Condition Assessment & Master Planning Final Report

DEPARTMENT OF DEVELOPMENTAL SERVICES

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Mazzetti and Associates, Inc.

VANIR

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DDS Developmental Centers

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Mechanical Systems

Electrical Systems

Appendix

Vanir Construction Management, Inc./Mazzetti & Associates
Lanterman Developmental Center
Facility Summary
September 11, 1998

Summary

Purpose: **M&A working under contract with Vanir Construction Management, Inc. performed its analysis of the five Department of Developmental Services (DDS) Developmental Center sites** with a number of purposes in mind. First, we assessed each of the utility systems for its ability to serve its intended mission, given current conditions. That is, we assessed these systems against the criteria of code compliance, capacity, cost-effectiveness of operation, reliability, and appropriateness for the intended mission. Second, we re-assessed the systems in the context of changes proposed by the overall Master Plan, within various options.

Method: Representatives of M&A begin by studying available documents relating to the site-wide and building utility systems. M&A then visited the respective sites. These visits included detailed interviews with representatives of the facility with specific knowledge of each of the utility systems. Next, M&A toured the sites, studying the actual installation in company with facility representatives in order to make a visual inspection of the actual condition of the systems. Finally, we concluded by synthesizing these results and analyzing them in the context of the initial criteria, and in terms of the overall Master Plan.

Results: The results of this process are summarized in the report which follows.

I. **Chilled Water System:** The site is presently served by four water-cooled, centrifugal chillers, all of which are located in a separate building near the Central Plant. Three are manufactured by Trane, 437 tons each, and of 1978 vintage. The third is a York unit, 581 tons, installed in 1985. All four are using R-11 refrigerant. All four appear to be in good condition. The existing demand is approximately 1471 tons, 3550 gpm at 10 degree differential temperature.

There are three chilled water pumps and a jockey pump. Nominally, the 100 hp pump is for the York, and the two 50 hp pumps are for the three Tranes. All three pumps are fitted with variable speed drives. Careful review of the drawings of the existing distribution system indicates that both the pumps and the distribution piping are undersized for the existing demand.

There are two cooling towers. One, 3-cell unit, is manufactured by Pritchard, and was installed in 1975 for the three Trane chillers. The tower contains asbestos (transite), but appears to be in good condition. The second is an Evapco, installed in 1985 for the York chiller. There is one condenser water pump per cell. The towers appear to be slightly under-sized for the existing installed chiller capacity.

Chilled water is distributed throughout the site in buried steel piping, which was installed in 1975. The supply and return lines leaving the building are 6" for the Acute Hospital and 12" for the balance of the site. Combined, they would be appropriate for 2,250 GPM. The existing chilled water system presently feeds all buildings except: The Activity Center, the Main Kitchen, the School and Auditorium, one-half of the Administration Building, Rehab Engineering, the Fashion Center and R2 through R5.

The Acute Hospital was originally supplied by a dedicated absorption chiller, which has since been removed, and the building connected to the campus chilled water distribution system. Two 40 hp main circulating pumps and individual booster pumps at each coil were installed as part of the absorption chiller system, and are still in use. The chilled water line to the Hospital is too small, so the pumping system should remain in place.

The existing chilled water system design is adequate for this application, except the lack of primary/secondary pumping. There were complaints of hot buildings. The existing chillers presently have enough capacity so that any three of the four chillers can handle the present chilled water demand on all but the hottest days. The existing chillers and towers do not have capacity to connect any additional buildings. The distribution piping and pumps are grossly undersized now. The existing chillers are operating at approximately 0.93 kW per ton. New chillers can achieve better than 0.6 kW per ton. It would not be cost effective to replace the chillers based on energy savings alone.

Replace two existing, 437 ton chillers with two, 850 ton, 2-stage absorption chillers. This would provide adequate cooling for the full build-out and adequate back-up. The two new chillers should fit in the existing space vacated by the two 431 ton chillers. The 850 ton absorption chillers would be operated as the base-load units. Make the existing pumps into primary circulating pumps. Provide new pumps (three @ 150 hp, each) to act as secondary loop pumps. The secondary loop pumps would be fitted with variable-frequency drives (VSD's). Replace the existing cooling towers with two new, 900 ton towers with VSD's on the fans. Replace the condenser water pumps with four new pumps @ 30 HP each.

Add two new, underground, chilled water distribution piping runs: (1) approximately 2,500 feet of mostly 6" to pick up the School, Gymnasium, and Buildings 26, 27 and 28, and (2) approximately 2,000 feet of mostly 8" to pick up the Kitchen, Activity Center (A7), Administration (A1), and Buildings 1 through 5. Retrofit the remaining 437 and 581 ton chillers with a more benign refrigerant.

II. **Steam System:** There are four 114# steam boilers installed in the Central Plant, and all are manufactured by Union Iron Works. Staff was not certain of the capacity of each boiler, but it was estimated at 30,000 to 39,000 PPH, each. 30,000 PPH is used as the boiler capacity for all calculations in this study. Boiler #1 was installed in 1949, and was taken out of service in 1973. Boiler #2 was installed in 1958, and has been fitted with Lo-NOx burners. Boiler #3 was installed in 1966, and has been fitted with Lo-NOx burners. Boiler #4 was installed in 1954, and has not been fitted with Lo-NOx burners yet.

With the exception of Boiler #1, they appear to be in good condition and would not be candidates for replacement.

Steam is distributed throughout the campus via insulated, buried steel lines. Portions of the steam distribution system are 70 years old. The newest major loops are 45 years old. More than an average number of leaks are reported per year. The age and frequency of repairs indicates that much of the distribution system is due for replacement.

Steam is used for cooking (in the Kitchen only), and for producing domestic hot water and heating hot water in many buildings.

Only one boiler is required to provide steam at the design winter conditions. The minimum usage is approximately 4,500 PPH in the summer months. The maximum usage is approximately 27,000 PPH in the winter months.

The boilers are fired on natural gas. A 26,000 gallon, buried, single-wall steel fuel oil tank is installed for back-up. This installation is not Code-compliant, and a project to replace the tank is planned. A low-sulphur fuel is used. A water softener is provided on the make-up water supply. This extends the life of the boilers. The softener was installed in 1993.

Many of the buildings that were observed have instantaneous heat exchangers for producing heating hot water, and heat exchangers, either with or without storage tanks for domestic hot water. Condensate return tank/pump sets return the condensate. Virtually all of the heat exchange equipment was installed in the 1950's. About one-half of the equipment that was observed, particularly steam traps, manual, control and relief valves, heat exchangers and condensate pump sets were at or near end of The main Kitchen has been disconnected from the steam system and has no heating.

