



**DURHAM COUNTY YOUTH HOME  
Building Assessment**

**May 30, 2014**

**(Updated October 18, 2017)**

**O'Brien/Atkins Associates, P.A.**

**O/A Project No. 2012068**



**O'BrienAtkins**

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## INTRODUCTION

### 1.1. Project Description

The existing Durham County Youth Home was built in 1983 on Broad Street north of Interstate I-85. Privacy and security improvements are needed to meet current standards.

### 1.2. Site

There is ample room on the existing site to accommodate the proposed interior renovations to the existing facility and make modest additions to parking, recreation and building facilities.

### 1.3. Building

The existing building structure and enclosure is in good condition. The interior construction is flexible and can be modified and renovated without requiring major structural or exterior modifications to the building.

### 1.4. Plumbing, Mechanical, and Electrical

In the last thirty years, many significant energy saving and technological improvements have been made in plumbing, mechanical, and electrical systems. Major changes to these systems are proposed. The addition of sprinklers, security, and information technology systems will make the facility code compliant, safer, and more useful in the future.

## 2.0 SITE

### 2.1. Zoning

The Durham County Youth Home sits on a 4.5 acre tract of land shared with the County Fire Marshall's Office. The property is zoned O-I (office and institutional), which does permit approved residential uses but specifically excludes correctional and jail facilities. Durham Planning staff has advised that an expansion of this facility may not qualify under the current zoning without a special use permit being adopted. Therefore, there are no guaranties at the present time that an expansion will be permitted.

### 2.2. Existing Conditions

The facility has no available parking for staff or visitors other than what is available by pulling off the side of the driveway or cul-de-sac in front the building. The current parking demand is estimated to be 10 for staff, 3 for visitors, 1 handicap space, and 3 secured spaces for facility owned vehicles.

The security fence surrounding the facility is chain link with a three barbed-wired top. *(Note: Security issues are discussed in Section 7.0 of this report).* A secured exercise yard on the east side of the facility contains some open lawn area and a narrow strip of asphalt with basketball goals at each end. While the basketball court serves its purpose, the sun orientation is wrong and the width limits meaningful play. The chain link fence in this exercise yard has a secondary mesh fence attached to deter climbing and escape. However, this additional mesh does little to screen the area from public viewing and protect the youths' identity.

An additional fenced exercise yard located on the west side of the facility is no longer used due to its visual exposure to the public and the fact that it is difficult for staff to adequately monitor two separate exercise yards.

A secured service court exists on the east side of the facility with its own vehicular security gate. Besides regular food deliveries and trash collection occurring here, the three youth home vehicles are kept within the tight confines of this space.

Site lighting is nearly non-existent and consists of a couple of dawn-to-dusk lights. There currently is no on-site stormwater management, but an expansion will trigger the implementation of both quantity and quality stormwater management devices.

### 2.3. Site Improvements

2.3.1. Add a 20-space parking lot with required landscaping and lighting.

2.3.2. Replace chain link fencing with a curved-top security fence.

2.3.3. Remove the west side exercise yard.

2.3.4. Add buffer planting around perimeter of the east exercise yard.

2.3.5. Improve the exercise yard, including re-orienting and expanding the basketball court.

2.3.6. Slightly expand the secured service court to better accommodate all existing functions.

2.3.7. Provide stormwater management devices commensurate with expanded impervious surfaces.

**2.4. Site Budget**

\$400,000

### 3.0 BUILDING

- 3.1. The architectural design of the existing building can basically be considered sustainable. Since the bedroom walls on the main floor are the only load bearing interior walls that support precast ceiling planks over the bedrooms, the interior construction is very flexible. The north facing clerestory daylighting for the dayroom is ideal. The thermal performance of the walls and roof can be improved to optimal levels by adding roof insulation above the insulating concrete roof deck and by adding a suitably protected layer of insulation on the interior side of the exterior masonry walls. Windows on the north, east, and west sides are minimal. South facing glass is generally shaded. The sprayed roofing more recently applied will require careful evaluation prior to a decision to salvage it.
- 3.2. The existing building concrete foundations and floors, exterior masonry walls, and steel framed structure are in good condition and will require minimal renovation.
- 3.3. Most, if not all, of the interior construction will have to be removed and replaced to achieve current code requirements for detention facilities as well as adequate food preparation space and separation of admissions and visitation. Some of the bedroom walls and the raised ceiling construction in the dayroom may be salvaged. For security reasons, most doors and windows will have to be replaced. All new finishes will be required. Toilet partitions and accessories need to be replaced to bring toilets up to accessibility codes. Some kitchen equipment will need to be replaced and supplemental kitchen equipment will need to be provided. Furniture costs are not included in this assessment.
- 3.4. An addition to the rear of the building will facilitate separation of admissions from visitation and provide additional space for staff, food preparation, storage, and sleeping rooms for ten additional youths.
- 3.5. Security upgrades are described in Section 7.0 of this report.

