NEIGHBORHOOD TRAFFIC MANAGEMENT PROGRAM

Adopted June 27, 2001

ACKNOWLEDGEMENTS

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I. EXECUTIVE SUMMARY

The primary goal of the Neighborhood Traffic Management Program (NTMP) is to provide residents relief from traffic-related impacts, such as speeding and other vehicle code violations, traffic volumes, noise, and threats to pedestrian and bicycle safety. This program balances the need for quick response in some cases, and the advantages of economy of scale in others. The primary means of communication to and from the community will be through the neighborhood associations, and citizens are encouraged to participate through their local association.

The City shall set aside an annual amount of funding for the neighborhood traffic management program. If funds are exhausted during the budget year, then the process shall stop for the remainder of that year until other funds are secured.

Why Traffic Management?

The City of Citrus Heights adopted this approach to neighborhood traffic management as a result of much concern about neighborhood traffic and an increased workload of complaints from citizens. It has become ineffective and inefficient to address a traffic problem as though it was a unique and unusual circumstance. Many complaints are of the same nature and similar responses to similar circumstances are appropriate. Staff spends considerable time collecting data, authoring memoranda and ancillary reports to both constituents and the City Council, and conducting follow-up studies.

Major considerations in a neighborhood traffic management program include the establishment of policy guidelines, public participation, education and enforcement strategies, recommended traffic control devices and criteria for their use.

The Neighborhood Traffic Management Program has two complementary components that will be referred to often in this document. They are defined as follows:

Ongoing Traffic Management-This is the process by which the City can respond quickly to traffic issues one at a time, as they are reported. It is typically done by City staff. Its advantages are:

- It preserves the ability to be responsive.
- Develops good community rapport by having a known contact at City Hall.
- Develops on-staff experience and policy-making capability.

Limitations of this process are:

- It can be overloaded by many complaints.
- It has limited data gathering and presentation ability.
- It has limited public outreach capability.
- It has limited design capability.

Active Traffic Management-This is a proactive process that actively solicits resident involvement, and typically is supported by mobilizing consultant resources. Its advantages are:

- It addresses multiple related traffic concerns.
- It uses scale economies to make the best use of available funding.
- It is more visible.
- It promotes comprehensive solutions on an area-wide basis.

Disadvantages are:

- Since it involves considerable expense and effort by all involved, it can only be done periodically, typically anually or less frequently.
- It happens on a fairly protracted schedule, so residents do not see immediate results.

Traditionally, traffic concerns were handled via the ongoing traffic management model. This is effective in certain cases. However, when the same types of concerns are seen again and again, it indicates the need for a proactive strategy that will actively expose as many of these as possible, and a need for the formulation of a comprehensive response. This need led to the active traffic management model. In practice, there is a need for both strategies of handling traffic problems.

Traffic Management Program

Both traffic management strategies follow the same basic steps. These are briefly listed below and are more fully discussed in Section III, "Process Overview". In some cases, it may not be necessary to follow every step, depending on the particular circumstances present.

1. Input of reported problem.
2. Confirmation/Investigation of reported problem.
3. Consideration of solution alternatives.
4. Review of selected solution.
5. Modification of selected solution.
6. City Council action.
7. Polling of affected residents.
8. Design.
9. Construction.
10. Evaluation.

II. POLICY GUIDELINES

The following policy guidelines are recommended for the implementation of local street traffic management projects:

- A combination of education, enforcement and engineering methods should be used to manage traffic. Traffic management devices will be planned, designed and used in keeping with sound engineering and planning practices. The City Engineer shall direct the installation of traffic control devices in compliance with the State of California Vehicle Code.

- In general, the use of traffic control devices will be warrant-driven, where warrants exist. Warrants are minimum requirements that should be met before a given measure is implemented. This is to retain control of the consistency and number of devices used.

- Some diversion of traffic from a traffic managed street to an adjacent street will be unavoidable. An increase of up to 25 percent of existing vehicles or 500 vehicles per day, whichever is less, would trigger an automatic analysis of that street. The analysis would include evaluation of measures to lower the level of impact. Some diversion of traffic from a local street to a collector street is appropriate, based on the functional definitions of the two types of streets.

- A low ambient level of non-neighborhood traffic on local streets usually exists and is virtually unavoidable. Ambient through traffic is estimated at between 10 percent and 20 percent of total daily traffic volume, and efforts to reduce this volume are usually not effective.

- Emergency vehicle access will be maintained in all traffic management plans. Emergency vehicle travel times will also be considered when evaluating traffic management measures.

- Reasonable automobile, pedestrian and bicycle access should be maintained to streets with traffic management plans.

- Removal of some on-street parking spaces may be necessary to install some traffic management measures. Parking loss at specific locations will be balanced with the neighborhood's desire for the traffic management device.

- In general, signs will conform to the State of California Traffic Manual and the Manual on Uniform Traffic Control Devices.

- In some cases, the most effective and appropriate solution may require a major capital improvement. Such projects will be evaluated for inclusion in the City's Five-Year Capital Improvement Plan.

III. Process Overview

The Neighborhood Traffic Management Program includes a structured planning and implementation process. A traffic management program shall be responsive to the needs of the residents of a street and neighborhood. The Ongoing Traffic Management Process will handle routine issues as they arise. The Active Traffic Management Process will reach out to neighborhoods to request input on their traffic issues. Both components may be handled by city staff acting alone or with consultant support.

