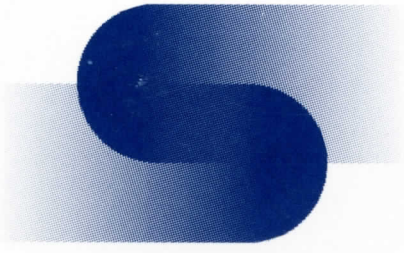

Spitznagel

Architects
Engineers
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Sioux Falls,
South Dakota

EROS DATA CENTER ADDITION
DESIGN PHASE I

Sioux Falls, South Dakota

Project No. 0492033

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ARCHITECTURAL

MAIN FLOOR PLAN

The new addition to the EROS Data Center is located southeast of the existing building. Although the new facility is to function independently, it was determined to connect the two buildings to share common support functions: cafeteria, training rooms, auditorium, conference rooms and lobby. The resulting plan is thus divided into three main areas with the existing data handling building to the northwest, and the new D.A.A.C. offices and Computer Center to the southeast separated in the middle by the common support functions. These common support areas would also be open to public circulation. (See Attachment A-1)

Concourse - The main element of the common area is a skylighted "concourse". This concourse, which is the physical link between the buildings, serves a variety of functions. It is the primary circulation area not only between buildings but also serves circulation among the common areas which branch off along its length. This concourse is planned to provide overflow area for Lobby, Auditorium and Cafeteria users. The concourse, which extends from the front of the building to the back also contains the new relocated entrance to the facilities. The back end of the concourse contains a dining alcove with large amounts of windows providing a panoramic view of the prairie landscape beyond. (See Attachments A-5 and A-6)

The atmosphere of the concourse space is to be an interior garden with large amounts of plantscaping where employees can retreat to during breaks for a relief from the office atmosphere. The roof of the concourse contains a series of arches supporting a full length translucent skylight which will flood the space with natural diffused daylight. The precast concrete wall panels along the wall of the existing building will be removed and reused on the new addition. This wall will be replaced with a two-hour fire separation wall constructed with gypsum board and fire rated glass block openings at each office. The glass block will allow natural light to enter the office areas from the concourse while cutting down on direct vision between spaces. The floor of the concourse will have paver tiles set in a pattern.

Lobby - Visitors to the EROS Data Center will be greeted by a new lobby entrance. This lobby will be designed as a neutral background for a variety of audio-visual displays. The

ceiling of the lobby will be raised to about seventeen feet above the floor to allow ceiling hung displays. Where the concourse bisects the lobby, the ceiling is yet higher with a translucent skylight to allow diffused daylight down into the lobby. The floor of the lobby will have a combination of paver tiles and carpet tiles set on a grid network of electrical troughs set in the floor for flexibility of displays. The walls will have a vinyl or fabric wall treatment over gypsum board and the ceiling will have a combination of gypsum board soffits and acoustical ceiling panels to control sound.

Executive Waiting and Conference Rooms - Directly adjacent to the lobby are the Executive Waiting Room, Executive Conference Room and Tele-Conference Room.

The Executive Waiting Room will provide a space for business guests to wait for their contacts and be away from the general public visitors. There will be adequate space to include an Executive Secretary/Receptionist to greet clients and contact in-house staff. The Executive Waiting Room is located directly adjacent to the Executive Conference Room with a common door between.

The Executive Conference Room will accommodate roughly thirty people at a table setting and can allow more around the perimeter. The Conference Room will be equipped for audio/visual projection capabilities from a common A/V Room shared with the Tele-Conference Room. The Tele-Conference Room will accommodate approximately twenty people.

The Waiting and Conference Rooms have been located to allow easy access for visitors and employees of each side. Each room will be constructed with full height sound isolation walls. Finishes within each room will include carpeted floors with borders and accent stripes, fabric wall treatment and decorative acoustical ceiling panels. The Waiting Room will also include a glass window/wall allowing a view across the corridor to the outside entrance court.

Auditorium - The auditorium, which is located directly off the concourse, will ultimately accommodate three hundred visitors, but will be able to be sub-divided into three separate mini-auditoriums, each containing approximately one hundred seats. At this time, studies are still being done to determine the best room and seating configurations to meet the flexibility and audio-visual requirements.

Coat racks for 300 visitors

The auditorium will be surrounded by sound isolation walls. Each mini-auditorium will also be sound isolated from adjacent auditoriums.

The auditoriums will be provided with a rear exit which will bring touring visitors directly into a computer viewing alcove.

Cafeteria - The cafeteria, which is located at the back of the building, is accessible from each side of the building and also open to visitors. Service to the Kitchen is provided by a separate entrance from the back directly adjacent to loading dock and waste facilities.

The Kitchen design has not been completed yet, but will include food storage, food preparation and dishwashing facilities. Service lines will be of a "scramble" type allowing fast and flexible serving.

The dining areas of the cafeteria will be varied, allowing different atmospheres. Directly to the north and east of the serving area will be larger tables for small groups. One wing of dining tables overlooks the concourse while the other is lined with windows to the exterior. A portion of this area will have the capability to be sectioned off with a moveable wall for larger group dining. Smaller, more intimate dining tables are located within the concourse itself. These tables are dispersed among the planters to provide a more secluded setting. Other dining areas are in the far end of the concourse in the alcove overlooking the prairie. This area was previously mentioned under the concourse heading. There is also a dining patio just outside the alcove providing outdoor dining during warm weather. This patio will also serve as the employee entrance to the new Addition.

Finishes within the cafeteria will include patterned ceramic tile in the Kitchen and serving area floors and along the lower areas of the exposed walls. The dining areas will have both paver tile in the concourse areas and carpet tiles in the remaining areas. The Dining Room walls will be of gypsum board construction with a combination of paint and vinyl wall covering. The ceilings will have acoustical ceiling panels and gypsum board soffits.

Offices - The balance of the main floor areas is allocated to private offices and the computer center. A ten foot wide corridor runs through the center of the office space, providing circulation among departmental areas and the computer center as well as a connection back to the common areas. The offices and computer center will be secured from the public at the two double doors. All stairs and elevators to the secured lower level

are located within the secured area on the main floor keeping the number of security doors to a minimum.

The two major design features of the office area layout are the use of a repetitive "cluster module" and the "open office" concept. These features are in response for a need to be very flexible for future change in occupancy.

The "open office" concept contains a ten foot wide corridor which runs through the center of the office ares. Every forty feet along the corridor lies a secretarial/receptionist area which supports the adjacent offices. These secretary/reception areas are open directly to the corridors. This openness allows the secretary/reception areas to feel larger than they actually are, while at the same time being more friendly and inviting to visitors and other department personnel. These open areas also break-up the "tunnel" feel associated with long corridors. At each intersection of the corridor and secretary/reception areas there is a translucent skylight above. This skylight allows diffused light to enter into the interior of the building and highlight the open areas.

Directly adjacent to the support services entrance (which is the main entrance to the computer center) is a large secretarial pool area. The offices located along the adjacent curved wall would have large interior windows allowing a panoramic view of the prairie beyond from this area of the corridor and secretarial area.

The offices are arranged around a repetitive module of about seven offices surrounding a secretary/reception area on three sides. These offices would include a combination of single and double or executive occupant offices. The secretary/reception areas will allow for up to three secretaries along the center. However, most modules will only require one or two secretaries, leaving the remaining space for file cabinets or layout/work tables. (See Attachment A-3)

The "open office" and "module" concepts allow for maximum flexibility by allowing a department to occupy a module with the option to expand into the module across the corridor or along the corridor. Since each module is not "bound" by surrounding walls. Expansion and change simply become a matter of moving personnel into different offices rather than tearing down walls and building new offices. Attachment A-2 illustrates the proposed department layout based on current program needs.

All offices are carpet tiled?

Finishes within the office areas will include a continuous acoustical ceiling panels with gypsum board soffits around the skylights. The walls will be painted gypsum board and the floor will be covered with carpet tiles that will have accent colors and borders at key areas along the corridors.

Computer Center - The Computer Center is centrally located within the surrounding office area. The main entrance to the Computer Center is through the support services area which acts as a control point for the Computer Center. This single point of access is preferred to maintain security and control air quality and cleanliness within the Computer Room. This support services room acts as a air lock vestibule for Computer Room users. On opposite sides of the support services area are the laboratories. These labs have their entrances along the same common wall, but do not allow access to the more secure Computer Room.

