Nebraska Department of Correctional Services

Feasibility Study for the former
Lancaster County Jail Facility

Lincoln Air Park
4420 NW 41st Street
Lincoln, NE

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Alvine Engineering

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Introduction

The Department of Correctional Services enlisted the services of Sinclair Hille Architects and Alvine Engineering to perform an analysis of the former Lancaster County Jail Facility on the Air Park campus in Lincoln, Nebraska to determine the feasibility of reusing the building for a temporary NDCS facility. On site investigation of the existing conditions as well as information provided by an independent hazardous materials vendor contributed to this report.

Existing Infrastructure

Existing Building Architectural Assessment & Recommendations

The existing corrections building consists of 2 parts—the original L-shaped building to the south constructed in the 1950's and an addition to the north built in 1991. The original building is listed at 17,160 square feet and the addition at 14,757 square feet—for a total building area of 31,917 square feet.

According to the original construction drawings provided, both buildings are of similar construction with load bearing masonry exterior and interior walls. The original building has single wythe concrete masonry exterior walls and interior furred walls with insulation and gypsum board finish. The addition consists of cavity type masonry construction with an interior 8" block wall and an exterior 4" wall with insulation in the cavity space. Based on the information in the existing drawings of the building, neither wall construction meets current energy codes. A survey of the exterior indicates that areas of the walls need repair as there open mortar joints and some apparent movement in the upper part of the 4" wall. But generally the structure seems in sound condition. Repointing of masonry joints where needed and total replacement of sealant joints should be included in the renovation work.

The roof assembly of both structures is similar with steel bar joists bearing on the masonry walls and metal roof deck supporting a ballasted EPDM roof. Per the information provided, this roof is nearing the end of its useful life and will need to be replaced as a part of this project. It is unknown if the current roof was installed over the roof system from the original construction or if the original roof was removed when the current roof was installed. We recommend complete removal of the roof down to the existing metal deck before installing the new roof system.

The interior of the building—as befitting its use as a correctional facility—is simply constructed with durable materials. The vast majority of the interior walls of the original building and the interior and exterior walls in the 1991 addition are exposed concrete masonry with a painted finish. They appear to be typically in good condition—but show their heavy use. There are gypsum board surfaces at the exterior walls of the original building as noted above, and in the non-inmate areas of the addition. Again these are generally in good condition but show wear. There were a few limited areas in the TV room and a mechanical room (approximately 100 sf) that had mold growth and these need to be replaced. *(See photograph A-1in the Appendix)*

The ceilings consist of both lay-in tile in a ceiling grid and gypsum board. The majority of both of these ceiling systems will be removed during renovation due to the replacement of the HVAC and other systems.

Exterior doors are generally aluminum storefront type. The existing windows are aluminum framed. All exterior doors and windows should be replaced as part of the renovation to comply with current energy codes and for installation of the new access control system.

The interior doors and frames are generally hollow metal type. The frames are generally in usable condition, but the doors and hardware should be replaced. Some frames may need to be replaced depending on which doors need access control.

The existing flooring is generally resilient flooring material, and of that type, most are a vinyl composition tile. The results of an asbestos survey by a licensed abatement contractor indicate that the area of the existing flooring containing asbestos material (approximately 1100 square feet) would need to be abated before construction could commence. Some of the areas of the resilient flooring will need to be replaced due to excessive wear and tear while still others will be removed due to the scope of the renovation project. In renovation areas, the existing floor will most likely be removed when concrete floor slab is removed for the installation of new utility lines or new walls. It is assumed the replacement floors would be a resilient flooring product to provide the durability needed in a correctional environment. Any use of carpet would likely be limited to the entry and office area at the west side of the building.

The restroom and shower areas throughout the building are in need to total renovation. The concrete masonry is generally in good condition but all of the finishes show the evidence of hard use and inadequate ventilation. *(See photograph A-2, M11, M12, M13, M14 in the Appendix)* For purposes of this study and the Opinion of Cost it is assumed these areas will be completely renovated including removal of masonry wall as needed for new restroom layouts to meet the current accessibility and ACA requirements, and possibly to increase fixture count as needed for the desired inmate capacity. As noted in the MEP report the existing underfloor piping is likely in need of replacement and if the restrooms are to be reconfigured, this would be necessary in any case. The renovation cost includes removal of large areas of the floor for the plumbing work. The cost also includes all new finishes and accessories in these areas. Floor finishes would best be ceramic mosaic tile with tile on all surfaces in the shower areas and on 'wet' walls in the restrooms. Other walls would be finished with epoxy paint. Ceilings in these areas would be either a Portland cement plaster system or an acrylic coated direct applied finish system over cement board or other moisture resistant backing. We recommend that the renovation includes new masonry walls for toilet and shower stalls for durability in the corrections environment.

The renovation project assumes all interior walls and doors would be painted with a paint system appropriate for the use and abuse. A durable paint system would be installed in rooms with lighter use and a high-performance system including epoxy paint would be installed at areas where heavy use and high durability is expected.

To increase the level of security for the building, a new perimeter security fence should be installed to enclose the site not only at the existing facility but also at the new Food Service/Support Building. The existing parking areas on the west and south sides of the existing building need maintenance work including asphalt crack repair, a new wear layer over the existing asphalt, and parking stall restriping.

Mechanical Systems Assessment

Existing Mechanical Systems

Original Building Built in 1956 – HVAC

A portion of the north/south leg of the 1956 building (approximately 5596.5 SF) was the only portion of the original building that was air conditioned. Based on the original building documents, the original east/west leg which was comprised of classrooms and restrooms was equipped with heat only and no air conditioning.

The portion of the building cooled was served by a single air handling unit which utilized a refrigerant cooling coil and steam heat heating coil. The air handling unit was a blow-thru design and was a multi-zone unit which provided air to the individual zones of the building. Separate control thermostats associated with each zone regulating the hot and cold decks of the multi-zone unit. The air handling unit had a refrigerant cooling coil and a steam heating coil and had an air capacity of 15,560 cfm. The unit incorporated a 102″x24″ roof intake gooseneck duct for introduction of ventilation air.

Cooling for the building was provided by an evaporative condenser with a capacity of 477,000 btuh or 40-tons. The condenser was provided with 84″x18″ intake air duct that was run up through the roof with the duct terminating with a gooseneck fitting above the roof. The condenser also was provided with a 48″x14″ relief air duct which also terminated above the roof with a gooseneck duct fitting. (*See photograph M-1 in Appendix*)

In addition to cooling provided by the air handling unit, there were two, 3-ton, self-contained systems serving the building's Instrumental Training Room. An additional 5-ton self-contained system served the Flight Simulator Room.

Heating for the building was provided by 3" steam and 1 ½" condensate return utility piping with the steam provided by an off-site utility source. The steam piping was provided to the building utilizing an underground utility tunnel system likely serving other buildings nearby.

Perimeter steam fintube elements were located around the entire building perimeter under windows and along exterior walls. The steam and condensate return piping ran below the floor in a perimeter utility tunnel with piping offsets run up through the floor to the fintube heating elements located above the floor.

Sometime after the original build was built, the underground steam system was abandoned and new gas fired boilers were provided as indicated by abandoned flues above the roof. No information regarding

the boiler capacity is available. It is unclear if the boilers were steam boilers or hot water boilers as they no longer exist at the building today.

A second air handling unit was installed in the original building in the same mechanical room as the 15,560 cfm unit although there is no information available indicating when this unit was added, the unit's capacity or airflow. It is believed this air handling unit served the north side of the east/west leg of the building.

A third air handling unit located at a north side, mid-leg mechanical room in the east/west leg, was added sometime after the original building was built. This unit served the south side of the east/west wing. As with the second air handling unit, no information exists indicating the capacity and airflow of this third unit.

Air distribution for the building included an above ceiling, supply air duct system and return air system. The supply air ductwork system was insulated but is unclear from the original building drawings if the return air was insulated. The distribution devices at the individual rooms included supply air diffusers and wall mounted return air grilles.

Roof mounted exhaust fans were provided to handle toilet room and shower room exhaust. (*See photograph M-2 in Appendix*) Much of the ceiling grilles associated with the exhaust systems are rusty as they were constructed of steel and not aluminum. In the toilet and shower rooms, there were heating units located at the ceiling. As with the ceiling grilles, the metal plates on the heating units are rusty indicating steel construction. (*See photograph M-3 in Appendix*)

1991 Building Addition

In 1991, a building addition was added to the north of the original building. This addition was approximately 14,757 SF in area. That project included a remodel of approximately 1351 SF of the original 1956 building.

The building addition HVAC system was comprised of three, roof-mounted, gas-fired heating and electric cooling rooftop units. (*See photograph M-4 in Appendix*) The equipment on the roof appears to be in fair shape but it is unknown if any repair work is needed on the units.

The rooftop units include one unit with 3000 cfm air capacity, 7.5-tons of cooling capacity and 150 MBH of heating capacity. The other two additional rooftop units are multi-zone units each with airflows of 8000 cfm and cooling capacity of 25-tons nominal. One of the two 25-ton units has a heating capacity of 235 MBH of heating capacity while the other unit has 335 MBH of heating capacity. Gas utility piping originating at one of the building's mechanical rooms currently runs above the roof to all of the rooftop units.

The 7.5 ton unit is a single zone unit controlled by a single control thermostat. The other two larger, multi-zone rooftop units currently serve four (4) and six (6) zones respectively. The zones are controlled by individual zones thermostats.

Air distribution for the 1991 addition is accomplished using above ceiling supply and return air ductwork which utilizes ceiling mounted supply diffusers and return air grilles.

As part of the 1991 addition, the entry area of the original 1956 building was remodeled where new supply air and return air ductwork served the renovated spaces by the 7.5-ton roof top unit.

