Historically, effective communication between more than 500 federally recognized tribes and the federal government has been a problem. In an effort to improve communication, tribal leaders have formed the Intertribal Transportation Association (ITA).

According to John Healy, Transportation Specialist for the Assiniboine Tribe in Montana, “During the Transportation Research Board meeting last May, an intertribal organization was created that would improve the ability of the tribes to network with other tribes and government entities on transportation issues.” The ITA serves as this communication link between federally recognized tribes and the federal government regarding transportation issues.

ITA enables tribes to exercise their rights as domestic sovereign nations and offers an efficient channeling of the choices of the tribes into established federal procedures. For this reason, many tribes have chosen to become members of the association.

Healy feels that, “With the government to government relations memorandum signed recently by President Clinton, ITA will be very beneficial to tribes on a national level. Now we have a stronger voice and the federal government will take our efforts more seriously.”

**Membership**

All federally recognized tribes are eligible to join ITA. Members may also be associate (those who are not tribal representatives but have some organizational interest), or individual (those who have some interest in transportation issues but are not part of a related organization). Membership currently includes 216 tribes that represent over 90% of the total IRR system mileage. Only the officers and the designated representative for each tribe may vote.

Twelve area representatives and three officers (President, Vice-President, and Secretary-Treasurer) make up the Executive Board. The area representative regions are divided in the same way as the BIA area agencies. The tribes in each region elect an area representative from their group of tribal representatives. Area representatives act as the conduit for transmitting information from the tribes to the federal bureaucracy.

**Decision Making**

Issues that affect the tribes are discussed with tribal representatives. The tribal representatives then discuss the issue with their tribe and request a council resolution either supporting or not supporting the issue. The resolutions are continued on page 5.

**An interview with ITA President Wendell George**

**What are some goals of ITA?**

The short term goal is to fund ITA so it can be responsive to tribal transportation needs. The initial grant proposal to the Federal Highway Administration will enable USDOT to work with tribal governments in developing a strong implementation focus on ISTEA policies. We intend to assist tribes in building individual transportation capacity and developing a regional/national consensus on transportation issues and approaches.

**What do you see as current challenges to the organization and how do you expect to overcome them?**

The challenge is to provide the vital connection between transportation and self-governance goals. With our assistance, USDOT will be able to develop an Indian policy, facilitate federal and state efforts to build tribal transportation capacity and encourage cross-cultural planning through recognized engineering and planning functions. Without a national approach, it is unlikely that many tribes could improve their transportation system and local economic base.

**What benefits will membership provide to either large or small tribes?**

ITA will provide all tribes a method of communicating with each other on transportation issues, to share their problems, knowledge and innovations and serve as the interface between tribal and federal governments. ITA will allow all tribes to work within their own processes, and at the same time...
Federal-aid highway acts
A message from Wellington Williams

The federal-aid highway program is an umbrella term, generally referring to all activities funded through the FHWA and administered by state highway or transportation agencies, or in some cases, by local transportation agencies.

Each of the categories, Interstate Construction Program, Interstate Maintenance Program, and Surface Transportation Program, are separately funded. Also, many important activities that do not have separate funding are eligible under one or more of the several categories that are included in the federal-aid highway program. Funds can be used for preliminary engineering, fringe and corridor parking, and wetlands mitigation efforts because they are eligible activities under one or more programs.

Federal-aid highway acts, often known as authorizing or substantive legislation, are distinct from appropriation acts. Federal-aid highway acts are passed periodically—basically when they are needed. The most recent one was included as Title I of the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA), which became effective on December 18, 1991 when President Bush signed it.

Although they may vary in scope, federal-aid highway acts will generally contain one or more of the following elements: authority to start new programs or change existing ones; special requests (studies); and specific funding authorizations for many categories of highway assistance. The ISTEA included eight titles: Surface Transportation Highway Safety Act of 1991, Intermodal Transportation; Research; Metropolitan Washington Airport Act Amendments of 1991; and Surface Transportation Revenue Act of 1991.

A federal-aid highway act establishes programs by identifying the scope of the problem addressed and setting the ground rules under which funds may be used, what activities are eligible, how the funds are to be distributed, and how long the funds are available. These can be changed by subsequent highway acts, such as appropriation acts and environmental legislation, to make changes to highway law.

