

CONTROL OF HEAVY LOADS
AT VIRGIL C. SUMMER
NUCLEAR STATION UNIT 1

PREPARED BY
GILBERT ASSOCIATES, INC.
READING, PENNSYLVANIA

Gilbert / Commonwealth

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PDR ADOCK 05000395
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INTRODUCTION

This report responds to a request by the Nuclear Regulatory Commission (NRC) to all Licensees of Operating Plants, Applicants for Operating Licenses, and Holders of Construction Permits to review their controls for the handling of heavy loads to determine the extent to which their facilities satisfy the recommendations as reported in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants."

The procedures to implement the recommendations of NUREG-0612 were outlined in enclosures that accompanied a letter dated December 22, 1980, by Darrell G. Eisenhut. This letter requires a six-month report and a nine-month report. The six-month report responds to the identification of the extent of potentially hazardous load-handling operations at a site and the extent of conformance to appropriate load-handling guidance. The nine-month report will respond to the requirement of demonstrating that adequate measures have been taken to ensure that the likelihood of a load drop which might cause damage to either fuel or components necessary for safe shutdown or decay heat removal is extremely small; or that the estimated consequences of such a load drop will not exceed the limits set by the evaluation criteria of NUREG-0612.

This is the six-month report which identifies any potentially hazardous load-handling operations that could cause damage to either fuel or components necessary for safe shutdown or decay heat removal at the South Carolina Electrical and Gas Company Virgil C. Summer Nuclear Station.

The review that is addressed in this report follows the guidelines as set forth in Darrell G. Eisenhut's December 22, 1980 letter, Enclosure 3, and Section 5.1.1 of NUREG-0612. The guidelines that are outlined in the above references, and followed in this report, require the evaluation of overhead handling systems that handle heavy

loads. A heavy load is defined as a spent fuel assembly and its associated handling tool; at the Virgil C. Summer Nuclear Station, this is defined as 2500 pounds. The guidelines for this report are:

- a) Identify all overhead handling devices from which a load drop could cause damage to fuel or components necessary for safe shutdown or decay heat removal.
- b) Justify the exclusion of any overhead handling device that handles heavy loads by verifying that there is sufficient physical separation from the point of impact and any component necessary for safe shutdown, decay heat removal, or spent fuel storage and fuel in the reactor vessel.
- c) Define safe load paths and procedures for the handling of heavy loads to minimize the possibility of the impact of a heavy load dropped onto spent fuel storage, spent fuel in the reactor vessel, safe shutdown equipment, or decay heat removal equipment.
- d) Overhead lifting devices should comply with either ANSI B30.9-1971, Slings, or ANSI N14.6-1978, Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 P ounds or More for Nuclear Material.
- e) Cranes should be designed according to CMAA Specification 70 and ANSI B30.2-1976, Overhead and Gantry Cranes, Chapter 2-1.
- f) The cranes should be inspected, tested, and maintained in accordance with ANSI B30.2-1976, Overhead and Gantry Cranes, Chapter 2-2.
- g) Review crane operators' training, qualifications, and conduct in reference to ANSI B30.2-1976, Overhead and Gantry Cranes, Chapter 2-3.

Table 1 enumerates the vital data for each overhead handling device at the Virgil C. Summer Nuclear Station.

TABLE 1

OVERHEAD HANDLING DEVICES, VIRGIL C. SUMMER NUCLEAR STATION

<u>Crane I.D.</u>	<u>Crane Type</u>	<u>Heavy Loads Handled and Lifting Device</u>	<u>Load Weight</u>	<u>Excluded From Further Concern</u>	<u>Figure No.</u>	<u>Location</u>
XCR-1	Reactor Cavity Manipulator Crane	Spent and New Fuel Assembly and Handling Tool	2500 lbs	No	5,6,&7	463' el. Reactor Building
XCR-2 & XCR-16	Spent Fuel Pit Bridge Crane	Spent Fuel Assembly and Handling Tool	2500 lbs	No	5 & 7	463' el. Fuel Handling Building
XCR-3, XCR-45, & XCR-49	Fuel Handling Building Crane	a) New Fuel Shipping Container and Vendor-Supplied Lifting Device	6600 lbs	Yes, except XCR-49	5 & 7	463' el. Fuel Handling Building
		b) Spent Fuel Shipping Cask and Vendor-Supplied Lifting Device	(later)			
		c) Fuel Transfer Canal Gates and 2 Part Sling Cable	4500 lbs			
		d) Irradiated Specimen Shipping Cask and Vendor- Supplied Lifting Device	(later)			

TABLE 1 (Cont'd)

<u>Crane I.D.</u>	<u>Crane Type</u>	<u>Heavy Loads Handled and Lifting Device</u>	<u>Load Weight</u>	<u>Excluded From Further Concern</u>	<u>Figure No.</u>	<u>Location</u>
XCR-4	Reactor Building Polar Crane	a) CRDM Missile Shields	54,000 lbs	No	5, 6, & 7	552' el. Reactor Building
		b) Upper Internals and Internals Lifting Rig	92,000 lbs			
		c) Lower Internals and Internals Lifting Rig	268,000 lbs			
		d) Internals Lifting Rig	19,000 lbs			
		e) ISI Tool and Vendor-Supplied Lifting Device	20,000 lbs			
		f) RCP Internals	48,000 lbs			
		g) RCP Casing and Lifting Beam	52,000 lbs			
		h) RCP Motor	77,140 lbs			
		i) RV Studs, Nuts, and Washer Stand	8500 lbs			
		j) Equipment Bridge	4000 lbs			
XCR-17	Turbine Building Crane	General Electric Turbine Generator and Associated Power Plant Equipment	Less than or equal to max. capacity	Yes	7 & 11 (10)	463' el. Turbine Building
XCR-18	10-ton Electric Cable Hoist and Trolley	Power Plant Equipment	Less than or equal to max. capacity	Yes	4 (2 & 3)	436' el. Auxiliary Building

TABLE 1 (Cont'd)

<u>Crane I.D.</u>	<u>Crane Type</u>	<u>Heavy Loads Handled and Lifting Device</u>	<u>Load Weight</u>	<u>Excluded From Further Concern</u>	<u>Figure No.</u>	<u>Location</u>
XCR-19	7.5-ton Electric Cable Hoist and Trolley	Power Plant Equipment	Less than or equal to max. capacity	Yes	6 (2,3,4, & 5)	485' el. Auxiliary Building
XCR-20A & XCR-20B	5-ton Hand Chain Hoist and Trolley	a) RHR Pumps b) RHR Pump Motor	4400 lbs 3200 lbs	Yes	2	374' el. Auxiliary Building
XCR-21A & XCR-21B	5-ton Manual Chain Hoist and Trolley	a) RB Spray Pumps b) RB Spray Pump Motors	5400 lbs 5880 lbs	Yes	2	374' el. Auxiliary Building
XCR-54A, XCR-54B & XCR-54C	5-ton Manual Chain Hoist and Trolley	SI Charging Pumps a) Pump b) Base c) Gear d) Motor	7500 lbs 6000 lbs 2100 lbs 6700 lbs	Yes	2	388' el. Auxiliary Building
XCR-23A & XCR-23B	2-ton Manual Chain hoist and Trolley	a) RB Spray Sump Isolation Valve Protective Chambers b) SI Recirculation Sumps Isolation Valves Protective Chambers	Top 3000 Complete 9000 lbs Top 3000 Complete 9000 lbs	No	3	412' el. Auxiliary Building
XCR-24	8-ton Hand Chain Hoist and Trolley	Main Steam Stop Valves	Less than or equal to max. capacity	Yes	11	463' el. Turbine Building

TABLE 1 (Cont'd)

<u>Crane I.D.</u>	<u>Crane Type</u>	<u>Heavy Loads Handled and Lifting Device</u>	<u>Load Weight</u>	<u>Excluded From Further Concern</u>	<u>Figure No.</u>	<u>Location</u>
XCR-25A, XCR-25B, XCR-25C, & XCR-25D	10-ton Hand Hoist and Trolley	Main Condenser Water Boxes (2 Cranes per Water Box)	26,500 lbs	Yes	9	412' el. Turbine Building
XCR-26	4-ton Hand Chain Hoist and Trolley	Feedwater Booster Pumps a) Pump b) Driver c) Bedplate	7800 lbs 8500 lbs 5900 lbs	Yes	9	412' el. Turbine Building
XCR-27	5-ton Electric Cable Hoist and Trolley	Power Plant Equipment	Less than or equal to max. capacity	Yes	4	436' el. Intermediate Building
XCR-28	2-ton Electric Cable Hoist and Trolley	Chemical Storage Containers	Less than or equal to max. capacity	Yes	1	Water Treatment Building
XCR-29A, XCR-29B	2-ton Hand- Operated Hoist and Trolley	Generator Parts	Less than or equal to max. capacity	Yes	4	Diesel Generator Building
XCR-31	1/2-ton Hand Chain Hoist and Trolley	Under heavy load limit	N/A	Yes	4	436' el. Intermediate Building
XCR-33	2-ton Hand Chains Hoist and Trolley	Turbine-Driven Emergency Feedwater Pump a) Pump b) Base c) Driver	3000 lbs 2400 lbs 3260 lbs	Yes	3	412' el. Intermediate Building

TABLE 1 (Cont'd)

<u>Crane I.D.</u>	<u>Crane Type</u>	<u>Heavy Loads Handled and Lifting Device</u>	<u>Load Weight</u>	<u>Excluded From Further Concern</u>	<u>Figure No.</u>	<u>Location</u>
XCR-34	1-ton Electric Cable Hoist and Trolley	Under heavy load limit	N/A	Yes	4	Reactor Building Tendon Access Gallery
XCR-36	20-ton Electric Cable Hoist and Trolley	Radwaste Facility Equipment	Less than or equal to max. capacity	No	4	436' el. Drumming Station
XCR-40A, XCR-40B, XCR-40C	10-ton Hand Chain Hoists and Trolleys	Main Steam Isolation Valves	21,000 lbs	No	4	436' el. Intermediate Building
XCR-42	10-ton Bridge Crane	Hot Machine Shop Applications	Less than or equal to max. capacity	Yes	4	Hot Machine Shop
XCR-43	10-ton Bridge Crane	Service Building Applications	Less than or equal to max. capacity	Yes	1	Service Building
XCR-46	3-ton Bridge Crane	a) Concrete Plugs b) Filters and Cartridges c) Storage Casks	1770 lbs Negligible 2590 lbs	No	5	463' el. Auxiliary Building
XCR-47	10-ton Bridge Crane	Hot Machine Shop and Low Level Waste Storage	Less than or equal to max. capacity	No	4	436' & 447' el. Drumming Station

TABLE 1 (Cont'd)

<u>Crane I.D.</u>	<u>Crane Type</u>	<u>Heavy Loads Handled and Lifting Device</u>	<u>Load Weight</u>	<u>Excluded From Further Concern</u>	<u>Figure No.</u>	<u>Location</u>
XCR-48	1-1/2-ton Hand Chain Hoist and Trolley	Instrument and Service Air Compressors	Less than or equal to max. capacity	Yes	9	412' el. Turbine Building
XCR-51 & XCR-50	10-ton Bridge Crane and Hoist	a) Service Water Traveling Screen	27,939 lbs	No	8	436' el. Service Water Intake Screen and Pumphouse
		b) Service Water Pump	14,000 lbs			
		c) Service Water Pump Motor	15,650 lbs			
XCR-53A, XCR-53B, XCR-53C	2-ton Twin Hook Extension Hoists	CRDM Cable Support Structures	N/A	Yes	5	475' el. Reactor Building
XRW-11	1-ton Jib Crane	Under heavy load limit	N/A	Yes	4	436' el. Drumming Station
XRW-13	3-ton Jib Crane	a) Concrete Plugs	1770 lbs	No	4	436' el. Drumming Station
		b) Spent Filters and Cartridges	Negligible			
		c) Storage Casks	2590 lbs			
		d) Lifting Beam	1350 lbs			
	Reactor Building Equipment Access Hatch Door	Equipment Hatch	N/A	Yes	5	463' el. Reactor Building

This study documents the review of overhead handling devices at the Virgil C. Summer Nuclear Station that can handle a heavy load, defined as an item equal in weight to a spent fuel assembly and its handling tool. The following sections are descriptions of the overhead handling device, crane, and hoist at the Virgil C. Summer Nuclear Station.

Each overhead handling device has been reviewed, and each individual description includes the type of crane or hoist being reviewed, the type of handling device being employed, and the items that the device was designed and designated to handle. The Virgil C. Summer Nuclear Station was then reviewed, in reference to the overload handling devices, by a physical inspection of the plant and by studying the up-to-date layout drawings. The various overhead handling devices are shown on Figures 1 through 11. The figures indicate each handling device's proximity to any components necessary for safe shutdown or decay heat removal, and to any area where an inadvertent drop of a heavy load may cause a radioactive release, such as the spent fuel pit or reactor vessel. The safe shutdown and decay heat removal components considered in this study do not include piping, valves, and cable.

A safe load path for every overhead handling device is defined where physically possible to do so. When a crane or hoist is operated within the confines of its defined safe load path, it would be unlikely that an inadvertent drop of a heavy load would cause damage to any component necessary for the safe shutdown of the plant, decay heat removal, or fall into an area that could cause a radioactive release. The safe load path is then defined as an area within the crane's or hoist's range where none of the above components are located. The only exceptions are those necessary components serviced uniquely by a crane or hoist for maintenance. The overhead handling device will not be operated until after these components have been

isolated from their system and after their function has been assumed by a redundant component. In areas where the only separation between a dropped heavy load and an item that needs to be protected is a structural floor, a preliminary study was conducted to indicate whether further study was necessary. The results indicating the necessity of any in-depth structural studies will be presented in the nine month report.

Safe load paths for some cranes and hoists could not be defined. In those cases procedures will be drawn up and design modifications will be made where necessary to minimize the chances and the consequences of an inadvertent load drop. Procedures for overhead handling devices are being developed to dictate the operation and use of the device. It should be recognized that because of the construction stage of the Virgil C. Summer Nuclear Station, procedures are not generally available at this time.

Reactor Cavity Manipulator Crane

Reactor Cavity Manipulator Crane XCR-1 is located on elevation 463' directly above the reactor vessel cavity. There is no safe load path that can be defined for this crane. The Reactor Cavity Manipulator Crane is shown on Figures 5, 6, and 7.

The Reactor Cavity Manipulator Crane is supplied by the Stearns and Rogers Corporation for Westinghouse Electric Corporation. The bridge crane is supplied by Dwight Foote, Inc. and the hoist by P&H Harnischfeger Company. The hoist and crane have a 2 ton capacity and utilize a handling tool to handle the new and spent fuel assemblies. The crane is an electric motorized bridge crane, and the hoist is an electric cable hoist. Both the crane and hoist are operated from a remote station. The crane and hoist are both designed in accordance with CMAA Specification 70 and ANSI B30.2, Chapter 2-1.

The Reactor Cavity Manipulator Crane is designated solely for the handling of fuel assemblies during refueling of the reactor. As stated above, no safe load path can be defined for the crane and operation is governed by Westinghouse Refueling Procedures which are being put into an approved standardized format at this time.

Spent Fuel Pit Bridge Crane

The Spent Fuel Pit Bridge Crane is XCR-2. Attached to it is the Protex Cable Reel XCR-16, which is excluded from further study since its maximum capacity is well under the heavy load criteria. This crane is located on elevation 463' of the Fuel Handling Building at column lines Q.5 to R.5 and 2.5 to 6.5 directly over the Spent Fuel Pit. The crane is shown on Figure 5 and 7. No safe load path is defined for this crane.

Crane XCR-2 is supplied by Dwight Foote, Inc. through Westinghouse Electric Corporation. The crane's hoist is supplied by the P&H Harnischfeger Company. The crane and hoist are rated for a 2 ton capacity and has a maximum 25 foot lift.¹ The hoist is an electric cable hoist on a hand geared trolley with a safety hook that attaches to a fuel handling tool when handling spent fuel assemblies. The crane and hoist are controlled by a hand-held pushbutton station. The crane and hoist design adheres to CMAA Specification 70 and ANSI B30.2, Chapter 2-1.

The Spent Fuel Pit Crane is designated for the handling of spent fuel assemblies in the Spent Fuel Pit. Since it operates over the Spent Fuel Pit, there is no safe load path defined for this crane. The operation of this crane and hoist are governed by the Westinghouse Refueling Procedures which are currently being reviewed and placed into a standard format.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

Fuel Handling Building Crane XCR-3 has associated with it Fuel Transfer Canal Gate Hoist XCR-49 and the New Fuel Elevator Winch, XCR-45. The New Fuel Elevator Winch is not considered further since by definition it is not an overhead handling device. All three items are located in the Fuel Handling Building on elevation 463' at column lines Q.5 to S and 2.5 to 4.91. The three items are shown on Figures 5 and 7, along with the safe load path which includes the New Fuel Laydown Area, New Fuel Storage Area, the Decontamination Area, and the Cask Loading Pit and surrounding area. The Fuel Handling Building Crane's safe load path does not include any area within 15 feet of the spent Fuel Pit.

