11. Vertical Transportation

SECTION I

Overview
The BOE building is a 25 story Class A office building which has a single State tenant. It consists of a total of 13 elevators. The equipment was installed in or about 1992 and the manufacturer/installer was the Dover Elevator Company. The traction equipment utilizes Dover’s Traflomatic III (T III) controllers and the hydraulics are Dover’s DMC-1 controllers. All traction elevators utilize motor-generator sets to convert the building’s AC power supply to DC voltage to be used by the elevator motor. While the equipment is similar to other manufacturer’s designs during that period, they do not reflect the state of the art at that time. Other manufacturers were utilizing more efficient SCR drives or AC motors in lieu of motor generators.

Three of the elevators are hydraulic equipment serving the garage. Five of the elevators are gearless traction elevators serving the upper floors and four of the elevators are geared traction elevators serving the lower floors. There is a single, geared traction service elevator that serves all floors. All elevators were in service except one car in the high-rise group at the time of the survey. The equipment meets the code at the time of installation (California Title-8, Part 2). California elevator code is not retroactive nor does California adopt ASME A17.3 “Existing Elevators.” Since the time the elevators were installed many important safety features are now code required on newer elevators.

A. Performance Evaluation
The equipment survey saw no major problems or defects with the main components. The measured performance was within or close to the operating thresholds for this particular equipment. However, building management informed us that two of the elevators are problematic and often are turned off because the problem cannot be determined. We recommend further review of the specific problems, as it is important that all cars operate 99% of the time. There were indications of past water intrusion in the hoistways and pits but it was not possible to tell when this occurred or how often. Our observations did not indicate compromise to the major components in the machine room, hoistways, or pits. AEC does not consider itself competent in estimating the environmental or health implications due to past water intrusion into these mechanical spaces and our observations were limited to what we could view.

B. Simulated Traffic Analysis
We performed simulated Traffic Analysis for the High Rise and Low Rise Elevators. The purpose of the simulation was to determine the speed, number and size of elevators to provide satisfactory service for the tenants. The results of our analysis are included in Appendix A of our report. The client provided an estimated population of the each floor. According to the population data provide to AEC, the low-rise floors will be less densely populated than the high-rise floors. The high-rise floors are estimated to have 186 square feet per usable foot. The low-rise floors are estimated to have 195 square feet per usable foot. Our traffic analysis indicates that neither the high-rise or low-rise group can meet a
minimum 30 second Average Interval nor do they attain a 14% Handling Capacity. The Average Interval for both the high-rise and low-rise floors was over 32 seconds. A 30 second Average Interval and 14% Handling Capacity are minimal performance guidelines for downtown Class A buildings. This insufficient performance would be most noticeable during peak hours of the day. The building would have been better served with an additional elevator.

Should any elevator in either group be inoperative for any reason a significant lack of performance would be recognized, characterized by long wait times and queuing in the lobby.

C. Maintenance Level
Our survey indicated a need for better housekeeping. Elevator pits, car tops, and most machine rooms were dirty. DC motors and motor generators utilize carbon brushes which throw off much carbon dust. This dust infiltrates just about everything and needs constant cleaning and changing of filters. Excessive build up of carbon dust can create problems with the equipment as well as fire hazards in the motors themselves. Also, the former maintenance provider left exposed wiring after removing their own monitoring equipment which has not yet been properly addressed.

AEC reviewed the maintenance contract and coverage. We also understand that a new maintenance provider only recently (Thyssen-Krupp; 10/08) has been in the building. However, our survey did indicate the need for better housekeeping, cleaning of the equipment, removing carbon build up, changing of filters, and record keeping. The Thyssen-Krupp maintenance log contains few entries since October last year. We did not see any evidence of any safety tests being performed since the original installation of the equipment. More information is included in Section III.