The computers, robotic storage, and peripheral operations are located within one large room for flexibility of adding or updating equipment in the future. One side of the Computer Room is open to visitor observation through a glassed alcove in the corridor. The other side of the Computer Room contains the support offices with the supervisor centrally located to allow observation of the Computer Room and support offices.

The entire Computer Center will have concrete filled raised flooring with a high pressure laminate finish. The computer floor will have a two foot raised plenum for wiring and air circulation. The underside of the computer floor will be insulated to prevent condensation build-up due to lower temperatures in the plenum. The four perimeter walls will be full height gypsum board on metal studs with a vapor barrier and sound control panels. The interior walls of the Computer Center will be a de-mountable wall system for flexibility and to eliminate dust from gypsum construction during remodeling. The ceilings will be acoustical ceiling panels. All finishes will meet Computer Room requirements for particle emission.

As computer technology changes, space requirements will fluctuate. In the event that more computer space is required, the entire Computer Center could expand to the southeast by moving the laboratories and support services room into the secretarial pool area. These spaces could compromise with the loss of a raised floor if the space is absolutely needed.

LOWER LEVEL PLAN

The lower level of the addition has a centrally located Computer Center surrounded by a corridor system and the perimeter space allocated to mechanical rooms, storage areas, and unfinished space for future expansion. (See Attachment A-4)

find different term

Computer Center - The Computer Center is located directly below the Main Floor Computer Center to simplify wiring connections and tape and personnel circulation. The Communications Room is located below the approximate location of the super computers on the Main Floor. This space will have a separate Maintenance Room and each will be set on a twelve inch raised computer floor. full raised floor in basement?

the equipment staging room ?
The Equipment Storage Room is located adjacent to the freight elevator and convenient to loading facilities and the ramp to the crawl space in the existing building.

The archives room is located directly off the elevator lobby for ease of movement of tapes between levels. The archives is designed in a linear manner to allow a robot to maneuver up and down rows of storage racks. Expansion to the tape archives would involve adding on twenty foot bays at a time. Enough expansion space is allowed to accommodate fifteen years of use. at what density

Finishes within the Computer Center will include vinyl tile floors in Equipment Storage and archives rooms, while the communications rooms will have a twelve inch raised computer floor with high pressure laminate finish. The walls will be gypsum board on metal studs with a vapor barrier around the perimeter walls. The ceiling will be acoustical ceiling panels.

Finishes within the archives room may change after further studies of environmental conditions for this area are complete.

Circulation System - A circular corridor system wraps around the Computer Center allowing access to individual areas within the Computer Center as well as to any future functions that may occupy the perimeter unfinished areas. A ramp connects the existing crawl space with the new lower level of the addition which will be about 5'-6" lower than the crawl space.

Two emergency exits open to the southeast where grade drops off to an elevation equal to that of the lower level. At the east corner of the building is a loading area for equipment and supplies.

Four stair towers, a freight elevator and a passenger elevator all extend through both floor levels and connect with the two penthouses on the roof.

Finishes within the corridors will be painted gypsum board walls, vinyl tile floors and acoustical ceiling panels.

Unfinished Areas - The lower level has three areas of unfinished space available for future expansion. will these areas be floored?

The area to the southeast of the Computer Center would be ideal for future office space as this area has the same floor elevation as the exterior grade. Windows to the exterior will be included along the curved wall similar to the upper level.

The unfinished area to the northwest of the Computer Center will be provided with rough-ins for a future locker and toilet room facility. As there will be very few occupants in the lower level under the current program, there is no current need for these toilets. However, future expansion may include more occupants in the lower level. This area would be the best location for a future fitness area, if so desired, as it is located relatively close to the existing building providing easy access for all employees.

The remaining unfinished area could be used for offices, storage, etc.

Mechanical Room - The Mechanical Room is located adjacent to the loading dock and the ramp to the existing building. This allows easy access for equipment and maintenance personnel coming into the building and moving between existing and new areas.

The floor of the Mechanical Room is lowered about two feet to allow a 15 foot ceiling height. A ramp is located at the loading dock to allow replacement of equipment.

BUILDING EXTERIOR

The exterior of the addition contains the same pre-cast concrete panel system used on the existing building. This was done to eliminate the appearance of an addition. (See Attachment A-7)

Unique features to the combined facility include a new entry, the concourse skylight, the dining alcove, and the curved facade along the southeast elevation.

The new entry, located at the end of the concourse, has been made into a more formal and dominant feature. It contains a large glass filled arch flanked on either side by a raised portion of the building. This is a result of the increased ceiling height within the lobby area. This raised area will be clad with architectural pre-finished metal wall panels with a white finish. This material and color selection is used to carry on the smooth white finish of the two free-standing satellite dishes. These dishes are dominant features against the rough grey building behind. The inclusion of a smooth white material on the building will transform the dishes into an extension of the building, rather than simply an object in front of the building. A horizontal band of pre-cast concrete will span across the new entrance tying the two structures together. (See Attachment A-8)

The skylight of the concourse extends out the back of the raised portion and terminates at the dining alcove. This circular element acts as a terminating point for the skylight as well as a focal point along the relatively flat wall of the back side. (See Attachment A-9)

The slightly curved wall along the southeast elevation reflects the curved forms of the satellite dishes and the shapes found naturally and manmade within the surrounding site. It also helps to anchor this end of the building which becomes two stories tall as the slope of the ground drops off naturally. (See Attachment A-10)

treatment of retaining walls? set back from doors to allow for landscaping

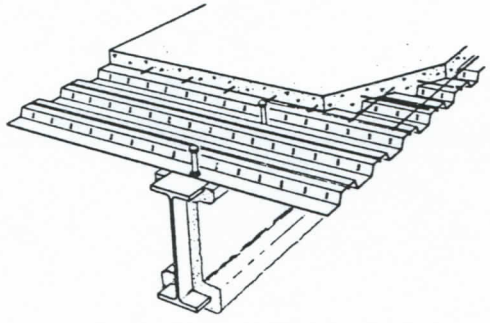
STRUCTURAL

The existing building is a single story structure with a large crawl space supported by a timber piling deep foundation system. The structure was designed for live loads that approach 250 pounds per square foot.

The building addition is a single story structure with a full basement that extends to a walk out (on grade) at the south end. The main floor structure will support live loads that approach 350 pounds per square foot. The upper level mechanical penthouses will be designed for a superimposed load of 150 pounds per square foot.

The foundation system will not be finalized until the geotechnical exploration program is complete. The suitability of a spread footing foundation with an alternate deep foundation system will be researched.

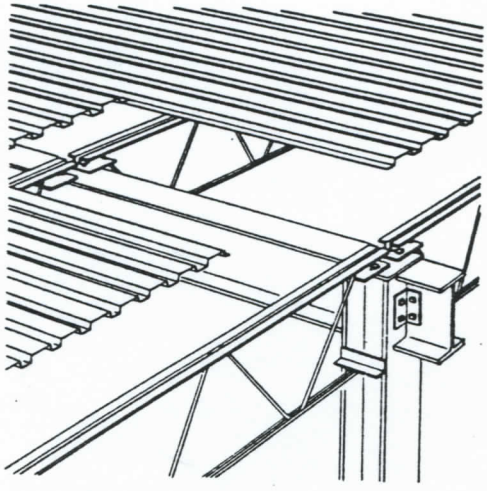
The main floor structural system utilizes a composite beam, deck and slab system. The composite system results in a savings in steel cost while the composite deck eliminates the need for concrete formwork. The system is inherently rigid with the flexibility for penetrations needed in a facility of this type. The 20'x20' framing grid is supported by 24" main beams with 18" purlins on 8' centers. The deck/slab system is 6 1/2" in thickness:



Composite Beam, Deck & Slab

The mechanical penthouse floors will use the same structural system. The composite system allows the designer to utilize a 40'x40' framing grid. To minimize deflection, a 40" main beam is proposed with 24" purlins on 8' centers.