The Fuel Handling Building Crane is supplied by the Whiting Corporation and the Fuel Transfer Canal Gate Hoist is supplied by the American Chain and Cable Company. The Fuel Handling Building Crane has a main electric motor cable hoist with a 125 ton capacity, a sister hook with eye, and a potential for a 60 foot lift. The auxiliary electric motor cable hoist has a 25 ton capacity, a single hook, and a potential lift of 60 feet 6 inches.¹ The Fuel Transfer Canal Gate Hoist is physically attached to the bridge of the Fuel Handling Building Crane and is a 3 ton capacity electric cable hoist. The assembly as a whole is designed in accordance with CMAA Specification 70 and ANSI B30.2, Chapter 2-1.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The Fuel Handling Building Crane is designated to handle New Fuel Shipping Containers, Spent Fuel Shipping Casks and Irradiated Specimen Shipping Casks with vendor-supplied lifting devices. The Fuel Transfer Canal Gate Hoist is designated to handle the Fuel Transfer Canal Gates with a two-point sling cable. Procedures are being developed (See Section 4.0) along with design studies to minimize the risk of a dropped heavy load in the Fuel Handling Building. Special procedures are also being developed for the Fuel Transfer Canal Gate Hoist since it is necessary to operate within 15 feet of the Spent Fuel Pit.

Reactor Building Polar Crane XCR-4 is located in the Reactor Building at elevation 552'. The Reactor Building Polar Crane and safe load paths are shown on Figures 5, 6, and 7.

The Reactor Building Polar Crane is supplied by the Whiting Corporation and has a main electric motor cable hoist rated at 360 ton with a sister hook with eye. The auxiliary electric motor cable hoist has a 25 ton capacity with a single hook. The hoists, bridge, and trolleys all have separate Whiting Telemotive radio control with redundant pushbutton station. The Reactor Building Polar Crane is designed in accordance with CMAA Specification 70 and ANSI B30.2, Chapter 2-1.

The Reactor Building Polar Crane is designed to handle the loads with the lifting devices as listed in Table 1. As stated above in Figure 5, safe load paths are identified where the Reactor Building Polar Crane can be operated without fear of damage to vital components due to inadvertant load drop. However, there are areas where the crane must operate where a safe load path could not be defined. Procedures are being developed to protect components necessary for safe shutdown of the plant, decay heat removal, or areas where an inadvertant load drop could cause a radioactive release. The items that could be affected by an inadvertant load drop include the reactor vessel, the steam generators, the pressurizer, and the reactor building cooling units, XAA-1A and B, XAA-2A and B, XFN-64A and B, XFN-65A and B, XCE-8A and B, and XCE-9A and B.

Turbine Building Crane XCR-17 is located on elevation 463' of the Turbine Building. The crane is shown on Figure 7 along with its safe load path. The safe load path encompasses the entire 463' elevation of the Turbine Building between column lines 1 and 12, and A and F, as well as those areas on elevation 463' open to hatches from the 463' elevation as shown in Figure 10.

The Turbine Building Crane is supplied by P&H Harnischfeger Corporation, and is a 220 ton, five motor overhead traveling crane with a 30 ton, 6 inch auxiliary hoist. The main hoist has a 95 foot lift and the auxiliary hoist a 111 foot lift.¹ The crane is operated through an operator's cab or pendant control and has a festoon conductor on the trolley. The crane's main hoist employs a sister hook and the auxiliary hoist employs a fish hook rated as stated above. The crane and associated hoists are designed in accordance with CMAA Specification 70 for Class A indoor service and ANSI B30.2, Chapter 2-1.

The Turbine Building Crane is designed to service the General Electric Turbine Generator and Associated Power Plant Equipment. Since there is no equipment in the Turbine Building required for safe shutdown or decay heat removal, this crane can be excluded from further study or concerns.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 10-ton electric cable hoist and motor operated trolley XCR-18 is located on elevation 463' of the Auxiliary Building at column lines 9.5 and L. The hoist is shown on Figure 4 and its safe load path is the equipment hatch and surrounding area through elevations 436', 412', 397', 388', and 374' of the Auxiliary Building. The safe load path is shown of Figures 2, 3, and 4.

Hoist XCR-18 is supplied by the American Chain and Cable Company and is a 10-ton capacity electric cable hoist with a motor driven trolley. The hoist has a 90 foot lift and is controlled with a single speed hand held controller.¹ The hoist's lifting device is a forged steel shank hook. The hoist and trolley are designed in accordance with CMAA Specification 70 for Class A and C indoor service, and ANSI B30.2, Chapter 2-1 to the extent to which they apply.

The 10-ton electric cable hoist is designated to lift power plant equipment through the equipment hatch from elevations 372' to 436' of the Auxiliary Building. Inside the safeload path and in the nearby surrounding area there is no equipment necessary for safe shutdown or decay heat removal. Therefore, the hoist is excluded from further study and concerns.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

7.5-Ton Electric Cable Hoist with Motor Operated Trolley

The 7.5-ton electric cable hoist and motor operated trolley XCR-19 is located on elevation 485' of the Auxiliary Building at columns P and 6.6. The hoist is shown on Figure 6, and its safe load path is the equipment hatch through elevations 388', 397', 412', 436', 463', and 485' of the Auxiliary Building as shown on Figures 2, 3, 4, 5, and 6.

Hoist XCR-19 is supplied by the American Chain and Cable Company and is a 7.5-ton capacity electric cable hoist with a motor driven trolley. The hoist has 126 foot lift and is controlled by a hand-held controller.¹ The hoist's lifting device is a forged steel shank hook. The hoist and trolley are designed in accordance with CMAA Specification 70 for Class A and C indoor service, and ANSI B30.2, Chapter 2-1 to the extent to which they apply.

The 7.5-ton electric cable hoist is designated to lift general power plant equipment through the equipment hatch from elevations 388' to 485' of the Auxiliary Building. Inside the safeload path and in the nearby surrounding area there is no equipment necessary for safe shutdown or decay heat removal. The hoist is excluded from further study or concerns.

1. The lift as given is the maximum from the eye or the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

5-Ton Hand Chain Hoist and Plain Trolley

The 5-ton chain hoists and trolleys XCR-20A and XCR-20B are located in Auxiliary Building on elevation 374' at the column lines K and 8.8 above the Residual Heat Removal Pumps. The hoists are shown on Figure 2 along with their safe load paths.

Hoists XCR-20A and XCR-20B are supplied by the American Chain and Cable Company and are 5-ton capacity hand operated chain hoists with a plain trolley. The hoists have 20 foot lifts and forged steel shank hooks.¹ The hoists and trolleys are designed in accordance with CMAA Specification 70 for Class A and C indoor service, and ANSI B30.2, Chapter 2-1 to the extent to which they apply.

The 5 ton hand chain hoists and plain trolleys XCR-20A and XCR-20B are designated to service the RHR pumps and motors, XPP-38A and XPP-38B, respectively. The RHR pumps necessary for the removal of decay heat are located within the safe load paths of hoists and trolleys XCR-20A and XCR-20B. While a heavy load drop from the hoists could cause damage to the RHR pumps the only time this would occur is when the pump in question would have maintenance being performed on it. During maintenance periods on an RHR pump, the pump would be isolated from its systems and on this basis can be excluded from further study or concern.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

5-Ton Manual Chain Hoist with Geared Trolley

The 5-ton manual chain hoists and geared trolleys XCR-21A and XCR-21B are located in the Auxiliary Building on elevation 374' near column lines K and 8.8 above the Reactor Building Spray Pumps. The hoists and trolleys are shown on Figure 2 along with their safe load paths.

Hoists XCR-21A and XCR-21B are supplied by the American Chain and Cable Company and are 5-ton capacity hand-operated chain hoists on geared trolleys. The hoists have a 20 foot lift with forged steel shank hooks.¹ The hoists and trolleys are designed in accordance with CMAA Specification 70 for Class A and C indoor service and ANSI B30.2, Chapter 2-2 to the extent to which they apply.

Hoists XCR-21A and XCR-21B are designated to service the Reactor Building Spray Pumps and Motors XPP-38A and XPP-38B. Within the safe load paths of hoists XCR-21A and XCR-21B there are no components necessary for safe shutdown or decay heat removal, so these hoists are excluded from further study.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 5-ton manual chain hoists with geared trolleys XCR-54A, XCR-54B, and XCR-54C are located in the Auxiliary Building on elevation 388' at the column lines M to Q and 7.7 above the Safety Injection Charging Pumps. The hoists and trolleys are shown on Figure 2 along with their safe load paths.

Hoists XCR-54A, XCR-54B, and XCR-54C are supplied by the American Chain and Cable Company, and are 5-ton capacity, closehead room, hand operated chain hoists on geared trolleys. The hoists have an 8 foot lift with a forged steel shank hook.¹ The hoists and trolleys are designed in accordance with CMAA Specification 70 for Class A and C indoor service and ANSI B30.2, Chapter 2-1 to the extent to which they are applied.

Hoists XCR-54A, XCR-54B, and XCR-54C are designated to service Safety Injection Charging Pumps XPP-43A, XPP-43B, and XPP-43C. Inside and near the safe load paths, the Safety Injection Charging Pumps are the only components necessary for the safe shutdown of the plant. The only time a heavyload drop could cause damage to the pumps is when the pumps are being serviced. While they are being serviced, the pumps are isolated from their systems, and on this basis hoists XCR-54A, XCR-54B, and XCR-54C are excluded from any further study or concerns.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 2-ton manual chain hoists with plain trolleys XCR-23A and SCR-23B are located in the Auxiliary Building on elevation 412' at column lines J to N and 7.7. The hoists and trolleys are shown on Figure 3 along with its safe load paths.

Hoists XCR-23A and XCR-23B are supplied by the American Chain and Cable Company, and are 2-ton capacity hand operated chain hoists on plain trolleys. The hoists have a 26 foot lift and a forged steel shank hook.¹ The hoists and trolleys are designed in accordance with CMAA Specification 70 for Class A and C indoor service and ANSI B30.2, Chapter 2-2 to the extent to which they are applicable.

Hoists XCR-23A and XCR-23B are designated to service the Reactor Building Spray Protective Sump Isolation Valve Chambers XSM-4A and XSM-4B, and the Safety Injection Recirculation Sump Isolation Valve Protection Chambers XSM-5A and XSM-5B. Near hoist XCR-23B is a Motor Control Center XMC-1DAZY and an Air Handling Unit for Motor Control Center XAH-32-VL, both of which are necessary for the safe shutdown of the plant. Procedures are being developed and design modifications studied to minimize the chances of an inadvertent load drop causing damage to the adjacent protective chambers and the motor control center and accompanying air handling unit.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

8-Ton Manual Hand Chain Hoist with Geared Trolley

The 8-ton manual chain hoist with geared trolley XCR-23 is located in the Turbine Building on elevation 463' at column lines F and 4 to 5. The hoist and trolley are shown on Figure 11 along with their safe load paths.

Hoist XCR-24 is supplied by the American Chain and Cable Company, and is an 8 ton capacity hand operated chain hoist with a geared trolley. The hoist has a 20 foot lift and a forged steel shank hook.¹ The hoist and trolley are designed in accordance with CMAA Specification 70 for Class A and C indoor service and ANSI B30.2, Chapter 2-1 to the extent to which they are applicable.

Hoist XCR-24 is designated to service the Main Steam Stop Valves XVG-2809 A to D. Since the Turbine Building contains no equipment necessary for the plant's safe shutdown or decay heat removal, this hoist can be excluded from further study or concern.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The four 10-ton manual chain hoists and geared trolleys XCR-25A, XCR-25B, XCR-25C, and XCR-25D are located on elevation 412' of the Turbine Building at column lines B to B.9 and 5 to 8. The hoists and trolleys are shown on Figure 9 along with their safe load paths.

Hoists XCR-25A thru XCR-25D are manufactured by the American Chain and Cable Company and are 10 ton capacity hand operated chain hoists on geared trolleys. The hoists have 15 foot lifts and forged steel shank hooks.¹ The hoists and trolleys are designed in accordance with CMAA Specification 70 for Class A and C indoor and outdoor service and ANSI B30.2, Chapter 2-1 to the extent to which they apply.

Hoists XCR-25A thru XCR-25D are designated to service the four Main Condenser Water Boxes. Two hoists service one water box at a time. Since the Turbine Building contains no equipment in it necessary for the plant's safe shutdown or decay heat removal, these hoists can be excluded from further study or concern.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 4-ton manual chain hoist with a plain trolley XCR-26 is located in the Turbine Building on elevation 412' at column lines F to G.1 and 1 to 3 above the Feedwater Booster Pumps. The hoist and trolley is shown on Figure 9 along with its safe load path.

Hoist XCR-26 is manufactured by the American Chain and Cable Company, and is a 4-ton capacity, hand operated, chain hoist on a plain trolley. The hoists have a 15 foot lift and a forged steel shank hook.¹ The hoist and trolley is designed in accordance with CMAA Specification 70 for Class A and C indoor service and ANSI B30.2, Chapter 2-1 to the extent to which they apply.

Hoist XCR-26 is designated to service the Feedwater Booster Pumps XPP-28A through XPP-28D. Since the Turbine Building contains no equipment necessary for the plant's safe shutdown or decay heat removal, this hoist can be excluded from further study or concern.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

5-Ton Electric Hoist with Motor Operated Trolley

The 5-ton electric hoist and motor operated trolley XCR-27 is located in the Intermediate Building on elevation 436' at column lines G.4 to H.4 and 7.5 to 8.3. The hoist and trolley are shown on Figure 4 along with its safe load path.

Hoist XCR-27 is manufactured by the American Chain and Cable Company, and is a 5-ton capacity, electric cable hoist on a motorized trolley, with a hand held electric controller. The hoist has a 49 foot lift and a forged steel shank hoist.¹ The hoists and trolleys are designed in accordance with CMAA Specification 70 for Class A and C indoor service and ANSI B30.2, Chapter 2-1 to the extent to which they are applicable.

Hoist XCR-27 is designated to handle power plant equipment through the equipment hatch from elevations 412' and 436' in the Intermediate Building. Nowhere within or near the safe load path are there components necessary for safe shutdown or decay heat removal; therefore this hoist can be excluded from further study or concern.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

2-Ton Electric Cable Hoist with Motorized Trolley

The 2-ton electric cable hoist and motorized trolley XCR-28 is located on elevation 463' of the Water Treatment Building at column lines D to D.6 and 10.6. The hoist and trolley are shown on Figure 1 along with its safe load path.

Hoist XCR-28 is supplied by the American Chain and Cable Company, and is a 2-ton capacity, electric cable hoist on a motorized trolley with a hand-held electric controller. The hoist has a 43 foot lift and has a forged steel shank hook.¹ The hoists and trolleys are designed in accordance with CMAA Specification 70 for Class A and C indoor and outdoor service and ANSI B30.2, Chapter 2-1 to the extent to which they are applicable.

Hoist XCR-28 is designated to handle containers from the Water Treatment Building's Chemical Storage area. Inside and near the hoist's safe load path there are no components necessary for safe shutdown or for decay heat removal. On this basis the hoist is excluded from further study or concern.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 2-ton hand operated hoists and geared trolleys XCR-29A and XCR-29B are located in the Diesel Generator Building on elevation 436' at the column lines C.4 to J.1 and column line number 1 above the Diesel Generators. The hoists and trolleys are shown on Figure 4 along with their safe load paths.

Hoists XCR-29A and XCR-29B are supplied by the American Chain and Cable Company, and are 2-ton capacity, single beam, underhung, hand operated hoists with geared trolleys. The hoists have a 24 foot lift and forged steel shank hooks.¹ The hoists and trolleys are designed in accordance with CMAA Specification 70 for Class A and C indoor service and ANSI B30.2, Chapter 2-1 to the extent to which they are applicable.

Hoists XCR-29A and XCR-29B are designated to service the two standby emergency diesel generators, XEG-1A-DG and XEG-1B-DG, respectively. Within the area of each crane's safe load path the diesel generator, the fuel oil day tank, the air receiver, and on elevation 427', the fuel oil transfer pump are necessary for the safe shutdown of the plant. The only time the four safe shutdown components are in jeopardy from a heavy load drop from hoists XCR-29A and XCR-29B, is when a hoist is servicing a diesel generator and associated equipment for maintenance purposes. When one diesel generator train is down for maintenance, the other is completely isolated from it and is capable of operating independently. On the basis presented above and because the two diesel generator trains are completely redundant, hoists XCR-29A and XCR-29B are excluded from further study or concern.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 1/2-ton hand operated chain hoist and plain trolley XCR-31, manufactured by the American Chain and Cable Company, has a maximum rated capacity less than that defined for a heavy load in this study. On this basis the hoist is not included in this study except for reference and completeness. It is located on elevation 436' of the Intermediate Building near column lines H.4 and 2 to 3, and can be found on Figure 4.