As part of the 1991 addition, the east/west leg of the original 1956 building was provided with new return air ductwork which served the south exposure rooms. This ductwork was connected to the third air handling unit located in a mid-wing mechanical room

Roof mounted exhaust fans were provided to handle toilet room and shower room exhaust. (*See photograph M-5 in Appendix*)

2001 Modifications to 1956 Building

In the fall of 2001, the original 1956 building mechanical system was renovated. This renovation work included removing the existing three air handling units and replacing them with nine (9) water source heat pumps of vertical and horizontal configuration. (*See photograph M-6, M-7, M-8, and M-9 in Appendix*) The supply and return air ductwork serving the spaces utilized by the air handling units was slightly modified to accommodate the heat pumps but overall maintained the original building zoning. The heat pumps are manufactured by Water Furnace.

The heat pumps range from 2.5-tons to 10-tons in cooling capacity and 15.1 MBH to 92.5 MBH in heating capacity. The total building cooling capacity is 56.6-tons or approximately 282.87 SF per ton based on the square footage of the building served by the heat pumps.

The heat pump systems utilize individual piping loops comprised of polyethylene piping below ground and copper piping above ground. Each piping loop is served by a circulating pump with each loop connected to a series of wells located at the well field. (*See photograph M-10 in Appendix*) Each piping loop was originally designed to be filled with a 30% glycol, 70% water solution allowing water piping circulation down to 15 degree F according to the original construction documents.

The loop piping originates at each heat pump and is piped under the building via the existing utility tunnels where it exits on the southeast side of the building and routes underground to a well field located southeast of the security fence. While the use of individual piping loops can maintain system operation to the majority of the building if one loop needs to be taken down due to maintenance on a heat pump or if a heat pump unit fails, it is not a very efficient system. A lower quantity of piping loops and larger headers could allow for increased load fluctuation allowing for a more efficient operating system.

The well field is comprised of 58-vertical wells approximately 180-feet deep. The individual heat pumps are piped to a series of wells specifically provided for each heat pump.

Service Life and Deficiency of the Existing HVAC Systems

Equipment and Ductwork Systems

The age of the rooftop units residing on the roof of the 1991 addition is approximately 24-years old. The American Society of Heating, Ventilating and Air Conditioning Engineers (ASHRAE), publishes a recommended service life for various equipment types. The recommended service life for rooftop equipment is 30-years therefore the rooftop units are approaching then end of their service life.

The heat pump systems currently serving the 1956 building were installed in 1991 making the systems approximately 14-years old. Commercial heat pumps systems have a recommended service life according to ASHRAE of 19-years. The heat pumps serving the building only have an expected service life of five (5) more years and thus should be considered for replacement.

The roof mounted exhaust fans are approximately 24-years old. The recommended service life of the fans and ductwork is 24-years for the fans and 30-years for the exhaust ductwork. It is unknown if any of the exhaust system ductwork is aluminum. If aluminum ductwork wasn't used in the exhaust systems which serve shower or wet areas, it is likely that this exhaust ductwork has deteriorated over the years due to the moisture in the airstreams. If this is the case, the ductwork will need to be removed and replaced.

The supply and return air duct systems serving the heat pump systems are original to the building making the majority of the ductwork approximately 59-years old. The supply, return and exhaust ductwork associated with the 1991 north addition and the return air ductwork serving the south side of the east/west leg were also installed in 1991 making the duct systems 24-years old. The ductwork has either surpassed its service life or is quickly approaching the end of its service life.

With the age of the building's HVAC equipment and ductwork at or beyond the rated service life according to ASHRAE, it is recommended that all HVAC equipment and ductwork systems be replaced.

Heat Pump System Deficiency

It has been stated that the heat pump system serving the original 1956 building has experienced some problems. It is unclear if the problems are related to the original design or if they are related to operational issues.

The heat pump system serving the building has a current capacity of 56.6-tons. With approximately 16,039 SF of the building served by the heat pump system, the resultant square foot (SF) per ton is approximately 283.4 SF per ton. Based on the SF per ton of 283.4, the cooling tonnage does not appear to be low for a facility of this type.

Reviewing the existing well field installed in 2001 as part of the heat pump system upgrade, there are 58 vertically bored wells with each well having a bore depth of 180-feet. Based on historical analysis, a typical eastern Nebraska well boring at 300-feet deep will yield about 1.25 tons. With the wells at the site being only 180-feet deep, it is anticipated that the maximum tonnage capacity that each well can expect to achieve would be .75 tons, or a reduction of 40% when compared to a typical 300-foot well.

With a building connected load of 56.6-tons, it would take approximately 76 wells to serve the building based on the current connected heat pump capacity.

As there are currently only 58 wells currently on the site, the heat pump well field appears to be undersized for its load. Additional wells would need to be added that are deeper to accommodate the anticipated tonnage capacity. The current well field capacity would appear to be approximately 24% short of capacity based on its current configuration and depth when based on a historic analysis.

Plumbing

Plumbing Systems and Water Heating

The original 1956 building is served by traditional sanitary waste and vent and potable water systems. It is assumed the facility sanitary waste and vent system was comprised of cast iron piping. The potable water system was assumed to have been galvanized steel piping due to the vintage of the building. It is likely that much if not all of the galvanized piping was removed and replaced with copper piping but it is unclear when this occurred. Much of the potable water piping has deteriorated and is likely in need of replacement. The removal and replacement of the sanitary and vent piping systems is recommended as well due to its age.

The sanitary and vent piping and potable water piping for the 1991 addition while in better condition associated with only being in the building 15-years, it is assumed that some scaling of the interior of the water piping has occurred due to the lack of water softening at the building.

The original 1956 building restroom and shower rooms were renovated in 1991. The restrooms renovated included the original shower and restrooms located at the east/west leg of the building and existing restrooms south of the main west entry area of the building. The plumbing fixtures were removed and replaced with new fixtures as part of this renovation project.

As part of the 1991 addition project, the main entry was renovated and new public Men's and Women's restrooms were provided. New restrooms and shower rooms were also added with the 1991 north addition serving inmates and staff when the building was renovated in 1991 and turned over to the Lancaster County Correctional Authority.

The plumbing fixtures for the areas of renovation are comprised of flush valve water closets with push-button operators, counter-mounted steel lavatories and walk-in ceramic tile showers. The water closets and showers are in poor shape with a lot of staining and deterioration and it is unclear if the fixture flush valves are still operational. (*See photograph M-11, M-12, and M-13 in Appendix*)

The Men's and Women's restrooms at the front entry area utilize wall-mounted flush-valve water closets, wall-mounted flush-valve urinals and wall mounted lavatories with manual faucets. These fixtures appear to be in reasonably good condition and, with proper cleaning and care, could be restored for reuse. (*See photograph M-14 and M-15 in Appendix*)

Floor-mounted mop sinks are located at janitor's closet of the 1991 addition and at the mechanical room housing the buildings' water heaters. (*See photograph M-16 and M-17 in Appendix*)

The original 1956 building storm system is comprised of an external gutters and downspouts. The 1991 addition is comprised of an internally piped storm and over-flow piping systems system with roof drains and over-flow drains. (*See photograph M-18 in Appendix*) The over-flow drains utilize downspout nozzles which discharge to grade. (*See photograph M-19 in Appendix*)

The storm piping for the internal storm and over-flow system is assumed to be cast iron piping.

Domestic water heating for the building was provided in 1991 as part of the renovation project. The water heating is accomplished by four, gas fired water heaters located in a 1991 mechanical room. (*See photograph M-20 in Appendix*) Two of the water heaters are A.O. Smith, model BTR 197-118 water heaters with storage capacities of 100 gallons and recovery rates of 192.96 gallons per hour at 199,000 btuh per hour of gas inputs. One of the two smaller water heaters is an A.O. Smith model BT 80-300 with storage capacity of 74 gallons and a recovery rate of 72 gallons per hour at 75,100 btuh per hour of gas input. The fourth water heater is an A.O. Smith model BT 80-104 with 74 gallons storage capacity and a recovery rate of 72.8 gallons per hour with 76,000 btuh per hour of gas input.

The two large water heaters were manufactured in 2008 and are in fairly good condition. One of the two smaller water heaters has a manufactured date of 2008 while the other small water heater while not having a manufactured date on it, looks to be about the same vintage of equipment as the other water heaters. As the water heaters are less than 10-years old, they could continue to serve the building into the near future.

The domestic water heating system incorporates a master mixing valve for limiting the hot water temperature for showers and lavatories requiring hot water. The mixing valve is a Powers model 433 Master Mixer and appears to have been installed after the 1991 building addition. (*See photograph M-21 in Appendix*)

The hot water from the two large 100 gallon water heaters is circulated with a hot water circulating pipe system and circulating pump. The hot water associated with the two smaller water heaters does not appear to be circulated.

Fire Protection

There is currently no fire protection system serving the facility at this time.

Electrical Systems Assessment

Primary Power

The building is served by a 300 KVA pad mounted transformer located on the east side of the building. The pad mounted transformer and primary distribution cable are owned and maintained by Lincoln Electric System. The pad mounted transformer was installed in 1991. The pad mounted transformer has a useful life of approximately another 25 years. The existing pad mounted transformer does not have enough capacity to support future renovation work. (*See photograph E-1 in Appendix*)

Electrical Service

The building has a 208/120 volt, 3 phase, 4 wire, 1600 amp electrical service. The main switchboard is a General Electric, two section type. The incoming section has a power company current transformer compartment and a 1600 amp 3 pole type HPC main circuit breaker. The second section has one 800 amp 3 pole type SKHA branch circuit breaker, two 300 amp 3 pole Type TJKA branch circuit breakers, one 225 amp 3 pole Type SFHA branch circuit breaker, two 125 amp 3 pole Type TJKA branch circuit breakers, one 225 amp 3 pole Type SFHA branch circuit breaker, two 125 amp 3 pole Type SFHA branch circuit breakers, one 100 amp 3 pole Type THED6 branch circuit breaker, one 80 amp 3 pole Type THED6 branch circuit breaker, and one 70 amp 3 pole Type THED6 branch circuit breaker. (*See photograph E-21 in Appendix*)

The electrical service was installed in 1991. An electrical service on average has a useful life span of 50 years maximum. The electrical service has reached approximately 50% of its useful life. The electrical service does not have enough capacity to support future renovation work.

