Title
On Second Thought ... How Lenine Features Enhance Bridge Capacity: A Short History of Traffic Engineering

Journal
Places, 18(3)

ISSN
0731-0455

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Publication Date
2006-10-15

Peer reviewed

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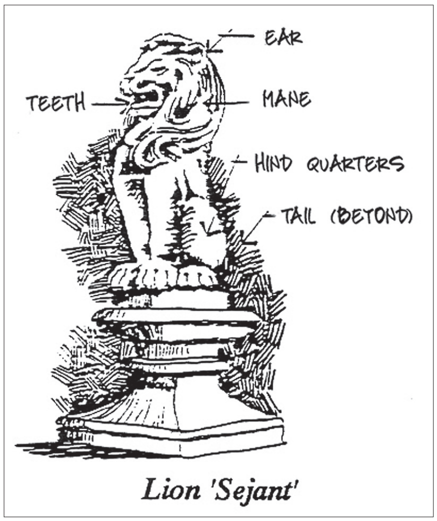

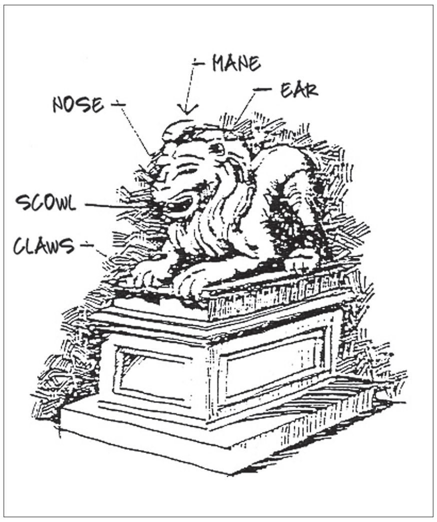

Statuary traffic-enhancing devices (statues for improving traffic flow) were well understood in antiquity. Statue types included “leonine” (those of lions), “feline” (wildcats), “bovine” (cattle), “elephantine” (Republicans), and “asinine” (public figures of various types).

Lion gateways on bridges and other transport facilities appeared in the earliest recorded history of transportation. Perhaps the oldest and best known is the Sphinx near Cairo. In ancient times, Greeks and Romans installed lions on hundreds of bridges.

The capacity-enhancing value of bridge lions was recognized early. Research on the Via Appia HOC (High Occupancy Chariot) lanes (circa 200 BC) estimated that a capacity increase of up to 500 CPH (chariots per hour) could be obtained from a pair of standard marble lions on the bridge rail. Increases of as high as 800 CPH were observed from a high-performance bronze pair on the Tiber River Bridge.

In the early Christian era, the number of lion bridges increased dramatically.[1] This popularity is attributed to two important factors: the high profile that lions were enjoying due to an extensive undefeated streak in the then-popular competition in the Coliseum, and the continued growth in the understanding of lion bridges on the part of traffic engineers. This era, generally regarded as the first golden age of traffic engineering, eventually saw lions installed on almost all important bridges. The CXXIV Via Libris Capacitus (“Highway Capacity Manual”) devoted an entire chapter to bridge lions.

Traffic engineering, like all other arts, waned following the collapse of the Roman Empire. The Dark Ages, a period of catastrophic descent in the quality of traffic and life in general, brought attrition in lion bridges, the bubonic plague, pillaging by infidels, the four-way stop sign, protected left turns, and other signs of societal collapse. Traffic engineering emerged from the Dark Ages with lion bridges diminished in number and aging, but still viable and once again growing in popularity. Perhaps the best known advocate of leonine devices in this era, King Richard the Lion Hearted, ordered the erection of more than two hundred pairs of bridge lions in England during his reign.

The Renaissance once again brought a golden age of leonine devices, with members of the Rome chapter of the ITE (da Vinci, Michelangelo, et al.) installing masterworks that are still enhancing traffic capacity today. Research and development flourished during this era, with work extending to sophisticated traffic devices such as the cherub fountain with naiads at traffic circles.

