OVERALL APPROACH

1. **Comment: I support MC Bicycle Master Plan Team's approach of using LTS to rate roads for bicycle travel, however, I believe the team's approach of adding three additional levels of stress is a disservice to the County. Manipulating Furth's system, which is based on years of research and analysis, places the County outside Furth's system of evaluation. The suggested similar yet independent LTS methodology negates the benefit of using Furth's national standard. A planning board can learn a great deal from other planning boards across the county if we maintain the same standards and work from the same methodology. For this reason, I support staying with Furth's original methodology of four levels of traffic stress.**

   Response: We have proposed three additional LTS levels based on early feedback from several community members (we conducted a meeting back in 2014 with number of bicycling advocates and expressed concern with some aspects of the methodology, including a few people on this Bicycle Master Plan community advisory group) and from feedback from our own staff. We believe that these categories provide a greater level of nuance that explains the different conditions people are willing (or not willing) to ride in. For example, we believe that the bicycling conditions on a trail is different from that of a very low stress sidepath. That said, we recognize the value of an apples-to-apples comparison and set up the three additional categories so that they could be easily be folded back into the four categories originally proposed by Peter Furth. LTS 5 would be combined with LTS 4, LTS 2.5 would be combined with LTS 2 or LTS 3, and LTS 0 would be combined with LTS 1.

   It's important to note, that while we're using a revised LTS on the maps on our website, all streets and intersections are also ranked using Peter Furth's LTS methodology. So every data point contains a Furth LTS and a Revised LTS, which allows us to use the more nuanced approach and still be comparable across jurisdictions.

   A few jurisdictions that I know of have modified the Furth approach, including Oregon and Colorado Springs (Oregon proposed changes to the methodology, Fort Collins added a LTS 5 level). We have been discussing the methodology with Peter Furth over the past year, and submitted our changes to him several weeks ago for feedback. Peter is actually proposing a number of changes as well to the methodology, but not the levels.

2. **Comment: I'd change the ranking used for the moderate high, high and very high levels on many different roads. After having ridden on those roads, I'd move some higher and some lower based on my experience. And the time of day one uses the roads really affects the stress level. Other people would probably argue for different levels being applied. I don't think it really matters. The most important differentiation is between the roads ranked low stress and lower and the roads ranked moderate stress and higher. After Matt's talk, I realized we're looking at 'good' roads and 'bad' roads. The LTS map does a good job with that differentiation. This tells us where we need to make improvements and connections. My guess is that when improvements are made, they will be implemented based on a variety of factors including cost, timing, and physical attributes of the road. The ranking of the road may have little influence on where an improvement is made. If the committee decides we should focus on improving level 2.5 and level 3 roads, then these rankings may be important, but they're not overly important at this point. I don't think we should spend a lot of time discussing which roads are really 3s and which are really 4s.**

Response: I agree with your overall comment that the specific LTS rating is less important than differentiating between good roads and bad roads. That said, I do think there is value in differentiating between bad and very bad roads in a few instances:

First, the State Highway Administration still insists on putting bike lanes on state highways as the preferred solution. Level of Traffic Stress can help to determine the level of relief that is caused by adding a bike lane to a state road. If the state has an LTS 4 road, adding a bike lane may not change the stress level. And if that's the case, why make the investment. We can use the methodology very easily to determine the minimum level of investment required to change the stress level in a positive direction.

Second, maybe less important to the bike plan, but more the bicycle industry. Level of Traffic Stress is now the leading approach for understanding what it takes to create a low stress bicycling environment. People are starting to move in the direct of developing demand projections and a LTS 3 road will attract a lot more demand than an LTS 4 road.

So I agree that for master-planning the key difference is between LTS 2 and LTS 2.5. But for these other reasons feedback on the nuances in the higher stress levels (LTS 2.5 and up) is still important to try and elicit, though like you said, perhaps not spend a lot of time on it.

3. **Comment: Please define "industrial street" and intent in adding this- large vehicles on the street?**

Response: An industrial street is a functional classification. Streets that are identified in a master plan that are located in an industrial area are typically defined as industrial streets. Industrial streets have wider lanes. The intent is to capture where there are a lot of large vehicles on the street and where pavement conditions are likely to be poorer and debris is more likely.

