120 SOUTH FAIRCHILD BUILDING STUDY

10-28-16

Prepared with the Assistance of
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Engberg Anderson ARCHITECTS

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1. Condition Assessment

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1. Executive Summary

1.1 Overview

Engberg Anderson has been retained by the City of Madison to provide a feasibility study for the development of the 120 South Fairchild Building to incorporate various community uses beyond its current occupants. The Facility Condition Assessment summarizes the efforts which have occurred during the survey of the existing conditions as well as provide an evaluation of the infrastructure and equipment, code compliance, accessibility barriers, and ability to support these operations.

1.2 Background

The existing building was originally built in 1927 with the most recent renovation taking place in 1989. Upon visual inspection there appears to have been other modifications over the years but exact dates are unknown at this time. The building is located 1 block off the Capitol square and fronts Fairchild Street to the Northeast, Doty Street to the East and Henry Street to the Southwest (see image 1). A multi- story parking garage abuts the building to the West with a separation of about 18" between the two. The building is a two story flat roof structure (first floor & ground floor) with a basement level. The grade of the site slopes from the North to the South running the length of the building. The first floor of the building (top floor) fronts Fairchild Street creating a one story building on this side. As the grade slopes the elevation becomes a two and one half height along Henry Street. There is vehicular and pedestrian access along Fairchild Street for the first floor. Along Doty Street there are two vehicular access points, one for the ground floor and one for the basement level. There is a pedestrian access to the ground floor next to the vehicular access. Along Henry Street there is pedestrian access to the main stairwell. The exterior façade is red clay brick with fairly rough face and somewhat varying shades and is ornamented with terracotta tiles. The windows are primarily original steel sash operable windows although many windows have been either covered with plywood or infilled with brick over the years.

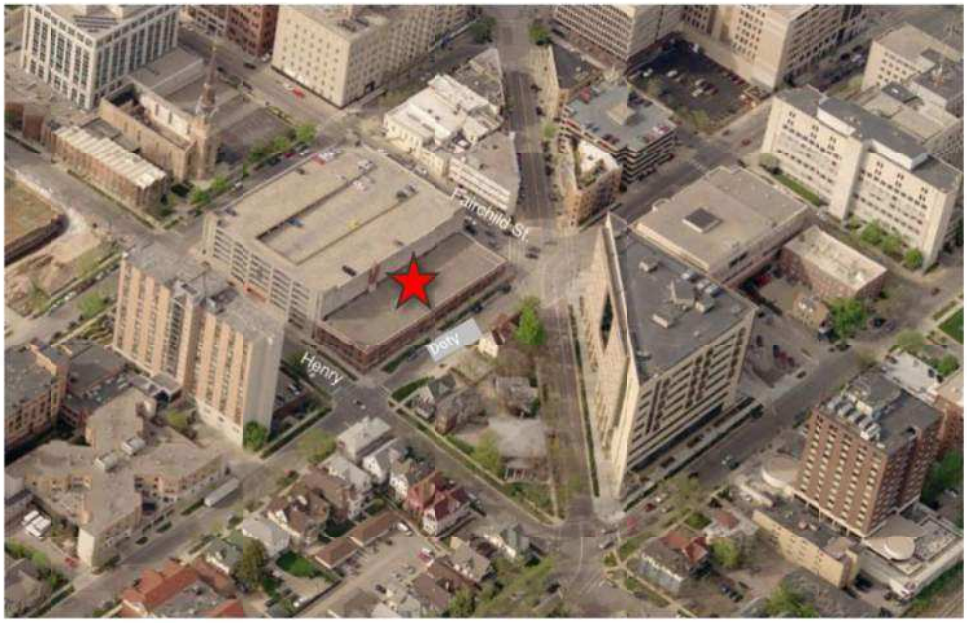
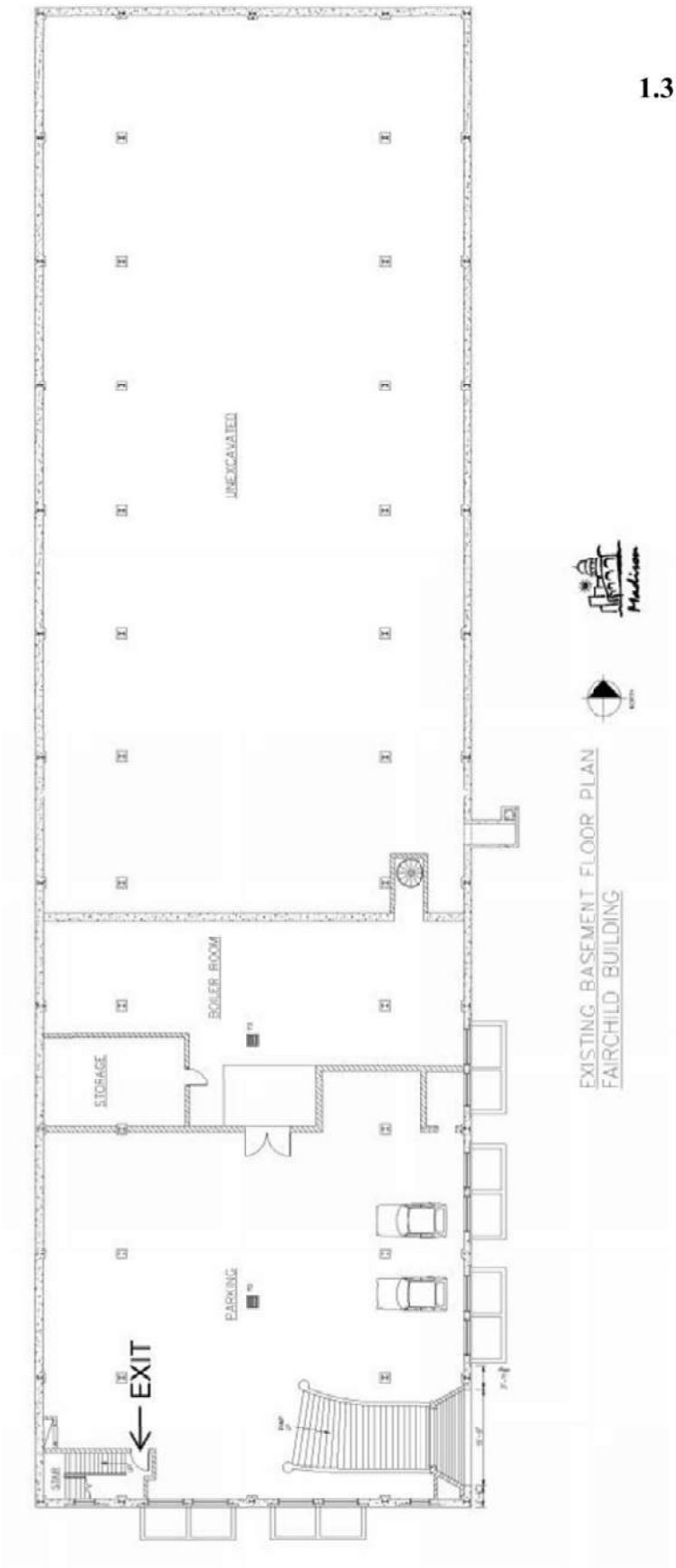


