

**SOLANO COLLEGE –
BUILDING 1200
DUE DILIGENCE REPORT FINAL
(MECHANICAL, ELECTRICAL,
PLUMBING, FIRE PROTECTION)**

PREPARED FOR:

TBP ARCHITECTURE

PREPARED BY:

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JULY 09, 2008

2008-0312



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EXECUTIVE SUMMARY:

Interface conducted a surface based site investigation of the Solano Community College, Building 1200 for the purposes of a due diligence on June 19, 2008. Our major findings are as follows:

1. The fire sprinkler riser will be required to be relocated to a more accessible location. A new 6" fire sprinkler line is recommended with new distribution throughout. Backflow assembly valve and post indicator valve shall be installed. Riser shall be drained to exterior of the building.
2. Replace broken and inoperable stage smoke venting system.
3. Plumbing fixtures are of original condition and will require replacement with new water conserving plumbing fixtures. Architect will need to confirm that fixtures do not meet ADA requirements.
4. Domestic water piping system is beyond its service life and will require replacement.
5. Domestic hot water system is beyond its service life. This system will require replacement.
6. Sanitary sewer piping is past its service life and requires replacement.
7. Building interior storm drainage piping is beyond its service life and should be replaced with new as well as all the roof drainage bodies. Standing water can create additional weight on the roof and be unsound.
8. All existing air handling units are well past their service life and will need to be replaced with new modern air handling units designed to last for a forty year life. There is concern of potential microbial growth with in the system as well as bat and rat/mouse residue. We recommend a review by a hygienist of the air handling systems.
9. All existing ductwork throughout the facility is well past its service life and will need to be replaced with new. There is concern of potential microbial growth with in the system as well as bat and rat/mouse residue. We recommend a review by a hygienist of the air handling systems.
10. All existing exhaust fans are well past their service life and will need to be replaced with new units.
11. The new air handling units will require integral economizers for energy reduction and code conformance with Title 24.
12. The existing outside air louver is under sized and will require replacement with a larger louver to provide adequate ventilation air. The building does not appear to be well ventilated as evident with smells of moisture and rodent infestation.
13. Existing heating ventilating unit will need to be replaced with new units.
14. All heating piping is original and past its service life and will require replacement. Use of the existing piping is creating leaks and increasing potential of hidden water retention within building systems. Concern over hidden water leaks should be investigated by a licensed hygienist to alleviate concern over microbial growth.
15. All chilled water piping is original and past its service life and will require replacement. Use of the existing piping is creating leaks and increasing potential of hidden water retention within building systems. Concern over hidden water leaks should be investigated by a licensed hygienist to alleviate concern over microbial growth.
16. Chilled water and heating water pumps are original and past their service life and will require replacement.
17. Perform the following envelope energy reduction measures:
 - a. Upgrade glazing to support high efficiency dual pane, low-e glass.



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- b. Install skylights where possible to support daylighting and reduced electrical lighting.
 - c. Upgrade insulating system in walls.
 - d. Upgrade insulating system in roof.
 - e. Upgrade exterior doors from single pane to dual pane glass.
18. Re-route piping located over electrical equipment to reduce potential fire threat.
 19. Replace existing outdated electrical equipment with new and reliable equipment.
 20. Replace existing overloaded dimmer panel system and provide new system and re-circuit the system to avoid overloading.
 21. Provide additional electrical infrastructure to support modern audio visual equipment.
 22. Replace existing receptacles in wet locations, kitchens, and provide new on rooftops with GFCI type.
 23. Replace existing lighting with new energy-efficient luminaires using T5 or T8 lamps.
 24. Replace existing fire alarm system with an addressable and annunciated system and ADA compliant devices.



Codes: Our understanding from Code research for this project indicates that we fall under the following:

1. 2007 California Building Code.
2. Occupancy type "E" throughout the building.
3. 2007 California Mechanical Code
4. 2007 California Electrical Code
5. 2007 California Plumbing Code
6. 2007 California Fire Code
7. California Energy Commission Title 24. This code will be updated soon, however the impact on systems is not known yet.
8. Local Code Amendments
9. Plan Check and Building Permit review under the jurisdiction of DSA.
10. Local Fire Marshall Review for Design-Build Fire Sprinkler and Fire Alarm shop drawings.
11. Local Planning Department Guidelines for sound transmission to property lines.

Recommendations have been made to support energy reduction at a level of 15% below current Title 24. Many modifications are for architectural envelope systems.

If Solano College decided to get their projects LEED Certified, we could analyze this project and determine what points we feel are attainable, however, some (like Enhanced Commissioning) may cost more money than the College is willing to spend. For our analysis, please see the attached LEED scorecard which has been filled out for MEP system only. All items left blank were assumed to be reviewed and documentation provided by other team members. Credit Interpretation Rulings (CIR's) have been given to tBP with respect to energy modeling for existing buildings. See the following page for potential points on LEED scorecard.



