High Street
A ‘Complete’ Street

by:
John A. Nawn, P.E., PTOE

The Pennsylvania Experience

- The first application of Back In or Reverse Angle Parking in the Commonwealth.
- Pre-dates the 'complete streets' paradigm, but an example of a complete street.

Borough of Pottstown

- 5.5 Square Miles (14.25 square kilometers)
- Population of 22,000
- 40 miles (64.4 kilometers) from downtown Philadelphia, Pennsylvania
- On the urban fringe of the Philadelphia metropolitan area
Borough of Pottstown

- Former industrial/river town with declining industrial base
- Bypassed by limited access highway in 1970’s
- Shift from ‘downtown’ shopping to regional malls
- Adverse impacts to the central business district

Borough of Pottstown

- Central Business District over 1 mile (1.6 kilometers) long, centered on ‘main’ (High) Street.
- Wide street to support former trolley than four lanes of vehicle traffic after trolley
- With sidewalks, businesses on each side of street 100 feet (30.50 meters) apart.

Problem Statement

- Two 11-foot (3.35 meter) travel lanes in each direction. Both no longer necessary
- Parallel parking not sufficiently meeting demand
- ADT 9000 vpd
- Due to linear nature of CBD, public parking lots not close to stores
Problem Statement

- 68-foot (20.74 meter) curb to curb pedestrian crossing distance
- 27 mph, (43.2 kilometers per hour) 85th percentile speed
- Ten, pre-timed, uncoordinated signals along corridor.
- 17 second pedestrian crossing time
- Adverse impact to bus transit times
- Two phase operation, no advance phasing for turns

URS Corporation
Issues

- Lack of ‘close in’ parking and wide street were considered detrimental to Pottstown’s revitalization
- Parking insufficient to meet demand
- Long ped crossing times
- Desire to accommodate bicycle use as part of County trail system.

First Study Effort

- 1995
- Five possible scenarios

Head in Parking/Both Sides

- 22.5 degree angle
- With 10 foot (3.05 meter) maneuver lane, only 18 feet (5.49 meters) left for travel lanes
- Not much more parking than currently provided
- Nine foot width insufficient for travel lane, busses, delivery vehicles, turning lanes, etc.
Head in Parking one side, Parallel on the other

- 22.5 degree angle
- Sufficient space for two 12-foot (3.6 meter) lanes, center turn lane and parallel parking lane
- Not much more parking than existing
- Questionable cost vs. benefit

Head In Parking down center of street

- 57-foot (17.38 meter) parking module necessary
- Only 11 feet (3.35 meters) left for both directions of travel

Parallel Parking both sides/both directions

- Would 'double' parking
- Would need beneficial (for peds) center median
- Sufficient space for wide travel lane in each direction
- Expected congestion from parking vehicles on both sides of the street
- Safety concerns/parking lot 'feel'
- How to handle turns

Sufficient space for two 12-foot (3.6 meter) lanes, center turn lane and parallel parking lane

Not much more parking than existing

Questionable cost vs. benefit

57-foot (17.38 meter) parking module necessary

Only 11 feet (3.35 meters) left for both directions of travel

Expected congestion from parking vehicles on both sides of the street

Safety concerns/parking lot 'feel'

How to handle turns
### Exclusive bus lane

- Make right lane exclusive bus lane
- Was the ‘recommended’ solution
- Did not address parking issues
- Did not address pedestrian issues

### What the 1995 Study did confirm

- One lane of traffic in each direction was sufficient with coordinated signals
- LOS B could be achieved with only one lane and coordination

### Back In Angle Study

- Back in or reverse angle parking suggested by Borough Planning Commission
- 2001 Study
- Also now wanted to incorporate bike lane into cross section
Back In Angle Study

- Established 11-foot (3.35 meter) travel lanes and 10-foot (3.05 meter) center turn lane as minimum acceptable
- 6 feet (1.83 meter) established as preferred bike lane width
- Remaining width insufficient to support angle parking on both sides

Back In Angle Study

- 30 feet (9.15 meters) available for parking
- PennDOT statutes for angle parking dictate required width for angle parking along state highways:
  "The parking and maneuver area adjacent to the near edge of the nearest travel lane equals or exceeds 30 feet for parking spaces at a 45 degree angle"

