

**PUBLIC NOTICE**  
**REQUEST FOR QUALIFICATIONS**  
**PAMLICO COUNTY**  
**BOARD OF COMMISSIONERS**  
**LICENSED CONTRACTOR DESIGN BUILD SERVICES FOR**  
**PAMLICO COUNTY HUMAN SERVICES BUILDING HVAC**  
**REPAIRS PAMLICO COUNTY, NORTH CAROLINA**

The County of Pamlico intends to replace the existing Heating Ventilations and Air Conditioning System that serves the Pamlico County Human Services Building located at 828 Main Street Alliance.

Pamlico County is soliciting Statements of Qualification from Licensed General Contractors interested in providing Design Build services for the Project. The County intends to select a qualified Contractor to provide design build services with a general scope of services as listed below.

Scope of services included the following: 1. Initial Design Build Services, 2. Design Build Services, and 3. Construction Services.

Copies of the full Request for Qualifications can be found on the Pamlico County Web Site: [www.pamlicocounty.org](http://www.pamlicocounty.org) or by contacting the County Manager at (252) 745-3133.

Three (3) copies of the Statement of Qualifications, each with requested additional information, must be received by August 14, 2019 at 2:00 P.M. in the office of the County Manager for County of Pamlico. Note: Facsimile and electronic submissions are not acceptable.

Statement of Qualifications must be submitted in a sealed envelope marked "Statement of Qualifications for Pamlico County, Design Build Services for the Pamlico County Human Services Building HVAC Repairs".

Statement of Qualifications may be mailed or hand delivered to:  
Tim Buck, County Manager, County of Pamlico  
302 Main Street  
PO Box 776  
Bayboro, NC 28515

Questions should be addressed to:  
Tim Buck, County Manager, County of Pamlico  
252-745-3133  
Tim.buck@pamlicocounty.org

The project budget is expected to be \$250,000 or above depending on the recommended solution. The project schedule is to begin immediately upon signing contracts with the intent of being complete by March 2020.

# REQUEST FOR QUALIFICATIONS (RFQ)

DESIGN BUILD

PAMLICO COUNTY HUMAN SERVICES BUILDING  
HEATING VENTILATION AND AIR  
CONDITIONING REPLACEMENT

FOR THE

PAMLICO COUNTY BOARD  
OF COMMISSIONERS

BAYBORO, NORTH CAROLINA

**REQUEST FOR QUALIFICATIONS  
PAMLICO COUNTY BOARD OF COMMISSIONERS  
LICENSED CONTRACTOR DESIGN BUILD SERVICES FOR  
PAMLICO COUNTY HUMAN SERVICES BUILDING  
HEATING, VENTILATION, AND AIR CONDITIONING REPLACEMENT  
PAMLICO COUNTY, NORTH CAROLINA**

A GENERAL

The County of Pamlico intends to construct replacement of the existing Heating, Ventilation and Air Conditioning System that serves the Pamlico County Human Services Building, Alliance, North Carolina.

Pamlico County is soliciting Statements of Qualification from Licensed General Contractors interested in providing Design Build services for the Project. The County intends to select a qualified Contractor to provide design build services with a general scope of services as listed below.

B. SCOPE OF SERVICES

1. Initial Design Build Services

- a. After reviewing the documents in the attached Appendix Documents Contractor shall conduct thorough actual on-site field inspection of project area.
- b. Contractor shall review County's Request for Qualifications Design Build Contract documents. Contractor shall develop itemized detailed list of required items to be corrected and coordinate with County's proposed scope of the work documents and drawings if any.

2. Design Build Services

- a. Prepare as applicable to the project, construction documents, drawings, item specifications, and engineering calculations. Prepare cost estimates for demolition and new construction as it relates to the project.
- b. Attend pre-construction conference called by County staff.

3 Construction Services

- a. Provide construction time-line and coordinate construction with County staff.
- b. Begin demolition and new construction. Schedule Construction conferences as work progresses. Coordinate with County that the quality of work is in accordance with the contract documents. Notify County if unforeseen and additional work items are discovered during construction.
- c. Complete project. Conduct Final Inspection. Close out project after final approval from County and final payment.