Power Distribution

Original Building Built in 1956

The original building has a Frank Adams 1200 amp 240/120 volt, 3 phase, 4 wire fusible distribution panel with one 600 amp 3 pole, three 400 amp 3 pole, on 200 amp 3 pole, and two 100 amp 3 pole fusible switches. (*See photograph E-3 in Appendix*)

The panel has reached the end of its useful life expectancy.

The original building has two Frank Adams panelboards with branch circuit breakers. (*See photograph E-4 and E-5 in Appendix*)

These panels have reached the end of their useful life expectancy.

1991 Building Addition

The 1991 addition has four panelboards with circuit breaker distribution. The panelboards are General Electric Type AL. Three panelboards are rated at 225 amps and one panelboard rated at 125 amps. (*See photograph E-6 in Appendix*)

The panelboards would have another 5 to 10 years of useful life expectancy. Although it would not be recommended to reuse the panels for future renovations work.

In 2001 heat pumps were installed in the building. In order to power the heat pumps an 800 amp 208/120 volt, 3 phase, 4 wire circuit breaker distribution panel was installed. (*See photograph E-8 in Appendix*)

This panel would have another 5 to 10 years of useful life expectancy. Although it would not be recommended to reuse the panels for future renovations work.

Emergency Power

The existing generator and automatic transfer switch have been removed from the building.

The addition has distribution panelboards to support emergency power. There is a 208/120 volt, 3 phase, 4 wire, square D panelboard in the main electrical room this panelboard serves two 225 amp panelboards located in the main electrical room with two 150 amp feeders. (*See photograph E-7 in Appendix*)

It has not been determined when these emergency panelboards were installed but was after 1991. The panelboards would have another 5 to 10 years of useful life expectancy. Although it would not be recommended to reuse the panels for future renovations work.

Interior Wiring

Original Building Built in 1956
The original building was wired with copper conductors installed in electrical metallic tubing EMT. A separate grounding conductor was not installed and the conduit system is the equipment grounding system.

The original 1956 building has a variety of safety switch types including the antiquated bull dog type. (*See photograph E-9 in Appendix*)

The original 1956 building wiring has reached the end of its useful life expectancy.

1991 Building Addition
The 1991 addition was wired with copper conductors installed in electrical metallic tubing EMT. A separate grounding conductor was not installed and the conduit is the equipment grounding system. The wiring meets minimum National Electrical Code requirements but does not meet current industry standards. The wiring has reached the end of its useful life expectancy.

The 1991 addition has heavy duty safety switches. (*See photograph E-17 in Appendix*) These safety switches would have another 5-10 years of life expectancy. It would not be recommended to reuse the safety switches in the future renovation work.

There are several receptacles in the inmate housing areas that are burnt from inmates inserting wires into the receptacles. (*See photograph E-16 in Appendix*) Due to the type of building usage this building has few receptacles.

Grounding

The main electrical service has a code compliant grounding electrode system with a #3/0 copper grounding conductor to the metallic water service and a #6 copper grounding conductor to a copper clad driven ground rod.

The grounding electrode system meets minimum National Electrical Code requirements.

The feeders to panels do not have separate grounding conductors; the conduit system is used as the equipment grounding path.

The equipment grounding system to panels meets minimum National Electrical Code requirements but does not meet current industry standards. It is not possible to add equipment ground wires without first removing the existing phase and neutral conductors and reinstalling in the existing conduit.

The branch circuits for lighting, receptacles, and equipment do not have separate grounding conductors; the conduit system is used as the equipment grounding path. The equipment grounding system for branch circuits meets minimum National Electrical Code requirements but does not meet current industry standards. It is not possible to add equipment ground wire without first removing the existing phase and neutral conductors and reinstalling in the existing conduit.

Lighting

The building has interior fluorescent lighting fixtures which have T-12 40 watt rapid start lamps. The T-12 40 watt fluorescent lamps are no longer manufactured. The lighting has reached the end of its useful life and does not meet current energy codes. The interior lighting fixtures are controlled by keyed switches. (*See photograph E-21 in Appendix*) There are no parking lot luminaires.

Room/Area	Lighting Fixture Schedule	Mounting	Lamps
Dorm Rooms	2′X4′ Recessed Troffer	Ceiling Flanged	3 Lamp Fluorescent Troffers With Vandal-Resistant Lens
Day Rooms	2′X4′ Recessed Troffer	Ceiling Flanged	2 Lamp Fluorescent Troffers With Vandal-Resistant Lens(*See photograph E-18 in Appendix*)
Corridors	4′ Vandal Wrap Around Fluorescent	Ceiling Surface Mounted	2 Lamp Fluorescent (*See photograph E-19 in Appendix*)
Office Areas	2′X4′ Recessed Troffer	Ceiling Flanged	4 Lamp Fluorescent Troffers With Vandal-Resistant Lens
Dining Area	2′X4′ Recessed Troffer	Ceiling Flanged	3 Lamp Fluorescent Troffers With High Impact Lens
Food Prep Area	2′X4′ Recessed Troffer	Ceiling Flanged	4 Lamp Fluorescent Troffers With Vandal-Resistant Lens
Mechanical Rooms	4′ Industrial	Ceiling Chain Hung	2 Lamp Fluorescent Industrial Lights
Garage Area	8′ Industrial	Ceiling Surface Mounted	2 Lamp Fluorescent Strip Lights (*See photograph E-22 in Appendix*)
Exterior	Flood Light	Wall	1 H.I.D. Metal Halide (*See photograph E-20 in Appendix*)

Exit and Emergency Lighting

There are exit lights located near exiting doors. The exit lights are the security style with 16 gauge steel housing with a polycarbonate lens. The exit lights have two 20 watt T-6 incandescent lamps. (*See photograph E-10 and E-11 in Appendix*)

The emergency lights are the wall mounted battery units with two incandescent heads. The condition of the batteries is unknown but due to the age of the unit it is doubtful the units are operational.

The exit and emergency lighting have reached the end of their useful life expectancy.

Fire Alarm System

The building has a fire alarm system that was installed in 1991. The fire alarm system is a Notifier system with a Notifier 5000 main fire alarm control panel. (*See photograph E-12 in Appendix*) There are smoke detectors in some areas.

The building has manual pull stations near exit doors. (*See photograph E-13 in Appendix*) There are heat detectors located throughout the facility. (*See photograph E-14 in Appendix*) There are horn/strobe lights located in the corridors and in the day rooms. (*See photograph E-15 in Appendix*) There are smoke detectors in some areas.

The fire alarm system does not meet current code requirements and has reached the end of its useful life expectancy.

Technology Systems Assessment

The existing Air Park Facility communications rooms and cabling systems are antiquated and obsolete and will be removed. The existing copper service entrance cable can remain provided it is Service Carrier owned. If the existing copper service is a part of a previous customer owned distribution system it will be replaced with a carrier owned service to provide commercial telephone access.

Communications cabling is very limited and minimal provisions exist for telephone (original 2-pair analog twisted pair cables), cable TV (RG-59 coax to inmate dormitory rooms), and free-lance non-plenum Category 5 computer cables run exposed and laying on ceiling tiles in the vicinity of the control room.

Presently the building does not have a fiber optic service cable entrance.

The existing Security and Paging systems and equipment are also obsolete and in a deteriorated condition and are not reusable.

The existing security provisions consist of minimal monitoring of the exterior doors with an analog control panel and alarm at the control room. Existing CCTV surveillance cameras have been removed.

The paging system consists of ceiling and corridor wall mounted building speakers located in corridors, dorm room, office, and common spaces. The amplifier appears inoperable.

Recommendations for the Existing Building and New Food Service/Support Building

Architectural Overview – New Food Service/Support Building

As the recommendations for the existing building were already addressed from an architectural standpoint earlier in this report, the following provides an overview of what will be needed for the new Food Service/Support Building.

The new Dining/Food Service/Program/Warehouse building will include a commercial kitchen with dining space to serve a 200 bed correctional facility, 4 program classrooms, a warehouse and other ancillary functions with a total size of approximately 13,300 square feet.

It is recommended that in order to meet current building, life safety, and energy codes as well as American Correctional Association design standards, the exterior walls would be of cavity type masonry construction with continuous rigid insulation. The roof structure would consist of steel beams with interior steel columns as needed, steel bar joists, metal deck, and a fully adhered EPDM roofing system. Exterior doors would be aluminum with thermally broken aluminum framed windows. Interior partitions would consist of painted concrete masonry with an epoxy paint system in the kitchen areas. Resilient flooring would be installed in all areas except kitchens and restrooms. Kitchen would be either quarry tile or seamless epoxy flooring. Restrooms would have ceramic tile floors, ceramic tile on wet walls and paint on other surfaces. Toilet partitions would be concrete masonry for added durability. Interior doors and frames would be heavy duty grade painted hollow metal.

Site work would consist of the installation of a new service drive from NW 41st Street to a receiving area adjacent to the new kitchen. A limited parking area would be constructed and connecting sidewalks within the security fence would provide access to the correctional building.

Based on these construction materials and systems as well as the MEP systems described, the construction cost for this building would be in a range from $250 to $275 per square foot. A 13,300 SF building at $275/SF would cost $3,657,500. Furnishings, fixtures and equipment are not included in the construction cost but should be included in the Owner's FFE cost.