Figure 1 – Aerial View

Figure 2 – Fairchild Elevation

Figure 3 – Doty Street Elevation

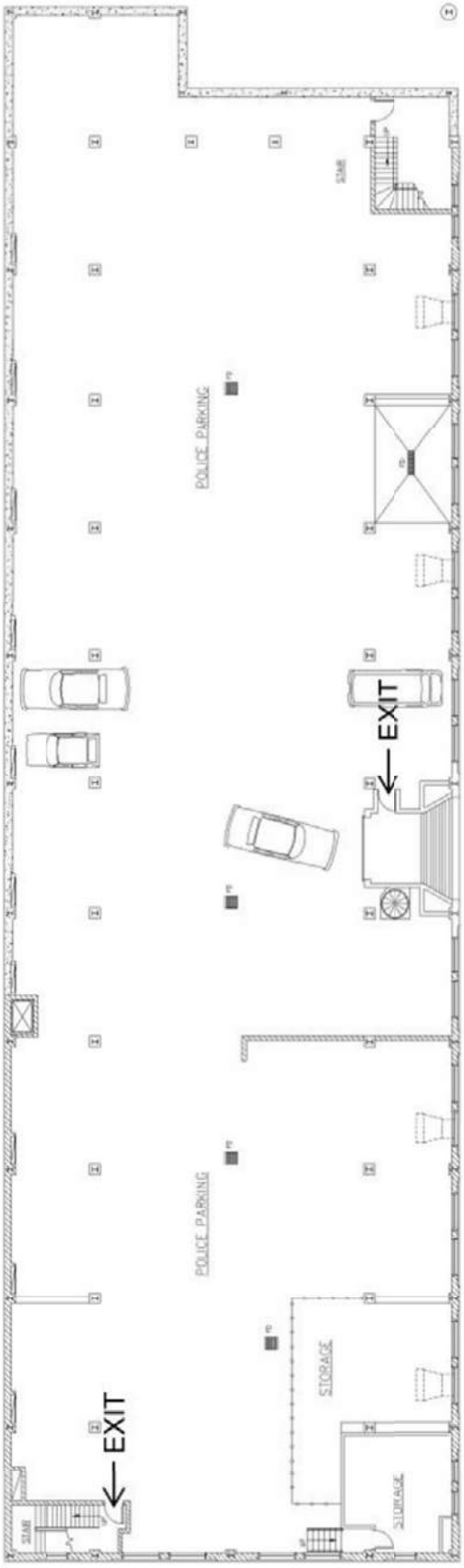
Figure 4 – Henry Street Elevation



1.3 Existing Building Floor Plans

Basement Floor Plan - 7,631 gsf

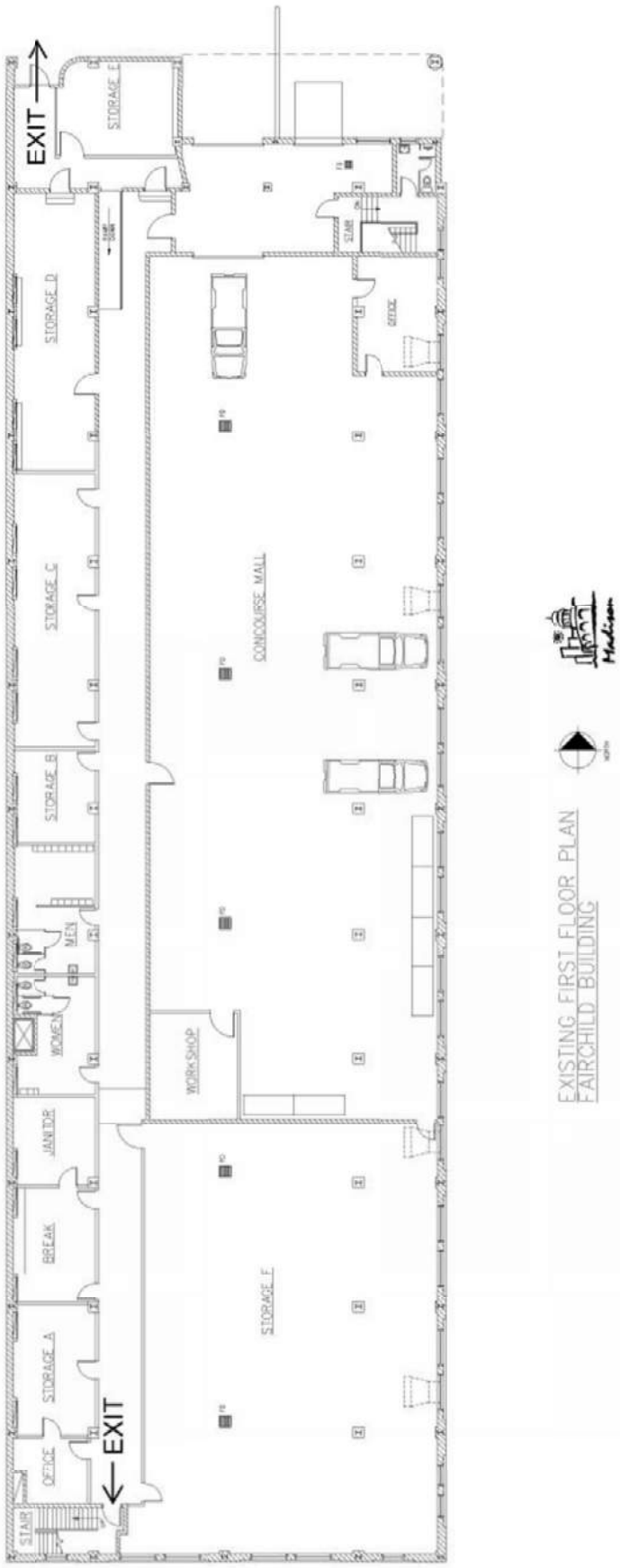
The basement floor has approximately half of the overall footprint as occupied space which consists of an open parking area, a mechanical room and a storage room. The remaining portion is unexcavated area below the ground floor. There is a vehicular access point at the Southeast corner of the building but the floor elevation is approximately 4'0" at this point creating a steep ramp on the interior. There is one pedestrian exit from this level which is through the Southwest stair. The building occupancy for this floor would be classified as S-2.



