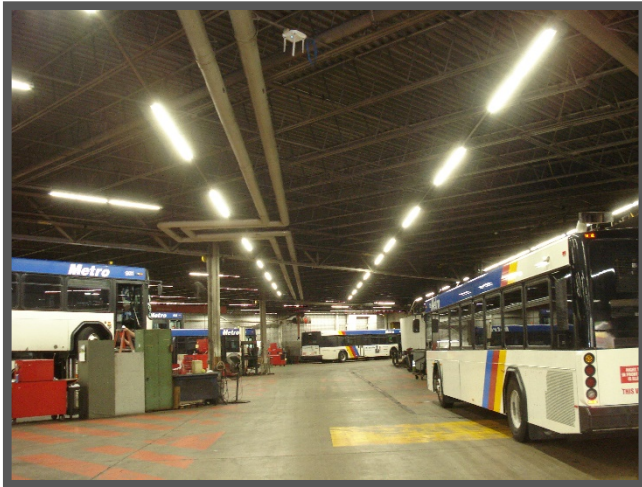




# Madison Metro Transit Building

## Executive Summary and Recommendations

Report prepared for

**City of Madison – Metro Transit**  
Madison, Wisconsin



Report prepared by

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M&H project. # 4503500-170148.01

March 9, 2018

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## EXECUTIVE SUMMARY

### Introduction

Every day, over 30,000 riders rely on Madison Metro Transit to get to and from work, school, home, and through their daily lives, with over 13 million trips a year. Metro serves as a proven support network to the community and even provides shelter in emergency situations. Over the last 20 years, it was clear Metro would outgrow then abandon this facility and, accordingly, only invested in critical systems. While Metro has in fact outgrown the facility, the condition of the facility, along with the negative funding forecast, demands that the City refurbish the existing facility and systems for the long haul.



This study has identified that significant capital investment in the facility at 1101 E. Washington Ave, of up to \$55M, is required over a 5 year period starting with the 2019 Capital Budget. Although the capital expenditure dollar value sounds extreme, in context this equates to \$2.7 million budget spending when spread over the intended life-cycle of 20 years. This is easily absorbed into Metro's annual operating budget of \$57 million. This expenditure is also significantly less than the cost of building a new facility on site or through the added expense of acquiring land elsewhere.

This critical capital investment would bring the facility up to current code, increase operational efficiencies, and allow the facility to continue to operate for at least 20 more years. Forty years ago, this property was designed to house and maintain 140 buses, but it is now servicing up to 223 buses to meet current ridership with future goals for expansion. The facilities and infrastructure have had no significant updates since its original construction, and nearly all components and workflows are past their useful life or are entirely deficient. This is creating undue hardship and stress on users of the building, resulting in deterioration of the overall work environment.

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An initial study, conducted in 2005 to address the facility and space need issues of the Metro Transit group, called for major reconstruction and expansion that ultimately proved too ambitious and costly for the City. With continued maintenance challenges arising, the City of Madison Engineering Department and Metro Transit group contracted with Mead & Hunt, Inc. in May of 2017 to provide a more modest renovation and reuse strategy with a goal for Metro to remain at this site for at least another 20 years. Mead & Hunt's project team of architects, engineers, and teaming partner specialists orchestrated the new master plan consisting of a facility assessment, staff and key stakeholder functional investigations, concept designs for improved workflow, creation of a basis of design, and development of a phasing and capital budget plan. Kueny Architects, with expertise in fleet maintenance facilities, was part of the project team to program and develop the concept plans for the bus maintenance, servicing, and bus storage. Destree Architects was part of the project team to program and develop the bus driver dispatch and support areas. Ken Saiki Landscape Architects rounded out the project team to provide site improvement concepts and general planning support services.



