Transit Route Location

Basic Principles

- Transit routes should be located in such a way as to provide the highest quality service to potential users within a given budget.

- User oriented transit: transit service developed to meet the particular needs of a selected group of travelers. Such a service would provide:
  - Direct linkage between the user's origin and destination with no transfers
  - At a time convenient to the user
  - At a cost competitive with the automobile

- Attempt to minimize out of vehicle time spent in travel (walking to bus stops, waiting, transferring). Such time is perceived two to seven times greater than in-vehicle time (time spent actually in the vehicle).

- Work with parking agency, regulations. Parking policy can be utilized to cause shift to transit for work or school trips, and also encourage shopping use. Carrot and stick approach.

- Two basic questions in route location:
  - Where? Where the route is located will affect quality of service to the user.
  - How much? Route length and headways will also affect the quality of service, but more directly determines the cost of providing service.

- Costs increase directly with route length and passenger demand, decrease inversely with vehicle capacity, speed and headways. Generally route length and headways must be balanced to meet cost goals.

- Major changes can occur in urban land use and travel patterns over time. Growth/decline of shopping, employment centers. Look for new markets; serve existing markets better.

Information Sources for Transit Route Analysis

1. U. S. Census
   Socioeconomic, demographic and housing data are available in census tracts or block groups, always aggregated, sometimes incomplete.

   Critical information:
   - Location of place of work
   - Income distribution
   - Automobile availability
   - Mode to work
   - Age distribution

   Can be available in a Geographic Information Systems format or hard copy, usually from planning agency.

2. Planning Agency Data
   - Current land use plan
   - Current zoning
   - Raw data
     - Employment locations
     - Centers of commercial activity sales tax data
   - Locations of special trip generators
     - Elderly housing
     - Medical facilities
     - Schools
     - Employment
     - Shopping

3. Traffic Department
   - Traffic volumes/capacity
   - Intersection geometry/control
   - Parking and other regulations
   - Construction plans

4. In-House Data Collection
   - Running time information
     - Time between checkpoints
     - Schedule adherence
     - Running time on alternative routes

   Passenger comments/complaints
   Driver comments/complaints

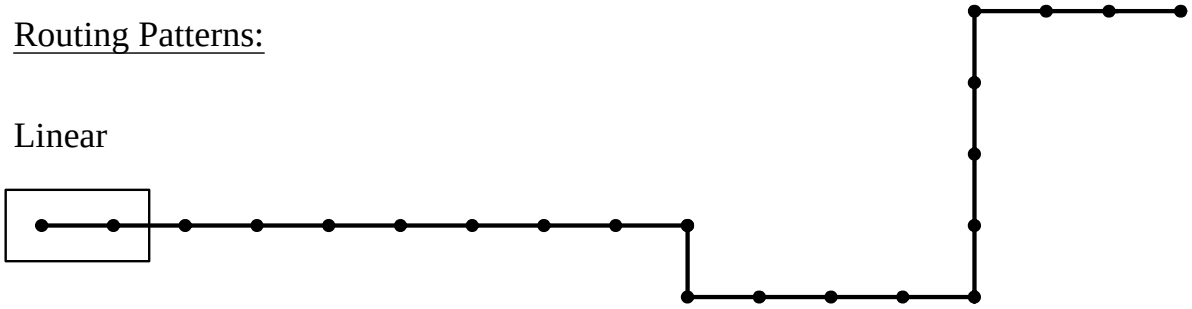
Surveys
- On-board
- Site interviews at major trip generators
- Factua1 information, i.e. residence location, schedule
- Opinions and attitudes

Ridership counts
- Rate revenue
- On-off counts
- Number of transfers issued/accepted