EXISTING GROUND FLOOR PLAN
FAIRCHILD BUILDING

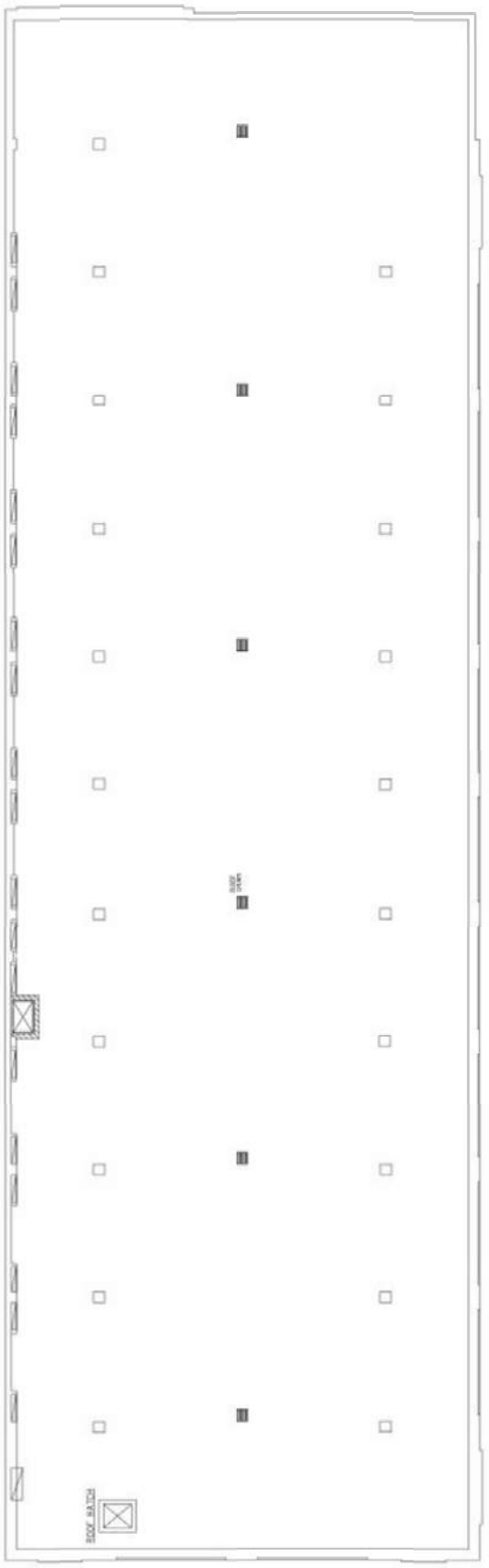
Ground Floor Plan - 18,525 gsf

The ground floor consists mainly of an open parking garage for the length of the building. There is a fenced in storage area and an elevated storage room in the Southeast corner over the vehicular access on the ground floor. There is vehicular access point in the middle of the building which enters on grade. There are two pedestrian exit locations on this floor, one into the stairwell at the Southwest corner and the other at the vehicular access point. There is an access door to the Northeast stairwell which leads to the first floor but does not exit directly out of the building. The building occupancy for this floor would be classified as both S-1 & S-2.



First Floor Plan - 18,525 gsf

The dominate space on the first floor is an open vehicular garage area that is used for maintenance and service for the City of Madison. An office and smaller maintenance shop are located within the garage area. A larger storage area is located behind the garage to the South end of the building. The West side of the floor houses a mixture of small support spaces for the first floor and includes the main entry, storage rooms, restrooms, breakrooms and a mechanical room housing a washer and dryer. These spaces are separated from the garage area by a corridor running the length of the building and terminating into the stairwell. There are two vehicular access points off of Fairchild Street, one for traffic into the building and one for exterior loading which contains a dock leveler. There are two pedestrian exits on this floor one at the main entry of the building and the other into the Southwest stairwell which leads to a direct exit on to Henry Street. There is an access point into the Northeast stairwell which terminates at the ground floor but it is not an emergency exit. The building occupancy for this floor would be classified as both S-1& S-2.



EXISTING ROOF PLAN
FAIRCHILD BUILDING

Roof Plan - 18,040 gsf

The roof has no occupied space and is accessed by a roof hatch from the Southwest stairwell.