C. CONTENTS OF QUALIFICATIONS

1. Completed signed and notarized 'Statement of Contractor's Qualifications' (located in the Appendix Documents), in addition to the following items.
2. Name of Firm.
3. Person Authorized to provide information and negotiate contracts.
4. Location of office(s). If more than one, indicate office from which work will be performed.
5. Brief history of Firm.
6. Firm employment profile.

**REQUEST FOR QUALIFICATIONS  
PAMLICO COUNTY BOARD OF COMMISSIONERS  
LICENSED CONTRACTOR DESIGN BUILD SERVICES FOR  
PAMLICO COUNTY HUMAN SERVICES BUILDING  
HEATING, VENTILATION, AND AIR CONDITIONING REPLACEMENT  
PAMLICO COUNTY, NORTH CAROLINA**

7. Project experience. Provide a list of projects (maximum of 10) demonstrating project experience similar to the proposed project. Include general project description, types of structural stability / engineering services provided / performed, and client contact information.
8. List of key personnel to be directly involved in this project, as well as a brief description of their responsibilities. Include a brief resume for key personnel, including specific relevant project experience.
9. Brief project approach, including approximate timeline for completion of the project, and the effects of the project on the existing public and required continual use of the Courthouse Building.

**D. EVALUATION CRITERIA**

1. Licensed General Contractor selection shall be conducted in accordance with NCGS 143-64.31. Statements of Qualifications received by the deadline and prepared in accordance with the RFQ instructions shall be reviewed to determine the scope and level of service considered most advantageous to the County.
2. The County will select the Contractor considered best qualified to provide the desired level of service, with consideration for the long-term interest of the County's efforts based on demonstrated competence and qualifications without regard to fee other than unit price information.
3. After selection of the best qualified consultant to meet the County's needs, the County shall negotiate a fair and reasonable fee with the Contractor for the desired scope and level of service.
4. Proposals will be reviewed and evaluated by County staff familiar with the Project, in accordance with the following criteria:
  - a. General Qualifications, Competence and Reputation of Firm. (30 Points)  
Age, size, staff qualifications and stability of Firm.  
Projects to illustrate competence in structural stability and renovation.  
Availability of Construction Job Superintendent and crew(s) to handle project.  
Reputation of Contractor with previous clients and projects.
  - b. Experience of Involved Staff and work crew(s). (20 Points)  
Contractor's experience with similar types of construction / renovation.
    - Key personnel - roles and experience
    - Sub-Contractors; experiences
  - c. Ability to address specific Courthouse renovation needs (20 Points)  
Grasp of project requirements
    - Construction timeline for approach / methodology to complete project
      - Familiarity with older buildings and resolving unexpected problems
  - d. Availability (30 Points)  
Ability to provide access to qualified construction personnel on a continual basis  
  
Ability to commit available construction crew(s) and resources to the project through completion and final payment.

**REQUEST FOR QUALIFICATIONS  
PAMLICO COUNTY BOARD OF COMMISSIONERS  
LICENSED CONTRACTOR DESIGN BUILD SERVICES  
FOR PAMLICO COUNTY HUMAN SERVICES BUILDING  
HEATING, VENTILATION, AND AIR CONDITIONING REPLACEMENT  
PAMLICO COUNTY, NORTH CAROLINA**

E. SUBMISSION INFORMATION

1. Three (3) copies of the Statement of Qualifications, each with requested additional information, must be received by AUGUST 14, 2019 at 2:00 P.M. in the office of the County Manager for County of Pamlico. Note: Facsimile and electronic submissions are not acceptable.
2. Statement of Qualifications must be submitted in a sealed envelope marked "Statement of Qualifications for Pamlico County, Design Build Services for the Pamlico County Human Services Building Heating Ventilation and Air Conditioning Replacement Project".
3. Proposals may be mailed or hand delivered  
to: Tim Buck, County Manager  
County of Pamlico  
302 Main Street  
PO Box 776  
Bayboro, NC 28515
4. Questions should be addressed  
to: Tim Buck, County Manager  
County of  
Pamlico 252-  
745-3133  
Tim.buck@pamlicocounty.org

