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VA Health Care Livermore Facility

4951 Arroyo Road, Livermore, CA

Elevator Equipment and Modernization Assessment

Prepared for
VA Palo Alto Heath Care System

The purpose of this report is to evaluate elevator equipment, to review modernization feasibility and potential scope and outcomes for the VA Health Care Facility in Livermore. Information was obtained through direct observation of elevators, review of existing elevator equipment and upgrade options with ThyssenKrupp, as well as other major manufacturers, and from experience with similar equipment installations.

Elevator system components are summarized below, followed by modernization budget and other modernization related information.

I. Existing Elevator Equipment

Location	No(s).	Capacity	Floors	Speed	Type	Mfg./Control
B-62	P1,P2 (Pass)	4000 lbs.	B,1-6	350 fpm	DC Geared SCR	Dover MCE-IMCP
B-62	S3 (Service)	5000 lbs.	B,1-6	350 fpm	DC Geared MG	US Elevator Relay Logic
B-64	F4 (Service)	5000 lbs.	1,2F,2R	250 fpm	DC Geared MG	Otis Millar CVT-2400
B-65	P-7 (Freight)	2400 lbs.	B,1	50 fpm	Hydraulic	IECO MCE-HMC 1000
B-88	P-4 (Pass)	3000 lbs.	1,2	100 fpm	Hydraulic	Dover Relay Logic
B-90	P5,P6 (Pass)	4000 lbs.	1,2	100 fpm	Hydraulic	Home Elevator ESI

All elevators installed by different manufacturers in various years.

II. Building 62

A. Original Equipment: Car frames, guiderails, hoistway switches, governors, buffers, doors, door operators and hoist machines are from original installation. Car frames, guiderails, buffers, doors and hoist machines are typically retained in the event of modernization.

B. Control System: The controls of elevator S-3 is the original US Elevator. This is an early relay logic control system with a motor-generator and older technology electro-mechanical components. Elevators P1 & P2 were modernized (controllers only) in 2002 with MCE solid state controllers and SCR drives.

As elevator S-3 contains all original manufacturer components, and US Elevator Co. no longer exists, there is no factory technical support for this system. In addition, components

gradually deteriorate with age, and experience with other installations of this type indicates that as time passes this control system can be increasingly prone to equipment failures resulting in elevator trouble calls. The impact on elevator system availability and reliability is further exacerbated by the decreasing number of technicians available with expertise and training to service this vintage and type of elevator equipment.

It is recommended to replace the existing original US Elevator controller with a new digital closed loop control system. This would significantly improve reliability, maintainability, longevity and energy savings.

As the MCE control system for elevators P-1 & P-2 have a life expectancy of 15 25 years, factory support is still available for these control systems. No immediate modernization is necessary for elevators P-1 & P-2.

C. Dispatch Operation: The "two button" is a conventional dispatch system, typical of equipment of this vintage, and normally adequate. There would be significant performance and traffic handling benefits to a "Destination Dispatch" system. This would also significantly improve service of the elevators in the main facility building.

D. Hoist Machines: The Dover and US Elevator geared hoist machines can have many years of remaining life, with proper maintenance, refurbishment and modification. While it is feasible to install new AC hoist machines, and there are potential longevity, energy savings and safety benefits to do so, hoist machine replacement is not required and is a discretionary upgrade. The gearbox for elevator P-2 was recently replaced by TKE.

E. Drive Systems: Elevator S-3 uses a motor generator to convert incoming AC power to DC. This is a dirty (carbon dust), energy inefficient and maintenance intensive technology from the 1930's. In the event of modernization, this will be replaced with new IGBT (Insulated Gate Bipolar Transistor) "power factor one" regenerative drives, resulting in significant energy savings. Elevators P-1 & P-2 were upgraded to SCR drives in 2002.

F. Door Operator: The original Dover (P-1,P-2) and MAC (P-3) door operator system can be significantly improved and made more reliable by installing a new closed loop door operator system. This will improve system performance as well as the quality of door operation.

G. Car and Hall Fixtures: All new car and hall fixtures would be installed as part of a modernization. Some modifications are required at the ground floor related to fire recall and emergency power operation to comply with current elevator code requirements. These new fixtures will comply with current CA Title 24 and ADA requirements. The upgrade may include destination dispatch hall keypads in place of the existing hall buttons.

