NEIGHBORHOOD TRAFFIC MANAGEMENT PROGRAM (NTMP)

POLICY AND PROCEDURES

CITY OF TUCSON
Department of Transportation
Traffic Engineering Division
Neighborhood Traffic Management Program
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INTRODUCTION

The protection of neighborhood environments and quality of life depends largely on the function of residential streets. The primary function of local and collector streets that serve neighborhoods is to serve the land that abuts them. Neighborhood streets, however, also serve as routes for those who wish only to travel through the neighborhood. As a result, conflict arises between the negative impacts of unnecessary traffic on neighborhood streets and the quality of life within the neighborhood. This conflict is reflected in virtually all Tucson neighborhoods and area plans, which contain goal statements, that discourage the use of neighborhood streets by nonlocal vehicular traffic. In addition to nonlocal traffic volumes, excessive vehicular speed is another element of the conflict. Independently, or in combination, nonlocal traffic volumes and excessive vehicular speed result in safety, noise, air quality, and visual impacts that detract from neighborhood quality of life. The overriding consideration in solving traffic problems in neighborhoods must be safety, the impacts of unnecessary traffic in the neighborhood environment, and maintaining emergency vehicle access. Convenience to the motorist is a secondary consideration in neighborhoods. This program is intended to establish a comprehensive approach to protecting Tucson neighborhoods through the management and control of traffic on neighborhood streets.

GOALS

The intent of the program is to protect neighborhoods and neighborhood quality of life through traffic management and control strategies. The goals are:

1. To protect existing neighborhood environments, cohesion, and integrity through traffic management.

2. To promote safe and comfortable travel in neighborhoods for pedestrians, bicyclists, and motorized vehicles.

3. To achieve efficient, effective, and safe movement of traffic within neighborhoods (including emergency vehicles) consistent with the intended function of the neighborhood street.

4. To provide acceptable levels of accessibility for local traffic, minimize unwanted traffic, discourage excessive speeds, and encourage opportunities for alternate modes of travel, all in recognition of quality of life and the specific objectives of the neighborhood or area plan.

5. To maintain acceptable levels of service on the City's arterials so as to avoid intrusion/diversion onto neighborhood collectors and local streets.

GUIDELINES

1. Neighborhood streets are defined as local or collector streets within or adjacent to designated neighborhoods with abutting land uses that are at least 85 percent residential when considered in segments of one-quarter mile.

2. Traffic volumes on neighborhood streets should be consistent with the density of residential development that is served by a particular neighborhood street. According to data assembled by the Institute of Transportation Engineers, single family detached residences serve as origins or destinations for five to twenty trips on a typical workday. As a general guideline, traffic volumes on neighborhood streets (total for both directions) should not exceed:
   - Local Street, Low Density - 1,000 vehicles per day or 75 vehicles per hour.
   - Local Street, High Density - 2,000 vehicles per day or 150 vehicles per hour.
   - Collector Street - 8,000 vehicles per day or 800 vehicles per hour.

   Neighborhood streets with traffic volumes near or in excess of these guidelines may benefit from a traffic study to develop, implement, and evaluate possible remedial actions.

3. Vehicle speeds on neighborhood streets generally should be:
   - Local Street - 25 miles per hour.
   - Collector Street - 30 to 35 miles per hour.

   Traffic speeds in excess of these guidelines, or neighborhoods, areas, or residences experiencing "unwanted" traffic volumes on neighborhood streets may indicate the need for implementation of a traffic mitigation plan and/or possibly a traffic study to develop, implement, and evaluate remedial actions. "Unwanted traffic" is defined as traffic within the neighborhood operating at excessive speeds, an excessive volume of traffic, cut-through traffic (using the neighborhood street as a shortcut or detour), or vehicles with origins or destinations outside of the neighborhood area.

POLICIES

1. The intended traffic service and accessibility functions of neighborhood streets shall be consistent with the hierarchy established in the Major Streets and Routes Plan, as amended.

2. Construction or reconstruction of streets and routes shall be consistent with the right-of-way and design standards established in the Major Streets and Routes Plan, as amended.

3. Implementation of the Major Streets and Routes Plan, as amended, and the adopted Pima Association of Governments Regional Transportation Plan should continue in order to provide acceptable levels of service on key features and principal arterials, and discourage neighborhood traffic intrusion.

4. All actions with regard to implementation of any feature of the Major Streets and Routes Plan and the Regional Transportation Plan, or land use proposals adjacent to any feature, shall consider as a primary goal the protection of existing neighborhood environments, cohesion, and integrity.

5. Both key features and principal arterial routes shall be designed to prohibit, where possible, neighborhood traffic intrusion.

6. Encourage the vehicular use of major streets through:
   a. The implementation of the Major Streets and Routes Plan.
   b. The improvement of safety and capacity at major street intersections.
   c. The application of traffic control devices consistent with applicable standards and practices.
   d. Enhancement and expansion of the computerized synchronization of traffic signals.
   e. The proper spacing of traffic signals.
   f. The control of access to major streets.
   g. The posting of speed limits consistent with applicable standards and practices.

   New residential areas and commercial developments shall be planned and constructed to discourage neighborhood traffic intrusion.

7. The City Department of Transportation shall provide technical assistance to neighborhoods and areas to define perceived traffic problems, develop and implement cost effective actions, and evaluate the effectiveness of implemented actions to resolve identified traffic problems.

8. Traffic management and control in neighborhoods shall be consistent with applicable standards and practices, and provide for emergency vehicle access.

9. Traffic management and control in neighborhoods shall be carried out in a systems context to minimize, and, if possible, avoid negative traffic impacts on adjacent neighborhoods and areas.

TRAFFIC CALMING

The NTMP (Neighborhood Traffic Management Program) is a program designed specifically to protect the environment and quality of life in Tucson neighborhoods through the management and control of traffic on neighborhood streets. What makes this program unique is neighborhood participation: The neighborhood and the Department of Transportation - NTMP can work together to create a pleasant and safe environment in which to live.