F. SMALL AND/OR MINORITY FIRMS ARE ENCOURAGED TO SUBMIT QUALIFICATIONS

G. APPENDIX DOCUMENTS

1. STATEMENT OF CONTRACTOR'S QUALIFICATIONS FORM
2. ENGINEERING STUDY

**REQUEST FOR QUALIFICATIONS  
PAMLICO COUNTY BOARD OF COMMISSIONERS  
LICENSED CONTRACTOR DESIGN BUILD SERVICES FOR  
PAMLICO COUNTY HUMAN SERVICES BUILDING  
HEATING, VENTILATION, AND AIR CONDITIONING REPLACEMENT  
PAMLICO COUNTY, NORTH CAROLINA**

REQUIRED FORM

STATEMENT OF CONTRACTOR'S QUALIFICATIONS

This statement of Contractor's Qualifications shall accompany all Request for Proposals (RFP) submitted for the Design Build project for the completion of Heating, Ventilation, and Air Conditioning Replacement of Pamlico County Human Services Building.

Name of Contractor: \_\_\_\_\_

Telephone Number: \_\_\_\_\_ License No: \_\_\_\_\_

Fax Number: \_\_\_\_\_

Business Address: \_\_\_\_\_

email address: \_\_\_\_\_

When Organized \_\_\_\_\_

Where Organized \_\_\_\_\_

Partnership: Yes \_\_\_\_\_ No \_\_\_\_\_ Corporation: Yes \_\_\_\_\_ No \_\_\_\_\_

How many years have you been engaged in this business under the present firm name? \_\_\_\_\_

Please attach a list of major accounts in North Carolina comparable to the work proposed for this project.

Remarks: \_\_\_\_\_

I, the undersigned, affirm that the information provided is true and correct to the best of my knowledge and belief.

Dated this \_\_\_\_\_

Firm Name: \_\_\_\_\_

By: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

North Carolina  
\_\_\_\_\_ County

I, \_\_\_\_\_, a Notary Public for said County and State, do hereby certify that personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

Witness my hand and official seal, this the \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

(Official Seal)  
Notary Public

My commission expires \_\_\_\_\_, 20 \_\_\_\_.

\*

**PAMLICO COUNTY  
NORTH CAROLINA**

**HVAC STUDY  
LAW ENFORCEMENT CENTER  
HUMAN SERVICES BUILDING**



**PREPARED BY:  
RONALD E. PLEDGER, PE LEED AP BD+C  
DIBBLE & PLEDGER, PA  
CONSULTING ENGINEERS  
POST OFFICE BOX 1885  
222 WEST MAIN STREET  
WASHINGTON, NORTH CAROLINA 27889  
PHONE: (252) 946-3320  
FAX: (252) 946-5160  
E-MAIL: [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)**

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

## INTRODUCTION

This study was necessitated as an evaluation of the existing HVAC systems in the Pamlico County Law Enforcement Center and the Pamlico County Human Services Building. There have been some performance issues for HVAC in these buildings.

The Law Enforcement Center stays in operation 24 hours a day, 7 days a week as this facility also includes the Pamlico County Jail and Sherriff Offices.

Both of these facilities are of a fundamental nature for services for Pamlico County and require functioning HVAC systems. Human comfort, sustainability, and energy conservation are very critical for the operation of these facilities. Also, of a critical nature is improving indoor air quality. Trends now are for more efficient heating and cooling systems as well as better building envelopes.

We are also looking for HVAC systems to remove odors, smoke, and VOC's (Volatile Organic Compounds). The systems also have to remove moisture and humidity to prevent mold and mildew and protect the health of the inhabitants.

Outside air is a common source for outside pollutants and is also a part of the considerations for both a "well" building while balancing a need for fresh air inside the facilities.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

## EXISTING HVAC SYSTEMS

### HUMAN SERVICES BUILDING:

The Human Service Building was designed in 2003 and became operational in 2004/2005. The HVAC systems consists of 15 above ceiling water source heat pumps with a closed loop cooling tower. The above ceiling heat pumps have conditioned supply air with ductwork to diffusers in an existing suspended ceiling grid. The return is through a plenum (not ducted) return system with return grilles near the above ceiling heat pumps.