The two main components of the City's Neighborhood Traffic Management Program (Ongoing Traffic Management and Active Traffic Management) handle each step in a slightly different manner. Each step, and the way each component treats them, is described below, and is summarized in Table 1, "Process Summary":

1. ***Input of Reported Problem***

   Effort in this step is concentrated on knowing the specific type of problem percieved by residents and road users. The challenge is to avoid skipping too quickly to a solution, before the reported problems have been fully explored and confirmed.
   a. Ongoing Traffic Management: Problems are recorded and acted upon as received by City staff. Ongoing level of effort, so complaint resolution can be rapid and frequent.
   b. Active Traffic Management: Problem reporting is actively solicited at area-wide neighborhood meetings, using consultant resources as needed. Includes short educational component. High effort required, so this happens at infrequent periods (one year or more).

2. ***Confirmation and Investigation of Problems***

   This step is crucial to avoid reacting to the wrong or misperceived problem. The approach is to learn enough about the reported problem to permit design of potential solutions using data gathering and on-site collaboration with the resident or road user. See Appendix A, "Typical Traffic Issues and Studies" for information on how reports of traffic problems are investigated and confirmed.
   a. Ongoing Traffic Management: City staff investigates and quantifies problem, generally in order. Complainant participation invited in problem investigation.
   b. Active Traffic Management: Large-scale data gathering, organization, and presentations are made for each area. Participation of residents from neighborhood under study invited.

3. ***Consideration of Solutions***
   a. Ongoing Traffic Management: City staff identifies and selects appropriate warrant-driven, locally-focussed solution. Typically, Category I and II solutions are used (see Section IV, "Traffic Control Measures" for definitions of categories).

b. Active Traffic Management: Comprehensive, area-wide set of solutions analyzed. Warrants are used when available. Category II, III, and IV devices considered.

4. Public Input

a. Ongoing Traffic Management: Return or advisory call to complainant by City staff regarding City's response.
b. Active Traffic Management: Proposed solutions discussed at public, area-wide Neighborhood Association meetings. After notification of residents on the affected streets. Public commentary invited and recorded.

5. Modification of Selected Solutions

a. Ongoing Traffic Management: As needed, in response to input received from complainant
b. Active Traffic Management: Public input used to refine and improve selected solutions. May require reiteration of steps 1 through 3, since new problems, not heard at the initial public meeting, are likely to surface at the second meeting.

6. Resident Polling

See Section IV, "Traffic Control Measures", for polling requirements for each traffic control measure. See Appendix B, "Resident Polling Procedures", for specifics common to all polling requirements.

a. Ongoing Traffic Management: Typically not done unless Category II, III, or IV device is involved.
b. Active Traffic Management: The polling process depends upon the measure to be implemented. Solutions that have direct effect on fronting residents, such as diverters, speed humps, and chokers, must be approved by a polling process. See Section IV, "Traffic Control Measures", for specific polling acceptance criteria for each type of solution.

7. City Council Action

a. Ongoing Traffic Management: Typically not appropriate for Category I, II, and III solutions.
b. Active Traffic Management: Council approval by simple majority required for Category IV and V measures.

8. Design

a. Ongoing Traffic Management: Typically requires minimal design work, done via City work order process.
b. Active Traffic Management: Requires detailed design work for layout of chokers, traffic circles, etc.

9. Construction

a. Notification: At least 10 calendar days before construction commences, signs will be placed in the affected area to notify residents and other stakeholders. Written notification will be sent to Fire and Police Departments.

b. Ongoing Traffic Management: Typically involves sign and striping placement, so purchase order or on-call type contracting resources are used.
c. Active Traffic Management: More complex construction may require separate, competitively bid contracts or inclusion in other contracts (overlay or capital project.)

10. Evaluation

a. Ongoing Traffic Management: As needed, subject to competition for priority status with new incoming complaints and responses
b. Active Traffic Management: Following construction of devices, area-wide data shall be gathered, analyzed, and presented in a format comparable to same work done in step 2, “Confirmation and Investigation". Effectiveness of devices is judged at this time, which may call for looping back to step 3 if further measures are needed. If such is the case, further measures can take either the Ongoing or Active Traffic Management paths, depending on resources available. Final Report prepared.

Table 1: Process Summary

	Ongoing Traffic Management	Active Traffic Managment	Example
Input of Reported Problems	City staff responds to reported traffic issues using work orders and/or service requests.	Traffic issues actively elicited from neighborhood associations at night meeting. Presentation includes display of permissible and non-permissible solutions.	"Speeds and volumes are too high on my street."
Problem Confirmation/Investigation	City staff investigates and, if possible, quantifies problem using consultant/vendor resources as necessary for data gathering and analysis	Same	Measure speeds Measure volumes Do Origin-Destination (O-D) study.
Solution Alternatives	City staff identifies alternative solutions and/or Traffic Control Devices (TCD's). Compare TCD warrants with conditions	Consultant identifies alternative solutions and/or TCD's. Compare TCD warrants with conditions.	Investigate enforcement, stop signs, diverters, striping changes, speed humps, etc.
Selection of Solutions	City staff selects	Report prepared of options with recommendations, supported by investigation. Report includes "before" conditions. City staff selects solutions.	Speed hump at two locations.
Public Input	As needed, by City staff	Display prepared with map/graphics showing selected solutions. Neighborhood Association night meeting held to show permissible/non-permissible solutions, recommended solution, and receive comments.	"We'd rather have street closed at one end." "Don't want it in front of my house."
Modification of Selected Solutions	Public input evaluated and used as appropriate.	Report prepared showing input received and modified recommendations as appropriate.	O-D study doesn't support street closure. Speed hump relocated one block.
Resident Polling	As required by selected measure.	As required by selected measure.	Fronting residents approve.
City Council Action	None.	Required for traffic circles, chokers, gateways, closures and diverters.	Agenda item for council approval.
Design	City staff, using consultant/vendor assistance as required.	City design or Consultant design with City direction.	Prepare 8½x11 location drawing/detail sheets.
Construction	County forces, private vendor, overlay contract, concrete contract, and special contract.	Same.	Change order to existing AC overlay contract.
Evaluation	As needed.	City staff investigates and prepares report using "after" traffic conditions with consultant/vendor assistance as required.	Measure speeds, volumes, do O-D study.