The 2-ton hand operated chain hoist and trolley XCR-33 is located on elevation 412' of the Intermediate Building at column lines G.3 to H.4 and 2 to 3, above the Emergency Feedwater Pump and Turbine Drives. The hoist is shown on Figure 3 along with its safe load path.

Hoist XCR-33 is supplied by the American Chain and Cable Company, and is a 2-ton capacity, hand operated, chain hoist with a plain trolley. The hoist has a 10 foot lift and a forged steel shank hook.¹ The hoist and trolley are designed in accordance with CMAA Specification 70 for Class A and C indoor service and ANSI B30.2, Chapter 2-1 to the extent to which they apply.

Hoist XCR-33 is designated to service the Turbine Driven Emergency Feedwater Pump XPF-8-EF. Within the hoist's safe load path the pump and its turbine driver are necessary for the plant's safe shutdown. The only time the pump and driver are in jeopardy of a heavy load drop is when the emergency feedwater pump has already been isolated for maintenance. On the basis given above and since the Turbine Driven Emergency Feedwater Pump is redundant with the Motor Driven Emergency Feedwater Pump, the hoist can be excluded from further study or concern.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

1-Ton Electric Cable Hoist and Trolley

1-ton electric cable hoist and plain push type trolley XCR-34, applied by the American Chain and Cable Company, has a maximum rated capacity less than that defined for a heavy load in this study. On this basis the hoist is not included in this study except for reference and completeness. It is located at elevation 436' of the Reactor Building over the Tendon Access Gallery, and can be found on Figure 4.

The 20-ton electric cable hoist and motorized trolley XCR-36 is located in the Drumming Station on elevation 436' at column lines P to R and 6.6 to 8.8. The hoist and trolley are shown on Figure 4 along with its safe load path.

Hoist XCR-36 is supplied by the American Chain and Cable Company, and is a 20-ton capacity, electric cable hoist with an electric motorized trolley. The hoist has a 25-foot lift and a forged steel shank hook.¹ The hoist and trolley are designed in accordance with CMAA Specification 70 for Class A and C indoor service and ANSI B30.2, Chapter 2-1 to the extent to which they are applicable.

Hoist XCR-36 is designated to handle low and high level radiation shipping casks. On elevation 463' and within the hoists safeload path there are no components necessary for the plant's safe shutdown or decay heat removal. Below hoist XCR-36, however, on elevation 412' are the Spent Fuel Pit Cooling Pumps, XPP-32A and XPP-32B. These pumps are classified as Safety Class 2b. A preliminary study has shown that a dropped shipping cask could not penetrate the elevation 436' floor and cause damage to one or both of the Spent Fuel Pit Cooling Pumps, which are independent and redundant pumps. Procedures are being written to prevent the dropping of a radwaste shipping cask and minimize the potential hazard that could result.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 10-ton hand chain hoists and geared trolleys XCR-40A, XCR-40B, and XCR-40C are located on elevation 436' of the Intermediate Building at column lines H.4 to J.1 and 2 to 8 above the Main Steam Isolation Valves. The hoists and valves are shown on Figure 4 along with their safe load paths.

Hoists XCR-40A, XCR-40B, and XCR-40C are supplied by the American Chain and Cable Company, and are 10-ton capacity, manually operated chain hoists. The hoists have a 20-foot lift and a forged steel shank hook.¹ The hoists and trolleys are designed in accordance with CMAA Specification 70 for Class A and Class C indoor service and ANSI B30.2, Chapter 2-1 to the extent to which they are applicable.

Hoists and trolleys XCR-40A, XCR-40B, and XCR-40C, along with a transfer rail, are designated for servicing the Main Steam Isolation Valves, XVM-2801 A through C. Directly below the hoists and trolleys on elevation 412' of the Intermediate Building are located the Component Cooling Heat Exchanger, XHE-2B-CC, the Component Cooling Pumps, XPP-1A through C, and the Motor Driven Feedwater Pumps, XPP-21A and XPP-21B. A preliminary study has shown that under the worst conditions a dropped Main Steam Isolation Valve would not penetrate, but would deform, the floor of elevation 436' at the point of impact. Procedures are being written to define the operation of hoists to minimize the consequence of a dropped Main Steam Isolation Valve.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 10-ton bridge crane and electric cable hoist XCR-42 is located in the Hot Machine Shop on an elevation 436' at column lines R.2 to S and 11.6 to 7.8. The crane is shown on Figure 4 along with its safe load path which encompasses the entire 436' elevation of the Hot Machine Shop.

Crane XCR-42 is supplied by the American Chain and Cable Company, and both the crane and hoist have a capacity of 10 tons. The crane is an underhung, single beam, motor driven, center drive crane. The crane has a 24-foot lift and a forged steel shank main and safety hook.¹ There are pushbutton controls for both the crane and hoist for the full length travel of the bridge. The crane and hoist are designed in accordance with CMAA Specification 70 for Class A and C indoor service, and ANSI B30.2, Chapter 2-1.

Crane and hoist XCR-42 are designated to handle loads in the Hot Machine Shop. The safe load path is defined as the Hot Machine Shop which contains no components necessary for the safe shutdown of the plant or decay heat removal, and on this basis can be excluded from any further study or concern.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 10-ton bridge crane and electric cable hoist XCR-43 is located in the Service Building and shown on Figure 1 along with its safe load path which essentially encompasses the Service Building Machine Shop.

Crane XCR-43 is supplied by the American Chain and Cable Company, and both the crane and hoist have a 10-ton capacity. The crane is a top running, double beam, motor driven, center drive crane. The crane has an 18-foot 11-inch lift and a forged steel shank main and safety hook.¹ There are pushbutton controls for the crane and hoist for the full length travel of the bridge. The crane and hoist are designed in accordance with CMAA Specification 70 for Class A and C indoor service, and ANSI B30.2, Chapter 2-1.

Crane and hoist XCR-43 are designed for General Service Building application in the Service Building Machine Shop. Since the Service Building contains no equipment necessary for either the plant's safe shutdown or decay heat removal, the crane can be excluded from any further study or consideration.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

3-Ton Bridge Crane with Electric Cable Hoist

The 3-ton bridge crane and electric cable hoist XCR-46 is located on elevation 463' of the Auxiliary Building at column lines P to Q and 8.8 to 11.5. The crane, associated monorail, and safe load path are shown on Figure 5. The safe load path encompasses the area of the Chemical Volume Control System's Concrete Filter Plugs, the area under the associated monorail, and the Filter Hatch to Drumming Station.

Crane, hoist, and monorail XCR-46 are supplied by the American Chain and Cable Company. The crane and hoist are each 3-ton capacity. The crane is an underhung, single beam, motor driven, center driven type crane, and the hoist is an electric cable hoist. Along with the crane is an associated monorail that can interlock with the crane so that the hoist can transfer filter plugs to the Filter Hatch. The crane and hoist are controlled remotely to remove the operator from the potentially radioactive filter plugs. The crane is designed in accordance with CMAA Specification 70 for Class A and C indoor service, and ANSI B30.2, Chapter 2-1.

Crane XCR-46 is designated to remove the concrete plugs and spent filter cartridges from their housing and transport the spent filter and cask to the Filter Hatch. In case of an inadvertent drop, control of the radioactive filters could create a handling hazard. Procedures are being developed and design modifications studied to prevent a drop and minimize the potential hazard.

The 10-ton bridge crane and electric cable hoist XCR-47 is located in the Drumming Station at elevation 447' at column lines P to R and 8.8 to 9.5. The crane and hoist are shown on Figure 4 along with its safe load path which encompasses the low level waste storage area.

Crane XCR-47 is supplied by the American Chain and Cable Company. The crane and hoist are both rated for a 10-ton capacity and the unit has a 14 foot lift.¹ The crane is a underhung, single beam, motor driven, center drive crane, and the hoist is an electric cable type with a forged steel shank hook. The crane and hoist are controlled remotely with a control panel to remove the operator from close proximity of the low level waste storage area while operating the crane. The crane is designed in accordance with CMAA Specification 70 for Class A and C indoor service, and ANSI B30.2, Chapter 2-1.

Crane XCR-47 is used to handle shielded and unshielded low level waste storage containers in the storage area. Procedures are being developed to ensure the safe handling of the storage containers.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

1-1/2 Ton Hand Chain Hoist and Plain Trolley

The 1-1/2 ton hand chain hoist and plain trolley XCR-48 is located on elevation 412' of the Turbine Building at column lines B.8 to D and 12 above the Instrument and Service Air Compressors. The hoist is shown on Figure 9 along with the safe load path.

Hoist XCR-48 is supplied by the American Chain and Cable Company, and is a 1-1/2 ton capacity, manually operated, chain hoist on a plain trolley. The hoist has a 17 foot lift and a forged steel shank hook.¹ The hoist and trolley are designed in accordance with CMAA Specification 70 for Class A and C indoor service, and ANSI 30.2, Chapter 2-1 to the extent to which they apply.

Hoist and trolley XCR-48 service the Instrument and Service Air Compressor, XAC-3A and XAC-3B. Two hoists service one water box at a time. Since the Turbine Building has no components necessary for the plant's safe shutdown or decay heat removal, these hoists can be excluded from further study or concerns.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 10-ton bridge crane XCR-51, and electric cable hoist, XCR-50, are located on elevation 436' of the Service Water Intake Screen and Pump House directly above and behind the Service Water Pumps. The crane and hoist are shown on Figure 8. The safe load path, also shown on Figure 8, includes the complete service area behind the pumps and under the monorails over each Service Water Pump.

Crane XCR-51 and hoist XCR-50 are supplied by the American Chain and Cable Company. The crane and hoist are both rated for a 10-ton capacity, and have a 57 foot lift.¹ The crane is an underhung, single beam, hand operated crane, and the hoist is an electric cable hoist with a pushbutton control station and a lifting beam. Associated with the crane and hoists are three monorails, one over each Service Water Pump, that can interlock with the crane. The hoist and crane are designed in accordance with CMAA Specification 70 Class A and C indoor service, and ANSI B30.2, Chapter 2-1.

Crane XCR-51 and hoist XCR-50 are designated to service the Service Water Pumps, XPP-39A through C, and the Traveling Screens, XRS-2A through C. Within the safe load path, the Service Water Pumps are necessary for the safe shutdown of the plant. The only time the crane and hoist are in operation is when an associated pump and screen are being serviced. When the pump and screen are being serviced they are isolated from the Service Water System, and at the time are no longer necessary for the plant's safe shutdown. The three Service Water Pumps have a 2 out of 3 redundancy. Procedures are being developed to ensure that the hoist does not travel over operating Service Water Pumps and Traveling Screens.

1. The lift as given is the maximum from the eye of the hook to the top of the beam; the actual lift as installed may be equal or less than this maximum.

The 2-ton twin hook extension hoists XCR-53A, XCR-53B, and XCR-53C are located in the Reactor Building at elevation 475' on the Loop B Steam Generator Wall. The safe load path is the area covered by the CRDM Cable Support Structures and the space directly above it. The three hoists and the safe load path are shown on Figure 5.

Hoists XCR-53A, XCR-53B, and XCR-53C are supplied by P&H Harnischfeger Company. Each hoist has twin hooks rated at 2-ton. The hoists are equipped with a handwheel for manual operation, and are capable of an 18 foot lift. The hoists are designed in accordance to ANSI B30.2, Chapter 2-1 to the extent to which it is applicable.

The three hoists are used to lift the CRDM Cable Support Structures during refueling or maintenance outages. Since the hoists are only used during cold shutdown, the hoists can be excluded from any further study or concern.

As part of the Rad Waste Package there is a one-ton capacity jib crane, XRW-11. Since this crane's rated maximum capacity is under the heavy load limit of this study it is not considered further, and is included herein only for reference and completeness. The one-ton jib crane is located in the Drumming Station at elevation 436' at column lines Q and 7.7. It is shown with its safe load path on Figure 4.

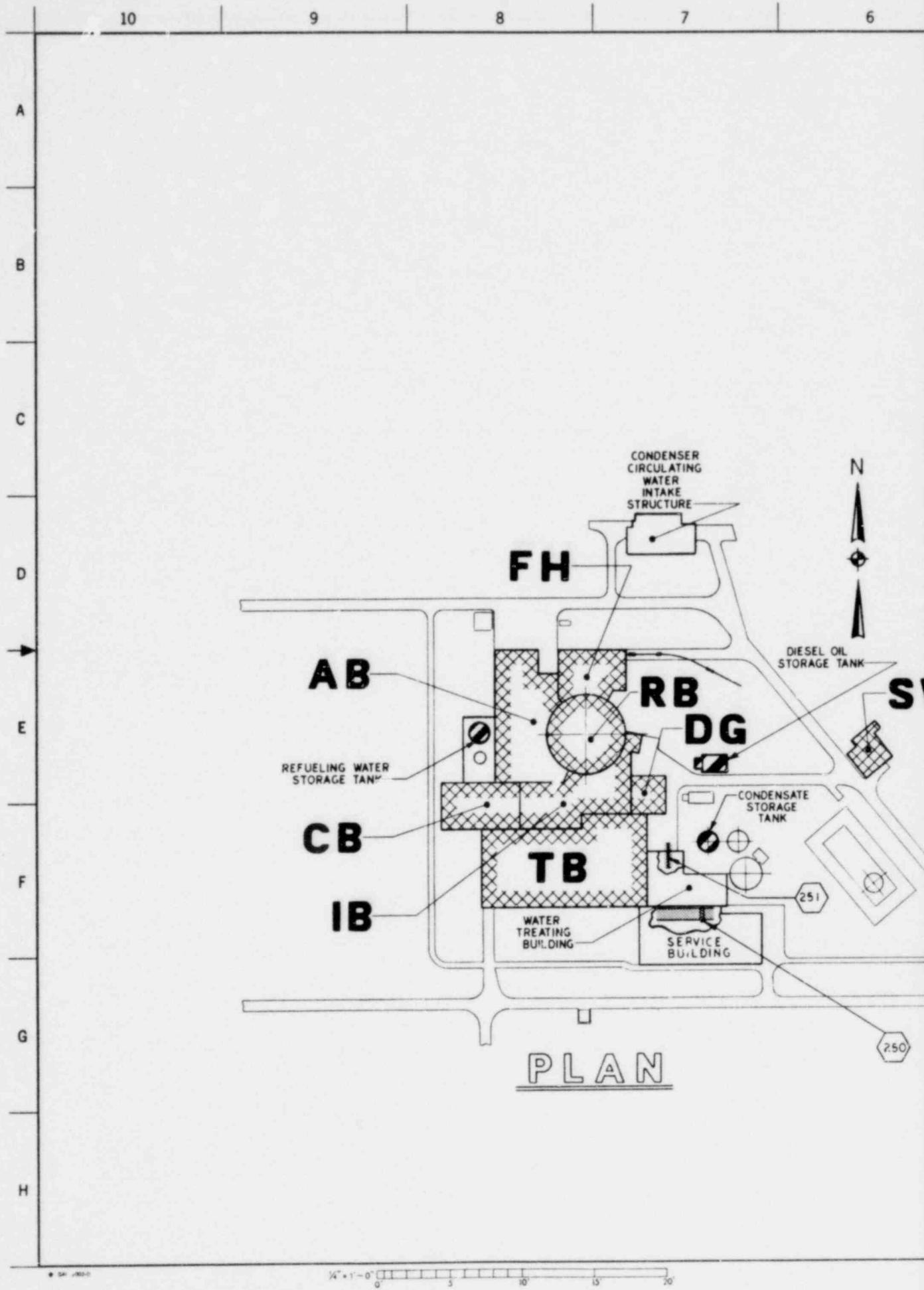
3-Ton Jib Crane - Rad Waste Package

As part of the Rad Waste Package in the same area as hoist XCR-36 is a 3-ton jib crane, XRW-13. The crane is at elevation 436' of the Drumming Station at column lines Q and 7.8 to 8.7. The jib crane and its safe load path are shown on Figure 4.

Jib crane XRW-13 has a 3-ton capacity with an electric cable hoist supplied by the American Chain and Cable Company. The hoist utilizes a 3-ton load beam as a handling device. The hoist is controlled by a pushbutton pendant station. Crane XRW-13 is designed in accordance with CMAA Specification 70 and ANSI B30.2, Chapter 2-1.

