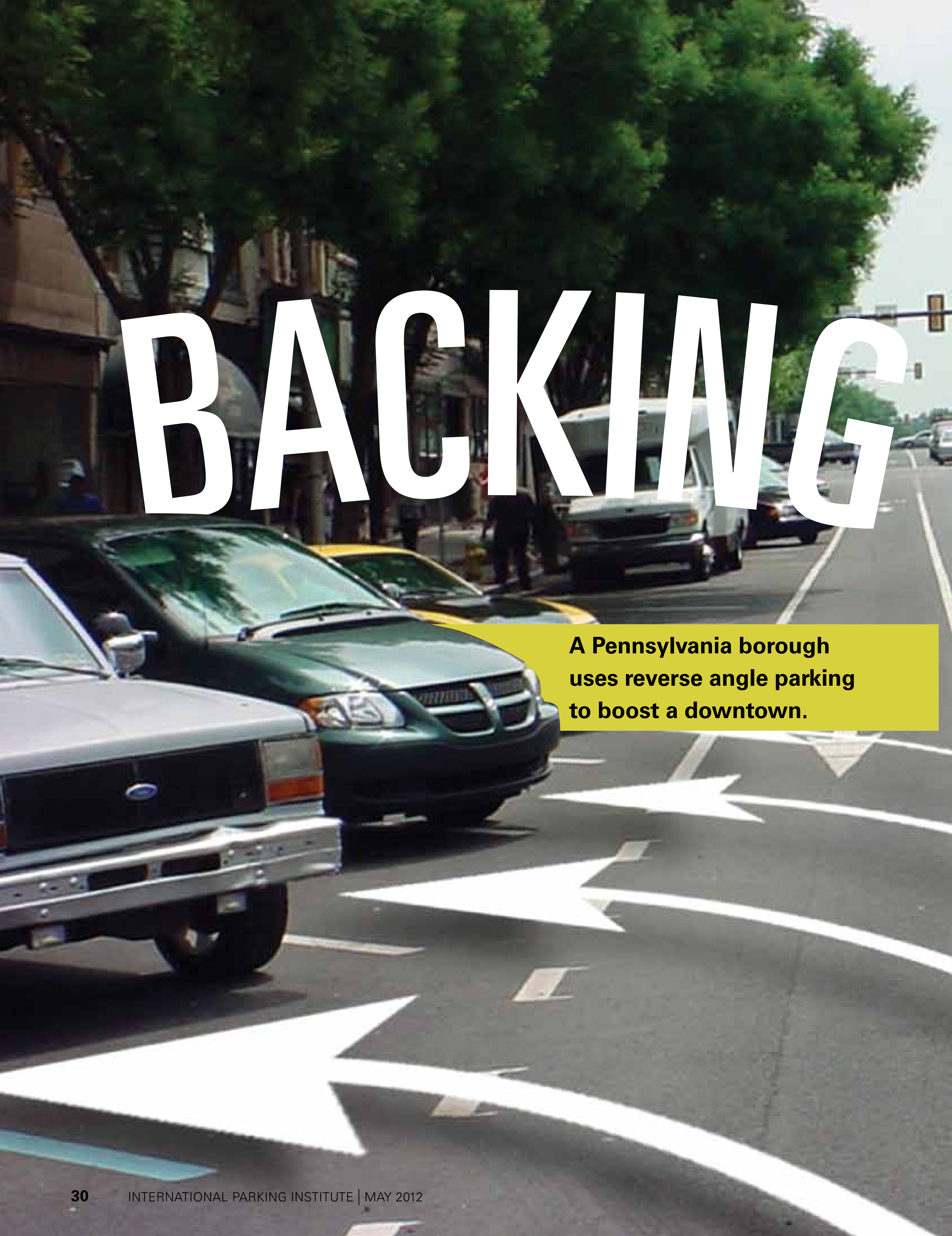

# BACKING

**A Pennsylvania borough uses reverse angle parking to boost a downtown.**


By John A. Nawn, P.E., PTOE

In many communities' central business districts (CBDs), a lack of available parking close to retail and commercial establishments is seen as a deterrent to continued retail development and reinvestment. One solution is back-in angle parking. The biomechanics necessary to position a car into a back-in angle space are not much different than those required for parallel parking, and leaving the space is no more different than pulling into the street. Furthermore, no maneuver space, as is required for pull-in angle parking, is typically required for a parallel parking space. Without the need for a maneuver space, the back-in angle parking provides the necessary additional parking without the need for the excessive or unavailable right of way.

The Borough of Pottstown, Pa., had struggled to revitalize and reinvigorate its downtown core since the 1990s. Its 1994 Downtown Comprehensive Plan identified several goals that specifically dealt with the creation of a more pedestrian friendly, multi-modal environment that would maximize the amount of available close-in parking.

Located in the Philadelphia metropolitan area, the Borough of Pottstown traces its routes to 1752. As the borough developed, the CBD also developed, centered along High Street, which became the town's "Main Street." Like many other local communities, Pottstown hosted a trolley operation in the early 1900s that traveled down the center of High Street and was double tracked, reflecting Pottstown's prominence in the region's economy.

With the abandonment of the trolley service and the increase in automobile traffic after World War II, the High Street cross section was reconfigured to maximize automobile mobility. With 68 feet available between the curb lines, two 11-foot through lanes and a 7-foot parallel parking lane were created in each direction along with a 10-foot wide center turn lane/painted median. Combined with a 16-foot sidewalk on each side, the face of the buildings on each side of the street are 100 feet apart, creating a very wide corridor through the CBD. The width of the corridor in and of itself was perceived by some to be a deterrent to downtown redevelopment.