Over one-half of the steam distribution system is near end of useful life. Approximately one-half of the heat exchange and condensate equipment is at end of useful life. Plant steam is used directly in the cooking kettles. Latest Code requires that a heat exchanger be installed to isolate the plant steam from the cooking steam. One of the three boilers is not provided with Lo-NOx burners. This may not be an issue because a reasonable design would require only two boilers. The existing back-up fuel oil tank is not Code-compliant. The steam distribution piping and some of the building components (traps, valves and condensate return pumps) are unreliable.

Replace approximately one-half of the steam distribution piping and one-half of the domestic and heating hot water equipment to ensure that the system remains reliable. Install steam-steam heat exchangers to provide cooking steam for the kettles. Replace the existing 26,000 gallon back-up fuel oil storage tank.

III. **Heating Hot Water System:** Heating hot water is produced in each building, via steam-water heat exchangers, to heat the building except: (1) Heating in the School of Fashion, Auditorium (Activity Center), Rehab Engineering, School, Main Kitchen, and one-half of the Administration Building are handled by steam baseboard or fan-coil units, and (2) portions of the Auditorium (Activity Center), one-half of the Administration Building, and most of the Acute Hospital is performed by steam coils in the air handling units rather than by hot water. The Canteen is heated by a packaged gas/electric air conditioner. Each building heating hot water system consists of one or two instantaneous, steam-water heat exchangers, and either one or two circulating pumps.

Seven of the buildings do not use heating hot water systems, but rather use steam directly in coils. These should be retrofitted with heat exchangers. About one-half of the buildings that do produce heating hot water do not have redundant circulating pumps. The heating hot water systems are in adequate condition, notwithstanding the comments found in the "Steam System" section of this study.

DDS should install steam-water heat exchangers and circulating pumps, and replace the building distribution piping and air handler coils in one-half of the Administration Building, and in the Acute Hospital. Install steam-water heat exchangers and circulating pumps, and replace the building distribution piping in the Auditorium, Rehab Engineering, School, Main Kitchen and one-half of the Administration Building. Install redundant circulating pumps in those buildings that are not furnished as such.

IV. **Air Handling Systems:** Most of the buildings are provided with air handling units (AHU's) of various types to provide heating, and in most cases, cooling. Most of the air handlers were installed around 1978. Most of the AHU's are of the hot/cold deck, multi-zone variety. Most of the air handling equipment appears to be in adequate condition, except that the coils in the Acute Hospital are all starting to corrode. There is no obvious reason for why this particular building is experiencing this problem. Filtration and outside air values are adequate, except as noted below.

Exhaust values appear to be adequate, on paper, in most areas. However, staff reports that the exhaust ventilation is inadequate in most restroom/bathing areas. The Residential units rely on central return grilles in many areas, so that air returns to the grille over the 3/4 height walls between living spaces. Full-height, fire-rated walls will impede the return air path.

Air handling units are not installed in the Main Kitchen, one-half of the Administration building, Activity Center, Auditorium, Rehab Engineering and School. These same buildings rely on thru-the-wall air conditioners or evaporative coolers for cooling; and baseboard heaters or fan-coil units for heating.

Portions of the Kitchen are heated via steam fan-coil units, though the main kitchen area is not heated at all. It is exhausted by one large utility set and 15, small, powered ventilators. It is not cooled. Make-up air to the preparation area is through clear-story windows and doors.

Filtration is therefore not adequate. Without chilled-water cooling the Kitchen cannot meet OSHA maximum temperature requirements. Unfiltered make-up air is also a Code violation. DDS should remove the existing heating systems (baseboard units and fan-coil units). Install new AHU's, totaling 85 tons. Install a 4-pipe hydronic system to support the AHU's.

The acute care building is served by ten AHU's, ranging from 3/4 hp to 15 hp. There were several complaints regarding insufficient cooling. All units, except surgery, are provided with economizers. Surgery is a 100-percent outdoor air unit, and is provided with direct expansion cooling, rather than being connected to the chilled water system. The air handling systems appear to be in adequate condition except that all of the coil fins are beginning to show scaling and corrosion. Total airflow appears to one-half of what it should be. Filtration is inadequate as to filter efficiency and location. The isolation and surgery rooms are not provided with HEPA filtration. Install additional AHU capacity, approximately 75 hp. DDS should install a new 4-pipe hydronic system to support the new AHU's. Integrating the new AHU's will entail major revision to the existing ductwork. Remove the existing AHU filters, and install 30-percent pre-filters and 90-percent final filters downstream of the supply fans and coils. Install dedicated exhaust with bag-in/bag-out (BIBO) HEPA filters in the isolation room.

One-half of the Administration Building is heated via baseboard units and cooled with thru-the-wall air conditioners. The other half is served by a built-up air handler using steam coil and direct expansion coil. Airflow appears to be adequate in the area served by the AHU, but filtration is less than adequate. DDS should Replace the steam coils and piping in the one existing AHU with hot water coils and piping. Replace the steam baseboard units and thru-the-wall air conditioners with a new, 15 hp AHU and ductwork in the half of the building that is not served by the existing AHU. Install a 4-pipe hydronic system to support the AHU. Install 50% efficiency filters to the existing AHU.

The Activity Center/Auditorium is mostly heated via steam baseboard units and cooled by thru-the-wall air conditioners. The one

AHU is provided with steam and chilled water coils. We could not observe the AHU because the building was undergoing asbestos abatement. Airflow appears to be adequate in the portion of the building served by the AHU. Replace the steam baseboard units and thru-the-wall air conditioners with a new, 15 hp AHU and ductwork. Install a 4-pipe hydronic system to support the AHU.

The Rehab Engineering building is heated by steam baseboard units and steam fan-coil units, and cooled by evaporative coolers and thru-the-wall air conditioners. The Rehab Engineering building is very hot, due primarily to underground steam leaks. We can not evaluate the capacity of the existing system until these leaks are repaired. Replace the steam baseboard units, evaporative coolers and thru-the-wall air conditioners with a new, 10 hp AHU and ductwork. Install a 4-pipe hydronic system to support the AHU.

The School is heated via steam fan-coil units and cooled by thru-the-wall air conditioners. The heating and air conditioning systems were at or beyond end of useful life. Replace the steam fan-coil units and thru-the-wall air conditioners with new combination heating-and-cooling fan-coil units (3/4 HP, 800 CFM, each). Install a 4-pipe hydronic system to support the fan-coil units. Replace the existing restroom exhaust fans with new units.

