

Appendix 1

- **Linear Reference System**

Linear Referencing System (LRS)

The highway encompasses many infrastructure elements. Some of which are to be considered concerning the LRS:

1. Roads
2. Bridge Sites and Structures
3. Intersections
4. Anchor Points

This section will provide some details about roads.

1.0 Road

“Road” is an existing or proposed infrastructure element that provides, or will provide, a path for surface vehicles to travel between points. A road includes the land used, or surveyed, for the entire road corridor.

1.1 Road Identifier

Provincial Highways

A road’s label (Road Number) is inherited from the Highway Number. For example, the Road Number for Highway 1 is 1 (Figure F1).

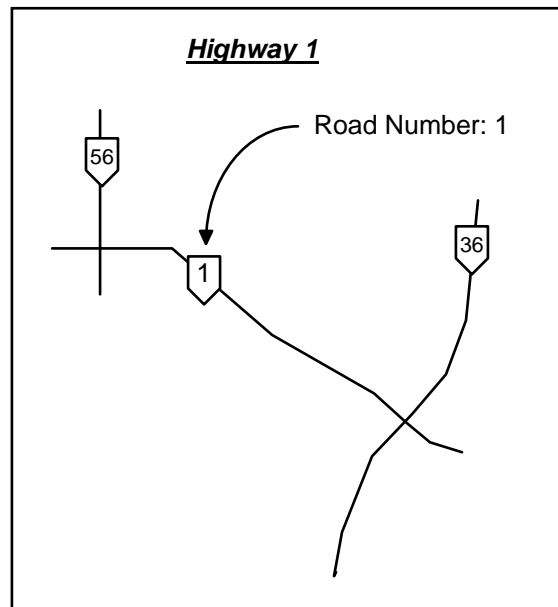


Figure F1: Highway with road number

Municipal Roads

Presently, there is no standardized way of numbering Municipal Roads. Perhaps, the Department can simply number them so that each number uniquely identifies each road. A description field would be used to store the locally established number.

1.2 Control Section Identifier

Provincial Highways

A Control Section is a length of road that, together with the road number, uniquely identifies the road location. The Control Section number is a two-digit code (00 to 99) that defines a control section's relative location along the road. Typically, the Control Section numbers increase by increments of 2 in the direction of increasing chainage, normally west to east and south to north (Figure F2).

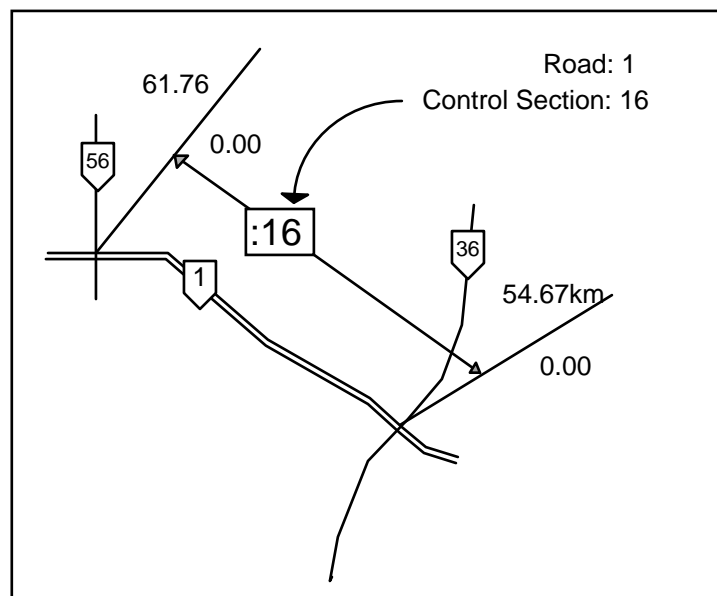


Figure F2: Control Section for a Road

Municipal Roads

Municipal Roads do not have Control Sections.