WHAT CAN BE DONE TO CORRECT A TRAFFIC PROBLEM?

There are many comprehensive approaches to correcting a traffic problem. Some are physical and some are non-physical:

Physical Approach:

* Speed Humps/Speed Tables
* Traffic Circles
* Traffic Islands
* Diverters
* Median Barriers
* Chicanes/Chokers
* Forced Turns
* Cul-de-Sacs

Non-Physical Approach:

* Signing (Speed Limit, etc)
* Turn Prohibition
* One-Way Streets
* Truck Restrictions
* Police Enforcement
* Elimination of Sight Obstruction (Trim bushes)
* Parking Programs

PROCEDURES

HOW DOES THE PROCESS BEGIN? HOW DOES THE PROGRAM WORK?

1. The process begins when an individual requests information for solving traffic problems in their neighborhood from NTMP. A request for traffic mitigation shall be made to the NTMP office. (The area for mitigation must be within the City of Tucson Limits) In response, a packet of information will be mailed to the individual requesting the mitigation.
2. After the information is reviewed, and before any remedial actions can be implemented, a petition must be circulated in the affected neighborhood. A specific NTMP petition will be required for all traffic mitigation depending on the type of traffic mitigation being requested (i.e. Speed Hump Petition for Speed Humps).
3. A petition for traffic mitigation *including speed humps, speed tables, traffic circles, chicanes, etc.* will require 60% signatures of either the businesses or residents (owners or renters) of the properties petitioned.
4. A petition for *street closures, diverters, median barriers, traffic islands, etc.* will require 60% signatures of either the businesses or residents (owners or renters) of the properties petitioned.
5. A petition for an *alley closure* will require 100% signatures of (property owner's/business owner's) of the properties petitioned.
6. The petitions submitted to NTMP must be our original petition, and it must represent the exact mitigation requested. The upper portion of the petition must be filled out prior to collecting signatures. Copies may be made of the original petition if additional copies are needed for obtaining signatures. You may call us (520) 791-4259 to have a specific petition mailed or e-mailed to you.
7. To be counted as 'valid', each petition signature must be legible, and it must have the full property address, signature of first and last name, printed first and last name, and the date the petition was signed. Petitions containing all of the original signatures must be returned to the NTMP office.
8. At least 60% of the residents or businesses in the affected area must support the proposed mitigation (with the exception of alley closures, which require 100%). Only one signature per property is allowable. The petition is to help guarantee that the neighborhood will actively support a traffic mitigation program, and it will also give the Mayor and Council a clear indication of the neighborhood's concerns.
9. If the petition submitted to the NTMP office does not meet the percentage requirement, the contact person will be notified that additional petition signatures are needed.
10. If the petition does meet the percentage requirement, a meeting with the neighborhood and NTMP staff may be held to inform residents of the techniques and strategies to eliminate or reduce traffic problems. The residents should establish a Neighborhood Traffic Advisory Committee to work closely with the NTMP staff.
11. NTMP staff will then proceed with agency approvals for the proposed traffic mitigation plan to make sure there are no issues with drainage, emergency vehicle access, etc.
12. After the agency approvals have been completed, NTMP staff will notify the contact person by a letter of approval with modifications, if any modifications are required to be made to the proposed traffic mitigation plan, and information for completing the traffic mitigation process.
13. The traffic plan costs are paid for by the neighborhood through neighborhood contributions. It is the neighborhood's responsibility to fund the mitigation, and to hire, pay, and work directly with a licensed contractor.
14. Maintenance of the landscaping in *chicanes, medians, traffic circles,* etc, in most cases, will become the responsibility of the residents. If the landscaping obstructs the view of traffic, becomes unsightly, or is otherwise potentially hazardous, the Department of Transportation shall have the authority to remove the landscaping.
15. All petitions submitted to NTMP will remain active for up to FOUR YEARS. After the four-year period has expired, the petition will no longer be valid, and a new petition will be required.
16. In complicated plans such as *traffic islands, median barriers, diverters, alley or street closures*, etc, the neighborhood may be responsible for hiring a consulting engineer.
17. Certain plans that divert traffic will need to be approved by Mayor and Council.
18. The removal process for any traffic mitigation plan that has been installed, will consist of a petition with at least 60% of the petitioned area approving the removal of the traffic mitigation. Additionally, the neighborhood requesting the removal of the traffic mitigation will be responsible for funding its removal.
19. If the neighborhood would like a traffic study done for their street or neighborhood, they must contact the NTMP office and notify us of the proposed traffic study area. (A traffic study is not required for traffic mitigation.)
20. The neighborhood must hire a Traffic Count Company to do the counts and process the report. NTMP requires that the neighborhood also request a copy of the count report for our files for review for potential mitigation in the traffic study area. The neighborhood can request that the count company e-mail the count report to: neighborhoodtraffic@tucsonaz.gov
21. If you are unsure of the petition area required for the traffic mitigation plan you are requesting, please contact NTMP at (520) 791-4259.

SPEED HUMP AND SPEED TABLE PETITION AREA

A request for speed humps/speed tables shall be made to the NTMP office. (Please see Procedures on Page 3)

1. The petition area for speed humps shall include the properties on both sides of the street (including corner properties) between the two intersections of the street where the proposed speed hump(s) will be placed. Where an intermediate intersecting street is a cul-de-sac, all residences on the cul-de-sac will be included.
2. Signatures from at least 60% of these residents (owners or renters) and businesses will be required to initiate the mitigation process.
3. Speed humps and speed tables can only be installed on a paved street or a paved alleyway. Speed humps or speed tables cannot be installed on collector streets or arterial streets.
4. The Tucson Fire Department has designated certain streets as Secondary Emergency Routes. These are streets that are frequently used by the City of Tucson Fire Department to access their emergency destinations. In the event that the street chosen for speed hump mitigation is designated by the Fire Department as a Secondary Emergency Route, speed tables must be installed on that street.

