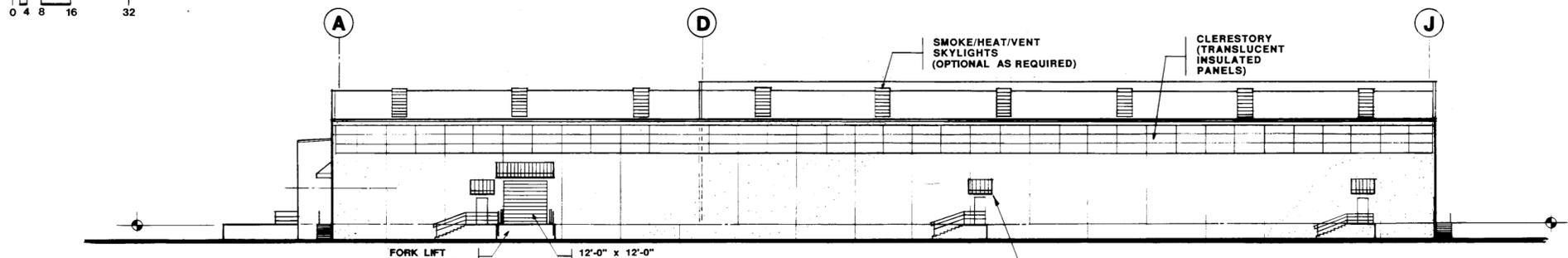
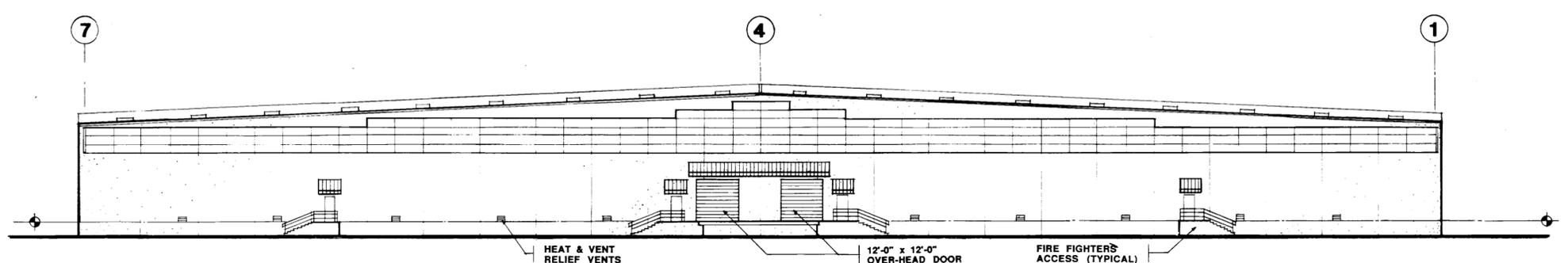


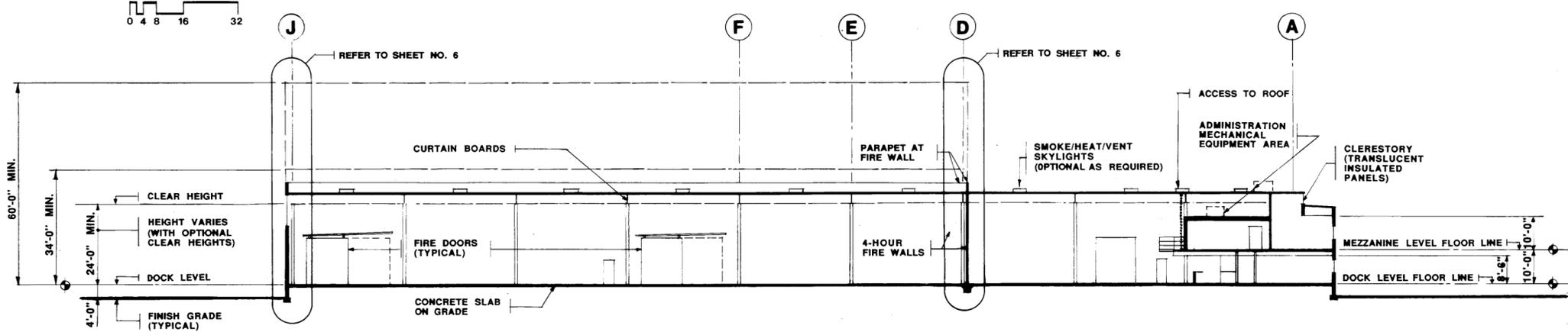
FRONT ELEVATION -- "A"



SIDE ELEVATION -- "B"



SIDE ELEVATION -- "C"



BUILDING SECTION -- "A-A"

Mechanical Design Objectives:

The mechanical systems for the General Purpose Warehouse shall include warehouse area heating and ventilating systems; administrative area heating, ventilating and (where appropriate) air conditioning systems; plumbing systems; and fire sprinkler systems. The design agency shall investigate various heating, ventilating and air-conditioning systems for appropriate application in the geographical area in which the project occurs. Air-conditioning of the administrative areas shall be permitted only where authorized under the Architectural and Engineering Instructions criteria. The HVAC system selected shall take into account the available sources of energy, the economics of the system, fuel type used, energy conservation, and local governing conditions.