D. Component Review
The major components seem to be in fair condition but are showing their age. The equipment is pushing 20 years of service and more than that regarding the technology. We would estimate the remaining useful life of this type equipment in its current condition to be approximately 5-6 years. This will depend on the effectiveness of the ongoing preventative maintenance efforts of the maintenance provider as well as the changing building environment, i.e., different/more tenants. A more in-depth review of the equipment is available in Section II of this report.

Current technology utilizes much more efficient AC machines or SCR Drives, closed-loop door operators, door restrictors, smarter and more responsive elevator controllers, and up to current code design. Modernization of this equipment would take advantage of these developments and further increase their reliability as the original equipment continues to age and becomes more difficult to support. The cost of such modernization to this equipment will, of course, depend on the extent of modernization which may include architectural improvements and updates to the building’s Life Safety, Fire and Smoke Alarm Systems, and other Emergency systems required by current building codes.
E. ADA/Title 24
All elevators met the ADA guidelines in effect at the time of installation. For a complete listing of ADA refer to our ADA appendix, Section IV.

F. Code Compliance A17.1 – Code for New Elevators
The elevators were installed under CAC Title 8, Group 2. While the elevators meet most code requirements at the time of original installation, they do not meet current code in California which is A17.1 2004 as modified by California. It is important to note that in California the newer code is not retroactively required. See Section IV for more information.

G. A17.3 Code for Existing Elevators
This code is the National Safety Code for all existing elevators no matter what date they are installed. This code is not enforced nor required in the State of California. California is one of the few states that does not require compliance with A17.3. We strongly believe that all elevators should meet this minimal code to attain basic safety levels. We recommend the elevators at 450 N St. to meet A17.3.

H. Summary
In summary, the equipment is nearing the end of its useful life. However, the performance analysis indicates that the current system does not meet the minimal performance requirements for a Class A building given its design and the projected building population. Based on this information we feel that a total modernization be planned for this building as soon as practical and an RFP be considered immediately.
Section II: Component Review

MACHINE ROOM:

Controllers
Dover Elevator manufactured/installed the T III controllers for cars 1-10 in 1991/92. The T III car controllers and group controllers are known in the industry to be reliable and should provide a minimum of 20 years service from installation. Unfortunately, the controllers use older technology motor-generators in lieu of SCR drives or AC motors.

The hydraulic elevators use the reliable Dover DMC-1 controllers which have been a workhorse for Dover during the past 20 years.

Hoist Machine
The elevators have 800 FPM gearless machines also manufactured by Dover Elevator. These machines are in relatively good condition and should provide another 20 years of service if properly maintained. The cost to replace the DC hoist motors with new DC or AC hoist motors would be about $35,000 per car. The added benefits of new machines would be marginal; therefore we recommend retaining all five gearless machines.

The low rise elevators have 450 FPM geared machines which were manufactured by Hollister-Whitney (HW). While HW made a good geared machine, they were pushing the limit at 450 FPM. These elevators would also benefit from conversion to new AC hoist motors and SCR Drive.

Hoist Motor
The hoist motors for cars are integral with the gearless machine. Replacing the motors would require replacing the machines. We recommend retaining and refurbishing the motors and providing SCR Drives in the new controls. The hoist motor armatures need to be turned and undercut. The field coils appeared to be in good condition. Either system will provide increased energy efficiency. The option for new AC motors offers the most for energy savings and eliminating carbon dust from the machine room. The Dover MG sets convert the building AC power to usable DC power. They are very inefficient and waste energy.
Governors
The governors were manufactured by Dover and are in good condition. We recommend retaining the governors during any future modernization.

Electrical Disconnects
The existing mainline disconnects are in good condition and meet current code requirements. The Disconnects could be retained when the elevators are modernized.

HOISTWAY:

Hoistway Construction
The hoistway (elevator shaft) is the main area where the elevator travels. The existing hoistway is in good condition, however, there are indications of past water intrusion evidenced by stains on the drywall, and in the pits. There is also rust on the rails, counterweight brackets, and separator beams. The rust should be removed and the affected areas well cleaned and painted with rust prohibitive paint. The pits were dirty and need cleaning.