WHAT IS THE DIFFERENCE BETWEEN A SPEED *BUMP*, A SPEED *HUMP*, AND A SPEED *TABLE*?

- **Speed Bumps** are 2' to 3' wide and 4" to 6" high. Speed Bumps are not authorized for use on public city streets. They are exclusively used in shopping centers, apartment complexes, and other private properties.
- **Speed Humps** are nationally accepted, and are used on residential streets. A speed hump is 12' wide, and 3" to 3½" high. A speed hump is designed to reduce the speed of vehicles on residential streets where speeding is occurring. They are not designed to change the volume of traffic on residential streets, and do not significantly reduce cut-through traffic. For Speed humps, to be effective, they must be installed in a series, approximately 400' to 600' apart. The number of speed humps installed depends on the length of the street.
- **Speed Tables** are nationally accepted, and are used on secondary emergency streets when the Fire Department has determined that speed humps are not appropriate. A speed table is 22' wide, and 3" to 3½" high. It has a flat 10' section in the middle and 6' ramps on each end.

TRAFFIC CIRCLE PETITION AREA

A request for a traffic circle shall be made to the NTMP office (Please see Procedures on Page 3)

1. The petition area for a traffic circle shall be defined by the NTMP office and will generally consist of all businesses and residences abutting, whether facing or not, all street segments radiating from the intersection, or street segment in question, usually for a distance of one block, to the next intervening four-way intersection.
2. Signatures from at least 60% of these businesses and residents (owners or renters) will be required to initiate the mitigation process.
3. A traffic circle is designed to reduce the speed of vehicles on residential streets where speeding is occurring, but may have limited impact on mid-block speeds. A traffic circle is not designed to change the volume of traffic on residential streets, and does not significantly reduce cut-through traffic.
4. A traffic circle can only be installed at a paved, four-way intersection, and cannot be installed at a "T" Type intersection.
5. If there is an existing manhole at an intersection where a proposed traffic circle is being petitioned, there will be an additional cost to raise the manhole above the traffic circle so that Wastewater Management can access it.
6. All landscaping in *traffic circles*, *chicanes*, *medians*, etc, must be approved by a Landscape Architect prior to installation. Landscaping includes, but is not limited to, vegetation and art projects.
7. Maintenance of the landscaping in the *traffic circles, chicanes, medians*, etc, in most cases, will become the responsibility of the residents. If the landscaping obstructs the view of traffic, becomes unsightly, or is otherwise potentially hazardous, the Department of Transportation shall have the authority to remove the landscaping. (a traffic circle may or may not include landscaping as part of the mitigation)
8. In complicated plans such as *alley or street closures, traffic islands, median barriers, diverters, etc*, the neighborhood will be responsible for hiring a consulting engineer to provide a conceptual plan to the NTMP office.
9. Certain plans that divert traffic need to be approved by Mayor and Council.
10. When petitioning a new traffic circle, the neighborhood can have a choice of either Stop or Yield Signs at that 4-way intersection, unless the intersection is on a "Bike Boulevard", then Yield Signs will be required.
11. If a traffic circle already exists at an intersection, and a neighborhood wants to change the signage at that intersection from a 4-way Stop to a 4-way Yield, a petition will be required with 60% neighborhood approval. (Please see Procedures on Page 3)
12. If a traffic circle already exists at an intersection, and a neighborhood wants to change the signage at that intersection from 4-way Yield to a 4-way Stop, and if the traffic circle is *not* on a "Bike Boulevard", a petition will be required with 60% neighborhood approval. (Please see Procedures on Page 3)

OTHER PETITION AREAS (alley closures, street closures, diverters, median barriers, traffic islands, etc.)
A request for other petition areas, including alley closures, street closures, diverters, median barriers, traffic islands, etc., shall be made to the NTMP office. (Please see Procedures on Page 3)

1. When submitting a petition for an *alley closure*, signatures from 100% of the property owner's/businesses will be required.
2. When submitting a petition for *street closures, diverters, median barriers, traffic islands, etc.*, signatures from 60% of the property owner's or renters and/or businesses will be required.
3. If an *alley closure* or a *street closure* is requested, the fire department requires that there must be at least a 65-foot turning radius at the end of the closure (32½ feet from the center of the radius).
4. Certain plans that divert traffic need to be approved by Mayor and Council.
5. In complicated plans such as *alley or street closures, diverters, median barriers, traffic islands, etc.*, the neighborhood may be responsible for hiring a consulting engineer to provide a conceptual plan to the NTMP office.
6. Maintenance of the landscaping in *chicanes, medians, traffic circles,* etc, in most cases, will become the responsibility of the residents. If the landscaping obstructs the view of traffic, becomes unsightly, or is otherwise potentially hazardous, the Department of Transportation shall have the authority to remove the landscaping.
7. A sign posted on the gate/bollard with contact information for opening the alley or street closure will be required.
8. If you are unsure about a petition area, please contact NTMP. (520) 791-4259.

HOW DO I GET NEIGHBORHOOD SIGNS INSTALLED IN OUR NEIGHBORHOOD?

The City of Tucson, Department of Transportation (TDOT) helps residents and visitors identify the various communities through special signs posted at area boundaries. The area's name and logo is printed with Engineering Reflective Sheeting on a 12-inch by 24-inch sign, and is placed on the street name's sign posts, only at locations with existing street name signs.