## **Current Facility Challenges**

Current challenges are numerous and interdependent. Working conditions, utilities, infrastructure, and occupant amenities are substandard, inefficient, and out-of-date. Inadequate ventilation, heating, and cooling have been identified as the most deficient system causing hazards to the occupants within the building, even described by users as foggy in the maintenance and bus storage areas. Nearly all of the mechanical units are past their useful life and inefficient, if not in complete failure. The general construction of the roof and exterior enclosure does not help the condition, with their poor insulative values. There is even concern over the ongoing annual maintenance budgets of \$680,000 plus staff time being insufficient in comparison to the growing quantity of replacements, maintenance, and repairs. See the Facility Assessment section of this report for detailed information.

The current open-air wash line is creating the largest hazard to the building overall, located at the center of the building directly adjacent to the maintenance bays. As the buses go through the wash cycle, their idle exhaust and the resultant debris removed from the buses creates mass air-borne pollutants. The continuous water flow affects the humidity controls throughout the facility. Additionally, it causes extreme temperature fluctuations caused by constant in-and-out of buses. This poor air quality, humidity and temperature fluctuations are causing extreme challenges and inefficiencies for the mechanics daily health and operations. Metro purchases gallons of sport drink for employees that work in the facility during hot summer days because the extreme heat would otherwise cause dehydration. Although this is not an atypical

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practice, the management has noted the quantity is significantly higher than average due to this challenging work environment.

Although Metro's Facility Department has been diligently providing repairs, water infiltration from the exterior and from within the building has been an ongoing challenge. The roof itself has had numerous reports of leaks in recent years and has even caused structural roof deck deterioration. These challenges have prompted an expedited 2018 flat-roof replacement through City Engineering, which will also provide enhanced insulation. The storm drains have also been overloaded at times creating flooding within the bus storage areas. Additionally, the general conditions and quantity of the toilet rooms and fixtures are substandard, with instances of sewer back-up sporadically over the years.



One significant challenge for the facility is related to gender equity. There is a current deficit in the quantity of toilet and locker rooms for women. According to Metro's Equitable Workforce Plan from 2017, Metro has 418 employees, with 117 being women. Out of these 117 women, at least 105 of them are bus drivers served at this facility. The trend is showing this number will be on the rise. It will be imperative that as improvements are made, equity in toilet/shower facilities will be required.

The Metro group has pro-actively made some upgrades to have more modern safety features, as would be required in new buildings, such as adding a sprinkler system in the bus storage area. However, these upgrades are in no way comprehensive. Refer to the list at the end of this summary for specific areas and systems that have more crucial code upgrade needs. With any future renovations, our recommendation is to meet current code requirement, with provisions for modern life-safety methods for building-wide sprinklers, fire detection, and fire alarm systems. We also recommend segregating areas with fire rated partitions to better improve the safety of the building. General upgrades will also provide more energy efficient systems with decreased maintenance, a key value to the City of Madison. With capital investment, these facility challenges can be met; and the operational efficiencies can be increased to better service to Madison Metro Transit customers.

## **Current Functional Challenges**

Beyond the need for building and equipment replacement, the building exists to house the function, support services, and employees for the critical service of bus transportation for the citizens of the City of Madison. This building has three major functions that contribute to the safety of the buses on the road: Driver Dispatch, Bus Maintenance, and Bus Storage.

Human error is noted as the causative factor in nearly 85% of all bus driver incidents according to the National Transportation Safety Board. Fatigue and stress for drivers is a widely recognized problem for bus drivers, with challenges in proper eating, sleep schedules, constrained working environments, customer



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interactions, passenger loading and unloading, time and schedule sensitivities, and traffic conditions. Several sources have cited countermeasures to stress and fatigue including support, promotion, and education on: psychological awareness, good health-sleep-physical fitness, and stress-management. Additional operational and management strategies are also recommended. The current facility with its aged conditions, shortage of space, and forced, inefficient work-flows are noticeably a challenge to dispatch and work environment for the Metro's drivers. A renovation to the building, providing very basic amenities, will likely produce innumerable results in creating safer drivers.

The Maintenance Department is also directly affected and constrained by the building and current equipment to efficiently service the 223 current bus stock. Their work bays are limiting due to the lift configurations, height limitations, and that they are not multi-functional or supported equally. The limited number of work bays, designed to service 140 buses, also limits the ability to provide preventative maintenance since so many are consumed by active break-downs. With lack of space directly adjacent to their shops due to poor space layout, their parts, tires, and storage areas located at the far ends of the facilities. This creates hours of lost time by staff to just traverse this extremely long building.



