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HVAC Repairs
Springfield Court Complex
50 & 80 State Street
Springfield, Massachusetts

Mass. State Project No. TRC 2111

Prepared For:
Division of Capital Asset Management and Maintenance
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Section 1 Introduction

This evaluation was prepared for the Division of Capital Asset Management and Maintenance (DCAMM) on behalf of the Executive Office of the Trial Courts (EOTC). The purpose of the assessment is to identify and prioritize capital repair needs primarily focused on the mechanical, electrical, plumbing (sanitary) and envelope conditions at 50 State Street, and mechanical, building automation systems and water damage repairs at 80 State Street. The goals of the Assessment are to document existing system conditions of the Court Complex, identify deficiencies and relevant lifecycle implications, recommend necessary repairs and/or upgrades, and provide an implementation plan and order of magnitude cost estimates for the improvements.

Section 2 Acknowledgements

The following individuals and firms contributed to this report:

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Section 3 Existing Conditions Investigation and Analysis

The Springfield Hall of Justice (HOJ), (also referred to as the Roderick L. Ireland Courthouse) located at 50 State Street is approximately 228,000 square feet (not including the garage or penthouses) in a four-story structure that was constructed in the mid-1970s. It houses the Springfield District Court, Superior Court, Probate & Family Court, and the Registry of Deeds. The lower level consists of the parking garage, mechanical and utility spaces, and facilities support spaces. The building has had recent electrical, elevator and accessibility upgrades, and has had other systems and envelope repairs performed over the years. In 2016, a significant project to modernize the elevators was completed, with accessibility upgrades included in this project. In 2019, the electrical service was upgraded to both courthouses, including electrical panel replacement throughout the HOJ.

The Housing and Juvenile Courthouse at 80 State Street is a granite, 48,900 square foot three-story building with interior steel framing that was constructed in the 1870's. It has had alterations over the years with the most recent renovations and system repairs occurring in 2005 and 2009.

For this assessment, DCAMM provided the design team with the following construction drawings/reports:

- Springfield Hall of Justice Court Facility Evaluation Summary dated June 22,2015
- Springfield Housing and Juvenile Court Facility Evaluation Summary dated June 22, 2015
- Construction Documents for Remodel of Juvenile Court, dated 1974
- Indoor Air Quality Assessment – Hall of Justice, 50 State Street, Springfield, Massachusetts, prepared by Massachusetts Department of Public Health, Center for Environmental Health, Emergency Response/Indoor Air Quality Program, dated May 2006
- Odor Assessment – Hampden County Registry of Deeds Hall of Justice, Springfield, MA, prepared by Massachusetts Department of Public Health Bureau for Environmental Health Indoor Air Quality Program, dated February 2012
- Indoor Air Quality Assessment – Springfield Hall of Justice, 50 State Street, Springfield, Massachusetts, prepared by Massachusetts Department of Public Health, Bureau of Environmental Health, Indoor Air Quality Program, dated March 2013
- Indoor Air Quality Reassessment – Springfield Hall of Justice, 50 State Street, Room 204, Springfield, Massachusetts, prepared by Massachusetts Department of Public Health Bureau of Environmental Health Indoor Air Quality Program, dated 2017.
- Springfield House of Justice - Tables and Pictures, dated 2019.
- Draft – Indoor Environmental Quality Assessment, Roderick L. Ireland Courthouse and Hampden Juvenile Court, Springfield, Massachusetts, prepared by Environmental Health & Engineering, Inc., dated January 22, 2020
- Draft – Summary of Indoor Environmental Quality Assessment – Roderick L. Ireland Courthouse and Hampden Juvenile Court, Springfield, Massachusetts, dated November 11, 2019
- Memorandum – Asbestos Bulk Sampling Results, Roderick L. Ireland Courthouse & Springfield Housing & Juvenile Courthouse, dated June 29, 2020
- Various construction documents, as-builts and AutoCAD drawings of Juvenile and Housing Court building from 2003-2009
- Diagram floor plans for the Hall of Justice
- Roderick L. Ireland Courthouse, Springfield, MA, HVAC Systems Evaluations Covid-19, Office of Court Management, dated January 6, 2021, prepared by Tighe & Bond
- Springfield Juvenile and Family Court, Springfield MA – HVAC Systems Evaluations, Covid-19, Office of Court Management, dated July 9. 2021, prepared by Tighe & Bond
- Witness Stand sketch dated September 29, 2021, by Creative Office Pavilion.

- Hampden County Hall of Justice Electrical Upgrades dated May 22, 2002, by MacRitchie Engineering Inc.
- Barber Coleman Company, Hampden Co. Hall of Justice AC Shop Drawings dated October 30, 1973.
- Mechanical Equipment Replacement Energy Conservation Project, Hall of Justice, dated 1997.
- Mechanical Equipment Replacement Energy Conservation Project, Juvenile Court, dated 1997.
- Original Construction Documents, Hampden County Hall of Justice, 1973-1976 by Eduardo Catalano Architect
- Delta Mechanical Inc, HVAC Documents, Hampden Co. Hall of Justice, assumed 1970's.
- Hampden County Courthouse, Johnson Controls, 1977.
- 2005 Roof Replacement & Repairs by Gale Associates As-Builts.
- Repairs Springfield Housing & Juvenile Court dated 2003-2004.
- ACM Results Jury Pool Toilet Room dated January 29, 2016.
- ADA Barrier Mitigation Report dated November 7, 2006.
- ADA Barrier Report Page 09-13, dated November 7, 2006, prepared by DCAMM.
- Courtroom Seating Plan, dated September 25, 2013 (no information on preparer).
- Electric System Component Replacements Study Draft, SHOJ, dated June 10, 2011.
- DCAM Accessibility Checklist for Triggered Building, dated September 12, 2013.
- Springfield Water Leak Evaluation dated 2009, by Gale Associates.
- Springfield Hall of Justice FA Narrative dated February 3, 2016.
- Eversource CAD File dated January 11, 2018.
- SHOJ-Electrical Replacement Drawings, dated September 12, 2013, prepared by DiMarinsi & Wolfe.
- SHOJ Electrical Components Replacement, dated May 4, 2016.
- DCAMM Electrical System Component Study at Springfield HOJ, dated June 10, 2011, prepared by DiMarinsi & Wolfe Architects and MacRitchie Engineering, Inc.
- SHOJ Electric Bills dated February 6, 2017.
- Electrical Monitoring Data – SHOJ, dated April 3, 2017.
- Juvenile Court As-Builts 2004
- Juvenile Court Boiler Room Structural Repairs As-Builts 2002
- Juvenile Court Life Safety Improvements As-Builts 2009

Testing/Inspections performed for this are included in the appendices (with the exception of video files) and include the following:

- Video Inspection Report of Ductwork – Springfield Court House Hall of Justice, performed by Air Duct Services & Restoration.
- Fiberglass Air Sampling Report of Findings- Springfield District Courthouse, performed by ATC Group Services, LLC.
- HVAC Repairs – Existing Building Code Report - Springfield Court Complex, Springfield, Massachusetts, October 1, 2021 prepared by Don E. Contois, PE. Sullivan Code Group.
- Infrared Survey of Hall of Justice - Springfield Hall of Justice, dated September 29, 2021, prepared by Infrared Diagnostic Report.
- Infrared Roof Moisture Survey – Hampden County Hall of Justice, dated November 17, 2021, prepared by ProScan Infrared Technologies.

H&A was the Designer of Record on the following projects related to the facilities:

- Water Infiltration Study: Project No. CFM 1002, window sealants, plaza deck waterproofing, stair at Juvenile Court, dated April 29, 2016.
- SHOJ Elevator modernization and accessibility improvements, Project No. TRC1305 FC1, dated October 3,2014.
- SHOJ Electrical Upgrades, Project No. TRC 1605 FCI, dated March 28, 2018.

Springfield Hall of Justice Existing Conditions

Roof:
The existing thermoplastic roof membrane was installed on the low sloped roof of the main building, mechanical penthouse, and four stair towers in 2005. Roof systems generally have a 20-year life expectancy, and that is the maximum warranty duration that can be obtained. It is nearing the end of its useful life within the next few years. There is a low parapet wall around the perimeter of the building with secondary overflow scuppers through the wall located in select areas. The parapet wall is covered with a painted aluminum coping. There are numerous roof drains. The membrane appears to be generally in fair condition based upon its age. At several roof drains, there was soft, spongey insulation, indicating moisture intrusion and degradation of the insulation, which may be contributing to the moisture infiltration observed by the occupants. An infrared scan of the roof area was performed to determine areas of heat loss, which are an indication of wet insulation below the membrane. The scan results indicate nine (9) localized wet areas of roof insulation totaling approximately 1,039 square feet, or approximately 2% of the roof area. The areas were marked on the roof with paint, and on a roof area plan so that repairs can be performed in these areas.

Exterior Walls:
The exterior walls consist of cast in place architectural concrete. The surface of the concrete is heavily stained in many areas, especially beneath windows, at the top of stair towers, on two ornamental concrete plaques that flank the entry, and at the walls of the plaza. In 2005 repairs to the exterior walls were completed including epoxy injection of cracks in the façade, application of sealants in concrete cracks, concrete spall repairs and application of an elastomeric coating. Aside from the heavy staining, the exterior walls appear to be in good condition.

Windows:
The windows are original to the building and consist of aluminum frames with single glazing, which do not meet current energy codes. Most of the windows are in a ribbon configuration and are butted together at the mullions with a sealant applied on top of the butt joints. The windows of the ground floor are recessed below the cantilever of the second floor. At the second floor, most of the windows protrude approximately 10” beyond the face of the building. Here a metal cap is installed at the window heads, which serves to close off and flash the window head. On the upper levels, the windows are nearly flush with the face of concrete. There are a small number of operable casement windows, while all the other windows appear to be fixed. Refer to discussions below regarding Moisture Infiltration for more information.

Exterior Doors:
The doors are original to the initial mid-1970’s construction. The public entry doors consist of a vestibule of full glass, aluminum framed doors. There are painted hollow metal doors at exits around the building that are dented and the finish has oxidized.

Plaza Deck and Garage:
The garage consists of on-grade parking located below the plaza area between the Hall of Justice and Juvenile and Housing Courts. The structure supporting the plaza consists of precast concrete double tees. Active leaks and areas of concrete deterioration and spalls were observed in several isolated locations in the underground parking garage. Along one wall, the spalls have exposed the reinforcing steel in the beam supporting the tees. Above the garage is a landscaped plaza area which was installed above protection board and a waterproofing membrane applied to the top of the garage framing. This waterproofing membrane was installed in 2006 as part of the concrete façade repairs and roof replacement in 2006. Refer to discussions below regarding Moisture Infiltration for more information.

Interior Moisture Infiltration:
A Leak Evaluation Study was conducted by Gale Associates, Inc. dated January 5, 2009. At that time, controlled leak testing was performed to determine the cause and origin of reported active interior water

infiltration. The testing confirmed that active leaks were found in Detention Cells, Room 208, the Law Library and below the plaza deck in the underground garage.

H&A conducted a Water Infiltration Study in 2016 that reviewed water infiltration at windows and in the parking garage below the plaza deck. The study revealed deficiencies with the plaza waterproofing that caused the infiltration into the garage. Also, as part of the 2016 study, H&A inspected a portion of the window sealants via lift and found the sealants in poor condition, with failed repair attempts with sealant overlays. Test cores of the plaza were removed to view the condition of the waterproofing membrane directly above two garage leak locations. The test cores revealed that the waterproofing membrane was not applied to below grade scuppers as detailed in the 2006 design plans. Recommendations were made to repair the deteriorated concrete and apply waterproofing. It does not appear that repairs have been made to the window sealants or plaza waterproofing since this report was issued, and the Trial Courts have noted that limited spall and sealant repairs have been completed.

Currently, in numerous locations throughout the façade and at various floor levels, evidence of moisture infiltration was visible at interior finishes such as window heads with deteriorated gypsum wallboard, peeling paint, stained wall soffits, stained ceiling tiles, and stained carpet. This is particularly evident in the third floor Law Library and the fourth floor Land Registration area. As part of this current evaluation, H&A used a drone with camera to obtain photos of the window sealants throughout the façade. The recent drone images (included in Appendix A) show the poor condition of the sealants and the failed attempts to repair the sealant with an overlay bead of sealant.

Facilities personnel reported that all five doors at the roof level leak into the mechanical penthouse space. There is also water damage evident at pipe drain in G27.

Plumbing:

Cold Water Service:
Building domestic cold water is served by a 6” ductile-iron main that enters through southeast side of the building into the mechanical room. Untreated water passing through the ductile-iron main has resulted in damage to water heater anode rods and water piping (both hot and cold) downstream resulting in pipe leaks. Water heater failure is reported by Facilities staff to be frequent, with replacements happening every 4-5 years. Wye strainers in cold water main are cleaned out frequently and facilities staff report finding black residue in strainers.

Hot Water Service:
Adequate hot water service requires the operation of dual electric hot water heaters with recirculation to sufficiently serve all the fixtures in the building. Due to frequent water heater failure and replacements, the building is instead being served by a single 80-gallon 45 max kilowatt water heater to reduce replacement costs. Water heaters require replacement every 4-5 years. The current water heater in service was replaced in 2016. A new water heater sits adjacent to the operating water heater in the event of failure. In several locations, hot water supply to a faucet is insufficient and has necessitated the installation of 120V electric 10-gallon point of use water heaters that must be kept hot all hours of the day. The probable cause is a combination of insufficient hot water capacity from the single water heater in operation, long segments of non-recirculated “dead-leg” hot water piping, and low flow fixtures.

Waste Drainage:
The building is served by a single waste main exiting the premises to the street on the north end of the building. A pipe surveying service discovered a crack in the waste main just upstream of Mailroom G27 that has yet to be repaired. In total, three independent services confirmed the finding, though a recent survey, performed October 4, 2021, failed to locate the crack. Waste piping is original to the building and beyond its useful life expectancy, including drains. The poor condition of this waste piping warrants full replacement. Several drains have been replaced due to significant corrosion and rust. At least three floor drains in various

restroom spaces remain inoperable and three floor drains in the mechanical room are also inoperable. DCAMM has been provided with five (5) videos of sewer scoping performed October 4, 2021.

Storm Drainage:
Storm drainage combines at the top floor below the roof into four (4) separate risers at each stairwell, three (3) 10" risers and one (1) 8" riser. Risers exit the building below grade at each corner.

Gas Service:
Natural gas is provided from high-pressure gas service to gas meter and pressure reducing valve to low-pressure gas supply.

ADA Requirements:
Lavatory tail pieces within ADA public-use restrooms are missing guards or insulation as required per Massachusetts plumbing code.

Fire Protection:

Fire Service:
An 8" fire service enters the mechanical room in the basement and passes through an 8" double check valve assembly. The service supplies a 6" wet alarm check valve assembly for the wet sprinkler and standpipe system and supplies a 6" dry pipe valve assembly for the dry system in the garage.

Standpipe System:
The wet manual standpipe main runs to risers located throughout the building. The 2 ½" fire department hose valves are located in cabinets in the stairwells. There are both 1 ½" fire hose valves and 2 ½" fire hose valves in cabinets located throughout the corridor spaces. The 1 ½" fire hose valves are capped as they are not required per 780 CMR and NFPA 14. The 1 ½" fire hose valve cabinets should have the labelling removed as there is no hose valve in the cabinet any longer. The 2 ½" fire hose valve cabinets in the stairwells were locked. These cabinets should be unlocked unless approved by the Springfield Fire Department.

Sprinkler System:
The automatic wet sprinkler system protects storage spaces throughout the Courthouse. No other areas are protected by the wet sprinkler system. Installing additional sprinkler coverage in unsprinklered spaces would only be required if the building undergoes renovations where the scope includes Level 2 alterations or higher. Level 2 alterations require sprinkler coverage in areas of renovation whereas Level 3 alterations require sprinkler coverage throughout the entire building.

Standard response sprinklers are installed throughout the storage areas. The dry sprinkler system protects the underground garage and is fed from the Courthouse mechanical room.

Fire Department Connections:
The fire department pumper connections for the wet sprinkler system, standpipe system and dry system are located on State Street. The sprinkler and standpipe systems have one connection while the dry system has its own connection. These connections are used by the fire department to boost the pressure in the systems.

Heating, Ventilation, & Air Conditioning (HVAC):

Air Handling Units:

The existing HVAC system consists of four (4) constant volume air handling units that provide cooling, heating, and ventilation to the building. All of the units are original to the building and are in poor condition.

Two units, AC-3 and AC-4, are located in the basement and serve the East and West sides of the building from the Ground Floor to the 3rd Floor. One unit, AC-2, is located in a mechanical room on the 4th floor and serves exclusively the 4th floor. The last unit, AC-1, is in a penthouse mechanical room and serves only courtrooms throughout the building. See summary table below for AHU information.

Unit	Age	Unit Condition	Areas Served
AC-1	48 yrs	Poor	All Court Rooms
AC-2	48 yrs	Poor	4th Floor
AC-3	48 yrs	Poor	Ground Floor – 3rd Floor (West)
AC-4	48 yrs	Poor	Ground Floor – 3rd Floor (East)

Each unit is equipped with an active combination hot/chilled water coil, supply fan, external return fan, mixing section, and MERV 13 filters. Outside air enters the unit through the outside air damper, mixes with building return air (if not in economizer mode) and reaches a supply fan that is in a 'blow-thru' configuration, with the combination hot/chilled water coil located downstream of the fan. This is a less effective way of heating and cooling air than what would be provided in a 'draw-thru' unit. The 'draw-thru' configuration allows for air to pass over coils at a slower velocity, allowing for more effective and efficient heating/cooling rather than requiring the system to condition air passing over a coil at a high discharge velocity. Additionally, having the return fans external to the unit and discharging air prior to the mixing section is not typical, as most units utilize an 'exhaust' fan downstream of the mixing section. However, it is not believed that this should cause significant operational issues if everything is balanced correctly.

In addition to the blow-through configuration, the units are not equipped with any form of reheat given that the system is constant volume. Having a reheat coil in place would allow for the system to cool the air down to lower temperatures in order to extract humidity from the air and subsequently reheat the air, if necessary, to provide the desired discharge air temperature. The units are equipped with existing electric coils, but these were taken offline during energy conservation upgrades in 1997, when the facility was under County control, and they now remain in the unit without purpose.

As stated, the supply fans are internal to the units and the return fans are external to the units. Each unit also contains an electric bi-polar ionization device, old roll filter assembly, and electric preheat coil, none of which are still in operation. All air handling units were also previously equipped with steam humidifiers, but this equipment has since been removed from inside of the units.

All fans are equipped with variable speed drives (VFDs). The VFDs are currently not integrated into the building management system (BMS) for building pressure controls and existing dedicated exhaust fans throughout the facility are not following the occupancy schedules for the AHU system.

In general, the units are operational, but are in poor overall condition. The coils, filters, etc. have been replaced over time to keep the unit operating to meet the building's needs; however, each unit is nearly 50 years old and well beyond the recommended useful life span (15-20 years).

Heating:
All four (4) air handling units are equipped with one coil downstream of the supply fans, which are supplied with hot water during the heating season (two-pipe system). Downstream of the air handling units there are duct-mounted hot water reheat coils for zone level reheat. The reheat coils were all originally electric but

were replaced with hot water during the 1997 energy conservation renovations. AEI understood all existing electric reheat coils to have been switched over to hot water based on the drawings provided; however, this does not appear to be the case based upon a review of the site conditions and discussions with facility staff. It appears that reheat coils serving the perimeter zones on the Ground Floor through the 3rd Floor have been swapped out for hot water coils and all coils have been changed to hot water on the 4th floor. The remainder of the coils seem to be existing electric coils and it is unclear to facility staff at this time if these are all still operational. Facilities staff currently are assessing the quantity of existing electric in duct reheat coils for operability via original pneumatic - electric controls. Some have been activated and are potentially operational but may require additional calibration work.

Hot water is generated by four (4) natural gas condensing boilers, which serve both buildings and are located in the central basement mechanical room (in 80 State Street). The boilers are estimated to have been installed in 2007, based on the equipment serial numbers, so the boilers are well within their 25-year expected useful life span. Two (2) Bell & Gossett centrifugal, base-mounted pumps (P-8 & P-9), sized at 467 GPM, direct hot water from the central boiler room to the Hall of Justice to serve the hot water reheat coils. Four (4) Bell & Gossett circulating pumps, each sized for 50 GPM, direct hot water to each of the air handling units. Two (2) base-mounted pumps, sized for 230 GPM, serve the perimeter fan coil units and are shared with the chilled water system (pumps understood to be original to CHW system prior to the two-pipe changeover).

Fan coil units are installed all around the perimeter of the building. These units are in poor condition and are problematic for facility staff to maintain. Per the EH&E Report issued in 2020 for the Hall of Justice, observed issues with the fan coil units included the following.

- Moderate dust build-up in the unit interior
- Surface mold growth in some units
- Frayed fiberglass insulation
- Pipe insulation in poor condition & moderate water staining
- Installation appears such that a significant percentage of return air is being drawn into the unit from the wall cavity rather than the occupied space itself

Based on existing documentation, the fan coil units were originally intended to operate with chilled water cooling and electric heating but were later converted to operate with hot water, likely when the system was converted to a two-pipe system in 1997. The two-pipe heating system is a manual operation. Facility staff are required to switch the system from cooling mode to heating mode depending on the season.

Cooling:
Two (2) centrifugal chillers (York & Trane) located in the basement mechanical room provide the chilled water for the two-pipe system, which includes the AC coils as well as fan coil units located throughout the building's perimeter. It was noted in the Tighe & Bond report that "the filters have been recently changed to 1" pleated MERV 13" and that "according to staff, the airflow was not noticeably impacted." It was confirmed during site reviews that all units have been provided with MERV-13 filters.

Both chillers are supplied with condenser water from an underground, geothermal cooling tower outside of the building along Columbus Avenue. The cooling tower acts as the first stage of cooling for the chilled water system and the chiller cools the water to the desired temperature for the downstream equipment. Condenser water is supplied between the cooling tower and the chiller by three (3) circulating pumps. Both the cooling tower and chillers appear to be in fair condition and operating as intended. The York chiller was reportedly installed roughly six years ago, and the Trane chiller was reportedly installed around 15 years ago, so both pieces of equipment are operating within their recommended useful lives, which is 23 years

for a centrifugal chiller per ASHRAE. The chillers feed three (3) chilled water pumps (CHWP-1, 2, & 3), sized for 100 GPM each per existing drawings, which circulate chilled water throughout the system to the four (4) air handling unit circulating pumps and the two (2) 230 GPM pumps for the fan coil unit loop.

The chiller plant control is currently a stand-alone operation not linked to the BMS for start-stop optimization and leaving water setpoint controls. Existing documentation indicates that both chillers are required to operate to meet the loads for design day conditions. Currently, both chillers have not operated together due to lack of BMS integration.

One notable operational issue is that the building users reported that the condensate drain pan for AC-1 recently failed, which caused water to leak into Probate and Family Courtroom 4 as well as the adjacent hallway. Refer to the photo below for an image of the containment efforts taken to address this.

Hall of Justice – AC-1 Failed Drain Pan – Leaking Above Hallway

A primary design issue of the cooling system is that it no longer has any capacity to reheat the air when the two-pipe system is providing chilled water to the AHU coils. As the system is constant volume, this correlates to a lack of control over zone temperatures during the cooling season. This has resulted in humidity issues throughout the building, which is suspected to be a contributing factor to mold issues. A November 2021 report by TRC Environmental Corporation, provides an analysis of the mold growth and indoor air quality for issues that arose in August 2021.

In the 2021 HVAC System Evaluation compiled by Tighe & Bond it was noted that:

> *According to staff, the AHU supply air temperature is generally set to 65-68°F depending on the season. This is a high supply air temperature for cooling during the summer, which limits the ability of the AHUs to dehumidify the air. The air handlers supply air at a constant airflow regardless of the space temperature. We presume the elevated supply air temperature was implemented to prevent overcooling. Staff mentioned that the duct mounted reheat coils are difficult to control and may not be balanced correctly.*

Based on a review of the building controls system, the active supply air temperature setpoints are in line with what has been reported.

AEI is in agreement with this assessment and on the potential effects the system operation is having on the building. Additionally, AEI found that the reheat coils seem to have been installed much smaller than the downstream and upstream ductwork, which is likely contributing to the control issues and is what is believed to be one of the most significant contributors to the mold growth and humidity issues experienced in the

building. Having the coils sized so much smaller than the ductwork in which it has been installed may be creating such intense velocity pressure that much of the supply air is returning to the units. If this is the case, it is possible that outside air is entering the building through the envelope, windows, etc. to make up for this pressure difference, which would further contribute to the humidity level inside the building and the propagation of mold growth. Facility staff informed AEI that the back walls of AC-2 and AC-4 had recently blown out, which is evidence to suggest this pressure issue at the reheat coils is occurring.