Generally, the Residences are served by AHU's with heating hot water coils, chilled water coils and economizers. All AHU's appear to be in adequate condition, and total and outdoor air flows appear to be adequate. The existing ductwork layout will not allow installation of fire-rated corridors as contemplated by the master plan. Provide behavioral residences with institutional grilles to reduce damage. Provide one 450 CFM, 3/4 HP fan-coil unit and separate dedicated exhaust system to serve the isolation room in each residence. Fan-coil shall have heating, cooling & 90% filtration. Exhaust shall include a BIBO HEPA filter. Install new supply and return duct systems to accommodate the addition of fire-rated walls. Grilles serving the new corridors will require fire/smoke dampers, probably four per wing.

The School is served by two small, heating-only AHU's, with steam coils. DDS should replace the steam fan-coil units and thru-the-wall air conditioners with new combination heating-and-cooling fan-coil units (3/4 HP, 800 CFM, each). Install a 4-pipe hydronic system to support the fan-coil units. Replace the existing restroom exhaust fans with new units.

The Canteen is presently served by a packaged gas/electric air conditioner. It is adequate. If the Canteen begins to serve more elaborate meals (it is reported that they intend to install a grill and deep-fat fryer) then more exhaust will be required. This work may be done by the occupant, rather than as a part of this program.

In addition, DDS should provide all new or remodeled toilet and bathing rooms with improved exhaust. Exhaust should be furnished via a single utility set per wing, ducted to each restroom (approximately 1 HP per 20,000 square feet). There are numerous small areas that probably do not have the latest, Code-required ventilation rates, or appropriate supply air flows, such as laundry rooms, barber shops, craft rooms, exercise rooms, residences, kitchens and linen rooms. <u>All</u> air handling systems should be reviewed during the design phase and re-balanced for Code-required airflows.

V. **Building Automation Systems:** A campus-wide DDC control system is not provided. Only the HVAC equipment in Building 14 is provided with such a system, as a test. The control panel for that unit is located in Plant Operations. All other HVAC equipment is provided with timeclock-type on/off controllers and pneumatic zone control. The boilers are controlled by a Rosemount system installed in 1990. The chilled water system is provided with only stand-alone controls. The main chilled water circulating pumps are provided with variable speed drives. Building air handling systems are provided with stand-alone pneumatic controls of 1970's vintage, and are not monitored, except Building 14. Building domestic and heating hot water systems are locally controlled, and are not monitored.

Existing pneumatic systems are not reliable and are difficult to find parts for. The steam and chilled water systems do not have an integrated control system. The pneumatic controls are due for replacement. The existing system is 1970's vintage, and, except for pneumatic actuators, cannot be reused. Except for boiler and chiller controls, the existing system is not entirely reliable. Some improvement in operating and maintenance cost could be realized by installing a DDC system.

Install a campus-wide DDC system to monitor and control the central plant chilled water and steam production systems, and the building air handling systems, and to monitor building hot water production and air handler zone temperatures.

VI. **Natural Gas System:** Natural gas use on the campus is limited to the Boiler House, Main Kitchen, Swimming Center, A9 (Accounting), Administration Building, Canteen, Research Building, Acute Hospital, staff housing and Plant Operations Building. Gas enters the site at the Boiler House and is distributed from there via an underground piping system. We do not foresee the demand changing in the future.

VII. **Domestic Water System:** There are two reservoirs, totalling 1,000,000 gallons storage, with two 8" lines and one 12" line connecting to the campus distribution. There is also an 8" and a 12" line connecting the County system at Temple Boulevard. A booster pump house is located near the reservoir. The existing domestic water system was installed in the 1950's. Water is distributed in buried steel pipe. Pressure is adequate, and there are no reported problems related to system age and maintainability. From review of plans the piping system appears to be sized adequately. Individual buildings are not provided with backflow preventers. Campus fire hydrants and fire sprinkler systems are connected to the domestic water distribution system. Water softeners at installed at specific buildings: Two 100-percent capacity softeners are provided for the boilers. They were installed in 1993. Two 100-percent capacity softeners are provided for the Kitchen. The Kitchen water softeners appear to be in good condition, but the brine tank has deteriorated badly and is need of replacement. The Research Building has a small water softener. The Acute Hospital is provided with one softener. It doesn't work, and the brine tank has deteriorated badly and is need of replacement.

Domestic hot water is produced in each building, generally via either an instantaneous steam-water heat exchangers (e.g. Research, Acute Hospital, Buildings 18 and 19), or by storage tanks with integral steam tubes (e.g. Kitchen, Rehab Engineering, Buildings 5, 12, 14, 27 and 28, and the School Gymnasium).Install a backflow preventer on each building supply.

VIII. **Sanitary Sewer System:** The existing sanitary sewer system was installed in the 1950's. Piping materials are cast iron in the buildings and buried vitrified clay throughout the campus. Drainage is adequate, and there are no reported problems related to system age and maintainability. The system appears to be sized adequately based on review of the plans. The hospital has a 5 horsepower sewage lift station. A 15" line leaves the campus, and is processed through a sewage grinder before connecting to the County collection system. We do not foresee the demand changing in the future. DDS should install a grease trap on the waste line from the Main Kitchen.

IX. **Storm Drainage System:** The existing storm sewer system was installed in the 1950's. It discharges into a municipal storm ditch. Piping materials are buried reinforced concrete throughout the campus. Drainage is adequate, and there are no reported problems related to system age and maintainability. The system appears to be sized adequately based on review of the plans. The Hospital has a 5 horsepower lift station. We do not foresee the demand changing in the future.

X. **Site Compressed Air:** Compressed air is distributed throughout the site, for the pneumatic controls in most buildings. The compressed air system was installed in the mis-1970's. Two screw compressors are located in the Laundry. One was installed in 1990 and one in 1998. Air is distributed at 90# through buried PVC piping. The system is adequate, and there are no reported problems related to system age and maintainability. The system appears to be sized adequately. Those buildings that are not connected to the campus-wide system are provided with small reciprocating air compressors.

The central system is a good idea, because the maintenance is limited to two compressors, one as a back-up. The existing system is adequate to handle the foreseeable demand. The only unknown factor is the use of buried PVC piping. There is limited historical data for the longevity of PVC in this application.

XI. **Medical Vacuum System:** The Acute Hospital is furnished with a Nash, simplex, water-seal vacuum pump, which is over 50 years old, but which appears to be functional. It discharges into the air handler intake (which is a Code violation). It serves Surgery. There is an air compressor, installed "backwards" (which is a Code violation) to act as a vacuum pump, outside the hospital and serving the Physical Therapy area and Unit 55. There is a Nash, duplex vacuum pump in a mechanical room in the basement of the Hospital. It is not evident what area it serves. Vacuum outlets were found in Units 51 and 55, with an alarm at the Nurse's Station in Unit 51, and shutoff valves in the corridors of Unit 51 and 55. It was reported that outlets are also installed in the Surgery Suite, but that area was not accessible during our site visit to verify the installation. Portable medical vacuum units are used in areas where vacuum outlets are not installed.

