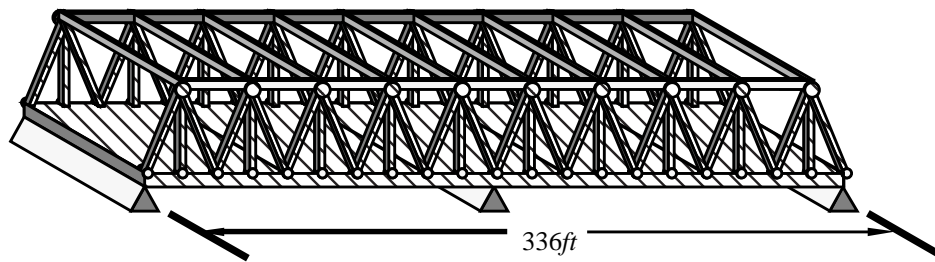


Truss Design Exercise

You are a project manager for Bechtel with responsibility for the design and construction of a bridge to replace a decaying truss structure at the Alewife MBTA station in North Cambridge. Figure 1 shows a sketch of the current structure and Figure 2 a plan view of the site. The bridge, currently four lanes, is a major link in Route 2 which carries traffic in and out of Boston from the west. Because the bridge is in such bad shape, no three-axle trucks are allowed access. Despite its appearance, the bridge is part of a parkway system like Memorial Drive, Storrow Drive, et. al., meant to ring the city of Boston with greenery as well as macadam and concrete. In fact, the MDC, the Metropolitan District Commission, has a strong voice in the reconstruction project and they very much would like to stress the parkway dimension of the project. In this they must work with the DPW, the Department of Public Works. The DPW is the agency that must negotiate with the Federal Government for funds to help carry through the project. Other interested parties in the design are the immediate neighborhoods of Cambridge, Belmont, and Arlington; the environmental groups interested in preserving the neighboring wetlands. (Osprey and heron have been seen nearby.) Commuters, commercial interests – the area has experienced rapid development – are also to be considered.

- 1.1 Make a list of questions of things you might need to know in order to do your job.
- 1.2 Make a list of questions of things you might need to know to enable you to decide between proposing a four-lane bridge or a six-lane bridge.
- 1.3 Estimate the “worst-case” loads a four lane bridge might experience. Include “dead weight loading” as well as “live” loads.
- 1.4 With this loading:
 - a) sketch the shear-force and bending-moment diagram for a single span.
 - b) for a statically determinate truss design of your making, estimate the member loads by sectioning one bay, then another...
 - c) rough out the sizes of the major structural elements of your design.



CONSERVATION COMMISSION FRUSTRATED AT ALEWIFE PLAN

(October 4, 1990, Belmont Citizen-Herald) by Dixie Sipher Yonkers, Citizen-Herald correspondent¹

Opponents of the planned \$60 to \$70 million Alewife Brook Parkway reconstruction can only hope the federal funding falls through or the state Legislature steps in at the eleventh hours with a new plan. Following a presentation by a Metropolitan District Commission planner on the Alewife Development proposal Tuesday night, the Belmont Conservation Commission expressed frustration over an approval process that appears to railroad a project of questionable benefit and uncertain impact, regardless of communities' concerns and requests. The Alewife project would widen Route 2 and redesign the truss bridge, access roads and access ramps on Route 2 near the Belmont-Arlington-Cambridge border. It also would extend Belmont's Brook Parkway significantly. Alewife Basin planner John Krajovick told the commission that MDC has grave concerns about the proposed transportation project and that, funding issues aside, it might be impossible to prevent the Massachusetts Department of Public Works' "preferred alternative" from being implemented. According to Krajovick, the MDC's concerns center around the loss of open space that will accompany the project, specifically the land along the eastern bank of Yates pond, the strip abutting the existing parkway between Concord Avenue and Route 2, the wetlands along the railroad right-of-way near the existing interim access road, and that surrounding the Jerry's pool site. "Our goal is to reclaim parkways to the original concept of them," said Krajovick. "It was Charles Elliot's vision to create a metropolitan park system – a kind of museum of unique open spaces...and use the parkways to connect them as linear parks." "The world has changed. They are no longer for pleasure vehicles only, but parkways, we feel, are a really important way to help to control growth and maintain neighborhood standards," he added. "We would like to see the character of this more similar to Memorial Drive and Storrow Drive as opposed to an expressway like Route 2." Krajovick outlined the MDC's further concerns with the project, citing its likely visual, physical, noise, and environmental impacts on surrounding neighborhoods. Projected to cost \$60-\$70 million, he said, the "preferred alternative" will also hurt a sensitive wetland area, the Alewife Reservation, in return for minimal traffic improvements. In spite of these concerns, Krajovick reported that the project is nearing a stage at which it becomes very difficult to prevent implementation. The Final Environmental impact Statement is expected to be submitted to the Federal Highway Department within a month. The same document will be used as the final report the state's Executive Office of Environmental Affairs. EOEA Secretary John DeVillars cannot stop the project once he receives that report. He can call for mitigating measures only. Krajovick noted a bill currently before the state Legislature's Transportation Committee could prohibit the project from going forward as presently designed. He took no position on that bill. Conservation Commission members, however, voiced doubts on the likelihood a passage in the face of the fiscal crisis and state elections that loom before legislators. In addition, Krajovick said that state budget cuts are expected to result in layoffs for nearly 600 of the MDC's staff of 1,000 workers, effectively decimating the agency. "Our hopes for a compromise solution may not happen," he said. Discouraged by Krajovick's dismal prognosis, Conservation Commission members expressed concern that there was nothing they could do to change the course of the project. The commission has been providing input on the project for 12 years with no results. In response to Krajovick's presentation, Commission member William Pisano called the need for updated impact studies, saying, "We agree with you. What we want to see is a lot more data and a more accurate realization of what we're playing ball with today." Commending the way in which concerned residents of Arlington, Cambridge and Belmont have gotten involved in the project, however, Krajovick said their thinking as a neighborhood rather than individual towns is a positive thing that has come from the project. Building on that team spirit, he said, the communities can raise their voice through formation of a Friends group and work toward the development of a master plan or restoration plan for the whole Alewife reservation area.

