Workshop 4: Facility and Equipment Needs

Issue Areas

The workshop on facility and equipment needs focused its attention on the related areas of fixed maintenance facilities and diagnostic and maintenance tools. Workshop 4 members were asked to identify reasons for the high degree of variation in facility design and equipment sophistication and to define research needs related to garage design and new equipment requirements.

Resource Paper

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The current generation of bus operators has an opportunity that is unique and exciting and also a bit terrifying. Most present-day bus facilities have their origin in the streetcar era, and throughout the country the vintage of these facilities is such that replacement is necessary, from the standpoint of both age and function.

It is exciting to know that in a period of 10-20 years fixed bus facilities will either be replaced or will have undergone major renewal. Considering past history, it has to be awesome to think that decisions made today will be in place and affecting bus operations up to 75 years from now.

It is certainly appropriate today to look to that future and be concerned with how we can improve on past performance. And there is room for improvement. But, before we throw over everything we know and do, let us define our present delivery system for facilities.

Let us compare a major commitment to a facility with a similarly sized commitment to our other big expenditure--buses. To produce a bus, millions are spent on design and research involving some of the most highly trained and skilled people available. Prototypes are built and tested. Production lines are built. Finally, through the miracle of mass production, buses are delivered. Nothing this sophisticated goes into a facility. The designer produces a custom (one-of-a-kind) design with input from the bus property, a property that probably has not had the experience before. Shortly after, a contractor with as many as 75 subcontractors sets about custom building the facility. Soon it is complete, ready for use. The difference in service delivery is dramatic. The results are also. A comparison of the warranty claims is revealing. When one compares the maintenance effort that goes into keeping the buses on the street--the refurbishing, rebuilding, etc.--with the benign neglect with which the facilities are treated, it is amazing that the facilities survive and serve so well.

I do not believe that the methods of facility delivery are wrong; rather, they appear to be very good. They certainly are in need of some improvement but not major surgery. Some well-thought-out refinement and development are suggested.

FACILITY DESIGN

Of unique importance in facility design is the relative size of properties and their resultant capability to help themselves. The larger properties have the resources to devote time to the study of future trends, to conduct research on new materials and equipment, perhaps even to visit other properties to view their progress and innovations. This is not true for the smaller properties. Better communication and publicity concerning improved facility design will be of help to all properties. The smaller properties, with their problems, will gain the most insight in this process.

There are a great many considerations to be thought through in any facility improvement. Budget capability is perhaps paramount. Deciding whether to build new or to remodel and renovate is always difficult. Some properties have rehabilitated automobile and truck sales and repair facilities at low cost. Site location as it affects highway access, soil conditions, environmental considerations, and present cost of acquisition, weighed against future operating costs, is also an important design consideration. The operating costs of pull-ins and pull-outs and the cost of driver relief are often overlooked in site selection and comparative site costs. But these operating costs go on forever and inflate whereas initial site costs are one-time costs paid for with today's dollars. Climate also has a major effect on facility design. Parking buses out of doors may work well in Florida, Texas, and California but would be a nightmare in Minnesota, Michigan, and Pennsylvania.

Two major questions must always be considered prior to planning a facility: (a) fleet size, both present and future, and (b) the nature of the bus to be housed now and for years to come.

For a multifacility property, the size of a facility is perhaps more logically determined by considering the maximum desirable size. The smaller property has the real dilemma: To accommodate even a modest unplanned growth in the size of the bus fleet--say, from 75 to 125 buses--at some time in the future will be a major undertaking.

Future vehicle design affects everyone and is one of the great unknowns. In 10 short years we have seen air conditioning in quantity and electronics in air conditioning, welded body skins, stainless steel bodies, a return of underfloor engines, the articulated bus, double-decker buses, foreign manufac-

turers, metric dimensions, advanced-design buses, and wheelchair lifts. The list could go on and undoubtedly will in the future.

Two new phenomena are also having their impact on facilities and equipment--safety and security. The large increases in absenteeism and compensation claims plus the recent activities of the Occupational Safety and Health Administration (OSHA) strongly suggest the need for an increased awareness of safety at the workplace. An increase in theft and vandalism is making mandatory built-in security controls that were not considered only a few years ago.

The value of better facilities and equipment to repair and operate buses is obvious. Adequate space for bus parking and maneuvering drastically reduces bus damage on many older properties. Adequate space for mechanics to service and maintain buses not only gets the job done faster but also encourages better work. Sufficient equipment properly located and properly selected to perform the task also contributes greatly to quality work.