The existing system is fairly-well distributed, but it does not appear that there are as many outlets as should be provided. Much of the existing medical vacuum equipment is either at end of useful life, and/or not Code compliant. Staff reported that there is a project underway to install a Code-compliant medical vacuum system in the Acute Hospital.

XII. **Oxygen System:** A 1500 gallon bulk Oxygen tank and a 500 gallon back-up tank are provided outside the Acute Hospital. Only the main tank is provided with dual evaporators. Oxygen outlets are found in Units 50, 51, 55, 56 and 57. There is an alarm at the Nurse's Station in

Unit 51, and shutoff valves in the corridors of Unit 51 and 55. It was reported that outlets are also installed in the Surgery Suite, but that area was not accessible during our site visit to verify the installation. Portable Oxygen cylinders are used in areas where Oxygen outlets are not installed.

The existing system is fairly-well distributed. There are some areas that are not provided with Oxygen outlets, and must rely on portable cylinders. The existing bulk Oxygen system is in good condition and capacity appears to be adequate. However, the controls and alarms and the quantity of outlets is not per Code.

XIII. **Medical Air System:** A central medical air pump is installed in the Acute Hospital. It is a Nash, simplex, water-seal pump. The intake is adjacent to the medical vacuum exhaust (which is a Code violation). The pump is over 50 years old. Medical air outlets were not evident in the Hospital. The only outlets to the medical air system may be in the Surgery Suite, which was not accessible at the time of our site visit. It appears that portable systems are used wherever medical air is required.

DDS should provide a new duplex medical air pump, with storage tank, on emergency power, with air distribution piping to provide an outlet at each nursing bed. Provide zone control shut off valves at each nurse's station. Alarm loss of medical air pressure at each nurse's station and at the PBX.

XIV. **Fire Suppression System:** Fire hydrants are installed throughout the campus, connected to the domestic water distribution system. They appear to be spaced according to Uniform Fire Code requirements. From review of the plans, the water distribution piping appears to be adequate to serve domestic water, hydrants and fire sprinkler systems. Most of the distribution is 6", and is looped, which can provide approximately 1000 gpm. Fire risers are installed on many buildings, but ceiling sprinklers were not evident on most.

From review of the plans, Buildings 1-5, 14-17 and 20-33, except 1, 29 and 30, are provided with 4" risers. The sprinkler heads in Buildings 1, 29 and 30 are connected to the building domestic water distribution piping. Coverage in all the aforementioned buildings is limited to utility areas, clothes and linen areas, classrooms, detention rooms and basement storage areas. These systems were installed in 1975. The School and the Main Kitchen are not provided with a fire sprinkler supply. The Administration Building and the Acute Hospital have fire risers, but are not adequately sprinkled. The Laundry needs no work. Refer to the State Fire Marshall's report for more detailed building observations and requirements.

DDS should extend 4" branch piping into Buildings 1, 6-12, 18, 19, 29 and 30. Install fire sprinkler systems in the Residences, the first and second floors of the Acute Hospital and the School. Sprinkler heads should be vandal-resistant. Provide fire department connections and post-indicator valves at the Acute Hospital and the School. Connect water flow and tamper switches to the building fire alarm system. Install a fire pump system, on emergency power, parallel to the existing pumping station. In the design phase it may be found that site pressure is adequate to eliminate this requirement.

XV. **Normal Power Service:** Lanterman receives its electrical service from two SCE feeders at 12 KV. The two SCE feeders are each capable of serving the facility, and have an automatic transfer switch to select between them, so a failure of one feeder will not cause the facility to lose all access to the utility. However, both feeders originate from the same SCE substation (though from different transformers). Nevertheless, the SCE service has reportedly been extremely reliable, experiencing loss of power only 2 time in the last two or three years.

The 12 KV feeders serve a set of 12KV switchgear located at the rear of the campus near the railroad tracks. The SCE service selected by the facility is an interruptible rate. However, the one time the facility has been asked to go on divert, they did not do so for the reason that their standby generators cannot serve the chillers (see below). This failure to divert cost the facility approximately $36,000, but also caused the utility to refrain from asking the facility to divert on other occasions.

The 12KV main switchgear serves two 12 KV feeders. Three substations each have a switch that allow them to select between either of the two 12KV feeders.

At the time of our site visit (7/20/98, 2:52 pm), the total load for the site was 2550 kw. The peak recorded load for the service was 3228 kw, recorded at 4:00 pm, 8/5/97. This latter figure represents 2.90 watts/sf for the entire site. The largest single use of electricity on the site is the chillers in the Power Plant. The facility uses a maximum of 1500 kw of chillers at this time.

The system is adequate to support the master plan.

XVI. **Standby Power Service:** The standby power service consists of three 800 kw, 2400 volt, Detroit Diesel emergency generators. The generators were installed in 1977, and were rebuilt approximately one year ago. The generators have approximately 700 hours of run-time each, since the re-build. The facility test the generators weekly.

The generators share a 10,000 gallon fuel oil storage tank. The tank is single-walled, and is already scheduled for replacement before December, 1998.

The generators are paralleled onto a common bus via a set of paralleling switchgear rated for 1000 amps at 2400 volts. The generator bus then serves two feeders. Feeder #1 can act as an input to any of the three substations. Feeder #2 is dedicated as an alternate feeder to the hospital. The generators assume the loads of the site within 45 seconds of loss of SCE power.

In addition to the site standby power system, the facility has a 60kw trailer-mounted generator that can be taken to any one building to serve as a backup to that building in the event of loss of the building service or transformer.

As noted above, the system is configured to carry the load of the entire site upon loss of SCE power. However, the system is currently unable to carry the existing loads upon loss of SCE power (capacity of 2400 kw vs. peak demand of 3220 kw). Even ignoring the overall capacity issue, the in-rush current of the chillers trips the breakers when the facility transfers to the generators. Moreover, the Master

Plan for the site includes an additional 27,000 sf of additional space. Finally, the Master Plan for the site includes added air conditioning loads, and kitchen loads, as well as the other equipments needs of the facility (for commercial washers and dryers in each residence, for instance). Thus, the existing system does not have capacity to serve its intended purpose.

The system as such does comply with current codes. However, because it does not assume the emergency loads within 10 seconds; and because it shares feeders with the normal power system (from the 2.4 KV substations); and because it does not ensure service to the hospital and skilled nursing areas at the expense of other areas, it does not meet the requirements for an emergency power system from the perspective of NFPA 99 or NFPA 70.The fuel tank does not meet current requirements and the upgrade project should be continued.

