SERVICE STANDARDS

SECTION 7: TRANSIT AMENITIES

The following general guidelines are intended to facilitate the proper placement of DART bus stops and set the standards for bench and shelter placement. Because the topic of bus stops involves a detailed discussion of sign design, placement, and safety, it is DART policy to pattern its bus stop policy after the well established and proven "Proper Location of Bus Stops: A Recommended Practice" guidelines of the Institute of Traffic Engineers (ITE), as approved by the ITE Board of Directors. This document is presented in Appendix C. It is recommended that all DART staff with bus stop responsibilities become familiar with the ITE document.

The following summary may be especially useful when a bus stop location decision must be made by staff in the field and there is insufficient time to review the entire appendix. In general, stops should be located in the vicinity of demonstrated or potential ridership generators where this can be accomplished safely. Safety issues take precedence over issues of convenience.

7.1 BUS STOP PLACEMENT

7.1.1 Signalized Intersections

Current practice at intersections with traffic signals is to locate bus stops near-side. This allows the bus to use the red light stop time for passenger boarding and alighting and to avoid making a second stop after the intersection. One exception to this practice is where exclusive right turn lanes prevent the location of a near-side stop close to the intersection. In such a case the preference is for either a far-side stop after the intersection, a mid-block stop, or a near side stop prior to the right turn lane. Generally, the far-side stop is more convenient for transfer passengers where applicable.

7.1.2 Unsignalized Intersections

At unsignalized intersections, far-side stops are preferred for safety reasons. Far-side stops should be located no closer than approximately 80 feet to the intersection to allow for adequate space to prevent automobiles from backing into the intersection.

If far-side stops are not possible, bus stops should be located mid-block or near-side. In placing these signs, special care should be taken to locate the stops far enough back from the cross street to preserve cross and parallel traffic sight distances and allow traffic traveling parallel to the bus route an unobstructed view of the intersection and traffic control signs, if present.

7.1.3 Left-Turning Buses

At locations where buses make a left turn at an intersection, bus stops are generally located either (1) mid-block or sufficiently near-side to allow the bus to access the left turn lane, or (2) sufficiently far-side after the turn to allow the bus to pull straight along the curb after the turn. The choice is usually dependent on opportunity to consolidate stops for multiple routes, thereby assisting transfer passengers and minimizing costs.

7.1.4 Right-Turning Buses

At locations where buses are make a right turn, a stop can be made either near-side or far-side depending on the opportunities for other routes to share the stop, enhancing transfer convenience. As noted above, near-side stops are preferred at signalized intersections. Near-side stops should be located at distances no closer than 20 feet from the intersection to allow for "squared off" bus burns. Far-side stop locations should provide enough distance for the bus to pull straight to the curb following the turn.

7.1.5 Passenger Boarding and Alighting

It is DART Policy to place bus stops along raised curb areas with sidewalks when possible and provided other criteria are met. This provides passengers with safe and convenient boarding and alighting. Stop placement should avoid vehicle doors opening in close proximity to catch basins, newspaper stands, and other such pedestrian hazards.

7.1.6 "Good Neighbor" Policy

It is DART Policy to place bus stops in locations that minimize conflict with adjacent residences and businesses. Whenever possible, and within the above criteria, stops should be located in unused areas along property lines, as opposed to near building doors and windows. These stops should also avoid blocking private signs. A location which places a barrier such as a fence between the stop and adjacent buildings, especially residences, is preferred, assuming passenger access is reasonable. In addition, stop locations should avoid interference with driveways.

7.1.7 Temporary Stops and Flag Stops

In locations where bus stops are likely to remain for less than six months, consideration may be given to the placement of temporary stops. When considering a location for a temporary stop, a number of factors should be considered, including all criteria for temporary stops at a given location. Among these is the likelihood that a temporary sign will be vandalized, stolen, or relocated improperly during the installation period.

Flag stops should be considered under the following conditions:

- Where low densities make placement of permanent bus stops inefficient or undesirable for passengers; or,
- Where street or sidewalk construction prevents the location of temporary or permanent stop signs until completion of construction.

7.2 BUS BENCHES

Where sidewalk width and available resources permit, bus benches are desirable at the busiest locations, especially where service headways exceed a few minutes. It is DART policy to place bus benches only at locations which have 25 or more boardings per day subject to the following guidelines:

1. The bus bench must be able to be safely located;

2. The bus bench must not be located where an existing shelter or bench is located, unless additional seating capacity is required; and

3. Locations adjacent to sensitive uses will receive consideration for a bus bench despite lower than normal boarding counts. Sensitive uses are the following:

    - Schools;
    - Hospitals;
    - Senior Citizen Activity Centers;
    - Rehabilitation Centers;
    - Social Service Agencies; and
    - Medical Facilities.

Finally, existing bench locations with a defective or vandalized bench will receive priority for a replacement bus bench provided the above criteria are met.

SERVICE STANDARDS APPENDIX E

Selected Bibliography

Selected Bibliography

Tri-County Metropolitan Transportation District of Oregon. "Planning with Transit." May 1979.

DART Service Planning. "Bus/Rail Interface Plan for Light Rail Starter System." Report No. 1, Dallas Area Rapid Transit Publication, August 1994.