PROCEDURE OF NEIGHBORHOOD SIGN INSTALLATION:

1. All signs shall be fabricated using Engineering Reflective sheeting on aluminum sign blanks – 12 inches at the highest point, and 24 inches in length. - all signs must be 12 inches in height x 24 inches in length.
2. Signs are installed only in neighborhoods/subdivisions officially recognized by the City of Tucson.
3. Signs cannot be installed at any signalized intersection.
4. The signs shall not contain any regulatory colors: red, green, or yellow.
5. The neighborhood can call (520) 791-4259 to request a Neighborhood Sign Request Form. The neighborhood will also need to inform us of the boundaries of their Neighborhood Association or Subdivision, and the proposed locations where they would like to have the signs placed.
6. ***NOTE**: If your proposed Neighborhood ID sign is in **color**, you must submit your proposed sign/prototype in **full color**.
7. After the neighborhood has decided on a design/prototype of the proposed neighborhood sign, the neighborhood shall fill out the top portion of the Neighborhood Identification Sign Request Form, and mail or e-mail the *entire form*, **and** *a copy of the proposed neighborhood sign/prototype** to**:**

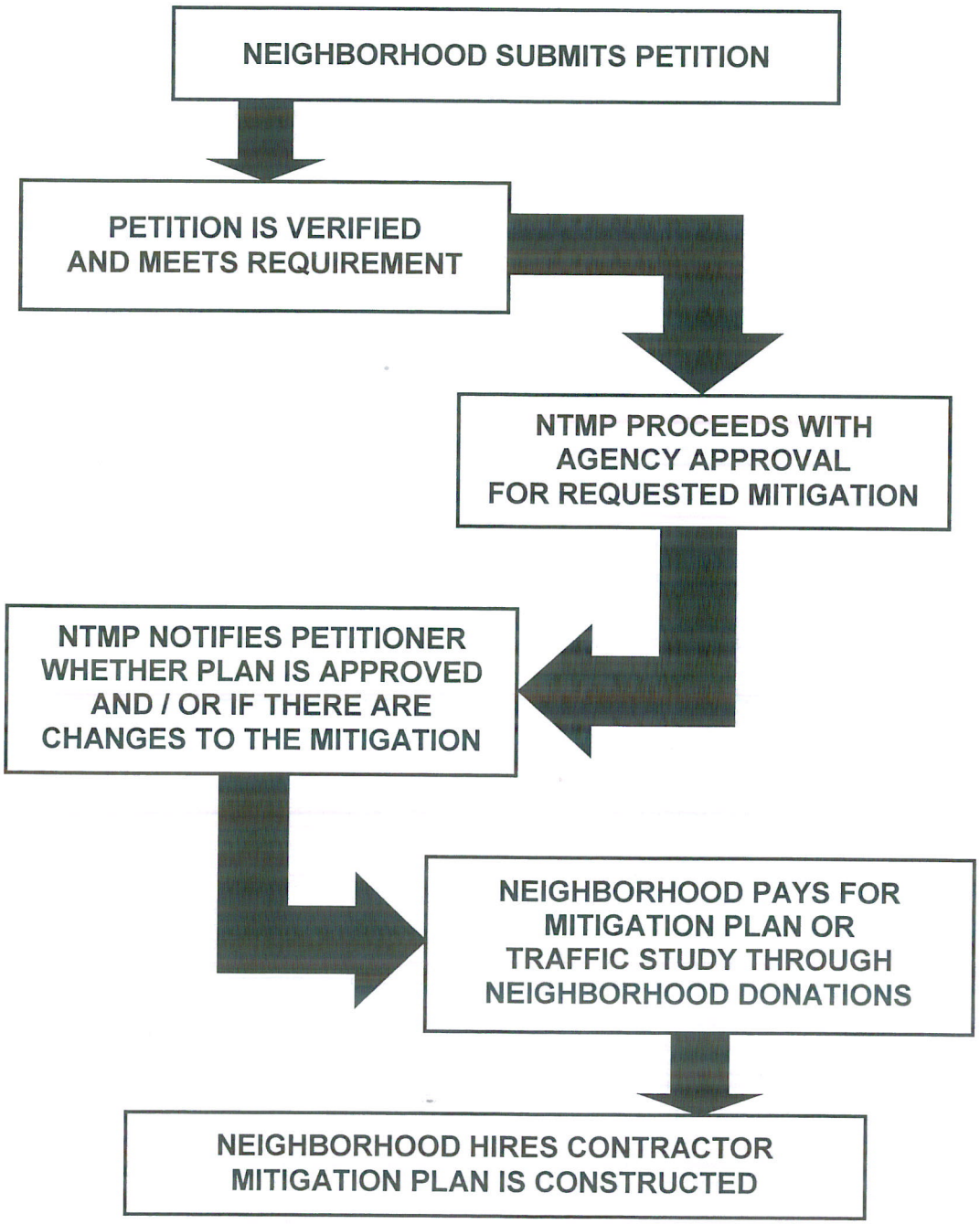
   City of Tucson
   Traffic Engineering
   Attn: Jesse Soto
   201 N. Stone Ave-5th Floor
   P.O. Box 27210
   Tucson, AZ 85726-7210 or
   e-mail to: neighborhoodtraffic@tucsonaz.gov

8. Traffic Engineering will review the design for approval.
9. Once the design is approved, Traffic Engineering will contact the neighborhood with an approval letter with possible comments, including the number of signs approved, and a map showing the proposed sign locations.
10. The neighborhood must hire a private qualified sign contractor to manufacture the signs.
11. Only one Neighborhood Identification Sign per street name location can be installed. (generally two signs are placed back-to-back)