Federal-aid highway acts such as ISTEA are the primary instruments used by Congress to shape and redirect the federal-aid highway program. This is done by eliminating or adding programs, modifying characteristics of a program, and changing requirements. All of these actions were done in the ISTEA.

If you would like more information about financing federal-aid highways, please do not hesitate to contact me at 303-969-6733.
time, incorporate their needs into the federal bureaucracy. Tribal councils will be continually informed on transportation matters and their involvement will give them a sense of ownership. ITA will provide the councils with:

1. Information on transportation developments and how transportation supports other goals and interest areas.

2. A method to gain tribal consensus and resolutions regarding transportation issues.

3. Direct tribal involvement in transportation concerns and a coordinated approach to relations between tribes and other governmental entities.

4. An education and information resource through the four tribal technical assistance programs and other means.

5. A method to attract, manage, oversee, and track grants and developments and how transportation supports other programs.

6. An organization that will embrace and advance tribal values of economic and social self-governance; respect for the earth; the protection of the physical, social, economic, and spiritual resources of Native American people and their lands.

Does it matter if the tribe has ownership of high or low IRR mileage?

No, but tribal interests or solutions to problems may be different based on high or low IRR mileage. For example, some tribes may benefit more by working with the state and counties through the ISTEA process to solve their road problems. ITA will help them do this through negotiation and other means. Other tribes will be more involved in stand-alone solutions as they would have more control over the complete road system because of BIA ownership.

Can you explain the results of the March meeting in Albuquerque between the BIA and Presnell Associates?

Because the BIA offered to pay travel expenses for all ITA area representatives, we were able, on short notice, to get 10 of the 12 area representatives to attend the meeting. The result of the meeting is that the tribes are assured full participation in all three phases of the inventory process. We will help set the criteria for the inventory process in the first phase; monitor the development of the demonstration model in the second phase; and participate, to the level that each tribe wants, in the actual inventory.

Does ITA have recommendations for the BIA Road Inventory and Pavement Management System?

We recommend using low volume road standards and leaving the selection of the Pavement Management System (PMS) up to the individual tribe. Low volume roads are more common on rural reservations, so our standards should reflect this. We could build more road miles for the same amount of money. A standardized PMS is not even used by the states; each state can choose their own.

Why should tribes be any different?

What are your hopes and plans for the growth of ITA?

To develop education programs in the technical fields of transportation planning, civil engineering, computers, etc., and to serve as a reference repository for tribal transportation planners use in problem solving. Today, we will help the BIA by providing them with a tribal forum to jointly work out our problems. Tomorrow, we can gradually assume many of the duties and responsibilities of the BIA in the transportation field.

Is there anything else you would like to tell tribes regarding ITA?

Tribes should be forewarned that we are dealing with a two-edged sword. Transportation is a key to developing reservations, and we have now been given the wherewithal to open this door. However, unless we are careful, we could be overrun with development we do not want, cannot use, or simply be assimilated into the dominant culture. Each tribe must assess how much and what kind of development it wants before it proceeds. The best way to do that in an organized and systematic manner is to combine tribal economic development plans with transportation plans. Previous reservation transportation plans have been mostly inventories, with very little thought given to future economic development plans. Tribal councils should periodically review these plans to assure themselves that they are heading in the direction that they intended.
Consider your chances of success first  
Most important paving factor is weather condition

Everybody knows that if you tried to do a paving job in January or February you would need to have extraordinary luck to be successful. In fact, the chances of success are so slim that no one ever tries to "get lucky." Even in the warm Southern Sunbelt states, paving operations generally shut down for the winter.

But what of the rest of the year? What is the "best" time to do paving? Wouldn't it make sense to consider your chances, and then try to schedule your paving jobs at the time of the year when chances of success are greatest?

What determines success?
First let us define success. I would say that a paving job is successful if it lasts for the period of time that it could reasonably be expected to last. Thus, there would be no premature failure.

This period of time might be 5 or 6 years for a single-layer chip seal, and up to 15 or 20 years for a substantial thickness of hot-mix asphalt concrete. One must consider the traffic (both its volume and the loads) as well as the strength of the supporting layers when estimating the lifetime of an improvement. Of course, it has to be assumed that the construction would be done by a knowledgeable crew, using good-quality materials.

Probability graph is based on experience
The graph above depicts the probability of successful paving on the first day of each month. It is based on the weather in the Northeast. In general, I think it would be applicable for all of the United States, with the possible exception of Florida and parts of Arizona and California where the favorable construction season is longer. The data is based on my 26 years of experience working in various parts of the country, but it represents only one person's opinion.