Enclosed bus storage greatly extends the life of the substantial investment of a bus and its components, enhances security, and is a requirement of the federal government for funding of new buses. The majority of Metro's buses are currently diesel and require heated conditions for proper function, and would otherwise require over 200 exterior block heaters. Circulation within this type of facility provides the greatest challenge, for both the buses and the pedestrians that are trying to access the buses themselves. The building is currently designed for right-hand turn circulation for buses, which creates a blind-spot turn direction for drivers, increasing the potential for incidents. Left-hand turns are the industry standard for current bus facilities, allowing the driver clear views of their path. Furthermore, with no definable path and low light levels throughout storage areas, pedestrians are difficult to distinguish.

With phased capital investment, these functional challenges can be met, starting with a redesign of the wash bay, which will improve all three functional aspects of the facility and result in better service for Metro Transit customers. The plan to accomplish the facility and functional challenges is detailed in the Preferred Design Solution Concept.

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## Preferred Design Solution Concept

The development of the program and renovation strategies started with early guidance provided by the City of Madison Engineering group and Madison Metro. At the forefront were the following goals and objectives:

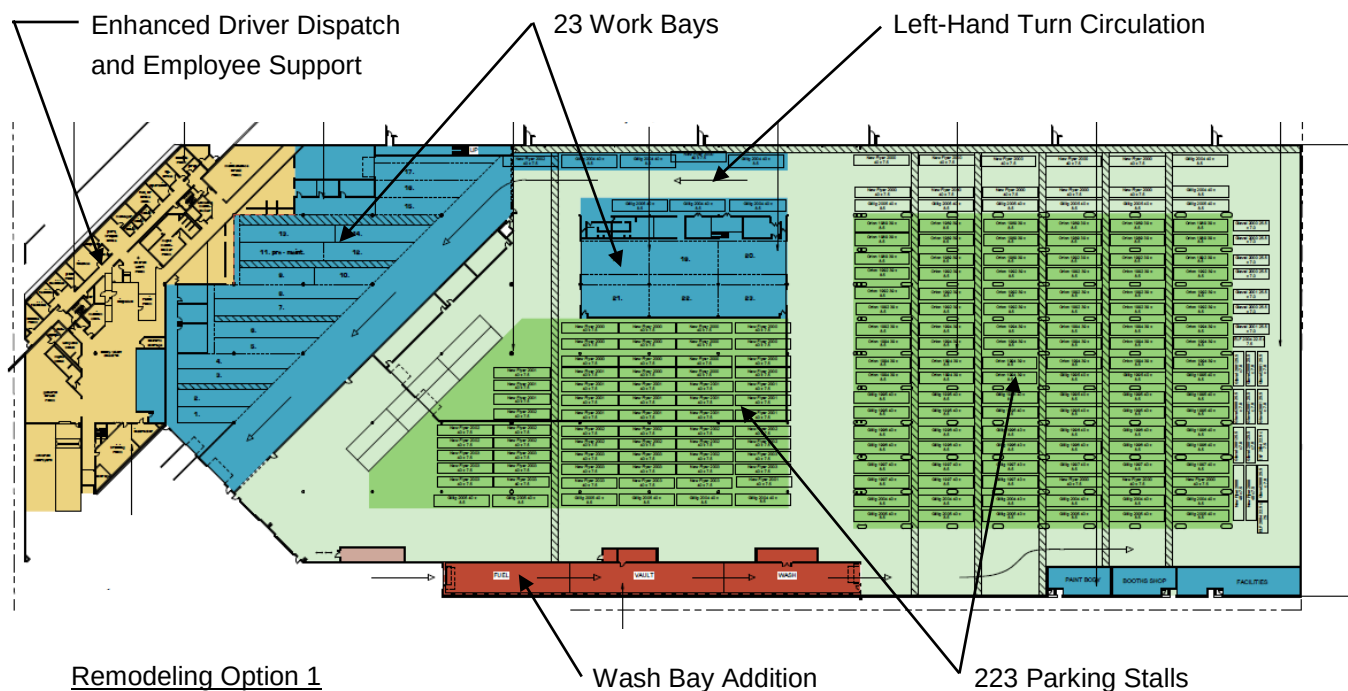
- Maintain functions generally **within the existing footprint**.
- Provide a **20-year solution** for the site.
- **Improve workflows** by reorganizing functional adjacencies.
- **Identify upgrade requirements** for utilities and life safety.
- **Staff safety and retention** are key priorities.
- Reorganize bus traffic flow for **Left-Hand turns** in lieu of current Right-Hand Turns for increased safety.
- **Sustainable Methods** and Decreased Maintenance are a value of the City.