Finally, the existing system has at least one serious reliability deficiency, associated with its starting sequence. The system as originally configured brought the generators up too fast so that two might try to close onto the generator bus simultaneously. This problem was corrected by blocking out generators #1 and #3 until generator #2 comes on line. Once generator #2 has come on line it closes onto the generator bus, and generators #1 and #3 parallel to it and close onto the bus. Once all three generators have closed onto the emergency bus, then all loads transfer. However, the relays dedicated to transferring the loads only attempt to close onto the bus once, based on a time delay. If the generators have not all come up, paralleled, and closed onto the bus, the loads will not transfer. So, sometimes, the loads never transfer onto the generator bus. This problem is at least partly because the generator switchgear was installed in two different phases and consists of switchgear of two different manufacturers which do not work well together.

DDS should replace the generator switchgear and controls. Provide a 500 kw emergency generator dedicated to the hospital. Provide transfer switches, feeders, and distribution system within the hospital from the new generator. Provide 3500 gallon fuel oil storage system for the generator. Provide one 750 kw emergency generator dedicated to the central plant. Provide transfer switch and feeders from new generator for (2) remaining electrical chillers, as well as pumps. Replace the existing generator switchgear and controls. Provide 5500 gallon fuel-oil supply for this generator.

XVII. **Power Distribution System:** The site has three unit substations that serve all of the electrical loads on campus. Each of the three substations can receive power from either of the site 12KV feeders (via a transformer) or from the 2.4 KV emergency switchgear. One of the substations is dedicated to the central plant, with one feeder serving the chillers and one feeder serving other loads (i.e. pumps). The other two substations serve a number of 2.4 KV feeders that distribute power throughout the site. The transformers for these two substations are currently planned for replacement with silicone transformers. The three substations are also tied together with a manually operated tie-circuit for a further level of redundancy.

The hospital can only select between one of the normal feeders and the dedicated emergency feeder. Each building contains a main distribution panel and a distribution system appropriate for the use of that building as of its original installation. Some of these systems have been improved since their original installation. During the 1977 upgrade, a number of the building transformers were replaced as they contained PCB's. The Rustic Camp has its own service from SCE.

The substations and 12 KV feeders have sufficient capacity for the proposed Master Plan. The 2400 volt feeders have sufficient capacity to serve their existing loads for the proposed Master Plan. However, they do not, in all cases, have sufficient capacity to serve all of their own loads plus all of their alternate loads, in the event of a failure of one feeder in the system. The building transformers for the residential units, as well as their main panels, do not have sufficient capacity for the proposed Master Plan.The old 2.4 KV feeders which were not replaced during the 1977 upgrade fail with relative frequency.

The distribution system for some buildings, particularly the

Hospital building and the Skilled Nursing Units do not comply with current codes.

DDS should commission coordination and voltage drop study of the system. Make noted improvements. Upgrade service to existing buildings being renovated, including upgrade of site transformers. Provide two 4160 V emergency feeders, running roughly parallel to the feeders from existing substations N and S. Provide site-mounted unit substations at various locations on campus central to the residential units. Provide emergency power feeders from the substations to the residential buildings. Re-work distribution system in SNF's and Hospital building to comply with current codes. Replace service to Rustic Camp with underground feeder from main site distribution system (for minor energy savings).

XVIII. **Grounding System:** The 12 KV lines are grounded at the SCE pole where they intersect at the automatic transfer switch. Some areas contain grounding conductors for branch circuits but most (including the hospital) do not. Test grounding electrode at each building and drive additional grounding rods as required. Provide grounding conductors in all branch circuits requiring them in buildings being renovated (all areas determined to be health care facilities as defined by NFPA 70; including Hospitals, Nursing Homes, Limited Care Facilities, Ambulatory Health Care Centers, Clinics, Medical and Dental offices, and other Health Care Facilities). Provide ground busses for branch circuit panels in these areas. Verify that all buildings have their own grounding system and install such systems for all building that do not. Begin a practice of installing grounding conductors in all new feeders installed on campus.

XIX. **Fire Detection and Alarm System:** the existing fire alarm system is a collection of control panels of differing manufacturers located in the various buildings. Most of the building systems were installed in the 1979 renovations. The code-compliance of the fire alarm systems in the various buildings varies widely. Staff reports that the system has been very reliable. When a building device goes into alarm, it annunciates at a control panel in the PBX in the administration building. The PBX operator dispatches facility police to check into the problem. If the alarm is genuine and the facility staff cannot properly deal with it, the PBX operator calls the local fire department.

Most of the system was installed in 1979.The system has largely reached the end of its useful life. New parts are difficult to obtain, and upgrades difficult. Some areas on campus largely comply with current codes. Many do not.

DDS should replace the entire existing head-end equipment system. Replace all alarm devices with ADA-compliant devices, including the addition of new devices throughout. This upgrade will trigger the replacement of the main control panel at each building which will, in turn, trigger the replacement of existing initiation devices. In addition, add additional devices as required by current codes.

XX. **Overhead Paging System:** The site has no overhead paging system. The Administration building has its own overhead paging system, activated through the phone system. In addition, the hospital has an overhead paging system. DDS should provide campus-wide zoned system, including ability to make local pages.

XXI. **Telephone System:** Service to the Lanterman Developmental Center is 200 pair of copper from GTE. The service enters the site in the Admin building, where the Fujitsu 9600 (approximately 2 years old) switch is located. Cabling is run throughout the campus underground, and is old and in poor condition. Three Northstar phone systems are located in plant operations, administration, and the workshops. GTE has also installed fiber optic lines from Pomona Boulevard, but the facility cannot use them because GTE will not provide the switch to use the fiber optics.

The system appears to marginally fulfill all of the required functions. The system has little remaining useful life. The existing system has insufficient capacity for current facility requirements.The system appears to have frequent reliability problems.

DDS should replace the existing phone system, both hardware and cable plant.

XXII. Data System: The data system is built around an IBM AS400 processor. The processor is connected to Sacramento. In addition, the PC network uses 2 Compaq Reliant servers (one is backup). Staff report that the system is slated for upgrade by the end of 1998. The facility is also now in the process of installing a site-wide fiber-optic system, including 6 strands of fiber to each building (2 for PC's, and 4 for future), as well as 12 strands to each of the future forensic buildings (i.e., buildings that exist today that are designated to house forensic patients). The network serves E-mail functions, as well as databases for client incidents and the DOCS physician order system. In the past, the cabling for the system was so poor that nobody used it. In the future, the system may be used for work-orders.

