

**CONDITION APPRAISAL  
(FY 2020)**

**UNION STATION BUILDING  
NEW HAVEN, CONNECTICUT**



**NEW HAVEN  
PARKING  
AUTHORITY**

**PREPARED FOR:**

**NEW HAVEN PARKING AUTHORITY**

**232 GEORGE STREET**

**NEW HAVEN CONNECTICUT 06510**

**PREPARED BY:**

**DESMAN**  
Design Management

**175 CAPITAL BOULEVARD, SUITE 402**

**ROCKY HILL, CONNECTICUT 06067**

**NHPA PROJECT No. 20-001**

**DESMAN PROJECT No. 20-19171.00-2**

**APRIL 2020**





## CONDITION APPRAISAL UNION STATION BUILDING

NEW HAVEN PARKING AUTHORITY FACILITIES  
NEW HAVEN, CONNECTICUT

APRIL 2020

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## **1. INTRODUCTION**

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The Condition Appraisal of the Union Station Building was performed by DESMAN in accordance with the executed agreement by and between the New Haven Parking Authority and DESMAN (NHPA Project No. 20-001).

The primary objectives of this appraisal are as follows:

- A. Perform a detailed, on-site inspection and observation of the Union Station Building in concert with DESMAN's applicable sub-consultants.
- B. Compare the results of the inspection with those addressed in the 2019 Condition Appraisal Report prepared previously by DESMAN.
- C. Prepare a report detailing the findings of the survey including, but not limited to, an update of the estimated construction costs, along with priorities for the various repairs, and recommended capital reserves (future repair and maintenance), to allow the New Haven Parking Authority flexibility in the implementation of structural repairs, mechanical and electrical modifications, and architectural improvements.



## 2. EXECUTIVE SUMMARY

The Union Station Building, consisting of 5 floors and 107,400 gross square footage (with an additional 12,000 gross square footage of underground passageway), was originally opened 1920, closed in the early 70's, then renovated by the New Haven Parking Authority and reopened in 1985. A busy transportation center, the Union Station is also a historic building listed on the National Register of Historic Structures.

This 100 year old Building (Union Station Transportation Center), located in New Haven, Connecticut (**Photos #1 & #2**), was found to be in good condition. The Building is currently programmed to receive various repairs and modifications to various components of the facility as outlined later in this report.

This year's assessment report (FY 2020) indicates a total expenditure of approximately **\$6,087,100.00** needed to be expended to properly maintain this facility over the next five years.

This year's figure incorporates adjustments in estimated expenditures for changes in the scope of future repairs currently found to be necessary or as is currently being recommended by DESMAN based upon observed conditions.

As appropriate DESMAN continues to document and budget for the cost of implementing various items of repair or improvements we feel are necessary within Union Station. Continued communication between NHPA, CDOT, and DESMAN is necessary to assure that all required work is documented and implemented according to specific need and availability of funds.

Multiple projects at Union Station are currently in design or about to commence construction:

- Various architectural repairs and improvements, such as common area re-finishing and painting, stairwell re-finishing and plaster repairs, miscellaneous floor tile repairs, and cleaning,
- Roof system repair, replacement & improvements study



Photo #1



Photo #2



Photo #3



Photo #4

- Internal signage assessment and conceptual study
- Terracotta cornice coating/cleaning/repair (initial assessment & investigation)

Continued funding for the repair, replacement, and enhancement of various architectural and structural components is strongly recommended. Additionally the continued maintenance, repair, and replacement of various mechanical, electrical, and plumbing components are required. Budgeting for all the recommended capital improvements will help assure the continued trouble-free operation of this facility and will help to keep this facility in good and aesthetically pleasing condition.

The costs associated with the implementation of future repairs and preventative maintenance for this facility is presented in more detail later in this report.

The Capital Projects currently in progress consist of the following:

PROJECT NUMBER	PROJECT TITLE	OPINION OF COST*	STATUS
15-003A	Architectural Repairs & Improvements	\$1,200,000	In Design
19-013	Terracotta Cornice Coating/Cleaning/Repair; initial assessment & investigation	TBD	Study
19-014	Roof System Repair, Replacement & Improvements Study	TBD	Study
19-032	Internal Signage Assessment and Conceptual Study	TBD	Study

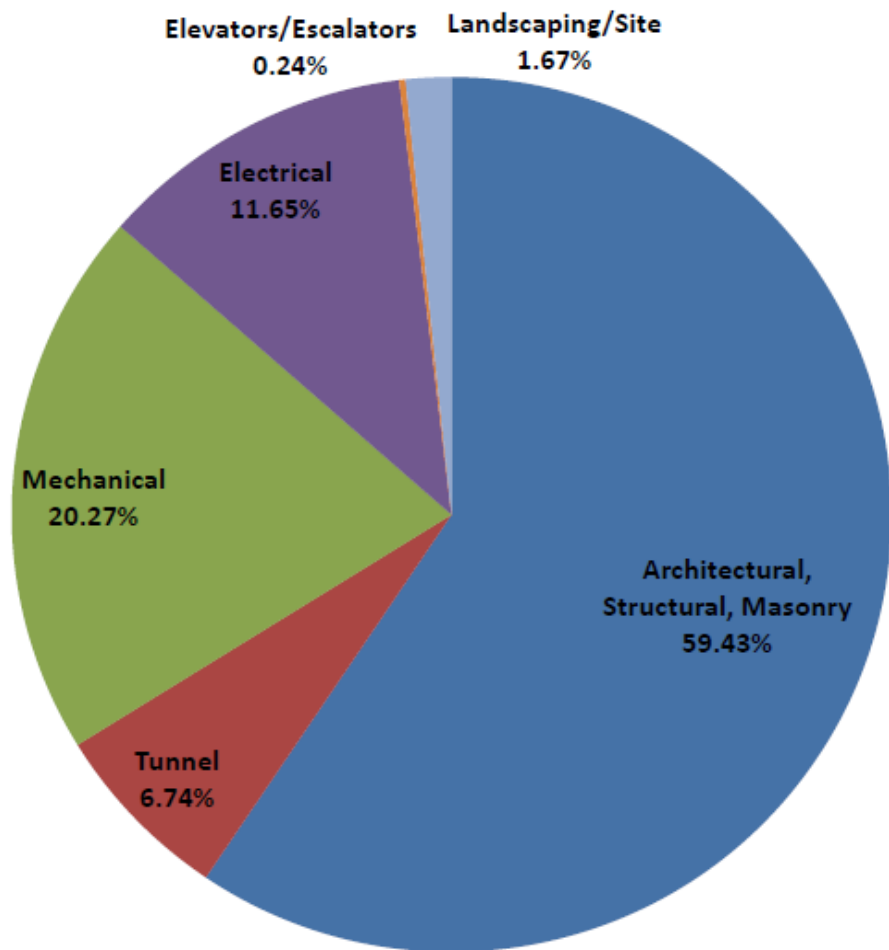
\* Rounded, Inclusive of Contingencies, Engineering and Program Management costs.

The repairs recommended to be performed over the next five years have been prioritized into three courses of action: Prioritized Repairs (FY 2021), Early Repairs (FY 2022), Programmed Repairs (FY 2023), and Long-Term Repairs (FY 2024 - 2025). The table below is a summary of DESMAN's estimated construction cost for each category of work.

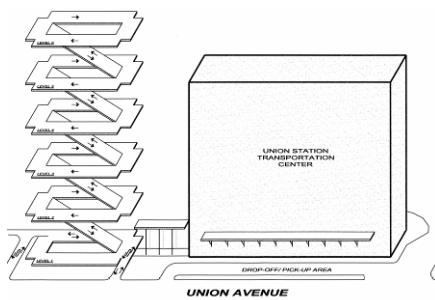
RECOMMENDED REPAIR PROGRAM	ESTIMATED CONSTRUCTION COST
Prioritized Repairs (FY 2021)	\$85,550.00
Early Repairs (FY 2022)	\$169,650.00
Programmed Repairs (FY 2023)	\$3,195,800.00
Long-Term Repairs (FY 2024 – 2025)	\$2,636,100.00
<b>TOTAL ESTIMATED COST</b>	<b>\$6,087,100.00</b>

To further summarize, the projected costs may be split into the following discipline categories, in accordance with the associated percentages, as represented by the following pie chart:

<b>Architectural, Structural, Masonry:</b>	<b>59.43%</b>
<b>Tunnel Improvements:</b>	<b>6.74%</b>
<b>Mechanical:</b>	<b>20.27%</b>
<b>Electrical:</b>	<b>11.65%</b>
<b>Elevators/Escalators:</b>	<b>0.24%</b>
<b><u>Landscaping/Site Improvements:</u></b>	<b><u>1.67%</u></b>
	<b>100.00%</b>



**Recommended Repairs & Improvements split into Disciplines**



**Isometric #1**



**Photo #5**



**Photo #6**

### 3. DESCRIPTION OF THE STRUCTURE

The Union Station Transportation Center Building is a historic four-story (with basement level) railroad station, designed by architect Cass Gilbert. Construction was completed circa 1920. The Station features brick and a faux granite water table (a produced stone), exterior walls with terra cotta accents, painted wood and metal trim, double paned/insulated windows and a 35-foot high main waiting room ceiling.

The Union Station Building is owned by the State of Connecticut, and operated by the New Haven Parking Authority under a lease agreement. The Parking Authority has had operational control of the facility since the building's reopening in 1985.

The main pedestrian entries are located off of Union Avenue on the north side of the Station, and pedestrian egress to an adjoining parking garage is provided to at the eastern end of the building (**Isometric #1, Photos #5 & #6**). At the western end of the facility there is a bus station/depot and car rental area. The station has an underground pedestrian tunnel, accessible by stairs, escalators and an elevator from the first level which leads to the railroad platforms located to the south of the Station.

The facility's main lobby and waiting room is on the first level, along with the ticket office and other passenger services, and several vendors. In addition to serving as access to platforms, the lower level of the Station also includes some commercial space, as well as various storage areas and mechanical rooms. Office space is found on the second, third, and fourth levels of the building.

During the 1950's through the early 1970's, the Station fell into disrepair and was eventually closed in 1973. Threatened with demolition, New Haven Union Station was placed on the National Register of Historic Structures and saved. In the early 1980's, City, State and Federal funds were pledged to renovate the Station and to construct the adjacent parking garage. July 25, 1985, marked the day that the New Haven Parking Authority officially re-opened the newly refurbished and restored Union Station Transportation Center Building.





**Photo #7**

Since the facility's reopening in 1985, various renovation projects have been undertaken, including, but not limited to the following projects:

- 1997 The pre-existing roofing system was removed and a new four-ply built-up roof, with a 20-year warranty by Johns Manville, was installed (**Photo #7**).
- 1998 A project was implemented to upgrade the Station to comply with the Americans with Disabilities Act (ADA). The scope of work included improvements to public spaces, train platforms, restrooms and tenant entries and new signage.

At this time there were also various mechanical and electrical improvements made to the facility including roof top HVAC equipment modifications and sprinkler system alterations.