The graph shows that the chances of getting a successful paving job are greatest in the months of July and August. The construction season for hot-mix paving starts about one month earlier than it does for cold-mix and chip seal operations, and extends about one month later. This is because the latter are dependent upon both temperature and humidity for curing of the emulsified asphalt. The conditions required for drying hay in the fields are about the same as for curing cold-mix and chip seals. And all the farmers know that they must make hay when the sun shines!

Note that there is never a time when the chances of success are either zero or 100%. There is a gradual transition from "poor" (less than 50%) up to "excellent" (better than 80%), and then back down again. The chances get steadily more favorable in May and steadily worse in September.

Beware—weather conditions are unpredictable
Even in July and August, however, you must consider the weather. If a thunderstorm is predicted for a given day, it would be wise to spend the taxpayers' money doing something other than paving. A cold night in late September can pose major problems for paving early the next morning. If it is a nice, warm day, it would be wise to wait until late morning to begin paving, thereby allowing the old surface to warm up.

All years are not the same, especially in the fall. It is possible to have a few very warm days in late October in one year and "get away" with late season paving. Try it again in a subsequent year and the new pavement fails before the next spring. The graph above depicts the average year—neither the best nor the worst.

Keep these dates in mind
Armed with this information, it should be possible to see how we arrived at the following recommendations:
• Wait until after the end of May to begin all paving operations.
• Try to do as much of your paving as possible in July and August.
• Complete all cold-mix and chip seal paving by the beginning of September.
• Complete all hot-mix paving by the middle of October.

By considering your chances for success and choosing the best time of the year to do paving, you will ensure that you get the maximum amount of value out of your paving dollars. If your scheduling is accompanied by good workmanship, you will create a situation that will give you the

This article was reprinted from Nuggets & Nibbles, Cornell Local Roads Program, and written by the director, Lynne H. Irwin.
Motor Grader Maintenance of Aggregate Surfaced Roads

Earth and gravel roads are an important part of the nation's transportation network. Often these roads are the only transportation connections for rural populations and provide routes for emergency services, mail delivery, school buses, and farmers shipping products to market. Proper maintenance is essential to meet the needs of rural road users.

Gravel roads are designed to carry traffic loads in all kinds of weather. Crushed stone and sand are the most commonly used aggregates in rural road construction. A combination of large aggregates, small aggregates and fines are compacted together to provide structural strength through aggregate interlock. This interlock forms a strong roadway as well as a water tight hard crust on the surface of the roadway. The crust must be water tight so the surface is not penetrated by the water, leading to the weakening of the subsurface. If the subsurface is weakened, traffic cannot be supported.

A motor grader operator has two main objectives:

1. To use the motor grader in a way that makes the most efficient and economical use of its capabilities;
2. To maintain roads and ditches to the proper shape and surface condition providing both rideability and good drainage.

The Operator as a Mechanic

As an operator you are not expected to be a trained mechanic; however, you are expected to know enough about the equipment you operate to recognize mechanical problems that might occur during operation. You are not asked to diagnose trouble when it arises, just be astute and alert to the symptoms that spell trouble and know when the trouble is serious enough to shut down a piece of equipment. An operator's judgment is valuable, literally worth thousands of dollars.

Grader Operation as a Skill

A motor grader is a complex and powerful machine. Its operation requires good coordination, and to some extent, a certain natural ability.

A grader operator's skills are acquired through hundreds of hours of operation. For novice operators, this isn't the sort of machine that will let you jump in the cab and go. To become a qualified operator you must learn as much as possible from a top-notch, knowledgeable operator. Good instruction combined with ample time out on the road will put you on a path towards the day when you will be proud to call yourself a "Motor Grader Operator."

Drainage and Crowning

The key to maintaining a smooth road is proper drainage. Water standing on a road causes road material to separate and form potholes when subjected to traffic.

The best way to provide drainage on a road is to crown its surface (see Figure 1) making the center of the road higher than the shoulders. This is done by blading the crown into the road-leaving more material in the center when spreading the material back across the road.

![Figure 1 Crown Diagram](image)

Proper Crown Shape

The crown should be an A-shape, not a parabolic shape. The A-shaped crown is best because it provides a uniform slope from the centerline to the edge of the road (see Figure 2).