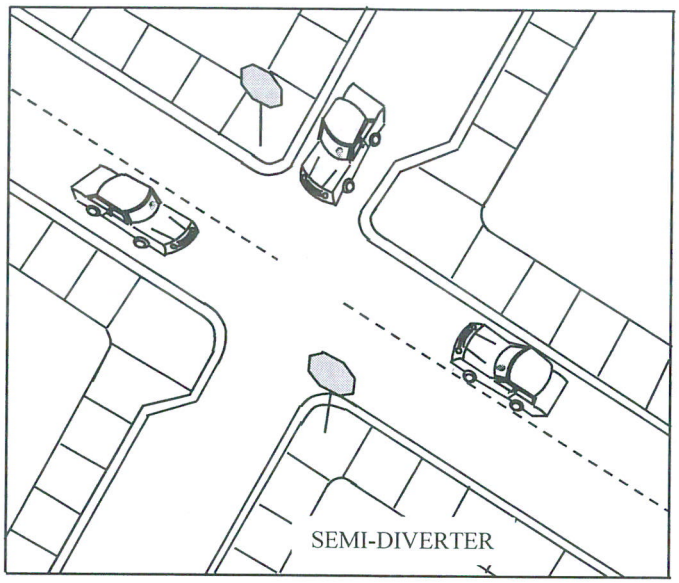
12. The neighborhood will pay the private sign contractor directly for the manufacture of the signs. The signs cost $50.00 to $100.00 per sign depending on the design. (Two signs will be required (back-to-back) for each location approved).
13. Holes will be punched in the signs before installation by the City Sign Shop.
14. When the signs are ready for pick-up, the neighborhood must pick up the completed signs from the private sign contractor, and drop them off at our office, Traffic Engineering, 201 N. Stone Avenue, 5th Floor.
15. Traffic Engineering will deliver the signs to the City Sign Shop.
16. After Traffic Engineering delivers the signs to the City Sign Shop, the signs will be scheduled for installation. (Only the City Sign Shop is authorized to install Neighborhood Identification Signs)
17. The neighborhood will be charged by the City Sign Shop for the installation cost. The labor for sign installation is up to $50.00 for each sign location (two back-to-back signs).
18. The City of Tucson will not replace or maintain the signs, and reserves the right to remove any Neighborhood Identification Signs that have become unsightly without replacing the sign.
19. **Sign Replacement:** The neighborhood may decide to order additional replacement signs when ordering the signs needed for their neighborhood locations.
20. When signs need replacing due to vandalism, loss, or normal wear, the neighborhood shall be responsible for replacing the signs at the prevailing rate for such signs, and the signs will only be replaced once the neighborhood has provided the appropriate sum.
21. The neighborhood is responsible for the storage of these replacement signs.

- Please visit the City of Tucson Website at www.tucsonaz.gov

NEIGHBORHOOD TRAFFIC MANAGEMENT PROGRAM (NTMP)



POLICY IMPLEMENTATION PROCESS

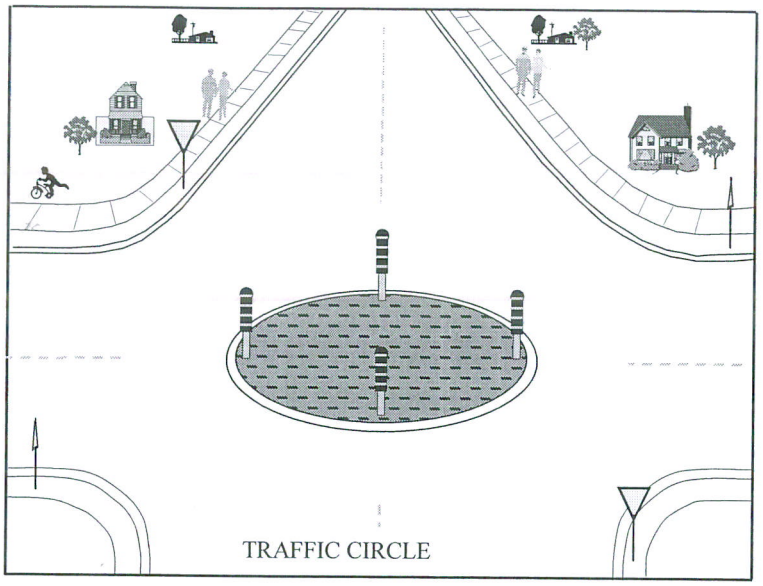


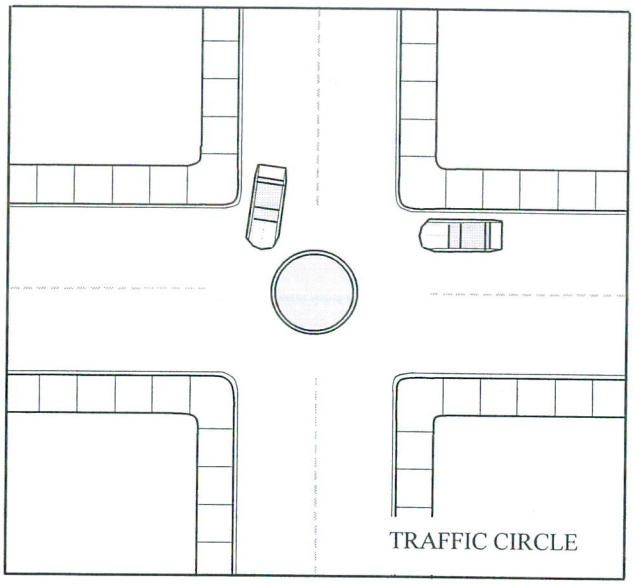
SEMI-DIVERTER -Typical Application

Effective in areas where the entry of emergency vehicles is a concern, and where neighborhood traffic management is well accepted by the public.

Effects or Impacts

Volume	Reportedly can significantly reduce volume, although subject to a relatively high violation rate of posted traffic signs.
Speed	Although not installed as a speed reduction device, the diversion of through traffic that formerly used the street as a short cut can significantly reduce speed on the street.
Noise, Energy, Air Quality	Noise reduction associated with the energy reduction of through traffic can be expected.
Safety	Generally, no impact on safety except what may be experienced due to reduced traffic volume on local streets. Accident potential may result from high violation rates.
Uniform Standards and Warrants	Not specifically covered in the MUTCD, however, recognized in basic traffic engineering standards texts and in practice. Signs and pavement markings should comply with the MUTCD.
Community Reaction	While local reaction is generally favorable, focus of community reaction can shift to violations of the diverter device or associated signs along with the lack of enforcement to prevent such violations.