DART System Planning. "Transit System Plan." *New Directions*, Dallas Area Rapid Transit Publication, July 1989.

Meyer, John R. and Jose A. Gomez-Ibanez. "Autos, Transit and Cities." Selected Readings. Harvard University Press, Cambridge, Massachusetts, 1981.

Gray, George E. and Lester A. Hoel, Editors. "Public Transportation: Planning, Operations, and Management." Selected Readings. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1979.

Metropolitan Transit Authority of Harris County, Texas. "The Transit Services Program." Selected Readings. Houston METRO, 1994.

Homburger, Wolfgang S., Louis E. Keefer, and William R. McGrath, Editors. "Transportation and Traffic Engineering Handbook." Institute of Transportation Engineers. Second Edition. Selected Readings. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1982.

Meyer, J.R., J.F. Kain, and M. Wohl. "The Urban Transportation Problem." Selected Readings. Harvard University Press, Cambridge, Massachusetts, 1974.

Transportation Research Board. "Urban Public Transportation Glossary." National Research Council, Washington, DC., 1986.

Dallas Area Rapid Transit
P.O. Box 660163
Dallas, Texas 75266-0163
214/749-3278

E.P.ATC.10.4.5

May 21, 1997

John Baumgartner
Town of Addison
16801 Westgrove Drive
P.O. Box 144
Addison, Texas 75001-0144

Dear John:

At the request of Mr. Ron Whitehead we are proceeding with an alternate bid for the paving of the sidewalk on the north side of the Transit Center site. The alternate will provide the same brick pavers the Town of Addison used on Quorum Drive.

To insure the use of same brick material, please send a copy of the brick specifications and color used on Quorum Drive to Van Stevens as soon as possible. Van's address is: Wendy Lopez and Associates, Inc., 1825 Market Center Boulevard, Suite 510, Dallas, Texas 75207, or you may fax the information to (214) 741-9413. Your assistance will be appreciated.

Sincerely,

A. Rene Rodriguez, AIA
Project Manager
Project Engineering

749-2910

ARR/tse

c: Tom Larkin
Rick Brown
Connie Santa Cruz
Ron Whitehead - TOA
Van Stevens - WLA

DART
Dallas Area Rapid Transit
P.O. Box 660163
Dallas, Texas 75266-0163
214/749-3278

May 16, 1997

Dave Nighswonger, P.E.
Department of Public Works
Town of Addison
P. O. Box 144
Addison, TX 75001

Dear Dave:

Attached is the latest quarterly report for the Town of Addison LAP program, including Technical Assistance. A status of LAP/CMS is also included. Sorry for the delay in getting the quarterly report to your office but I wanted to include a copy of the latest TAP report, which shows that a $44,531.64 of allocated money has not yet been approved for programming by the DART Board.

If I can be of further assistance, please call me at 214/749-2913.

Sincerely,

Tom K. Ryden, P.E.
Sr. Manager Project Development

TKR:jr

Attachments

TAP FUND PAYMENT SUMMARY

TOWN OF ADDISON - March 31, 1997

Date	Action	Resolution	FY89-96 Allocation	Interest	Allocation + Interest	Programmed	Unprogrammed	Funds Paid
06/27/89	DART initates LAP program	890080						
11/17/89	Letter and LAP application to DART for 89/90 Programming along with request for transfer from CAP $24,572 to TAP.							
12/05/89	FY89 - Approved by P&D Committee; check request processed and mailed.		5,832.00		5,832.00	5,832.00	0.00	
12/05/89	FY90 - Approved by P&D Committee; check request processed and mailed.		26,563.00		26,563.00	26,563.00	0.00	32,395.00
12/19/89	P&D Comm. approved $24,472 transfer from CAP to TAP							
10/17/90	FY91 - Program approved; check request processed and mailed.	900195	26,020.00	647.47	26,667.47	26,667.47	0.00	26,667.47
11/27/90	FY 89/90 - additional documentation to support request of November17, 1989.							
12/19/90	Letter to Addison along with a check for $4,672.93 from CAP budget to complete funding of approved FY91 TAP project. (Copy of check request & letter in file; no check.)							
10/16/91	FY92 - Program approved; check request processed and mailed.	910200	23,964.00		23,964.00	23,964.00	0.00	23,964.00
10/15/92	FY93 - Check request processed and mailed.		26,796.00		26,796.00		26,796.00	26,796.00
06/22/93	FY 93 - LAP application submitted for programming of $9,750 and approved by the Board.	930133				9,750.00	(9,750.00)	
11/08/93	FY94 - Check request processed and mailed.		27,485.64		27,485.64		27,485.64	27,485.64
11/16/94	DART sends letter of notification to Addison for FY95 funds alongs with request for FY95 work program and FY94 year end report.							
03/14/95	FY95 - Program approved; check request processed and mailed.	950064	27,675.00	567.15	28,242.15	28,242.15	0.00	28,242.15
07/16/96	FY 96 - Program approved by the Board.	960130	19,956.85	854.23	20,811.08		0.00	0.00
08/02/96	FY 96 - Check requested processed and mailed					20,811.08		20,811.08
	TOTALS		**184,292.49**	**2,068.85**	**186,361.34**	**141,829.70**	**44,531.64**	**186,361.34**