#### 3.6. Building Budget

Renovation with 3,000 SF Addition:	\$862,650
Renovation with 5,000 SF Addition:	\$1,102,650

## 4.0 PLUMBING AND FIRE PROTECTION

### 4.1 Existing Building Plumbing

- 4.1.1. Existing plumbing fixtures are generally in fair condition. Any modifications, additions and/or renovations made to the building would require replacement of the fixtures as required to meet the current NC code requirements regarding maximum water consumption.
- 4.1.2. Existing domestic water, waste, and vent piping systems appear to be in fair condition. Any modifications, additions, and/or renovations made to the building, however, would render the piping systems obsolete to a large degree due to pipe sizes, arrangement, etc., and would require replacement.
- 4.1.3. Existing kitchen plumbing is in poor condition and in need of replacement. The drain from the pot and pan sink is directly connected to the sewer, which is a code violation. Any modifications, additions, and/or renovations made to the food service would require complete replacement. Additionally, the grease interceptor size would need to be increased to meet the current criteria of the local authority.
- 4.1.4. Existing domestic water heaters located in the basement are in good condition (one water heater appears to be fairly new). The piping is missing insulation but otherwise is in fair condition. Any modifications, additions, and/or renovations made to the building would require larger water heaters.

**(Updated, October 18, 2017: The existing water heater serving the kitchen was replaced in July of 2106 with a new Rheem natural gas fired 38,000 BTU, 40-gallon water heater. Cost: \$412.54)**

- 4.1.5. The existing natural gas piping system serves the building's heating system, domestic water heaters, and kitchen equipment and appears to be in fair condition. (*Note: A code violation exists with regard to gas meter/regulator vent.*) The vent must terminate a minimum of 10'-0" from any intake, operable window, door, etc.
- 4.1.6. The existing roof drainage piping system appears to be in operable condition. Any modifications, additions, and/or renovations made to the building, however, would render the piping system obsolete to a large degree and would require replacement.

### 4.2 Existing Utilities

- 4.2.1. The existing 2" domestic water service is only adequate for the current facility. Any modifications, additions, and/or renovations made to the building would require a larger water service.
- 4.2.2. The existing gas service is only adequate for the current facility. Any modifications, additions, and/or renovations made to the building would require a larger gas service.

4.2.3. The existing 6" sanitary building sewer should be adequate to serve the anticipated expansion of this facility. The size, material, and condition of the existing sewer would, however, need to be evaluated further.

4.2.4. The building roof drainage/storm sewer will require modification based on any modifications, additions, and/or renovations made to the building. Refer to Section 2.0 of this report for additional stormwater related information.

#### 4.3. Plumbing Summary

It is expected that any significant alterations or additions to this facility will require complete demolition of the existing building plumbing systems and have new systems provided accordingly. The new additions, alterations, renovations, etc., would consist of complete new plumbing systems for staff toilet rooms, employee break rooms, food service, bedroom security fixtures, etc.

