KLEIN CONTRACTING CORPORATION

Submission

AT&T MIDTOWN CENTER

WORKMANSHIP

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W O R K M A N S H I P

TWO LIMITED ACCESS ROOF SYSTEMS, ONE A SKYSCRAPER, ONE A HIGH RISE, WITH A MYRIAD OF CHALLENGES.

The AT&T skyscraper and support building in midtown Atlanta are iconic, high profile and presented a bit of a quandary to reroof. The TWO freight elevators that serve the skyscraper only go to the 46th floor (the roof is on the 48th floor), the loading dock that serves both buildings is tiny and in use 24 hours a day, the support building hosts a data center that has additional security, power and work stoppage requirements. The **design build project** had to work two buildings each with active coal tar pitch as the base layer of IRMA roof systems. All this in addition to the usual ~ tight deadline, failing roof system with inadequate drainage, occupied with both people and sensitive equipment while respecting the budget needs of the client.

PROJECT BACKGROUND

A MYRIAD OF CHALLENGES:

* **Failing roof system with almost no roof access located over 600' in the air created a host of design challenges.**

* **Existing barrier layer was active cold tar pitch as the base layer of an IRMA system.**

* **Access to skyrise roof is limited to a narrow set of stairs too small to move people or material through efficiently.**

* **Buildings share a tiny loading dock in use 24 hrs which was the only location for material handling.**

* **Roofs host multiple pieces of equipment managed by multiple federal agencies.**

* **Buildings in use 24 hrs with perpetual traffic resulting from being a transportation AND communications hub in a congested city.**

IN SEPTEMBER OF 2015, WE WERE ASKED TO EVALUATE AT&T'S ICONIC MIDTOWN CENTER IN ATLANTA, GEORGIA.

The Tower (skyscraper), at 675 West Peachtree Street, is a building that has been fundamental to the Atlanta skyline for a generation. The high rise structure is over 600' tall. Completed in 1982, it serves as the regional headquarters of AT&T Southeast and is host to a major rail line stop within the ground floor.

The adjacent support building (Annex) is an eight story structure that hosts a data center with black out dates (work stoppage) to coincide with software updates, holidays, major sporting events, etc. for peak use times for high traffic data.

The project presented two interesting challenges. 1. Designing and installing roof systems that could, within budget, get AT&T a 20 yr NDL warranty and 2. Creating a value engineered solution to managing construction on TWO complicated facilities.

The project went under contract in early **September 2016** and was completed in **Feb 2017**, while maintaining a **perfect safety record**.

CONDITIONS

Both buildings were constructed in the early 1980's and both had the original IRMA roof systems. Both systems were failing and had a host of issues including changes in building codes, lack of drainage, lack of access, etc..

Skyscraper:

- Building stands over **600' tall**
- **42"parapet** wall
- Approximately **36,000SF**
- IRMA system included base of **coal tar pitch**, one layer of 2" extruded polystyrene insulation board, 24"x24" pavers
- **Coal tar installation**, caused a problem with limited adhesion to the concrete deck
- Pavers crumbling and unusable and weight over **22 TONS**
- Approximately **20 pieces of equipment** to be disassembled and removed
- Drainage was inadequate
- Access only through one narrow u-shaped staircase that can not support disposal or material handling
- Building only has **two freight elevators** that service all delivery and moving needs for all floors
- **Freight elevators go to the 46th floor** and the roof is located on the 48th floor
- **Multiple federal agencies** oversee equipment in use on the roof system.

Annex Building:

- Building stands over **95’ tall**
- **24”parapet** wall
- Approximately **71,600SF**
- IRMA system included base of **coal tar pitch,** one layer of 2” extruded polystyrene insulation board, 3” river rock ballast
- **Coal tar installation,** caused a problem with limited adhesion to the concrete deck
- **Water** was found **below the coal tar** membrane.
- Multiple roof systems at **different elevations** within the footprint
- **Access** through a set of **doors located in the lowest roof system** and designed to service the **enormous amount of cooling tower equipment**.
- Building(like the Tower) only has **two freight elevators** that service all delivery and moving needs for all floors.
    - **Code will not support reuse** of ballast due to building height.

•Building is an AT&T **data center** with unique power and cooling needs all of which can not be interrupted.