ADDISON CAPITAL ASSISTANCE PROGRAM

PROJECT #	PROJECT NAME	OATE APPROVED	APPROVED AMOUNT	AMOUNT TO BE REPROGRAMMED	EXPENDITURES DURING FY89-90	EXPENDITURES DURING FY91-92	EXPENDITURES DURING FY93-94	EXPENDITURES DURING FY95	EXPENDITURES DURING FY96	EXPENDITURES DURING FY97	TOTAL AMOUNT PAID PER PROJECT	PROGRAMMED FUNDS NOT YET PAID
	Addison Road/Excel Way (Intersection Improvements) per Resolution 960194	10/22/96	$346,000.00									$346,000.00
	TRANSFER TO TAP ACCOUNT FOR PAVEMENT MGMT. & THOROUGH-FARE PLAN		$18,712.40		$24,572.00							
	STAFF SALARIES	12/19/89	$5,859.60									
*	Project Completed										$24,572.00	$0.00
	SUBTOTAL THIS PROJECT		**$24,572.00**									
	TRANSFER TO TAP ACCOUNT TO HELP FUND SALARY FOR CITY ENGINEER	10/23/90	$4,672.93			$4,672.93					$4,672.93	$0.00
*	Project Completed											
	SUBTOTAL THIS PROJECT		**$4,672.93**									
	Belt Line - Quorum/Midway Intersections											
	PASS PROJECT	10/23/90										
	Belt Line/Quorum	10/23/90	$187,000.00									$187,000.00
	Belt Line/Midway	10/23/90	$78,606.00								$0.00	$78,606.00
	Right-of-Way Acquisition	04/11/95	$508,000.00								$0.00	$508,000.00
	SUBTOTAL THIS PROJECT		**$773,606.00**									
	BELT LINE/ADDISON RD INTERSECT	10/23/90	$132,960.00									
	ADDITIONAL FUNDS	11/26/91	$63,040.00									
	Payment	03/17/93					$12,605.00					
	Payment	11/01/93					$151,277.36					
	Payment	04/11/95						$170.00				
*	Project Completed Under Budget and funds transferred to the Keller Springs/N. Dallas Tollway Project	04/11/95	($31,947.64)								$164,052.36	$0.00
	SUBTOTAL THIS PROJECT		**$164,052.36**									
	MONTFORT/BELT LINE INTERSECT	10/23/90	$125,000.00									
	Payment	03/17/93					$19,926.00					
	Payment	02/10/94					$56,064.42					
	Payment	10/04/94					$8,128.66					
	Payment	04/11/95						$3,622.75				
*	Project Completed Under Budget and funds transferred to the Keller Springs/N. Dallas Tollway Project	04/11/95	($37,258.17)								$87,741.83	$0.00
	SUBTOTAL THIS PROJECT		**$87,741.83**									
	TRAFFIC SIGNAL IMPROVEMENTS	10/23/90	$20,400.00									
	Payment	10/04/94					$20,400.00				$20,400.00	$0.00
*	Project Completed 10/4/94											
	SUBTOTAL THIS PROJECT		**$20,400.00**									
	SIDEWALK/BUS BENCH PADS	11/26/91	$41,000.00				$34,404.00					
*	Project Completed Under Budget	04/11/95	($3,211.70)	$3,211.70			$3,384.30				$37,788.30	$0.00
	SUBTOTAL THIS PROJECT		**$37,788.30**									
	ADDISON/WESTGROVE INTERSECT.	11/26/91	$125,000.00									
	Payment	03/17/93					$8,500.00					
	Payment	04/11/95						$86,955.18				
	Payment	03/14/96							$14,163.23			
*	Payment and project completed. Reprogram balance per 9/27/96 letter	10/22/96	($13,407.64)	$13,407.64					$1,973.95		$111,592.36	$0.00
	SUBTOTAL THIS PROJECT		**$111,592.36**									
	MIDWAY/LINDBERG INTERSECT.	11/26/91	$150,000.00									
	Payment	03/17/93					$10,830.00				$10,830.00	$139,170.00
	SUBTOTAL THIS PROJECT		**$150,000.00**									
	MIDWAY/BELTWAY INTERSECT.	11/26/91	$45,000.00									
	Payment	03/17/93					$2,925.00				$2,925.00	$42,075.00
	SUBTOTAL THIS PROJECT		**$45,000.00**									