Ventilation & Exhaust:
The only source of ventilation in the building is the four (4) air handling units. Ventilation is not provided by the fan coil units. Outside air dampers for the air handling units were closed during the mold remediation process and period of time that the building was not occupied. All dampers were restored to their intended operational positions prior to re-occupancy.
AEI has not performed a full ventilation calculation for the Hall of Justice, but it should be noted that there is one space that was identified as under-ventilated in the 2021 Tighe & Bond report. “The large conference room identified on the 1973 plans as ‘Board of Commissioners’ appears to be under-ventilated for its current use as a conference room.” AEI is in agreement that this particular space is under-ventilated per current code requirements. The space, Room 240 on the 1973 plans, is supplied 260 CFM from air handling unit AC-4. Unit AC-4 is scheduled for 31% outside air (OA), which translates to a ventilation rate of 81 CFM supplied to the room. ASHRAE 62.1 requires a ventilation rate of roughly 210 CFM for a space of this size and classification.

Below is a summary table of the existing air handing unit supply airflows, design outside airflows, and current code required outside airflows. The code required values are extracted from the 2021 Tighe & Bond report. Based on this analysis, all existing air handling units are operating at outside airflows that are notably higher than current code requirements. Screenshots of the building management system (BMS) also seem to confirm that the units are operating near this design outside airflows. There may be a handful of other issues on an individual space basis; however, based on the outside air provided to each air handling unit, the building is well-ventilated in relation to code (ASHRAE 62.1).

Unit	**Original Design Airflow (CFM)**	**Original Design Min. OA (CFM)**	**OA%**	**Current Code Min. OA Requirements (CFM)**	**Current Code Min. OA%**
AC-1	64,000	25,500	39.84	10,400	16.25
AC-2	42,000	8,500	20.24	7,300	17.38
AC-3	58,000	13,000	22.41	11,000	18.97
AC-4	64,000	20,000	31.25	13,000	20.31

Exhaust fans are located throughout the building to serve mechanical rooms, elevator machine rooms, transformer vaults, etc. The one fan that has been confirmed by facility staff to be non-operational is EF-6, which provides general exhaust to the penthouse mechanical room. There also is one (1) toilet exhaust fan (EF-1, 16,000 CFM) serving all bathrooms throughout the building. No issues were reported or observed for this fan. Per the existing drawings there are seven (7) inline exhaust fans serving the building and nine (9) propeller-type fans. It is understood that the exhaust fans are largely original to the 1973 installation. A summary of the exhaust fans and the areas they serve is included below:

Fan	Type	Airflow (CFM)	Location	Areas Served
PF-1	Propeller	3,000	Penthouse Mechanical Room	Penthouse Mechanical Room
PF-2	Propeller	1,625	4th Floor Mechanical Room	4th Floor Mechanical Room
PF-3	Propeller	2,500	Basement Mechanical Room	Basement Mechanical Room
PF-4	Propeller	2,500	Basement Mechanical Room	Basement Mechanical Room
PF-5	Propeller	735	Elevator Machine Room	Elevator Machine Room
PF-6	Propeller	735	Elevator Machine Room	Elevator Machine Room
PF-A	Propeller	3,000	Staircase	Staircase (Heating)
PF-B	Propeller	1,700	Staircase	Staircase (Heating)
PF-C	Propeller	750	Vestibule 109	Vestibule 109 (Heating)
EF-1	Vane Axial Belt Drive	16,000	Penthouse Fan Room	Toilet Exhaust (Located in Penthouse Fan Room)
EF-2	Vane Axial Belt Drive	10,200	Basement Fan Room	Loading Dock Exhaust
EF-3	Vane Axial Belt Drive	8,000	Fan Room at Shaft #3	Garage Exhaust
EF-4	Vane Axial Belt Drive	8,000	Fan Room at Shaft #4	Garage Exhaust
EF-5	Vane Axial Belt Drive	24,000	Basement Mechanical Room	Transformer Room Exhaust
EF-7	Centrifugal Belt Drive	5,000	Basement Mechanical Room	Basement Mechanical Room Exhaust

During the site assessment, the facility staff indicated that the HVAC system serving the central garage between the Hall of Justice and the Housing and Juvenile Court is not operational, causing temperature issues in the summer and winter. Based on existing drawings provided to AEI, it appears that the garage is served by supply fan SF-1 (20,000 CFM), which is interlocked with exhaust fans EF-2, EF-3, & EF-4.

EF-2 serves the loading dock area while EF-3 & EF-4 serve the stairwells and garage. Facility staff was unsure of the extent these fans are operational. The fans are understood to be original to the 1973 construction, in poor condition, and are all also well beyond the expected 20-year useful life span for an axial fan. Additionally, the exhaust fans are not understood to be interlocked with any form of carbon monoxide detection, which is recommended for an adequate garage ventilation system.

Controls:
The existing building control system for the Hall of Justice is a Schneider Electric SmartStruxure building management system (BMS). This system was installed in 2013 and controls the majority of HVAC equipment in the building. The existing pneumatic system still remains, as it controls the reheat coils and perimeter fan coil units. Both pieces of equipment are controlled by pneumatic thermostats that do not accurately control space temperature according to facilities staff and the 2021 Tighe & Bond report. It is noted in the Court Facility Evaluation Summary that the existing pneumatic system is split into two zones – east and west. All other devices are a part of the digital controls system.

The original pneumatic thermostats are not the proper action to effectively control space temperature as both a heating application in the winter and cooling in the summer. Also, there is not an active unoccupied cycle control in the facility other than the existing inaccurate thermostats.

Facility staff has reported that the existing electric reheat coils are enabled / staged by an older EMS interface panel (at each electrical room serving the reheats) that stage the heating output of each coil. It is unclear to staff how this staging occurs. The original O&M manual for the electric reheat system indicates that each unit has a dedicated pneumatic thermostat – integrated into an electronic device (vintage 1976) called a silicon capacitor transducer (SCR). It does not describe the actual function or sequence of how the varying output pneumatic pressure from the thermostat varies the staging of the electric heat. The facility staff is working to obtain more information on this system. For the time being, facility staff has been recommended to diagnose any coils labeled “found breaker off” for faults prior to livening up.

The existing air compressor and air dryer serving the pneumatic controls system appears to be in fair condition.

All air handling units are programmed with an economizer mode. Economizer mode was being used as a method to cool the building during a recent visit because the building was experiencing space temperatures that were too high for the occupants and the chillers had been taken offline for the heating season at that point in time.

Miscellaneous:
As part of this assessment, a vendor was retained to perform video scoping services of the ductwork through grilles, registers, and existing access panels. The video inspection showed that the ductwork is in good condition but recommended that the system should be cleaned. Refer to Appendix C for more information.
A vendor was retained by the Trial Courts to perform air sampling and testing specifically to identify whether mold is present in the ductwork. This microbial sampling identified the presence of mold growth in supply and return ductwork on every floor of the building. Per the report, “the detection of mold growth on the [duct] surface samples is a potential concern; however, the results of the surface sampling for mold in air ducts should be interpreted with caution because mold detected on a duct surface is not necessarily correlated with airborne concentrations of mold in occupied space.”

Energy:

The existing HVAC system at the Hall of Justice includes a few inefficiencies that should be rectified to improve energy performance:

(1) Constant Volume System: The constant volume system used to ventilate and condition the building would not be acceptable under current energy code requirements. The system continuously operates at one discharge airflow with one outside air ventilation rate and heats/cools that quantity of air to the desired temperature. Use of variable volume capability to reduce the amount of airflow if it were not needed to maintain thermal comfort in a given space, paired with demand control ventilation, would reduce the amount of incoming outside airflow based on CO2 levels, thus reducing the load on the heating and cooling systems.

(2) Pneumatic Control System: Pneumatic controls are an archaic and inefficient system in comparison to new digital controls. The hot water reheat coils and fan coil units in the Hall of Justice are still controlled by the pneumatic system. Given the age of this system, it is highly likely that there are leaks in some locations that are causing improper control of some equipment. This is both a concern for energy use and system operability.

(3) Supply Fan Speed: The HVAC system currently has issues with increased pressure that are leading to operational issues and possible energy inefficiencies. Airflow is being choked down by the AC unit heating/cooling coils, MERV-13 filters in the unit, and most importantly improperly sized reheat coils downstream of the units. The 2021 Tighe & Bond report noted that “coil air pressure drops [are] roughly three times higher than design on AHU’s 2-4”. These issues are causing the unit supply fans to operate at maximum speed to condition the building. If these points of extreme pressure drop were not present, the fans may not need to run at full speed all the time to condition the building, which is causing excessive energy use.

One positive aspect of the existing air handling units is that they are equipped with an economizer mode. This allows the outside air dampers to open for 100% outside airflow when the outdoor conditions are sensed to be ideal to condition the space. This saves energy for the heating and cooling equipment, as they do not need to treat the air during those time periods.

The vast majority of the building’s lighting fixtures were retrofitted with LED lamps approximately four years ago, as reported by the facility staff. Because of this, it is expected that the lighting system’s energy usage is moderately efficient by a modern standard. However, automatic lighting control devices such as occupancy sensors were not found in the building, and traditional manual lighting controls are typically not the most efficient strategy in terms of limiting lighting energy.

Electrical Systems:

Power:
The power distribution system in the Hall of Justice was replaced in 2019, thus the equipment is still in very good condition and does not have any visible signs of wear. A series of new 4” conduits containing the utility power service enter the building through the parking garage from the exterior pad-mounted transformer.

The distribution equipment in the main electrical room consists of a 3000 Amp 480/277V switchboard and a 2500 Amp 208/120V switchboard fed via a 750KVA transformer. These distribute power to the building’s branch panels with a series of bus ducts. The building’s original switchboard housing from the 1970s has been re-purposed as a large junction box to connect old and new bus ducts, and it resides in its original electric room, which is separate from the new/current main electrical room.

All building power panels and transformers appear to have been upgraded in 2019. Panels include arc flash labels. Several original disconnect switches have been reused, however, these are not of concern since they are simply disconnect switches and do not provide overcurrent protection (the manufacturer of these switches has a history of malfunctioning overcurrent protection devices and is out of business).

There is a 200KVA power generator outside of the building which appears to be in good condition. The respective Kohler generator annunciator panel is located in the lower-level security booth, along with the building's fire alarm Radio Master Box and the generator annunciator for the Juvenile court.

Lighting:
The vast majority of the building's lighting fixtures were retrofitted with LED lamps approximately four years ago. These were previously fluorescent lamps and now consist of majorly 4' LED lamps. Fixture types range from ceiling grid-recessed troffers to surface- or pendant-mounted linear lights. Traditional lighting switches control the lights in most areas, and there is a lighting override energy management control panel located in the lower-level security booth, which appeared to still be in use at the time of visit. The power circuits feeding the building's light fixtures are 277 volts, allowing more fixtures per circuit while conserving copper.

The parking garage shared by the two buildings contains upgraded LED light fixtures. However, the circuiting for these fixtures re-uses a series of original conduits concealed in the concrete structure. Facility personnel have reported that these conduits are rusty and falling apart and have caused repetitive problems with the light circuits.

Fire Alarm:
The fire alarm devices throughout the Hall of Justice are a mixture of old and new. A more recent upgrade to the system provided a new GE-EST type fire alarm control panel to support the original device loops. The control panel is located in the lower-level security booth, and the radio master box is located in the upper stair.

Smoke detectors were observed in electrical spaces. Detectors were otherwise scarce throughout the building.

Housing and Juvenile Court Existing Conditions

Roof:

The current roof system was installed in 2003 and consists of low sloping asphalt that is worn and is at its useful life. Typically roof systems require replacement every 20 years and that is the extent of the warranty. The aggregate of the asphalt has run off and accumulated in the low points of the roof, clogging the roof drains. There are many spongy areas evident over the surface of the roof. Access hatches are difficult to open and close as the hardware has corroded.

The granite tower is multi-leveled with the upper roof steeply pitched with heavily patinaed flat seamed copper. There is a flat portion of roof with a low granite parapet at this level. The lower roof level is flat with a granite parapet and granite structure that supports open air patinaed copper arches. This level was deemed too dangerous to access from the supporting platforms below. Several drone images of the exterior roofing at this level were taken. The wood framing supporting the of tower platforms at several levels is deteriorated. Any access to the upper levels of the tower should be performed with care given the potential for framing collapse.

Exterior Walls:
The exterior facades are gray Monson granite in rough-faced random ashlar masonry, with smooth-faced trim. In general, the stone façade is in good condition. However, in various locations there are of minor spalls and some cracks in the granite. Several pieces of granite have reportedly fallen off the tower and onto the roof below. There are localized areas of mortar that require repointing. Some of the mortar is grey to match the granite and other areas have terracotta colored mortar.

The granite stairs at both the south and north ends have damaged sealants and require repair.

Windows:
The windows are fixed, thermal glazed, painted aluminum. The windows are not original to the building, but it is unclear when they were installed. Window air leaks were reported by facilities personnel. Several windows in the tower are unstable due to detached and deteriorated window frames. Many of the windows in the basement have been replaced with painted metal panels.

Exterior Doors:
There are full glass aluminum entry doors with decorative half round transoms at the North and South Entries. Painted hollow metal doors provide egress from basement. The doors are in fair condition throughout the façade.

Interior Moisture Infiltration:

There is ample evidence of water infiltration throughout the basement level. Paint is peeling off interior walls in the vicinity of the elevator. There is water on the floor in the Boiler room, Juvenile Storage and Room B14. Walls are damp and there is evidence of brick spalling on the interior face of the walls. Attempts to reduce the infiltration damages were made by installing a concrete slab around the perimeter of the building at grade and by venting the gypsum wallboard along the exterior walls. These vents have had limited success as the wallboard is still deteriorating and paint peeling in these locations. The infiltration may be a result of ground water levels or infiltration through the joints in the foundation walls.

During the 2016 evaluation, H&A noted standing water on the basement storage room slab on grade below the stairs on Court Street. For this review, access could not be provided to view this area, but it was reported that infiltration is on-going, and the area is no longer used for storage.

On the third floor in the ceiling of Room 301 there is evidence of water infiltration under the tower. There are additional water leaks on various levels of the tower. This appears to be due to the infiltration through the windows of the tower and uppermost roof level.

Plumbing:

Cold Water Service:
The building is served by a 6" main. Water service then splits off into four separate pressure reducing valves and recombines into a single main.

Hot Water Service:
Hot water service is provided through a single 119-gallon 4.5-kilowatt electric hot water heater with recirculation. In several locations, hot water supply to a faucet is insufficient. Though the water heater at basement has sufficient capacity to supply hot water to these locations, the fixtures that are furthest away from the water heater are those experiencing a lack of heating. In two locations point of use water heaters are installed to provide hot water to the sink. The probable cause is a combination of low flow fixtures, and long segments of non-recirculated "dead-leg" hot water piping.

Waste Drainage:
Building waste mains exit the premises to the street on the south end of the building. A pipe surveying service discovered 10-15 feet of waste main between the elevator and the bathroom at basement level is improperly pitched and lays flat. Additionally, a waste main check valve before the main exits the building has failed. Both of these conditions result in waste backups that require manual rodding to clear blockages. Backups result in overflow of floor drains in mechanical room. Waste piping throughout the building is in poor condition. Refer to Appendix A for photos and videos of sewer scope performed on October 4, 2021.

Storm Drainage:
Storm drainage risers combine below grade into a 10" main that exits the southeast side of the building toward Court Street.

Gas Service:
Natural gas is provided from high-pressure gas service to gas meter and pressure reducing valve to low-pressure gas supply.

ADA Requirements:
Lavatory tail pieces within public-use restrooms are missing guards or insulation as required per Massachusetts plumbing code.

Fire Protection:

Fire Service:
A 6" fire service enters the mechanical room in the basement and passes through a 6" double check valve assembly. The service supplies a 6" wet alarm check valve assembly for the wet sprinkler and standpipe system.

Standpipe System:
The wet manual standpipe main runs to risers located throughout the building. The 2 ½" fire department hose valves are located in cabinets in the stairwells. There are 1 ½" fire hose valves with 2 ½" fire hose valves in cabinets located throughout the corridor spaces. The 1 ½" fire hose valves are capped as they are not required per 780 CMR and NFPA 14.

Sprinkler System:
The automatic wet sprinkler system protects storage spaces throughout the Juvenile Courthouse. No other areas are protected by the wet sprinkler system. Standard response sprinklers are installed throughout the storage areas. Installing additional sprinkler coverage in unsprinklered spaces would only be required if the building undergoes renovations where the scope includes Level 2 alterations or higher. Level 2 alterations require sprinkler coverage in areas of renovation whereas Level 3 alterations require sprinkler coverage throughout the entire building.

Fire Department Connections:
The fire department pumper connection for the wet sprinkler system and standpipe is located on State Street. This connection is used by the fire department to boost the pressure in the systems.

Heating, Ventilation, & Air Conditioning (HVAC):

Air Handling Units:
The existing HVAC system consists of fifteen (15) water-source heat pump air handling units located in mechanical rooms throughout the facility. These units were installed as a part of a large-scale HVAC upgrade project done in 2005. All units are constant volume, single-zone units that ventilate, heat, and cool the spaces that they serve. The typical life span for a commercial water-to-air heat pump is 19 years per ASHRAE, so these units are approaching their expected useful life spans.

Six (6) of the air handling units are located in a basement level mechanical room and are vertical style units. Each unit is supplied outside air through exterior louvers with control dampers. The remaining nine (9) air handling units are located in an attic mechanical room and are horizontal style units. Each of these units are supplied with 100% outside air from three (3) dedicated outside air system (DOAS) rooftop units, which were also installed during the 2005 HVAC Upgrades. The DOAS units are each equipped with a packaged DX cooling system, hot water heating coil, and 2” MERV-13 filter. The MERV-13 filters were reportedly replaced in August 2020 and replaced again in April 2021 per the facility staff and the 2021 Tighe & Bond report.

Similar to the Hall of Justice, perimeter spaces in the Housing and Juvenile Court are served by fan coil units, in this case packaged water-source heat pump units. These units have recently been upgraded with MERV-7 filters per the 2021 Tighe & Bond report.

Heating & Cooling:
A closed-circuit, forced draft cooling tower located on the roof serves all the air handling units and four (4) gas-fired, condensing boilers inject hot water into the loop for heating purposes. The boilers are located in the central Elm Street mechanical room and are the same boilers that serve the Hall of Justice hot water system. The boilers are estimated to have been installed in 2007 based on the equipment serial numbers, so the boilers are well within their 25-year expected useful life span.

Condenser water appears to be circulated throughout the building by a pair of base-mounted pumps (labeled P-1 & P-2) located in the attic mechanical room. Hot water is circulated throughout the building through the use of five (5) centrifugal, base-mounted pumps. Three (3) of the pumps (P-5, P-6, & P7), sized for 125 GPM, serve the primary water loop, and two (2) of the pumps (P-8 & P-9), sized for 467 GPM, serve the secondary water loop that heads to the Hall of Justice. The primary loop branches off to two (2) circulating pumps (HWP-3 & HWP-4), which serve the reheat coils and heating equipment throughout the building such as unit heaters, cabinet unit heaters, and finned tube radiation. It also branches off to a heat exchanger in the attic mechanical room. This heat exchanger (HTX-1) feeds two (2) additional circulating pumps (HWP-1 & HWP-2) that serve the low temperature heat pumps and the heat exchanger is used to heat the return water back to the boiler. 200°F water enters the heat exchanger from the primary loop pumps, roughly 70°F water exits the heat exchanger to serve the heat pump air handlers, while on the other

end return water from the heat pump air handlers enters the exchanger from the fan coils and exits the exchanger as 160°F water back to the boilers.

In-duct, hot water reheat coils are also located throughout the building to reheat air to the desired discharge air temperatures as necessary. These coils are understood to have been installed as a part of the 1976 HVAC upgrades per the existing drawings available to AEI.

In general, all heat-pump air handling units, fan coil units, and rooftop units installed as part of the 2005 HVAC upgrades are in fair condition and are within or just past their life expectancies (15-20 years). Per the 2021 Tighe & Bond report, the facilities staff cleans the heating and cooling coils twice a year for preventative maintenance, which is keeping them in good condition. This report also noted that some of the outdoor air dampers are rusted. Additionally, the facilities staff was in the process of replacing many of the perimeter fan coil units with brand new units during this assessment.

Housing & Juvenile Court – Rusted Outside Air Damper

The cooling tower serving the building also appears to be in fair operating condition. It is unclear how old the cooling tower is, but the unit installed in 1976 appears to have been replaced with a newer style unit within the last 10-15 years and that the cooling tower is still operating within its recommended useful life span (20 years).

Ventilation & Exhaust:
The Housing and Juvenile Court is ventilated by the three (3) rooftop DOAS units, which deliver conditioned outside air to the heat pump air handling units that heat and cool the building.

The original air handling units serving the building were provided with outside air using five (5) rooftop gravity air intakes. These were largely replaced with the DOAS units; however, it still appears that two (2) intakes remain to provide ventilation to the attic spaces. Based on the condition and style of the intakes, it is evident that they have been replaced since the original equipment was installed in 1976. It is estimated that these are roughly 10-15 years old.

AEI has not performed a full ventilation calculation for the Housing and Juvenile Court, but it should be noted that a few spaces have been identified in the 2021 Tighe & Bond report as not being provided with any form of ventilation. These are noted to be interior office spaces that do not have operable windows or a source of mechanical ventilation. Unless the space configuration has been updated since the 2005 renovations to add enclosed interior spaces, it is not evident to AEI that there are spaces without a source of ventilation that require one.

Below is a summary table of the existing air handing unit supply airflows, design outside airflows, and current code required outside airflows. The code required values are extracted from the 2021 Tighe & Bond report. Based on this analysis, existing ventilation rates are adequate for many of the air handling unit systems; however, a handful of the units are short on ventilation in relation to code (ASHRAE 62.1). It is recommended that the outside airflow rates be adjusted to the recommended values listed in the table below, as stated in the 2021 Tighe & Bond report.

Unit	Original Supply Airflow (CFM)	Original Design Min. OA (CFM)	Current Code Min. OA Requirements (CFM)	Recommended Minimum O.A. (CFM)
HP-1	3,200	640	790	790
HP-2	2,400	480	521	525
HP-3	2,400	480	520	520
HP-4	1,720	345	392	395
HP-5	1,120	225	272	275
HP-6	2,115	425	329	425
HP-7	2,300	860	537	860
HP-8	2,320	880	501	880
HP-9	1,915	975	468	975
HP-9A	1,915	975	468	975
HP-10	2,300	1,050	531	1,050
HP-10A	2,300	1,050	531	1,050
HP-11	1,600	555	611	620
HP-12	2,480	1,200	622	1,200
HP-13	1,530	580	402	580
RTU-1	2,335	2,335	1,635	2,400
RTU-2	2,715	2,715	1,506	2,715
RTU-3	3,075	3,075	1,529	3,075

Per the 1976 design drawings there are four (4) exhaust fans that serve bathrooms throughout the building, which are still in place, and all are well beyond their useful life spans (15-25 years). Fans EF-1, EF-2, and EF-4 are all confirmed to be operational by facility staff; however, EF-3 is being investigated for replacement.

Controls:
The HVAC equipment serving the Housing and Juvenile Court is controlled by both pneumatic and electronic controls. A Building Management System (BMS) controls the DOAS units, cooling tower, boilers, pumps, etc. The pneumatic system appears to have been installed as a part of a renovation that precedes the 1976 HVAC upgrades, which is the earliest drawing set the design team has been provided. Per the 2021 Tighe & Bond report many of the actuators and sensors, including space temperature sensors, are still under pneumatic control and audible leaks were observed in the system. There are even reportedly some control cabinets that are pressurized by control systems that are no longer there.

It appears that the air compressor and dryer feeding this system are relatively new and in good operating condition; however, the pneumatic system is an obsolete system that is likely leading to operational inefficiencies.

Miscellaneous:
As part of this assessment, a vendor was retained to perform video scoping services of the ductwork through grilles, registers, and existing access panels. The video inspection showed that the ductwork is in good condition but recommended that the system should be cleaned. Refer to Appendix C for more information.

Energy:

The HVAC system used to ventilate, heat, and cool the Housing and Juvenile Court is more energy efficient than the system serving the Hall of Justice. The heat-pump air handling units and rooftop DOAS units have been installed far more recently (2005) than the nearly 50-year-old air handling units serving the Hall of Justice. They heat pumps are still operating within their expected useful life span (19 years), which indicates better efficiency, and should also be more capable of maintaining thermal comfort within the building.

The main area of energy deficiency in the Housing and Juvenile Court system is that the existing pneumatic control system is still in use for some of the equipment. As discussed for the Hall of Justice, pneumatic controls are an archaic and inefficient system in comparison to new digital controls. Given the age of this system, it is highly likely that there are leaks in some locations that are causing improper control of some equipment. Audible leaks were reported by the 2021 Tighe & Bond report. This is both a concern for energy use and system operability.

