

PREPARED FOR: Western Wake Partners

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DATE: July 22, 2005

SUBJECT: Western Wake Regional Wastewater Management Facilities
Western Wake Water Reclamation Facility
PER Technical Memorandum No. 25 – Operations and Maintenance

INTRODUCTION

This TM is one in a series of TMs being prepared for the Preliminary Engineering Report for the Western Wake Regional Wastewater Management Facilities project. The purpose of this TM is to present the preliminary engineering information and data for the Operations and Maintenance Building. The Operations and Maintenance Building will house plant operations and maintenance staff, a main control room, laboratory spaces, storage rooms and maintenance shops. This building will act as the “nerve center” for the site and will be the primary entrance point for the public.

PROCESS REQUIREMENTS

The basis of design for the Operations and Maintenance Building is to provide a central point for controlling, monitoring, and coordinating operations and maintenance tasks. Central staff amenities will be housed within the building and include locker rooms, lunch room, and training/conference facilities. Process operation spaces will include laboratory spaces, plant administration, and the main control room. Maintenance group spaces include small and large maintenance areas, bench space, electrical repair, and inventory storage areas. Two separate storage buildings will supplement the maintenance group.

The design of the Operations and Maintenance Building will be sufficient to accommodate foreseeable future requirements as the plant expands to its ultimate capacity. Although separate functionally, the operations and maintenance groups work closely together. To encourage a strong relationship between the buildings, although different in scale, should be placed under “one roof”. The attached functional plan (Figure 25-1) explores the general relationship of the spaces required.

DRAFT
PER TECHNICAL MEMORANDUM No. 25
OPERATION AND MAINTENANCE BUILDING
WESTERN WAKE REGIONAL WASTEWATER MANAGEMENT FACILITIES

ALTERNATIVES EVALUATION

Layout of the Operations and Maintenance Building is based on general functionality of the spaces. The attached functional diagram (Figure 25-1) indicates the basic plan size and relational proximities desired. Development of a final layout and spatial massing will occur during the detailed design phase. The functional relationships and general massing of the buildings should remain consistent. The Operations and Maintenance Building should set the stage for the basic aesthetic of the site. The functional plan shows a one-story solution with an operations and maintenance wing connected by a common employee node. Several variations using the same general configuration could exist. The wings could be placed further apart and rotated and the employee node expanded. Another option would be to place more emphasis on the employee node, giving it more prominence and perhaps combining the employee and public entrance. A two-story solution could be created with a second story administration area and a first story maintenance and employee area creating a “single” building. The options are numerous and need to be further evaluated during detailed design.

The aesthetic for the plant should reflect the rich heritage of the rural agricultural community and the progressive nature of the western Wake County communities. The South Cary Water Reclamation Facility provides a good example of an architectural style that utilizes the shapes and human scale associated with local traditional building.

REGULATORY COMPLIANCE REQUIREMENTS

The Operations and Maintenance Building will be governed by several codes and standards. The codes, standards, and references will provide the minimum standard for fire resistance, serviceability and quality of materials used for construction. The North Carolina State Building Code (NCSBC) will be the governing building code. Additional federal, state and local codes, standards and references will be coordinated and applied in accordance with the State Building Code. A partial list of these codes and standards follow.

- ❖ 29 CFR 1910 – Occupational Safety and Health Standards
- ❖ ACI 530/ASCE 5/TMS 402 – Building Code Requirements for Masonry
- ❖ ACI 530.1/ASCE 6/TMS 602 – Specification for Masonry Structures
- ❖ American with Disabilities Act of 1990
- ❖ ASME A17.1 – Safety Code for Elevators and Escalators
- ❖ NFPA 10 – Portable Fire Extinguishers

DRAFT
PER TECHNICAL MEMORANDUM No. 25
OPERATION AND MAINTENANCE BUILDING
WESTERN WAKE REGIONAL WASTEWATER MANAGEMENT FACILITIES

- ❖ NFPA 13 – Installation of Sprinkler Systems
- ❖ NFPA 30 – Flammable and Combustible Liquids Code
- ❖ NFPA 45 – Fire Protection for Laboratories Using Chemicals
- ❖ NFPA 80 – Fire Doors and Fire Windows
- ❖ NFPA 704 – Identification of Fire Hazards of Materials

Occupancy and use of the building will include both Business and Storage Occupancies as defined by the NCSBC. The building will be occupied by employees and escorted visitors. Portions of the building will be occupied 24 hours per day/7 days a week.