Through the charrette process, development of three renovation options, and continued vetting by the major stakeholders, the project team was able to develop and refine a preferred concept design, referenced as Remodeling Option 1. This option optimizes the top priorities for renovation as indicated, by staff and key stakeholders, calling for improvements to the ventilation, safety, and toilet rooms.



The preferred design solution concept, Remodeling Option 1, moves the current centrally-located service/wash lanes into a small addition to the south side of the building. This simple solution eliminates the major contributor to vehicle circulation congestion, reduces humidity and temperature problems, and isolates pollution/exhaust fumes. The facility can then be reconfigured to provide left-hand turn bus circulation, an increased number of maintenance work bays, isolated spaces for enhanced safety zones for staff, and better space and amenities to the driver dispatch and building support areas for employees. This can be accomplished while maintaining the same quantity of bus parking in the storage areas.

Improvements to the air quality of the building would be the number one health and safety improvement to the facility that is currently the cause of the most distress to employees and their ability to work. Moving the wash bay out of the work areas will eliminate the major contributor of pollution in the facility. New HVAC systems will also provide separated zones, address negative pressure issues, and provide enhanced ventilation (above code minimums, in line with LEED requirements) to create a healthier environment. This remodeling option also provides additional safety features and benefits. The change in circulation patterns to incorporated left-hand turns will result in increased savings through reductions in inadvertent building and bus damage. Providing quality work environments and a commitment to employee satisfaction, with even modest improvements, are proven to improve worker productivity and efficiency. Metro Transit staff take pride in providing great, on-time customer service to transit customers. Providing them with a work environment that promotes this will help the organization to grow and serve the community even better in the future.



While there was a small cost premium (15%) for building the new wash bay as an addition vs. remodeling it in place, there are many advantages to the Remodeling Option 1 configuration, and the cost is easily recovered through operational efficiencies this solution provides. First, it is important to understand that the wash bay operates 365 days per year. It would be very difficult to rebuild it in place without dramatically affecting bus operations. Secondly, for the maintenance department operations, increasing service bays from 16 to 23 and the growing the space within the bays will improve the efficiency of each mechanic potentially by 10-15%. New lifts, product drops, and improved workspaces could also increase productivity by an additional 5%. This could equate in regular annual operational savings due to less bus down-time, less staff overtime, as well as lower expenses in hire training and attrition.

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## Phasing and Construction Timelines

Strategies for phasing were first evaluated by establishing the primary considerations raised by the design team and the stakeholders. These considerations were then cross-evaluated with the staff and key stakeholders' top priorities of indoor air quality, safety, and toilet room renovations. The categories for evaluation were the critical paths for system failure and life safety, operational efficiencies, and the need for ongoing operations through the duration of construction and its effects.

Each phase/capital project also needs to be stand-alone, where no additional work or projects are required to have a complete and usable facility when they are complete. This stand-alone project strategy does involve some minor reconfigurations due to subsequent remodel areas but is minimized by the order presented below.