- 1999 An architectural restoration project was started in 1999, and subsequently completed in 2000 which was inclusive of refinishing various interior and exterior finishes throughout the Station. This work included, but was not limited to, window/door and trim refinishing, masonry re-pointing and cast stone repair, painting of exterior metals, and brass and interior metals refinishing.
- 2002 New vehicle access control equipment was installed at the back of the station (south side) to restrict access to this limited parking area to CDOT and Metro North staff.
- 2003 Two projects were performed. One project was related solely to architectural repairs, and the second was associated with mechanical, electrical, and plumbing improvements.

The architectural project consisted of the following work:

- Reworking of the facility's roof level parapet coping stones to eliminate water infiltration into the exterior masonry wall construction. This work was coordinated with the application of an architectural waterproof coating on interior surfaces of the parapet following miscellaneous brick removal/replacement and re-pointing of brick mortar (**Photo #8**).



**Photo #8**



Photo #9

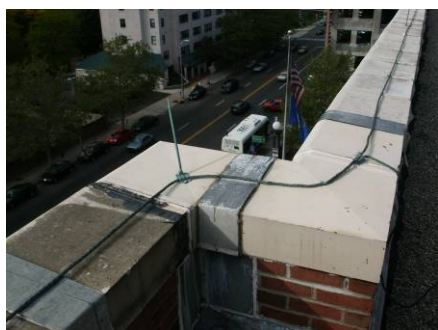


Photo #10

- Addressing various concerns to the facility's southwest stairwell, inclusive of the application of an architectural waterproof coating on the exterior surfaces of the penthouse, repair to the plaster finishes of the upper reaches of the interior of the stairwell, the replacement of the access door and its associated framing.
- Installation of rubber treads, risers, and landings on the stairs leading to the train platforms (**Photo #9**).
- Repair of the lightning arrestor system (**Photo #10**).

The mechanical, electrical, and plumbing improvements project consisted of, but is not limited to, the following items of work:

- Removal of window A/C units from within first floor tenant spaces and the upgrade and/or modification of HVAC equipment with the installation of split systems.
- Installation of new A/C and exhausts within the women's and men's public restrooms on the first floor.
- Performing of modifications to the facility's fire alarm system for improved monitoring of the Station's fire pump equipment, smoke detection and smoke purge.
- Performing of modifications to the fourth floor HVAC distribution, monitoring and control in keeping with the interior modifications made to the interior space of this portion of the Station.
- Removal and replacement of various roof top HVAC equipment for improved operating efficiency and maintenance of the system and system components.
- The condensing unit serving the basement level Amtrak crew room was replaced during 2004.

2005 Various site improvements were performed and throughout the exterior of the Union Station Building in 2005, work included, but was not limited to:

- The repair and/or replacement of miscellaneous metal items on the roof. These items include the repair of doors and frames to the hoist-way enclosures and the smoke vents over the stairs. These items were sandblasted to remove rust, scale and old paint, and repainted to protect the metals. The insulation jacket on the exhaust ducts on the roof was repaired as well, as well as replacing associated sealant materials.
- The canopy between the Station and the parking garage was renovated to be more in keeping with the style and historic nature of the Station. A new plaster ceiling was installed, along with new architectural lighting (**Photo #11**).
- The front passenger drop-off area and sidewalks were replaced. The previous construction of the sidewalk areas consisted of brick pavers set in sand beds, and over time the pavers settled due to moisture and cyclical freeze-thaw. Additionally, because the driveway area was originally constructed of bituminous concrete pavement in combination with brick and granite cross-walk and sidewalk areas, the pavement had become increasingly deteriorated due to contamination with motor oil from the taxis and other vehicles. The front passenger drop-off area now consists of a combination of stenciled and stamped concrete, providing an aesthetic treatment, as well as a more forgiving surface considerate to the level of usage this area receives (**Photo #12**).



**Photo #11**



**Photo #12**

In addition to the exterior renovations which were performed in 2005, a second project entailed additional mechanical, electrical, and plumbing repairs and improvements throughout the Building. This work included, but is not limited to:

- Correction of water damage to various electrical components within the pedestrian tunnel access to the train platforms. Repairs to the fire alarm system, and programmed repairs to replace sections of damaged conduit.
- Various exterior lighting fixtures were replaced or otherwise added around the perimeter of the station building to increase lighting levels as an enhancement to security (**Photo #13**).
- The facility's HVAC duct system was cleaned.
- One cabinet unit heater located at the stairs to the train platforms was replaced due to its having been badly damaged due to ground water infiltration through tunnel walls. The remaining cabinets were salvagable and were repaired and re-finished.
- The balanced doors located at the top of the stairs to the on the train platforms were replaced.
- Repair and replacement of the domed skylights within the pedestrian tunnel, and extensive cleaning was performed to areas which were are not typically easily accessible.
- The B-1 boiler was replaced in its entirety. This work was inclusive of all associated plumbing work and the installation of updated digital boiler controls. The pressure relief valves for all the boilers were also replaced.



**Photo #13**





**Photo #14**



**Photo #15**



**Photo #16**



**Photo #17**

Also in 2005, CDOT worked with DMJM to identify various code compliance issues at Union Station which needed to be addressed. CDOT has now addressed the various repairs, updates, and improvements to Union Station, and the work included, but was not limited to, the following (including various items previously documented by DESMAN in prior appraisals):

- Elevator Modernization and Improvements
- Installation of a new emergency generator.
- Replacement of the fire alarm system with new fire suppression components
- Installation of a New Public Address and Video Message System. **(Photo #14)**
- Installation of a New Security System **(Photo #15)**
- Installation of a New Sand/Oil Separator **(Photo #16)**
- Improvements to the Basement Level Corridors and Spaces **(Photo #17)**
- Various architectural, electrical, and mechanical Improvements to the Pedestrian Tunnel **(Photo #18)**.
- Mechanical, Electrical and Plumbing Improvements: CDOT is currently making various mechanical, electrical, and plumbing improvements within the Union Station Building started in 2010.

2008 A 10,000-gallon underground fuel storage tank and a 1,000-gallon underground diesel fuel storage tank located at the rear of the Union Station was removed and a new above ground diesel fuel storage tank to service the emergency generator was installed within the emergency generator enclosure.

2010 Subsequent to the replacement of Boiler B-1 in 2005, the other two boilers were replaced in 2009/2010.



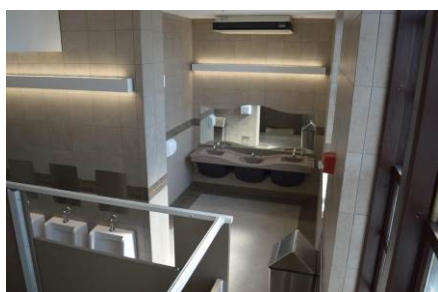
**Photo #18**



**Photo #19**



**Photo #20**



**Photo #21**

2016 Various repairs and improvements were addressed as part of the General Repairs and Improvements project (combining work at both the Building and the adjacent Union Station Parking Garage). The decorative stenciled and stamped concrete finishes in front of Union Station received a protective penetrating sealer. This work was performed in concert with some limited reapplication of colorant on certain areas of the decorative concrete and repairs to some of the sealant/caulking materials which need replacement. This work was addressed as part of Project no. 08-016 B.

2016 Work related to the Building includes extensive renovation of the facility's public restrooms (**Photos #19, #20 & #21**). The two restrooms were gutted and entirely reworked with new floor and wall tiles. All bathroom fixtures (sinks, toilets, urinals, partitions, etc.) were replaced with new components and all existing plaster finishes were repaired and repainted. New lighting was also installed. Implementation of this work was part of Project No. 08-016 E, now completed.

2016 The (4) elevators serving the train platforms, as well as the escalators providing access to the tunnel, have all been modernized. This work was addressed as part of NHPA Project no. 13-012 B.

2017 All of the Station's entry/exit doors have been either replaced or repaired, with all hardware and automatic controls (**Photos #22 & #23**). This work was addressed as part of NHPA Project no. 10-005 A.

2017 Various mechanical and electrical repairs were addressed consisting of, but not limited to:

1. Replace Pneumatic HVAC Controls w/ Electronic Controls (**Photo #24**)
2. Replace 3 Packaged Rooftop Units (**Photo #25**)
3. Replace Eight (8) Gate Valves @ Control Valves
4. Replace two (2) Existing Recessed Wall Heaters in Main Entry



Photo #22



Photo #23

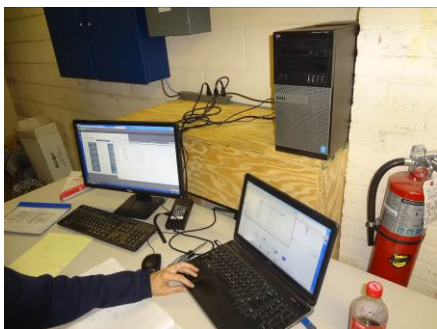


Photo #24



Photo #25

#### Vestibules & Repair Cabinet Unit Heater Coil

5. Perform Repairs & Preventative Maintenance on Main Lobby Air Handlers
6. Misc. Mechanical/Plumbing Repair
7. Miscellaneous Electrical Work

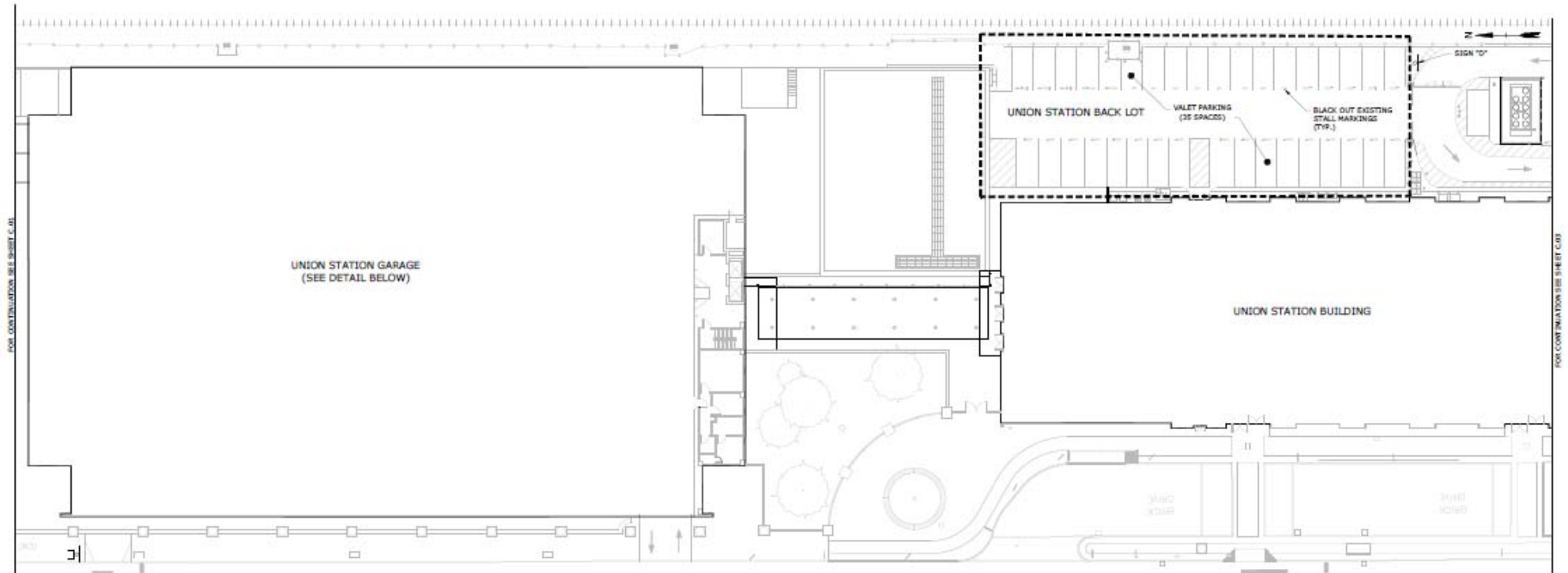
This work was addressed as part of NHPA Project no. 10-005 B.