The existing system is slow and outdated. DDS should continue the system upgrade/replacement currently envisioned. In addition, modify the current cabling plans to include fiber for buildings that will be built under the master plan.

XXIII. Nurses' Call System: The facility has few nurse call systems, as most consumers are not really capable of operating such a system. Several units have old nurse call systems installed that have never been used, and long since abandoned. We believe that a nurse's call system is not appropriate for this facility. However, as discussed below, current codes require such systems, especially in the hospital building. We recommend that the state review the requirements for this system with the various financing, insuring, and licensing organizations, for verification that they are still required.

XXIV. Security Systems: The facility has a number of local, stand-alone "security" systems. Most significant of these systems are nurse alert systems in several of the buildings. These systems consist of alarms, ceiling-mounted lights that strobe to the point of alarm, and overhead pages announcing location of alarm. These systems alarm, as well, at the Administration Building. The staff generally report that the systems do not work, and plant operations generally report that the systems do work, but that the staff just do not like to use them. The facility also has door alarms for the trust, the pharmacy, and the snack bar. The facility has no CCTV camera system to monitor the site, but Plant Operations has installed one at their facility to protect it and to test different types of cameras.

The possible security needs of a facility such as this Developmental Center are virtually infinite, especially given plans for relocating forensic and additional behavioral patients into the facility. For the purposes of this report, we recommend an allowance of .25/sf for installation of new security systems.

XXV. Television Systems System(s)Service: The center currently relies on local MATV systems scattered throughout the site. Cable television is impractical for the facility due to the service cost the local carrier requires. Virtually every building on campus has its own MATV system. In many cases, however, the antennas are in poor condition. Several buildings have antennas lying on their sides on the roofs. The systems provide service to the day rooms in all residential units. There is no service to individual rooms. Where there are systems, they appear to function sporadically. In numerous buildings, users are required to use "rabbit-ears" for their televisions, in lieu of connecting to the MATV system. The systems are of various vintages, but most of the existing systems appear to have no remaining useful life.

DDS should provide MATV system at each building, complete with wiring throughout, including outlets at each consumer room and day room.

XXVI. General Electrical Observations

A. Much of the lighting system appears to use T-12 lamps with old magnetic ballasts. Significant energy savings could be realized through the implementation of a lighting retrofit to replace the existing systems with electronic ballasts and T-8 lamps.

B. Site Lighting: Street lighting is generally adequate. Where staff has any complaints is on the walkways that lead from parking areas to the various facilities. We toured the campus at approximately 11:00 pm one night, and found the areas lit by the more decorative street lights to be under-lit. The site lighting is controlled by 2 iron core regulators, both of which require replacement. Conductors for the street lighting system are old, regularly fail, and need to be replaced.

C. Patient bed locations typically do not have the code-required number of outlets (rooms typically have one outlet per bed).

D. The facility does not have a testing and maintenance firm regularly inspect its equipment. Thus, many of the device settings have been turned to "high" and left. The facility should commission a coordination study of the campus system.

E. Staff generally complain about insufficient numbers of outlets.

F. Some buildings have door bell systems that appear to work as well as can be expected.

G. The facility is part of the county-wide "Redi-net" radio system for emergency preparedness purposes.

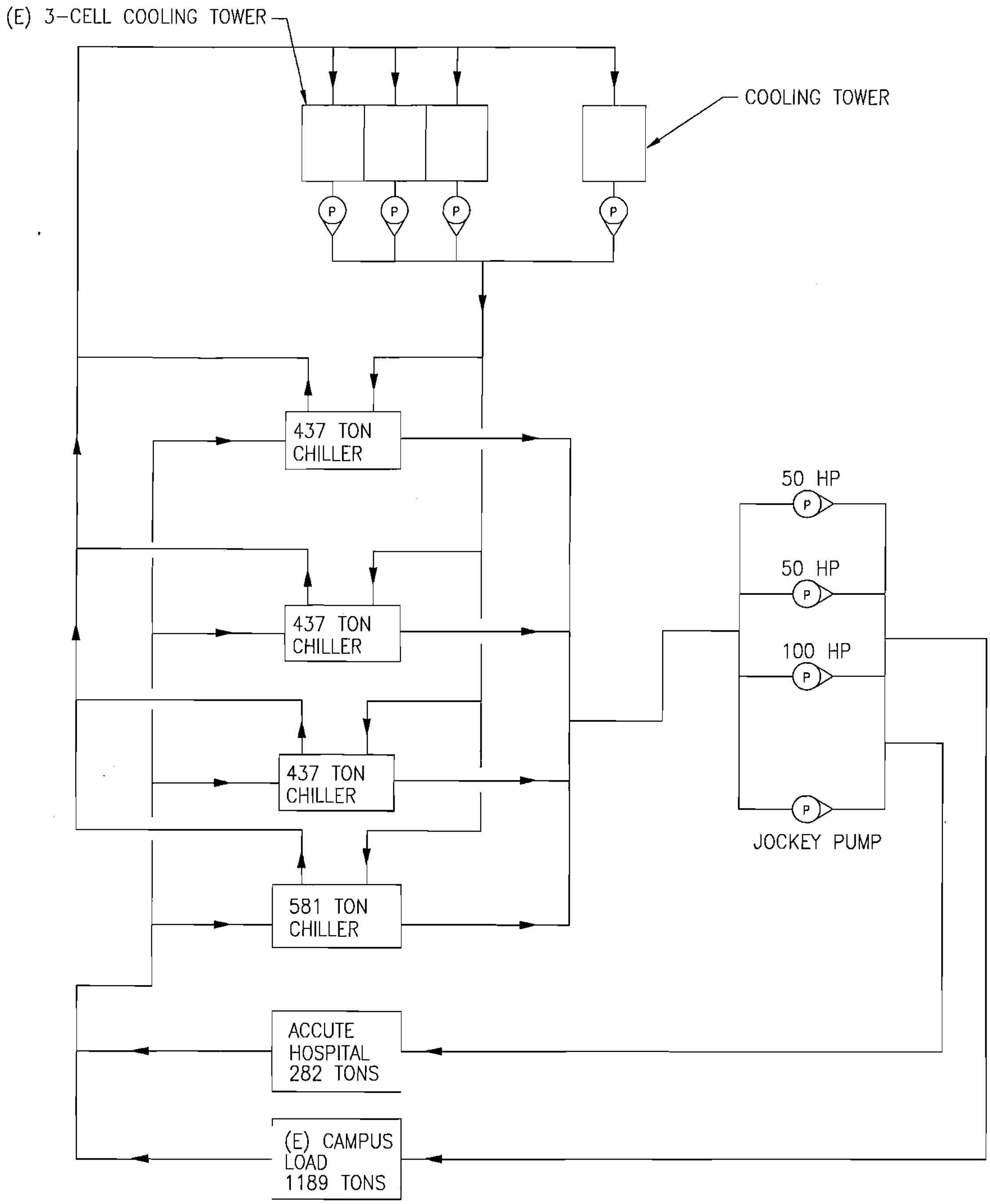
H. The facility has its own police radio system which appears to be adequate for its intended use.