Heat Pumps are as follows:

HP-1	3 Ton
HP-2	3 Ton
HP3A	3 Ton
HP-3B	3 Ton
HP-4	3 Ton
HP-5	4 Ton
HP 6	3 ½ Ton
HP-7	3 ½ Ton
HP-8	4 Ton
HP-9	3 ½ Ton
HP-10	3 ½ Ton
HP-11	3 ½ Ton
HP-12	5 Ton

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

HP-1 3      3 ½ Ton

HP-1 4      3 Ton

The cooling Tower is a Baltimore Aircoil (BAC) FXT-187. This unit provides approximately 500 GPM at 95 degrees Fahrenheit dry bulb and provides heat removal from the building.

Water source heat pumps use the cooling tower water as a heat source or sink and water as the heat transfer medium. This water temperature is relatively constant across the seasons

The cooling tower is a heat rejection device that rejects waste heat to the atmosphere through the cooling of a water stream to a naturally lower temperature. Cooling towers may either use the evaporation of water to remove process heat and cool the working fluid to near the wet-bulb air temperature or, in the case of *closed circuit dry cooling towers*, rely solely on air to cool the working fluid to near the dry-bulb air temperature.

This system is comprised of efficient packaged reverse cycle heat pump units interconnected by way of the water loop. Each unit satisfies the air comfort requirements of the particular zone in which it is installed. In cold weather, the heat pump removes heat from the water loop via the unit's specially designed refrigerant-to-water coaxial heat exchanger and transfers it to the air.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

## LAW ENFORCEMENT CENTER:

The Law Enforcement Center was designed in 2004 and became operational in 2005. The HVAC systems consists of (11) roof top Gas Pack Units. For the Housing Areas B, C, D, E, and F there are separate roof top Gas Pack units for each housing area that furnished supply air and return air for the dayrooms and cells. Separate zones are also fed from rooftop Gas Pack Units for the Sherriff areas, dispatch, Control Room, etc.

The system works off natural gas which is piped up to the roof and extends across the roof to each of the RTU's.

Gas fired forced air furnaces have a burner in the furnace fueled by the natural gas. A blower forces return/outside air through a heat exchanger and then through duct-work that distributes the hot air through the building.

For air conditioning the system works as an air cooled condenser. The condensing unit is a separate package that includes a compressor, condenser (air cooling) mounted on a base plate in the roof top unit and all connecting pipes, together with the necessary wiring and control to create a cooling system. The condenser used in central air conditioning systems has a heat exchanger section to cool down and condense incoming refrigerant vapor into a liquid. A compressor is used to raise the pressure of the refrigerant and move it along, and a fan for blowing return/outside air through the heat exchanger section to cool the refrigerant inside.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

The Roof Top Gas Pack Units are as follows:

RTU-1	6 Ton
RTU-2	6 Ton
RTU-3	4 Ton
RTU-4	8.5 Ton
RTU-5	7.5 Ton
RTU-6	2 Ton
RTU-7	7.5 Ton
RTU-8	7.5 Ton
RTU-9	4 Ton
RTU-10	4 Ton
RTU-11	5 Ton

There is a Direct Digital Control (DDC) Trane system that controls the rooftop gas packs. Electronic sensors are located for each zone.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

## HUMAN SERVICES BUILDING HVAC PROBLEMS:

- There is a high silica content in the water system at the Human Services Building. Silica (silicon dioxide) is a compound of silicon and oxygen (SiO<sub>2</sub>). Silica is only slightly soluble in water. The type and composition of the silica-containing minerals in contact with the water and the pH of the water are the primary factors controlling both the solubility and the form of silica in the resulting solution. Silicates can form scale as well as accumulate to foul membrane surfaces or piping. It appears the Heat Pump loop water to the cooling tower has a high silica percentage which is causing scaling within the piping system. Poor water quality leads to issues with heat transfer and system deterioration, eventually resulting in leaks. The loss of heat transfer means that the heat pump is trying to cool with the hydronic water but because of a lack of flow through the scaled piping system it wants to use more make up water. The water bills for the Human Services Building have been excessive indicating that this is one problem of the system.

