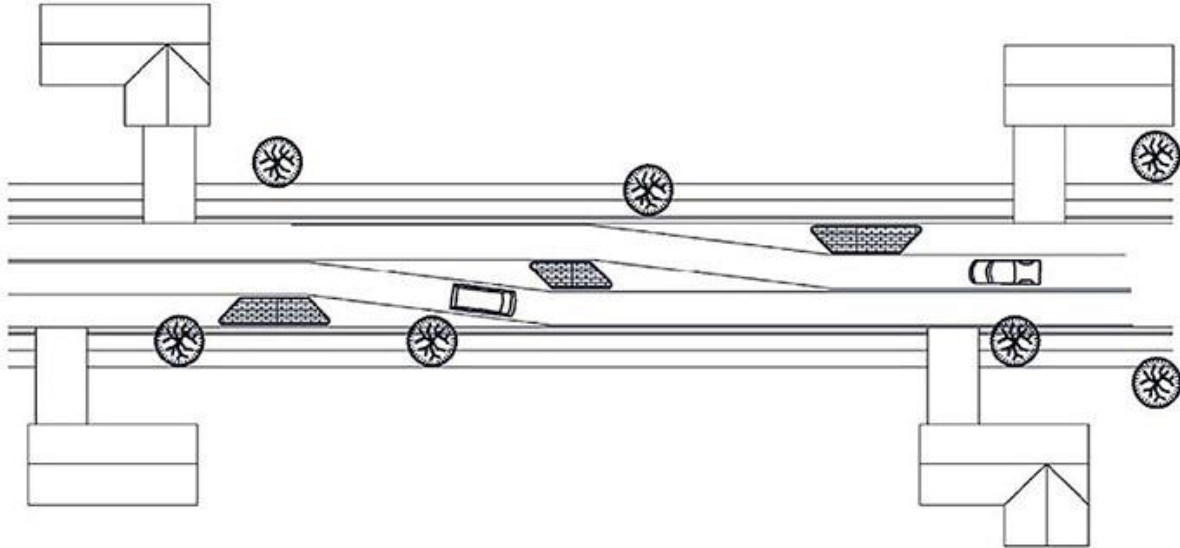


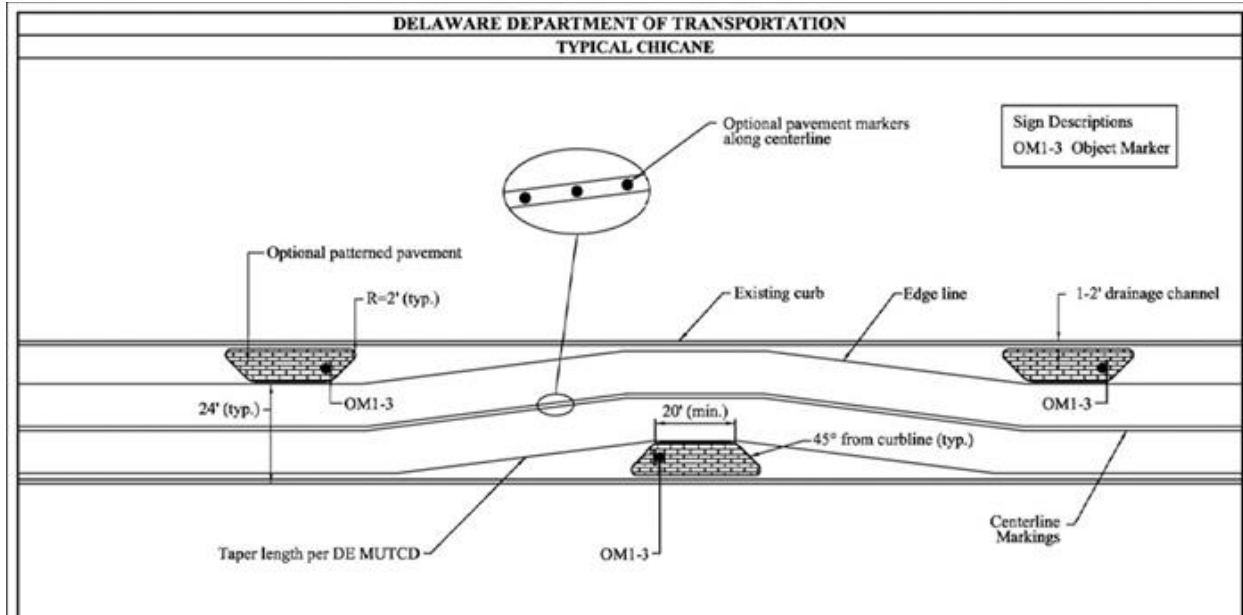
- Lateral Shift

A lateral shift moves, or offsets, the road in typically one direction. Appropriate for nearly all road types, emergency vehicles and transit vehicles don't have issues with this measure. This treatment has limited research information on its impact on speeding, so it may not be as effective as other measures. Costs (2017 dollars) \$8k - \$25k.



