

Greater Bozeman Area Transportation Plan (2007 Update)

Transportation Coordinating Committee

Project Meeting No. 10
December 19th, 2007

12/18/2007



Today's Meeting Goal

- Review level of service (LOS) definitions
- Review current level of service criteria in place by MDT, Gallatin County and the City of Bozeman
- Discuss if current criteria is acceptable or in need of change going forward

12/18/2007

2

Level of Service - Defined

- Level of service (LOS) is a qualitative measure developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles.
- It provides a scale that is intended to match the perception by motorists of the operation of the intersection.
- Level of service provides a means for identifying intersections that are experiencing operational difficulties, as well as providing a scale to compare intersections with each other.
- The level of service scale represents the full range of operating conditions. The scale is based on the ability of an intersection or street segment to accommodate the amount of traffic using it.
- The scale ranges from “A” which indicates little, if any, vehicle delay, to “F” which indicates significant vehicle delay and traffic congestion.

3

Level of Service (Signalized Intersections)

Table 1
Signalized Intersection Level of Service Definitions Based on Control Delay

Level of Service	Description	Average Control Delay Per Vehicle (Sec.)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	Up to 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.1 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	Greater than 80.0

Source: Transportation Research Board, 2000 *Highway Capacity Manual*, (Washington, D.C., 2000).

12/18/2007

4

Level of Service (Unsignalized Intersections)

Table 2
Unsignalized Intersection Level of Service Definitions Based on Control Delay

Level of Service	Description	Average Control Delay Per Vehicle (Sec.)
A	Operations with very low delay occurring with favorable progression.	Up to 10.0
B	Operations with low delay occurring with good progression.	10.1 to 15.0
C	Operations with average delays resulting from fair progression.	15.1 to 25.0
D	Operations with longer delays due to a combination of unfavorable progression or high V/C ratios.	25.1 to 35.0
E	Operations with high delay values indicating poor progression and high V/C ratios. This is considered to be the limit of acceptable delay.	35.1 to 50.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation and poor progression.	Greater than 50.0

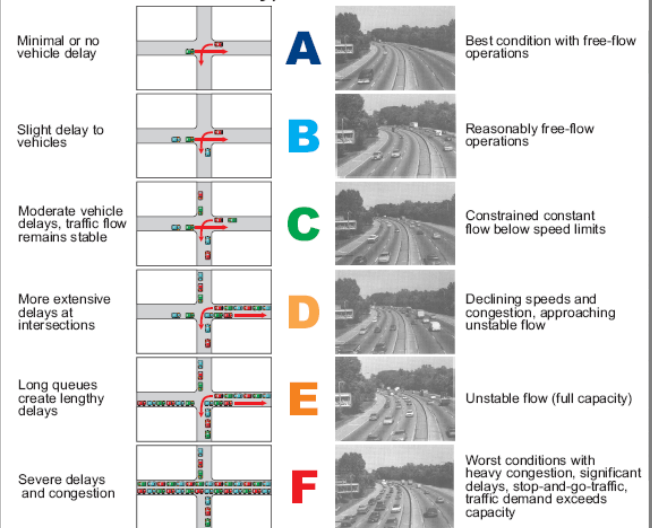
Source: Transportation Research Board, 2000 *Highway Capacity Manual*.

Level of Service (Graphic Portrayal)







What is Level of Service?

Intersection (Based on vehicle seconds of delay)

Roadway (Ratings)



Level of Service (Graphic Portrayal)

LEVELS OF SERVICE for Two-Lane Highways			
Level of Service	Flow Conditions	Operating Speed (mph)	Technical Descriptions
A		55+	Highest quality of service. Free traffic flow with few restrictions on maneuverability or speed. No delays
B		50	Stable traffic flow. Speed becoming slightly restricted. Low restriction on maneuverability. No delays
C		45	Stable traffic flow, but less freedom to select speed, change lanes or pass. Minimal delays
D		40	Traffic flow becoming unstable. Speeds subject to sudden change. Passing is difficult. Minimal delays
E		35	Unstable traffic flow. Speeds change quickly and maneuverability is low. Significant delays
F			Heavily congested traffic. Demand exceeds capacity and speeds vary greatly. Considerable delays

12/18/07

Source: 2000 HCM, Exhibit 20-2, LOS Criteria for Two-Lane Highways in Class 1

7

MDT LOS Criteria

TYPE OF FACILITY	LEVEL-OF-SERVICE CRITERIA	
Freeways (NHS — Interstate)	Rural: B	Urban: B
Principal Arterials (NHS — Non-Interstate)	Level/Rolling: B	Mountainous: C
Minor Arterials (Non-NHS — Primary)	Level/Rolling: B	Mountainous: C
Rural Collector Roads (Non-NHS — Secondary)	Desirable: B	Minimum: C
Urban Principal Arterials (NHS — Non-Interstate) 2-Lane and Multi-Lane	Desirable: B	Minimum: C
Urban Minor Arterials (Non-NHS) 2-Lane and Multi-Lane	Desirable: B	Minimum: C
Urban Collector Streets (Non-NHS)	Desirable: C	Minimum: D

MDT Traffic Engineering Manual (Figure 30.2B)

12/18/2007

8

Gallatin County LOS Criteria

- Gallatin County does not have a formal LOS standard as part of their Subdivision Regulations and/or adopted Growth Policy
- Gallatin County uses its discretion on a case-by-case basis to decide what an acceptable level of service would be.

City of Bozeman LOS Criteria

- Defined by the Unified Development Ordinance

“Streets and intersection level of service “C” shall be the design and operational objective, and under no conditions will less than level of service “D” be accepted. All arterial and collector streets, and movements on intersection approach legs designated as arterial or collector streets, shall operate at a minimum level of service “C”. The design year for necessary improvements shall be a minimum of fifteen years following construction of said improvements.”

City of Bozeman LOS Criteria

Current application of the UDO

- Scenario 1
Existing intersection operation is a LOS D and development traffic impact continues the LOS at a D then----- no mitigation is being required.
- Scenario 2
Post-development analysis shows intersection operations to fall below LOS D, then-----intersection mitigation (i.e. improvements) must achieve a LOS of C over the next fifteen years.
- So what is the Issue?

Discussion Time

- Different jurisdictions have different approaches to level of service
- Can the Transportation Plan provide a consistent approach to level of service that can accommodate every jurisdictions operational objectives
- Apply level of service criteria to the intersections as a whole? Or apply to individual turning movements?
- What is acceptable should be defined in the Transportation Plan.
- TCC to offer thoughts/guidance!!!!

TCC Discussion:

Should the LOS Criteria be a LOS C or better for the intersection as a whole, with the allowance that some individual turning movements can be worse than a LOS C?



Questions and/or Comments

TCC Discussion:

Should the LOS Criteria be a LOS C or better for the intersection as a whole, with the allowance that some individual turning movements can be worse than a LOS C?