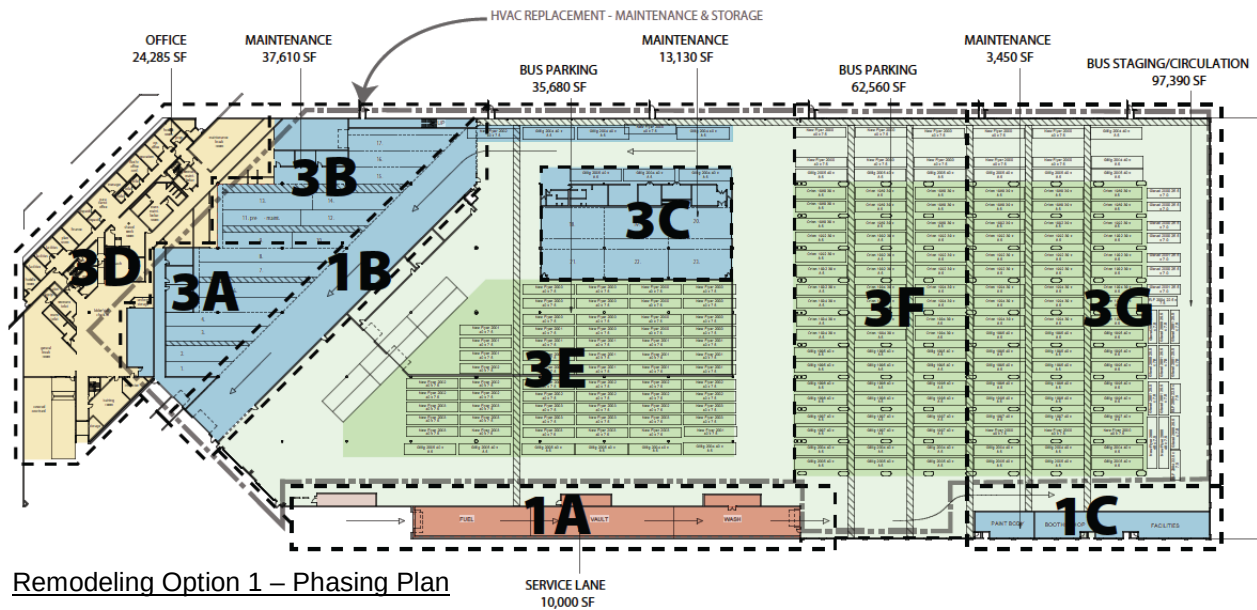
Goals for desired construction start, timelines for construction, and overall budget package amounts were established through discussions with the stakeholders. The flat roof replacement project is already underway through a maintenance allowance and is slated to start in 2018. The first interior construction project is desired to start in 2019, with subsequent annual projects over the next five years.

Each of the projects are self-supportable and do not required additional projects to complete each phase. Design for each phase would precede the construction work by 1 year. Additional phasing/sequencing breakdowns for construction or budget packages can be proposed by the areas on the phasing plans further delineated with A, B, and C areas. The stakeholders' desired schedule and capital budget plan breaks the project as follows:

| Year | Phase |                                                              | Design      | Construction | Equipment   |
|------|-------|--------------------------------------------------------------|-------------|--------------|-------------|
| 2018 | 1     | Design: Service Line/Body Shop                               | \$458,878   |              |             |
| 2019 | 1     | Service Line/Body Shop Construction                          |             | \$4,681,269  |             |
|      | 1     | Service Line/Body Shop Equipment                             |             |              | \$1,260,173 |
|      | 2     | Design: HVAC Bus Maint. & Storage                            | \$711,144   |              |             |
| 2020 | 2     | HVAC Bus Maintenance & Storage                               |             | \$7,227,288  |             |
|      | 3     | Design: Bus Maint., Dispatch/Support, Bus Storage            | \$2,438,010 |              |             |
| 2021 | 3     | Bus Maintenance, Dispatch/Support, & Bus Storage Renovations |             | \$24,755,843 |             |
|      | 3     | Renovation Equipment & Furniture                             |             |              | \$2,738,260 |
|      | 4     | Design: Ongoing Maintenance                                  | \$977,083   |              |             |
| 2022 | 4     | Ongoing Maintenance                                          |             | \$9,911,304  |             |



|              |  |  |                    |                     |                    |
|--------------|--|--|--------------------|---------------------|--------------------|
|              |  |  |                    |                     |                    |
| <b>TOTAL</b> |  |  | <b>\$4,126,238</b> | <b>\$46,575,705</b> | <b>\$3,998,434</b> |



