Mayor's Pedestrian Safety Task Force

Columbia Public Works and MoDOT Responses to Questions Submitted Following August 18, 2015 Presentations

1. What kind of follow-up analysis (if any) does CPW or MoDOT do after a serious crash involving pedestrians and/or motorists, with a view to improving safety through engineering changes?

Richard Stone, Columbia Public Works: Fatal crashes on City Streets are reviewed if there is concern of a potential engineering issue. We rely on Police Department contact if there is a location of specific concern and also have access to collision data to perform analysis on our own. There is not a specific engineering report generated for all major collisions.

Trent Brooks, MoDOT: MoDOT reviews every fatal crash that occurs on the State System, which does not involve weather. We also do a yearly review of intersections and roadway segments where multiple serious crashes have occurred over the previously three years. These reviews are done in part to help determine if there are any trends that need to be addressed through systematic improvements.

2. From the discussion of speed limits, it sounded as if engineers set a speed limit based on the actual speed people are driving (the "85th percentile rule") rather than intentionally designing a road to ensure drivers do not exceed a certain design speed. Can you please comment on that?

Engineering designs are by nature conservative. This makes sense in that we would not design a bridge for the exact load that the legal limit allows and it would fail at just above that. Engineers refer to this as a factor of safety. The same is true for geometric design for roadways. We should not design a road so that someone will immediately crash if they exceed the speed limit by 1 mile per hour. The type of vehicle being driven also factors in to operating speeds. A 1985 mini-van operates around a 35 mph design speed curve differently than a new sports car on the same curve. As mentioned during the presentation the built environment currently exists. Design parameters change over time as research continues to provide better data.

The American Association of Highway Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets (currently the 6th Edition – 'The Green Book') provides the core basis for roadway design criteria. Some criteria in AASHTO has evolved over time based on in depth study. One of those factors is how to design both vertical and horizontal curves. In the mid-1990s, a research study by The Transportation Research Board (TRB) reviewed several roadway design factors. Based on the findings from that report, (NCHRP Report 400 http://pubsindex.trb.org/view/1997/M/476601), some different design criteria were eventually incorporated in the AASHTO manual. Of particular impact was the calculation of sight distance for vertical curves which had utilized a 6 inch object changing to utilizing a 2 foot object in the roadway (other factors involved, see report). I think there is still ongoing analysis at federal and state levels as to whether this has led to more safe or less safe operating conditions. The general consensus appears to be that there have been better overall roadway designs since the modifications.

On streets the City has designed since the new standards have been in place, actual operating speeds along roadways tend to be closer to the design speed. This means that a roadway constructed since about 2005 with a design speed of 35 MPH tends to have drivers that operate closer to 35 MPH. There are many factors that determine the design speed, most of them related to the primary function of the road (mobility if it is an arterial, or access if it is a local street). From a total transportation perspective in an urban setting, there is a balance between moving traffic from place to place and keeping speeds at lower levels.

Information on how MoDOT's determines speed limits can be found in our EPG, section 949.2 or at the following link - http://epg.modot.org/index.php?title=949.2_Speed_Limit_Guidelines .

Operating speed is the speed at which drivers are observed operating their vehicles during free-flow conditions. The 85th percentile of the distribution of observed speeds is the most frequently used measure of the operating speed associated with a particular location or geometric feature. The 85th percentile speed gives engineers a starting point for determining the design speed of a roadway.

Design speed is a selected speed used to determine the geometric design features for a roadway to ensure it is safe for drivers. Such features as curvature, superelevation, and sight distances are directly related to design speed. Lane widths, shoulders, and clearances are not directly related, but do affect vehicle speeds.

3. Does MoDOT or PW have any kind of policy about how far a pedestrian has to walk along a road to find a safe place to cross? If not, do you believe such a policy should exist, at least in areas where there's residential and retail development? –

The City does not have a specific policy regarding this. While I think I understand the intent, the selection of the words 'safe crossing' would need to be better defined for a specific policy. The right of way is an inherently dangerous place for all people and vigilance is required for all users. However, pedestrian features should and are incorporated into roadway design by Public Works.

MoDOT does not. We use guidelines found in our EPG section 620.2.18, which is section 3B-18 of the 2009 MUTCD. Most of the marked crosswalks on the State System are located at signalized intersections. There are a couple of mid-block locations in Columbia where some type of signal control is included. Where crossing are installed for schools, an adult crossing guard is required.

