VI. Physical Structure

Two issues are of concern relative to the physical structure of the Michigan highway system: 1) road construction standards, and 2) the level of maintenance devoted to the highway system. These issues involve the quality of product constructed with taxpayer dollars and the maintenance performed on the system to extend use of the highway system for as long as possible and minimize expenditures.

A. Road Construction Standards

The issue of road construction standards pertains to the materials, engineering, and financial assumptions that go into road and bridge construction. Michigan, as a northern state, must give greater attention to several factors that affect highway conditions.

1. Highway Condition Factors

Most highway problems in Michigan stem weather and terrain. Other factors, including the age of the highway system, a relatively heavy reliance on road salt, and truck use, also play important roles in road quality. How Michigan deals with these factors is key to the strength of its highway system. If these factors are taken into consideration at the design stage, constructing roads and bridges to a higher standard than is currently used might make greater economic sense.

a) Age of the Michigan Highway System.

By the time that the McNitt Act was fully implemented in 1937, much of the current Michigan highway system (104,974 miles) was in place. Other than the interstate system, which currently comprises six percent of the Michigan highway system, there has been very little addition to the road system since 1937.

Additionally, Michigan was a leading state in paving roads and designing its interstate system. On average, Michigan interstates are seven years older than those in other states. With a relatively old highway system, Michigan is facing the cost of reconstruction a little earlier than most other states.

b) Michigan Terrain and Weather.

Much of the Michigan terrain has soil types that are difficult for effective road construction, including a strong subgrade. The road subgrade is the soil bed upon which the road surface is placed. Soil quality is judged based on the performance of soil material according to gradation, liquid limit, and a plasticity index. The best soils for a road subgrade are gravels with a high bearing strength. The poorest soils have high amounts of clay, with low strength when wet. Parts of Michigan tend to have high amounts of clay. Soils in other parts of the state are a result of glacial deposits. Additionally, the state is home to a lot of wetlands. All of these soils make it difficult to create a strong subgrade.

Like many other northern states, deciduous trees -- trees that drop their leaves -- are common in Michigan. Leaves that fall on the road surface often end up in the drainage systems. Without proper maintenance, the accumulation of leaves prevents proper drainage. This affects road beds, compounds any subgrade problems caused by the soil types, and allows water to accumulate, weakening the road surface.

Michigan also is subject to relatively harsh freeze-thaw cycles. A freeze-thaw cycle occurs when temperatures fluctuate above and below the point of freezing (32 degrees). Because parts of the Upper Pen-

How Other States Deal With The Environment

Other states provide examples in which higher construction standards are imposed on infrastructure projects to account for conditions common to that state. In California, infrastructure construction costs are high relative to other states because of the danger of earthquakes. Infrastructure in Gulf Coast states is built to deal with the annual threat of hurricanes. Michigan residents do not have to deal with single event disasters of this sort. Instead, they have to deal with ongoing environmental conditions that negatively affect the highway infrastructure. The freeze and thaw cycle and winter weather conditions wreak havoc on the highway system. Like the additional costs incurred because of the high standards of construction in California and Florida for different reasons, standards of highway construction and maintenance appropriate to Michigan conditions should be applied.

insula and much of Canada experience a permanent freeze during the winter and states to the south remain much warmer, most other states experience few freeze-thaw cycles. The Lower Peninsula, however, experiences fluctuations above and below freezing several times during the winter.

Freezing and thawing causes expansions and contractions in road and bridge surfaces and pressure from the ground around the road pushes the concrete up out of the ground, creating cracks in the road surface. These cracks allow water to sink in and pockets to form around the reinforcing rods. With roads subject to this cycle, a higher initial investment in materials is required in Michigan to withstand this freeze-thaw cycle. Some of this investment currently is taking place, such as the use of a higher quality, densely packed aggregate.

Roads in Michigan are typically constructed 13 to 15 inches thick, with 9 to 11 inches of concrete on top of a 4 inch base. In order to properly account for the freeze-thaw cycles, roads like buildings, should be constructed with a foundation that reaches below the freeze-thaw line. This could require roads to be constructed as much as twice the current thickness, with a much deeper base.

Finally, winter maintenance creates conditions that accelerate the process of road deterioration. There are two means of winter highway maintenance: removing the snow and ice with a plow or "burning off" (melting) the ice and snow with road salt. While plowing causes wear and tear on the road surfaces, more significant damage is done to road surfaces with the use of road salt.

c) Road Salt.

Age, terrain, weather, and motor vehicles all contribute to road deterioration. However, the principal reason for the deterioration of Michigan roads is road salt. Road salt is used as a deicing agent, to keep snow and ice from bonding to the pavement and to allow snowplows to quickly and efficiently remove accumulations. When road salt is applied to ice and snow, it creates a brine that has a lower freezing temperature than ice or snow. Road salt is used as the principal deicer because of its abundance, low price, cost-effectiveness, and safety.

Today, salt is a necessary and generally accepted part of winter maintenance. It provides safety and essential mobility for motorists, commercial vehicles, and police, fire, and other emergency vehicles. Without road salt, there would often be hazardous conditions and greater expense in removing snow and ice solely with snow plows.