2019 Several projects at Union Station were recently substantially competed or closed out for NHPA:

- Miscellaneous sidewalk & driveway repairs as part of NHPA Project No. 18-012.
- Replacement of the final one of the three boilers, as well as replacement of the main chiller, as part of NHPA Project No. 18-014
- Replacement of various interior light fixtures, as well as related electrical improvements throughout the Building, as part of NHPA Project No. 15-003 B.
- Underground passageway waterproofing improvements throughout the tunnel (to the train platforms) as part of NHPA Project No. 18-013.

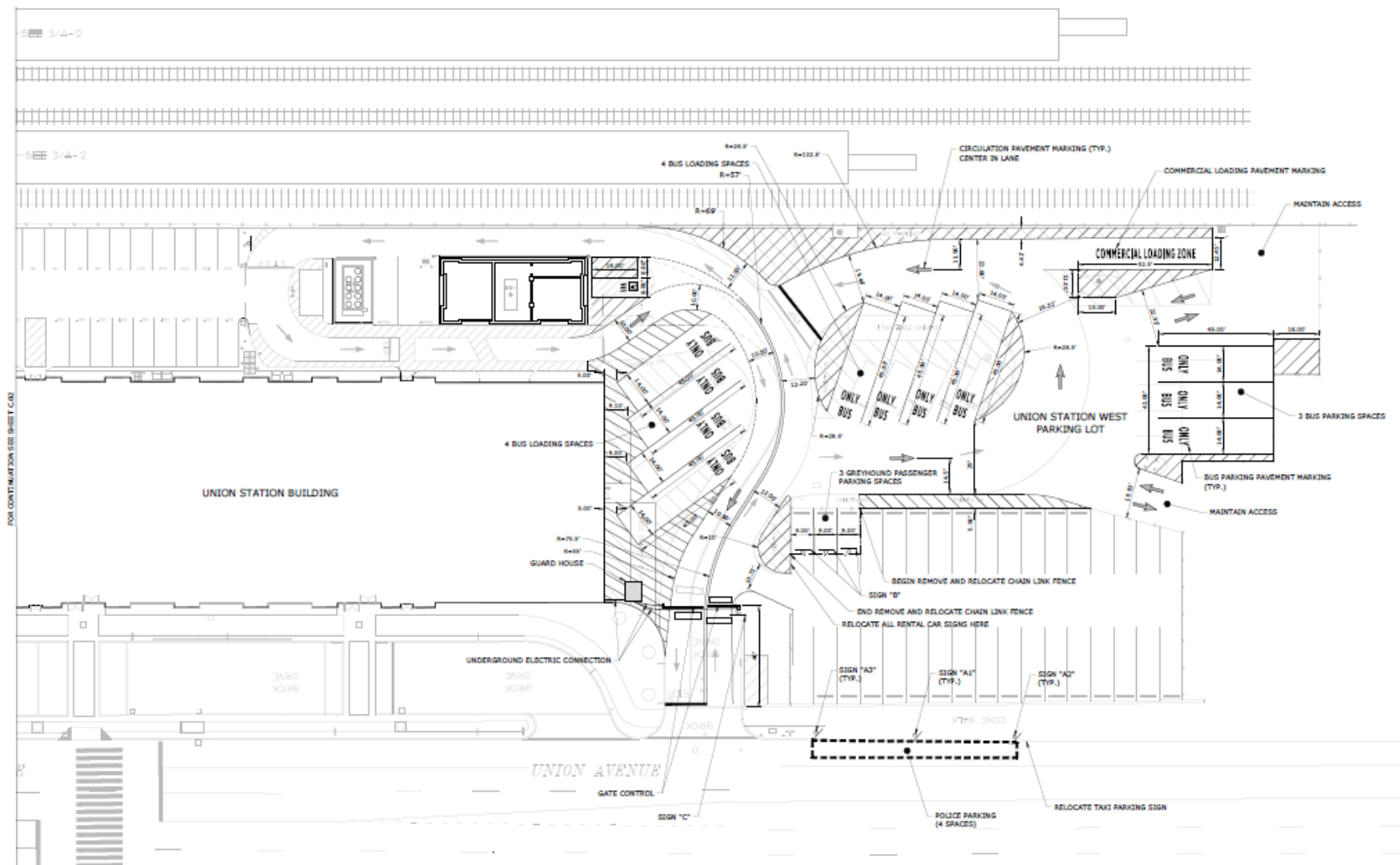






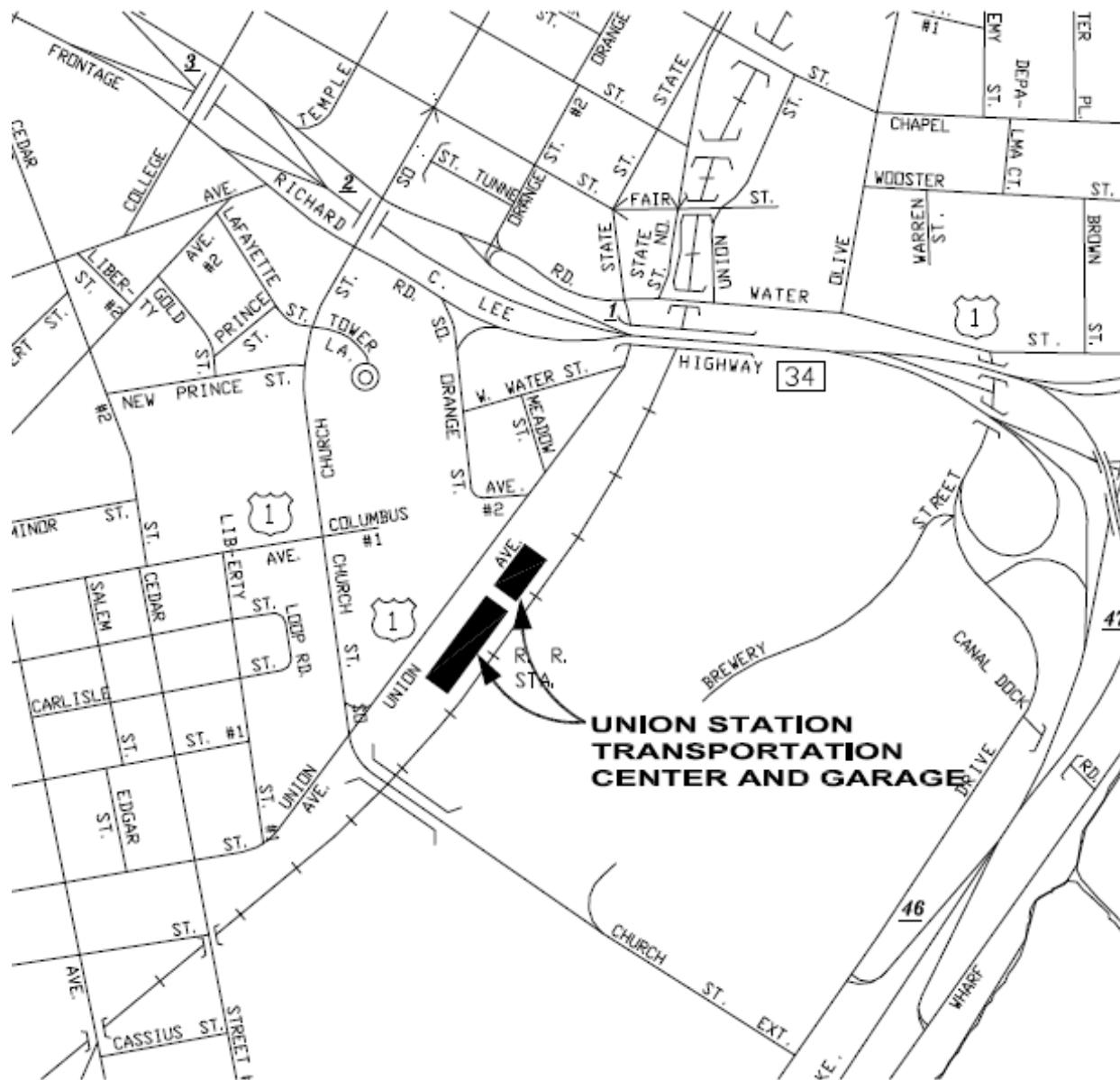
COURTESY OF DRAWING C.02, "UNION STATION BUS PARKING PLAN," PREPARED BY TIGHE & BOND, 7/27/2015





COURTESY OF DRAWING C.03, "UNION STATION BUS PARKING PLAN," PREPARED BY TIGHE & BOND, 7/27/2015





**Site Plan**

## STRUCTURAL DATA

### UNION STATION BUILDING NEW HAVEN, CONNECTICUT

Legend:	Square Feet	SF
	Pounds Per Square Inch	PSI
	Pounds Per Square Foot	PSF

Date of Completion:	circa 1920 (original completion)
	1985 (renovated and re-opened)
Age of Structure:	100 Years
Plan Dimensions:	±300 FT x ±90 FT

Note: All values listed above are approximations of actual values

Design Loads:	Platforms and Public Areas	150 PSF
	Basic Snow Load for Roof Canopies	40 PSF
	Live Load for Stairs: Uniform Load of, plus a concentrated load of 300 pounds on the center line of stair treads	100 PSF



#### 4. VISUAL OBSERVATIONS & REPAIR RECOMMENDATIONS

A visual examination of the facility's structural, mechanical, and electrical components was performed as part of DESMAN's review of the Union Station Building (Union Station Transportation Center) again this year.

In general, the overall condition and appearance of the New Haven Union Station can be described as being in good condition. There are a number of items that have been observed this year that require attention; these are explained in detail in the following pages.

##### A. ARCHITECTURAL, STRUCTURAL & MASONRY REPAIR:

###### 1. Plaster Ceiling Repair & Painting:

CDOT had recently addressed certain miscellaneous plaster repair as part of CDOT's code and upgrade project circa 2014. DESMAN recommends however that NHPA continue to program repair and re-painting of the plaster surfaces of the main waiting room and anterior lobbies located at the east and west ends of the main waiting room accordingly; DESMAN observed recent damage subsequent to CDOT's project (**Photo #26**). Although this work is currently planned as part of NHPA Project no. 15-003 A, now in design, DESMAN recommends that a nominal extent of repair continue to be programmed to address preventative maintenance needs accordingly as they arise.