ADDISON CAPITAL ASSISTANCE PROGRAM

PROJECT #	PROJECT NAME	DATE APPROVED	APPROVED AMOUNT	AMOUNT TO BE REPROGRAMMED	EXPENDITURES DURING FY89-90	EXPENDITURES DURING FY91-92	EXPENDITURES DURING FY93-94	EXPENDITURES DURING FY95	EXPENDITURES DURING FY96	EXPENDITURES DURING FY97	TOTAL AMOUNT PAID PER PROJECT	PROGRAMMED FUNDS NOT YET PAID
	MIDWAY/GREENHILL INTERSECT.	11/26/91	$75,000.00									
	Payment	03/17/93					$4,280.00				$4,280.00	$70,720.00
	SUBTOTAL THIS PROJECT		$75,000.00									
	BELTLINE/MARSH LN. INTERSEC.	11/26/91	$550,000.00									
	Additional Funds	06/14/94	$250,000.00									
	Payment	03/17/93					$19,590.00					
	Payment	10/04/94					$635,526.80					
	Payment	04/11/95						$5,525.00				
	Payment	03/14/96							$86,845.27			
	Payment and project completed. Reprogram remaining balance per											
*	9/27/96 letter	10/22/96	($41,359.86)	$41,359.86					$11,153.07		$758,640.14	$0.00
	SUBTOTAL THIS PROJECT		$758,640.14									
*	TRANSFER TO TAP FOR CITY ENGINEER/PLANNER POSITION	11/26/91	$8,701.00									
		09/30/94					$8,701.00				$8,701.00	$0.00
	SUBTOTAL THIS PROJECT		$8,701.00									
*	THOROUGHFARE PLAN	2/25/92	$37,500.00									
	Payment	03/17/93					$33,750.00				$37,500.00	$0.00
	Payment	11/01/93					$3,750.00					
	SUBTOTAL THIS PROJECT		$37,500.00									
	BELT LINE/DALLAS NORTH TOLLWAY INTERSECTION	06/22/93	$262,000.00									
	Payment	11/01/93					$13,770.00					
	Payment	02/10/94					$3,870.00					
	Payment	04/11/95						$120.00				
	Payment	03/14/96							$238,217.72			
	Payment and Project Completed per											
	9/27/96 letter	10/22/96							$6,022.28		$262,000.00	$0.00
	SUBTOTAL THIS PROJECT		$262,000.00									
	KELLER SPRINGS/DALLAS NORTH TOLLWAY											
	INTERSECTION	6/22/93	$226,150.00									
	Payment	04/11/95						$35,825.00				
	Addtional funds transferred from Belt Line/Montfort and Belt Line/											
	Addison Rd. Projects	04/11/95	$69,205.47									
	Payment	03/14/96							$232,043.44			
*	Payment and Project Completed	10/22/96							$27,487.03		$295,355.47	$0.00
	SUBTOTAL THIS PROJECT		$295,355.47									
*	EXT ARAPAHO FROM NO DALLAS TOLLWAY TO MARSH LANE PHASE I	10/26/93	$255,000.00									
	Payment	02/10/94					$255,000.00				$255,000.00	$0.00
	SUBTOTAL THIS PROJECT		$255,000.00									
	WESTGROVE/SOJOURN INTER. IMPV.	02/15/94	$175,000.00									
	Payment	09/30/94					$15,570.00					
	Payment	04/11/95						$93,958.00				
	Payment	03/14/96							$16,492.77			
	Payment and project completed.											
*	Reprogram balance per 9/27/96 letter.	10/22/96	($45,856.01)	$45,856.01					$3,123.22		$129,143.99	$0.00
	SUBTOTAL THIS PROJECT		$129,143.99									
	ARAPARO REALIGNMENT/EXTENSION	02/15/94	$803,000.00									
	Additional Funds	09/13/94	$1,200,000.00									
	Additional Funds	10/01/94	$900,000.00									
	Payment	04/11/95						$184,715.00				
	Payment	03/14/96							$9,500.00			
	Additional Funds	10/01/95	$620,559.00									
	Payment	05/20/96							$553,492.70		$747,707.70	$2,775,851.30
	SUBTOTAL THIS PROJECT		$3,523,559.00									
*	BELT LINE RD. / BUSINESS DR.	02/15/94	$200,000.00									

ADDISON CAPITAL ASSISTANCE PROGRAM

PROJECT #	PROJECT NAME	DATE APPROVED	APPROVED AMOUNT	AMOUNT TO BE REPROGRAMMED	EXPENDITURES DURING FY89-90	EXPENDITURES DURING FY91-92	EXPENDITURES DURING FY93-94	EXPENDITURES DURING FY95	EXPENDITURES DURING FY96	EXPENDITURES DURING FY97	TOTAL AMOUNT PAID PER PROJECT	PROGRAMMED FUNDS NOT YET PAID
	Additional Funds	06/14/94	$50,000.00									
	Payment	10/04/94					$225,000.00					
	Payment (and Project Complete)	04/12/95						$25,000.00			$250,000.00	$0.00
	SUBTOTAL THIS PROJECT		**$250,000.00**									
	TOTAL		**$7,360,325.38**	$103,835.21	$24,572.00	$4,672.93	$1,547,252.54	$435,890.93	$1,200,514.68	$0.00	$3,212,903.08	$4,147,422.30
	TOTAL DISBURSEMENTS ALL YEARS					$3,212,903.08						

* Project(s) Completed/Closed

SUMMARY STATUS REPORT: 3/31/97
(CAP ASSISTANCE FUNDS - ONLY)