LEED SCORECARD



LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

Solano College – Building 1200
Solano County, CA

Yes ? No

			Sustainable Sites	14 Points
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Y				
			Prereq 1 Construction Activity Pollution Prevention	Required
			Credit 1 Site Selection	1
			Credit 2 Development Density & Community Connectivity	1
1			Credit 3 Brownfield Redevelopment	1
			Credit 4.1 Alternative Transportation, Public Transportation Access	1
			Credit 4.2 Alternative Transportation, Bicycle Storage & Changing Rooms	1
			Credit 4.3 Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles	1
			Credit 4.4 Alternative Transportation, Parking Capacity	1
			Credit 5.1 Site Development, Protect or Restore Habitat	1
			Credit 5.2 Site Development, Maximize Open Space	1
			Credit 6.1 Stormwater Design, Quantity Control	1
			Credit 6.2 Stormwater Design, Quality Control	1
			Credit 7.1 Heat Island Effect, Non-Roof	1
			Credit 7.2 Heat Island Effect, Roof	1
1			Credit 8 Light Pollution Reduction	1

Yes ? No

			Water Efficiency	5 Points
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			Credit 1.1 Water Efficient Landscaping, Reduce by 50%	1
			Credit 1.2 Water Efficient Landscaping, No Potable Use or No Irrigation	1
	1		Credit 2 Innovative Wastewater Technologies	1
1			Credit 3.1 Water Use Reduction, 20% Reduction - Efficient Fixtures	1
1			Credit 3.2 Water Use Reduction, 30% Reduction - Efficient Fixtures	1

Yes ? No



			Energy & Atmosphere	17 Points
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Y			Prereq 1	Fundamental Commissioning of the Building Energy Systems	Required
Y			Prereq 2	Minimum Energy Performance	Required
Y			Prereq 3	Fundamental Refrigerant Management	Required
3	2	5	Credit 1	Optimize Energy Performance - See energy saving features in Report	1 to 10
	1	2	Credit 2	On-Site PV panel to be located on the roof, planned by College	1 to 3
	1		Credit 3	Enhanced Commissioning - Can be provided by CxA	1
	1		Credit 4	Enhanced Refrigerant Management -	1
	1		Credit 5	Measurement & Verification - Can be included in controls installation	1
		1	Credit 6	Green Power - Can be contracted through District	1

continued...

Yes ? No

			Materials & Resources	13 Points
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Y			Prereq 1	Storage & Collection of Recyclables	Required
			Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	Building Reuse, Maintain 100% of Existing Walls, Floors & Roof	1
			Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements	1
			Credit 2.1	Construction Waste Management, Divert 50% from Disposal	1
			Credit 2.2	Construction Waste Management, Divert 75% from Disposal	1
			Credit 3.1	Materials Reuse, 5%	1
			Credit 3.2	Materials Reuse, 10%	1
			Credit 4.1	Recycled Content, 10% (post-consumer + 1/2 pre-consumer)	1
			Credit 4.2	Recycled Content, 20% (post-consumer + 1/2 pre-consumer)	1
			Credit 5.1	Regional Materials, 10% Extracted, Processed & Manufactured Regionally	1
			Credit 5.2	Regional Materials, 20% Extracted, Processed & Manufactured Regionally	1
			Credit 6	Rapidly Renewable Materials	1
			Credit 7	Certified Wood	1

Yes ? No



			Indoor Environmental Quality	15 Points
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Y			Prereq 1 Minimum IAQ Performance	Required
Y			Prereq 2 Environmental Tobacco Smoke (ETS) Control	Required
1			Credit 1 Outdoor Air Delivery Monitoring - Needs CO2 sensors and OA monitors	1
1			Credit 2 Increased Ventilation -	1
1			Credit 3.1 Construction IAQ Management Plan, During Construction By Contractor	1
1			Credit 3.2 Construction IAQ Management Plan, Before Occupancy - By Contractor	1
1			Credit 4.1 Low-Emitting Materials, Adhesives & Sealants - Spec item	1
			Credit 4.2 Low-Emitting Materials, Paints & Coatings	1
			Credit 4.3 Low-Emitting Materials, Carpet Systems	1
			Credit 4.4 Low-Emitting Materials, Composite Wood & Agrifiber Products	1
1			Credit 5 Indoor Chemical & Pollutant Source Control - High ventil. at Hair Salon	1
1			Credit 6.1 Controllability of Systems, Lighting - Will be designed	1
1			Credit 6.2 Controllability of Systems, Thermal Comfort - Will be designed	1
1			Credit 7.1 Thermal Comfort, Design - Will be documented	1
1			Credit 7.2 Thermal Comfort, Verification	1
1			Credit 8.1 Daylight & Views, Daylight 75% of Spaces	1
	1		Credit 8.2 Daylight & Views, Views for 90% of Spaces	1
Yes ? No				

			Innovation & Design Process	5 Points
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1			Credit 1.1 Innovation in Design: Water use reduction 40%	1
1			Credit 1.2 Innovation in Design: Provide Specific Title - To be designed	1
1			Credit 1.3 Innovation in Design: Provide Specific Title	1
	1		Credit 1.4 Innovation in Design: Provide Specific Title	1
1			Credit 2 LEED® Accredited Professional	1
Yes ? No				

			Project Totals (pre-certification estimates)	38 Points
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Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points
Platinum 52-69 points



DIVISION 21 – FIRE PROTECTION

A. PROJECT LOCATION:

The project location is building 1200 located on Solano Community College campus, Solano County, California.

B. PROJECT SQUARE FOOTAGE:

Building 1200 is being used as the Performance Theater, Music Classrooms and Workshop with an approximate total area of 25,000 square feet.

C. SPRINKLER SYSTEM (EXISTING CONDITIONS):

1. The existing system is a 6" automatic sprinkler system with the main coming in from the East side of the building. The existing sprinkler riser is not provided with a drain to the exterior of the building. The sprinkler riser is located inside the Mechanical room, tucked in the corner behind the hydronic pipe risers and pumps. It is in. See Figure F1. We could not identify additional risers within the building with the facility engineer.
2. The existing sprinkler system appears to only serve the Theater 2nd floor Lobby, the Stage, the Dressing room, the Workshop and the Storage room.
3. The Choral, Instrumental and Piano rooms have no protection.
4. There is a Fire Department connection on the Northeast side of the building. See figure F2.
5. There are (4) Fire Hose Cabinets in the Theater. They have expired and have not been certified or tested recently. See Figure F3.
6. There are no backflow preventer or post indicators that we could see.
7. The existing piping and fire sprinkler system is original to the Building dating back to 1973. The sprinkler system is past its service life. Testing is required per Title 19 for up to 5 years certification and for fast response sprinkler heads as required by NFPA 25.
8. The existing smoke vent for the stage is inoperable and poses a hazard to the building.