DATA COLLECTION, TRAVEL PATTERNS AND METRICS

4. **Comment: Can the Bicycle Master Plan Scope of Work be extended to cover bicycle travel data collection?**

Response: The question we have asked ourselves is whether a bicycle travel data collection effort would be an effective use of resources to develop the Bicycle Master Plan. Our conclusion is that it would not. The amount of bicycle travel is relatively small and observation leads us to believe that much of the existing bicycle travel is by bicyclists that tolerate a higher level of traffic stress or people bicycling on off-roads trails. Using existing bicycle counts will only represent those people that are bicycling today, not the types of trips that we anticipate will be made if we have a highly connected, low-stress bicycle network. And of course over the next 10 – 20 years we will see changes in development patterns that will further effect bicycle travel. So while it is important to conduct bicycle counts to track the growth of bicycling (which we are starting to do), we do not believe that bicycle counts are an effective way to evaluate this bicycle master plan.

5. **Comment: Once we have current bicycle travel data in hand, how do we extrapolate it to obtain anticipated future bicycle travel patterns?**

Response: The approach we have outlined to anticipate the future is to use the output of the regional travel demand forecasting model – which captures most daily trips in the region – to identify those trips that are potential bicycle trips (note that this would not be a demand forecast). The travel demand forecasting model forecasts travel in 5 year increments over a 30-year period and is based on population, household, and employment projections that will result from land use changes that we expect to occur. Our approach is to take the universe of daily trips and adjust it by travel distance (the longer the trip, the less likely it will be made by bicycle) and whether the trip can be made on a low-stress network.

6. **Comment: What analytics do we apply to the data?**

   Response: We have some ideas on this that we will share, but we will be working through a process with the advisory group to develop metrics over the course of the next few months. The first step is to identify the major issues that the Bicycle Master Plan needs to address (this meeting). We will then develop goals and objectives to address the issues and ultimately create metrics that measure how well the plan is achieving the objectives.

ADDITIONAL DATA NEEDED

7. **Comment: The map needs to include slope. (from 2/2016 meeting)**

   Response: As discussed at our February 2016 meeting, we have slope data and can include it as an additional GIS layer in a second version of the LTS map.

8. **Comment: The map needs to include sight distance. (from 2/2016 meeting)**

   Response: While we agree that sight distance can create additional traffic stress when bicycling, we have not found a good approach to consistently identify locations where sight distance is an issue. We therefore proposed to consider changes to the traffic stress on these roads based on feedback from the advisory group members and the public.

9. **Comment: Add transit layer for future analysis**

   Response: We can add transit stops in a second version of the map.

10. **Comment: Include traffic data (original Furth model) and non-traffic data – but keep them separate so we can look at each individually for planning purposes (i.e., turn "on" and "off" GIS layers)**

    Response: Some traffic data is required in the existing methodology (mixed traffic streets with no on-street parking, posted speed limit of 25 mph, and 2 -3 lanes), and we have included this where available. There are also online interactive maps that include traffic count data (see: www.mcatlas.org/intersections), however, it is very time consuming to merge the two layers.

11. **Comment: Confirm - is annual average daily traffic (AADT) included in the model? I believe during the presentation it was indicated that the # of lanes is a proxy - but this could be useful information**

    Response: ADT is included only on mixed traffic streets with no on-street parking, posted speed limit of 25 mph, and 2-3 lanes. This data is generally only available on some segments of state highways.

12. **Comment: Can we add AADT by time of day and see various version of BLOS based on time of day? If not included in BLOS, maybe like slope it could be added as a temporal add-on layer.**

    Response: In addition to the ADT data described above, we have peak hour data at about 500 intersections, though many of the counts were taken several years ago. It is time consuming for us to add this data in to the LTS map, but it is available on www.mcatlas.org/intersections.

13. **Comment: Facility proximity – could we add a layer to consider the roadway proximity to certain types of facilities that generate high vehicle trips (e.g., safety) – these may be places where bicyclists also want to go but knowing where they are /understanding their relationship to stress could be valuable. We could consider using the MOCO land use maps and either identifying these land use categories and apply a trip generation # to them, or create a list of such place types and use GIS to identify where they are, then buffer 1/8 mile around these place types to add a certain amount of stress?**

    Response: We believe the number of lanes is a reasonable proxy for the amount of vehicular trips.

TABLE 1: METHODOLOGY FOR STREET SEGMENTS

14. **Comment: Regarding Draft LTS Methodology for Street Segments (2/2/2016) - I think grade separation should be a criterion for LTS. In the category of Separated Bike Lanes, I see Flex Posts, Wide Buffer, & Parked Cars but nothing for grade separation.**

    Response: This is a good point. We propose to accommodate it by replacing the "wide buffer" category with a "buffer < 5ft" and a "buffer ≥ 5 ft", using the same ratings that are in the "shared use path" section.