H. Elevator Code Related Building Work: A modernization will trigger requirements in the elevator code for alterations of the fire/life safety system such as for phase 1 alternate floor recall, the addition of electrical ground wires, and the removal of sprinklers from elevator spaces. This work is mandatory. This work is not overly complex and can be included in the scope of work of the elevator contractor.

I. Cab Interiors: Passenger elevator cab interiors and lighting should be upgraded as part of modernization. This is a discretionary upgrade.

J. Access Control System: Control modernization may be combined with discretionary installation of a new access control and card reader system. If destination dispatch is installed, a more sophisticated serial/IP interface with greater functionality would be typical. Options can also include a visitor processing system.

III. Building 64

A. Original Equipment: Car frame, guiderails, hoistway switches, governor, buffers, doors, door operators, hoist machine and motor generator are from the original Otis installation. Car frames, guiderails, buffers, doors and hoist machines are typically retained in the event of modernization.

B. Control System: The controls of the elevators were replaced with Millar CVT-2400 in 1992. This is an early microprocessor control system with solid state components and older technology electro-mechanical components. Millar is no longer in business. There is no factory technical support for this system. In addition, components gradually deteriorate with age, and experience with other installations of this type indicates that as time passes this control system can be increasingly prone to equipment failures resulting in elevator trouble calls. The impact on elevator system availability and reliability is further exacerbated by the decreasing number of technicians available with expertise and training to service this vintage and type of elevator equipment.

It is recommended to replace the existing Millar control with a new digital closed loop control system. This would significantly improve reliability, maintainability, longevity and energy savings.

C. Dispatch Operation: The “two button” is a conventional dispatch system, typical of equipment of this vintage, and adequate for this single elevator.

D. Hoist Machines: The Otis DC geared hoist machines can have many years of remaining life, with proper maintenance, refurbishment and modification. While it is feasible to install new AC hoist machines, and there are potential longevity, energy savings and safety benefits to do so, hoist machine replacement is not required and is a discretionary

upgrade.

E. Drive Systems: The elevator uses a motor generator to convert incoming AC power to DC. This is a dirty (carbon dust), energy inefficient and maintenance intensive technology from the 1930's. In the event of modernization, these will be replaced with new IGBT (Insulated Gate Bipolar Transistor) "power factor one" regenerative drives, resulting in significant energy savings.

F. Door Operator: The original door operator systems can be significantly improved and made more reliable by installing new closed loop door operator systems. This will improve system performance as well as the quality of door operation.

G. Car and Hall Fixtures: All new car and hall fixtures should be installed as part of the modernization. Some modifications are required at the ground floor related to fire recall and emergency power operation to comply with current elevator code requirements. These new fixtures will comply with current CA Title 24 and ADA requirements.

H. Elevator Code Related Building Work: A modernization will trigger requirements in the elevator code for alterations of the fire/life safety system such as for phase 1 alternate floor recall, the addition of electrical ground wires, and the removal of sprinklers from elevator spaces. This work is mandatory. This work is not overly complex and can be included in the scope of work of the elevator contractor.

I. Cab Interiors: Passenger elevator cab interiors and lighting should be upgraded as part of the modernization. This is a discretionary upgrade.

IV. **Building 65**

A. Original Equipment: Car frame, guiderails, hoistway switches, buffers, doors, car gate, and pump unit are from original installation. Car frames, guiderails, buffers and doors are typically retained in the event of modernization. These elevators were manufactured by IECO, which no longer exists. These elevator types were sold and installed in relatively few numbers compared to other major manufacturers, and so there are few technicians who know how to trouble shoot and adjust this equipment type. There is also not a significant aftermarket parts supply.

B. Control System: The controls of this elevator was modernized (controllers only) in 1997 with an MCE solid state controller. This is an early microprocessor control system with solid state components and older technology electro-mechanical components.

This MCE control system has exceeded its life expectancy of 15 25 years, factory support is still available for these control systems. As this elevator is not heavily used, no

immediate modernization is necessary.

C. Pump Unit: The Original IECO pump unit and Maxton control valve can have many years of remaining life, with proper maintenance, refurbishment and modification. While it is feasible to install new pump unit, and there are potential longevity, energy savings and safety benefits to do so, replacement is not required and is a discretionary upgrade.

D. Drive System: The elevator uses a direct plunger hydraulic ram. This unit was installed in the walk-in pit area and is exposed (above ground). This eliminates the possibility of in ground hydraulic jack erosion. With proper maintenance and refurbishment (packing), replacement is not necessary and is a discretionary upgrade.

