and bars. The little theater area will simply require a modern finish and exist as a venue for smaller events. However, this repurposing also involves much of the preservation and restoration of the Auditorium as well as preserving the historic murals and memorial paintings placed to honor the Worcester Residents who had perished in World War I.

Building Transition

The building transition element involves the installation of new facilities to accommodate for modern restaurants and bars as well as a new flexibility for market stalls. Each would include additional electrical outlets, formal ethernet sources, a proper ventilation system, additional plumbing pipelines, updated fire prevention systems, and protective measures. Formal balcony railings would need to be placed on the second floor, security gates within the basement parking area, and lastly the refurbishing of the little theater area to a more modern aesthetic. Overall, the major additions to the building for modern use would be added within this element and would be completed primarily by the Construction Teams.

Building Consolidation

Building Consolidation would occur between the city of Worcester and the Worcester Redevelopment Authority Committee. Their consolidation would involve sending small teams to monitor the existing facility and determine the value of murals and memorial objects that require preservation and either relocate or retain them within the project's scope. This element of the work breakdown structure holds value as the building design will remain the same and while the marketplace adds economic value. Moreover, the facility itself still remains a memorial to the World War I Worcester Residents who had lost their lives. The memorial is a major aspect of this building, losing that value would create negative tension within Worcester Residents and would also impact the number of stakeholders and financial backers supporting the project's execution.

Existing Use and Conditions Documentation

Currently as the facility had remained shut down for the past decade, previous blueprints and formal historical records remain lost in older archives before the technological boom. With the marketplace project affecting one of the largest monuments in the city, the construction team and the city of Worcester will work to document new facility additions and structural changes essentially documenting a modern view of the auditorium in its pre-developed and post-developed states. Once the marketplace is completed, transitional projects that may occur in the future can benefit from consolidating existing facilities documented from the marketplace project.

Facility Development

The Facilities Development element will be used to track project planning and execution for existing stakeholders with connections to the memorial and future owners of facilities that would be added to the facility. These include leasing procedures for small business owners, Worcester Redevelopment Authority Projects, and the Architectural Heritage Foundation of Worcester. Important interactions with these groups are included within this work breakdown structure as these three groups hold influence over the project timeline, investors, and future maintenance of the Auditorium as a building and as a memorial site.

Architectural Heritage Foundation

The Architectural Heritage Foundation has a history with the Worcester Memorial Auditorium, primarily in its design and original purpose as a memorial to Worcester residents. Events held before its closure included basketball events, plays, and graduation ceremonies, but

the value of the Auditorium to date is held by this group of individuals. Previous attempts to refurbish the Auditorium had been shut down due to this group's disapproval and as a result they will be involved in the development and reporting of the Marketplace primarily for its value in maintaining the memorial site and artifacts.

Lease Development Procedures

The individual stalls and Little Theater space will be scheduled to lease to small business owners and event staff upon completion of the construction phase. Lease documentation will be conducted by the city of Worcester Town Hall and Manager's Office. They have been the primary contact for hosting the facility as a venue prior to its closure and will continue to do so after its revitalization. Their purpose will be updating leasing documentation to permit marketplace businesses to create a foundation and grow but also to define the type of businesses that can nest within the facility.

Worcester Redevelopment Authority Projects

As this project involves a revitalization of a central Worcester building, the involvement of the Worcester Redevelopment Authority will also be required. Interactions with this group are vital to ensuring there is no duplicity in the work to revitalize the city of Worcester. The authority was designated with the responsibility of monitoring and organizing the new Worcester Common shops, the new Worcester Red Sox Stadium, and the maintenance of the DCU center. Their importance in maintaining the culture and revitalization of the downtown Worcester area will allow the project team to avoid developing unnecessary facilities and documentation that may be in development elsewhere within the district.

Network Diagram

After project scheduling is completed, the network diagram was developed. The network diagram is a graphical visualization of task completion overtime outlined in the project schedule. It serves to separate the planning and scheduling functions and is based upon the planning phase. Although it is not drawn to time scale, the time scale can be derived from the outcome of a network diagram. There are four types of network diagrams: the Program Evaluation and Review Technique (PERT), Critical Path Method (CPM), Precedence Diagramming Method (PDM), and the Graphical Evaluation and Review Technique (GERT). For the project purpose and to align with the Project Management Body of Knowledge, the critical path method will be used. The critical path method is used for projects with interdependent tasks. It calculates the longest path of planned activities to the end of a project. In addition, the earliest start (ES), earliest finish (EF), latest start (LS), and latest finish (LF) can be determined for each task as well as which tasks are critical or have more time to finish (Wermann, 2020a).

To display the tasks, there are two types of network diagram formats. One is Activity in the Box (AIB) and the other is Activity on the Arrow (AOA). In the AIB method, activities or tasks are represented in boxes that are labeled with an activity number. The boxes are linked with one or more arrows depending on how many tasks need to be completed. The ES, EF, LS, LF are put in each of the four corners of the box. For the AOA method, activities are linked by circles called events and actions are represented by one arrow between these events. The events indicate the completion of one activity and the start of another. All activities going into an event must be finished before any activities leading from that event can start. For both types of diagrams, precedential relationships do exist, meaning tasks can have priority in terms of importance. Duration and resources needed for the task can also be displayed. In addition, concurrent events

can occur, as in, tasks can be displayed to take place simultaneously. For this project, the AIB is used as it is more organized and readable compared to AOA. It creates a clean and straightforward way to visualize the tasks that are necessary to carry out the entire project (Wermann, 2020b).

There are many advantages to creating a network diagram that were utilized when developing the diagram of the tasks needed for the Worcester Memorial Revitalization project. The network diagram for this project can be found in **Appendix B**. The critical path and the total calendar time give a good idea of when the overall project is expected to finish. Another benefit is calculating the ES, EF, LS, and LF of a particular task in order to know if the project can be delivered on time and be adjusted accordingly. In addition, total slack or float also helps to see how much time there would be between the calculated and required project completion time. The positive and negative total slack can be used to plan the amount of time the project activity can be delayed or accelerated. Moreover, seeing which tasks can be done concurrently or are interdependent allows for project completion in the shortest amount of time (Wermann, 2020b). Setting the resource determines who is responsible for finishing that activity and makes tracking progress easier. These benefits help keep the project within the triple constraint, or the scope, time, and cost, of the project.

Project Schedule Information

The revitalization of the Worcester Memorial Auditorium is a complex project due to the age of the building, its historical significance, and its central location in Worcester. The building has been unoccupied for several years, likely causing a large number of updates to the utilities and structure. Due to the building's historical significance, extra care will need to be taken in

order to preserve the building's original memorial intent. It is also located near one of the busiest intersections in Worcester which could cause significant traffic delays, if work is not planned accordingly. These factors require special consideration when creating the project schedule because they will add time to the project. With these in mind, the total number of workdays required for this project is 638 days. Assuming eight hour shifts and a five day work week, the project is estimated to take 900 calendar days or roughly 2.5 years. The project will launch on October 5, 2020 and is estimated to end mid-February to early March. The full schedule is shown in **Appendix C**.

The first phase of the project focuses on the project management team developing overarching documentation. Such tasks include blueprint development and archiving for city records and various permissions and assessments of the site required by law prior to the construction phase. This phase would also include heavy communication with factions such as the Worcester Redevelopment Authority, the Architectural Heritage Foundation, and the city of Worcester Senior Council Representatives when discussing the specific demolition conducted during the project and detailed efforts on the restoration and revitalization of the facility as a memorial to the Worcester residents who had lost their lives. To complete the first phase accurately and completely, the time frame requires 66 workdays meaning a little over three months from the project kickoff.

The second phase primarily focuses on the controlled demolition of the facility and the construction focusing on the preservation of the memorial. A significant amount of this construction requires care, communication, and delicacy. The construction would allocate over 397 workdays or 1.5 years of the project's 2.5-year constraint. When defining the second phase's baseline timeframe, one primary factor included the consideration for most of the project's

construction zoning requirements. When developing the construction zone, transportation of various machinery and materials would be required thus impacting the Worcester traffic cycle. As these impacts would require time and resources, the baseline for this phase received the largest segment of our schedule. However, it also permits the potential for developing the most slack during the final phase of the project.

The project's final phase occurs over the course of 137 workdays, a little under eight months, until project completion. During this phase much of the marketplace construction would occur including the addition of new facilities and the reallocation of existing facilities for modern consolidation and use. While this phase remains shorter than the second, it also involves the least imposing construction as multiple teams can complete tasks simultaneously without imposing a risk to the facility and the memorial, a major concern held by stakeholders and the Worcester community. This also permits a closure to the project and a launch to the public by the early spring. Once the construction is completed the facility would be ready to hand off to the client, in which they can begin to allow vendors to fill the space. After the completion of vendor fit outs or decoration the building can be opened to the public. Upon handing the project over to the client all additional setup, build outs and other work is not in the scope, schedule, or budget. Considering potential risks and delays, the latest completion time of this project would be expected around mid to late March 2023. If none of the available slack is used, the project could finish in mid to late February. This completion time permits the public to partake in the marketplace immediately following the heaviest months of the New England winter season where foot and vehicular traffic remain limited and much of the Northeast remains indoors due to freezing conditions.

Gantt Chart

A Gantt chart is a graphical representation of the project schedule. The vertical axis lists the activities while the horizontal axis shows the timeline. The project activities are depicted as bars within the Gantt chart where the width of the bar represents the duration of the activity. Gantt charts are useful for projects like this because they clearly depict the length of a project better than just a list will. They can help project managers keep track of progress during the project and show how certain activities depend on each other. The reconstruction of Worcester Memorial Auditorium is a timely endeavor. It takes 900 calendar days from project planning, design, and evaluation to demolition and reconstruction. The project is divided into three parts including: project planning, facility integration and reconstruction, and facility redevelopment. The Gantt chart is shown in **Appendix D**.

Resources

Linear Responsibilities Matrix

There are many different team members that need to be involved in the revitalization of the Worcester Art Museum. Overall, there is the project management team, design team, construction workers, contractors, suppliers, and consultants as well as the sponsor and stakeholder. A table of the different team members, their responsibilities, and their level of effort is shown in *Table 1*.

The project management team would develop the project plan, recruit staff, and monitor the progress from start to finish. The team consists of the Project Manager, Assistant Project Manager, Superintendent, and Project Engineer. The assistant project manager would help the

project manager with daily duties such as putting together the timeline and recruiting staff. The Superintendent would approve project ideas such as the overall design, timeline, schedule, finance budgets, and so on. The project engineer would communicate the design, timeline, and project related materials to the rest of the team such as construction workers so that all members are on the same page.

The design team serves to create the layout, blueprints, architecture, and restructuring of the building as well as a vision of the potential finished product. The members consist of the architect, structural engineer, civil engineer, specialist designer, design team, and art conservator. The architect, structural engineer, and civil engineer would work together to restructure and develop blueprints of the building such as floor plans. The specialist designer and the design team would sketch what the exterior and interior of the building would look like such as determining the patio design, wall color or flooring.

The construction workers would execute and build the architecture and design developed and approved by the project management and design team. The team members include the demo crew, framers, drywall crew, laborers, finish carpenters, electricians, plumbers, HVAC technicians, painters, and cleaners. The demo crew will demolish only the existing internal structure that is planned to be renovated such as the stage and seating area. After this, the framers will put up the metal or wood structure for the walls as well as put in windows and doors. The drywall crew will apply the drywall on new or existing walls. The laborers will be around for any heavy lifting or other work that needs to be completed. The finish carpenters will place the flooring. The electricians are responsible for installing the electrical units throughout the building, the plumbers will take care of the plumbing unit for the bathrooms and water hookups for food vendors, and the HVAC technicians will install the AC and heating units. Then, the

painters will finish painting or repainting the interior of the building and the cleaners will clean up to make sure the area is in its best shape.

The contractors, suppliers, and consultants would provide legal contracts and gardening services, supply construction equipment, and provide budget management advice, respectively. The sponsor and stakeholder would make key business decisions about the project, approve budgets and resource allocations, and ensure the end result is satisfactory. For the revitalization project, the sponsor and stakeholder are the city of Worcester Council.

Overall, the teams above are significant to ensuring the successful completion of the project. Each member has a distinct responsibility and would contribute to advancing the progress of the project. The levels of effort are low or medium for most of the teams as well as the sponsor and stakeholder because the foundation of the building is already established. The purpose is to revitalize the building while keeping the memorial and its essence intact. Thus, the teams can work on the project in phases and do not need to be present for the entire project. For example, the design team would create the vision of the building in one phase and the construction team would build the vision in the next phase. The highest level of effort is needed from the project management team as they will need to oversee the project from beginning to end given it is approximately a three year project.

Table 2

Linear Responsibilities Matrix

Role	Responsibility	Number of people	Level of Effort
Project Management Team (PM, Assistant PM, Superintendent, Assistant Super. RM, Project Engineer)	Develop the project plan, recruit staff to execute the plan, lead and manage the team, create project schedule, ensure deliverables are given in a timely fashion, provide updates.	6	High

Demo Crew	Responsible for demolishing the existing auditorium, basement, site, and balcony	15	Medium
Framers	Responsible for building any new metal or wood walls, installing windows, and doors.	10	Medium
Laborers	Responsible for heavy lifting, moving and general labor onsite	15	Medium
Finish Carpenters	Responsible for all trim, molding, baseboard and wood flooring	10	Low
Drywall crew	Responsible for putting up all drywall on new or existing walls	15	Medium
Design Team	Manage and lead the design team	3	Medium
Architect	Visualize the whole layout of the building and communicate with the structural and civil engineers	1	Low
Services Engineer	Design, installation, and monitoring of mechanical, electrical, and public health safety systems	2	Medium
Structural Engineer	Consult with civil engineers to restructure certain aspects of the building by creating drawings and specifications, perform calculations, and create reports. Inspect structures to ensure they are properly built.	1	Medium
Specialist Designer	Design the exterior and interior building layout to make the building look presentable and attractive	1	Medium
Civil Engineer	Design and visualize the building blueprints and floor plans	1	Medium
Art Conservator	Oversee restoration and preservation of historical murals and paintings	2	Medium
Electricians	Install electrical units and systems throughout the building	15	Medium
Plumbers	Manage the plumbing unit for bathrooms	10	Medium
HVAC Technicians	Install air conditioning, heaters, ventilation, and refrigeration systems	10	Medium

Painters	Paint the interior of the building	10	Low
Gardening & Landscaping Contractor	Maintains outdoor grass, mulch, and plants, and landscaping	2	Low
Cleaner	Clean the facility	3	Low
Contractor	Provide legal contracts and lease documents	1	Medium
Cost Consultant	Budget and cost management/advice	1	Low
Suppliers	Supply the required construction equipment	10	Low
Sponsor	Make key business decision about the project, approve the budget, ensure availability of resources	1	Low
Stakeholder	Approve budgets and resource allocations. Ensure the end results are satisfactory	1	Low

Resource Leveling Diagram

Resource leveling is the process of developing a schedule that minimizes fluctuations in resource requirement throughout the project (Gido, Clements, & Baker, 2018). It is an attempt to balance the cost of the resources and the time required to complete a task. Resource leveling is done by delaying certain noncritical activities, those with positive slack, to a later date to ensure that the level of resources required stays uniform. Activities can only be delayed until their latest start date. Any further delays would cause the project to go past its end date.