#### 4.4. Fire Protection

In accordance with the building code rules and regulations regarding building size increase, fire ratings, etc., the building will require a new sprinkler system as follows:

4.4.1. Building conditioned spaces: Wet sprinkler system.

4.4.2. Basement (unconditioned space): Dry sprinkler system.

#### 4.5. Plumbing Budget

Renovation with 3,000 SF Addition:	\$352,430
Renovation with 5,000 SF Addition:	\$406,430

#### 4.6. Fire Protection Budget

##### 4.6.1. Wet Sprinkler System:

Renovation with 3,000 SF Addition:	\$41,600
Renovation with 5,000 SF Addition:	\$48,625

##### 4.6.2. Dry Sprinkler System (Existing Basement):

\$10,440



## 5.0 HEATING, VENTILATION, & AIR CONDITIONING

### 5.1. Existing HVAC

- 5.1.1. The existing HVAC comfort systems located in the basement are Payne gas furnaces with DX cooling coils in the supply duct for each system. The Carrier outdoor condensing units are located in the exterior equipment yard. The condensing unit coils have been damaged over time, adversely affecting heat exchange. The HVAC systems are old, inadequate for owner and mandated needs, and require replacement. Supply and return duct is run in the attic and the crawl space. Insulated duct has interior rigid insulation.
- 5.1.2. Air filtration appears to be inadequate for this type of facility, resulting in indoor air quality issues. There is evidence that the HVAC supply ducts are very dirty on the inside.
- 5.1.3. Due to insufficient cooling, the existing control room and pantry contain Everstar portable cooling units.
- 5.1.4. Due to insufficient cooling, the kitchen contains a supplemental split system Payne air-conditioning unit mounted on the wall.
- 5.1.5. There are two quiet rooms in the secure admissions area that do not have heating, cooling, or exhaust air.
- 5.1.6. There is no smoke control system in the existing building as required by the NCBC 408.9. The existing comfort HVAC systems are not adequate for use in the engineered smoke control system that must be designed as part of the renovation/addition, even with a one-to-one exchange using new equipment. HVAC system zoning must be modified to allow for at least two smoke control areas. Modifications must be made to the detention rooms to allow for a plumbing/HVAC chase to serve detention rooms in pairs, i.e., one chase per each two rooms.
- 5.1.7. The existing outside air louvers are not of sufficient size to allow 100% outside air for needed smoke control.
- 5.1.8. Bedrooms do not have a dedicated exhaust system as required by the current building code.

### 5.2. Recommended HVAC actions for renovations to bring the facility up to current standards

- 5.2.1. Existing HVAC heating/cooling and exhaust systems are far from adequate for this facility. All existing HVAC equipment, including ductwork, diffusers, and controls, should be completely removed. Commercial grade systems should be installed, sized, and zoned for anticipated needs, allowing for required smoke control and indoor air quality.

**(Updated, October 18, 2017: In April of 2016, the existing 5-ton HVAC system serving the administration area of the facility was replaced with a 7.5-ton Trane Odyssey system. Air handling units AHU-5A and AHU-5B were replaced with Trane XB natural gas furnaces. New supply and return air ductwork was installed from the**

**units that run across the storage room and into the crawl space. Once inside the crawl space it was connected to the existing duct work. Cost: \$13,260.00)**

- 5.2.2.** Additional space will be needed for the HVAC equipment. This space may be obtained using the existing basement mechanical and storage room. Additional storage should be considered in the scope of renovations to the building.

### 5.3. HVAC Budget

Renovation with 3,000 SF Addition:	\$359,000
Renovation with 5,000 SF Addition:	\$414,000

## **6.0 ELECTRICAL**

### **6.1 Codes and Standards**

The electrical site survey and existing building review were compared to the latest editions of the following model building codes and standards:

- NFPA 70 - National Electrical Code
- NFPA 72 - National Fire Alarm Code
- NFPA 75 - Protection of Electronic Computer/Data Processing Equipment
- NFPA 780 – Standard for Installation of Lightning Protection Systems
- NFPA 101 - Life Safety Code
- NESC – National Electrical Safety Code
- UL – Underwriters Laboratories, Inc.
- NEMA – National Electrical Manufacturers Association
- IEEE – Institute of Electrical and Electronic Engineers
- ADA - Americans with Disabilities Act
- North Carolina State Building Energy Code
- North Carolina State Building Codes and Regulations

### **6.2 Site Electrical and Telecommunications Distribution**

- 6.2.1.** The existing building is electrically fed by Duke Energy from pole mounted transformers. The electric service at the secondary transitions to underground distribution and into the existing facility.
- 6.2.2.** The telecommunications pathway into the facility is through an underground 2" conduit between the building point of demarcation and above grade utility pole.
- 6.2.3.** The existing site infrastructure appears to be from the original construction circa 1983.