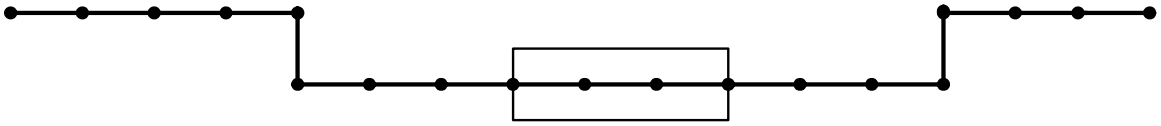
5. Community Sources
   - Political leaders
   - Other community leaders/knowledgeable persons
     - Informal contacts
     - Task forces
   - Public hearings

Routing Patterns:

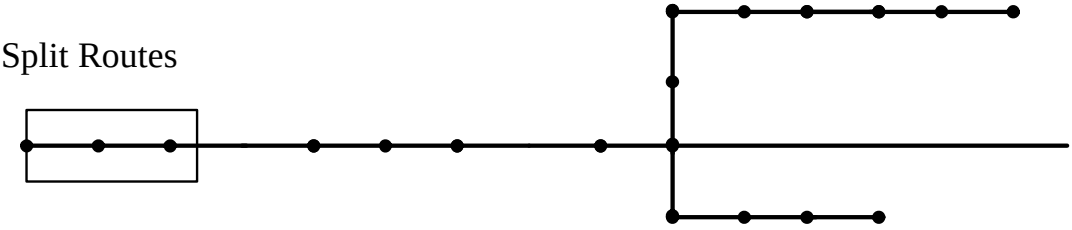
Linear



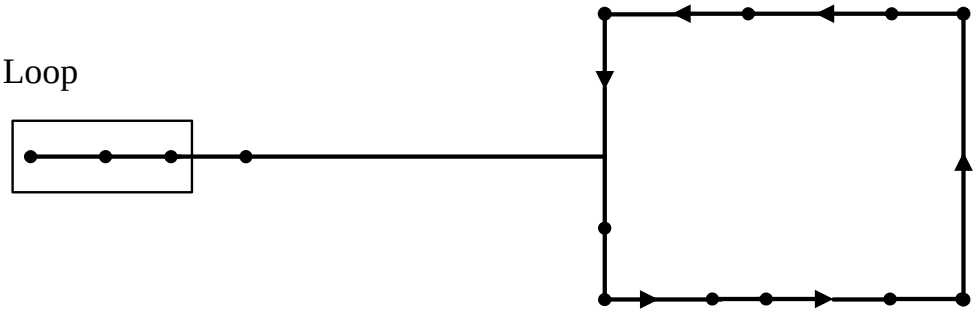
Through Routing



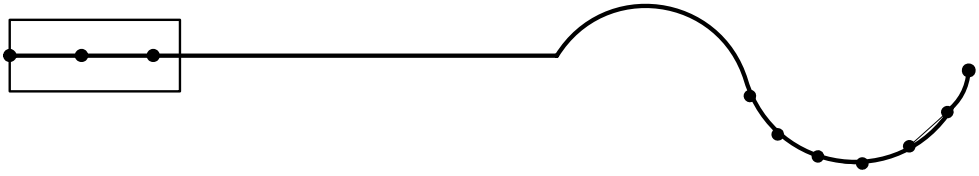
Split Routes



Loop



Local/Express



Considerations in Route Location

In locating transit routes, the following factors should be considered:

- Integration with rest of network
  - Other competing services
  - Transfer opportunities
  - Similar parallel routes
- Simplicity and clarity
  - Directness
  - Imageability
  - Reasonable
- Marketing Factors
  - Attraction to choice riders
  - Relate to travel needs of target groups
  - Alternative to parking congestion
  - Serve established travel patterns of existing users
- Rider Access
  - Kiss-n-Ride
  - Park-n-Ride
  - Walk-n-Ride
- Safety Considerations
  - Pedestrian
  - Rider
- Highway Geometry
  - Continuity, width, volume/capacity, traffic control, intersection problems
- Utilization of Special Facilities
  - Bus on freeways
  - Good stop locations
    - Transit centers
    - Major trip generators
    - Weather protected areas
- Political Considerations

Route Location Guidelines:

1. A route should, if possible, begin and end at traffic generators.

2. Routes should attempt to touch as many traffic generators as possible.

3. Buses should, if possible, enter a traffic generator such as a shopping center, apartment complex, or an industrial plant.