Mechanical Addition to the Existing Correctional Building

As noted in the MEP discussion, an addition is proposed for the west side of the existing correctional building just north of the main building entrance. This building would contain heat pumps serving various zones in the adjacent part of the building and other equipment as needed. Access to this building would be from the public side of the building for ease of service by not requiring access to the inmate areas. This addition will serve to intention of removing as much HVAC equipment as possible from the roof—for ease of service.

This addition would be constructed of similar height, design, and materials as the existing 1991 addition it is located adjacent to. This would consist of load bearing cavity type masonry exterior walls with continuous rigid insulation. The roof structure would consist of either bar joists or small steel beams bearing on the new west wall and the existing building. Roofing would consist of the same fully adhered EPDM system on a metal deck as will be installed when the existing correctional building roof is replaced.

Mechanical Systems Overview

The mechanical systems serving the existing building, the 1991 addition, and the new food service/support building shall be designed to provide adequate comfort levels and reliability.

Design Criteria

The design of the mechanical, plumbing, and fire protection systems shall conform to the following codes:

- 2009 International Plumbing Code
- 2009 International Mechanical Code
- NFPA-13
- NFPA-101
- 2009 International Energy Conservation Code (IECC)
- 2009 International Fuel Gas
- Applicable State and Local

The design of the mechanical systems shall conform to the following standards:

- American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
- National Fire Protection Association (NFPA)
- American National Standards Institute (ANSI)
- America Society of Mechanical Engineers (ASME)
- Sheet Metal and Air Conditioning Contractors National Associated (SMACNA)

Outside Design Conditions	
Summer	95°F, db, 72°F wb
Winter	-20°F, db
Indoor Design Conditions	
Summer	75°F, 50% RH
Winter	70°F, 20% RH

Outside Air Requirements

Outside air will be provided in the form of make-up air through the use of energy recovery ventilators (ERVs). Outdoor air quantities will be provided to equal those with the greatest demand as dictated by ASHRAE Standard 62 of the current Correctional Facility Standard requirement.

HVAC

It is recommended that a geothermal heat pump system be utilized to replace the existing heat pump systems serving the 1956 original building and to replace the rooftop systems serving the 1991 building addition. A geothermal heat pump system would also be provided to serve the new food service/support building. The life of the well field is forecasted to last several generations.

When compared to more traditional HVAC systems utilizing direct expansion cooling or a chilled water hydronic system, the first cost of the geothermal system is generally higher primarily due to the cost associated with the well field. The anticipated ever-increasing cost of energy will drive down the payback period of this system and provide the most energy efficient option.

Advantages of heat pumps systems:

1. Extremely efficient system operation.
2. Can be used to heat and cool simultaneously.
3. Geothermal uses renewable energy from the earth.
4. Clean operation. No combustion on site.
5. Long Life (50+ years for a closed loop ground loop).
6. Low maintenance (for a closed loop ground loop).
7. No noisy outdoor units such as you would find with standard air conditioning equipment such as condensing units and water chillers.

The area occupied by the existing well field would be used to locate 58 new wells, each being 300-feet deep to serve the new food service/support building. The approximate capacity of the new well field would be approximately 70-tons including heat of rejection of the heat pumps. The new wells would be configured 20-feet center-to-center and be placed in between the existing 180-feet deep wells. The existing wells would have their vertical piping capped off and the horizontal mains removed from the well field back to the existing building. The existing wells would be abandoned.

A minimum of two (2), high-density polyethylene (HDPE) piping loop headers would be provided from the new building to the well field allowing branch lines from the main loop piping to serve the rows of well borings.

The header piping would be tied together in the building and be served by redundant circulating pumps controlled by variable speed controllers to vary the speed of the pumps based on system differential pressure. One pump will act as a primary pump and the other as a stand-by pump.

The land area to the north of the existing well field is proposed to be used to provide space for 133 new wells, each 300′ deep to serve both the 1956 original building and 1991 building addition. This will provide approximately 130-tons of capacity including heat of rejection of the heat pumps.

The original building and 1991 addition would be provided with a minimum of four (4), high-density polyethylene (HDPE) piping loops from the building to the well field allowing branch lines from the main loop piping to serve the rows of well borings.

The header piping would be tied together in the building with redundant circulating pumps provided with variable speed controllers to vary the speed of the pumps based on system differential pressure. One pump will act as a primary pump and the other as a stand-by pump.

The cost information provided in the opinion of cost within this report for the well field include well borings, thermal grout and all of the piping loops from the building to the exterior well field boring locations.

Each heat pump will be provided with a two-position valve to close off loop water when the heat pump is not running. This allows for variable flow on the building heat pump loop systems, resulting in pump energy savings.

Existing building mechanical rooms in the 1956 original building would be reused to house new heat pumps serving that portion of the building. In the 1991 building addition, the new heat pumps would be located in a new mechanical room constructed immediately west of the existing dining room with exterior access for mechanical contractors and operations personnel alleviating interaction with inmates.

Duct Systems

The air distribution systems for both the 1956 original building, the1991 building addition, and the new food service/support building would be provided with all new, low pressure duct system including supply air return air, exhaust air, and outside air systems. The new supply and return air duct systems would be fully insulated with a vapor barrier to prevent condensation. It is anticipated that any new return air system would be a fully ducted system, except perhaps from any large commons areas or assembly spaces.

Space Distribution

New ceiling supply and return diffusers and grilles would be provided. In areas of high humidity areas such as shower rooms, aluminum ductwork, and grilles would be used for corrosion resistance.

Kitchen HVAC Systems

The new food service/support building would be provided with kitchen cooking exhaust hoods coupled with gas-fired make-up air units providing 80% of the exhaust make-up air. As with the existing building, energy recovery ventilators would be used to precondition outside air used for ventilation for the building. No cooling of make-up air to cooking hoods is anticipated. The regular HVAC serving the kitchen will include cooling.

Ventilation Air

Ventilation air for the heat pump systems would be provided by means of energy recovery ventilators (ERV) which would use waste exhaust air and some return air from the building to precondition outside air used for ventilation. Supplemental heating and cooling will be provided to further condition the 100% outside air. The exhaust/return air will have its own fan and flow through a desiccant energy transfer wheel for preconditioning of the incoming air in both the heating and cooling modes. The outside air will be further conditioned by use of a heat pump to deliver the air to the building heat pumps serving the occupied spaces. In general, the thermally neutral outdoor air shall target the set point of the heating and cooling modes of the space heat pumps. The energy recovery ventilators will be provided with auxiliary heating coils to prevent frost build-up on the total energy wheels during winter months.

Outside air will be delivered to the return air side of the heat pumps. For assembly type spaces, the ERVs will deliver outside air directly to those spaces to not cause all of the heat pumps to require the same high percentage of outside air that assembly occupancies dictate.

Building Automation System (Temperature Control)

The existing and new building HVAC systems would be controlled by an electronic microprocessor based direct digital (DDC) temperature control system which would be the primary control of all heating, ventilation, and air conditioning systems and equipment. All equipment will have schedules and set point modifications readily accomplished through an onsite terminal and offsite by means of internet connection and access protocol. Each zone or space will have individual control and will be addressable from the operator station. Alarms will be set up, as well as trend logging and reporting.

Utilities

The existing gas will be retained and re-piped as necessary. The gas utility at the rear of the building currently serves the existing building domestic hot water heaters and rooftop units. The gas utility will be modified as it would no longer be needed for the rooftop units and would need to be extended to the new food service/support building providing for the kitchen cooking equipment and kitchen ventilation make-up air systems. The gas service to the building is a service with a pressure above 2 psi and is anticipated to be large enough to serve the facilities without modification.

The water service to the existing building is a 3″ service installed in 1991 with the new addition. It is anticipated that this water service is in satisfactory condition and can be reused to serve the existing and new building addition without modification. The water service was originally installed to have backflow prevention, metering and bypass city requirements at the time of installation. The water service serving the existing building will be extended to the new food service/support building.

A new 6″ fire line will be required to be installed on site from the existing 8″ water main currently running north/south at the west end of the property just east of 41st Street.

Plumbing

Due to the age of the existing sanitary, vent and water supply systems serving the existing building, it is recommended that all of these piping systems be replaced. In areas where extensive floor removal would be required to replace the existing sanitary waste piping, the existing piping will be scoped with a camera to determine the condition of the piping possibly mitigating the total replacement of the piping under the floor.

The new food service/support building will be provided with a new 6" cast iron sanitary sewer. The sewer will route to the west and connect to the existing 8" sewer main located on the west side of 41st Street.

The new sanitary and vent utilities will be service weight cast iron with gasketed joints underground and service weight cast iron with no-hub joints and fittings above ground.

Domestic water piping shall be Type L copper with wrought copper fittings for all above ground services. Underground piping shall be Type K copper with no joints below ground. All domestic water piping will be insulated with fiberglass insulation and a vapor barrier jacket.

The existing gas-fired domestic water heaters will be retained and continue to serve the existing building as the water heaters are only six (6) years old. The heaters will be re-piped with new water piping and will be insulated. A new master mixing valve will be provided to ensure that hot water is produced and stored at 140° F to prevent the formation of Legionella with the mixing valve limiting the discharge water temperature to the building to 110° F to prevent scalding.

New hi-efficiency, gas-fired water heaters will be provided for the food service/support building.

Hot water circulation pumps will be provided to ensure that hot water is available to all fixtures requiring hot water. The hot water circulation pumps will be connected to the building automation system (BAS).

Plumbing fixtures

Plumbing fixtures shall be commercial grade and shall be designed to meet the Americans with Disabilities Act where required.