I. The facility has its own short-range voice page system for doctors and emergency team which appears to be adequate for its intended use.

J. The facility has its own Medical Gas Alarm Panel system which appears adequate for its intended use.

K. The facility has its own air horn system which appears adequate for its intended use.

L. The facility utilizes an outside service for pocket page service.



LANTERMAN DEVELOPMENTAL CENTER EXISTING MECHANICAL CONDITION

SCALE: NOT TO SCALE

MAZZETTI & ASSOCIATES, INC.
Consultants & Engineers

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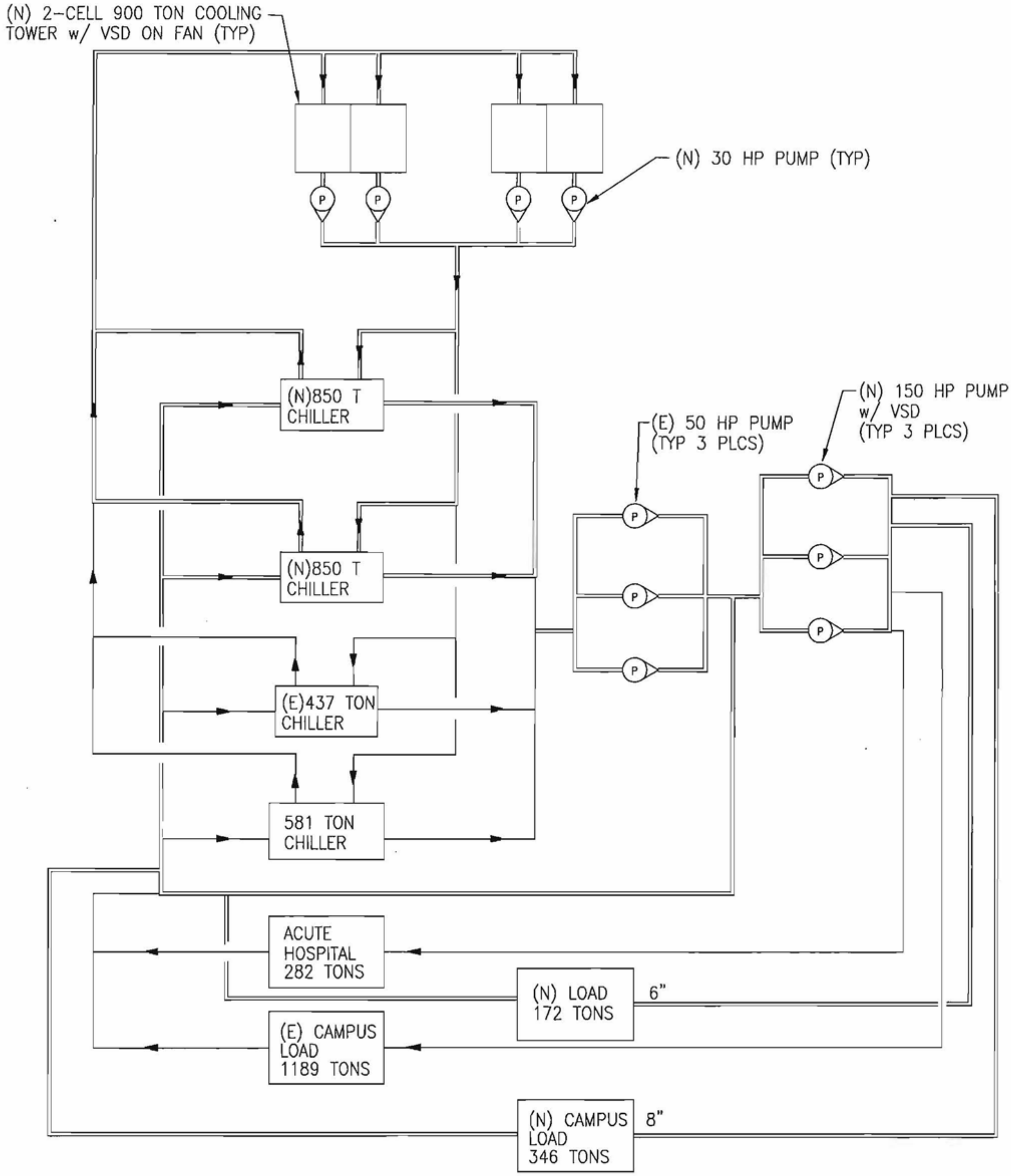
FAX (916) 565-2726