The building will be constructed of non-combustible materials, primarily consisting of concrete, masonry or steel. The size of the building should allow the use of unprotected structural members. The building code recognizes this type of construction as 2B. The building code limits buildings of this occupancy and construction type to an area of 14,400 square feet with a maximum height of 55 feet and three stories. This construction type should allow for the best combination of durability, flexibility, and economy. The addition of sprinkler systems would allow greater flexibility.

Separation of the maintenance and operations functions may require fire-rated construction. A two-story building will require exits and other shafts to have fire resistance. The building location will be separated from other buildings by open space greater than 30 feet; thus, the exterior walls will not be required to have a fire rating or be limited in regards to openings in the exterior walls. Certain exit components of the design may require fire-rated separation. All openings and penetrations through fire rated construction must be sealed with an approved firestop system.

The NCSBC does not require the installation of a fire suppression system. The addition of a fire suppression system will provide several advantages, including future flexibility, additional material choices, and the possibility of minimizing the number of fire separation walls. Fire extinguishers are required to be placed throughout the building. Hazardous chemical signs will be placed in accordance with NFPA 704.

The building will be designed in accordance with the codes to provide adequate egress from the building. The doors will be of size and operation as required by the building code. Exits will open directly to the exterior, exit passageway or stairwell. Exits will be located as remote from each other as possible. Illuminated exit signage and emergency lighting will be placed throughout the structure. Travel distance within a space or floor having only one exit will not exceed 75 feet. Travel distance to the nearest exit from any point in the building will not exceed 200 feet. Travel distance will take into account travel around fixed pieces of equipment. Training and assembly type spaces will be

DRAFT
PER TECHNICAL MEMORANDUM No. 25
OPERATION AND MAINTENANCE BUILDING
WESTERN WAKE REGIONAL WASTEWATER MANAGEMENT FACILITIES

provided with two means of exit where more than 50 people may occupy the space according to the NCSBC. Paths of travel will not proceed from a room of low hazard to a room of higher hazard.

Where applicable stairs will be provided in enclosed fire-rated shafts in accordance with the NCSBC. Size and configuration of stairs will meet the requirements of the NCSBC.

Accessibility is the design of a building to provide access to people with physical limitations. The building will be required to meet the full intent of the North Carolina State Accessibility Code and the Americans with Disabilities Code. In addition to the Operations and Maintenance Building, any area of the site that will be open to public tours will be required to meet the requirements of the accessibility code.

PROPOSED FACILITIES

The proposed facilities include a single building that organizes the central activities of the operations and maintenance groups and employee amenities. Table 25-1 and the following discussion outline the basic facilities that will make up the Operations and Maintenance Building and storage buildings.

OPERATIONAL FACILITIES

The operations facilities will include office space for the superintendent, team leaders, and support staff. A main control room will be included and will contain control equipment and furnishings. A conference room will provide an area for small group meetings. Laboratory spaces will be provided within the operations facilities. The laboratory will include a main lab area, a bacteriological lab, an inorganic lab, a laboratory supervisor office, and operations and laboratory storage areas. The laboratory will be designed to accommodate all compliance and operational testing except upstream and downstream monitoring.

MAINTENANCE FACILITIES

The maintenance facilities will provide space for parts storage, electrical and instrument repairs, general repair bays and office support areas. Large bays will be used for typical large-scale maintenance of pumps and equipment. The large bay areas will be heated and ventilated. Instrument and electrical shop areas will be air conditioned "clean room". In addition to the main building, two "pole barn" type structures will be required to house various equipment.