Net Square footage of Building

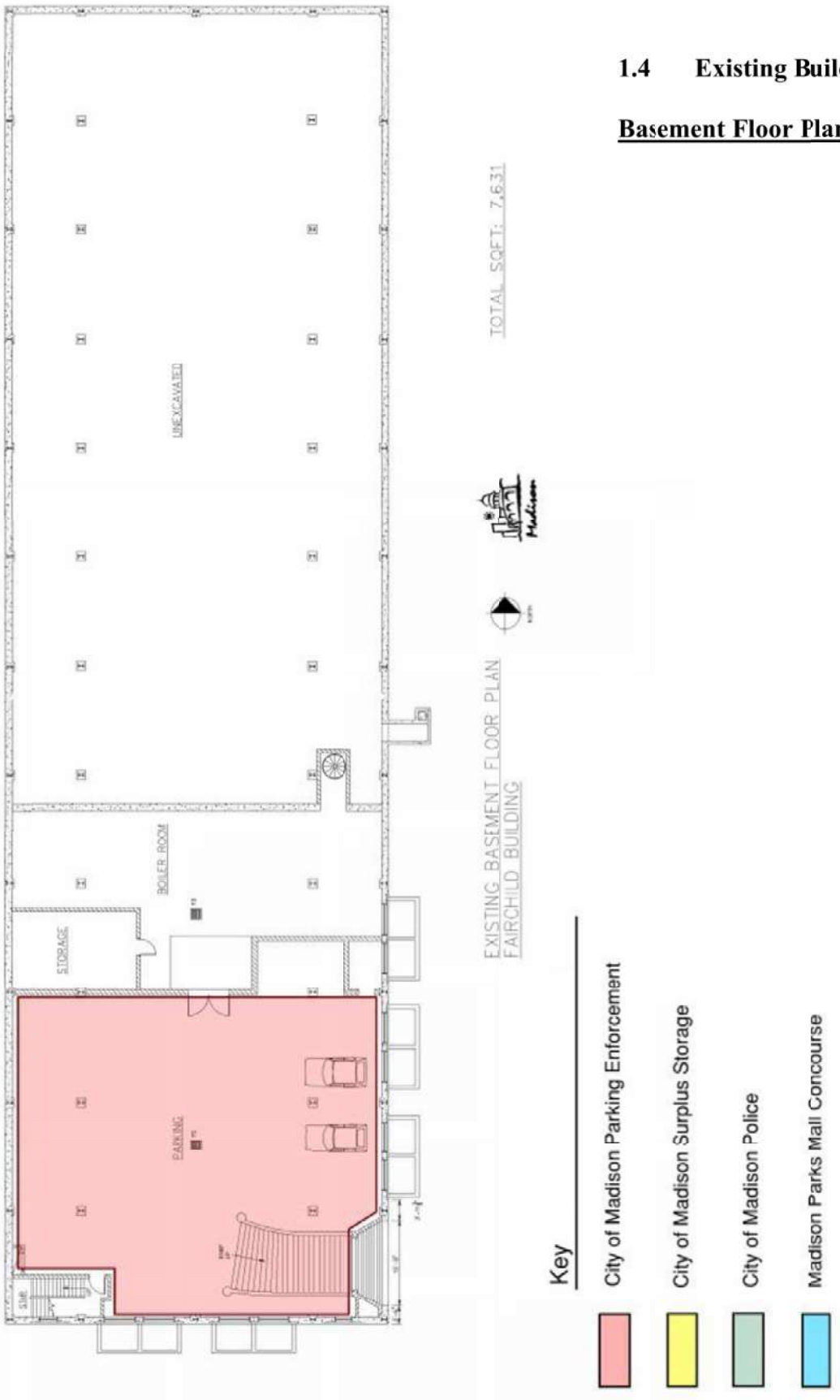
Basement	6,828 nsf
Ground Floor	17,013 nsf
First Floor	17,299 nsf
Total Area	**41,140 nsf**

Gross Square footage of Building

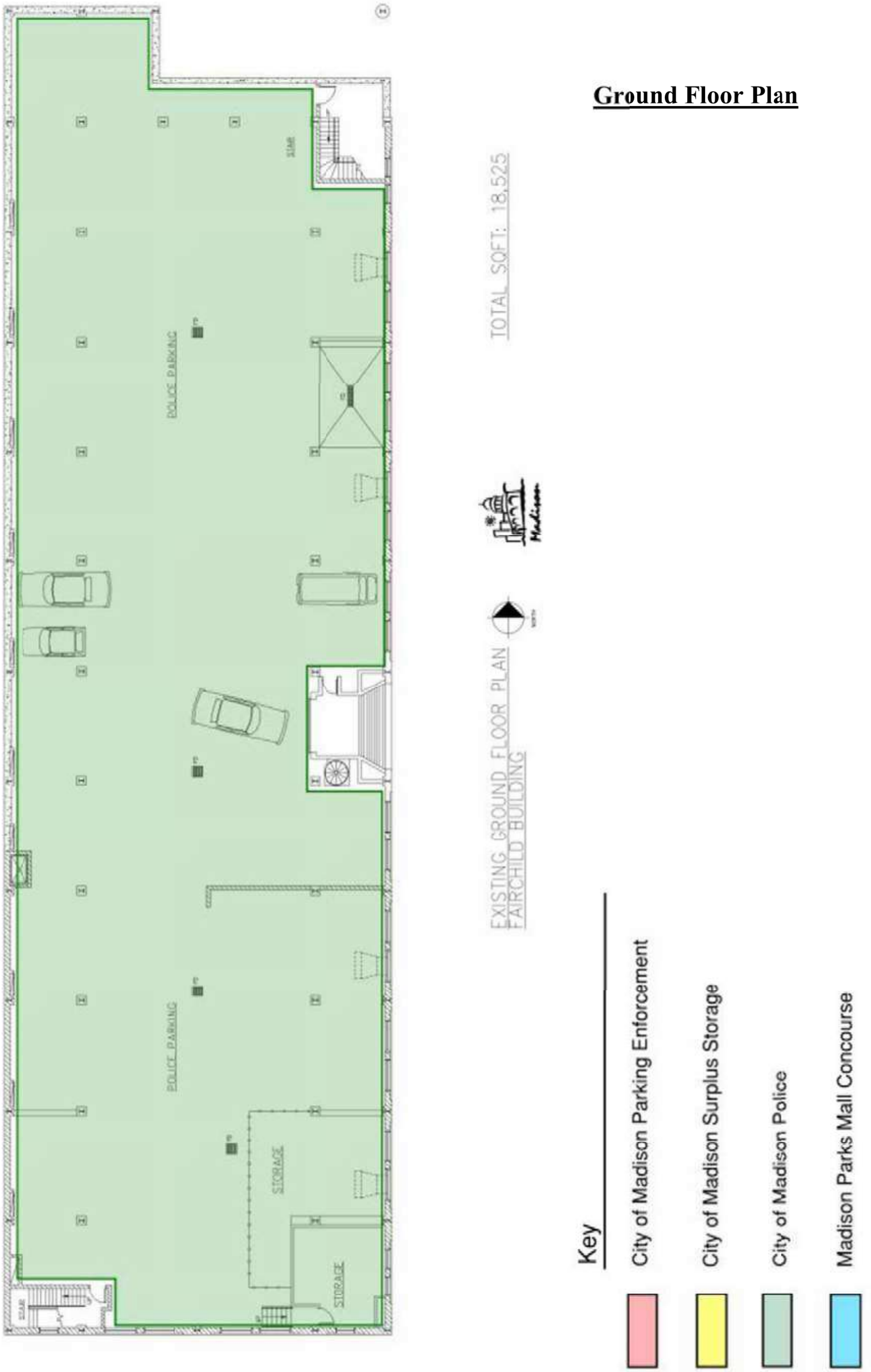
Basement	7,631 gsf
Ground Floor	18,525 gsf
First Floor	18,525 gsf
Total Area	**44,681 gsf**

