

01/14/97

## **Minnesota Department of Transportation**

Metro Division

### *Guidelines on Shoulder Use by Buses*

The Minnesota Department of Transportation (Mn/DOT) is allowing public transit buses to use the shoulders in an effort to encourage transit use and to fully utilize the capacity of the metropolitan highway system. An evaluation of shoulder use by buses prepared by MathCraft Inc. and JHK & Associates has shown shoulder use resulted in increased transit ridership and decreased operational costs. Shorter, more predictable travel times and fewer missed transfer connections have increased ridership. Operational costs have decreased because more reliable travel times result in less driver overtime. In some cases, travel times have decreased to the point that schedules have been rewritten to eliminate unneeded buses.

#### **Authorization of Buses**

The use of designated shoulders by buses is limited to those transit operators funded by the Metropolitan Council. The Metropolitan Council, in cooperation with Mn/DOT, is responsible for authorizing transit operators. As additional transit operators are authorized, Metropolitan Council Transit Operations' (MCTO's) Director of Team Transit will furnish the Minnesota State Patrol's East and West Metro Captains with an updated list of transit operators. MCTO's Director of Team Transit is responsible for ensuring that all drivers using shoulders receive operational instructions and a copy of these guidelines.

#### **Roadway Eligibility Criteria**

A number of criteria must be met in order for a roadway to be considered for bus shoulder use. The primary criterion is that there must be "predictable congestion delays", meaning the running speed of the roadway must be less than 35 mph during the peak period and/or approaches to intersections have continuous back-ups. Additional criteria that must be met for a roadway to be considered for bus shoulder use include:

- Congestion delays must occur one or more days per week.
- A minimum of six transit buses per week must use the proposed bus shoulder.
- The expected time savings of using the shoulder must be greater than eight minutes/mile/week.
- The proposed shoulder must have a continuous shoulder width of at least 10 feet.

#### **Operational Guidelines**

Whenever shoulders are used, bus drivers must exercise their best judgment in considering the safety of other motorists, as well as that of bus passengers. Bus drivers will use designated shoulders only when traffic is moving at speeds less than 35 mph. While using the designated shoulders, the bus shall not exceed the speed of traffic by more than 15 mph, the maximum speed being 35 mph. If traffic is stopped, the bus speed shall not exceed 15 mph. Bus speed on shoulders, and especially on bridge decks, should be reduced if water, snow, or ice is present. During the winter months, shoulders may be blocked temporarily by snow, especially on bridges and in areas adjacent to guardrail. In such cases where the bus will not fit on the shoulder, that shoulder shall not be used. If the shoulder is obstructed in any way, the bus driver must re-enter

Appendix A

**Shoulder Use by Buses: Geometric Design Criteria**

**Type of Highway: Urban Multi-Lane Freeway and Expressways;  
Buses on right shoulder**

Controlling Geometric Design Criteria	Mn/DOT Std.	Notes:
Design Speed, mph	35 mph	Maximum speed for buses traveling on shoulder, as per operational policy
Shoulder Width, ft.	10 12	minimum desirable for pavement longevity and added safety
Bridge Width, ft.	11.5	11.5' wide shoulder is needed on bridges.
Grades, max. %	nc	no change (nc) match existing roadway
Inslopes	1:6	If inslopes are not steeper than 1:6, inslopes may be steepened to 1:6. If inslopes are steeper than 1:6, match existing, except in the following cases; If fill slope is steeper than 1:3 and higher than 2 feet, provide guardrail, If fill slope is steeper than 1:3.5 and higher than 5 feet, provide guardrail, unless there is 18 feet between the edge of shoulder and the point where the fill slope becomes steeper than 1:3.5.
Structural Capacity	HS25	For new bridges, for existing bridges to allow shoulder use the shoulder must be structurally adequate (capable of carrying legal loads and does not appear on the inventory of inadequate bridges).
Horizontal Alignment, radius (ft.)	nc	no change (nc) match existing roadway
Vertical Alignment minimum K value (ft./deg.)	nc	no change (nc) match existing roadway
Stopping Sight Distance (ft.)	250'	Stopping Sight Distance based on 35 mph design speed
Cross Slope, (ft./ft.)	.02-.05	Mn/DOT Road Design Manual; Tbl. 4-4.03A, p. 4-4.0(3)
Superelevation max max. negative (ft./ft.)	.06 -.04	for curves less than or equal to 8 degrees Mn/DOT Road Design Manual; p. 3-2.0 (2A)
Vertical Clearance	14'	AASHTO 1990 Policy on Geometric Design of Highways & Streets; p. 526 Tallest design vehicle is 10'-9"
Horizontal Clearance	0'	AASHTO 1990 Policy on Geometric Design of Highways & Streets; p. 586 2' beyond edge of shoulder is preferable, as a minimum, place at the edge of shoulder