DATE 9/23/98



LANTERMAN DEVELOPMENTAL CENTER PROPOSED MECHANICAL CONDITION

SCALE: NOT TO SCALE

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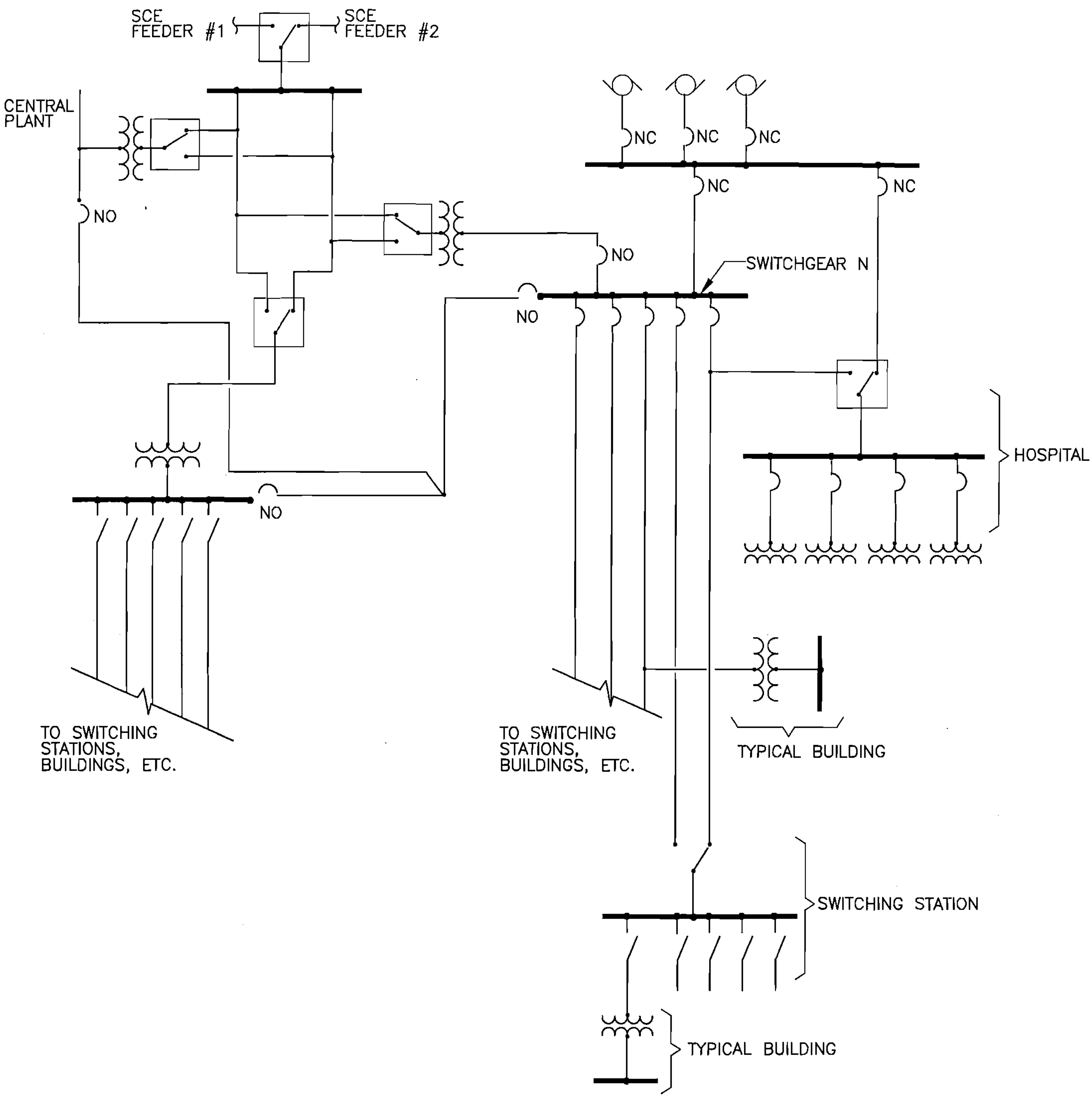

LANTERMAN DEVELOPMENTAL CENTER – EXISTING ELECTRICAL DISTRIBUTION SYSTEM

SCALE: NOT TO SCALE

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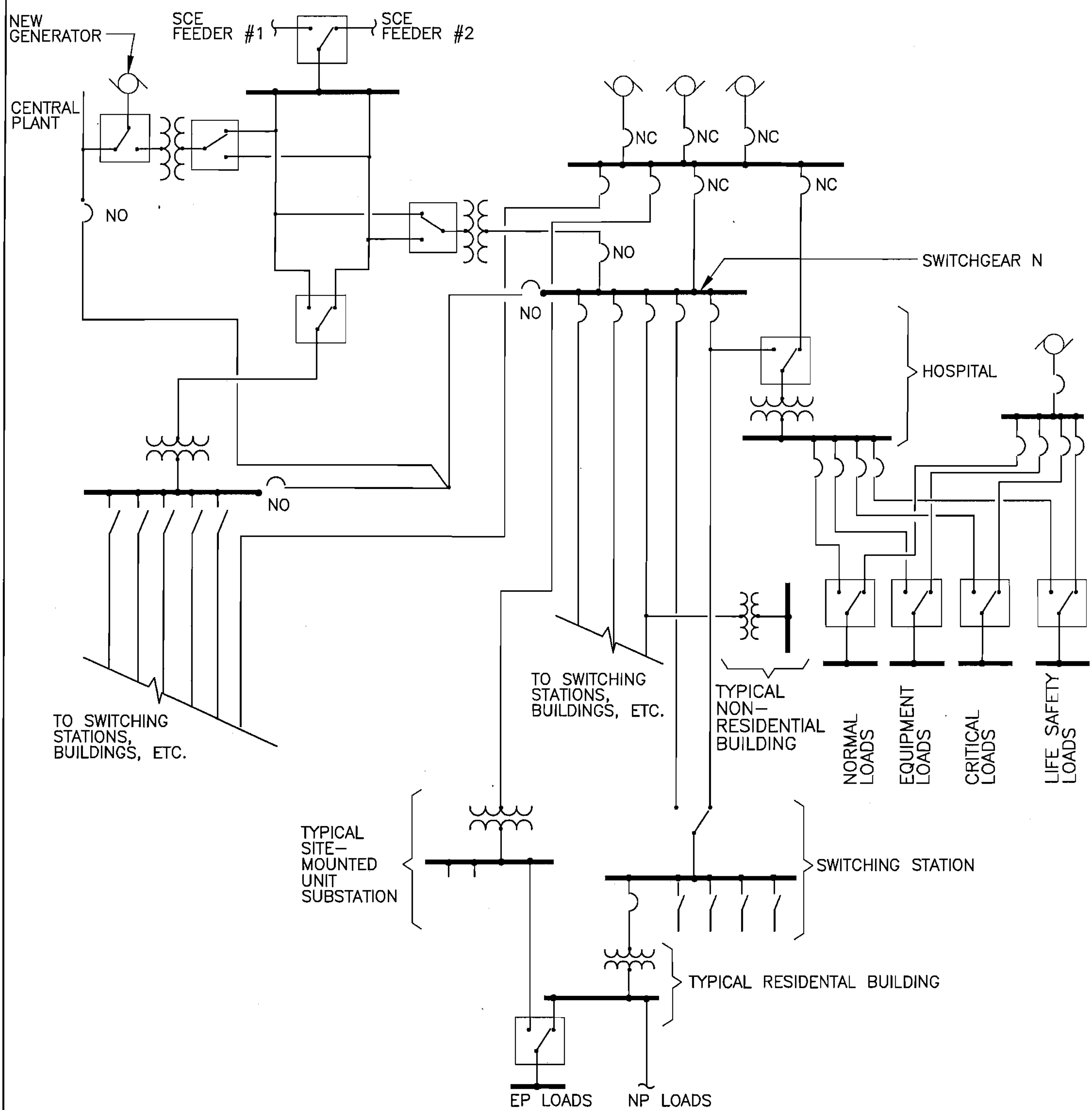
APPENDIX 7

DATE 9/4/98



LANTERMAN DEVELOPMENTAL CENTER – PROPOSED ELECTRICAL DISTRIBUTION SYSTEM

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APPENDIX 7A

DATE 9/4/98