THE CONTRACTOR'S PROBLEMS IN THE DESIGN AND CONSTRUCTION OF URBAN HIGHWAYS

William Gelbach, Glasgow, Inc., Philadelphia

•OUR COMPANY has been involved in constructing major highways in urban areas for many years. We first began during the time when the difference between rural construction and urban construction presented no extraordinary problems. The present problems of urban highway construction have snowballed because of the phenomenal growth in the number of automobiles and their constant use by their owners, to say nothing of the social changes that have occurred. It is my intention not to cover all of the many problems involved but to highlight a few of the more important ones such as labor, costs, phasing of the project, maintenance of traffic, safety, public relations, excavation, theft, and vandalism.

Urban areas are usually centers of strong union activity. Therefore, labor costs are much higher in urban areas than in other areas. Because of high labor costs and the longer period of time to complete urban projects, it has become increasingly difficult to predict the escalation of the various labor rates, fringe benefits, and restrictions on working conditions.

Urban areas normally have a great deal of nonhighway construction such as hospitals, schools, commercial buildings, and industrial plants. The availability of employment on these large building projects puts members of the labor force in the position of being particular in choosing where they wish to work. The result is that the productivity level of the workers seems to be decreasing at approximately the same rate that wages and benefits have been increasing. In rural areas it is often possible to offset these two factors by using larger, and therefore, more productive equipment, but the normal working areas on urban projects preclude the use of this type of equipment.

In the past, even though a highway was being constructed in an urban area, the site was usually not too congested. Therefore, phasing of the project was not of prime importance. Because of the ever-growing congestion of our cities, however, maintenance of traffic and relocation of utilities have led to the use of complex phasing by the contracting agencies. Many projects today are built in as many as 4, 10, or 12 different phases that make it impossible for the contractor to obtain respectable production on any items of the work. In many areas the utility-relocation problems have become so great that the contractor must come to a virtual standstill between various phases of the construction.

The consultant, when setting up the construction phasing of sequence, naturally makes his analysis so as to arrive at a construction sequence that will cause a minimum disruption for the local residential and business community. Although this is a very desirable and in many cases a very necessary concept, the costs involved become exorbitant. Take, for example, a case in which construction can proceed only from 9:00 a.m. to 3:30 p.m. in order to maintain maximum traffic flow during the peak hours. In this case, the contractor is required to pay 8 hours of wages for 6 hours of work.

Maintenance and protection of traffic were never critical nor expensive items of highway construction in the past. However, the car owner today considers his car as an extension of his home, and it seems that, in spite of the hazards and delays due to traffic problems, he still prefers to drive his car to and from work and to travel most of the time alone. On projects where heavy traffic flow must be maintained directly

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adjacent to and parallel with the new construction, the maintenance and protection of traffic become very major problems. Add to this the "curiosity crawl" of drivers in their attempt to watch the new construction work, and the magnitude of this problem becomes obvious.

If a traffic snarl does occur, it is not unusual for the contractor's material trucks to be stopped in this tie-up. If some of these trucks contain ready-mixed concrete, for which travel time is a critical matter, these tie-ups can be extremely costly. Therefore, good traffic maintenance is a must not only for the public but also for the contractor. In the past, a contractor could estimate these costs in his various items and the costs were reasonable. Today, however, on major urban projects it is not unusual to have the costs for maintenance and protection of traffic on multimillion-dollar projects run as much as 20 to 25 percent of the total project.

The Federal Highway Safety Act covering construction has made safety another item of prime importance that will require a more formal approach by the contractor. This is not to say that highway contractors were not safety oriented in the past. I am sure that any reputable contractor will tell you that "safety is our business" not only because of the physical and material discomfort involved but also because of the economics involved. A contractor who continues to have a bad accident record incurs increasingly high insurance premiums to the point that his high costs would reduce his competitive capabilities.

The contractor doing urban construction must attach great importance to public relations, particularly in the early phases of construction. In recent years many projects have received strong opposition from local community groups and, in some cases, from the news media. To offset this opposition and the continuing problems it could cause, the contractor should have either individual or group meetings with the people in the area to explain his activities to them. In some cases the contractor should even take small groups for a tour of the project.