1.4 Existing Building Uses

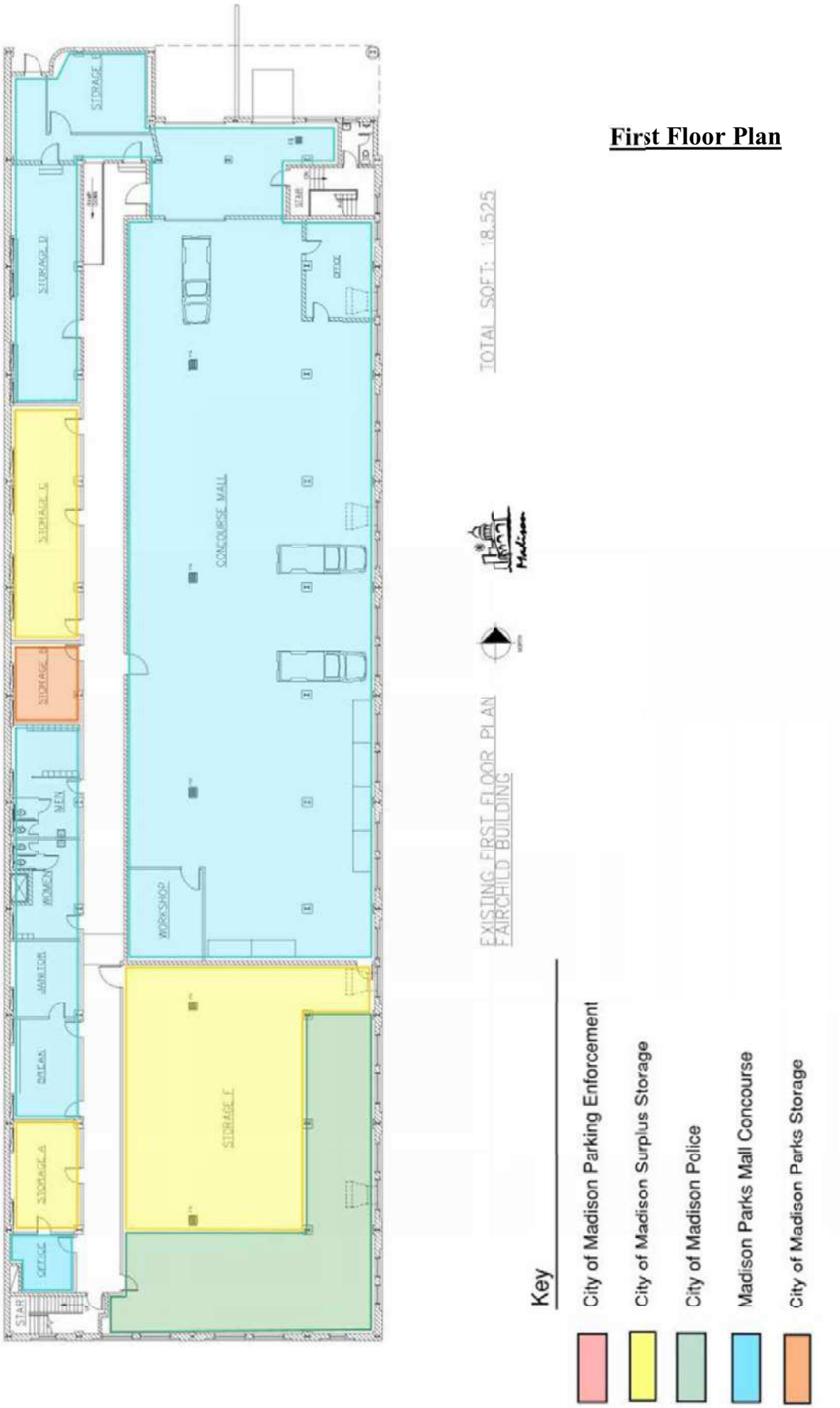
Basement Floor Plan



Ground Floor Plan



First Floor Plan



1.5 Existing Conditions

Accessibility:

The exterior approach to the main building entry on the first floor is not accessible as it does not provide a level landing at the door entry. Once inside the building, the entry way and storage room are 18" above the main floor elevation but an existing accessible ramp makes the transition down. From here the accessible path does provide access to the rest of the first floor with the exception of the men's and women's toilets and locker rooms where the door openings measure less than the required 32-inch clearance. Accessible features have been added to the plumbing fixtures in both bathrooms over the years but the required clear floor space dimensions are not met. Typical door hardware throughout the building is not currently code compliant. The pedestrian access to the ground floor off Owen Street is also not accessible as the exterior door does not provide the required amount of clearance due to the deep recess that it sits within. The floor plan on this level is primarily open so the accessibility impact is minimal inside although the raised storage on this floor only contains a stair access. The building does not have an elevator so it limits the accessibility to both the Ground and the Basement floors. The Basement floor is approximately 4' to 5' below grade and the only pedestrian access to this floor is through the Southwest stair. The mechanical room on this level is about 12" lower than the adjacent parking area with a concrete ramp leading up to then double doors.
Although areas of the building do not meet current accessibility requirements, there are no requirements to bring the existing building up to current standards as it is assumed that the building met the code requirements in existence at the time it was constructed. Any renovations to individual spaces would require compliance with current accessibility requirements.