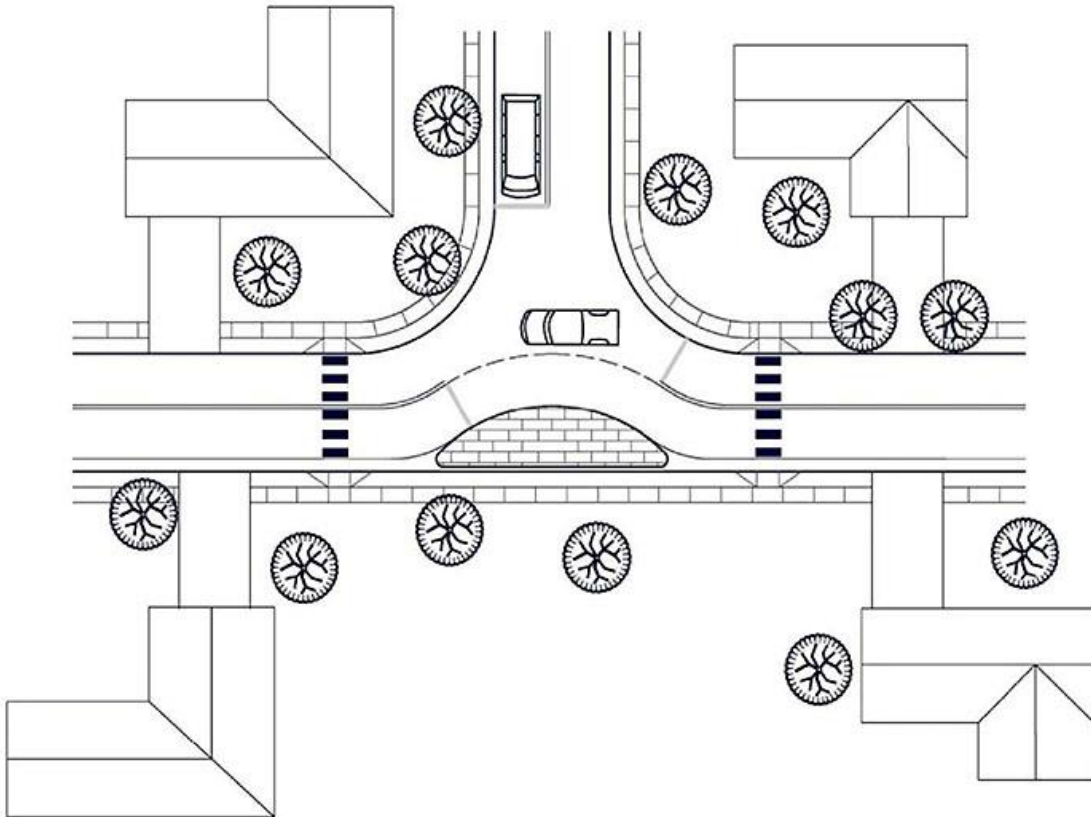
- Chicane

A chicane is a road offset occurs more than once, like a lateral shift that is back-to-back. This treatment is appropriate for residential roads, and depending on spacing, can slightly slow-down emergency vehicles and transit vehicles. It is effective at reducing speed, but drivers may ignore pavement markings to drive straight. Costs (2017 dollars) \$8k – \$25K.



- Realigned Intersection

This treatment reconfigures an intersection to have skewed approaches. It is appropriate for residential roads of low speed, and primarily for T-intersections. This can be imagined as a Chicane at a T-intersection, with more space between the road offsets due to the intersection. This treatment has little impact on emergency vehicle response times and transit vehicles. Costs (2017 dollars) \$15k - \$60k.



- Traffic Circle

Not to be confused with a roundabout, this treatment places an island in an intersection which is usually landscaped or decorated, and should not be used for intersections where large trucks or buses often turn left. This is for intersections where modern roundabout principals cannot be applied. A traffic circle typically does not have splitter islands/ deflection preventing vehicles from entering the circle against the flow of traffic. This means vehicles could technically make a left-turn against traffic in the circle. Some jurisdictions permit fire engines and transit buses to make the left-turn in front of the circle if there is no traffic present as the larger vehicle typically cannot circulate the island. This measure is appropriate for less-heavily traveled roads and residential roads, and sees many of the same safety benefits as a roundabout. Costs (2017 dollars) \$10k - \$25k.