The resource leveling diagram was created based on the tasks in the WBS and is shown in **Appendix E**. Resources available are based on when each subcontractor is on site. Tasks were scheduled so that the resources from each subcontractor would stay constant during their portion of construction. However, this does mean that the total number of resources on site will vary month to month. Because the number of resources on site depends on the tasks being

accomplished and the subcontractor responsible for them, the varying resources do not affect the cost or the schedule.

Budget

The reconstruction of Worcester Memorial Auditorium is a large undertaking requiring an extensive amount of manpower, materials and money. Not only will the project take nearly 3 years to be completed, it will later need to be retrofitted to the vendors that will be selling inside the market. After detailed calculations and research on materials and unit costs, the estimated overall budget of the project is \$94,002,550. The budget is split into separate divisions but can mainly be divided into five parts: general requirements, design and engineering and other allowances, demolition, indoor renovation, and outdoor improvements. The full project budget is broken down by division and is shown in *Table 2*. A breakdown of each of the parts of the budget are shown in **Appendix F**.

When estimating the project budget, the general requirements initially totals up to about \$17,221,000 and accounts for 18% of the total investment. This part includes the general conditions, indirect construction costs, job trailer, storage box, site restrooms, project team, field layout, labor, temporary utilities, project signage, police details, hoisting/scaffolding, site cleaning, dumpsters, travel expenses, permits, and company profit. The general requirements section is a large component of the project because it includes the main setup and breakdown costs, pays the employees of the company, and includes numerous necessities and safety requirements.

The next part of the project includes the engineering and design costs as well as allowances. The budget of this section totals \$19,425,000, accounting for 21% of the total

investment. This part mainly includes design services, design markup, contingencies, insurance, overhead and profit.

Since our project is based on the renovation of the existing memorial hall, the next step is to demolish the existing facilities. The budget of this part is \$8,850,000, accounting for 10% of the total budget. To accomplish our goal of building a marketplace, the construction needs to demolish the basement, the first floor, the second floor and the top of the second floor which is to become the third floor. Additionally, the concrete outside the building, the existing elevator and elevator shaft, and the existing courtyard area will all be demolished to allow for a full rebuild.

In the total investment budget, the largest proportion is the indoor renovation, which will account for almost half of the total investment of our project. In our estimate, the budget for indoor renovation is \$46,385,550, accounting for 29% of the total budget. The indoor renovation includes materials, a new elevator and shaft, plumbing, HVAC, electrical, communication cable, security system, fire suppression system, framing and finish work, and all additional interior work.

The last section of the budget is the outdoor improvements section. Our team expects the new memorial marketplace to become a revitalized landmark building in Worcester, so it is necessary to repair the appearance, form new green space, build new pavement and improve drainage around the facility. Our budget for outdoor improvements is \$2,120,000 for 2% of the total project budget. With the entire project totaled up, Worcester Contracting plans to make around \$10,500,000 in profit and revenue of \$94,002,500. The value of \$94,002,500 includes all work to allow for the building to be ready to be passed off to the client for them to rent to vendors, any tenant improvement, such as vendor build outs or changes to the work that is currently in the scope are not included.

Table 3

Project Financials

Project Financials			
Worcester Memorial Marketplace			
Project Description:		Revitalization of Worcester Memorial Auditorium to create Worcester Memorial Marketplace.	
Estimated Duration:		30 Months	
Division		Cost	Notes
01	General Requirements		
	General Conditions	\$ 2,220,000.00	
	Indirect Construction Costs	\$ 166,500.00	
	Job Trailer	\$ 75,000.00	
	Storage Box	\$ 10,500.00	
	Site Restrooms	\$ 45,000.00	
	Project Team	\$ 2,940,000.00	PM, RM, Asst. PM, Super, Asst. Super, Project Engineer
	Field Layout/ Engineering	\$ 190,000.00	
	Labor	\$ 5,550,000.00	General labor, all activities unless specified have labor included.
	Temporary Utilities	\$ 50,000.00	Reinstate existing Water and Electricity
	Project Signage	\$ 15,000.00	
	Temp. Fencing	\$ 20,000.00	
	Police Details	\$ 55,000.00	
	Hoisting/Scaffolding	\$ 1,500,000.00	
	Site Cleaning	\$ 75,000.00	
	Dumpsters	\$ 35,000.00	
	Misc. Travel expenses	\$ 250,000.00	
	Permits	\$ 250,000.00	
	Company Profit	\$ 3,774,000.00	
	General Requirements Total	\$ 17,221,000.00	
02	Existing Conditions		
	Demolition of Basement	\$ 1,100,000.00	Removal of all non-structural walls, existing floor slab
	Demolition of First Floor	\$ 1,250,000.00	Removal of all seating, stage, interior walls
	Demolition of Second Floor	\$ 550,000.00	Removal of all seating, interior walls
	Demolition of Top of Second Floor (Future Third Level)	\$ 325,000.00	Removal of all interior walls
	Demolition of Exterior Site Concrete	\$ 750,000.00	Breakup and remove all concrete
	Restoration of Existing monuments	\$ 250,000.00	
	Hazardous Demolition	\$ 750,000.00	
	Historical Preservation	\$ 1,500,000.00	
	Demolition of Roofing and RTU's	\$ 525,000.00	
	Demolition of existing Elevator and Pit	\$ 250,000.00	
	Demolition to existing patio areas	\$ 750,000.00	
	Demolition Misc. Allowances	\$ 850,000.00	
	Existing Conditions Total	\$ 8,850,000.00	
03	Concrete		
	Form and pour new basement floor slab	\$ 1,050,000.00	
	Form and Pour New Interior Stairs	\$ 120,000.00	

	Form and Pour New third floor	\$ 550,000.00	
	Form and Pour Sidewalks	\$ 120,000.00	
	Form and pour new patio, with brick inlay	\$ 500,000.00	Brick inlay installed and supplied by Mason
	Concrete Total	\$ 2,340,000.00	
04	Masonry		
	Exterior Stone walls	\$ 150,000.00	
	Rebuild Elevator shell	\$ 125,000.00	
	Patio Brick inlays	\$ 1,000,000.00	
	Masonry Total	\$ 1,275,000.00	
05	Steel		
	Joists and girders	\$ 1,800,000.00	Additional Steel to support building loads and New steel for building of third floor
	Columns	\$ 400,000.00	New steel for building of third floor
	Metal deck	\$ 350,000.00	New steel for building of third floor
	Metal Framing	\$ 1,305,000.00	Frame interior rooms
	Misc. Metals	\$ 350,000.00	Decorative metals, stairs
	Steel Total	\$ 4,205,000.00	
06	Wood, Plastics, Composites		
	Misc. Rough Carpentry	\$ 1,875,000.00	Rough carpentry for vendor stalls, interior rooms & stage
	Misc. Finish Carpentry	\$ 3,500,000.00	Finish carpentry for vendor stalls, interior rooms & stage. Includes all trim, moldings, baseboard
	Wood, Plastics, Composites Total	\$ 5,375,000.00	
07	Thermal and Moisture Protection		
	EPDM Roofing	\$ 725,000.00	Install new roof
	Roof Blocking	\$ 35,000.00	
	Flashing	\$ 225,000.00	Copper Flashing
	Caulking	\$ 125,000.00	Caulk all Seams
	Waterproofing	\$ 200,000.00	
	Thermal and Moisture Protection Total	\$ 1,310,000.00	
08	Openings		
	Doors and Frames	\$ 1,250,000.00	Install new interior and exterior doors
	Overhead Doors	\$ 16,000.00	Install 2 new Overhead garage doors
	Windows	\$ 3,500,000.00	Install new windows
	Openings Total	\$ 4,766,000.00	
09	Finishes		
	Drywall	\$ 1,800,000.00	New drywall on all framed walls/ ceilings
	Paint interior walls of building	\$ 750,000.00	
	Paint 10' of columns yellow	\$ 5,000.00	Only in Basement
	Paint all Doors and windows	\$ 100,000.00	
	Paint all trim, molding and baseboard	\$ 250,000.00	
	Paint Exterior of Building	\$ 2,300,000.00	
	Stain stage	\$ 6,000.00	
	Furnish and Install tile flooring	\$ 180,000.00	
	Furnish and Install wood flooring	\$ 2,010,000.00	
	Furnish and Install carpet	\$ 900,000.00	
	Power wash Building	\$ 750,000.00	

	Finishes Allowance	\$ 250,000.00	
	Finishes Total	\$ 9,301,000.00	
10	Specialties		
	Toilet Partitions	\$ 35,000.00	
	Toilet Accessories	\$ 20,000.00	
	Fire Extinguishers	\$ 15,000.00	
	Knox Box	\$ 1,000.00	2 Knox boxes
	Signage	\$ 25,000.00	
	Striping for parking area	\$ 35,000.00	
	Interior parking gate/ meter	\$ 50,000.00	
	Parking medians, blockades, protection	\$ 100,000.00	
	Specialties Allowance	\$ 70,000.00	
	Specialties Total	\$ 351,000.00	
11	Equipment	N/A	
12	Furnishings	N/A	Supplied by Tenant
13	Special Construction	N/A	
	Refinish murals	\$ 1,250,000.00	
	Special Construction Total	\$ 1,250,000.00	
14	Conveying Equipment		
	Elevator	\$ 45,000.00	4 story elevators
	Elevator Labor, Install, Testing, and Inspection	\$ 30,000.00	
	Conveying Equipment Total	\$ 75,000.00	
21	Fire suppression		
	Sprinkler Heads	\$ 350,000.00	
	Fire Pump	\$ 90,000.00	
	Fire Pipe	\$ 225,000.00	
	Fire Cabinets	\$ 200,000.00	
	Fire Tank	\$ 155,500.00	
	Permit	\$ 3,000.00	
	Fire Suppression Total	\$ 1,023,500.00	
22	Plumbing		
	Domestic Water line	\$ 75,000.00	New waterline from road
	Sewer line	\$ 90,000.00	New Sewer line from Road
	Gas line	\$ 75,000.00	New Gas line from Road
	Floor drains	\$ 75,000.00	Only in basement
	Grey Water Drain Pump	\$ 160,000.00	
	Interior plumbing	\$ 1,500,000.00	
	Supply toilets, sinks, urinal	\$ 350,000.00	
	Plumbing Total	\$ 2,325,000.00	
23	HVAC		
	Heating/Air Conditioning	\$ 4,200,050.00	heat and AC throughout the entire building
	Louvers	\$ 75,000.00	
	Unit Heaters	\$ 25,000.00	

	HVAC Total	\$ 4,300,050.00	
25	Integrated Automation	N/A	
26	Electrical		
	Main Service	\$ 555,000.00	
	Panel and sub panels	\$ 450,000.00	
	Transformer and Transformer pad	\$ 95,000.00	
	Lighting	\$ 225,000.00	
	Receptacles	\$ 125,000.00	
	Power to kitchen, Bathrooms and all other rooms	\$ 1,450,000.00	
	Fire Alarm	\$ 1,250,000.00	
	Supply power to all vendor stands	\$ 1,105,000.00	Supply power to 2 outlets to each vendor stand
	Site Lighting	\$ 80,000.00	Includes light poles and monument lighting
	Electrical Total	\$ 5,335,000.00	
27	Communications		
	Install Phone/Cable service	\$ 150,000.00	
	Data and WIFI throughout Building	\$ 250,000.00	
	Ethernet Hookup for all vendor stalls	\$ 450,000.00	
	Communications Total	\$ 850,000.00	
28	Electronic Safety and Security		
	Security Cameras	\$ 1,200,000.00	
	Security Alarm	\$ 900,000.00	
	Automatic Call System	\$ 85,000.00	
	Electronic Safety and Security Total	\$ 2,185,000.00	
31	Earthwork		
	Regrade Site	\$ 1,200,000.00	Small Tight Site requires intricate planning
	Paving	\$ 60,000.00	
	Walkways to doorways	\$ 190,000.00	
	Curbing	\$ 75,000.00	
	Drainage	\$ 260,000.00	
	Form New Green Space	\$ 35,000.00	
	Earthwork Total	\$ 1,820,000.00	
32	Exterior Improvements		
	Misc. Plantings	\$ 250,000.00	
	Grass Seeding	\$ 5,000.00	
	Mulch	\$ 5,000.00	
	Misc. Improvements	\$ 40,000.00	
	Exterior Improvements Total	\$ 300,000.00	
33	Utilities		
	Utility Stub ins	\$ 120,000.00	
	Utilities Total	\$ 120,000.00	
34	Transportation	N/A	
35	Waterway & Marine Construction	N/A	
40	Process Interconnections	N/A	

41	Material Processing & Handling Equipment	N/A	
42	Process Heating, Cooling, & Drying Equipment	N/A	
43	Process Gas & Liquid Handling, Purification & Storage Equipment	N/A	
44	Pollution & Waste Control Equipment	N/A	
45	Industry Specific Manufacturing Equipment	N/A	
46	Water and Wastewater Chemical Feed Equipment	N/A	
48	Electrical Power Generation	N/A	
	Architecture and Engineering		
	Design Services	\$ 3,885,000.00	
	Design Markup	\$ 1,110,000.00	
	Architecture and Engineering Total	\$ 4,995,000.00	
	Miscellaneous Allowances		
	Contingencies	\$ 7,215,000.00	
	Insurance	\$ 555,000.00	
	Overhead and Profit	\$ 6,660,000.00	
	Miscellaneous Allowances Total	\$ 14,430,000.00	
	Project Total	\$ 94,002,550.00	Total Project Revenue