Michigan relies more heavily on the use of road salt than do other states. Road salt use grew common during the 1950s and 1960s when highway departments changed from a strategy of plowing snow to melting the snow and ice. Since the 1970s, aggregate road salt use has been fairly steady in the United States at about 10 million tons per year. Information about road salt use by different states is not kept regularly, however, the Transportation Research Board reports that only New York and Pennsylvania used more road salt per mile than Michigan did in 1989.[5]

d) Trucks.

Age, weather, terrain, and road salt all combine to create the conditions for deterioration of roads and bridges, but ultimately it is contact with the surface by motor vehicles that causes roads to deteriorate.

Michigan has historically allowed larger and heavier trucks to operate on its highways than those allowed to operate without a special permit in other states. Most states limit truck weights to 80,000 pounds, the federal limits, unless a special permit is obtained to carry heavier weights. Michigan law, because it was "grandfathered" in when the federal standards were adopted, allow commercial vehicles with a gross vehicle weight up to 164,000 pounds. These weight limits have been permitted since the 1950s.

Trucks weighing double the federal standards are permitted because weight limits are based on the axle load and the axle spacing, rather than the gross vehicle weight. This methodology is based on engineering analyses, which show that pavement design and load induced distress is related to axle loading rather than

[5] Highway Deicing: Comparing Salt and Calcium Magnesium Acetate, Special Report 235, Transportation Research Board, National Research Council, (Washington, D.C., 1991).

The Use of Alternative Technologies in Road and Bridge Construction

Steel and salt do not mix well. The aggregate used to construct Michigan roads and bridges surrounds steel. Roads are designed with a tightly packed aggregate to provide compression. Steel rods and steel I-beams provide tension that gives roads their structural integrity that holds roads together and gives bridges their strength. Salt is commonly used as a deicing material because it is readily available, the least expensive deicer, easy to store and handle, easy to spread, non-toxic, and harmless to skin and clothing.

Driving over the road or bridge surface causes flexing in the concrete. When road salt is applied to keep the roads clear of snow and ice, it is absorbed into the concrete or if there is an asphalt overlay, the road salt finds its way into cracks in the asphalt. The expansion and contraction caused by winter freezing and thawing, combined with the corrosion of the steel rods caused by salt, causes the aggregate to pull away from the steel. Eventually, pockets of ice, water, and air are created within the cement. When the steel is exposed to water and salt, the result is rust and the steel is weakened. It is only after the aggregate is weakened and road salt has corroded the steel that damage is reflected from the pounding caused by vehicles driving on top of the road surface. When vehicles drive over the air and water pockets, the aggregate comes loose from its surroundings and causes potholes.

Sand and Other Corrosives.

Other states use sand, or other friction agents, to deal with ice and snow. While these agents are less harmful to the road surface, their application tends to be more expensive. The use of abrasives requires at least seven times more material to treat a given distance of roadway. A loaded salt truck, spreading at the generally accepted rate of 500 pounds per two-lane mile for general storm conditions, can treat a 22.5 mile stretch of roadway, traveling a total of 45 miles on the round trip. A sand truck requires seven loads and must travel a total distance of 187 miles to treat the same section of road that a salt truck can treat with a single load, thus sand trucks require four times more fuel. The result is a greater use of fuel, increased staff, and more time spent treating roads during a storm.

Additionally, other states may have some advantage in using alternative corrosives. Much of Michigan receives a wet snow due to the number of freeze thaw cycles and the proximity of the Great Lakes. Rather than creating friction on the road surface, applying sand on a wet snow creates mud. Instead of snow and ice causing safety problems, mud would create different traction and safety problems.

Alternative Concrete Mixes.

One solution to the incompatibility of salt and steel is to use construction standards that do not expose the steel bars to water and other materials. Engineers employed by the State of New York Department of Transportation have developed a "High Performance" concrete (designated Class HP). Class HP concrete substitutes "Class F" fly ash and microsilica for a proportion of the cement used in conventional concrete and a lower water-to-cementitious ratio. Fly ash is industrial waste material from smoke stacks. Tests have shown this mix results in lower permeabilities of water, air, and chlorides, reduces cracking potential, creates a comparable strength gain rate, and is easier to handle and place than conventional concrete mixes. In 1996, this mix was established as the required class of concrete for all bridge deck construction and the department is now implementing its use in substructures. The New York DOT estimates the use of Class HP concrete will increase construction costs by about ten percent over construction costs using conventional concrete. However, this cost is offset by a projected life of two to three times longer than the expected life of conventional concrete and the benefit of finding a productive use for the fly ash that would otherwise require space for storage.

Materials That Do Not Rust .

A second solution is to use materials that do not rust as reinforcing rods. The automobile industry has had to face the same basic problem that road constructors face; namely that salt and steel do not mix well in the long run. The solution in the automobile industry was to work with stainless steel, plastics, and other materials not susceptible to the effects of salt. This solution might cost slightly more to consumers at their time of purchase, but in the long

run, the automobile lasts longer than if steel were still used. Similarly, in road construction, an alternative to deicing or friction agents is the use of something other than steel in road and bridge construction. Some applications that are less susceptible to rust are already being used in road construction, such as epoxy-coating the steel rods.