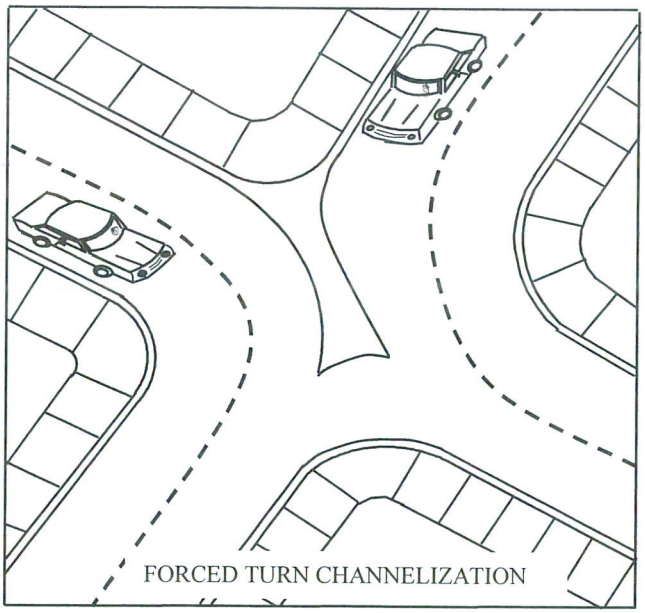


TRAFFIC CIRCLE-Typical Application

Reported to be effective at intersections with relatively high accident experience.

Effects or Impacts

Volume	Reduction of traffic volume is dependent upon the system of residential traffic management techniques and devices in the area. From a distance, the traffic circle may appear as an obstruction to traffic. If diverters have been encountered by drivers in other areas of the city, they may turn away from the circle prior to the circle. Volume reductions are typically limited unless a series of circles and diverters are placed along a route.
Speed	Reduction in speed is generally noted in the area of the traffic circle, however, the device may have only limited impact on mid-block speeds.
Noise, Energy, Air Quality	Noise reduction is associated with the reduction in volume experienced.
Safety	There is evidence that traffic circles are effective in reducing vehicle collisions at intersections. Traffic circles may present a hazard to bicyclists and pedestrians by bringing cars and trucks closer to the curb, but are normally not a problem. Design provisions must be made for emergency vehicles and city service vehicles.
Uniform Standards and Warrants	Traffic circles in neighborhoods are not specifically covered in the MUTCD; however, they are recognized in basic traffic engineering texts and in practice.
Community Reaction	There has been mixed reaction to traffic circles. Residents near the intersection perceive a reduction in traffic speed; others may see them mainly as a nuisance.

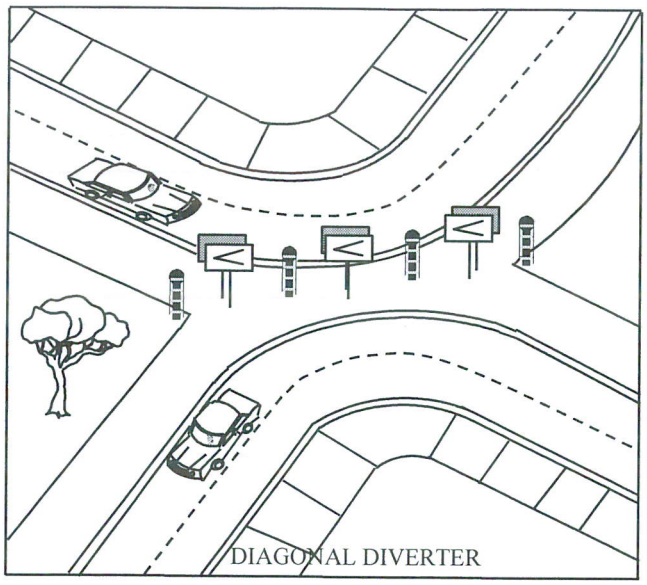


FORCED TURN CHANNELIZATION-Typical Application

Effective at the intersection of a collector and/or a local street, where traffic flow on the collector street is basically unaffected (or even enhanced) and through traffic on the local street is prevented.

Effects or Impacts

Volume	Reportedly effective in reducing volume if the turning movement prevented is a significant contributor to overall traffic on the local street.
Speed	Minimal impact on speed, except if the street was formerly used as a high speed through route.
Noise, Energy, Air Quality	Noise reduction associated with the energy reduction in volume can be expected on the local streets.
Safety	Channelization tends to increase safety of locations where the design is easily understood.
Uniform Standards and Warrants	Similar channelization techniques covered in the MUTCD.
Reaction Community	Although community reaction is generally favorable, complaints do occur if frequent violations occur.