Jib crane XRW-13 is designated to handle the spent filter and their storage casks that were lowered through the filter hatch from elevation 463' by hoist XCR-48 and places them in temporary storage. Procedures are being developed to ensure the proper handling of these filters to minimize the possibility of an inadvertent drop.

The Reactor Building Equipment Hatch has a permanent crane arm attached to it at elevation 463' of the Reactor Building. This crane arm is used to swing the equipment access hatch door out of the hatch opening along a guide track when necessary. By definition of this report, this crane can be excluded from further study since it is not an overhead handling device. The crane and hatch are located in a designated safe load path as shown on Figure 5.





LEGEND

1. BUILDING DESIGNATIONS

AB	AUXILIARY BUILDING
CB	CONTROL BUILDING
DG	DIESEL GENERATOR BUILDING
FH	FUEL HANDLING BUILDING
IB	INTERMEDIATE BUILDING
RB	REACTOR BUILDING
SWPH	SERVICE WATER PUMP HOUSE
TB	TURBINE BUILDING

2. WALL DESIGNATIONS

	CONTINUOUS FROM FLOOR TO CEILING
	NOT CONTINUOUS FROM FLOOR TO CEILING

3. 	LOAD PATHS
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4. 	SAFE SHUTDOWN EQUIPMENT
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5. 	CRANES
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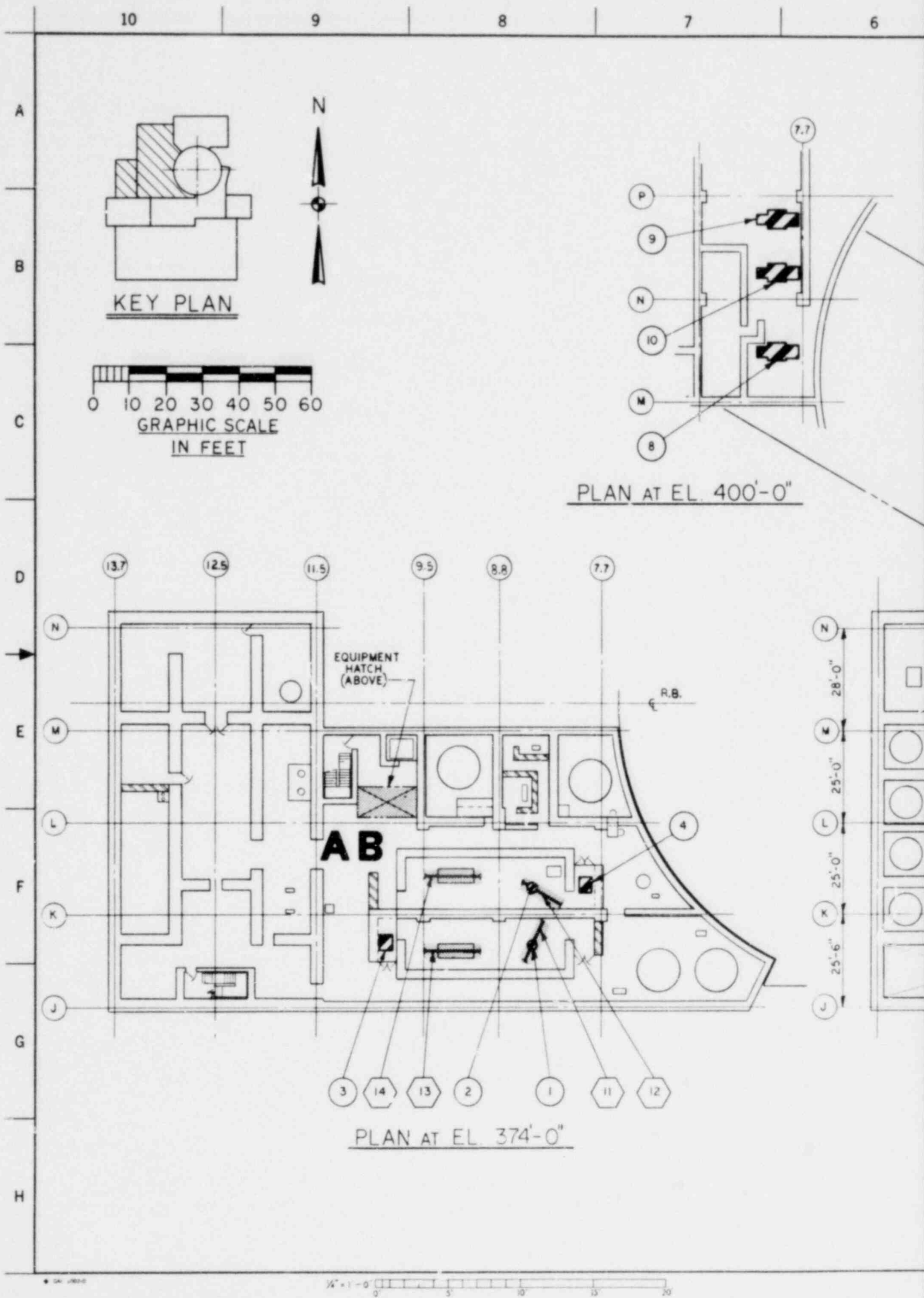
EQPT NO.	DESCRIPTION
250	MACHINE SHOP CRANE, 10 TON (XCR-43)
251	WATER TREATMENT BUILDING CHEMICAL STORAGE BUILDING, 2 TON HOIST (XCR-28)

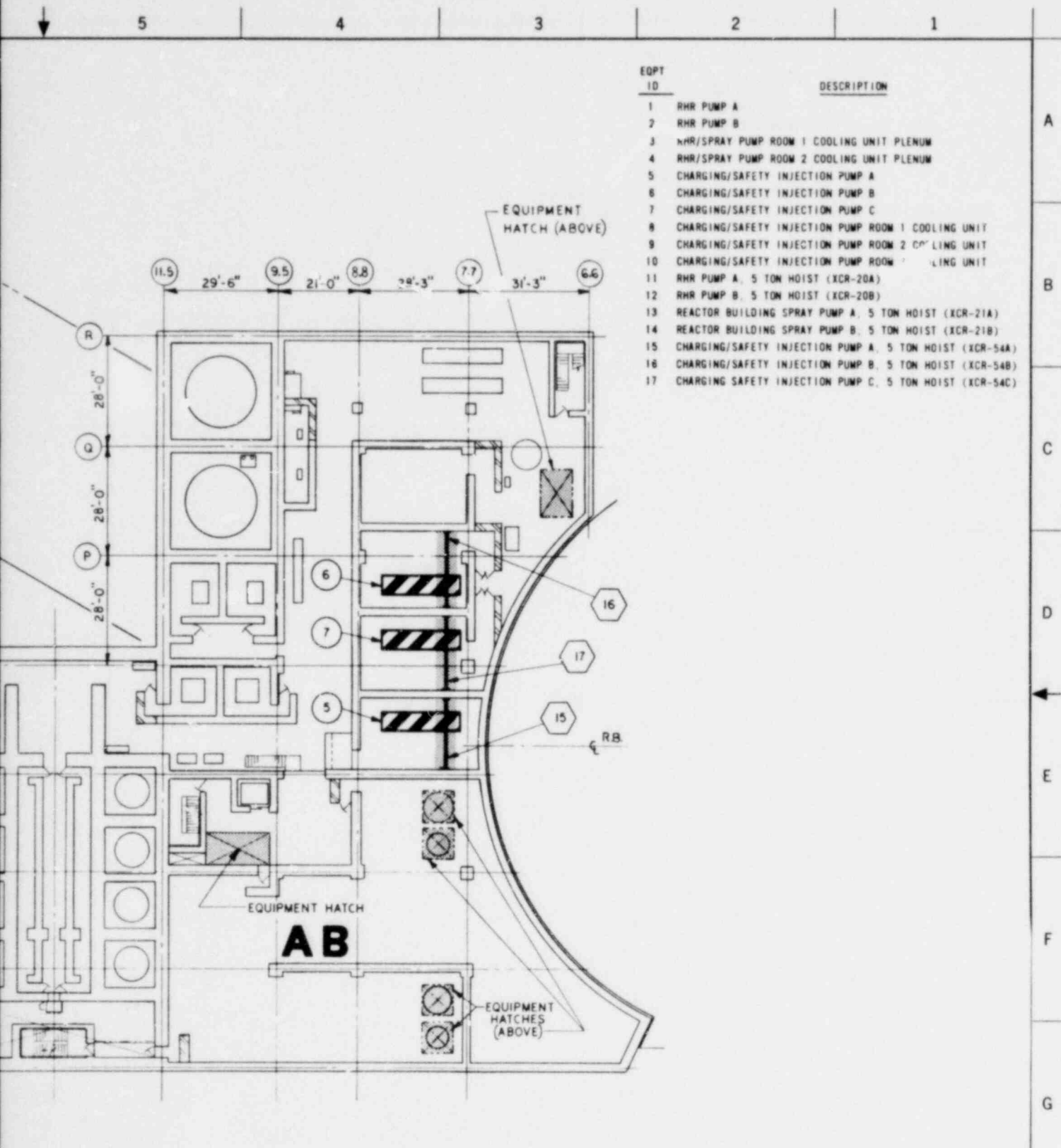
**SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION**

Site Plan

Figure 1
CAI Dwg. C-021-001

01-11 NO612 CONT HVY LOADS NPPS



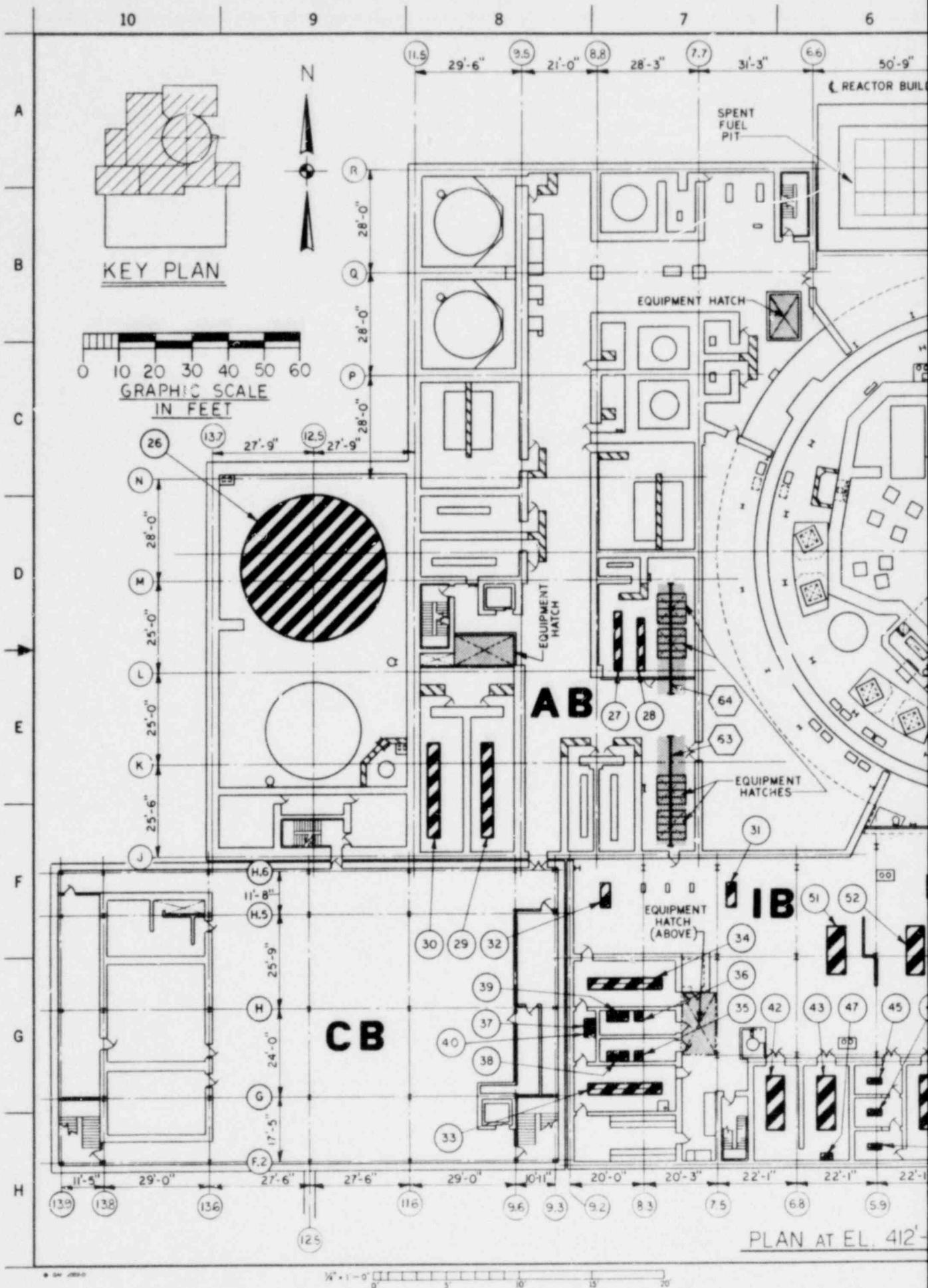


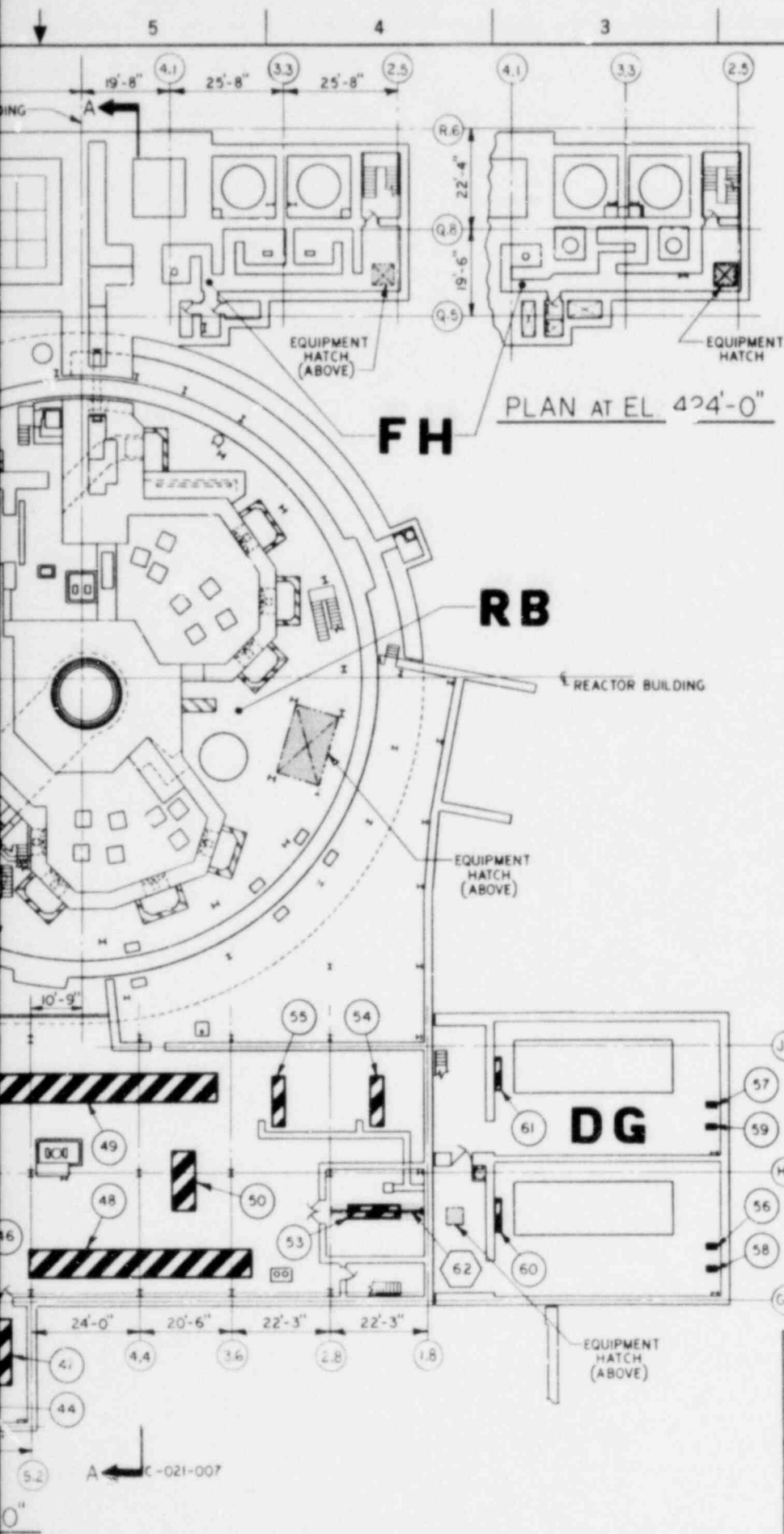
PLAN AT EL 388'-0" & 397'-0"

**SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION**

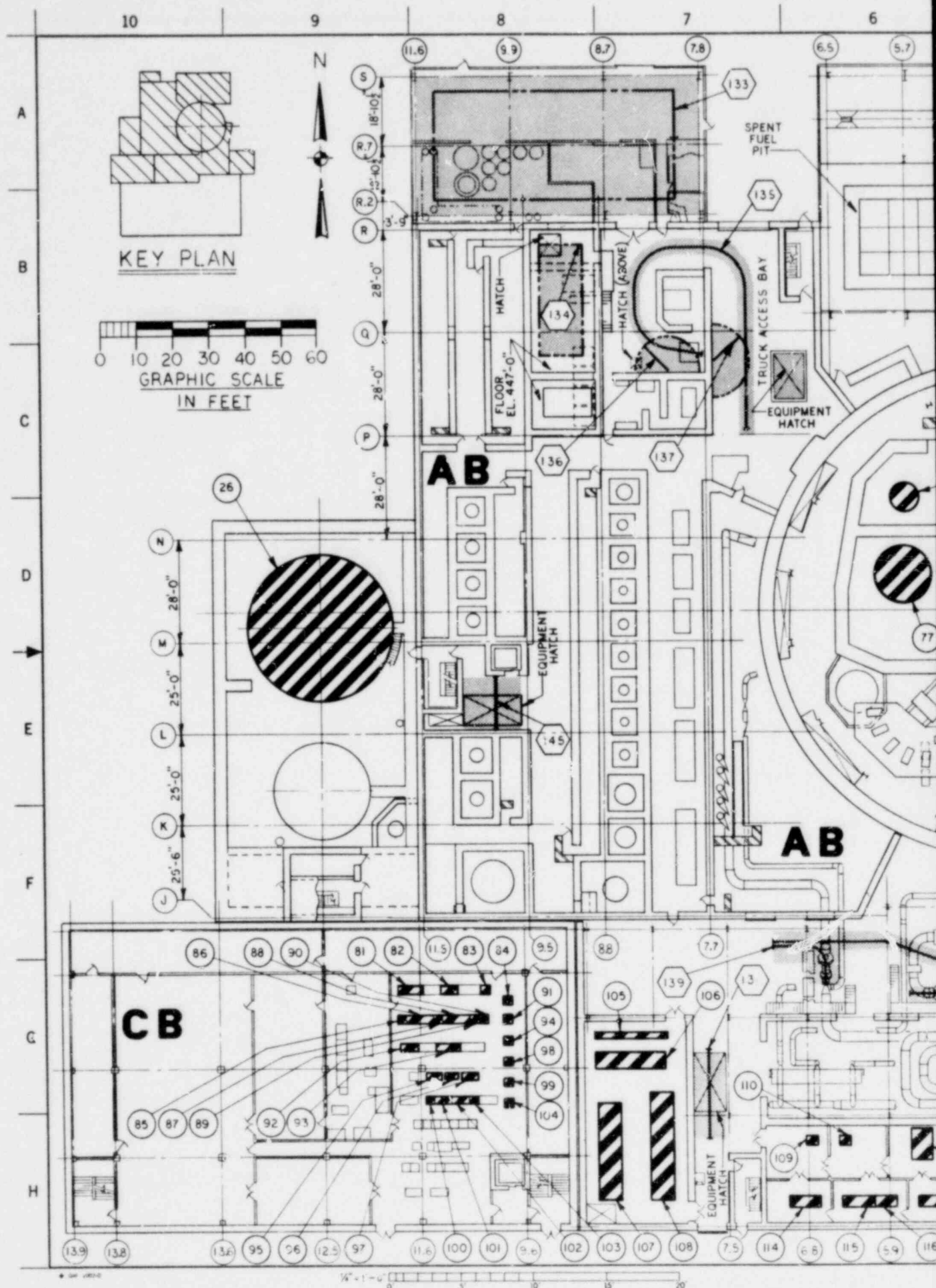
Plan at Elevations
374'-0", 388'-0", and 400'-0"