IV. Traffic Control Measures

The following list consists of possible neighborhood traffic control measures by category.

Category I: Implemented at the Discretion of the City Traffic Investigator

- Police Dept. Enforcement Request.
- Radar Trailer Speed Advisory.

Category II: Implemented at the Discretion of the City Engineer

- Class II (on-street) Bike Lane Striping.
- Speed and Warning Signs.
- Stop Signs.

Category III: Installed at the Discretion of the General Services Director

- Landscape Curbside Trees.
- Rumble Strips.
- Speed Humps (Permanent and Temporary.)

Category IV: Installed With Approval of City Manager and City Council

- Forced Channelization.
- One-Way Chicane.
- Speed Limit Change.
- Speed Table, Raised Intersection.
- Traffic Circle.
- Choker, Bulb-Out, Curb Extension, Center Island Narrowing

Category V: Installed After Other Measures Have Proved Unsuccessful and With Approval of City Manager and City Council.

- One-Way Closure.
- Street Closing (Cul-de-Sacs).
- Turn Restriction Sign.

A. Category I Measures

These can be implemented by or coordinated through the City Traffic Investigator.

EDUCATION/ENFORCEMENT

This is an important component of the traffic management program and may be used as a first action of the process. Education and enforcement may be sufficiently effective to reduce the identified problem. These measures are mostly used when a street may not be appropriate for any measure, such as the collector or arterial streets intended to carry larger traffic volumes, and streets that do not qualify for any traffic measures but have traffic complaints from residents. It should be noted that these measures have been found to be effective only when in place. The residual effect after they are withdrawn is often negligible.

Usage and Warrants

The use of the speed trailer and special signs to alert motorists to the posted speed limit, and a concentrated effort by the police department to enforce the posted speed limit of the affected street are typically the most effective measures for Category I.

Each candidate street will be surveyed to determine the volume and speed. The data will be analyzed to determine if the street would qualify for a traffic management measure. If the street were to qualify for education/enforcement, then special signs and the speed trailer would be deployed. After one month, the speed trailer would be withdrawn and an additional speed survey will be conducted. The target 85th percentile speed is 30 miles per hour in a school zone or 32 miles per hour in residential streets. Additional surveys will be conducted within a further 45 days to determine if the speed has changed from the last survey. If the survey shows a lasting effect, no additional enforcement will be implemented. If the measure proves to be ineffective with the speed trailer or "special sign" program, heightened police enforcement of the speed limit will be utilized.

Approval

The City Traffic Investigator can implement these measures.

Cost

Minimal. The city already owns and operates a speed trailer, and deployment would be within the regular duties of the City Traffic Investigator.

B. Category II Measures

These can be implemented by the City Engineer, using outside vendors or other agency resources as appropriate.

BIKE LANES

The City of Citrus Heights has developed a Draft Bikeway Master Plan for the city. The Plan is a blueprint for a bikeway system that includes both on-street and off-street facilities. When adopted, the bikeway program will be implemented as the identified streets are improved or striped.

Usage & Warrants

Bikeway design in California uses the guidelines and standards established by the California Department of Transportation as documented in "Chapter 1000: Bikeway Planning and Design" in the Highway Design Manual, July 1, 1995.

Approval:

At the discretion of the City Engineer.

Removal:

Bike lane signs and stripes would typically not be removed; however, removal would be at the discretion of the City Engineer.

Cost:

Cost is about $0.75/ft for stripes plus $50 per legend.

SPEED AND WARNING SIGNS

Speed and warning signs, including street legends, are the easiest and simplest of the techniques on this list. The purpose of posting the speed limit on a residential street is to inform the motorist of the prima facie speed limit of 25 miles per hour and to attempt to gain compliance with the speed limit. Warning signs provide information to the motorist. Fabrication and installation of a sign is a low-cost item. However, the effectiveness of the signs is short-lived and motorists who travel the area soon pay no attention to them. Also, a proliferation of signs could cause visual blight or visual pollution in some neighborhoods.

Usage & Warrants:

Speed and warning signs are used to guide and warn traffic of conditions on or adjacent to the highway. Warning signs alert vehicle operators to use caution, reduce speed, or make a maneuver in the interest of the operator's safety and/or pedestrians. Typically, warrants that govern the installation of speed and warning signs are: Changes in horizontal alignment, intersections, control devices, converging traffic lanes, narrow roadways, changes in highway design, grades, roadway surface conditions, railroad crossings, entrances and crossings, and other miscellaneous conditions.

Speed and warning signs are installed at the discretion of the City Engineer according to State and Municipal Codes.

Approval:

At the discretion of the City Engineer.

Removal:

Signs and legends of this type would typically not be removed; however, removal would also be at the discretion of the City Engineer.

Cost:

$200 per new sign and legends.

STOP SIGNS

The installation of stop signs as a technique to reduce speed or volume on neighborhood streets is not used. Stop signs at any location must meet State or City warrants. Stop signs are intended to assign the right-of-way at locations when traffic volumes meet specified levels and/or there is a sight distance problem or many pedestrians. Stop signs do not reduce speed or the volume of traffic and, in fact, result in increased localized air pollution, rolling stops through intersections, so-called "jack-rabbit" starts from stop sign controlled intersections and create a false sense of security for pedestrians, especially children, at controlled intersections.