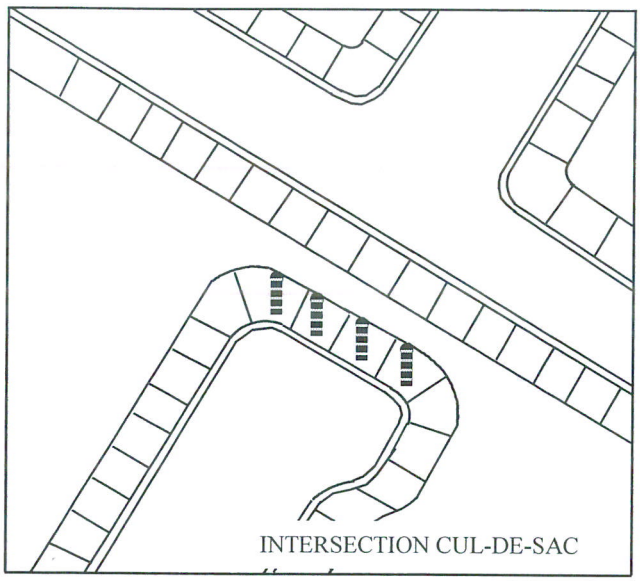


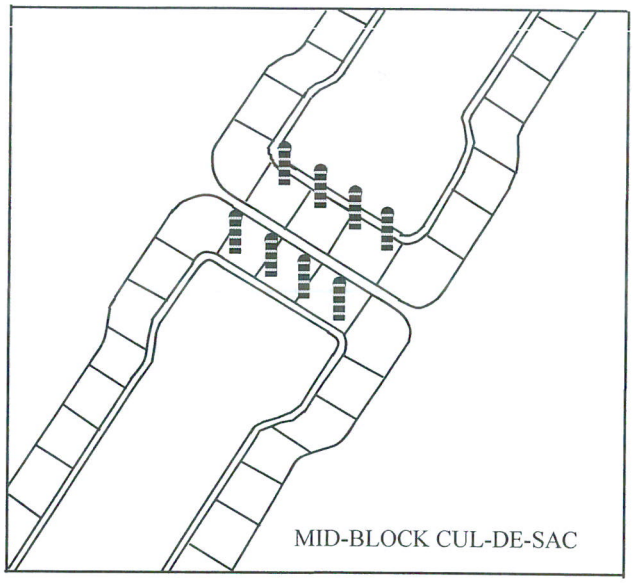
DIAGONAL DIVERTER-Typical Application

Effective as part of a system of devices which discourage or preclude travel through a neighborhood by breaking up traffic patterns associated with a grid street system. Individual or limited use can cause traffic to shift to another street or neighborhood.

Effects or Impacts

Volume	Studies have shown that traffic volumes can be reduced from 20 to 70 percent when used in conjunction with other diverter systems. They are less successful, however, if used with passive techniques such as stop signs, yield signs, or traffic circles.
Speed	Reportedly, speeds are only reduced in the immediate vicinity of the diverter. However, substantial reductions in speed may be noticed if the diverters cause a breakup of high speed through routes.
Noise, Energy, Air Quality	Noise reduction associated with the energy reduction in volume can be expected on the affected local streets.
Safety	Before-and-after studies of accident rates on streets with diverters show a substantial reduction in accidents after the installation of diverters. Systemwide accident experience, however, reportedly remains the same.
Uniform Standards and Warrants	Not specifically listed in the MUTCD. However, diverters may be considered a channelizing island, being constructed and marked as such.
Community Reaction	Residents of areas where a substantial number of diverter systems are used are generally in favor of them; residents in other areas are generally opposed. This is substantiated by a vote in Berkeley, California. Residents in areas of the city that had few diverters, voted for the removal of them; residents in areas with frequent diverters, voted against their removal.





INTERSECTION CUL-DE-SAC and MID-BLOCK CUL-DE-SAC-Typical Application

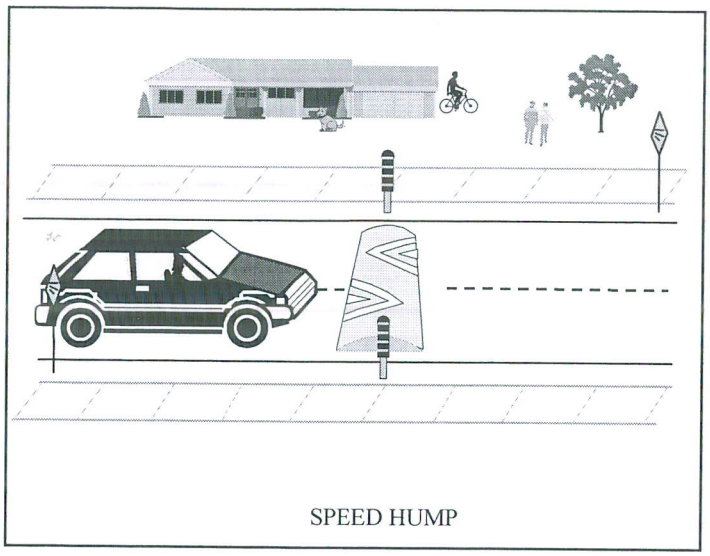
Effective in areas near high traffic generators where the residents are less concerned about access by emergency vehicles than they are about excess traffic. Also found to be effective in areas where other diversion methods are frequently violated.

Effects or Impacts

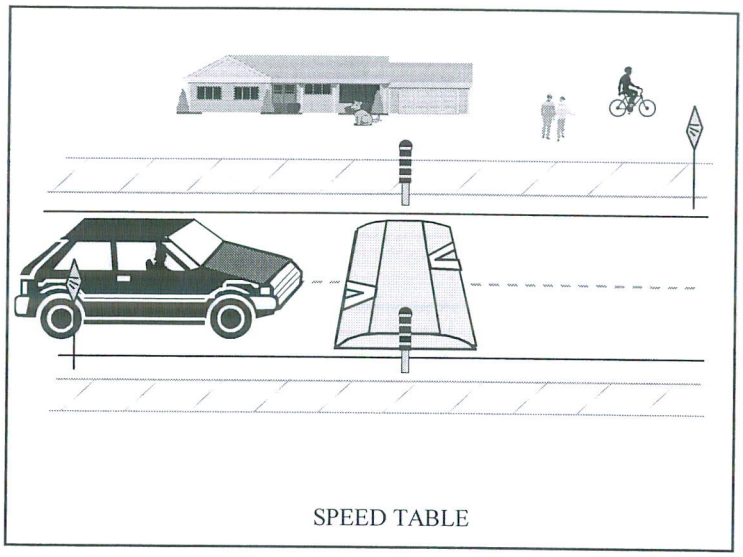
Volume	Reported to be extremely effective in reducing traffic volumes.
Speed	Speeds are reduced if the cul-de-sacs cut off a formerly used through route.
Noise, Energy, Air Quality	Noise is reduced as a function of traffic reduction.
Safety	Safety is enhanced on the local street based upon the reduction in volume.
Uniform Standards and Warrants	Acknowledged in basic traffic engineering texts and in practice.
Community Reaction	Generally favorable on the streets where they are used; disliked by others in the community if traffic is shifted to their street, or if long detours are caused. Emergency service access can be provided through removable or flexible barriers, or through tire track passages.