E. Doors and Gate: The original Peele door system and gate are manual operation. As these are functioning as intended, and Peele is still supporting these systems, with proper maintenance, replacement is not necessary and is a discretionary upgrade.

F. Car and Hall Fixtures: All new car and hall fixtures should be installed as part of a future modernization. Some modifications are required at the ground floor related to fire recall and emergency power operation to comply with current elevator code requirements. These new fixtures will comply with current CA Title 24 and ADA requirements.

G. Elevator Code Related Building Work: A future modernization will trigger requirements in the elevator code for alterations of the fire/life safety system such as for phase 1 alternate floor recall, the addition of electrical ground wires, and the possible, but not likely removal of sprinklers from elevator spaces. This work is mandatory. This work is not overly complex and can be included in the scope of work of the elevator contractor.

H. Cab Interior: Freight elevator cab interiors and lighting do not require replacement or alteration as part of modernization. This is a discretionary upgrade.

V. Building 88

A. Original Equipment: Car frame, guiderails, hoistway switches, buffers, doors, door operator, operational controls and pump unit are from original installation. Car frames, guiderails, buffers and doors are typically retained in the event of modernization. This elevator was manufactured and installed by Dover in 1977. These elevator types were sold and installed in relatively large numbers. There are a limited supply aftermarket parts supply, particularly for control system components.

B. Control System: The controls of the elevator are the original Dover relay type. This is an early control system with relay-logic components and older technology electro-mechanical

components.

While ThyssenKrupp is the technically best qualified company to work on this system as they acquired Dover, the original manufacturer, even for ThyssenKrupp it is increasingly difficult to provide full factory technical support for this system. In addition, components gradually deteriorate with age, and experience with other installations of this type indicates that as time passes this control system can be increasingly prone to equipment failures resulting in elevator trouble calls. The impact on elevator system availability and reliability is further exacerbated by the decreasing number of technicians available with expertise and training to service this vintage and type of elevator equipment.

It is recommended to replace the existing original Dover control with a new digital closed loop control system. This would significantly improve reliability, maintainability, longevity and energy savings.

C. Dispatch Operation: The “two button” is a conventional dispatch system, typical of equipment of this vintage, and is adequate for this single elevator.

D. Pump Unit: The Original Dover pump unit and control valve can have many years of remaining life, with proper maintenance, refurbishment and modification. While it is feasible to install new pump unit, and there are potential longevity, energy savings and safety benefits to do so, replacement is not required and is a discretionary upgrade.

E. Drive System: The elevator uses a direct plunger hydraulic ram. This unit was installed in-ground. There is the possibility of in ground hydraulic jack erosion. With proper maintenance and refurbishment (packing), replacement is not necessary and is a discretionary upgrade.

F. Door Operator: The original Dover door operator system can be significantly improved and made more reliable by installing a new closed loop door operator system. This will improve system performance as well as the quality of door operation.

G. Car and Hall Fixtures: All new car and hall fixtures would be installed as part of a modernization. Some modifications are required at the ground floor related to fire recall and emergency power operation to comply with current elevator code requirements. These new fixtures will comply with current CA Title 24 and ADA requirements.

H. Elevator Code Related Building Work: A modernization will trigger requirements in the elevator code for alterations of the fire/life safety system such as for phase 1 alternate floor recall, the addition of electrical ground wires, and the possible removal of sprinklers from elevator spaces. This work is mandatory. This work is not overly complex, and can be included in the scope of work of the elevator contractor.

I. Cab Interiors: Passenger elevator cab interiors and lighting do not require replacement or alteration as part of modernization. This is a discretionary upgrade.

VI. Building 90

A. Original Equipment: Car frames, guiderails, hoistway switches, buffers, doors, door operators, operational controls, group dispatch controls and pump unit are from original installation by Home Elevator Co.in 1981. Car frames, guiderails, buffers, doors and pump units are typically retained in the event of modernization. These elevators were manufactured and installed by Home Elevator Co., and so the elevators consist of a combination of equipment from, 3rd party companies and various aftermarket suppliers (such as GAL door operators. Maxton valves and ESI controls). These elevator types were sold and installed in relatively few numbers compared to other major manufacturers, and so there are few technicians who know how to trouble shoot and adjust this equipment type. There is also not a significant aftermarket parts supply, particularly for control system components.

