NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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May 14, 1984

Docket No. 50-423
B11156

Director of Nuclear Reactor Regulation
Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Reference: (1) B. J. Youngblood to W. G. Counsil, Draft SER for Millstone Nuclear Power Station, Unit 3, dated December 20, 1983.

(2) W. G. Counsil letter to B. J. Youngblood, NRC-CMEB Review Meeting (March 7, 1984), dated March 23, 1984.

Dear Mr. Youngblood:

Millstone Nuclear Power Station, Unit 3
NRC Chemical Engineering Branch (Fire Protection)
Review Meeting, March 28, 1984

A meeting was held between the NRC-CMEB (fire protection section) and Northeast Nuclear Energy Company (NNECO) in Bethesda, Maryland on March 28, 1984 to discuss seven (7) Draft SER items contained in Reference (1). Additional information/clarification for three previously discussed and closed Draft SER open items (FP-2, FP-12 and FP-21) (Reference 2) was provided to the NRC Staff at the March 28, 1984 meeting. A status of each open item was noted as defined by one of the following three categories:

Closed - No further NNECO input or action is needed to resolve the NRC concern.

Confirmatory - NNECO must provide the requested information on the Millstone 3 docket, either by a letter or FSAR amendment.

Open - No resolution possible at this time, NNECO to address.

Attachment I provides the status of those Draft SER Open Items. NNECO also agreed to provide all additional information on a confirmatory item (FP-4) and two open items (FP-10 and FP-17) that were a result of the March 28, 1984 meeting. Attachment II formally transmits our responses to each Draft SER item. These responses should fully resolve the Staff's concerns regarding open items. The responses will be incorporated into the FSAR in a future amendment.

B002 1/40

If you have any concerns related to the information contained herein or any questions related to our responses, please contact our Licensing representative directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY ET AL

By Northeast Nuclear Energy Company, their Agent

W. G. Counsil
Senior Vice President

STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me W. G. Counsil, who being duly sworn, did state that he is Senior Vice President of Northeast Nuclear Energy Company, Applicant herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Applicants herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Notary Public

My Commission Expires March 31, 1988

ATTACHMENT I

Status of the NRC-CMEB (Fire Protection)
Draft SER Open Items Discussed at the Meeting
with the NRC-CMEB March 28, 1984

Item No.	Description	Status
FP-2*	Potential Systems Interaction	Closed
FP-4	Qualification of Fire Doors	Confirmatory
FP-9	Routing of Hydrogen Piping	Closed
FP-10	Protection of Cables Outside Cable Spreading Room	Open
FP-12*	Installation of Fire Detectors	Closed
FP-14	Independent Sprinkler and Hose Station Connections	Closed
FP-16	Manual Hose Coverage	Closed
FP-17	Hose Station Standpipe Diameters	Open
FP-18	Control Room Smoke Detectors	Closed
FP-21*	Emergency Diesel Generator Day Tanks	Closed

*These Draft SER items were previously discussed and closed.

ATTACHMENT II

Responses to the Draft SER Open Items

Item No.

FP-2
FP-4
FP-9
FP-10
FP-12
FP-14
FP-16
FP-17
FP-18
FP-21

Open Items

Chemical Engineering Branch - Fire Protection

FP-2 Potential Systems Interaction (Draft SER Section 9.5.1.1)

We are concerned whether the mechanisms by which fire and fire fighting systems may cause the simultaneous failure of redundant or diverse trains have been adequately considered in the design. We will require the applicant to identify the mechanisms that were considered in the fire hazards analysis and the measures taken to preclude the fire or fire-suppressant-induced failure of redundant or diverse safety trains and to document the procedures. This is an open item.

Response (2/84)

Section C5.b.1 of the Standard Review Plan CMEB 9.5.1 states:

> "Fire Protection features should be provided for structures, systems, and components important to safe shutdown. These features should be capable of limiting fire damage so that:
>
> a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage, and
>
> b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours."

To meet the guidelines of Position C5.b.1, one of the following means of ensuring that one of the redundant trains is free from fire damage is suggested.

a. Separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3 hour rating.

b. Separation of cables and equipment and associated circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area, or

c. Enclosure of cables and equipment and associated circuits of one redundant train in a fire barrier having a 1 hour rating. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.

If the guidelines listed above cannot be met, then alternative or dedicated shutdown methods should be provided.

FP-2 Cont.

Millstone 3 Fire Protection Evaluation Report Section 6.2 lists the function required and equipment available to achieve and maintain safe shutdown. From this list, each fire area was evaluated to assure that redundant components/systems required for safe shutdown are separated by fire barriers having a fire resistance rating of 3 hours. Some isolated cases exist where the 3 hour barrier option was not used, and in this area one of the two options was utilized or a deviation was/will be requested.

This approach provides assurance that a fire in any one fire area does not effect the abiilty to achieve and maintain safe shutdown at Millstone 3.

In addition to the redundant train/fire analysis noted above, NNECO evaluated the effect of fire suppression activities. This evaluation was conducted to assure that at least one method of achieving and maintaining safe shutdown was free from the effects of the firefighting system activities. Further, additional safeguards were incorporated into the design to reduce the possibility/effects of inadvertent operation.

As an example, the CO_2 system, which provides protection for the Cable Spreading Room, East and West Switchgear Rooms, North and South Tunnels, Normal Switchgear Room, and East and West MCC Rod Drive Areas, have cross-zoned detection incorporated into their design. This detection scheme eliminates the possibility of a failure in one detector causing the CO_2 system to inadvertently operate. In addition, each discharge nozzle was or will be field checked to assure that discharging CO_2 would not directly impinge on sensitive electrical equipment.

The combination of field verification, proper system design, and separation of redundant safe shutdown components by rated fire barriers, assures that at least one method of achieving and maintaining safe shutdown would be free from the effects of fire or fire suppression activities.

Status (2/84)

Confirmatory.

Revised Response (3/84)

Section C5.b.1 of the Standard Review Plan CMEB 9.5.1 states:

> "Fire Protection features should be provided for structures, systems, and components important to safe shutdown. These features should be capable of limiting fire damage so that:

a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage, and

b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours".

To meet the guidelines of Position C5.b.1, one of the following means of ensuring that one of the redundant trains is free from fire damage is suggested.

a. Separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3 hour rating.

b. Separation of cables and equipment and associated circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area, or

c. Enclosure of cables and equipment and associated circuits of one redundant train in a fire barrier having a 1 hour rating. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.

If the guidelines listed above cannot be met, then alternative or dedicated shutdown methods should be provided.

Millstone 3 Fire Protection Evaluation Report Section 6.2 lists the function required and equipment available to achieve and maintain safe shutdown. From this list, NNECO evaluated each fire area to assure that redundant components/systems required for safe shutdown are separated by fire barriers having a fire resistance rating of 3 hours. Some isolated cases were identified where safe shutdown equipment is not separated by 3 hour fire barriers. These areas either have alternative shutdown provided, or a deviation was/will be requested.

This approach provides assurance that a fire in any one fire area does not effect the ability to achieve and maintain safe shutdown at Millstone 3.

In addition to the redundant train/fire analysis noted above, NNECO evaluated the effect of fire suppression activities. This evaluation was conducted to assure that at least one method of achieving and maintaining safe shutdown was free from the effects of the firefighting system activities. Further, additional safeguards were incorporated into the design to reduce the possibility/effects or inadvertent operation.

FP-2 Cont.

As an example, an automatic preaction sprinkler system provides suppression capabilities for each of the redundant diesel generator rooms. In order to ensure that either automatic suppression system will not operate improperly during a seismic event, NNECO intends to change the systems from their present automatic mode to a manual mode. This change eliminates the possibility of these systems to operate inadvertently. With this change, the existing detection system will remain intact. Should a fire occur, it will be quickly detected and annunciated within the control room. Fire brigade members will immediately respond to manually open the sprinkler valves as necessary. It should be noted that these areas are physically separated by three hour fire barriers. (5/84)

In addition, the CO_2 system, which provides protection of the Cable Spreading Room, East and West Switchgear Rooms, North and South Tunnels, Normal Switchgear Room, and East and West MCC Rod Drive Areas, have cross-zoned detection incorporated into their design. This detection scheme eliminates the possibility of a failure in one detector causing the CO_2 system to inadvertently operate. In addition, each discharge nozzle was or will be field checked to assure that discharging CO_2 would not directly impinge on sensitive electrical equipment. Each of the above areas is separated from adjacent areas by three hour rated fire barriers.

Status (3/84)

Closed.

Open Items

Chemical Engineering Branch - Fire Protection

FP-4 Qualification of Fire Doors (Draft SER Section 9.5.1.4)

We will require that all fire door assemblies installed in the plant have been tested and labeled in accordance with NFPA 252 "Fire Tests of Door Assemblies." This is an open item.

Response (4/84)

NNECO has reviewed NRC's concern with regard to qualification of fire door assemblies at Millstone Unit No. 3. It has been NNECO's position that those fire doors installed within three hour rated fire barriers, utilized to provide separation between redundant safe shutdown systems/equipment, be qualified based upon requirements of NFPA-252, "Fire Tests of Door Assemblies". In order to satisfy NRC's concern, and to assure compliance with NFPA requirements, those door assemblies purchased at Millstone Unit No. 3 for installation in fire barriers have been rated for their intended service by Underwriters Laboratory (UL), and bear the UL label.

However, due to changing security requirements at Millstone Unit No. 3, several minor field modifications have been made to some of the labeled fire doors, typical security modifications include the following:

a) As shown on attached sketch FP4-1, the door frames have been drilled to:

- o accommodate the installation of magnetic door switches and electrical conduits.
- o simplify the grouting of the door frames to the surrounding concrete wall.

It is NNECO's position that the type of security modifications being done to labeled fire doors will not affect fire doors structural stability or ability to prevent the spread of fire based upon the fact that the door frames are grouted in-place. The normal procedure for the installation of the door frame requires that it be securely anchored to the surrounding wall in a specified number of places. During the design phase of Millstone Unit No. 3, it was decided to construct all door openings a quarter inch larger than necessary to simplify their installation. Thus following installation of the door frames, a space will exist between it and the wall. In order to fill this void space, each door frame is being filled with a cement grout as illustrated in sketch FP4-1. This will involve filling the entire door frame and void space such that it will become a structural part of the surrounding wall. Thus, the modifications made will not cause the door frames to violate their original acceptance criteria from NFPA-252 which states that:

FP-4 Cont.

> "5-1.1.6.6 Door frames to be evaluated with doors shall remain securely fastened to the wall on all sides and shall not permit through openings between frame and doors or between frame and adjacent walls."

Therefore, it is NNECO's position that minor security modifications made to doors/frames does not affect its structural stability or its ability to prevent the passage of fire.

b) Double width fire doors, with astragals, which for security purposes require the installation of an electric strike plate, in the inactive door have been modified as shown in attached sketch FP4-2. This modification consists of an internal electrical conduit coupled with an electric door hinge. Due to information recently supplied by the door vendor, it has been determined that each of the door modifications (electric hinge, internal conduit, and electric striker) have individually been qualified per the requirement of NFPA-252. It is, therefore, NNECO's position that the three-hour fire rating of the double width fire doors has not been degraded. This is based upon each of the modifications being tested and approved for their intended use.

In addition, please note that the following factors are relative to these doors and should be considered:

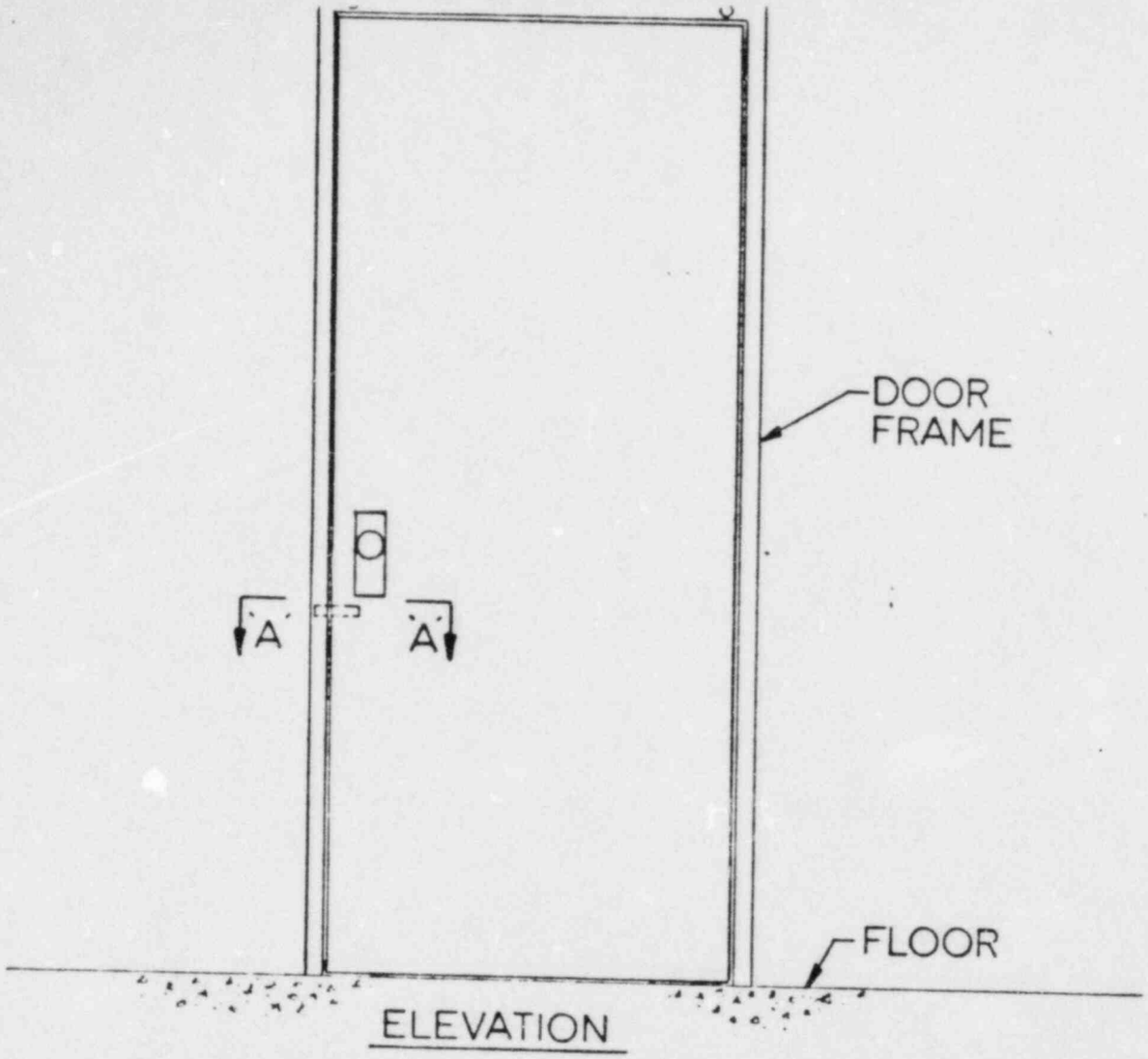
- The maximum fire duration for any area containing the double fire doors is 99 minutes based upon the "Fire Protection Evaluation Report".
- These doors will be used as ingress/egress routes, thus transient combustibles will not be located near the doors.
- Areas containing the double doors have as a minimum early warning smoke detection to alert plant personnel of a possible fire condition.

Therefore, under actual fire conditions, the intensity of the fire to which these doors will be subjected will be substantially less than the NFPA-252 test fire.

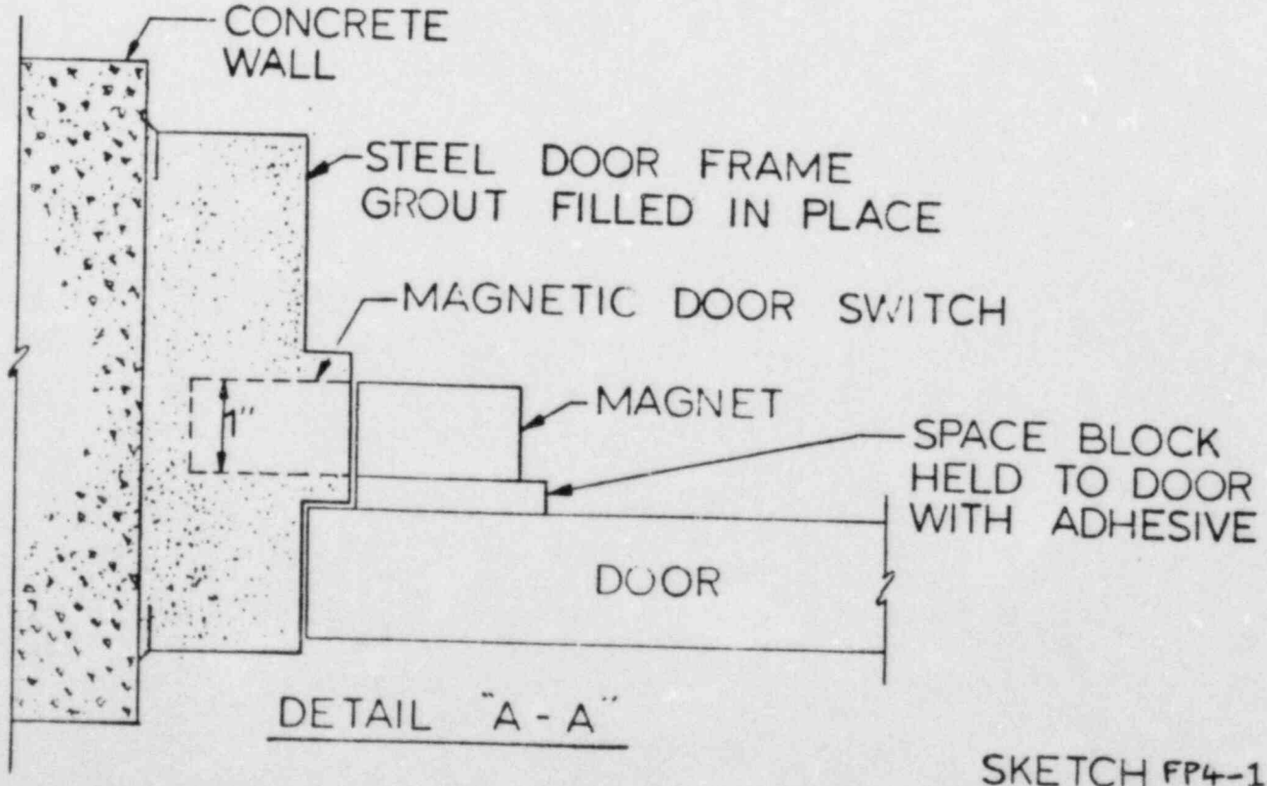
Since field installation/modification is now in progress, it is NNECO's intent to minimize modifications to fire doors in order to assure compliance with the requirements of NFPA-252. Any future field modifications that are performed will be reviewed in order to determine their effect upon the fire doors structural stability and ability to prevent the spread of fire.

Status (/4/84)

Closed.

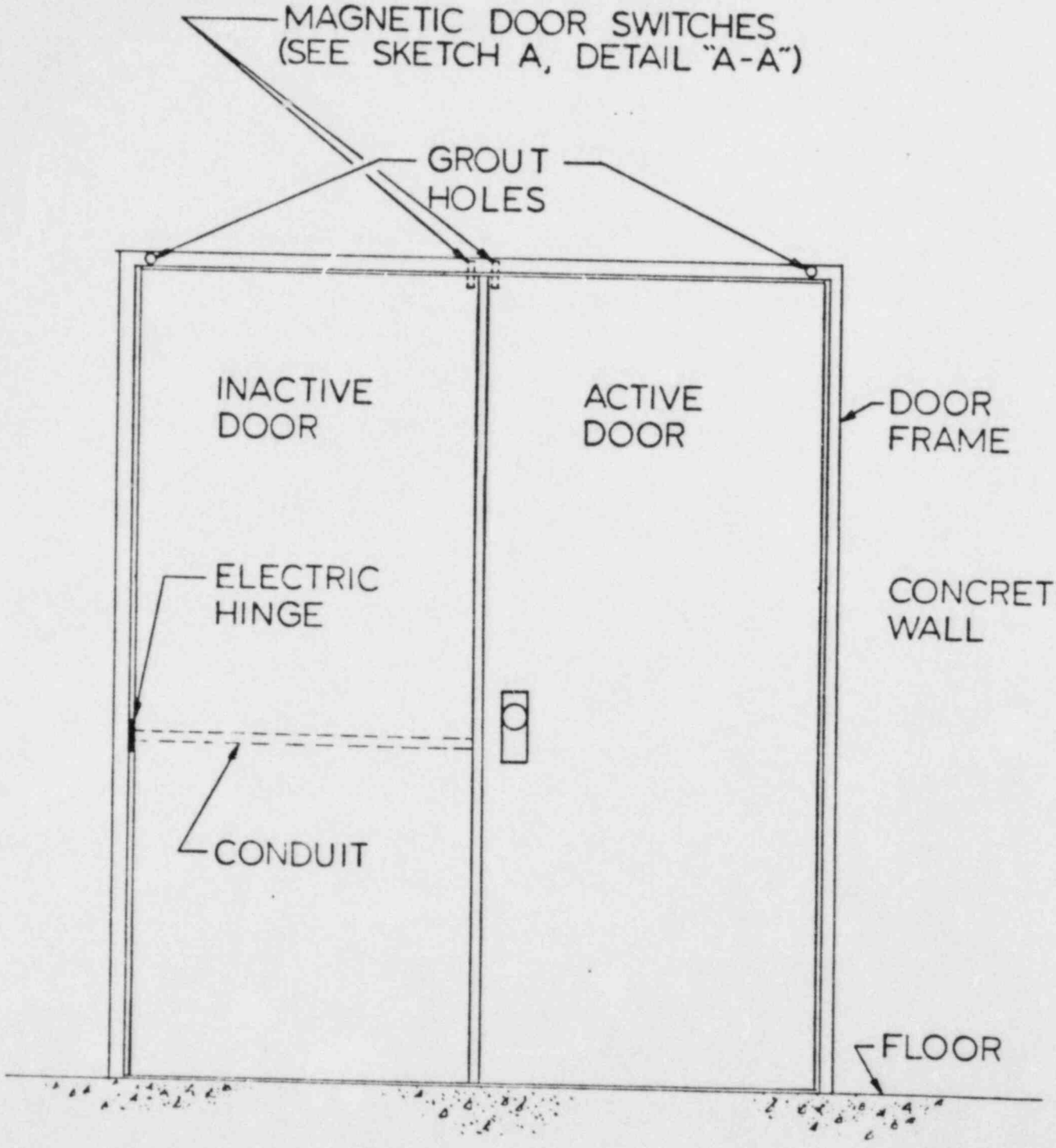


ELEVATION



DETAIL "A - A"

SKETCH FP4-1



ELEVATION

SKETCH FP4-2

Open Items

Chemical Engineering Branch - Fire Protection

FP-9 Routing of Hydrogen Piping (Draft SER Section 9.5.1.4)

The applicant has not described the routing of hydrogen piping in safety-related areas. We will require the applicant to meet the guidelines of BTP CMEB 9.5.-1, Sections C.5.d(2) and (5). This is an open item.

Response (4/84)

Refer to FSAR Section 9.5.9.1 for the description of Hydrogen storage distribution system.

Status (4/84)

Closed.

line pressure, is closed when the line pressure is above 90 psig. The line pressure is normally above 90 psig as long as the active tube bank is charged and the active regulator is set at 100 psig. When the active storage is fully expended and the pressure drops below 90 psig, the reserve regulator opens and begins to discharge the reserve bank until the active bank is recharged. Table 9.5-5 lists the design parameters of the gaseous hydrogen storage tubes.

The following components are supplied by the hydrogen system.

1. The turbine generator (Section 10.2), which is cooled by the circulation of hydrogen at 75 psig, requires 39,700 scf for the initial purge and fill, plus a maximum of 600 scfd (14.7 psia, 95°F) to make up normal leakage.

2. The volume control tank system (chemical and volume control, Section 9.3.4) requires a maximum of 1 scfm of hydrogen continuously at 50 psig.

Relief valves are provided downstream of the high pressure storage tubes and pressure control manifold to prevent overpressurization of the equipment. Rupture discs are also provided on the high pressure storage tubes, located in the yard, for overpressure protection.

The hydrogen system is equipped with an excess flow manifold to assure safety from a line rupture between the storage facility and the supplied components. The excess flow manifold has an excess flow valve which is designed to close at 6,500 scfh hydrogen flow, securing flow. | 5

9.5.9.1.3 Safety Evaluation

The following provisions have been made to preserve an adequate hydrogen supply and ensure system reliability.

1. A trailer discharge stanchion is connected into the high pressure side of the pressure control manifold. This enables a tube trailer truck to be used as a source of gaseous storage or for recharging the storage vessels. A tube trailer grounding assembly has been provided to ground the tube trailers before discharge begins. | 430.135 | 430.135

2. An excess flow manifold provides automatic isolation of the system in the event of a pipe rupture or excessive leakage.

3. All valves (except for check and control valves) located inside the building will be of the sealed globe type to prevent the leakage of hydrogen gas. The pressure switches located inside the control cabinet are explosion-proof. | 430.135

4. All hydrogen gas supply piping, located inside buildings, is either enclosed in steel guard piping (which is vented to the atmosphere) ~~to prevent hydrogen buildup inside the building in the event of a hydrogen pipe break~~ or designed to Seismic Class I: Both provisions being in accordance with Branch Technical Position CMEB 9.5-1 Section C.5.d(5).

Open Items

Chemical Engineering Branch - Fire Protection

FP-10 Protection of Cables Outside Cable Spreading Room (Draft SER Section 9.5.1.4)

Automatic water suppression systems are not provided for cables in heavily-cabled areas, including the cable tunnels, motor control center area and rod central areas of the plant. The applicant has not provided adequate information to indicate that such areas are protected in accordance with our guidelines. We will require the applicant to meet the guidelines of BTP CMEB 9.5-1, Section C.5.e(2) for the protection of cables outside the cable spreading room. This is an open item.

Response (4/84)

The intent of BTP CMEB 9.5-1 Section C.5.e(2) is to assure adequate fire protection is provided in areas where...

a.) Stacked cable trays represent a significant fire load or,

b.) Exposure fires could render redundant safety-related (safe shutdown) cables inoperable.

Section C.5.e(2) describes three acceptable methods which provide adequate fire suppression for the two situations described above. They are:

* the use of automatic sprinkler protection where safety-related cables are separated by three hour fire barriers.

* the use of automatic deluge protection where safety-realted cables are not separated by three hour fire barriers.

* manual fire fighting using standpipe hose stations for areas where safety-related cables are separated by three hour barriers and are accessible for manual fire fighting.

Millstone Unit No. 3 does not fully comply with the specific guidelines listed in C.5.e(2), but does meet the intent of this section.

Millstone Unit No. 3 design is such that each fire area is bounded by three hour fire barriers. These barriers provide adequate fire separation of safety related cables/components from the redundant counterpart and from fire hazards in non-safety-related areas. The loss of any single fire area would not affect the plant's ability to safely shut down.

Cables installed throughout Millstone Unit No. 3 have been tested and qualified to IEEE-383 standards. These cables do represent combustible material, but as tests have shown, these cables limit fire promagation and when the external fire source has been removed, the cables self-extinguish. The ignition temperature of

these cables are in the range of 400°F to 550°F. The type of fire which can be expected in these cables is a small smoldering type fire. Ionization smoke detectors which is best suited for this type of fire, has been installed in these areas to provide early warning.