- Mini-Roundabout

Similar to a roundabout, but with smaller diameter and a mountable island. This treatment has one lane in each direction, and the center island is fully traversable so that emergency vehicles and transit vehicles may driver over the center island for left turns at slow speeds. This intersection is not an appropriate type for intersections with a lot of heavy vehicles and buses making left-turns. It is appropriate for most road types, although it is not typically used for major thoroughfares. Costs (2017 dollars) \$15k - \$60k.



- Roundabout

A raised island which requires drivers to slow, yield to traffic in the intersection, and then circulate the island to complete their movement. Generally considered safer than signalized and stop-controlled intersections. Has a limit to the number of lanes that can be accommodated, as well as the volume of traffic it can handle during peak times. Can be used to replace a traffic signal. If used to replace a City-owned traffic signal, would reduce maintenance costs, and would eventually increase revenue from Municipal Agreement under NCDOT Schedule C & D. Appropriate for all road types, but not typical for intersections inside of neighborhoods. Costs vary wildly based on retro-fit versus new construction costs, but recent 2017 dollars have estimates range from \$150k - \$2M.



- Speed Bump/Hump

A 3 to 4 inch raised area that forces drivers to reduce speed or else they experience discomfort. This type of treatment impacts emergency response time as it delays fire trucks and ambulances, but it does not impact access to driveways. One of the most cost-efficient ways to reduce speeding, but only suitable for less-heavily traveled roads, residential roads, and roads with lower speeds. Costs (2017 dollars) \$2k - \$4k.



- Speed Cushion

Raised areas that are identical to speed bumps/humps, with gaps between raised areas located to allow the wheels of wider fire engines higher speeds across the cushion. A detriment of this treatment is that collective experience shows drivers of standard vehicles favor driving with one of their wheels aligned with the gap in the cushion which can lead to “close calls” with on-coming traffic. Motorcycles also use the gap without reducing speed. This treatment is appropriate for collectors and residential roads. Costs (2017 dollars) \$2.5k - \$6k.





- Speed Table/Raised Crosswalk

Speed bump/hump with a flat top, often used in an area with a lot of pedestrian activity or where pedestrian visibility is a priority. This treatment is also useful when reviewing place-making opportunities and trying to serve pedestrian safety concerns, like the downtown area, but less suitable for higher-speed roads. This measure also has a sizable crash rate reduction on treated streets. This treatment is not favorable for emergency access vehicles, and causes delays similar to speed bumps/humps. Costs (2017 dollars) \$4k - \$8k.



- Raised Intersection

The road rises to sidewalk level, and generally makes the intersection more pedestrian-accessible. This measure is normally observed in densely-developed urban areas, and part of a broader area-wide traffic calming scheme with very high pedestrian crossing demand. This measure is not suitable for high-speed roads or major thoroughfares. This treatment is not favorable for emergency access vehicles, but is not as impactful as speed bumps/humps. Costs vary wildly based on the site however research provides a 2017 dollars' estimate of \$15k to \$60k and higher per treatment.



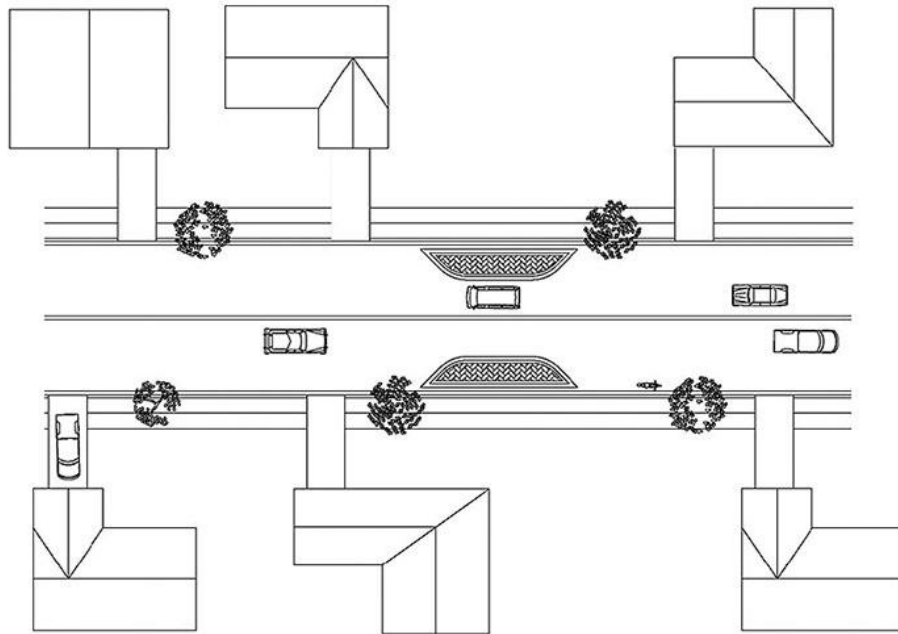
- Corner extension/bulb-out

An extension of the sidewalk into the road, resulting in a narrower roadway. This reduces the distance pedestrians need to cross an intersection, and is appropriate for all road types. Vehicle speeds may not be reduced as effectively as other treatment options. The two main challenges for this treatment is drainage and visibility of the curb delineation. Emergency and transit vehicles should not have an issue with this treatment. When applied to all corners of a four-legged intersection, 2017 dollar estimates begin at \$8k and increase to \$40k or more if drainage is an issue.