A parabolic crown drains poorly and the gravel tends to get scraped off the center. This allows water to run further along the center of the road, weakening it in the process.

Parabolic crowning may develop during blading with bits that are worn or cupped in the middle. You can tell if you are blading properly by looking at the used bit pile in your maintenance yard. The used bits should be straight. If they are badly cupped, chances are the county roads have parabolic crowns and poor drainage.
Smoothing is limited to leveling the road surface when it becomes rough and uneven. The intent is to keep the stable crust, not to destroy it by cutting into it. A dragging, rolling action created by the curve of the grader's moldboard helps compact the road surface as it is bladed. Blading speed will depend on the grader, pressure of tires, and condition of the road surface. Going too fast will cause the grader to bounce, making a good job impossible.

1. Place the traffic control devices. Use a flagger if circumstances require.

2. Check the moisture content of the road surface. A damp surface will prevent the loss of fine particles such as dust and provide proper compaction. Use a water truck to dampen the surface in dry weather.

3. Determine the limits for smoothing. Place wooden stakes to mark where the repair is to begin and end. Repair only one half of the road at a time.

4. Check the condition of the grader blade cutting edge. The blade edge should be straight. A cupped blade edge will not maintain a proper crown.

5. Tilt the moldboard forward to get a dragging action. The moldboard tilt will preserve the crust and compact the surface material (see Figure 3).

6. Angle the moldboard 30° to 45° to spread loose material to the center of the road. The moldboard angle will distribute excess material into ruts and holes in the surface.

7. Slightly tilt the front wheels 10° to 15° from the vertical in the direction the aggregate rolls across the blade.

8. Stop to repair minor bad spots such as holes, rutted areas and poor surface drainage conditions. Always have a shovel available.

**When Blading Curved Roads--Maintain Superelevation**

1. Gradually eliminate the crown 50 to 100 feet before starting into the curve. This is the transition zone. Slowly raise the end of the blade from the outside edge of the curve. The centerline elevation should remain the same (see Figure 4).

2. Where the curve begins, the outside curve edge should be at the same height above the center of the road as the inside curve edge is below the center--superelevate or bank the road. Do not blade a crown on the curved part of the road.

3. Slope the shoulder to the superelevated part of the road downward from the road edge to the ditch.

4. Gradually change the road surface back from superelevation to crown.
Reshaping Aggregates Roads

Reshaping involves more than just smoothing the surface. After a period of rainfall or slow-melting snow, traffic scatters the aggregate, flattens the crown, makes potholes and deep ruts in the road, and produces a rough washboard surface. These conditions cannot be corrected by just smoothing the surface. The aggregate base must be reshaped.

Reshaping involves remixing the aggregate base to get a proper blend of fines and different size aggregates and blading this blended material into a properly crowned surface. When remixing, you may need to add additional aggregates or fines to the road surface and shoulders particularly in rough spots or washed-out areas.

The art of proper blending is a cut-and-dry proposition depending on the types of materials at hand. Experience will provide know-how to determine the correct blend.

The crust that forms what is left of the old wearing surface is broken up during remixing, often with a scarifier. After the aggregate base is remixed, it is bladed to obtain a smooth surface with the proper crown. A new set of cutting edges gives the best result. As with smoothing, reshaping should be done when the aggregate is moist.

1. Place the traffic control devices. Use a flagger if circumstances require.
2. Check the moisture content of the road surface. A damp surface will prevent the loss of fine particles as dust and provide proper compaction. Use a water truck to dampen the surface in dry weather.
3. Check to see if more aggregate or fines need to be added to surface and shoulders, particularly in rough spots or washed-out places.
4. Tilt the moldboard to a cutting position. This will let the blade cut into ridges and potholes.
5. Angle the moldboard at 30° to 45°. Using a mixing action, move and roll the aggregate toward the center of the road.
6. Lean the front wheels 10° or 15° from the vertical into the direction the aggregate is rolling across the blade.
7. Put enough pressure on the blade to cut shoulders and washboard ridges.
8. Scarifying, when necessary, should go as deep as the average pothole or washboard—usually two or three inches.
9. Watch blade action very closely and continuously adjust the controls to get good cutting and mixing action.
10. Check to see if more passes are needed in the same direction to continue mixing, cutting to the bottom of potholes and ridges, and to windrow aggregate to the center of the road.
11. Windrow remixed aggregate to the center of the road.
12. Distribute aggregate evenly over roadway edges and shoulders, blading the material into a proper crown.
13. Blade the shoulder downward toward the ditch so the slope is at least as much as the slope of the road.