Standpipe hose stations are installed throughout all safety-related areas. These hose stations are designed such that an effective hose stream can reach all portions of the fire area. These hose stations provide adequate water supply to assist in manual fire fighting should a cable fire exist. Also located in each area are portable extinguishers. These extinguishers provide appropriate portable fire protection for the hazards in the area (i.e. pressurized water - Class A fires, CO_2 - Class B, C, etc.).

The heavily cabled safety-related areas as referenced in the question, are defined as the Cable Tunnels, Motor Control Center areas, Rod Drive areas and the Switchgear rooms. Within these areas, automatic fire suppression is provided by total flooding CO_2 systems which utilizes ionization smoke detection (cross-zoned) to initiate CO_2 discharge. The CO_2 system is designed such that each area can be protected by at least three single discharges of CO_2. The CO_2 systems have been designed and installed in accordance with NFPA #12. NNECO elected to use CO_2 because it has demonstrated that it (CO_2) provides adequate fire suppressant capabilities for stacked cable trays and is the preferred agent for the areas where electrical hazard (MCCs, switchgear, etc.) are present. The indiscriminate use of water spray that deluge/sprinkler systems would subject these areas to, could present a safety concern.

Areas other than those listed above, generally don't contain high concentrations of cables. These areas have had and will continue to have fire hazard analysis performed by qualified fire protection personnel to determine what appropriate fire protection measures (automatic/manual capability) should be instituted. In all cases, each area is accessible for manual fire fighting and will have the appropriate equipment (hose, nozzles, extinguishers) installed to assist in this task.

It is NNECO's position that the intent of Section C.5.e(2) has been met. The combination of:

1.) Three hour barriers separating safe shutdown equipment.

2.) The fire retardent characteristics of the cable.

3.) Early warning smoke detection.

4.) Automatic CO_2 fire suppression systems protect heavily cabled areas.

5.) Areas accessible for manual fire fighting.

6.) Hose stations strategically located throughout safety related areas.

7.) Portable extinguishers adequately specified, sized and located to assist in manual fire fighting.

8.) Alternate shutdown provided for the control room, cable spreading room and instrument rack room.

Assures that a fire will be detected in its earliest stage and controlled either by the automatic suppression system or by manual fire suppression. In either case the fire damage will be limited to that one fire area and that at least one method of achieving safe shutdown remains available.

The information/justification pertaining to heavily cabled safety related areas with a calculated fire loading of 1-½ hours (or greater) is provided below. Also, included is a brief discussion relating to the area's status with regard to compliance to Section C.5e(2) of CMEB BTP 9.5-1.

NORTH CABLE TUNNEL, SOUTH CABLE TUNNEL

The North and South cable tunnels are located at the 4'6" elevation of the service building. These tunnels are designed to allow passage of safety related/safe shutdown cables from the switchgear rooms (control building) to the MCC rod drive areas (auxiliary building). The cable tunnels are separated from each other and from all other areas of the plant by 3 hour fire rated barriers. Equipment located in these areas is limited to only the cables and the metal cable trays. No electrical instruments/equipment exist in these areas. While these areas do not fully comply with the automatic sprinkler guidelines listed in CMEB BTP9.5-1, Section C.5e(2), they are in compliance with Section C.5b(2), "Safe Shutdown Guidelines". Therefore, NNECO is requesting a deviation.

Millstone Unit No. 3's cable tunnels are protected by an automatic total flooding CO_2 system. NNECO choose to install CO_2 in these areas because of its (CO_2) effectiveness on cable fire and its ability to saturate the areas where water spray would not be effective (under metal covers, etc.).

The CO_2 system has been designed in accordance with NFPA-12. Ionization smoke detectors are wired in a cross-zoned concept, to provide early warning and

to initiate the discharge of CO_2. Personnel evacuation horns, lights and time delays have been incorporated into the system's design to assure personnel safety by providing early warning before CO_2 is discharged. Also, included in the system's design is the capability of providing multiple discharges of CO_2 to the area should the need arise.

These areas are unique in that no ignition sources exist. There are no components or instruments that require servicing or surveillance. Personnel access is restricted. Thus, it is NNECO's position that downtime (for personnel entry into the area) of the CO_2 system is not a concern. The only time the CO_2 would be removed from service would be when new cables are being pulled. This type of activity does not require the introduction of transient combustibles or ignition source. Further, Station Technical Specification will require that a trained fire watch be posted anytime the CO_2 system is removed from service. To assist the fire watch/manual firefighting, standpipe hose stations are installed. These hose stations are designed such that an effective hose stream can reach all portions of the fire area. Also, located in each area are portable extinguishers. These extinguishers provide appropriate portable fire protection for the hazards in the area (i.e., pressurized water - Class A fires, CO_2 - Class C, etc.).

Cables installed in the cable tunnels have been tested and qualified to IEEE-383 standards. These cables do represent combustible material, but as tests have shown, these cables limit fire promogation and when the external fire source has been removed, the cables self-extinguish. The ignition temperature of these cables are in the range of 400°F to 550°F. The type of fire which can be expected in these cables is a small smoldering type fire. Ionization smoke detectors which are best suited for this type of fire have been installed in these areas to assure early warning.

Since these areas are free from ignition sources, free from installed combustibles (other than cables), and the area is restricted from personnel entry (no transient combustibles), the possibility of an exposure fire has been eliminated. It is NNECO's position that the combination of:

- These areas are in compliance with CMEB BTP 9.5-1, Section C.5b(2), Safe Shutdown;
- Three hour barriers separating cable tunnels;
- Fire retardant characteristics of the cable;
- Early warning smoke detection;

- Automatic CO_2 fire suppression;
- Areas accessible for manual fire fighting;
- Portable extinguishers adequately specified, sized, and located to assist in manual fire fighting;
- Hose stations strategically located throughout areas;
- No ignition sources;
- No other combustibles in area;
- Limited personnel access;

Provides equivalent fire protection for these areas and a deviation from Section C.5e(2) of CMEB BTP 9.5-1 is justified.

EAST SWITCHGEAR ROOM, WEST SWITCHGEAR ROOM

These areas do not fully comply with Section C.5e(2) of CMEB BTP 9.5-1, however, equivalent protection has been provided. The east and west switchgear rooms have a calculated fire load of one hour, 39 minutes, and one hour, 35 minutes, respectively. These areas are separated from each other and from other areas of the plant by 3 hour fire barriers. Automatic fire suppression is provided by a total flooding CO_2 system which is designed in accordance with NFPA-12. Ionization smoke detection, in a cross-zoned concept, has been installed to provide early warning and to initiate CO_2 discharge.

Cables installed throughout the switchgear rooms have been tested and qualified to IEEE-383 standards. These cables do represent combustible material, but as tests have shown, these cables limit fire promogation and when the external fire source has been removed, the cables self-extinguish. The ignition temperature of these cables are in the range of 400°F to 550°F. The type of fire which can be expected in these cables is a small smoldering type fire. Ionization smoke detectors which are best suited for this type of fire, have been installed in these areas to assure early warning.

Standpipe hose stations are installed throughout these areas. These hose stations are designed such that an effective hose stream can reach all portions of the fire area. These hose stations provide adequate water supply to assist in manual fire fighting should a cable fire exist. Also located in each area are portable

extinguishers. These extinguishers provide appropriate portable fire protection for the hazards in the area (i.e., pressurized water - Class A fires, CO_2 - Class, B, C, etc.).

NNECO elected to use CO_2 because it has demonstrated that it (CO_2) provides adequate fire suppressant capabilities for stacked cable trays and is the preferred agent for the agent were electrical hazards (MCC, switchgear, etc.) are present. The indiscriminate use of water spray that a deluge/sprinkler system would subject these areas to could present a safety concern.

It is NNECO's opinion that the features listed herein provide adequate equivalent protection of the cables in the switchgear rooms and that a deviation is justified.

FUEL BUILDING FILTER BANKS, FIRE AREA AB-2, AB-3, AB-10

These areas comply with Section C.5e(2) of CMEB BTP 9.5-1.

EAST AND WEST FUEL VAULTS

These areas comply with Section C.5e(2) of CMEB BTP 9.5-1.

REFUELING WATER RECIRCULATION PUMP CUBICLE

This area complies with Section C.5e(2) of CMEB BTP 9.5-1.

Status (4/84)

Open

Open Items

Chemical Engineering Branch - Fire Protection

FP-12 Installation of Fire Detectors (Draft SER Section 9.5.1.5)

The applicant's Fire Protection Evaluation Report does not indicate that fire detectors have been selected and installed in accordance with NFPA 72E. We will require the applicant to select and install early warning fire detectors as a minimum in accordance with NFPA 72E. This is an open item.

Response (2/84)

Millstone 3 Specifications for Fire Detectors (smoke, heat and ultra-violet types) requires that the supplier/vendor provide UL listed and/or FM approved equipment. Furthermore, the specification also requires that the detectors provided are suitable for the environment to which they (detectors) will be installed.

Selection of the type of detectors to be installed in the plant was based on the burning characteristics of materials within the protected areas. In areas, where high concentrations of cable are present, a combination of photoelectric and ionization type smoke detectors are installed. In areas where oil represents the major fire hazard, either smoke heat, UV detectors or a combination of fire detectors and systems are installed. Each detecton system provides an early warning signal to the main fire control panel. In some cases, the detection system also activates the area's suppression system as well.

With regards to the detection system's design and installation, the applicable guidelines of both NFPA-72E and the manufacturer's technical recommendations have been considered when developing the design criteria. The development of design criteria and the determination of actual installation was performed by a qualified Fire Protection engineer who meets the BTP 9.5-1, Section C.1.a(5) guidelines. Engineering judgement was employed as part of the actual design criteria basis. Any deviations to NFPA-72E guidelines were reviewed by the Fire Protection engineer and an alternate means of satisfying the intent of the code (NFPA-72E) guidelines was utilized. (5/84)

Factors that were considered in the detection design criteria in order to establish consistent engineering judgement were:

Types of Postulated Fires:

Selection as to the type of detector to be used was based on the type of postulated fire (smoldering, large free burning, etc.) for in each area.

FP-12 Cont.

Ceiling Construction/Shape:

Ceiling configuration and types (smooth, girder and beam construction) were considered when determining detector locations.

Ceiling Height:

Ceiling heights varied throughout the plant. Reduced spacing of detectors was considered on a case by case basis depending on ceiling height.

Ventilation Effects:

The direction of air movement throughout each area was considered when determining detector locations. In addition, the possible effects of stratification were also considered.

Locations of Hazards:

The amount of combustible material, burning characteristics and the projected fire plume and resultant smoke distribution paths were considered when evaluating detector locations. In areas, where no or limited combustible loading was present, and no heat or smoke was anticipated, no detectors were deemed necessary for that immediate area.

Considering the applicable guidelines of NFPA 72E, the manufacturers recommendations and sound engineering judgement, it is NNECO's position that Millstone 3 fire detection system design will provide a reliable early warning of a fire condition. The above referenced information satisfies the intent of BTP 9.5.1 Section C.6.a requirements.

Status (2/84)

Confirmatory.

Additional Response (3/84)

The fire detectors location drawing (SW Drawing No. 12179-EE-51P-2A) was provided to the NRC Staff at the Fire Protection Meeting.

Status (3/84)

Closed.

Open Items

Chemical Engineering Branch - Fire Protection

FP-14 Independent Sprinkler and Hose Station Connections (Draft SER Section 9.5.1.5)

We will require the applicant to provide a fire protection water supply for the emergency generator enclosure, service building, waste disposal building, containment and the auxiliary boiler room such that a single break or failure in the supply piping will not result in the loss of both the primary and secondary water supplies. This is an open item.

Response (4/84)

NNECO has reviewed the NRC's concern relative to assuring that a single pipe break or failure will not result in a loss of both primary and secondary fire water supplies.

The design of the underground fire water supply system at Millstone Unit No. 3, as illustrated on attached sketches A through D, is such that a minimum number of fire water suppression systems would be affected by a single break or failure. This same philosophy has also been utilized in the design of the plants interior fire water suppression systems. It is NNECO's concept should a break or failure occur in the fire water supply piping at Millstone Unit No. 3 to either:

- Temporarily supply those fire water suppression systems rendered inoperable utilizing large diameter fire hose (2½ inch). Fire hose of sufficient quantity and size would be utilized to adequately supply the inoperable systems. These fire hoses would be supplied from fire hydrants connected to the underground fire water supply system that are unaffected by the break and/or failure. (See Table FP14-1).

- Provide adequate manual fire suppression capability, in those areas affected by the pipe/break failure, by routing fire hoses from adjacent operable portions of the fire water system.

It should be noted that in the following areas of the plant, primary fire suppression capability is provided by automatic total flooding carbon dioxide systems:

- cable spreading room
- east/west switchgear rooms
- east/west cable tunnels
- normal switchgear area
- east/west MCC and control rod control area
- east/west fuel oil vaults

FP-14 Cont.

Additional fire suppression capability is provided in the computer room/subfloor area and in the instrument rack room subfloor area by automatic total flood Halon systems. Thus a break or failure in the fire water supply system would not adversely affect the primary fire suppression capability for these areas. Also, the majority of the plants redundant safe shutdown systems/equipment are separated by qualified three hour rated fire barriers in order to mitigate the consequences of a postulated fire.

With regards to inside containment, a combination of active and passive fire protection features have been incorporated into the design of this area. Namely, the various fire protection features provided are: cable separation, fire barriers, fire detection, a sprinkler system (electrical penetration area) and hose stations. Millstone Unit No. 3 containment has been designed in accordance with BTP 9.5-1 Section 7.a.1.b guidelines which allows for cable separation and/or barriers between redundant circuits. In the event of a rupture/pipe break within the fire supply piping, the sprinkler and standpipe systems will be rendered inoperable, however, the plant's ability to initiate and achieve safe shutdown will not be affected due to the fact that passive fire protection features (barriers/separation) have been provided. Therefore, NNECO is requesting a deviation from this BTP guideline for providing redundant water supply feeds for the containment structure be granted.

It is therefore NNECO's position that a single pipe break or failure would not adversely affect the plant's ability to extinguish a fire or achieve safe shutdown. This is based upon the variety of available fire suppression systems/equipment (portable extinguishers, hose stations, sprinkler/spray systems, CO_2 and Halon systems), the ability of the plant to provide adequate temporary fire suppression capability, and the separation provided between safe shutdown systems.

Status (4/84)

Closed.

Table FP14-1

Summary of Temporary Fire Water Supply Hose Lengths

Building	Hose Length
Auxiliary Building - Feed A	
Primary	Hard Pipe - Feed B
Secondary	150 ft.
Auxiliary Building - Feed B	
Primary	Hard Pipe - Feed A
Secondary	250 ft.
Auxiliary Boiler Area	
Primary	300 ft.
Secondary	425 ft.
Condensate Polishing Area	
Primary	400 ft.
Secondary	450 ft.
Emergency Generator Enclosure A	
Primary	50 ft.
Secondary	200 ft.
Emergency Generator Enclosure B	
Primary	270 ft.
Secondary	350 ft.
Fuel Building	
Primary	150 ft.
Secondary	350 ft.

Table FP14-1

Building	Hose Length
Office/Technical Support Area	
Primary	250 ft.
Secondary	400 ft.
Service Building	
Primary	275 ft.
Secondary	300 ft.
Turbine Building - Feed A	
Primary	Hard Pipe - Feed C
Secondary	Hard Pipe - Feed B
Turbine Building - Feed B	
Primary	Hard Pipe - Feed A & C
Secondary	100 ft.
Turbine Building - Feed C	
Primary	Hard Pipe - Feed A
Secondary	100 ft.
Turbine Building - Feed D	
Primary	Hard Pipe - Feed A
Secondary	Hard Pipe - Feed C
Waste Disposal Building	
Primary	275 ft.
Secondary	300 ft.

Please note the following relative to the drawings:

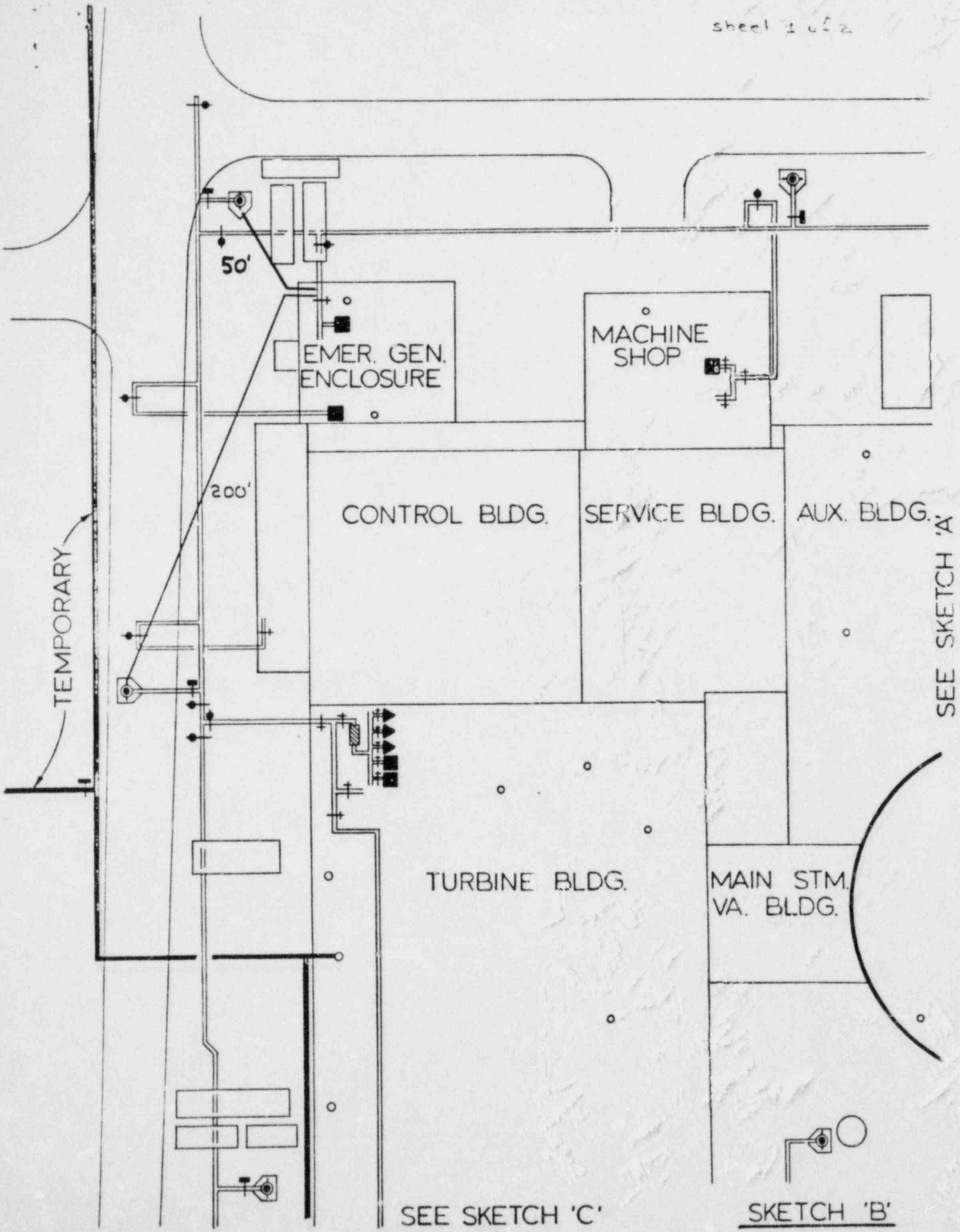
1. Those portions of the fire water supply piping highlighted in yellow are considered inoperable based upon a pipe break.