B. Control System: The controls of the elevators are the original ESI 3rd party relay-logic type. This is an early control system with older technology electro-mechanical components.

It is recommended to replace the existing original ESI control with a new digital closed loop control system. This would significantly improve reliability, maintainability, longevity and energy savings.

C. Dispatch Operation: The existing “two button” is a conventional dispatch system, typical of equipment of this vintage, and normally adequate. However, conventional dispatch systems do not effectively handle intra-group floor service. There would be significant performance and traffic handling benefits to a “Destination Dispatch” system.

D. Pump Units: The Original pump units and control valves can have many years of remaining life, with proper maintenance, refurbishment and modification. While it is feasible to install new pump units, and there are potential longevity, energy savings and safety benefits to do so, replacement is not required and is a discretionary upgrade.

E. Drive Systems: The elevators use direct plunger hydraulic rams. These units were installed in-ground. There is the possibility of in ground hydraulic jack erosion. With proper maintenance and refurbishment (packing), replacement is not necessary and is a discretionary upgrade.

F. Door Operator: The original GAL door operator system can be significantly improved and

made more reliable by installing a new closed loop door operator system. This will improve system performance as well as the quality of door operation.

G. Car and Hall Fixtures: All new car and hall fixtures would be installed as part of a modernization. Some modifications are required at the ground floor related to fire recall and emergency power operation to comply with current elevator code requirements. These new fixtures will comply with current CA Title 24 and ADA requirements. The upgrade could include destination dispatch hall keypads in place of the existing hall buttons.

H. Elevator Code Related Building Work: A modernization will trigger requirements in the elevator code for alterations of the fire/life safety system such as for phase 1 alternate floor recall, the addition of electrical ground wires, and the possible removal of sprinklers from elevator spaces. This work is mandatory. This work is not overly complex and can be included in the scope of work of the elevator contractor.

I. Cab Interiors: Passenger elevator cab interiors and lighting do not require replacement or alteration as part of modernization. This is a discretionary upgrade.

J. Access Control System: Control modernization may be combined with discretionary installation of a new access control and card reader system. If destination dispatch is installed, a more sophisticated serial/IP interface with greater functionality would be typical. Options can also include a visitor processing system.

VII. Maintenance Review

A. A review of the on-site records was conducted for all elevators. There was significant lapse in report documentation on-site.

B. A visual inspection of the elevator machine areas, pits and hoistways. The observation conclusion was poor to average housekeeping.

VIII. Modernization

A. Summary: Modernization would significantly improve elevator performance and reliability. If the objective to provide a high quality of elevator operation, reliability and performance, then modernization is recommended. We have successfully completed modernizations of similar elevators in Northern California and Los Angeles over the last decade.

B. Modernization Scope

1. New microprocessor elevator motion control with digital positioning

2. New IGBT fully regenerative “power factor 1” drives
3. New microprocessor group dispatching, with destination dispatch
4. New door operators, with digital closed loop control
5. New car and hall fixtures
6. Computer based elevator monitoring and reporting, with remote monitoring
7. New intercom system
8. Refurbish all retained components
9. New cab interiors (discretionary)
10. Integration with new access control system (discretionary)
11. Speed and capacity will remain unchanged in the event of modernization.

C. Modernization Outcomes: Below is a summary of the results of a properly designed and installed modernization:

1. Significantly reduced waiting times and trip times with destination dispatch; over 50% reduction in trip time for tenants and passengers at the top of buildings.
2. Improved system handling capacity of 15-25% with destination dispatch compared to conventional dispatch (destination dispatch can effectively handle a greater population and higher population density than conventional dispatch).
3. Significant reliability improvement. Depending on manufacturer, callbacks, shutdowns and entrapments will be reduced by 50 to 90%.
4. Improved leveling accuracy decreases likelihood of tripping accidents to public.
5. Over 50% reduction in elevator energy consumption (existing elevators such as these are typically estimated to be ~5% of total building power consumption).
6. Improved ride quality, in particular door operation, acceleration and deceleration.
7. Improved appearance of new car and hall fixtures
8. Reduced heat release, machine room air conditioning, carbon dust and noise.
9. Upgrades to latest California elevator code and safety features.
10. Significantly improved interface and operation for persons with disabilities.
11. Extension of elevator system longevity by 25+ years, depending on manufacturer.