FUNDS PROGRAMMED	***$7,360,325.38***
Funds Allocated thru FY 96	**$6,163,569.94**
(plus) Interest Earned on Unpaid Balance to date	**$1,435,881.79**
Total Funds Available	**$7,599,451.73**
(less) Total Paid to Date	**$3,212,903.08**
Account Balance	**$4,386,548.65**
(less) Programmed Funds Not Yet Pai	**$4,147,422.30**
Unprogrammed Balance (currently available)	***$239,126.35***

ADDISON LOCAL ASSISTANCE PROGRAM/CONGESTION MANAGEMENT SYSTEM (LAP/CMS)

PROJECT #	PROJECT NAME	DATE APPROVED	FUNDS PROGRAMMED	UNPROGRAMMED BALANCE BY PROJECT	EXPENDITURES DURING FY 97	EXPENDITURES DURING FY 98	EXPENDITURES DURING FY 99	EXPENDITURES DURING FY 2000	TOTAL PAID TO DATE	PROGRAMMED FUNDS NOT YET PAID
3	Midway Road & Dooley Intersection Improvements per Resolution #970046	03/25/97	$135,000.00							
	Payment	04/23/97			$135,000.00				$135,000.00	
	SUBTOTAL THIS PROJECT		***$135,000.00***							$0.00
2	Railroad Crossing Replacement on Surveyor Rd.	10/23/96	$100,000.00		$100,000.00				$100,000.00	$0.00
1	Technical Assistance Program	10/23/96	$34,000.00		$34,000.00				$34,000.00	$0.00
	TOTAL		$269,000.00	$0.00	$269,000.00				$269,000.00	$0.00

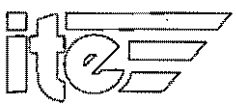
SUMMARY STATUS REPORT: 3/31/97

FUNDS PROGRAMMED	$269,000.00
Funds Allocated for FY 97	$1,135,592.00
(less) Total Paid to Date	$269,000.00
Account Balance	$866,592.00
(less) Programmed Funds Not Yet Paid	$0.00
Unprogrammed Balance (currently available)	$866,592.00

BUS STOPS

Proper Location of Bus Stops

A Recommended Practice



Institute of Transportation Engineers
525 School St., S.W., Suite 410
Washington, D.C. 20024-2729 USA

A Recommended Practice

Proper Location of Bus Stops

This is a Recommended Practice of the Institute of Transportation Engineers, as approved by the ITE Board of Direction on August 4, 1967. It supersedes the 1964 ITE Recommended Practice on bus stop location and also the Tentative Recommended Practice published in the December 1965 issue of Traffic Engineering.

In accordance with Institute procedures, equipment standards are reviewed at least once every five years. In 1984, this standard was reviewed by several ITE technical committees and by the ITE Technical Council. The resulting recommendation to extend the standard for another five-year period was published for comment in April 1985 and confirmed by the ITE Standards Approval Board in December 1985.

Careful analysis will show that the proper location for a bus stop will vary with circumstances and that need can be shown for near-side, far-side, and mid-block locations. The location of bus stops should be standardized within the general community so as to avoid undue confusion. However, standardization should not be a substitute for sound judgment whenever conditions render the standard practice inappropriate.

The motor bus is a large and at times awkward vehicle, but the fact that it can carry more people per foot of road space than other vehicles warrants particular consideration in the allocation of street area. It is important that the presence of buses does not reduce the capacity of the roadway so as to result in a net loss in its passenger-carrying ability. Therefore, it is imperative that bus stop areas be of adequate length and so located that the net adverse effect of the bus stop on the traffic stream (including pedestrians) is kept to a minimum. When bus stops of adequate length are provided and parking restrictions are enforced, proper usage of the stop on the part of bus operators can be expected.

GENERAL CONSIDERATIONS

Safety

1. Consideration must be given to the effect that the stopped bus will have on sight distance for pedestrians using the parallel and transverse crosswalks at the intersection.
2. The bus stop must be located so that passengers may alight and board with reasonable safety.
3. Consideration must be given to the effect that the stopped bus will have on sight distance for parallel traffic and cross traffic. For instance, at a near-side stop, vehicular right turns are facilitated and sight distance is improved when the bus stop is set back from the crosswalk.
4. The conflicts in the traffic stream caused by a bus, as it enters or leaves a stop, must be considered.

Traffic Flow

1. The position of a bus entering, leaving, or stopped at the bus stop will affect other moving traffic and must be considered, particularly where turns are involved.
2. The bus stop must be of sufficient length that a stopped bus does not interfere with moving traffic and a departing bus does not swing beyond the lane adjacent to the bus stop.

GENERAL CHARACTERISTICS

In determining the proper location of bus stops, the choice lies between near-side, far-side, and mid-block stops. A decision as to the type of bus stop to be used should be based on engineering judgment of specific factors for each type of bus stop. The several types of bus stops have the following general characteristics.

Near-Side Bus Stops

1. A minimum of interference is caused at locations where traffic is heavier on the leaving side than on the approach side of the intersection.
2. Less interference will usually be caused at locations where the crossing street is a one-way street with its direction from right to left.
3. Passengers generally alight close to a crosswalk.
4. There is less interference with traffic turning into the bus route street from a side street.
5. The sidewalk is more often cleared of snow closer to an intersection.
6. Heavy vehicular right turns can cause conflicts, especially where a vehicle makes a right turn from the left of a stopped bus.
7. Buses often obscure stop signs, traffic signals, or other control devices, as well as pedestrians crossing in front of the bus.
8. A bus standing at a near-side stop obscures sight distance of a driver entering the bus street from the right.
9. Where the bus stop is too short for occasional heavy demand the overflow will obstruct the traffic lane.