2. The primary temporary supply is the shortest route/discharge to an operable yard hydrant/water source.

3. The secondary temporary supply is the alternate source to the primary should it be unavailable.

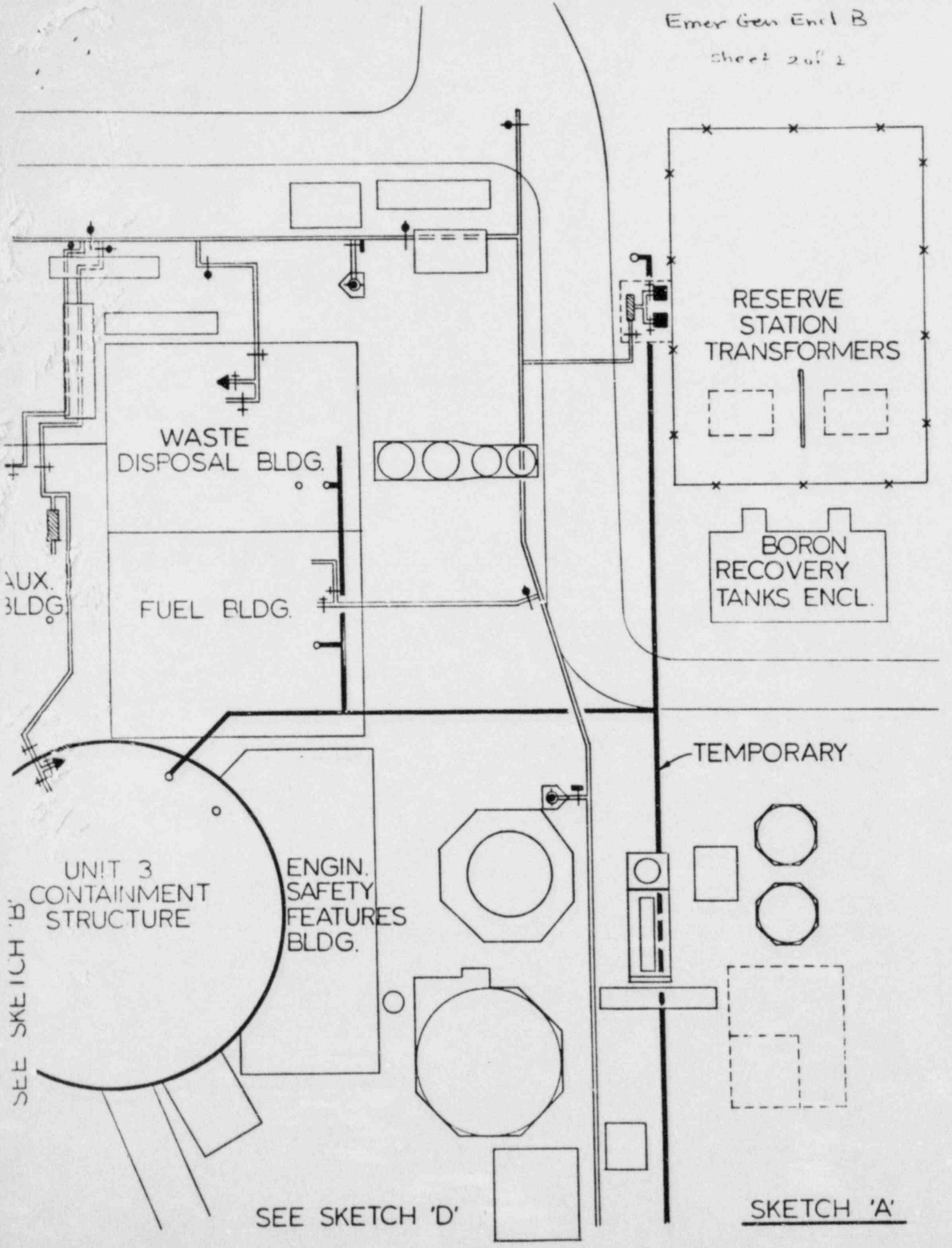
Emer Gen Encl 7

sheet 1 of 2



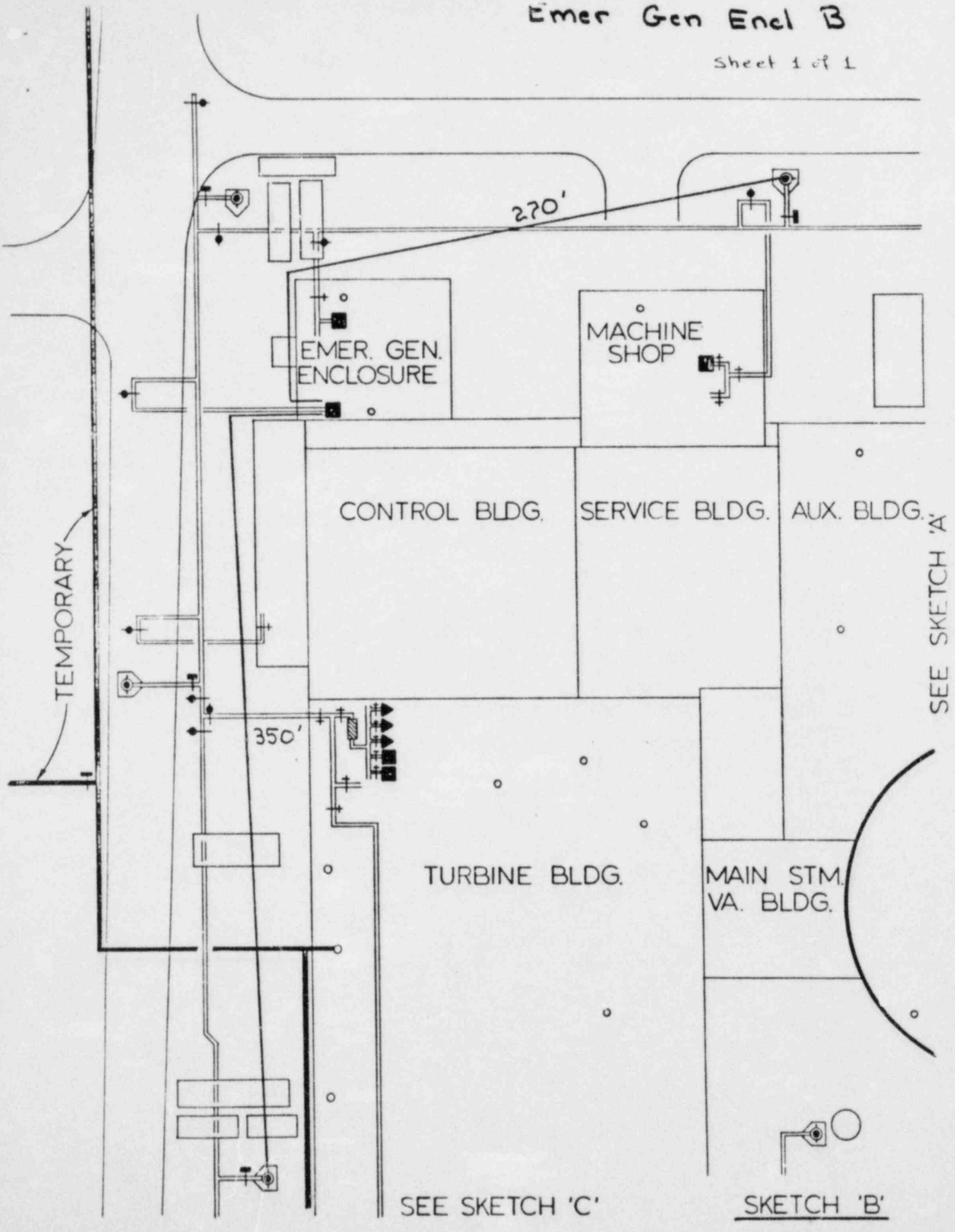
Emer Gen Encl B

Sheet 2 of 2



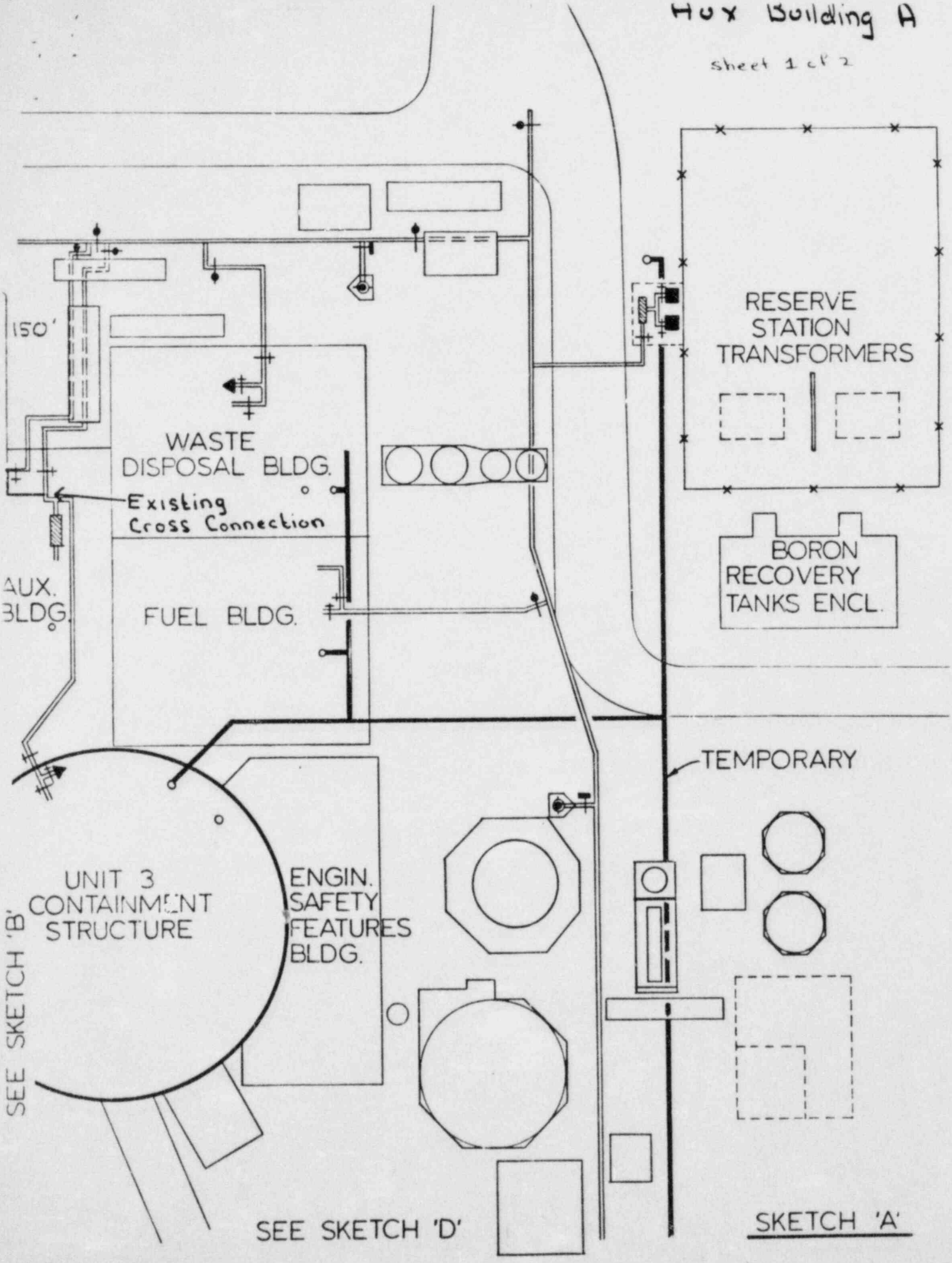
Emer Gen Encl B

Sheet 1 of 1



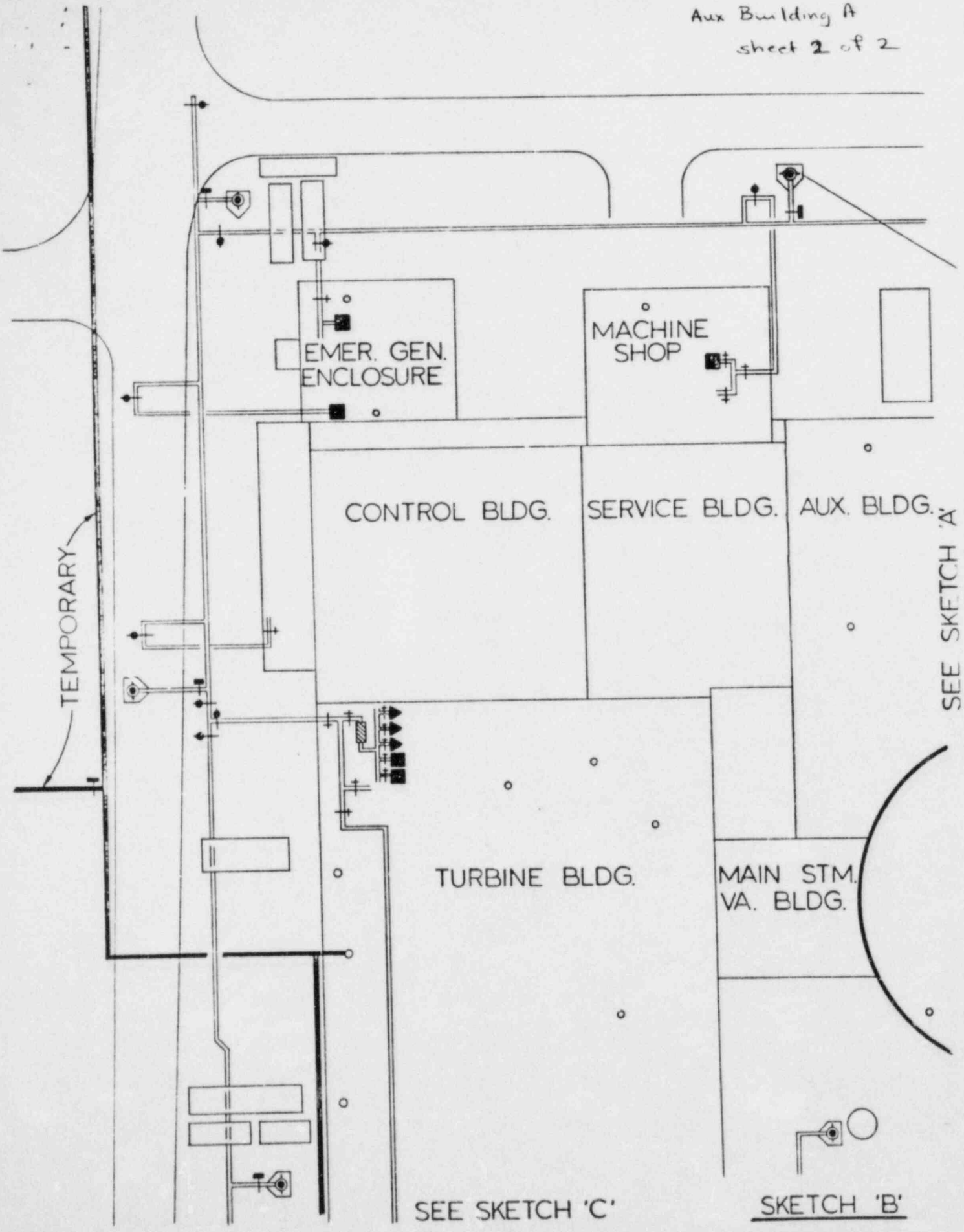
Hox Building A

sheet 1 of 2



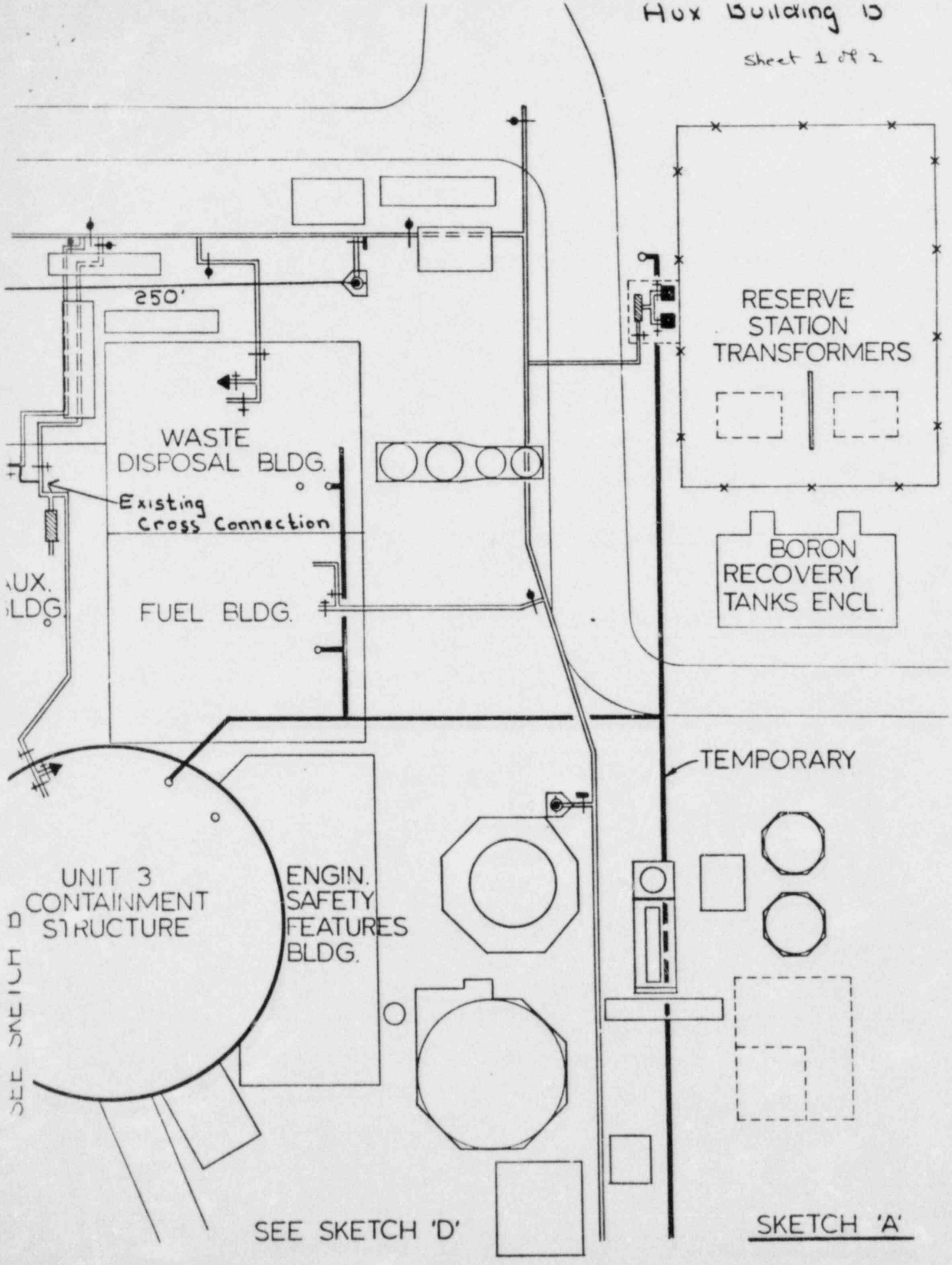
SKETCH 'A'

Aux Building A
sheet 2 of 2

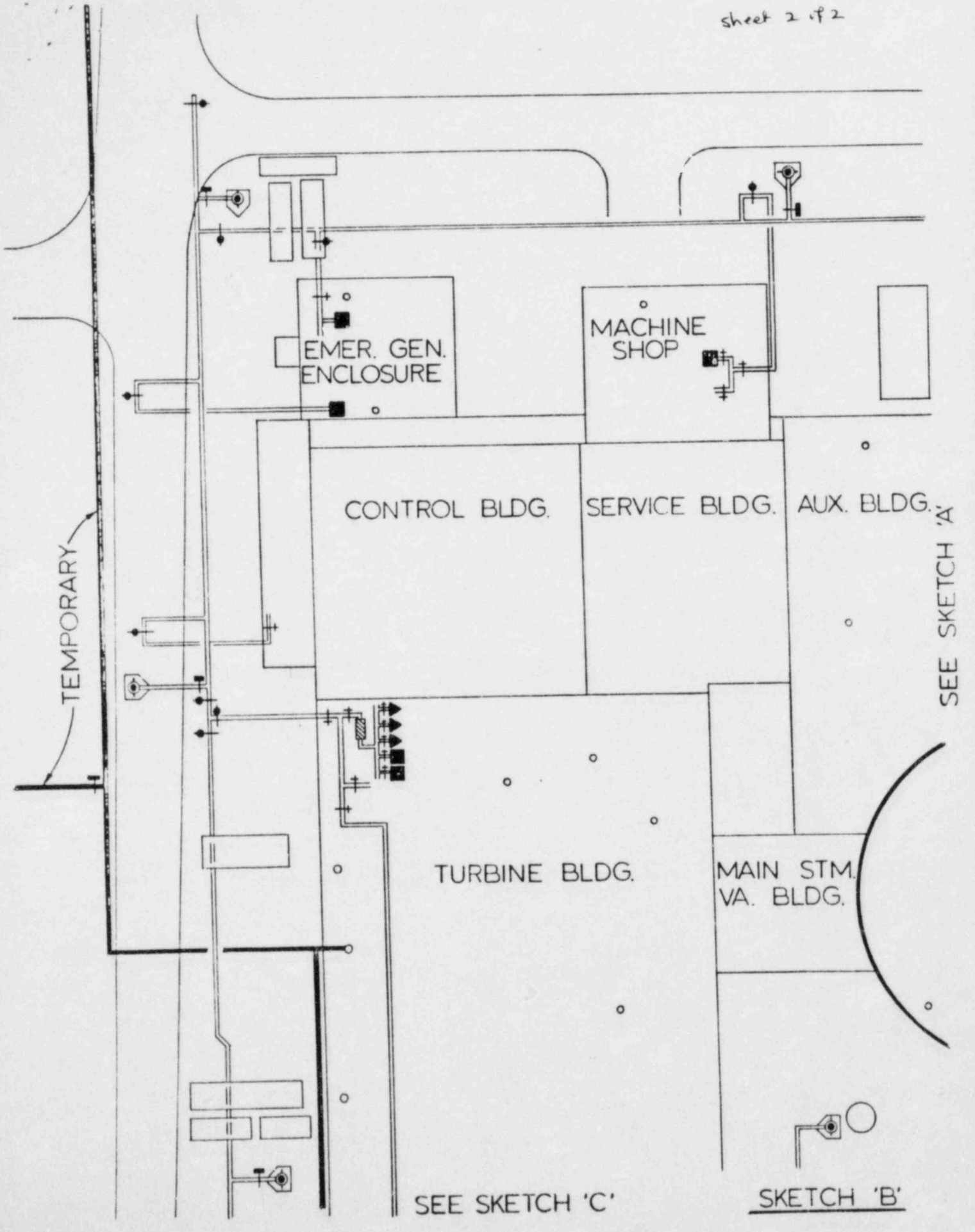


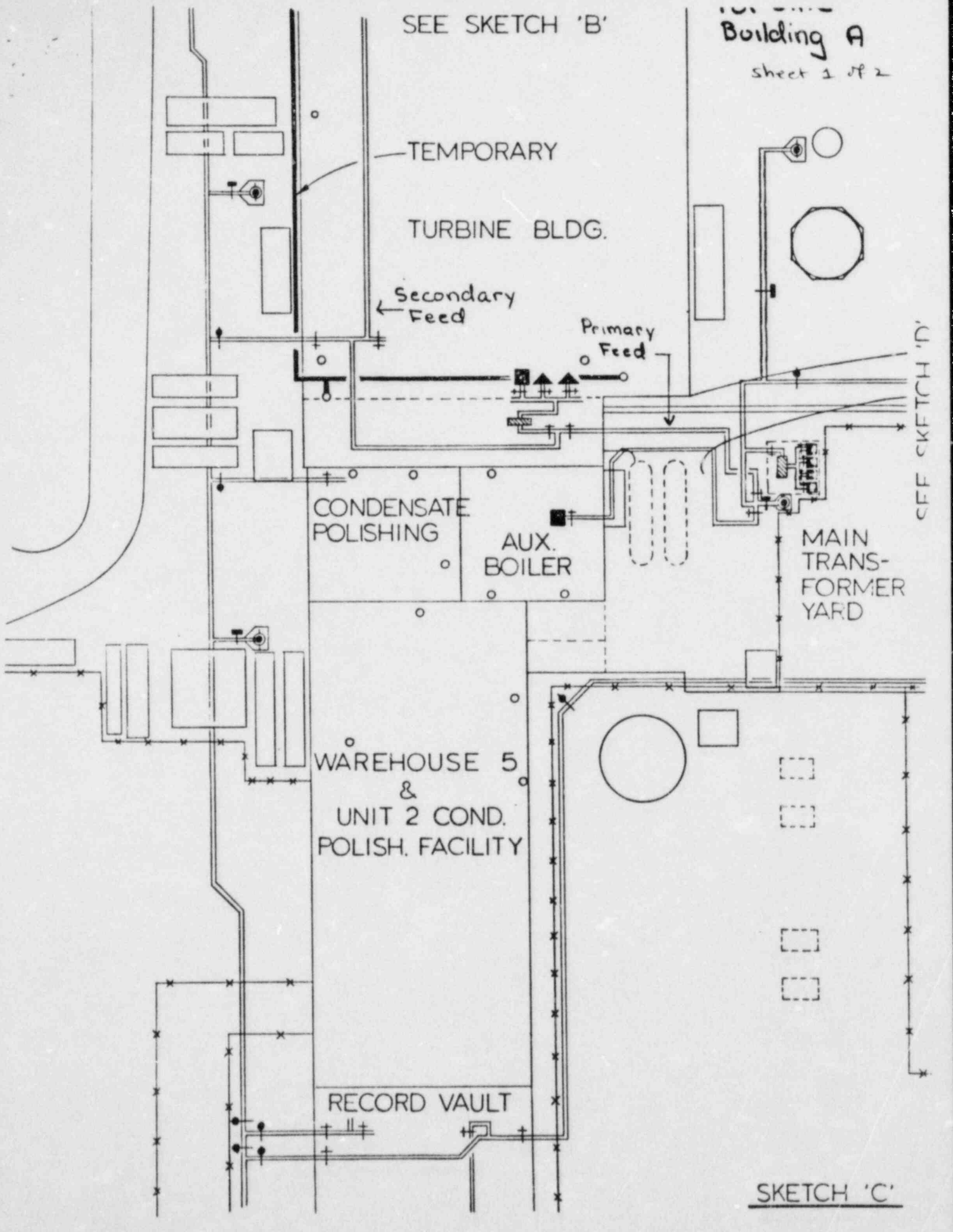
Hux Building 15

Sheet 1 of 2



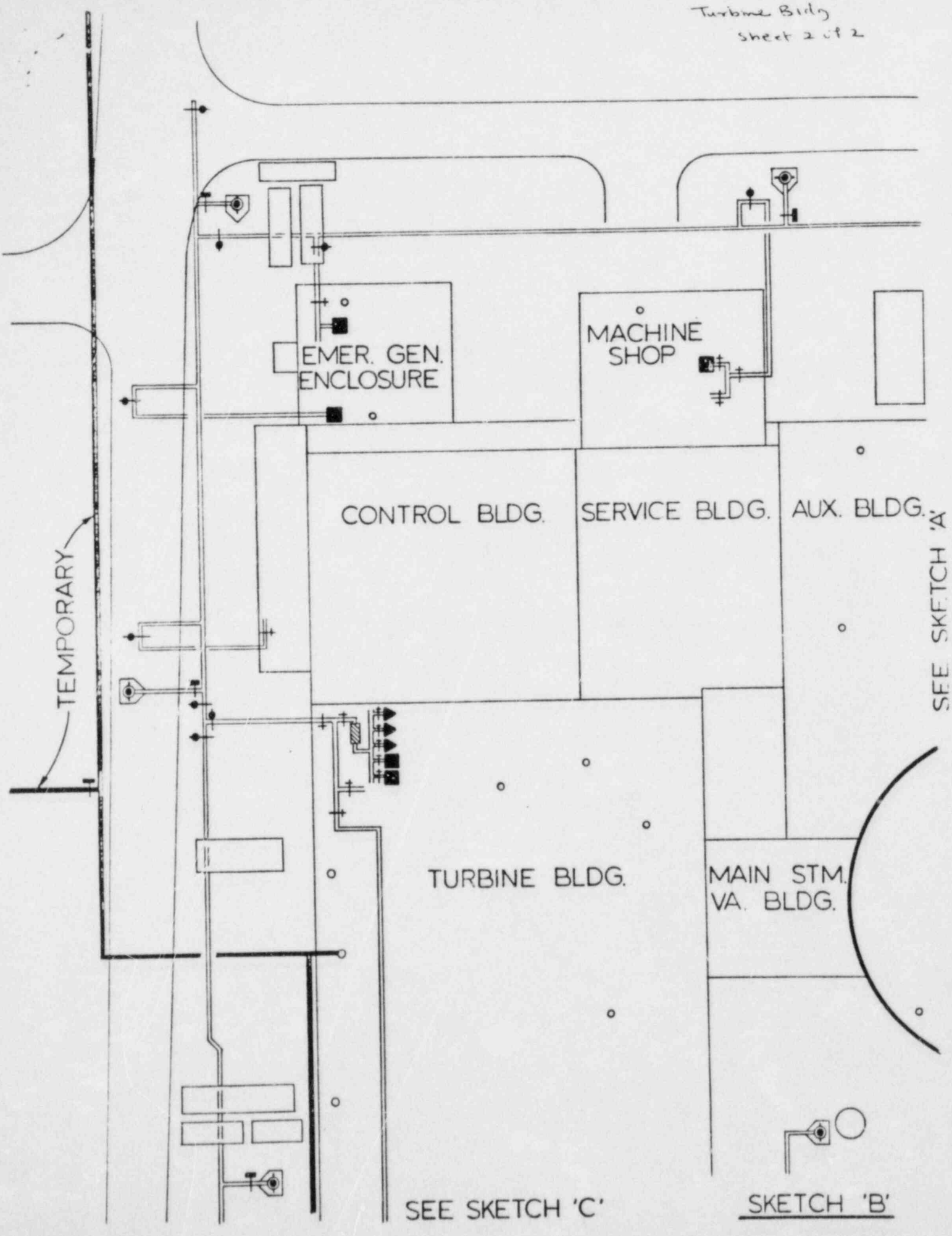
Aux Bldg B
sheet 2 of 2




SEE SKETCH 'B'
Building A
sheet 1 of 2
TEMPORARY
TURBINE BLDG.
Secondary Feed
Primary Feed
SEE SKETCH 'D'
CONDENSATE POLISHING
AUX. BOILER
MAIN TRANS-FORMER YARD
WAREHOUSE 5 & UNIT 2 COND. POLISH. FACILITY
RECORD VAULT

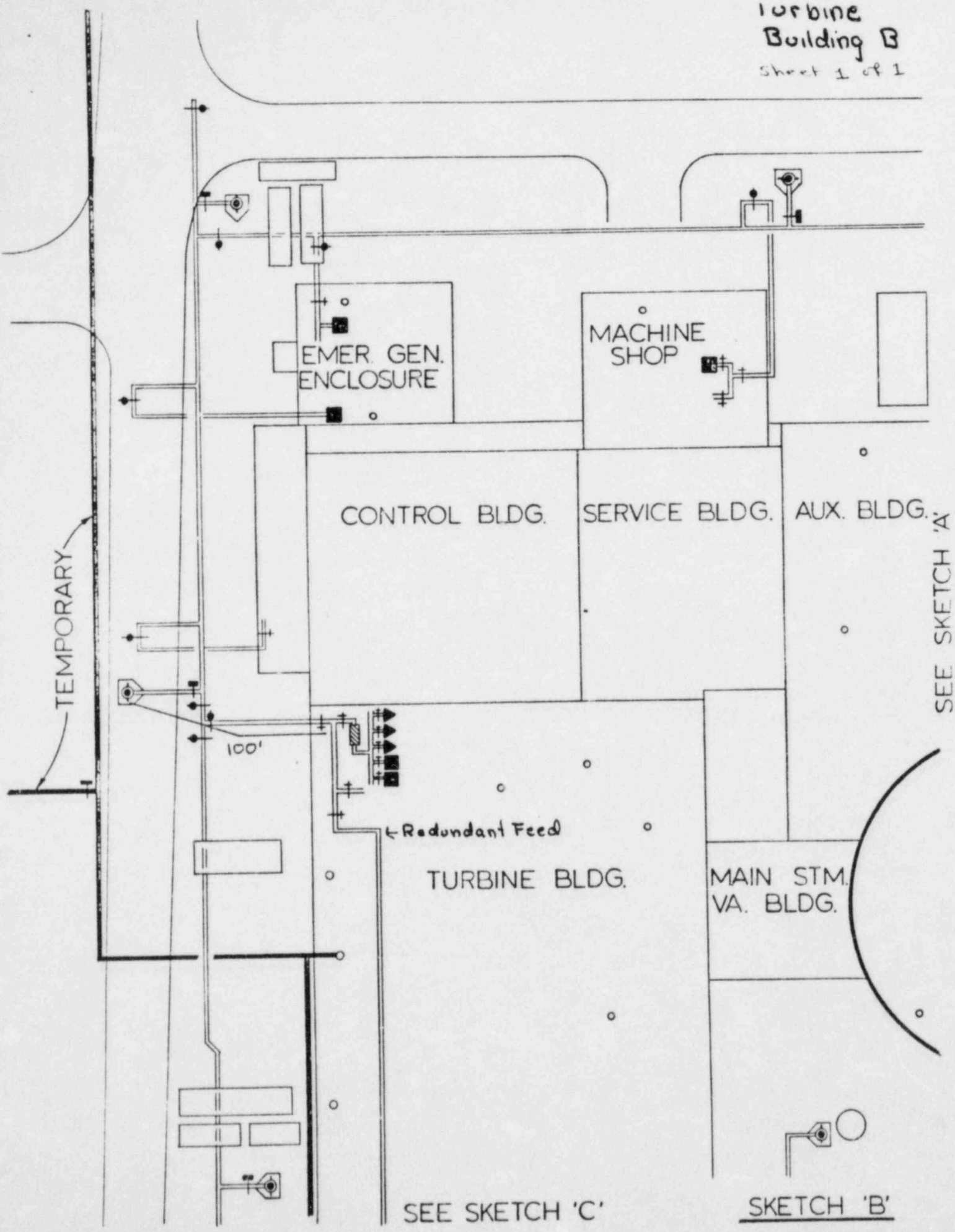
SKETCH 'C'