### **6.3 Building Electrical Service**

- 6.3.1.** The existing building service is 600A, 208/120V, 3Ø, 4 wire, grounded wye. The service allows for only 15 VA per square foot. The building distribution is by multiple 208/120V panels ranging in size from 225A to 100A. All panels and main distribution are original equipment nearing the end of its service life.
- 6.3.2.** Wiring and cable appear to be mostly copper computer feeders and branch circuits. Most duplex outlets appear to be 15A rated, indicating the likelihood of #14 AWG conductors, which is typically not acceptable in institutional construction. Conduits are a mix of rigid steel and EMT. The conduits are in varying degrees of condition. There are numerous exposed, wall mounted circuits throughout the building, which is not appropriate or recommended for detention use.
- 6.3.3.** The existing service is not adequate to handle a building addition and would require either a second service or a full, new, comprehensive service upgrade.

#### 6.4. Surge Protection and Power Quality

No comprehensive surge protection exists as an integral part of the existing electrical distribution system.

#### 6.5. Standby Power System

**6.5.1.** The existing 180 Kva standby diesel generator is located outdoors and equipped with a weatherproof enclosure and sub-base fuel tank. The generator electrical distribution includes an automatic transfer switch, associated distribution switchboards, and panelboards as required. The existing generator was installed as a used unit. The generator age at installation is reported to have been eight years old. The facility is also equipped with a mix of various battery lights. The lights appear to be of various ages and conditions, having been installed throughout the life of the building.

**6.5.2.** The current standby power is a mix of battery and generator. The transfer switch and emergency power usage does not meet current building code and is not separated per NEC 700, NEC 701, and/or NEC 702.

#### 6.6. Fire Alarm

**6.6.1.** The existing fire alarm system is a non-coded addressable system. The system is of original installation and does not comply with current NFPA standards or ADA requirements.

**(Updated, October 18, 2017: Due to a lightning strike, the existing fire alarm control panel was replaced in July of 2017 with a Honeywell Fire-Lite MS-10UD-7 fire control panel. Cost: \$4,120.75)**

**6.6.2.** The fire alarm audio/visual devices have been modified and amended over the years with different device models. This condition creates a non-synchronous strobe and audible alarm cycle that does not meet the NFPA fire code.

#### 6.7. Interior and Exterior Lighting

**6.7.1.** The existing interior lighting is linear fluorescent technology. Fixtures appear to be of original installation consisting of 1 x 4 surface, 2 x 4 recessed mounted, and tamperproof fixtures in secure rooms.

**6.7.2.** Troffers exist in offices and other non-detention areas. Public lobbies are equipped with recessed down lighting fixtures. Fixtures are all locally controlled by wall mounted toggle switching.

**6.7.3.** Outdoor lighting consists of walkway bollard lights. No other building powered exterior lighting exists.

#### 6.8. Lightning Protection

The facility is not equipped with a comprehensive, U.L. “master-labeled” lightning protection system.

## 6.9. Electrical Budget

Renovation with 3,000 SF Addition:	\$380,772
Renovation with 5,000 SF Addition:	\$428,772

Electrical budgeting assumes pricing for new service at 1000 amperes, 208/120V, 3Ø, 4 wire, lighting, telephone, data, fire alarm, and generator.

## 7.0 ELECTRONIC SECURITY

### 7.1. Assessment of Existing Building Access Control

Currently, the only remote access door control system inside the facility consists of a magnetic contact lock system on the student sleeping room doors and two interview/visitation rooms. The system is antiquated and was only recently repaired after an extended period of inoperability, during which time these doors had to be controlled with keys, as are all other doors in the facility. As per the building code, the provisions for remote locking and unlocking of occupied rooms in an Occupancy Condition 4 in a Group I-3 occupancy classification, which is how the Youth Home would be classified, are not required, provided that not more than 10 locks have to be unlocked in order to move occupants from one smoke compartment to a refuge area within three minutes. The opening of necessary locks must be accomplished with not more than two separate keys. When operated with keys at the full capacity of 14 students, the current locking arrangement exceeds the capacity allowed by the North Carolina State Building Code. The exterior security fence also has a magnetic lock on the personnel gates that are operated by either staff card keys or from the panel in the control room. The vehicular sallyport gate in the exterior fence is a remote controlled sliding gate operated from the control room.