###### Lobby Area Interior Refinishing:

Various components of the building's interior, mainly concentrated to those areas occupied by the general public, need to be periodically maintained. This maintenance will entail periodic refinishing.

Items to be re-finished include, but are not limited to interior wood trim (i.e. doors and storefront, waiting room benches, stair handrails, etc.), and various brass finishes and components (**Photo #27**). Although this work is currently included as part of NHPA Project no. 15-003 A, now in design, DESMAN recommends that a nominal extent of repair continue to be programmed to address preventative maintenance needs accordingly as they arise.



Photo #26



Photo #27





Photo #28



Photo #29



Photo #30

CDOT had addressed miscellaneous repair to various plaster finishes throughout the facility circa 2014. Plaster damage, though, is the result of various issues including, but not limited to ambient humidity within the building, but is also the result of moisture migration through the building's masonry construction and through deteriorated exterior caulking around various doors and windows. DESMAN recommends that a nominal amount be programmed for miscellaneous repair in the future. This work is currently included as part of NHPA Project no. 15-003 A, now in design.

## 2. Upper Floor Common Area Interior Repairs & Improvements:

A review of upper level common spaces and tenant spaces reveals that there is a need to refinish interior window trim. Similarly, the entry doors to the tenant spaces on all levels would benefit from refinishing.

A limited amount of plaster and sheetrock repair is required within the common areas on all levels of the station. This work would be performed in combination with a repainting of these areas.

Refinishing and/or repairs within tenant space is generally considered a tenant responsibility to address but some items serve to protect the integrity of the building and may be included as a building capital cost.

Although this work is currently included as part of NHPA Project no. 15-003 A, now in design, DESMAN recommends that a nominal extent of repair continue to be programmed to address preventative maintenance needs accordingly as they arise.

## 3. Stairwell Repairs & Improvements:

A review of the Station's stairwells indicates that each stair well access door on all levels would benefit from being refinished (**Photo #28**), as well as the handrails throughout the stairwells (**Photo #29**). In combination with this work, each stairwell has been identified as requiring a limited amount of plaster/sheetrock repair in combination with a fresh coat of paint (**Photo #30**).



Photo #31



Photo #32



Photo #33

In addition to repainting the stairwell walls, it was noted that the stair treads and risers need to be properly prepped, primed, and repainted (**Photo #31**) along with associated balusters, railings and handrails.

Although this work is currently included as part of NHPA Project no. 15-003 A, now in design, DESMAN recommends that a nominal extent of repair continue to be programmed to address preventative maintenance needs accordingly as they arise.

#### 4. Miscellaneous Floor Repair:

Though the floors are well maintained as evidenced by the high shine, cracked tiles should be maintained in accordance with Historic Preservation Guidelines. Quarry tile repair was identified as being required in the main lobby entry vestibule, the east entry vestibule and in limited areas of the main waiting room (**Photo #32**).

Though it does not create a trip hazard, there is a limited area of cracked terrazzo floor within the southwest stairway which should eventually be repaired.

Although this work is currently included as part of NHPA Project no. 15-003 A, now in design, DESMAN recommends that a nominal extent of repair continue to be programmed to address preventative maintenance needs accordingly as they arise, as well as a more substantial allowance to address the tile replacement in a more comprehensive manner as appropriate.

#### 5. Cleaning Limestone Wall Finishes:

Various components of the building's interior, mainly concentrated to those areas occupied by the general public, need to be periodically maintained; this maintenance will entail periodic cleaning. These items include the cleaning of various limestone and travertine wall finishes within the main lobby, the lobby mezzanine area, the east and west end lobbies and the lower east end lobby at the entry to the pedestrian tunnel (**Photo #33**).



**Photo #34**



**Photo #35**



**Photo #36**

Cleaning of all lobby area walls and floor surfaces is needed, as beverages and other contaminants have stained the finishes. Coffee, in particular, has been observed discoloring the Station's walls in multiple locations.

The second level lobby balcony carpet exhibits multiple localized stains.

Although this work is currently included as part of NHPA Project no. 15-003 A, now in design, DESMAN recommends that a nominal extent of repair continue to be programmed to address preventative maintenance needs accordingly as they arise..

#### 6. Station Door Repair/Replacement:

The main waiting room entry doors, west & east end entry doors (**Photos #34 & #35**), as well as the doors along the south side have all either been repaired or replaced as part of NHPA Project No. 10-005.

Due to the extremely heavy use of the doors on a daily basis, however, DESMAN recommends that the door systems, specifically including their seals and weatherstripping, be monitored and repaired as needed in order to reduce energy losses and maintain the critical aesthetic finishes.

The brass doors located at the base of the escalators, leading to the pedestrian tunnel to the train platforms, are in need of repair (**Photo #36**). While the doors themselves are in acceptable condition to remain but be cleaned and refinished, all hardware and automatic controls should be replaced.

The brass doors located at the base of the escalators are included for repair as part of NHPA Project no. 15-003 A, now in design





Photo #37



Photo #38



Photo #39

## 7. Misc. Exterior Repairs & Improvements:

The exterior painted finishes on wood and metal trim located around the perimeter of the Station's windows, have been repainted as part of NHPA Project no. 08-016 B. (**Photo #37**).

The periodic repair of exterior sealant installed around the windows and doors will alleviate some of the interior plaster damage which is found around some of the facility's windows on all levels.

Miscellaneous windows were identified as needing to be reworked to replace damaged double paned windows which have lost their vacuum seal and are fogged. Although miscellaneous and limited repairs were recently intended to be performed as part of Project no. 08-016B, it was realized that repair work would need to be more extensive and need to be more comprehensive than originally anticipated; therefore, Desman recommends that PNH program a more comprehensive window repair program accordingly.

A nominal amount of distress continues to be seen on the exterior of the building. Although periodic masonry repairs inclusive of brick replacement and re-pointing have been accomplished since the facility reopened, this type of repair work is not unexpected for a building of this vintage. Care in repair must be used for this historic structure.

The exterior stone elements of the building facade exhibits isolated areas of organic growth which will eventually need to be cleaned off and minor, miscellaneous damage is observed.

Exterior wood trim around doors and windows would benefit from refinishing inclusive of proper preparation, priming, and painting. This work was addressed as part of NHPA Project no. 10-005 A.

The entire building exterior was cleaned as part of NHPA Project no. 08-016 B. Stains, dirt and other contaminants were noted throughout the exterior. The terra cotta accents along the roof edge appear to be specifically stained, perhaps





Photo #40

with the staining embedded in the terra cotta due to exposure over time (**Photo #40**). Not all stains are removable and may need to remain as a natural element of this historic building's age.

The terra cotta cornice is exhibiting its age (**Photos #41 & #42**). Although NHPA and DESMAN have been hesitant to program extensive repairs to this cornice due to the historic nature of the building, the time is approaching that repairs should be considered more inevitably due to concerns of waterproofing and maintain the building envelop. Acknowledging that respecting the historic nature of the building is critical, there are various options for coatings that may be applied and faux terra cotta that may be installed that would be minimally visible. DESMAN recommends that NHPA continue to monitor the condition of the cornice and program repairs accordingly. That said, an assessment and initial investigation is currently in progress as part of Project No. 19-013.

#### 9. Roof Level Repairs:

In 1997, a new four-ply, built-up roof was installed with a 20-year NDL warranty. DESMAN notes that miscellaneous leaking has been observed by NHPA and repairs have been addressd where a leak could be located. DESMAN recommends and has included an allowance to budget for costs associated with miscellaneous water testing to identify leaking in obscure locations.

DESMAN also recommends that the condition of the roof system be monitored, including the various secondary canopy roofs as well (**Photo #43**). Even though the warranty expired in 2017, Desman does not necessarily recommend that NHPA plan to replace the roof in the immediate future. However, miscellaneous repairs are now a maintenance cost, and eventually, the miscellaneous maintenance costs would outweigh the cost of installing a new roof system and obtaining a new 20-year warranty. That said, a study of system options is currently in progress as part of Project No. 19-014.



Photo #41



Photo #42



Photo #43



**Photo #44**



**Photo #45**



**Photo #46**



**Photo #47**

In the meantime, other roof level repairs were addressed to maintain the waterproofing integrity of the roof:

- a. Existing caulking was nearing the end of its useful life. The caulking has all been replaced as part of NHPA Project no. 08-016 B.
- b. Cracking in the coping stones, as a result of miscellaneous distress and the mounting of the lightening arrestor system air terminals was also contributing to water penetration. The coping stones have been coated with an elastomeric coating to waterproof and span the cracking as part of NHPA Project no. 08-016 B (**Photo #44**).
- c. Miscellaneous brick removal and re-pointing, on the interior face of the parapet, has been addressed as required, to maintain the waterproofing integrity and prevent leaking (**Photo #45**). Following the masonry repairs, the architectural waterproofing coating has been repaired and re-coated as part of NHPA Project no. 08-016 B.
- d. Miscellaneous flashing has been repaired or replaced as required as part of NHPA Project no. 08-016 B (**Photo #46**).

At the time of roof replacement, DESMAN recommends that NHPA consider installation of limited railings and/or fall-arrest equipment. Considering the on-going need for maintenance of the various equipment and materials located on the roof level, along with the lower height of certain parapets along the perimeter of the Building (**Photo #47**), the installation of certain safety equipment is recommended. Since the various divits and hardware may need to be anchored to the structural framing, the work would be more cost-effectively installed if coordinated with the replacement of the actual roofing system.

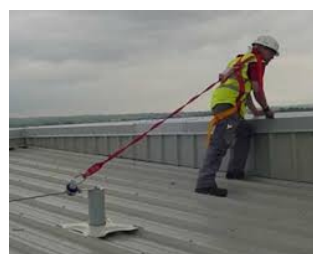






Photo #48



Photo #49



Photo #50

10. Clean Main Waiting Room Lights and Repaint Wall Sconces:

Cleaning of the globe lights in the main waiting area should enhance the aesthetics of the lobby area (**Photo #48**). The wall sconces above the galleries in the main waiting room require a fresh coat of paint. This work is currently included as part of NHPA Project no. 15-003 A, now entering design.

11. Emergency Generator Enclosure Repair:

Miscellaneous re-pointing of the brick enclosure was recommended to remove organic growth (**Photo #49**), and repair of miscellaneous units was recommended throughout.

This work was addressed as part of Project no. 08-016 B.

12. Miscellaneous Exterior Sidewalk Repair:

Even though miscellaneous sidewalk repairs were addressed as part of NHPA project no. 08-016 B, ongoing maintenance and repair can be expected in future years and this has been accounted for in the five year construction cost projections. These repairs will be inclusive of, but not limited to, concrete repairs, sealant work and periodic reapplication of penetrating concrete sealers and colored pigments to keep the decorative sidewalks looking appealing. Miscellaneous repairs have recently been addressed as part of NHPA Project No. 18-012, now nearing completion.

13. Miscellaneous Rear & West Parking Lot Repair:

- Cracking has been observed in the bituminous concrete pavement throughout the west lot. These cracks should be properly cleaned and sealed to prevent further deterioration of the pavement.
- Miscellaneous pavement repair is required within the west surface parking lot (**Photo #50**) to address differential settlement issues. This is especially important for those defects that are several inches deep and present a potential trip hazard.