1. Water Closets - New water closets will be wall-mounted, flush-valve water closets with sensor-operated flush valves for staff and non-inmate areas. Floor-set, back-outlet, penal type, flush valve water closets with push buttons accessible from utility corridors will be used in all inmate areas. Concealed carriers will be utilized for all wall-mounted fixtures

2. Urinals located in staff areas will be provided. Urinals will be wall-hung washout type with sensor-operated, flush valves.

3. Lavatories located in the inmate areas will be penal type stainless steel units with a push button metering faucet. Lavatories will either be wall mounted utilizing concealed carriers or counter-mounted. Lavatories in staff areas not used by inmates will be wall-hung lavatories with single lever faucets and concealed carriers will be used.

4. Janitor's sinks will be floor set terrazzo with stainless steel caps and wall-hung faucets with a wall brace.

5. Showers will be provided to have non-scald pressure regulating type faucets. A floor drain will be provided in each shower. ADA showers shall be provided at all designated locations.

6. Floor drains will be cast iron body with nickel bronze grates for finished areas and cast iron grate for equipment and maintenance areas.

Fire Protection

The fire service entrance will enter the building into a designated mechanical room or fire entrance room. The fire service will be provided with a main flow switch which will indicate flow for the fire alarm system.

The system is anticipated to be a traditional wet sprinkler system. Fire suppression heads will be provided to cover all areas of the facility. Each different zone connection to the system will be provided with a flow switch and an OS&Y monitoring valve. A fire department Siamese connection will be provided at the location to be determined later when consulting with the fire department. In all areas subject to even temporary occupancy by inmates, penal type sprinkler heads shall be utilized to prevent self-injury. Fire sprinkler heads in all other areas will be determined upon consultation with correction personnel.

Electrical Systems Overview

The electrical systems will be designed to provide adequate power, lighting, fire alarm system, and communication pathways for the occupancy and use of the renovated existing building and new food service/support building.

The design of the electrical systems will conform to the currently adopted editions of the following codes:

- National Electrical Code (NEC)
- Life Safety NFPA-101
- State and Local Codes
- Energy Codes

Electrical Demolition

It is recommended that the following items be removed from the existing building and replaced with new: Main switchboard, underground secondary electrical feeder, distribution panel in main mechanical room, all panelboards, interior lighting, exterior lighting, wiring devices, exposed and above ceiling branch circuit conduits and boxes, connections to mechanical equipment, and the fire alarm system. The existing drywall ceilings in the building need to be removed in order to access electrical work to be demolished.

Basic Electrical Materials

Existing exposed raceways and boxes and raceways and boxes above existing drywall ceilings should be removed.

Raceway systems for both the existing renovated building and new food service/support building will generally consist of metal boxes interconnected with electrical metallic tubing (EMT). Fittings shall be set screw or compression type. Poly-vinyl chloride (PVC) 40 will be used for underground installations. Rigid galvanized steel (RGS) conduit or intermediate metal conduit (IMC) will be used for exposed exterior work where subject to damage. Liquid type flexible conduit shall be used for connections to motors. The minimum conduit size for power wiring will be 3/4 inch. The minimum conduit size for communication raceways will be 1 inch.

Existing conductors should be removed. New conductors will be copper. New conductors shall be No. 12 AWG minimum size. Insulation will be THWN or XHHW rated for 90°C; however, design will be based on 75°C ratings. Four-wire feeders, where neutral is considered a current-carrying conductor, will have an additional 80% derating. A maximum of nine (9) current-carrying conductors, using code-designated derating factors, will be installed in any raceway. All conductors, including neutrals and grounding conductors, will be color-coded. Conductors shall be solid except conductor's No. 8 and larger shall be stranded. A separate neutral conductor will be provided for each branch circuit.

Existing wiring devices should be removed. New wiring devices will be specification-grade, 20 amp minimum, and grey color. Device plates will be institutional grade stainless-steel. Back-to-back installation of devices will not be allowed.

Primary Power

The existing renovated building and new food service/support building will each be provided with a new primary electrical service from the Lincoln Electric System (LES) utility company. The existing 300 KVA pad mounted transformer serving the existing building will not be large enough to serve the renovated building and will need to be replaced with a larger pad mounted transformer. Each building will be served by a separate pad mounted transformer. Service voltage from each new pad mounted transformer will be 208Y/120-volt three-phase, four-wire.

Electrical Service

The existing 1600 amp electrical service is not large enough to support the renovated building and will need to be removed.

The new 2,500 amp 208/120-volt electrical service for the existing renovated building will have conductors run underground from the new pad mounted transformer to the new switchboard. The 1200 amp 208/120-volt electrical service for the new food service/support building will have conductors run underground from the other new pad mounted transformer.

The new 2,500 amp main switchboard for the existing renovated building will have an insulated-case main breaker with full-feature electronic trip. The 1200 amp main distribution panel for the new food

service/support building will have a molded case main breaker. Both electrical services will have surge protective devices.

Emergency Power

Emergency power will be supplied to both the existing renovated building and new food service/support building by a single 1000 KW/1250 KVA diesel-fueled engine generator located outdoors. The engine generator will be complete with double-wall, in-base fuel tank, radiator**,** silencer and automatic transfer switches. The generator will be installed in a walk around weatherproof enclosure. The generator will be sized to provide 100% emergency back-up power for both buildings.

For each building code-required emergency loads including exit lighting, egress lighting, communication systems, fire alarm system, and security systems will be served from a dedicated life safety branch of the emergency power system. This branch will include a dedicated automatic transfer switch and the necessary distribution equipment.

For each building all other non-emergency loads noted to be supplied by the emergency power system will be served through additional branches of the emergency power system. These branches will include automatic transfer switch(es) and distribution equipment as necessary and will be separate from the code-required life safety branch.

Grounding

For the existing renovated building and new food service/support building each will have the electrical power distribution systems provided with a "single-point ground systems." For each building the ground bus at the main service equipment is connected to the water service and a ground rod.

An insulated equipment grounding conductor will be installed with feeders and branch circuits. Metal raceways, boxes, equipment, receptacles, and light fixtures will be bonded to the equipment grounding system.

Power Distribution

For the existing renovated building and new food service/support building each will have new distribution panelboards to serve new mechanical equipment. New lighting panelboards will serve other building loads. HVAC equipment will be supplied with 208-volt, three-phase power. 120-volt circuits will be used for LED lighting.

New distribution panels and switchboard are the circuit breaker-type.

New lighting panels will be commercial-type with bolt-on circuit breakers. Bussing will be aluminum or copper. Components will be fully rated to provide the required AIC. Each panel will have a hinged door with a master keyed flush tumbler latch. Half-size breakers and load centers will not be used. Lighting panel overcurrent protection will be limited to 400-amp.

Fusible coordination panelboards with surge protection will be provided for emergency life safety power distribution.

New disconnect switches will be heavy-duty type. Exterior switches will be rain-tight. Disconnect switches for packaged HVAC equipment will be fusible.

New HVAC equipment will be controlled by individual motor starters or variable frequency controllers. Each magnetic motor starter will include a hand-off-auto (H-O-A) switch, auxiliary contacts, a control power transformer, and a motor running pilot light. Loose starter will be combination-type with a fuse overcurrent protection.

Surge protective devices will be provided at the new main service entrances for both buildings and at selected panels serving sensitive equipment.

Wiring Methods

For the existing renovated building conduits exposed and conduits above ceilings will be removed. Existing conductors will be removed.

New conduits will be installed above new ceilings. Existing conduits and boxes in concrete block walls will be reused where needed in the existing renovated building.

Exposed conduits will only be allowed in non-finished spaces.

For the existing renovated building and new food service/support building each will have new service entrance conductors run underground in PVC 40 raceways.

Feeders to new panels and branch circuits will consist of conductors installed in metal raceways. Conduit fill will not exceed 40 percent.

Lighting

For the existing renovated building all existing interior and exterior lighting fixtures will be removed.

For both buildings general lighting for offices, training rooms, kitchen, dining room, dorm rooms, day rooms, corridors, and general purpose occupancies will consist of recessed LED institutional grade fixtures. The LED fixtures in the dorm rooms and training rooms will be dimmable.

For both buildings equipment room lights will be 4-foot LED industrial fixtures. In congested areas, fixtures will be chain hung.

For both building's exterior lighting will consist of LED fixtures. A combination of wall-mounted fixtures pole-mounted security luminaires and pole mounted parking lot luminaires will be used. Illumination levels will meet IES standards.

Multi-pole contactors will be provided for remote switching of large rooms or areas and for exterior lighting.

Exit and Emergency Lighting

For the existing renovated building the exit lights will be removed.

For both buildings exit lights will be LED institutional grade type. Egress lighting will be provided by selected fixtures connected to the emergency generator system.

Fire Alarm

For the existing renovated building the existing fire alarm system will be removed.

Both the existing renovated building and new food service/support building will each be provided with a new intelligent microprocessor-based, addressable fire alarm system complete with addressable control relays. The system will be interfaced with an integrated security system. The system will have sensitivity monitoring and adjustment of all smoke detectors.

Addressable manual stations will be provided at each exit from the buildings and no more than 200 feet from any part of the buildings. Smoke detectors will be provided for HVAC system control, sleeping areas, paths of egress, and other areas required by code.

Audible/visual evacuation signals will be visible in the evacuation path. Signals will be located no more than 10 feet from exit doors and no more than 100 feet on center in corridors. Signals will also be installed in toilets, common use areas, and rooms larger than 2000 square feet. Additional signals will be located on the exterior of the buildings.

Audible evacuation signals will be speakers with a pre-recorded voice evacuation message provided by the fire alarm system amplifier. Visual signals will be strobes meeting ADA requirements. Signals will be combined audible/visual assemblies, unless otherwise indicated.