the mainline to avoid the obstruction. Bus drivers must yield to any vehicle that enters the shoulder as well as any vehicle merging or exiting at an interchange ramp. Buses can use the shoulder while "dead heading" or when returning with an empty bus to the beginning of a new route.

### **Enforcement**

The Minnesota State Patrol will notify MCTO's Director of Team Transit and Mn/DOT's Team Transit Project Manager if they discover drivers that fail to adhere to these operational guidelines. The State Patrol will tow abandoned vehicles in the designated bus shoulder use areas.

### **Design Criteria**

See the attached Appendix A for geometric design criteria.

- **Shoulder Width**  
Shoulders used by buses will be a minimum of 10 feet wide. In areas of new construction where bus shoulder use is expected, it is desirable to have 12-foot shoulders for increased pavement longevity and added safety.
- **Structural Capacity**  
All shoulders proposed for use by buses must be of sufficient strength and must be inspected by the Mn/DOT Materials Section prior to use.
- **Drainage Structures**  
Mn/DOT is currently testing three catch basin designs along I-35W. After evaluating these designs, Mn/DOT will issue a standard catch basin design where bus shoulder use is permitted. All drainage structures will be inspected and evaluated for structural integrity before bus use is allowed. If necessary, grates, frames, and adjusting rings will be reinforced or replaced.

### **Maintenance**

Shoulders used by buses will be cleared of snow and obstructions as a part of normal maintenance activities. Whenever possible, these shoulders will receive maintenance priority over normal shoulders.

### **Signing and Striping**

See the attached Appendix B for typical signs and placement.

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## **Authorized User List for Bus Shoulder Use**

All MCTO, Maple Grove Transit, Minnesota Valley Transit, Plymouth Metro Link, Southwest Metro Transit, University of Minnesota, and Metro Mobility Buses are authorized to use the designated shoulders.

The following are charter bus companies that are contracted to perform as transit buses:

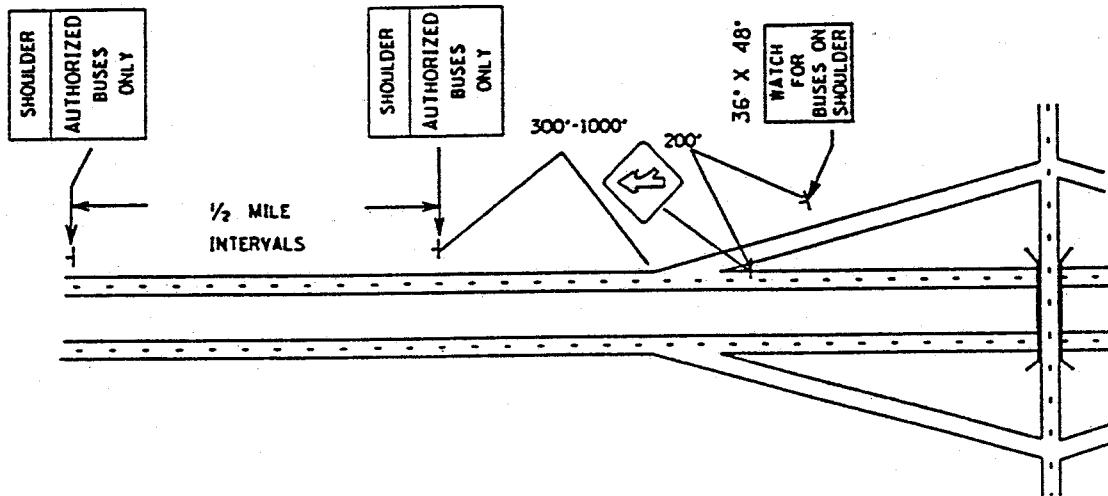
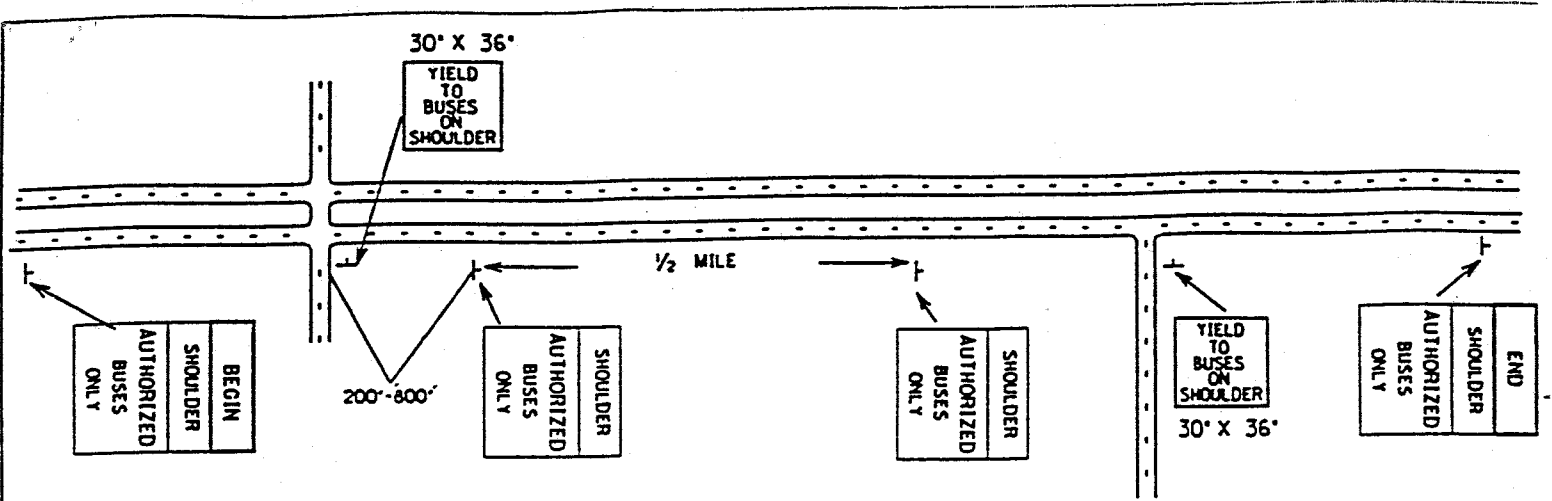
Be-Line  
Laidlaw  
Lorenz  
Medicine Lake Lines  
St. Croix Valley

Each of these buses must have a route number displayed on its route destination sign to be an authorized user. If the bus is displaying "charter" on its route destination sign, they are **not** an authorized user.