Adjacent Establishments

When dealing with major passenger generators it will be an advantage to locate the bus stop so that the crosswalk movements are minimized. However, an engineering investigation is necessary to determine if the importance of crosswalk movement involved is sufficient to supersede the other considerations for bus stop locations.

In general, it is desirable to avoid "boxing in" a commercial establishment at a corner by having bus zones on both sides of it. However, if there is one predominant transfer movement at an intersection, it is desirable to locate the bus stops so that passenger walking will be minimized. This transfer movement should be of sufficient volume to supersede other considerations.

Physical Features Affecting Passengers

For the convenience and protection of bus passengers, consideration should be given to the proximity of shelter and to adequate lighting. The existence of traffic control features that provide for passenger safety when boarding and alighting should be considered. Along avenues with planted or grass parkway strips, it may be desirable to add a sidewalk slab between the existing sidewalk and the curb where otherwise a bus passenger would have to cross wet grass or mud during inclement weather. This added sidewalk slab has the further advantage of having the bus passenger stand where it is desired to have the bus stop. Shelter and lighting can be modified to accommodate a stop location determined by other considerations.

It is desirable to avoid placing bus zones at locations where there are a series of raised and lowered curbs, since passengers may mis-step and injure themselves when alighting from the bus at a lowered or sloping curb.

Pavement Width

Where the pavement is substantially wider on one side of the intersection than on the other, the bus stop may be best located on the side with the wider pavement if traffic volumes are comparable.

Frequency of Stops

Generally, each stop adds to the inconvenience of the majority of passengers, decreases the average speed of operation, and promotes congestion. Superfluous locations should be avoided.

In practice, spacing may range from one stop per block where city blocks are 500 or more feet in length, to stops in alternate blocks where city blocks are shorter. The location of important buildings and traffic generators, and the configuration of side streets leading into the bus route, should be considered in spacing the stops.

Whenever consistent with safety and adequate sight distance, passenger service stops can be combined with mandatory stops required for stop signs, traffic signals, railroad crossings, and the like. The number of stops along a given bus route will be decreased and scheduled speed will be increased.

Parking Practices

The best-engineered bus stop is of little value if the attendant parking prohibition is not strictly enforced. If the bus must "double park" because its designated curb space is occupied by parked or stopped vehicles, other traffic may be blocked or its flow made hazardous. Devices and markings that give the bus stop prominence such as curb painting, tow-away zones, and transit emblems may deter motorists from parking in the stop, and aid enforcement.

The sign regulating parking should conform to the *Manual on Uniform Traffic Control Devices.*

Snow Removal

Heavy snow should be removed from the full length of every bus stop so that the bus can pull in parallel and immediately adjacent to the curb. If heavy snow is not removed, the bus may be forced to stop in a position that interferes with traffic movement.

MINIMUM LENGTHS

The following recommended minimum lengths assume 40-foot buses and high-frequency service. For longer or shorter buses, lengths should be adjusted accordingly. In Figures 1-3 the length of 40 feet beyond the bus stopping point is in excess of the minimum required by bus turning radii, but provides for better maneuvering and smoother reentry into the traffic stream when leaving the stop. The 40-foot distance could be reduced if absolutely necessary.

In the case of infrequent service, sound engineering judgment may call for a compromise between desirable bus stop lengths and demand for parking in the area.