Turbine Bldg
sheet 2 of 2



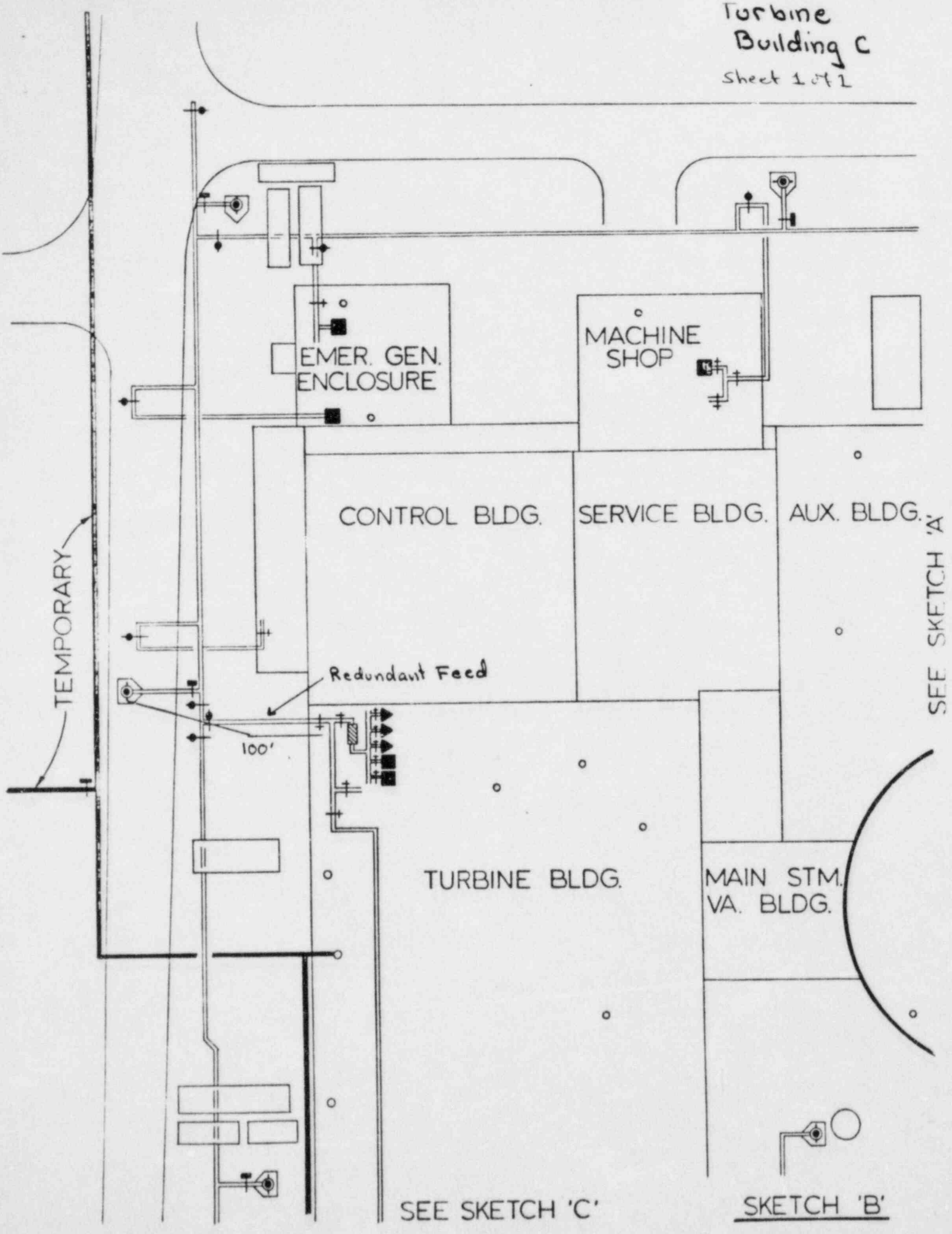
Turbine Building B

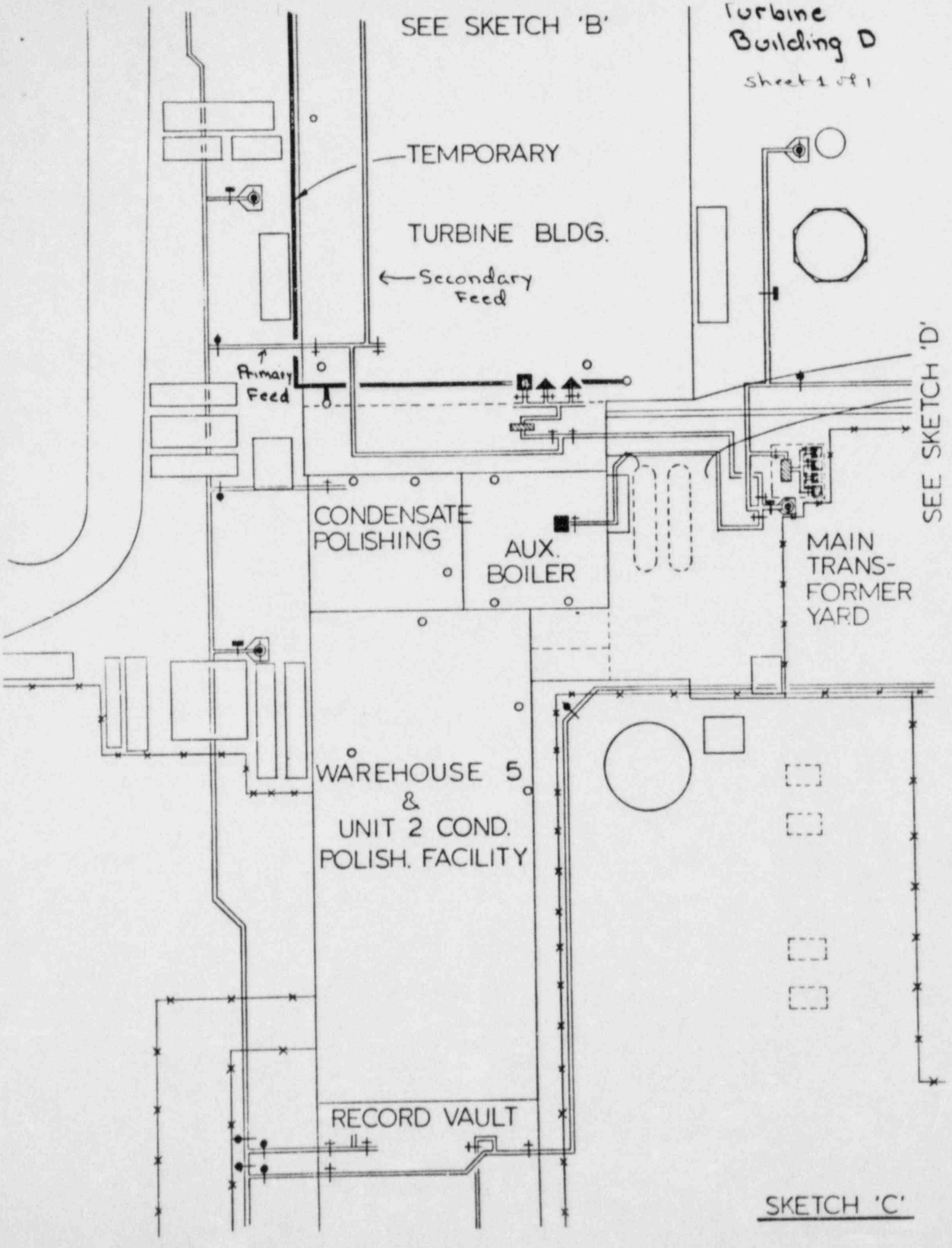
Sheet 1 of 1



Turbine Building C

Sheet 1 of 2

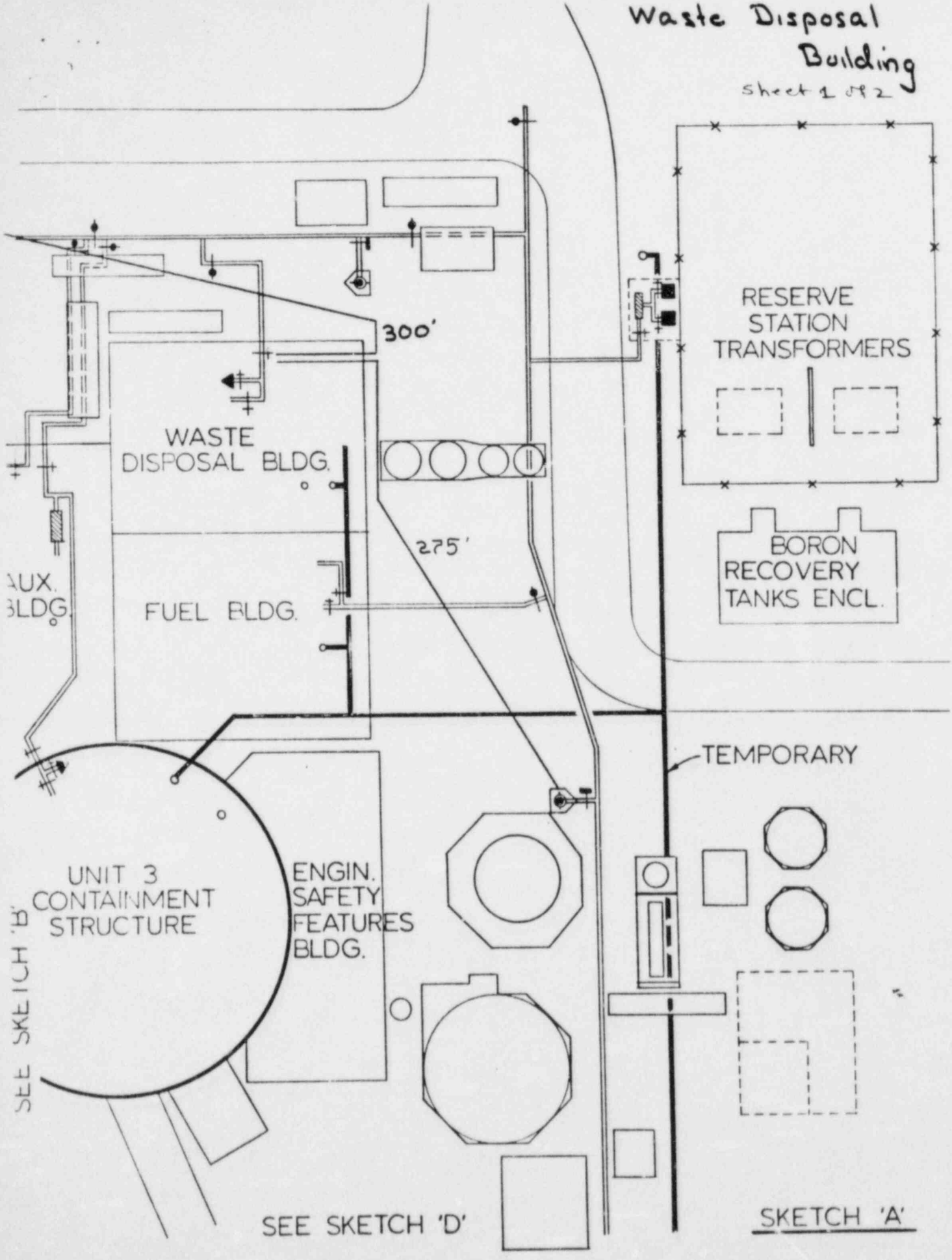



SEE SKETCH 'B'
Turbine Building D
Sheet 1 of 1
TEMPORARY
TURBINE BLDG.
← Secondary Feed
Primary Feed
SEE SKETCH 'D'
CONDENSATE POLISHING
AUX. BOILER
MAIN TRANS-FORMER YARD
WAREHOUSE 5 & UNIT 2 COND. POLISH. FACILITY
RECORD VAULT

SKETCH 'C'

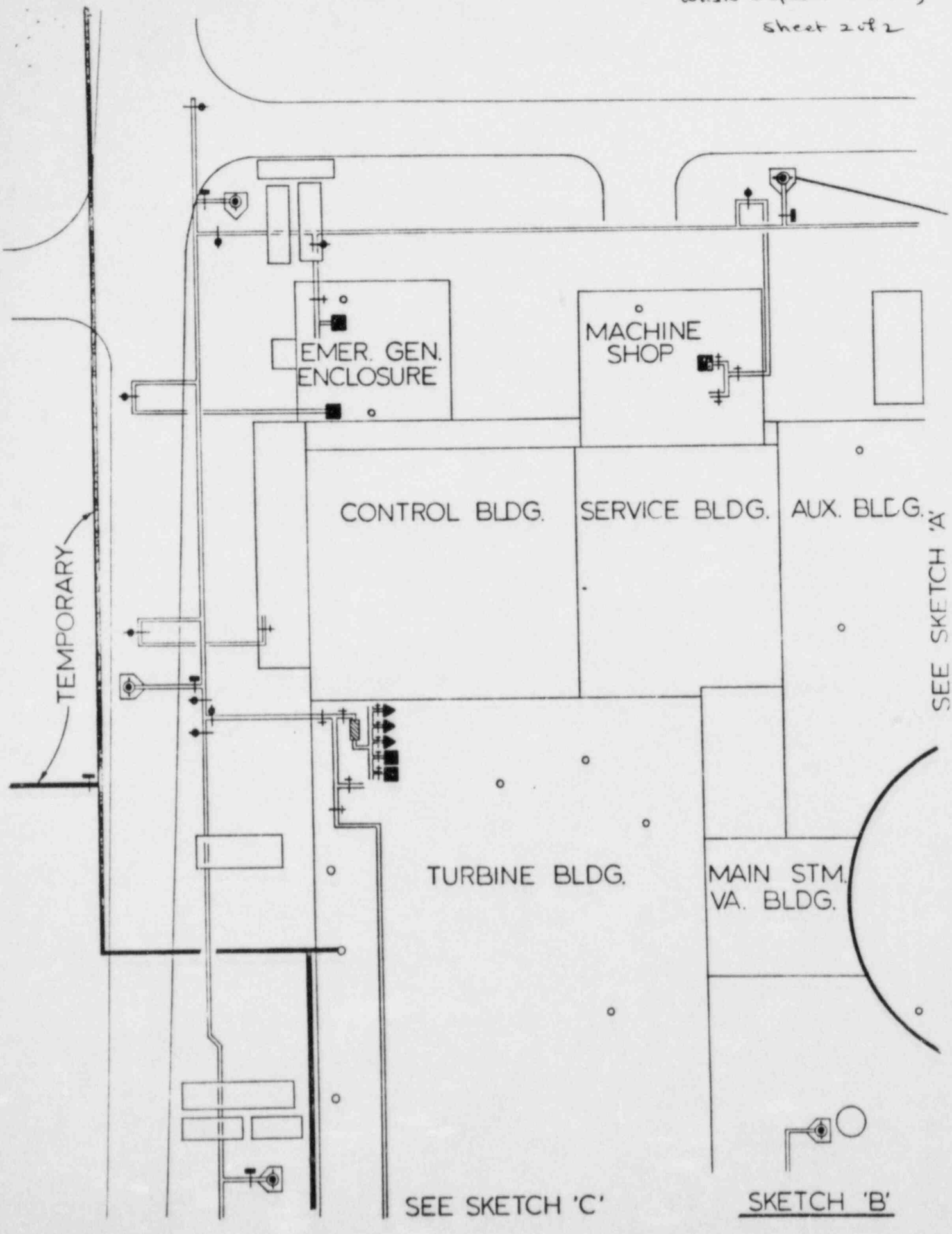
Waste Disposal Building

Sheet 1 of 2



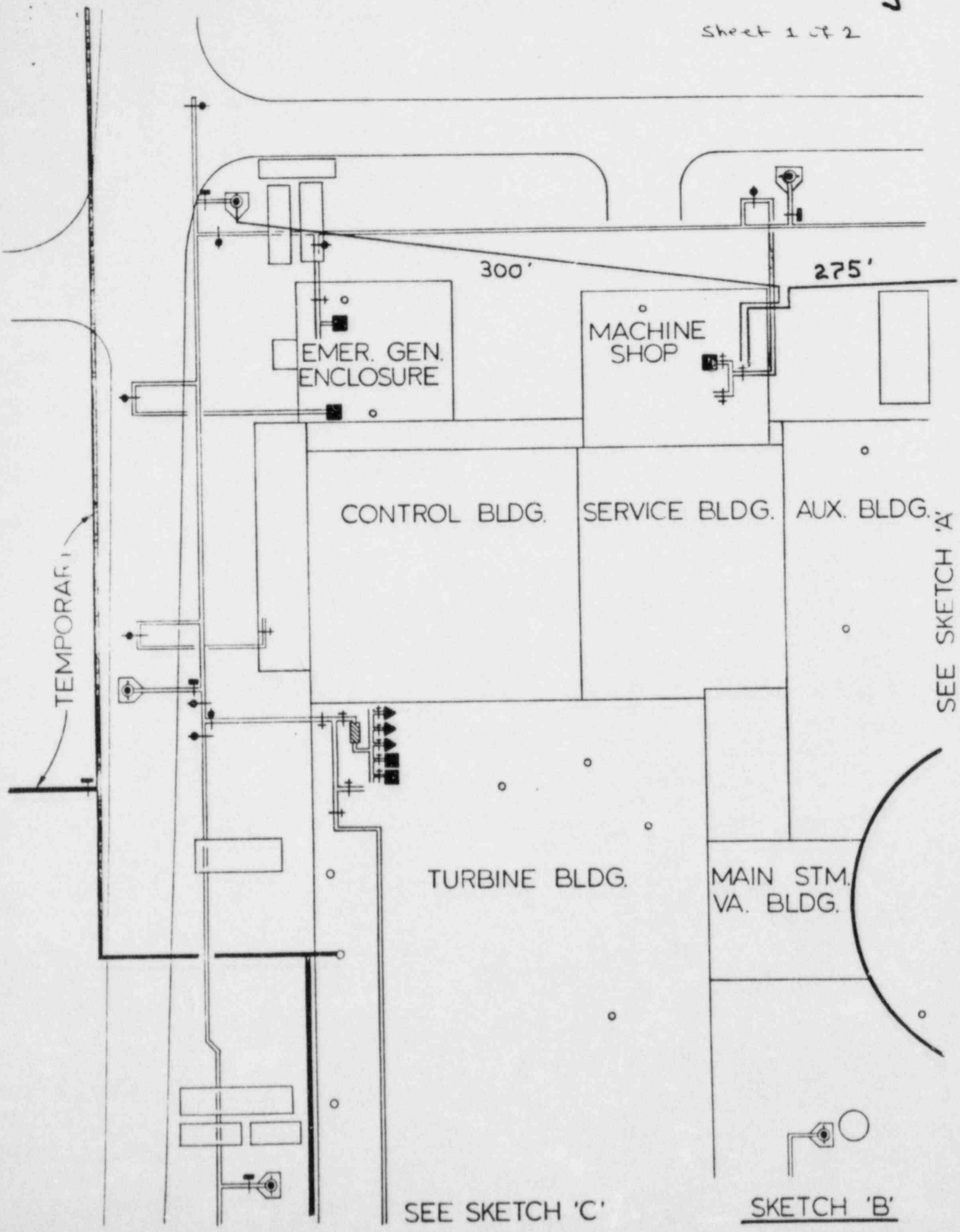
SKETCH 'A'

Waste Disposal Building
Sheet 2 of 2

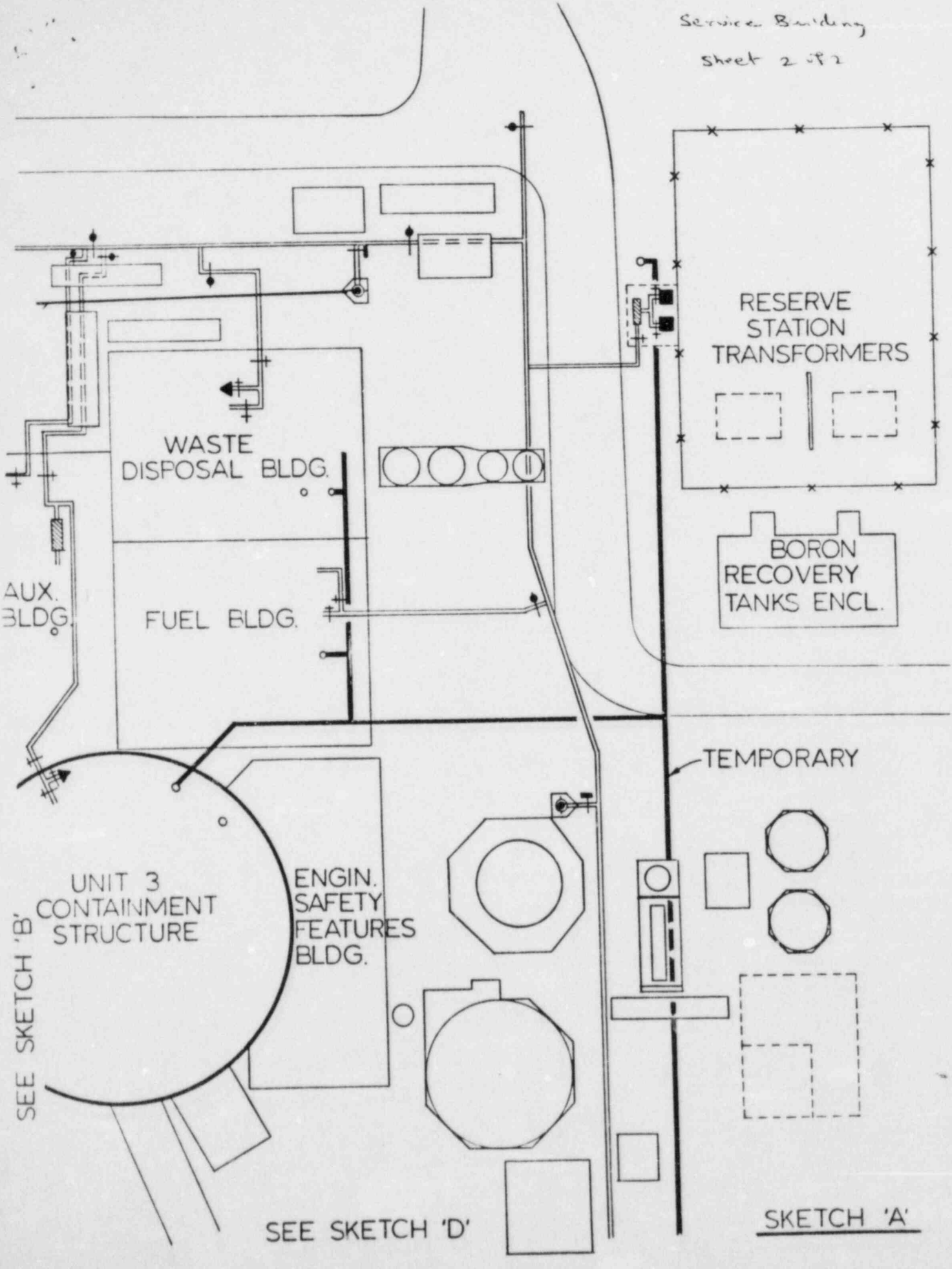


Service Building

Sheet 1 of 2

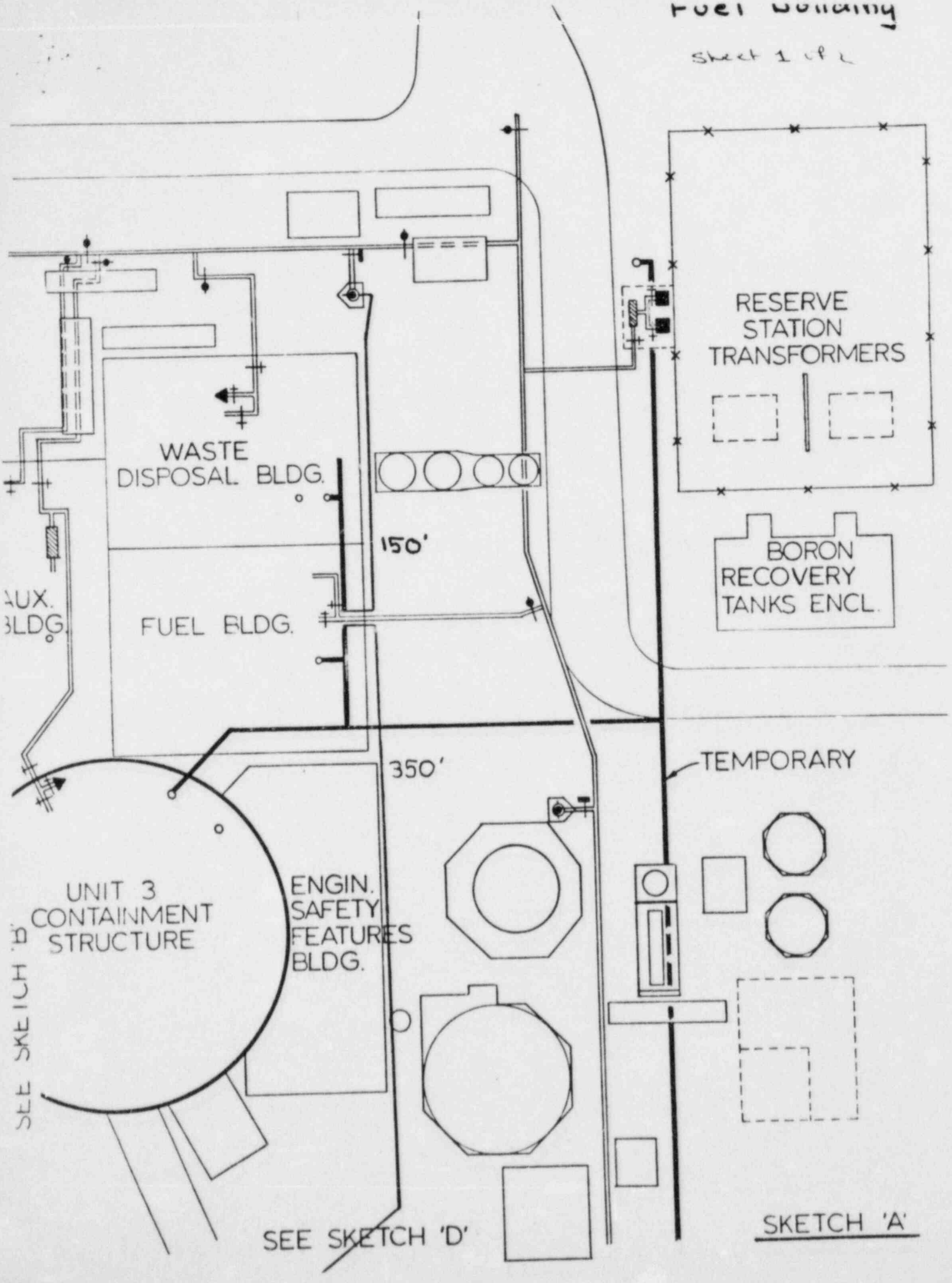


Service Building
Sheet 2 of 2



Fuel Building

Sheet 1 of 2



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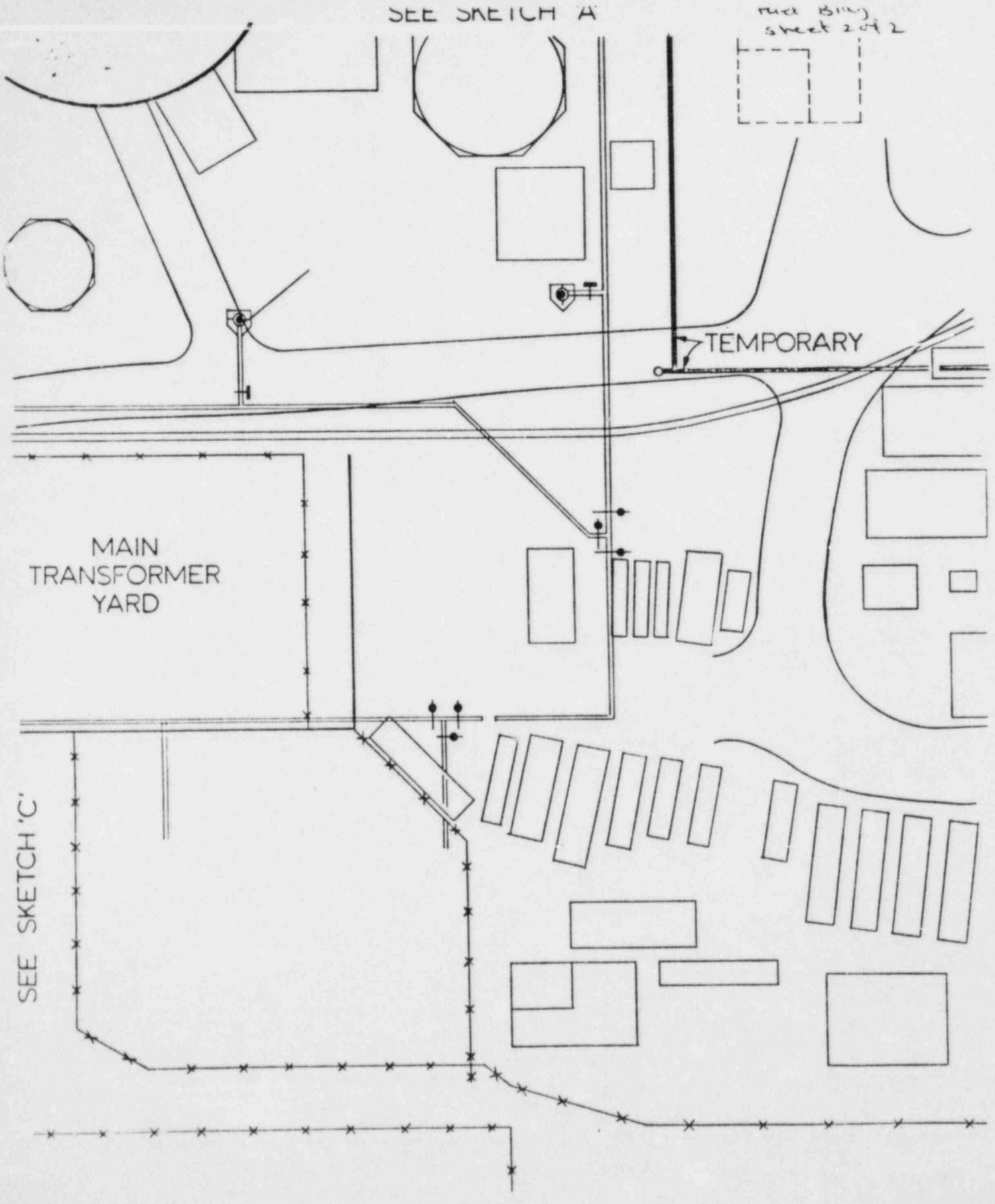