The roof structure utilizes a standard steel beam, bar joist, and deck system. The system is designed to accommodate the single ply membrane roof system in addition to 90 pounds per square foot drift loads. The system is on a 40'x40' framing grid with 24" main beams and 24" bar joists on 5' centers.



Steel Joists, Beams and Deck on Columns

The exterior walls are framed with non-load bearing precast panels to match the existing.

SITE DEVELOPMENT

PROPOSED ADDITION

The proposed addition shall be located at the southeast end of the existing facility. The main level finish floor shall match that of the existing finish floor. The lower level in the proposed addition shall be 15'-6" below the main level and have walkouts on grade at both the southeast and northeast sides. The southeast entrance shall be for employee access and the northeast shall be a 48" high loading dock for tractor/trailer deliveries. The main level shall have a relocated ~~main~~ employee entrance and a loading area on the northeast side. The loading area shall consist of a 30" high loading dock for food service and other miscellaneous deliveries, and a trash enclosure. The proposed addition will also require the relocation of a grass-lined swale at the southeast end of the existing facility. (See Attachment A-11)

VEHICULAR AND PEDESTRIAN CIRCULATION

The vehicular circulation will remain in a one-way configuration. A 10 foot drop-off lane will be added to the existing road at the front entrance. A new parking lot will be added west of the existing road and will accommodate 10 busses and/or R.V.'s and 26 visitor parking spaces. A new 100 stall employee parking lot will be located northeast of the existing facility. The first 22 more? parking stalls will be provided with engine heater outlets. A new 60 foot cul-de-sac will be located northeast of the proposed addition and will provide access to the food delivery loading dock and trash enclosure. The lower level access road will be north of the proposed cul-de-sac and provide access to the tractor/trailer loading dock. These features will tie to a main road that lies north of the solar panels and intersect the existing road directly across from the north entrance/exits of the existing employee parking lot. Additional entrance?

A pedestrian walkway will be installed from the new bus/R.V. parking lot northeast to the new front entrance. A handicap ramp system will be installed on this new walkway between the existing visitor parking lot and the existing access road. This ramp will have a switch-back configuration. Walkways will also be installed from the new 100 stall employee parking lot and new cul-de-sac to the entrances on the main level near the proposed dining area. A stairway will be installed between the food service delivery area and the tractor/trailer loading dock. All pedestrian walkways and parking lots will have light standards. These pedestrian walkways are issues which require further discussion.

LANDSCAPE DESIGN

Formal landscaping will be provided along all pedestrian walkways and at the new front entrance. The areas disturbed by construction away from the building will be replaced in native prairie grass. This is a topic that requires further discussion.

UTILITY SYSTEMS

The existing water main southeast of the existing facility will be relocated to approximately 150 ft. southeast of the proposed addition. A new fire service and fire hydrants will be required for the proposed addition. Currently, the domestic service is adequate; however, this will depend on the kitchen design. All exterior water piping should be ductile iron pipe (D.I.P.) or cast iron pipe (C.I.P.).

The new sanitary sewer service for the proposed addition will require a lift station to provide service for the lower level locker rooms and the mechanical room. All exterior sanitary sewer should be polyvinyl chloride (P.V.C.) pipe with a elastomeric seal.

The existing storm sewer system will be expanded to accommodate the proposed addition and the proposed parking facilities. All exterior storm sewer should be reinforced concrete (R.C.P.) or high density polyethylene pipe. All storm sewer inlets should be cast-in-place concrete with heavy-duty metal castings.

The utility systems will require further discussion and may change as the design progresses.

MECHANICAL

ENERGY SOURCES

Natural Gas - Natural gas is not available at the site, nor is it planned to be available in the foreseeable future.

Fuel Oil - There is an existing 10,000 gallon underground fuel oil storage tank which serves the existing emergency generator and steam boiler. It is proposed to serve the new emergency generator from this tank. The condition of the existing tank is not known. ? how to verify

Electricity - The existing building was originally designed to be heated with electricity. With the possible exception of vestibules, small storage rooms and kitchen and auditorium ventilation systems (that might require excessive amounts of outside air), it is proposed that electricity not be utilized as a direct heating source. However, the proposed heat recovery system would utilize electricity indirectly as an energy source. The proposed air conditioning system would utilize electricity as an energy source.

Propane - Propane is not presently available at the site, nor is it being considered as an energy source.

Solar - An active solar heating system provides domestic hot water for all of? the existing building. It is proposed to utilize the existing domestic hot water system to serve the Addition to the greatest extent possible.

ENERGY CONSERVATION

Building Envelope - Roof construction with an R-40 rating and wall construction with an R-20 rating are being considered.

HVAC - It has been requested that we investigate the production of chilled water directly, with the cooling towers, whenever outside air temperatures permit (free cooling) and to utilize heat produced within the Computer Room to heat the rest of the facility whenever required (heat recovery).

how to bound expectations

Electric Motors - It is proposed that all electric motors of 1HP and larger be specified as energy efficient in accordance with NEMA nominal efficiency guidelines. Variable frequency drives are also being considered to match pump and fan speeds with the required loads.

Energy Efficiency Requirements - We have been directed to conduct an energy audit of the proposed construction to show a reduction of 45 percent from the energy consumed per square foot in 1975 by the use of "energy conservation measures." The energy audit will draw conclusions as to which energy conservation measures are compatible and can be utilized to effect the required reduction in energy consumption. The energy audit will be performed as a "topic for further study".

HEATING AND VENTILATION

Steam Boiler - It is proposed to install a steam to hot water converter in the Addition to provide all of the heating hot water, (if the heat recovery system is not operating), or a portion of the heating hot water, (if the heat recovery system cannot satisfy all of the load). It should be noted that during initial operation of the Addition, that the computer systems will not be functional and therefore will not yet be producing any heat which could be recovered for space heating needs in the rest of the facility. A steam line would be extended from the existing steam boiler plant to serve the converter.

Heat Recovery System - Since the Computer Room will require "year round" cooling, there is an opportunity to recover this heat rather than reject it and use it to heat the rest of the Addition when required. We are in the process of investigating various chiller, cooling tower, heat exchanger, pump and piping arrangements.

what assumptions are being made about heat btus available

Humidification - It is proposed to utilize steam grid dispersion tube humidifiers, either duct mounted or unit mounted, as applicable. The existing steam boiler plant would serve the humidifiers.

request separate meeting

Ventilation - The following rooms, areas and equipment will require exhaust ventilation:

- toilet rooms;
- locker rooms;
- elevator equipment room;
- chiller room;
- emergency generator;
- kitchen cooking and dishwashing.

Air Handling Systems - Each fan system is being considered and will be selected on a case by case basis. The Addition includes many distinct areas and occupancies and therefore no one (1) fan system type will satisfy all of the diverse needs and requirements. The following system types and configurations are being evaluated:

- built-up fan systems;
- modular, pre-fabricated fan systems;
- double wall, insulated panel, fan system construction;
- hydronic heating coils, unless possible freeze condition exists due to amount of outside air introduced;
- utilize pre-filters and high efficiency final filters (in selected areas);
- carefully consider use of air-side economizer cycle; may not apply in most situations;
- consider introducing a constant amount of fresh air for each fan system to maintain indoor air quality and to compensate for exhaust air;
- double duct VAV or fan powered hydronic heat VAV for office areas;
- computer room air conditioning units to contain filter, fan, steam grid humidifier and chilled water coil.

AIR CONDITIONING

Free Cooling - Since the Computer Room will require "year round" cooling, there is an opportunity to produce chilled water directly, with the cooling towers, whenever outside air temperatures permit (free cooling). During the winter, the chillers would largely be operated based upon the need for heating to be satisfied through the heat recovery system.

Chilled Water System - We are in the process of investigating various chiller, cooling tower, heat exchanger, pump and piping arrangements. The following aspects are being evaluated:

- Cooling redundancy for the Computer Room is critical;
- Refrigerant type utilized is a concern and must take into account ozone depletion potential, global warming, efficiency, long-term availability and toxicity;
- Chilled water flow, through the evaporator, can be varied but must not fall below 3 ft/sec (turbulent flow);
- Condenser water flow can be varied and laminar flow is acceptable if slightly increased fouling can be tolerated;
- Utilize return water temperature when controlling a heat recovery chiller;
- Consider designing the chilled water system for a high temperature rise (15 to 20) degrees);
- Consider producing 42 degree chilled water which can result in better humidity control (dehumidification);
- The noise level of the chillers is a concern and must be addressed;
- Cooling towers should utilize remote sumps and variable frequency drives;
- Consider an induced draft crossflow cooling tower for outdoor applications;
- Consider a forced draft counterflow cooling tower for indoor applications;
- Water treatment is critical, especially with an open system.