Risk Management Information

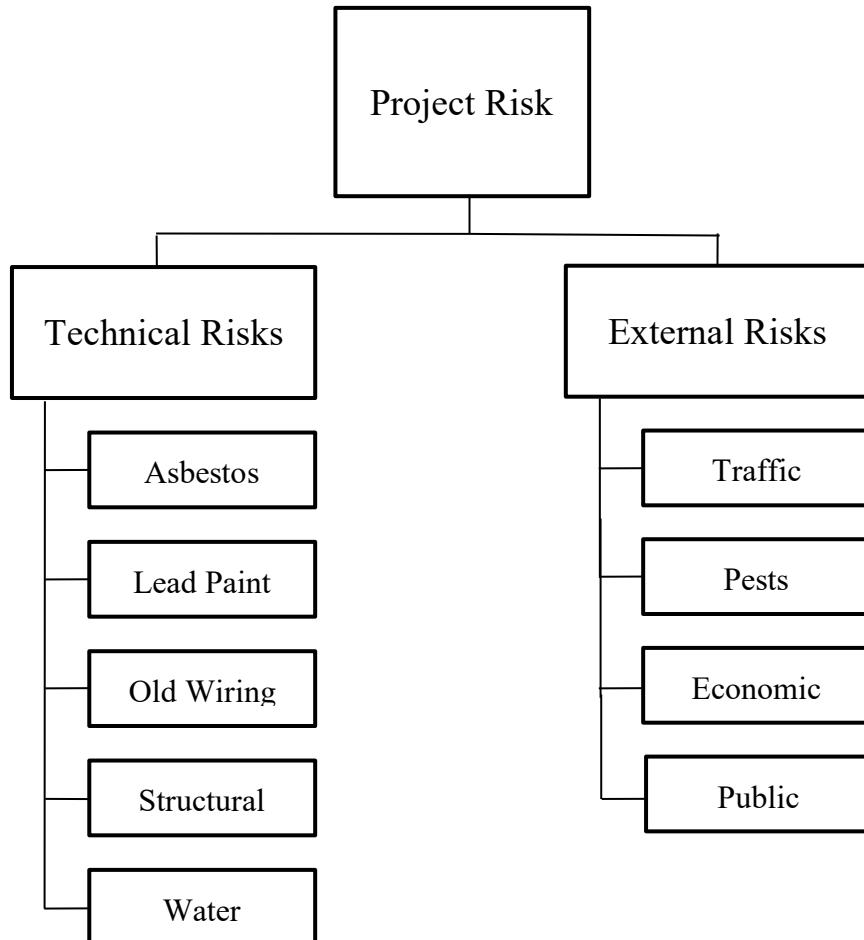
Risk management is a very important aspect of project management. Risk is inherent to every project and can be defined as “an uncertain event that can jeopardize accomplishing the project objective (Gido et al., 2018). When not planned for properly, risks can threaten the scope, quality, and cost of the project in addition to the threat of total project failure. In order to avoid negative impacts, project managers employ risk management strategies to plan for and mitigate any potential impacts to the project. These strategies are implemented at various stages of the project to manage possible risks.

The first part of risk management is identification of the risks. At the beginning of the project, project leaders, team members, and stakeholders should come together to brainstorm possible risks they may encounter over the lifetime of the project. During this step, risk assessment, identifying the likelihood of an event happening and the impact, should also take

place. Once different risks and their potential impacts have been identified, project managers should come up with a risk response plan. This plan will detail steps taken to mitigate potential risks as well as actions which will be implemented in the event of a risk. Each factor is then contained in a risk assessment matrix. Proper risk management should continue throughout the duration of the project. Monitoring risks during the project is just as important as planning for them before. Project managers should refer back to the risk assessment matrix periodically to ensure that the project is staying on track and to update it with any new risks that may have been identified as the project continues.

The restoration of the Worcester Memorial Auditorium involves several risks due to the type of project it is and the location of the project. A risk breakdown structure is shown in *Figure 1* which provides an overview of the types of risks present in this project. A risk assessment matrix is shown in **Appendix G** which provides more detail about each type of risk and the response and mitigation plan for each risk.

Figure 1

Risk Breakdown Structure

Some of the main risks for this project site revolve around the technical risks that come from renovating an old building. Because of the period it was built in, there is a high likelihood of encountering toxic materials during renovation. One of the most common risks in old buildings is asbestos. Asbestos is a toxic mineral which was commonly used in building material in the early 20th century. Asbestos is commonly found in adhesives, tiling, electrical components, insulation, and fireproofing (*CONCEPTION AND PURPOSE OF THE BUILDING*, 1933). Another toxic material often used in the beginning of the 20th century is lead paint (Admin,

2019). Ingested or inhaled lead paint flakes can cause severe organ damage. Both asbestos and lead paint are a threat to the construction workers if particles of the material get into the air. Removal of these materials, especially asbestos, can be very expensive, so it will add cost and halt construction if found later in the project. Part of the mitigation plan for these materials should be to have a professional come in and assess the situation. It is often cheapest and easiest to seal or leave toxic materials like these alone. They only pose a problem when flakes are made. However, removal of these materials should be considered in the beginning of the project, so they can be added into the project baseline.

Old wiring is another common technical risk in old buildings. Old or damaged wiring can cause shocks, burns, or electrical fires. Such instances are especially a hazard in an old, abandoned building like the Worcester Memorial Auditorium because it has not been inspected or updated for several years. An electrician should inspect all of the wiring early on in the project and begin replacing any faulty wiring in order to avoid harming workers.

Water damage is another risk that may be found in the Worcester Memorial Auditorium. If left for long periods of time, it can cause decay, structural damage, and mold. The building should be inspected for leaks in the roof or from pipes within the building to mitigate any damage that may occur throughout the course of the project. Water damage may cause structural issues that increase the cost and time to renovate the building. Structural damage in general is another risk associated with this project. Buildings that have been abandoned for years have a higher likelihood of structural damage. If damage goes uncaught, there is an increased risk that once renovations begin it might cause a collapse. A collapse can harm workers and increase the time and cost of the project. The building should be thoroughly inspected for any damage prior to construction in order to incorporate any repairs that need to be done into the project baseline.

In addition to technical risks, there are also several external risks associated with this project. The Worcester Memorial Auditorium is located in between two busy streets. The traffic on these two streets poses a risk to the project. The busy streets could cause delays to the schedule, and people in the city might be displeased with the possible delays in traffic. Project managers should work with the Worcester Police to create alternate routes and a traffic plan if construction will interfere with traffic flow. In addition, the project could be scheduled to avoid outside work during high traffic times. Outside work could happen in the middle of the day and stop during rush hour times.

Another potential external risk is pests like rodents, birds, or insects. Rodents will often chew through wires, increasing risk of electrical fires. Pests in general will create an unhygienic environment. This risk stems from gaps that may be present in the exterior of the building. The building should be checked for gaps and any found should be sealed. An exterminator might also be called to get rid of any pests in the building.

An economic recession is an external risk to the project. Downturns in the economy could potentially affect the cost of the project. Material costs could go up while the selling price of the finished marketplace could go down, decreasing the net profit of the project. In order to mitigate this risk, protocols for when certain materials are ordered will be put in place. For example, if the price of a material increases by a certain amount, the material will be ordered immediately to avoid any further increases in price.

The final risk to this project is public opinion. Historical buildings can mean a lot to a community, and if the new design does not respect the history of the building properly, it can cause delays to the schedule or even project failure. There are often societies in cities that are in

charge of historical buildings. They ensure that buildings built before a certain year or that have historical significance are not demolished or altered in a harmful way. It is vitally important in this project to be respectful of the history of the Worcester Memorial Auditorium. The mural, dedication to WWI veterans, and the pipe organ should be preserved even as it is renovated for a new use. If the historical value is not upheld, historical societies might be able to stop construction temporarily or permanently. Historical societies and the public are important stakeholders in a project like this, so they should be included in the planning and design phase to ensure that the project respects the history of the building.

There will always be risks associated with new projects. Properly identifying, mitigating, and managing risks will help ensure a project is a success. The risks for this project were split into technical and external risks. The technical risks associated with this project are asbestos, lead paint, old/faulty wiring, structural damage, and water damage. The external risks include pests, traffic, and historical societies and public opinion. In general, mitigating these risks can be done through careful planning in the design phase. The building needs to be thoroughly inspected before construction to avoid any surprises in the middle of construction and to mitigate potential risks to workers.

Project Organization Type Information

The revitalization of the Worcester Memorial Auditorium would be considered an Autonomous Project Organization due to the many construction related tasks required for the project's completion. An Autonomous Project Organization is commonly referred to as a Projectized Organization type, which are typically utilized in contracting/consulting companies. This is because Projectized Organizations operate around projects where employees are

organized to work on one or multiple projects at a time. Project teams are organized based on each member's experience and skill sets in order to ensure the success of each project.

Furthermore, in a Projectized Organization each team member directly reports to the project manager (PM) as the PM oversees the decision making for the project budget, schedule, quality, and resources. In this structure, the PM plays an important role in the project team and is responsible for the success of the projects they manage. For these reasons, this type of organization is suitable for the reconstruction of the Worcester Memorial Auditorium.

One major advantage to utilizing a Projectized Organization type is that by having each member report back to the PM, decisions are made faster and with less controversy, increasing the efficiency of the project. In addition, a Projectized Organization type promotes communication within specified teams and throughout the organization itself. Team members are urged to discuss project topics and decisions in detail before reporting back to the PM - as not only does the PM need to agree upon final decisions but the PM also has assignments of their own. Collaboration between team members drives each member to build their own skill sets and propels them to become more flexible, as for each project they participate in they will meet new people. The combination of a single project manager and a versatile team promotes the development of a powerful entity that produces well thought out work.

The power the PM possesses can also be obstructive to a Projectized Organization type as the position of the project manager can allow them to have the final say. For instance, if a PM is not knowledgeable or experienced on the project, they are assigned they could hinder the development of the project. In addition, the attitude the PM possesses can hinder the success of the project as Projectized Organizations utilize a collaborative environment. Absolute authority can cause individuals to become arrogant, causing them to abuse their power. If a PM acts in

such a way, it can cause disagreements within the projects they are assigned. Another issue that can arise within a Projectized Organization is the division of work among team members and ensuring each member is up to date within their assigned projects. This issue would arise from a lack of communication within teams and/or arise from team members confusing their assignments - as each team member may be assigned to more than one project at once (Management Square, 2017).

This organizational structure may have potential shortcomings, but it would still be considered the best organization type for the renovation of the Worcester Memorial Auditorium. The renovation will require specialized contractors and consultants in conjunction with a knowledgeable project manager and a team of highly-skilled members. The renovation of the auditorium will require an immense amount of collaboration as the project plan integrates restaurants, bars, shopping and entertainment spaces. Once a memorial that was made to entertain, the landmark's new use will still resemble its history and purpose, but also become an economic powerhouse for the city of Worcester.

Project Team and Manager Section

Executing project work is rarely ever done by one individual contributor. There is a team that helps each other to attain the overall goal as efficiently and effectively as possible. Usually a leader or organizer, called the project manager (PM), will oversee the entire project lifecycle. This individual is responsible for making key decisions about the project, such as the scope, vision, and timeline (Harrin, 2015). Possessing strong skills is necessary from both the project manager and the team in order to drive a project to success.

Project Manager

First and foremost, it is necessary for a project manager to have outstanding leadership skills. Managing a team, making sure everyone has the resources to get their work done, and maintaining happy employees lead to successful execution of a project. It is important to be able to motivate and help others develop in the process. Moreover, handling the project lifecycle is equally as important. The project manager should know how to mitigate and respond to risks, set up a timeline, ensure tasks get completed on time as well as make sure the quality and initial vision is met.

Communication skills are essential. Whether it be speaking with stakeholders, obtaining a new contract, or telling the team about setbacks or accomplishments, effective communication skills leads to great productivity. In this way, the team would know the big picture of the project and could better accomplish their tasks with minimal confusion or scope changes taking place.

Writing business cases, gathering requirements, and envisioning the pipeline for a project is significant to the success of a project and the team. Valid business concepts are crucial because otherwise there would be no way to validate the use of the project. Without good requirements, the team would not know what to implement, quality would be compromised, and customers would be unhappy.

Overall, a project manager must have effective leadership and communication skills as well as the knack to create well-written business cases, gather requirements, and vision for the project. Making sure a project manager encompasses these characteristics is important to a successful team and project.

Team

It is necessary for a project team to have technical skills in order to carry out their work.

Technical skills not only involve knowing particular technologies, but also analytical, critical, and problem solving skills. In addition to technical skills, for project teams outside of their functional roles, soft skills would be essential. Soft skills include communication and presentation skills, teamwork, time management, and ownership (*Find Top ELearning Content Providers 2020*, 2020). These skills are often undervalued but are what makes or breaks a project.

Problem solving, critical thinking, and analytical skills are significant when breaking down a vague or large task. Not only can team members understand the bigger picture, but they can also understand the smaller details to build the necessary components of a project. These skills come in handy when making important technical decisions that can impact the business. Moreover, quickly understanding the needs of a business, customer satisfaction, and other data can identify feature updates that can lead to overall quality improvements.

Communication and presentation skills go hand in hand, leading to valuable productivity and useful results. In this way, the team and manager can understand the progress of each other's work. Moreover, transparency of difficulties that are faced when doing a project can result in faster resolutions that in turn lead to delivering a successful product.

Teamwork is essential as a project would not be able to meet expectations without team members. Learning how to effectively work in a team and dividing tasks based on skill sets are crucial to ensure the highest quality of a product. Time management is also involved when discussing teamwork as there are many tasks and projects that team members have to handle. Knowing which items to give priority helps the team as a whole achieve their goals. It is also

equally as important to take ownership of the project tasks. Whether it be an accomplishment or a failure, team members should take responsibility and own up to their work.