15. **Comment: For <+= 25 – Why is the LTS lower for situations where there is parking and a center line than where there is no parking? It seems to me that situations with parking are more stressful because vehicle could pull out in front of you or open doors in front of you.**

    Response: We believe this question is focused on mixed traffic roads with a posted speed limit of ≤25 mph and 2 – 3 lanes of traffic.

    We agree that on-street parking tends to be more stressful in commercial areas when the turnover frequency is high or there are frequent blockages, but it tends to be less stressful in residential areas where the turnover frequency is low and there are infrequent blockages. Therefore, in commercial areas our approach is that on-street parking creates a stress level of

2.5 (moderate low), though other factors (number of through lanes and posted speed limit) can increase the stress level.

The original Level of Traffic Stress treats roads such as Sligo Creek Parkway the same as a two-lane residential street with 25 mph speed limits and a painted centerline. However, many bicyclists would consider Sligo Creek Parkway to be the more stressful experience because it lacks context cues to advise motorists to expect bicyclists. To reflect that many cyclists experience more stress on roads such as Sligo Creek Parkway, we used the presence of on-street parking and lower traffic volumes (<6,000 daily vehicles) to differentiate residential two-lane streets from two-lane streets like Sligo Creek Parkway.

16. **Comment: Likewise, why is a situation with no center line and parking a [LTS] 1 while with a center line it is a [LTS] 2?**

    Response: When there is a painted centerline, drivers tend to pass bicyclists more closely than when there is no painted centerline. As a result, a centerline may increase the stress of cycling. It also serves somewhat as a proxy for determining traffic volume, since low-traffic streets often do not have striped centerlines.

17. **Comment: Why are bike lanes only two absolute widths 5.5 feet and 6 feet. Shouldn't it be less than 6 feet and greater than 6 feet.**

    Response: Yes. The analysis used a six-foot threshold. The table will be corrected.

18. **Comment: Is there really a big difference between a 14 ft bike lane and parking and a 15 ft bike lane and parking? Maybe to simplify you should make it less than 14.5 ft and greater than and equal to 14.5 ft?**

    Response: Per the Level of Traffic Stress methodology, "With a reach of 15 ft, cyclists can ride with ample clearance from hazards on both sides. With 14 ft., cyclists can usually avoid both hazards, but have to maintain a carefully chosen, narrow track that keeps risk low on both sides; this need to keep to a narrow track increases stress."

    The comment recommends collapsing the three categories (<14 ft, 14 to 14.9 ft, >=15 ft) to two categories (<14.5 ft and >= 14.5 ft).

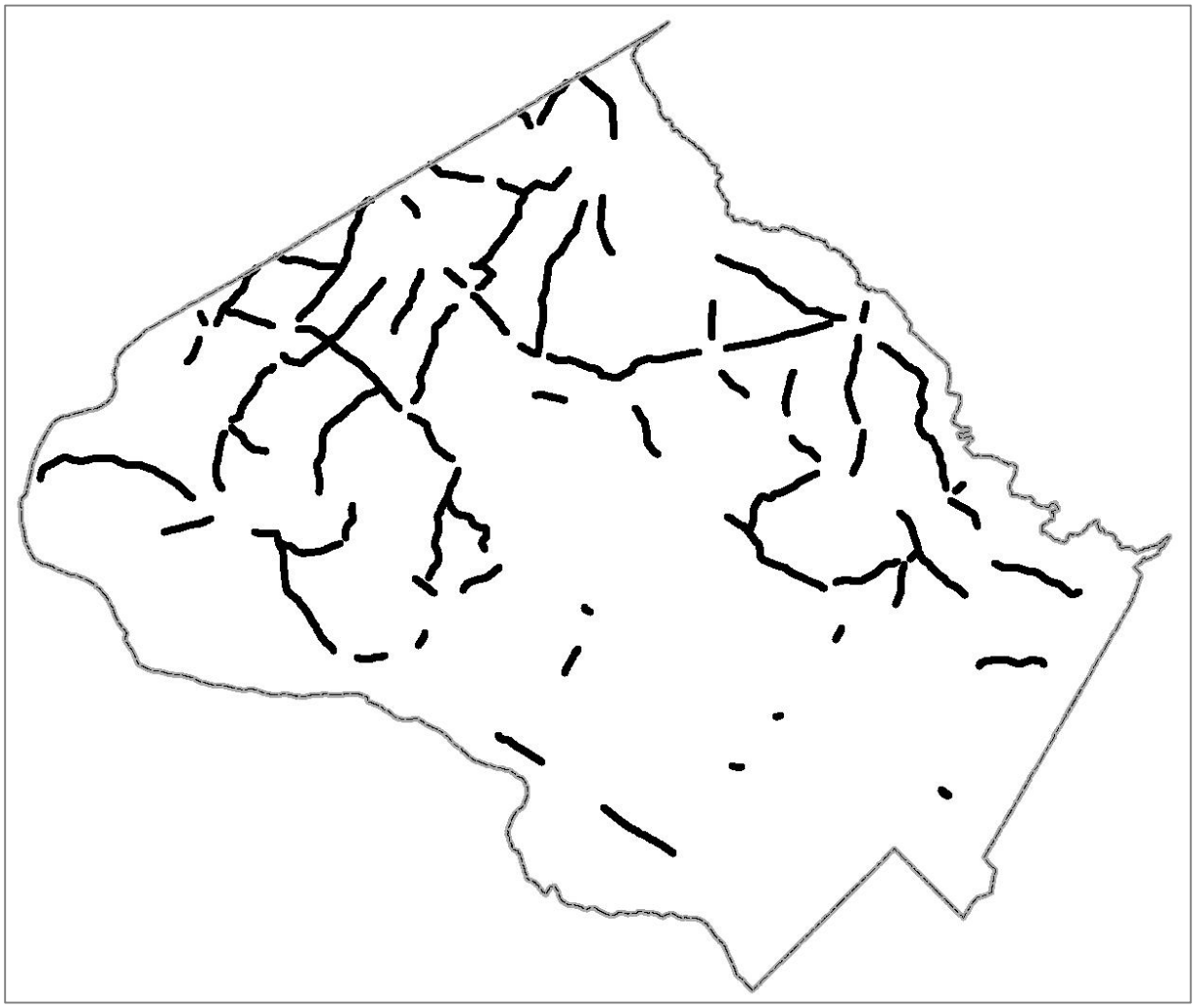
    The practical effect of this change is limited in regards to master plan recommendations. Per our count there are about 15 locations in the County with both bike lanes and on-street parking, of which only 3 have combined bike lanes and parking lanes that exceed 14 ft.