The BAC cooling tower also has its problems. The high silica content has led to corrosion on the tower. Since cooling towers remove heat by the process of evaporation, it's typical that they, in turn, can use lots of water to make up the difference. Depending on the quality of makeup water being added to the cooling tower and the operation efficiency of the unit, **large amounts of solids can remain after evaporation occurs**, causing an increased need to “blow down” or remove solid waste and dissolved solids buildup from the circulation water before it has a chance to scale or corrode equipment.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

Therefore, not only are the Heat Pumps not cooling as effectively and efficiently as they should. The Cooling Tower is losing its capabilities due to corrosion.

## LAW ENFORCEMENT CENTER HVAC PROBLEMS:

The Law Enforcement Center seems to have intermittent problems. The units seem to not cool or heat effectively at various times. Additionally the Trane DDC system seems to have its own share of electronic problems due to voltage transients, lightning, or other technical issues. Only recently the system has not allowed various Roof Top Units to run at all. There are some wall mounted sensors, but other sensors appear to be in the return air ducts. These sensors may not be providing accurate space temperatures of the Center, particularly in the Jail area.

In regards to the Roof Top Heat Pumps, their air handling fans are belt driven. The belt is between the blower motor and the blower motor shaft. There are sheaves attached to the blower motor shaft and the shaft attached to the blower wheel. Sometimes sheaves get out of alignment and sometimes belts just naturally wear out. We were informed that the County is replacing these belts on numerous Roof Top Units on a monthly basis. These replacements are not normal maintenance. These belts should not be failing that quickly. If the belts or sheaves are out of their alignment the fan speed and subsequently air flow are affected. There could also be a problem with the alignment of the blower motor that may be affecting the life of the belts.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

## **DESIGN CONSIDERATIONS**

One of the first considerations for the remission of the HVAC problems in these buildings is the age of the systems. The water cooled heat pumps at the Human Services Building are about 14 years old. The life cycle cost that we use with heat pumps is around 15 years. Therefore this system is very close to the end of its useful life.

Similarly, the Roof Top Gas Pack units are 12 years old. Although the burners may still be capable of firing, the heat exchangers often deteriorate. Also, the air cooled condensers (air conditioning) only have a useful life of 15 years.

As such, both systems are close to their useful life.

If we are looking at new systems, we must evaluate how to meet the criteria we established in the introduction (ie. efficiency, well being of inhabitants, comfort of inhabitants and elimination of the maintenance problems).

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

## HUMAN SERVICES BUILDING:

Due to the age and ongoing problems with the water source heat pumps, it is felt that a new HVAC system is required. As such, it must be determined which system is the best for this applications. Due to the silica problems with the Pamlico County water, it is felt that it is best to avoid a water based heating or cooling system. Therefore, with a ductwork system in place containing at least 15 zoned areas it is best to try and utilize this existing duct system.

Air to air heat pumps is a logical replacement. The heat pumps can be removed above the ceiling and new air handlers installed with refrigerant coils. Split system heat pumps would be installed outside and form at least two heat pump courtyards. Refrigerant piping would be sleeved to a chase that would route to the above ceiling spaces. The proposed air handling units would tie into the existing ductwork. The duct system is a plenum return system meaning the return air is brought back through the above ceiling space via return grilles in the ceiling. The filters are at the heat pump locations which requires removing ceiling tiles to do a monthly replacement. Some tiles have been broken and are having to be replaced in this process. We would recommend adding return duct but we are estimating that separately. In lieu of a return duct system, filter grilles should be added to the returns for an easier replacement without removing ceiling tiles.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

As these are air to air heat pumps back-up electric heat strips are required, however with the new refrigerants the heat transfer is much better. HFC 134A also has a lower GWP (global warming potential). This refrigerant also has no ozone damaging CFC's (chlorofluorocarbons).

There are presently wall mounted "Totaline" thermostats that control the operation of these heat pumps. These thermostats are programmable but only sense temperature. These thermostats could be replaced with a "smart stat" controller.