The vast majority of the building's lighting fixtures were retrofitted with LED lamps approximately 4 years ago as reported by the facility staff. Because of this, it is expected that the lighting system's energy usage is moderately efficient by a modern standard. However, automatic lighting control devices such as occupancy sensors were not found, and traditional manual lighting controls are typically not the most efficient strategy in terms of limiting lighting energy.

Electrical Systems:

Power:
With the exception of a few panels, the power distribution equipment in the Housing and Juvenile Court is beyond its useful age. Switchboards and panelboards observed in the building have been in service since the late 1970s. The distribution equipment in the main electrical room consists of an 800 Amp 480/277V switchboard.

The building's below-grade boiler room contains a 100KVA generator that appears to have been installed in the late 1990s. There is also a 30KVA wall-mounted transformer in this room that has a rusted enclosure because of leaking water. A more recent panel in this room powers the boilers and appears to be in good

condition. The utility power feeds from the exterior pad-mounted transformer via the electrical vault near the boiler room. Panels do not include arc flash labels.

Lighting:
The vast majority of the building's lighting fixtures were retrofitted with LED lamps approximately four years ago, as reported by the facility staff. These were previously fluorescent lamps and now consist of majorly 4' LED lamps. Fixture types range from ceiling grid-recessed troffers to surface- or pendant-mounted linear lights. Traditional lighting switches control the lights. The power circuits feeding the building's light fixtures are 277 volts, allowing more fixtures per circuit while conserving copper.

Fire Alarm:
The fire alarm system in the Housing & Juvenile Court was replaced approximately 12 years ago. It consists of an addressable system with voice evacuation. The main fire alarm control panel and power supplies are located on the first floor in the stairwell of the building's south wing, a short walk from the State Street entrance. The system distributes to the upper and lower levels of the building through a series of fire alarm terminal cabinets, which utilize class A wiring for all SLC device loops.

Smoke detectors are numerous throughout the building and are found in almost every room. Mechanical spaces contain heat detectors and carbon monoxide detectors. There were no observed code issues with the fire alarm system.

EXISTING BUILDING CODE REPORT

Prepared by Sullivan Code Group
RW Sullivan Engineering

November 22, 2021

Section 4 Recommended Repairs

Springfield Hall of Justice Recommended Improvements

The following section summarizes recommendations to address the identified deficiencies of the building systems discussed in the previous section. The recommendations are prioritized based upon the following criteria:

- Priority 1 – needs which significantly impact functionality and require action to stop accelerated deterioration, or that correct a building code noncompliance.
- Priority 2 – upgrades and/or projects that should be addressed within five years due to life cycle considerations
- Priority 3 – upgrades and/or conditions that should be anticipated over a longer term

Priority 1

Roof:

- Replace roof system in its entirety, including insulation, coverboard and membrane on all roof areas, including low roof, main roof, penthouse and stair tower roofs with single ply PVC system.

Exterior Walls:

- Scrape peeling paint, prime and paint interior face of stairwell walls at all four stair towers.

Windows:

- Replace all windows, flashings and associated sealants and replace storefront at main entry.

Exterior Doors:

- Replace all exterior hollow metal doors and frames.

Interior Moisture Infiltration:

- Replace ceiling tiles throughout building after ductwork, windows and other MEP/FP work is complete.
- Replace carpeting throughout building after ductwork, windows and other MEP/FP work is complete.
- Repair damaged gypsum wallboard finishes at leak locations.
- Repaint walls throughout the building after ductwork, windows and other MEP/FP work is complete.

Fire Protection:

- Expand sprinkler protection to provide complete coverage throughout the building. Substantial ceiling work will be required if level 2 or higher alterations occur.
- Provide zone control valve assemblies so that the sprinkler protection can be zoned by floor.
- Provide new drain risers from the zone control valve assemblies to drain down to the exterior of the building at each stairwell.

Plumbing:

- Replace the 6” water main from the street to the backflow preventer.
- Provide new water filtration for the domestic cold-water service.
- Replace corroded segments of 5” underground sanitary pipe.
- Replace failed floor drains.
- Install missing guards or insulation at lavatory tail pieces within public-use restrooms
- Replace waste piping.

Mechanical:

- Replace the fan coil units serving the perimeter of the building with units that are integrated with the building management system using direct digital controls.
- Replace all constant volume boxes, preferably with variable air volume (VAV) terminal units connected to the building control system.
- Replace the existing reheat coils with appropriately sized hot water reheat coils connected to the building controls system.
- Upgrade electric heating coils to controls by electronic thermostats tied into the building controls system.
- Clean and coat duct liner to prevent future deterioration. Alternatively, the ductwork should be replaced in its entirety with external insulation.
- Provide a full new direct digital controls (DDC) building management system for the building.
- Replace the four air handling units with units that include internal supply and return fans, VFDs, a hot water coil, a chilled water coil, a full economizer section, an energy recovery section, MERV 8 pre-filters, and MERV-13 final filters. Tie in to building controls system.
- Perform general maintenance to help increase heating/cooling performance and reduce pressure drop across the coils (if air handling units are maintained for extended use).
- Remove the bi-polar ionization filter, electric heater, and old roll filter assembly on the four (4) existing air handling units (if air handling units are maintained for extended use).
- Replace the water coil for AC-1 and clean the coils for AC-2, AC-3 and AC-4.
- Perform general maintenance to ensure that all existing diffusers and grilles openings are clean, clear, and operating as intended.
- Replace supply and exhaust fans serving the central garage, loading dock and building stairwells, and replace the piping with insulated pipes. Tie-in fans to building controls system.
- Replace building exhaust fans. Tie-in to building controls system.
- Install bi-polar ionization devices throughout the ductwork system to improve indoor air quality and connect to the BMS.
- Upgrade chiller BMS integration so that both units can operate simultaneously to meet building loads. Provide controls for start-stop optimization and leaving water setpoints.

Electrical:

- Provide new electrical service to support all of the applicable HVAC priority 1 work.

Priority 2

Interior Moisture Infiltration:

- Perform investigation of plaza leaks below grass/sidewalk overburden into garage.

- Upon repair of waterproofing membrane above the garage area, repair spalls and deteriorated concrete below plaza deck in parking garage.

Plumbing:

- Replace the 80-gallon electric water heaters with new units after the cold-water main is replaced.
- Extend the 3/4" hot water recirculation loops to within 5-feet of the furthest fixtures in order to eliminate long dead-leg piping run.
- Replace the existing hot water recirculation pumps with duplex pumps.

Electrical:

- Provide new surface mounted conduit and new copper wiring to all electrical equipment and lighting fixtures in the garage.

Priority 3

Mechanical:

- Replace each chiller as it reaches its 23-year recommended life span. Replace existing ductwork if not already replaced in response to the Priority 1 recommendations (ASHRAE ductwork median life expectancy is 30 years).

Electrical:

- Install a building-wide networked lighting control system, including occupancy sensors, daylight sensors, and a new networked control system head-end.

Housing and Juvenile Court Recommended Improvements/Study

Priority 1

Roof:

- Replace the roof system in its entirety, including membrane, coverboard, insulation and flashings at the main roof level and at the tower belfry roof level.
- Replace the roof hatch (at a minimum hatch doors) with proper hardware.

Windows:

- Repair windows in tower; reattach to structure.

Interior Moisture Infiltration:

- Investigate source of moisture infiltration in basement. Determine groundwater levels, excavate around foundation to determine condition of foundation wall. Perform leak testing investigations as needed and identify required repairs. Perform repairs needed to remedy the infiltration.

Fire Protection:

- Expand the existing sprinkler protection to provide complete coverage throughout the building. Substantial ceiling work will be required if level 2 or higher alterations occur.
- Provide zone control valve assemblies so that the sprinkler protection can be zoned by floor.
- Provide new drain risers from the zone control valve assemblies to drain down to the exterior of the building at each stairwell.

Plumbing:

- Replace and re-slope sanitary piping.
- Replace the failed check valve located on the sanitary piping main.
- Replace failed floor drains.
- Install missing guards or insulation at lavatory tail pieces within public-use restrooms.

Mechanical:

- Convert controls system to electric actuators monitored by the building management system.
- Clean and coat all ductwork. Alternatively replace all ductwork with external insulation.
- Perform general maintenance to ensure that all existing diffusers and grilles openings are clean, clear, and operating as intended.
- Replace all existing exhaust fans. Add all new equipment to the building management system.
- Replace the perimeter fan coil units which are well beyond their useful operational life span.
- Add all new equipment to the building management system.

Electrical:

- Replace wiring, conduits and switches serving HVAC work to be replaced.
- Replace remaining fan coil units, with associated wiring, conduits, and switches.
- Replace transformer in the boiler room and relocate to avoid leaking water.

Priority 2

Roof:

- Repair dented copper arch of tower belfry, west elevation.

Exterior Walls:

- Repoint isolated stone mortar joints throughout the façade, including entry stairs.

Interior Moisture Infiltration:

- Replace deteriorated wood and steel framing in tower belfry at two levels.
- Replace stained ceiling tiles throughout the building.
- Replace gypsum walls and ceilings upon repair of basement infiltration.
- Replace spalled and damaged interior brick at basement walls.
- Repaint new and repaired finishes.

Plumbing:

- Extend the 3/4" hot water recirculation loops to within 5-feet of the furthest fixtures to eliminate long dead-leg piping run.
- Replace the existing hot water recirculation pumps with duplex pumps.

Mechanical:

- Replace water-source heat pump air handling units.
- It is recommended that air handling units be replaced within the next 5 years, with units connected to the building management system.

Electrical:

- Provide a replacement electrical power distribution system for the whole building.
- Replace the existing generator power system with a 125KVA generator, two automatic transfer switches (to separate emergency and optional / standby loads).
- Replacement of heat pump air handling units and DOAS rooftop units will require new electrical copper wiring, conduits, and disconnect switches.

Priority 3

Mechanical:

- Install bi-polar ionization devices throughout the ductwork system to improve indoor air quality.
- Hot water equipment should be replaced as needed, including base-mounted pumps, circulating pumps, heat exchanger, boilers, etc.
- Provide new base-mounted pumps with new VFDs when replaced and connect to the building management system.
- Monitor and maintain the cooling tower and replace when it is found to be deficient.

Electrical:

- Install a building-wide networked lighting control system, including occupancy sensors, daylight sensors, and a new networked control system head-end.

Section 5 - Construction Cost Estimate

The recommended repairs for each building, broken out by priority, have been tabulated with associated construction costs for each scope item and are included in Appendix F. Order of magnitude estimated construction costs have been prepared that are based on assumptions about the project location, square foot building costs, and allowances for existing court buildings.

The cost estimates are a reasonable opinion of cost based on public bidding under Chapter 149A of the Massachusetts General Laws. The estimates represent only an order of magnitude accuracy based upon preliminary recommendations. Actual costs will vary based upon the development of more complete scope documents at the time of implementation. The costs provided are current 2022 values, escalated to June 2023 construction start. The construction market is currently very volatile, with increasing prices and limited availability of some construction materials. The final construction costs will vary based upon these market factors. As such, cost should be revisited when implementation is considered in order to estimate applicable escalation based on cost increases over time.

Once developed, the Estimated Construction Costs (ECC) were reviewed to assure reasonable accuracy of the scope, with the ECC comprised of direct trade costs as well as soft costs such as escalation, general conditions, fees, and contingencies, etc. From the ECC, the Total Project Cost (TPC) for each building was calculated, which includes design costs, change order contingencies, other consultants and costs for furnishings and equipment. The following table summarizes the ECC and TPC for each building.

Alternate #1 was established for the HOJ for the option to address full ductwork replacement, including full ceiling and lighting replacement.

Building	ECC	TPC
Hall of Justice with full duct replacement	$54M	$77.5M
Hall of Justice with Alternate #1 - full duct replacement and phased, second shift work	$62.7M	$91M
Housing & Juvenile Court	$8M	$14.6M

Section 6 Appendices

Appendix A:
Existing Conditions Photographs

Appendix B:
Existing Conditions Drawings

Appendix C:
Video Inspection of Ductwork

Appendix D:
Air Sampling and Testing

Appendix E:
Infrared Roof Scan

Appendix F:
Construction Cost Estimates

Appendix A

Existing Conditions Photographs

1. Hall of Justice - Exterior

Photo 1: Eastern elevation and entry to Hall of Justice

Photo 2: Vista from the street.

Photo 3: Discoloration of concrete at windowsill.

Photo 4: Top of window at Second Floor.

Photo 5: Sealant failure at window.

Photo 6: Sealant failure at window.

Photo 7: Sealant failure at window.

Photo 8: Hole in window sealant.

Photo 9: Deteriorated sealant at window.

Photo 10: Thermoplastic roof with stair and mechanical penthouses.

2. Hall of Justice - Interior

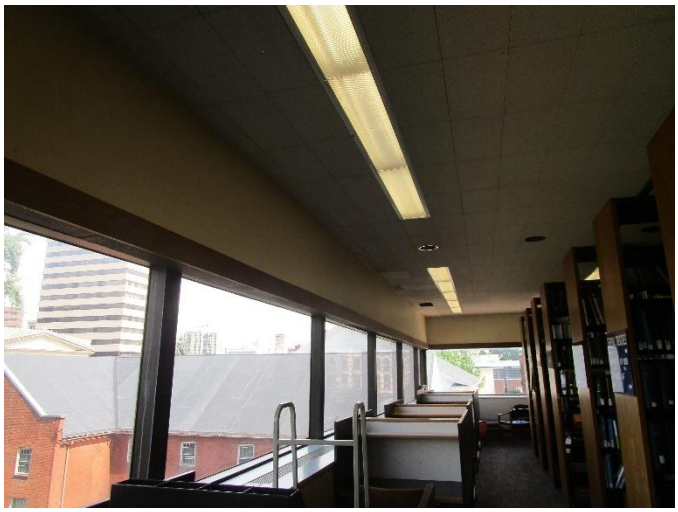


Photo 1: Damaged ceiling at windows in Law Library.

Photo 2: Ceiling damage in Law Library.

Photo 3: Water infiltration onto unit ventilator after rainstorm.

Photo 4: Water infiltration at window head after rainstorm.

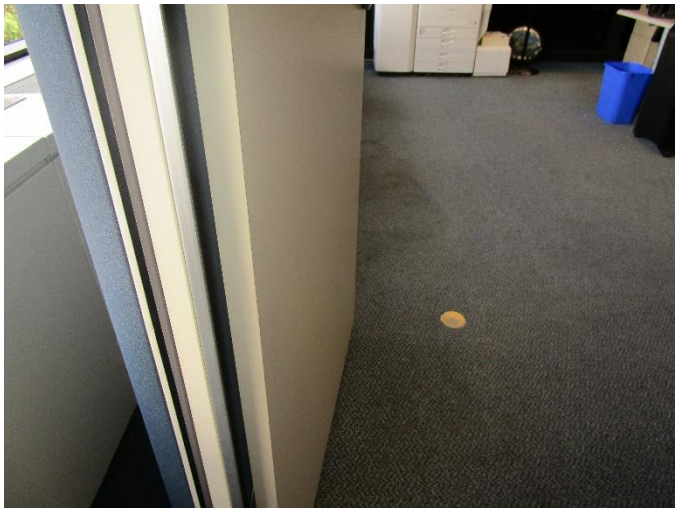


Photo 5: Water damaged carpet.

Photo 6: Peeling paint in stair tower.

3. Hall of Justice - Plumbing

Photo 1: 6” Water Service Backflow Preventer.

Photo 2: (2) A.O. Smith DRE-80 100 Electric Water Heaters.

Photo 3: Bradford White LE11OU3-1NAL 10-Gal Electric Water Heater.

Photo 4: Inoperable Floor Drain.

Photo 5: ADA Restroom Lavatory Tailpieces.

4. Hall of Justice – Fire Protection

Photo 1: 8” Fire Service With 6” Wet Alarm And 6” Dry Valves.

Photo 2: Fire Department Valve Cabinet.

Photo 3: Standard Response Sprinkler Heads.

Photo 4: Fire Department Pumper Connections.

5. Hall of Justice - HVAC

Photo 1: AC-4 Duct Smoke Detector & Existing Pneumatic Controls.

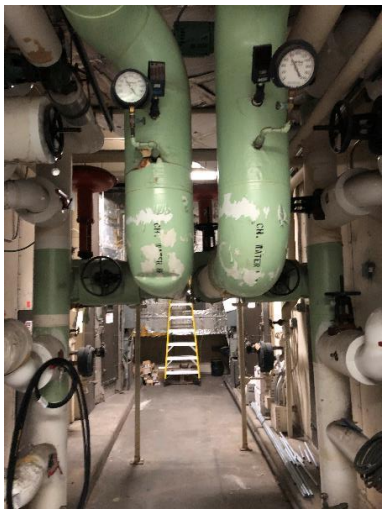


Photo 2: Chilled Water Piping Serving AC-3 & AC-4.

Photo 3: Cooling Tower Fan 1 & 2 Variable Frequency Drives (VFDs).

Photo 4: Air Compressor Serving Pneumatic Controls.

Photo 5: Trane Centrifugal Chiller.

Photo 6: Chilled Water Pump Variable Frequency Drives.

Photo 7: AC-2 Existing Conditions.

Photo 8: AC-1 Existing Conditions.

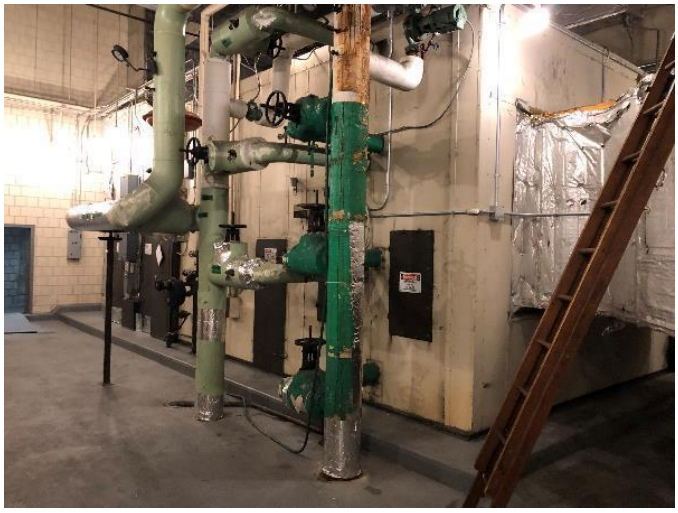


Photo 9: Geothermal Cooling Tower (Inside).

Photo 10: Geothermal Cooling Tower (Outside).

Photo 11: Perimeter Fan Coil Unit Internal Condition.

Photo 12: Perimeter Fan Coil Internal Condition.

Photo 13: Perimeter Fan Coil Internal Condition.

Photo 14: Typical Constant Volume Box.

Photo 15: Typical Reheat Coil (Smaller than Upstream/Downstream Ductwork).

Photo 16: Typical Reheat Coil (Smaller than Upstream/Downstream Ductwork.

Photo 17: Existing AC Unit Pneumatic Control Panel.

Photo 18: MERV-13 Filter Installation (AC-1).

Photo 19: AC-2 Fan Variable Frequency Drives (VFDs).

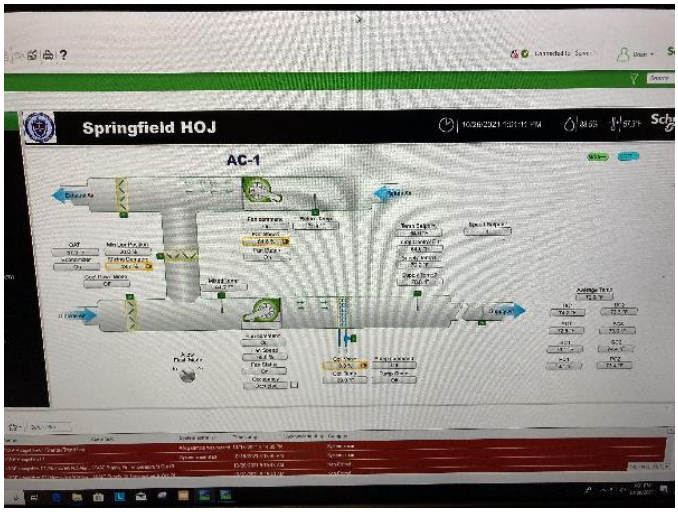


Photo 20: Typical AC Unit Controls Diagram.

Photo 21: AC-1 Failed Drain Pan – Leaking Above Hallway.

Photo 22: Aerco Condensing Boiler Installation.

Photo 23: Typical Base-Mounted Hot Water Pumps.

Photo 24: Supply Fan Believed to Serve Smoke Control System.

6. Hall of Justice - Electrical

Photo 1: Existing 208/120V Switchboard in Main Electrical Room.

Photo 2: Above the original switchboard, which provides a junction for the old and new bus ducts.

Photo 3: Fire Alarm Radio Master Box and Power Supplies by GE.

Photo 4: Original Federal Pacific Disconnect Switch and Newer Distribution Panel.

Photo 5: 200KVA Generator and exterior pad-mounted utility transformers for both buildings.

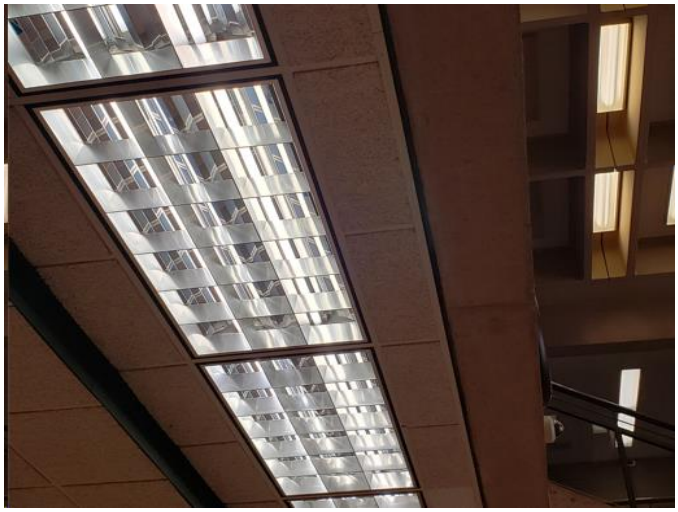


Photo 6: Light fixtures retrofitted with new LED lamps.

Photo 7: Simplex Fire Alarm Devices.

1. Juvenile Court - Exterior

Photo 1: Street vista and South Entry to Juvenile Court.

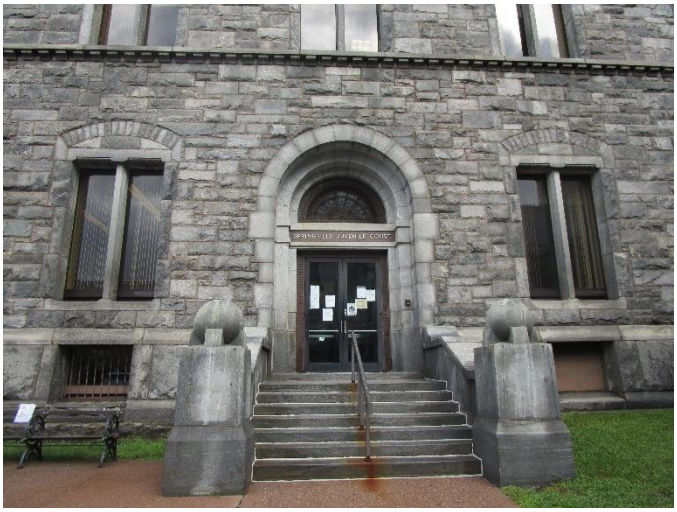


Photo 2: South Entry to Juvenile Court.

Photo 3: North Entry and granite stairs into Juvenile Court.

Photo 4: Granite spall at North Entry.

Photo 5: Granite spall at South Entry.

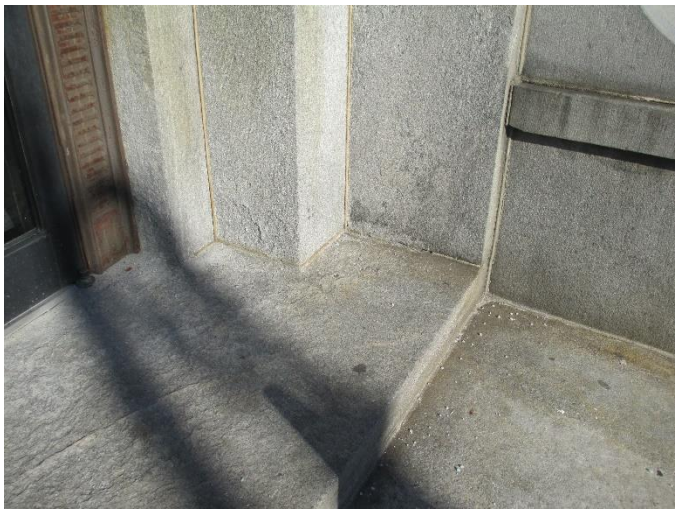


Photo 6: Deteriorated sealant at South Entry Stairs.