A properly designed area is easier to maintain, which contributes greatly to employee morale. Absenteeism is reduced, and there is renewed interest in doing a good job. The results can be seen in better, self-enforced housekeeping. You need only open a new garage and watch the job bidding interest to know that something good is about to happen.

Less rigid planning and less permanent construction are also suggested. Use of techniques that allow for easy and inexpensive changes and additions will do much to alleviate future problems.

The question of centralization or decentralization of all maintenance functions should also be determined prior to major facility changes. Again, the smaller properties probably have no real choice because everything is in one location. The larger properties do have a choice. My limited investigation into this area for larger properties has favored decentralization. The service garage should include those maintenance functions that allow it to reasonably control its own activities and its own quality control. This includes component replacement, inspections, engine tune-up, brake work, and limited body work. Functions such as major body work, painting, and component rebuilding are better left to a heavy repair facility. In addition, repair of spark ignition vehicles seems to work best if treated separately.

These decisions can be made on two bases. When the cost of equipment and manpower, as well as scheduling, gets excessive it fits best in a heavy repair facility. The second choice is usually somewhat controlled from the outside by building codes, OSHA, etc. (e.g., paint spray booths are too expensive to have in each facility, and body shop equipment, heavy welding, and engine rebuilding all require special safeguards and equipment and highly skilled people).

If the service garage is made adequate for normal service and maintenance, it aids in the garage planning for on-street bus service. The garage can schedule repair and maintenance directly without reliance on another facility and group of mechanics. The savings in time and operating expense to move buses between facilities for repair are substantial. The benefit of on-time performance of the bus service is easily apparent.

There are some real advantages in a specialized central shop for some types of work. The skills required for body work, painting, engine building, machine shop, woodworking, and component rebuilding can be put to better use on an ongoing basis. The specialized equipment needed to perform these functions on a larger property can easily cost $500 000 for one central shop. The capital cost to equip a group of service garages could be prohibitive. There is further advantage in scheduling this work for an entire fleet on a full-time basis as opposed to the sporadic scheduling that would be required in a single service garage.

PLANT INFRASTRUCTURE

One of today's planning considerations that is likely to be a factor in the future is energy conservation. Funds are available if plant design reflects a conscious choice to conserve both heat and electricity. Building materials, control of open doors, restricting the number of doors, and adequate insulation are all "passive" choices that can be made. "Active" choices are also available--e.g., better preventive maintenance, clean filters, tuned-up boilers and fans, and clean light fixtures. Automated control of building equipment is a relatively new and highly successful method. Today, we can sense the presence of diesel fumes and ventilate only as needed, sense external temperature changes and control internal equipment accordingly, control preventive maintenance, and diagnose faulty equipment and performance before it is a major problem. Computer-controlled automation of buildings will not only cut operating costs but also reduce labor costs. It should be investigated.

EQUIPMENT

Bus maintenance equipment must also be considered. Fortunately, much of the equipment can be added without major facility changes. The single largest maintenance cost is labor, and any labor-saving equipment that can be added should be investigated. In addition to saving labor, equipment such as hoists and fork trucks can reduce injuries and worker's compensation claims.

Using diagnostic equipment is faster and more reliable in many cases than doing the work manually. The current diagnostic demonstration project in New York, which allows frequent checks of bus performance, bears close watching. Recent developments in dynamometers bode well for future diagnostic efforts. As the older, more skilled mechanics who have worked since World War II retire, it is becoming increasingly difficult to find staff replacements with the same skills. The future use of diagnostic equipment is rapidly becoming a necessity. It would appear that combining a diagnostic system with a chassis dynamometer to check a bus under load would be an excellent addition to present capabilities. By and large, designers and vendors of bus maintenance equipment have been and are doing a good job.

INFORMATION NEEDS

There is actually very little that maintenance departments require or want that is not available. In my view, it is again the problem of small versus large properties. Small properties are limited by budget constraints and in many cases are not aware of equipment availability. The profit margin prohibits contact by manufacturers. Perhaps the bus manufacturers should provide lists of tools and equipment that would aid in the repair and maintenance of their vehicles along with their maintenance manuals and parts lists. They have the information and could provide a real service.

All of this is not to suggest a big hole in our knowledge of facility and equipment changes. Rather, somewhere among all the properties in this country almost every problem has been encountered and

solved. The real problem is how to communicate and distribute this knowledge. A number of efforts have been made by special UMTA-funded manuals and studies.