### 7.2. Recommended Access Control Improvements

Provide a new electro-mechanical remote operated locking system on secure exterior and interior sallyports as well as on each student sleeping room (cell) operated via an integrated intercom system from a PLC based controller located in the control room. Various newly identified doors within the facility, as well as at staff only entrances, could be controlled via card readers or card reader/keypads to allow staff movement within the facility where the level of security may be lower than in areas that require remote operation of doors from the control room.

**(Updated, October 18, 2017: In January of 2017, a new, stand alone, Paxton Net2 PC based access control system was installed by Leonine Building Solutions, LLC. The system utilizes RCI magnetic locks, proximity card readers, scramble key pads, and mogul pass keys. A central control station is installed in the control room to provide remote locking/unlocking of secure exterior and interior doors. The front entry doors are interlocked to create a secure sallyport. Various secured doors are operated locally by proximity reader or a combination of proximity reader and key pad or key switches. The proximity readers on student room (cell) doors are used only as a guard tour function. Operationally, the student rooms are locked and unlocked remotely from the control room. However, a separate key FOB is provided to staff for emergency access to student rooms utilizing the proximity readers. Key switches are also provided at student room doors. Cost: \$99,999.99)**

### 7.3. Assessment of Closed Circuit Television System (CCTV)

The existing CCTV system is approximately 7 to 8 years old and consists of 13 analog cameras viewed on one multiplexed monitor that is located in the control room. In general, the system is operating well. Additional cameras are planned in the near future.

### 7.4. Recommended CCTV Improvements

Provide a new IP addressable camera CCTV system with hard drive recording capabilities and

expanded coverage of all critical areas within the facility, at each exterior entrance, at the outdoor recreation area, and at the parking areas. The existing CCTV system could be salvaged for use in another county facility.

**7.5. Assessment of Duress Alarms**

A single duress alarm button is located inside the control room that is set up on an autodialer to contact the City of Durham Police Department when pressed. A police officer is then dispatched to the facility in response to the alarm.

**7.6. Recommended Duress Alarm Improvements**

Provide duress alarms at critical locations within the facility that would alarm on the new PLC control system located in the control room. Staff could then be sent to respond to the location of the alarm. In addition, staff could be provided personal duress alarms that could either be incorporated into staff handheld radios or worn as body alarms that, when activated, are picked up by radio frequency detectors located throughout the facility that can broadcast the location of the alarm via staff radios. Should police response be required, the call could be placed by staff from within a new secure control room rather than via a duress button.

**7.7. Electronic Security Budget**

Renovation with 3,000 SF Addition:	\$425,000
Renovation with 5,000 SF Addition:	\$484,000



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**8.0 OVERALL BUDGET SUMMARY**

	<u>3000 SF ADDITION</u>	<u>5000 SF ADDITION</u>
<b>SITE</b>	<b>\$400,000</b>	<b>\$400,000</b>
<b>BUILDING (general construction)</b>	<b>\$862,650</b>	<b>\$1,102,650</b>
<b>PLUMBING</b>	<b>\$352,430</b>	<b>\$406,430</b>
<b>SPRINKLER (wet)</b>	<b>\$41,600</b>	<b>\$48,625</b>
<b>SPRINKLER (dry)</b>	<b>\$10,440</b>	<b>\$10,440</b>
<b>HVAC</b>	<b>\$359,000</b>	<b>\$414,000</b>
<b>ELECTRICAL</b>	<b>\$380,772</b>	<b>\$428,772</b>
<b>ELECTRONIC SECURITY</b>	<b>\$425,000</b>	<b>\$484,000</b>
<b>SUB-TOTAL</b>	<b>\$2,831,892</b>	<b>\$3,294,917</b>
<b>GENERAL CONDITIONS</b>	<b>\$679,654</b>	<b>\$790,780</b>
<b>TEMPORARY HOUSING</b>	<b>\$500,000</b>	<b>\$500,000</b>
<b>TOTAL</b>	<b>\$4,011,546</b>	<b>\$4,585,697</b>