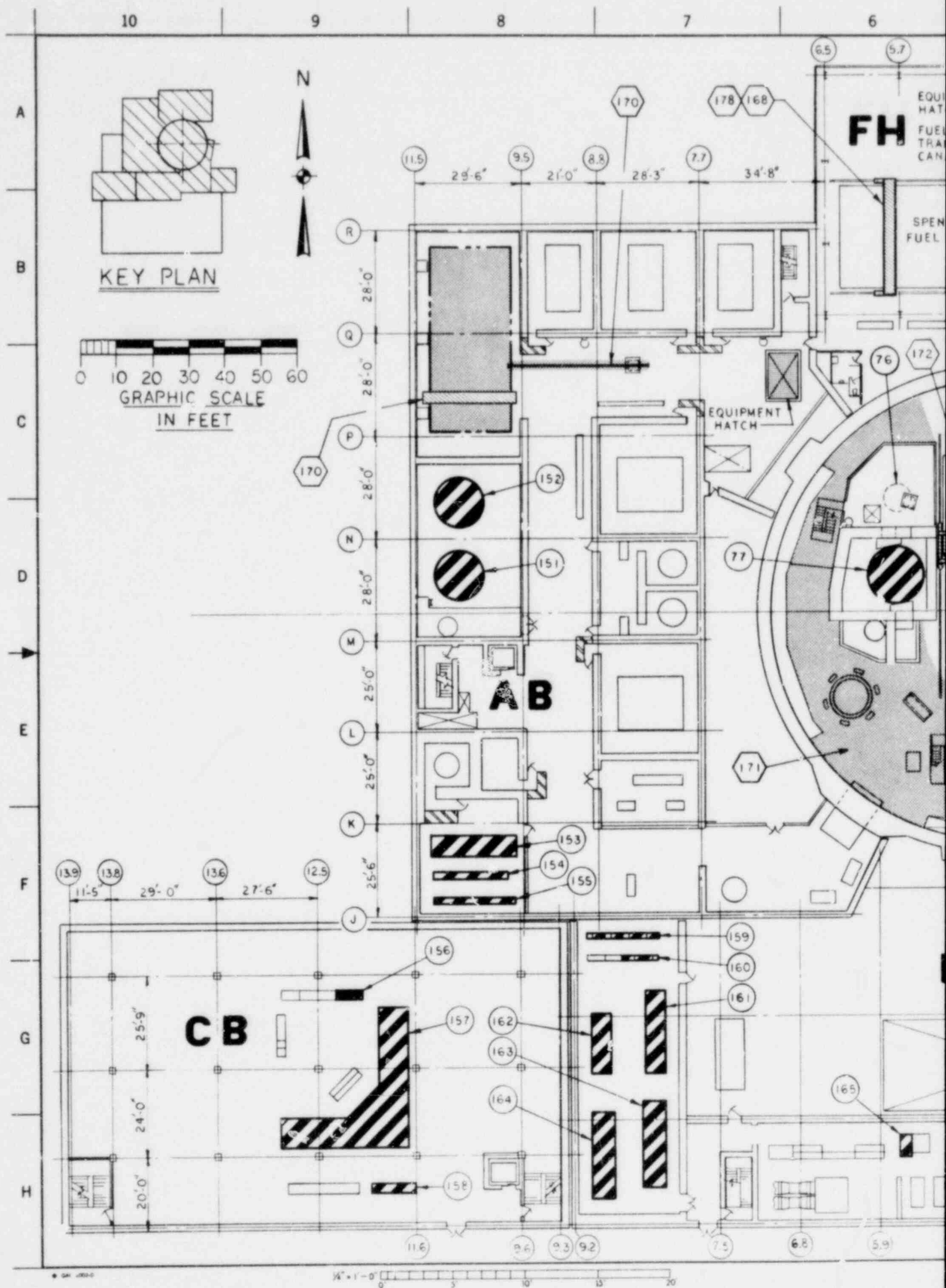
Figure 2
GAI Dwg. C-021-002

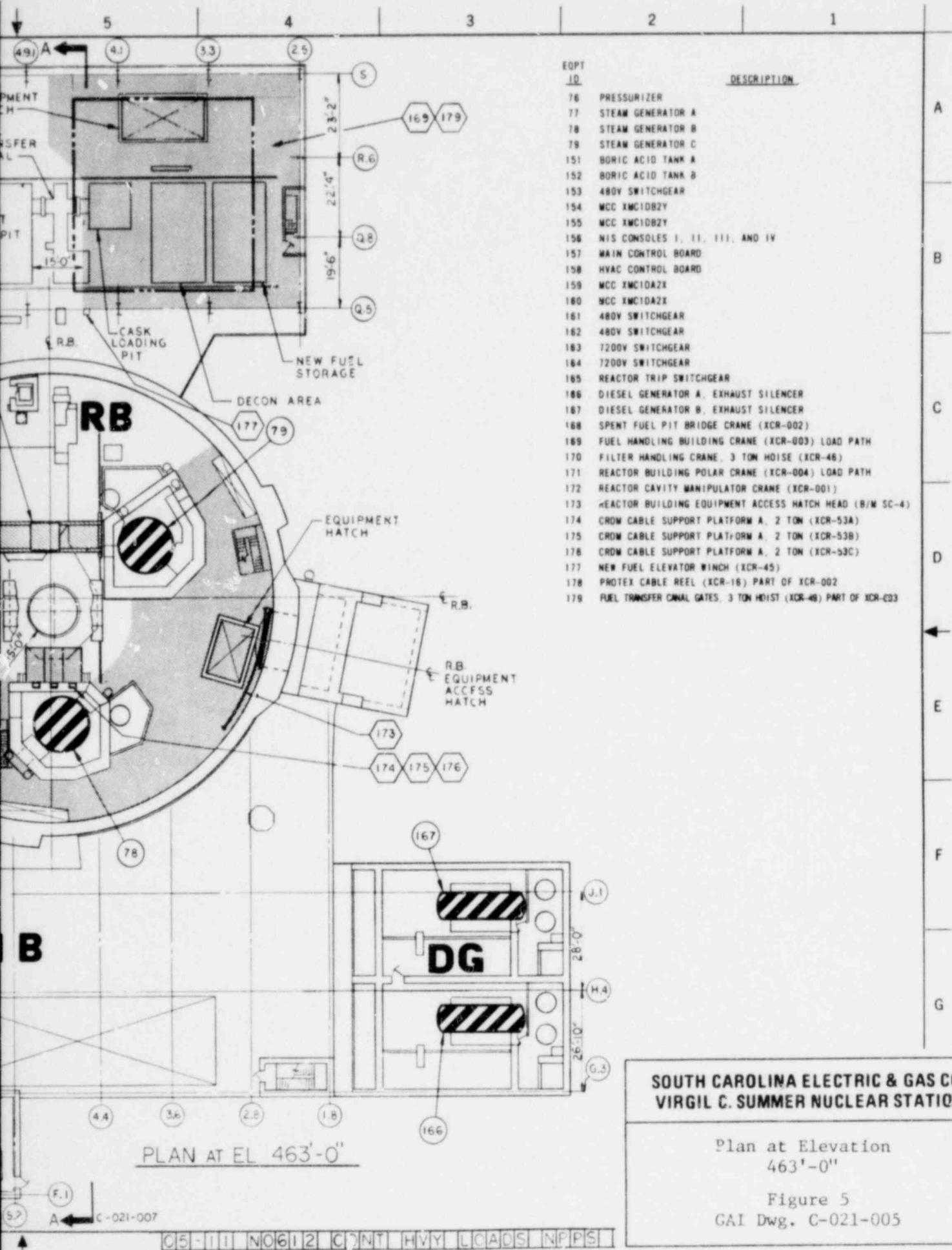


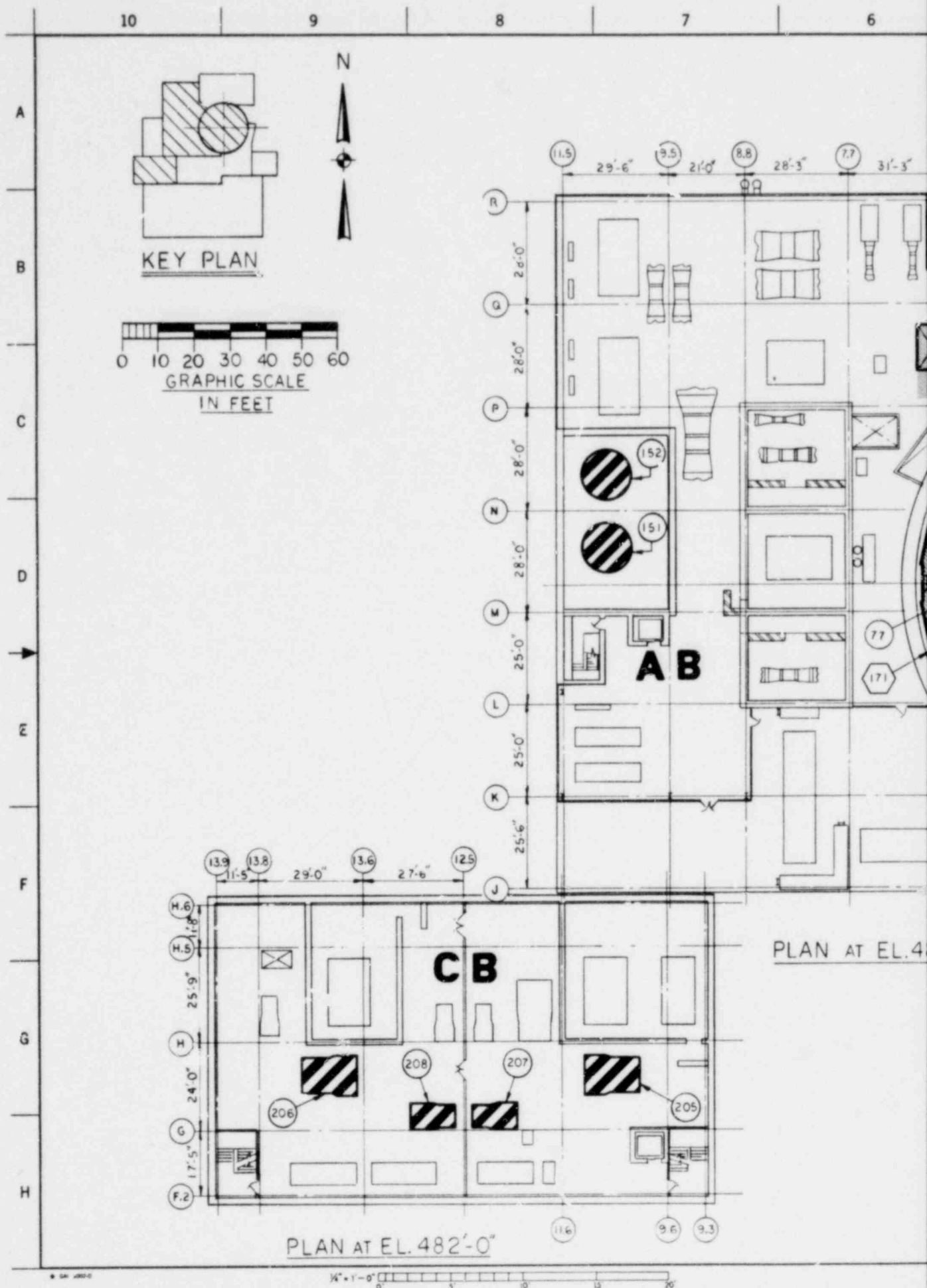


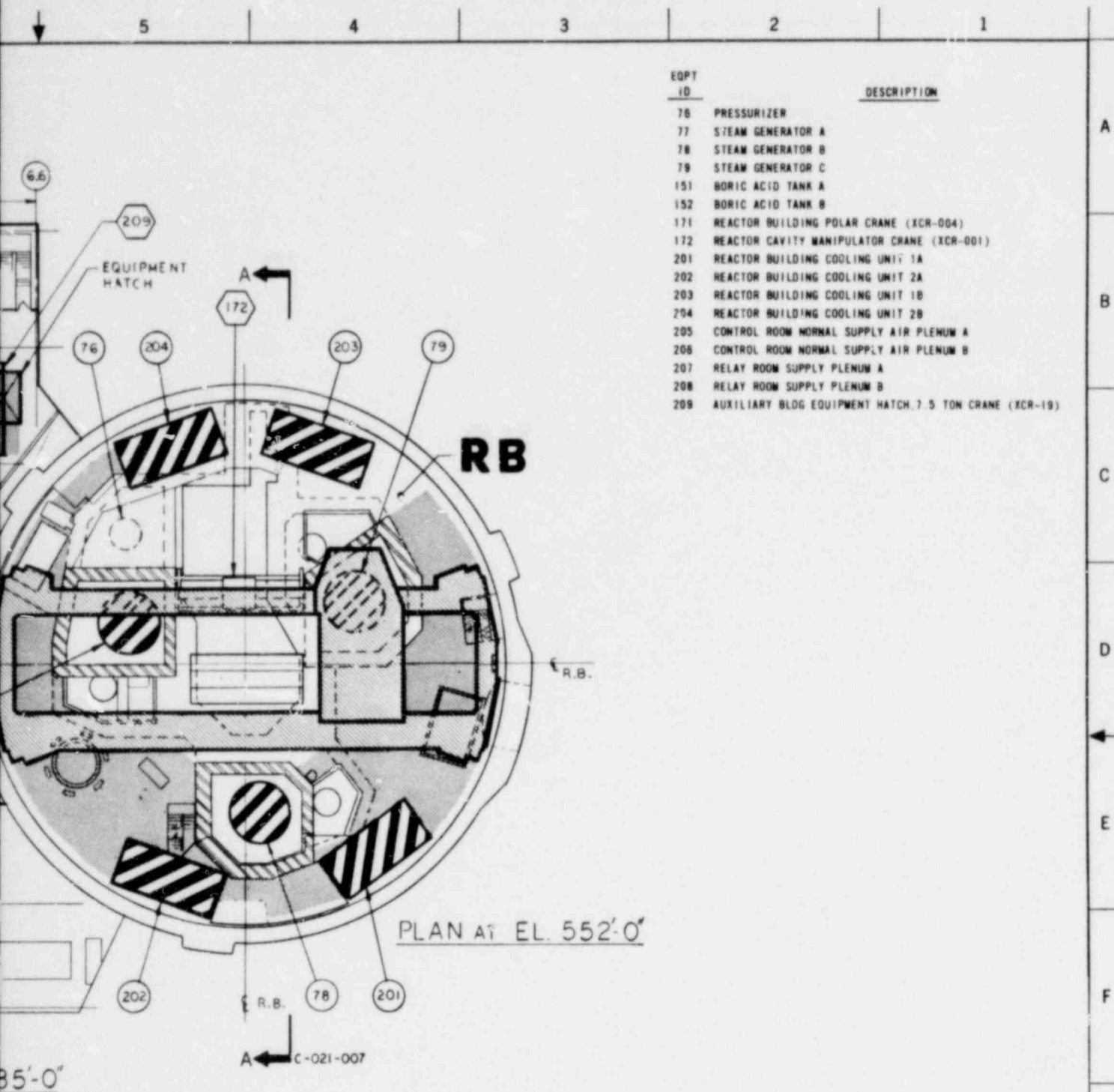
EQPT ID	DESCRIPTION
26	REFUELING WATER STORAGE TANK
27	MOTOR CONTROL CENTER
28	MOTOR CONTROL CENTER
29	RHR HEAT EXCHANGER A
30	RHR HEAT EXCHANGER B
31	SERVICE WATER BOOSTER PUMP A
32	SERVICE WATER BOOSTER PUMP B
33	BATTERY A
34	BATTERY B
* 35	BATTERY CHARGER 1A
* 36	BATTERY CHARGER 1B
* 37	BATTERY CHARGER 1A/1B
* 38	DISTRIBUTION PANEL A
* 39	DISTRIBUTION PANEL B
40	TRANSFER SWITCH
41	HVAC EQUIPMENT WATER CHILLER A
42	HVAC EQUIPMENT WATER CHILLER B
43	HVAC EQUIPMENT WATER CHILLER C
44	HVAC EQUIPMENT WATER CHILLER PUMP A
45	HVAC EQUIPMENT WATER CHILLER PUMP B
46	HVAC EQUIPMENT WATER CHILLER PUMP C
47	TRANSFER SWITCH
48	COMPONENT COOLING HEAT EXCHANGER A
49	COMPONENT COOLING HEAT EXCHANGER B
50	COMPONENT COOLING PUMP A
51	COMPONENT COOLING PUMP B
52	COMPONENT COOLING PUMP C
53	TURBINE DRIVEN EMERGENCY FEEDWATER PUMP
54	MOTOR DRIVEN EMERGENCY FEEDWATER PUMP A
55	MOTOR DRIVEN EMERGENCY FEEDWATER PUMP B
56	FUEL OIL TRANSFER PUMP A
57	FUEL OIL TRANSFER PUMP B
58	FUEL OIL TRANSFER PUMP 1A
59	FUEL OIL TRANSFER PUMP 1B
60	GENERATOR NEUTRAL TRANSFER BOX A
61	GENERATOR NEUTRAL TRANSFER BOX B
62	TURBINE DRIVEN EMER FOW PUMP, 2 TON (OCR-53)
63	RECIRC SLUMP VALVE PROT CHAMBER A, 2 TON (OCR-23A)
64	RECIRC SLUMP VALVE PROT CHAMBER B, 2 TON (OCR-23B)







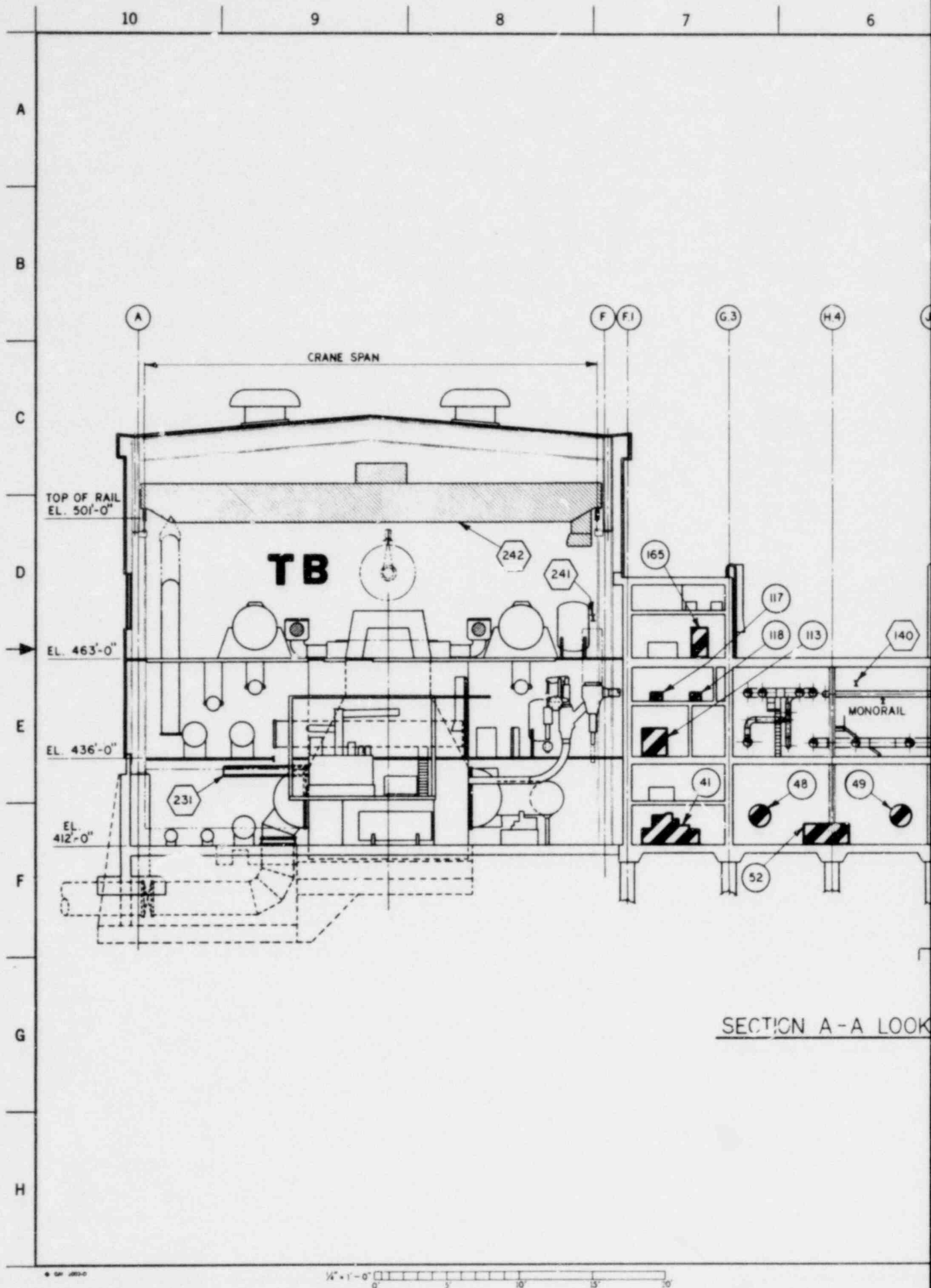


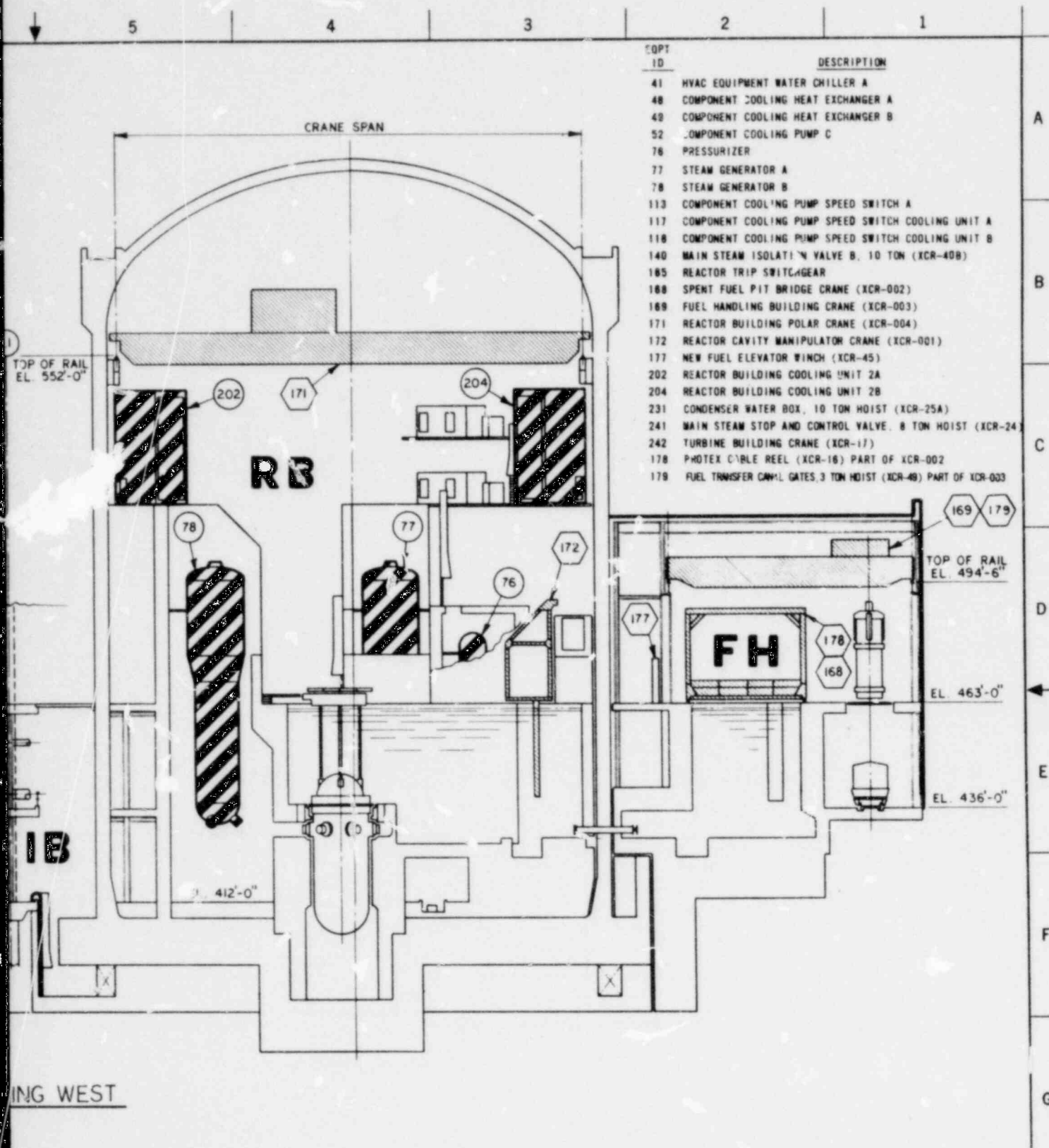


**SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION**

Plan at Elevations
485'-0", 482'-0", and 552'-0"

Figure 6
GAI Dwg. C-021-006





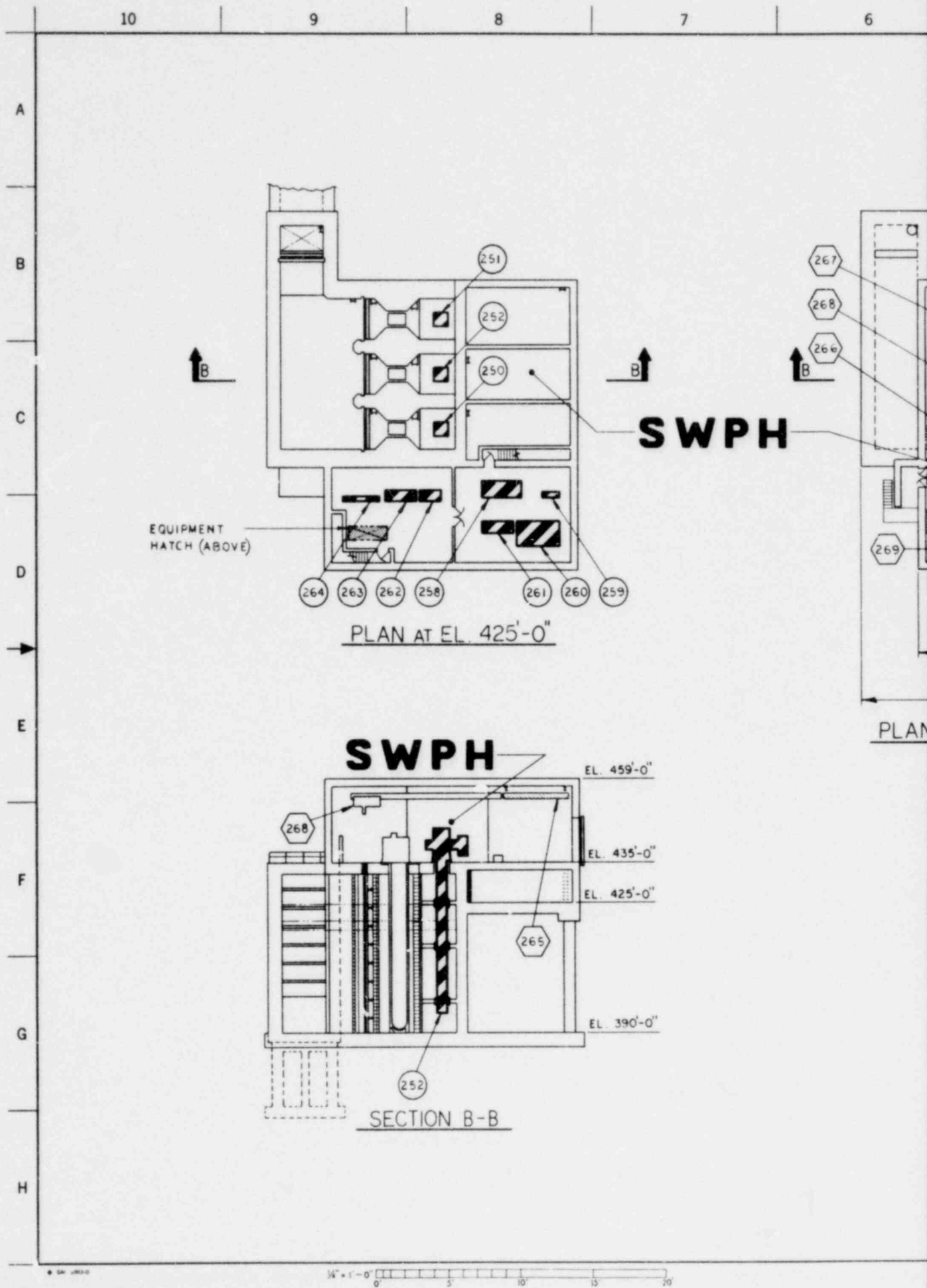
**SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION**