Descriptions

Cul-de-sacing is commonly used and is a very effective way of eliminating nonlocal traffic on a street. There are inherent problems in closing a street, however. The response time of emergency vehicles may be increased. Residents will have only one way to/from their street, which may be a problem if the street intersects with an arterial. If unwanted through traffic is a persistent problem, and a high violation rate is noted with other traffic devices, cul-de-sacing may be an alternative. Cul-de-sacs can be landscaped to add to the environment of the street and may add to the feeling of community.



SPEED HUMP



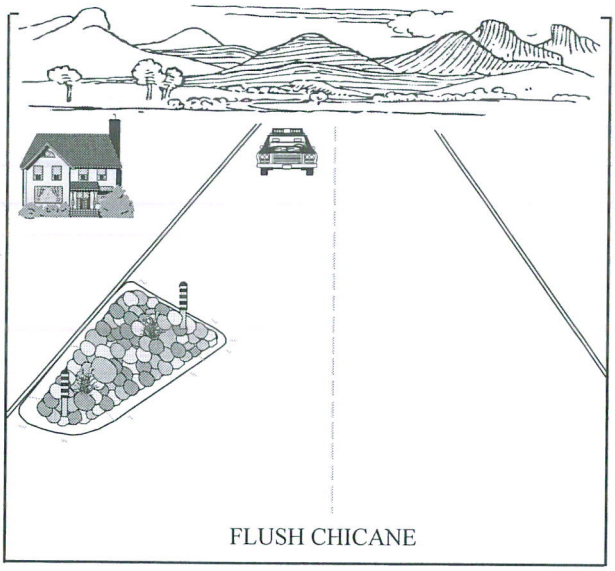
SPEED TABLE

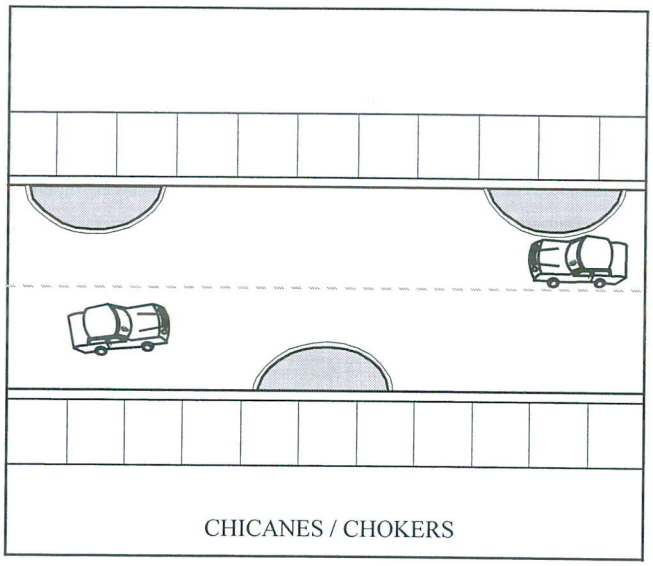
SPEED HUMP and SPEED TABLE-Typical Application

Effective as a speed and volume reduction technique on local streets with limited truck traffic.

Effects or Impacts

Volume	We have found the volume of traffic did not change as expected. The same volume of traffic continued to travel through the neighborhood, but at slower speeds, with the exception of some isolated speeding.
Speed	A single speed hump or speed table can reduce the 85th percentile speed between 14 to 20 mph at the device itself, with normal speeds returning soon after the encounter of the hump. A series of humps (undulations) with spacings less than 600 feet will reportedly have an increased effect on speed reductions.
Noise, Energy, Air Quality	Reportedly, some reductions in noise energy levels can be experienced on low-volume streets. Noise levels can actually increase if there is substantial truck traffic on the street.
Safety	There has been a great deal of debate and discussion as to the impact undulations have on vehicle safety. While felt by some engineers to be a serious hazard, a study by a subcommittee of the California Traffic Control Devices Committee found that with between 150 and 200 million crossings of the state's 150 to 160 undulations, very few claims for damages had been filed due to the undulations.
Uniform Standards and Warrants	Not covered by the MUTCD, but recently accepted by the Institute of Transportation and Engineers.
Community Reaction	Mixed reaction has been noted. Local residents note an apparent decrease in speed, and like them because they feel that speed humps/speed tables are the least expensive approach to their problems.





FLUSH CHICANE-Typical Application

Typically a series of at least three curb extensions, alternating from one side of the street to the other, forming S-shaped curves. At intersections, also called neckdowns or bulb-outs. At mid-block, also called deviations or chokers. Works well with speed humps, speed tables, raised intersections, textured crosswalks, pedestrian crossings, and raised median islands.

Effects or Impacts

Volume	Minor decrease in traffic for two-lane and 20 percent reduction for one-lane chokers. Most effective with equivalent volumes on both approaches. Maneuvering through chicanes may reduce the comfort level of some motorists, encouraging them to take an alternative route.
Speed	Effective as a speed reduction technique on local streets. Speeds have typically been reduced on average by 4 percent for two-lane chokers, and 14 percent for one-lane chokers.
Noise, Energy, Air Quality	Adequate drainage is a key consideration. Provides opportunity for landscaping. Street sweeping may need to be done manually. Can impact parking and driveway access.
Safety	No effect on street access. One-lane chokers/chicanes rely on regulatory signs and driver courtesy to work. Preferred by many fire department/emergency response agencies to most other traffic calming measures. Emergency response typically prefer two-lane chicanes to speed humps. Reduces pedestrian crossing width and increases visibility of pedestrians. Chicanes require motorists to make a turning maneuver to travel through the chicanes, making it more difficult to pass through them at higher speeds.
Uniform Standards and Warrants	Some applications use an island which allows drainage and bicyclists to continue between the choker and the original curb line. Typically designed to narrow the road to 20 feet for two-way traffic. RPM's and bollards or object markers are used to make chicanes visible to motorists.
Community Reaction	Chicanes give the impression of a narrower road, slowing down drivers as they maneuver through the devices.