4. Routes should be linear -- providing direct two-way service between all points on the route.

5. Where transit rider origin-destination linkages exist between one sector of the city to another, through routes should be developed.

6. Loop and reverse routing -- being circuitous and inconvenient to the riders -- should be avoided.

7. Unless patronage demands require, placing of several routes on one street should be avoided (generally, it is better to run four routes on four streets than four routes on one street).

8. A corollary to guideline number 7 is that routes should be spaced no closer together than the average acceptable walking distance to a bus stop in a given service area. (In most instances, this is a 1/2 mile spacing or a maximum walking distance of 1/4 mile.)

9. The traffic operational characteristics of potential transit route streets must be carefully considered.

10. Transit routes should be considered as flexible and should be reviewed and evaluated periodically.

Coverage vs. Directness

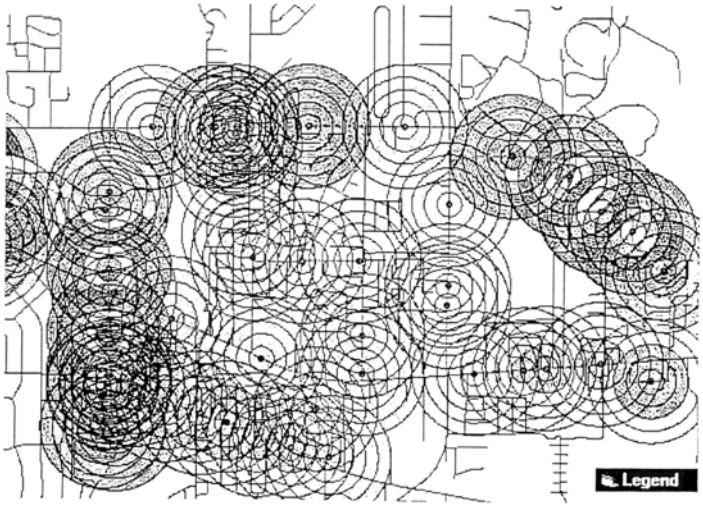
A fundamental problem with transit is the conflict between good coverage (location near origins and destinations) vs. providing a direct route between an origin and destination. When trip generators are located off of a direct route, it will require additional time and expense to serve them and it will inconvenience other users.

Access to transit

Generally. people will be unwilling to walk more than 1/4 mile (1200 feet, 400 meters) to a transit stop. This distance could be greater for some types of transit such as rail transit and may also vary for different types of users. Transit dependant users may be willing to walk greater distances. Also it will depend on the quality of the walk environment. It the walking portion of a trip is pleasant, then people may be willing to walk greater distances. If on the other hand it is difficult, because of terrain, street crossing, lack of pathways, or perceived dangers, then it is unlikely that any distance will be acceptable.

The true walk distance is important rather than the air distance as shown in the following maps. The map at the top shows the service area of a route within a ¼ mile air distance and the one at the bottom shows it within a ¼ mile walk distance. The walk distance map is correct since it shows the actual areas that can be reached by walking