Overall, a project team should embody both strong technical and soft skills. For the latter, these include analytical, critical, and problem solving skills. In addition, soft skills are equally as important and include communication and presentation skills, teamwork, time management, and ownership. Developing these skills enable a team to effectively work together towards achieving a common goal.

For the Worcester Memorial Renovation project, our team will make sure to adopt these skills in order to deliver efficient results. Throughout the course of the project, weekly meetings with the owner and architect will take place. The project management team will discuss the project's progress, changes in schedule, scope or cost as well as go over any hot items. A hot item is an important task that needs to be focused on during a meeting. If a hot item cannot wait for approval until the next meeting, an emergency meeting may be called for. Additional meetings will include a kickoff meeting with all subcontractors in which the meeting will be run by the project manager and site superintendent. The kickoff meeting will be to go over all scope, schedule, answer questions, and explain safety procedures. Coordination with other subcontractors will be discussed to ensure that the project can progress smoothly. Additionally, weekly subcontractor meetings will occur with the project management team and the superintendent to do safety reviews and get progress reports from each foreman. The implementation of weekly meetings will help eliminate possible confusion and allow for questions and concerns to be addressed while the project manager is present.

The project will have a greater likelihood of success if the reporting process is thorough. For that reason, the project will use a daily reporting system. The program called Procore will be

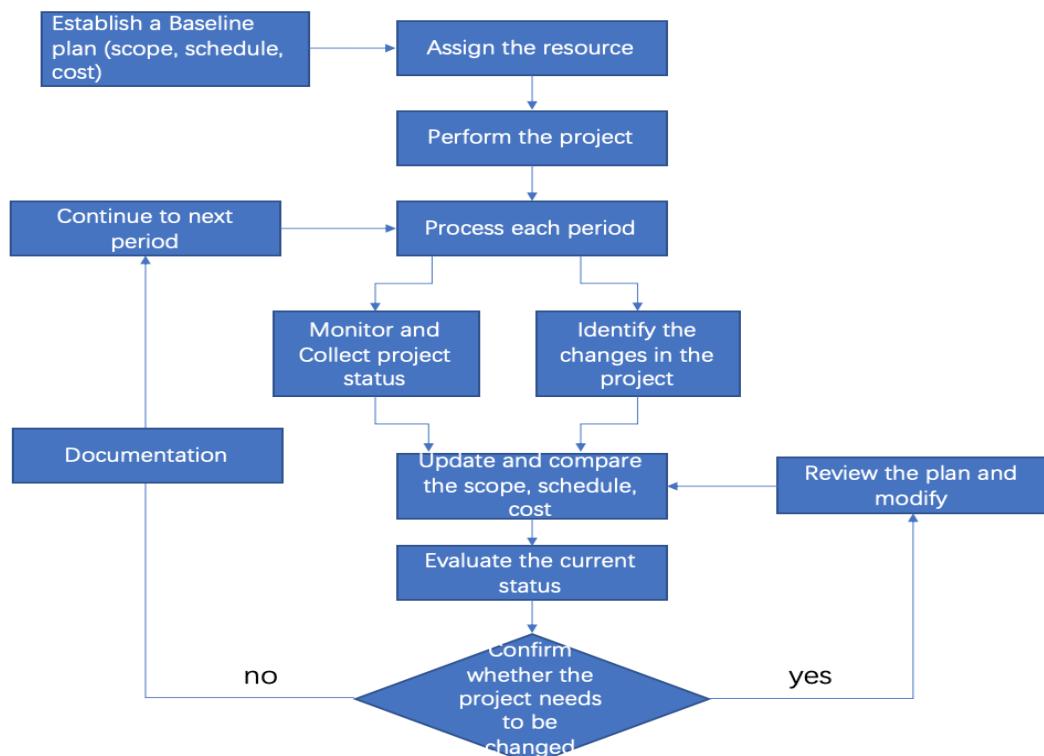
used to report the weather, people onsite, work performed, deliveries and any notes that the site super feels is important. At the end of the week, a weekly report will be created to highlight the key work that was performed that week as well as show photos to the client.

Project Control Process

Project control needs to use systematic theory and method, and under the limited conditions and resources, plan, organize, and coordinate the whole process from the beginning to the end of the project until the final realization of the project objectives. Through the project control process, the team can efficiently plan, organize, guide, and control Worcester Memorial Auditorium projects, and closely link the tasks with relevant departments and personnel, so that the departments and staff have clear goals. The project control process is shown in *Figure 2*.

Figure 2

Project Control Process



The project control process includes five parts: project start-up, project planning, project execution, project monitoring and change, and project closing. The first stage of project management is called project start. Project start-up includes initiating, naming, and defining a broad plan of the project, and at the same time, determining the target according to the restrictions, risks, and participation of the project. In addition, the feasibility of the project will be determined according to the feasibility study results of the project. In the planning stage, it is necessary to draw up a comprehensive operation road map that can guide the team through all stages of project implementation and termination and set deadlines at key nodes. In addition, resources should be allocated well. During the project execution phase, the team will be responsible for the deliverables to ensure that the project can achieve the initial set goals. The monitoring and control of the project will happen at the same time as the project implementation. At this stage, the role of project manager is very important. In addition to supervising the project performance, the project manager must also monitor resources and manage risks. In case of unexpected problems, the project manager must adjust the plan content and schedule.

Rebuilding Worcester Memorial Auditorium is a challenging project. The project will face many uncertainties and challenges. But with a clear project control process and plan, the team can move towards their goals. At the same time, the team is prepared for the problems. Once unexpected challenges are encountered, the corresponding responsible person will solve the problems in the fastest time.

Reporting and Documentation Section

To ensure the successful monitored completion of our project, our team will document and report the work they have completed, are in the process of completing, and are beginning on

a weekly basis. **Appendix H** has a template of the weekly report that would be submitted to the client.

The weekly report first identifies the project, the square footage of the project, and the week the report is reviewing. The report then states who will be receiving it and who sent the report - identifying the individuals by name, email, and company name. To gather a holistic viewpoint of how much work was completed, the team keeps track of the weather at both the start and ending of the day throughout the week. Below this portion of the report, the specific tasks are highlighted with the level of completion for each task during the week. In addition, tasks are identified for the following week.

To make certain team members are aware of where the budget is at, the weekly report reviews any payments made for that week, their amount, submittal date, and payment status (in case the payment is made in increments). Furthermore, at the end of the report meetings for that week are specified by both date and time to confirm each team member is aware of the progress. Lastly, at the conclusion of the report includes progress photos of each task.

Conclusion

The Worcester Memorial Marketplace will benefit local businesses, Worcester residents and the city of Worcester because of its focus on business and community. The project, if approved, is scheduled to begin in October of 2020 and have an end date of March 2023, allowing the project to span a total of 30 months. The total estimated cost of the revitalization and repurposing of the memorial is about 94 million dollars with additional improvement costs per vendor. It is important to note that vendor fit out is not part of the scope of work, nor is it implemented in the project budget or schedule. With every project there comes risks which may

include technical risks, given that the building is old and may have unsafe building materials, structural damage, faulty wiring, etc. There is a risk of traffic concerns due to the small property boundaries and the extensive site and exterior work. There could be a potential push back from the local historical society due to the building's age and memorial status. Lastly, the potential for an economic downturn could result in the space not being rented out or having less customers. Fortunately, these risks can be mitigated by proper project management, risk mitigation, and quality control. With all the risks in mind, the reward has to be looked at as well. This is to include, but is not limited to, the potential economic boost with a centralized market of this size, the repurposing of a vacant building that is transformed into a multipurpose entertainment space, the potential to attract people to the city, and the ability for small businesses, local vendors and more to showcase and sell their products. The project will have a team of experts that are in charge of designing, operating, and completing the marketplace to ensure it is handed off just as the plans and scope had been created. As the city begins to re-establish itself in the new age of technology and modernize to the current trends, it is important to ask, why blend in with the modern style? Worcester Memorial Marketplace will not blend in, it will be a remarkable one of a kind space that will attract people from all around, while also standing strong to honor the lives that were lost in WWI. The city needs a space that will forever change how buildings are repurposed, so why not let that be Worcester Memorial Marketplace.

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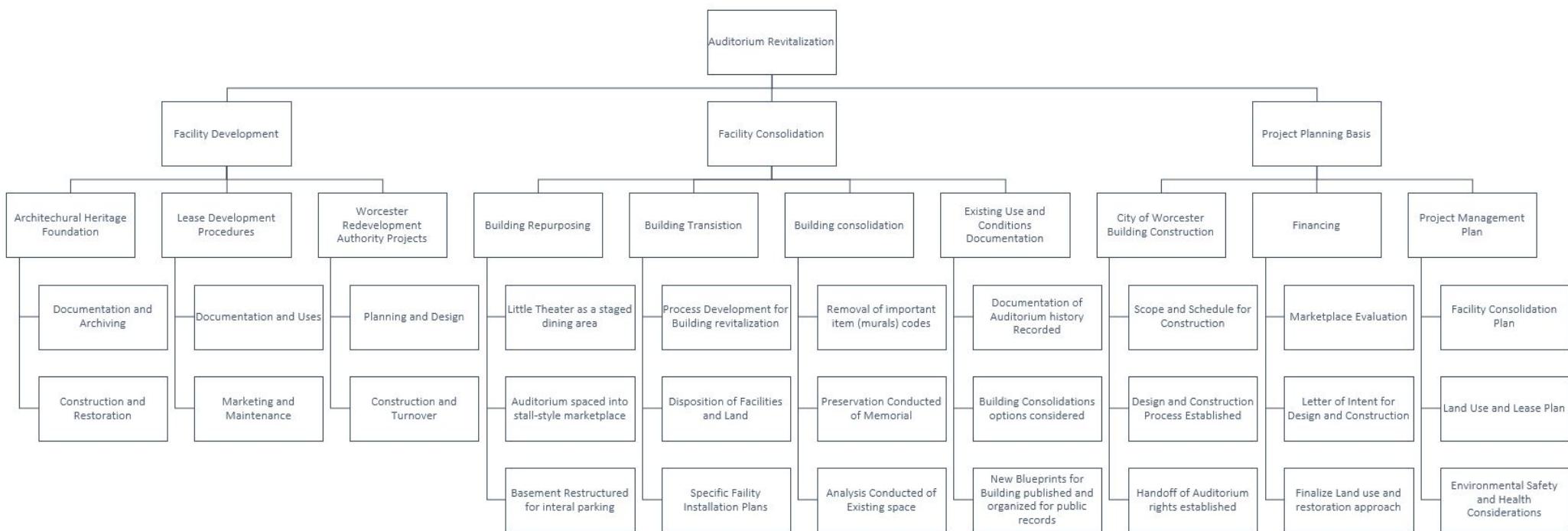
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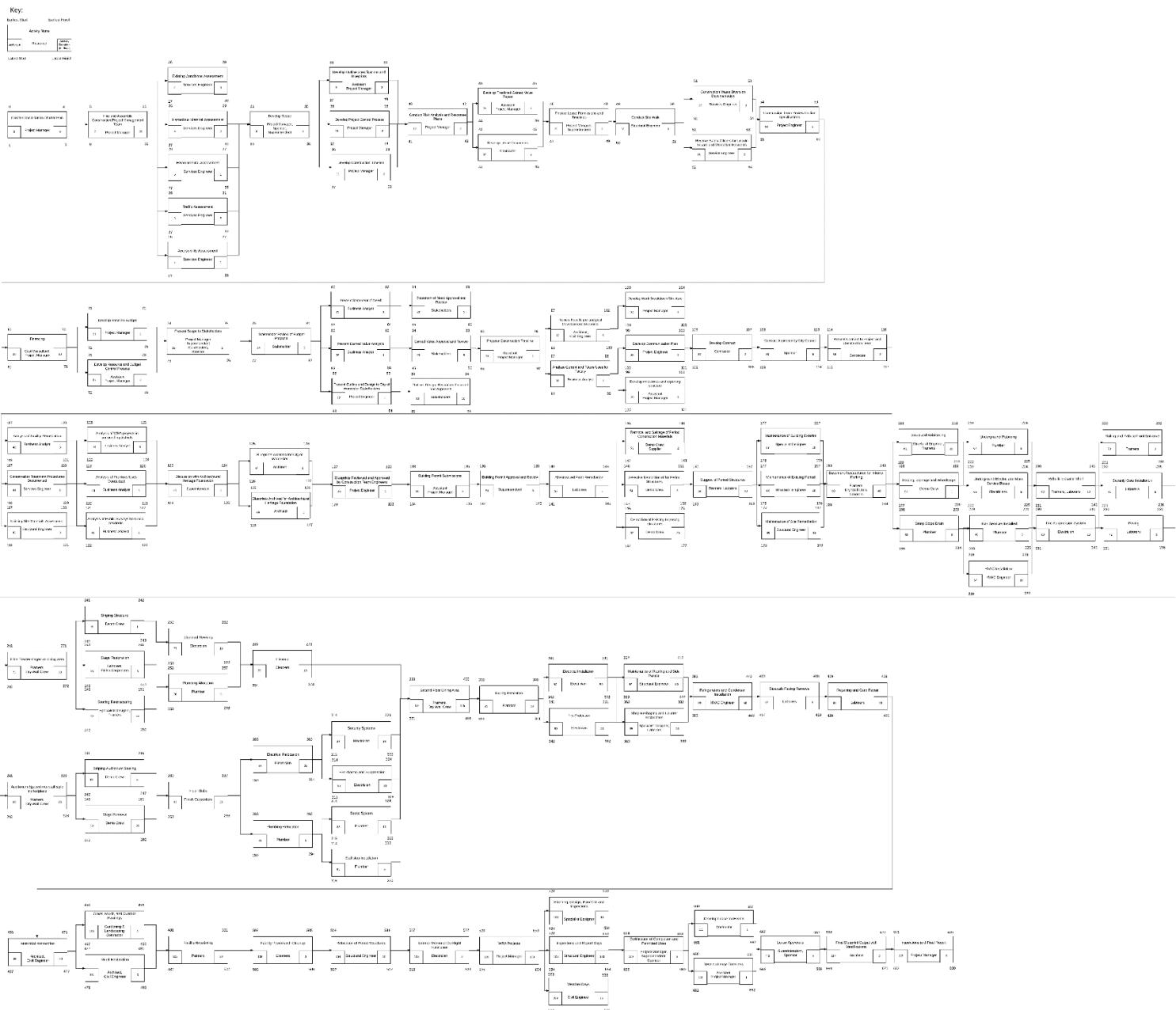
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Appendix A-Work Breakdown Structure