Photo 7: Example of grey and terracotta colored mortar in granite of Juvenile Court.

Photo 8: Juvenile Court tower and Roof.

Photo 9: Intermediate roof at tower.

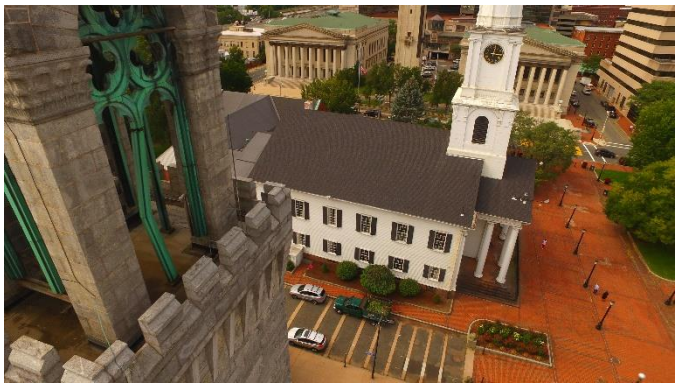


Photo 10: Damage to support of arch in tower.

Photo 11: Water Infiltration at below grade parking.

Photo 12: Evidence of water infiltration at parking garage.

Photo 13: No waterproofing at below grade scuppers

2. Juvenile Court - Interior

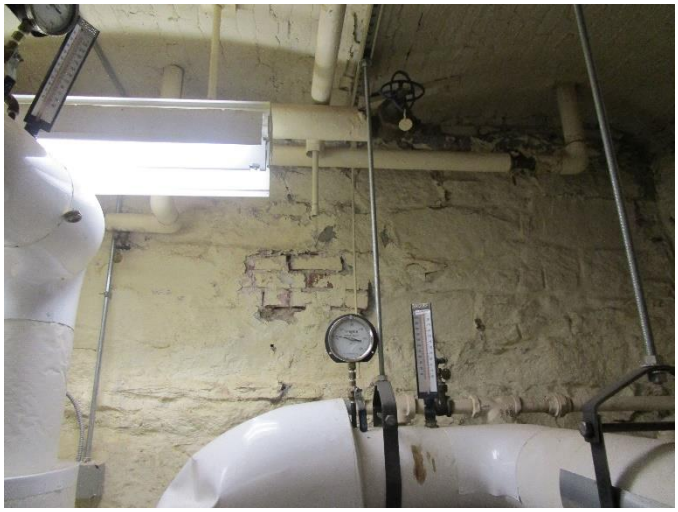


Photo 1: Spalling brick in basement.

Photo 2: Water infiltration on walls in basement

Photo 3: Moisture damaged walls in basement. Note vents added in wall assembly as attempted repair to reduce moisture buildup and peeling paint.

Photo 4: Water infiltration in basement after rainstorm.

Photo 5: Water infiltration at tower after rainstorm.

Photo 6: Damaged ceiling in Room 301, which is the room below the tower.

3. Juvenile Court - Plumbing

Photo 1: (5) Pressure Reducing Valve Manifold.

Photo 2: Water Heater.

Photo 3: Basement Corridor with Improperly Pitched Waste Main.

Photo 4: Failed Waste Main Check Valve.

Photo 5: Mechanical Floor Drain Overflow.

Photo 6: Gas Service.

Photo 7: ADA Restroom Lavatory Tailpieces.

4. Juvenile Court – Fire Protection

Photo 1: 6” Fire Service With 6” Wet Alarm Valve.

Photo 2: Fire Department Valve Cabinet.

Photo 3: Standard Response Sprinkler Heads.

Photo 4: Fire Department Pumper Connection.

5. Juvenile Court - HVAC

Photo 1: Basement Mech Room Typical Vertical Air Handling Unit.

Photo 2: Basement Mech Room Base-Mounted Pumps.

Photo 3: Air Compressor & Tank Dryer Serving Pneumatic Controls System.

Photo 4: Existing Fan Coil Unit Replacement Progress.

Photo 5: Hot Water Heat Exchanger.

Photo 6: Base-Mounted Pumps, Expansion Tank, Air Separator, etc.

Photo 7: Attic Mechanical Room Typical Air Handling Unit.

Photo 8: Roof-Mounted DOAS Units.

Photo 9: Roof-Mounted DOAS Unit.

Photo 10: Rooftop Cooling Tower.

Photo 11: Rooftop Cooling Tower.

Photo 12: Rusted Outside Air Damper.

6. Juvenile Court - Electrical

Photo 1: Ductwork intruding on clear working space of power panels.

Photo 2: Rusted transformer enclosure under leaky spot in mech room.

Photo 3: Notifier Fire Alarm Control Panel.

Photo 4: Vintage Power Distribution Equipment.

Appendix B

Existing Conditions Drawings

A1 **NORTH ELEVATION**
SCALE: 1/8" = 1'-0" 0 4' 8' 16'

HABEEB & ASSOCIATES
ARCHITECTS
150 LONGWATER DR
NORWELL, MA 02061
100 GROVE STREET # 303
WORCESTER, MA 01605
781.871.1600
habeebarch.com

STAMP

CONSULTANT

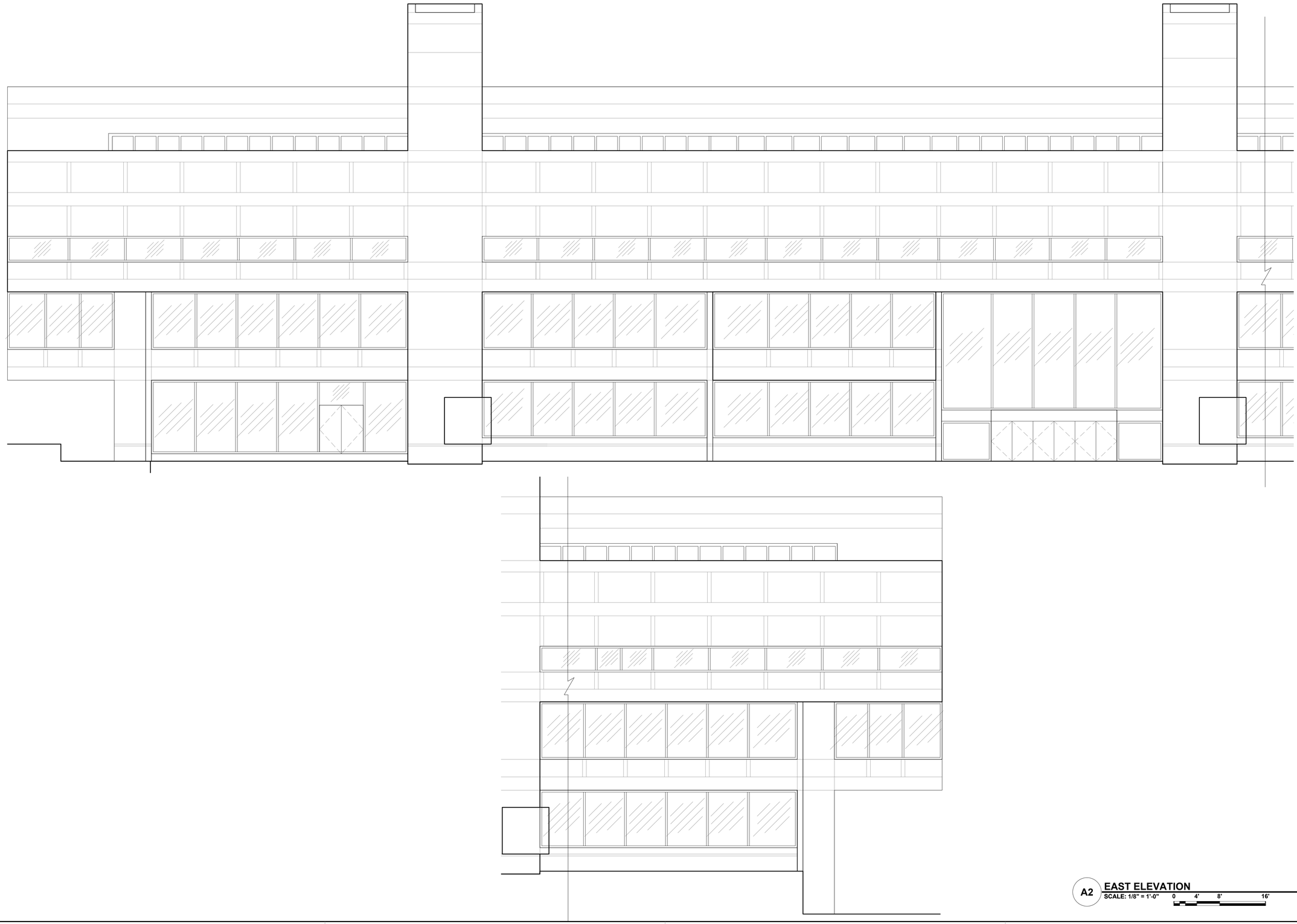
REPAIR
SPRINGFIELD COURTS
HALL OF JUSTICE
50 STREET
SPRINGFIELD, MA 01103

REVISIONS:	
MARK:	DESCRIPTION:
DATE:	

PROJECT NO:	1906.03
DATE:	09/03/21
SCALE:	1/8" = 1'-0"
DRAWN BY:	OTHER
CHECKED BY:	TBA

NORTH ELEVATION

A-201



A2 **EAST ELEVATION**
SCALE: 1/8" = 1'-0" 0 4' 8' 16'

HABEEB & ASSOCIATES
ARCHITECTS
H&A
150 LONGWATER DR
NORWELL, MA 02061
100 GROVE STREET #303
WORCESTER, MA 01605
781.659.1004
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CONSULTANT

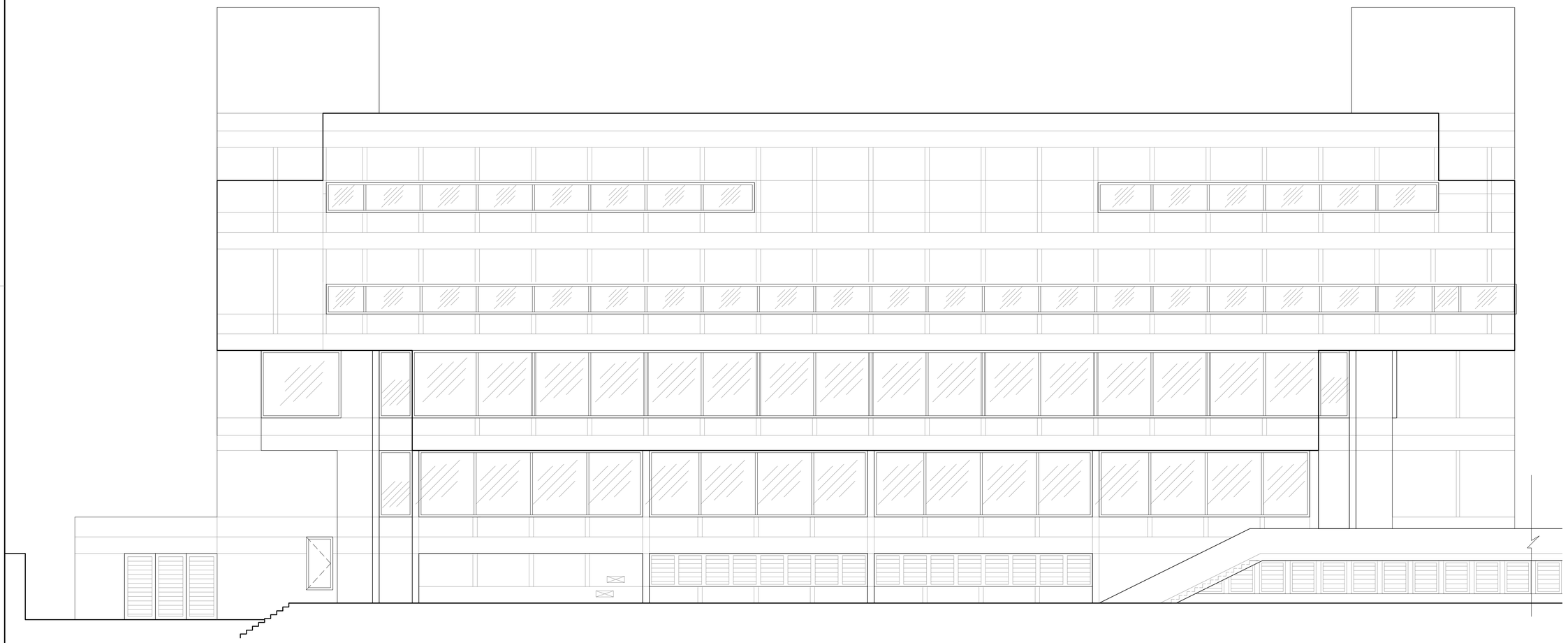
REPAIR
SPRINGFIELD COURTS
HALL OF JUSTICE
50 STREET SPRINGFIELD, MA 01103

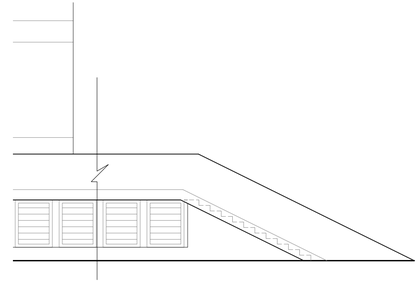
REVISIONS:
MARK: DATE: DESCRIPTION:

PROJECT NO:	1906.03
DATE:	09/03/21
SCALE:	1/8" = 1'-0"
DRAWN BY:	OTHER
CHECKED BY:	TBA

EAST ELEVATION

A-202





A3 **SOUTH ELEVATION**
SCALE: 1/8" = 1'-0" 0 4' 8' 16'

HABEEB & ASSOCIATES
ARCHITECTS
150 LONGWATER DR
NORWELL, MA 02061
100 GROVE STREET # 303
WORCESTER, MA 01605
781.871.9004
habeebarch.com

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CONSULTANT

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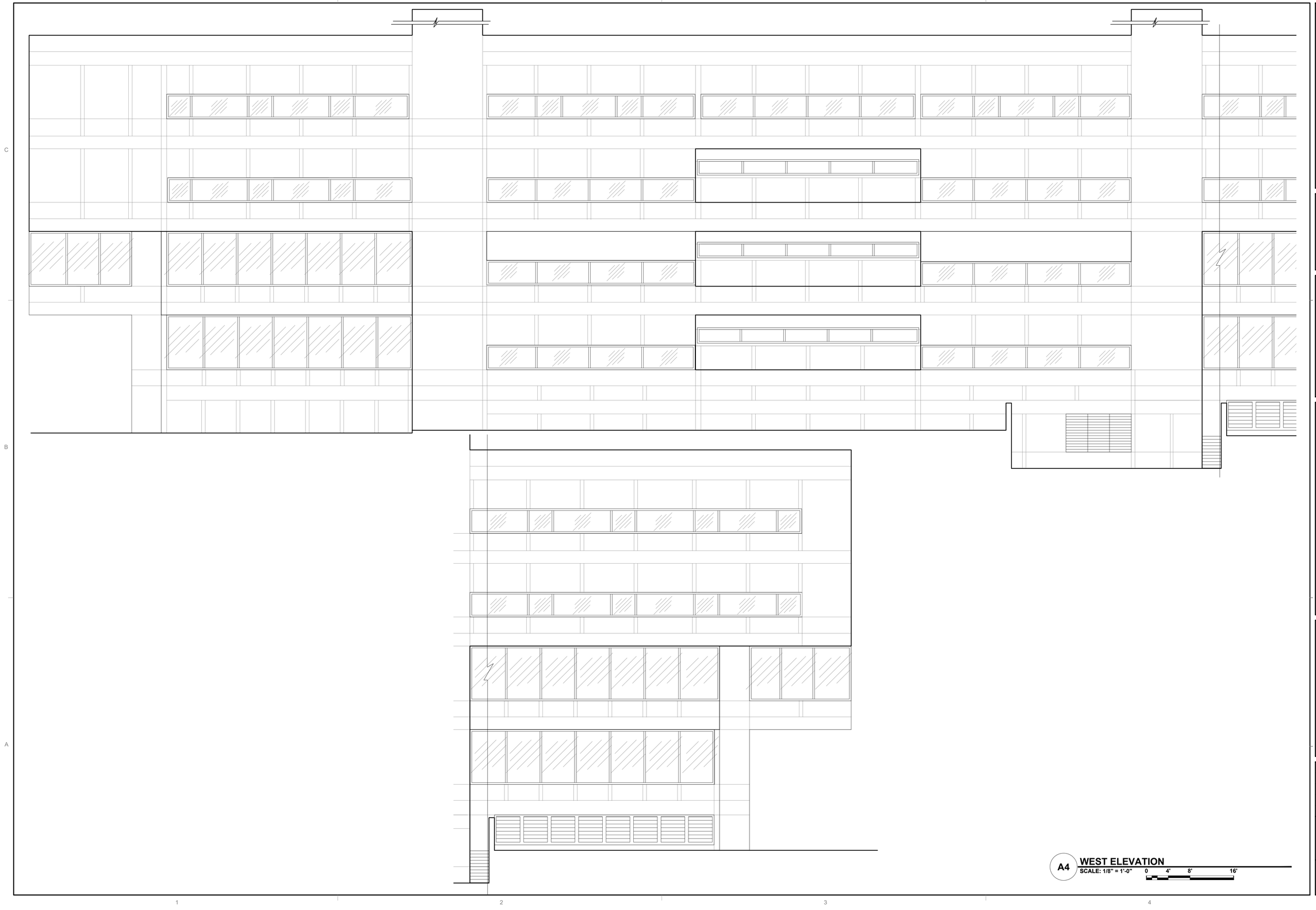
SPRINGFIELD COURTS
HALL OF JUSTICE
50 STREET
SPRINGFIELD, MA 01103

REVISIONS:
MARK: DATE: DESCRIPTION:

PROJECT NO:	1906.03
DATE:	09/03/21
SCALE:	1/8" = 1'-0"
DRAWN BY:	OTHER
CHECKED BY:	TBA

SOUTH ELEVATION

A-203



A4 **WEST ELEVATION**
SCALE: 1/8" = 1'-0" 0 4' 8' 16'

HABEEB & ASSOCIATES
ARCHITECTS
H&A
150 LONGWATER DR
NORWELL, MA 02061
100 GROVE STREET #303
WORCESTER, MA 01605
781.659.1004
habeebarch.com

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CONSULTANT

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SPRINGFIELD COURTS
HALL OF JUSTICE
50 STREET SPRINGFIELD, MA 01103

REVISIONS:
MARK: DATE: DESCRIPTION:

PROJECT NO:	1906.03
DATE:	09/03/21
SCALE:	1/8" = 1'-0"
DRAWN BY:	OTHER
CHECKED BY:	TBA

WEST ELEVATION

A-204

A1 NORTH ELEVATION
SCALE: 1/8" = 1'-0" 0 4' 8' 16'

H&A
HABEEB & ASSOCIATES
ARCHITECTS
150 LONGWATER DR
NORWELL, MA 02061
100 GROVE STREET # 303
WORCESTER, MA 01605
781.871.1600
habeebarch.com

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CONSULTANT

REPAIRS
SPRINGFIELD COURTS
JUVENILE COURT HOUSE
80 STATE STREET SPRINGFIELD,MA 01103

REVISIONS:
MARK:	DATE:	DESCRIPTION:

PROJECT NO:	1906.03
DATE:	09/03/21
SCALE:	1/8" = 1'-0"
DRAWN BY:	OTHERS
CHECKED BY:	TBA

NORTH ELEVATION

A-201

A2 WEST ELEVATION
SCALE: 1/8" = 1'-0" 0 4' 8' 16'

HABEEB & ASSOCIATES
ARCHITECTS
H&A
150 LONGWATER DR
NORWELL, MA 02061
100 GROVE STREET # 303
WORCESTER, MA 01605
781.871.1900
habeebarch.com

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SPRINGFIELD COURTS
JUVENILE COURT HOUSE
80 STATE STREET SPRINGFIELD,MA 01103

REVISIONS:

MARK:	DATE:	DESCRIPTION:

PROJECT NO:	1906.03
DATE:	09/03/21
SCALE:	1/8" = 1'-0"
DRAWN BY:	OTHERS
CHECKED BY:	TBA

NORTH ELEVATION

A-202

A3 SOUTHELEVATION
SCALE: 1/8" = 1'-0" 0 4' 8' 16'

H&A
HABEEB & ASSOCIATES
ARCHITECTS
150 LONGWATER DR
NORWELL, MA 02061
100 GROVE STREET # 303
WORCESTER, MA 01605
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JUVENILE COURT HOUSE
80 STATE STREET SPRINGFIELD,MA 01103

REVISIONS:
MARK:	DATE:	DESCRIPTION:

PROJECT NO:	1906.03
DATE:	09/03/21
SCALE:	1/8" = 1'-0"
DRAWN BY:	OTHERS
CHECKED BY:	TBA

SOUTH ELEVATION

A-203

A4 WEST ELEVATION
SCALE: 1/8" = 1'-0" 0 4' 8' 16'

HABEEB & ASSOCIATES
ARCHITECTS
150 LONGWATER DR
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WORCESTER, MA 01605
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habeebarch.com

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CONSULTANT

REPAIRS
SPRINGFIELD COURTS JUVENILE COURT HOUSE
80 STATE STREET SPRINGFIELD,MA 01103

REVISIONS:
MARK: DATE: DESCRIPTION:

PROJECT NO:	1906.03
DATE:	09/03/21
SCALE:	1/8" = 1'-0"
DRAWN BY:	OTHERS
CHECKED BY:	TBA

WEST ELEVATION

A-204

Appendix C

Video Inspection of Ductwork

1-800-974-2622
781-356-8244
Fax 781-356-8493

NADCA Certified Staff
Division of **BMCA, Inc.**
info@airductservices.com

Air Duct *Services* & Restoration

HVAC Cleaning * Mold Remediation
Flood & Fire Restoration

Video Inspection Report

Proposal Submitted to:	Habeeb & Associates 150 Longwater Drive Norwell, MA 02061
Attention:	Ms. Elizabeth Lewis
Phone:	781.871.9804
Email:	elewis@habeebarch.com
Job Name:	**Springfield Court House** **Hall of Justice**
Service Location:	50 State St. Springfield, MA 01103
Date:	November 26, 2021

1-800-974-2622
781-356-8244
Fax 781-356-8493

NADCA Certified Staff
Division of **BMCA, Inc.**
info@airductservices.com

Dear Elizabeth,

Beginning on September 30th, 2021 we began inspecting the HVAC systems at the above mentioned location, this inspection includes video and/or pictures of all accessible supply and return ducts utilizing access doors and any other duct openings that were in place to perform the inspection. We worked in conjunction with the trial court consultants who were onsite to perform sampling of the duct work for possible mold.

In the pictures and videos included with this document you will find them labeled under the unit it is associated with, and what part of the HVAC system it handles:

AC-1

Unit AC-1 is located in the penthouse of the building. This system controls all court rooms only throughout the building. There are 2 supply and return risers that start in the penthouse and continue down to each floor. Upon reaching each floor horizontal ducts wrap around the court rooms and most supply and return vents are linear diffusers. We were not able to access the duct work from the linear diffusers so we inspected mostly from access panels and other openings from the hallways on each and floor as well. Some areas also had spline ceiling tiles that could not be removed.

We inspected all accessible supply and return duct work throughout this system on all levels of the building. Through video and pictures we found both the supply and return ductwork to have a decent amount of debris, which is to be expected for a building of this age. Some parts of the system are also internally lined; the insulation itself was mostly intact, but definitely and should be cleaned and coated where accessible.

AC-2

Unit AC-2 is located on the 4th floor of the building in the mechanical space. This system controls the entire 4th floor besides the courtrooms. Just like AC-1 certain areas of the system are behind linear diffusers and/or spline ceilings with no access points. We were not able to access the duct work from the linear diffusers so we inspected mostly from accessible access panels, supply and return registers and any other openings from the mechanical space.

We inspected all accessible supply and return duct work throughout this system. Through video and pictures we found both the supply and return ductwork to have a decent amount of debris, which is to be expected for a building of this age. Some parts of the system are also internally lined; the insulation itself was mostly intact, but definitely and should be cleaned and coated where accessible.

AC-3

Unit AC-3 is located on the basement of the building in the mechanical space. This system controls half of floors 3, 2, and 1 not including any court rooms. Just like AC-1 & 2 certain areas of the system are behind linear diffusers and/or spline ceilings with no access points. We were

not able to access the duct work from the linear diffusers so we inspected mostly from accessible access panels, supply and return registers and any other openings as well as from accessible areas in the mechanical space.