Particular attention should be given to informing the local people of the projects using large quantities of explosives. Excavation and grading in this type of project present a set of problems entirely different from those encountered on rural work. For example, a 90-ft deep cut in solid rock is proposed. In the unpopulated areas this presents no great problem. However, if this same cut is made in an area where the top of the slope comes to within 30 ft of $100,000 to $150,000 homes, the contractor is confronted with an entirely different problem. The use of safety and public relations is the key to this situation. Let us assume, for example, that we are to widen an existing expressway carrying approximately 100,000 cars per day. We must maintain the traffic while we drill, shoot, and excavate a sliver cut approximately 8 ft wide and from 2 to 40 ft high. To further complicate the situation, let us assume that, when the original project was constructed and the rock excavated, cracks and faults occurred within the rock mass during the original blasting. Blasting this type of cut, therefore, is not only a very difficult operation but also a very expensive and time-consuming operation. Again, safety is the key.

Urban highway construction presents a very costly problem when excavated material exceeds the embankment requirements and when waste areas must be obtained. These areas are usually a considerable distance from the project, and the cost of purchasing the waste site is exceedingly high. When the situation is reversed and borrow excavation is required, the contractor is also faced with the high costs.

Hauling excavated material has become increasingly difficult not only because of traffic but also because of the many hauling restrictions placed on contractors by the various motor vehicle codes concerning overweight loads on urban streets and highways. This involves using much longer routes to move the material from one location to another and much smaller and, therefore, less economical hauling units.

Theft and vandalism in the urban areas have become almost intolerable. In the past 1 or 2 years in Philadelphia there have been cases where front end loaders and compressors have been stolen from the projects during the night and during weekends. Acts of vandalism are everyday occurrences and include the putting of sand, sugar, and other materials into the fuel tanks. These actions, to say the least, have a very disruptive and costly effect on these projects. Even the use of police and uniformed guards on constant patrol has not stopped these actions.

These problems are not unique to any one contractor. All contractors doing this type of work are faced with these situations and many more. We are striving daily to arrive at better solutions to these problems. All agencies involved in this type of construction must combine their efforts to find satisfactory solutions to these problems. If we do not, we will price our industry out of business because of the skyrocketing costs involved.

INFORMAL DISCUSSION

Robert G. Bartlett

It is good to know that the contractor is aware of the public relations aspects and implications of his work and assignment. The use of letters to the adjacent property owners, tours of projects to enable people to know the contractor personnel and the work schedule and tours of projects also help make the project's neighbor a watchman for people who may come on the property to perform acts of vandalism or theft. Ads in newspapers, signs, and other materials help to cultivate the goodwill of the local people. Building in an urban area is a challenge. If the highway administrator or the highway designer is not aware of the contractor's problems and he does not prepare for them properly, it is only going to result in an increased cost to the taxpayer with fewer results being achieved per available dollar.

Marshall Suloway

Have you ever thought of not hiring a safety engineer, and of hiring a noise consultant when working in urban areas on projects that involve heavy construction and moving or blasting rocks? Do you know of contractors who have done this?

William Gelbach

It is true that we have a man who handles safety. However, when we have a job in an urban area where there is much rock, we usually hire a technical outfit to take readings of every blast from the houses in the area adjacent to the construction. First, a survey of all the houses in the area is made by our safety man and an engineer from the firm that is going to take the recordings. They go around to all the people in the neighborhood, explain to them what we are going to do and why, and explain what effect it may have on them. However, with regard to noise, ecology, and all the things that are to be faced in the future, we have not had to deal with all these things yet. We have had a problem with noise, particularly on jobs that require 2 work shifts per day. The present earth-moving equipment, such as a TS-24, is louder than a sonic boom, but this is the way the machines are built and we have to use them. I think the manufacturer is looking into the problem, we are looking into it, and we are still involved with the economics of getting the job done as reasonably as we can.

Robert G. Bartlett

It is true that earth-moving equipment or construction equipment is basically a real noise producer. I know that an extensive amount of research is being done to eliminate having the steel-on-steel moving paws and to coat the parts with certain plastics or other noise-suppressor pieces. The turbine engines generate high pitches and whines and lack appropriate means to muffle exhaust noises. The construction agencies will have to specify what equipment they will permit and what decibel range they will consider as a maximum, and they will have to work through the contractors and equipment manufacturers to have the kind of equipment produced that will meet these requirements. It is going to cost money; I think we have mentioned this several times. We can protect and enhance the environment, and we can pay more attention to the design involved. The point remains, however, that it is ultimately going to be the taxpayer who pays the additional tariff.