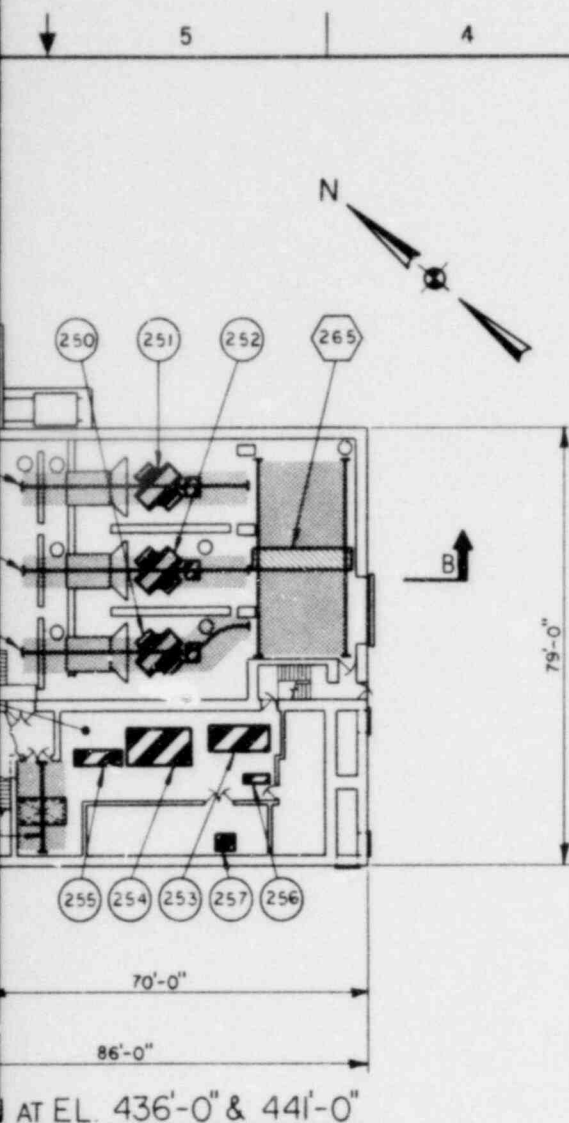
General Section A-A - Looking West

Figure 7

GAI Dwg. C-021-007

07-11 NO612 CONT HVY LO/OS NPPTS





EQPT ID	DESCRIPTION
250	SERVICE WATER PUMP A
251	SERVICE WATER PUMP B
252	SERVICE WATER PUMP C
253	480V SWITCHGEAR B
254	7200V SWITCHGEAR B
255	SPEED SELECTOR SWITCH
256	MCC XMC1EB1X
257	SERVICE WATER PUMP HOUSE SUPPLY FANS (T AND B)
258	480V SWITCHGEAR A
259	MCC XMC1EA1X
260	7200V SWITCHGEAR
261	SPEED SWITCH
262	TRANSFER SWITCH
263	SPEED SWITCH
264	MCC XMC1EC1X
265	SERVICE WATER PUMP HOUSE TRANSFER RAIL, 10 TON HOIST (XCR-51)
266	SERVICE WATER PUMP A, 10 TON HOIST (XCR-50)
267	SERVICE WATER PUMP B, 10 TON HOIST (XCR-50)
268	SERVICE WATER PUMP C, 10 TON HOIST (XCR-50)
269	EQUIPMENT HATCH, 2 TON MONORAIL

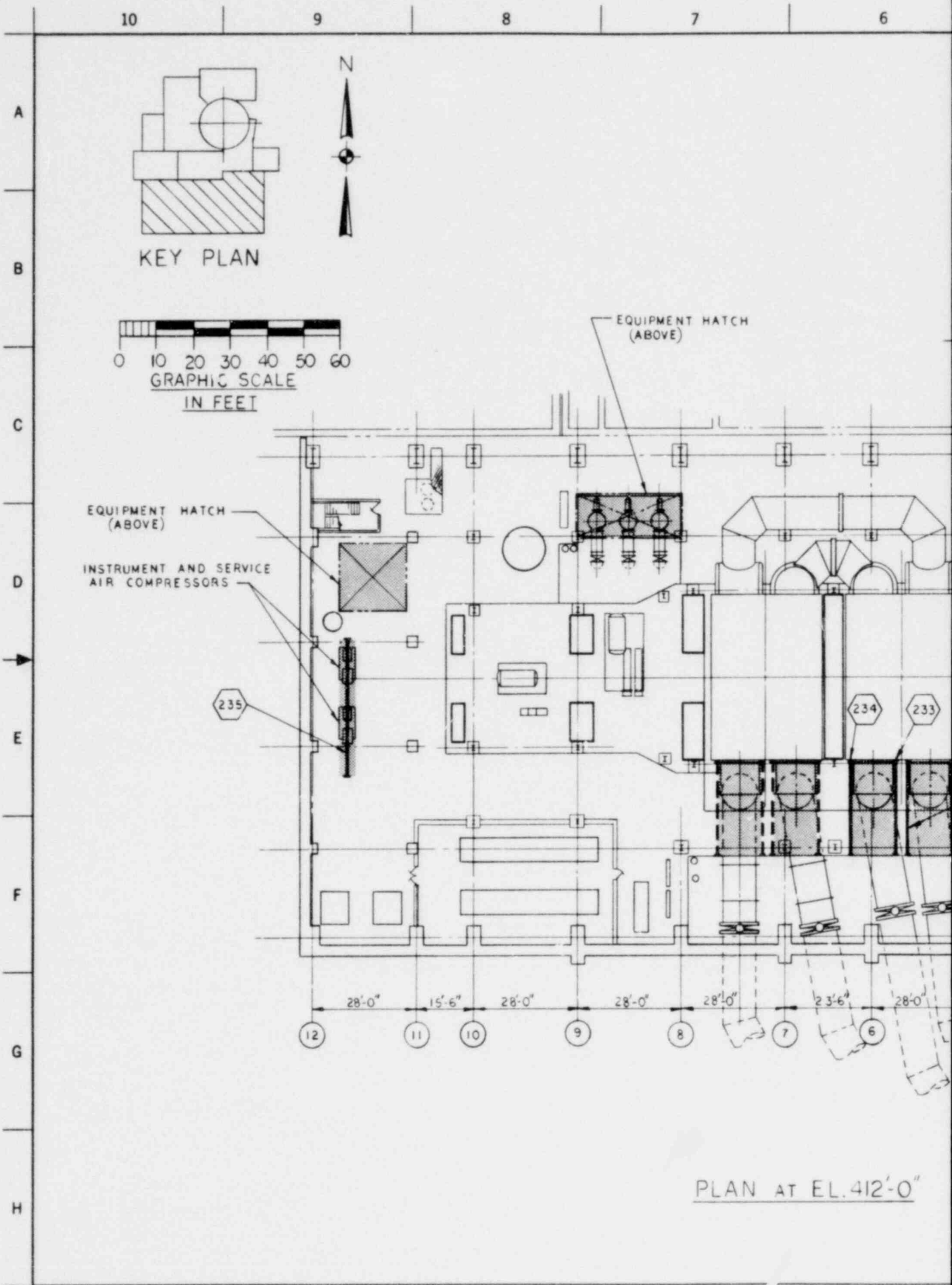


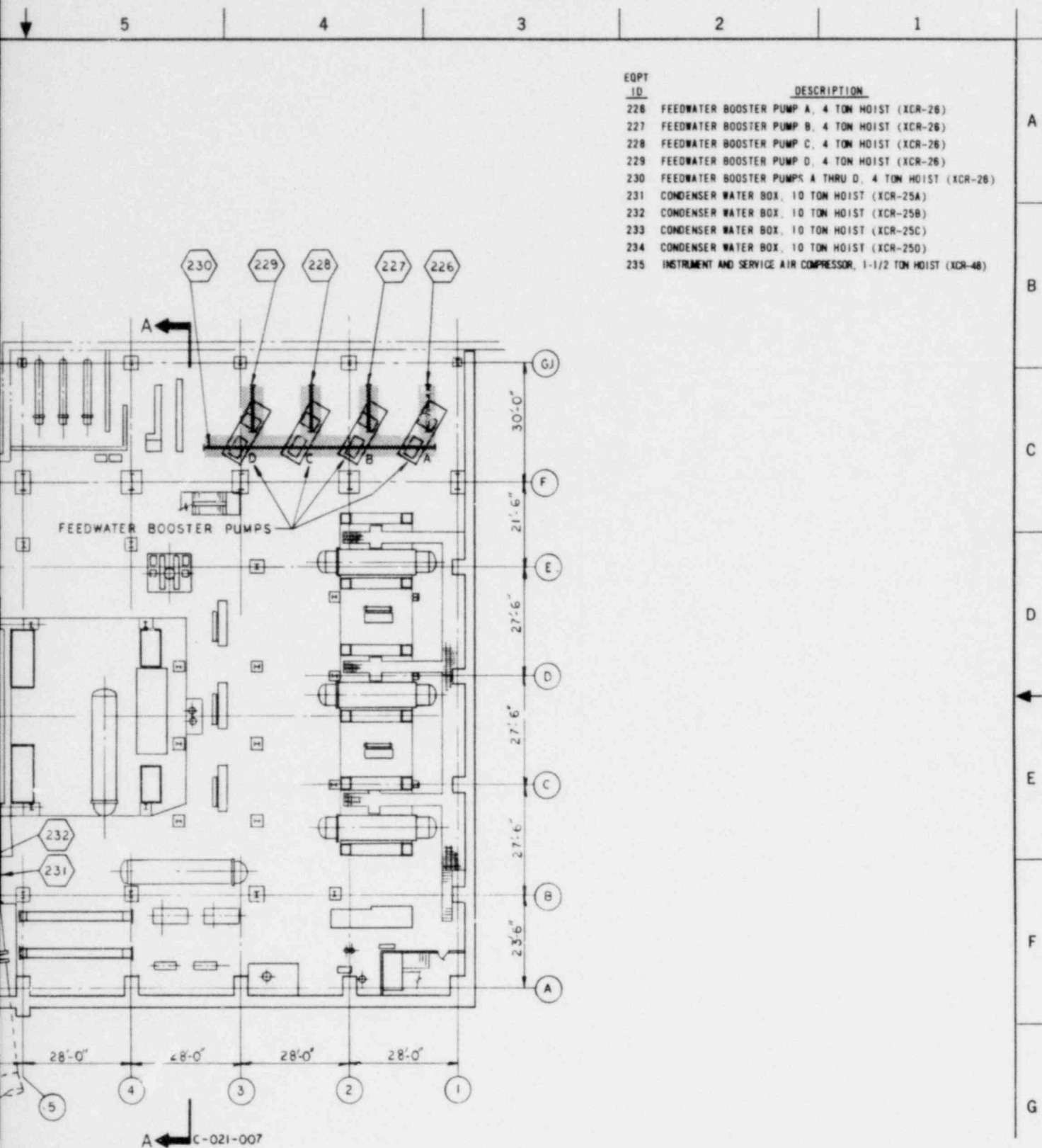
**SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION**

Service Water Pump House

Figure 8
GAI Dwg. C-021-008

08-11 NO612 CONT HVY LOADS NPPS



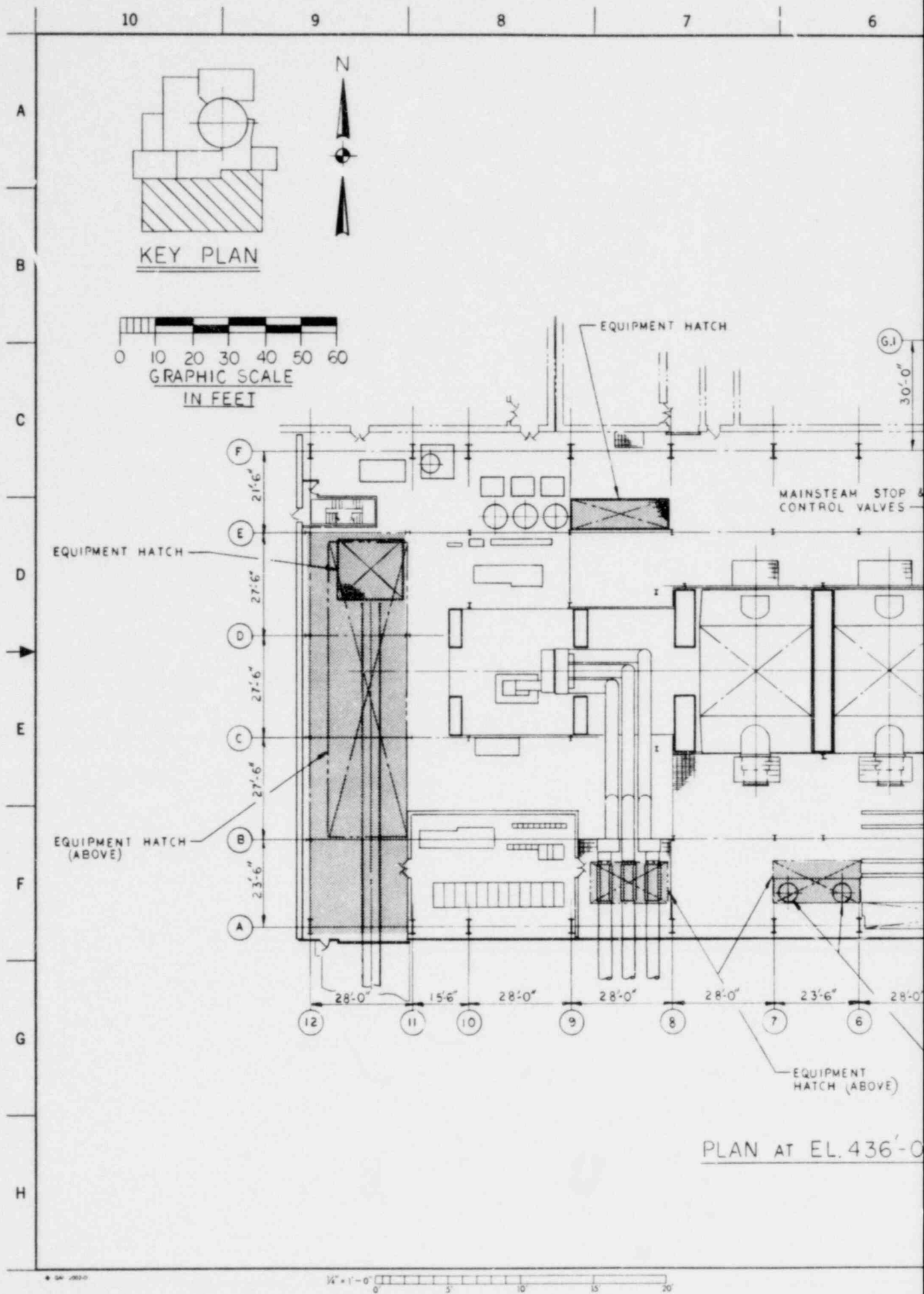


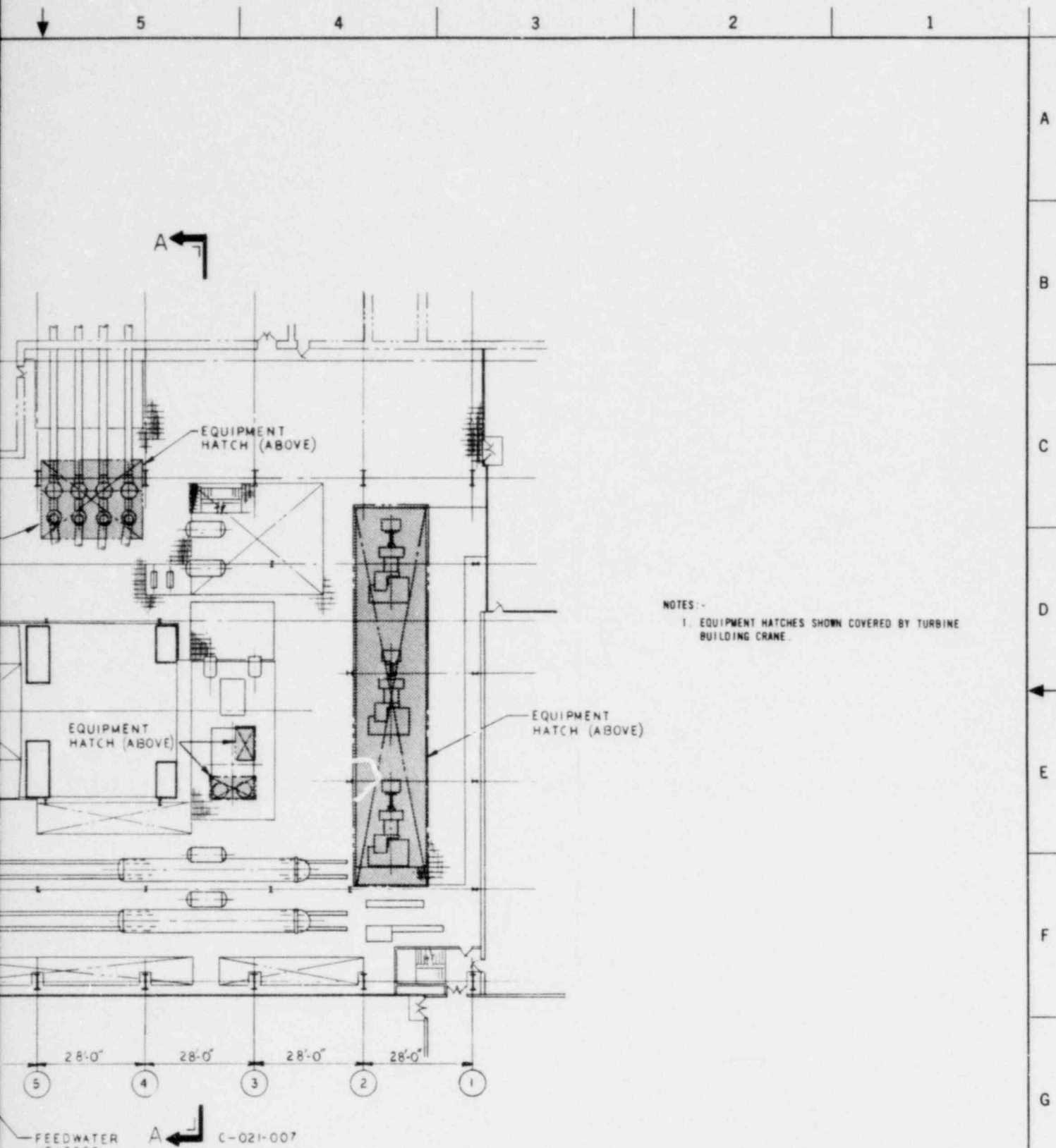
EQPT ID	DESCRIPTION
226	FEEDWATER BOOSTER PUMP A, 4 TON HOIST (XCR-26)
227	FEEDWATER BOOSTER PUMP B, 4 TON HOIST (XCR-26)
228	FEEDWATER BOOSTER PUMP C, 4 TON HOIST (XCR-26)
229	FEEDWATER BOOSTER PUMP D, 4 TON HOIST (XCR-26)
230	FEEDWATER BOOSTER PUMPS A THRU D, 4 TON HOIST (XCR-26)
231	CONDENSER WATER BOX, 10 TON HOIST (XCR-25A)
232	CONDENSER WATER BOX, 10 TON HOIST (XCR-25B)
233	CONDENSER WATER BOX, 10 TON HOIST (XCR-25C)
234	CONDENSER WATER BOX, 10 TON HOIST (XCR-25D)
235	INSTRUMENT AND SERVICE AIR COMPRESSOR, 1-1/2 TON HOIST (XCR-48)

**SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION**

Turbine Building - Plan at
Elevation 412'-0"

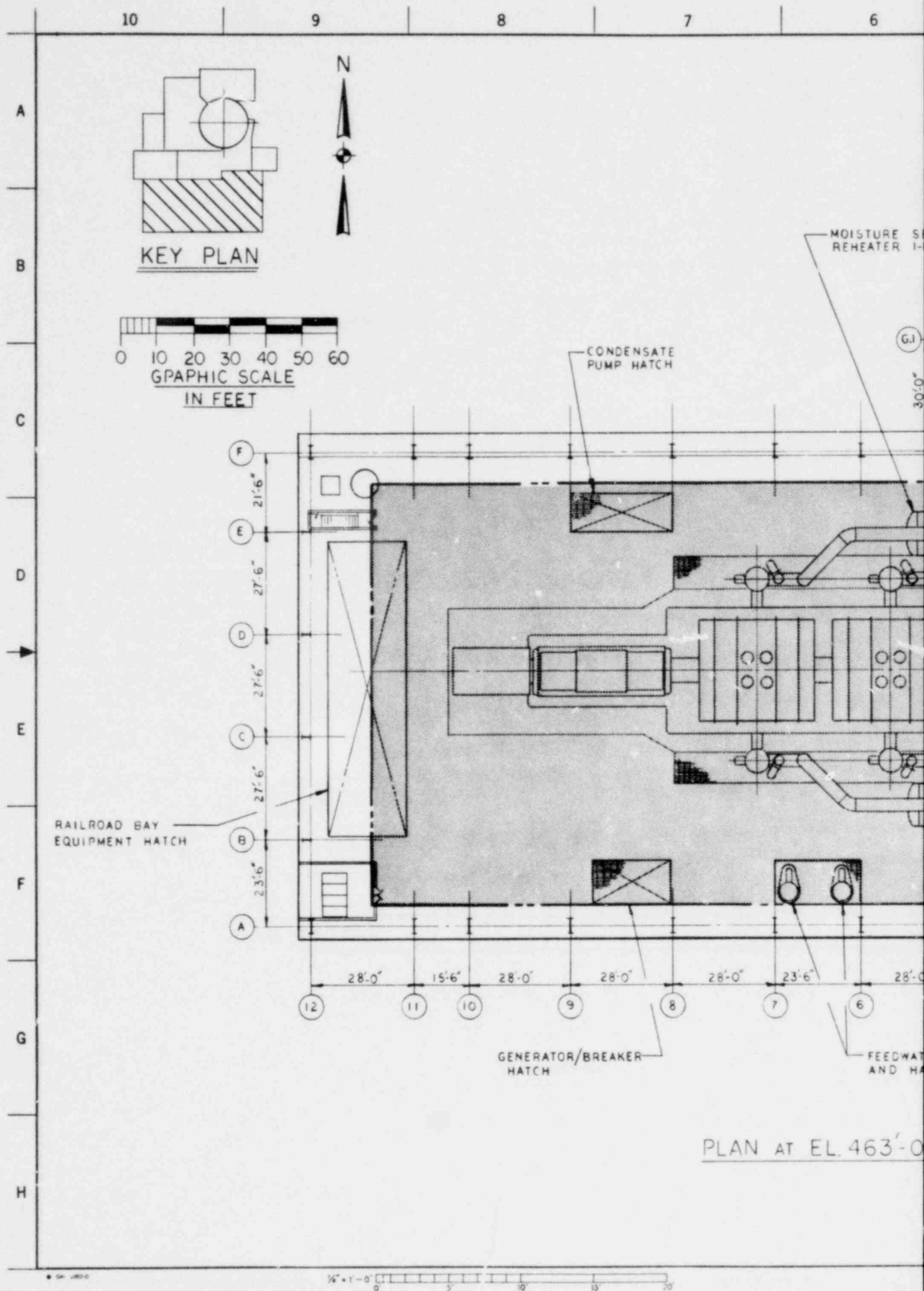
Figure 9
GAI Dwg. C-021-009

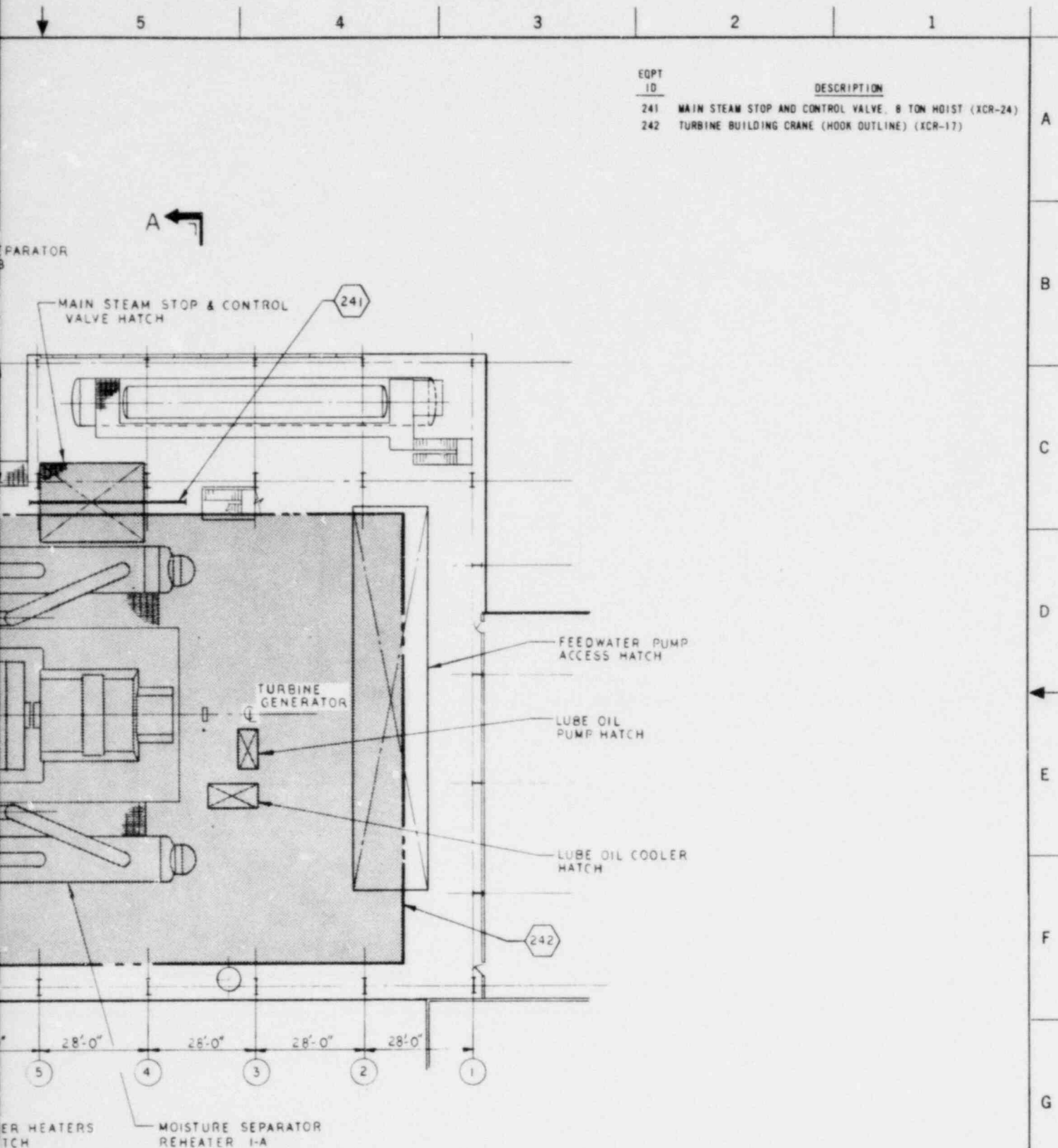




**SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION**

Turbine Building - Plan at
Elevation 436'-0"
Figure 10
GAI Dwg. C-021-010





**SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION**

Turbine Building - Plan at
Elevation 463'-0"

Figure 11
GAI Dwg. C-021-011

11-11 NO612 CONT HVY LOADS NPPS

3.0 CODE AND STANDARD COMPLIANCE FOR OVERHEAD HANDLING DEVICES

3.1 Crane Design

As stated in NUREG-0612, Section 5.1.1 and Enclosure 3 of D. G. Eisenhower's December 22, 1980 letter, it should be verified that crane design complies with the guidelines of CMAA Specification 70 and Chapter 2-1 of ANSI B30.2. As already stated in the individual overhead handling device descriptions, each device design was required by the original Purchasing Specification to adhere to the guidelines of the above standards, and each supplier adhered to the standards quoted above to the extent to which they were applicable.

3.2 Lifting Devices

Lifting devices do not comply with either the requirements of ANSI N14.6-1978, "Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds or More Nuclear Material," or ANSI B30.9-1971, "Slings". Alternate methods for demonstration of equivalency are provided by a detailed inspection and testing program. Maintenance procedures are being developed to perform frequent and periodic inspection, which include visual and non-destructive examination of critical surfaces. Periodic load test will be performed as necessary to verify structural adequacy of the special lifting devices. All rigging and lifting devices are controlled and maintained using the plants computerized preventative maintenance program (CHAMPS). Existing inspection and maintenance procedures are outlined in the Virgil C. Summer's Nuclear Station Operations Mechanical Maintenance Procedure MMP-165.8, "Use and Control of Rigging Equipment".

3.3 Inspection, Testing, and Maintenance

Cranes and rigging equipment are maintained, tested, and inspected to the requirements of ANSI B30.2, Chapter 2-1. The crane and rigging

equipment are scheduled for the specific maintenance tasks by the plant's computerized history and maintenance program (CHAMPS).

3.4 Crane Operator Training

Nuclear Operations at the Virgil C. Summer Nuclear Station conducts an extensive training program for its crane operators and riggers which meets or exceeds all the requirements of Chapter 2-3 of ANSI B30.2. The Nuclear Operations Maintenance group at the plant conducts a program for the crane operators and riggers entitled "Basic Operator and Rigger Training Program" which covers the following topics:

- a) OPERATIONAL SAFETY PRACTICES AND PREVENTATIVE INSPECTION AND MAINTENANCE
- b) WRIGHT WIRE ROPE ELECTRIC HOIST
- c) ANSI B30.16 - 1973, "OVERHEAD HOIST"
- d) SPECIFICATIONS FOR ELECTRIC OVERHEAD TRAVELING CRANES C.M.A.A. #70
- e) WHITING OVERHEAD CRANE - P&H OVERHEAD CRANE
- f) MMP 165.3, "TURBINE BUILDING CRANE INSPECTION AND MAINTENANCE PROCEDURE"
- g) MMP 165.7, "MAINTENANCE OF THE REACTOR BUILDING POLAR AND FUEL HANDLING BUILDING CRANES"
- h) NUREG-0554, "SINGLE-FAILURE-PROOF CRANES FOR NUCLEAR POWER PLANTS"
- i) ANSI B30.2.0-1976, "OVERHEAD AND GANTRY CRANES"
- j) OSHA 1910.179, "OVERHEAD AND GANTRY CRANES"
- k) INSTRUCTION MANUAL MANIPULATOR CRANE
- l) SPENT FUEL BRIDGE CRANE
- m) ANSI B30.9-1971, "SLINGS"
- n) MMP 165.8, "USE AND CONTROL OF RIGGING EQUIPMENT"
- o) ANSI B30.10-1975, "HOOKS"
- p) INSTRUCTION OF CRANES:

- 1) Wright Electric Hoist 3/20 Tons

- 2) P&H-Turbine Building 220/30 Tons
- 3) Polar Crane-Reactor Building 360/25 Tons
- 4) Manipulator Crane-Reactor Building
- 5) Whiting Overhead Crane-Fuel Handling Building 125/25 Tons
- 6) Spend Fuel Bridge Crane-Fuel Handling Building

The crane operator and rigger training programs include in-class written examinations and in-plant examinations for practical application. After a crane operator or rigger becomes qualified by the training program, an annual physical examination and a biannual retraining and requalification of the crane operators and riggers are required.

PROCEDURES

Because of the construction stage of the Virgil C. Summer Nuclear Station, most procedures for handling heavy loads with overhead handling devices are still under development. At this time maintenance procedures are being developed to encompass overhead handling systems with respect to the safe load paths. Where safe load paths can not be established, special lifting procedures are being developed, and where possible special lifting instructions are incorporated into specific component maintenance procedures. Any deviation from established safe load paths will be enforced by established procedures.

Procedures have been transmitted from Westinghouse Electric Corporation to South Carolina Electric and Gas Company for the Handling of New and Spent Fuel, Refueling, and for the Operation of Refueling Equipment. These procedures are being reviewed and placed into a standard format prior to issuance and use.

The individual overhead handling device descriptions in Section 2.0 indicate where procedures are being developed to minimize the possibility of an inadvertant heavy load drop.

This report identifies areas in the Virgil C. Summer Nuclear Station where an inadvertant drop of a heavy load from an overhead handling device could cause damage to components necessary for the plant's safe shutdown, decay heat removal, or into areas where the drop could cause an uncontrolled radioactive release. Safe load paths have been identified for each crane or hoist where physically possible to minimize the chances of an inadvertant heavy load drop and its consequences. The safe load paths will be permanently marked, where practical, on the floors and walls of the plant, and all riggers and operators are receiving training to fully understand and adhere to the safe load path concept.

In addition to the safe load paths, special operating procedures are being prepared for overhead handling devices in the plant and where possible, incorporated into standard component maintenance procedures to define the handling of heavy loads by cranes and hoists. These procedures are being incorporated into the plant's operator and rigger training program.

This report will be followed by a nine month report as required by the December 22, 1980 letter of D. G. Eisenhower. The nine month report will follow the guidelines as outlined in Sections 5.1.2, 5.1.3, 5.1.5, and 5.1.6 of NUREG-0612 and Sections 2.2, 2.3, and 2.4 of Enclosure 3 of Darrell G. Eisenhower's December 22, 1980 letter. The nine month report will outline the procedures and required design modifications necessary to minimize the possibility of an inadvertant load drop and the drop's consequences. The nine month report will also include the results of studies conducted to analyze and minimize the consequences of an inadvertant heavy load drop operating in the Fuel Handling Building, the Reactor Containment Building, and other plant areas.