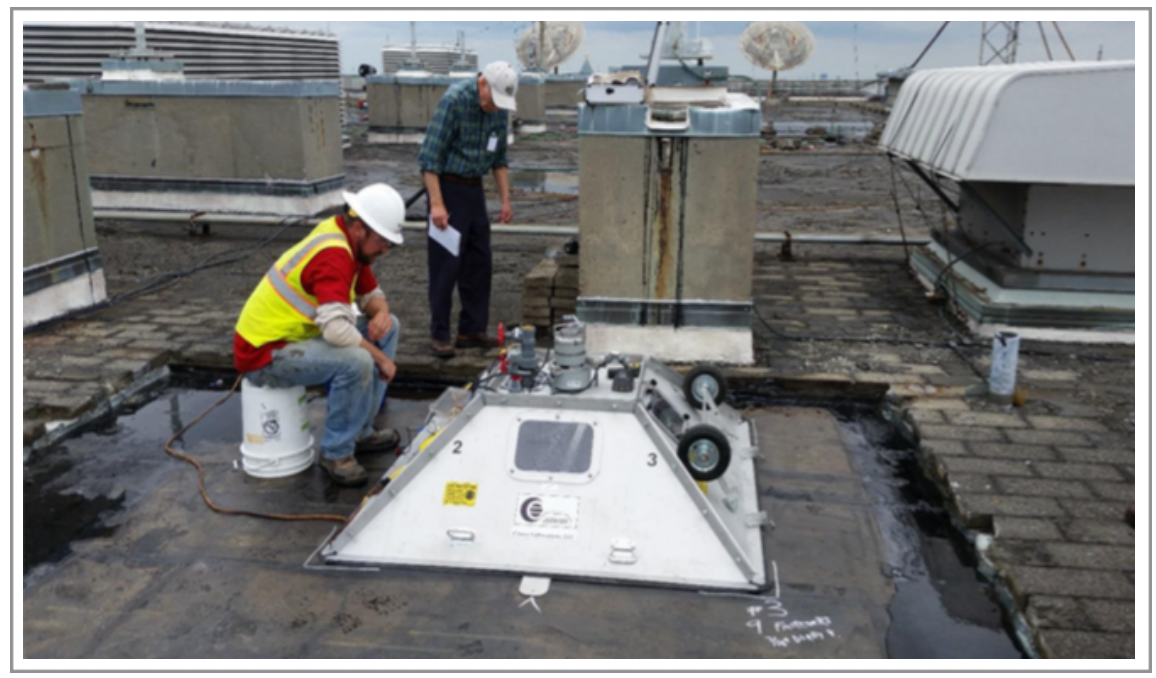
•Street access for mobilization and dumpster possible however **VERY limited**.

•Building is next door to Fox Theatre and multiple residents and hotels, all with SERIOUS **noise restrictions and enforced ordinances.**

DESIGN

THE TOWER (SKYSCRAPER)

Due to the height of the building, approximately 677 ft., the initial issue of concern when re-roofing this building was achieving the proper wind uplift resistance. This could have been achieved either with a dead load system, a mechanically attached system, a fully adhered a system or a hybrid. The "dead load" system, which was what was on the roof (via the pavers) would have cost up to 20% more than a mechanically attached system and thus would have busted the budget.



A fully adhered system would have forced the full removal of the active coal tar pitch. We did not recommend this as we are sensitive to the quantity of noxious material carried through the occupied building.

We recommended a hybrid system. That is a system comprised of a mechanically attached cement board with insulation and an adhered membrane.