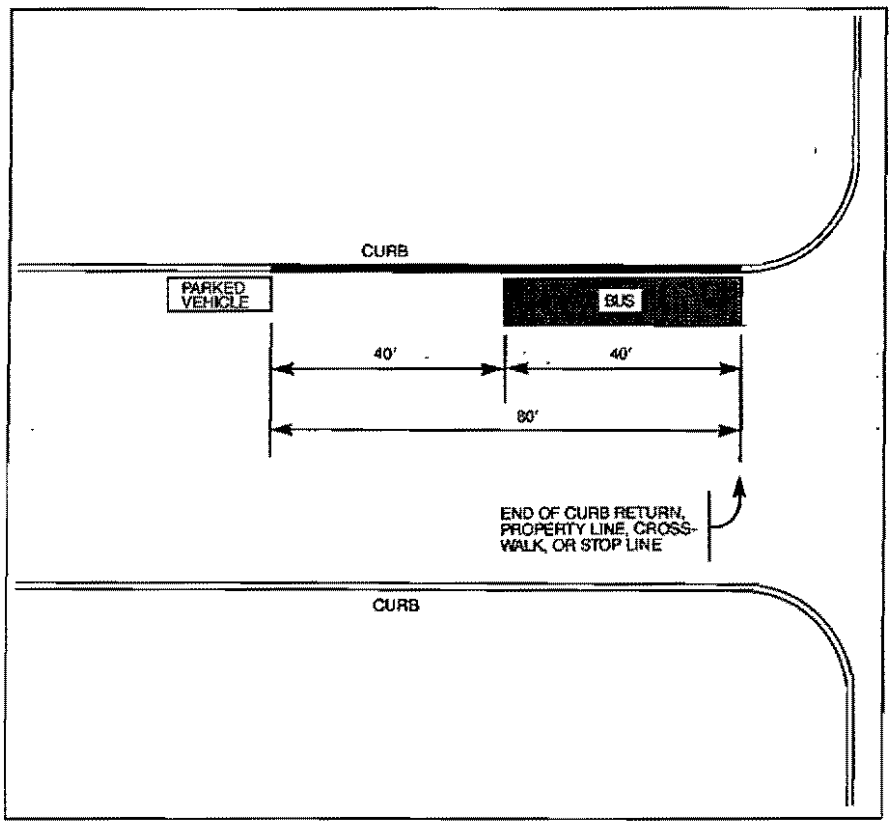


Figure 1. Far-side bus stop (for a 40-foot bus).

Far-Side Bus Stops

1. Right turns can be accommodated with less conflict.
2. A minimum of interference is caused at locations where traffic is heavier on the approach side than on the leaving side of the intersection.
3. Less interference will usually be caused at locations where the crossing street is a one-way street with its direction from left to right.
4. Left turning buses approaching a far-side (around the corner) stop commence their left turn from the proper lane. Leaving a near-side stop they would have to cross traffic in the lane to their left.
5. Stopped buses do not obstruct sight distance to the left for vehicles entering or crossing from a side street.
6. At a signalized intersection, buses can find a gap to enter the traffic stream without interference, except where there are heavy turning movements into the street with the bus route.
7. Waiting passengers assemble at less-crowded sections of the sidewalk.
8. Buses in the bus stop will not obscure traffic control devices or pedestrian movements at the intersection.
9. Intersections may be blocked if other vehicles park illegally in the bus stop, thereby obstructing buses and causing traffic to back up across the intersection.
10. Stops on a narrow street or within a moving lane may block traffic on both the street with the bus route and on the cross street.
11. A bus standing at a far-side stop obscures sight distance, to the right, of a driver entering the bus street from the right.
12. Where the bus stop is too short for occasional heavy demand, the overflow will obstruct the cross street.

Mid-Block Bus Stops

1. Buses cause a minimum of interference with sight distance of both vehicles and pedestrians.
2. Stops can be located adjacent to major bus passenger generators.
3. Waiting passengers assemble at less-crowded sections of the sidewalk.
4. The removal of considerable curb parking is required.
5. Pedestrian jaywalking is more prevalent. This is hazardous and creates vehicular friction and congestion.
6. Patrons from cross streets must walk farther.

SPECIAL FACTORS TO CONSIDER

Through Bus Movements

1. At intersections controlled by signals or Stop or Yield signs, when transit is critical but traffic and parking are not critical, a near-side stop is preferable.
2. At intersections where heavy left or right turns occur, a far-side bus stop should be used. If a far-side bus stop is impractical, the stop should be moved to an adjacent intersection or to a mid-block location in advance of or beyond the intersection.
3. At intersections where bus routes and heavy traffic movements diverge, a far-side stop can be used to advantage.
4. At intersections controlled by signals or Stop or Yield signs, when traffic or parking is critical and transit is not critical, a far-side installation is best.

Turning Bus Movements

In determining the proper location of bus stops with reference to turning bus movements, the problems of bus-vehicle conflict become more pronounced. *Sound engineering judgment of specific factors for each type of bus stop becomes critical.*

Right Turn—Curb Space Critical, Traffic Not Critical

1. Establish near-side stop prior to turn.
2. If right turns are an appreciable factor, locate bus stop some distance prior to intersection, possibly mid-block.

Right Turn—Traffic Critical, Curb Space Not Critical

1. Establish far-side stop after turn.
2. If far-side stop is impractical, establish mid-block stop before or after turn.
3. If mid-block stop is impractical, move to another intersection.

Right Turn—Traffic Critical, Curb Space Critical

1. These are special cases, where experience and engineering judgment must be applied using principles contained herein. Experimentation often will be necessary.

Left Turns

1. Establish far-side stop after bus has turned. This may require an extra-long stop to permit bus to complete turning maneuver.
2. If far-side stop cannot be established, use a mid-block stop after turn. A mid-block stop prior to turn may be feasible if traffic is sufficiently light and the block long enough to allow the bus to move from the stopped position to the left turn position without traffic conflict.
3. If both (1) and (2) are impractical, establish stop at an adjacent intersection.

Mid-Block Stops

Mid-block stop areas are recommended under the following conditions:

1. Where traffic or physical street characteristics prohibit a near- or far-side stop adjacent to an intersection.
2. Where large factories, commercial establishments, or other large bus passenger generators exist, and heavy loading therefore makes the location desirable.
3. A mid-block stop should be located at the far-side of a mid-block pedestrian crosswalk, if one exists, so standing buses will not block a motorist's view of pedestrians in the crosswalk.