Research is being done on alternative technologies that would replace steel in roads and bridges. For example, Lawrence Technological University (LTU), in Southfield, Michigan, is researching the possible use of glass and carbon composites -- materials that are lighter and stronger than steel, and not susceptible to rust -- for use in bridge construction. This technology has been utilized in Japan and Canada, and the City of Southfield is cooperating with LTU in the reconstruction of a bridge in that city using this technology.

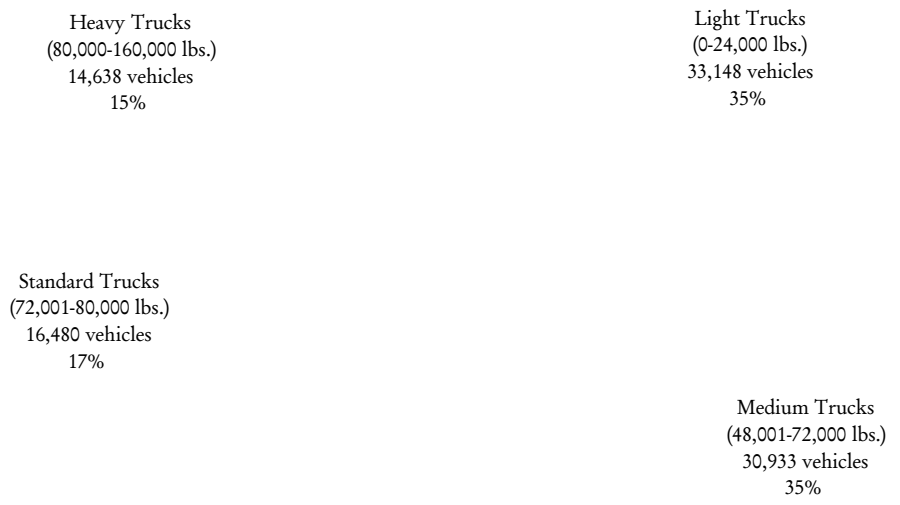
According to LTU, these alternatives could add to initial road construction costs, but they should reduce costs over the life of a bridge. Steel bars comprise about ten percent of bridge construction costs. Using carbon or glass composites currently costs about five times as much as steel bars. However, if this technology proves feasible, this extra cost would be more than offset by lower maintenance and repair costs over the long term. LTU hopes to demonstrate that a bridge constructed using this technology could have a design life of 200 years, a period in which a bridge constructed using steel bars would have to be replaced four times.

to vehicle gross weights. Trucks weighing 164,000 pounds must have the load weight spread over 11 axles. Because the heavier load is dispersed over more axles, the axle-weight is lower than the axle weight of an 80,000 pound truck spread over five axles.

Highways must be constructed to withstand the weight of trucks. According to MDOT, because axle-weight is the determining factor for damage to the road surface, heavier trucks do not add costs to road construction in Michigan. The same is not true for bridge construction. Because the total weight of a truck must be wholly absorbed by the bridge structure, the axle-weight bears little significance. MDOT reports that heavier trucks on Michigan highways add four percent to the cost of bridge construction.

The majority of the commercial trucks weigh less than 72,000 pounds. Of the 109,199 trucks registered in Michigan in 1994, only 14,638 (12 percent) were

Chart **17**
Number and Size of Trucks on Michigan Roads -- **1994**



Source: 1995 Facts and Figures, Michigan Department of Transportation.

registered with gross vehicle weights greater than 80,000 pounds. These vehicles generally carry bulk commodities such as steel, gravel, fuel, grain, and forest products -- commodities historically considered important to Michigan commerce (see Chart **17**).

Prohibiting heavier trucks on the Michigan highways has the potential of increasing wear on the road surface. Transportation for these commodities would remain important. There would need to be more trucks on the highways to carry these commodities, making more trips to carry the same aggregate weights, with 20,000 pounds per axle rather than the 18,000 pounds per axle of the heavy trucks.

2. Re-Addressing Highway Construction Assumptions

Roads and bridges can be constructed to different standards that will result in different durations of usefulness; however, higher construction standards result in higher costs. Currently, roads are designed to last 25 years, and bridges are designed to last 50 years. This design life is expected to be extended with proper maintenance. These standards are based on American Association of State Highway Transportation Officials (AASHTO) assumptions on what taxpayers would be willing to pay for infrastructure that were developed some 40 years ago. Traffic patterns, upon which these standards are primarily based, have increased in volumes since that time, with much more truck traffic.

Because a number of Michigan roads and bridges are in need of replacement, the opportunity is at hand to reevaluate construction standards. Road and bridge usefulness under the current assumptions fall short when compared to those built in Germany or Japan, where greater initial investments have been made in highways so that they are less prone to deterioration and last longer.

A cost-benefit analysis of road and bridge construction and maintenance costs over the entire period of usefulness should consider whether constructing highways to higher standards could result in lower costs over the life of a road or bridge, because the road or bridge would not need to be replaced as often. A number of factors might affect these assumptions, including the advancement of highway construction technology since the AASHTO assumptions were formulated. The focus in reassessing these assumptions should be the long-term costs -- how much it will cost to construct and maintain a section of road or a bridge over its life of usefulness.