PLUMBING

Storm Sewer - It is proposed to utilize roof drains and roof drain piping which will be connected to the underground storm sewer system.

Sanitary Sewer - Sanitary sewer loads will consist of toilet rooms, kitchen equipment and other general purpose plumbing fixtures and drains. Due to the elevation of the lower level, a lift station will probably be required to discharge into the existing sewer lines outside the building.

Domestic Water - It is proposed to extend the existing domestic hot and cold water systems into the Addition. The proposed kitchen load needs to be evaluated, when it is available, to determine if the existing systems have adequate capacity.

FIRE PROTECTION

Wet Fire Sprinkler System - It is proposed to protect the Addition with a wet fire sprinkler system installed throughout the facility. The only possible areas where this system may not apply are the computer and archive areas. The type of fire suppression systems selected for these areas will be determined as a "topic for further study". It is anticipated that a new fire sprinkler service entrance will be required to serve the Addition. what do regulations specify ?

SPECIAL MECHANICAL SYSTEMS

Archive Environment - It has been requested that the environment maintained in the Digital Archive provide the necessary degree of flexibility to preserve and protect the recording media utilized. This will be addressed as a "topic for further study.

Building Automation System - It has been requested that a Honeywell Graphics Central 486 be selected to monitor and control the Addition with the following items taken into consideration:

- System is to include security and fire alarm and is to be integrated with the existing Honeywell Delta 1000 System;
- Consider additional electrical power demand, usage, quality monitoring and control capabilities at various points;
- Consider additional maintenance software capabilities such as inventory control, work order generation, etc.;
- It would be desirable to obtain direct and complete communication between the BAS System and the chiller control panels.

Power Conditioning and Back-up Power - Although this is an electrical system, the type of system selected will have a large impact on the mechanical services required. This will be addressed as a "topic for further study".

GENERAL SPACE REQUIREMENTS

Penthouses - Two Penthouses are proposed to contain the following equipment:

- indoor cooling towers;
- freezer/cooler condensers;
- air handling equipment;
- exhaust fans;

Chases are proposed that will connect the Penthouses to the lower level.

Mechanical Room - A mechanical room is proposed for the lower level which would contain the following equipment:

- chillers;
- pumps;
- cooling tower remote sumps, unless an open chilled water system is utilized;
- steam to water converter;
- condensate pump;
- heat exchangers, unless an open chilled water system is utilized;
- electrical equipment;
- emergency generator, unless a CPS system is utilized.

It will probably be necessary to sub-divide the Mechanical Room into the following separate rooms:

- chiller room;
- electrical room;
- emergency generator room.

Cooling Tower Enclosure - In the event that an outdoor cooling tower is utilized, an area has been allocated as indicated on the site plan.

CPS Building - In the event that a CPS system is selected, an area has been allocated as indicated on the site plan.

ELECTRICAL

Power Service and Distribution - The existing facility receives electrical utility power via high voltage switchgear in the MGS Building, through a redundant high voltage feeder to a high voltage switch in the existing Data Center Building. The existing distribution system consists of high voltage feeders to 4-1000 KVA unit substations. These unit substations serve a series of 480 volt, 3-phase, 4 wire bus ducts that are routed throughout the crawl space.

The existing load, from the design program, is approximately 1200 KW, which is approximately 30% of the system capacity. We currently estimate the load of the new addition to be approximately 1800 KW. This load could be added to the existing service with a 25% spare capacity maintained.

The design program mentions the possibility of extending the existing 480 volt bus into the new Addition. However, with the requirement to separately meter the new Addition, it may be more practical to extend the high voltage feeders to the new addition and serve a series of two or three unit substations in a configuration consistent with the existing system.

There are a couple of possible locations for connecting this high voltage feeder.

One possibility is to make this connection in the existing switchgear in the Data Center. This would require modifying the existing high voltage switchgear in the Data Center.

The other possibility is to extend a feeder to the existing high voltage switchgear in the MGS Building. This switchgear was originally installed with provisions for expansion which could be taken advantage of at this time. In this case, we would expect to install a redundant feeder to remain consistent with the original design and provide protection against accidental loss of a feeder.

The new distribution system will utilize a 277Y/480V three-phase, 4 wire configuration. A bus duct system similar to the existing system in the crawl space would not be as practical in this application since the lower level of the new Addition is finished or may be finished in the future.

A more practical approach will be to use a series of small electrical rooms (10'x15'+/-) distributed throughout the lower level and electrical closets on the upper floor. The electrical closets would be approximately 3' deep and 12' to 16' long with two compartments. One compartment to be used for data and telephone terminal boards and the other compartment to house a normal power panel and a computer power panel.

Energy Conservation - The fluorescent lighting system will be designed with energy efficient lamps and electronic ballasts. A control system will be designed to provide controlled lighting levels with occupancy sensors, photo sensors, and dimming controls. This system is to be integrated with the building automation system.

The energy audit described in the mechanical section of this report will include a review of the lighting system design to compare with 1975 square foot energy consumption.

Lighting - In general, the lighting system will be 2'x4' fluorescent fixtures. Fixtures will have parabolic louvers in areas where minimum glare is a factor, such as computer rooms, operator work stations, and offices. Lamps will be energy efficient, T-8, type. Color and temperature of lamps will be selected to maximize both efficiency and comfort. Energy saving ballasts will be electronic type to maximize energy efficiency. A lighting control system will incorporate photo sensors to make use of the benefits of day lighting and prevent overlighting of a space. Occupancy sensors will be used to turn lighting off in unoccupied areas, thus improving system efficiency. This lighting control system will also be connected to the building automation system to provide system status, remote control and programming functions in a central location.

Telephones - A telephone distribution system will be provided with telephone outlets throughout the building addition. Telephone raceways for individual outlet locations will be brought to electrical closets where telephone terminal boards will be located. From the electrical closets on the main level, large, multi-conductor cables will be installed to a central telephone room which could be located in an electrical room in the lower level. This location will serve to connect all points in the new addition.

A similar separate distribution system is proposed for the computer data system throughout the new addition.

Fire Detection and Alarms - A fire detection and alarm system will be provided in the facility to protect the path of egress with corridor smoke detection. Air handling systems will have duct mounted smoke detectors. Manual pull stations will be provided at all exits and other appropriate locations. Sprinkler flow switches will be connected to initiate an alarm signal in the event of water flow in the system.

Fire alarm signals will be combinations audio/visual signals throughout the facility.

The fire alarm system in the computer center will employ sensors of a special nature that will be selected as part of the "topics for further study".

The fire detection and alarm system as a whole will employ "addressable" sensors which provide individual point annunciation capabilities for alarm, trouble, and maintenance conditions. The system will be integrated with the building automation system for central alarm reporting and control.

Security Systems - Card readers will be used at secure entrances to the building as well as interior passages to secure areas of the building.

Closed-circuit television cameras and monitors will also be provided where visual surveillance is needed. Motion detection may be incorporated to provide alarm initiated switching of cameras and monitors.

This subject must be discussed in great detail as the design of this facility progresses.

Electronic Communications - A data distribution system, similar to the telephone distribution system previously described, will be provided. Data outlets will be provided throughout the addition with raceways to data terminal boards located in the electrical closets. I would like more info re telephone, data distrib networks

Special Electrical Systems - Power conditioning and back-up power will be provided as a part of the computer equipment purchase. Provisions for the connection of this system to the building distribution system will be provided. The type of power conditioning and back-up power system will be discussed as a "topic for further study".

A signal ground reference system (SGRS) will be provided for the computer center to ensure the proper operation of the installed computer and peripheral equipment. The type of system and materials will be discussed and established as a part of the "topics for further study".

General Space Requirements - The main electrical service entrance will be located in the mechanical space along with unit substations, UPS and generators (except in the case of a CPS which requires a separate enclosure).