4. Regarding pedestrian crossings:

(a) Is it correct that, within a marked crosswalk in Columbia, the motorist/cyclist must yield to a pedestrian in their path but that in unmarked crossings, the pedestrian must yield?

Information about a specific incident would be fact dependent about the particular incident. Based on Ordinance 14-236, drivers must drive in a careful and prudent manner with the highest degree of care. This means that if a driver noticed a pedestrian crossing, the driver obviously does not have the legal right to hit the pedestrian. The physics of the situation are that a pedestrian needs to exercise extreme caution whenever they cross the street, no matter the location. Again, if there were an incident, the findings would be fact specific. A good resource for additional legal information would be Robert Rinck with the City Prosecutor's office. However, provided below is a general overview.

Correct that a motorist must yield to a pedestrian legally crossing within a marked crosswalk. At unmarked (and marked crosswalks) a pedestrian can not enter the roadway unexpectedly or in a way contrary to traffic control at the location. Based on Ordinance 14-581, pedestrians crossing while not in a marked crosswalk yield the right of way to vehicles upon the roadway. However, again, 14-236 applies.

(b) What City/MoDOT regulations or ordinances dictate the placement of marked crosswalks? More pointedly, what limits the marking of more crosswalks with frequent pedestrian crossings?

We utilize guidelines per the MUTCD and EPG and engineering judgement. The City's previously adopted Pedestrian Crossing Policy Resolution was written in 1999 and provided threshold volumes and criteria regarding mid-block crosswalks. That policy was rescinded recently based on the updates to the MUTCD reflecting better pedestrian guidance and changes in available manufactured signing. For instance, in-pavement pedestrian signs were invented which appear better suited to help warn drivers than the previous policy signs. There is still limited national standards information to provide perspective regarding this question. Good information regarding some of the challenges and benefits of mid-block crosswalk design can be found in the FHWA document "Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations, FHWA-HRT-04-100 Sept 2005". The research for this study and previous studies indicates some level of concern with marking crosswalks on streets with higher average daily traffic volumes unless there are additional measures beyond just marking. There are challenges inherent to this type of research due to limited data. Most communities tend to produce guidance based on experience. The City of Boulder adopted a Pedestrian Crossing Treatment Warrants policy in 1996 and produced a revised Pedestrian Crossing Treatment Installation Guideline in 2011 that could help provide points of reference. The Boulder documents and Columbia's previous policy are attached. Rigid policies can sometimes leave little room for flexibility for incorporating new technology.

We use guidelines found in our EPG section 620.2.18, which is section 3B-18 of the 2009 MUTCD.

(c) What is the frequency of repainting of crosswalks? Is there a maintenance program which defines that or is it based on staff observation and public request?

The City uses different types of material for marking crosswalks. Typically, painted crosswalks are remarked on a yearly basis, but depending on time constraints may be marked bi-annually. Tape crosswalks typically require less ongoing upkeep and are replaced if deterioration occurs (typically about 3-5 years, depending on the location).

MoDOT used several types of materials to mark lanes, crosswalks, stop bars and arrows. We review these markings every year to determine if they need to be redone.

5. Richard, you stated during the presentation and also to the media that "pedestrian scramble" intersections create delays for both drivers and pedestrians. Can you please send a research study to back up that claim? From what I have read, it seems that the question of delays is highly dependent on the relative volumes of vehicles and pedestrians and, in certain situations, that the "pedestrian scramble" can actually reduce delays for both vehicles and pedestrians compared with a standard pedestrian crossing system.

This is related to physical constraints in time. If there are three phases at a signal, the delay would typically be higher than two phases due to more yellow and all red and lost time. A phase is one type of movement (north-south, protected left turn, etc.). Regarding overall delay, in some cases, overall delay might be overcome by lengthening the signal cycle length or by providing more preference to a heavy movement (the delay for some movements might go up, but the delay for the higher movement could go down). At an intersection with balanced movements, the overall delay would be higher if more phases were added. For instance, at 9th & Elm, the current timing plan allows for a 55 second cycle. A copy of the timing plan is provided. If we change this to add a pedestrian only cycle, the vehicle only green time is not going to be able to be reduced much due to the already relatively short length, the yellow and all red times are going to stay the same and we are going to add a certain amount of time for pedestrians to cross the intersection exclusively. Not knowing the exact final dimensions, I can't say for sure what the cycle length will be. I would guess around 60-65 seconds. If a pedestrian wants to go diagonally across the intersection, they might walk a slightly shorter distance, but will probably end up waiting longer to do so. The pedestrians wanting to go straight will typically wait longer for the dedicated phase to come up.