Appendix B- Network Diagram



Appendix C- Project Schedule

ID	WBS	Task Name	Duration	Start	Finish
0	0	Auditorium Construction	638 days	Mon 10/5/20	Wed 3/15/23
1	1	Project Planning Basis	69 days	Mon 10/5/20	Thu 1/7/21
2	1.1	Project Management Plan	40 days	Mon 10/5/20	Fri 11/27/20
3	1.1.1	Facility Consolidation Plan	30 days	Mon 10/5/20	Fri 11/13/20
4	1.1.1.1	Create Consolidation Charter Plan	4 days	Mon 10/5/20	Thu 10/8/20
5	1.1.1.2	Hire and Assemble Construction and Project Management Team	15 days	Fri 10/9/20	Thu 10/29/20
6	1.1.1.3	Analysis Conducted of Existing Space and Facilities	3 days	Fri 10/30/20	Tue 11/3/20
7	1.1.1.3.1	Existing Conditions Assessment	3 days	Fri 10/30/20	Tue 11/3/20
8	1.1.1.3.2	Hazardous Material Assessment	3 days	Fri 10/30/20	Tue 11/3/20
9	1.1.1.3.3	Environmental Assessment	1 day	Fri 10/30/20	Fri 10/30/20
10	1.1.1.3.4	Accessibility Assessment	1 day	Fri 10/30/20	Fri 10/30/20
11	1.1.1.3.5	Traffic Assessment	3 days	Fri 10/30/20	Tue 11/3/20
12	1.1.1.4	Develop Scope	3 days	Wed 11/4/20	Fri 11/6/20
13	1.1.1.5	Develop Outline Specifications and Blueprints	3 days	Mon 11/9/20	Wed 11/11/20
14	1.1.1.6	Develop Project Control Process	2 days	Mon 11/9/20	Tue 11/10/20
15	1.1.1.7	Develop Construction Timeline	2 days	Mon 11/9/20	Tue 11/10/20
16	1.1.1.8	Conduct Risk Analysis and Response Plans	2 days	Thu 11/12/20	Fri 11/13/20
17	1.1.2	Land Use and Lease Plan	4 days	Mon 11/16/20	Thu 11/19/20
18	1.1.2.1	Develop Predicted Gained Value Report	2 days	Mon 11/16/20	Tue 11/17/20
19	1.1.2.2	Develop Lease Documents	2 days	Mon 11/16/20	Tue 11/17/20
20	1.1.2.3	Finalize Lease Permissions and Timelines	2 days	Wed 11/18/20	Thu 11/19/20
21	1.1.3	Environmental Safety and Health Considerations	6 days	Fri 11/20/20	Fri 11/27/20
22	1.1.3.1	Conduct Site Walk	1 day	Fri 11/20/20	Fri 11/20/20

Project: Auditorium Construction Date: Fri 8/14/20	Task	Inactive Summary	External Tasks
	Split	Manual Task	External Milestone
	Milestone	Duration-only	Deadline
	Summary	Manual Summary Rollup	Progress
	Project Summary	Manual Summary	Manual Progress
	Inactive Task	Start-only	
	Inactive Milestone	Finish-only	

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ID	WBS	Task Name	Duration	Start	Finish
23	1.1.3.2	Construction Waste Diversion Documentation	2 days	Mon 11/23/20	Tue 11/24/20
24	1.1.3.3	Reserve Safety Officers for Lincoln square and Worcester Residents	2 days	Mon 11/23/20	Tue 11/24/20
25	1.1.3.4	Construction Team Review Outline Specifications	3 days	Wed 11/25/20	Fri 11/27/20
26	1.2	Financing	17 days	Mon 11/30/20	Tue 12/22/20
27	1.2.1	Marketplace Evaluation	6 days	Mon 11/30/20	Mon 12/7/20
28	1.2.1.1	Develop Baseline Budget	1 day	Mon 11/30/20	Mon 11/30/20
29	1.2.1.2	Develop Resource and Budget Control Process	2 days	Mon 11/30/20	Tue 12/1/20
30	1.2.1.3	Present Scope to Stakeholders	1 day	Wed 12/2/20	Wed 12/2/20
31	1.2.1.4	Stakeholder Review of Budget Proposal	3 days	Thu 12/3/20	Mon 12/7/20
32	1.2.2	Letter of Intent for Design and Construction	1 day	Tue 12/8/20	Tue 12/8/20
33	1.2.2.1	Present Statement of Need	1 day	Tue 12/8/20	Tue 12/8/20
34	1.2.2.2	Present Earned Value Analysis	1 day	Tue 12/8/20	Tue 12/8/20
35	1.2.2.3	Present Outline and Design to City of Worcester Stakeholders	1 day	Tue 12/8/20	Tue 12/8/20
36	1.2.3	Finalize Land Use and Restoration Approach	10 days	Wed 12/9/20	Tue 12/22/20
37	1.2.3.1	Statement of Need Approval and Review	3 days	Wed 12/9/20	Fri 12/11/20
38	1.2.3.2	Earned Value Approval and Review	3 days	Wed 12/9/20	Fri 12/11/20
39	1.2.3.3	Outline, Design and Resources Finalized and Approval	10 days	Wed 12/9/20	Tue 12/22/20
40	1.3	City of Worcester Building Construction Discussion	12 days	Wed 12/23/20	Thu 1/7/21
41	1.3.1	Scope and Schedule for Construction	4 days	Wed 12/23/20	Mon 12/28/20
42	1.3.1.1	Propose Construction Timeline	1 day	Wed 12/23/20	Wed 12/23/20
43	1.3.1.2	Review Facility pre and post development blueprints	3 days	Thu 12/24/20	Mon 12/28/20
44	1.3.1.3	Analyze Current and Future Uses for facility	1 day	Thu 12/24/20	Thu 12/24/20
45	1.3.2	Design and Construction Process Established	3 days	Fri 12/25/20	Tue 12/29/20

Project: Auditorium Construction Date: Fri 8/14/20	Task	Inactive Summary	External Tasks
	Split	Manual Task	External Milestone
	Milestone	Duration-only	Deadline
	Summary	Manual Summary Rollup	Progress
	Project Summary	Manual Summary	Manual Progress
	Inactive Task	Start-only	
	Inactive Milestone	Finish-only	

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ID	WBS	Task Name	Duration	Start	Finish
46	1.3.2.1	Develop Work Breakdown Structure	1 day	Tue 12/29/20	Tue 12/29/20
47	1.3.2.2	Develop Communication Plan	1 day	Fri 12/25/20	Fri 12/25/20
48	1.3.2.3	Develop milestones and reporting structure	1 day	Fri 12/25/20	Fri 12/25/20
49	1.3.3	Handoff of Auditorium Rights established	7 days	Wed 12/30/20	Thu 1/7/21
50	1.3.3.1	Develop Contract	2 days	Wed 12/30/20	Thu 12/31/20
51	1.3.3.2	Contract Approval by City Council	3 days	Fri 1/1/21	Tue 1/5/21
52	1.3.3.3	Present Contract to Project and Construction Team	2 days	Wed 1/6/21	Thu 1/7/21
53	2	Facility Consolidation	464 days	Fri 1/8/21	Wed 10/19/22
54	2.1	Existing Use and Conditions Documentation	7 days	Fri 1/8/21	Mon 1/18/21
55	2.1.1	Documentation of Auditorium History recorded	3 days	Fri 1/8/21	Tue 1/12/21
56	2.1.1.1	Analysis of Facility Remediation	3 days	Fri 1/8/21	Tue 1/12/21
57	2.1.1.2	Existing Site Materials Assessment	3 days	Fri 1/8/21	Tue 1/12/21
58	2.1.1.3	Conservation Treatment Procedures Documented	1 day	Fri 1/8/21	Fri 1/8/21
59	2.1.2	Building Consolidations options considered	2 days	Mon 1/11/21	Tue 1/12/21
60	2.1.2.1	Analysis of Previous Uses Conducted	1 day	Mon 1/11/21	Mon 1/11/21
61	2.1.2.2	Analysis of WRA projects in surrounding districts	1 day	Mon 1/11/21	Mon 1/11/21
62	2.1.2.3	Analysis of Public Surveys from local residents	1 day	Mon 1/11/21	Mon 1/11/21
63	2.1.2.4	Discussion with Architectural Heritage Foundation	1 day	Tue 1/12/21	Tue 1/12/21
64	2.1.3	New Blueprints for Building published and organized for political records	4 days	Wed 1/13/21	Mon 1/18/21
65	2.1.3.1	Blueprints Archived for City of Worcester	1 day	Wed 1/13/21	Wed 1/13/21
66	2.1.3.2	Blueprints Archived for Architectural Heritage Foundation	1 day	Wed 1/13/21	Wed 1/13/21
67	2.1.3.3	Blueprints Reviewed and Approved by Construction Team Engineers	3 days	Thu 1/14/21	Mon 1/18/21
68	2.2	Building Consolidation	64 days	Tue 1/19/21	Fri 4/16/21

Project: Auditorium Construction
Date: Fri 8/14/20

Task: Inactive Summary, External Tasks, Duration-only, Manual Task, External Milestone, Deadline, Progress, Manual Summary Rollup, Manual Progress, Manual Summary, Manual Progress, Start-only, Finish-only.

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ID	WBS	Task Name	Duration	Start	Finish
69	2.2.1	Removal of important items	29 days	Tue 1/19/21	Fri 2/26/21
70	2.2.1.1	Building Permit Submission	2 days	Tue 1/19/21	Wed 1/20/21
71	2.2.1.2	Building Permit Approval and Review	3 days	Thu 1/21/21	Mon 1/25/21
72	2.2.1.3	Asbestos/ Lead Paint Remediation	3 days	Tue 1/26/21	Thu 1/28/21
73	2.2.1.4	Removal and Salvage of Period Construction Materials	2 days	Fri 1/29/21	Mon 2/1/21
74	2.2.1.5	Selective Demolition of for Period Structures	3 days	Fri 1/29/21	Tue 2/2/21
75	2.2.1.6	Demolition of Existing Imposing structures	21 days	Fri 1/29/21	Fri 2/26/21
76	2.2.1.7	Support of Period Structures Conducted	8 days	Wed 2/3/21	Fri 2/12/21
77	2.2.2	Preservation of Memorial	35 days	Mon 3/1/21	Fri 4/16/21
78	2.2.2.1	Maintenance of Building Exterior	35 days	Mon 3/1/21	Fri 4/16/21
79	2.2.2.2	Maintenance of Existing Period Conditions	15 days	Mon 3/1/21	Fri 3/19/21
80	2.2.2.3	Maintenance of Site Remediation	11 days	Mon 3/1/21	Mon 3/15/21
81	2.3	Building Repurposing	357 days	Mon 3/22/21	Tue 8/2/22
82	2.3.1	Basement Parking Garage	61 days	Mon 3/22/21	Mon 6/14/21
83	2.3.1.1	Basement Restructured for internal parking	32 days	Mon 3/22/21	Tue 5/4/21
84	2.3.1.2	Structural Reinforcing	15 days	Wed 5/5/21	Tue 5/25/21
85	2.3.1.3	Striping, Signage and Wheelstops	1 day	Wed 5/5/21	Wed 5/5/21
86	2.3.1.4	Steep Slope Drain	3 days	Wed 5/5/21	Fri 5/7/21
87	2.3.1.5	Underground Plumbing	3 days	Wed 5/26/21	Fri 5/28/21
88	2.3.1.6	Underground Electric and Main Service Boxes	3 days	Wed 5/26/21	Fri 5/28/21
89	2.3.1.7	Gas Services Installed	3 days	Wed 5/26/21	Fri 5/28/21
90	2.3.1.8	HVAC Installation	7 days	Wed 5/26/21	Thu 6/3/21
91	2.3.1.9	Rebuild Elevator shell	5 days	Fri 6/4/21	Thu 6/10/21

Project: Auditorium Construction
Date: Fri 8/14/20

Task: Inactive Summary, External Tasks, Duration-only, Manual Task, External Milestone, Deadline, Progress, Manual Summary Rollup, Manual Progress, Manual Summary, Manual Progress, Start-only, Finish-only.