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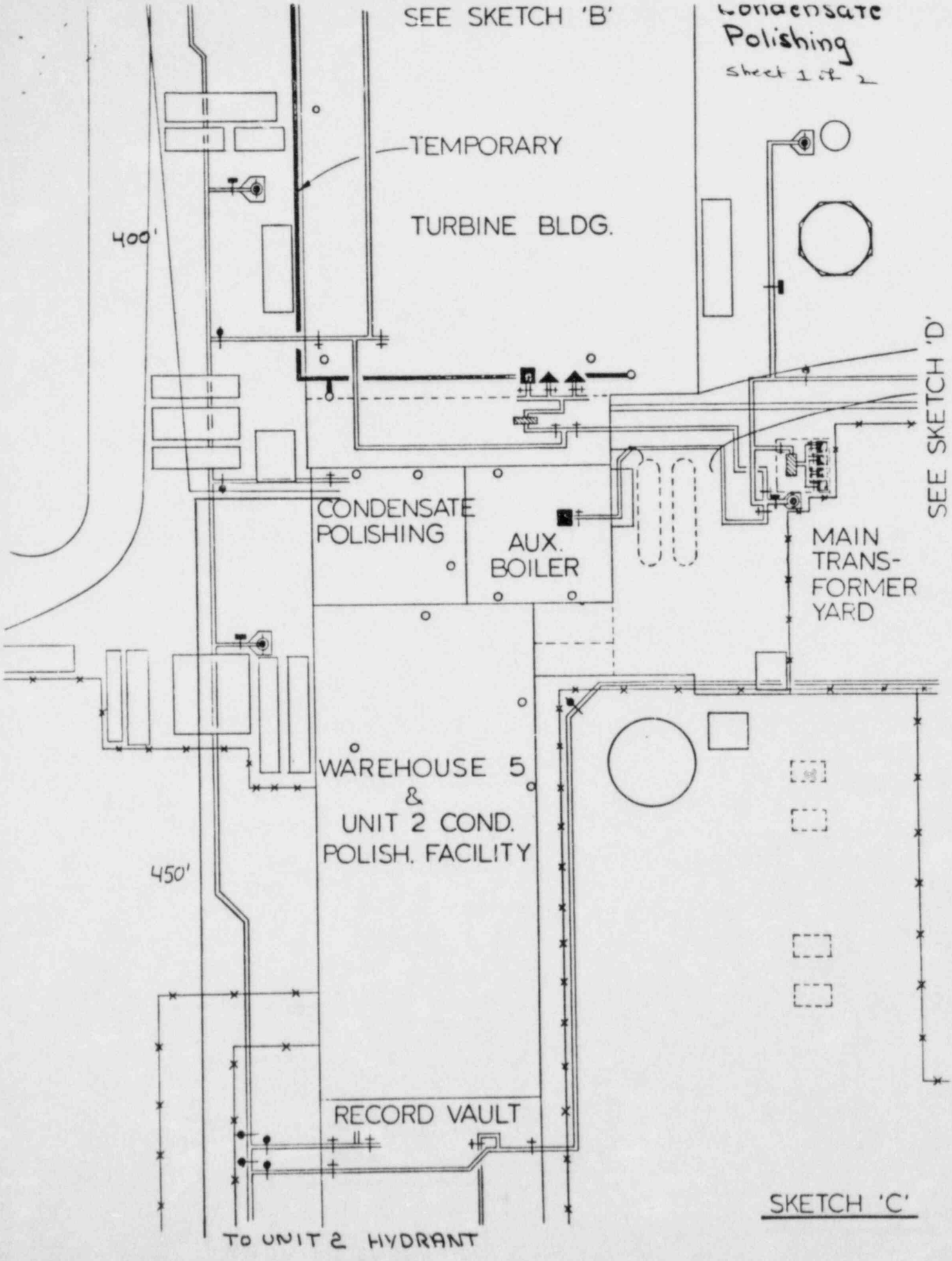
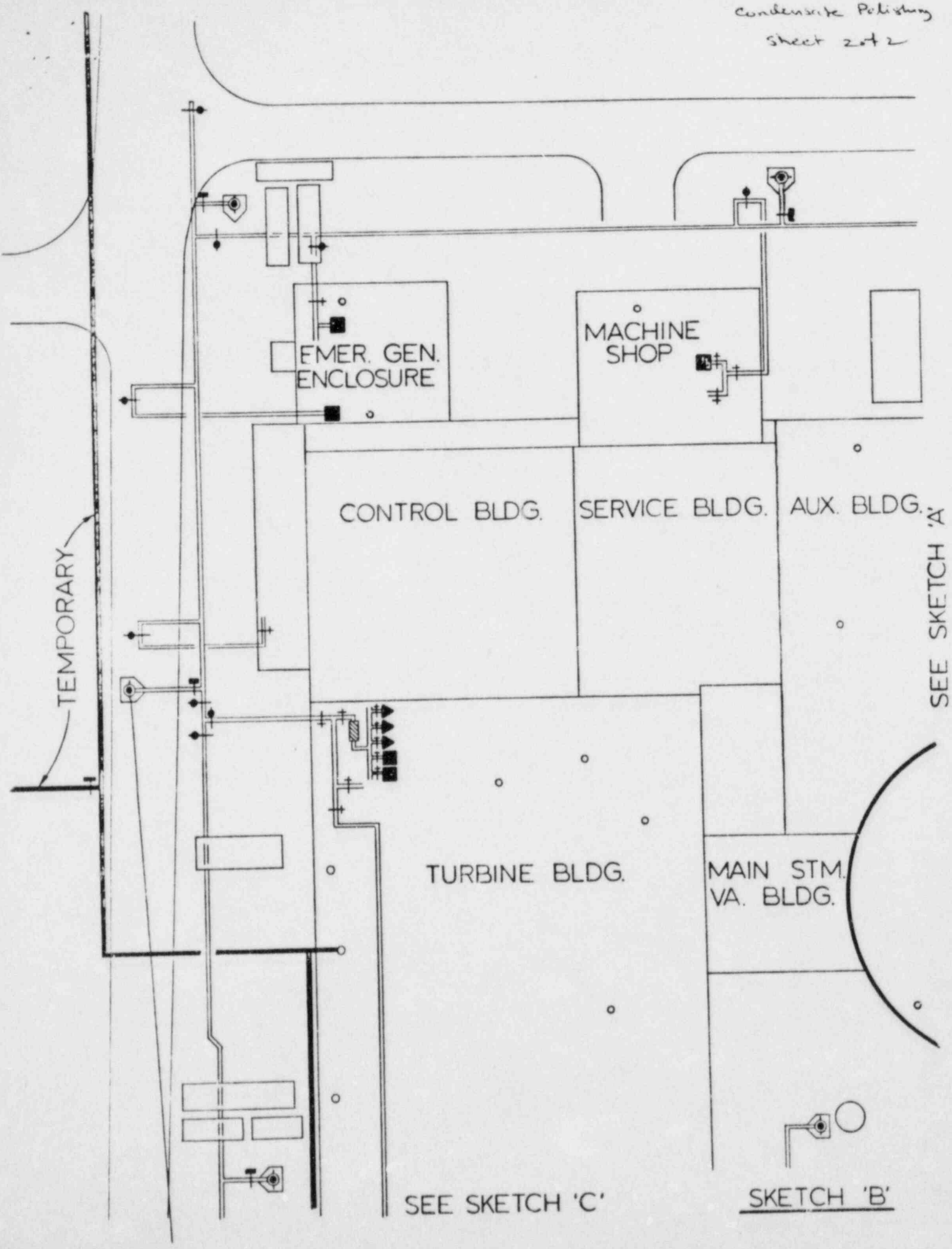
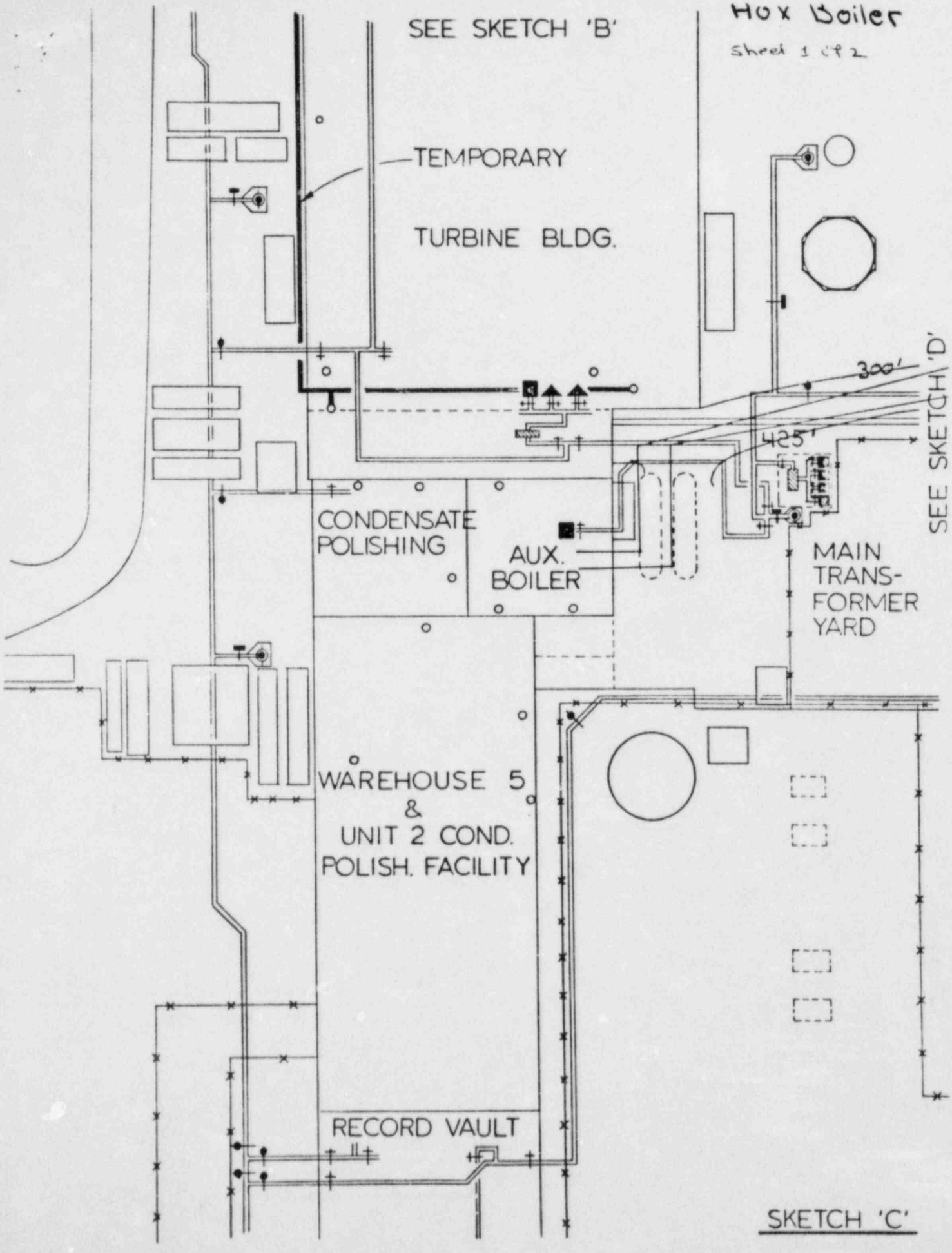
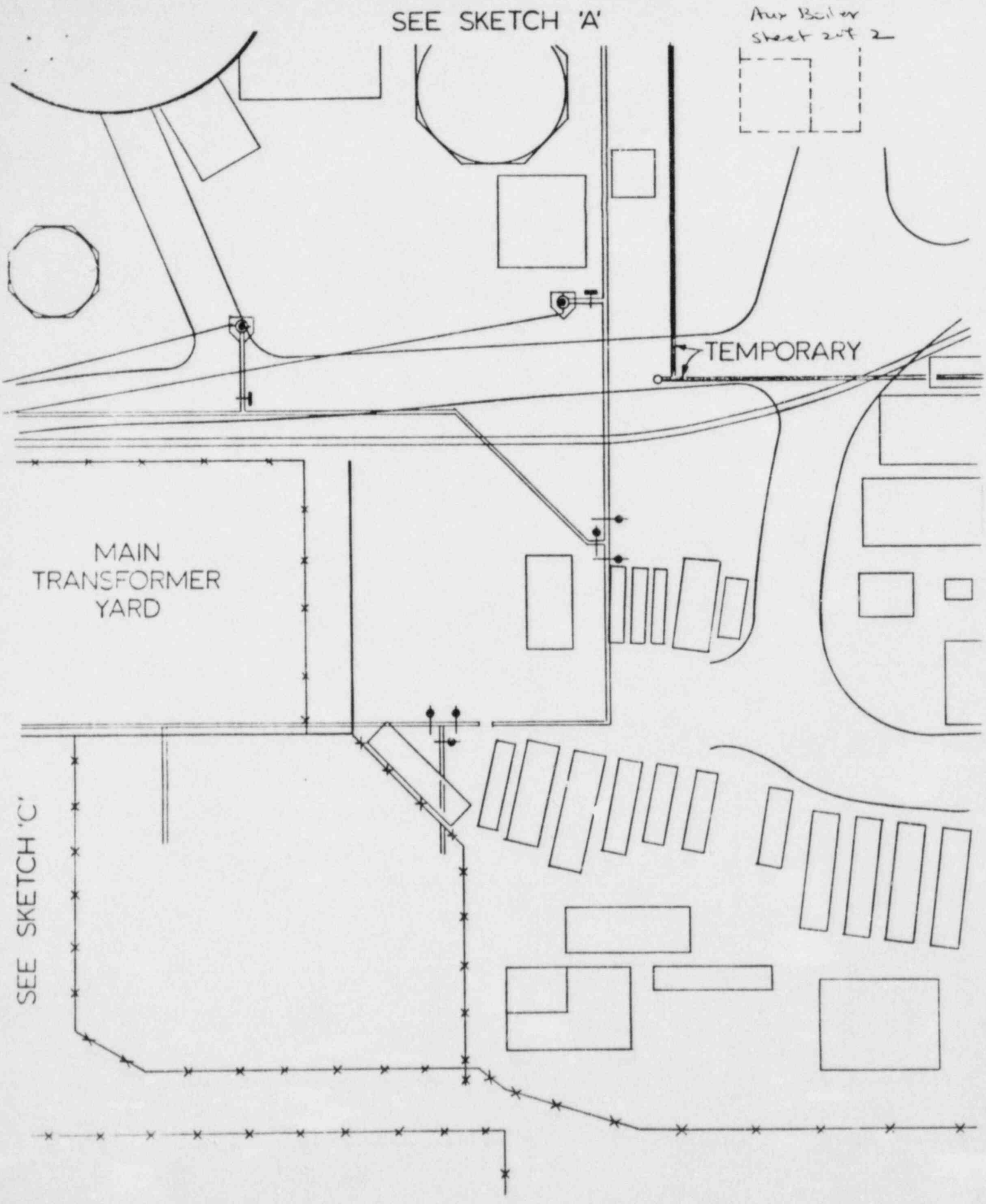

SEE SKETCH 'B'
Condensate Polishing
sheet 1 of 2
TEMPORARY
TURBINE BLDG.
400'
SEE SKETCH 'D'
CONDENSATE POLISHING
AUX. BOILER
MAIN TRANS-FORMER YARD
WAREHOUSE 5 & UNIT 2 COND. POLISH. FACILITY
450'
RECORD VAULT
TO UNIT 2 HYDRANT
SKETCH 'C'

Condensate Polishing
Sheet 2 of 2



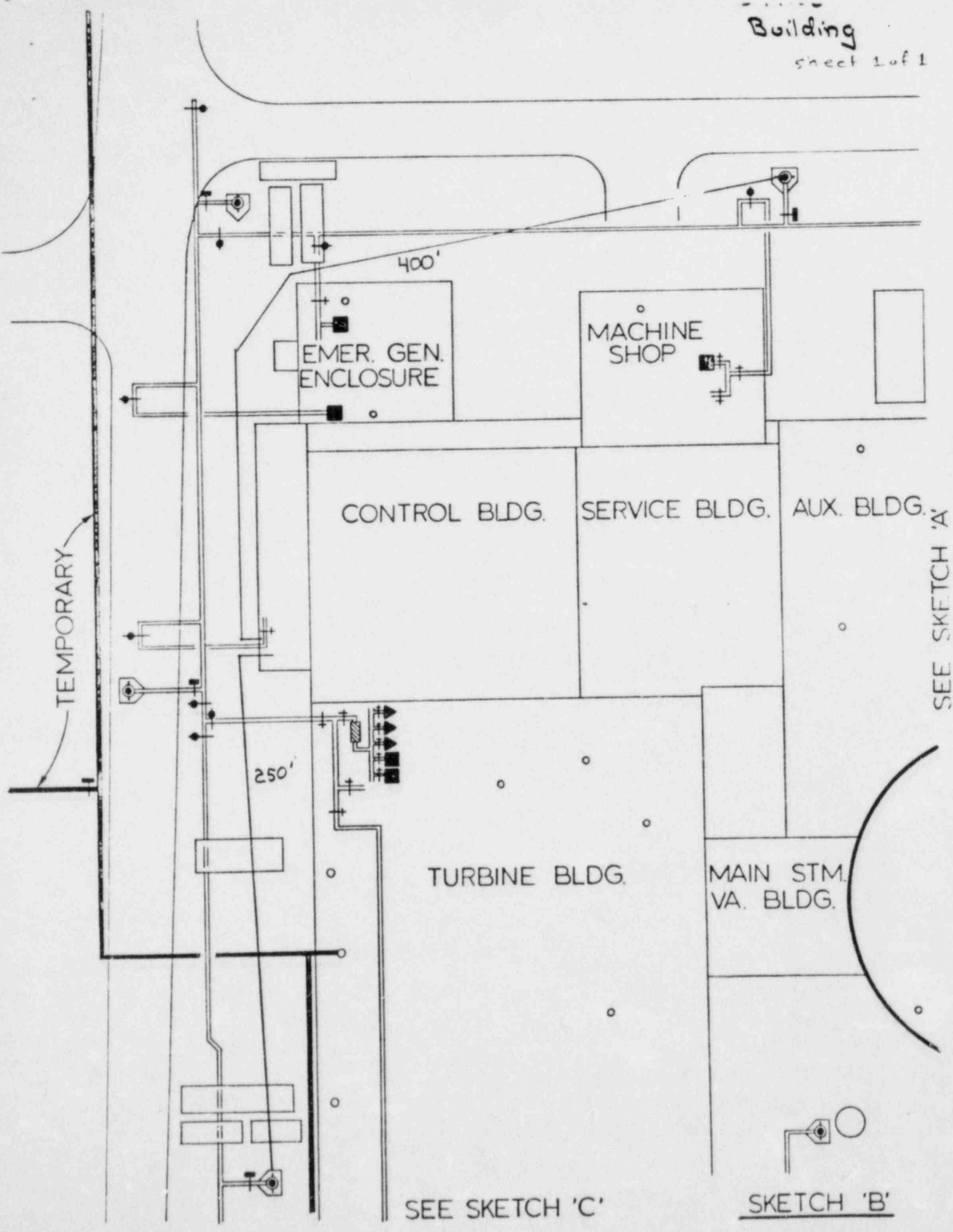

Hox Boiler
Sheet 1 of 2
SEE SKETCH 'B'
TEMPORARY
TURBINE BLDG.
300'
425'
SEE SKETCH 'D'
CONDENSATE POLISHING
AUX. BOILER
MAIN TRANS-FORMER YARD
WAREHOUSE 5 & UNIT 2 COND. POLISH. FACILITY
RECORD VAULT
SKETCH 'C'


SEE SKETCH 'A'
Aux Boiler
Sheet 2 of 2
TEMPORARY
MAIN
TRANSFORMER
YARD
SEE SKETCH 'C'

SKETCH 'D'

Building

sheet 1 of 1



Open Items

Chemical Engineering Branch - Fire Protection

FP-16 Manual Hose Coverage (Draft SER Section 9.5.1.5)

To meet our guidelines of BTP CMEB 9.5-1, Section C.1.c, we will require the applicant to install manual hose stations so that all areas of the Control Building can be reached with an effective hose stream. This is an open item.

Response (4/84)

In response to the above draft SER open item which pertains to hose stations within the Control Building, NNECO has evaluated our present design as well as the BTP 9.5-1 Section C.5.4 guidelines. As a result of this evaluation, NNECO has determined that a reliable standpipe system is necessary within the Control Building to support manual fire fighting efforts should the need ever arise. However, due to various factors, namely, the construction schedule and major activities ongoing throughout the entire Control Building, installation of a properly designed standpipe system at this time would cause extreme difficulties. Therefore, NNECO is requesting that an extension of time be granted to allow us (NNECO) to properly engineer, design and install a standpipe system within the Control Building after all major work is completed in the area. A tentative schedule for the completion of the Control Building standpipe system in accordance with BTP guidelines would be by the end of the first refueling cycle.

During this interim period, NNECO intends to utilize the existing construction standpipe system. NNECO proposes to make the following modifications to the construction standpipe system in order to ensure that a reliable means of manual fire fighting capability is available during this period:

- Extend and connect construction standpipe system to permanent plant standpipe system located in adjacent area.
- Relocate hose stations, as necessary within the Cable Spreading Room and Switchgear Rooms so that an effective hose stream will be provided utilizing a maximum of 150 feet of 1½" fire hose. (Refer to attached sketches for existing hose station locations).
- Increase construction standpipe system piping size, wherever necessary, in order to provide a minimum flow capacity of 200 gallons per minute with a residual pressure of 65 psi.
- Convert construction standpipe system to a dry pipe system in order to limit the possibilities of accidental flooding within the Control Building.
- Provide additional lengths of hose at the Service Building hose stations (45'-6" elevation) and Control Building hose stations (66'-6" elevation) to support manual fire fighting efforts for the top two elevations of the Control Building.

The above proposed modifications, in most cases, have already been implemented to support the construction effort.

In addition to providing a temporary standpipe system within the Control Building during this interim period, it is NNECO's position that a fire within any one area would not effect the plants capabilities to achieve safe shutdown. This position is based on the active and passive fire protection measures which have been in corporated in Millstone III's design. They are:

- Ionization smoke detection provided throughout the Control Building which would provide an early warning of any fire condition.
- Portable fire extinguishers provided throughout all areas of the Control Building in accordance with NFPA 10 guidelines.
- Automatic Total Flooding Carbon Dioxide Suppression systems provided within areas with high cable concentrations, namely the Switchgear Rooms and Cable Spreading Room.
- Three hour (3 hr.) fire rated walls and floor/ceiling assemblies separating each area of the Control Building. In addition, no combustible fire loading in any area of the Control Building excesses the rating of the fire barriers provided.
- Safe shutdown of the plant can be achieved from two separate and remote locations within the Control Building.
- Additional manual fire fighting capability can be provided for the Control Building by utilizing hose stations from adjacent areas or outside hydrant houses.

Based on a review of the proposed modifications to the construction standpipe system, and the active/passive fire protection features provided in the Control Building design, it is NNECO's position that an adequate level of fire protection will be provided during the period of time (by the end of the first refueling cycle) which NNECO is requesting to complete the installation of a permanent plant standpipe system. NNECO's commitment to provide a standpipe system within the Control Building by the end of the first refueling cycle will satisfy the BTP 9.5-1 Section 6.C.4 guidelines at that time.

Status (4/84)

Closed.

SUPPLEMENT TO FP-16

MANUAL HOSE STATIONS IN

THE CABLE SPREADING ROOM

HYDRAULIC CALCULATION SHEET

System No. ______ Sheet ______

NAME, ADDRESS OF PROPERTY

NOTES

DATE

Calculated by ____________

SPRINKLERS NOZZLES			(q) ADDED GPM	(Q) TOTAL GPM	PIPE SIZE In.	PIPE AND EQUIVALENT LENGTH FITTINGS - DEVICES Feet	FRICTION LOSS		(Elevation) STATIC Plus or Minus PSI	REQUIRED PRESSURE PSI	CALCULATN. REFERENCE	
PLAN REF. PT.	TOTAL HEADS	TYPE					PSI/FT. C=120	TOTAL PSI			Sheet No.	Point No.
							PRESSURE AT HEAD →					

HYDRAULIC CALCULATION SHEET

System No. — Sheet 1

NAME, ADDRESS OF PROPERTY MP-3 CABLE VAULT - TEMP. Hose Station

NOTES

DATE 4/16/84

Calculated by T.N.P.