D. SPRINKLER SYSTEM (RECOMMENDATIONS):

1. Demolish the existing original 6" fire sprinkler service and install a new fire sprinkler main. We anticipate that the fire sprinkler system will also be required to be 6".
2. Install all new automatic fire sprinkler system throughout the building including office spaces, mechanical rooms, classrooms, storage spaces, practice rooms, restroom and corridor. The automatic fire sprinkler system will be required to be in compliance with local Codes, local Fire Marshall requirements, the DSA, and NFPA 13.
3. New sprinkler riser shall be located to a more accessible location.
4. Provide sprinkler riser with a drain to the exterior of the building.
5. Install backflow preventer assembly and post indicator valve.
6. Extend the new automatic fire sprinkler system into the new Building Fire Alarm system.
7. Install a new smoke vent above the stage.



Fire Protection Photo Index



Figure F1: Fire Riser Tucked in Corner



Figure F2: Fire Department Connection



Figure F3: Fire Hose Cabinet



DIVISION 22 – PLUMBING

A. PROJECT LOCATION:

The project location is building 1200 located on Solano Community College campus, Solano County, California.

B. PROJECT SQUARE FOOTAGE:

Building 1200 is being used as the Performance Theater, Music Classrooms and Workshop with an approximate total area of 25,000 square feet.

C. PLUMBING SYSTEMS (EXISTING CONDITIONS):

1. Piping Systems: In general, the existing plumbing systems are original to the buildings (1973). Visible corrosion and leakage are seen through out the piping system. According to the on-site engineer, numerous repairs were done to the existing piping system in the past. Use of the existing piping is creating leaks and increasing potential of hidden water retention within building systems. Evidence of leaks is shown in pictures further in the report.
2. Plumbing Fixtures: The existing plumbing fixtures are generally past their service and utilize much more water than is currently utilized in modern plumbing fixtures. See figures P3 through P6. Architect to confirm that some fixtures do not meet current ADA requirements.
3. Domestic Cold Water: The building is serviced by a 3" domestic cold water main which entered the Mechanical room from the East side of the building. Isolation valves and backflow assembly valve were also provided. See figure P1. The cold water pipe is then split in two branches with its own isolation valve, one serving the Theater side and the other servicing the Classroom side. These valves were installed with the piping directly above the electric transformer and switch board which is an NEC code violation and a fire hazard. See figure P2. In discussions with the on-site engineer, there appears to be adequate pressure throughout the domestic water system.
4. Domestic Hot Water: Light commercial 50 gallon electric water heater by State, model PV52, with (2) 4.5 Kilowatt elements. It was installed in 1989 and is past its service life. See Figure P8.
5. Sanitary Sewer Drainage: According to the on-site engineer, the sanitary sewer system operates well and back-ups in the plumbing system have not occurred. The as-built site plan showed (4) locations of sanitary sewer exiting the building, one each to the East and the West of the Theater's restrooms, one to the South of the Make-up room and one to the East of the Mechanical room. For due diligence we recommend that the system be further investigated via camera investigation prior to re-use to validate its life.
6. Roof Storm Drainage: All rain water from the roof is drained down through many rain water leaders located throughout the building. The rainwater leaders are then hard-pipe connected into the site storm drain system. See figure P7. There are no storm drain backflows reported. For due diligence we recommend that the system be further investigated via camera investigation prior to re-use to validate its life.
7. Natural Gas: There is no natural gas servicing this building.



8. Condensate Systems: The condensate systems for the air handling units are in poor condition. Inadequate condensate removal can create poor indoor air quality and cause water carryover creating microbial growth within the ductwork system.

D. PLUMBING SYSTEMS (RECOMMENDATIONS):

1. Piping Systems: Domestic hot water system will require a complete new distribution system with accompanying hot water return lines and recirculation pump. New piping will be provided to accommodate installation of new fixtures and equipment, this work includes new piping, isolation valves, branches, appurtenances, etc. for a fully functioning system. Domestic water supply and distribution shall be sized and designed per CPC 2007 chapter 6.
2. Plumbing Fixtures: The plumbing fixtures should be replaced in their entirety. For water conservation, new low flow fixtures should be installed including: Dual flush water closets (or low flow water closets), low flow lavatories, low flow shower heads. Plumbing fixtures shall be designed per CPC 2007 chapter 4. We recommend that all plumbing fixtures be selected to be low consumption, thus saving both domestic water usage as well as energy for domestic hot water heating. Architect to confirm that some fixtures do not meet current ADA requirements. We recommend the following throughout:
 - a. Water closets – Dual Flush. 1.6 / 1.1 gallons per flush.
 - b. Urinals – Low flow 0.125 gallons per flush.
 - c. Lavatories – Low flow – 0.5 gallons per minute.
3. Domestic Cold Water: The existing main domestic cold water isolation valves shall be relocated. These valves and piping were installed directly above the electric transformer and switch board which is a direct NEC code violation. They shall be relocated away from the electrical equipment. Domestic water supply and distribution shall be sized and designed per CPC 2007 chapter 6.
4. Domestic Hot Water: Provide new dedicated high efficiency storage tank type electric water heater at the Theater's restroom, Dressing's restroom and student's restroom. Water heater shall be U.L. listed, CEC certified, in compliance with California Title 24. Domestic water supply and distribution shall be sized and designed per CPC 2007 chapter 6.
5. Sanitary Sewer Drainage: Due to age of the existing sanitary sewer system, we would recommend testing of the existing sanitary sewer main lines to determine the condition of the existing piping. In general, the sanitary sewer system is sized adequately and reduced flow fixtures will alleviate demand on the sanitary sewer system. Sanitary drainage and plumbing vent system shall be sized and designed per CPC 2007 chapter 7.
6. Roof Storm Drainage: The system shall be upgraded, sized and designed properly per the latest CPC 2007 chapter 11.
7. Natural Gas: There is no natural gas serving this building.
8. Condensate Drain: All new condensate drain piping system will be provided to accommodate the cooling coil condensate drainage from the new Air Handling Units. Condensate drain piping shall be sized and designed per CPC 2007 chapter 8.