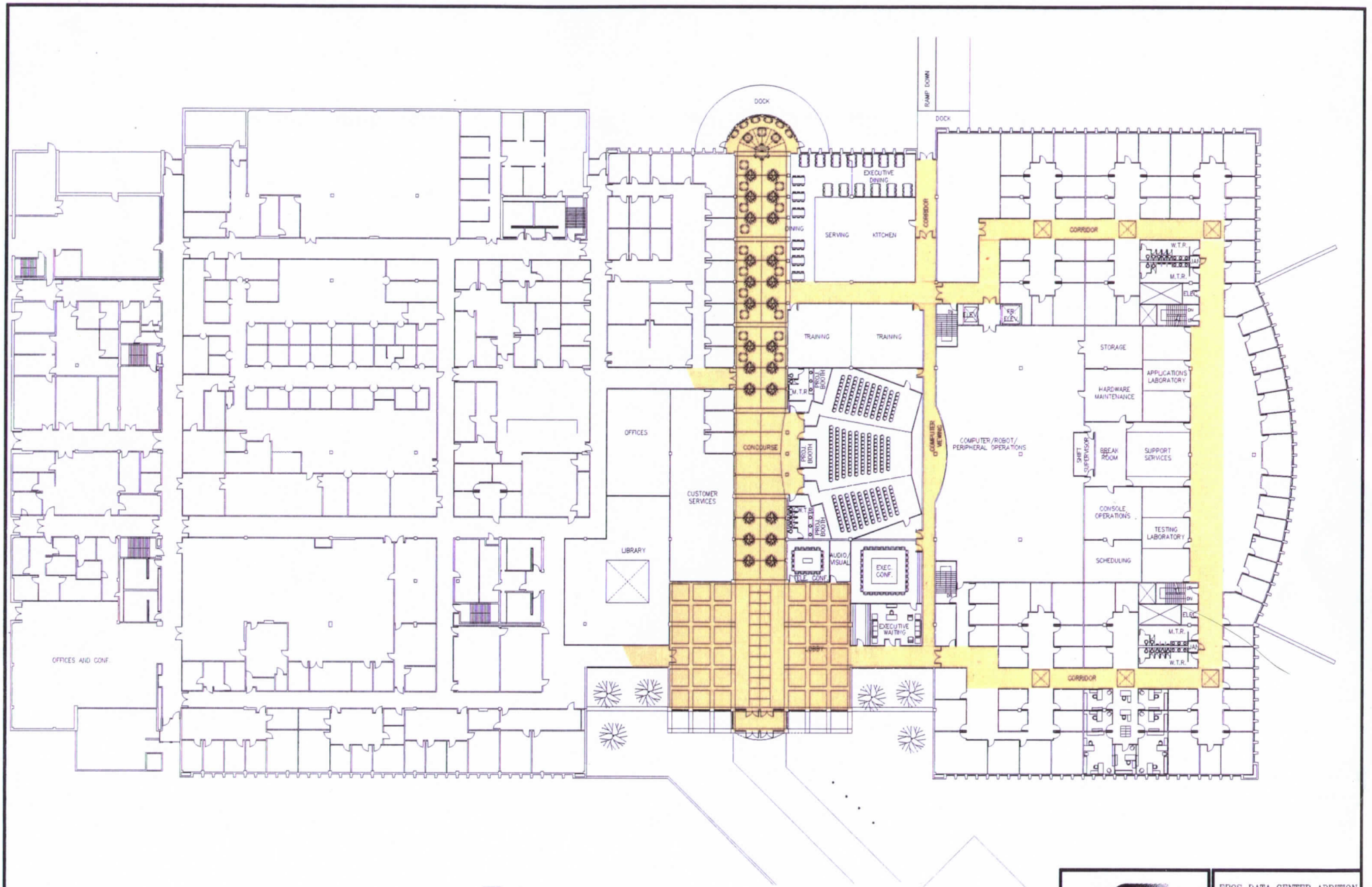
Several electrical rooms will be located throughout the lower level. These rooms will house electrical distribution switchboards and transformers.

Electrical closets will be located on the main level which will house data and telephone terminal boards and normal and computer 120/208 volt power panels.

PROBABLE COST OF CONSTRUCTION

Building Structure	$6,167,000.00
Site	$685,000.00
Mechanical	$2,721,000.00
Electrical	$1,404,000.00
TOTAL	$10,977,000.00

Total S.F. - 139,570.00 S.F. = $78.65/S.F.



PROPOSED FLOOR PLAN

SCALE: 1/16" = 1'-0"

A-1

Spitznagel

Architecture
Engineering
Interior Design

1112 West Avenue North
P.O. Box 84427
Sioux Falls, SD 57118-4427
(605) 336-1160

EROS DATA CENTER ADDITION
SIOUX FALLS, SOUTH DAKOTA

PROPOSED FLOOR PLAN

Project No. 0492033
Drawn by BWH BGG
Checked by BWH
Date 6/22/92
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4-2

PROPOSED FLOOR PLAN

SCALE: 1/16" = 1'-0"

A-2

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EROS DATA CENTER ADDITION
SIOUX FALLS, SOUTH DAKOTA

PROPOSED FLOOR PLAN

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4-2A

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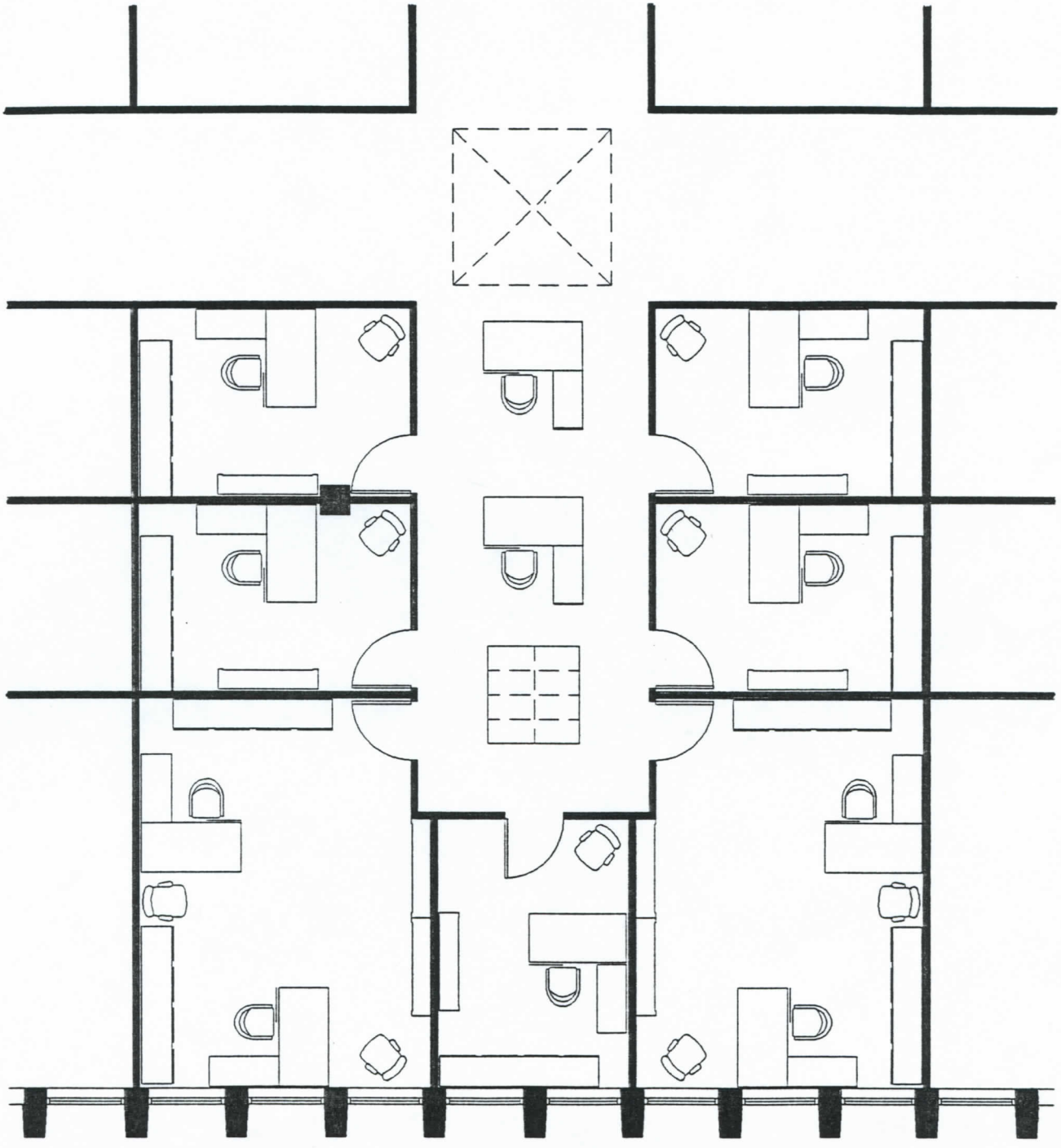

