

**DRAFT MEMORANDUM**

**TO:** File  
**FROM:** Mike Dannemiller and Liz Ward  
**DATE:** 9/24/2013  
**SUBJECT:** Back-in angled parking

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In situations where the cartway widths are generous and motor vehicle parking demand is high, angled parking is a reasonable option. In New Jersey this has typically taken the form of “head-in” angled parking. Many jurisdictions, particularly those working to safely accommodate bicycle travel have begun to utilize another form of angled parking: “back-in” angled parking, also known as “head-out” angled parking or “reverse” angle parking. Evidence is mounting that back-in angled parking has some significant advantages, not just for bicycle traffic, but for automobile traffic as well.

NJDOT requested a summary of the efficacy of back-in angled parking, to have available as communities consider this as an alternative to traditional front-in angled parking.

This memorandum explores the pros and cons of back-in angled parking and documents the findings of studies regarding back-in angled parking.

<b>Benefits</b>	<b>Concerns</b>
Visibility when leaving the parking spot, motorists can see oncoming traffic, including bicycle riders	Unfamiliarity with this configuration
Reduction in crashes	Fear that there will be more parking crashes
Ability to access the trunk from the sidewalk, rather than the travel lane or street	Potential for confused drivers to U-turn into parking spaces
Open car doors channel passengers to the sidewalk	Exhaust directed toward sidewalk
Additional maneuvering space is not required	Parked vehicles may overhang the sidewalk more at the rear of the vehicle than the front
On steep uphill terrain this will automatically ‘curb the wheels’ preventing runaway autos	On steep downhill terrain it is not possible to “curb the wheels”
Disabled parking spaces can be located adjacent to curb ramps and provide direct wheelchair access for the driver	
Drivers pull out directly into the travel lane, rather than needing to back out into oncoming traffic	

**Design resources** – There are several national publications that encourage the use of back-in-angled parking:

1. AASHTO Guide for the Development of Bicycle Facilities
2. ITE Designing Walkable Urban Thoroughfares: A Context Sensitive Approach

**Design Samples** – Striping patterns, angles, stall depth and width vary around the country. Some sample measurement ranges are summarized as follows:

- Stall Width [8 feet, 9 feet, 9 feet 6 inches]
- Stall Depth [12 feet, 15 feet, 19 feet]
- Angle of striping [45 degree, 60 degree]

Striping patterns [4 inch white lines, 4 inch white lines with raised pavement markings]

### Typical Applications

- Back-in angled parking requires careful site planning to ensure that the car stops before encroaching into the pedestrian space.
- Usually found in commercial areas.
- According to ITE's *Designing Walkable Urban Thoroughfares*, back-in angle parking utilizes the same dimensions as head-in angled parking except the curb overhang. The additional buffer width between the curb and sidewalk can be offset by less depth required for the parking stall. See table below.

**Table 9.3 Minimum Dimensions for Head-In Angled On-Street Parking\***

Angle	Stall Width	Stall Depth (Perpendicular to Curb)	Min. Width of Adjacent Lane	Curb Overhang
45°	8.5–9.0 feet	17 feet 8 inches	12 feet 8 inches	1 foot 9 inches
50°	8.5–9.0 feet	18 feet 3 inches	13 feet 3 inches	1 foot 11 inches
55°	8.5–9.0 feet	18 feet 8 inches	13 feet 8 inches	2 feet 1 inches
60°	8.5–9.0 feet	19 feet 0 inches	14 feet 6 inches	2 feet 2 inches
65°	8.5–9.0 feet	19 feet 2 inches	15 feet 5 inches	2 feet 3 inches
70°	8.5–9.0 feet	19 feet 3 inches	16 feet 6 inches	2 feet 4 inches
90°	8.5–9.0 feet	18 feet 0 inches	24 feet 0 inches	2 feet 6 inches

Source: *Dimensions of Parking*, 4th Edition, Urban Land Institute

**Notes:**

Typical design vehicle dimensions: 6 feet 7 inches by 17 feet 0 inches. Use 9.0 feet wide stall in commercial areas with moderate to high parking turnover.

\*For back-in angled parking, reduce curb overhang by one foot.