By the late 1960s, it was clear that High Street and nearby Ridge Pike were quickly becoming inadequate. To serve the ever-increasing traffic demand, the Pennsylvania Department of Transportation (PENNDOT) undertook the construction of a four lane, grade separated, limited access freeway that bypassed the CBD and drew a large amount of the existing through traffic volume from High Street. Combined with a general decline in shopping within the CBD in favor of regional malls, High Street quickly became an underutilized transportation asset.

With four lanes of rapidly moving traffic, High Street was neither pedestrian nor shopper friendly. High Street's 68-foot cross-section is intimidating and discourages pedestrians and shoppers from crossing the street. In addition, the vehicle traffic along High Street moved too quickly to allow passengers adequate time to identify shopping opportuni-

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ties and find parking spaces. A perceived lack of parking was also identified as a concern of the downtown business owners. Although metered, parallel parking was available on both sides of High Street throughout the CBD, it was generally only 50 percent used. It was also not conducive to bicycle travel, with no dedicated bike lanes.

### Rethinking the Street

The general thinking was that reconfiguring and calming traffic on High Street would address Pottstown's economic development goals and have a positive effect on regional transportation and growth issues.

The findings of a study of High Street commissioned by the borough, among other things, included that the existing through lanes could be reduced to one lane in each direction without losing roadway function. The study then analyzed a number of alternative parking and lane scenarios for the CBD. The alternatives studied included three angle parking scenarios and two parallel parking scenarios. It should also be noted that while one solution could have been simply widening the sidewalks, it was deemed cost prohibitive due the length of the corridor.

The initial approach to the study was to establish the minimum required lane widths for the conventional elements of the roadway cross-section, leaving 36 feet available to support parking and bicycle lanes. Angle parking would likely only be possible on one side of the street, and parallel parking would be retained on the opposite side. With all the other minimum widths established and agreed upon, this left 18 feet available for angle parking.

Traditional pull in angle spaces require a maneuver area so vehicles can re-enter the roadway safely. However, with back-in angle parking, no such maneuver area is necessary. The human biomechanical motion used to enter a back-in angle parking space is similar to, if not easier than, entering a parallel parking space. For a 45 degree back-in angle space, the operator only needs to complete the first two steps of the typical parallel parking maneuver: he pulls past the space and proceeds in reverse into the space. When leaving the space to reenter the highway, the back-in angle space has a clear advantage over the parallel parking space: the movement requires only that the operator turn sideways, not backwards.

### Room for Bikes

Accommodating bicycles within the roadway cross section was of key importance to the stakeholders, and sufficient width was planned. In general, traditional pull in angle parking and bicycling do not mix well. Back-in angle parking, on the other hand, can coexist well with cyclists and other forms of non-motorized vehicles. When entering a space during the backing maneuver, the cyclist can see the backing vehicle in time to take alternate action even if the vehicle operator fails to see the cycle. When leaving the space, the vehicle operator has sufficient sight distance to the left to see the approaching cyclist.

Ultimately, it was decided to locate a single 6-foot bike lane to the right of each travel lane, adjacent to the parallel and back-in angle parking, respectively.

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The combined 12-foot width was two feet more than originally allowed for in the design, which required shortening the back-in angle parking spaces by 2 feet to 16 feet. The remaining four feet, four inches exceeded PENNDOT's minimum criteria for a one-directional bike lane and therefore, was acceptable.

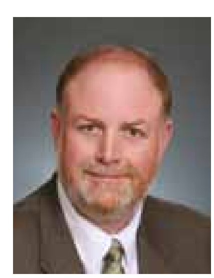
Providing a 6-foot wide bike lane allows delivery vehicles to temporarily share it with cyclists without affecting through vehicular traffic. While it is recognized that the 6-foot lane is not wide enough to support most delivery vehicles, in combination with the adjacent 11-foot travel lane, the total 17-foot width is sufficient for vehicles to pass safely around delivery vehicles. Furthermore, with the 10-foot median remaining painted and flush with the pavement surface, additional maneuver space is available for through vehicles to pass parked delivery vehicles. The wide bike lane also provides maneuver space for both parallel and back-in angle parking, which reduces effects to the through movements.

One additional advantage of angle parking is the ability to provide for a handicap accessible stall in each block, something rarely provided for in downtown on street parking. A 13-foot wide handicap-parking stall was incorporated into the angle parking as the last space of each block. This placed the space close to the existing curb ramps. Fifty-foot long bus stops are also located at the far side of each intersection to accommodate bus boarding and bus layover if necessary, without blocking the through lane.

The decision as to which side of the street to locate the back-in angle parking was cause for much discussion among the stakeholders. Ultimately, the decision was based entirely on which side would yield the biggest increase in parking, and that was found to be the north side of High Street. The additional parking yield over the existing parallel parking per block varied greatly depending on the location of driveways, no-parking zones, and the like, with some blocks gaining as many as 23 spaces and some blocks as few as two. Overall, the downtown area gained a total of 95 new spaces, a 21 percent increase.

Analysis of accident experience pre- and post-parking makeover shows an overall reduction in the number and severity of accidents as a result of the installation. Although some accident categories increased, primarily because of the unfamiliar nature of back-in angle parking and the introduction of a bicycle lane, accidents associated with parking spaces declined substantially, reinforcing the inherent safety of back-in angle parking.

This context-sensitive solution demonstrates that back-in angle parking can be effectively integrated into the downtown environment and co-exist along an arterial highway using current, minimum design standards. In addition to creating more parking over traditional parallel parking, back-in angle parking can also be used as a traffic calming/street narrowing tool, can enhance pedestrian functionality and walkability within the downtown area, and can work harmoniously with bicycle lanes, all resulting in a more attractive and intimate downtown corridor, enhancing the downtown experience, and leading to increased economic investment.



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