Main & Car Rails
The main car and counterweight rails are in good condition and should be reused. The brackets and bracket spacing appear to be close to current seismic code. We feel that the spacing of the brackets along with the thickness and size of the brackets offers enough seismic protection. However, if the most stringent requirements are desired, than replacing the fishplates should be considered.

Traveling Cables
The traveling cables provide all the electrical communication between the elevator car and the machine room. The cables are in good condition. However, we recommend replacing all these cables and providing new traveling cables with shielded pairs for telephone communication and other spares at the time the elevators are modernized.

Hoistway Wiring
The hoistway wiring provides all the electrical communication between the hoistway door equipment, terminal switches and other miscellaneous equipment. The previous water intrusion may have entered the raceways, however, we could not observe the wiring inside the raceway to determine the state of the wiring. We would recommend replacing all the wiring when the cars are modernized.
**Hoist & Governor Ropes**

The elevator has a set of hoist ropes that suspend the elevator. The governor rope is connected to the car and actuates the safety in the event of an overspeed. The traction car ropes are in varying stages of rope wear. It is apparent that ropes have been changed as recently as 2003. We recommend retaining the ropes and including them in the full maintenance contract that would go with the future modernization program.

**Safeties**

The elevator has a safety located on the bottom of the elevator designed to stop the elevator in the event the overspeed governor is tripped. The safety was manufactured by Dover Elevator and is known to be reliable and appeared in good condition. We recommend cleaning and adjusting during any upgrade.

**Limit Switches**

At the top and bottom of each elevator shaft there are several limit switches as required by code. These switches are mechanical and are thus subject to wear, but looked to be in good condition. However, during a future modernization we recommend all the necessary slowdown and final limit switches be replaced with new as part of a new control system.

**Counterweight:** The existing counterweights are in good condition and should be retained.

**Hoistway Doors & Frames**

All the hoistway doors and frames are in good condition and should be reused. The door panels at each floor looked in good condition. The doors had fire labels.

**Hoistway Door Tracks & Hanger Assemblies**

To hold the elevator doors in place each set of hoistway doors has tracks and hanger rollers that allow the doors to slide open and close. The solid bar tracks and hanger assemblies looked to be in good condition and only a few needed some extra cleaning and adjusting. We recommend replacing worn rollers only and retaining the hangers and bar tracks.

**Hoistway Pick Up Rollers & Door Locks**

Each set of hoistway doors has pick up rollers that allow the power car door to engage and open the door when the elevator stops at each landing. All this equipment looks in good condition and could be retained with a future modernization.
Hoistway Door Closers
The hoistway door closers ensure that each hoistway door stays closed when the elevator is away from the floor. We recommend retaining the spirator type door closers at each floor.

Hoistway Door Gibs
Each hoistway door has nylon or plastic gibs on the bottom of the door that ride in tracks on the sill. These gibs prevent the bottom of the door from swinging into the hoistway and they help keep the doors aligned in the proper plane. Two gibs will provide more stability and reduce unwanted movement in the door.

CAR TOP:

Door Operator
The existing Dover HD 85 door operators are high quality and can last another 5-7 years. When the cars are modernized we recommend these be upgraded to new closed-loop door operators. The closed-loop feature will allow the elevator service company to easily adjust the door speed to optimum condition. An additional benefit of the new door operator is that it will come with door restrictors. The door restrictors will prohibit passengers who may be stuck inside the car from opening the door.

Electric Safety Edge
The existing electric safety edges appear to be working fine and in good condition. Therefore we recommend retaining.

Car Top Inspection Station
The car top inspection station allows the elevator mechanic or inspector to safely operate the elevator from the top of the car.