So looking at our goals of efficiency, the new heat pumps have digital scroll compressors that can stage and save energy when full heating or cooling loads are not required. Also with the new refrigerants, there is a better heat transfer for energy efficiency. Additionally the new refrigerants have low GWP and do not deplete the ozone layer for better site sustainability. Modulating dampers for the outside air would also help with building pollutants as more outside air is brought in if CO2 levels are rising. Additionally, with the new wall mounted "Smart Stat" controllers, the cooling/heating loads can be increased or decreased as necessary.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

The “smart stat” is a networkable thermostat and controller that enables variable capacity modulation, dehumidification, and improved system performance.

The “FlexStat” controller may be applied in most single or multi-stage direct expansion, applications including roof-top or split commercial applications, heat pumps, or commercial refrigeration applications.

In single compressor applications, the FlexStat controller varies the capacity of a Scroll Digital compressor over 10–100% of the rated capacity. Below 10% cooling demand, the controller automatically cycles the compressor ON and OFF to meet low levels of demand. In multiple compressor (tandem) applications, the controller manages the variable capacity Copeland Scroll Digital compressor as the 1st stage of cooling, effectively providing 5–100% variable capacity control over the full range of cooling demand. All required safeties to properly load and unload the Scroll Digital compressor are embedded in the firmware of the device, negating the need for any external, safety-type devices.

These controllers sense temperature, humidity and CO<sub>2</sub> (carbon dioxide) levels. During times when there are few people in the building and the cooling or heating requirement is low. The CO<sub>2</sub> levels will be low and the controller stages back the heat pump heating or cooling to match the requirements of the heating or cooling load. Similarly when a high humidity situation is detected more constant cooling load is applied to alleviate the high humidity.

So looking at our goals of efficiency, the new heat pumps have digital scroll compressors that can stage and save energy when full heating or cooling loads are required. Also with the new refrigerants, there is a better heat transfer for energy efficiency. Additionally the new

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

refrigerants have low GWP and do not deplete the ozone layer for better site sustainability. Modulating dampers for the outside air would also help with building pollutants and VOC's (volatile organic compounds) as more outside air is brought in if CO2 levels are rising. Additionally, with the new wall mounted "Smart Stat" controllers, the human comfort levels will increase due to more modulated control of heating and cooling based on the building occupancy.

## LAW ENFORCEMENT CENTER:

Again, due to the age of the Roof Top Gas Packs it is felt that it is an optimal time to replace these units. The air cooled condenser portion of these Gas Packs is close to its useful life expectancy. Again, what HVAC systems is the most optimal to meet the previously established requirements for sustainability, human comfort, energy conservation and maintenance.

From an efficiency standpoint, natural gas is an efficient method of providing heating. The energy efficiency of any heating system is measured in its Annual Fuel Utilization Efficiency (AFUE). This is the ratio between the amount of energy that goes into the system and the amount of energy that comes out as usable heat. It takes into consideration heat lost during start-up and cool-down, as well as the unit efficiency while it is running. The higher the AFUE, the more efficient the furnace. New gas burners must operate at 78 percent efficiency or better; some high-efficiency gas heating systems use 98 percent of their energy input.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

The new refrigerants for air conditioning with the air cooled condenser was previously discussed as with the new refrigerants the heat transfer is much better. HFC 134A also has a lower GWP (global warming potential). This refrigerant also has no ozone damaging CFC's (chlorofluorocarbons).

With these factors in mind and natural gas is already piped to the roof of this building as well as ductwork extending to these locations, it makes sense to stay with the Gas Pack system with the air cooled condensers.

The maintenance and performance problems seemed to have stemmed from the belt driven air handling units. If the belts slip or are worn or the sheaves are out of alignment, the air flows are compromised, thus changing the heating or cooling capabilities in the ductwork delivery system. With these problems in mind, Trane and other vendors make Gas Pack Units with direct drives air handlers up to 15 tons. The largest Roof Top Gas Pack on this building is an 8.5 ton unit. Going to a direct drive Gas Pack will eliminate the belt problems. The new Roof Top units may have a bigger footprint, but will interconnect back to the existing supply and return ducts.