Exterior Walls:

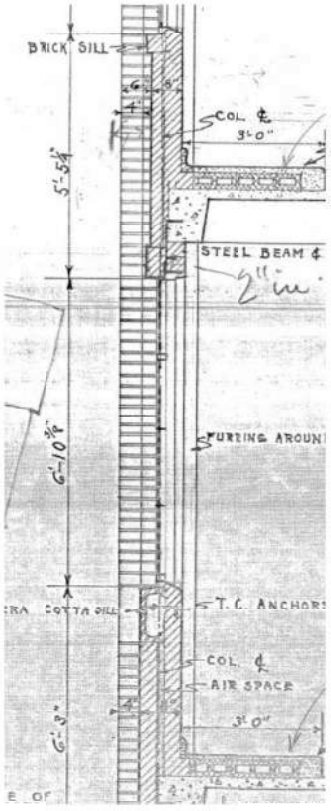


Figure 5 – Original wall section

The primary exterior wall construction is the original construction and consists of red clay brick which is ornamented with white terracotta tiles. The brick and terracotta covers the concrete and steel structural frame. The exterior wall is an infill between the structure and it is a double wythe of brick with a minimal airspace. There is no apparent insulation within this construction so it has very little R-value.
The exterior walls had an extensive repair completed in 2013. The work included tuck pointing to the window sills, tuck pointing and replacement of brick at the lower walls next to the side walk and general brick replacement around specific columns. Visual inspection by a masonry restoration contractor has identified that there are several areas that would require additional work to preserve the envelope. Some of this work would require additional tuck pointing, repairs to the terra cotta and areas where brick would need to be removed and replaced. See **Exterior Elevations** for detailed locations of areas.

Exterior Windows:

Figure 6 – Exterior window & wall thickness detail

The exterior windows are from the original construction and are divided lite steel sash style with single pane glass. Most units have an operable panel in the central portion and have difficulty sealing properly. The frames are rusty and perimeter caulk around the frame is deteriorating. It appears that individual glass panes have been replaced in many units over the years. With this construction the windows have very little thermal resistance.
Many of the units have been covered with plywood on the exterior either for security reasons or for the inclusion of a mechanical louver at some time (see **Exterior Elevations** for locations). Some of the covered windows have rigid insulation located between the plywood and frame. The windows are in poor condition and depending on the use should be replaced.

Roof Construction:

The current roof is a rubber membrane with stone ballast over an existing concrete structure and it was last replaced in 1993. The membrane has visible areas of recent patching at penetrations and it is "tenting" or pulling away from the wall in locations along the parapet. It does not appear that there is any insulation under the membrane. The parapet flashing appears to be in satisfactory shape but there are visible areas on the façade that show the brick bowing along the roof edge which could be a result of water penetration from above. These areas should be investigated further. The roof has outlived its previous warranty of 10 years and will need to be replaced in the near future.

The brick on the chimney located next to the parking garage is deteriorating and will need to be fixed or removed. In a 2009 report there was documentation for a support systems to repair and brace the existing chimney but that work appears to not have been completed.

Stairwells:

There are two stair wells in the building, the first is located in the Southwest corner of the building which connects the first floor to the basement and exits directly onto Henry Street. The exit discharge at this location is not level onto grade as there is a small 6" +/- step as you exit on to the sidewalk. The second stair is in the Northeast corner of the building and connects the first floor to the ground floor and does not exit directly out of the building. Both stairs are a concrete filled steel pan with a typical riser at 7" high and the treads 11" deep which meets current code standards. The concrete is in satisfactory shape along with the steel structure in both stairs. A pipe rail with two horizontal guards runs down the center of the stairs and there are no handrails on either side of the runs. This does not meet current code standards and would need to be addressed if the use was altered. The Northeast stairwell has been altered from the original design and now has a winder stair in midway to the floor landing. The change has created a headroom issue where the height is below the required 6'-8" clearance. Again this issue would need to be address if alterations were to be made to these areas. The roof structure above both stairwells is of wood construction with the apparent intent to allow for vertical expansion. The width of the stairs is 3'-6" wide typically and meets the exiting requirements for today's use. A change in occupancy would require verification that the existing stair width would meet the code required exit widths for the new occupancy loads.

Asbestos Removal:

In 2011 parts of the first floor building were tested by a third party agency for asbestos and the results found certain floor tile and mastic to have asbestos present. At that time the window glazing was also tested for asbestos and the results were negative. It was also noted that the front entry doors and windows on this floor are covered with a transite or asbestos cement board and will need to be removed by an asbestos contractor. The tiles and mastic were removed from the building in 2012. It was not clear if all areas of the first floor had been tested for asbestos at that time. Although the primary floor surface is concrete there are areas with applied flooring. The Janitors/Mechanical room on the first floor has older VCT flooring that is breaking apart and the mastic is exposed. It is also unknown when the VCT in the Mall Maintenance office was installed although it does not appear to failing at this time. It would be recommended that additional testing be done in the future especially before any change in occupancy.

1.6 Structural Systems

The structure of the building consists of concrete and steel encased in concrete and in general is performing well. The floor structure above occupied space is of pan-joist construction, consisting of 6" wide by 12" deep concrete joists spaced at 26" oc. and overlain by a 3" concrete slab. These joists are in turn supported by steel wide-flange beams, encased in concrete. Steel wide-flange columns encased in concrete complete the superstructure support. The remaining floors are slab on grade construction.

The first floor structure has been exposed to significant moisture and corrosive salts and has undergone significant concrete and steel reinforcing deterioration. This resulted in an extensive concrete renovation completed in 2009 of the pan joist areas located on both the first and ground floors. There are some minor underside spalling/reinforcing corrosion that is apparent and was not addressed as part of the concrete renovation but these are not structurally significant at this time.

On the first floor in Storage Room F the concrete topping is in varying condition and it appears that it was patched at an earlier undetermined time. In the Southwest corner and North end of the room it has been removed all together and tapered concrete is used within this room to make the offset transition at two locations. Additional concrete removal and repair in this area will need to be completed.