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Contact List

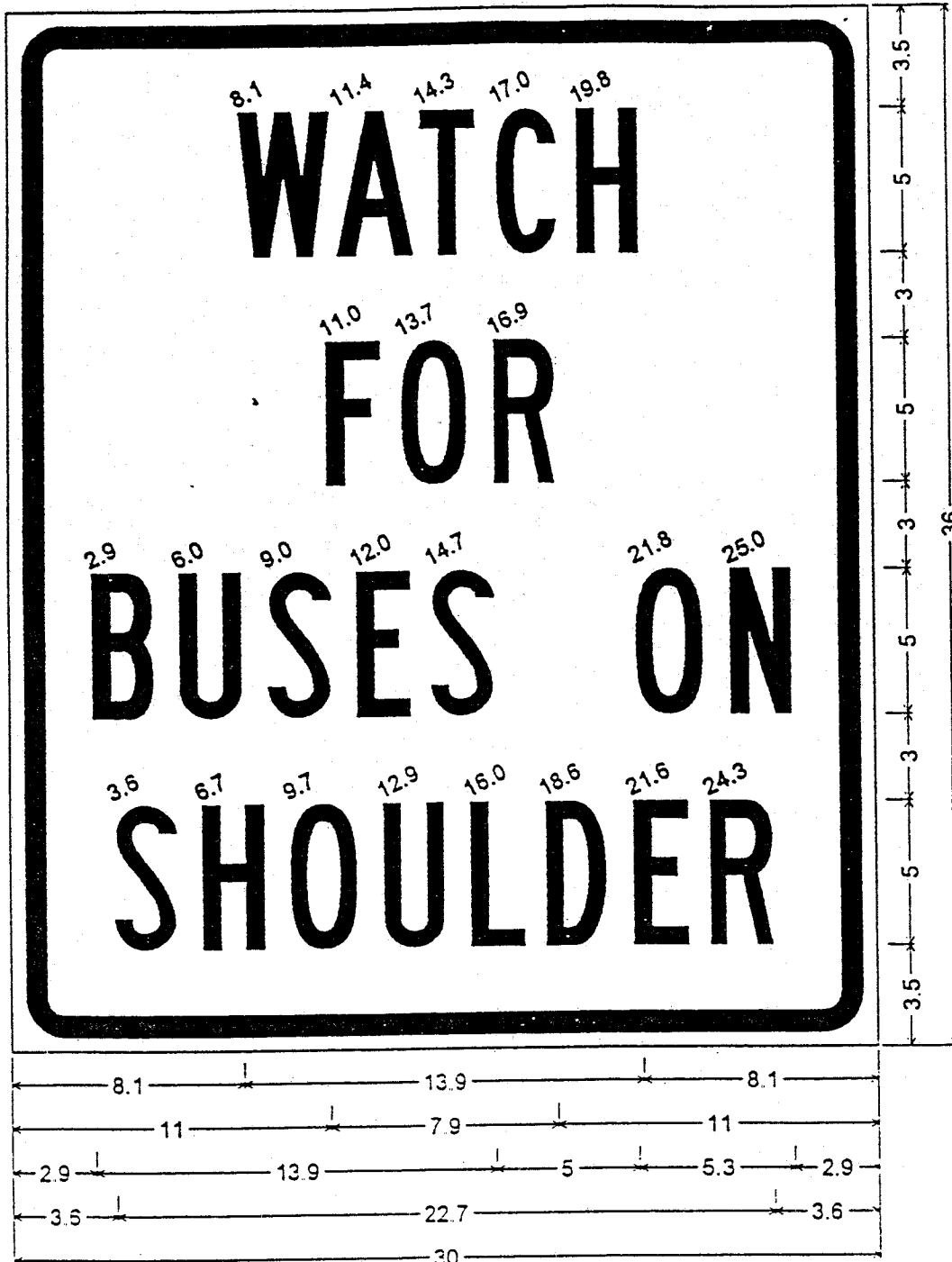
Mn/DOT Team Transit Project Manager	Joe Gladke	582-1586
MCTO Director of Team Transit	Aaron Isaac	349-7690
Minnesota State Patrol East Metro Captain	Kevin Kittridge	779-5900
Minnesota State Patrol West Metro Captain	Steve Mengelkoch	591-4680