Facility design manuals have tended to be a bit narrow in their results. They have been "how-to" books reasonably void of philosophy and background and have failed to supply a full range of ideas and solutions. Thus, a property using one of these manuals may find that only a portion of the document is applicable to its unique problems.

I strongly urge a continuation of this type of study and data collection. I would, however, suggest that UMTA fund an organization such as APTA to prepare a manual on facility design and equipment on an ongoing basis. The wealth of information and solutions available can then be gathered and presented in the most beneficial way to the industry.

In addition to these planning manuals, UMTA has funded a number of technical studies managed by individual properties. Although provision is made for distribution of the results on request, it is not widely used. There is no doubt that a great amount of thoughtful and useful research is available--in fact, so much that volume may be the problem. Again, having a group such as APTA collect and review these data and provide capsulized reports would perhaps be a more effective way to disseminate already available information.

PUBLICATION

Another strategy that could be expanded is a case-study presentation of ideas and facilities. APTA attempts this at its regional conferences. Friendship Publications does an excellent job once a year at its seminar.

Several bus-related magazines, most notably Friendship Publications' Bus Ride, also carry stories in their issues. Several architectural magazines such as Architectural Record and engineering magazines such as Construction Specifier have developed techniques and include facts and details that give a better, more rounded view. I am sure that, if sufficient interest were expressed in in-depth stories on facilities and equipment, they would be forthcoming from the present publishers, and I believe we would all benefit from such coverage.

NEEDED IMPROVEMENTS

Bus operators do need assistance, most notably from UMTA and the bus manufacturers, in addition to an improved communication network among themselves. This will result not only in improved facilities and equipment but also in a better-maintained bus fleet. The following are some major steps that could be taken toward improving the current situation:

1. Research and field visits by properties contemplating changes,
2. Study and use new building operation technology,
3. Do thorough space and functional planning,
4. Obtain a diligent effort from the designer,
5. Analyze future needs and plan for change,
6. Temper decisions based on life-cycle cost input,
7. Provide adequate amount and type of equipment,
8. Develop an ongoing preventive maintenance program,
9. Consult with bus manufacturers on bus maintenance program and equipment needs,
10. Improve communications between properties,
11. Provide an organization such as APTA to coordinate and distribute present information in technical studies and design manuals, and
12. Encourage more periodic case studies.

Workshop Report

Peter Wood, Chairman
Henry J. Mercik, Recorder

A broad spectrum of topics related to facility and equipment state of the art and function was discussed in Workshop 4. To focus the discussion, examples of facility design and equipment (existing and desired) were highlighted. The broad background of knowledge brought to the group by the participants was impressive and resulted in a reasonably in-depth exploration of the issues and topics. Specific actions were suggested to assist operators in making decisions about establishing new facilities and defining equipment needs. There was a consensus that there are significant differences in the requirements of large and small transit operations. Attention should be focused on the requirements for both large and small operations.

FACILITIES

The general discussion of facilities was initiated by a description of the new St. Louis Maintenance Facility by Paul Hampton. The major functions of the facility were defined, and the rationale and philosophy of operation were presented and discussed.

The needs of the St. Louis transit property and the needs of other properties were considered to be similar. The rationale used in the decisionmaking process was considered sound and similar to rationales used by other properties. However, facility layout and traffic-flow decisions were different in each case. Considerable time was spent discussing the pros and cons of facility layout and equipment. There was general agreement among the properties on the rationale for layout, but it was recognized that other, equally effective designs were possible.

In the area of facility design, the workshop group agreed on the following:

1. An APTA subcommittee should be formed (Cecil Tammen and Paul Hampton volunteered to serve) to compile and disseminate state-of-the-art information related to facility construction and equipment. This subcommittee should participate in the development of the new Bus Maintenance Facility Planning and Design Study (the request for proposals for this study has been issued by UMTA).
2. A design guide that treats the building functions in modular form should be prepared. It should include the rationale and philosophy for facility decisionmaking, including trade-offs. The guidelines should include modules such as brake repair bay, engine change-out bay, paint booth, fuel island, body shop, parking, and upholstery shop.
3. The main problem in this area is the dissemination of the information developed by various transit properties.
4. A series of seminars should be conducted for the purpose of exchanging information on facility design and maintenance. These seminars could be set up by region. The format could be a case study involving the design of a facility, including the