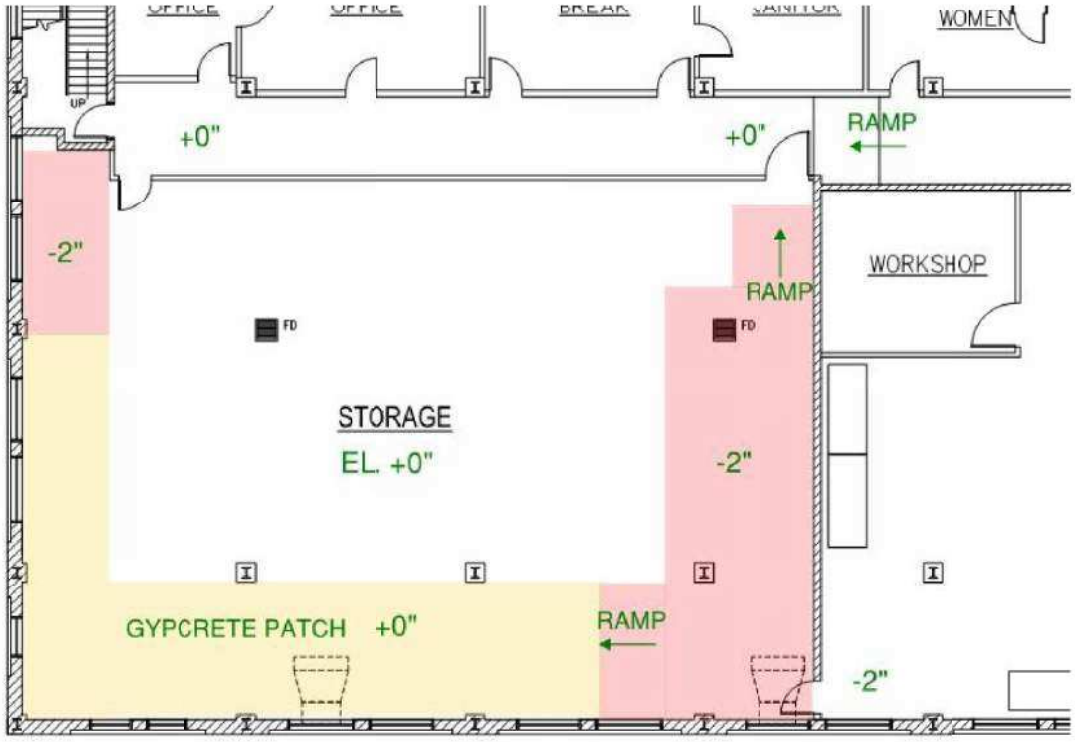


Figure 7 – Concrete topping repair

1.7 Structural Capacities

The Fairchild building is made up of three structural levels: a partial ground floor level; a first floor and a roof that is designed as a future second floor. This building incorporates the use of concrete pan joists, supported by concrete encased steel beams and columns, along with exterior brick and concrete masonry walls. The existing drawing package is somewhat vague in exactly what the structural elements are, as the set incorporates two drawings showing typical floor framing, along with column and footing schedules. One drawing, however; has a handwritten note on it, indicating that this is the drawing used for construction. This is reinforced by the fact that the joists as cast are of the depth (10 inch) reflected on this drawing, but contradicted as they have tapered ends, where the drawings indicate straight cast joist ends. This being said, capacities have been developed using the structural sheet indicating use as the construction drawing.

Concrete joists are similar for all levels, with the existing roof being originally designed as a floor. The existing joists have a nominal available live load capacity of 100 psf. In areas where there is a topping (ie. Police storage), this available live load capacity would be reduced by the effective weight of the topping. This effective weight is not fully known as it may be of varying thickness because of drainage slope of the floor slabs/joists.

Encased beams are also considered to be the same for each level. These beams are called out as Carnegie or Bethlehem sections and subject to an allowable bending stress of 18,000 psi, standard to the time of this construction. The main 45'-0 span, a 30" x 181#/ft beam, was found to have an available live load capacity of 90 psf, with allowance of live load reduction. As it happens, the shorter 14'-0 spans, a 14" x 33#/ft beam, is the limiting member for floor capacity. These narrow 14'-0 areas are limited to an available live load capacity of 61 psf.

Columns and footings were evaluated as well. Based on column and potential footing capacities, we can assume it is not a problem to vertically expand the building the one additional level for which the drawings indicate it was designed. Columns and footings have the capacity to support another level as well. However; this additional load capacity will be dependent on the capacity of the soils. There is no soils or bearing capacity information on the drawings or in any of the other existing building information we have received. Any consideration of vertical expansion over the one additional level indicated on the original documents would require verification of the bearing capacity. Should the bearing capacity prove to be in the range of 7000 psf or higher, an additional floor level could be contemplated. To clarify, this then would be making the existing roof level into a floor, adding a floor level with assumed steel framing with concrete slab on form deck and a new steel-framed roof.

A few things should be considered for any floor capacity or vertical expansion. The existing floor capacities, as limited by the steel beams, in particular the shorter beams at the outside spans, are adequate for most of the current use. There are potentially some loadings in the garage area that, if spread over a large enough area along the Doty St. side, could be in excess of the capacity of the short beam span. Any toppings that may be used to level existing floors or existing roof, would decrease available live load. Capacities noted assume that the existing steel beam and column members are in substantially undeteriorated condition. The present building review was visual in nature only and no steel member deterioration was noted as these members are concrete-encased. However; since there have been substantial floor concrete repairs in the past, it is possible steel beam members have undergone some section loss due to ferrous corrosion.

1.8 MEP Systems

Mechanical Systems

The Upper Level is currently served by AHU-1 which is suspended in the laundry room. AHU-1 serves the general maintenance support area. The design airflow for AHU-1 is 5,000cfm with a discharge air temperature of 55°F and is a constant unit with the supply circulation fan. Air is currently distributed to the Upper Level maintenance support areas utilizing ducted supply and return air. Convectors and unit heaters are served by steam heating which have unit regulators or wall-mounted thermostats. Most of the perimeter spaces have individual steam convectors to maintain minimum space temperatures. All of the thermostats and actuators are electronically controlled. The existing steam boiler is 2950 MBH capacity to provide heating to the perimeter terminal devices as well tempering the make-up air units. There are multiple make-up units to temper the air serving the parking garage and maintenance services areas. Both equipment and piping is operational, but at end of its useful life. Any changes to the systems or program will require change to the equipment and air distribution system.

The existing exhaust systems serving the parking garage and maintenance services areas are operational, but are at the end of useful life. The IBC code requirements requires a minimum ventilation of 0.75 cfm/sf for parking garage and maintenance services areas. For any renovation of the building or change, the existing ventilation systems serving these parking garage and maintenance services areas will need to be replace to meet minimum code standards.

