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STATE OF MICHIGAN
DEPARTMENT OF TRANSPORTATION
LANSING

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November 13, 2009

Mr. John D. Niemela, Director
County Road Association of Michigan
P.O. Box 12067
Lansing, Michigan 48901-2067

Mr. Christopher Hackbarth,
Legislative Associate
208 North Capitol Avenue, 1st Floor
Lansing, Michigan 48933-1354

Dear Mr. Niemela and Mr. Hackbarth:

Conversion of a Roadway to Reduce Capacity

We have recently received direction from the Federal Highway Association (FHWA) addressing capacity reduction projects which reduces the number of through lanes. These projects will no longer be classified as "Categorical Exclusion" projects but will be elevated to higher scrutiny as a "Categorical Exclusion with FHWA Concurrence." In order to obtain concurrence there needs to be evidence of Public Involvement and a corresponding traffic analysis showing the reduction in the level of service for the corridor.

A new policy guide named "4 lanes to 3 lane conversions" has been issued (and is attached). The document is also available on the Local Agency Programs website www.michigan.gov/mdotlap.

Please forward this information on to your members.

If you have any questions regarding the conversion of a roadway to reduce capacity by reducing the number of through lanes please contact Mr. Gonzalo Puente at (517) 335-0878.

Sincerely,

Rudolph S. Cadena
Local Agency Programs Engineer

Enclosure

cc: M. Harbison
B. Kadzban ✓
M. Harrison

D-121	MICHIGAN'S OPERATIONS MANUAL
DATE:	July 30, 2009
SUBJECT:	4-to-3 Lane Conversions
AUTHORITY/CFR REFERENCE:	
PURPOSE:	Provide Policy and Guidance
APPROVED:	Division Administrator 
Electronic File:	Subject: 100987

Definition:

4-to3 Lane Conversion is the changing of highway laneage, from a 4-lane undivided roadway section with all four lanes designated for through traffic movement, to a 3-lane cross-section, in which the center lane functions as a shared left turn lane in each direction, and the two outside lanes are designated for through traffic. 4-to-3 lane conversions are often accomplished through re-striping and signing alone, but can also involve reconstruction of pavement and re-establishment of curb lines.

Need for MOM:

The conversion of a corridor from 4 to 3 lanes is becoming a common treatment applied by MDOT and many local agencies in the state of Michigan. However, most corridors in this state get converted without FHWA involvement. When this type of project is proposed for federal-aid funding, there are issues for our office to resolve:

- How well will the proposed cross-section handle the anticipated traffic demand
- What design year is applicable to this type of project
- What are the air quality requirements for lane reduction in EPA non-attainment area
- What type of environmental document is appropriate
- How to respond to a community that decides they want to switch back to 4 lanes

Background

A discussion of issues related to a 4-to-3 lane conversion is included as an appendix to this document. In general, we believe it is appropriate to match project design life with the scope of project. For projected ADT of 15,000 or less, 4-to-3 lane conversions have been found in Michigan and throughout the nation to have a positive effect on crash reduction, with only minor or no effect on quality of traffic flow. Above 15,000 ADT, conversions have been successful, but inconvenience due to congestion increases and the project deserves closer scrutiny in the design phase, including more detailed traffic analysis and public involvement.

Policy

New projects: The conversion of 4-lane undivided corridor to 3-lane cross-section with center lane reserved for left turn is eligible for Federal-aid funding when documentation from the submitting jurisdiction shows positive resolution of the following issues. This documentation is to be submitted to the FHWA Area Engineer on FHWA oversight projects, following review and recommendation by MDOT:

1. Operational analysis shows that the 3-lane cross section will provide reasonable level of service for all traffic movements at major intersections through the design life. Reasonable level of service is generally considered to be LOS C; however, LOS D could be considered reasonable if part of a calculated trade-off to react to other community goals, such as traffic safety and traffic calming. Proposed projects with design year ADT projected to be 15,000 or less will not require operational analysis.
2. Projected ADT for the design life is consistent with the area Long Range Transportation Plan, for projects within an area covered by an MPO.
3. Project design life is determined to be:
 - a. For safety project, supported by a time-of-return (TOR) analysis, project design life can be as chosen for the TOR analysis
 - b. 3 years or longer – if the project consists mostly of signing, striping, and striping removal.
 - c. 10-20 years – if the project consists of significant pavement or curb work.
4. Public involvement has demonstrated sufficient support for the project within the community OR formal agreement has been reached for a trial project that would allow at least one year of operation of the 3-lane section.