We inspected all accessible supply and return duct work throughout this system. Through video and pictures we found both the supply and return ductwork to have a decent amount of debris, which is to be expected for a building of this age. Some parts of the system are also internally lined; the insulation itself was mostly intact, but definitely and should be cleaned and coated where accessible.

AC-4

Unit AC-4 is located on the basement of the building in the mechanical space. This system controls half of floors 3, 2, and 1 and basement not including any court rooms. Just like all other systems certain areas of the system are behind linear diffusers and/or spline ceilings with no access points. We were not able to access the duct work from the linear diffusers so we inspected mostly from accessible access panels, supply and return registers and any other openings as well as from accessible areas in the mechanical space.

We inspected all accessible supply and return duct work throughout this system. Through video and pictures we found both the supply and return ductwork to have a decent amount of debris, which is to be expected for a building of this age. Some parts of the system are also internally lined; the insulation itself was mostly intact, but definitely and should be cleaned and coated where accessible.

Summary of Inspection

To summarize the inspection completed I feel we got a good portion of all systems within the areas that were accessible and as the video and pictures show all four systems have debris, which is to be expected given the age of the building, the internal lining is mostly intact. It is recommended to have all systems cleaned and insulation coated. Minor repairs to insulation may be required during the cleaning process where some minor separation exists. Throughout our entire process no visible mold growth was found inside the duct work but this does not guarantee mold is not present as it is not always visible to the naked eye.

Please feel free to contact me with any other questions or concerns.

Sincerely,
Mike Ryberg

Director of Sales & Marketing
Air Duct Services & Restoration
mike@ airductservices.com
www.airductservices.com

REFER TO DRAWING # H-2 FOR CONTINUATION OF DUCTWORK & PIPING BETWEEN GUIDE LINES 1 & 8 AND WEST OF "A"

STAIR NO. 1

STAIR NO. 2

MECHANICAL EQUIPMENT ROOM B05

REFER TO DRAWING # H-8 FOR CONTINUATION OF ALL DUCTWORK AND PIPING

TO AC 2

FOR CONTINUATION SEE DRAWING # H-2

SEE DWG. H-2 FOR PART 'B'

HATCH LINE PART 'B'

PART 'A'

PART 'B'

STAGE 1

STAGE 2

SEE GENERAL NOTES APPLICABLE TO ALL DRAWINGS

1. HVAC SUB-CONTRACTOR SHALL COORDINATE WITH ALL THE TRADES, BUT NOT NECESSARILY LIMITED TO THE FOLLOWING:
   (a) WITH GENERAL CONTRACTOR FOR MASONRY, COOLING TOWER STRUCTURE, MASONRY OPENINGS, LOUVERS, EQUIPMENT PADS, ACCESS PANELS ETC.
   (b) WITH PLUMBING SUB-CONTRACTOR FOR COLD WATER MAKE UP CONNECTIONS AT COOLING TOWER, BOILERS, CHILLED WATER, FLOOR DRAINS & OVERFLOW DRAIN AT THE COOLING TOWER.
   (c) WITH ELECTRICAL SUB-CONTRACTOR FOR EMERGENCY GENERATOR, PART A/T, CONTROL WIRING, TOWER IMMERSION HEATERS, CABINET HEATERS, ELECTRIC RADIATION, STARTERS, SWITCHES, ELECTRIC REHEAT & PREHEAT COILS WIRING, ELECTROSTATIC FILTERS & OTHER ELECTRIC SERVICE FURNISHED AND INSTALLED BY HIM FOR THE BUILDING.
2. HVAC SUB-CONTRACTOR SHALL INVESTIGATE AVAILABLE SPACE FOR ALL EQUIPMENT PRIOR TO SUBMISSION OF SHOP DRAWINGS.
3. EXACT LOCATIONS OF THERMOSTATS SHALL BE DETERMINED IN THE FIELD WITH THE ARCHITECT AND/OR ENGINEER AND THE LOCATIONS APPROVED BY THE ARCHITECT AND/OR ENGINEER.
4. HVAC SUB-CONTRACTOR SHALL COORDINATE ALL DIFFUSER/REGISTER/GRILLE LOCATIONS WITH REFLECTED CEILING PLANS. ANY RELOCATIONS SHALL BE APPROVED BY ARCH., E/ME ENGINEER AS THE SYSTEM VOLUMES.
5. ALL HIGH VELOCITY DUCTS LEADING TO THE CONSTANT VOLUME BOXES SHALL BE OF SAME SIZE AS THE BOX VOLUMES.
6. ALL FIRE DAMPER RATING SHALL CORRESPOND TO THE RATING OF THE WALL IN WHICH THEY ARE INSTALLED.
7. ALL DUCTWORK SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH SMACNA STANDARDS UNLESS OTHERWISE NOTED.
8. FOR EXACT LOCATIONS OF THERMOSTATS, PLEASE REFER TO ARCHITECTURAL PLANS.
9. ANY DEVIATIONS FROM SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER.
10. ADEQUATE SIZE ACCESS DOORS SHALL BE FURNISHED AND INSTALLED FOR ALL EQUIPMENT REQUIRING SERVICE, MAINTENANCE AND REPLACEMENT, OR THE BALANCING OF VALVES AND FOR THE OPERATION OF HVAC SYSTEMS.
11. ALL THE WORK SHALL CONFORM TO THE LATEST EDITION OF THE STATE BUILDING CODE AND BY-LAWS OF THE CITY OF SPRINGFIELD.

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E. CRAWLEY COOPER · FREDERICK M. TAYLOR
ASSOCIATE ARCHITECTS
500 FRANKLIN STREET · CAMBRIDGE · MASSACHUSETTS
DEBORAH FORSMAN · STRUCTURAL ENGINEER
FRANCIS ASSOCIATES INC. · MECHANICAL AND ELECTRICAL ENGINEERS

THE COMMONWEALTH OF MASSACHUSETTS · BUREAU OF BUILDING CONSTRUCTION

HAMPDEN COUNTY HALL OF JUSTICE

SPRINGFIELD · MASSACHUSETTS

PROJECT CHN72-1 CONTRACT NO. 1

BASEMENT FLOOR PLAN PART 'A"

DRAWING NO. H-1

DATE 7-6-73 · SCALE 1/8" · DRAWN BY · CHECKED BY

GREEN ARE SUPPLY LIINES
TAN ARE RETURN LINES

GREEN ARE SUPPLY LIINES
TAN ARE RETURN LINES

NOTES

1 FOR CONTINUATION OF DUCTWORK & PIPING IN SHAFTS SEE PLANS NOS. M12 & M13
2 FOR SECTIONS A-A & B-B SEE DWG. NO. M 25
3 FOR LINEAR DIFFUSER DETAILS IN LOBBY SEE ARCHITECTURAL DWG "A-19"

TOP NORTH

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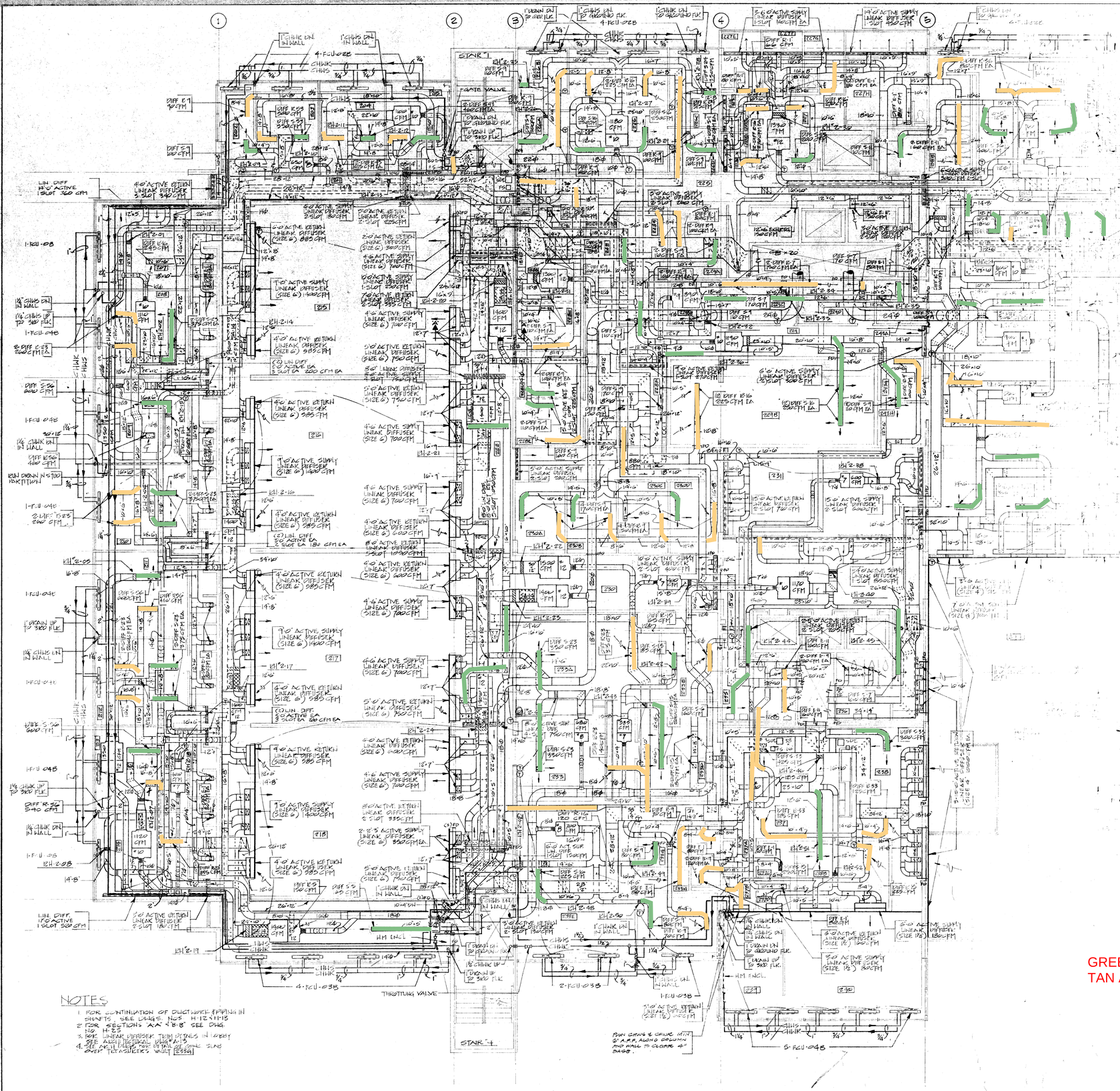
HAMPDEN COUNTY HALL OF JUSTICE
SPRINGFIELD MASSACHUSETTS
PROJECT CHN72-1 CONTRACT NO. 1

GROUND FLOOR PLAN

DATE	SCALE	DRAWN BY	CHECKED
5/16/73	1/8" = 1'-0"	E.C.M.	E.W.

DRAWING NO. H-3



GREEN ARE SUPPLY LIINES
TAN ARE RETURN LINES

NOTES

1. FOR CONTINUATION OF DUCTWORK RISING IN SHAFTS, SEE DWGS. NOS. H-12 & H-13.
2. FOR SECTIONS AA & BB SEE DWG. NO. H-25.
3. FOR LINEAR DIFFUSER TRIM DETAILS IN LOBBY SEE ARCHITECTURAL DWG. A-13.
4. SEE DRAWING H-5 FOR DETAIL OF CONC. SLAB OVER TELASLEEK'S VAULT [2336]

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PROJECT CHN72-1 CONTRACT NO.

SECOND FLOOR PLAN

DATE	SCALE	DRAWN BY	CHECKED

DRAWING NO.
H-4

GREEN ARE SUPPLY LIINES
TAN ARE RETURN LINES

NOTE:
1 FOR CONTINUATION OF ELECTRICAL LIGHTING & SHAFTS SEE PLANS NO. H-2, H-3, H-4
2 FOR SECTION A-A SEE DWG NO. H-25

TOB NORTH

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HAMPDEN COUNTY HALL OF JUSTICE

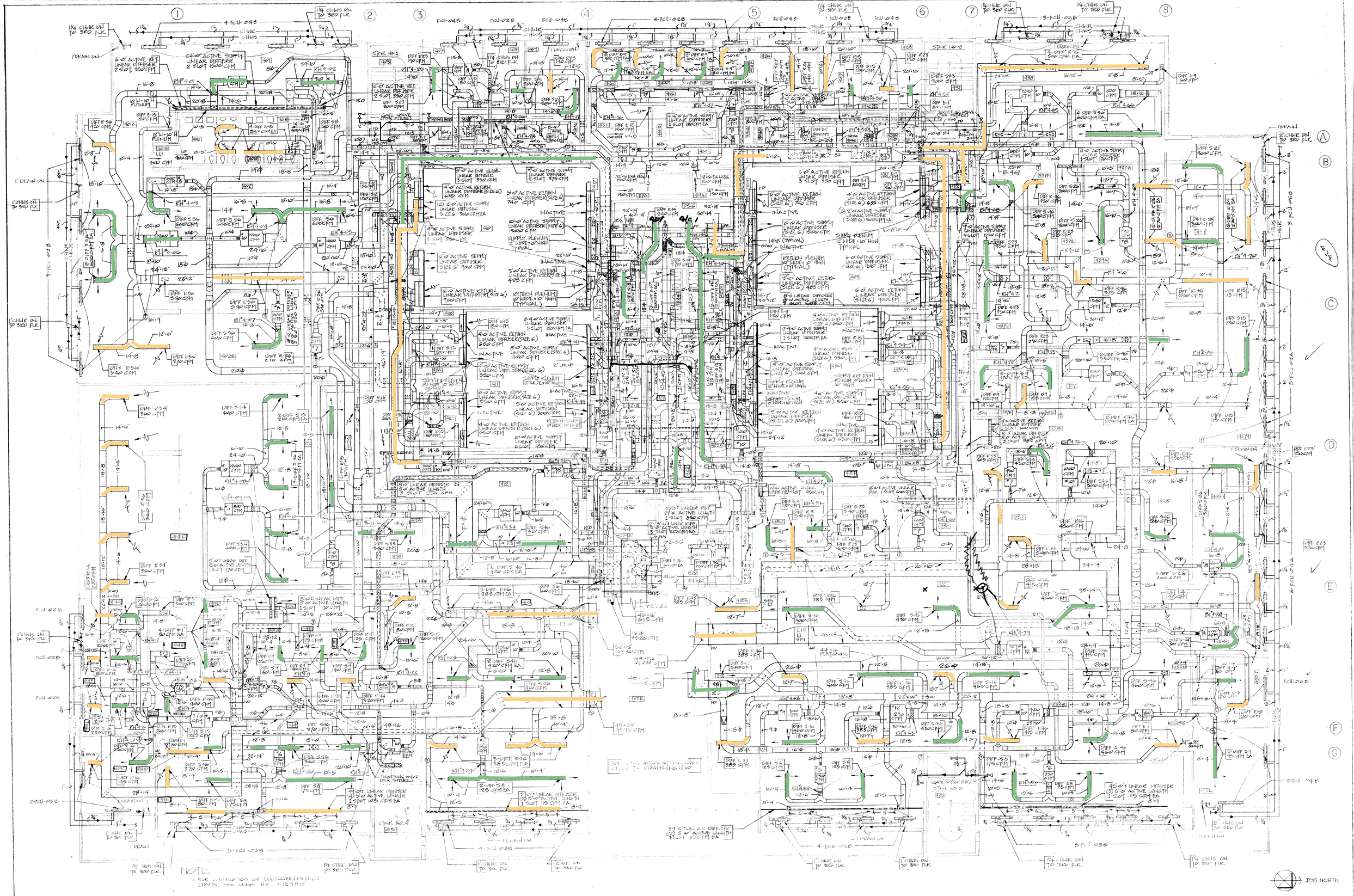
SPRINGFIELD MASSACHUSETTS

PROJECT CHN72-1 CONTRACT NO. 1

THIRD FLOOR PLAN

DATE	SCALE	DRAWN BY	CHECKED
3/6/73	1/8 1'0"	D.C.M.	D.N.

DRAWING NO. H-5



GREEN ARE SUPPLY LIINES
TAN ARE RETURN LINES

Edward J. Catalano

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HAMPDEN COUNTY HALL OF JUSTICE

SPRINGFIELD MASSACHUSETTS

PROJECT CHN72-1 CONTRACT NO. 1

FOURTH FLOOR PLAN

DATE	SCALE	DRAWN BY	CHECKED
3/4/13	1/8" = 1'0"	P.K.M.	

DRAWING NO. H-6

SEE DRAWING H-1 FOR CONTINUATION OF DUCTWORK AND PIPING.

SEE DRAWING H-2 FOR CONTINUATION OF EXHAUST PIPE.

SEE DRAWING H-1 FOR REMAINING DUCTWORK & PIPING BETWEEN GUIDE-LINES 3 & 4, D & E.

SEE DRAWING H-1 FOR CONTINUATION OF DUCTWORK

ELECTRICAL TRACING BY ELECTRICAL SUB-CONTRACTOR AS PER SPECIFICATIONS UNDER SECTION 16-A PARA. 22 g-1

GREEN ARE SUPPLY LIINES
TAN ARE RETURN LINES

FRESH AIR INTAKE PLENUM

SMOKE REMOVAL PLENUM

FRESH AIR INTAKE PLENUM

EXHAUST PLENUM

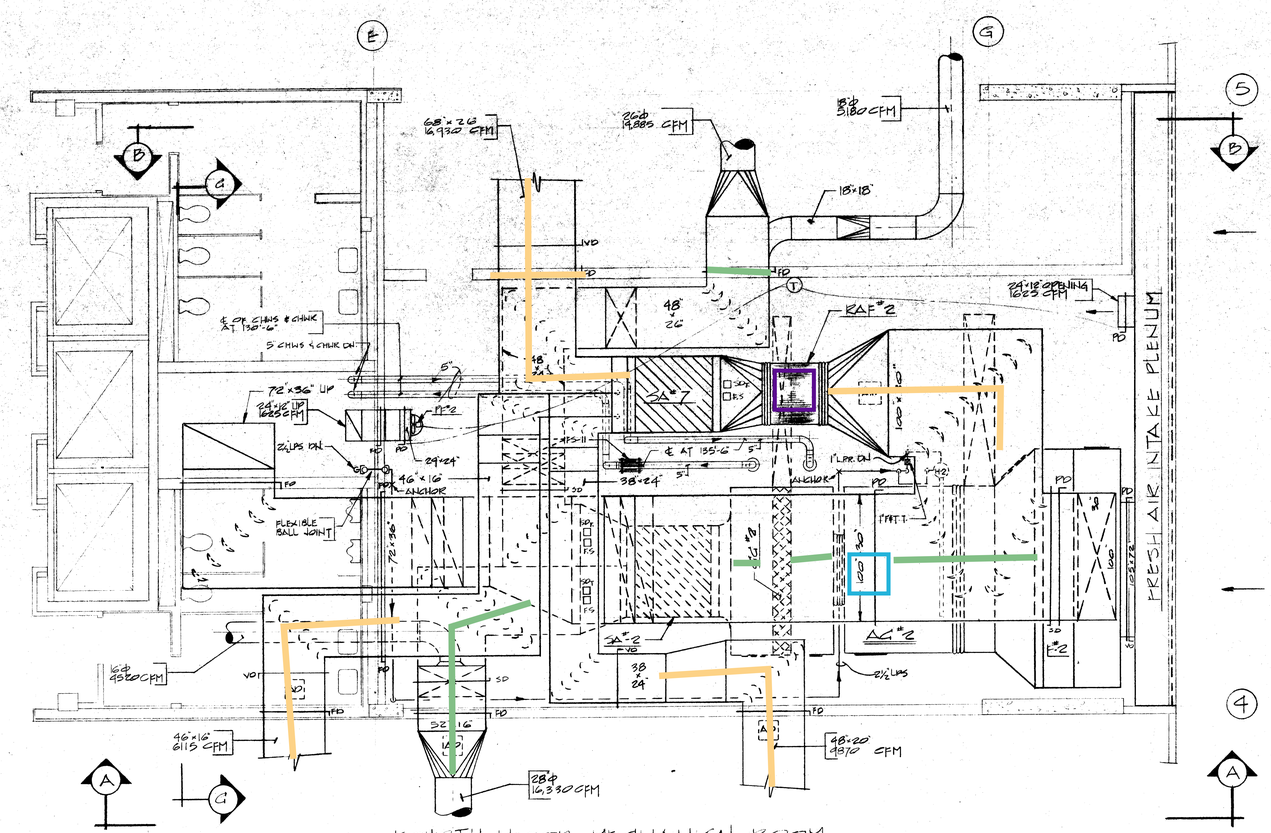
EXHAUST LOUVER

MOTOR CONTROL PANEL

TO EP SWITCH LOCATED AT EF-3 FAN MOTOR STARTER

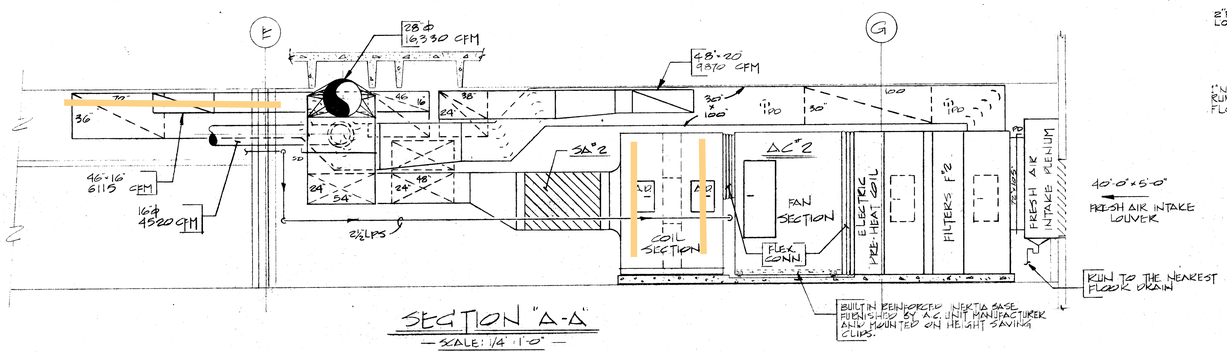
AEDWAY NO. 1

EDUARDO CATALANO • ARCHITECT PETER C. SUGAR · PAUL S. SHIMAMOTO E. CRAWLEY COOPER · FREDERICK M. TAYLOR ASSOCIATE ARCHITECTS 300 FRANKLIN STREET · CAMBRIDGE · MASSACHUSETTS DEBORAH FORSMAN · STRUCTURAL ENGINEER FRANCIS ASSOCIATES INC. · MECHANICAL AND ELECTRICAL ENGINEERS	THE COMMONWEALTH OF MASSACHUSETTS BUREAU OF BUILDING CONSTRUCTION HAMPDEN COUNTY HALL OF JUSTICE SPRINGFIELD MASSACHUSETTS PROJECT CHN72-1 CONTRACT NO. 1	BASEMENT MECHANICAL ROOM DATE 3/6/73 · SCALE 1/4"=1'-0" · DRAWN BY P.K.M. · CHECKED D.H.	DRAWING NO. H-8



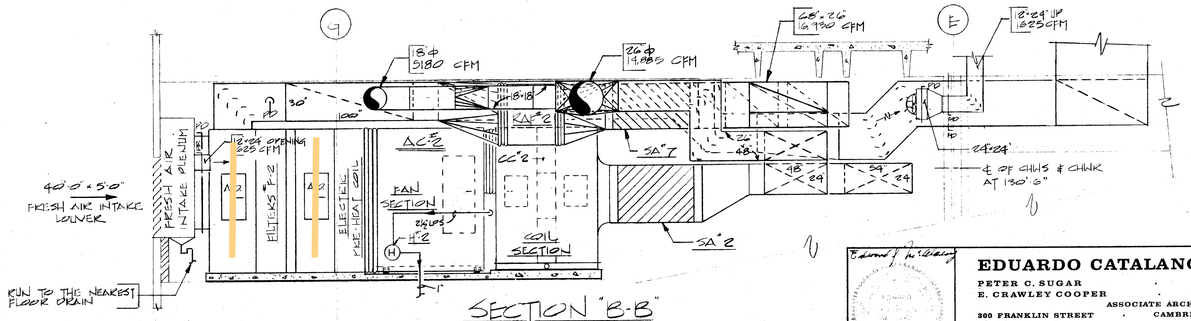
FOURTH FLOOR MECHANICAL ROOM

— SCALE: 1/4"=1'-0" —



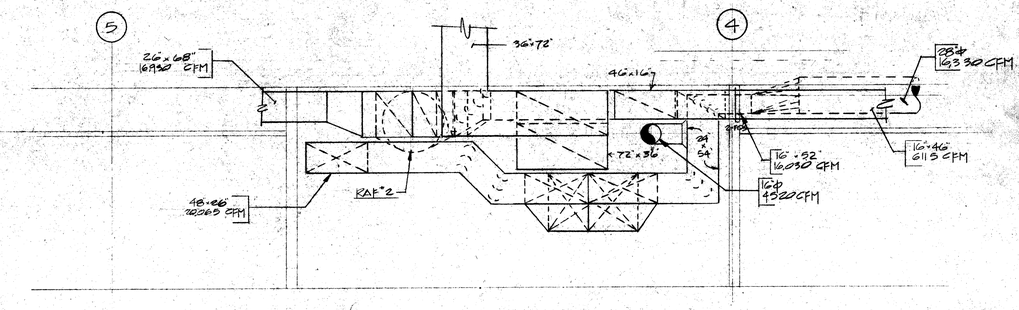
SECTION "A-A"