HVAC systems will be provided with duct detectors as required by code. Relays will be provided to shut down each air handling unit in response to an alarm generated by its associated detector. Smoke dampers will be wired to dedicated 120-volt circuits from emergency panels. Circuits will be controlled by the fire alarm panel so dampers close upon smoke detection at the serving air handling unit or in the space served.

Fire sprinkler systems will be monitored for flow and valve position.

A remote annunciator panel will be located at the security control desk.

All fire alarm wiring will be installed in raceways.

Technology Systems Overview

The project scope will need to include new cabling infrastructure and build-out of dedicated spaces for the communications equipment, cabling, and associated infrastructure to support voice/data, life safety, and security, as well as audiovisual transmission (CATV). Work will also include a public address/paging system, access control, and CCTV video surveillance and recording. Detailed recommendations are outlined as follows.

Design Criteria

All telecommunications infrastructure and spaces are to be designed and constructed per The State of Nebraska and Department of Corrections standards and recognized industry standards and best

practices. As a minimum, all systems shall comply with NFPA, TIA, ANSI, and BICSI standards and particularly the following:

1. ANSI/TIA-568-B.1 Commercial Building Telecommunications Cabling Standard Part 1 General Requirements.
2. ANSI/TIA-568-B.3 Optical Fiber Cabling Components Standard.
3. ANSI/TIA 569-A Commercial Building Standard for Telecommunications Pathways and Spaces.
4. ANSI/TIA 607(A) Commercial Building Grounding and Bonding Requirements for Telecommunications.
5. Federal, state, and local rules, regulations, and ordnances governing the work as fully a part of the specifications as if herein attached. Where requirements of the drawings or specifications are more stringent than the applicable codes, rules, regulations and ordinances the specifications shall apply.

Cabling shall be installed in accordance with the most recent addition of BICSI publications:

- BICSI Telecommunications Distribution Methods Manual (TDMM).
- BICSI Electronic Safety and Security Design Reference Manual (ESSDRM)

Communications Rooms

The Main Air Park Facility can be served by One (1) centrally located communications room approximately 10′ x 10′ (100 S.F.). If the room cannot be centrally located, cabling distances will dictate that a second room be provided. The remote Food Service Facility will require a similar although smaller communications room or closet suitable for the installation of a single rack or wall cabinet.

Grounding and Bonding for Communications Systems

Grounding requirements specified in this section may be supplemented by special requirements of systems described in other sections.

The Air Park Facility shall be provided with an industry standard communications grounding system to supplement and expand upon electrical systems grounding. Elements of the communications grounding systems shall include:

1. Each communications room shall be provided with a communications ground bar to establish equipotential grounding for communications equipment and safety of personnel.
2. A telecommunications main ground bar (TMGB) shall be provided in each communications room.
    A. The TMGB shall be connected to the facility grounding electrode system with a properly sized #6 minimum up to a #4/0 telecommunications bonding conductor (TBC). The TBC shall bond directly to the main electrical ground bar (MGB) located immediately adjacent to the main electrical service equipment.

B. All equipment within the room and all Incoming cables shall be protected and grounded and bonded with #10 to #6 AWG copper grounds to the telecommunications ground bar. (TGB).

Pathways for Communications Systems

Pathway requirements specified in this section may be supplemented by special requirements of systems described in other sections.

The facility shall be provided with an industry standard communications cable distribution pathway system which includes, but is not limited to, cable trays, surface-mounted conduits, sleeves/conduits through walls and spaces, J-hooks, wall boxes, pull boxes, D-rings, cable drop-outs (waterfalls) and enclosures.

1. All telecommunications pathways shall be designed to comply with TIA-569A standards.

2. All telecommunications pathways shall be designed to provide the capability and capacity to properly install high-performance balanced twisted-pair optical fiber and coax cables from the beginning of the facility's construction and any future installations.

3. Telecommunications outlets shall have the following provisions:

   A. All conduits shall be 1″ in diameter (pending minimum size of cable quantities).

   B. All wall-mounted outlets shall be provided with a 4″ wide by 4″ high electrical box with a single-gang drywall mud ring. Minimum clear inside depth shall be 2-5/8″ to accommodate Category 6 cabling installation and termination requirements.

4. Cable Management Tray:

   A. Provide steel zinc electroplated wire management tray which utilizes a 2″ x 4″ nominal mesh pattern. Depths shall be 2″ up to 4″ with widths as scheduled on the drawings. Trays shall be provided with trapeze-style side rail hangers.

5. J-Hooks:

   A. Provide 2″ or 4″ Category 6 rated with wire spring cable clips or slots for Velcro cable ties.

The following design criteria have been determined to be applicable for Site-Outside Plant Pathways:

1. Outside plant pathways shall follow ANSI, TIA, and BICSI customer-owned outside plant standards.

2. Conduits shall enter the EF from underground and shall terminate 4″ above finished floor with a conduit bushing and penetration seal.

Identification for Communications Systems

This section includes means and methods for the labeling and documentation of communications infrastructure as needed as needed to implement and manage future adds, moves, and changes.

1. All communications cabling and infrastructure components shall be labeled. Labeling shall be produced with quality commercial equipment which utilizes self-adhesive vinyl or vinyl cloth labels with machine printed alpha numeric cable and equipment designations as detailed on the drawings. Labels shall be as produced by Brady I.D. Pro label maker or by software/printer industrial printing equivalents.

Communications Equipment Room Fittings

This section includes telecommunications infrastructure for communications equipment rooms and service entrance facilities including, but not limited to, equipment racks, cable, termination hardware, connecting devices, lightning protection, and installation for wiring systems to be used as signal pathways for voice and high-speed data transmission.

1. Free-standing, 19″ x 84″, two-post, black finish equipment racks shall be provided with 2U horizontal cable management between patch panels and termination shelves. Racks shall be provided with vertical cable management. Equipment racks shall be bolted to the floor.

2. 19″ configuration lockable, black finish wall-mount cabinets shall be provided with 2U horizontal cable management between patch panels and termination shelves. Equipment racks shall be bolted to plywood backing trimmed and painted black to match the cabinet.

3. 48-port, flat, Category 6 or above rated copper patch panels and terminations shall be provided with 20% spare ports or as required to satisfy specified expansion criteria

4. Modular panels housing multiple-numbered cable connectors shall be provided; one for each fiber of cable or cables assigned to field, plus 20% spares and blank positions adequate to satisfy specified expansion criteria.

5. Copper and fiber patch cords shall be provided as required for communications rooms and work area outlets.

6. D-rings and cable straps uniformly installed and neatly fitted with Velcro ties shall be utilized for wall management of miscellaneous cabling around the communications room.

7. Rack-mounted power distribution units (PDU/plug strips) shall be coordinated with equipment requirements and provided in the appropriate racks and cabinets.

Communications rooms shall be provisioned as follows:

1. Telecommunications rooms shall be “dedicated” spaces that house electronics and equipment for voice and data networking, equipment racks, horizontal station cabling, and intra-building backbone cabling. Telecommunications rooms may also house electronics, cabling, and equipment for video, security, and/or BAS.

2. Plywood: communications rooms shall be lined with 3/4″, A/C-rated, interior-grade, plywood-painted with three coats of fire-rated white paint.

3. Each communications room shall be provided with a 120/208-volt, three-phase, four-wire, 100-amp lighting panel to power only IT loads and other systems (fire alarm/security) or devices (general purpose outlets) located within or serving the room. Power outlets configured to provide a minimum of two 20-amp circuits per rack, minimum, shall be provided. Outlet

configuration and amperage shall be confirmed as required for electronics or UPS input requirements prior to final design. Outlets shall be located above the racks unless specifically required otherwise.

4. Each communication equipment room shall be provided with cooling and separate T-stat. Cooling shall typically be standalone split-systems providing cooling to the rooms 24 hours a day, 365 days a year.

5. Communications rooms shall be designed with adequate clearance for cable trays and pathways.

6. Adequate termination space shall be provided on walls and in equipment racks allowing for future expansion.

7. Conduits between the EF, MDF, and communications rooms (IDFs) shall be no less than two conduits. The number of conduits shall accommodate current and future use.

8. Communications rooms shall be centrally located with direct hallway access.

9. Communications rooms shall be provided with a ring of 12″ wide by 4″ deep cable management tray, including a separate run over the equipment racks.

Communications Copper Backbone Cabling

Backbone cables shall consist of a minimum of 25-pair Category 5e twisted-pair between the main room (MDF) and the second room. Cables entering the MDF and remote communications rooms shall be terminated onto modular RJ-45 patch panels in equipment rack and cabinets.

Communications Optical Backbone Cabling

Backbone cables shall consist of fiber optic cables, terminations, patch cords and/or jumpers used for backbone-to-backbone cross-connection, termination, and testing for a complete system.

1. As a minimum, all fiber run between communications shall be 12-strand OM2 or OM3, 50/125 micron laser optimized-rated multimode (aqua colored) in combination with 12-strand OS2, 9/125 micron-rated single mode fiber (yellow colored).

2. Fiber shall be terminated inside equipment cabinets located in the MC rooms in rack-mounted fiber termination shelves.

3. Connections between fiber optic patch panels shall be made with a pre-manufactured fiber optic patch cord. All fiber optic jumper assemblies shall comply with the standards for both fiber optic cables and fiber optic connectors.

4. A 20′ service loop shall be provided at each end of all fiber backbone cable runs. Slack loop shall be wall-mounted high in the communications room neatly formed with D-rings and cable ties.

Customer Owned Outside Plant

Two 4″ underground entrance conduits at this time are proposed to be extended out from the communications room toward the service provider/network fiber access.

1. Two 2-1/2″ conduits are proposed to be extended out from the new communications room to serve the food service facility.