Photo #51



Photo #52



Photo #53

- The barrier fence along the railroad tracks along the west end parking lot should be inspected periodically and repaired as required.

It is DESMAN's opinion that the above repairs associated with the West End Surface Lot are in reality operating and maintenance expenses, and are therefore not included as separate and distinct items within our projected capital budget costs

#### 14. West Entrance Enhancements:

Originally, a canopy structure was intended to be installed at the West Entrance (**Photos #51 & #52**) as part of the comprehensive renovation project of the early 1980s; however, it was never installed. Since then, this entrance has become a challenge since it serves patrons waiting for buses as well as other related needs.

There may be opportunities which could make this area more inviting (**Photo #53**). Various enhancements could include installing the canopy as originally intended, perhaps similar to the East Entrance and the Main Entrance or some such variation, but also updating the signage and lighting to better identify the entrance, provide bench seating, or replacing the bollards with illuminated bollards, all of which could assist in transforming the area (various concepts as follows)







Photo #54

#### 15. Construction of New Access Hatch into Basement:

Due to the recent deliveries and installations of larger equipment, such as a new boiler, concern has risen due to the need for specialized rigging, shoring and materials to protect the sensitive floor elements with their limited loading capacity. PNH has therefore requested that DESMAN consider the installation of a hatchway with direct access into the basement of the Building, in order to accommodate the delivery and installation of larger mechanical equipment.



#### 16. Cleaning of Furred Ceiling Space; Fall-Protection Improvements

Recently, PNH has had the desire and need to address certain lighting and electrical improvements in the furred ceiling space (Level 3 ½) as part of PNH Project #15-003B. In the course of addressing the work, we have become aware of the dirt and debris currently there (due to the lack of a finished floor and confined spaces with low ceiling heights, it has been impractical and quite challenging to regularly clean the space as part of the regular maintenance operations) (**Photo #55**). Therefore, PNH requests that a formal cleaning be performed as a capital project; at that time, DESMAN will consider additional measures that can be implemented to assist in making the access more practical for future cleanings.



Photo #55





Photo #56

#### 17. Construction of Family Restroom.

Pursuant to recent discussions, **DESMAN** understands that **PNH** desires to review and study various issues that may be involved in the construction of a potential family restroom (**Photo #56**), in addition to the existing restrooms currently located at the Union Station Building. This study has been in progress as part of NHPA Project No. 18-022; plans however for a single toilet family restroom have been deferred and instead will be considered as part of a comprehensive plan to increase public restrooms.

#### 18. Replacement of Stone Thresholds at East Entry/Exit Doors:

Cracking in the stone thresholds has apparently allowed moisture through, and so nominal leaking has been observed into the tunnel below (**Photo #57**). **DESMAN** recommends that these thresholds be properly sealed and any cracking be repaired.

#### 19. Replacement of Brass Rails at Exterior Doors:

The brass railings by the exterior doors have been susceptible to moisture and thus have corroded, becoming loose (**Photo #58**). **DESMAN** recommends that these railing systems be replaced, perhaps mounted onto a raised curb of some form so as to provide further protection.



Photo #57

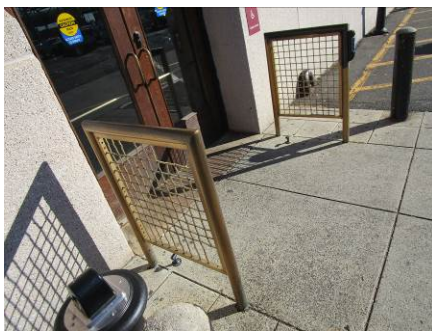


Photo #58





Photo #59



Photo #63

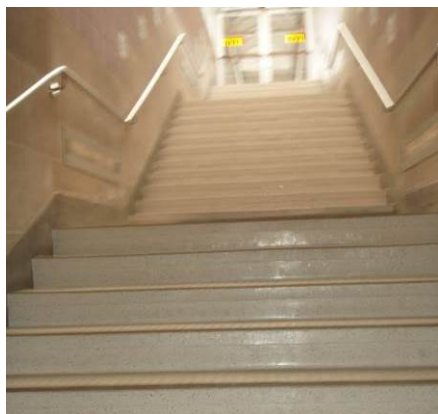


Photo #64

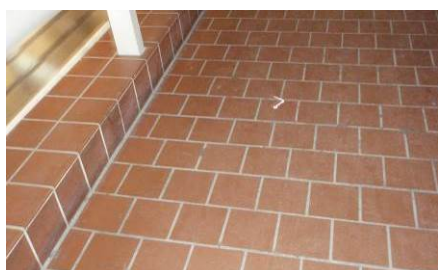


Photo #65

## 20. Miscellaneous Wall Repair, in tenant spaces:

Apparently due to moisture penetrating through the windows or roofing system above, various extents of damage have been observed throughout the now-vacant tenant spaces (**Photo #59**). Since the source of moisture is not exactly confirmed, DESMAN recommends that the envelop be monitored along with other planned improvements, and this wall damage be repaired as required.



## B. TUNNEL WORK:

CDOT has addressed repair work within the pedestrian tunnel; as part of the scheduled repairs implemented by CDOT, the tunnel's original stainless steel liner was removed and replaced in its entirety. Additionally, a limited amount of repairs was necessary to the interior surfaces of the tunnel's concrete construction and aforementioned corrugated metal decking.

Even though various drainage improvements were undertaken by CDOT as well, additional drainage improvements were undertaken by NHPA in summer/fall 2019 (**Photo #63**) as part of NHPA Project No. 18-013; a limited amount of reserve is recommended to be budgeted each year for additional seepage crack injection which may be required.

The stair treads and stair landings within the tunnel which access the station's railroad platforms had exhibited some limited wear due to heavy usage and were addressed and replaced in the CDOT project's scope of work (**Photo #64**). NHPA, however, has requested that DESMAN consider a future replacement program in which DESMAN considers other options besides rubber flooring that may be more durable for the long-term, such as supplemental metal treads that may be installed as a retrofit.

Cleaning of the limestone walls and wall tile is required along the perimeter of the pedestrian tunnel and up the stairs to the individual platforms.





Photo #66



Photo #67

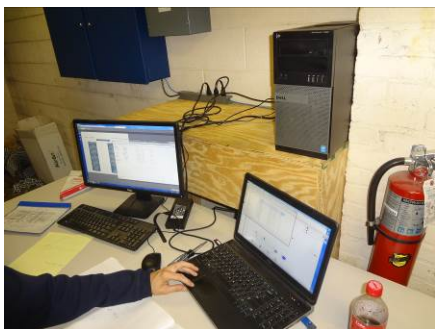


Photo #68

### C. ELEVATOR/ESCALATOR WORK:

The tunnel elevators and escalators were modernized as part of NHPA Project no. 13-012 B.

In order to assist PNH in the ongoing execution of its Maintenance Agreement with Schindler Elevator Corp., it is recommended that PNH program the services of DESMAN and its elevator sub-consultant, Sterling Elevator Consultants, to oversee an elevator maintenance audit on a regular basis.

As recently discussed, DESMAN and Sterling recommended that the escalators be shut down for a “rest period” during the early morning hours; a period of downtime each day would be expected to reduce the long-term wear and tear on the escalator systems as a means of saving energy and costs. DESMAN and Sterling note that proper signage would need to be placed so as to prohibit use of the escalators in a static position; use of an escalator as a static stairwell is prohibited and not compliant with Code due to the height of the steps; this rest period is implemented every day from 1:00 AM to 4:00 AM.

### D. MECHANICAL WORK:

#### 1. Replace Pneumatic HVAC Controls w/ Electronic Controls:

A pneumatic automatic temperature control system was furnished as part of this facility's original renovations in the 1980s. The pneumatic control system air compressor required frequent maintenance and the control components often required adjustment by a control system service contractor.

The Building has a DDC (Direct Digital Control) building management system which was installed as part of the 2003 HVAC improvements. This system is capable of supervision and control of all building HVAC systems from the operator's workstation.

This work has been addressed as part of NHPA Project No. 10-005 B. The upgrades included installation of a new web based Head End Controller for the Building Management System (**Photos #68 & #69**) and replacement of all remaining



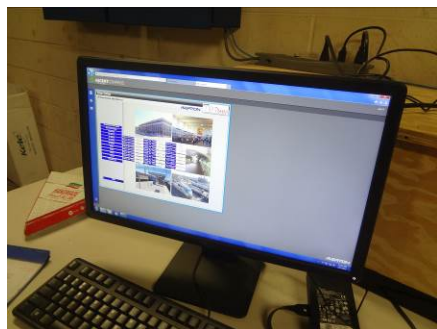


Photo #69



Photo #70



Photo #71

pneumatic controls with new DDC controls. This work eliminated the need for the pneumatic compressor which were removed.

HVAC equipment that was furnished or replaced as part of the 2003 HVAC improvements is controlled by the existing DDC system. Designated other existing pneumatic controls serving other systems were replaced with new electronic components in order to have a more comprehensive supervision of the building HVAC systems through the new DDC system. These modifications will reduce maintenance cost.

As other HVAC systems throughout the facility near the end of their useful life, they should be replaced with newer components equipped with DDC system interface.

## 2. Packaged Rooftop Unit Repairs:

Three of the six packaged rooftop air conditioning units were replaced in 2003, and the second set of three were replaced (**Photos #70 & #71**) as part of NHPA Project No. 10-005 B. However, the time has come again to consider replacement of the initial three, and thus DESMAN recommends that they be monitored and planned for accordingly.

## 3. Tunnel Exhaust Fan Work:

- i. Replace Tunnel Exhaust Fans: There was a need to replace the tunnel exhaust fans, as this equipment is in operation almost continuously and was showing increased signs of problems.
- ii. Install Manual Override Switch for Tunnel Exhaust Fans at Fire Alarm Control Panel: Tunnel exhaust fans should have a manual override switch installed near the fire alarm control panel to allow fans to be turned on or off by local fire department depending on specific needs.

This work has been performed by CDOT, as part of the CDOT's code and upgrade project.

4. Replace Sump Pump Cover w/ Grating & Add Sump Water Level Monitoring (Boiler Room):

The sump pump cover located within the basement boiler room was corroded and replaced with an open grating/cover. The sump is wired to be monitored by the BMS system, in the event that the pumps fail to function. Replacement and installation of new monitoring has been addressed as part of NHPA Project No. 10-005 B.

5. Replace Gate Valves @ Control Valves:

The gate valves that isolate the hot water coil control valves did not close properly. Since closure of the gate valves is required in order to service the control valves, the gate valves needed replacement. Shutdown and partial draining of the hot water system was required for gate valve or control valve repairs. Replacement has been addressed as part of NHPA Project No. 10-005 B.

6. Fire Pump Repairs:

The following repairs were performed by CDOT, as part of the CDOT's code and upgrade project:

- i. The battery rack for the fire pump was cleaned and painted to prevent further corrosion.
- ii. A fuel level monitoring system was installed to make sure that adequate fuel supply is available for weekly tests and emergency operation.