Pilot projects: Because 4-to-3 lane conversions are viewed as a safety countermeasure, MDOT and/or local agencies will occasionally offer a low-cost conversion (removal and re-application of pavement markings only, no pavement or curb reconstruction) to communities on a trial basis. This approach by definition includes the possibility of a later reversal back to the 4-lane section if the trial period is deemed unsuccessful. Federal-aid funds are eligible for this type of project approach provided that FHWA agrees in the measures that will be used to evaluate the success of the trial.

Reversal of cross-section: If Federal aid was used to convert a 4-lane section to 3-lane, FHWA will not participate in the reversal of that cross-section back to 4-lane, unless justified by crash analysis, level of service analysis or unanticipated operational issues.

Exception: if a 3-lane corridor was installed on a pilot project as discussed above, and the project is deemed to be unsuccessful according to the agreed-upon evaluation measures, FHWA will participate in the return to 4-lane cross-section.

FHWA Processing

Requests for 4-to-3 lane conversion projects that are to be accomplished with use of Federal-aid highway funds will be processed and approved in the same manner as typical highway projects.

- STIP –
 - Safety projects which are documented with a time-of-return analysis that meets the definition of state or local safety project could be covered under one of the local or trunkline safety General Program Accounts (GPA); however, a road agency can choose to list the project in the STIP individually if it so desires.
 - Rural Task Force projects may be lumped under one GPA
 - Projects which are not documented as safety projects or rural task force projects must be listed on the STIP individually

- Air Quality Analysis –
 - In EPA designated air quality nonattainment and maintenance areas, proposed 4-to-3 lane conversions should be reviewed through the interagency consultation process to determine if an air quality conformity analysis is needed.
 - For projects that are not located in an EPA non-attainment or maintenance area, no air quality analysis is needed.

- Environmental Clearance –
 - Projects can be processed as a categorical exclusion with FHWA approval per 23 CFR 771.117 (b) and (d) pending other proposed project elements and results of MDOT environmental classification process. Consultation with the public is required on all 4-to-3 lane conversions to ensure there is no substantial controversy on environmental grounds.

- Project Approval
 - FHWA Oversight projects - FHWA Area Engineer
 - FHWA non-oversight projects – FHWA fiscal clerk
 - On all projects (oversight and non-oversight), FHWA approval document should contain the following statement: “FHWA will not participate in the reversal of cross-section from 3-lane back to 4-lane, unless justified by crash analysis, level of service analysis or unanticipated operational issues, or if the 3-lane cross-section on a pilot project is deemed to be unsuccessful according to the agreed-upon evaluation measures”.

APPENDIX

Project design life: FHWA generally requires agencies using Federal-aid highway funds to follow AASHTO guidelines that suggest that a project should be designed to accommodate the traffic demands that will be experienced throughout the design life of the improvement. For a typical pavement construction or reconstruction, where construction costs are relatively high, 20 years into the future is commonly used as project design life.

For an operational improvement such as the 4-to-3 lane conversion, the typically lower costs and almost universal safety benefits can result in an effective project that can be successfully planned and constructed, even with a much shorter project design life. For corridors in which the pavement will not undergo significant work, project costs will be minimal - re-striping and signing, and removal of old striping. Under this scenario, if the corridor is experiencing crashes that can be corrected by the 3-lane section, the conversion to 3-lane can be investigated to see if the expected crash reduction is great enough to allow the project to be addressed as a safety project; if it is, the project design life need only be as long as the time period calculated in the MDOT time-of-return safety analysis.