Pass pattern for reshaping aggregate roads

Tilt moldboard back to cut into ridges and potholes

Figure 5: Reshaping
Blading at Intersections

Blading the Intersection of Aggregate Surfaced and Paved Roads

Bumps form on one side of the road at paved intersections and dips form on the other side due to continuous blading with the flow of traffic. Alternate blading against the flow of traffic will produce the best results.

1. Gradually eliminate the crown, starting about 50 to 100 feet before the intersection. At the point where the two roads meet the grade should be the same (see figure 6).
2. Change the angle of the blade to meet the paved road, raise the blade, pull onto pavement, drop the blade, put the grader in reverse, pull the aggregate off the paved road.
3. Check to see if an extra pass or two is needed to eliminate the crown and to ensure that the shoulders have slope.
4. With the grader facing against the flow of traffic, cut the bump starting at the edge of the paved road, moving material to the other side of the road. Turn the grader around and spread excess material into the dip.

Blading the Intersection of Two Aggregate Surfaced Roads

1. Gradually eliminate the crown on each road, starting about 50 to 100 feet before the intersection.
2. Check to see if an extra blading pass is needed to eliminate crown and ensure that the shoulders have a slope.

![Figure 6 Intersection of paved and aggregate roads](image)

The Local Technical Assistance Program

Great Grader Operator Wall Poster

This 22" x 33", two color wall poster covers a wide variety of grading techniques. It is perfect for hanging in your vehicle storage area, maintenance area, lunch room, or wherever operators congregate.

This poster is available free for single requests.

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Quantities are limited, so call the LTAP office today at (906) 487-2102.
Tourism industry supports economic development
Tribes have many cultural options to choose from and use in a tourism plan

Economic advantages
Studies indicate that tourism will be the #1 industry in the world by the year 2000; it is already one of the top three industries in most states. Tribes who take advantage of the growing tourism industry will experience benefits through economic development and cultural enrichment.

The economic advantages of tourism have only recently been taken into account; people took trips to particular locations and, as a result, offered some financial benefit to the area. Communities are realizing that tourist destinations have a larger impact on the economy than they previously thought, and are preparing cooperative plans for tourism development.

Strategies are being developed to provide memorable experiences that can provide economic sustainability for communities over time. Tribes have unique cultural backgrounds to offer and, for this reason, distinctive cultural tourism can be developed more easily than other types of tourism. The difficult, yet important part of the tourism planning process for tribes is determining what part of the cultural background to share with tourists.

In addition to cultural demands, increased tourism demands more service-type businesses. Restaurants, gas stations, lodging, and educational and promotional centers can have a noticeable impact on the economy of rural areas.

Multi-destination tourists
Multi-destination tourists are being targeted because they have different needs than single-destination tourists, and therefore have more to offer the economy.
1. They spend more money and the money is new (new money coming into the community creates a greater multiplier effect than recycled money from the surrounding community).
2. They spend more time, which requires more services.
3. They focus on cultural and rural tourism.
4. They require cultural and rural destination communities to work together to create a comprehensive experience.
5. They provide an opportunity to use the industry as a way to promote cultural preservation and education.

Multi-destination tourists demand different approaches in the assessment and marketing of this growing industry. Ways to attract these tourists and the economic opportunities they represent are being explored.

Scenic byways
To promote recreational travel and tourism projects, tribes may use their IRR funds for the development of scenic byways as provided by ISTEA by the National Scenic Byways program. The BIA is developing a scenic byways program to complement the national program.

The information for this article was adapted from a draft by Edward H. Hall III, BIA Transportation Specialist, titled "Tourism and Transportation in Indian Country".

First annual meeting
ITA held its first annual meeting in March to organize the association and determine which issues to investigate. At this meeting, the 30 tribes who attended represented over 23,000 of the 25,729 total BIA road miles.

The tribal representatives present voted to accept the charter, bylaws, area representatives, and standing committees. The officials elected at the meeting are Wendell George, President; Malcolm Curley, Vice President; and Andrea Smith, Treasurer-Secretary.

The Standing Committees are Membership, Finance, and Technical. The Technical committee covers tribal involvement in the national inventory effort that the BIA is undertaking and the evaluation of the Relative Needs formula.