DRAFT
PER TECHNICAL MEMORANDUM No. 25
OPERATION AND MAINTENANCE BUILDING
WESTERN WAKE REGIONAL WASTEWATER MANAGEMENT FACILITIES

EMPLOYEE AMENITIES

Employee amenities include items such as a training/conference, break room, toilets, locker and shower rooms. The break room should be designed to accommodate about 16 people. The break room should house two to three microwaves, a coffee maker, a refrigerator and snack and drink machines. The training/conference room should be designed to accommodate about 30 people and include a countertop for coffee and food preparation and layout. Toilet rooms will be sized as required by the North Carolina State Plumbing Code. Lockers will be provided for 35 employees. Each employee will be assigned three full-height lockers. The lockers are to accommodate street clothes, site uniforms and Personal Protection Equipment. The design of the lockers should allow for changing staffing mixes between female and male. A mud room will be provided at the employee entrance areas and include boot wash-down space.

TABLE 25-1
OPERATION AND MAINTENANCE SPACE REQUIREMENTS

DESCRIPTION	AREA
Operations Facilities	
Plant Superintendent	220
Lab Supervisor	145
Team Leader	145
Team Leader	145
Support Staff	160
Main Control Room	340
Main Laboratory	640
Bacteriological Laboratory	160
Inorganic Laboratory	140
General Storage	140
Laboratory Storage	145
Sample Receiving	145
Conference Room	180
Copier Room	145
<i>Sub-Total Operations</i>	<i>2,850</i>
Maintenance Facilities	
Large Bay (2 Bays)	1,600

DRAFT
 PER TECHNICAL MEMORANDUM No. 25
 OPERATION AND MAINTENANCE BUILDING
 WESTERN WAKE REGIONAL WASTEWATER MANAGEMENT FACILITIES

TABLE 25-1 (CONTINUED)
 OPERATION AND MAINTENANCE SPACE REQUIREMENTS

DESCRIPTION	AREA
Bench Area	460
Storage and Inventory	575
Electronics Shop	360
Maintenance Supervisor	120
Maintenance Technicians	140
<i>Sub-Total Maintenance</i>	3,255
Common Amenities	
Foyer	200
Secretary Area	60
Mud Room/Employee Entrance	240
Shower/Locker Room	540
Toilet Room	145
Training/Large Conf/Break	640
Break Room	180
<i>Sub-Total Common</i>	2,005
Utility	
Mechanical Room	145
Electrical Room	145
Electrical Room	100
Janitor's Closet	60
<i>Sub-Total Utility</i>	450
<i>Total Net Area</i>	8,560
<i>Circulation and</i>	
<i>Structure (40%)</i>	3,425
<i>Total Gross Area</i>	11,985
<i>Large Storage Building</i>	2,000

Small Storage Building

1,000

UTILITY REQUIREMENTS

The facility will be fully conditioned with the exception of the large maintenance bays, bench room and storage/inventory room. These rooms will be heated and ventilated only. In addition to typical utilities, laboratory gases and compressed air will be required in the building. The laboratory gases will require a special enclosure to ensure proper separation.

INSTRUMENTATION & CONTROLS

The main control room will be located in the Operations Building and connected to the plant control system. Operators will be able to monitor status of all process mechanical systems from this location. The plant control system is described in further detail in TM No. 33-Instrumentation and Controls.

DRAFT
PER TECHNICAL MEMORANDUM No. 25
OPERATION AND MAINTENANCE BUILDING
WESTERN WAKE REGIONAL WASTEWATER MANAGEMENT FACILITIES