If there is not a significant safety problem to be addressed, and a road jurisdiction is proposing a 4-to-3 lane conversion with signing and marking as the major items of work, a project design life of 3-5 years would justify the limited costs.

If a conversion project is proposed in which significant pavement construction or reconstruction will be performed, the project design life will necessarily have to increase as the project cost increases: 10-20 years, depending on the costs.

For projects located within a Metropolitan Planning Area, the projected ADT at the end of the selected project design life should be checked against, and correspond with, the traffic volume projections shown in the Long Range Transportation Plan as maintained by the Metropolitan Planning Organization (MPO) for that area.

Safety and capacity: On corridors with 15,000 ADT or less, 4-to-3 lane conversions across the country and across Michigan have been successfully implemented, recording safety gains with very little sacrifice to traffic flow. Almost universally, converted corridors are documented as being safer, with reported crash reduction between 10% and 50% per corridor. A Michigan study of 8 converted corridors documented an average injury crash reduction of 26%, an average injury crash reduction for older drivers of 37%, and an average pedestrian crash reduction of 37%. The 3-lane section is safer at intersections and driveways, because the monitoring task of looking for traffic gaps is simpler. On the corridor links, the 3-lane cross-section is safer because the center lane acts as a buffer between through traffic lanes.

As ADT climbs from 15,000 to 20,000, users report that special treatment for turning traffic is often necessary at the intersections along the corridor to maintain sufficient

traffic flow. Organizations like Michigan DOT and Iowa DOT, both big users of this cross-section, set guidance limits of about 15,000 to 17,500 ADT as being realistic volumes for such conversions; however, depending on conditions and incentive, a 3-lane cross-section can be investigated at the higher levels.

At any of the ADT ranges mentioned above, left-turning traffic on the undivided 4-lane cross-section has a large and inverse relationship on capacity and safety: as left turning volume increases, capacity is rapidly diminished because the inside lane cannot move through traffic until the individual left turns are completed. The turning conflict itself, as well as the lane changing that results from through traffic switching to the outside lane poses increased safety risks to the road users. The 3-lane section is much better equipped to handle left turning traffic, without suffering as large a reduction in capacity and safety.

Finally, the Michigan Governor's Highway Traffic Safety commission, appointed by the governor for the purpose of setting overall statewide strategy in highway safety and developer of the Michigan Strategic Highway Safety Plan, has twelve subcommittees that pro-actively address issues and set strategy for safety in twelve specific subject areas. Three of these subcommittees – the Intersection Safety Team, the Elderly Mobility Work Group, and the Pedestrian and Bicycle Action Team – promote 4-to-3 lane conversions as a strategy to reduce crashes in their own subject area.

Pedestrian and bicyclist accommodation: A conversion to three lanes from existing 4-lane pavement often offers an opportunity for the constructing jurisdiction to provide bike lanes to the outside of each through lane; often helping communities progress toward a master plan for accommodation of non-motorized travel. For adult bikers, use of a bike lane within the roadway or curb lines places the bicyclist in more direct line of sight to motorists. As a result, turning conflicts are reduced because the motorists are more aware of bicyclists on the road, more alert when it comes time to scan for their turn, and more aware of where to look for bicyclists during their scan.

Community support: In communities where 3-lane cross-sections are uncommon, business owners and community citizens do not always appreciate the potential benefits of the cross-section as readily as the community leaders or agencies that are promoting the cross-section. The business owners, in particular, worry about loss of customer access, and the motoring citizens envision a large drop in capacity, with accompanying congested traffic flow. This can lead to local reluctance to install a 3-lane cross-section in the first place. – or occasionally, backlash after the installation. As of mid-2009, Michigan DOT has installed about 25 corridors using 4-to-3 lane conversion around the state; only one community after installation has objected to the cross-section.

Because of the documented safety benefits of a conversion to 3-lanes, road jurisdictions will sometimes offer trial periods of 1-3 years to the citizens of a community, with a promise to revert back to 4 lanes if the community as a whole does not want to keep the 3-lane section after the trial period. This can be a reasonable approach to take, if the conversion and reversion involve only signing and marking, with little or no pavement reconstruction.