7. Fire Pump Replacement:

The 30-year old fire pump was replaced (**Photo #72**) as part of NHPA Project No. 10-005 B.

8. Replace two (2) Existing Recessed Wall Heaters in Main Entry Vestibules & Repair Cabinet Unit Heater Coil:

In addition to the need to replace the two (2) recessed wall heaters, it is necessary for the heating registers and returns to be cleared of trash and debris by maintenance staff periodically. Replacement has been addressed as part of NHPA Project No. 10-005 B.



Photo #72



Photo #73

9. Perform Repairs & Preventative Maintenance on Main Lobby Air Handlers:

The main lobby air handlers have been re-balanced and bearings to be greased or replaced. These repairs and maintenance have been addressed as part of NHPA Project No. 10-005 B.

10. Boiler Replacement:

There are three (3) boilers serving the Station. Two boilers were replaced circa 2010 and the third boiler was replaced in 2019 as part of NHPA Project No. 18-014.

11. Replacement of Chilled Water Pump:

The previous chilled water pump, installed during the 1980's, has now been replaced (**Photo #73**) as part of NHPA Project No. 18-014 now complete.

12. Mechanical Preventative Maintenance:

DESMAN recommends the periodic maintenance and repair of various components of the buildings mechanical systems; the costs are considered operational costs and are therefore not included as separate and distinct items within our projected repair and preventive maintenance costs. Periodic maintenance and service of the mechanical systems should be in accordance with the O&M requirements for the individual systems and include but are not limited to the following:

- Sump Pumps (located in basement)
- Heating Plant including boilers, hot water pumps, combustion air fan, and Boiler Room controller
- Chilled Water Plant including, air cooled chiller, chilled water pump, system controller, and chiller heat trace
- Mechanical Room Unit Heater

- Air Handling Units and Return/Exhaust Fans (Located in basement)
- Packaged Rooftop Air Conditioning Units
- Roof Exhaust Fans
- Split System Air Conditioning including Air Handling Units and Condensing Units serving miscellaneous 1<sup>st</sup> floor spaces
- Variable Air Volume Terminals located throughout the facility
- Automatic Temperature Controls including Controllers, Control Dampers and Control Valves
- Elevator Machine Room HVAC Equipment
- Equipment Located in Mechanical Furred Ceiling Space, exhaust fans, air handling units, and unit heaters
- Exhaust fans, cabinet unit heater and dewatering pumps serving Pedestrian Tunnel

CDOT completed the installation of a new sand/grit separator as part of its code compliance project, and subsequently, NHPA received a permit for the discharge of industrial wastewater from the underground passageway through the discharge locations into the Greater New Haven Water Pollution Control Authority (GNHWPCA) sewer system; the permit also dictates that the oil/grit separator be cleaned once per year. The permit expired on March 31, 2018 and was renewed by NHPA; the next renewal is due by April 1, 2023.



Photo #74





Photo #75



Photo #76

#### 14. HVAC Improvements in Designated Tenant Spaces:

- The Amtrak, Avis & Greyhound spaces (**Photos #74 & #75**), currently served by AHU-6, had been experiencing overheating issues; after review, we found that the unit was originally set up for free economizer cooling but that there was excess restriction in the outside air duct so economizer was ineffective. We addressed the overheating by adding a booster fan in the basement to supply the correct amount of outside air for economizer. Further improvements to AHU-6 controls were included in NHPA Project #10-005B, so additional improvement should be noted. We would subsequently recommend continued monitoring of these spaces to confirm.

The MetroNorth Police Department's space, however, is served by AHU-1 which provides heating and ventilating only to the basement. A new split system with ducted fan coil unit and outdoor condensing unit was installed, which supplements the existing system and provide AC to the space.

Although certain improvements and repairs within tenant spaces are generally considered a tenant responsibility to address, some items serve to enhance the efficiency and integrity of the building and may be included as a building capital cost. Therefore, this work was accomplished as part of Project no. 10-005B now completed.

- The electrical room near the Amtrak office in the basement required certain HVAC improvements to enhance cooling and ventilation. This work was accomplished in 2019 are part of NHPA Project No. 18-014.
- PNH had observed multiple minor air leaks at several of the air handling systems in the basement (**Photos #76**); these leaks represented an inefficiency in operation of the systems and could limit their ability to properly heat or cool the space. The leaks occurred in a number of different areas, including worn flexible connections. DESMAN recommended that testing be performed on

each of the units to identify the leaks and an allowance programmed for associated repairs. This work was addressed in 2019 as part of Project No. 18-014.



Photo #77

15. The prior 90 ton chilled water plant has been replaced with a new 100 ton chiller in 2019 as part of NHPA Project No. 18-014 (**Photos #77**). DESMAN recommends that regular preventative maintenance be scheduled and provided for every 3 years approximately.

16. Cleaning of Interior Ductwork:

DESMAN recommends cleaning the interior of all existing supply and return ductwork. Ductwork shall be cleaned in accordance with National Air Duct Cleaners Association (NADCA) Standard ACR 2013. Work shall be performed by a contractor certified in duct cleaning by NADCA or other nationally recognized industry organization; Provide duct openings as required to perform duct cleaning. Close and seal openings upon completion of work. DESMAN anticipates that most of this work will need to be performed during off hours and during a season when the heating and/or cooling systems can be shut down for several hours at a time.

17. Miscellaneous Capital Repair/Replacement: DESMAN recommends that a certain allowance be set-aside for unexpected costs that are too significant for maintenance and thus may be considered capital expenditures.

**E. ELECTRICAL WORK**

1. Emergency Generator Maintenance:

The emergency generator was replaced as part of the CDOT's code and upgrade project currently completed circa 2014. DESMAN notes that additional loads have been added to the generator system. Maintenance is an operating expense and therefore is not included within the projected repair and preventative maintenance costs.



Photo #78



Photo #79



Photo #80



Photo #81

## 2. First Floor Lighting Replacement:

Interior lighting fixtures in several areas adjacent to the main waiting room were recently upgraded in 2019 as part of Project No. 15-003 B.

Also, as recommended by DESMAN, modifications were made to the light fixtures over the escalators (**Photos #78 & #78**). Due to their height and positioning over the escalators, access for maintenance was challenging and scaffolding was necessary. This work was accomplished as part of NHPA Project No. 15-003 B in 2019, now substantially complete.

## 3. Miscellaneous Electrical Repair:

Miscellaneous electrical repairs, such as exposed wiring, corroded conduits, and boxes, and damaged light fixtures should all be addressed as may be required. This work is considered as operating expenses and therefore are not included within the projected repair and preventative maintenance costs.

## 4. Elimination of T12 Fluorescent Lamps:

Production of many replacement ballasts for T12 fluorescent systems has already been discontinued. As a result, replacement T12 lamps and ballasts will become increasingly expensive and difficult to obtain. Replacement of any remaining T12 fluorescent systems in the facility should be considered in the near future. There were existing T12 fixtures serving the back stairwells, first floor wall-wash fixtures (**Photo #80**), and first and second floor restrooms. This work was completed in 2019 as part of NHPA Project No. 15-003 B.

## 5. Thermal Scanning:

Thermal imaging, or scanning of electrical equipment, is a tool used to identify heating problems before they result in a failure or outage. Overloading, high contact resistance and material degradation can all cause excessive heating of equipment and terminations. Thermal scanning can detect these problem areas and allow corrective action to be taken



Photo #82

on a scheduled basis. This procedure is common for industrial facilities and is typically performed prior to a scheduled shut-down of the equipment so that repairs can be done during that outage. While the electrical characteristics of this facility will not tend to cause this type of failure at the same rate as an industrial facility, the age of the equipment, the environment in which it is installed, and the potential impact of a significant failure are all indications that periodic thermal scanning would be beneficial. This work was completed in 2019 as part of NHPA Project No. 15-003 B.

6. Emergency Lighting:

Existing battery-powered twin-head emergency lighting units are installed throughout the second, third and fourth floor corridors (**Photo #81**). DESMAN recommends that PNH Maintenance monitor them and repair/replace them as may be required.

7. Replacement of Tunnel Pendant Fixtures:

16 foot pendant mounted fixtures in each of two high ceiling areas of the tunnel were replaced in 2019 as part of NHPA Project No. 15-003 B (**Photo #82**).

8. Mobile Device Charging Stations have been installed at various locations throughout the Union Station Building (**Photo #83**). DESMAN recommends that PNH monitor the stations for volume of usage and prepare a preventative maintenance program accordingly.

9. PNH had requested that service lights be installed on the roof in designated locations (**Photo #84**) to provide enhanced lighting when performing maintenance on the various roof level mechanical units and equipment. This work was completed in 2019 as part of NHPA Project No. 15-003 B.



Photo #83



Photo #84





Photo #85

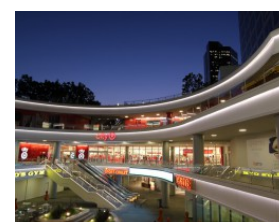


Photo #86



Photo #87

10. Decorative lighting: Outdoor rated, linear, colored LED fixtures are available from a number of reliable manufacturers. These fixtures could be used for aesthetic appeal and level identification. Color changing effects can be included to provide season-appropriate lighting. The scope and cost for this type of lighting can vary greatly (**Photos #85 & #86**). A study of acceptable effects, potential installed locations and associated costs should be performed prior to implementation.



11. Surge Protection: Recent events in several of the facilities have raised concerns about surge protection for the electrical distribution system. Such protection can help prevent damage to equipment connected to the system and limit power outages. Protection can be provided at any point in the distribution system and is typically designed based on the level of protection desired at any point. Multiple levels of protection are often implemented with devices installed at the incoming service, at select subpanels and at the sensitive equipment. This work was completed in 2019 as part of NHPA Project No. 15-003 B.
12. Transformer Replacement: The basic cause of transformer noise is magnetostriction: the expansion and contraction of the iron core (laminations) due to the magnetic effect of alternating current flowing through the transformer coils; this produces an audible hum. Magnetostriction may be partially controlled by the transformer design, but it cannot be totally eliminated. Thus all transformers will have some audible noise and will also transfer some vibration into the surfaces they are mounted to. Reducing the noise and vibration could be accomplished by replacing the transformer with one having a more modern construction or providing some form of vibration isolation. Sound deadening materials could also be placed between the transformer and any



Photo #88



Photo #89



Photo #90

location where the noise is problematic. The humming is not typically an indication of impending failure or overloading and unless the noise is creating a disturbance to patrons or employees, DESMAN recommends that it simply be monitored for the time being (**Photo #87**). Various units located in the furred ceiling space are also showing signs of age; DESMAN recommends that these units be monitored and as well, programmed for replacement as may be appropriate.

13. Replacement of the Tunnel Light Rail: In order to enhance the tunnel leading to the train platforms, consideration has been made to enhance the rail light on either side of the tunnel (**Photos #88 & #89**). A simple but decorative enhancement may be to retrofit or replace the rail with a color-changing lighting system that may be programmed for additional aesthetics. At that time, DESMAN recommends that the mounting system be modified, as well, so as to avoid the rail system being exposed to moisture and subsequent corrosion.