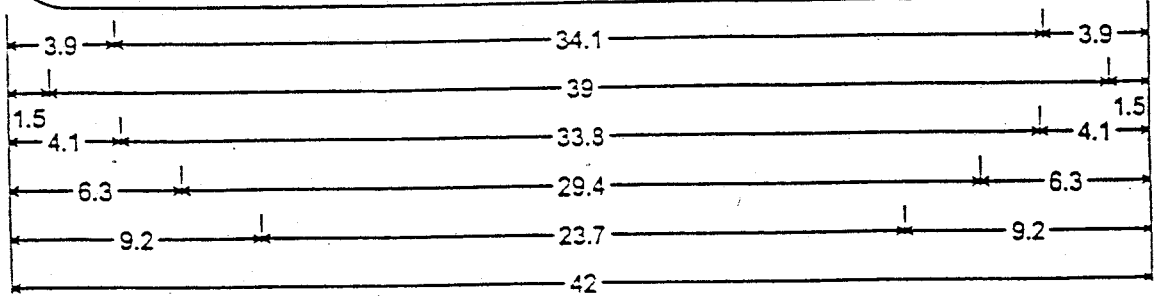
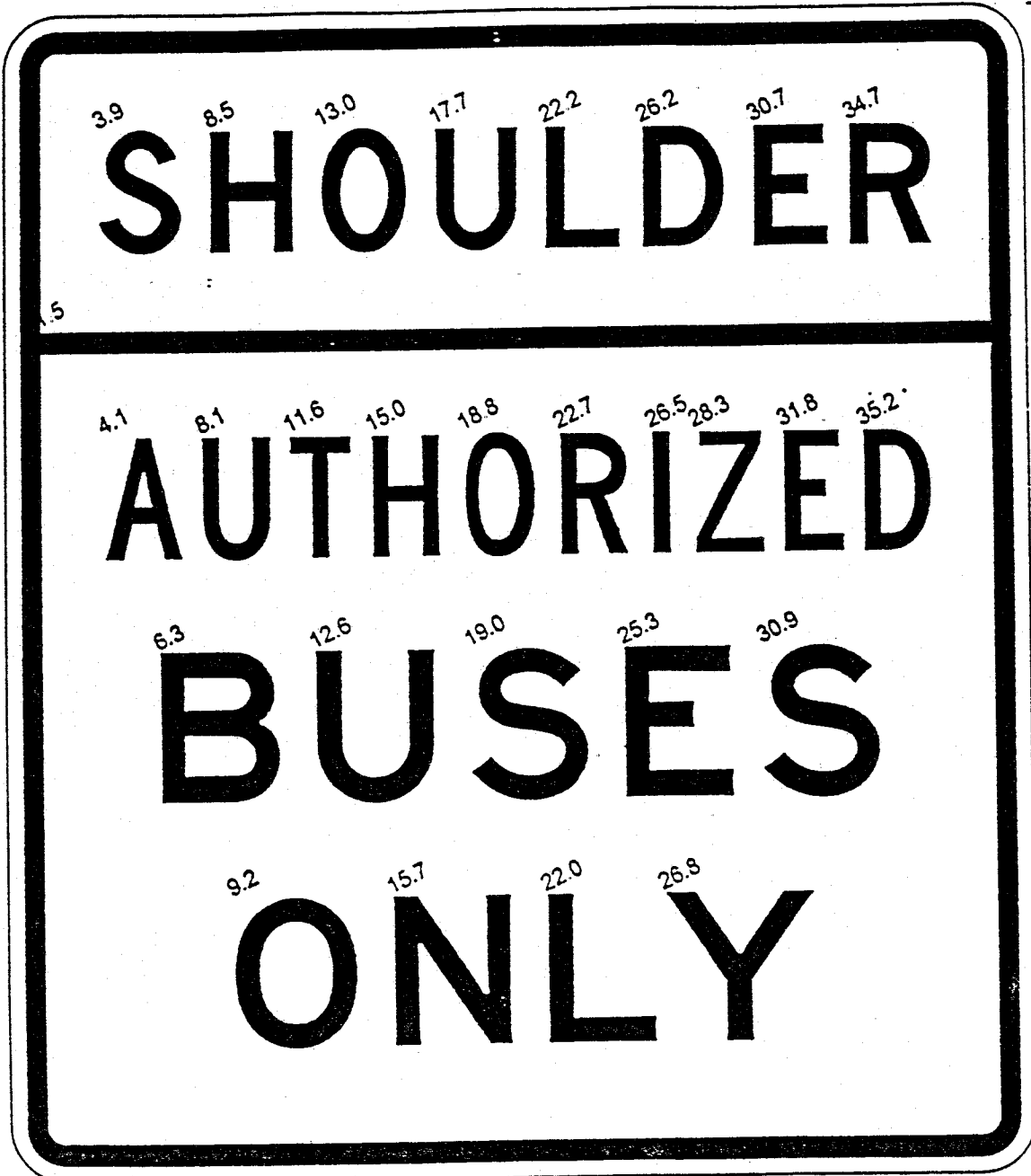
NOTES:

One sign minimum between signalized intersections.