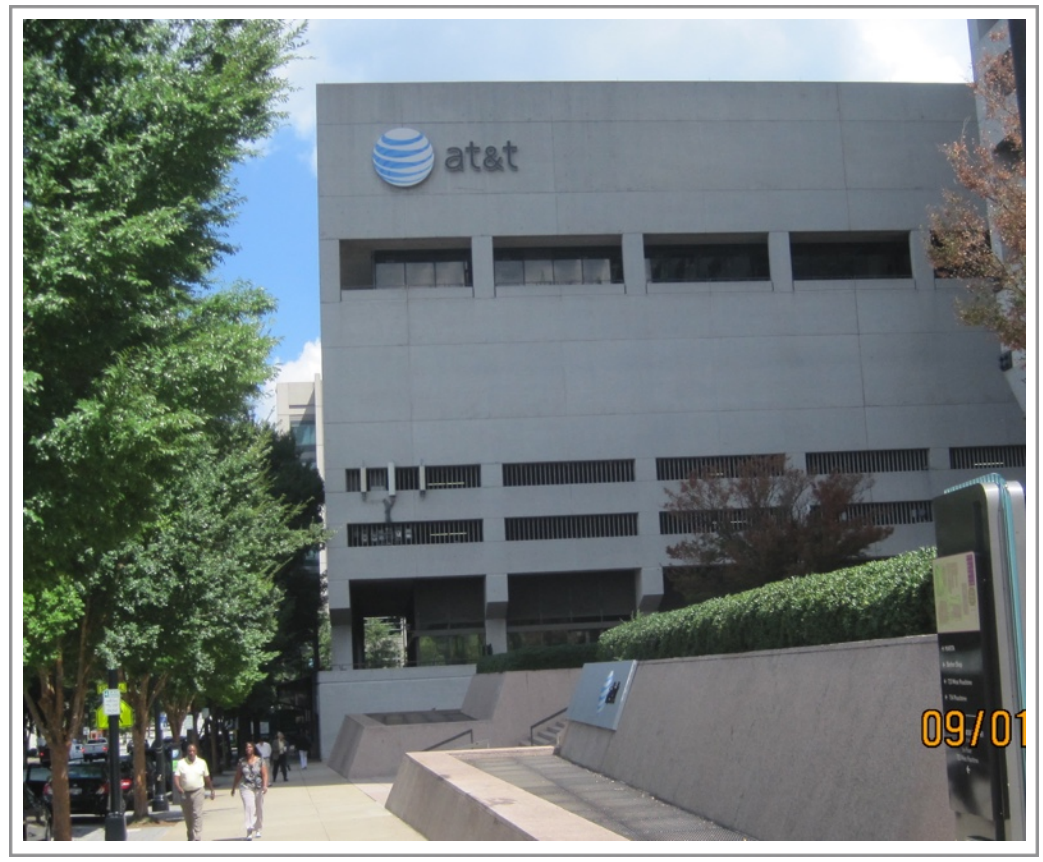
In order to propose the hybrid solution, we had to address proper **wind uplift issues** in design. We engaged Dr **Rene Dupius,** PE PhD, to design and to conduct testing run by Terracon, Inc. on the proposed solution. Based on the American Society of Civil Engineering 7 - 10, wind uplift loads, Dr. Dupuis determined that the field needed to achieve an 74.3 minimum psf and the perimeter needed a 121.8 minimum psf (prior to adding a safety factor to this number). This system achieves these standards with the fastening pattern reflected in the detail drawings he created for this project.

We proposed to mechanically attach a 7/16" Dexcell cement cover board to the deck. Prep work included removing the limited coal tar pitch in areas where it wasn't adhered. This meant bagging and then placing the bagged coal tar pitch into drums that were then sealed. The next layers were a torch applied APP smooth surface barrier membrane followed by two layers of twenty pound, 2" ISO insulation laid in low rise foam. Above that is a 1/2" HD cover board also laid in low rise foam. The top is a fully adhered 60 mil TPO membrane. This also meets the current R value per building code, that has changed considerably since the 1980s when the building was constructed. Additionally this allowed us to secure a 20 year, no dollar limit warranty.

Included in the design was the installation of a new drain as well as the removal and reinstall of the current lightening protection system. **Under contract in September 2016. Completed Feb 2017.**

DESIGN, Continued

THE ANNEX BUILDING



Although this support building is not over 600‘ tall, it is an eight story building with a 71,600SF roof area over multiple elevations, on a building that is an active data center.

The AT&T Midtown Center eight story roof system has a lot of similarities to the AT&T Midtown Center tower with the exception of the height. This structure is eight stories and like the tower roof, needed to meet strict wind uplift resistance standards. A “dead load” system was in use via the river rock ballast. Again, to replace this roof with another dead load design would cost significantly more due to the fact that the current code did not allow stone ballast to be used at this height. The dead load weight would have to be pavers and this was not a budget friendly solution.

Like the tower, the primary issue was to address the coal tar that was attached to the structural concrete deck. There is no testing to determine wind uplift resistance of coal tar on concrete. We proposed removing the unattached the current system, repairing the coal tar barrier and pouring a tapered 1/8” Celcore lightweight insulating concrete layer over the barrier. The American Society of Civil Engineering 7-10 wind uplift minimums for the height of this system was achievable with this system.