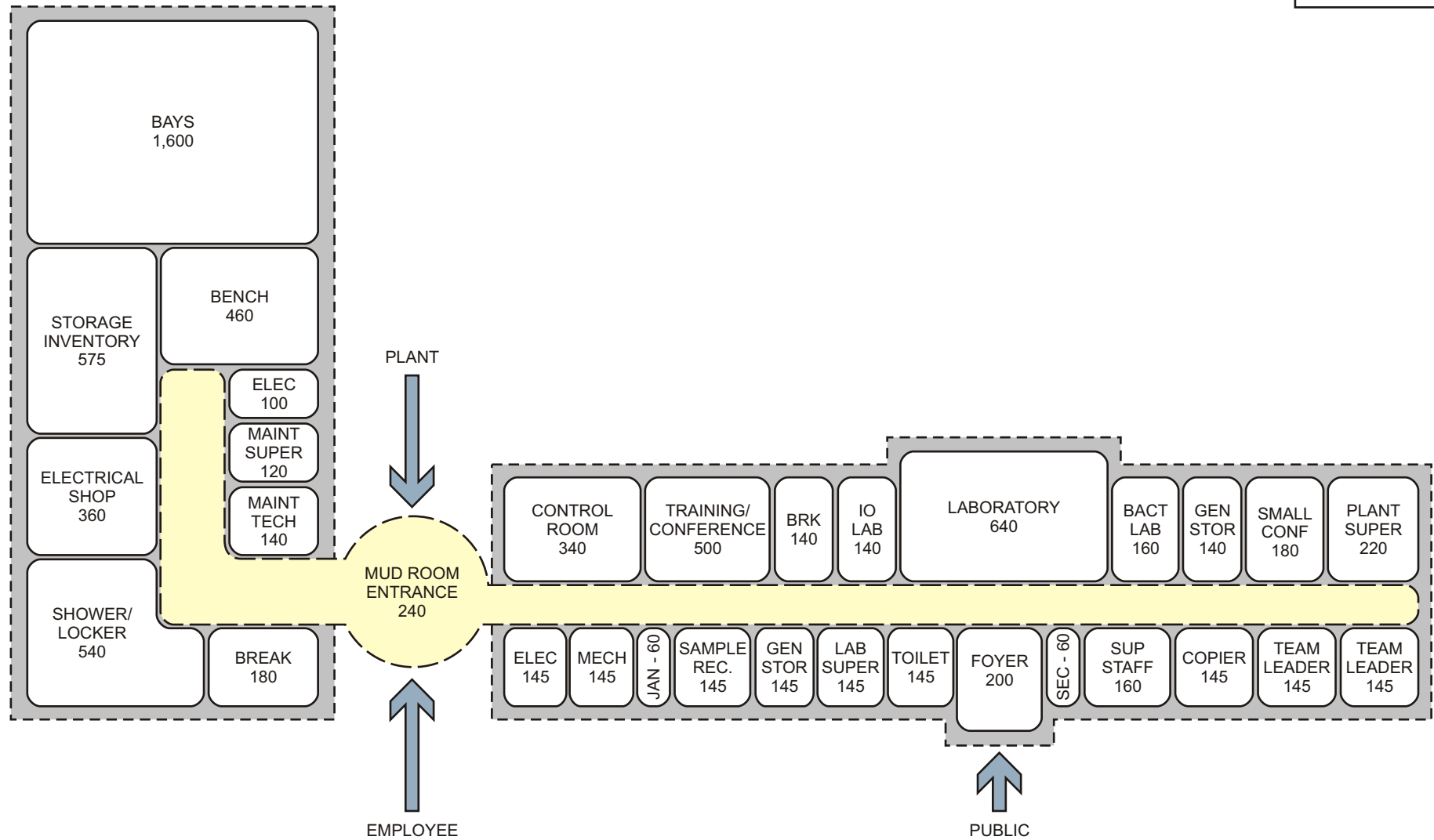
ESTIMATED CAPITAL COST

Costs for the proposed facility are included in Table 25-1 below:

TABLE 25-1
ESTIMATED CAPITAL COST FOR OPERATIONS AND MAINTENANCE BUILDING

Sitework	\$40,000
Structural	\$700,000
Architectural	\$1,150,000
Laboratory Equipment	\$275,000
Furnishings	\$175,000
HVAC	\$450,000
Electrical	\$400,000
<i>Large Storage Building</i>	<i>\$190,000</i>
<i>Small Storage Building</i>	<i>\$50,000</i>
Subtotal	\$3,430,000
Construction Contingencies (15%)	\$515,000
Engineering and Construction Services (10%)	\$395,000
Legal and Financial (5%)	\$217,000
Total	\$4,557,000

FIGURE 25-1



WESTERN WAKE REGIONAL
WASTEWATER MANAGEMENT FACILITIES
OPERATIONS AND MAINTENANCE BUILDING
FUNCTIONAL PLAN