Usage & Warrants

Stop signs are installed at the discretion of the City Engineer according to State and adopted City criteria. It should be noted that the *Manual on Uniform Traffic Control Devices for Streets and Highways* states that stop signs should not be used for speed control.

Approval:

At the discretion of the City Engineer.

Removal:

Signs of this type would typically not be removed; however, removal would be at the discretion of the City Engineer.

Cost:

Cost is about $200 per sign and legend.

C. Category III Measures

To be authorized by the General Services Director, subject to resident polling.

CURBSIDE TREES

The purpose of planting trees in the curbside or parking strip area in front of the sidewalk of residential or collector street is to give the impression of a narrower street and thus slow traffic. A variation on this planting idea is to place trees at selected parking space locations along the street. Trees are not as effective in areas with monolithic sidewalks and no planting strip in front of the sidewalk until the trees reach maturity. The trees act as a buffer zone between motorists and pedestrians and also provide a visual barrier between the two. Trees have no impact on the volume of traffic but have minor impact on speed. To be effective, trees must be planted consistently along street frontages at a rate of about one every 30' to 50' and will need time to mature. Tree planting has sometimes been criticized as merely a "beautification project" rather than a traffic control project. While trees most definitely also improve the aesthetics of roadways, they do provide value in traffic calming. This measure in particular should be encouraged in new developments.

Usage:

Curbside trees may be used when all other methods are not available. It is also possible for residents to implement this alternative themselves through a concerted neighborhood effort.

Approval:

At the discretion of the General Services Director and the Community Services Director with an approval rate of 67 percent of the affected residents.

Criteria for the installation of trees includes the following:

- Other traffic management devices are not acceptable to the emergency response services.
- The neighborhood is opposed to other measures or other measures previously installed are not as effective as desired.
- The neighborhood is deficient in street landscaping.
- Tree species will not mature to be a traffic hazard.
- Existing conditions, such as right-of-way and sidewalks, allow for installation of trees.

Removal:

Planted trees would not be removed unless they were a safety hazard.

Cost:

For the City to purchase and plant 15-gallon landscape trees, the cost is currently about $150 per tree. A major additional cost component would be provision of

watering. This cost will vary according to where the nearest water supply is, or whether regular truck watering will be used.

RUMBLE STRIPS

Rumble strips consist of raised ceramic markers that were originally designed to alert drivers to dangerous or unexpected conditions. They are also seen on freeways as lane markers. On local streets their purpose is to reduce speed. This alternative has had a mixed response in Citrus Heights where it has been implemented. The objection to the rumble strips lies in the noise that is created by vehicles traveling over the strips. In some neighborhoods, the noise seems to be more intrusive than in other neighborhoods. Speed reduction ranges from 0 to 15 miles per hour. Bicyclists may find the rumble strips to be objectionable, therefore, they are not recommended on a bicycle route. Increased maintenance may also be required.

Usage & Warrants:

The use of rumble strips in residential areas is discouraged due to noise concerns.

SPEED HUMPS

PERMANENT SPEED HUMPS

Certain types of speed humps (also referred to as undulations or speed bumps) can be very effective at slowing traffic and also have an impact on the amount of traffic on local neighborhood streets. Speed humps range in height from about 3" to 4" and are approximately 12' in width and extend across the entire street; they are not the older style speed bump that is much shorter in width and sometimes much taller. The older style speed bumps are ineffective at slowing traffic as most motorists have realized that it is actually easier to cross them at higher speeds than at slower speeds. Speed bumps are not recommended for use in the NTMP; speed humps are recommended. They should not be installed indiscriminately, however. Very specific criteria for their use has been developed by other cities, including roadway classification, traffic volume, traffic speed, whether or not the roadway is an emergency route, on-street parking conditions, whether or not the roadway is a bicycle route, the location of schools and sidewalks and other criteria. The criteria have been simplified for our use and are described below. The disadvantages of speed humps include complaints from residents of neighboring streets due to diversion of traffic onto area streets, emergency vehicle travel time and bike route impacts.

- Speed humps should be placed a minimum of 175' to 200' from the nearest intersection and should be spaced a maximum of 500' apart but more typically about 300' to 400' apart to be effective. Some streets will require multiple speed humps

Usage & Warrants:

Speed humps are one of the preferred alternatives to slowing traffic and slightly decreasing the volume of traffic. Criteria for installation of speed humps include the following:

- The street should be a local street.
- The street must be at least 250 feet to 700 feet in length between controls, four way intersections, and/or curves with a radius of less then 250-foot radius.
- The speed limit may not be greater than 25 miles per hour.
- The 85th percentile speed must be at least 32 miles per hour.
- At least 67 percent of the responding street residents must approve the speed humps.
- Adequate provision of access for emergency vehicles must be provided.
- The street should be a local street - it may not be a two-lane (each direction) roadway, collector or arterial.
- The street is not part of the regional transit bus network.
- The street is not identified as an emergency response route by the fire department.
- The street must have an average daily traffic volume of at least 600 vehicles and not exceed 3,500 vehicles per day.

Approval:

At the discretion of the General Services Director, with 67 percent approval of affected residents and with City Council approval.

Removal:

Upon request, within 18 months, 67 percent approval of the affected responding neighborhood residents.

Cost:

Cost estimates range from $2,500 to $4,000 for each speed hump, including signing and striping.