Car Roller Guides
On both sides of the elevators and on the top and bottom roller guides with springs and bushings keep the elevator riding up and down the steel guide rails. The existing ride quality is satisfactory thus we recommend retaining the roller guides.

Emergency Escape Hatch
The emergency escape hatch allows passengers to be rescued in the event the elevator becomes stuck between floors. Code requires that the hatch be set up so that passengers cannot open the hatch from within the car. It also requires that the locking mechanism on top of the car be easily operable without a key or special tools.
PIT:

Buffers
The elevator and counterweight each has an oil buffer to lower the impact in the event the elevator goes into the pit at a high speed. The existing elevators have oil buffers and these are in good condition.

Pit Ladder/Access Door
Access to elevator pits can be made through a pit access door or through the lowest hoistway door opening. All access points to the pits appeared to be in code compliance and no additional work is needed.

Pit Lighting
The pit lighting is adequate. Pits are in need of cleaning.

Counterweight Guards
For each counterweight a guard is to be installed around the bottom of the counterweight rails to prevent persons from getting hit by the counterweight when working in the elevator pit. The existing cars have compensation rope or chain and thus do not need a counterweight guard.

SIGNAL FIXTURES:

Car Operating Panels
Car operating panels are located in the front wall of the elevators and are equipped with all the necessary buttons to operate the elevator. The car operating panels will be fine until the elevators are modernized. Modernization will require control panels and they will need to be updated with current fire service, which at this time is A17.1 2004.

Emergency Telephone
The emergency telephone is required to allow trapped passengers to call for help in the event the elevator gets stuck. None of the cars has a telephone. Pushing the alarm signals security and they respond through a 2-way intercom. We recommend providing new emergency 2-way communication during future modernization.

Car Position Indicator
The car position indicator is located in the elevator and allows the passengers to see what floor the elevator is going to next. The existing car position indicators are in good condition but should be changed with the modernization.
Hall or Car Riding Lanterns
Hall lanterns inform persons waiting in the hall of which direction the elevator is about to travel in next. ADA requires that the hall lanterns illuminate and sound for the waiting passengers. If the elevator is going up, the lantern should light up and sound once. If the elevator is traveling down, the lantern should light up and sound twice. In lieu of hall lanterns ADA allows the lanterns to be located in the car. These types of lanterns serve the same purpose, but are located in the car and are referred to as car riding lanterns. The existing elevators have hall lanterns and they meet code.

Hall Call Pushbuttons
At each floor hall call push buttons are located so that users can call the elevator. Each terminal landing has an up or down button, while intermediate floors have both up and down buttons. The hall call buttons are located 42” above the finished floor and meet ADA code.

CAB INTERIOR:

Wall Finish
The existing cab interiors are in good condition. The clear inside cab dimensions for all cars meet minimum ADA compliance based on the then existing ADA regulations. (Car 10 will accommodate an ambulance stretcher required in CBC 2007.)

Ceiling
The existing ceilings on all the elevators are in good condition and should be retained. There is an opening at the very top which makes the cab top visible from the car. It allows viewing to the top of the cab top.

Smoke/Heat Detectors
Fire service requires that a smoke detector be located in each elevator lobby, machine room and top of hoistway. In addition heat detectors are required to be within two feet of each sprinkler head. The machine room and main lobby level all had smoke detectors. The typical floors had smoke detectors. Should the elevators be modernized they will be required to have the most recent fire service recall. Thus all modernized elevators will need to be updated with the most recent fire recall, which will require 3 zones for the recall.
Section II: Component Review: Hydraulic Elevators:

MACHINE ROOM:

Controllers
The controllers were manufactured by Dover Elevator and installed in 1992. The controllers are Dover’s DMC-1 model and these are known to be very reliable and maintainable.