3. Effect on Road Construction Costs

Acknowledging that these factors all increase the cost of highway construction in Michigan, the question becomes, "How much more will it cost to build roads to a higher standard?" Some experimentation is currently underway in constructing Michigan highways to higher quality standards. A 2.1 mile stretch of I-75 in downtown Detroit recently was reconstructed using European construction standards. Reconstruction of this stretch of road used different techniques in the form of thicker concrete, shorter joint spacing, doweled joints, a deep foundation, and a denser, graded, drainable base. This stretch is expected to last 40 years rather than the 20 year design life roads have with commonly used construction techniques.

In addition to the higher construction standards, extraneous factors -- the level of contractor experience, lack of proper equipment, the small size of the section to be reconstructed, the importation of a superior grade of aggregate from Canada, and use of a special patented surface coat -- all contributed to increase the cost per mile of reconstructing this road to roughly double the average Michigan freeway construction costs of $3.5 million per mile. These extraneous factors mean that constructing other roads using these standards should cost less per mile than it cost to construct this experimental stretch of I-75.

Highway User Costs in Michigan

Any cost-benefit analyses must consider what costs current highway conditions impose on highway users. The highway system relies on the public provision of roads and bridges, but this infrastructure cannot be used without a private investment in motor vehicles. The Road Information Program estimates that substandard roads in Michigan cause motorists in the state to spend $679 million per year more than if they were traveling on roads in good or fair condition. This translates to $105.43 per driver per year for vehicle repairs (replace bent rims, align front ends, and other automobile maintenance) due to substandard roads.

Cold Patching and Plowing the Same Roads

Cold patching is the practice of taking a shovel full of asphalt from the bed of a truck and dumping it into a pothole. Usually, excess asphalt is put into the potholes because the proper equipment is not readily available to pack down the asphalt. The expectation is that vehicles will drive over the cold patch to pack it into the pothole. In general, this "throw and go" method of cold patching is fairly effective in filling the pothole.

However, problems often arise the next time there is a snowfall. Because excess cold patch is placed into potholes, and the cold patch is never completely packed down, the result is often a bump in the road. For vehicles on the road, this is often an annoyance. For snowplows, plowing the original road surface, this excess cold patch is something for the blade of the plow to remove from the road surface. The result is not shaving off the excess cold patch. It removes all, or almost all, of the cold patch. In the end, patching crews often are brought back again and again to patch the same hole.

Other methods of patching potholes require more time and effort, but last longer and have lower costs in the long term. Ideally, potholes would be patched by cleaning it of water and loose materials, squaring it, putting in tack coat, and filling it with a hot asphalt and aggregate mix, and then rolling it smooth. There are two alternative patching methods that are not as cumbersome as the ideal method. The "spray injection" approach involves cleaning water and loose material out of a pothole, treating the clean pothole with a tack coat, and then blowing a hot mix of asphalt and aggregate into the hole. The "throw and roll" approach is much like the common throw and go approach, except that the road crews do not leave excess aggregate to be patted down by passing vehicles. Rather, crews use their own truck to run back and forth over the newly filled pothole several times to settle and smooth the patch.

B. Investment in Maintenance

Because a very extensive system is already in place, it is not likely that there will not be a great deal of new mileage added to the Michigan highway system. The emphasis in highway administration is shifting away from the location and construction to a new emphasis on maintenance and operational efficiency. The resources and attention of the engineers charged with the care of this system must change accordingly to reflect this shift in emphasis. Directing the attention and resources of highway providers to this new focus is fundamental in providing economies and efficiencies to Michigan taxpayers. Part of this shift must include greater attention to capital maintenance.

A capital maintenance program requires that preventive actions take place before damage is done to the road or bridge structure. Maintenance of roads involves such activities as keeping drains clear and making sure that expansion joints are in working order. A properly funded and executed capital maintenance program is one-third to one-fifth the cost of replacing roads that are in poor condition because they have not been properly maintained.

Kansas provides an example of how effective maintenance can reduce costs in the long run. Rather than dealing with potholes in a crisis manner, the state has decided to invest in maintaining roads that are sill in fairly good condition, sealing and redoing overlays so water cannot get in. An American Public Works Association study has found that after four years, the state has begun to see a regular annual drop in the amount of aggregate and asphalt used for pothole patching.

Capital maintenance has not been properly funded in recent years. MDOT has found that road repairs have been underfunded. With limited resources, highway providers have had to choose between construction and maintenance. With a greater return on investment when resources are committed to construction, maintenance has been delayed.

1. Effect of Federal Funding on Maintenance

Efforts to maximize the federal funds available to the state have tended to crowd out funding available for capital maintenance projects. Federal highway funds can be used only for construction, reconstruction, or enhancement. For every $10 expended by the state on roads eligible for federal funding, the Federal Highway Administration contributes $90. Efforts to put state resources into projects eligible for federal

funding, because they deliver a greater return on investment, have left few resources available for the capital maintenance projects.

Restrictions on the use of these funds for construction, reconstruction, and enhancement are based on the intended role of federal funding. It was meant to assist the states in constructing a uniform national highway system. Once the system was built, it was up to the state and local governments to maintain it.