Plumbing Systems

The plumbing systems currently serving the building consists of domestic water, hot water, sanitary waste, and vent piping. There are restrooms and laundry located in the Upper Level of the building. The plumbing piping serving the restrooms are fed directly above the ceiling and below the Upper Level. The Upper Level also has a break/kitchette room that has domestic water, hot water, sanitary waste, and vent piping fed from adjacent water heater room. The existing incoming 2-1/2" water service is on main level in parking garage. The building currently doesn't have a wet pipe automatic sprinkler system installed. A new 6" incoming water service would need to be consider for installation of wet pipe automatic sprinkler system for the building.

Electrical Systems

The existing electrical service currently serving the building is fed from feeders from MG&E utility vault at 208Y/120V which then feeds the power to the building. The main distribution system is 208Y/120V, 3ph, 400A electrical service. The 400 Amp service currently serve the facility with very little air-conditioning load and minimal power density for parking garage and maintenance services. The main distribution system and service entry is located Westside of the main service. The electrical systems existing main distribution system is in poor condition and beyond its service life. The equipment will need to be replaced when changes to any system are made.

There are multiple power branch panels serving Upper, Main and Lower Level. Most of three branch panels has been renovated over the years. The old panels have been converted over to adjacent junction boxes for wiring tie-ins. These existing branch panels should be replaced with a new three-section 208Y/120V, 3ph, 4w, 225A, M.L.O. branch panel to serve new and existing loads. The existing conduit and feeder to the panels can be reused depending on changes to any system or new programming of the

space. Any existing remaining branch circuits can be relocated to the new panels not affect by any new system or program change. Existing conduits in horizontal ceiling space can be reused where new walls do not require the conduits to be demolished. All branch wiring for new circuits are to be served with new wiring.

The primary lighting system in the building have been recently replaced. The new fluorescent fixtures with occupancy sensor controls are installed throughout the building. All suspended linear direct fixtures in the storage, hallways, garages area and service maintenance areas. Currently there is an occupancy sensor within each lighting fixture which controls only the light fixture associated with that area. For any surface mounted ceiling fixtures, the occupancy are either wall or ceiling mounted devices. The fixtures utilize a single T8 fluorescent lamps per four feet of run length. The lighting fixtures are in good working condition. The lighting power density is nearly 1.5 watts per square foot. You're also required to walk a considerable distance before the light turns on.

For system changes or new programmed areas, the strategy is to replace with new energy efficient LED light fixtures with occupancy sensor control. Lighting controls will be wall mounted type with passive infrared occupancy sensors. The existing low voltage switch lighting controls will be removed and replaced with new low-voltage relay controls, bi-level switching, automatic dimming, and occupancy control. The lighting power density goal will not exceed 1.0 W/ft2.

Exit signs are integral battery type with emergency lighting. These exit signs are fairly new. Exit signs are LED type and are associated with the path of egress in the building. These are currently installed in hallways, stairwells, and egress points.

The building is not currently connected to the existing building fire alarm system or building automation system. Audible and visual signaling devices should be installed in all appropriate areas. Fire alarm pull stations and visual and audible devices should located to comply with public mode operations. New fire alarm devices will be provided as code required and connected to new fire alarm control panels. All new visual strobes will be synchronized with each other. New smoke detectors will be provided at spaces along with new pull stations will be provided at each exit. If the building is sprinklered based on occupancy use, the tamper switches and flow monitors will be provided at standpipe location and at the sprinkler system head end equipment.

Functionality and Quality Issues

Mechanical

- The HVAC system will provide the proper environmental control of the space to meet ASHRAE 55-2010 for thermal comfort.
- Access will be provided to allow equipment located above ceiling to be properly maintained.
- Proper space ventilation will provide the appropriate outside air required to meet or exceed ventilation rates per ASHRAE 62.
- The air diffusers will be properly located in both private and open office configurations to meet the ADPI ratings for thermal comfort.
- Enclosure parking and service garage areas will need to maintain a minimum of 0.75 cfm/sqft.

Plumbing

- Water heating demand and storage to be considered for any change in occupancy use.
- The fire sprinkler wet system to be considered for any change in occupancy use for fully functional system.

Electrical

- All lighting and controls should comply with local code requirements and city's standards. Lighting layouts will provide an average of 5 fc maintained ambient light level in parking and service garage areas.
- "Daylight" harvesting will be considered based on architectural layouts. When adequate levels of daylight is available, the daylight zones should be controlled to a preset level using automatic dimming controls.
- Audible and visual signaling devices should be provided in all public areas including occupancy offices. Additional signaling devices should be provided in mechanical equipment rooms. Audio/visual signals should be placed to cover all areas of the building for alarm signaling. Fire alarm pull stations and visual and audible devices should be located to comply with public mode operations

1.9 Conclusion

The building is in satisfactory condition for its age and appears to function adequate for the current uses that are present today.

If the building were to change uses such as adding an R-1 occupancy like a shelter, there are several obstacles that will need to overcome to make it viable option. First and foremost would be to address the lack of thermal resistance in the exterior envelope. The exterior walls would need to have insulation applied to an interior face within a furred out wall. The windows would need to be replaced with a more energy efficient model where the appearance would closely match the original design intent of the building. Another significant obstacle would be to bring the renovated areas up to be code compliant. Egress paths and stairwells will need to be renovated to handle the increase occupant loads and provide a safe path of travel out of the building. Accessibility standards both on the inside of the building and for the exterior approach to the building will need to be addressed. Depending on the layout of the renovated spaces the addition of an elevator would also need to be required. The mechanical, electrical and plumbing systems will all need to be upgraded to meet any type of occupancy change.

The structural system is in good condition and provides above average loading capabilities. The floor to floor height would provide enough room for the distribution of new MEP systems throughout the building. The fact that the building was originally designed for an additional floor allows for the potential for vertical expansion to the downtown Madison site. Although the building meets current operations requirements there are certain ongoing maintenance will need to be addressed even if the building is not renovated. The existing roof membrane is beyond its life and will need to be replaced. The exterior facades will also need to have ongoing maintenance done to limit them from deteriorating further.

There is potential for adapting the building to another use but with all of these factors there can be significant costs involved in the project.