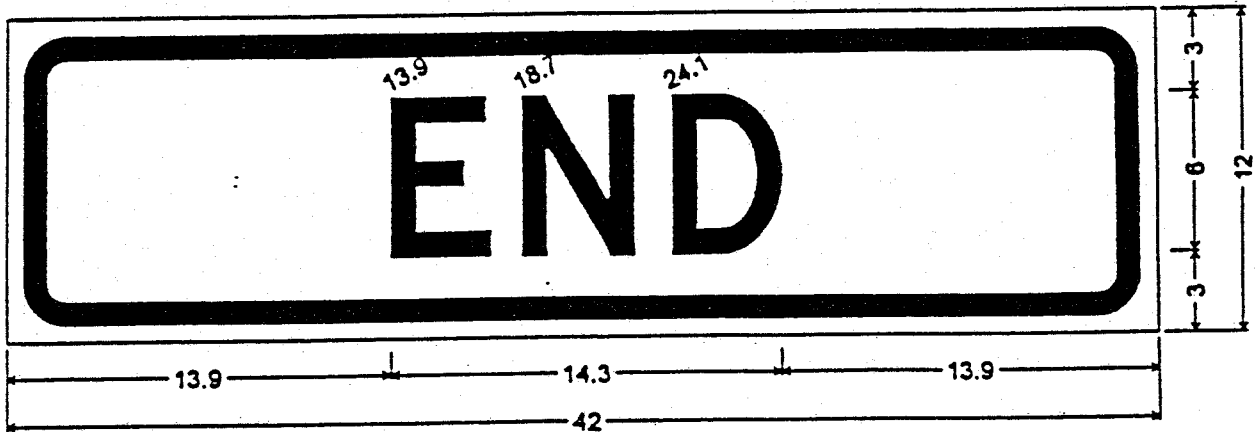
TYPICAL SHOULDER  
SIGNING FOR BUS USE



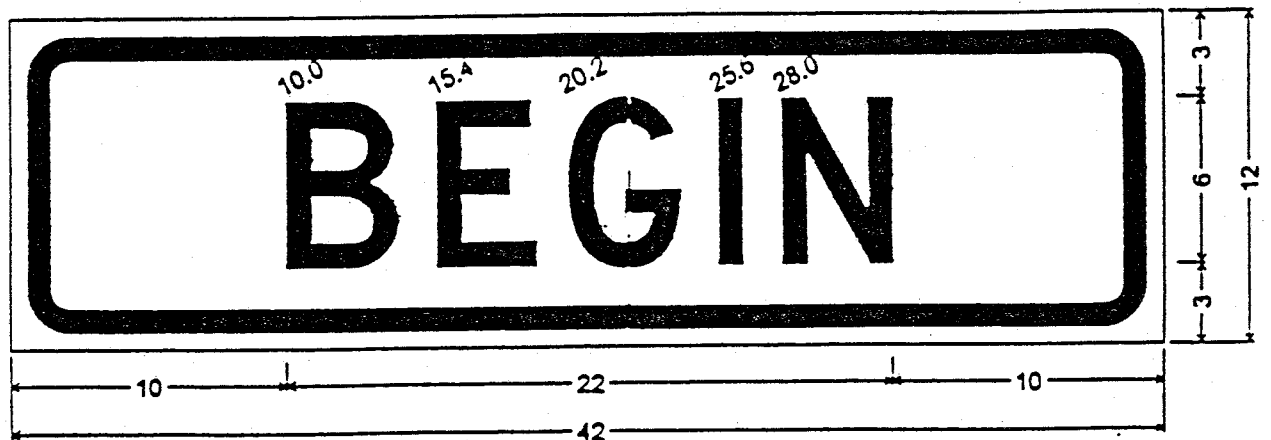
1.9" Radius, 0.8" Border, 0.5" Indent, Black on Yellow;  
 "WATCH" B; "FOR" B; "BUSES ON" B; "SHOULDER" B;