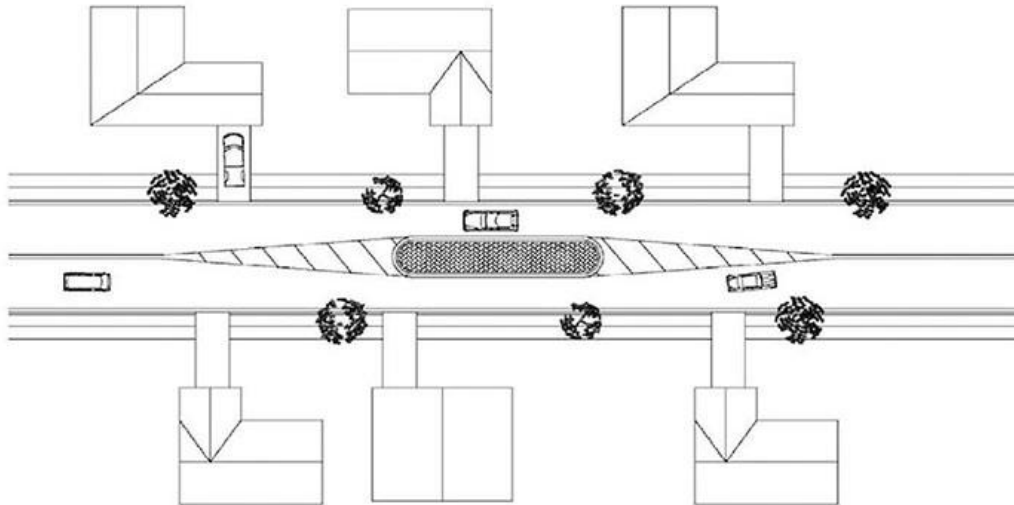
- Choker

Essentially a corner extension/bulb-out that is placed at a mid-block location, or where there is not an intersection. Can be used to narrow the shoulder, or can be used to pinch a two-lane road down into a one-lane segment at a specific location with a “one-lane choker”. A one-lane choker forces two-way traffic to take turns going through the pinch point. This would be similar to a one-lane bridge on a two-lane road. Appropriate for all road types and mainly lower speeds, but may not reduce as effectively as other treatment options depending on application. Emergency and transit vehicles should not have an issue with this treatment. Costs (2017 dollars) \$10k - \$25k.



- Median Island

A raised island along the street centerline that narrows the travel lane. This can be used as a pedestrian refuge when used at a pedestrian crossing, and also with a Choker which can help reduce speeds more efficiently. Driveway access in relation to the median is always a concern. Studies have shown that there is no significant impact on speed reduction beyond the median island. Cost is a direct function of length and width of median island and research estimates place typical 2017-dollar estimate at \$15k - \$55k per treatment.



- On-Street Parking

Providing on-street parking narrows the road when vehicles are parked. This can also be used as a place-making tool to provide parking opportunities to nearby land uses. A challenge arises when parking is not used, that drivers may feel more comfortable speeding through the area. There's also the concern of drivers maneuvering between active traffic and parking. This treatment is appropriate in most settings on most roads, but should be reviewed on a case-by-case basis instead of applied with broad strokes. Parking should not be considered near traffic circles, roundabouts, or where it could create safety hazards at intersections. Costs vary based on length of application, and is open to interpretation, with one estimate placing the cost at \$5k-\$10k per newly paved space, and another placing the cost at \$250 per retrofitted parking space for a road diet.



- Road Diet

Reduces the existing number of lanes or their lane width through paint or physical changes. This often occurs with four-lane roads being converted to three-lane or two-lane roads, with improvements suggested along the segment or corridor. The improvements typically associated with a road diet include bicycle lanes, multi-use paths, two-way left-turn lanes, pocket turn-lanes, on-street parking, raised medians, sidewalks, and many other improvements. This treatment is suitable for nearly all road types, all speeds, and benefits all road users. Limiting factor for a road diet is the volume of the road, with an unofficial threshold of 20,000 vehicles per day. While a road diet normally reduces the number of through lanes, mobility (i.e., speed, travel time) can actually improve depending on how the treatment is applied. This type of treatment typically requires a lot of community involvement, and the costs vary wildly as each site is unique and different.