Plumbing Photo Index



Figure P1: Domestic cold water assembly



Figure P2: Domestic cold water isolation valves above electric transformer & equipment.



Figure P3: Toilet with flush valve



Figure P4: Urinal with flush valve



Figure P5: Lavatory

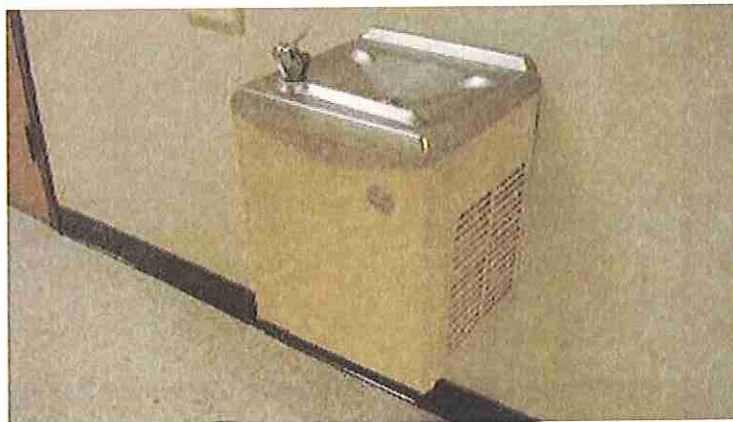


Figure P6: Drinking Fountain



Figure P7: Typical rainwater leader hard-piped to site storm drain system.



Figure P8: Electric water heater



DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

A. PROJECT LOCATION:

The project location is building 1200 located on Solano Community College campus, Solano County, California.

B. PROJECT SQUARE FOOTAGE:

Building 1200 is being used as the Performance Theater, Music Classrooms and Workshop with an approximate total area of 25,000 square feet.

C. HVAC SYSTEMS (EXISTING CONDITIONS):

Air System: In general this building is being served by (2) existing Air Handling Units (AHU), (1) Return Fan, (1) Heating and Ventilating (HV) unit and (8) Exhaust fans. The building is divided into (3) zones as follow: The Theater, Classroom and Workshop.

- a. AHU-1: Serving the Theater side comprised of the Lobby, Theater, Stage, Dressing Room, Make-Up Room, Green Room and Control Room. This AHU-1 is located on the roof and is in poor condition. Pipes and insulation are severely corroded and deteriorated. There have been several attempts to patch and fix the pipes and insulation. The fan motor and bearings are worn out and generate a lot of noise. The unit is well beyond its useful service life. See Figure M1 through M4. Due to the severe odors in the buildings and the clear signs of leaks, we recommend that the District engage the services of a hygienist to test the air handling systems and ductwork.
- b. AHU-2: Serving the Classroom side comprised of the Choral Room, Piano Room, Instrumental Room, and Practice Rooms. This AHU-2 is located on the roof and is in poor condition. Pipe insulation, isolation & control valves are severely corroded and deteriorated. See Figure M22 & M23. Fan belt has been severed and broken for quite some time yet the fan motor is still running. Notice for immediate belt replacement and service was sent out to the campus M&O department. See Figure M21. The unit is well beyond its useful service life. See Figure M7. Due to the severe odors in the buildings and the clear signs of leaks, we recommend that the District engage the services of a hygienist to test the air handling systems and ductwork.
- c. HV-1: Serving the Workshop and Storage. This heating and ventilating unit is located up high in the corner of the ceiling of the Workshop Area. It is inaccessible. Based on our observation, the unit seems antiquated and is well beyond its useful service life. See Figure M8. Due to the severe odors in the buildings and the clear signs of leaks, we recommend that the District engage the services of a hygienist to test the air handling systems and ductwork.
- d. R-1: This return fan is serving the Theater in conjunction with the AHU-1. The unit has a bad fan bearing and generated a lot of noise. See Figure M5 and M6.
- e. E-1: This roof mounted exhaust fan is serving the Make-Up Room, Green Room and Control Room. The unit shows visible corrosion and water proofing problems at the duct penetration through the roof. The unit is past its useful service life. See Figure M9.
- f. E-2: This roof mounted exhaust fan is serving the Dressing Room. The unit is past its useful service life. See Figure M10.



- g. E-3: This exhaust fan is serving the Choral Room. The unit is past its useful service life. See Figure M11.
- h. E-4: Serving the lower Restroom. This roof mounted exhaust fan is serving the lower Restroom. The unit is past its useful service life. See Figure M12.
- i. E-5 & E-6: These roof mounted exhaust fans are serving the Theater Restrooms. The units are past their useful service life. See Figure M13.
- j. E-7: Serving the upper Theater Hallway. This roof mounted exhaust fan is serving the Theater Restrooms. The unit is past its useful service life.
- k. E-8: Serving the Workshop Area. This roof mounted exhaust fan is serving the Workshop Area. The unit is past its useful service life. See Figure M15.