6. Can you please place a "Yield to Bikes" sign on Stewart Road where the eastbound bike lane ends just before the intersection with Providence Road? This is one of the most heavily traveled intersections in Columbia by bicycles, and there is a significant and persistent hazard with cars accelerating to pass bicyclists and then cutting off the bicycles to make a right turn, or get across the intersection before the light changes.

We will evaluate the location.

7. You mentioned that you use MoDOT's Engineering Policy Guide (EPG), FHWA's Manual on Uniform Traffic Control Devices (MUTCD), as well as guidance from the American Association of State Highway and Transportation Officials (AASHTO), and the Americans with Disabilities Act (ADA), in designing pedestrian facilities but neither of you referenced the National Association of City Transportation Officials (NACTO) Urban Street Design Guide. However, Scott Bitterman had previously reported to City Council that the City of Columbia does use the NACTO Urban Street Design Guide - could you both please clarify whether the City and MoDOT use the NACTO Urban Street Design Guide and, if so, how? –

As I stated in my presentation, the City utilizes several resources as reference manuals. However, recommendations and decisions we pursue are within context of the following main 5 resources:

- Code of Ordinances
- MoDOT EPG (Ordinance 14-462)
- Manual on Uniform Traffic Control Devices (MUTCD) - the basis for MoDOT's EPG – published by the Federal Highway Administration (FHWA)
- AASHTO A Policy on Geometric Design of Highways and Streets – (The Green Book) adopted as the design standard by FHWA
- Americans with Disabilities Act

In addition we can use the NACTO Urban Street Design Guide and other published material as sources of information to help shape recommendations and design features. NACTO is an organization of transportation professionals and is not a government body. There are certainly beneficial aspects to information they produce, just like publications produced by the Institute of Transportation Engineers (ITE) and others.

We use these other sources of material to help provide guidance and information when adopted guidance is not as up to date as desired or there is limited specific detail such as with the Americans with Disabilities Act (where we utilize the Public Rights-of-Way Accessibility Guidelines as the source document).

NACTO Urban Street Design Guide is not a manual that MoDOT uses for design guidance in designing pedestrian facilities. MoDOT uses the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and the Public Rights-of-Way Accessibility Guidelines (PROWAG) as its source guides. PROWAG has been approved by the FHWA as best practices. PROWAG is the primary guide MoDOT uses for designing pedestrian facilities in the public right-of-way. There are other guides published by AASHTO that MoDOT uses too; Guide for the Planning, Design, and Operation of Pedestrian Facilities and Guide for the Development of Bicycle Facilities (2012). MoDOT's Engineer Policy Guide makes reference to these manuals and provides some additional guidance particular to MoDOT pedestrian facilities.

8. Please clarify the level of control the City of Columbia has over MoDOT roads within City limits? How do members of the community participate in MoDOT's design process in constructing new roads or modifying existing ones? – Missouri Highway's and Transportation Commission, which governs MoDOT, is responsible for constructing, maintaining and operating the state highway system and owns the right of way. A permit is required for other entities such as a city, county, utility company, developer or adjacent land owner to perform work on the right of way.

Typically construction projects that are built for roadways maintained by MoDOT are identified in the Statewide Transportation Improvement Program (STIP) and are developed and programmed based input from local jurisdictions. In Columbia, the Columbia Area Transportation Study Organization (CATSO - http://www.gocolumbiamo.com/community_development/planning/boards_and_commissions/catso/) provides the basis for the Long Range Transportation Plan. This regularly updated plan goes through a public process. Also, most major projects within the City will tend to have some form of local matching funds. This would mean that a MoDOT project would typically have some form of City Council action as part of designating the funding.

Construction Projects that MoDOT designs are identified in our 5-year Statewide Transportation Improvement Program (STIP). The STIP is developed with input from our planning partners, like CATSO, from across the state and approved by our Commission after a public comment period. The specific project will determine the amount of public input obtained during its design. Resurfacing projects will generally have little public input unless within a city or developed part of a county, then some discussions with city / county staff typically occur. Larger projects that have long term impacts to the traveling public or where right of way is needed will usually have either a public hearing or meeting. Projects that are complex will sometimes incorporate an advisory committee to get input.