— SCALE: 1/4"=1'-0" —



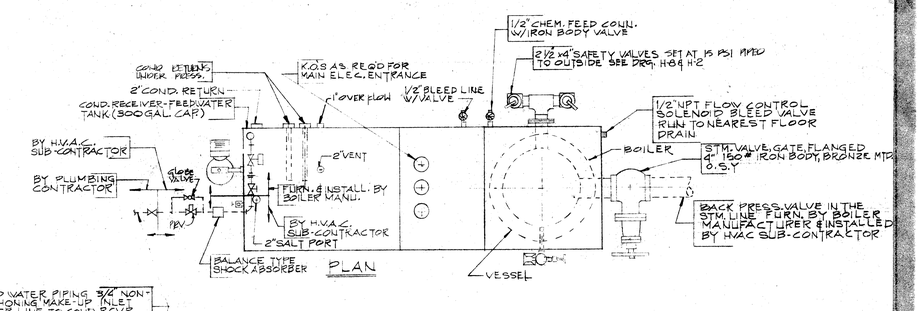
SECTION "B-B"

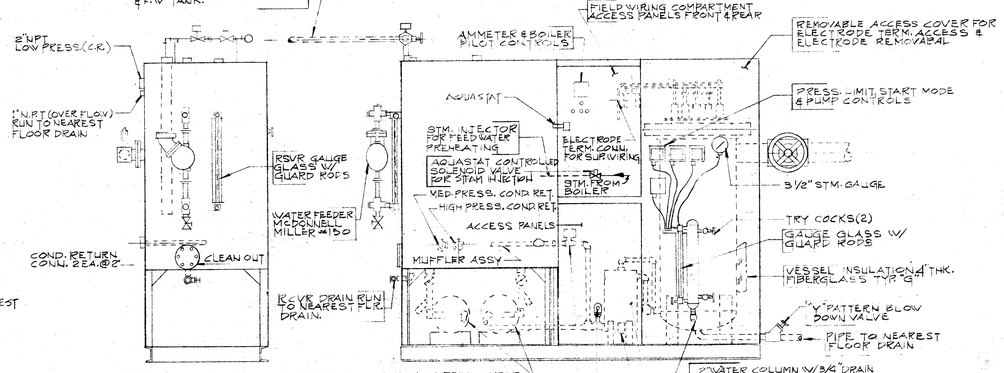
— SCALE: 1/4"=1'-0" —



SECTION "C-C"

— SCALE: 1/4"=1'-0" —





SIDE ELEVATION

FRONT ELEVATION

GREEN ARE SUPPLY LIINES
TAN ARE RETURN LINES

NOTES:

1. K.W. RATING SHOWN IS MAX. RATED FULL LOAD MAX. K.W. OUTPUT MAY BE LIMITED TO 0% TO 100% IN 20% INCREMENTS BY CONTROL ADJUSTMENT. CONTROLS PROPORTION STEAM GENERATION RATE TO MATCH USE RATE AT CONSTANT PRESS. AND/OR NOT TO EXCEED LOAD SETTING.
2. BOILER CONSTRUCTION PER ASME CODE SEC. IV NATIONAL BOARD INSPECTED. DESIGN PRESSURE 15#
3. JACKET AND ENCLOSURE FINNISHED W/ HAMMERTONE GREEN ENAMAL.
4. ADJUST PRESS. CONTROL FOR OPERATION AT (10-12) SI OPERATING PRESSURE.
5. CIRCUIT BRKR. (2000 AMP 3 POLE, 600V W/120 V SHUNT TRIP FURNISHED BY ~~ELECTRICAL~~ H.V.A.C. CONTRACTOR, ~~CONTRACTOR~~ INSTALLED BY ~~ELECTRICAL~~ CONTRACTOR.
6. H.V.A.C. SUB CONTRACTOR SHALL ENSURE ADEQUATE HOIST SPACE ABOVE THE HEAD ROOM FOR EQUIPMENT REMOVAL.
7. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ~~POWER~~ ELECTRICAL WIRING AS PER INSTRUCTIONS AND REQUIREMENTS OF THE BOILER MANUFACTURER, OBTAINED THROUGH H.V.A.C. SUB CONTRACTOR.

BOILER DETAILS

— NO SCALE —

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HAMPDEN COUNTY HALL OF JUSTICE

SPRINGFIELD MASSACHUSETTS

PROJECT CHN72-1 CONTRACT NO. 1

FOURTH FLOOR MECHANICAL ROOM & SECTIONS AND BOILER DETAILS

DATE	SCALE/NO.	DRAWN BY	CHECKED
3/6/73		P.K.M.	D.N.

DRAWING NO. H-10

Future System according to schedule. Not operational until 5th floor is open

GREEN ARE SUPPLY LIINES
TAN ARE RETURN LINES

SECTION "A-A"
— SCALE: 1/4"-1'-0" —

SECTION "B-B"
— SCALE: 1/4"-1'-0" —

SECTION "C-C"
— SCALE: 1/4"-1'-0" —

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HAMPDEN COUNTY HALL OF JUSTICE
SPRINGFIELD MASSACHUSETTS
PROJECT CHN72-1 CONTRACT NO. 1

PENTHOUSE MECHANICAL ROOM AND SECTIONS

DATE	SCALE	DRAWN BY	CHECKED
3/6/73	1/4"1'0"	P.E.M.	D.N.

DRAWING NO. H-11

Appendix D

Air Sampling and Testing

10 State Street, Suite 100
Woburn, MA 01801
781.932.9400 | oneatlas.com

October 8, 2021

Ms. Elizabeth Lewis
HABEEB ARCHITECTS
150 Longwater Drive, Suite 201
Norwell, Massachusetts 02061

SUBJECT: Fiberglass Air Sampling Report of Findings
Springfield District Courthouse
1600 E. Columbus Ave., Springfield, Massachusetts

Dear Ms. Lewis:

ATC Group Services LLC doing business as Atlas Technical (Atlas) performed ambient air sampling for the presence of fiberglass at 10 pre-determined locations, at the Springfield District Courthouse, located at 1600 E. Columbus Ave., in Springfield, Massachusetts. Atlas followed the air sampling method for asbestos, as described in the State of Massachusetts Department of Environmental Projection (Mass DEP) Regulations 301 CMR 7.15 (8) and the State of Massachusetts Department of Labor Standards (DLS) Regulations, 453 CMR 6.14 (5). Atlas' Massachusetts licensed asbestos project monitor, Patrick Desmond (AM900717), performed the air sampling on October 2, 2021. Although the air sampling was performed after normal business hours, HVAC systems were fully operational during the air sampling event in order to simulate full building occupancy.

Analysis of all air samples indicated levels below 1.0 f/cc, the non-mandatory guidance threshold limit value for fiberglass established by the American Conference of Governmental Industrial Hygiene. ProScience Analytical Services, Inc., (ProScience), located in Woburn, Massachusetts, analyzed the air samples via Phase Contrast Microscopy (PCM), NIOSH 7400 Method – B Rules. ProScience is fully accredited for bulk sample analysis under the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology and is also licensed by the Massachusetts DLS (License #AA000156).

A final copy of the PCM air sample analysis is attached for your records. If you have any questions, please contact us at (781) 932-9400.

Respectfully submitted,

ATLAS TECHNICAL CONSULTANTS, LLC

Charmayne Eriacho
Senior Project Manager

Bryan Thompson
Division Manager – Building Sciences

Attachment:
PCM Air Sample Laboratory Report

ATTACHMENT

PCM AIR SAMPLE LABORATORY REPORT

ProScience Analytical Services, Inc.

Bryan Thompson
Atlas Technical Consultants, LLC - Woburn
10 State Street, Suite 100
Woburn, MA 01801

October 5, 2021

Dear Bryan Thompson,

The enclosed analytical results have been obtained using Phase Contrast Microscopy in accordance with NIOSH-7400 Issue 2. Appendix C Alternate Counting Rules for Non-Asbestos Fibers (B counting rules) was applied to these samples. The detection limit of this method is 5.5 fibers per 100 fields or 7 fibers per mm squared. ProScience Analytical Services Inc., assumes no responsibility for inaccurate analytical results caused by improper sample collection techniques, improper use of the field equipment, insufficient number of samples collected or erroneous data provided by the client. The condition of the samples received are acceptable unless otherwise noted.

The Quality Control data related to the samples analyzed is available for review upon the client's written request. ProScience Analytical Services, Inc., makes no representation or statement related to the clearance of the area where the samples have been collected or for potential sample contamination, misuse, misinformation or misrepresentation by the client. Results are adjusted for blank counts. Intra-laboratory Sr values: 5 to 20 = 0.34, >20 to 50 = 0.30 and >50 to 100 = 0.16.

All Laboratory records are retained for at least ten years unless otherwise directed in writing by the client. The sample cassettes are retained for a period of two months. All analytical results and records are considered strictly confidential and will not be released under any circumstances to anyone except the actual client. The analytical results included in this report apply only to the items tested. This report may not be reproduced, except in its entirety, without the permission of ProScience Analytical Services, Inc.'s Laboratory Director.

If you have any questions please contact the Laboratory Manager or the Laboratory Director.

Aimee L Cormier

Aimee Cormier, Laboratory Director

Enclosure:
LAB BATCH ID:A 128499 CLIENT PROJECT ID: N/A
Client Ref: Springfield District Court

ProScience Analytical Services, Inc. PCM Report

Client Name: Atlas Technical Consultants, LLC - Woburn
PO #: N/A
Client Project #: N/A
Client Reference: Springfield District Court
Method: NIOSH 7400 Issue 3

Batch: **A128499**
Date Sampled: 10/2/2021
Date Received: 10/3/2021
Date Analyzed: 10/5/2021
Date of Report: 10/5/2021

Sample ID	Volume (L)	# of Fibers	# of Fields	Fibers / mm2	Fibers / cc
01	1200	< 5.5	100	< 7.01	< .0023

Description: PCM
Location: Snack Bar Basement
Comments:
Analyzed: Yes

Sample ID	Volume (L)	# of Fibers	# of Fields	Fibers / mm2	Fibers / cc
02	1200	< 5.5	100	< 7.01	< .0023

Description: PCM
Location: G27
Comments:
Analyzed: Yes

Sample ID	Volume (L)	# of Fibers	# of Fields	Fibers / mm2	Fibers / cc
03	1200	< 5.5	100	< 7.01	< .0023

Description: PCM
Location: 1st Fl. Courtroom #2
Comments:
Analyzed: Yes

Sample ID	Volume (L)	# of Fibers	# of Fields	Fibers / mm2	Fibers / cc
04	1200	< 5.5	100	< 7.01	< .0023

Description: PCM
Location: 1st Fl. Bar Association Entry Lounge
Comments:
Analyzed: Yes

Sample ID	Volume (L)	# of Fibers	# of Fields	Fibers / mm2	Fibers / cc
05	1200	< 5.5	100	< 7.01	< .0023

Description: PCM
Location: 204
Comments:
Analyzed: Yes

ProScience Analytical Services, Inc. PCM Report

Client Name: Atlas Technical Consultants, LLC - Woburn
PO #: N/A
Client Project #: N/A
Client Reference: Springfield District Court
Method: NIOSH 7400 Issue 3

Batch: **A128499**
Date Sampled: 10/2/2021
Date Received: 10/3/2021
Date Analyzed: 10/5/2021
Date of Report: 10/5/2021

Sample ID	Volume (L)	# of Fibers	# of Fields	Fibers / mm2	Fibers / cc
06	1200	< 5.5	100	< 7.01	< .0023

Description: PCM
Location: 2nd Fl. Courtroom 10
Comments:
Analyzed: Yes

Sample ID	Volume (L)	# of Fibers	# of Fields	Fibers / mm2	Fibers / cc
07	1200	< 5.5	100	< 7.01	< .0023

Description: PCM
Location: 3rd Fl. Superior Courtroom #1
Comments:
Analyzed: Yes

Sample ID	Volume (L)	# of Fibers	# of Fields	Fibers / mm2	Fibers / cc
08	1200	< 5.5	100	< 7.01	< .0023

Description: PCM
Location: 317 Lobby
Comments:
Analyzed: Yes

Sample ID	Volume (L)	# of Fibers	# of Fields	Fibers / mm2	Fibers / cc
09	1200	< 5.5	100	< 7.01	< .0023

Description: PCM
Location: 423
Comments:
Analyzed: Yes

Sample ID	Volume (L)	# of Fibers	# of Fields	Fibers / mm2	Fibers / cc
10	1200	< 5.5	100	< 7.01	< .0023

Description: PCM
Location: 4th Fl. Probate Courtroom #1
Comments:
Analyzed: Yes

Note: To create a unique lab sample ID, use the Batch # and the Sample ID (example: [Batch #] - [Sample ID]).

Analyst: Mark Derosier

AIR QUALITY REPORT Analysis Niosh 7400 24TAT ~~AT18868~~ A128499

Client/Project No.: _____ Date of Collection: 10-2-21 Date of Analysis: 10-5-21

Job Site: 50 State St, Woburn, MA Project Manager: _____ On-Site Contact: _____

Work Area: Throughout Analyst Signature: _____ Analyst License Number: _____

Collected by: _____ Method of Analysis: NIOSH 7400 Microscope Make: Olympus

Signature: _____ Microscope Number: _____ Batch Number: _____

Sample No.	LOCATION	Sample Type	Pump On	Pump Off	Rotometer (LPM)		Rate	Time	Air Volume	L.O.D.	Actual Count	Adjusted Count	Result	Analyst Initials
		(1-9)	(2400)	(2400)	On	Off	(LPM)	(Min)	(Liters)	2.7/V	(/100)	(/100)	(F/CC)	
~~01~~	~~Field Blank~~	------	-----	-----	----	----	----	----	-----	-----				
~~02~~	~~Field Blank~~	------	-----	-----	----	----	----	----	-----	-----				
01	Snack Bar basement	1	1300	1420	15	15	15	80	1200		10	5		
02	G27	1	1300	1420	15	15	15	80	1200		Ø	Ø		
03	1st fl Courtroom #2	1	1305	1425	15	15	15	80	1200		Ø	Ø		
04	1st fl Bar association entry lounge	1	1305	1425	15	15	15	80	1200		Ø	Ø		
05	204	1	1310	1430	15	15	15	80	1200		Ø	Ø		
06	~~2nd~~ 2nd floor Courtroom 10	1	1430	1550	15	15	15	80	1200		Ø	Ø		
07	3rd fl Superior Courtroom #1	1	1430	1550	15	15	15	80	1200		Ø	Ø		
08	317 lobby	1	1435	1555	15	15	15	80	1200		Ø	Ø		
09	423	1	1435	1555	15	15	15	80	1200		Ø	Ø		
10	4th fl Probate Courtroom #1	1	1440	1600	15	15	15	80	1200		Ø	Ø		

Work Phase: 1) Background 2) Pre Abatement 3) During Prep Work 4) During Removal 5) During Final Clean 6) During Glovebag Removal 7) Final Air Clearance 8) Personal Air Sample 9) Associated Work

Rotometer Number: ATC08 Calibration Date: 10-31-20 Relinquished By: _____ Received By: _____

NOTE: The ATC Associates Inc. Lab meets the requirements set forth by AHERA 40 CFR 763.90 (i) (2) (ii). PCM FILTERS ARE 25MM MCE.

NIOSH 7400 Method Limit of Detection is 7.0 fibers per millimeter squared (7.0 f/mm²).

10 State Street, Suite 100
Woburn, MA 01801
Telephone 781-932-9400
Fax 781-932-6211

A 128499

ProScience *Analytical Services, Inc.*

www.proscience.net
22 Cummings Park, Woburn, MA 01801 T: 781-935-3212 F: 781-932-4857 general@proscience.net

TAT (Circle) Rush 12h (24h) 48h 3d 4d 5d Other

TEM
Chain of Custody
ver 3.1 Updated 7/11/11

Off-hours work is available but subject to PASI approval and surcharges.

PASI Batch #
~~A 18606~~
A 128499

Client	
Name	Atlas ATC
Address	16 State St, Woburn
Job #	
Job Name	Springfield district Court
PO #	

Contact	
Name	Patrick Desmarais
Phone/Fax	617-763-8610
Email	Patrick.desmarais@atlas.com

Results

Tel	Fax	Email	HC

Final Report

Email	Hard Copy

Analysis

Air		Water		Bulk	
AHERA Clearance Set		Drinking (EPA 100.2)		NOB	
AHERA Method (no set)		Waste (EPA 100.1)		Qualitative	
NIOSH ~~7402~~ 7400 (PCM Equiv.)	X	**Dust**		Soil	
ISO 10312 (direct)		ASTM D6480		**Stop 1st Pos**	
ISO 13794 (indirect)		ASTM D5755		Other in Comments	

Relinquished By	Patrick Desmarais	**Date / Time**	10/3/15 - 15:00
Received By	Kathy Artone	**Date / Time**	10-3-15 @ 6:10pm (Sunday)
Relinquished By		**Date / Time**	
Received By		**Date / Time**	

Sample ID	Description	Type In, Out, Blk, Pnl, Area	Location / Date & Time Collected	Volume or Area	Comments
C1	Snack bar basement	Area	16 State St	Dcc	
02	27				
C3	1st fl Courtroom #2				
C4	1st fl bar association room entry, hallway				
C5	2nd 4				
C6	2nd fl ~~Superior~~ Courtroom #10				
C7	~~317 lobby~~ 3rd fl Superior Courtroom #1				
C8	~~423~~ 317 lobby				
C9	423				
10	4th fl Probate Courtroom				

Appendix F

Infrared Roof Survey – Hall of Justice

PROSCAN®
INFRARED TECHNOLOGIES

INFRARED ROOF MOISTURE SURVEY

HAMPDEN COUNTY HALL OF JUSTICE
Springfield, MA

Prepared for:

Habeeb & Associates Architects
Norwell, MA

Survey Date: November 17, 2021

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I. Introduction

Non-Invasive Roof Moisture Surveys

Because of the many potential problems associated with entrapped moisture, good roofing practice requires that wet roof materials, when found, be removed and replaced with new dry materials. Periodic roof moisture surveys are an effective means of detecting moisture damage in the roof components and of defining small problems that can be repaired before they involve large areas of the roof, potentially adding years to the serviceable life of the roof system.

Two *non-invasive* procedures are available for detecting areas of moisture damage in almost any type of flat roof. These procedures utilize infrared thermal imaging cameras and nuclear moisture/density gauges to detect moisture beneath the surface of the roof, particularly in the insulation layer beneath the membrane. Used together, infrared and nuclear surveys are fast and cost-effective means of developing a detailed and accurate moisture profile of the roof.

Entrapped moisture may be detected by analyzing roof surface temperature patterns with an infrared camera at night. During the day, the roof absorbs heat energy from sunlight, passing a portion of this energy into the insulation beneath the membrane. As the sun sets and the roof begins to cool, dry insulation or roof board, which consists mostly of air, cools relatively quickly while the wet component stays warm later into the evening. Heat stored by the wet material is conducted to the roof's surface, creating warm areas that can be detected with an infrared camera.

Not all warm areas on the roof are caused by moisture. Heat discharged by mechanical equipment, variations in interior temperature and differential exposure to sunlight may cause temperature differences that are unrelated to moisture. As part of a properly conducted moisture survey, a nuclear moisture/density gauge is used to conduct further testing in such areas. The nuclear gauge operates by emitting a signal from a low-level radioactive source that reacts to the presence of moisture without piercing the roof. As the nuclear gauge does not rely on temperature variations to detect moisture, it is also used to cross check results obtained with the infrared camera, thereby limiting the number of invasive test cuts required to confirm our results and reducing the likelihood of false positives. *Nuclear gauge testing is also the only viable method of moisture testing stone ballasted membrane roofs.*

In the final stage of the roof moisture survey, confirmed wet areas are outlined on the roof with marking paint, measured, photographed and plotted on a diagram of the roof. The information presented in this report is intended to help establish an appropriate roofing application and may serve as the basis for bid comparison for any needed moisture related replacement work.

II. Purpose & Scope of Work

In response to a request by Habeeb & Associates, Proscan technicians conducted an infrared roof moisture survey at the Roderick L. Ireland Hampden County Hall of Justice, located at 50 State Street in Springfield, MA. The purpose of the survey was to detect the locations and extent of moisture damage to the insulation layer or other components beneath the roof membrane using non-invasive test procedures.

Moisture entrapped within the roofing materials may lead to one or more of the following problems:

- Structural degradation of the roof and other building components
- Increased weight load to the roof structure
- Increased energy losses
- Mold and insect infestation
- Interior damage due to roof leaks
- Reduced serviceable life of the roof

Wet roof materials identified by our survey should therefore be removed and replaced with new dry materials in conjunction with roof maintenance, repair or replacement.

The infrared survey was conducted during late afternoon and evening hours on November 17, 2021 and included all areas of the main roof, mechanical penthouse and four stairwell penthouses. Total area scanned was approximately 53,000 square feet of TPO membrane roofing in five roof sections.

III. Equipment & Procedure

Equipment utilized for the survey consisted of a FLIR Model PM360 High Resolution Thermal Imaging Camera operating in the short-wave spectrum (best for roof testing), sensitive to a temperature differential of 0.1° F, and a Troxler Model 3216 Nuclear Moisture/Density Gauge. The infrared camera was used to scan the entire roof to detect thermal anomalies potentially indicating the presence of sub-surface moisture. The nuclear gauge was used to cross-check the results obtained with the infrared camera, and to test areas of the roof where conditions such as those described in the *Introductio*n limited the utility of the infrared camera. Where either the nuclear gauge or infrared camera indicated the presence of moisture, the location was marked on the roof, measured, photographed and plotted on a roof diagram.

To the extent possible, our scanning and reporting procedures are conducted in accordance with ASTM C1153-10-R2015 *(Standard Practice for Location of Wet Insulation in Roofing Systems using Infrared Imaging).*

IV. Environment

The following environmental information is provided in compliance with the *Standard* referenced above:

Weather conditions for the infrared scan were acceptable, with daytime high temperature at 48° F and clear sky during the day and evening. Nighttime low temperature during the survey was 43° F, with wind at 5-10 mph. There was no precipitation during the 24-hour period preceding the survey, and there were no areas of standing water on the roof; nor was there any stored material, debris or other objects limiting access to any roof area for scanning.

V. Summary of Results:

The results of our survey are shown in detail on the roof diagram in the next section of this report. The term *wet areas* refers to locations where thermal imaging and/or nuclear gauge testing results were consistent with the presence of moisture in the roof's components.

The following is a summary of our findings:

- Our survey detected thermal anomalies indicating the presence of sub-surface moisture in nine locations on the main roof (Roof A). Wet areas range in size from 9 square feet to 396 square feet and affect a total combined area of 1,039 square feet, or about 2 percent of the total of all areas tested. All other areas of the main roof appeared dry to both the infrared camera and nuclear gauge. No wet areas were found on any of the penthouses.
- One wet area (A9) exhibited an open membrane seam, a likely cause of moisture damage at that location. The defect is circled within the wet area and shown in the photo accompanying the roof diagram. No obvious physical defects were noted in the other wet locations.
- Nuclear gauge readings in the areas that appeared wet to the infrared camera were recorded and compared with baseline (dry) readings in other locations: higher readings generally indicate higher levels of moisture. Baseline readings for the main roof were between 13 and 21. Nuclear readings in the wet areas ranged between 24 and 44, indicating varying moisture levels.
- All of the areas where moisture is indicated were soft when walked on, indicating wet or disintegrated gypsum roof board under the membrane. It is not clear if the moisture in these areas extends into the insulation layer beneath the roof board, or if any of the areas are associated with reported leaks within the building. Further investigation via

core sample test cuts will be required to determine if there is moisture in the insulation layer or on the roof deck. No core samples, moisture probes or other invasive procedures were conducted by our technicians.

All wet areas are marked on the roof with weather-resistant orange spray paint.

The Wet Area Chart accompanying the roof diagram shows the overall dimensions and actual size of each wet area, as well as dry and wet nuclear gauge readings. Infrared thermal images and reference photos of the wet areas are provided in the Photo Section following the roof diagram.