Because construction of the Michigan highway system is nearly complete, reliance on federal funds should diminish over the coming years. Additionally, because this incentive has had a crowding out effect on maintenance funding, reducing the federal gas tax or changing the role of federal funding could affect how priorities are set for maintenance funding.

VII. Administrative Issues

A commonly perceived problem in the provision of highway services is the duplication of services among units and levels of government. Addressing the jurisdictional control of roads will provide opportunities for these governments to become a little more specialized in the highway services they provide. The next step toward reducing duplication is the realization that there are 83 counties, 534 cities and villages, and one state government, all constructing and maintaining roads throughout the state. There are two ways for governments to use specialization to their advantage: privatization and intergovernmental cooperation.

A. Privatization

Privatization is a much-heralded means of achieving economies and efficiencies in the delivery of a wide variety of government services, including highways. Privatization of government services occurs when the government contracts with an outside interest to provide a service on behalf of the government.

The privatization, however, is not panacea. Labor, machinery, and supplies are required to perform highway construction and maintenance, whether these tasks are performed by a public or private body. There is little to show that a private body is better suited to care for highways than is a public body. What privatization brings is competition and a strong incentive to eliminate waste and duplication.

Operations of the private sector are not always less ex-pensive than the operations of the public sector, but the private sector can often position itself to take advantage of economies and efficiencies. For example, the private sector can make changes in personnel more easily than the public sector. Additionally, private companies are not confined by the boundaries of a single unit of government. Private companies can contract with several units of government, thus allowing the company to take advantage of the economies-of-scale inherent in the care of highways.

For the typical unit of government in Michigan to care for highways, staff and equipment must be maintained in sufficient levels to handle a "worse-case" scenario. However, the need for this level of staffing and equipment does not remain uniform throughout the year. Periods of over-staffing would result from maintaining this staff year-round. Because a private company can utilize its staff and equipment over a wider geographical area than the typical unit of government, it can avoid many of the problems of over-staffing.

Finally, by serving a wider geographical area, private companies are able to position themselves to enjoy the savings of purchasing in larger quantities. Many suppliers offer lower unit prices if the supplies are purchased in large quantities. Unless governments engage in intergovernmental cooperation or joint purchasing arrangements, they cannot position themselves to enjoy economies-of-scale that the private sector enjoys.

B. Intergovernmental Cooperation

In order to take advantage of economies-of-scale in highway provision, local governments must think of themselves less as independent, autonomous bodies and more as a part of an integrated system. Local control of roads will facilitate decisionmaking that is in the best interest of individual communities, but efforts to work together with other highway providers in the actual road construction and maintenance will bring greater economy and efficiency.

Michigan law is very permissive in this regard, allowing governments to enter into cooperative agreements to maintain, enhance, or provide services in any way possible. All governmental units in Michigan are authorized to cooperate with one another in the provision of any functions that each would have the power to perform separately. Article VII, Section 28, of the 1963 Michigan Constitution, as implemented by the "Urban Cooperation Act," authorizes all governmental units to:

> . . . enter into contractual undertakings or agreements with one another. . . for the joint administration of any functions or powers which each would have the power to perform separately; share the costs and responsibilities of

functions and services with one another. . . which each would have the power to perform separately; transfer functions or responsibilities to one another. . . upon the consent of each unit involved; cooperate with one another. . . ; lend their credit to one another or any combination thereof as provided by law in connection with any authorized publicly owned undertaking.

C. Experience with Privatization and Intergovernmental Cooperation

The state, counties, and municipalities have different experiences and different potential for utilizing privatization and intergovernmental cooperation.

1. Michigan Department of Transportation

The Michigan Department of Transportation has experience in both intergovernmental cooperation and, more recently, privatization.

a) Privatization.

MDOT does very few of the physical tasks involved in construction and maintenance of the highway system. Act 51 requires all federal-aid construction projects, and all other projects concerning highways, streets, roads, and bridges exceeding $20,000 for construction or maintenance, to be performed on contract ". . . unless the department shall affirmatively find that under the circumstances relating to those projects, some other method is in the public interest."

In recent years, MDOT has experimented with competitively bidding the maintenance contracts of entire stretches of highways. Maintenance of a section of I-94 in Wayne County and I-496 in Ingham County was contracted competitively. In the case of I-94, the Wayne County Department of Public Works won the contract both years in which they have had to compete. Wayne County had been maintaining this section of road prior to the competitive bidding process, but now does so at a reduced cost to the state. In the case of I-496, a private company, ABC Paving Company, won the contract. This is the first experiment with a private firm having full-time responsibility for a state road. In both cases, the state is paying less than it previously had to provide maintenance for these sections of the trunkline system.

b) Intergovernmental Cooperation.

MDOT also has experience in intergovernmental cooperation. MDOT contracts with 62 of the 83 counties and 125 of the 534 municipalities for state trunkline maintenance within their boundaries. The state has written agreements with these counties and municipalities that defines what services are to be provided. If the state directly maintained its own roads, it would have to keep on hand at all times, staff and equipment sufficient in size to cope with any worst case needs. It is more economical to have somewhat larger county garages, than to place additional staff directly on the state payroll, either rent or build additional garages, and purchase additional equipment for the state to maintain these sections of road itself.