2. All conduits shall be installed with 1″ innerduct or Maxcell fabric innerduct.

Communications Horizontal Cabling

This section includes wire, cable, connecting devices, installation, and testing for wiring systems that runs from the telecommunications space to a device location. Device locations include voice and data outlets, wall phones, wireless access points, CCTV cameras, fire alarm and BAS systems control panels, and all other devices or systems requiring network copper cable connectivity.

The telecommunications cabling system shall be designed to conform to TIA/EIA 568B, the Commercial Building Telecommunications Cabling Standard, and the Owner's standard.

All cabling shall be designed in a star topology. Cable length limitations shall be as follows:

1. Horizontal Cabling: 290′ from the furthest work area outlet to the termination equipment in the communications rooms.

The horizontal cabling includes the installation of the appropriate jacks, faceplates, copper station cable, distribution frame hardware, cross-connect hardware, labeling, and testing.

Work area outlets shall be provided with a standard of TIA-568B 4-pair balanced twisted-pair cables rated for plenum environments. All workstation cabling shall be terminated utilizing TIA-568B, 8-pin modular jack using TIA-T568B pinning at the workstation faceplate and shall be terminated onto rack-mounted Category 6 or above modular patch panels in the communications rooms.

All cabling shall be new and unused provided, installed, terminated, labeled, and tested to form a complete system. Components shall be as follows:

1. Horizontal cables for voice, data, CCTV, and wireless access points shall be 4-pair UTP (twisted-pair) 24 AWG solid copper, color-coded Category 6.

Cables shall be installed continuous from communications room to device. Intermediate cross-connects or splicing is not allowed.

1. All cables shall be installed in dedicated communications pathways and shall be completely accessible. Cable installations shall be planned to fill conduits and sleeves efficiently and allowing for additional growth. Pathway fills shall not exceed 40% of the total capacity.

CATV service will originate from the centralized communications room.

1. A CATV outlet will be provided at each designated area in the facility and in resident unit.

2. CATV outlets will also be provided in common areas as directed by the Owner and determined during the design process.

Audiovisual Systems

The audiovisual systems shall include installation of displays, sound reinforcement and control capability in selected administrative and inmate service areas.

The educational spaces will be provided with a complete sound reinforcement and video system including the design of all necessary equipment, cabling, equipment, control system, and programming.

The sound reinforcement system will be designed so that it provides acceptable sound coverage and distribution throughout the space.

Public Address and Mass Notification Systems

The public address system will consist of a distributed loudspeaker system connected to head-end distribution equipment. The system will incorporate paging zones with a telephone/voice paging interface for flexibility.

Wireless Clock Systems

A wireless clock system will be provided.

Electronic Safety and Security

Electronic security including access control and intrusion detection will include video surveillance and recording, access control and monitoring, exterior intrusion detection, and central alarm notifications.

1. Access control and monitoring will be provided for all exterior doors, secure entry vestibules, exterior gates, and any interior passageways as required by the program. The system will have a central control station located and configured as required by the program.

2. Intrusion detection/activity detection will be provided for exterior fence, food service facility, and other areas as required by the program.

3. CCTV video surveillance will include interior and exterior cameras and video recording. Cameras will be strategically placed to provide 100% coverage of the building exterior, entrances, and exits. Coverage will be provided for all corridors and intersections, public areas, and all other areas as required by the program.

Opinion of Costs, page 1 of 3

Component	Specification	Qnty.	Units	Cost/Unit	Component Cost
DIVISION 1 - GENERAL REQUIREMENTS					
See General Conditions cost at bottom of spreadsheet					$ -
	SUBTOTAL				**$ -**
DIVISION 2 - DEMOLITION					
Wall Demolition	miscellaneous (mainly RR)	1	LS	$ 50,000	$ 50,000
Plaster Ceiling Demolition	remove all	30000	SF	$ 2	$ 45,000
Acoustical Ceiling Tile Removal		3000	SF	$ 1	$ 3,000
Floor Slab Demolition--RRs	saw cut/remove/haul	2500	SF	$ 10	$ 25,000
Exterior Door and Frame		15	EA	$ 250	$ 3,750
Interior Door	frames to remain	1	LS	$ 5,000	$ 5,000
Window demolition		3000	SF	$ 5	$ 15,000
	SUBTOTAL				**$ 146,750**
DIVISION 3 - CONCRETE					
Floor Slab Infill	new slab at demo	2500	SF	$ 8	$ 20,000
Miscellaneous		1	LS	$ 5,000	$ 5,000
	SUBTOTAL				**$ 25,000**
DIVISION 4 - MASONRY					
New Interior Walls	CMU	1	LS	$ 100,000	$ 100,000
Exterior Masonry Repair		1	LS	$ 25,000	$ 25,000
New exterior walls in Mech Addition Cost below					
	SUBTOTAL				**$ 125,000**
DIVISION 5 - METALS					
Structural Steel	Rooftop Equip Supports	1	LS	$ 10,000	$ 10,000
Miscellaneous Fabrications		1	LS	$ 10,000	$ 10,000
	SUBTOTAL				**$ 20,000**
DIVISON 6 - WOOD, PLASTIC, AND COMPOSITES					
Miscellaneous Carpentry	Blocking, etc.	1	LS	$ 5,000	$ 5,000
Casework	classrooms	1	LS	$ 10,000	$ 10,000
	SUBTOTAL				**$ 15,000**
DIVISION 7 - THERMAL & MOISTURE PROTECTION					
Roof Removal	include flashing removal	32000	SF	$ 5	$ 160,000
Roof Replacement	fully adhered EPDM	32000	SF	$ 10	$ 320,000
Flashing	Included in roofing				$ -
Sealants		1	LS	$ 10,000	$ 10,000
	SUBTOTAL				**$ 490,000**
DIVISION 8 - OPENINGS					
Replace Exterior Doors/Frames	includes hardware w/o acc cont	15	EA	$ 2,500	$ 37,500
New Interior Doors w/exst frame	includes hardware	100	EA	$ 750	$ 75,000
New Interior Doors and Frames	includes hardware	25	EA	$ 1,000	$ 25,000
Replace Windows		3000	SF	$ 50	$ 150,000
Access Doors		1	LS	$ 2,000	$ 2,000
	SUBTOTAL				**$ 289,500**
DIVISION 9 - FINISHES					
Gypsum Bd/Stud Walls	office area remodel	1	LS	$ 10,000	$ 10,000
Ceilings	90% GWB / 10% ACT	30000	SF	$ 6	$ 180,000
Flooring	50% new / 50% existing	15000	SF	$ 3	$ 45,000
Interior Painting-Walls	repaint - 80% epoxy/20% paint	30000	SF	$ 3	$ 75,000
Interior Painting-Ceilings	repaint - 80% epoxy/20% paint	27000	SF	$ 1	$ 27,000
Exterior Painting-CMU	repaint - prep and 2 coats	18000	SF	$ 2	$ 36,000
New Restroom Finishes	tile/epoxy/	5000	SF	$ 25	$ 125,000
	SUBTOTAL				**$ 498,000**
DIVISION 10 - SPECIALTIES					
RR accessories/compartments	assume CMU partitions	1	LS	$ 20,000	$ 20,000
Signage		1	LS	$ 10,000	$ 10,000
Miscellaneous		1	LS	$ 5,000	$ 5,000
	SUBTOTAL				**$ 35,000**

Opinion of Costs, page 2 of 3

Component	Specification	Qnty.	Units	Cost/Unit	Component Cost
DIVISION 11 - EQUIPMENT					
Miscellaneous	Projection screens	1	LS	$ 10,000	$ 10,000
Appliances	in Owner FFE				$ -
	SUBTOTAL				**$ 10,000**
DIVISION 12 - FURNISHINGS					
Window coverings		3000	SF	$ 6	$ 18,000
	SUBTOTAL				**$ 18,000**
DIVISION 13 - SPECIAL CONSTRUCTION					
Not Required					
	SUBTOTAL				**$ -**
DIVISION 14 - CONVEYING EQUIPMENT					
Not Required					
	SUBTOTAL				**$ -**
DIVISIONS 22/23/26/28 - MEP					
HVAC		1	LS	$ 1,665,000	$ 1,665,000
Well Field		1	LS	$ 495,000	$ 495,000
Plumbing		1	LS	$ 988,000	$ 988,000
Fire Protection		1	LS	$ 197,500	$ 197,500
Power		1	LS	$ 885,000	$ 885,000
Lighting		1	LS	$ 305,000	$ 305,000
Fire Alarm		1	LS	$ 65,000	$ 65,000
Telecom Demo		1	LS	$ 19,150	$ 19,150
Voice/data		1	LS	$ 95,751	$ 95,751
PA		1	LS	$ 23,938	$ 23,938
Intrusion Detection		1	LS	$ 25,000	$ 25,000
Video Surveillance		1	LS	$ 62,500	$ 62,500
Access Control		1	LS	$ 37,500	$ 37,500
	SUBTOTAL				**$ 4,864,339**
DIVISIONS 31/32/33 - SITEWORK					
Utilities	In MEP cost				$ -
Pavements	asphalt wear course/curb/walks	1	LS	$ 50,000	$ 50,000
Site Improvements	miscellaneous	1	LS	$ 10,000	$ 10,000
	SUBTOTAL				**$ 60,000**
MECHANICAL ADDITION					
Heat Pump Room-west side	12 x 48 masonry	600	SF	$ 125	$ 75,000
	SUBTOTAL				**$ 75,000**
HAZARDOUS MATERIAL ABATEMENT					
Asbestos abatement		1104	SF	$ 2	$ 2,180
Mold abatement		100	SF	$ 21	$ 2,120
	SUBTOTAL				**$ 4,300**
RENOVATION CONSTRUCTION SUBTOTAL					**$ 6,675,889**
Contingency			10% of Construction Subtotal		$ 667,589
General Conditions			10% of Construction Subtotal		$ 667,589
				SUBTOTAL	**$ 8,011,067**
GENERAL CONTRACTOR OVERHEAD & PROFIT			**10% of Construction Subtotal**		**$ 801,107**
	CONSTRUCTION COST OF RENOVATION				**$ 8,812,173**
			COST / SF		**$ 275**