TEMPORARY SPEED HUMPS

Temporary speed bumps are manufactured from hardened rubber to match the profile of permanent bumps that are made on the job site from hot asphalt. Matching sections of the rubber bumps can be fitted together and fastened to the road pavement by anchor plates and bolts. Temporary speed bumps will be used at locations where the effectiveness of speed bumps is in question, and a trial period is considered necessary. Temporary bumps will also be used at locations where the need for a bump is established, but where it is not feasible to install the hot asphalt bumps. Streets planned for an asphalt overlay in the near future would be a typical location where a temporary bump would be installed pending completion of the overlay.

Warrants and Usage

At the discretion of the General Services Director, with 67 percent approval of affected residents. Often, the placement of temporary speed humps can be used at a location determined by the General Services Director, to be evaluated and studied before the permanent measures are implemented.

Removal

Generally, removal of the temporary speed humps will vary in time not to exceed 120 days per location.

Cost

The cost to place and remove each portable speed hump is between $ 1,500 – $2,500.

D. Category IV Measures

These must be authorized by the City Manager and the City Council.

CHOKERS AND BULB-OUTS (Necked Intersections)

Necked intersections are also referred to as chokers or bulb-outs and may be installed at either the intersection or at the mid-block or both. The purpose of the narrowing is to reduce the width of the traveled way and thus both slow and reduce traffic. The narrowing is usually accomplished by extending the curb line into the street, whether for a bulb-out or as a simple narrowing. Chokers and bulb-outs reduce traffic volumes if they narrow the travel lanes so that they "feel" very tight to the motorist or are installed frequently along a considerable length of street. The intersection is narrowed with chokers and so decreases the crossing length for pedestrians. However, chokers bring vehicles close to the curb, which could increase pedestrian hazards, and narrowing of the lanes forces motor vehicles and bicycles together. Some or all parking may be eliminated, depending upon the extent of the bulb-outs.

Chokers and bulb-outs may or may not be landscaped but should always be constructed with a raised curb. Painting only of chokers and bulb-outs is not effective. Increased maintenance will be required for street sweeping, gutter clearing and landscaping. Chokers and bulb-outs also may have a fairly significant impact on on-street parking, especially if they are installed for some distance along a street.

Usage:

Chokers and bulb-outs are used in situations that appear to require more action than other types of speed and volume controls discussed previously. Criteria for the installation of chokers and bulb-outs includes the following:

- Average daily traffic (ADT) on the affected street should be between 800 and 3,500 vehicles.
- Street must be at least 750' long.
- The speed limit may not be greater than 25 miles per hour.
- The 85th percentile speed must be at least 32 miles per hour.
- The street must be a local street; it may not be a two-lane (each direction) roadway or a collector.
- Excessive cut through or nonresident traffic (above 25 percent) as calculated from the expected generation based on the Institute of Transportation Engineers (ITE) *Trip Generation Handbook* or by an origin and destination study.
- Adequate provision for emergency vehicles must be provided.

Approval:

At the discretion of the General Services Director, an approval rate of 67 percent of the responding affected residents and with City Council approval.

Removal:

Upon request, within 24 months, 67 percent approval of the responding neighborhood residents.

Cost:

The cost ranges from $2,000 for a simple raised berm to $40,000 for low maintenance/high aesthetic landscaped islands, per set (one on each side of the street).

ONE-WAY CHICANES

A one-way chicane is an artificially created series of tight turns with only enough width for one-way travel through a short section. They are similar in construction to chokers or bulb-outs but protrude more substantially into the street. While chokers merely reduce the width of streets, chicanes eliminate one lane. The purpose of a one-way chicane is to reduce both the speed and volume of traffic. One-way chicanes are quite effective; in Seattle volumes were reduced up to 35 percent and speeds were reduced up to 25 percent. Some noise may be generated by braking and accelerating in the chicane area; however, overall noise should be reduced due to lower speeds and fewer vehicles. Some parking is lost at the location of each chicane. There would be a substantial delay to emergency vehicles if a chicane is very long. Access to the entire street is maintained, however.

The islands created by a one-way chicane may be landscaped, but warning signs and reflectors would be required. Maintenance would be increased for landscaping, street sweeping and gutter clearing. Criteria for the installation of a one-way chicane include the following:

- Street must be at least 750 feet long.
- The speed limit may not be greater than 25 miles per hour.
- The 85^{th} percentile speed must be at least 32 miles per hour.
- The street must be a local street; it may not be a two-lane (each direction) roadway or a collector.
- A majority of the daily traffic on the street must be non-neighborhood or cut-through traffic as determined by the ITE *Trip Generation Manual* or a license plate survey.
- Adequate provision for emergency vehicles must be provided.
- The street is not identified as an emergency response route by the fire department.

Usage:

Simple removable one-way chicanes are allowed but are initially installed on a trial basis for a one-year trial. This measure is more extreme than some of the other measures and will require some evaluation to determine its appropriateness.

Approval:

With staff approval as to safety, technical feasibility and financial feasibility, an approval rate of 67 percent of responding residents and with City Council approval.

Removal:

Upon request, within 24 months, 67 percent approval of the responding residents to remove a permanently installed chicane. This device qualifies for the additional condition of a five-year waiting period should residents again reverse themselves and wish to reinstall the device.

Cost:

For a chicane with two installations similar to chokers, the cost ranges from $4,000 for simple berms to $80,000 for low maintenance/high aesthetic islands. City staff to determine most appropriate type of permanent closure. Temporary installation of freeway or construction type barriers, sometimes referred to as Jersey barriers, is considerably less expensive and is recommended for a trial demonstration.