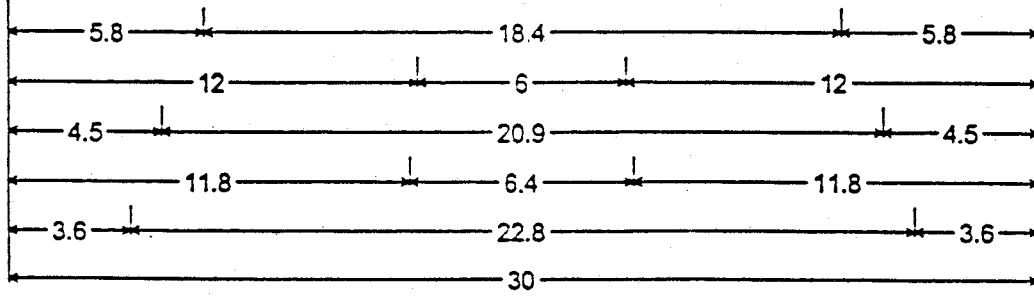
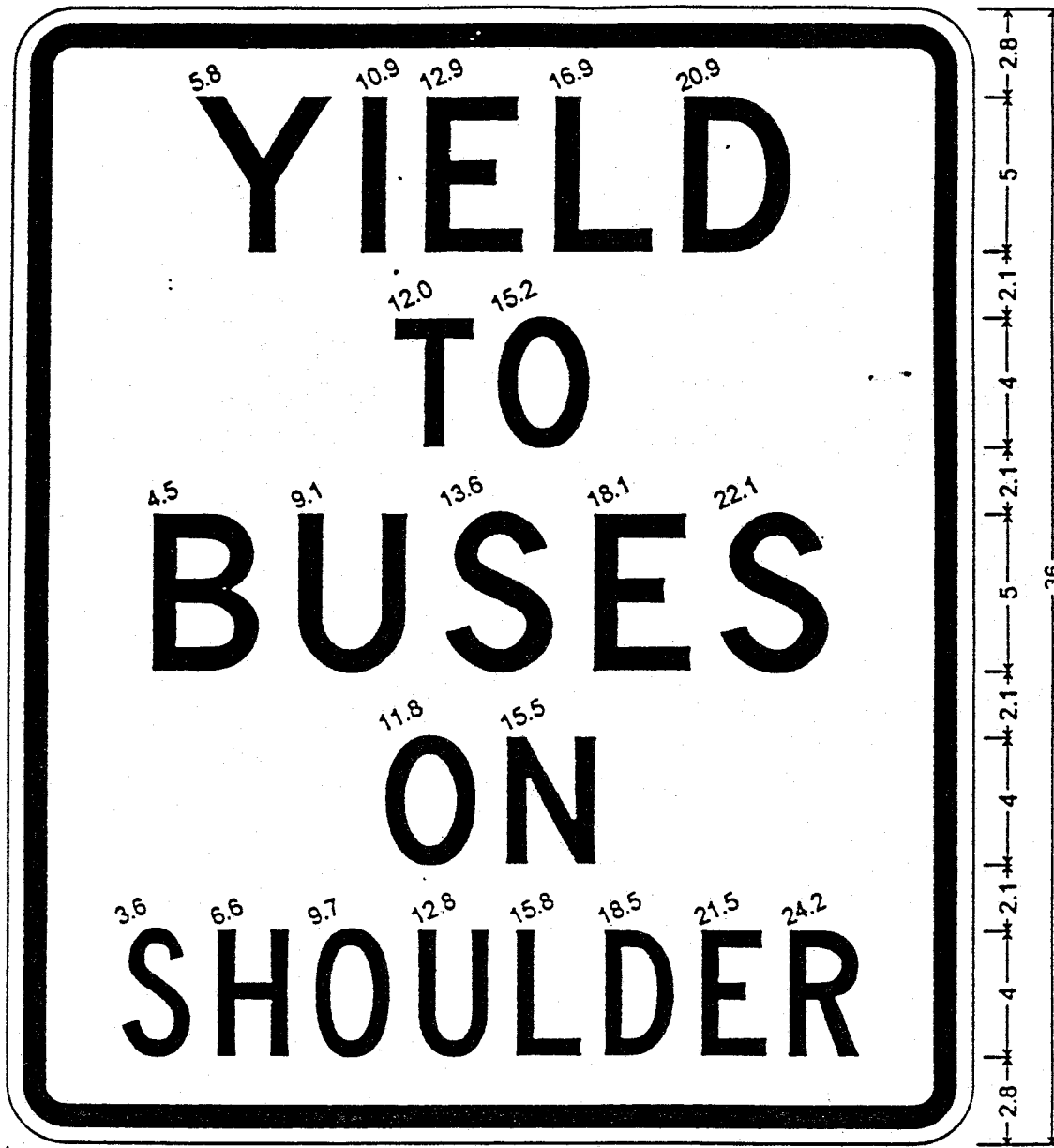
2.2" Radius, 0.9" Border, 0.6" Indent, Black on White;  
 "SHOULDER" D; "AUTHORIZED" C; "BUSES" E; "ONLY" E;



2.2" Radius, 0.9" Border, 0.6" Indent, Black on White  
 "END" D



2.2" Radius, 0.9" Border, 0.6" Indent, Black on White  
 "BEGIN" D



1.9" Radius, 0.8" Border, 0.5" Indent, Black on White;  
 "YIELD" D; "TO" D; "BUSES" D; "ON" D; "SHOULDER" C;