Many of these local governments have been maintaining the highway system within their unit by contract since the state trunkline system was first constructed. When state roads came into being, they were merely a specially designated system of township and county roads. While the state provided some "rewards" to fund construction of these roads, maintenance of these roads remained with the local government. As travel increased, state roads grew in importance and the state assumed a more direct responsibility for the maintenance of some roads, the practice of local governments maintaining state roads was continued in many other counties and municipalities.

Reimbursements to local governments for the care of state trunklines are based on cost accounting for all road operations of the county road commission or municipality. The state benefits from the efforts of county road commissions or municipalities in controlling costs under this arrangement. The advantages to the state with this maintenance agreement are that it has staff and machinery set aside for its use and can call for, and get, more staff and equipment for emergency use.

This arrangement is also advantageous to the counties and municipalities. Many local governments could not afford to keep their regular staff employed full-time or to purchase essential machinery for use only on their own roads. By contracting with the state, there is more work to be performed by the staff throughout the year. By leasing this machinery to the

state on a part-time basis, they also get the part-time use of it. The extra work and costs, that might otherwise be of marginal use, are justifiable with the greater workload.

Not all counties, cities, and villages contract with the state to maintain state trunkline roads. MDOT performs the maintenance work on the state highways in 21 counties, and in some cities. The state has chosen to do this itself either because some local governments do not wish to contract with the state, because the local unit does not have the necessary staff or equipment to carry out such tasks, or because the state has opted to keep the maintenance in-house for its own purposes. Because the counties with which the state does not have contracts are located throughout the state, MDOT has maintenance equipment located throughout the state. This allows the Department to perform tasks in the counties that are under contract if the road commissions cannot, or will not, perform those tasks.

MDOT could achieve some savings by carrying the logic of contracting one step short of a full contract for maintenance work. MDOT maintains garages in each of nine districts throughout the state. Not far from each of these garages is a county road commission garage. These garages are performing the same functions, often with the same kind of support staff. Rather than maintaining separate garages in each of the districts, the state could lease space from the county road commissions and share some support services.

It is possible that the maintenance work of some counties or municipalities is better than others, but it is also likely that differences are found between different state maintenance districts where the state maintains the roads directly. The present system of maintaining the state road system by use of the counties and municipalities works satisfactorily and economically. No gain would be made by changing to direct state maintenance.

2. County Road Commissions

Like MDOT, most county road commissions have experience with privatization. Unlike MDOT and most municipalities, however, county road commissions have not capitalized on using other resources available at that level of government, such as county accounting, personnel, or vehicle maintenance departments.

a) Privatization.

County road commissions have not privatized maintenance of stretches of roads as MDOT has done. Rather, they have privatized specialized and individual functions. These functions cover the whole gamut of road commission functions, ranging from asphalt paving and bridge construction to street sweeping and roadside mowing.

b) Intergovernmental Cooperation.

Construction and maintenance of the local highway system would seem inherently well suited for intergovernmental cooperation. Because every county road commission and every municipality receive funding from the Michigan Transportation Fund, the system created for highway maintenance tends to be very decentralized. Unlike other services that are provided by all or most units of local government, care of the highway system has not experienced a great deal of intergovernmental cooperation.

The entire state is covered by county road commissions. These county road commissions share borders with at least one, often four, in some cases six other county road commissions. County roads usually end where city roads begin, but in some larger urban areas the road system is intermixed with state highways, county roads, and city or village streets.

County road commissions could create opportunities for savings if more commissions engaged in intergovernmental cooperation. County road commissions have used their separation from the actual county government as a barrier to utilizing the kinds of specialization utilized at the state level. Most functions are kept in-house. They have not broadened to perform tasks other than road functions as is common with municipalities. County governments and county road commissions operate parallel administrative functions: including accounting departments and personnel office systems. Many counties are involved to some extent in maintaining vehicles for county use. However, county governments and county road commissions use separate garages and personnel to maintain these vehicles. Like municipalities, many counties have parks and recreation departments that perform tasks similar to those performed by county road commissions, but the counties have their own personnel and vehicles to tend to these parks. A great deal of duplication could be

avoided with intergovernmental cooperation. This would allow county governments to share the available resources whenever possible to provide more resources with fewer dollars.

3. Municipalities

While most cities and villages tend to contract for construction or major street functions, routine maintenance tends to be performed in-house. One advantage municipalities have over county road commissions is that resources are spread over several functions. Many municipalities have combined road maintenance with other services of like content: parks, cemeteries, and grounds' maintenance.

Intergovernmental cooperation has not been as readily adopted by municipalities. As with county road commissions, there is great opportunity for intergovernmental cooperation and potential for savings in the maintenance of municipal street systems. The state has a number of urban areas in which several municipalities border each other. The nature of these urban municipalities is that they were created as the larger cities grew and people desired residences in less urban areas, while still depending on the larger cities for employment and shopping. Consequently, a network of roads exists inter-linking the larger cities with their outlying municipalities. Yet, in nearly every case, care for the municipal roads ends at the borders between the municipalities.