The Trane DDC (Direct Digital Control) system seems to be a major player in the problems with this building and the operation of the HVAC. DDC's are used when there is a capability for night setback or modulation of a systems. It can also be good to monitor the building setpoints from a remote location. However, the Law Enforcement Center is occupied 24/7 and other than some offices is not a candidate for night setback or other monitoring.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

The previous discussion of “Smart Stat” could be applied here. The “smart stat” is a networkable thermostat and controller that enables variable capacity modulation, dehumidification, and improved system performance. Using the digital scroll compressor in the cooling mode, this controller can modulate the cooling capabilities based on increased CO2 levels for any particular zone. Let’s say that some office zones are closed for the evening, those compressors would modulate down while the Jail and Dispatch could be maintained to their desired levels. Another advantage with the “Smart Stat” is that by wall mounting them in a better location to reflect the actual comfort levels of the inhabitants and the system will more accurately reflect temperature and humidity levels of the inhabitants.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

## FINAL RECOMMENDATIONS:

### HUMAN RESOURCES BUILDING:

It is recommended to go with split system heat pumps with air handling units above the ceilings in the old water source heat pump locations and eliminate the cooling tower. New electric back up heat may require additional electrical load. However, staging compressors and “Smart Stat” controls should minimize the need for excessive back up heat operation.

It is recommended to provide a Test and Balance of the existing duct system before and after the installation to confirm air flows are to the design requirements for these zones.

### LAW ENFORCEMENT CENTER:

It is recommended to go with new Roof Top Gas Pack units utilizing the existing natural gas piping. These units would tie into the existing ductwork systems. New “Smart Stat” controls would make the building HVAC more efficient and provide additional benefits of temperature, humidity and CO2 control of the HVAC

Again, it is recommended to provide a Test and Balance of the existing duct system before and after the installation to confirm air flows are to the design requirements for these zones.

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

## CONSTRUCTION COST ESTIMATES FOR HVAC UPGRADES

### HUMAN SERVICES BUILDING

Demolition	
Remove existing heat pumps (15)	10,000.00
Remove existing cooling tower	5,000.00
Remove existing heat exchanger and Pump	5,000.00
Remove existing thermostats	2,000.00
Installation	
(15) new split system Heat Pumps outside	80,000.00
(15) new air handlers with coils and backup heat	150,000.00
Refrigerant Piping and 134A refrigerant	20,000.00
New Filter Return Grilles	5,000.00
Ductwork to interconnect to existing runouts	15,000.00
“Smart” Flex Stats	18,000.00
Plenum rated cable for Flex Stats	
above ceilings	7,000.00
Electrical Upgrades	35,000.00
Pre and Post TAB report	<u>10,000.00</u>
	362,000.00

### LAW ENFORCEMENT CENTER

Demolition	
Remove existing rooftop Gas Packs (11)	25,000.00
Remove existing Trane DDC system	5,000.00

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

## Installation

(11) rooftop gas packs with digital scroll compressors and VFD's.	167,000.00
(11) new rooftop curb adapters	20,000.00
(11) "Smart: flex stats in existing spaces on walls	18,000.00
Controls conduit and wire	15,000.00
Pre and Post TAB	<u>10,000.00</u>
	\$260,000.00

Construction Estimate	\$622,000.00
Contingency & Design Fees	<u>93,300.00</u>
Total Budget	\$715,300.00

# Dibble & Pledger, P.A.

**Consulting Engineers Electrical, Mechanical, & Plumbing**

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889

## APPENDIX

## PHOTOGRAPHS

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889



1. Trane DDC at Law Enforcement Center



2. Supply & Return at Law Enforcement Center

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889



3. Jail Ceilings at Law Enforcement Center



4. Heat Pump with filter above ceiling @ HS Building

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889



## 5. Cooling Tower at HS Building

# Dibble & Pledger, P.A.

Consulting Engineers Electrical, Mechanical, & Plumbing

---

OFFICE PHONE: (252) 946-3320 (252) 946-0511

LEED AP

FAX: (252) 946-5160

P.O. Box 1885

E-mail [rpledger@dibbleandpledger.com](mailto:rpledger@dibbleandpledger.com)

Washington, North Carolina 27889



6. Standard thermostat at HS Building