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ID	WBS	Task Name	Duration	Start	Finish
92	2.3.1.10	Fire suppression system	7 days	Fri 6/4/21	Mon 6/14/21
93	2.3.1.11	Paving	3 days	Fri 6/4/21	Tue 6/8/21
94	2.3.1.12	Railing and Path to Front Entrance	3 days	Fri 6/4/21	Tue 6/8/21
95	2.3.1.13	Security Gate Installation	3 days	Fri 6/4/21	Tue 6/8/21
96	2.3.2	Little Theater Dining Construction	42 days	Tue 6/15/21	Wed 8/11/21
97	2.3.2.1	Little theater staged as dining area	21 days	Tue 6/15/21	Tue 7/13/21
98	2.3.2.2	Striping	1 day	Wed 7/14/21	Wed 7/14/21
99	2.3.2.3	Stage Restoration	3 days	Wed 7/14/21	Fri 7/16/21
100	2.3.2.4	Seating Restructuring	7 days	Wed 7/14/21	Thu 7/22/21
101	2.3.2.5	Plumbing Allocation	5 days	Fri 7/23/21	Thu 7/29/21
102	2.3.2.6	Electric Rewireing	7 days	Fri 7/23/21	Mon 8/2/21
103	2.3.2.7	Cleanup	7 days	Tue 8/3/21	Wed 8/11/21
104	2.3.3	Auditorium Marketplace	121 days	Fri 6/11/21	Fri 11/26/21
105	2.3.3.1	Auditorium spaced into stall-style marketplace	60 days	Fri 6/11/21	Thu 9/2/21
106	2.3.3.2	Striping Auditorium Seating	3 days	Fri 9/3/21	Tue 9/7/21
107	2.3.3.3	Stage Removal	15 days	Fri 9/3/21	Thu 9/23/21
108	2.3.3.4	Floor Slabs	18 days	Fri 9/24/21	Tue 10/19/21
109	2.3.3.5	Plumbing Relocation	3 days	Wed 10/20/21	Fri 10/22/21
110	2.3.3.6	Electrical Relocation	18 days	Wed 10/20/21	Fri 11/12/21
111	2.3.3.7	Security Systems	10 days	Mon 11/15/21	Fri 11/26/21
112	2.3.3.8	Fire alarms and suppression	7 days	Mon 11/15/21	Tue 11/23/21
113	2.3.3.9	Septic System	7 days	Mon 10/25/21	Tue 11/2/21
114	2.3.3.10	Stall stop Installation	3 days	Mon 10/25/21	Wed 10/27/21

Project: Auditorium Construction Date: Fri 8/14/20		Task		Inactive Summary		External Tasks	
		Split		Manual Task		External Milestone	
		Milestone		Duration-only		Deadline	
		Summary		Manual Summary Rollup		Progress	
		Project Summary		Manual Summary		Manual Progress	
		Inactive Task		Start-only			
		Inactive Milestone		Finish-only			

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ID	WBS	Task Name	Duration	Start	Finish
115	2.3.4	Second Floor Restaurant	177 days	Mon 11/29/21	Tue 8/2/22
116	2.3.4.1	Second Floor Dining Area	90 days	Mon 11/29/21	Fri 4/1/22
117	2.3.4.2	Railing Installation	7 days	Mon 4/4/22	Tue 4/12/22
118	2.3.4.3	Electrical Installation	35 days	Wed 4/13/22	Tue 5/31/22
119	2.3.4.4	Fire Protection	10 days	Wed 6/1/22	Tue 6/14/22
120	2.3.4.5	Maintenancce of Roofing and Side Panels	7 days	Wed 6/15/22	Thu 6/23/22
121	2.3.4.6	Shop Reshaping and Counter Installation	10 days	Wed 6/15/22	Tue 6/28/22
122	2.3.4.7	Refrigerators and Condensor Installation	25 days	Wed 6/29/22	Tue 8/2/22
123	2.4	Building transition	56 days	Wed 8/3/22	Wed 10/19/22
124	2.4.1	Process Development for Building Revitalization	10 days	Wed 8/3/22	Tue 8/16/22
125	2.4.1.1	Sidewalk Paving Removal	3 days	Wed 8/3/22	Fri 8/5/22
126	2.4.1.2	Repaving and Curb repair	7 days	Mon 8/8/22	Tue 8/16/22
127	2.4.2	Disposition of Facilities and Land	18 days	Wed 8/17/22	Fri 9/9/22
128	2.4.2.1	Memorial Restoration	15 days	Wed 8/17/22	Tue 9/6/22
129	2.4.2.2	Grass mulch and outdoor plantings	3 days	Wed 9/7/22	Fri 9/9/22
130	2.4.2.3	Mural Restoration	3 days	Wed 9/7/22	Fri 9/9/22
131	2.4.3	Specific Facility Installation Plans	28 days	Mon 9/12/22	Wed 10/19/22
132	2.4.3.1	Facility Repainting	15 days	Mon 9/12/22	Fri 9/30/22
133	2.4.3.2	Facility Powerwash Cleanup	3 days	Mon 10/3/22	Wed 10/5/22
134	2.4.3.3	Relocation of Period Structures	3 days	Thu 10/6/22	Mon 10/10/22
135	2.4.3.4	Exterior Memorial Darklight Installation	7 days	Tue 10/11/22	Wed 10/19/22
136	3	Facility Development	105 days	Thu 10/20/22	Wed 3/15/23
137	3.1	WRA Projects	93 days	Thu 10/20/22	Mon 2/27/23

Project: Auditorium Construction Date: Fri 8/14/20		Task		Inactive Summary		External Tasks	
		Split		Manual Task		External Milestone	
		Milestone		Duration-only		Deadline	
		Summary		Manual Summary Rollup		Progress	
		Project Summary		Manual Summary		Manual Progress	
		Inactive Task		Start-only			
		Inactive Milestone		Finish-only			

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ID	WBS	Task Name	Duration	Start	Finish
138	3.1.1	Planning and Design	7 days	Thu 10/20/22	Fri 10/28/22
139	3.1.1.1	Punchlist and Inspections	7 days	Thu 10/20/22	Fri 10/28/22
140	3.1.2	construction and Turnover	93 days	Thu 10/20/22	Mon 2/27/23
141	3.1.2.1	Inspections and Report Days	93 days	Thu 10/20/22	Mon 2/27/23
142	3.1.2.2	Weather days	10 days	Thu 10/20/22	Wed 11/2/22
143	3.2	Lease Development Procedures	7 days	Tue 2/28/23	Wed 3/8/23
144	3.2.1	Documentation and Uses	7 days	Tue 2/28/23	Wed 3/8/23
145	3.2.1.1	Certification of Completion and Permitted Uses	3 days	Tue 2/28/23	Thu 3/2/23
146	3.2.1.2	Develop Lease for Events	1 day	Fri 3/3/23	Fri 3/3/23
147	3.2.1.3	Develop Lease Timelines	1 day	Fri 3/3/23	Fri 3/3/23
148	3.2.1.4	Lease Approvals	3 days	Mon 3/6/23	Wed 3/8/23
149	3.3	Architectural Heritage Foundation	5 days	Thu 3/9/23	Wed 3/15/23
150	3.3.1	Documentation and Archiving	2 days	Thu 3/9/23	Fri 3/10/23
151	3.3.1.1	Final Blueprint Output with Modifications	2 days	Thu 3/9/23	Fri 3/10/23
152	3.3.2	Construction and Restoration	3 days	Mon 3/13/23	Wed 3/15/23
153	3.3.2.1	Inspections and Final Report	3 days	Mon 3/13/23	Wed 3/15/23

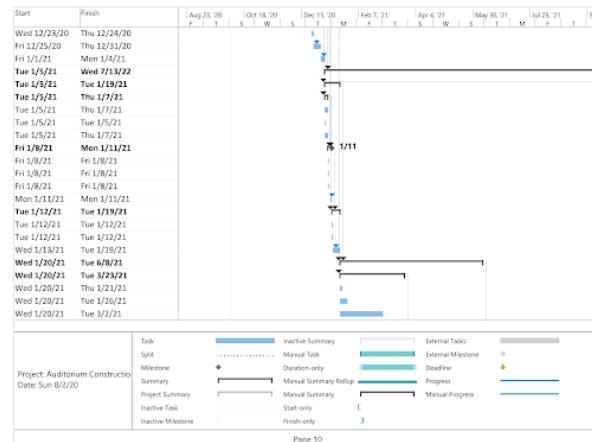
Project: Auditorium Construction Date: Fri 8/14/20		 Inactive Summary  Split  Milestone  Summary  Project Summary  Inactive Task  Inactive Milestone	 Manual Task  Duration-only  Manual Summary Rollup  Manual Summary  Start-only  Finish-only	 External Tasks  External Milestone  Deadline  Progress  Manual Progress
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Appendix D-Gantt Chart

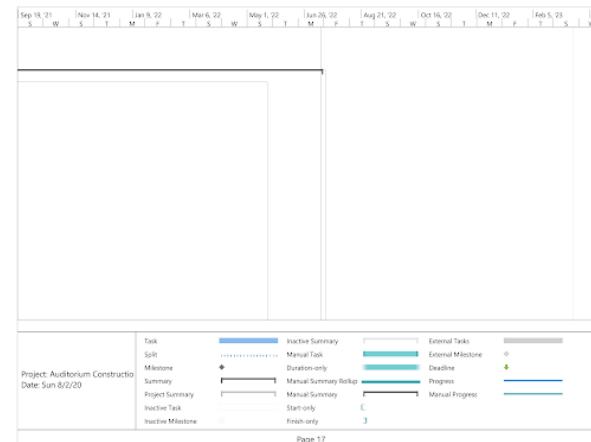
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46		1.3.3.1	Develop Contract	2 days
47		1.3.3.2	Contract Approval by City Council	5 days
48		1.3.3.3	Present Contract to Project and Construction Team	2 days
49		2	Facility Consultation	397 days
50		2.1	Existing Use and Conditions Documentation	11 days
51		2.1.1	Documentation of Auditorium History recorded	3 days
52		2.1.1.1	Analysis of Facility Remediation	3 days
53		2.1.1.2	Conservation Treatment Procedures Documented	1 day
54		2.1.1.3	Existing Site Materials Assessment	3 days
55		2.1.2	Building Consolidations options considered	2 days
56		2.1.2.1	Analysis of Previous Uses Recorded	1 day
57		2.1.2.2	Analysis of Public Use in Surrounding Districts	8 days
58		2.1.2.3	Analysis of Public Surveys from Local Residents	1 day
59		2.1.2.4	Discussion with Architectural Heritage Foundation	1 day
60		2.1.3	New Blueprints for Building published and organized for political records	6 days
61		2.1.3.1	Blueprints Archived for City of Worcester	1 day
62		2.1.3.2	Blueprints Archived for Architectural Heritage Foundation	1 day
63		2.1.3.3	Blueprints Reviewed and Approved by Construction Team Engineers	5 days
64		2.2	Building Consultation	100 days
65		2.2.1	Removal of Important Items	45 days
66		2.2.1.1	Removal and Salvage of Period Construction Materials	2 days
67		2.2.1.2	Selective Demolition of Period Structures	5 days
68		2.2.1.3	Demolition of Existing Impairing Structures	30 days

Project: Auditorium Construction
Date: Sun 8/2/20

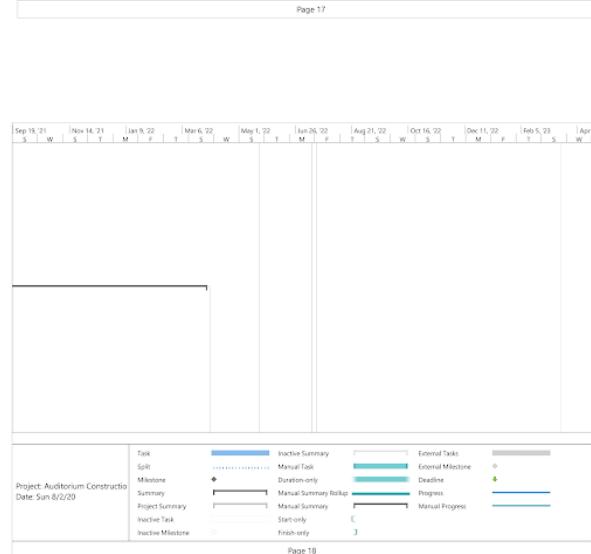
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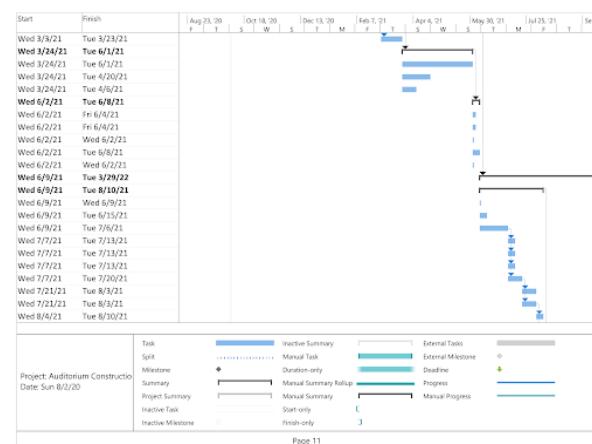


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ID	Task Mode	WBS	Task Name	Duration
69		2.3.1.4	Maintenance of Site Remediation	15 days
70		2.2.2	Preservation of Memorial	50 days
71		2.2.2.1	Maintenance of Building Exterior	50 days
72		2.2.2.2	Maintenance of Existing Period Conditions	20 days
73		2.2.2.3	Support of Period Structures Conducted	10 days
74		2.2.3	Analysis Conducted of Existing Space and Facilities	5 days
75		2.2.3.1	Existing Conditions Assessment	3 days
76		2.2.3.2	Hazardous Material Assessment	3 days
77		2.2.3.3	Environmental Assessment	1 day
78		2.2.3.4	Structural Assessment	5 days
79		2.2.3.5	Tray Assessment	1 day
80		2.3	Building Repurposing	210 days
81		2.3.1	Basement Restructured for Internal parking	45 days
82		2.3.1.1	Striping, Signage and Wheelstops	1 day
83		2.3.1.2	Steep Slope Drain	5 days
84		2.3.1.3	Structural Reinforcing	20 days
85		2.3.1.4	Underground Plumbing	5 days
86		2.3.1.5	Underground Electric and Main Service Boxes	5 days
87		2.3.1.6	Old Equipment Removed	5 days
88		2.3.1.7	HVAC Installation	10 days
89		2.3.1.8	Rebuild Elevator shell	10 days
90		2.3.1.9	Fire suppression system	10 days
91		2.3.1.10	Paving	5 days

Project: Auditorium Construction
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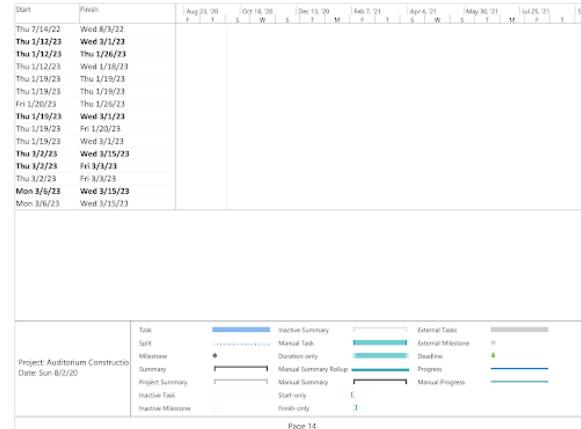
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ID	Task Mode	WBS	Task Name	Duration
118	■	3.2.2	Weather days	15 days
119	■	3.2	Lease Development Procedures	35 days
140	■	3.2.1	Documentation and Uses	11 days
141	■	3.2.1.1	Certification of Completion and Permitted Uses	5 days
142	■	3.2.1.2	Develop Lease for Events	1 day
143	■	3.2.1.3	Permit Lease Timelines	1 day
144	■	3.2.1.4	Lease Agreements	5 days
145	■	3.2.2	Marketing and Maintenance	30 days
146	■	3.2.2.1	River Development	2 days
147	■	3.2.2.2	Advertising Campaign for DCU Center and City of Worcester	30 days
148	■	3.3	Architectural Heritage Foundation	10 days
149	■	3.3.1	Documentation and Archiving	2 days
150	■	3.3.1.1	Final Blueprint Output with Modifications	2 days
151	■	3.3.2	Construction and Restoration	8 days
152	■	3.3.2.1	Inspections and Final Report	8 days