TRAFFIC SIGNALS

The purpose of traffic signals is to control the flow of traffic and to assign vehicular right-of-way. Traffic signals are similar to stop signs and should not be used as traffic calming devices. They are excessively expensive for traffic calming purposes and are inappropriate for the purpose. They do not decrease the speed or volume of traffic and, in fact, can actually increase the volume of traffic on certain roads as motorists divert to certain routes without signals to avoid other routes with signals. Signals also have many of the effects that stop signs have; they can cause quick starts from the signal and running of unwarranted signals.

Usage& Warrants:

Traffic signals determine who has the right of way at an intersection. They facilitate orderly flow, allow pedestrians to cross, and provide cross-street traffic a chance to cross or entering an intersection.

Traffic signals are installed in accordance with City standards and State of California Department of Transportation warrants.

Approval:

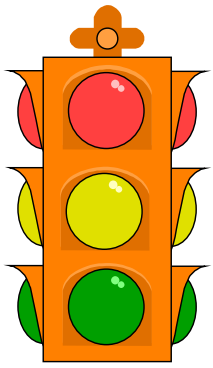
Recommendation of the General Services Director and approval by the City Council. No unwarranted signal should be installed. The traffic signal priority list establishes locations based upon criteria developed from the Traffic Signals Prioritization Program. Locations are evaluated from specific warrants and ranked using a point system.

Removal:

Traffic signals are rarely removed once installed and concerns for liability and safety result from the removal of any signal.

Cost:

Depending on the complexity of the signal, cost could range from $150,000 to $250,000 per signal. Traffic signals would require a CIP budget request.



RAISED CROSSWALKS:

Raised Crosswalks should be placed at locations were there is evidence of heavy pedestrian activity. Raised crosswalks usually are placed at intersections around schools and at mid-block crossing.

- The street should be a local street - it may not be a collector or arterial.
- The street is not part of the regional transit bus network.
- The street is not identified as an emergency response route by the fire department.
- The street must have an average daily traffic volume of at least 500 vehicles and not exceed 3,500 vehicles per day.
- The street must be 250 to 700 feet in length between controls, four way intersections, and/or curves with a radius of less then 250-foot radius.
- The speed limit may not be greater than 25 miles per hour.
- The 85th percentile speed must be at least 32 miles per hour (30 mph in school zones.)
- At least 67 percent of the responding street residents must approve the raised crosswalks.
- Adequate provision of access for emergency vehicles must be provided.

Usage:

The raised crosswalks are used to define pedestrian crossings and can also used as an alternative to slowing traffic and slightly decreasing the volume of traffic.

Approval:

At the discretion of the General Services Director, with 67 percent approval of affected responding residents and with City Council approval.

Removal:

Upon request, within 18 months, 67 percent approval of the responding residents in the affected neighborhood.

Cost:

Cost estimates range from $2,500 to $4,500 for each raised crosswalk, including signing and striping.

TRAFFIC CIRCLES/ROUNDABOUTS/ISLANDS:

Traffic circles are relatively small circular islands, usually landscaped, placed at the center of intersections of local residential streets. The purpose of traffic circles is to reduce speeds along a length of street, if used in a series, and to reduce accidents at problem intersections. It is normal practice for traffic circles to be installed without stop signs. However, where circles are installed at intersections with existing signs, it is recommended that the signs remain in place until experience shows they can be removed. Some series of traffic circles have reduced traffic by up to 20 percent; however, a single traffic circle may have little effect on traffic volume. The location of a circle or circles in the center of the street creates the impression from a distance that the street is not a through road, thus having a psychological impact on drivers that may cause them to seek an alternative route.

Speed is reduced for about 100' to 200' before and after the circle, compared to no circle, with little or no effect at mid-length of long blocks. Circles can reduce speed from 2 miles per hour to 9 miles per hour, but smaller circles reduce speed less. Emergency access is also slowed but is not blocked completely, because emergency vehicles would have to slow at an intersection to pass through it anyway. Increased maintenance is required for landscaping but there is no impact on drainage or street sweeping. Criteria for the installation of traffic circles follow:

- Documented accident problem.
- Traffic control signs, such as stop or yield signs, consistently ignored or only partially obeyed.
- Shorter streets on a grid-type street system are more appropriate for installation of traffic circles as traffic circles are more effective at those locations.
- Adequate width at each intersection to accommodate the appropriately sized circle.
- The speed limit may not be greater than 25 miles per hour.
- The 85^{th} percentile speed must be at least 32 miles per hour.
- The street should be a local street - it may not be a two-lane (each direction) roadway, collector or arterial.
- The street is not part of the regional transit bus network.
- The street is not identified as an emergency response route by the fire department.
- The street must have an average daily traffic volume of at least 600 vehicles and not more than 3,500 vehicles per day.
- Adequate provision of access for emergency vehicles must be provided.
- The street must be 250 to 700 feet in length between controls, four-way intersections and/or curves with a radius of less than 250 feet.

Usage & Warrants:

Traffic circles may be used at locations that experience stop sign violations or accidents at a series of intersections with or without sign control. As traffic circles are unusual in California, a trial demonstration of a series of circles should be performed with temporary installation. Single circles may also be used at intersections with similar concerns.

Approval:

With staff approval as to safety, technical feasibility and financial feasibility, an approval rate of 67 percent of the responding residents and with City Council approval.

Removal:

Upon request, within 24 months, 67 percent approval of the responding residents on all cross-streets for removal of the entire group of permanently installed traffic circles. This device qualifies for the additional condition of a five-year waiting period should residents again reverse themselves and wish to reinstall the device.