14. Lights around Flagpole: the embedded light fixtures surrounding the flagpole in the front of the Station are aged and damaged due to water (**Photo #90**). DESMAN recommends that these fixtures be replaced.

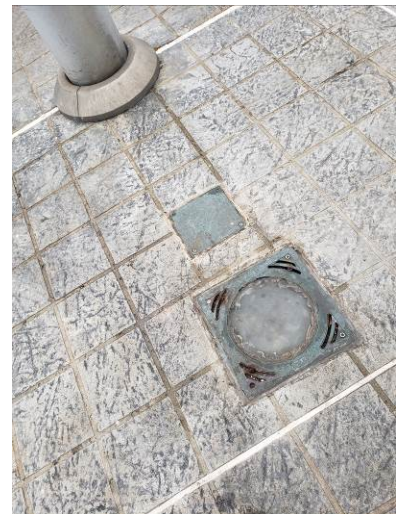






Photo #91



Photo #92



Photo #93



Photo #94

15. The lights within the walls of the stairs leading to the train platforms are aged and difficult to maintain due to their exposure to moisture (**Photo #91**). DESMAN recommends that the photometrics of these lights be reviewed to confirm whether the fixtures are actually necessary; if they are not necessary, DESMAN recommends that the fixtures be removed and plated over, otherwise they be replaced with new fixtures.

#### F. SECURITY ENHANCEMENTS:

DESMAN recommended that a study be performed to review security needs and to provide appropriate recommendations; design and installation of the security system would follow and be programmed for implementation accordingly. The draft study is currently complete as part of NHPA Project No. 15-002.

DESMAN understands that this work would be subject to funding, and so DESMAN recommends that NHPA program this work accordingly. Since these security enhancements would be an optional consideration, the related expenses are not included as an item within our project capital budget costs.

#### G. LANDSCAPING & SITE IMPROVEMENTS

##### Rear-placed Mechanical Equipment:

Over the recent years, additional mechanical equipment has been installed in the rear of the building along the curbing. In the past, effort had been given to enclose the various piping so as to minimize the aesthetic impact to the building, but the recent piping remains exposed.

A combination of housekeeping pads also exists, consisting of raised concrete, surface-flush concrete, as well as no pad but for the pre-existing asphalt curbing.

DESMAN recommends that this curbing area be reviewed and the equipment re-organized, appropriate pads be placed or adjusted, and the various piping be enclosed. (**Photos #92, #93 & #94**)



Photo #95



Photo #96



Photo #97

### 1. Miscellaneous Site Repairs:

Various site elements have been damaged, such as the precast planter walls in the rear of the Building, as well as moisture damage and corrosion to fencing. All elements and materials should be repaired as may be required. (**Photos #95, #96 & #97**).

### 2. Miscellaneous Signage Improvements:

Recently, PNH authorized DESMAN to review, identify and study the program elements for wayfinding needs of the interior common spaces of the Union Station Building. The goal of the Assessment & Study is to provide PNH with a clear understanding of the complexity and/or simplicity of implementing a new signage program; this study is in progress in accordance with PNH Project #19-032 and subsequent recommendations will be programmed accordingly.

In the meantime, any existing signage which have been damaged should be replaced. DESMAN also recommends that the signage program be reviewed for any potential updating as may be appropriate for patron requirements. (**Photo #98**)

### 3. Streetscape Improvements:

PNH has determined the need to modify the existing traffic and transit operations along Union Avenue and in front of New Haven Union Station (**Photo #99**) to better organize and delineate the various functions for all types of travel including shuttle bus, city bus, taxi, Uber, limo, pickup/drop off by car, bicycling and walking. Improvements include, but are not limited to, installing new vehicular signage and pedestrian wayfinding signage, installing new bus shelters, installing a new bicycle parking area, and other streetscape and site improvements at New Haven Union Station (the "Project"). Although this work is currently being considered as part of Project no. 15-023, progress is on hold per discussion with the City of New Haven and State of Connecticut.





Photo #98



Photo #99

#### H. MISCELLANEOUS WORK:

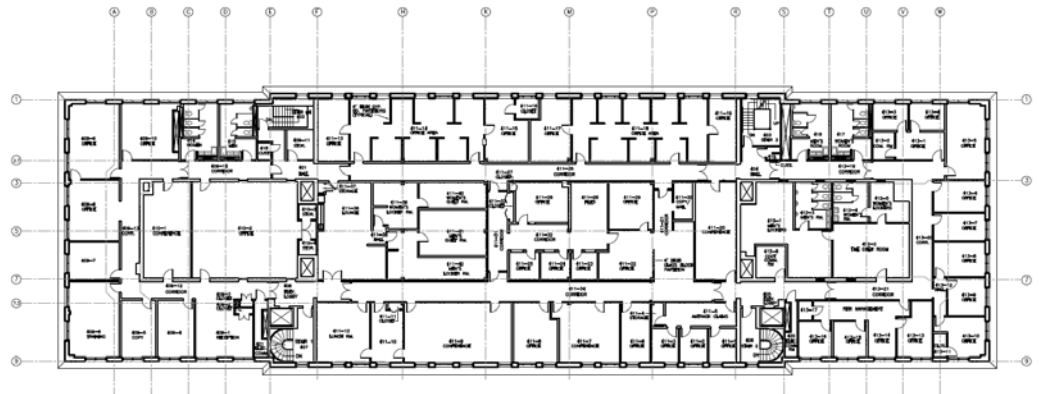
1. Some of the coated skylights on the fourth floor offices are peeling. Should privacy or heat/light protection still be required, a new coating should be applied, or the glass replaced with opaque glass or insulated panels. DESMAN recommends that these be monitored as required. **(Photo #100)**
2. Periodic inspection of the perimeter fencing is recommended to assure this fence remains secure and properly maintained.

#### I. SPACE PLANNING FOR 4<sup>TH</sup> FLOOR

Due to the recent departure of CDOT and Metro-North from the 4th floor (circa 2017/2018), designated tenant space has become available for new leasing. While other current tenants have expressed interest in the space, this scenario creates the need to review the floor in its entirety due to CDOT's and Metro-North's current layout and the possible desire to subdivide the floor to accommodate multiple tenants, and to provide appropriate corridors, access to restrooms, access to the stairs and elevators, etc. DESMAN recommended that PNH perform a space planning study to consider possible configurations, access requirements and other code-related improvements. This study was performed as NHPA Project No. 17-009.



Photo #100



#### **J. UPDATING OF RECORD DOCUMENTS:**

Given the size of this facility, and its associated building systems, and the need to perform regular maintenance, as well as the need to correctly oversee future repair and preventative maintenance projects, NHPA will benefit from the continuous updating of a set of as-built drawings. Such drawings will identify the locations and ratings of all electrical distribution components, locations and manufacturers of fire alarm and security systems, and the location and circuiting of all regular lighting, emergency lighting, and exit signs. Mechanical systems (boilers, fans, HVAC equipment, pumps and sprinkler systems) would also be documented. DESMAN recommends that the record documents be updated as required.

In conjunction with the benefit of preparing Record Drawings, it is becoming more cumbersome and inefficient for NHPA to maintain a hard-copy set of the original/past documents from the garage's original construction. The documents are becoming more aged and the paper more susceptible to damage. Considering the valuable nature of the historic documentation with regards to future repair work, DESMAN recommends that NHPA arrange for the scanning of all documentation into electronic (PDF) format; converting the documents into electronic format would allow for easier sharing of documents, as well, which can then easily be transmitted via e-mail as required.

This work is currently in progress as part of NHPA Project No. 18-015.

## 5. PRIORITIZED REPAIR PROGRAMS & ESTIMATED COSTS

A revised repair and preventive maintenance program has been developed to assure the long-term durability of the Union Station Building. The repairs required have been prioritized into three courses of action:

- Prioritized Repairs (FY 2021)
- Early Repairs (FY 2022)
- Programmed Repairs (FY 2023)
- Long-Term Repairs (FY 2024 - 2025)

Below is a summary of the estimated construction cost for each category.

RECOMMENDED REPAIR PROGRAM	ESTIMATED CONSTRUCTION COST
Prioritized Repairs (FY 2021)	\$85,550.00
Early Repairs (FY 2022)	\$169,650.00
Programmed Repairs (FY 2023)	\$3,195,800.00
Long-Term Repairs (FY 2024 – 2025)	\$2,636,100.00
<b>TOTAL ESTIMATED COST</b>	<b>\$6,087,100.00</b>

A detailed cost estimate is provided in the table on the following page, entitled “Projected Five Year Construction Costs.”

The construction costs are based on current prices in the New Haven area for labor, equipment and materials. The estimated construction costs also include a 20% contingency factor to account for uncertainties in the restoration market at the time of bidding, and a preliminary design, construction management fee and program management fee estimated at 25% of total construction cost has been provided for budgeting purpose.