SPRINKLERS NOZZLES			(q) ADDED GPM	(Q) TOTAL GPM	PIPE SIZE In.	PIPE AND EQUIVALENT LENGTH FITTINGS - DEVICES Feet	FRICTION LOSS		(Elevation) STATIC Plus or Minus PSI	REQUIRED PRESSURE PSI	CALCULATN. REFERENCE	
PLAN REF. PT.	TOTAL HEADS	TYPE					PSI/FT. C=120	TOTAL PSI			Sheet No.	Point No.
1	1	1½ hose connection	100	100	2½"	9EL-54, 1T-12 75' Pipe T=141	PRESSURE AT HEAD →			65		
							.0395	5.5695		70.57		2
2	2	1½ hose Conn.	100	200	4"	15EL-150, 2T-40, 1V-2 183-Pipe T=375	.0132	4.95		75.52		3
3	2	-	-	200	4"	6EL-60, 1 45°-4 80-Pipe T=144	.0132	1.90		77.42		4
4	2	-	-	200	4"	3EL-80, 1LT-6, 1V-2 90-Pipe T=178	.0132	2.35		79.77		5
5	2	-	-	200	4"	2T=40, 1V-2 1-Pipe T=43	.0132	.57		80.34		6
6	2	-	-	200	6"	Pipe-2 T=2	.0018	.0036		80.35		Source

2 Hose Stations flowing 100 gpm each @ 65 psi, will require 200 gpm @ 80.35 psi at the Source

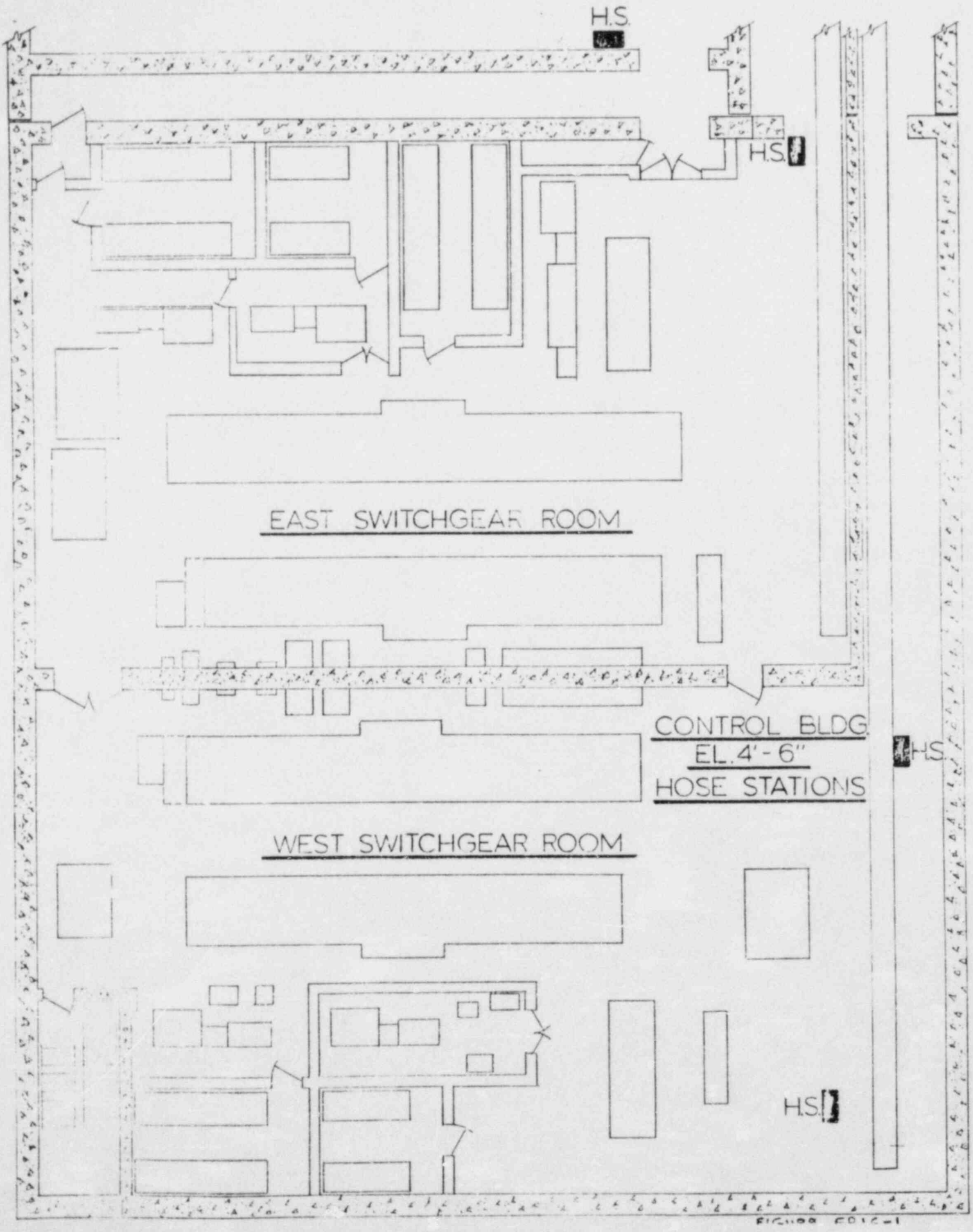
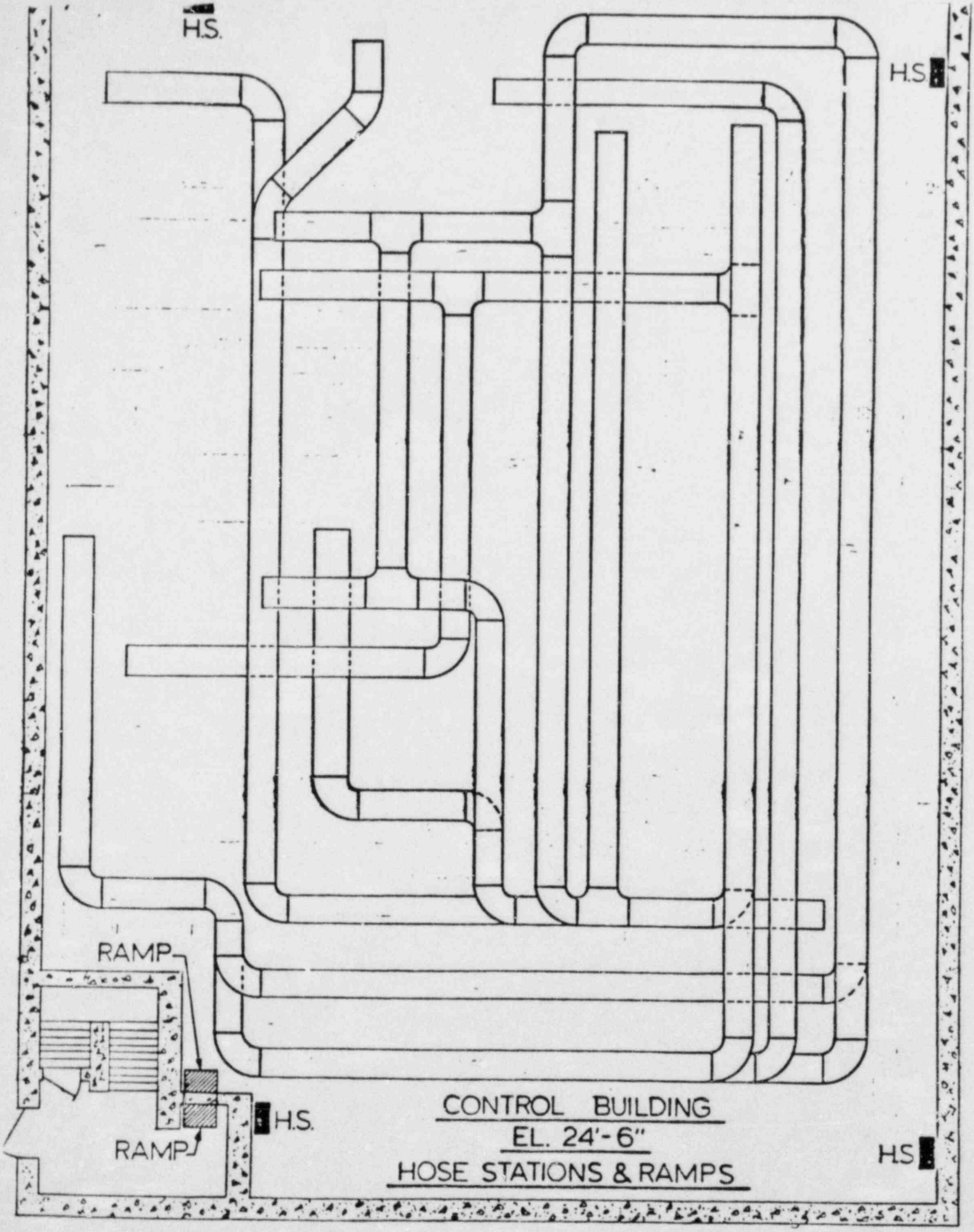
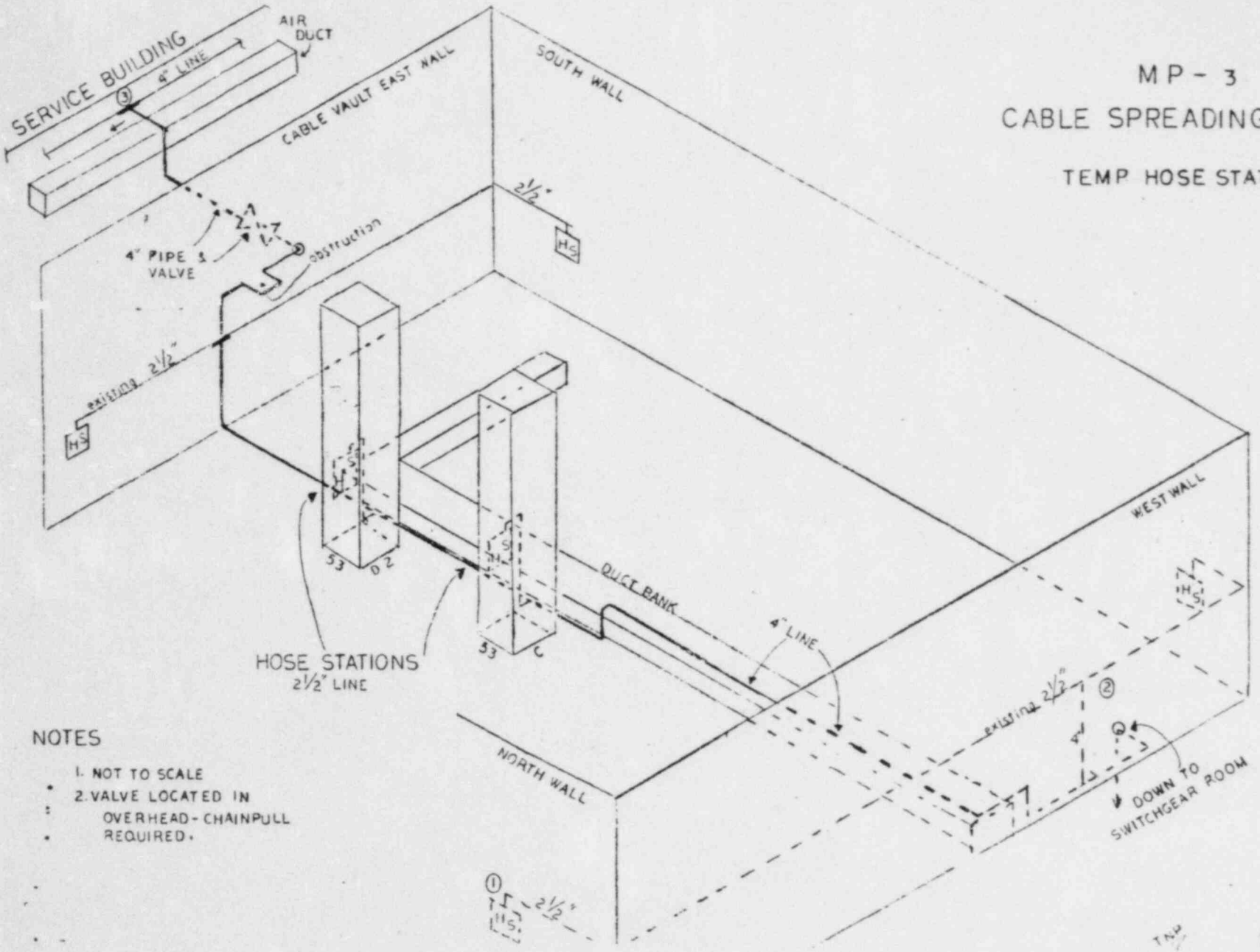

H.S.
H.S.
EAST SWITCHGEAR ROOM
CONTROL BLDG.
EL. 4'-6"
HOSE STATIONS
H.S.
WEST SWITCHGEAR ROOM
H.S.

FIGURE 9.5.1-1



CONTROL BUILDING
EL. 24'-6"
HOSE STATIONS & RAMPS

FIGURE FP16-2



MP - 3

CABLE SPREADING ROOM

TEMP HOSE STATIONS

NOTES

1. NOT TO SCALE
2. VALVE LOCATED IN OVERHEAD - CHAINPULL REQUIRED.

TNP

FIGURE FP16-3

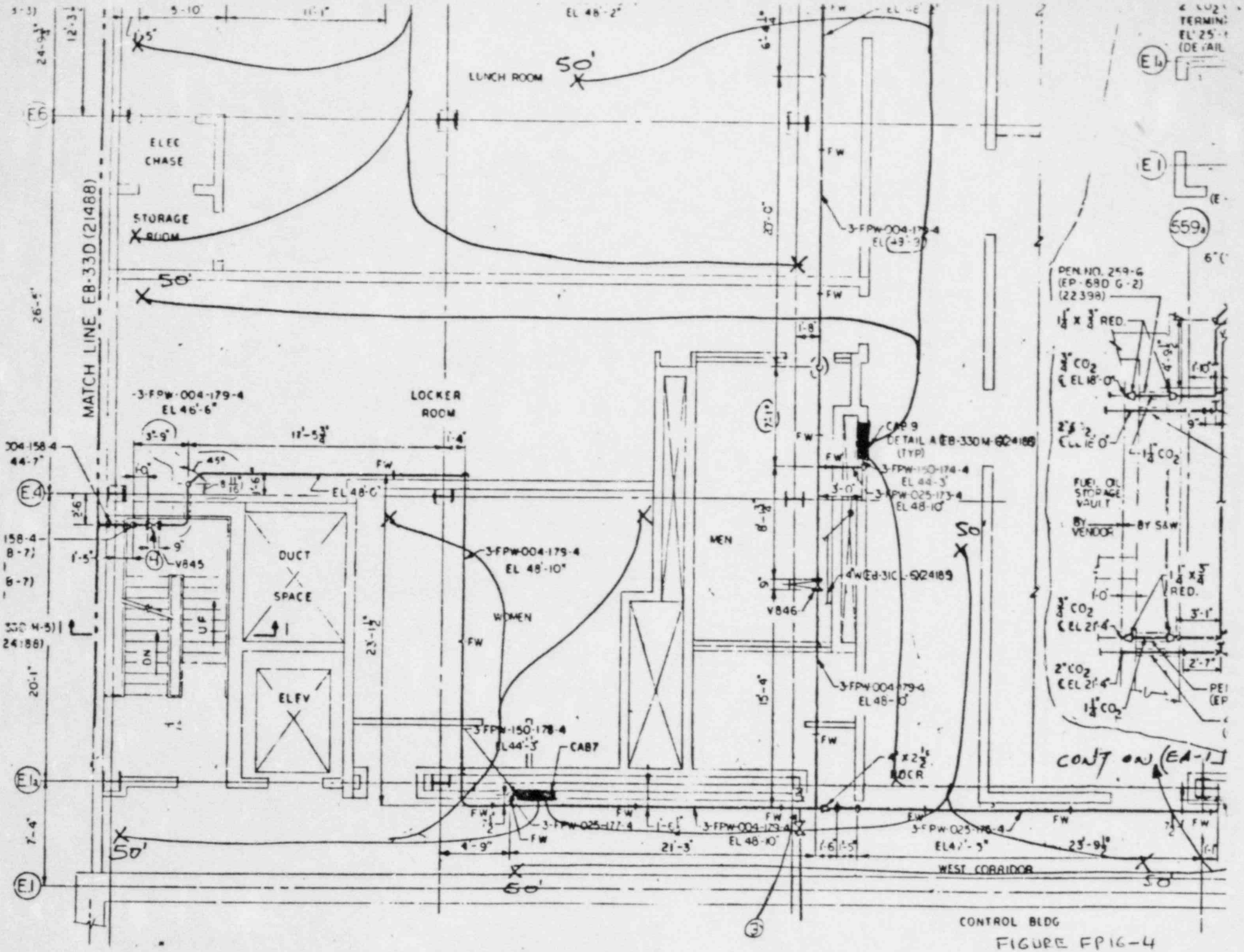


FIGURE FP16-4

Open Items

Chemical Engineering Branch - Fire Protection

FP-17 Hose Station Standpipe Diameters (Draft SER Section 9.5.1.5)

BTP CMEB 9.5-1, Section C.G.c, recommends standpipes to be sized four inches in diameter for multiple hose station supplies and two and one-half inches in diameter for single hose station supplies. The applicant has provided standpipe of a smaller size. We will require that applicant to either verify that the smaller sized standpipe is capable of providing the 500 gpm hose streams at adequate pressure for manual fire fighting operations, or increase the size of the piping in the standpipe system. This is an open item.

Response (3/84)

NNECO has evaluated BTP CMEB 9.5-1, Section 6.c.4 guidelines which address standpipe and hose station recommendations. In response to the referenced guidelines, NNECO is offering the following comments/clarification for your review.

> Millstone Unit No. 3's standpipe system is designed as a Class 3 service which provides both 2½" and 1½" hose connections. The piping utilized for Millstone Unit No. 3's standpipe supply system is four inches (4") in diameter and is capable of providing a minimum flow of 500 gallons per minute with a residual pressure of 65 pounds per square inch at the top-most outlet.
>
> In buildings having large areas which required additional hose stations throughout the building, multiple hose station connections (2½ and 1½ inches) have been provided, in accordance with the guidelines of NFPA 14 "Standpipe and Hose Systems". NNECO trusts that the above information will satisfy any concerns with regard to Draft SER Question FP-17.

Status (3/84)

Open.

Additional Response (4/84)

Additional information developed as a result of the NNECO/NRC March 7, 1984 meeting was presented at the March 28, 1984 Fire Protection Meeting (See Attachment FP17-1). During the meeting the NRC requested that NNECO verify that the fire protection system can provide the flow and pressures required in NFPA-14 for the standpipe of a smaller size than specified in BTP CMEB Section C.6.c considering the operation of two hose stations simultaneously with the largest water demand from suppression system in the vicinity of the hose stations. The Attachment FP17-2 provides the above requested information.

Status (4/84)

Closed.

NORTHEAST UTILITIES
THE CONNECTICUT LIGHT AND POWER COMPANY
THE HARTFORD ELECTRIC LIGHT COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

ATTACHMENT FP 17-1

MP-3 STANDPIPE FLOW TEST

On March 22, 1984, Generation Fire Protection Engineering conducted a water flow test at Millstone Unit No. 3's Turbine Building. The purpose of this flow test was to determine the water supply/pressure available at the most hydralically remote hose station.

The flow test was conducted utilizing two hose stations located in the northeast corner of the Turbine Building (El. 68'5"). Two 2½" fire hoses (100' in length each) were connected to the standpipe system. Attached to the hoses were two standard underwriters' play pipe, 1 3/4" tip. Static and residual pressure readings were obtained using a pressure gage installed in the flow path. Sketch #1 provides the test configuration.

The rate of flow in gallons per minute (GPM) was determined by measuring the velocity pressure of each stream utilizing a pitot gage. The test findings were as follows:

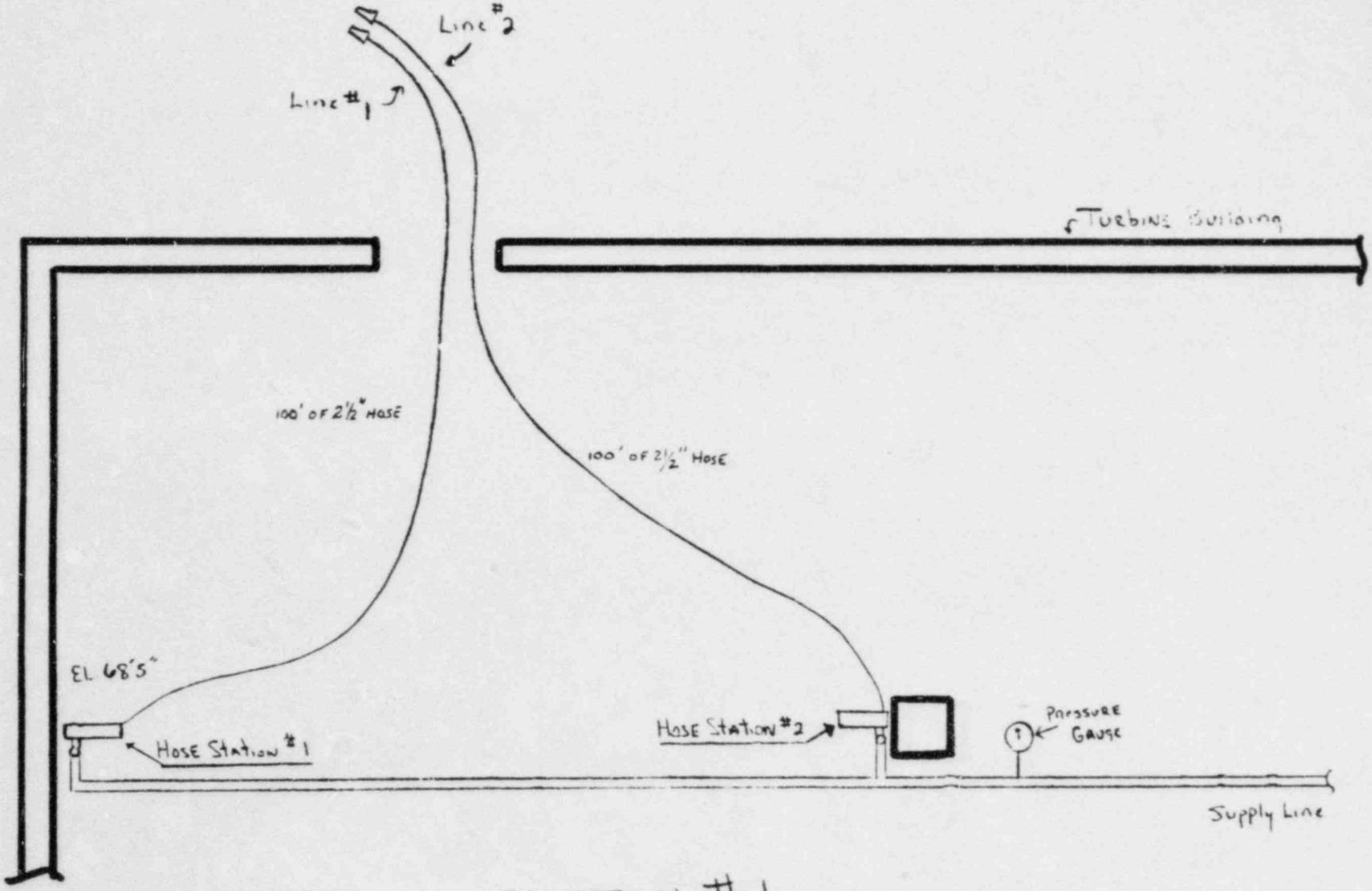
Static Pressure	100 psi
Residual Pressure	80 psi
Hose #1 pitot reading	20 psi or 407 gpm
Hose #2 pitot reading	30 psi or 498 gpm

It was concluded that the most hydraulically remote hose stations (Turbine Building, El. 68'5") can deliver 905 gpm at a pressure of 80 psi which is in conformance with the appropriate sections of NFPA #14.

ANTHONY N. PATRIZZ
Generation Fire Protection Engineering
Generation Engineering Department

ANP/kwa
3/23/84

MP-3 TURBINE BUILDING FLOW TEST



SKETCH #1

ATTACHMENT FP17-2

MP-3 DIESEL GENERATOR HOSE STATION AND SPRINKLER SYSTEM CALCULATION

Floor Area:	29' x 62.5' = 1812.5 sq. ft.
Design Density:	.3 gpm/sq. ft.
Gallonage:	.3 x 1812.5 sq. ft. = 543.75 gals.
120% Overdischarge:	543.75 x 1.2 = 652.5 gallons
Hose Stream:	200 gpm @ 60 psi
Total Gallons (hose & sprinklers):	652.5 + 200 = 852.5 gpm

Water Flow Requirements: 852.5 gpm @ 60 psi

ANPatrizz/kwa
5/02/84

HYDRAULIC CALCULATION SHEET

System No.________ Sheet ________

NAME, ADDRESS OF PROPERTY

NOTES

DATE

Calculated by____________

SPRINKLERS NOZZLES			(q) ADDED GPM	(Q) TOTAL GPM	PIPE SIZE In.	PIPE AND EQUIVALENT LENGTH FITTINGS - DEVICES Feet	FRICTION LOSS		(Elevation) STATIC Plus or Minus PSI	REQUIRED PRESSURE PSI	CALCULATN. REFERENCE	
PLAN REF. PT.	TOTAL HEADS	TYPE					PSI/FT. C= 120	TOTAL PSI			Sheet No.	Point No.
							PRESSURE AT HEAD →				X	X

HYDRAULIC CALCULATION SHEET

System No. 116 Sheet 1

NAME, ADDRESS OF PROPERTY MP-3 D.C Enclosure

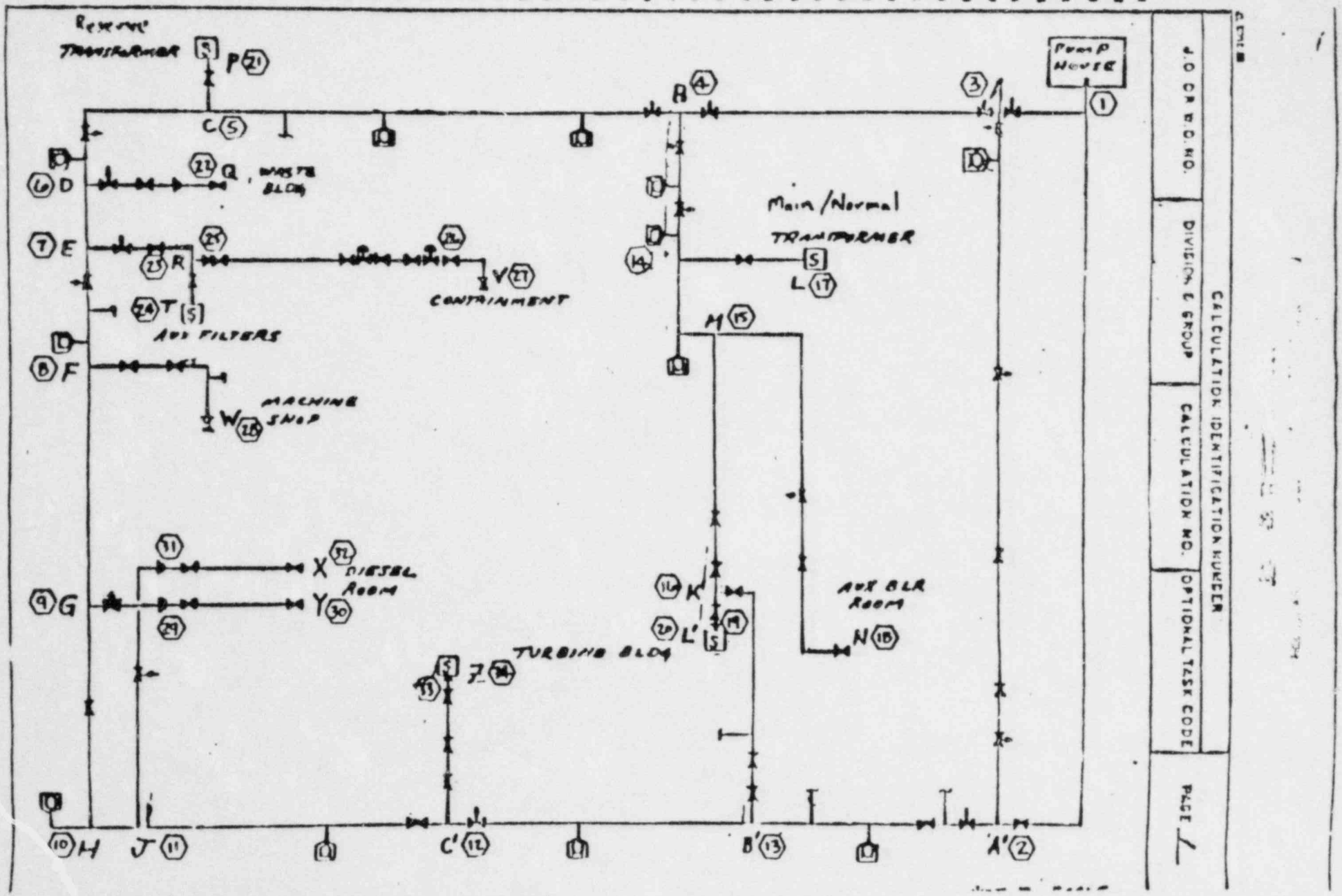
NOTES Hose Station + Sprinklers DATE 5/2/84