Cost:

The cost ranges from $2,000 for a small circle constructed with simple berming to $30,000 for a large island with landscaping. However, large islands are not recommended.

E. Category V Measures

CUL-DE-SACS

Cul-de-sacs successfully reduce the volume of through traffic on neighborhood streets. They may or may not reduce speed, depending on the length of the street. However, cul-de-sacs can rarely be created on neighborhood streets that do not impede some amount of circulation. Cul-de-sacs are the same technique as street closures. They are not recommended for implementation at this time. See the discussion on street closings for more information.

FORCED-TURN CHANNELIZATION (DIVERTER)

Forced-turn channelization consists of one or more traffic islands designed to prevent traffic from making certain movements at an intersection. A diagonal diverter usually forces all traffic onto the intersecting street, thus breaking up through routes and making travel through a neighborhood more difficult. Speed may also be reduced, especially near the intersection, and the measure reduces or eliminates the number of drivers that formerly used the route as a cut-through. Noise is also lessened due to fewer vehicles on the street. Emergency vehicles may not be able to continue through the intersection, depending upon the type of device used to channelize traffic. A potential decrease in response time could result. Before proceeding with this traffic control device, a turn restriction sign should be implemented for a minimum nine-month trial period. The turn restriction sign is much less expensive and may be effective enough to alleviate the problem. A trip diversion of about 10 percent on each of the adjacent neighborhood streets should be expected.

Criteria that must be met to implement this item include:

- A turn restriction sign must have failed, or reasonably be expected to fail, to alleviate the problem of excessive cut-through traffic on the affected street.
- Excessive cut-through or nonresident traffic as calculated from the expected generation based on the Institute of Transportation Engineers (ITE) Trip Generation Handbook or an origin and destination study.
- A detailed traffic study to model the likely effects on traffic volumes on streets in the surrounding area
- Adequate provision of access for emergency vehicles.

Usage:

Forced-turn channelization is used only in circumstances where other measures, such as turn restriction signs, have failed to adequately address the problems of speed and volume.

Approval:

With staff approval as to safety, technical feasibility and financial feasibility, an approval rate of 67 percent of affected residents and with City Council approval.

Removal:

Upon request, within 18 months, 67 percent approval of the responding residents on the street with channelization.

Cost:

Costs range from $1,000 for a simple berm to $40,000 for a low-maintenance landscaped island.

STREET CLOSINGS (Permanent or During Certain Hours Only)

A street closure is a complete closure of a street at an intersection or mid-block and may be permanent or during designated hours only. If the closure is permanent, it will result in the creation of a cul-de-sac. Access for emergency vehicles can be provided through certain styles of closures. Response time could be impacted. Bicycle and pedestrian access usually is maintained. This device is the most extreme traffic calming measure, but can be the most effective measure at reducing the volume of traffic. It may also have an impact on the speed of traffic. Some on-street parking may be lost at the closure. The street closure will reduce noise and traffic accidents in the immediate vicinity. Signage is required and the aesthetics of the closure will depend upon the type of closure installed.

Criteria that must be met to implement this item include:

- A turn restriction sign must have failed, or reasonably be expected to fail, to alleviate the problem of excessive cut-through traffic on the affected street.
- Excessive cut-through or nonresident traffic as calculated from the expected generation based on the Institute of Transportation Engineers (ITE) Trip Generation Handbook or an origin and destination study.
- A detailed traffic study to model the likely effects on traffic volumes on streets in the surrounding area
- Adequate provision of access for emergency vehicles.
- The street must have a turnaround at some location along its length if the street is greater than 150 feet long. This requirement is necessary so that fire trucks may turn around once they have entered a dead-end or cul-de-sac street. The street must be 40' at the face of curb and at least 50 feet at the property line for fire trucks to turn. Streets also may not be greater than 700 feet in length.
- Fire Department and the Police Department must be consulted in consideration of closing and in actual street closing design.

Usage & Warrants:

Initially, only simple removable street closures are allowed and are installed on a trial basis for a one-year period. This measure is more drastic than the other measures and will require evaluation.

Approval:

With staff approval as to safety, technical feasibility and financial feasibility, an approval rate of 67 percent of the responding residents and with City Council approval.

Removal:

Upon request, within 24 months, 67 percent approval of the responding neighborhood residents for removal of a permanently installed street closure. This device qualifies for the additional condition of a five-year waiting period should residents again reverse themselves and wish to reinstall the device.

Cost:

Approximate cost ranges from a low of $1,000 for simple removable bollards to $40,000 for a landscaped island. City staff to determine most appropriate type of permanent closure. Temporary installation of freeway or construction type barriers, sometimes referred to as Jersey rails, is considerably less expensive and is recommended for trial demonstration.

TURN RESTRICTION SIGNS

The purpose of turn restriction signs is to prohibit certain turning movements to block short cutting traffic on residential streets. The success of these signs depends on obeyance by the drivers and on the level of enforcement. These signs are often ignored, just as are the speed and warning signs. Traffic volume reduction is potentially significant, but a high violation rate reduces their effectiveness. Speed and noise may or may not be reduced with these prohibitions. A trip diversion of about 10 percent on each of the adjacent neighborhood streets should be the maximum expected. Criteria that must be met to implement this item include:

- Excessive cut-through or nonresident traffic (above 25 percent of the total street traffic) as calculated from the expected generation based on the Institute of Transportation Engineers (ITE) *Trip Generation Handbook* or an origin and destination study.