Ductwork and Air Devices: Existing ductwork has extensive air leakage at the duct joints. Air supply/return registers showed visible smudge and dust. See Figure M20. Due to the severe odors in the buildings and the clear signs of leaks, we recommend that the District engage the services of a hygienist to test the air handling systems and ductwork

Hydronic System: Heating water and chilled water are being provided by the central underground hydronic loop. The heating and chilled water piping entered the Mechanical room on the East side of the building. See Figure M19. From here the water is then delivered to the AHU's heating and cooling coils by a pair of heating water and chilled water pumps. See figure M18.

- a. P-1: Heating Water Pump: Single speed Lincoln motor rated at 280V, 3 phase, 60 hertz, 2.0 HP. See Figure M16. The pump's impeller size could not be read. This pump seems to be antiquated. It is past its useful service life.
- b. P-2: Chilled Water Pump: Single speed Lincoln motor rated at 280V, 3 phase, 60 hertz, 7.5 HP. See Figure M17. The pump's impeller size could not be read. This pump seems to be antiquated. It is past its useful service life.



D. HVAC SYSTEMS (RECOMMENDATIONS):

1. Air System:

In general the existing HVAC system of this building is extremely inefficient to operate. We recommend complete system replacement of the air handling units with all new. The new air handling units will be replaced with commercial grade (manufacturers such as Governair, Temtrol, Haakon) variable volume units designed and built to operate for forty years. All units will be double wall, with plug fans, variable frequency drives, pre-filter, Merv-13 final filter, chilled water coil with condensate drain, heating hot water coil, air flow measuring station for outside air measurement, 0-100% modulating economizer, and smoke detection for fan shutdown. The air handling units will continue to be located in the main mechanical room in the basement of the building. The existing outside air louver will be expanded to support 100% outside air supply from the exterior louver at no more than 500 feet per minute. Since there is no economizer relief for the building and the building gets over pressurized, we recommend the installation of pressure relief fans for proper operation of the economizer. These fans will be located on the roof and connected to the ceiling plenum. Fans will be provided with variable frequency drives to maintain an appropriate space pressure. The air handling units will be provided with DDC controls for energy management routines. All controls will tie into the existing system being used currently on the campus.

Due to the severe odors in the buildings and the clear signs of leaks, we recommend that the District engage the services of a hygienist to test the air handling systems and ductwork.

2. Ductwork: The existing ductwork is over 10 years past its service life. We recommend all ductwork to be replaced. The new ductwork will support the supply air and return air for the whole building, estimated at 75,000 cfm. All main ductwork will be medium pressure ductwork and will connect to terminal boxes. All ductwork downstream of the terminal boxes will be low pressure ductwork. Provide all new duct supports and seismic bracing of ductwork throughout.

Due to the severe odors in the buildings and the clear signs of leaks, we recommend that the District engage the services of a hygienist to test the air handling systems and ductwork.

3. Hydronic System: Heating water and chilled water piping system within the building are past their service lives and will require replacement with new piping. The new piping will be insulated per code and seismically braced. Chilled and hot water will be provided to the building air handling unit cooling and heating coils. All new piping will be schedule 40 welded black steel for piping over 2-1/2" and copper piping up to 2-1/2". Existing hot water and chilled water pumps are well beyond their service lives. We recommend the pumps to be replaced with all new (manufacturers such as Bell & Gossett or Taco) with variable frequency driver (VFD) for variable flow system. Pumps shall be UL listed and in compliance with NEMA, IEEE and IEC standards. The pumps will be controlled by a VFD system (manufacturers such as ABB, Magnetek or Toshiba).



Use of the existing piping is creating leaks and increasing potential of hidden water retention within building systems. Evidence of leaks is shown in pictures further in the report.

4. Additional Energy Considerations (besides those mentioned below). Provide a simple BACnet energy management system to control all areas of the building.
5. Expected Energy Conservation Measures (ECM's):

We recommend that the following strategies be employed to help reduce the energy use of the building at least 15% beyond Title 24 requirements:

- a. Replace the existing single pane windows with new dual pane, high performance glazing (Viracon, PPG, etc.).
- b. Insulate the walls with new insulation (R-19 in the walls). The insulation should be installed between the exterior wall and the framing if at all possible.
- c. Insulate the roof with new insulation (R-30 in the roof).
- d. Provide skylights where possible to allow free daylighting throughout the building. Lights will be controlled through daylight sensors.
- e. Provide occupancy sensors in each open area, classroom, etc. to allow reduction in heating and cooling for the zones during unoccupied periods.
- f. Provide bypass dampers to bypass all coils in the air handling units to avoid system pressure drop during economizer mode.
- g. Provide premium efficiency pump motors and air handler fan motor.
- h. Provide variable frequency driver (VFD) to hydronic pumps and air handler.
- i. Provide variable volume diffusers to allow reduced airflow at variable volume terminal boxes, reduced reheat, and reduced fan energy.
- j. Provide demand based ventilation.
- k. Provide for building commissioning.
- l. Provide allowance for advanced control system integration through the campus Johnson Metasys system for load shedding, night purge, etc.