REF. SHT. 4-2

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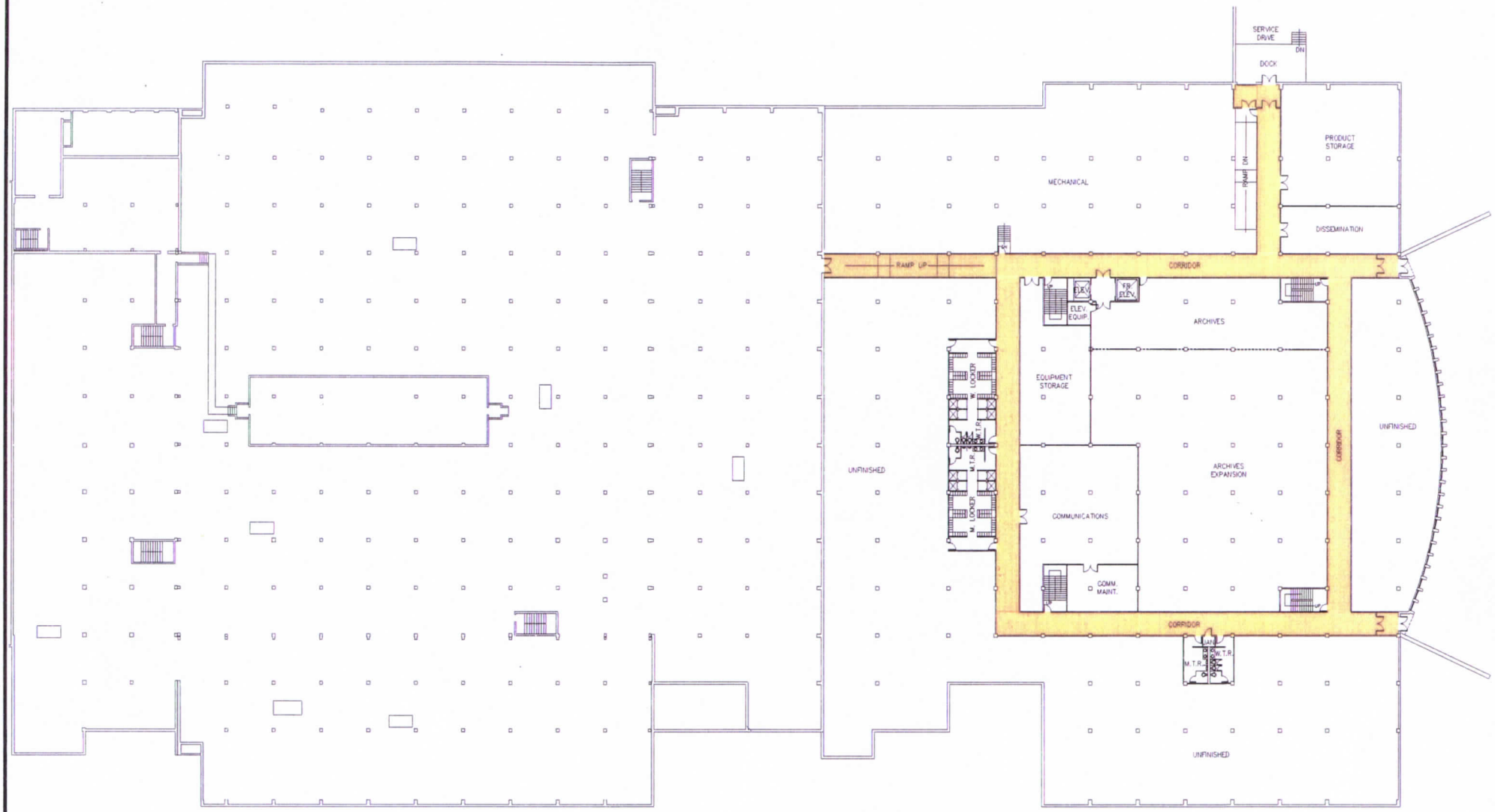
EROS DATA CENTER ADDITION
OFFICE LAYOUT
SIOUX FALLS, SOUTH DAKOTA

Project No. 0492033
Drawn by BWH
Checked by BWH
Date 5/19/92

A-3



PROPOSED LOWER LEVEL FLOOR PLAN

SCALE 1/16" = 1'-0"

A-4

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EROS DATA CENTER ADDITION
SIOUX FALLS, SOUTH DAKOTA

PROPOSED LOWER LEVEL FLOOR PLAN

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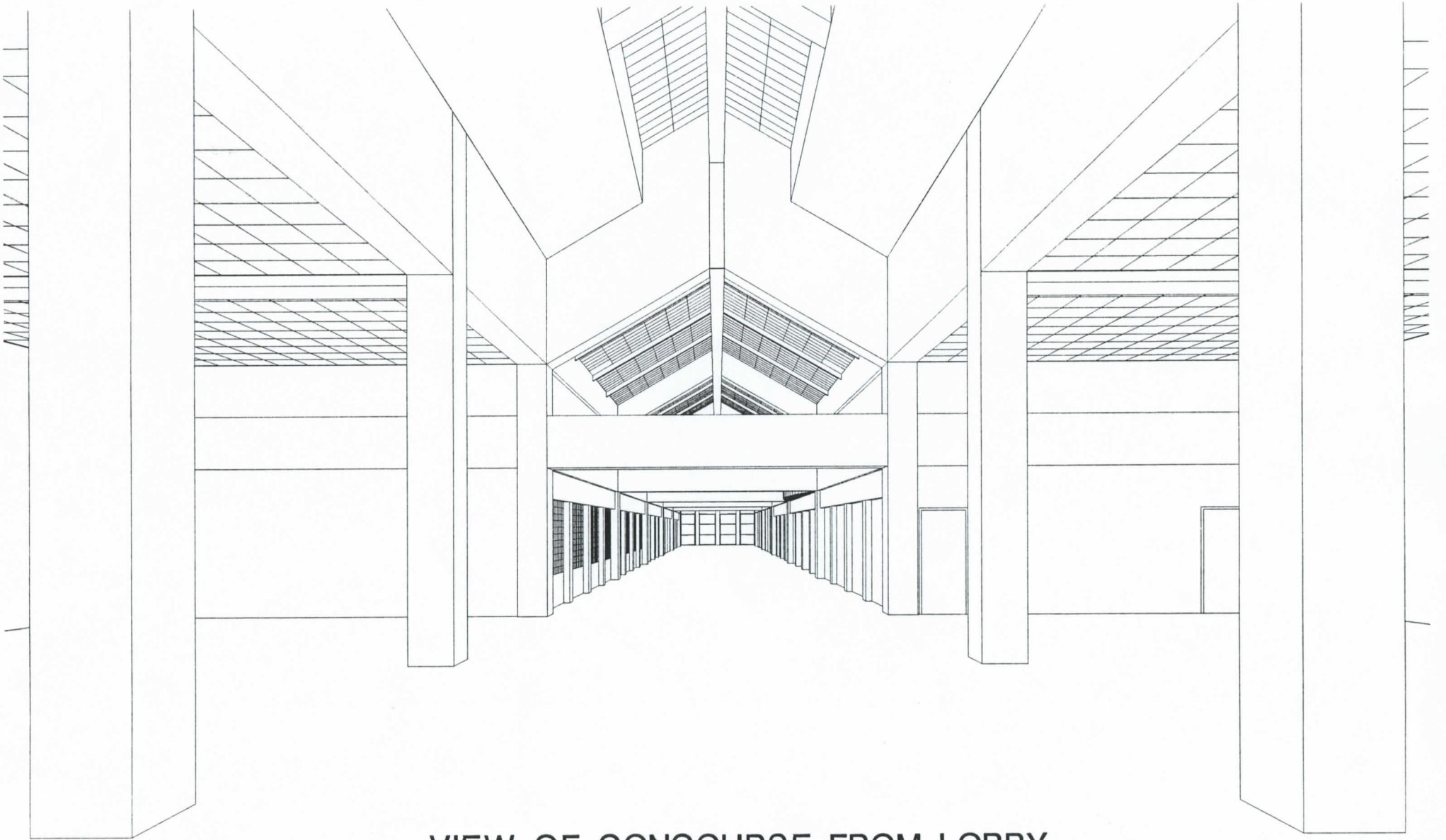
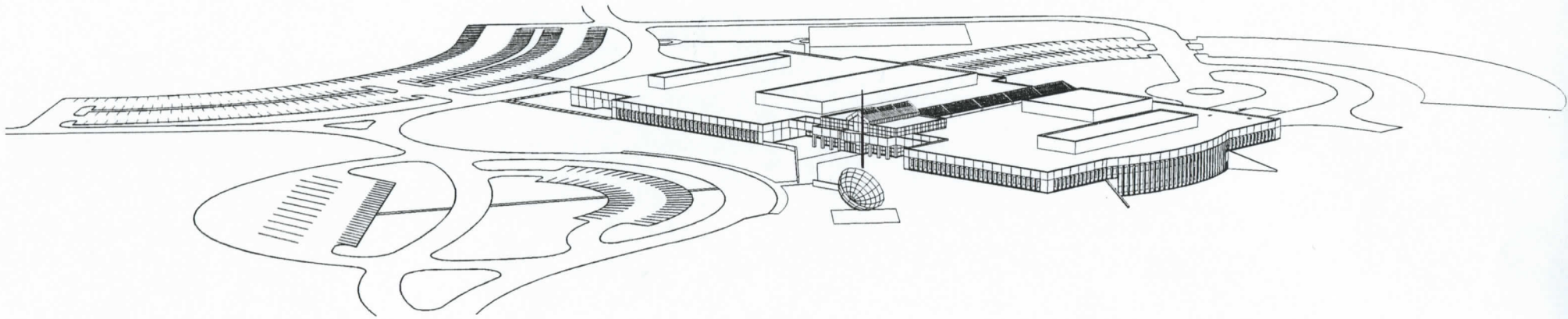
4-1