Cities and villages tend to be fairly compact, often with land areas of only a few square miles. In suburban areas, they usually have common roads running through them. In many cases, these municipalities have already cooperated to some extent for care of roads that serve as the municipal border. These municipalities all perform the same street tasks, in the same general way. They all use staff with the same basic skills. They all own the same basic equipment. They all have garages of like purpose. They all buy the same types of supplies to perform maintenance tasks. All of these factors would seem to indicate that road and street maintenance would lend itself well to intergovernmental cooperation. If implemented properly, there is opportunity for savings through cooperation in highway care. The Urban Cooperation Act provides for such cooperation.

D. Conclusions: Administrative Issues

Any ability to gain efficiencies, reduce duplication, and save taxpayer dollars should be encouraged. Both privatization and intergovernmental cooperation lend themselves to this end. For the most part, state and local governments have successfully implemented privatization and further efforts should be pursued. However, privatization, when adopted, should be implemented in a manner that promotes effective contract management. Contract management involves different staffing requirements than acting as the actual service provider. Namely, contract management requires the ability to analyze proposals and award contracts on a competitive basis, to monitor work performance, and to audit the services provided. As the actual provider, the staff must have the skills to perform these tasks.

Intergovernmental cooperation does not require a change in the focus of the government highway providers. Instead, it involves consolidating the funds, staff, and equipment from more than one unit of government to provide highway services over a wider geographic area. Since every city, village, county, and potentially, some townships provide highway services, cooperation could yield sufficient benefits and taxpayer savings.

Additionally, administrative and system delivery efficiencies would result from addressing the assignment of jurisdictional control over the roads. This would allow each unit of government to concentrate its efforts on the roads and bridges that best reflect the regional or local nature of that unit of government.

The Need for County Road Commissions

Because many of the conditions that made establishment of county road commissions necessary have subsided, it is often suggested that county road commissions be abolished. Irrespective of any arguments for or against the faults and merits of county road commissions, the gains from abolishing county road commissions may be less than anticipated under the current county governance structure. It is not clear that county commissions in the general law form of county government, under which county road functions would fall with the elimination of county road commissions, are better suited to administer roads than are county road commissions.

Background.

County road commissions were established to fill a void. Townships had proven incapable of creating extensive, uniform highway systems to connect the state's population centers. Additionally, the legislative, policymaking bodies for county government prior to the late 1960s were county boards of supervisors, consisting of one representative from each organized township, cities, and village. Supervisors were not elected by county voters, but were selected from local units of government. Community funding needs were the highest priority in the eyes of the people in that community, and the votes of the supervisors tended to reflect this bias. Thus, without an autonomous governing body making road decisions, funding and priority decisions for county roads would reflect this parochial bias. In this context, it made sense to create an independent body for care of regional roads.

The regional nature of the county road systems was reduced by the McNitt Act, Public Act 130 of 1931, which merged township roads into the county road systems. After this merger, local access roads accounted for a majority of the county road system. A local access road serves a very narrow purpose; access to the properties abutting the road. This Act changed the significance of having an autonomous body to deal with regional roads.

Courts ruled that the provisions for a county board of supervisors, Article VII, Section 7, of the 1963 Michigan Constitution, violated federal constitutional provisions. This was addressed by Public Act 266 of 1966, which ended the system of selecting county supervisors from local governmental units and replaced it with a general election of county commissioners. This change gave county boards of commissioners a county-wide focus that had not been previously possessed by the boards of supervisors.

It is arguable, given the effects of the McNitt Act and Public Act 266 of 1966, that the void that county road commissions were created to fill no longer exists. County road commissions are no longer making decisions solely about constructing roads between population centers, administering only major, inter-community roads, or filling a void as a policymaking body elected solely for county government purposes. Given these factors, perhaps the niche filled county road commissions no longer exists, and they could be eliminated.

County Government Options.

In Michigan, there are three kinds of county government. These include the general law county, the optional unified form, and the charter county. Under the general law and the optional unified forms of county government, road responsibilities rest with the county boards of commissioners. Road responsibilities rest with the county executive in charter counties.

If the county road commission were to be eliminate in a general law county, the road function would fall directly under the county board of commissioners. County road commissions consist of three commissioners who have both administrative and policymaking powers and duties over the road functions. County boards of commissioners in general law counties range in number from 7 to 35 commissioners, depending on the county population. They have both legislative and administrative powers and duties over all county functions. It is not clear what advantage would be achieved under such an arrangement.

Thus, unless counties move away from operating as a general law county, it is not clear that many of the claimed weaknesses of county road commissions -- such as, political decisionmaking, lack of accountability, and lack of connection with local needs -- would be addressed simply by transferring the powers and duties of the road commission to the county boards of commissioners.

The second option for county government is the optional unified form of county government as provided for in Public Act 139 of 1973. Only Oakland and Bay counties have adopted this form of government, which provides for either election of a county executive or appointment of a county manager. Both of these counties have opted for the elected county executive, whose powers are much more limited than the county executive under a county charter. Act 139 would need to be amended to provide for the road function to fall under the county executive. Therefore, responsibility for roads would fall upon the board of commissioners, with many of the problems that would face a general law county if it were to eliminate its county road commission.