Back In Angle Study

- Theoretically could provide head in angle parking, but only on one side of street with no parking on the other side
- Would not solve parking problem
- Could not fairly decide which side of street to install it
Back In Angle Study

- PennDOT, however had no standards for Back In Angle Parking
- Successfully argued the merits of Back In Angle Parking with PennDOT to permit installation

Advantages

- No maneuver space necessary since backing into space is similar to backing into parallel parking space, only with one less movement

Advantages/Entering

<table>
<thead>
<tr>
<th>Parallel Parking</th>
<th>Back In Angle Parking</th>
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</thead>
<tbody>
<tr>
<td>1. Pull past space</td>
<td>1. Pull past space</td>
</tr>
<tr>
<td>2. Back into space on angle</td>
<td>2. Back into space on angle</td>
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<tr>
<td>3. Pull forward and turn wheel to straighten parallel to curb</td>
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</tbody>
</table>
Advantages

Fade in angle parking

1. Signal
2. Stop
3. Reverse

Advantages / Exiting

Parallel parking
1. Generally must back up first
2. Driver must turn 180 degrees to see approaching traffic

Back in angle parking
1. Just pull forward
2. Driver only needs to turn 135 degrees to see approaching traffic
3. Quicker entry into traffic flow

Advantages

- Easy and safe exit from space
- No ‘blind’ backing into traffic or bike lane
- Bike lane could be used as maneuver lane
- Exiting drivers field of view within bike operators stopping sight distance from 10 mph (16 kilometers per hour)
Recommended Cross Section

Experience of Others

Wilmington, Delaware, USA
- Six blocks of Back In Angle Parking
- Over 50 years old
- All angle parking required to be Back In Angle by ordinance
- 19-foot (5.79 meter) space and 11-foot (3.35 meter) travel lane standard
Seattle, Washington, USA

- 280 blocks of angle parking
- Majority: Back In Angle
- Utilized for 30 years

Seattle, Washington
Washington, D. C., USA
- Six blocks of Back In Angle parking
- 15 to 20 years old
- Two lanes of traffic in each direction with ADT over 9,000 vpd

Washington, D. C.

Indianapolis, IN, USA
- One block of Back In Angle parking
- 15 years old
- One way, three lanes of traffic
- ADT of 13,000 vpd
Montreal, Quebec

- Increased parking by 40%
- 43 degree angle
- Has traffic calming benefit

Montreal, Quebec

Montreal, Quebec

Montreal, Quebec
View from vehicle

Pottstown, PA

- Approved by Borough Council, PennDOT and Montgomery County
- Endorsed by three downtown organizations
- Recommended by Walkable Communities
- Received grant from DVRPC for design
- Construction in Spring, 2003

Pottstown, PA
After brief, initial reluctance, has met with general acceptance.
Businesses generally pleased with results.
Most drivers able to properly place car in space.

- Increased parking by 21%
- Placed more vehicles closer to stores
- Decreased ped crossing times by 12%
- Gives perception of a more 'intimate' street environment
- Supports bicycle use
Permits installation of accessible space in each block

Pottstown, PA
Pottstown, PA

Inspiration or Idiocy

Everyone Gets Into the Act

US Cities w/ Back In Angle Parking
- Seattle, WA
- Tucson, AZ
- Vancouver, WA
- Portland, OR
- Salem, OR
- Yakima, WA
- Salt Lake, UT
- Denver, CO
- Indianapolis, IN
- Washington, DC
- New York, NY
- Williamsburg, VA
- Portland, OR
- Chicago, IL
- Philadelphia, PA
Accepted Standard

- PennDOT Publication 46

Lessons Learned

Bulb outs helpful
Be mindful of sign clutter

Sign wording

Driver education and bike lane width
Rear overhang

Bike Lane treatment at intersections

Other Findings

- 25% reduction in the number of crashes and 43% reduction in injuries from crashes
- No measurable vehicle speed reduction, but average speeds below posted speeds (signals now coordinated)
- Consider installation of center median
- Marked increase in Bike Usage, noted on County, and Greater Philadelphia area Bike Maps and Guides
Questions?