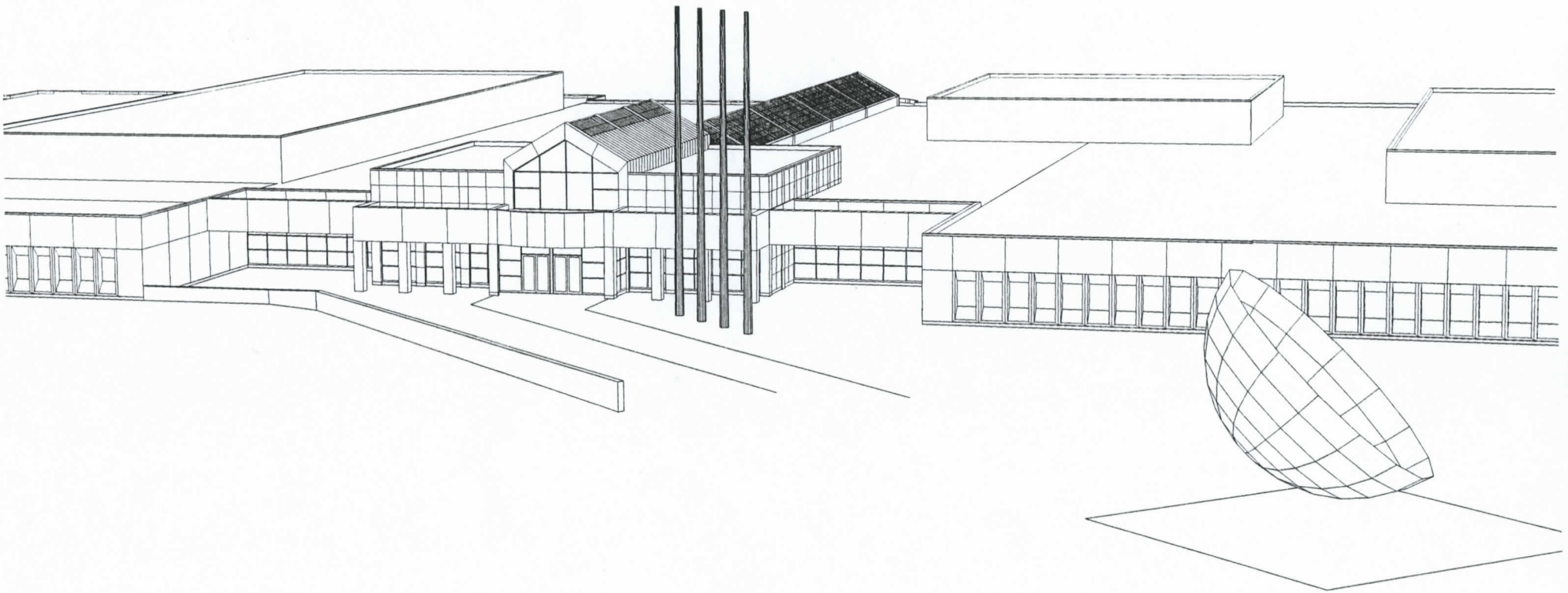


VIEW OF CONCOURSE FROM LOBBY

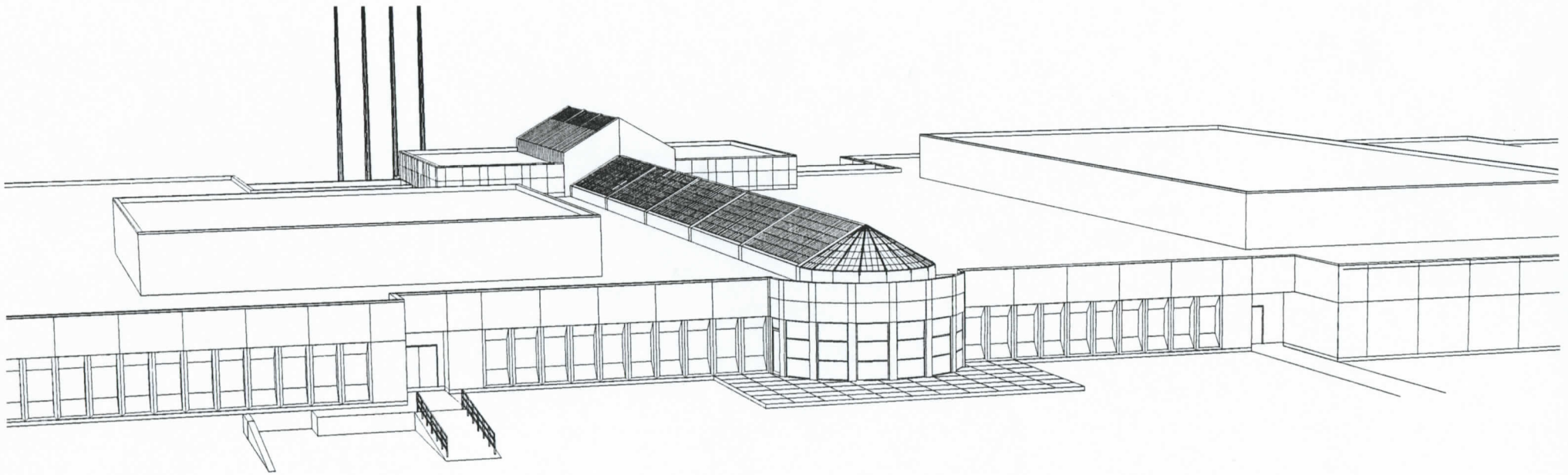
VIEW OF CONCOURSE FROM DINING ALCOVE



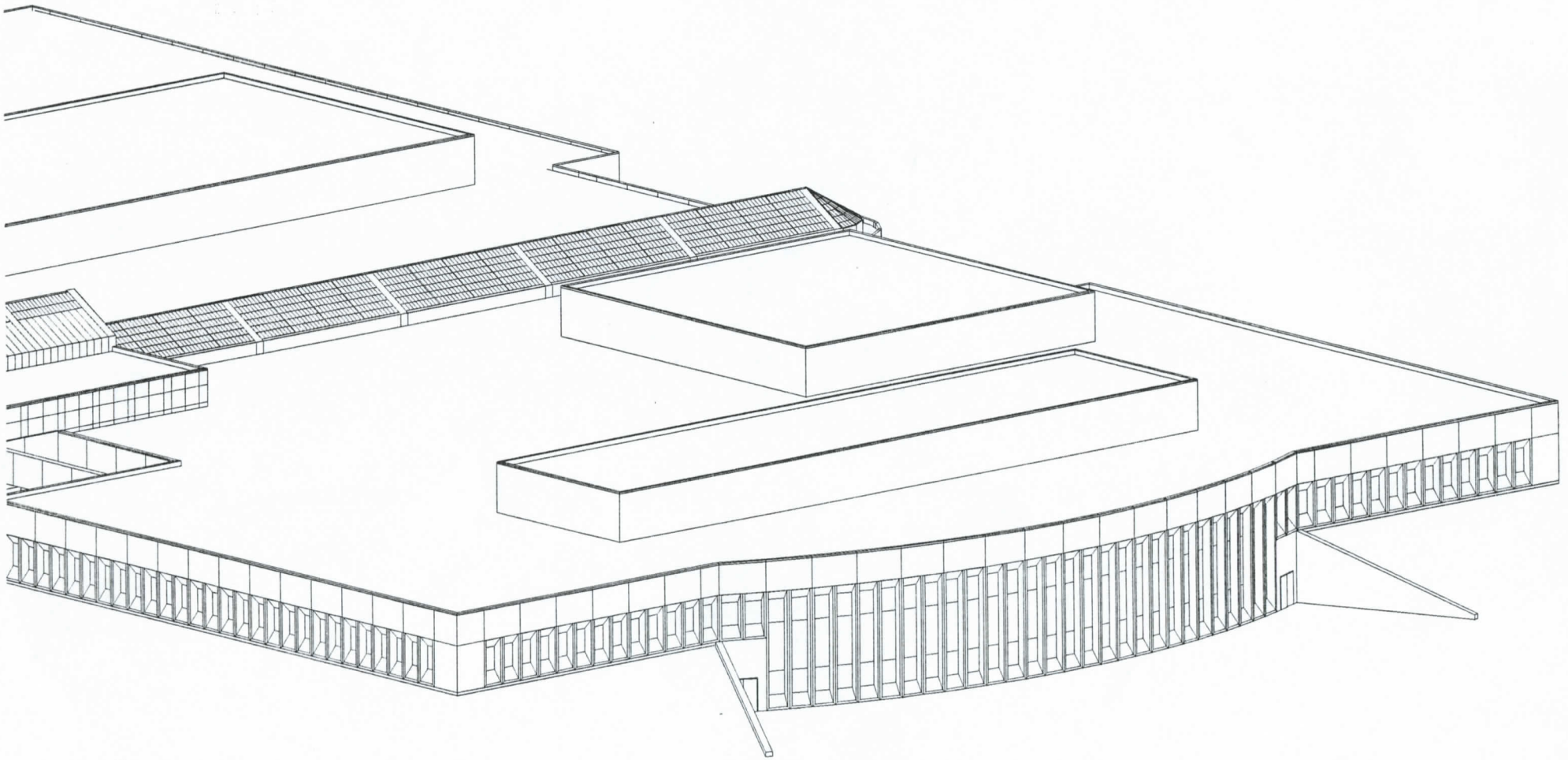
VIEW OF BUILDING AND SITE



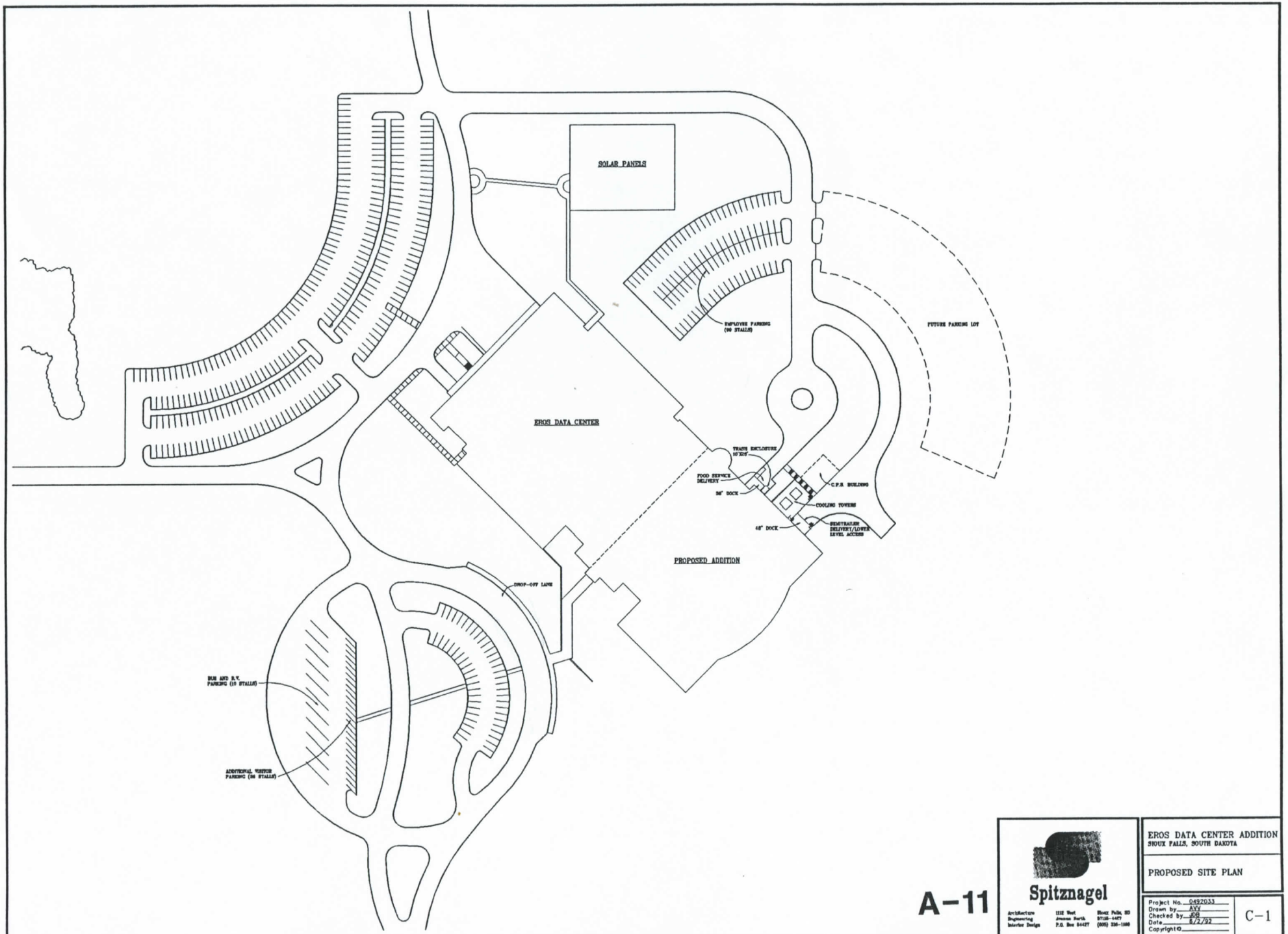
VIEW OF NEW ENTRANCE



VIEW OF DINING ALCOVE



VIEW OF SOUTHEAST ELEVATION



A-11

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EROS DATA CENTER ADDITION
SIOUX FALLS, SOUTH DAKOTA

PROPOSED SITE PLAN

Project No. 0492033
Drawn by AVV
Checked by JOB
Date 8/2/92
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