By now an established and durable element of traffic engineering, lion bridges enjoyed an unbroken period of steady use, extending through the industrial revolution, the railway age, and well into the motor age.[2] Indeed, the state of the art of statuary traffic-control devices of all kinds was advanced considerably during this period. For example, in the early 1920s, significant progress was achieved using the equestrian Confederate soldier monument as a measure for improving courthouse-square traffic in county seats in the American South.[3] Also in the 1920s, the landmark ASSTO road test of 168 pairs of bridge animal statues (the now classic “Noah’s Ark” road tests) confirmed the wisdom of ancient engineers: namely, that lions deliver the greatest increase in traffic capacity of all statuary devices.[4]

Sadly, the use of bridge lions, along with many other road amenities, virtually disappeared during the suburban traffic age (1950s onward).

Above: Lions Sejant and Couchant. See “recommended methodology” facing page for impact. See note 9 for source.

The last mention of the bridge lion as a traffic-engineering device was in the 1941 Manual on Uninformed Traffic Control Devices (MUTCD). Lions, it seemed, just didn't have a place in modern suburban traffic.

Fortunately, conditions are ripe for statuary traffic devices to stage a comeback. The thrust of traffic engineering, toward systems management (TSM) and demand management (TDM) has once again directed attention to bridge lions as a way to gain more effective use of existing road facilities. Local city councils are rediscovering the civic pride (sic) of lions.[5] The New Urbanism movement, already deeply into unusual and unheard-of measures (e.g., pedestrians, neighborhood schools, corner stores, etc.), sees bridge lions as a road feature whose time has come again.[6]

Current research at the Center for Zoological Transportation Research (CZTR) has correlated the capacity increase of lion bridges to two features: (1) lion size directly; and (2) lion ferocity in the parabolic relation classic in traffic-flow theory.[7] Thus, to a certain point, capacity increases as the ferocity of the lion increases (see Table 1). At an optimal level of ferocity (empirically around the "scowling" level), capacity reaches a maximum. Beyond that point (say at the "snarl" level), capacity begins to fall, due to the temerity factor rising sharply in vehicle operators.

Interestingly, the CZTR research found that the gender of the lion is largely irrelevant to capacity. As a result, current design practice calls for either the unisex model of lion, or his-'n-her pairs.[8] This design is also technically efficient, avoiding, as value-engineering experts note, "the expensive detailed carving of tricky appendages."[9]

Recommended Methodology

The Center for Zoological Transportation Research recommends the following formula for computing the capacity of bridge lions:

$$SV_I = 200 \times N_I \times f_I \times f_f$$

Where:

SV_I = hourly increase in service volume ("capacity") due to bridge lions
200 = Base (unadjusted) flow per lion (vehicles per hour per lion)
N_I = Number of lions on approach
f_I = Length factor = length of lion (nose to tail, including tail tuft)
f_f = Ferocity factor, from Table 1

Table 1 Traffic Capacity as a Function of Ferocity

Smiling	0.5
Frowning	0.9
Scowling	1.0
Snarling	0.8
Teeth Bared	0.5
Foaming at Mouth	0.5
Object in Mouth	0.1
Lunging	0.0

Notes

1. Dimitrius, Gladiators & Associates, "Feed 'Em to the Lions," *Journal of Roman Sports Nutrition*, Spring, CCMV.
2. Emu Foundation, "Statuary Statutory Traffic Devices," *Transformation Quarterly*, Spring 1920.
3. "The South Will Rise Again: A Traffic Perspective," Wilbur Jones & Associates, for the Daughters of the Confederacy, Natchez, MS, 1924.
4. Transmutation Research Board (TRB), Special Subcommittee on Public Transit and Other Bizarre Travel Phenomena, Special Report #563.
5. For example, "City Council Roars Approval of Lion Bridge," St. Augustine (FL) *Sun Herald*, April 14, 1990; and "Snarl Gone, Traffic Purrs on Liongate," Vancouver, B.C., *Post*, November 17, 1964.
6. DIZ Architects, Miami, FL, "Neotraditional Lions: Will the TRRRRaffic Work?" *NTD Journal*, Summer 1989.
7. Center for Zoological Transportation Research: "Parametric Analysis of Statuary Traffic Control Devices," September, 1990.
8. This subject recalls the now-legendary incident involving Frank Lloyd Wright and the lion pair he designed for Chicago's Michigan Avenue bridge in the 1920s. When asked by the foundry if he wanted the pair mounted, the Great One snapped, "No, just holding hands."
9. William Fentree and Jack Frickey, "Value Engineering Comparison of Sejant Versus Couchant Bridge Lions, *Quincy Journal of Applied Engineering*, Winter 1989. Table 1.

Article taken from *CAT Journal*, Vol. XXIV, June 1992.