#### Phasing Detail

- Phase 1, 2019 – The new service lane addition and remodeling allows for the continued use of the existing lanes until the new lanes are operational. This eliminates any downtime or suspension of service activities for daily bus maintenance and cleaning. The resultant reclamation of the area of the old service lane provides extra area for bus maintenance and starts the separation for internal zoning of Mechanical ventilation systems. This construction project is estimated to require 9 months.
- Phase 2, 2020 - New mechanical distribution system upgrades to support the existing maintenance areas and bus storage areas, exclusive of the administrative support area. This upgrade would also include the creation of physical separations between work area activities, such as maintenance and the administration and bus storage, to support individual area ventilation requirements and vastly improve air quality within the existing building. This construction project is estimated to require 12 months.
- Phase 3, 2021 - Remodeling of the existing Maintenance, Driver Dispatch, and support areas, will reconfigure to the building to the Remodeling Option 1 layout. This construction activity requires temporary relocation of Maintenance bays, bus storage, and Driver Dispatch/support areas to other off-site facilities or on-site mobile facilities. The sequencing of this construction activity is more critical to maintaining Metro Transit Operations. This construction project is estimated to require 18 months.
- Phase 4, 2022 - On-going Building Maintenance is for the restoration of the existing building envelope, such as metal wall panel replacement and masonry tuckpointing and possible “Gisholt” clerestory roof replacement in the bus storage area. This also would provide for miscellaneous mechanical and electrical system upgrades not addressed in previous projects. This construction project is estimated to require 12 months.

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- Note: Through the process of this report and concept development, there was a separate facility planned to house electric buses. However, a recent grant award has moved the timeline of electric bus acquisition to the forefront. Adjustments to the capital budget plan will already need to be made, to accommodate the affects of the electric buses. The scope of work requires additional investigations and considerations outside of this report scope and timelines.

## **Current Life Safety Challenges to Be Addressed**

As an existing building without any major renovations, the facility is held to the life-safety requirements from the period it was built. For this facility, the last overall construction project was 1982. The Metro group has pro-actively made some upgrades to have more modern safety features, as would be required in new buildings, however the list below are some of the more critical challenges that need addressing:

- Replacement of degraded metal decking at the roof (Intended to take place with the 2018 roof replacement project).
- Interior building ventilation does not meet current code requirements and is hazardous to the building occupants.
- Code required smoke detection is not present for any of the direct-fired make-up air units.
- Fire Detection and Alarm System is past its useful life and does not meet the latest standards to provide audible and visual notification. This system requires replacement (scheduled for 2018).
- Fire protection sprinkler systems should be provided in the administrative and employee support areas, where there are none currently.
- Emergency Shower/Eyewash stations require tepid water to meet OSHA requirements and are currently only provided with cold water.
- The water heater should be replaced with a sealed combustion type, to be a code compliant installation in the boiler room. This water heater has a gravity draft flue which is a code violation when installed in the same room as the building's heating boilers, which have power draft burners. When the boilers fire, it can create negative pressure in the room impairing the natural draft of the flue of the water heater drawing combustion fumes into the boiler room.
- Emergency egress lighting requires upgrades for code compliance. Currently the exterior does not have any emergency lighting to lead occupants to the public way, which is a current code requirement. The interior lighting levels are also questionable whether they meet current code levels, although not formally metered as part of this project.

## **Conclusion**

The Madison Metro Department and its employees provide bus service at tremendous value to the City of Madison on a limited budget, always prioritizing service improvements when making capital expenditures. However their Transit Maintenance Facility is broken, due to a lack of investment over the past several decades. With modest renovations and maintenance projects for their current facility, they will be able to rejuvenate their workplace with new operational efficiencies and meet critical OSHA and life-safety requirements, that will take them through the next 20 years of devoted service. As one of the largest Madison employers with more than 500 employees, Metro employees need a workplace that affords their basic rights for safety and wellness.