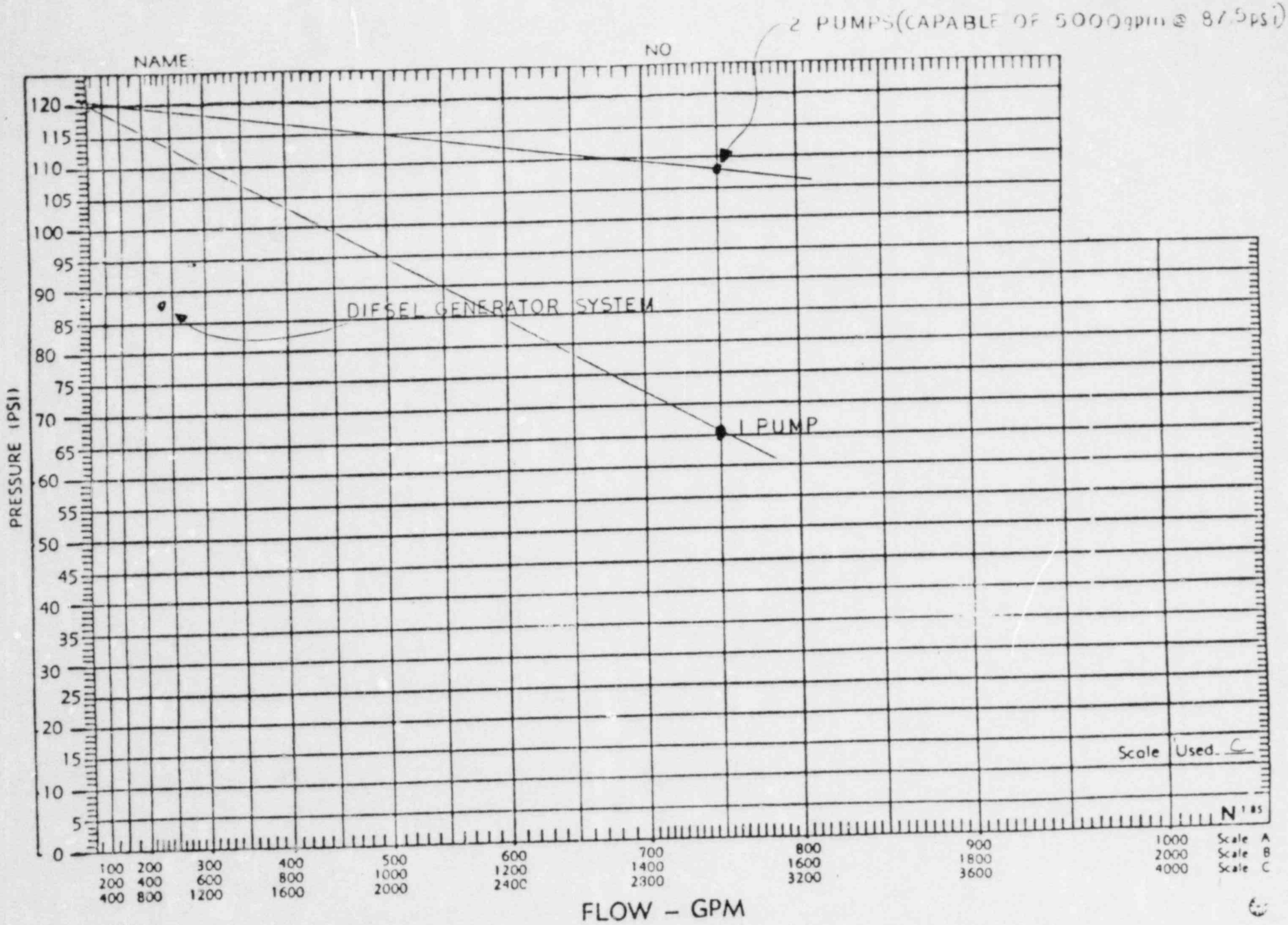
Calculated by TNP

SPRINKLERS NOZZLES: FLOW REF. PT.	SPRINKLERS NOZZLES: TOTAL HEADS	SPRINKLERS NOZZLES: TYPE	(q) ADDED GPM	(Q) TOTAL GPM	PIPE SIZE In.	PIPE AND EQUIVALENT LENGTH FITTINGS + DEVICES Feet	FRICTION LOSS: PSI/FT. C=120	FRICTION LOSS: TOTAL PSI	(Elevation) STATIC Plus or Minus PSI	REQUIRED PRESSURE PSI	CALCULATN. REFERENCE: Sheet No.	CALCULATN. REFERENCE: Point No.
	2-S					Pipe = 22, 2GV=4	PRESSURE AT HEAD →			60.03		
	3-H		860	860	4"	5 ELL = 50, 1EE=4 Total = 80	.196	15.68		75.68		31
31	"			860	6"	Pipe = 61, 1GV=3 3ELL=42, 1EE=42 1T=35 Total=178	.0366	4.738	5.	85.41		11
11	"			860	12"	Pipe = 160 1GV=8 Total=186	(C-140) .0009	.1674		85.58		12
13	"			860	12"	Pipe = 245, 2GV=16, 2EE=35 Total=296	.0009	.2664		85.85		13
13	"			860	12"	Pipe 195, 2GV=16, 1EE=17, 2ELL=72 Total=300	.0009	.27		86.12		2
2	"			860	12"	Pipe=1081, 7GV=56, 12ELL=431, 1EE=277 3Tee=240 Total=2085	.0009	1.877		88.00		1

HOSE STATION & SPRINKLERS REQUIRE 860 GPM AT 88.00 PSI

NOTE: NO CREDIT TAKEN FOR (UNDERGROUND) LOOP


Reserve Transformer
P 21
C 5
B 4
3
Pump House
1
6 D
22 Q
Waste Bldg
7 E
23 R
24 T 5
Adv Filters
25
26
V 27
Containment
Main / Normal Transformer
5 L 17
14
M 15
8 F
W 28
Machine Shop
11
X 32
Diesel Room
9 G
Y 30
29
14 K
20 L' 5
19
Aux Blr Room
N 18
Turbine Bldg
5 33
J 34
10 H
J 11
C' 12
B' 13
A' 2
P.O. or B.O. No.
Division 2 Group
Calculation No.
Optional Task Code
Calculation Identification Number
Page 1


2 PUMPS (CAPABLE OF 5000gpm @ 87.5PSI)
NAME
NO
DIESEL GENERATOR SYSTEM
1 PUMP
PRESSURE (PSI)
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
100 200 300 400 500 600 700 800 900 1000
200 400 600 800 1000 1200 1400 1600 1800 2000
400 800 1200 1600 2000 2400 2300 3200 3600 4000
Scale A
Scale B
Scale C
Scale Used. C
N 185
FLOW – GPM

Form No. 3016

Open Items

Chemical Engineering Branch - Fire Protection

FP-18 Control Room Console Smoke Detectors (Draft SER Section 9.5.1.6)

Smoke detectors are not provided inside control room cabinets and consoles. We will require the applicant to install such detectors in accordance with our guidelines in BTP CMEB 9.5-1, Section C.7.b. This is an open item.

Response (2/84)

NNECO has evaluated the guidelines of BTP CMEB 9.5-1, Section C.7.b to Millstone 3's control panel design with regards to smoke detection within the control cabinets. As a result of this evaluation, it is NNECO's position that an equivalent level of fire detection/protection for the control cabinets has been provided and therefore, NNECO is requesting that a deviation to BTP CMEB 9.5-1, Section C.7.b guidelines be granted based on the following information:

Control Room Fire Protection Features

Millstone 3's Control Room has been provided with a general area smoke detection system. This detection system utilizes a combination of photoelectric and ionization type smoke detectors in order to provide an early warning of a smoke/fire condition (refer to the attached drawing for the detector layout). Since the major fire loading within the control cabinets is cable insulation, which represents a smoldering type fire, detectors are located at the ceiling level of the room utilizing the applicable sections of NFPA 72E as guidance. In addition, cable tray arrangements and ventilation paths, both in the room and control cabinets were considered when determining the appropriate detector location. Alarm annunciation of a detector will occur at both the main control board and the fire control panel. Both locations are provided with an audible/visual alarm to alert personnel of a smoke/fire condition.

Portable fire extinguishers have been provided throughout the control room area in accordance with the guidelines of NFPA 10 (Portable Fire Extinguishers). Selection of the type of extinguishers provided was based on the postulated fire within the immediate area. In addition, hose stations and fire extinguisners have been provided in the adjacent area (Service Building) to support manual firefighting efforts.

The control room is manned on a continuous basis by NNECO's Operation Department. On each shift, selected operations personnel, who are fully trained fire brigade members, are assigned the responsibility of supporting Millstone 3's fire brigade assignment for that shift. It can be expected, that any fire within a control cabinet will quickly be detected, controlled and extinguished by these qualified fire brigade personnel.

FP-18 Cont.

Control Cabinet Design Features

Millstone 3's control cabinets are constructed of metal and therefore are rated as non-combustible. The major fire loading within the cabinets is cable insulation which conforms to IEEE 383 requirements. Since the chemical composition of the cable insulation offers an inherent fire retardent characteristics, a postulated fire within the cabinets is expected to result in either self-extinguishing or of a slow burning, smoldering type.

Class 1E circuits providing instrumentation and control functions are separated from their redundant class 1E circuits as well as from non-class 1E circuits in accordance with Regulatory Guide 1.75. Separation of redundant circuits has been achieved by either distance or the employment of metal barriers/enclosures. The electrical loads for the control cabinet wiring are of the low voltage type. Considering the characteristics of the cable insulation and the low voltage currents within the circuits, the potential for sufficient heat to be generated from an electrical fault to ignite adjacent cabling is remote.

Natural ventilation paths within the control cabinets move in the upward direction toward the ceiling area. Louvers located in the bottom sections of the cabinets provide the means for air intake. Air exhaust and the removing of any heat build-up within the cabinet is achieved by openings provided for cable routing at the top of the cabinet. This upward ventilation path will not only remove any heat generated but will also carry any products of combustion upward to the room ceiling area which is provided with smoke detectors, thus resulting in the detection and early warning of a smoke/fire condition.

Control Cabinet Fire Scenario

As previously discussed, NNECO has postulated that the only fire that is likely to occur is a smoldering, slow-burning type fire. When evaluating the possible damage that could result from such a fire, it was established that there are several means of detecting a fire at its early stages. Since the control room is manned on a continuous basis, NNECO believes that credit for operations personnel's sense of sight and smell should be considered as part of means for detecting a fire. Whether by the sight of smoke or smell of burning material, prompt operator action to control and extinguish the fire will occur. Considering the human factor and the installed early warning smoke detection system, it is NNECO's belief that an equivalent level of fire detection has been provided for the control cabinet in lieu of installing smoke detectors within the cabinet themselves. It should be noted that even postulating the worst case fire, one which is <u>not</u> detected and is allowed to develop into a fire which causes major

FP-18 Cont.

damage within the control cabinet, safe shutdown capability would not be affected. Millstone 3's design for achieving safe shutdown has provided alternate safe shutdown capability from dedicated control cabinets located in the switchgear rooms of the Control Building (elevation 4'6"). Therefore, a loss of the Control Room's main control cabinets would not affect the ability of the plant to achieve safe shutdown.

Status 2/84

Open.

Revised Response (3/84)

Smoke detection for the control room cabinets and consoles was discussed with the NRC at a meeting on February 16, 1984. Based on the type of combustibles and continuous manning of the control room, it was agreed that the main control board was the only cabinet/enclosure of concern. It should be noted that even with a total loss of the main control board, safe shutdown capability would still exist. Sketch 1 illustrates a layout of the control room and the detection system concept.

The following information is presented for clarification and consideration.

- The ventilation path within the main control board moves in an upward direction towards the ceiling area. Fixed open louvers located in the bottom of the control board provide the means for air intake. Air exhaust and the removal of any smoke/heat buildup is achieved by two 1890 cfm exhaust ducts located at the top (ceiling) of the main control board (refer to Sketch #2). The upward ventilation path will not only remove any smoke/heat generated but will also carry any products of combustion to the duct above.

- The cable within the main control board is qualified to the requirements of IEEE 383 and therefore has inherent fire retardant characteristics.

- The Class 1E circuits which provide instrumentation and control functions are separated from their redundant Class 1E circuits as well as from non-class 1E circuits in accordance with Regulation Guide 1.75. Separation of redundant circuits is achieved by either distance or use of metal barriers/enclosures.

- Wiring and cabling within the main control board are of low voltage.

FP-18 Cont.

- The type of fire postulated for this area is a slow burning/smoldering type fire, in which a large quantity of smoke would be generated with very little heat damage incurred.

- A general area detection system provides for both photoelectric and ionization smoke detectors within the control room (refer to Sketch #1).

- The control room is continuously manned by operations personnel. It must be recognized that the senses of sight and smell can realistically detect a smoke/fire condition. On each shift, selected operations personnel, who are fully trained fire brigade members, will be assigned the responsibility of supporting Millstone Unit No. 3's fire brigade assignment for that shift. It can be expected that any fire within the main control board will be quickly detected, controlled, and extinguished by qualified fire brigade personnel.

NNECO concludes that sufficient justification exists that the possibility of having an undetected fire within the main control board is extremely remote. Even with this, NNECO will commit to the installation of a detection scheme for the main control board to increase the level of protection. Because the main control board is of enclosed metal design, one detection technique to be considered will be a duct detection system. NNECO concludes that this justification and position will completely satisfy the NRC's concerns.

Status 3/84

Open.

Revised Response (4/84)

It is NNECO's position that the possibility of having an undetected fire within the main control board is extremely remote. Even though sufficient justification of adequate detection exists, NNECO will commit to the installation of an ionization smoke detection system within the main control board to increase the level of detection. Sketch 3 illustrates the layout of the main control board and the detection system concept. This concept will provide complete coverage within the control board by detecting any postulated fire in its incipient stage. The early warning system will also allow control room personnel to take prompt action to control/extinguish any fire within the main control board.

The following information is presented for clarification and consideration.

- The ventilation path within the main control board moves in an upward direction towards the ceiling area. Fixed open louvers located in the bottom of the control board provide the means for air intake. Air exhaust and the removal of any smoke/heat buildup is achieved by two 1890 cfm

exhaust ducts located at the top (ceiling) of the main control board. The upward ventilation path will not only remove any smoke/heat generated but will also carry any products of combustion to the duct above.

- The cable within the main control board is IEEE 383 which has inherent fire retardant characteristics.

- The Class 1E circuits which provide instrumentation and control functions are separated from their redundant Class 1E circuits as well as from non-class 1E circuits in accordance with Regulatory Guide 1.75. Separation of redundant circuits is achieved by either distance or use of metal barriers/enclosures.

- Wiring and cabling within the main control board are of low voltage.

- The type of fire postulated for this area is a slow burning/smoldering type fire, in which a significant amount of smoke would be generated with very little heat damage incurred.

- A general area detection system provides for both photoelectric and ionization smoke detectors within the control room.

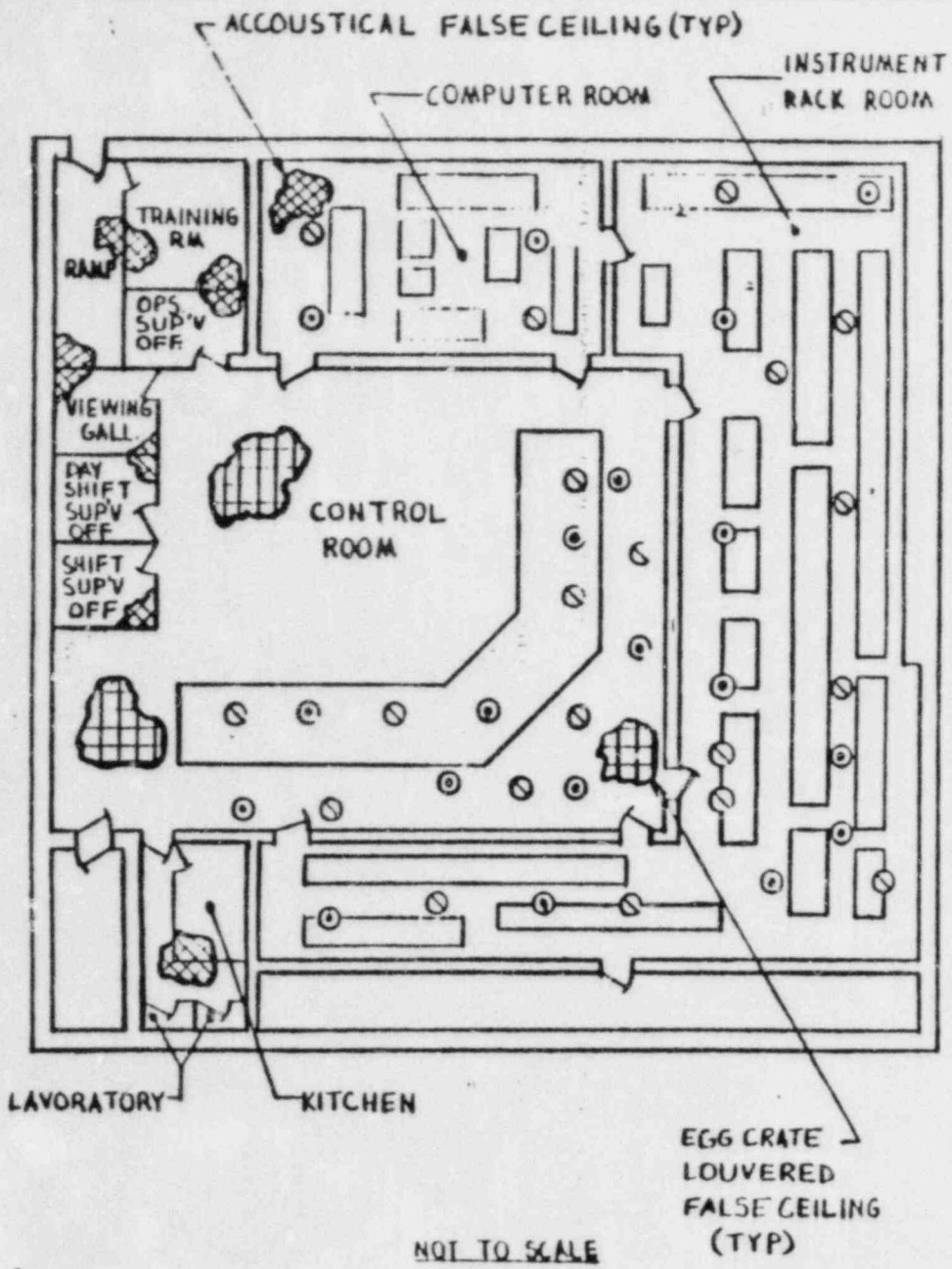
- The control room is continuously manned by operations personnel. It must be recognized that the senses of sight and smell can realistically detect a smoke/fire condition. On each shift, selected operations personnel, who are fully trained fire brigade members, will be assigned the responsibility of supporting Millstone Unit No. 3's fire brigade assignment for that shift. It can be expected that any fire within the main control board will be quickly detected, controlled, and extinguished by qualified fire brigade personnel.

NNECO concludes that with the increased level of detection within the main control board and the above justification, this position will completely satisfy the NRC's concerns.

Status (4/84)

Closed.

SKETCH 1



NOT TO SCALE

GENERAL NOTES

1. UNDER FLOOR AREAS OF INSTR. RK. RM. AND COMP. RM. NOT SHOWN
2. ⊙ - DEPICTS PHOTOELECTRIC TYPE SMOKE DETECTOR
3. ⊘ - DEPICTS IONIZATION TYPE SMOKE DETECTOR
4. THERE IS A FALSE CEILING INSTALLED IN THE CONTROL ROOM. SMOKE DETECTORS ARE INSTALLED ABOVE THIS FALSE CEILING. NO SMOKE DETECTORS ARE INSTALLED IN THE CABINETS OR CONSOLES OF THIS AREA.
5. THERE IS A FALSE CEILING INSTALLED IN THE COMP. RM. SMOKE DETECTORS ARE INSTALLED BELOW THIS FALSE CEILING. NO SMOKE DETECTORS ARE INSTALLED IN THE CABINETS OR CONSOLES OF THIS AREA.
6. THERE IS NO FALSE CEILING IN THE INST. RK. RM. AND ALSO THERE ARE NO SMOKE DETECTORS INSTALLED IN THE CABINETS OR CONSOLES OF THIS AREA.

REF: 12179-EE-51Q-3

SKETCH SK-Q280.24 1 OF 1

TITLE: CONTROL ROOM COMPLEX - SMOKE DETECTOR LAYOUT

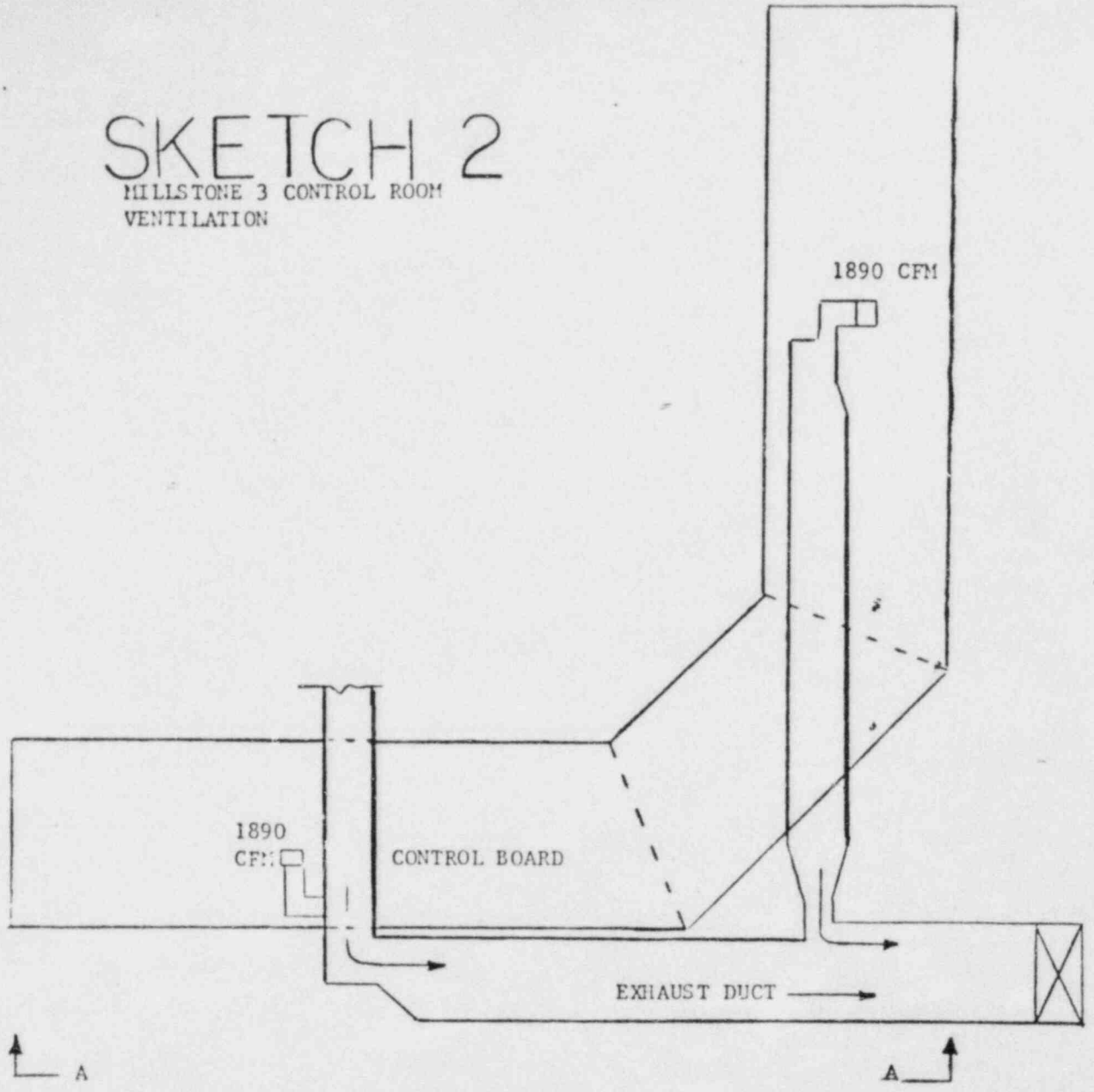
	1	2	3	4	5
DATE					
PREP.					
CHECK					
APPR.					