Mechanical Photo Index



Figure M1: AHU-1 Right Side



Figure M2: AHU-1 Left Side



Figure M3: AHU's Isolator & Snubbers



Figure M4: AHU's flex connector

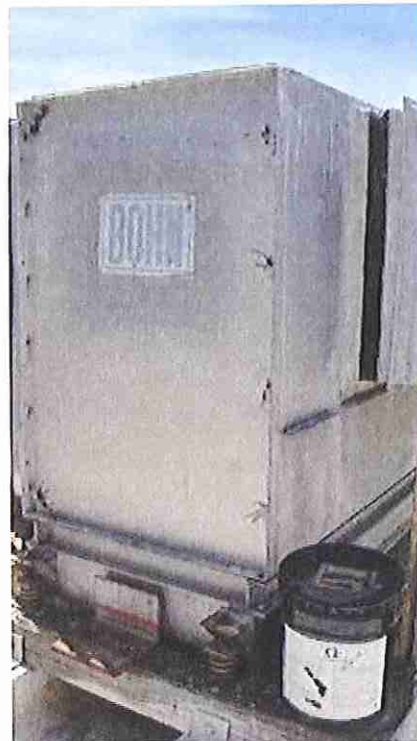


Figure M5: Return Fan



Figure M6: Return fan motor with bad bearing.



Figure M7: AHU-2 Air Handling Unit.



Figure M8: Heating Ventilating Unit



Figure M9: E-1 Exhaust Fan



Figure M10: E-2 Exhaust Fan



Figure M11: E-3 Exhaust Fan



Figure M12: E-4 Exhaust Fan



Figure M13: E-5 & E-6 Exhaust Fan



Figure M14: E-7 Exhaust Fan



Figure M15: E-8 Exhaust Fan



Figure M16: Heating Water Pump



Figure M17: Chilled Water Pump



Figure M18: Heating & Chilled Water Pumps



Figure M19: Chilled & Heating Water Risers with isolation valves.



Figure M20: Air supply register at the ceiling.



Figure M21: AHU-2 fan belt is snapped, motor is still running!



Figure M22: AHU's isolation valves showed extensive corrosion



Figure M23: AHU's control valve showed extensive corrosion



DIVISION 26 - ELECTRICAL DUE DILIGENCE REPORT

A. PROJECT LOCATION:

The project is located in Solano, California.

B. PROJECT SQUARE FOOTAGE:

The project are Building 1200 is comprised of Theatre, Music, and Arts Facility with a total of 25,000 square feet.

C. ELECTRICAL SYSTEMS (EXISTING CONDITIONS):

1. Power and Distribution System

- a. The Building 1200 is currently served by a 1200A, 277/480V, 3 phase, 4 wire Motor Control Center (MCC) equipment located in a electrical room shared with various plumbing equipment. The Motor Control Center is powered from pad mounted Substation #1 located outside the building, within close proximity of the electrical room. The Motor Control Center serves all of mechanical/plumbing equipment and two transformers which are located above, behind the MCC equipment footprint.
- b. The two transformers that are connected to the MCC are: Transformer #1, a 112.5 KVA, 480-208/120V that serves the low voltage Distribution Panel 'DP1' for branch circuit panelboards, and Transformer #2, a 225 KVA, 480-208/120V that serves the low voltage power supply for the Theater's dimmer bank. Our understanding from the Facility Engineer is that the dimmer panel system is overloaded. The distribution branch panel serves the following:
 - 1) **Distribution Panelboard 'DP1'** - 400 amp, 120/208 volt, 3 phase, 4 wire. Serves the following panelboards:
 - Panel 'LP1' – 100A, 120/208V, 3P, 4W (serves House Lighting)
 - Panel 'RP1' – 150A, 120/208V, 3P, 4W (serves Bldg receptacles)
 - Panel 'RP2' – 100A, 120/208V, 3P, 4W (serves Bldg receptacles)
 - Panel 'TL1' – 100A, 120/208V, 3P, 4W (serves Theater Lighting)
- c. The MCC is manufactured by General Electric and the distribution and branch-circuit panelboards are manufactured by Westinghouse. The electrical equipment is the original equipment installed when the Facility was constructed in 1974. All electrical equipment is approximately over 34 years old but appears to be in fair working condition and properly maintained, based on a surface investigation. Spare parts, though will be hard to find and cost of replacing parts will eventually exceed the cost of replacement.
- d. No service receptacles were installed near the HVAC equipment on the roof. This does not conform to the current electrical Code, which require a maintenance receptacle within 25' of any HVAC equipment.



- e. Existing receptacles on exterior and near the sink does not have a ground fault protection.

2. Lighting System

- a. The existing lighting luminaires serving the Theater, Music, and Arts Facility are a mixture of fluorescent and incandescent type. Fluorescent luminaires consist of recessed mounted 2' x 4', surface mounted, and downlights. Incandescent luminaires consist of pendant-mounted fixtures, track lighting, wall sconces, and chandeliers at the Lobby.
- b. The building interior lighting system is controlled by manual lighting controls, either toggle switches or dimmers. There are no automatic lighting controls, such as occupancy sensors, serving individual rooms or areas. The majority of existing luminaires appear to be in substandard condition, several lensed luminaires have discoloration, broken lenses, and some luminaire housing rusted due to roof leakage.
- c. Currently, no emergency egress lighting is installed which could pose a life/safety threat.
- d. Site and exterior lighting system is comprised of wall, ceiling, and pole mounted luminaries utilized to provide lighting along the pathways and building perimeters. According to our source in the field, the site and exterior lighting is controlled via an automatic time switch (computer programmable) located in the Faculty Building.

- 3. Fire Alarm System: The existing fire alarm system for the Building is by Standard. The Main Fire Alarm Control Panel is located in the backstage, west side of the Theater. The existing Fire Alarm System currently provides audible notification and for initiation devices only in Common areas and Corridors. Pull stations are located within close proximity of main entrance and exit doors. No visual device coverage was observed. The Fire Alarm System is a non-addressable type and is the original system installed when the Building was constructed in 1974.