Usage & Warrants:

Regulatory signs inform highway users of traffic laws or regulations and are erected ONLY when and where they are needed to fulfill this purpose. State laws and local ordinances regulate the placement and use of these signs. Regulatory signs are classified in the following groups: Right of way series (stop & yield), speed series, movement series, parking series, pedestrian series, miscellaneous series. The warrants for each series will vary and are extensive in nature for each application.

Turn restriction signs may be installed based on the established criteria described above.

Approval:

At the discretion of the General Services Director and with an approval rate of 67 percent of the responding affected residents.

Removal:

Upon request, within 18 months, 67 percent approval of the responding residents on the street with restricted access signage.

Cost:

$150 per new sign.

Appendix A: Typical Traffic Problems and Studies

Complaint	Investigation/Study
Speeding	Radar trailer. Speed study using radar or tube detectors
Cut-through traffic	Origin-destination study
Excessive traffic volume	24-hour count, origin-destination study
Stop sign violation	Violation rate study
Pedestrian safety	Speed study, pedestrian count
Parking in traffic lanes and on sidewalk	Enforcement

Appendix B: Resident Polling Procedure

Affected residents are those people living on streets where traffic volumes are predicted to change. Some measures have an effect only over a limited area (such as in the case of a speed hump), and the eligible voters will be limited accordingly. Other measures might be linear (such as a series of circles or a closure) and will have a wider range of eligible voters. There shall be only one vote per household.

Category I and II devices do not require a vote.

Category III devices require approval of affected residents who are defined as living on any property within 500 feet of the traffic control device, measured in all directions along the street centerlines.

Category IV and V devices require approval of affected residents who are defined as living on any property on streets within 1,000 feet of the device, and those that City staff determine to be the affected area by observations of volumes, speeds and origin-destination patterns, including, if necessary, traffic modeling analyses. City staff would then prepare a report based on these observations for consideration by the neighborhood and approval by Council.

Polling Procedure for All Category III, IV and V Traffic Measures:
Any measures intended to provide permanent traffic control measures, other than signs and striping, require 67% approval of those affected residents who respond to the ballot.

Polling shall conform to the following:

- Ballots shall be mailed via certified mail, return receipt required, with return postage paid.
- There shall be one ballot sent per household, regardless of household size.

- No proportioning of votes shall be done.

Appendix C: GLOSSARY

Access	The ability to enter and/or exit a property, street or neighborhood; includes both ingress and egress.
ADT	Average daily traffic, or the number of vehicles that travel a roadway in one 24-hour weekday period.
Chokers and Bulb-Outs	An extension of the curb towards the center of a street, either in the midblock or at the intersection, used to narrow the roadway to slow traffic.
Chicane	An artificial curve added to an otherwise straight street.
CIP	The City's Capital Improvement Program, used to schedule and budget major capital projects.
Cul-de-Sac	A dead-end street.
Forced Channelization	Similar to a diverter; used to force traffic to right or left.
General Plan	The City General Plan is the planning document for Citrus Heights. It contains several chapters that describe and discuss various important aspects of the City and sets goals, policies and actions. The Circulation Chapter applies to traffic and transportation.
Grade	A vertical incline; can be either uphill or downhill.
ITE Trip Generation Handbook	The Institute of Transportation Engineers (ITE) professional manual that compiles surveys of the amount of vehicle trips generated by land use type.
Ingress and Egress	The ability to enter (ingress) and exit (egress) a property, street, or neighborhood, such as a driveway into a parking lot.
Midblock	Any point between successive intersections along a street.
Necked Intersection	Similar to a choker or a bulb-out placed at an intersection; used to narrow the intersection to slow traffic.
NTMP	Neighborhood Traffic Management Program.

One-Way Entrance and Exit	Similar to a diverter; used to prohibit entrance or exit into or out of a street or neighborhood.
Prima Facie Speed Limit	The apparently obvious speed limit on a street with no posted speed limit, such as 25 miles per hour on a local residential street.
Rumble Strips	Lines of small ceramic bumps used to slow traffic or alert drivers to certain road conditions.
Safe Stopping Distance	Also safe sight distance. A distance of sufficient length such that a driver can avoid striking an unexpected obstacle on the roadway.
Speed Humps	Often referred to as speed bumps or undulations. Speed humps are placed across the street and used to slow traffic. Approved speed humps are 3" to 4" in height and 7 to 12 feet long.
Speed Survey	A survey of vehicles performed with radar to determine the speed at which they are traveling. The 85th percentile speed is commonly used as the indicator of the appropriate roadway speed (see 85th Percentile). Radar may be used to enforce a speed limit set with a radar survey.
Speed/Warning Signs	Speed limit signs and signs warning motorists of traffic conditions such as speed humps or schools.
Sight Distance	The maximum distance at which a driver can clearly see an oncoming vehicle, a stopped vehicle or an obstacle in the roadway; this distance is often reduced by the vertical and horizontal alignment of a roadway.
Traffic Calming	A technique for reducing the speed and volume of traffic on residential streets that uses various traffic control devices.
Traffic Control Devices	A general category of physical devices used to direct and slow traffic, such as speed humps or traffic circles.

Turn Restriction	The prohibition of right and/or left turns from one street to another by means of signage, diverters or forced channelization.
Traffic Circle	A landscaped or hardscaped circular median island placed in the center of an intersection used to slow traffic by requiring a maneuver around the circle. Also known as roundabouts and islands.
Warrant	Requirements such as traffic speeds, volumes, or turning movements that must be met to justify a traffic control device. Warrants can be minimum (not less than) or maximum (not more than.)
85^{th} Percentile	The speed at or below which 85 percent of vehicles surveyed travel. This measurement is one criteria used to set speed limit on roadways.