Walk Buffers, Tallahassee, Florida



Air Buffers, Tallahassee, Florida

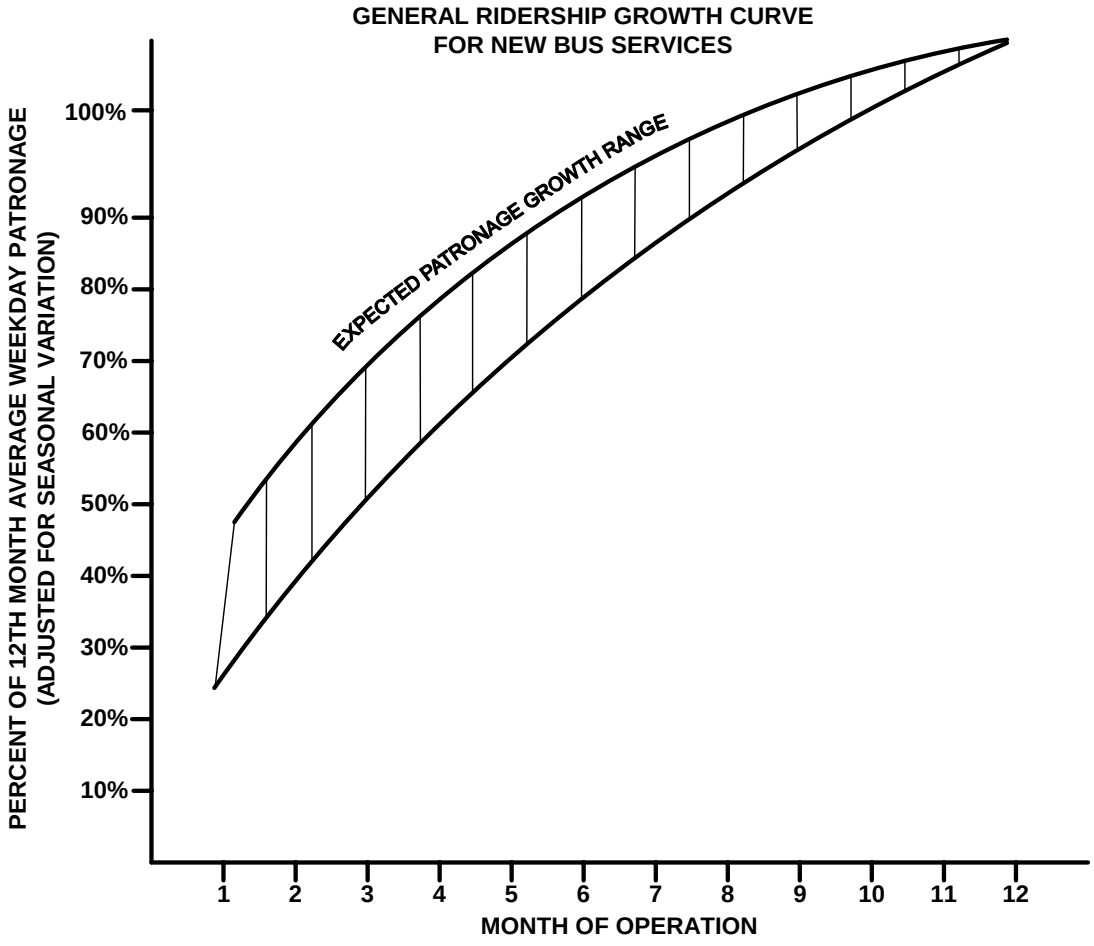
Bicycle access to transit

Bicycles can expand the service area of a transit route considerably. Since the distance traveled by bicycle can be greater, say two miles, the area served will be much greater.

	Average Trip Distance	Average Speed	Average Service Area
Walking	.33 miles 	2 mph 	.34 sq. mi. 
Biking	2 miles 	8 mph 	12.6 sq. mi. 
Biking vs. Walking	6 times distance	4 times speed	37 times catchment area

New Services

- New services should be labeled as experimental to the transit board and specific target goals should be set in order to continue the service on a permanent basis.
- New services should be aggressively marketed to potential users. Develop route level market information that points out advantages of the service from the point of view of the user (a good idea for existing routes as well).
- When starting the new service, provide backup capacity for the first week to handle higher than expected demand if it occurs. Adjust vehicle supply to demand over time.
- Generally new routes take some time to build ridership, as shown below. Marketing can make this occur faster.