D. ELECTRICAL SYSTEMS (RECOMMENDATIONS):

1. Power and Distribution System

- a. The Electrical Distribution System serving the Facility is approximately over 34 years old. Based on a surface investigation, the electrical equipment appears to be in fair working condition and occasionally maintained. However, the dependability of the electrical distribution system is questionable due to the age of the electrical equipment. Also, many parts of the electrical equipment are now obsolete and may not be readily available. Purchasing a replacement or refurbished parts are expensive and may eventually exceed the cost of replacing the outdated equipment. We recommend replacement of systems.



- b. Existing Distribution and branch-circuit panelboards to be re-used or provisions for remodel and expansion should be replaced to provide dependability, flexibility, and more capacity for future renovations. The Distribution panel has few space available and needs to be replaced. The main circuit and feeder has to be upgraded to accommodate future loads.
- c. Existing plumbing pipes are routed above electrical equipment, NEC 110.26(F)(1)(a) requires that dedicated space 6 feet above an electrical equipment be free of foreign system such as piping, duct, etc. This is to avoid damage to electrical equipment from condensation, leaks, in such foreign system. We recommend relocating all piping systems over electrical equipment or in electrical rooms.
- d. Replacement of existing receptacle outlets with Ground-Fault Circuit-interrupter type is recommended for safety and protection of personnel and student in compliance with NEC 210.8 for outlets located in toilets, bathrooms, around six feet of a sink, outdoors, and rooftops.
- e. Provide service receptacle within 25 feet of HVAC equipment in compliance with the current electrical code, CEC Article 210.63.
- f. Apparently, the Control Room in the Theater requires additional receptacles and branch circuits as well to accommodate new technology for audio/visual equipment. We recommend upgrading the panelboard in the Theater. Panelboard size and feeder could be determined once the audio/visual equipment is defined.

2. Lighting

- a. Majority of lighting luminaires in the Building are not energy efficient. Since the building was constructed before 1979, it is possible that the ballast of existing luminaires may contain hazardous material called Polychlorinated Biphenyls or PCB. We recommend replacement of existing fluorescent luminaires with new luminaire fixture using T8 or T5 type lamps with integral energy efficient electronic ballast. Replace incandescent downlights (general lighting) with compact fluorescent type with electronic ballast for energy efficiency and cost savings.
- b. The new lighting system shall utilize low glare lighting luminaires with a density to supply appropriate light levels for the tasks being performed while minimizing watts per square foot. These luminaires shall be equipped with energy efficient T8 or T5 fluorescent lamps and electronic ballast.



- c. The following minimum uniform maintained lighting level is recommended based on the IESNA Standards:
- | | |
|-------------------------|--------------------|
| • Entry and Lobby | 15-20 foot-candles |
| • Reception Area | 20-30 foot-candles |
| • Offices | 30-50 foot-candles |
| • Hallway and Corridors | 10-15 foot-candles |
| • Toilets | 10-15 foot-candles |
| • Storage | 10-15 foot-candles |
- d. Occupancy sensors for lighting control should be the predominant means of achieving automatic lighting control in Utility Rooms, Private Offices, and other Administrative areas.
- e. Provide emergency egress lighting along emergency egress path as required. Emergency lighting shall have a uniform distribution of 1 foot-candle minimum illumination at floor level as required by the California Building Code. Emergency lighting luminaires shall be with emergency battery pack integral to luminaire's housing.
- f. For added safety, we recommend to provide exit sign fixtures and emergency egress lights in Choral and Instrumental rooms.
- g. We recommend that the overloaded dimmer panel system be demolished, replaced, and re-circuited.

3. Fire Alarm System

- a. The existing Fire Alarm System is non-addressable and out-dated. The installation of Fire Alarm devices are not ADA compliant. We recommend a new, complete, supervised, and annunciated Fire Alarm System be installed for this project. The Fire Alarm System shall comply with NFPA, NEC, and ADA requirements and shall consist of manual pull stations, combination audio/visual alarms, and strobes. Ceiling mounted smoke and heat detectors should be provided in all electrical and mechanical rooms, storage, shafts, and along all major corridors in accordance with code and as required by the State Fire Marshall.