Project: Auditorium Construction

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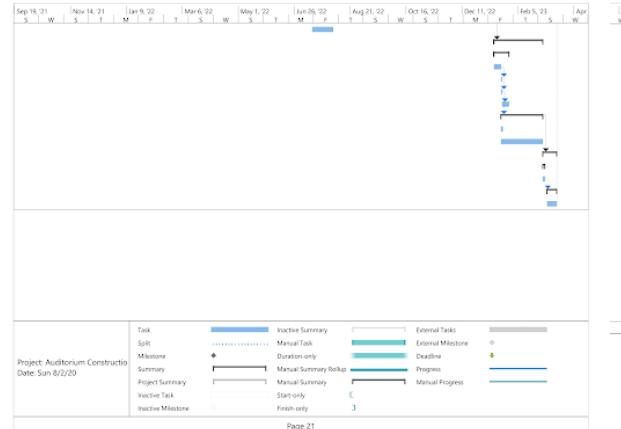
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Project: Auditorium Construction

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Project: Auditorium Construction

Date: Sun 8/2/20

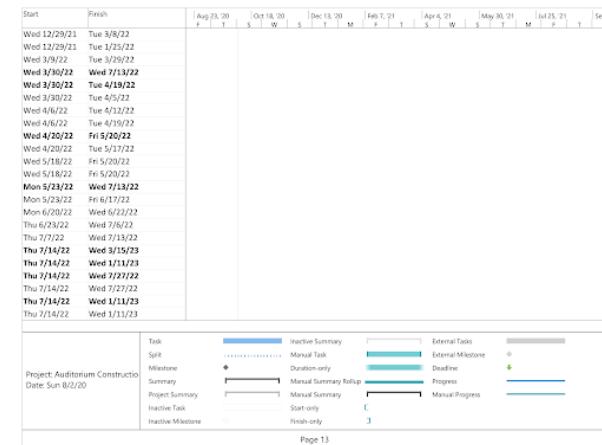
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ID	Task Mode	WBS	Task Name	Duration
116	■	2.3.4.4	Refrigerators and Condenser Installation	50 days
117	■	2.3.4.5	Shop Reshaping and Counter Installation	20 days
118	■	2.3.4.6	Maintenance of Roofing and Side Panels	10 days
119	■	2.4	Building Renovation	70 days
120	■	2.4.1	Project Management for Building Revitalization	15 days
121	■	2.4.1.1	Sidewalls Paving Removal	5 days
122	■	2.4.1.2	Asbestos Remediation	5 days
123	■	2.4.1.3	Repaving and Curb repair	10 days
124	■	2.4.2	Disposition of Facilities and Land	23 days
125	■	2.4.2.1	Memorial Restoration	20 days
126	■	2.4.2.2	Grazing mulch and outdoor plantings	3 days
127	■	2.4.2.3	Mural Restoration	3 days
128	■	2.4.3	Specific Facility Installation Plans	38 days
129	■	2.4.3.1	Perimeter Repairs	10 days
130	■	2.4.3.2	Facility Groundwork Cleanup	3 days
131	■	2.4.3.3	Relocation of Pivoted Structures	10 days
132	■	2.4.3.4	Exterior Memorial Darklight Installation	5 days
133	■	3	Facility Development	175 days
134	■	3.1	WRA Projects	130 days
135	■	3.1.1	Planning and Design	10 days
136	■	3.1.1.1	Punchlist and Inspections	10 days
137	■	3.1.2	construction and Turnover	130 days
	■	3.1.2.1	Inspections and Report Days	130 days

Project: Auditorium Construction

Date: Sun 8/2/20

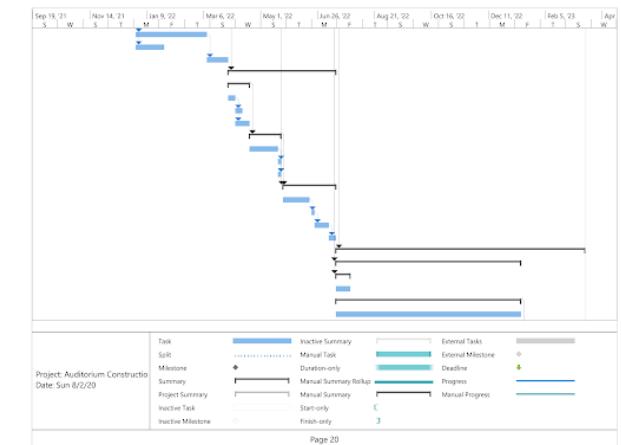
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Project: Auditorium Construction

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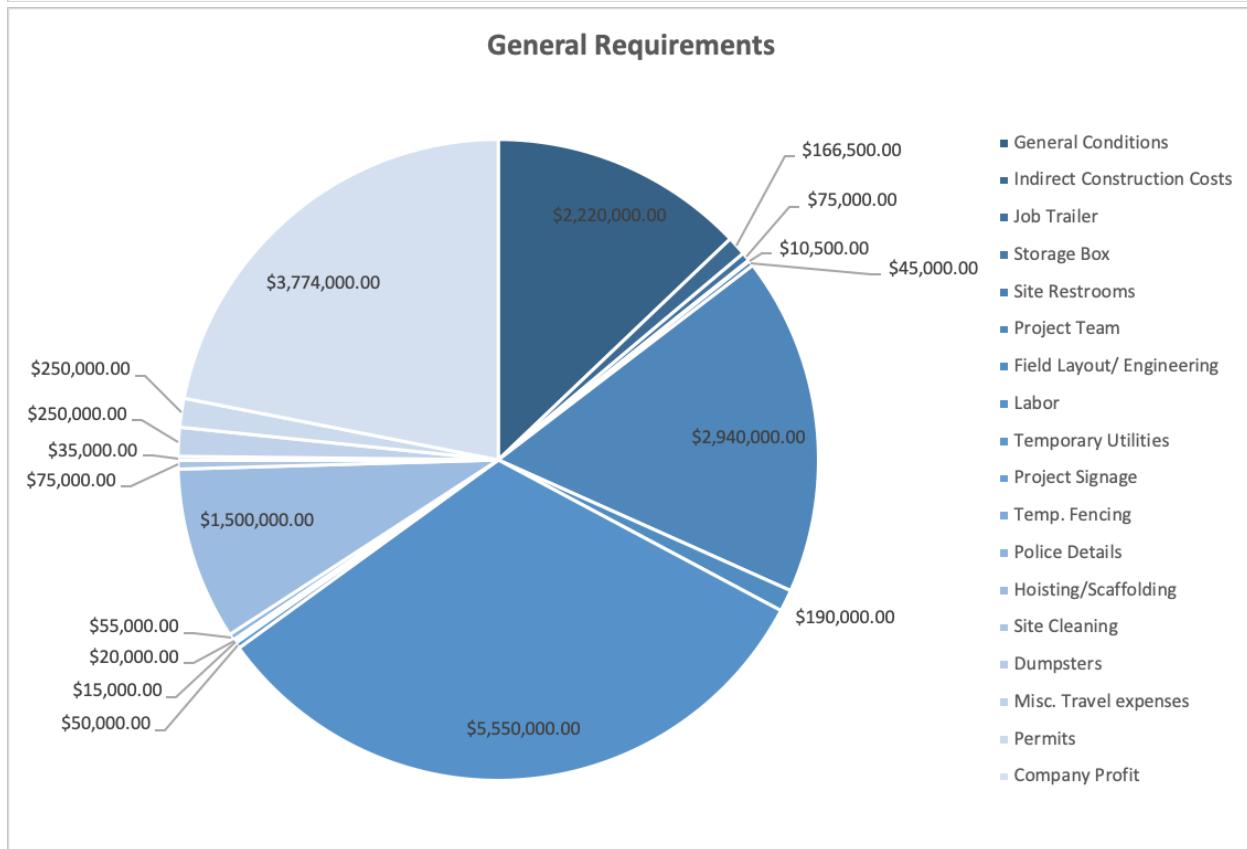
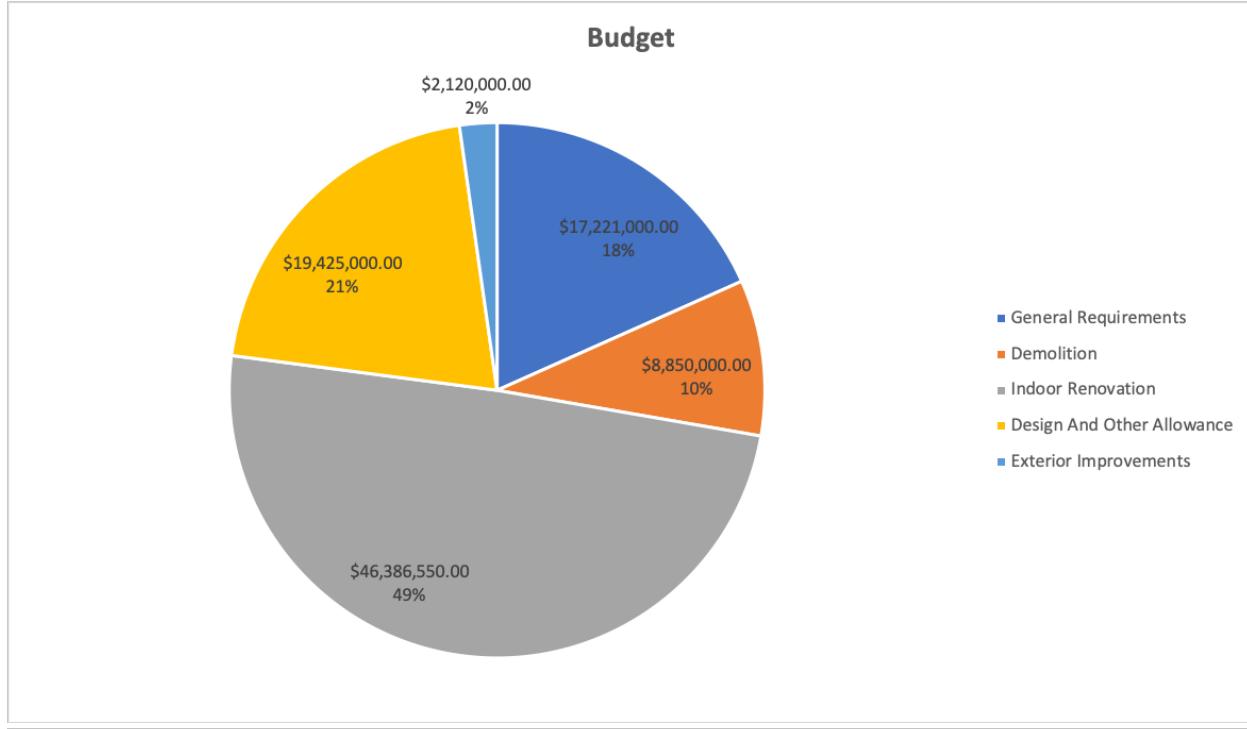
Project: Auditorium Construction