▲ 5215.9

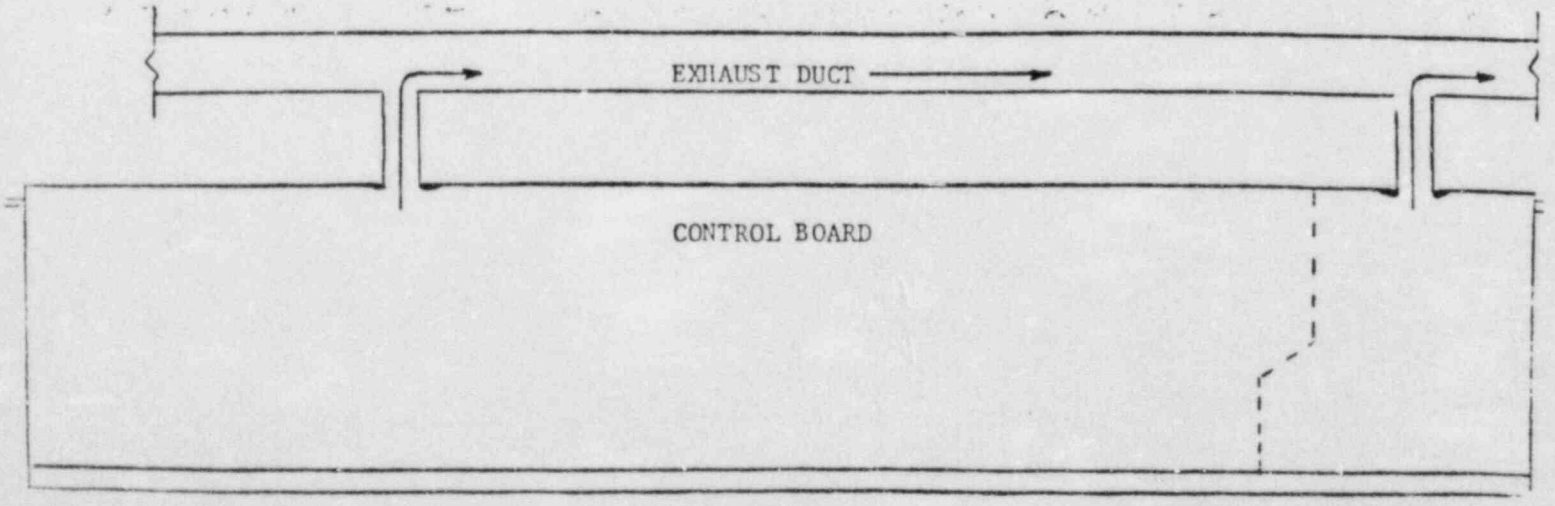
STONE & WEBSTER ENGINEERING CORPORATION

SKETCH 2

MILLSTONE 3 CONTROL ROOM
VENTILATION



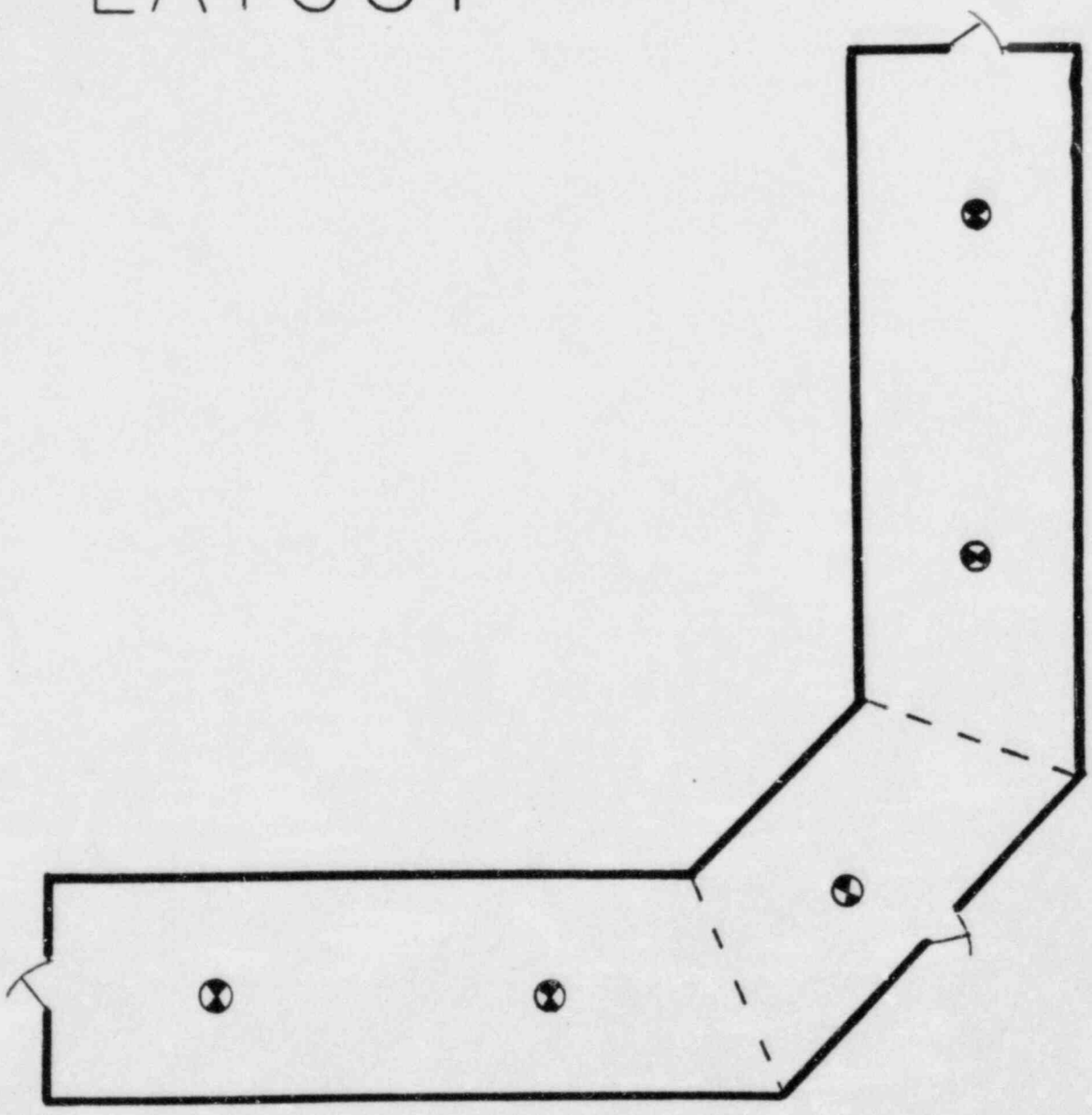
Ref. S&W Dwg. No. 12179-EB-39C-12



(Section A-A)

Ref. S&W Dwg. No. 12179-EB-39F-11

CONTROL PANEL SMOKE DETECTOR LAYOUT



KEY ⊗ = SMOKE DETECTOR

SKETCH - NO SCALE

SKETCH 3

Open Items

Chemical Engineering Branch - Fire Protection

FP-21 Emergency Diesel Generator Day Tanks (Draft SER Section 9.5.1.6)

The day tanks are not separately enclosed from the diesel generators, nor are they in a diked enclosure. We will require the applicant to meet the guidelines of BTP CMEB 9.5-1, Section C.7.i. This is an open item.

Response (3/84)

BTP CMEB 9.5-1, Section C.7.i permits day tanks with a total capabity up to 1,100 gallons within the diesel generator area under the following conditions:

1. The day tank is located in a separate enclosure with a minimum fire resistance rating of three hours, including door penetrations. These enclosures should be capable of containing the entire contents of the day tanks and should be protected by an automatic fire suppression system, or

2. The day tank is located inside the generator room in a diked enclosure that has sufficient capacity to hold 110% of the contents of the tank or is drained to a safe location.

Present design includes a day tank with a capacity of 550 gallons, located within each diesel generator area.

Both diesel generator/day tank areas are completely redundant and physically separated from each other and from other areas of the plant by fire barriers having a minimum fire resistance rating of three hours. A dip pan design capable of holding 160 gallons of fuel for each day tank is provided for both areas. A preaction sprinkler system, activated by heat detectors, is also provided for each area. In addition, ultra violet (UV) fire detectors are installed to provide both a local alarm and annunciation in the control room. Fire hose stations, portable fire extinguishers, and a yard hydrant fire protection system are all available for backup manual protection. Floor drains connected to an oil separator located outside of the area allow for adequate drainage in both areas (See existing design attachment I, sketch I).

An evaluation was conducted to determine the effects of fire involving the diesel generator only, day tank only and combination diesel generator and day tank. It was concluded for all three fire scenarios that the end result would be the same. The fire would render the specific diesel generator inoperative. It should be noted that this conclusion is based on no operator action or failure of the installed preaction sprinkler system. Even if this occurred, there would be no safe shutdown consequences since the system (diesel generator/day tank) is completely redundant and physically separated by a three hour fire barrier. Because of this redundancy, the unaffected generator/day tank would be capable of providing on-site power.

FP-21 Cont.

Although sufficient justification exists to assure that safe shutdown can be achieved, NNECO proposes to modify the existing (Sketch FP-21-1) fuel collection system to provide a positive means of collecting/ drainage/fuel oil (See FP21-2). The proposed collection system will be hard piped to an underground storage oil separator tank and the total capacity of this collection/drainage system will contain 110% of the day tank capacity. NNECO trusts that this proposed collection/drainage system concept will satisfy the fire protection concerns for the Diesel Generator Rooms.

Status (3/84)

Closed.

Additional Response (4/84)

Additional information pertaining to the day tank drip pan/oil collection design was provided using the attached sketches and calculations to the NRC Staff at the March 28, 1984 Fire Protection Meeting.

Status (4/84)

Closed.

ATTACHMENT TO FP-21

OIL SEPARATOR & DRAIN LINE CAPACITY

Objective: To determine if oil separator and drain lines (cast iron soil pipe) can hold 100% and 110% capacity of diesel oil day tank (550 gals) should a leak occur.

Method of Calculation:
- Volume determined by multiplying .7854 x ID^2 x L of pipe.
- Capacity determined by multiplying Volume x 7.48052 (gallons).

Notes:
- Diesel day tank capacity, 100% = 550 gals. 110% = 605 gals.
- Oil Separator capacity, 500 gals.

6" pipe

Vol. per 1 foot of pipe, in cubic feet = .7854 x (ID^2) x 1
= .7854 x .25 x 1
= .'9635

.19635 x 7.48052 = 1.47 gals. per 1 foot of 6" pipe.

4" pipe

Vol. per 1 foot of pipe, in cubic feet = .7854 x (ID^2) x 1
= .7854 x .1111 x 1
= .08726

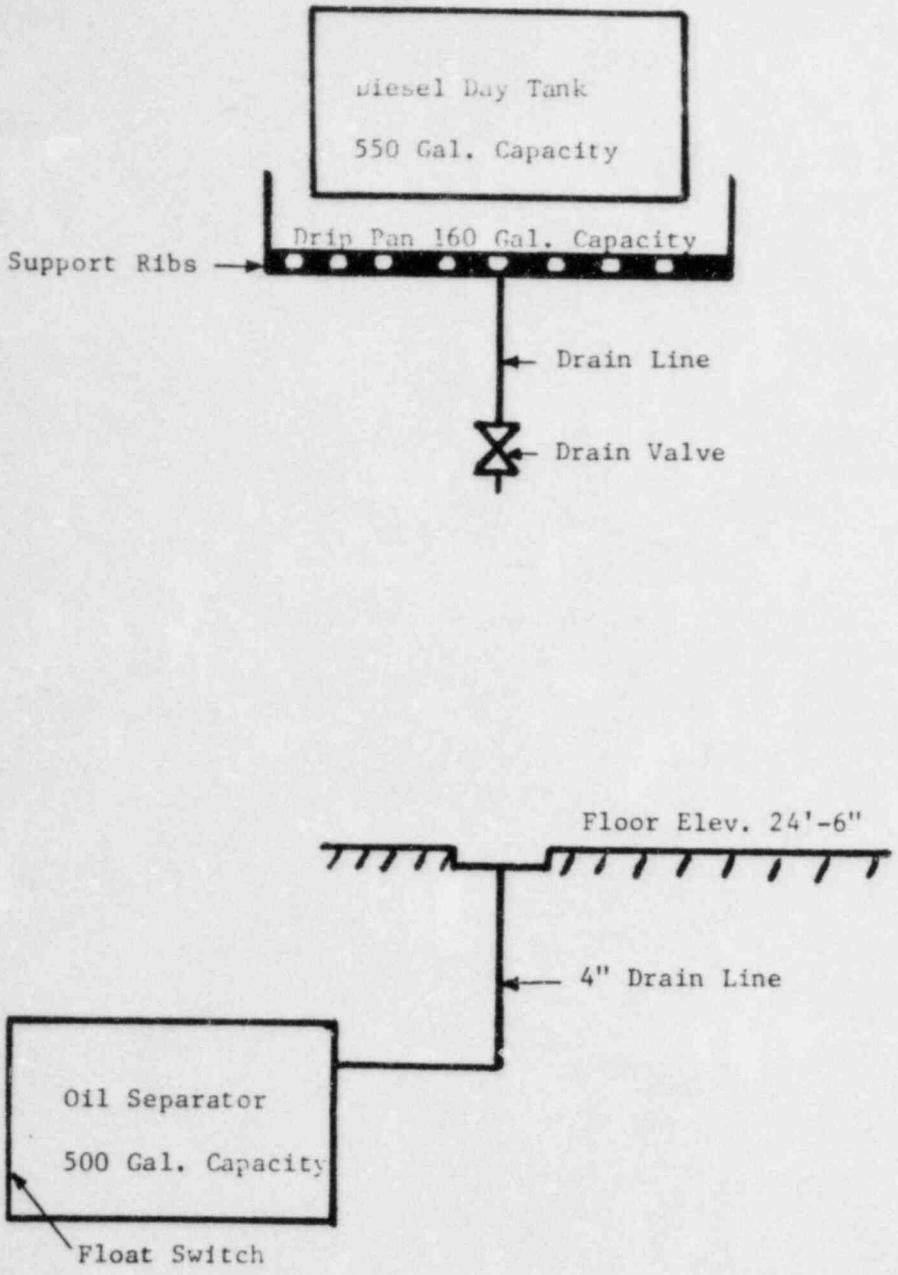
.08726 x 7.48052 = .65 gals. per 1 foot of 4" pipe.

Equivalent lengths of pipe in system

6" = 52.5 ft.
4" = 90

6" - 52.5 x 1.47 gal.	= 77.175	gals.
4" - 90 x .65	= 58.5	gals.
oil separator	= 500	gals.
	635.675	

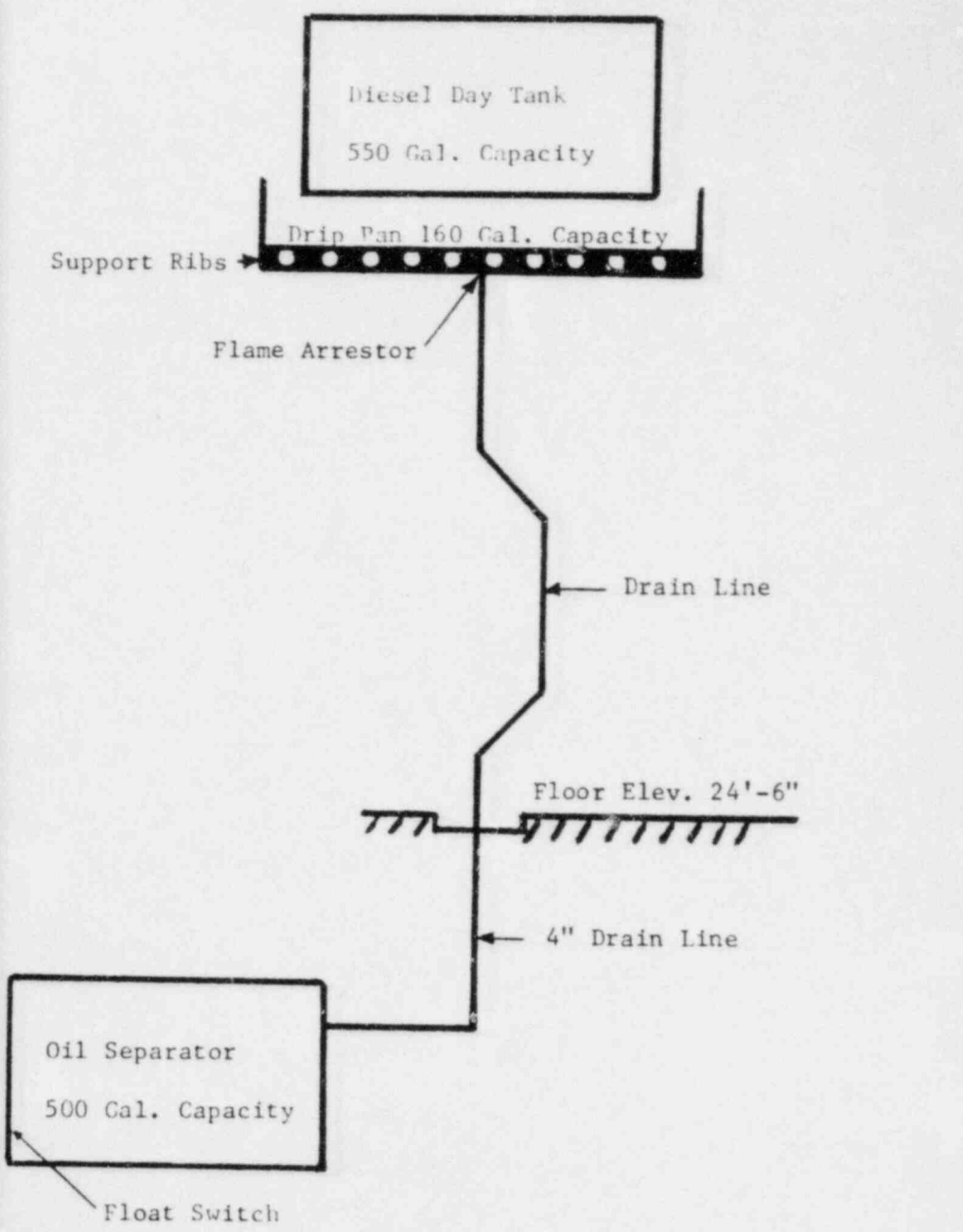
SKETCH FP21-1



EXISTING DESIGN

(SECTIONAL VIEW)

SKETCH FP21-2

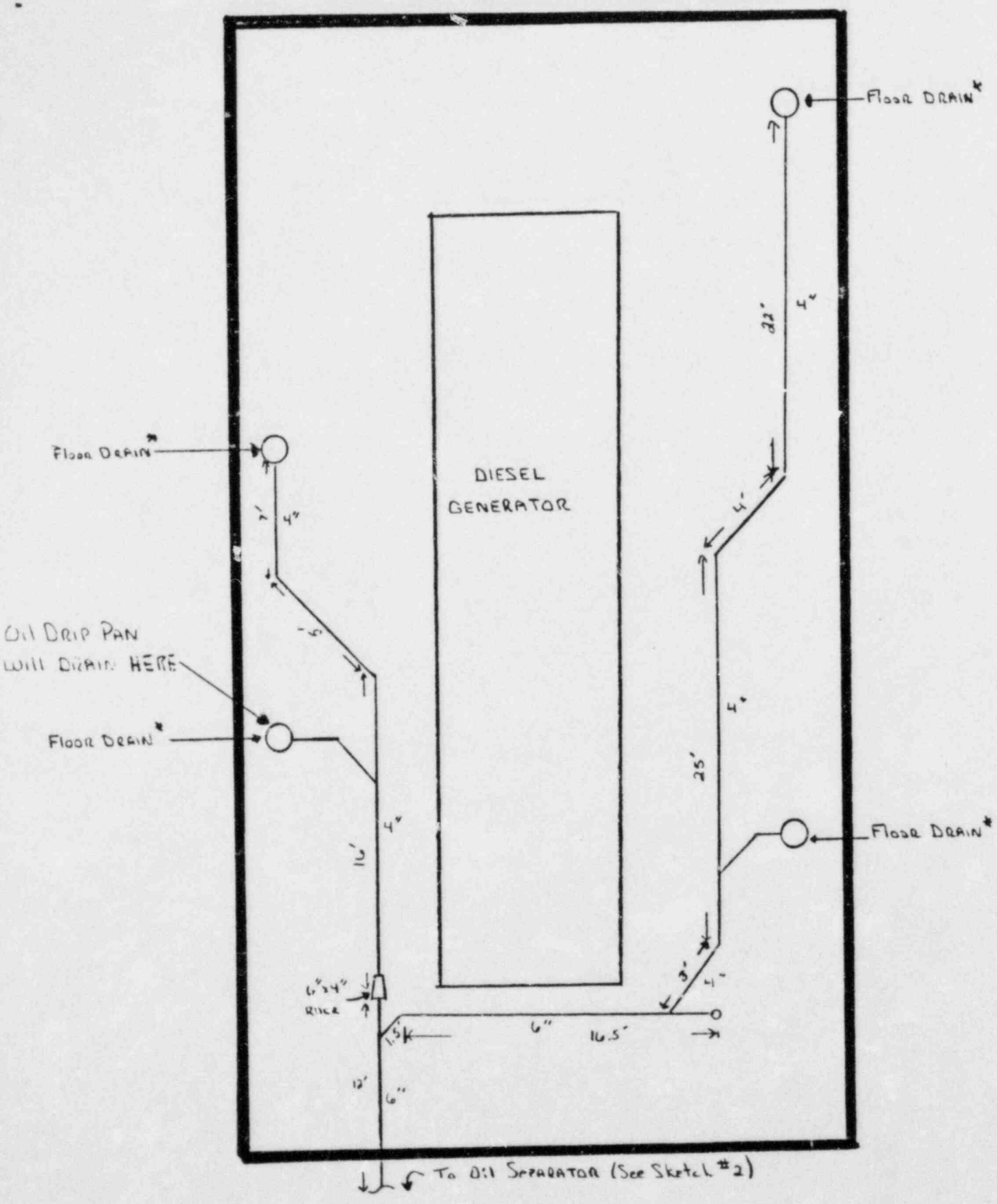


PROPOSED DESIGN CONCEPT

(SECTIONAL VIEW)

Ref. S&W Dwg. No. 12179-BS-485

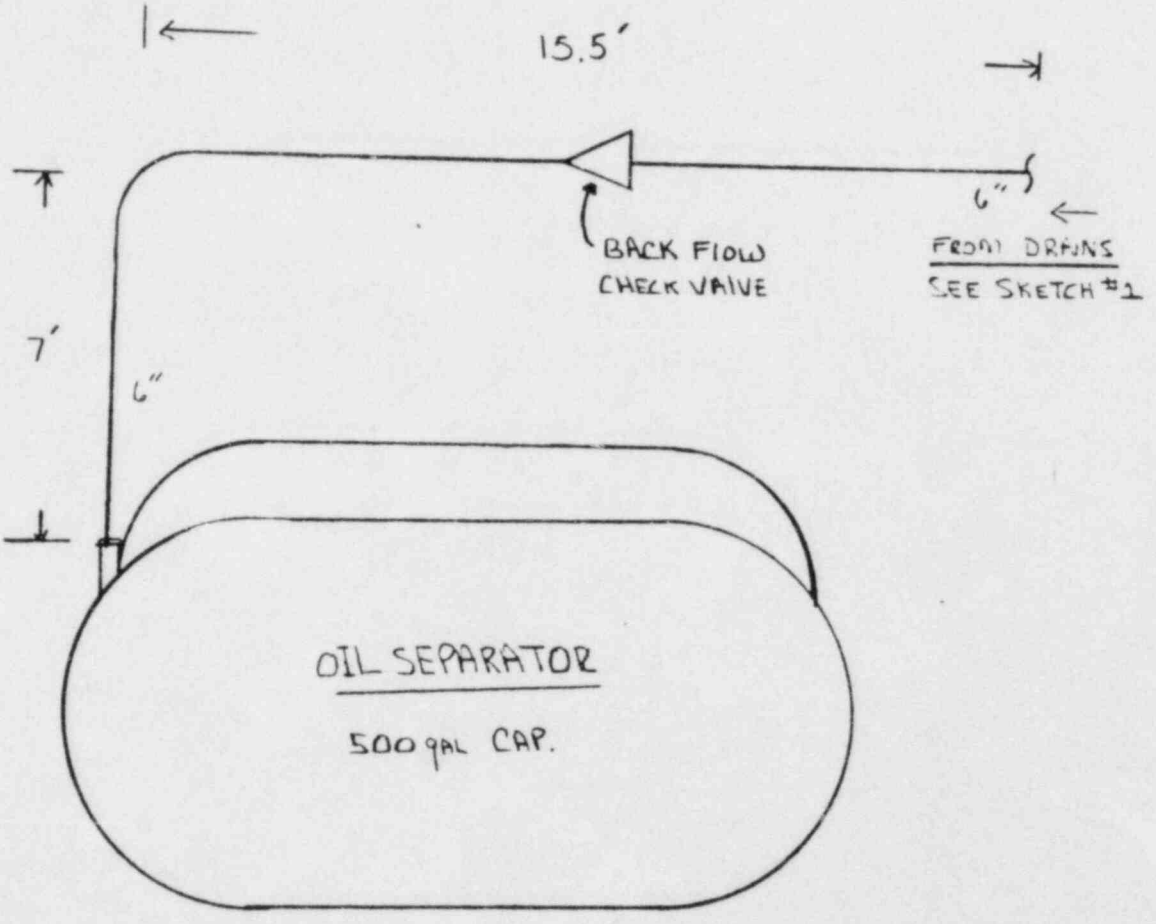
SKETCH # FP21-3



* Drain will have Back Flow check valves installed

Not to Scale

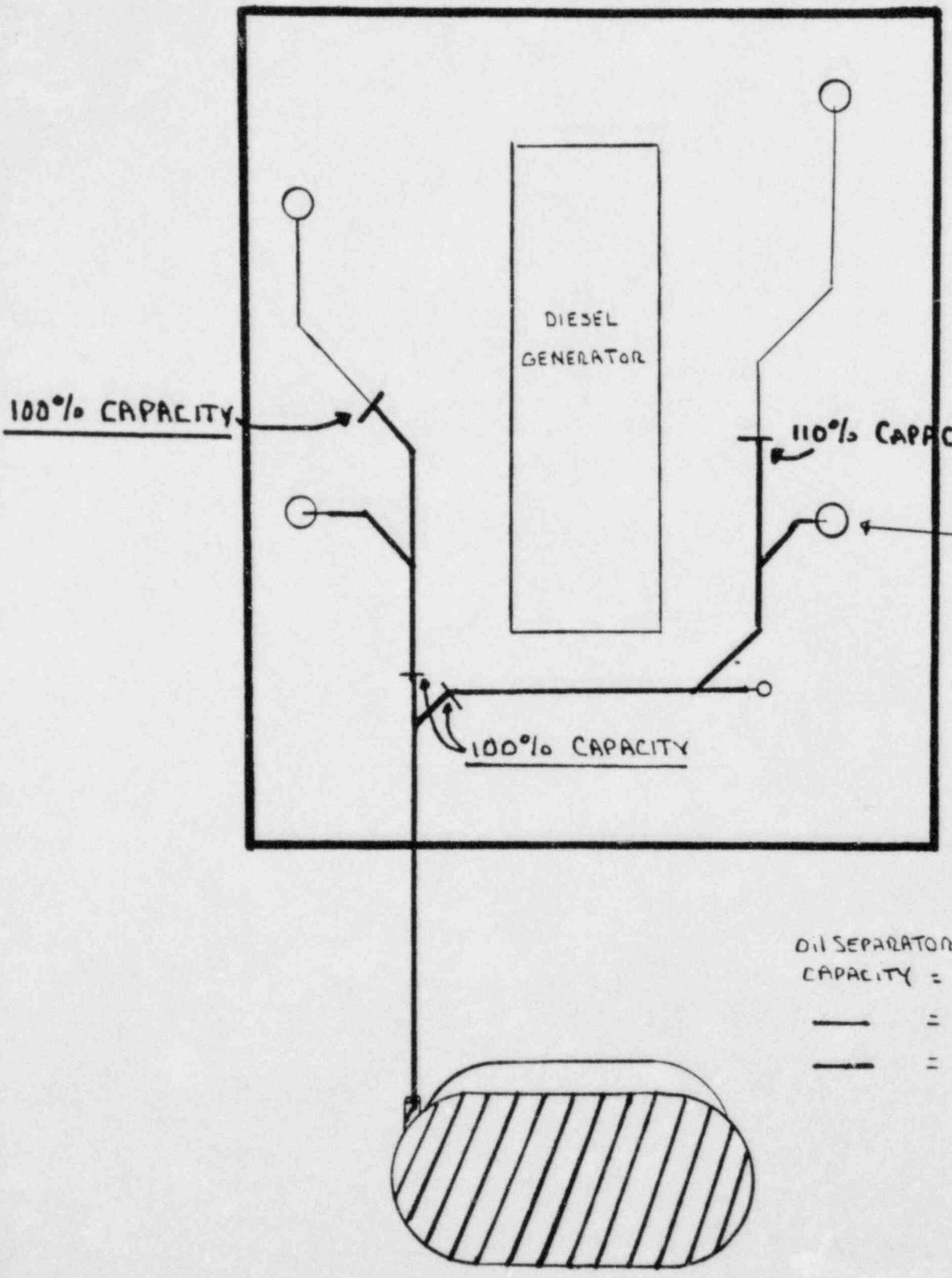
SKETCH # FP21-4



ALL VALVES + ACCESSORIES
NOT SHOWN

Not to Scale

SKETCH # FP 21-5



OIL SEPARATOR + DRAIN LINE
CAPACITY = 635.7 gals
——— = 550 gals
— — = 605 gals

Not to Scale

OIL SEPARATOR
500 Gals.