The principal benefit of moving away from operating as a general law county is the county executive position. The Home Rule Charter County Act, Public Act 293 of 1966, is the option that most clearly allows for and grants the most powers in a county executive. In 1980, Wayne County became the first Michigan county to adopt a charter. That charter established a strong county executive form of government. Among the aims of this charter revision was a reduction in the number of independent bodies in county government. The Wayne County Road Commission subsequently was abolished and the road functions were placed in the Department of Public Service under the county executive. While budgets, contracts, and revenue raising responsibilities rest with the county board of commissioners, responsibility for priority setting and execution of the road construction and maintenance rests with the executive branch. The experience of Wayne County has established the precedent that the county charter may provide for abolishment of the county road commission. The arrangement in Wayne County has worked with apparent success.

Interstate Comparisons.

Highway provision is a prime example of how the federal form of government allows states to act as laboratories for experimenting with how to best provide a service. Each state has adopted a system of highway jurisdiction and governance that reflects the state's history and character. Because of the politics involved, many of these systems could not be transferred easily to another state.

Some states have highway jurisdiction systems that are drastically different from the Michigan system. For instance, 13 states either do not have county roads or the counties play a limited role in road care. These include: Alaska, Connecticut, Delaware, Maine, Massachusetts, New Hampshire, North Carolina, North Dakota, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

Other states have taken different approaches to organizing their county road functions. Each state has provided different levels of autonomy to local governments in the decision-making processes. The following are brief descriptions of how county roads are governed in a few surrounding states. These states have a county government history similar to Michigan, having been created from the Northwest Territory.

The services and functions provided by county governments are performed as agents of the state. The states that surround Michigan have systems of sharing state-collected highway-user tax revenues with the counties. Each state has taken a slightly different approach to organizing governance of the county roads and bridges. The physical construction and maintenance of roads and bridges in Illinois, Indiana, and Wisconsin are performed by the county government, similar to the services provided by county road commissions in Michigan. Ohio counties have county engineer offices, but all major construction and maintenance is contracted out. Unlike Michigan, Illinois, Ohio, and Wisconsin have maintained township road systems, which tend to consist of rural local access roads.

Illinois counties are responsible for rural primary roads, such as arterial and collector routes. Townships are responsible for rural access roads. Illinois county highway departments are run by county engineers appointed to serve six-year terms. Township roads are maintained by elected township road commissioners. Both of these levels of government receive some state motor fuel tax revenues to supplement revenues raised from local taxes. County engineers make recommendations on which roads to fix and how much money to spend in a year, but the final approval must come from the elected county board of commissioners. Township road commissioners make the spending and priority decisions for township roads. County highway departments are sometimes asked to maintain county landfills, to serve as the plat officer, or to take part in zoning. Township road commissioners are responsible only for roads and bridges.

In Indiana, county roads and bridges are secondary roads in rural areas. Any roads within a municipal boundary are, by definition, the responsibility of the municipality. Responsibility for setting funding levels for county roads and bridges rests with the boards of county commissioners, the executive branch of county government. Beyond this, county road administration varies widely from county to county. The boards appoint county highway supervisors, to have general supervision of the maintenance and repair of all county roads and bridges. Some counties have one supervisor. Some have more than one. Some counties have hired county highway engineers to oversee roads. Some counties have employed one individual as both the highway supervisor and the highway engineer. The supervisors or engineers are responsible for priority setting in most counties. Sometimes the boards of commissioners reserve priority setting for themselves in their own districts. Like Michigan, Indiana does not have township roads.

Like Michigan, Wisconsin counties have optional home rule provisions. Almost one-half of the counties have adopted these provisions and currently operate with a county executive. Each county has a highway or transportation committee, depending on the number of modes of transportation provided, that makes program recommendations on the amount of spending and the road priorities. These committees tend to have more responsibilities in non-home-rule counties. The recommendations of the county executives tend to carry more weight in home rule counties. It has become common for counties to have departments of public works, instead of highway departments, that provide landfills, airports, parks, and other services in addition to constructing and maintaining roads and bridges. County roads tend to be rural primary roads, although urban counties tend to have county roads intersecting and serving the same purposes as municipal streets. Township roads, governed by township boards, tend to be rural local access roads. County highway departments often provide a wide array of road services to townships, ranging from piecemeal services such as bridge inspection, technical expertise, and routine maintenance, to a contract to service all township roads.

While Ohio counties have responsibility for roads and bridges, the physical activities involved in constructing and maintaining these roads are primarily contracted out. All road work with aggregate costs in excess of $10,000, bridge work in excess of $40,000, and purchasing over a year in excess of $15,000 must be let by contract. These dollar requirements have not been revised over the years to reflect changes in purchasing power and there is some pressure to revise these amounts upward. The county boards of commissioners are responsible for approving all contracts, approving the dedication of new roads or vacating roads that no longer serve public purposes. Ohio has township roads also, and the county commissioners have the authority to decide when a new road is dedicated whether it should be a county or township road. County highway departments, referred to as county engineers' offices, are managed by independently elected county engineers. County engineers are responsible for overseeing the roads, preparing the engineering work in the preparation stages, presenting a plan of road work every year to the boards of commissioners, and performing the actual work on forced account projects (minor projects that do not exceed the limits requiring a project be let by contract). As independently elected officers, county engineers have autonomy to perform some work independently, but they must work hand in hand with the county boards of commissioners to make this system work.