Bay-Type Bus Stops

Bay-type bus stops are encouraged where conditions permit. These involve relocation of the curb so as to flare the street width and allow a bus to pull completely out of the normal traffic and parking lanes. Where used they should be consistent with recommendations of this report.

Passenger Interchange Points

If transfer movements between bus routes are heavy, consideration should be given to locating bus stops so as to minimize crosswalk movements of transferring passengers. Engineering judgment must be used to determine if these transfer movements are important enough to supersede the other considerations which determine bus stop locations.

One-Way Streets

The basic principles for bus stop locations on two-way streets apply also on one-way streets. A special consideration is this: Where the bus route turns left, the preceding bus stop must be located far enough in advance to allow the bus to shift to the left traffic lane. A far-side stop after a left turn from a one-way street is feasible but requires an extra long bus stop to permit the bus to complete its turning maneuver and to pull in parallel and close to the curb.

Near-Side Stop

A near-side type bus stop for a single bus should be 105 feet in length as measured from the front of the stopped bus to the front of the preceding parking stall.*

Far-Side Stop

A far-side type bus stop for a single bus should be 80 feet in length as measured from the rear of the stopped bus to the end of the first parking stall.*

A far-side type bus stop after a right turn for a single bus should be 140 feet in length as measured from the edge of the lane from which the bus is turning to the end of the first parking stall.*

Mid-Block Stop

A mid-block bus stop for a single bus should be 140 feet in length as measured from the front of the preceding parking stall to the rear of the next parking stall.*

*An additional 45 feet of length should be provided for each additional bus expected to stop simultaneously at any given bus stop area. This allows for the length of the extra bus (40 feet) plus 5 feet between buses.

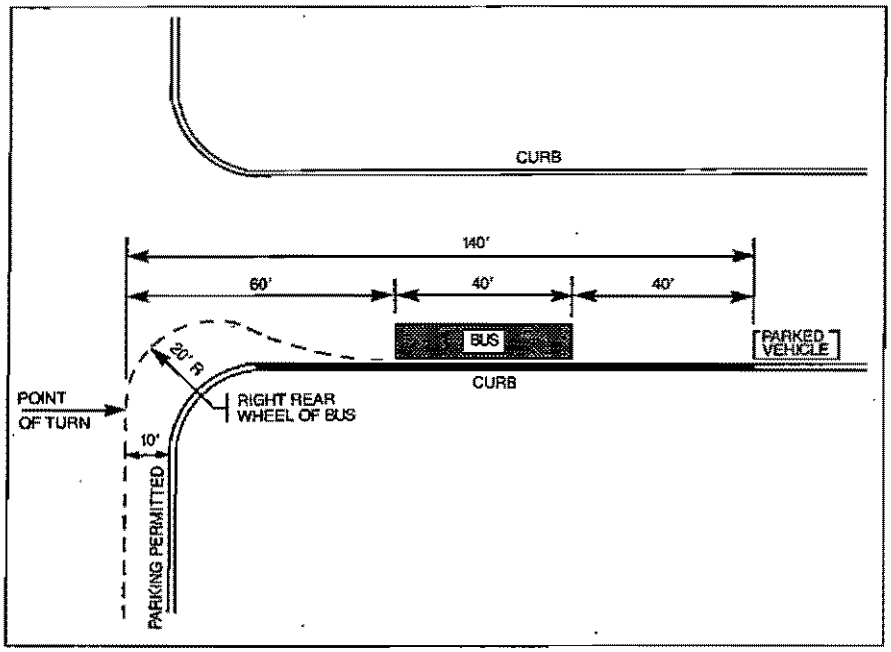


Figure 2. Far-side bus stop after right turn (for a 40-foot bus).

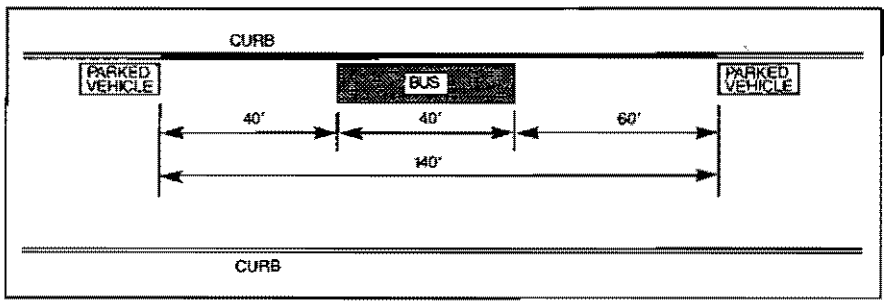


Figure 3. Mid-block bus stop (for a 40-foot bus).

Bibliography

Institute of Traffic Engineers, *Manual of Traffic Engineering Studies*, 3rd ed. (1964), Chaps. 5 and 6.

Institute of Traffic Engineers, *Proper Location for Bus Stops, A Recommended Practice*, (1954).

Institute of Traffic Engineers, *Traffic Engineering Handbook*, 3rd ed. (1965), pp. 511-514.

Matson-Smith-Hurd, *Traffic Engineering*, (McGraw-Hill, 1955), pp. 287-288.

New York Metropolitan Section, Institute of Traffic Engineers, *Bus Stop Locations and Lengths* (1963).

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