The BIA will continue to act as ITA’s main interface, however, the USDOT and Congress are now included in federal government contacts to establish that the federal government, as well as the BIA, has trust responsibility to Native American tribes. George points out that, “We will be careful of individual tribal sovereignty issues so all tribal councils are worked with, even though transportation has many technical aspects that may not interest them.”
STOP signs are not a solution for residential speed control

Speeding on local streets is probably the most persistent problem facing residents and traffic officials alike. Every traffic engineer has been shaken by the telephone caller who opens with, “If something isn’t done about the speeders on our street someone is going to be killed and it will be your fault,” followed by a demand for various traffic control measures and threats of petitions with several hundred signatures.

Although there could be a flaw in the traffic engineering plan, most often the problem is one of perception. Residents who consider speeds excessive in their own neighborhood often consider the same speeds reasonable when they drive in other neighborhoods. A resident’s complaint usually includes the solve-all solution to the speeding problem—install STOP signs.

The traffic official’s common response is that STOP signs don’t work to control speeding because:

a. research has shown that speeds often increase between the signs,

b. they are frequently violated,
c. they are detrimental to safety and,
d. they are not warranted in the Manual on Uniform Traffic Control Devices (MUTCD).

The STOP sign as a trophy

When residents are told that stop signs are not the answer to the speeding problem, they often feel their only option is to fight city hall to get them installed. In the confrontational relationship that results, the stop sign becomes a trophy that is awarded to the “winner.” Solving the speeding problem becomes secondary to winning the trophy. The results of this process are usually unhappy citizens who continue to complain and request more stop signs and, quite often, approval for the sign installation in an attempt to tem-

Community solutions to residential speed control

A good way to eliminate confrontational relationships between residents and traffic officials and avoid knee-jerk reactions to traffic engineering is to develop a process that involves both traffic officials and affected community members.

Some communities have successfully employed a standing committee, normally referred to as the “Citizen Traffic Committee,” to deal with traffic-control issues. The committee members need to educate themselves on aspects of traffic engineering, but are also advised by non-voting staff experts who provide input and send recommendations to the decision-making body.

Another option is the “ad hoc” or advisory committee. An ad hoc committee is formed when a community seeks help in dealing with a specific traffic control problem. The committee identifies the problem and sets quantifiable goals that it hopes to reach. Traffic engineering staff collects data for the identified problems, presents it to the committee, identifies options, presents alternatives, and then explains the pros and cons, costs, etc., of each option. The committee and the staff discuss the alternatives until they agree on a solution to be recommended to the decision-making body and the community at large.

Advantages of a community committee

• It hears-out neighborhood traffic control concerns.
• It may be perceived as more objective than official staff.
• It acts as a buffer between the decision-making body and citizens.
• It creates an understanding of traffic engineering principles among laypersons.

• It builds a relationship between staff and community that can be used for working through future problems.
• It dampens the adversarial relationship that often develops between the citizens and staff.

Disadvantages of a community committee

• It can consume considerable time and effort of the engineering staff.
• It might divide the neighborhood if a consensus cannot be reached.
• It can become an unwieldy process if not handled skillfully by staff.

Citizen input can be used to solve problems of all kinds—not just traffic control problems. So whenever possible, consult your community. Think of it as talking to your boss, because they are in fact your employer.
STOP signs as a speed control solution

porarily bring the controversy to an end.

What the studies show
Experience and research show that speeding problems are usually not solved by the installation of a stop sign. Before-and-after studies show that stop signs increase mid-block speeds and create violations of motorists who feel the sign is unwarranted.

When not required to stop by cross street traffic, only 5 to 20% of all drivers come to a complete stop, 40 to 60% will come to a rolling stop below 5 mph, and 20 to 40% will pass through at higher speeds. Signs placed on major and collector streets for the purpose of speed reduction are the most flagrantly violated. Stop signs placed for right-of-way assignment are more likely to be obeyed, whereas stop signs that do not meet the standard warrants tend to be ignored by drivers.

Effect on traffic volume
The basic purpose of a stop sign is to assign right-of-way at intersections. Regardless of their intended purpose, stop signs are persistently requested by citizens with the expectation that the signs will control speed or reduce traffic volume in residential neighborhoods.

Stop signs do little to reduce traffic volume when local streets offer significant avoidance of congestion points on major and collector routes. However, when a local street offers only a slight advantage over other routes, the time lost at additional stop signs may be enough to shift traffic.