The above figures represent the actual dimensions of wet areas as they are marked on the roof and shown on the diagram. For replacement purposes, each area should be expanded somewhat beyond its spray-painted boundaries in order to include any moisture migration that may occur prior to replacement work. Where appropriate, areas will also be simplified in shape in order to tie into existing roofing. The final replacement figure will therefore be somewhat larger, typically by 10-25 percent for most roofs.

For future reference, it should be noted that roof leaks may occur as a result of many different causes, including membrane defects such as small tears or punctures, improper sealing of equipment penetrations and defective equipment or wall flashings. Unless these defects cause the insulation layer or other materials under the membrane to become wet, it is unlikely that infrared or nuclear surveys will be useful in locating moisture or resolving leaks. This report is intended to provide information as to the current locations and extent of moisture damaged materials. While locating wet material often helps to resolve leaks, infrared and nuclear surveys are not guaranteed to determine the source or cause of any roof leak.

Once moisture penetration of the roof components occurs, it is likely to spread. Infrared and nuclear surveys are effective means of identifying small moisture problems before they involve large areas of the roof, resulting in potential moisture damage and costly replacement. Consideration should be given to performing moisture surveys on a regular basis, typically every three years during the warranty period and every year thereafter in order to extend the potential serviceable life of the roof.

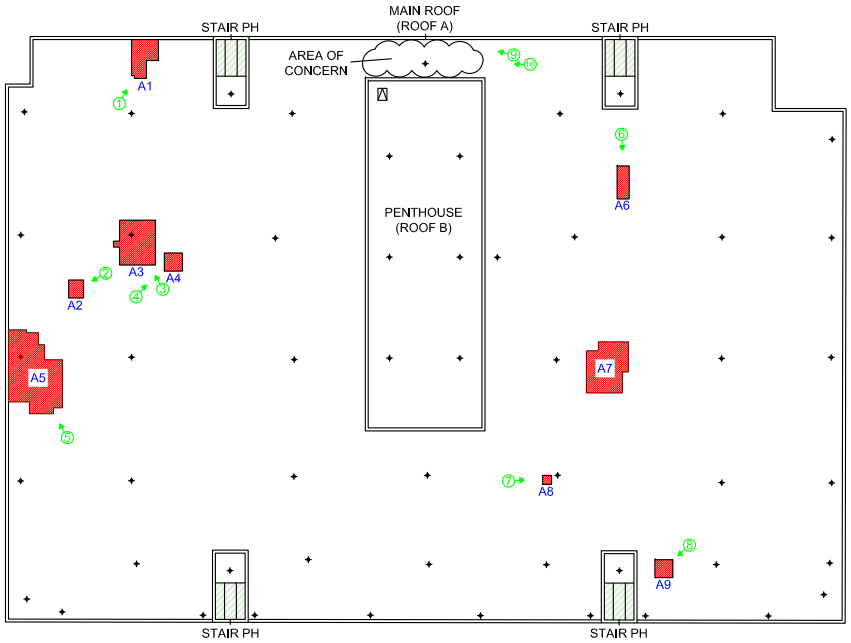
OPEN SEAM FOUND WITHIN AREA A9

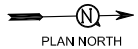
WET AREA CHART			
AREA #	OVERALL DIMENSIONS	ACTUAL SQ.FT.	NUCLEAR GAUGE READING(S)
A1	9' X 13'	92	24
A2	5' X 6'	30	31
A3	14' X 15'	184	23-30
A4	6' X 6'	36	28
A5	18' X 28'	396	23-44
A6	4' X 11'	44	24-33
A7	14' X 17'	212	23-30
A8	3' X 3'	9	31
*A9	6' X 6'	36	34

*INDICATES THAT A MEMBRANE PUNCTURE OR DEFECT WAS NOTED WITHIN THE WET AREA.

MOISTURE SURVEY RESULTS					
ROOF SECTION & TYPE	APPROX. SIZE (SF)*	NUMBER OF WET AREAS	AREA WET (SF)**	PERCENTAGE WET	NUCLEAR GAUGE BASELINE(DRY) READINGS
ROOF A (TPO)	48,000	9	1,039	2.2%	13-21
ROOF B (TPO)	4,500	0	0	0%	10-15
STAIRWELL PENTHOUSES (TPO)	400	0	0	0%	13-21
TOTAL SCANNED	52,900	9	1,039	2.0%	-

*ROOF SIZE IS APPROXIMATE AND IS PROVIDED SOLELY TO SHOW AMOUNT OF MOISTURE DAMAGE AS A PERCENTAGE OF THE ENTIRE ROOF AREA. CONTRACTORS ARE RESPONSIBLE FOR THEIR OWN MEASUREMENTS.
**FIGURES SHOWN ON THIS CHART REPRESENT THE ACTUAL DIMENSIONS OF WET AREAS AS MARKED ON THE ROOF AND SHOWN IN THIS DRAWING. FINAL REPLACEMENT FIGURES(SQUARED OFF DIMENSIONS) WILL BE HIGHER.





NOTE:

ALL AREAS WHERE MOISTURE WAS INDICATED WERE SOFT WHEN WALKED ON, TYPICAL OF DAMP OR WET GYPSUM BASED COVERBOARD.

INFRARED ROOF MOISTURE SURVEY

HAMPDEN COUNTY HALL OF JUSTICE
50 STATE ST.
SPRINGFIELD, MA

LEGEND:

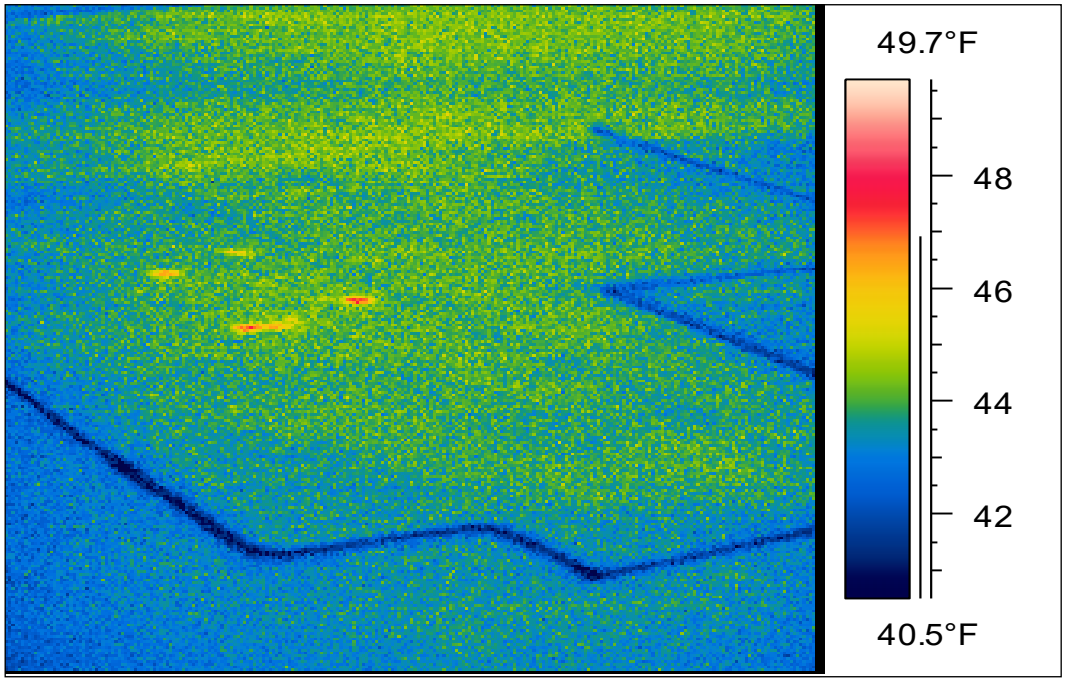
- MOISTURE INDICATED
- GLASS ROOF
- ROOF DRAIN
- ROOF HATCH
- PHOTO ORIENTATION

SHEET	1 OF 1	DATE	11/17/2021
SCALE	NO SCALE		

0 REFERENCE 40'

PROSCAN INFRARED TECHNOLOGIES
AMESBURY, MASSACHUSETTS 01913
(978) 388-5155 proscan@comcast.net

HAMPDEN COUNTY HALL OF JUSTICE
INFRARED THERMAL IMAGES
See accompanying roof plan for photo location

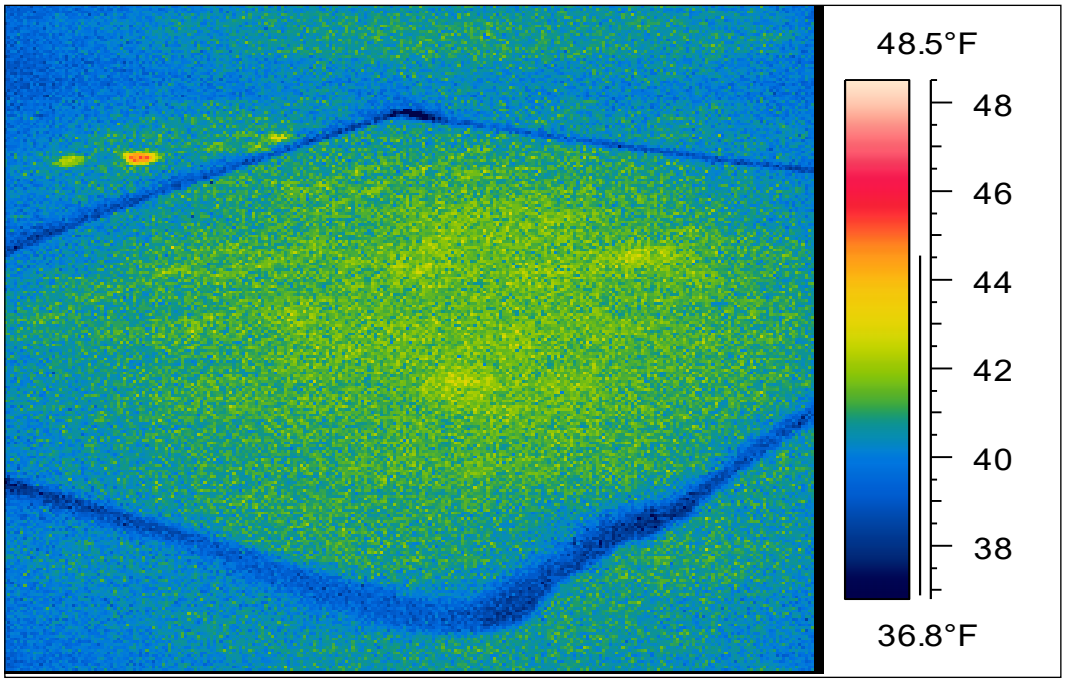


1

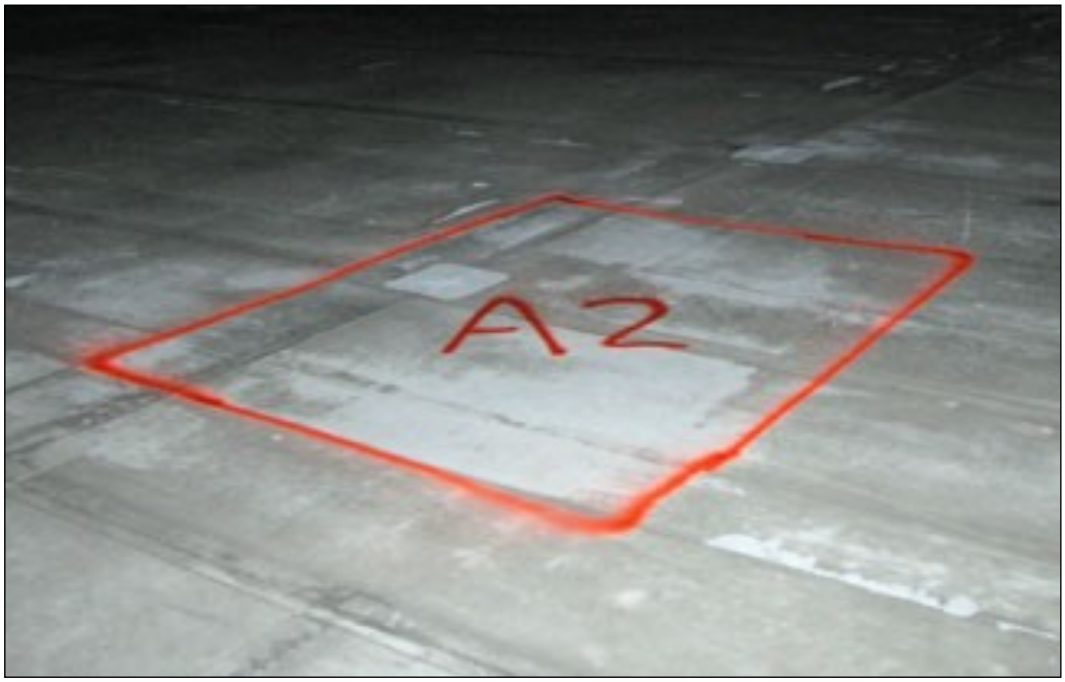
The above thermal image is of Area A1 along the west wall of the main roof (Roof A). *Blue* areas in this and the following images are dry, while objects such as drains, mechanical equipment and masonry may appear warmer without containing moisture. The boundaries of wet areas are marked with orange spray paint, shown in the photo below.

Reference Photo

HAMPDEN COUNTY HALL OF JUSTICE
INFRARED THERMAL IMAGES
See accompanying roof plan for photo location

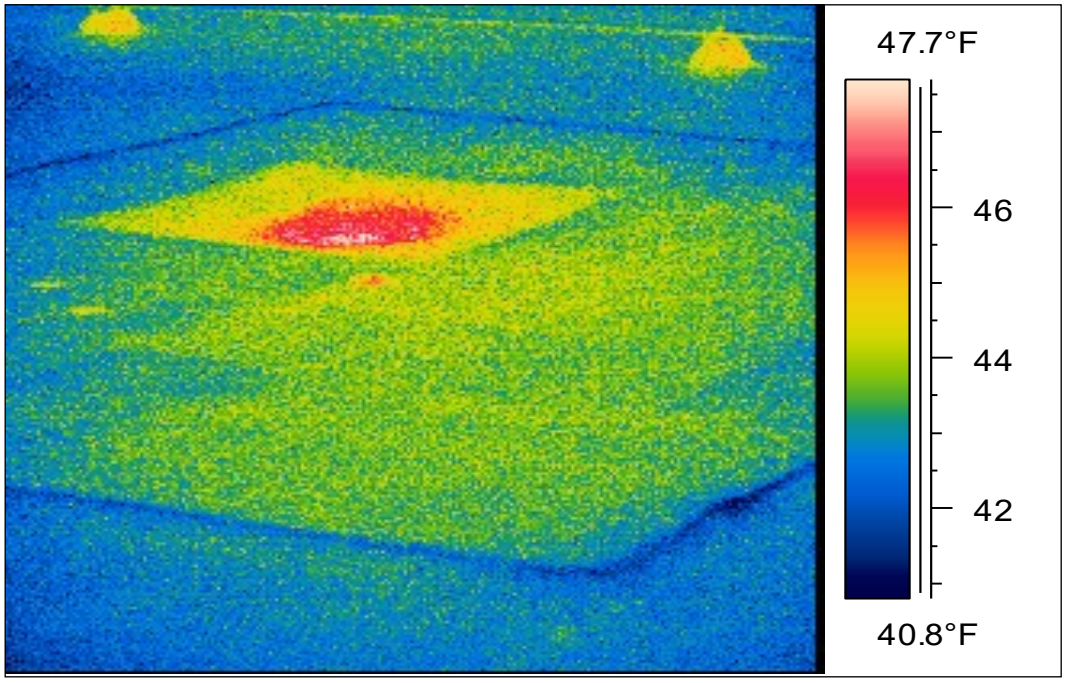


2
Thermal image of Area A2 on the south side of the main roof.



Reference Photo

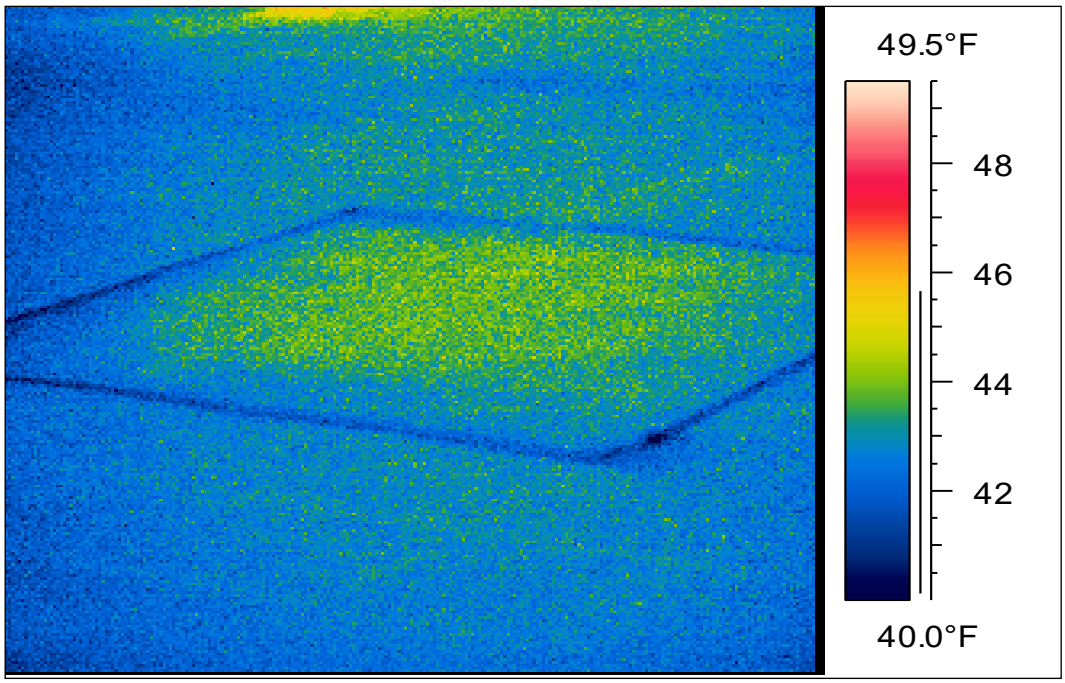
HAMPDEN COUNTY HALL OF JUSTICE
INFRARED THERMAL IMAGES
See accompanying roof plan for photo location



3
Thermal image of Area A3 around a roof drain on the south side of the main roof.

Reference Photo

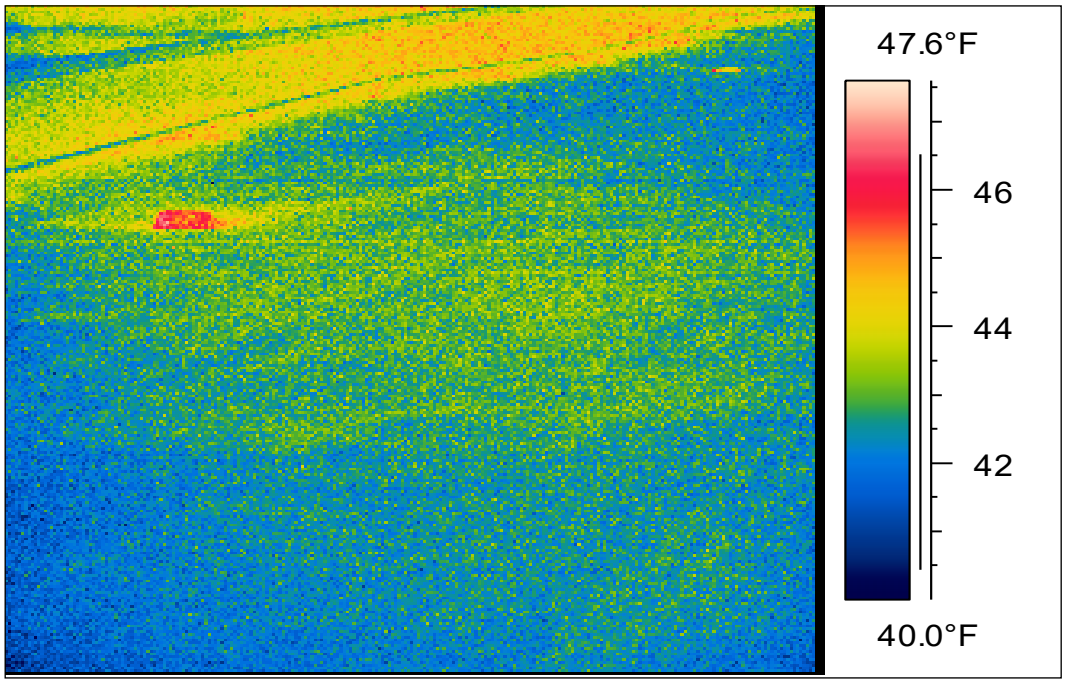
HAMPDEN COUNTY HALL OF JUSTICE
INFRARED THERMAL IMAGES
See accompanying roof plan for photo location



4
Thermal image of Area A4 on the south side of the main roof .

Reference Photo

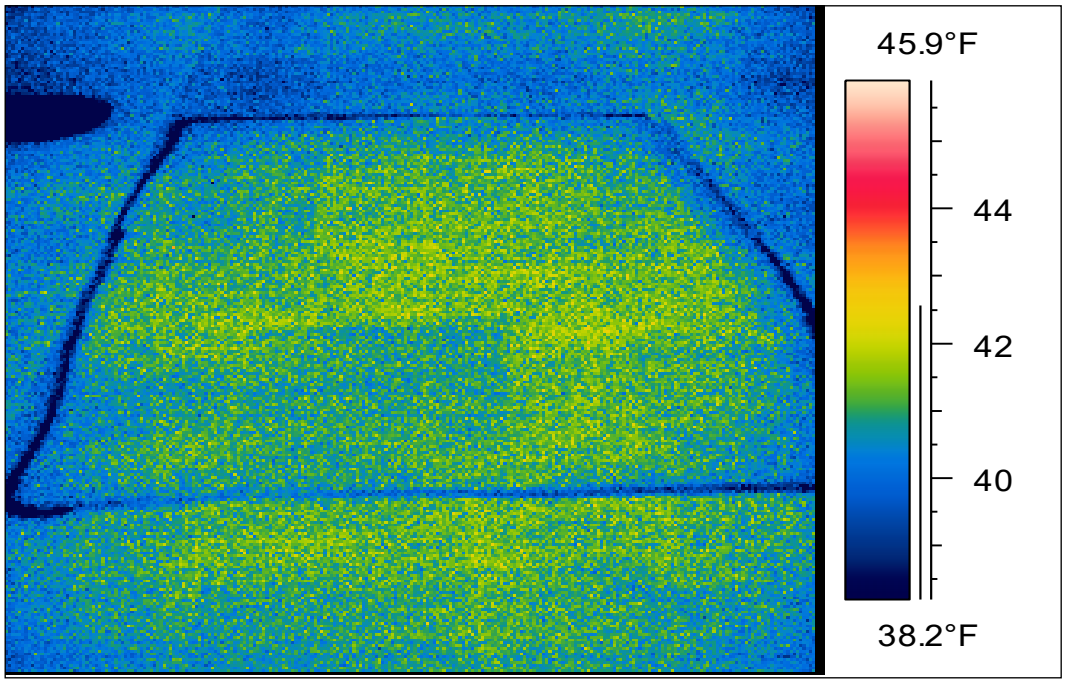
HAMPDEN COUNTY HALL OF JUSTICE
INFRARED THERMAL IMAGES
See accompanying roof plan for photo location



5
Thermal image of the Area A5 along the south edge of the main roof .

Reference Photo

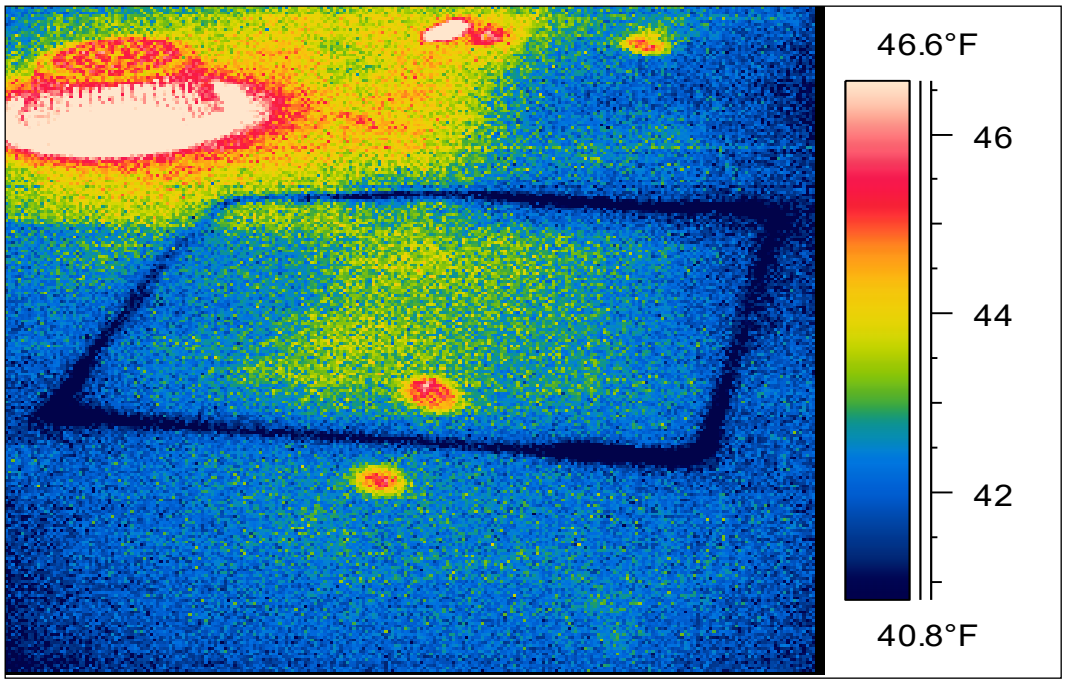
HAMPDEN COUNTY HALL OF JUSTICE
INFRARED THERMAL IMAGES
See accompanying roof plan for photo location



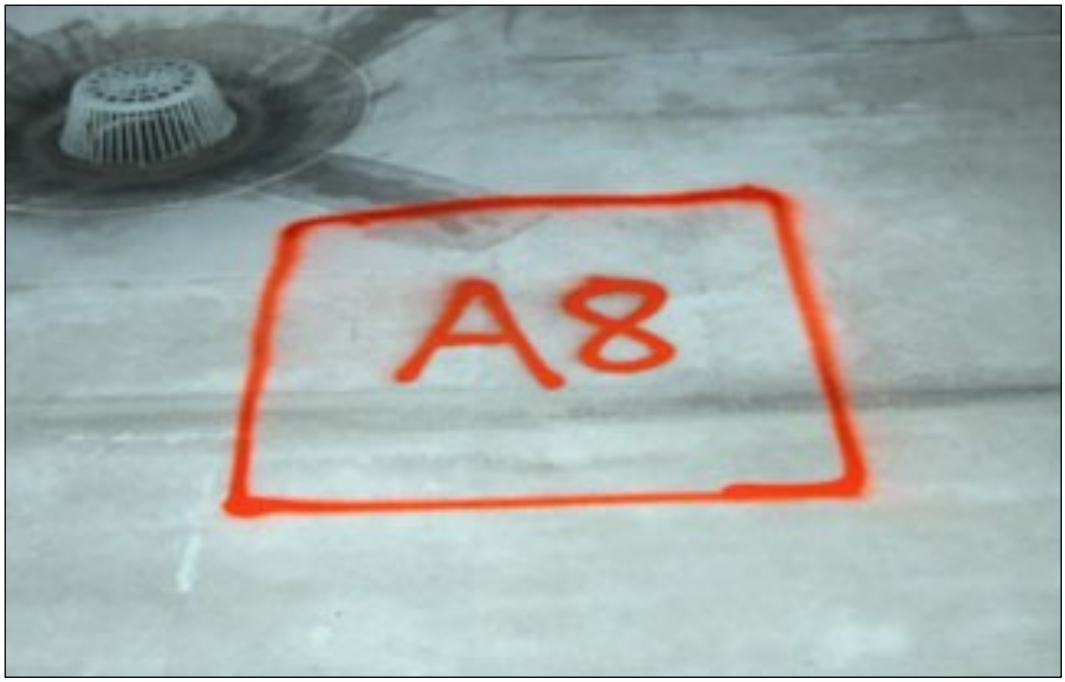
6
Thermal image of Area A6 on the north side of the main roof.