Adhered to the lightweight insulating concrete was a 115 ml fleeceback TPO adhered in low rise foam. This was a critical element to the system. The lightweight concrete holds moisture and the fleeceback system would allow for the moisture to move and to exit without doing any harm.. This system would provide an average R value of 20. This design allowed us to secure a 20 year, no dollar limit warranty for the client.

We recommend the installation of 2,000 sf of walk pads in the area of the roof where the mechanical equipment is located. This protected the roof system and allow for the servicing of the extensive equipment.

Under contract in September 2016. Completed Feb 2017.

CONSTRUCTION TOWER

The Tower (skyscraper) Set Up

Creating the opportunity to efficiently move people and material through the limited access conditions was a challenge on this project. The roof system was only accessible through the small U-shaped stair case (see illustration) that was too narrow to transport supplies and waste. We found an opportunity through the **removal of a fan** which created a space that was approximately 5'x6' where we could hoist material.

We positioned a two ton crane above the opening HOWEVER that only allowed us to move material to the 47th floor. **The freight elevator is located on the 46th floor.** We had to create a means by which we could smoothly move material an additional floor. The 47th floor had a crane in a different area that would allow us to hoist from between the 46th and 47th floors so we could load items, roll them to the next crane location and either up to the roof system, or down to the freight elevator. In order to prevent redundant handling of pavers, etc. we had **wheelbarrows customized** so that we could remove the handles (wheelbarrow total length was too long for the fan opening) and so that they had attachments for hoisting. (see illustration without handles for hoisting)

The building **ONLY has two freight elevators** for all moving and deliveries in the tower. The client generously allowed us to have use of one that was assigned to us during the course of construction. The next limitation was the dock area which supports all the deliveries for BOTH buildings. The dock is VERY small and congested. We were allowed to use one spot for our dumpster and we had use of one area to create a cage for staging material delivery and storage.

The Tower (skyscraper) Project

EXECUTION

Removal ~ First, we broke down and **removed over twenty pieces of equipment** that had been "retired in place". Then we began the roof removal process that included **removing over 22 TONS of pavers with the modified wheelbarrows,** lowering them down one story, reattaching handles to the wheelbarrow and rolling them to the second crane and lowering them down another story to the freight elevator down 46 stories to the loading dock and placing the pavers into the dumpster.

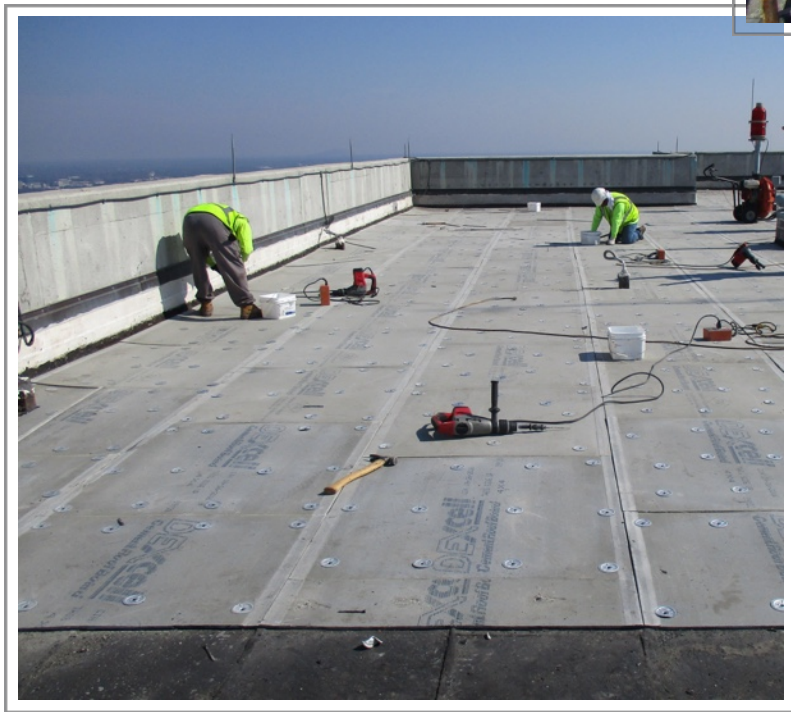
Next we repeated the same process to **remove the 2" extruded polystyrene insulation board**. We had to be careful as we did not want to disturb the coal tar pitch. The design called for only removing unattached areas and leaving as much of it in place so as to not create a situation where noxious fumes were pervasive in the building. The coal tar that was removed was bagged and placed in drums that were then sealed prior to removal.