**Print publications** – There has been extensive research and study on back-in-angled parking. Major findings from the following locations are as follows:

- **Pottstown, PA**
  - Motor vehicle accidents are reduced with back-in-angled parking.
  - There is no change in operating speeds, even when a change to back-in-angled parking was implemented along with a road diet from two lanes to one lane in each direction



- **San Francisco, CA**
  - Better visibility - Back-in-angled parking mitigates the lack of visibility past large SUV's, trucks and cars with tinted windows that occurs when attempting to back out of a head-in angled parking space.
  - Drivers are able to load and unload their vehicles from the curb rather than the travel lane.
- **Salt Lake City, UT**
  - Back-in-angled parking is similar to but easier than parallel parking
  - Allows for full vision of the street (and on-coming cyclists) when pulling out of a parking space
- **Philadelphia, PA** (Bicycle Coalition of Greater Philadelphia, New Jersey Bike Walk Coalition & Tri State Transportation Campaign)
  - Philadelphia's Traffic Guidelines specify back-in-angled parking as the preferred standard
  - A two-year crash comparison of before and after study show a significant reduction in total crashes

**Video resources** – There are numerous videos of back-in-angled parking, ranging from documentaries with interviews and first person perspective views, to cartoon style animated graphics on its operation. Several of the recent videos posted publically are listed here:

- Austin, TX, in place for a year, interviews and sample maneuvers :  
<http://www.youtube.com/watch?v=HddkCbsWHlk>
- Pensacola, FL, very instructional, but narrated graphic images only – no live footage:  
<http://www.youtube.com/watch?v=25fo6AX3zBQ>
- Somerville, MA – by Livable Streets, bike lane and back in angled parking, shot on first day of operation:  
<http://vimeo.com/43001944>
- Macon, GA – shows installation of new striping and interview footage:  
[http://www.macon.com/2013/08/27/2630767\\_a2630767/reichert-on-back-in-angle-parking.html](http://www.macon.com/2013/08/27/2630767_a2630767/reichert-on-back-in-angle-parking.html)



### New Jersey Examples

- The **City of Newark** will be striping its first back-in-angled parking along roadways in Spring 2014. RBA will coordinate with them to ensure that ‘before’ conditions are documented in photo and video, so that contrasting ‘after’ conditions can be compared.
- **Hoboken** - Willow Avenue in Hoboken is scheduled for a redesign that follows the city’s Complete Streets resolution. To be done in conjunction with a resurfacing project, the City proposes adding a median, bike lanes, high-visibility crosswalks, and back-in angled parking. Link to redesign: <http://www.hobokennj.org/content/wp-content/uploads/2013/05/Upper-Willow-Ave-Complete-Street-Redesign>.

**Regional Examples** – There are municipalities around the country that have had back-in-angled parking, some for many years. These include:

- Arlington, VA
- Birmingham, AL
- Charlotte, NC
- Chico, CA
- Dover DE
- Everett, WA
- Honolulu, HI
- Indianapolis, IN
- Knoxville, TN
- Marquette, MI
- M o n t r e a l ,  
Quebec Canada
- New York, NY  
(Brooklyn and  
Manhattan)
- Olympia, WA
- Philadelphia, PA
- Plattsburg, NY
- Pottstown, PA
- Salem, OR
- Seattle, WA
- Syracuse, NY
- Tacoma, WA
- Tuscon, AZ
- Vancouver, WA
- Ventura, CA
- Wilmington, DE
- Washington, DC

**Conclusions** – While back-in-angled parking has not yet been implemented in New Jersey, the research shows that this style of angled parking clearly has many safety benefits over traditional head-in angled parking with respect to both bicycle and motor vehicle travel. If angled parking is to be striped along a roadway, with or without bicycle lanes, back-in angled parking is the orientation of choice.

## Appendix

Copies of several print publications are included in the appendix:

- AASHTO Guide for the Development of Bicycle Facilities (see page 4-17)
- ITE Designing Walkable Urban Thoroughfares: A Context Sensitive Approach
- Sunnyvale, CA – ordinance change to allow back-in-angled parking, includes a layout sketch of proposed striping along a typical roadway
  
- Pottstown, PA
  
- San Francisco, CA
  
- Salt Lake City, UT
  
- Philadelphia, PA
  
- New York, NY – Bureau of Traffic Operations, Bicycle facility striping [http://www.nyc.gov/html/dot/downloads/pdf/nycdot\\_highwaydesign\\_typicalmarkings.pdf](http://www.nyc.gov/html/dot/downloads/pdf/nycdot_highwaydesign_typicalmarkings.pdf)