Reference Photo

HAMPDEN COUNTY HALL OF JUSTICE
INFRARED THERMAL IMAGES
See accompanying roof plan for photo location

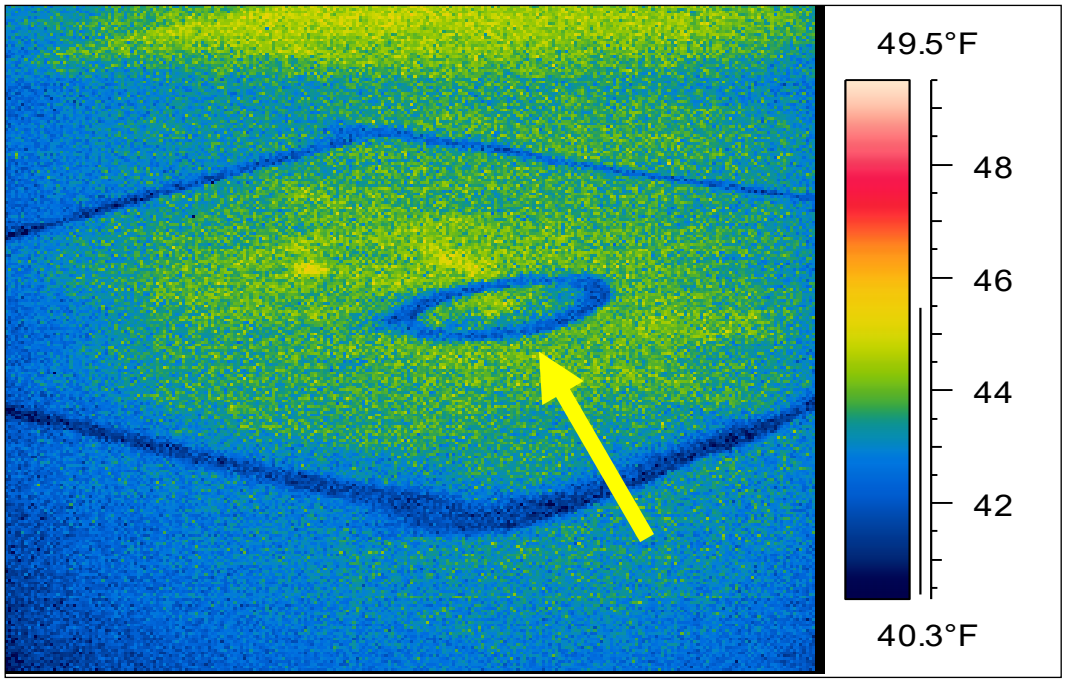


7
Thermal image of Area A8 by a roof drain on the north side of the main roof.



Reference Photo

HAMPDEN COUNTY HALL OF JUSTICE
INFRARED THERMAL IMAGES
See accompanying roof plan for photo location

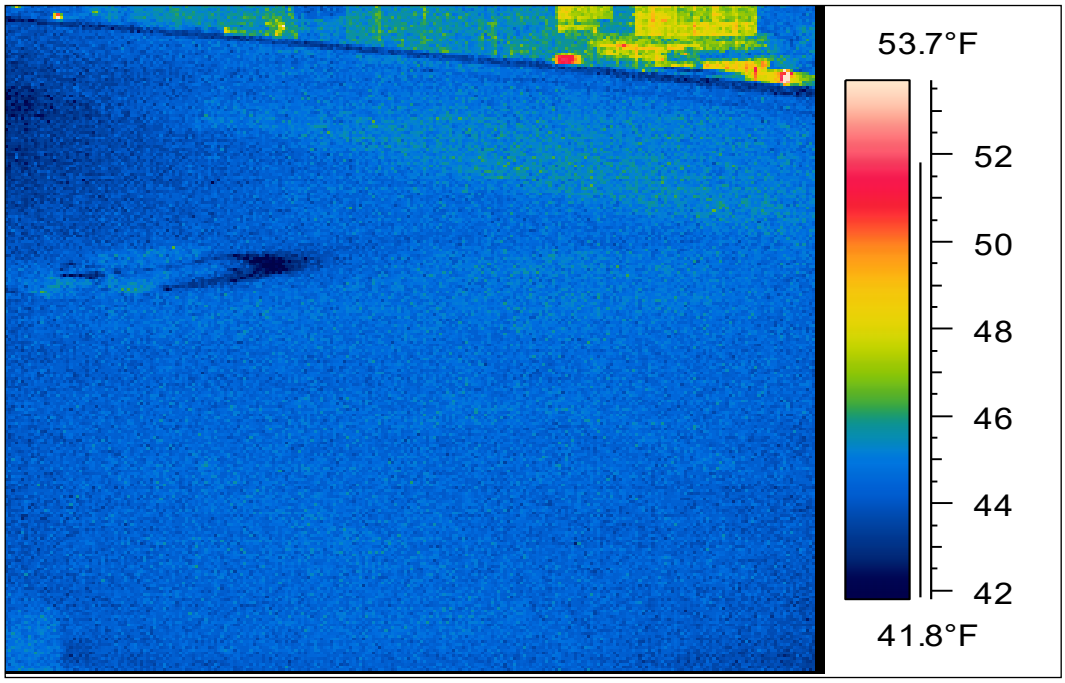


8

Thermal image of Area A9 by the stairwell penthouse on the NE side of the main roof. An open seam was found and circled within the area, shown in the photo below.

Reference Photo

HAMPDEN COUNTY HALL OF JUSTICE
INFRARED THERMAL IMAGES
See accompanying roof plan for photo location



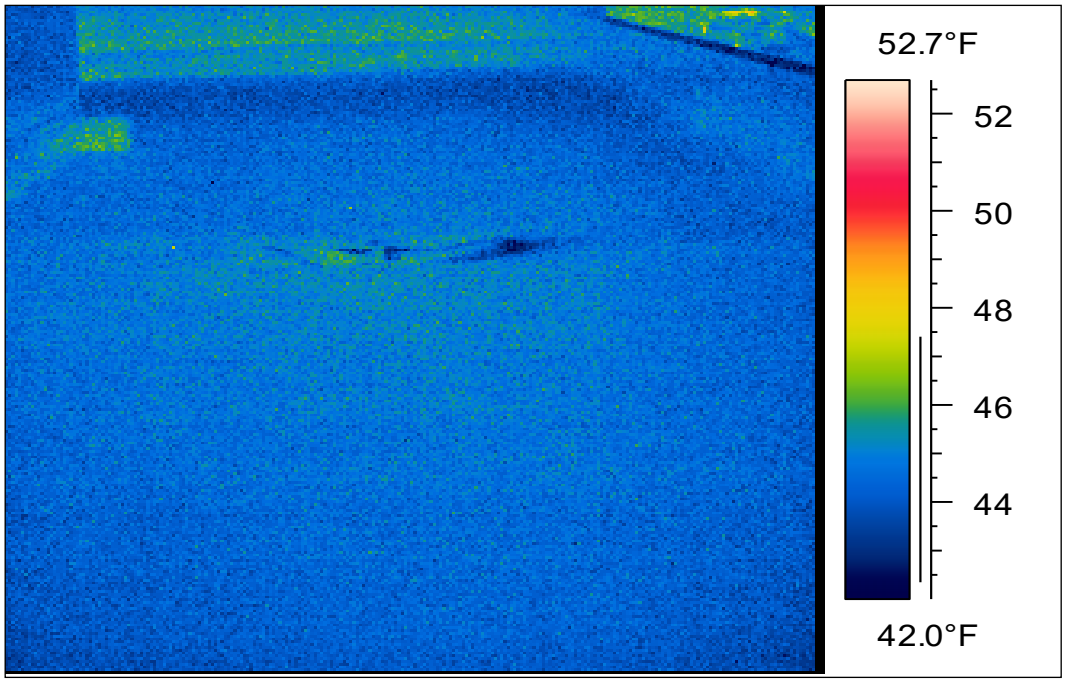
9

Thermal image of the area of concern between the penthouse (Roof B) and the west edge of the main roof.

No nuclear or thermal anomalies were detected in this area.

Reference Photo

HAMPDEN COUNTY HALL OF JUSTICE
INFRARED THERMAL IMAGES
See accompanying roof plan for photo location



10
Another thermal image of the area of concern
No nuclear or thermal anomalies were detected in this area.

Reference Photo

Appendix G

Recommendation Summary and Cost Estimate

Recommendation	Qty	Unit	Unit Cost	Direct Trade Cost	Priority 1	Priority 2	Priority 3	Totals
HALL OF JUSTICE								
Building Envelope and Interiors								
1. Replace roof system in its entirety.	52,800	SF	36.40	1,921,920	1,921,920			1,921,920
2. Replace all windows and associated sealants.	19,500	SF	143.00	2,788,500	2,788,500			2,788,500
3. Replace all exterior hollow metal doors and frames. (17 single and 4 double)	1	LS	79,170.00	79,170	79,170			79,170
4. Replace storefront at main entry.	145	SF	136.50	19,793	19,793			19,793
5. Perform investigation of plaza leaks below grass/sidewalk overburden.	1	LS	25,000.00	25,000		25,000		25,000
6. Repair spalled, deteriorated concrete framing above parking garage (below plaza).	50	SF	234.00	11,700		11,700		11,700
7. Replace ceiling tiles throughout the building to accommodate MEP work.	245,000	SF	7.80	1,911,000	1,911,000			1,911,000
8. Replace carpet throughout the building.	19,000	SY	78.00	1,482,000	1,482,000			1,482,000
9. Scrape, prime and recoat peeling paint in stairwells due to leaks.	22,500	SF	3.25	73,125	73,125			73,125
10. Repair damaged gypsum wall board finishes at leak locations.	2,000	SF	20.80	41,600	41,600			41,600
11. Repaint walls throughout the building.	245,000	SF	2.75	673,750	673,750			673,750

Recommendation	Qty	Unit	Unit Cost	Direct Trade Cost	Priority 1	Priority 2	Priority 3	Totals
HALL OF JUSTICE								
Fire Protection								
1. Extend sprinkler protection to provide complete coverage throughout building.	245,000	SF	5.50	1,347,500	1,347,500			1,347,500
2. Provide zone control valve assemblies at each floor level of a stairwell to zone sprinkler protection by floor.	20	EA	3,250.00	65,000	65,000			65,000
3. Provide drain risers from the zone control valve assemblies to drain down to the exterior of the building at each stairwell.	4	EA	12,000.00	48,000	48,000			48,000
Plumbing								
1. Replace corroded portions of 6" water main from street to the BFP.	60	LF	455.00	27,300	27,300			27,300
2. Replace 80-gallon electric water heaters if affected by corroded pipe (depends on when pipe is replaced).	2	EA	39,000.00	78,000		78,000		78,000
3. Replace segments of 5" corroded underground sanitary pipe.	40	LF	325.00	13,000	13,000			13,000
4. Replace all failed floor drains in the building.	4	EA	2,600.00	10,400	10,400			10,400
5. Extend 3/4" hot water recirculation loops.	600	LF	52.00	31,200		31,200		31,200
6. Replace one hot water recirculation pump with duplex variable speed pumps.	1	EA	9,750.00	9,750		9,750		9,750
7. Add insulation to piping under ADA lavatories.	1	LS	26,000.00	26,000	26,000			26,000

Recommendation	Qty	Unit	Unit Cost	Direct Trade Cost	Priority 1	Priority 2	Priority 3	Totals
HALL OF JUSTICE								
Mechanical								
1. Replace all perimeter fan coil units and add to new control system.	215	EA	5,850.00	1,257,750	1,257,750			1,257,750
2. Replace all constant volume boxes (preference to replace with VAV boxes) includes new controls.	224	EA	5,200.00	1,164,800	1,164,800			1,164,800
3. Replace all hot water reheat coils and add to new control system.	207	EA	8,775.00	1,816,425	1,816,425			1,816,425
4. Replace or retrocommission electric heating coils and add to new control system.	170	EA	2,600.00	442,000	442,000			442,000
5. Replace pneumatic control system with new full DDC building management system.	245,000	SF	9.75	2,388,750	2,388,750			2,388,750
6. Maintain chilled water system and replace when needed - replace control system to integrate to new BMS.	820	TON	2,600.00	2,132,000			2,132,000	2,132,000
7. Replace air handlers and provide new controls.	250,000	CFM	26.00	6,500,000	6,500,000			6,500,000
8. Clean and coat ductwork.	245,000	SF	0.46	111,475	111,475			111,475
9. Clean diffusers and return grilles.	245,000	SF	0.33	79,625	79,625			79,625
10. Clean air handling unit coils and drain pans.	1	LS	13,000.00	13,000	13,000			13,000
11. Remove abandoned equipment from existing air handling units (1 electric reheat coil, one electric bi-polar ionization devise and one roll filter for each AHU) - four AHU's total.	4	EA	3,250.00	13,000	13,000			13,000
12. Replace AC-1 Water Coil.	1	EA	9,750.00	9,750	9,750			9,750
13. Replace heating system in the garage with new equipment and all new insulated pipe. Add to new control system.	1	LS	39,000.00	39,000	39,000			39,000

Recommendation	Qty	Unit	Unit Cost	Direct Trade Cost	Priority 1	Priority 2	Priority 3	Totals
HALL OF JUSTICE								
14. Install bi-polar ionization devices in the ductwork for enhanced Indoor Air Quality (IAQ).	1	LS	97,500.00	97,500			97,500	97,500
15. Replace malfunctional exhaust fans and add to new control system.	6	EA	6,500.00	39,000	39,000			39,000
Electrical								
1. Upgrade lighting controls.	245,000	SF	3.90	955,500	955,500			955,500
2. Provide electrical portion of work related to electric reheats in HVAC system. Determine if reduction in service size will affect reuse of electric heating coils.	245,000	SF	10.40	2,548,000	2,548,000			2,548,000
3. Provide new surface mounted conduit and new wiring to all equipment and lights in the garage.	27,000	SF	9.10	245,700		245,700		245,700

Recommendation	Qty	Unit	Unit Cost	Direct Trade Cost	Priority 1	Priority 2	Priority 3	Totals
								HALL OF JUSTICE
Cost Estimate Totals								
Total - Direct Trade Cost					27,906,133	401,350	2,229,500	30,536,983
Estimating Contingency 10%					2,790,614	40,135	222,950	3,053,699
Escalation 16.26%					4,537,538	65,260	362,517	4,965,315
General Conditions 14%					3,906,859	56,189	312,130	4,275,178
CM Fees 3%					837,184	12,041	66,885	916,110
CM Contingency 2%					558,123	8,027	44,590	610,740
Estimated Construction Cost					**40,536,451**	**583,002**	**3,238,572**	**44,358,025**
Premium for phased work (5 phases; 5-year construction period)								6,000,000
Premium for 2nd shift								2,700,000
Total Estimated Construction Cost								**53,058,025**

Recommendation	Qty	Unit	Unit Cost	Direct Trade Cost	Priority 1	Priority 2	Priority 3	Totals
								HALL OF JUSTICE
Alternate #1: Replace all ductwork								
A-1: Replace ductwork throughout building	245,000	SF	17.50	4,287,500	4,287,500			4,287,500
A-2: Delete mechanical line items #8 and #9	245,000	SF	-0.78	-191,100	-191,100			-191,100
A-3: Replace lighting throughout the building	245,000	SF	10.50	2,572,500	2,572,500			2,572,500
Total - Direct Trade Cost - Alternate #1					6,668,900			6,668,900
Estimating Contingency 10%					666,890			666,890
Escalation 16.26%					1,084,364			1,084,364
General Conditions 14%					933,646			933,646
CM Fees 3%					200,067			200,067
CM Contingency 2%					133,378			133,378
Alternate #1 Estimated Construction Cost					**9,687,245**			**9,687,245**
Estimated Construction Cost - including Alternate #1					**50,223,696**			**54,045,270**
Premium for phased work (5 phases; 5-year construction period)								6,000,000
Premium for 2nd shift								2,700,000
Total Estimated Construction Cost - including Alternate #1								**62,745,270**

Recommendation	Qty	Unit	Unit Cost	Total	Priority 1	Priority 2	Priority 3	Totals
JUVENILE AND HOUSING								
Building Envelope and Interiors								
1. Replace building roof system in its entirety, including large access hatch (3'x8').	16,120	SF	45.50	733,460	733,460			733,460
2. Replace tower roof system at belfry.	675	SF	58.50	39,488	39,488			39,488
3. Repair windows in tower; reattach to structure.	4	EA	455.00	1,820	1,820			1,820
4. Replace deteriorated wood and steel framing in tower belfry at 2 levels.	1,350	SF	23.40	31,590		31,590		31,590
5. Repair dented copper arch of tower, west elevation.	1	LS	975.00	975		975		975
6. Replace stained ceiling tiles in Room 301 below tower.	675	SF	13.00	8,775		8,775		8,775
7. Repoint isolated stone mortar joints throughout the façade, including entry stairs.	1,200	LF	32.50	39,000		39,000		39,000
8. Investigate source of moisture infiltration in basement. Determine groundwater levels, excavate around foundation to determine condition of foundation wall. Perform leak testing investigations as needed.	1	LS	100,000.00	100,000	100,000			100,000
9. Upon repair of basement infiltration, replace interior gypsum walls and ceilings.	14,800	SF	20.80	307,840		307,840		307,840
10. Replace spalled and damaged interior brick at basement walls.	500	SF	156.00	78,000		78,000		78,000

Recommendation	Qty	Unit	Unit Cost	Total	Priority 1	Priority 2	Priority 3	Totals
JUVENILE AND HOUSING								
Fire Protection								
1. Extend sprinkler protection to provide complete coverage throughout building.	48,900	SF	5.50	268,950	268,950			268,950
2. Remove and replace ceilings for MEP work.	48,900	SF	7.80	381,420	381,420			381,420
3. Provide zone control valve assembly at each floor level of stairwell to zone sprinkler protection by floor.	3	EA	3,250.00	9,750	9,750			9,750
4. Provide one drain riser from the zone control valve assemblies to drain down to the exterior of the building.	1	EA	12,000.00	12,000	12,000			12,000
Plumbing								
1. Replace and reslope portion of sanitary pipe that was not installed properly and is backing up into the building.	100	LF	325.00	32,500	32,500			32,500
2. Replace failed check valve on sanitary piping.	1	EA	9,750.00	9,750	9,750			9,750
3. Replace all failed floor drains in the building.	3	EA	2,600.00	7,800	7,800			7,800
4. Extend 3/4" hot water recirculation loops.	150	LF	52.00	7,800		7,800		7,800
5. Replace hot water recirculation pump with duplex variable speed pump.	1	EA	9,750.00	9,750		9,750		9,750
6. Add insulation to piping under ADA lavatories.	1	LS	9,750.00	9,750	9,750			9,750

Recommendation	Qty	Unit	Unit Cost	Total	Priority 1	Priority 2	Priority 3	Totals
JUVENILE AND HOUSING								
Mechanical								
1. Maintain heat pump system/equipment. In future, replace with 15 new water source heat pump air handlers (avg CFM=2110) with integration to BMS.	31,650	CFM	26.00	822,900		822,900		822,900
2. Maintain heating hot water system. In future, replace 5 base mounted pumps, 4 circulating pumps, 1 heat exchanger, 5 VFD's for base mounted pumps and integrate with BMS.	1	LS	195,000	195,000			195,000	195,000
3. Maintain DOAS units. In future, replace 3 rooftop DOAS units (hot water heating & packaged DX cooling) and integrate with BMS.	22,500	CFM	39.00	877,500	877,500			877,500
4. Maintain cooling tower system. In the future, replace with one-120 ton unit and integrate with BMS.	120	TON	650.00	78,000			78,000	78,000
5. Replace pneumatic control system with new full DDC building management system.	48,900	SF	9.75	476,775	476,775			476,775
6. Clean and coat ductwork.	48,900	SF	0.46	22,250	22,250			22,250
7. Clean diffusers and return grilles.	48,900	SF	0.33	15,893	15,893			15,893
8. Replace existing exhaust fans. Add to new BMS.	10	EA	6,500.00	65,000	65,000			65,000
9. Replace any existing perimeter fan coils not already replaced in 2021. Add all units to new BMS.	24	EA	5,850.00	140,400	140,400			140,400
10. Install bi-polar ionization devices in the ductwork for enhanced Indoor Air Quality (IAQ).	1	LS	32,500	32,500			32,500	32,500

Recommendation	Qty	Unit	Unit Cost	Total	Priority 1	Priority 2	Priority 3	Totals
JUVENILE AND HOUSING								
Electrical								
1. Upgrade lighting controls.	48,900	SF	3.90	190,710		190,710		190,710
2. Provide all new power distribution system to include new panels, wiring, conduit, etc.	48,900	SF	10.40	508,560		508,560		508,560
3. Replace 125KVA generator.	1	EA	97,500.00	97,500		97,500		97,500
Cost Estimate Totals								
Total - Direct Trade Cost					3,204,505	2,103,400	305,500	5,613,405
Estimating Contingency 10%					320,451	210,340	30,550	561,341
Escalation 16.26%					521,053	342,013	49,675	912,741
General Conditions 14%					448,631	294,476	42,770	785,877
CM Fees 3%					96,136	63,102	9,165	168,403
CM Contingency 2%					64,091	42,068	6,110	112,269
Total Estimated Construction Cost					**4,654,867**	**3,055,399**	**443,770**	**8,154,036**