Roofing ~ As per the design aforementioned, we installed the following:

- Mechanically fastened 7/16" Dexcell cement cover board to the deck
- A torch applied smooth surface membrane
- Two layers of twenty pound, high density 2" ISO insulation laid in low rise foam
- 1/2" HD cover board laid in low rise foam
- Fully adhered 60 mil TPO membrane
- An additional drain

This allowed the system to meet current R value codes and to allow the manufacturer to issue a 20 year NDL warranty.

The Tower (skyscraper) Photos



The Tower (skyscraper) Photos

The Tower (skyscraper) Photos

CONSTRUCTION ANNEX

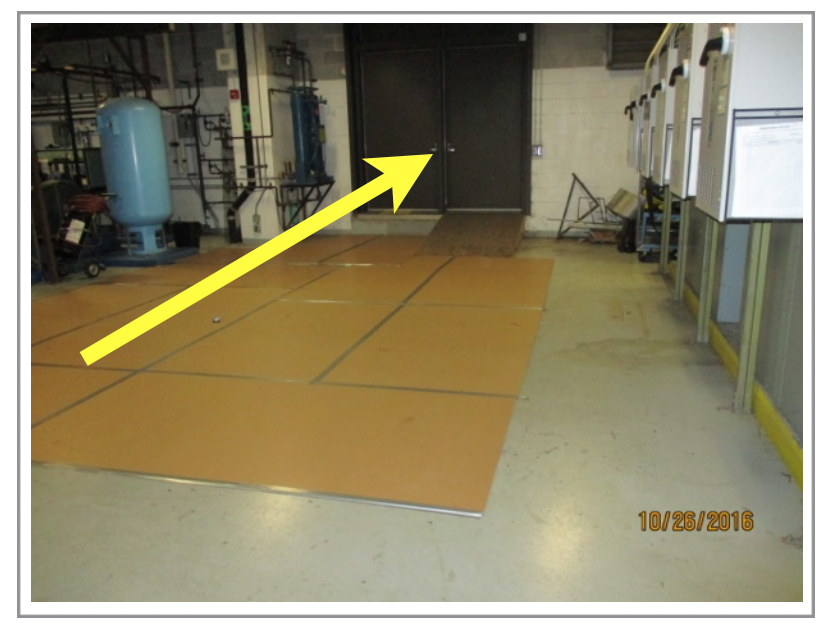
ANNEX BUILDING (SUPPORT BLDG) SET UP

Creating the opportunity to efficiently move people and materials through the limited access conditions was a challenge on this project. The roof system was accessible two ways. One through the doors that exist on each of the lower areas that in turn had a ladder to the roof This was how our crews moved through the project. The other was from the ground where we hoisted materials and placed a chute for waste.

Like the Tower building, the Annex **ONLY has two freight elevators** for all moving and deliveries. The client generously allowed us to have use of one that was assigned to us during the course of construction. Another limitation was the dock area that supports all the deliveries for BOTH buildings. We were allowed to use one spot for our dumpster and had use of one area to create a cage for staging material delivery for BOTH roofing projects. We staged a dumpster on the sidewalk with access via a chute over one side of the building.

THE ANNEX PROJECT EXECUTION

Removal ~ First, we began the removal process which included **removing in excess of 200 TONS of ballast, across multiple elevations,** via a vacuum truck as well as approximately **30 TONS of pavers** in the cooling tower area that had to be **hand carried** through the building.



Next we repeated the same process to **remove the 2" extruded polystyrene insulation board**. We then removed extensive areas of lose coal tar pitch and conducted repairs to the barrier. Some of the removal work was challenging due to not just the **multiple elevations** but also the tight areas in the cooling tower area with **clearance enough only to crawl**.

Roofing ~ As per the design aforementioned, we installed the following in order:

•A tapered 1/8" Celcore lightweight insulating concrete.
•A Fully adhered 115 mil fleeceback TPO membrane in low rise foam.
•Walk pads

This allow the system to meet current R value codes and to allow the manufacturer to issue a 20 year NDL warranty.

The Annex Photos

The Annex Photos

The Annex Photos

Note: what looks like lines is the lightening protection...