1.Reprinted with permission of Harte-Hanks Community Newspapers, Waltham, MA

BRIDGE MEETING HIGHLIGHTS ISSUES

Belmont Citizen-Herald September 26, 1991 by Alin Kocharians, Citizen-Herald staff

Some 50 residents turnout out Tuesday night at Winn Brook School to hear a presentation by the state Metropolitan District Commission on the Alewife Brook Parkway Truss Bridge. MDC representatives previewed their Truss Bridge renovation and Parkway restoration plans. The Parkway segment affected is in Cambridge, between the Concord Avenue rotary and Rindge Avenue. Plans for the two-year project, MDC officials hope, will be completed by early 1992, with construction following in the spring of that year. Julia O'Brien, MDC's director of planning, said that the \$12 million necessary for the project will be provided by the Legislature and federal grants. Once the bridge renovation is completed, the truck ban on it will be lifted, hopefully reducing truck traffic in Belmont. The renovation plans are 75 percent complete, according to John Krajovic, the MDC planner in charge of the project. The MDC is also visiting with Arlington and Cambridge residents, asking for input on the project's non-technical aspects. Residents and MDC representatives exchanged compliments in the first hour, but as the meeting wore on, the topics of cosmetic versus practical and local versus regional issues proved divisive. One Belmont resident summed up what appeared to be a common misgiving in town. "I don't want to cast stones, because it is a nice plan," said John Beaty of Pleasant Street, "but it doesn't solve the overall problem. I wish that I were seeing not just MDC here. There were two competing plans. It is the (State Department of Public Works') charter to solve the overall region's problem. I see those two as being in conflict." Beaty said that the DPW plan was presented two years ago to residents, when officials had said that the plan was 60 percent complete. Stanley Zdonik of Arlington agreed. "I am impressed with the MDC presentation, but what bothers me is, are you going to improve on the traffic flow?" he said. "You have got one bottleneck at one end, and another at the other." He said that the Concord Avenue and Route 2 rotaries at either end of the bridge should have traffic signals added, or be removed altogether. Krajovic replied that according to what the MDC's traffic engineer had told him, "historically, signaling small rotaries actually backs up traffic even more." Belmont Traffic Advisory Committee member Marilyn Adams took issue with the decision not to add signals to the rotaries, and asked to see the study that produced this recommendation. Adams was also concerned with a "spill off" of traffic from the construction. "I can't guarantee people won't seek out other routes," including Belmont, O'Brien said. However, she added, she did not expect the impact to be very great, as the Parkway would still be open during construction. "We will make really a strong effort for a traffic mitigation" plan to be negotiated with the town, she said. Selectman Anne Paulsen also asked about the impact of traffic on the town. MDC representatives said that various traffic surveys were being conducted to find a way to relieve the traffic load on Belmont. Krajovic said that traffic problems in Belmont were regional questions, to be handled by local town officials, a point with which Paulsen disagreed. Paulsen said that she would prefer a more comprehensive plan for the region. Aside from the reconstruction of the Truss Bridge, she said, "I think the point of the people of Belmont is that...we want improvement in the roadway, so that we are relieved of some of the traffic." According to the plans, the new bridge will have four 11-foot lanes, one foot wider than the current width for each lane. There will also be a broader sidewalk, and many new trees planted both along the road and at the rotaries. There will be pedestrian passes over the road, and a median strip with greenery. The bridge will be made flat, so that motorists will have better visibility, engineering consultant Ray Oro said. It will be constructed in portions, so that two lanes will always be able to carry traffic, he said. According to Blair Hines of the landscaping firm of Halvorson Company, Inc., by the end of the project, "Alewife Brook Parkways will end up looking like Memorial Drive." All the talk about landscaping, Paulsen suggested with irony, "certainly calms the crowd."