    The bigger implication is on the County's road design standards, which have a maximum combined bike lane and parking lane width of 14 ft.

    We recommend keeping this differentiation.

19. Comment: A 40 mph road with 2-3 lanes is probably as stressful or more stressful than ones with 4-6 lanes. Why did you decide to make this cell a [LTS] 3.

Response: This was a change to the original Level of Traffic Stress methodology that the Planning Department staff made. This condition existing largely in the rural area of the County (see map below).



20. Comment: Busses – busses add a high level of stress for many bicyclists – in part due to shared space- could we add a GIS layer of the RideOn/Metro lines that serve MOCO and make some modification to the BLOS rating for those roads that are serviced by high frequency bus routes? (yet, we also need to be aware the bicyclists might want to get on a bus, so I'm not saying to de-prioritize investments on these routes)

Response: I'm not sure how this would fit into the LTS methodology. I suspect that the streets that have frequent bus service are mainly arterials with a relatively high level of stress already.

Quiet residential streets (LTS 1, LTS 2) are unlikely to have frequent bus service.

TABLE 2: METHODOLOGY FOR INTERSECTIONS

21. **Comment: In the second table it appears that in most cases the LTS with a median and 4 to 5 lanes is the same as 2-3 lanes, which makes sense. However, this is not true for >= 40 mph, why not?**

    Response: Discussion needed.

22. **Comment: Should we consider adding something that reflects the frequency of intersections?**

    Response: No. It is unclear whether the frequency of intersections would increase or decrease traffic stress. Super long block distances tend to increase traffic speeds, so could increase stress. Shorter block distances reduce traffic speeds, so could reduce stress. But, if one finds intersections stressful, then closer spacing would seem to increase stress.

23. **Comment: It would be helpful to have more clarity on what is included in the MOCO BLOS model regarding intersections- what features are all considered? For example, are the following included? If not, should they be? I would imagine (hope) that SHA and MOCO DOT have this data?**

    - Stop sign only/combo with traffic type/# lanes?
    - Signal but no pedestrian signal
    - Signal with pedestrian signal
    - Signal with pedestrian advance signal (peds go first)
    - Signal with countdown timers
    - Traffic Light Bicycle-specific signal
    - Green Bicycle Lanes /dashes/bike lane/sharrows through intersections
    - Bike box in front of waiting traffic
    - Bicycle friendly light signal
    - Visibility- (does landscaping block visibility?)

    Response: The LTS methodology only analyzes unsignalized intersections where the conditions of the street being crossed would trigger an increase in traffic stress. Signalized intersections are assumed to have no effect on traffic stress.