While there are several heating and ventilation system types available, the type recommended for the Warehouse area is a direct fired, space heating unit. A building pressurization system with minimal ductwork shall be utilized. The system shall provide barometric relief air dampers strategically located at the perimeter of the building to exhaust air evenly. Features of this type of equipment, which are particularly useful for warehouse area heating and ventilating, are as follows:

First, the equipment utilizes building pressurization along with a very low (less than 90 degrees F.) discharge air temperature. These two factors combine to eliminate cold drafts and stratification. The system uses building pressurization; therefore, minimal ductwork is required to vector the air in a horizontal direction after leaving the unit. If commodities are allowed to be stored high enough to obstruct the air flow, the unit should be aligned so air can be blown down the aisles. Building pressurization allows considerable flexibility in locating units. They can be mounted where a structural support system can most easily be developed. Typically, the heating and ventilating units are relatively light with about an 85 pound per square foot "footprint" when in a horizontal configuration.

Second, the unit is entirely self-contained, factory built, and designed to be located indoors, suspended from the roof or mounted vertically against an outside wall, or located outdoors on the roof or vertically against a wall. It has a built-in diagnostic trouble shooting control system to aid maintenance personnel in identifying operational problems. The components of the system are standard U.S. manufactured and readily available.

Thirdly, the unit conforms to ANSI Z83.18 "Direct Fired Industrial Air Heater," and has evolved over the years to become one of the most energy efficient types of systems for heating large warehouses. This is because of several factors: 100% efficient direct gas fired; a recirculation feature which allows up to 80% of the air to be recirculated after the burner; and a high (25 to 1 turndown ratio) combustion system which allows burner output to match the building heat requirements.

Interior and exterior design temperatures shall be based upon the Architectural and Engineering Instructions and ASHRAE Standard 90-75. Examples of heating loads for various conditions are indicated elsewhere on these drawings. Whereas the Warehouse area will generally be designed for an interior design temperature of 55 degrees F., a Warehouse that is to be unstaffed may be designed for 40 degrees F. Ventilation requirements are estimated at a minimum of two air changes per hour; however, the designer shall review final design conditions/requirements and provide required ventilation for fuel powered lift trucks and electrical charging areas.

The basic fuel is assumed to be natural gas, however, "current criteria" for fuel selection shall be part of the designer's final design fuel selection responsibilities. A life cycle cost analysis should be performed to verify its economic viability. This fuel was selected at this time because of its wide availability; its current cost relative to other fuels; and its efficiency of combustion. Other fuels may be considered such as electricity and propane (LPG). Oil may be used for "indirect fired" equipment only. The type of fuel selected may affect the type of heating equipment selected, but not the design approach. The warehouse heating units described hereinbefore have, as a rule, adequate facility for housing the heat exchange equipment and controls necessary to adapt to other fuels if it becomes necessary to change to a different fuel source after installation. It is the responsibility of the designer to make sure all equipment specified will meet this criteria. Dual fuel capability is not required.

Plumbing fixtures of barrier-free design shall be provided. The quantity of fixtures shall be determined by National Plumbing Code, based on the male/female populations. Army Tech Manual TM5-810-5 "Plumbing" shall be used to provide specific design guidance.

Floor drains are to be included in the restroom areas, with trap primers.

Passive solar design for the warehouses is best implemented by properly orienting the clerestory translucent panelled areas where practicable. When it appears that appropriate conditions may exist, a life cycle cost analysis should be developed to determine the cost benefit of active solar design.

Revisions			
Symbol	Descriptions	Date	Approved

	U. S. ARMY ENGINEER DISTRICT, SEATTLE CORPS OF ENGINEERS SEATTLE, WASHINGTON		
	DEPARTMENT OF THE ARMY FACILITIES STANDARDIZATION PROGRAM DEFINITIVE DESIGN		
Designed by: LDC	GENERAL PURPOSE WAREHOUSE		
Drawn by: KNY	Scale: As shown	Sheet number: 5	Drawing number: 44110-01 44220-01
Checked by: LDC/DHH	Spec. No.	Contract No. DACA67-86-D-0029	
Reviewed by:			
Submitted by:			