Deletion of a Route

Deleting a route is far more difficult than adding service.

Well-defined and *accepted* standards based on goals, objectives, performance indicators are needed.

Real planning skills -- no longer engineering, but social policy, are needed. Work with community groups and affected citizens.

Innovation is needed. Consider substitute service, taxicabs, etc.

Flexibility is necessary.

Route Diagnosis

After once developing a route network, it should never have to be considered "good for all time." Transit rider requirements are apt to change over time, perhaps rapidly. Therefore, the usage of transit service along a given route should be monitored and evaluated at fairly regular intervals, perhaps once to twice a year, or more often in rapidly changing areas.

The following pages provide forms that can be used to evaluate current routes (from "Transit System Performance Evaluation and Service Change Manual," prepared for the State of Pennsylvania and reprinted by U. S. Department of Transportation, February, 1981).

TABLE IV-2
ROUTE OPERATING DATA

Route No.: _____
Name: _____
Date: _____

Round Trip Route Length (Miles)

Local - _____
Short Run - _____
Express - _____

Weekday Service Utilization

Trips	Passengers
Total	

Maximum Load Points

Direction	Location
A.M. Peak	
Inbound -	
Outbound -	
Midday	
Inbound -	
Outbound -	
P.M. Peak	
Inbound -	
Outbound -	

Fare Structure

Bus Fare - _____
Additional Zones - _____
Maximum One-Way Fare - _____
Transfers - _____

Vehicle Requirements

A.M. Peak - _____
Midday Base - _____
P.M. Peak - _____
Evening - _____
Saturday - _____
Sunday - _____

Summary of Service

Time Period	Scheduled Headway	Total Trips	Normal Cycle Time
A.M. Peak (6-9 a.m.)			
Midday (9-4 p.m.)			
P.M. Peak (4-6 p.m.)			
Evening (6-10 p.m.)			
Saturday			
Sunday			

Miles/Hours of Service

	Weekday	Saturday	Sunday
Scheduled Miles			
Pay Hours			
Miles/Hour			

TABLE IV-3
CHECKLIST FOR POTENTIAL ROUTE IMPROVEMENTS

Route: _____ Prepared by: _____

Date: _____

	Yes	No	If "YES," describe:
1. Alignment			
a. Could the route be extended to serve major residential/activity concentrations?	____	____	
b. Could the route be curtailed without losing significant patronage?	____	____	
c. Could segments of the route be realigned to provide better service/increase speed?	____	____	
d. Does the route duplicate other routes in serving major markets?	____	____	
2. Headways/Turnbacks			
a. Are "load standard" headways excessive or insufficient?	____	____	
b. Are "policy" headways at variance with service standards?	____	____	
c. Could certain trips be "turned back" midroute without violating headway standards?	____	____	
d. Is there insufficient patronage early morning, late evening, or weekends to justify service?	____	____	
e. Could schedules be better coordinated with predominate shift or school times?	____	____	

TABLE IV-3 (continued)
CHECKLIST FOR POTENTIAL ROUTE IMPROVEMENTS

	Yes	No	If "YES," describe:
3. Schedule Adherence/Running Time			
a. During short headway periods, do vehicles "bunch up?"	____	____	
b. Are there significant deviations between actual and scheduled running times by route segment by time period?	____	____	
c. Is there insufficient or excessive recovery time at each end of the route?	____	____	
4. Schedule Coordination			
a. Should route be jointly scheduled with another route where service duplication exists?	____	____	
b. Where there is major transfer activity, should schedules be coordinated during policy headway periods?	____	____	
c. Could route be "hooked" with another route where there is a major transfer activity?	____	____	
5. Traffic Aids			
a. Are recovery/turnaround points inadequate for vehicle storage?	____	____	
b. Are there serious congestion points along the route?	____	____	
c. Does illegal parking/truck loading seriously impede vehicle movement?	____	____	

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