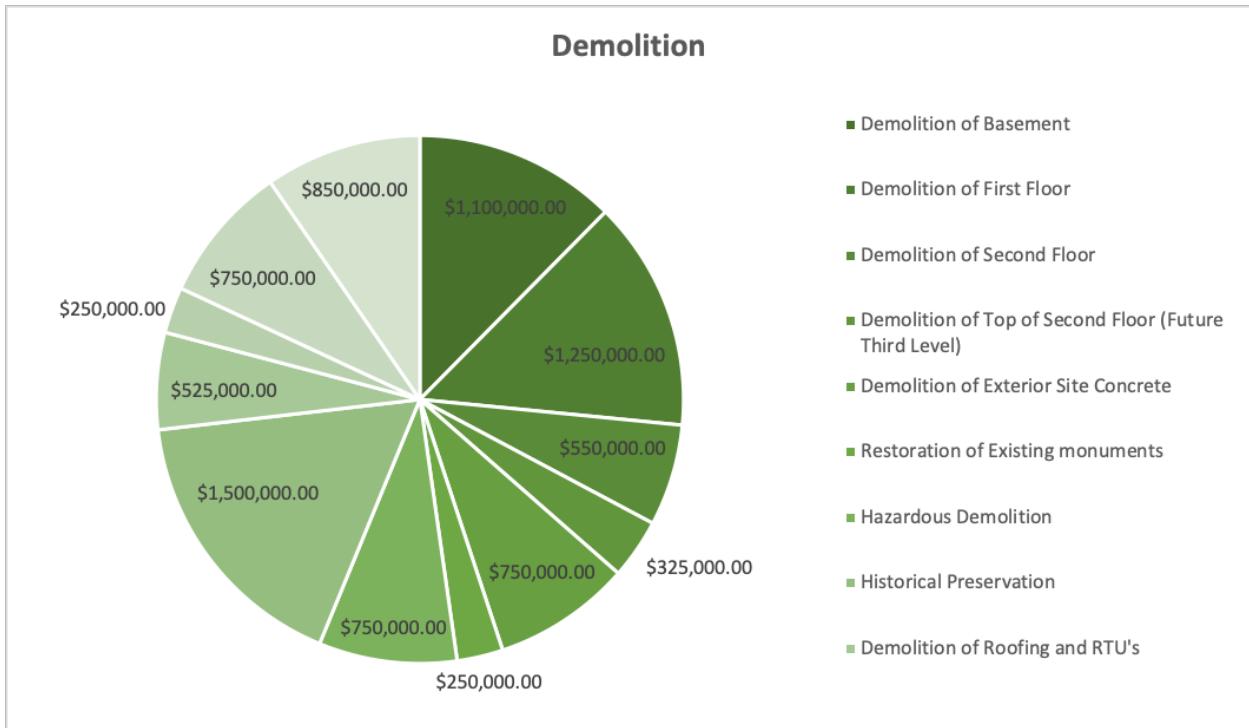
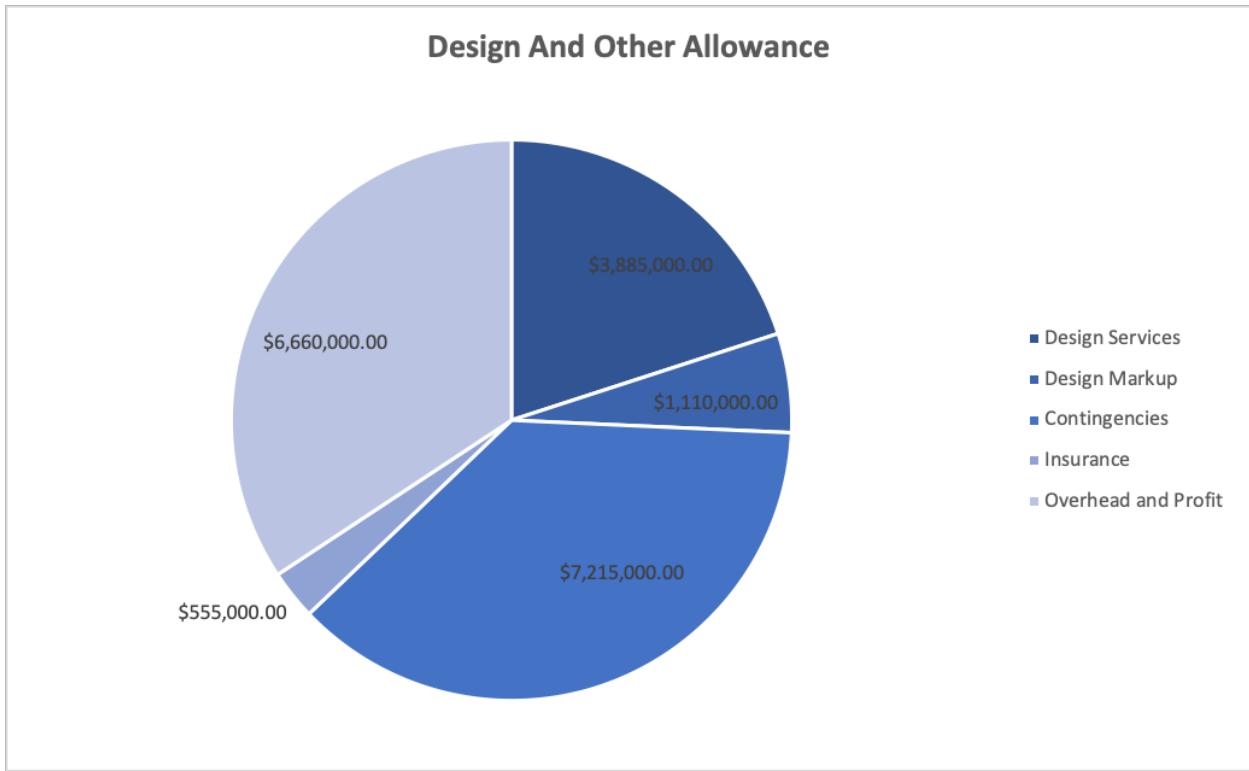
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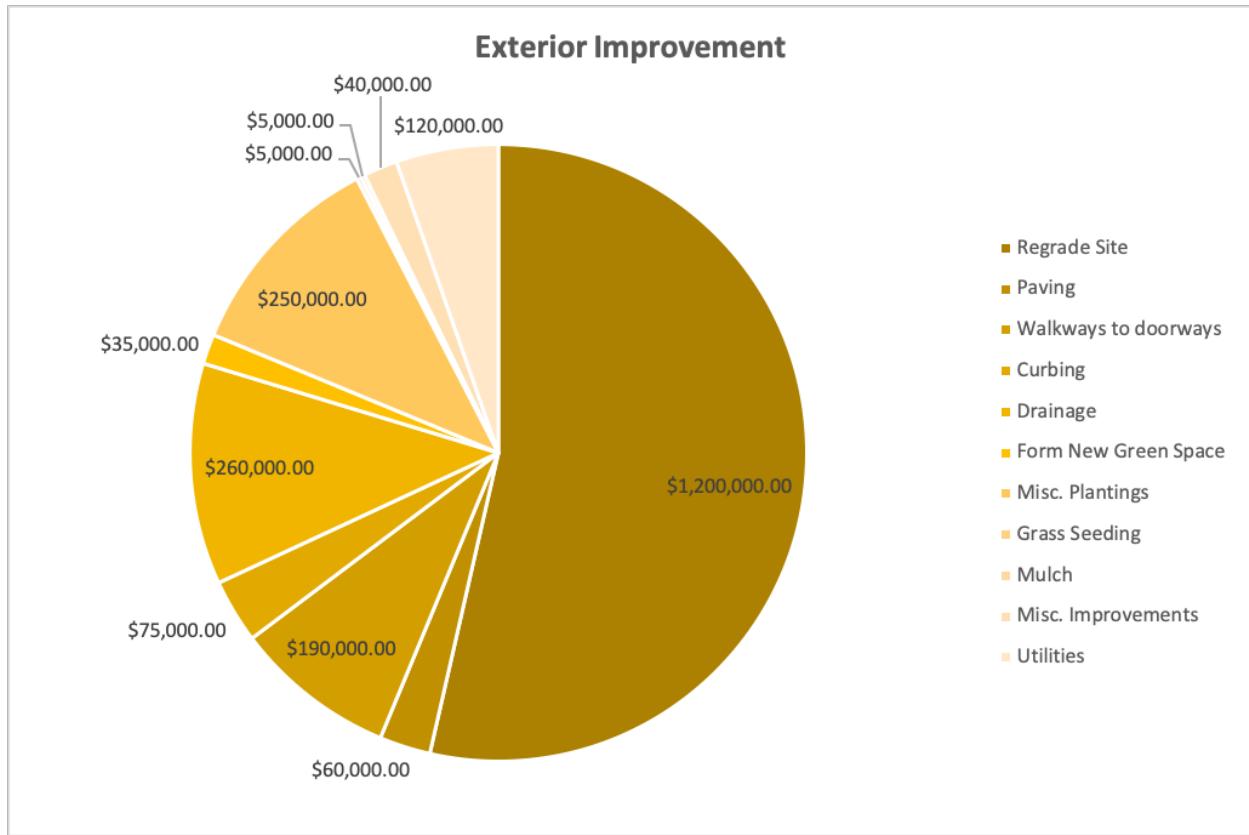
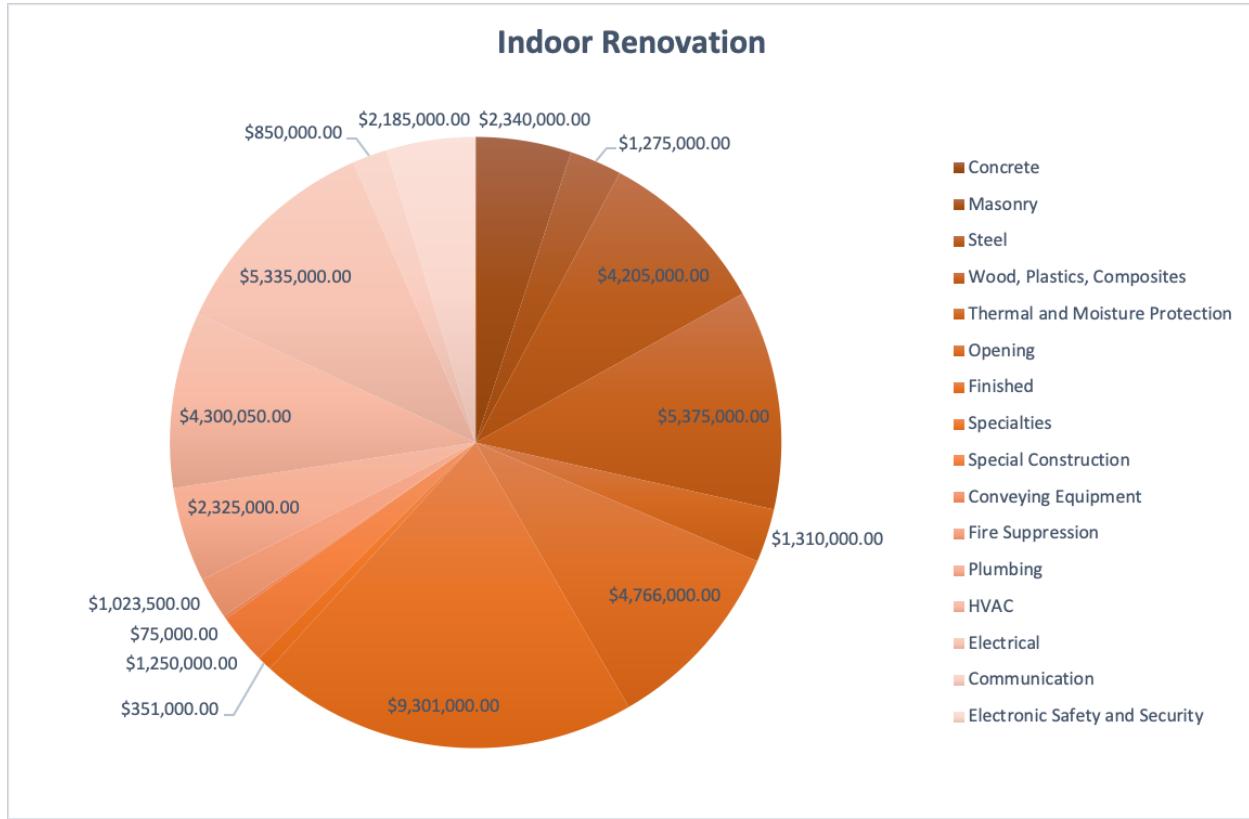
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Appendix E-Resource Leveling Diagram

Appendix F-Budget







Appendix G-Risk Assessment Matrix

Identified Risks	Potential Response	Potential Mitigation	Root Cause	Likelihood	Degree of Impact
1. Asbestos-highly toxic, fibrous material that can cause inflammation, scarring, and cancer when dust is inhaled	Seal off work area with plastic sheets; wear respirators when entering area; keep asbestos material wet to avoid dust	Consult certified asbestos abatement professional before construction begins to identify asbestos materials	Common construction material in the early 20 th century	H	M
2. Lead Paint-paint additive that can cause kidney, nerve, and brain damage when ingested or inhaled	Seal off work area; wear a respirator and disposable coveralls and gloves when removing the paint	Identify any sources of lead paint before construction; if it is under several layers of other paint, try not to disturb it	Lead paint was not banned in the US until 1977, so buildings built before then have a high likelihood of having lead paint	H	L
3. Old Wiring- faulty or aging wiring can cause fires or electric shock burns	Hire an electrician to update wiring	Hire an electrician to inspect all wiring within the building to ensure it is up to current building codes	Building was abandoned for years so wiring may not be up to current standards	L	M

4. Pests- can cause an unhygienic environment and carry diseases; rodents can also chew through wires causing electrical fires	Hire an exterminator to get rid of any pests; seal any holes that may let them into the building	Inspect the building and seal any holes; hire an exterminator at the beginning of the project to check for pests	Old buildings can have a lot of gaps which let pest in	H	L
5. Structural Damage- could increase cost and time fixing structural damage; chance of collapses	Evacuate area and repair damages quickly	Inspect the building thoroughly for any types of structural damage, so it can be incorporated into the schedule and cost baseline	Old buildings will naturally have some structural damage when they are left untended for long periods of time	M	H
6. Water Damage-mold can grow causing health issues, decay, and structural damage	Find the site of the leak and patch it; if there is mold damage, hire a professional to remove damaged materials and clean area	Thoroughly inspect the site before construction starts and patch any leaks as soon as they are found	Without regular maintenance leaks can go uncaught for long periods of time increasing the damage they cause	M	M
7. Public Opinion (Historical Society)-if a historical preservation society does not approve of the changes we're making, it can cause schedule delays	Hold meetings with the local historical societies to see if we can come to an agreement on the renovations as quickly as possible	Hold meetings with the historical society during the design phase, so they are involved in the process and can approve of the design before construction	Historical societies exist to protect historic buildings from being demolished or changed too much	L	M

8. Traffic-large amounts of traffic could cause delays in the schedule	Create schedule to work around high traffic times	Work with the Worcester Police to create a traffic control plan; work during low traffic hours when doing work outside	Site is located between two high traffic streets with little sidewalk	H	L
9. Economic Recession- unexpected economic downturn could affect the selling and material prices	Buy materials if price starts to rise too much	Watch materials prices, so the materials can be bought when cheapest	Downturns in the economy can happen for many reasons and affect selling and material prices	L	M

Appendix H-Sample Weekly Report

Worcester Memorial Marketplace
110,668 SF, 2.42 Acres
Lincoln Street
Worcester, MA
Job Number 1-100

Weekly Update #XX
Week Ending: Month Date, Year

To: Partner Name Company Name partner@x.com

From: Employee Name Company Name employee@x.com

<u>Day</u>	<u>Date</u>	<u>AM Temp(°F)</u>	<u>Weather</u>	<u>PM Temp(°F)</u>
Monday	xx/xx/yyyy	--	Partly Sunny	--
Tuesday	xx/xx/yyyy	--	Sunny	--
Wednesday	xx/xx/yyyy	--	Cloudy	--
Thursday	xx/xx/yyyy	--	Partly Cloudy	--
Friday	xx/xx/yyyy	--	Cloudy	--
Saturday	xx/xx/yyyy	--	--	--
Sunday	xx/xx/yyyy	--	--	--

(*) Denotes lost day or partial day

1. The following items are completed/or were in progress the week ending xx/xx/yyyy:

- a. Begin X.....% Complete
- b. Begin X.....% Complete
- c. Continue X.....% Complete

2. The following items are scheduled for the week ending xx/xx/yyyy:

- a. Complete X.....% Complete
- b. Begin X.....% Complete
- c. Continue X.....% Complete

3. Pay Applications

Application #	Amount	Date Submitted	Status
Pay App #001	\$	xx/xx/yyyy	
Pay App #002			
Pay App #003			
Pay App #004			
Pay App #005			
Pay App #006			

4. Next Scheduled Owner's Progress Meeting:

- a. Owner Meeting: Date @ (Time) AM EST

Description:

Attachment A - Progress Photos

Figure 1	Figure 2
Figure 3	Figure 4