**Table 1**  
**Union Station Building**  
**Projected Five Year Construction Costs**  
**(FY 2020)**

Work Description		Prioritized Repairs (FY 2021)	Early Repairs (FY 2022)	Programmed Repairs (FY 2023)	Long-Term Repairs (FY 2024 - 2025)
<b>A. Architectural, Structural &amp; Masonry Repair:</b>					
1	Plaster Ceiling Repairs & Painting (miscellaneous locations throughout Facility):	\$ -	\$ -	\$ -	\$ -
2	Main Lobby & Anterior Lobby Area Interior Refinishing/Painting	\$ -	\$ -	\$ -	\$ -
3	Upper Floor Common Area Interior Repairs & Improvements/Painting:	\$ -	\$ -	\$ -	\$ -
4	Stairwell Repairs & Improvements/Painting:	\$ -	\$ -	\$ -	\$ -
5	Miscellaneous Floor and Tile Repair.	\$ -	\$ -	\$ -	\$ -
	Allowance for Tile Replacement	\$ -	\$ -	\$ -	\$ -
6	Clean Limestone Walls in Main Lobby & Anterior Lobby Areas:	\$ -	\$ -	\$ -	\$ -
7	Misc. Exterior Repair:				
a.	Rework/Repair Double Pane Exterior Window Glass	\$ -	\$ -	\$ -	\$ 630,000.00
b.	Misc. Terracotta & Masonry Repair - Cornice Coating/Cleaning	\$ -	\$ -	\$ -	\$ -
c.	Misc. Exterior Sealant/Waterproofing Work - Decorative Stone/Concrete/Cove Joint	\$ -	\$ -	\$ -	\$ -
8	Clean Main Waiting Room Lights & Paint Wall Sconces	\$ -	\$ -	\$ -	\$ -
9	Misc. Exterior Sidewalk Repair				
a.	Concrete Sidewalk Repair	\$ -	\$ -	\$ -	\$ -
b.	Sidewalk Sealant/Caulking Work	\$ -	\$ -	\$ -	\$ -
c.	Decorative Concrete Sidewalk Sealant and Pigment Repair	\$ -	\$ -	\$ -	\$ -
10	Misc. Rear Parking Lot Repairs:				
a.	Misc. Bituminous Concrete Curb Repair	\$ -	\$ -	\$ -	\$ -
b.	Misc. Pavement Repair	\$ -	\$ -	\$ -	\$ -
c.	Re-Striping Work	\$ -	\$ -	\$ -	\$ -
11	West Entrance Enhancements (New Canopy, related improvements)	\$ -	\$ -	\$ -	\$ 91,000.00
12	Roofing Repairs, Replacement and Improvements:				
a.	Study of Roof System Options	\$ -	\$ -	\$ -	\$ -
b.	Replacement of Roofing System	\$ -	\$ -	\$ 1,332,000.00	\$ -
c.	Installation of Railings and Fall-Arrest Devices	\$ -	\$ -	\$ 134,000.00	\$ -
13	Installation of Access Hatch into Basement	\$ -	\$ -	\$ -	\$ 70,000.00
14	Cleaning of Furred Ceiling Space; installation of fall arrest equipment	\$ -	\$ -	\$ 100,000.00	\$ -
15	Construction of Family Restroom	\$ -	\$ -	\$ -	\$ -
16	Replacement of Stone Thresholds at Eastern Entry/Exit Doors	\$ -	\$ -	\$ 34,000.00	\$ -
17	Replacement of Brass Rails at Exterior Doors	\$ -	\$ -	\$ 40,000.00	\$ -
18	Misc. Wall Repair in Tenant Spaces (Amtrak, 4th floor, etc.)	\$ -	\$ 64,000.00	\$ -	\$ -
<b>B. Tunnel Work:</b>					
1	Misc. Limestone Wall Repair	\$ -	\$ -	\$ -	\$ -
2	Misc. Plaster Repair & Repainting	\$ -	\$ -	\$ -	\$ -
3	Limestone Wall Cleaning	\$ -	\$ -	\$ -	\$ -
4	Replace Stair Treads and Stair Landing Flooring (Platform Stair Access)	\$ -	\$ -	\$ -	\$ 126,000.00
5	Repair Floor Tiles & Cove Base	\$ -	\$ -	\$ -	\$ 21,000.00
6	Negative-Waterproofing	\$ -	\$ 32,000.00	\$ 34,000.00	\$ 70,000.00
<b>C. Mechanical Work:</b>					
1	Water Chiller:				
a.	Preventative Maintenance (and pump replacement as required)	\$ -	\$ -	\$ -	\$ 70,000.00
b.	Replacement of Water Chiller	\$ -	\$ -	\$ -	\$ -
2	AHU Testing & PM Repairs				
a.	Testing for Leaks	\$ -	\$ -	\$ -	\$ -
b.	Allowance for Repairs	\$ -	\$ -	\$ -	\$ -
3	Miscellaneous Mechanical/Plumbing Repairs	\$ -	\$ -	\$ -	\$ -
4	Boiler Replacement	\$ -	\$ -	\$ -	\$ -
5	HVAC Modifications to Electrical Room	\$ -	\$ -	\$ -	\$ -
6	Cleaning of Ductwork System	\$ -	\$ -	\$ 67,000.00	\$ -
7	Rooftop Unit Replacement (3 units)	\$ -	\$ -	\$ -	\$ 630,000.00
8	Miscellaneous HVAC Repair/Replacement	\$ 16,000.00	\$ 16,000.00	\$ 17,000.00	\$ 35,000.00
<b>D. Electrical Work:</b>					
1	First Floor Lighting Replacements				
a.	Replacement of Fixtures over Escalators	\$ -	\$ -	\$ -	\$ -
b.	Retrofit of Chandeliers; and Connection to Generator	\$ -	\$ -	\$ 134,000.00	\$ -
2	Miscellaneous Electrical Repairs	\$ -	\$ -	\$ -	\$ -
3	Thermal Scanning (every 3 to 5)	\$ -	\$ -	\$ 5,000.00	\$ -
4	Replacement of Decorative Light Rails, along Tunnel	\$ -	\$ -	\$ 267,000.00	\$ -
5	Replacement of Light Fixtures around Flagpole (including replacement of decorative concrete)	\$ -	\$ -	\$ 40,000.00	\$ -
6	Accent Lights at Stairs in Tunnel (Study) (including selective exploratory demo)	\$ 43,000.00	\$ -	\$ -	\$ -



**Table 1**  
**Union Station Building**  
**Projected Five Year Construction Costs**  
**(FY 2020)**

Work Description		Prioritized Repairs (FY 2021)	Early Repairs (FY 2022)	Programmed Repairs (FY 2023)	Long-Term Repairs (FY 2024 - 2025)
<b>E. Security Improvements</b>					
1	Study of Security Needs	\$ -	\$ -	\$ -	\$ -
2	Installation of Security System (i.e. Cameras, Access Control, and other components)	\$ -	\$ -	\$ -	\$ -
<b>F. Elevator/Escalator Upgrades and Improvements:</b>					
1	Maintenance Audit (Bi-Ennial)	\$ -	\$ 5,000.00	\$ -	\$ 5,000.00
2	Installation of Enhanced Escalator Handrails	\$ -	\$ -	\$ -	\$ -
3	Procurement & Placement of Fire-Rated Rag Cans	\$ -	\$ -	\$ -	\$ -
<b>G. Landscaping &amp; Site Improvement Work:</b>					
1	Streetscape Improvements	\$ -	\$ -	\$ -	\$ -
2	Precast Concrete Planter Wall Repair	\$ -	\$ -	\$ -	\$ 7,000.00
3	Rear-place Mechanical Equipment/Curbing Improvements	\$ -	\$ -	\$ -	\$ 49,000.00
4	Signage Repairs and Improvements (Exterior)	\$ -	\$ -	\$ -	\$ -
5	Signage Replacement and Improvements (Interior)	\$ -	\$ -	\$ -	\$ -
6	Misc. Fencing Repairs (caulking at bases, paint touch-up)	\$ -	\$ -	\$ -	\$ 14,000.00
<b>H. Space Planning for 4th Floor:</b>					
		\$ -	\$ -	\$ -	\$ -
<b>I. File Management</b>					
1	Preparation of Record Drawings	\$ -	\$ -	\$ -	\$ -
2	Scanning of Original Drawings	\$ -	\$ -	\$ -	\$ -
<b>Sub-Total:</b>		<b>\$59,000.00</b>	<b>\$117,000.00</b>	<b>\$2,204,000.00</b>	<b>\$1,818,000.00</b>
20% Contingencies (Unless depicted Otherwise)		\$11,800.00	\$23,400.00	\$440,800.00	\$363,600.00
25% Engr. & Construction Management, incl. Program Management (Unless depicted Otherwise)		\$14,750.00	\$29,250.00	\$551,000.00	\$454,500.00
<b>Total Phased Construction Costs with Contingencies:</b>		<b>\$85,550.00</b>	<b>\$169,650.00</b>	<b>\$3,195,800.00</b>	<b>\$2,636,100.00</b>
<b>TOTAL Construction Cost with Contingencies:</b>					<b>\$6,087,100.00</b>

*Note 1: Costs Presented do not Include Typical Operational & Maintenance Costs Except as Noted*

*Note 2: Costs include a 15% allowance for General & Special Conditions.*

*Note 3: Future costs incorporate a cumulative 5% inflation for all costs, to be adjusted annually*

**6. APPENDIX A – SCHEMATIC FLOOR PLANS**

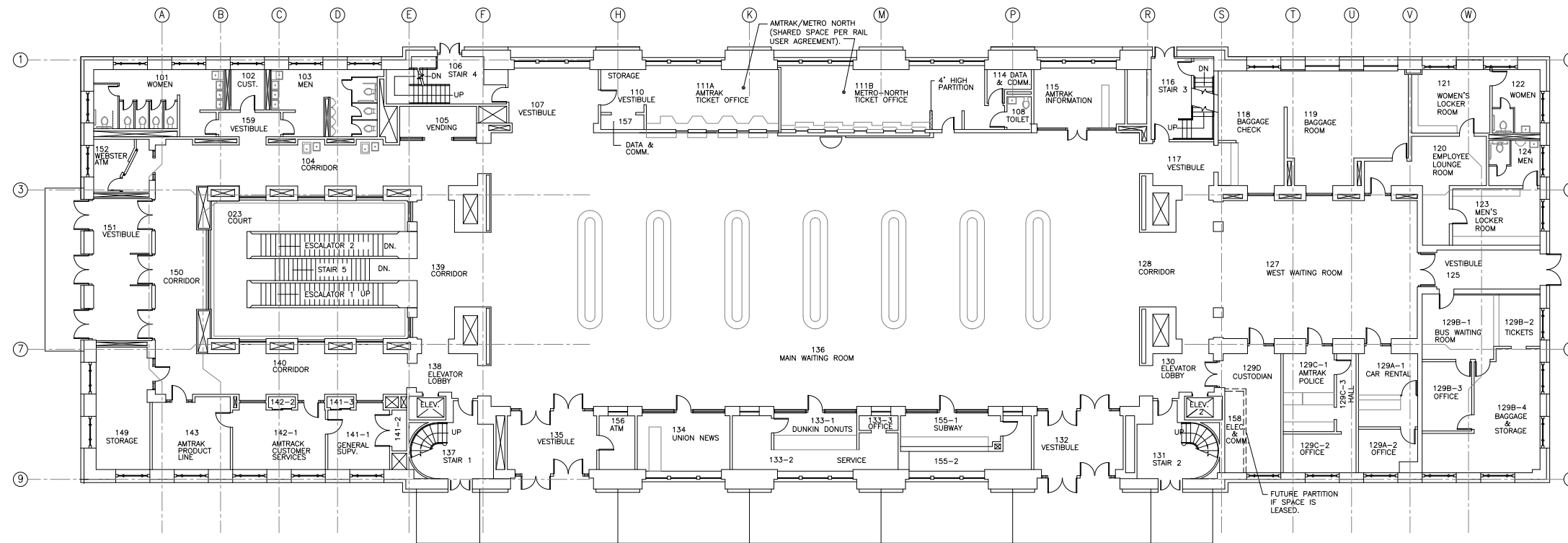
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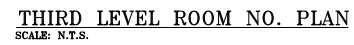


FIRST LEVEL ROOM NO. PLAN  
SCALE N.T.S.

NEW HAVEN  
NHPA PROJECT #20-001  
CONDITION APPRAISAL, YEAR 2020  
CONNECTICUT

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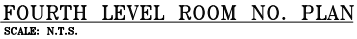


CONDITION APPRAISAL, YEAR 2020  
NHPA PROJECT #20-001  
NEW HAVEN  
CONNECTICUT

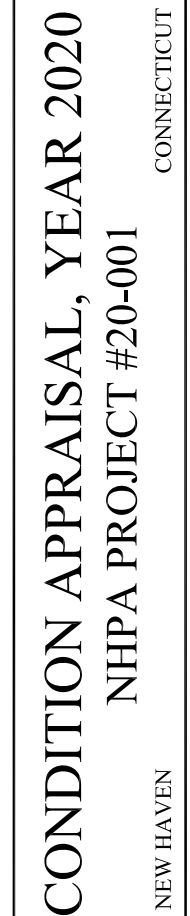
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NEW HAVEN  
CONNECTICUT

## Design Management

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