Power Units
Each elevator has a power unit that includes a pump, control valve, AC motor and oil tank reservoir. The power units move the elevator up and down the hoistway by controlling oil in and out of the hydraulic cylinder. The existing units including valves, pumps and motors are all made by Dover Elevator and are some of the best available in the industry. Aside from some minor oil leaks the valves, pumps and tanks are all top of the line and can be expected to provide another 5-10 years of service. The Dover I-3 Valve is also known to be very reliable.

Selectors
The selectors inform the pump unit and controller of the exact location of the elevator in the hoistway. The existing selector uses a fixed tape in the hoistway with a tape reader on top of the car. The selector appeared to be in good condition.

Main Disconnects
The existing main disconnects are in good condition and do not need to be upgraded.

HOISTWAY:

Hoistway Construction
The hoistway (elevator shaft) is the main area where the elevators go up and down. The existing hoistways are in good condition; however, we suggest the rust be removed and the affected areas cleaned and painted with a rust prohibitive paint. No other work is expected in the hoistways.

Hydraulic Jack
The existing in-ground hydraulic jacks (cylinders) were installed at the time of the installation and most likely have a double bottom jack. The #11 car needs lubrication around the packing as it is very dry, causing excess friction on the jack.
SECTION III

Elevator Maintenance Contract

The current maintenance contract was reviewed for extent of coverage, conditions, and market pricing. It is a full coverage maintenance contract for a five year duration with a performance clause. The performance clause allows the Owner the option of cancelling the contract should the Owner prove non-performance and if subsequently not corrected within a 30 day period.

While we understand that the current maintenance provider has been under contract since 10-9-08, the contract does set certain, time sensitive criteria for Thyssen (TKE) to follow. The following are those items we bring to your attention:

Spec Section VIII G.3b Monthly Fire Recall test: No charts or other indications of these code required tests being performed were visible in the machine rooms.

Spec Section VIII G.3d Forms: A standard TKE maintenance chart was noted in the machine rooms; however, the only notations were from 12/08. The required information was not evident on these forms or elsewhere in the machine room.

Spec Section VIII H.1 Housekeeping: This section calls for the thorough cleaning of elevator hoistways, pits, car tops, controller interiors including filters, and machine rooms within 3 months of the date of contract execution (10-09-08). We found many of these items in non-compliance with this contract section.

Spec Section VIII I.1 Stock of Materials: Many of the items to be stored were not in evidence.

Spec Section VIII K 1, 3, 5. Schedules and Records: The required logs and information were not in evidence in the machine rooms.

Housekeeping and cleaning of the items listed above are considered indicators of the level of general maintenance.

The contract does provide the Owner the right for independent evaluations and tests witnessed by a neutral party annually at no cost to the Owner (see Section VIII N.1 and 2).

The contract price is within +/- 5% of the estimated average local market price for maintenance for this equipment.
SECTION IV

California Elevator Code and ADA
The elevators were installed in 1992. At that time the effective elevator code was California’s:

Division 1. Department of Industrial Relations
   Chapter 4. Division of Industrial Safety
   Subchapter 6. Elevator Safety Orders
   Group 2. Existing Elevator Installations.

Group 2 regulations apply to existing elevators installed prior to October 25, 1998.

ADA parameters are as follows:

<table>
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<tr>
<th>ADA Requirement</th>
<th>Cars 1-9</th>
<th>Cars 11-13</th>
<th>Car 10</th>
</tr>
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<tbody>
<tr>
<td>Hall Lanterns, 72” height, 2 1/2”</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Raised Braille entrances; 60”</td>
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<td>Y</td>
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<td>Door Protective Re-opening</td>
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<td>Door Delay (3 Seconds)</td>
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<td>Car Illumination 5 FootCandles</td>
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<tr>
<td>Car Controls; Height, Braille</td>
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<td>Car Position Indicators</td>
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<td>Emergency Communication</td>
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<tr>
<td>2-way communication</td>
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</table>

** Two way communications is accomplished by activating the car alarm. On-site 24 hour security responds via intercom.

*** Meets current codes for accommodation of ambulance stretcher.