Electrical Photo Index



Figure 1 – Substation #1 located South of Building 1200

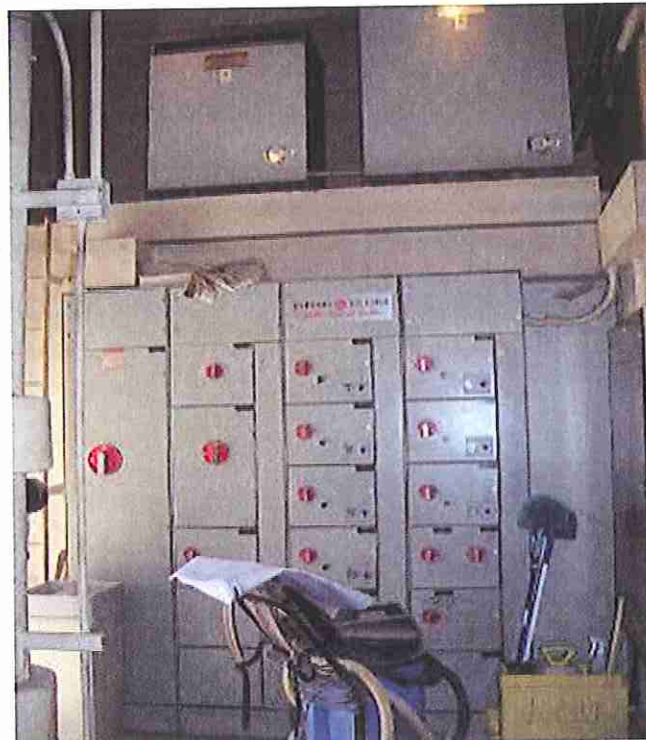


Figure 2 – Motor Control Center and Transformers



Figure 3 – Plumbing Water Pipes above the Electrical equipment



Figure 4 – Branch circuit panelboards in Shop Room

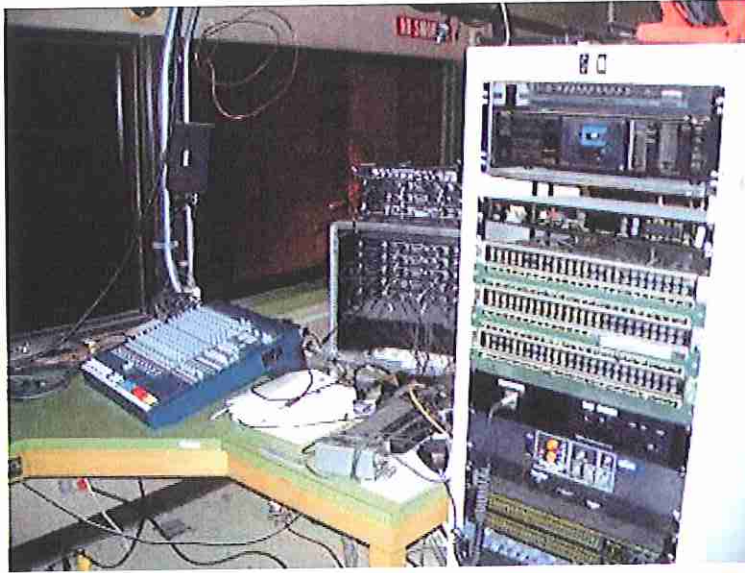


Figure 5 – Audio/Visual Equipment in Control Room



Figure 6 – Typical Exterior Perimeter Lighting

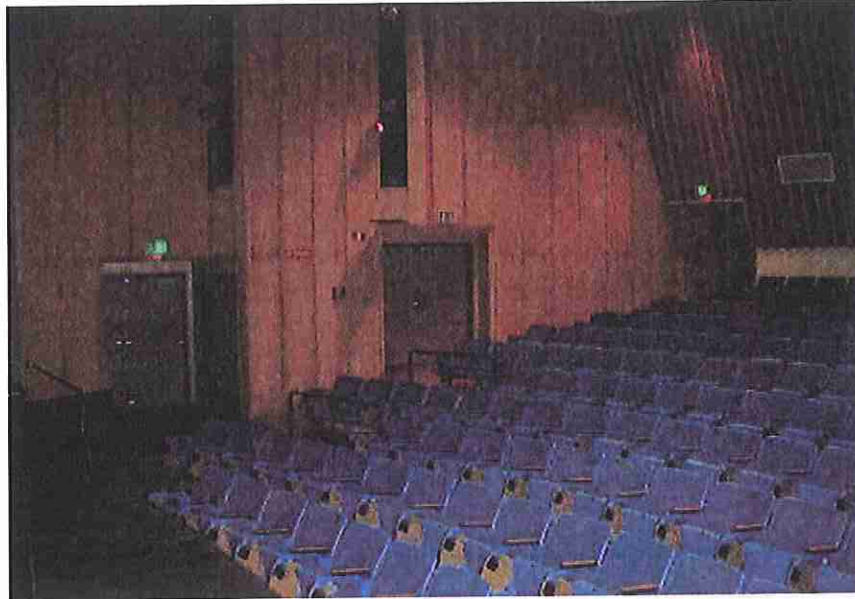


Figure 7 – Theater Lighting



Figure 8 – Typical Corridor Lighting



Figure 9 – Incandescent Downlights



Figure 10 – Lighting in the Lobby



Figure 11 – Exterior Lighting from the Theater towards the Parking Lot



Figure 12 – Theatrical Lighting along the Catwalk



Figure 13 – Fire Alarm Control Panel behind the Stage in the Theater Area



Figure 14 – Typical Fire Alarm Pull Station

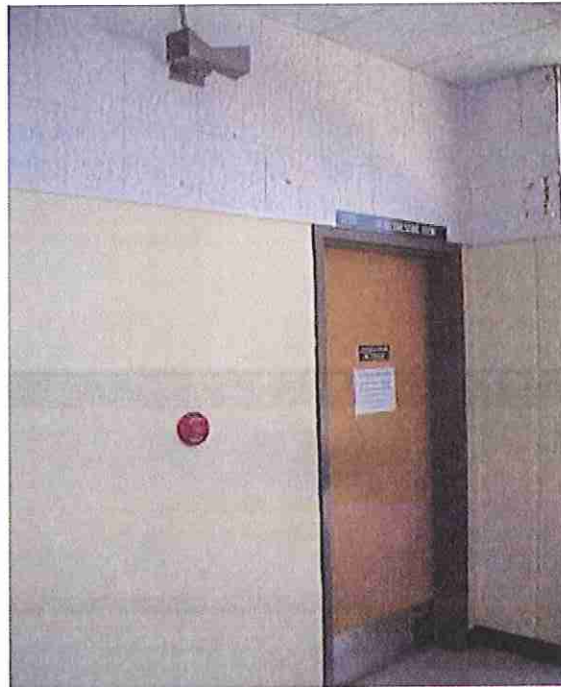


Figure 15 – Fire Alarm Horn and Pull Station at end of Corridor