Two-way stop
This is used to assign right-of-way to traffic on one of two intersecting streets by requiring traffic on one street to come to a complete stop.

A two-way stop is suitable:
1. Where one street is a major street;
2. Where sight distances approaching the intersection are substandard and traffic approaching under the general rules for uncontrolled intersections would run a strong risk of being involved in collisions;
3. Where a crash pattern exists that could be corrected by right-of-way controls, yet conditions do not require traffic on both streets to stop.

Four-way stop
Four-way stops are more common in the United States than in other countries. They are intended for use where two collector or major streets intersect and traffic volumes do not warrant a traffic signal. They have often been used in response to complaints by the public about excessive speeds, but this application has produced questionable results.

Effect on traffic speed
The general conclusion from many studies on the effectiveness of stop signs as a speed control measure is that they have little overall effect on speed, except within about 150 feet of the stop sign. They are reported to have little or no effect in controlling mean (average) or 85th percentile speeds at mid-block. (The 85th percentile speed is that speed at which 85% of the traffic is travelling at, or below.)

A stop sign observance study of unwarranted four-way stops in Troy, Michigan, found that the percentage of no-stops or roll-stops was significant after the installation of unwarranted stop signs, and there was no significant change in 85th percentile speeds.

A study in Star City, West Virginia, showed an increase in no-stops from 14.1% to 25.1% when two-way stops were converted to four-way stops each summer for pedestrian safety. The mean speed was not significantly affected by the presence of the four-way stops, and the recommendation of this particular study was to end the practice of using four-way stops for speed control.

Effect on traffic noise, air quality, and energy consumption
When stop signs cause traffic to stop, there is a noticeable noise increase in the vicinity of an intersection from acceleration and braking. Additionally, deceleration, idling, and acceleration of vehicles increases air pollutant emissions and fuel consumption.

Effect on traffic safety
Stop signs that are not warranted by traffic volume or specific site safety conditions tend to increase traffic crashes because they introduce a general disregard of stop signs. Motorists who violate unwarranted traffic controls tend to carry this behavior over intersections where traditional warrants for stop sign installation were actually met, thereby creating a dangerous situation and increasing the potential for accidents.

Uniform standards and warrants
Warrants for stop sign installations are included in the MUTCD. These warrants relate to right-of-way assignment and respond to site safety conditions. The Manual specifically states that "Stop signs should not be used for speed control." Those may be harsh words to a resident who files a complaint, but when accompanied with some explanation of the engineering principles involved and the results of studies and actual experience, should be possible to work out a more appropriate solution.

Adapted in part from "Solving the Speedway Problem," The Bridge, Vol. 6, No. 3, Michigan's Local Technical Assistance Program; Speed Control in Residential Areas, Office of Highway Safety Planning, Michigan Department of State Police; and Speed Control on Local Streets in Residential Areas, the Michigan Traffic Engineering and Environment Coordinating Committee.
Transportation Planning Essentials

This workshop will give participants basic transportation planning information and provide an opportunity for participants to give feedback on current BIA transportation planning issues to a Washington, DC, representative.

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<td>Wed. July 13</td>
<td>West Greenwich, RI</td>
</tr>
<tr>
<td>Thurs. July 14</td>
<td>Oneida, NY</td>
</tr>
<tr>
<td>Tues. July 19</td>
<td>Hayward, WI</td>
</tr>
<tr>
<td>Wed. July 20</td>
<td>Keshena, WI</td>
</tr>
<tr>
<td>Tues. July 26</td>
<td>Mt. Pleasant, MI</td>
</tr>
</tbody>
</table>

Brochures have been mailed for this workshop. If you did not receive one or would like to register, call the TTAP at (906) 487-3164.

Tourism Information Series

This 11 part series is designed for communities interested in tourism development. Each bulletin offers different preliminary considerations, ranging from the beginning of the development process to the end. The bulletins are available free to tribes and public agencies.

Call the TTAP at (906) 487-3164 to order titles listed below.

- Tourism and its Significance
- Tourism Planning
- Developing a Tourism Organization
- Tourism Marketing
- Feasibility Analysis in Tourism
- Developing a Promotional Strategy
- Creating a Promotional Theme
- Traveller Decision Making
- Tourism Information Systems
- Selecting Promotional Media
- Pricing Tourism Products and Services