Opinion of Costs, page 3 of 3

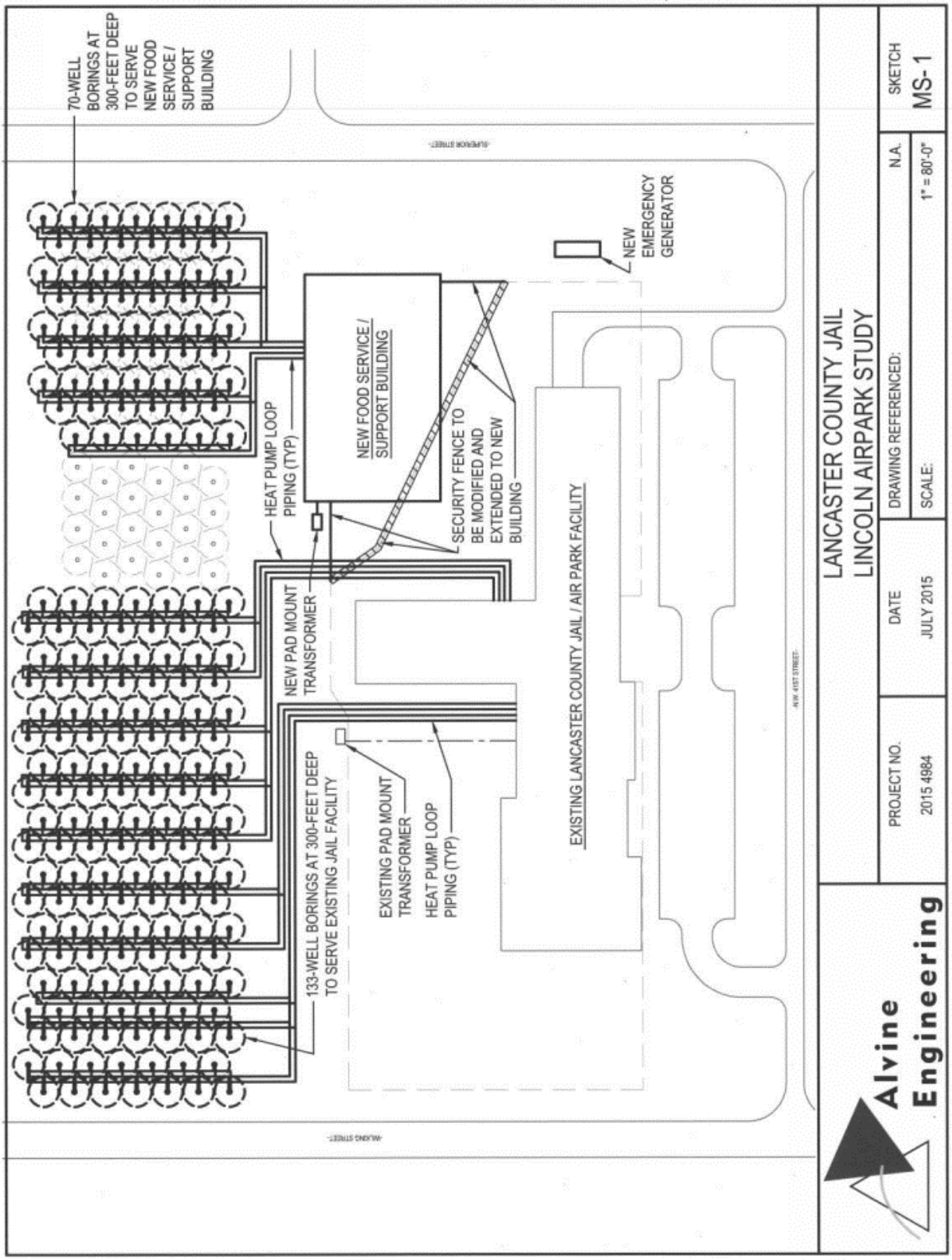
Component	Specification	Qnty.	Units	Cost/Unit	Component Cost
Lincoln Air Park Correctional Building-New Food Service/Support Building					
Component		**Qnty.**	**Units**	**Cost/Unit**	**Component Cost**
New construction	(not including MEP below)	13300	SF	$ 125	$ 1,662,500
HVAC		1	LS	$ 713,000	$ 713,000
Well Field		1	LS	$ 216,000	$ 216,000
Plumbing		1	LS	$ 418,000	$ 418,000
Fire Protection		1	LS	$ 83,500	$ 83,500
Power		1	LS	$ 230,000	$ 230,000
Lighting		1	LS	$ 140,000	$ 140,000
Fire Alarm		1	LS	$ 27,000	$ 27,000
Voice & Data		1	LS	$ 40,500	$ 40,500
Public Address & Paging		1	LS	$ 10,125	$ 10,125
Audio Visual		1	LS	$ 30,000	$ 30,000
Intrusion Detection		1	LS	$ 25,000	$ 25,000
Video Surveillance		1	LS	$ 37,500	$ 37,500
Access Control		1	LS	$ 15,000	$ 15,000
	SUBTOTAL				**$ 3,648,125**
Contingency			10% of Construction Subtotal		$ 364,813
General Conditions			10% of Construction Subtotal		$ 364,813
				SUBTOTAL	**$ 4,377,750**
GENERAL CONTRACTOR OVERHEAD & PROFIT			**10% of Construction Subtotal**		**$ 437,775**
	CONSTRUCTION COST NEW BUILDING				**$ 4,815,525**
			COST / SF		**$ 362**
	TOTAL PROJECT CONSTRUCTION COST				**$ 13,627,698**
			COST / SF		**$ 301**
NON-CONSTRUCTION COST (per NDCS Feasibility Study)					
Fixtures, Furnishings, and Equipment (FFE)					$ 280,000
Fixed Food Service, Laundry, and Medical Equipment					$ 610,000
Information Technology (Computers, servers, hubs, cabling, etc.)					$ 115,000
One Time Start Up Costs (metal detectors, security items, vehicles, maintenance items bedding, food service items, cleaning and other)					$ 825,000
				SUBTOTAL	**$ 1,830,000**
SUB-TOTAL CONSTRUCTION & NON-CONSTRUCTION COST					**$ 15,457,698**
	INFLATION TO MID-POINT OF CONSTRUCTION				**$ 1,062,717**
	(2.5% PER YEAR TO 9/20/2017 - TOTAL OF 6.875%)				
PROGRAM DEVELOPMENT COST					
Program Statement (including draft lease / amortization agreement					$ 75,000
A/E Design Fees, Contract Administration, Geotechnical, Asbestos & Lead Paint Inspection					$ 1,500,000
Legal, Bidding (approx. 11% of Total Project Construction Cost)					
				SUBTOTAL	**$ 1,575,000**
	TOTAL PROJECT COST				**$ 18,095,415**
**Note: This Cost Estimate does not include staffing or operational costs.*					

* Note that the Non-construction cost information was taken from an earlier feasibility report prepared by the NDCS dated December 31, 2014. The only changes to these numbers were to reduce the non-construction IT cost based on work included in the construction costs

** This Opinion of Costs does not include staffing and operational costs.

Summary

A complete and extensive renovation of the existing former Lancaster County Jail facility and the addition of a new Food Service Building as defined by this report can provide the State of Nebraska with a facility that will meet the needs set forth in the NDCS' 2014 Strategic Comprehensive Capital Facilities Master Plan and the capital construction program. The final cost of such renovation paired with the fact that the facility will be leased for a set number of years by the Airport Authority to the State of Nebraska should be compared against the construction of a new, state-owned facility on State of Nebraska owned property that could be utilized for this Program for an unlimited amount of time.


70-WELL BORINGS AT 300-FEET DEEP TO SERVE NEW FOOD SERVICE / SUPPORT BUILDING
NEW EMERGENCY GENERATOR
NEW FOOD SERVICE / SUPPORT BUILDING
HEAT PUMP LOOP PIPING (TYP)
SECURITY FENCE TO BE MODIFIED AND EXTENDED TO NEW BUILDING
NEW PAD MOUNT TRANSFORMER
EXISTING LANCASTER COUNTY JAIL / AIR PARK FACILITY
133-WELL BORINGS AT 300-FEET DEEP TO SERVE EXISTING JAIL FACILITY
EXISTING PAD MOUNT TRANSFORMER
HEAT PUMP LOOP PIPING (TYP)
LANCASTER COUNTY JAIL
LINCOLN AIRPARK STUDY
PROJECT NO. 2015 4984
DATE JULY 2015
DRAWING REFERENCED: N.A.
SCALE: 1" = 80'-0"
SKETCH MS- 1
Alvine Engineering

Appendix A

Photograph A-1

Photograph A-2

Photograph M-1

Photograph M-2

Photograph M-3

Photograph M-4

Photograph M-5

Photograph M-6

Photograph M-7

Photograph M-8

Photograph M-9

Photograph M-10

Photograph M-11

Photograph M-12

Photograph M-13

Photograph M-14

Photograph M-15

Photograph M-16

Photograph M-17

Photograph M-18

Photograph M-19

Photograph M-20

Photograph M-21

Photograph E-1

Photograph E-2

Photograph E-3

Photograph E-4

Photograph E-5

Photograph E-6

Photograph E-7

Photograph E-8

Photograph E-9

Photograph E-10

Photograph E-11

Photograph E-12

Photograph E-13

Photograph E-14

Photograph E-15

Photograph E-16

Photograph E-17

Photograph E-18

Photograph E-19

Photograph E-20

Photograph E-21

Photograph E-22

End of Report