1.3 Road Part Identifier

A cross-section of the road shows that a road has parts. It has at least two Roadsides and a Roadway (see Figure F3 below). For a divided highway, the road may be made of two Roadsides, two Roadways and one Median.

Road Part Identifier is the longitudinal cross-section elements that constitute a road, namely, Roadside (RS), Roadway (RW), and Median (MN) if applicable.

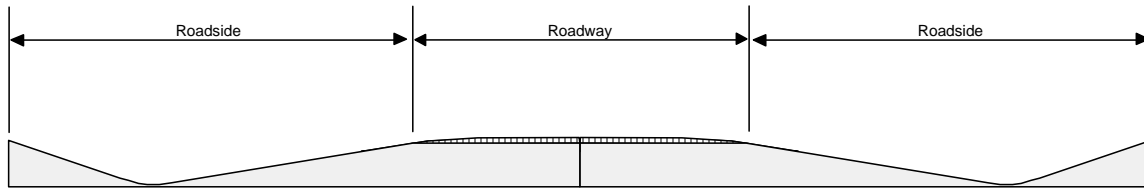


Figure F3: Cross-section of an Undivided Road

1.3.1 Roadway (Undivided, Divided, and Split)

A Roadway is that part of a road, including the shoulder that is constructed, designed, or ordinarily used for the passage of vehicular traffic. The Roadway includes the whole structure from top of side-slope to top of side-slope (for gravel roadways) or from edge of pavement to edge of pavement (for surfaced roadways) and from the surface to the bottom of the sub-grade layer. Where a length of road is comprised of two or more separate Roadways, the term Roadway refers to any one Roadway separately and not all such Roadways collectively. Linear references for a Roadway are dependent of Control Sections; that is, a Roadway will never cross a control section boundary. The length of a Control Section equals the length of the longest Roadway path. When there is a transition from divided to undivided highway there is a point where the two Roadways become one. At that point, the kilometer post (increasing chainage or Control Section direction) would read the length of the longest roadway path.

A Road Part Identifier inherits the road and Control Section labels. To distinguish between road parts within a road, road part is labeled with one of the following: “RW” for Roadway, “RS” for Roadside, and “MN” for Median.

To distinguish Roadways within a Control Section, Roadways receive a two character alphanumeric identifier. The two character code will indicate if the highway is divided (see Figure F4).

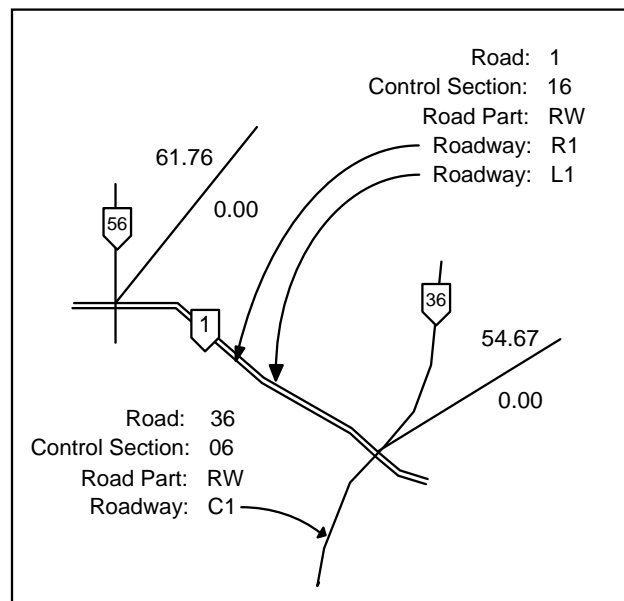


Figure F4: Road, Control Section, and Roadway Labels

For **Divided and Split Roadways**, each Roadway is labeled using “R” for right of Median or “L” for left of Median while facing increasing chainage or Control Section. The Median used to determine the code R or L is the center median that separates opposing traffic flow. The digit indicates the number of roadways from the centre Median.

For **Undivided Roadways**, there is no right or left of Median; therefore, “C” is used to show that the Roadway is approximately in the centre of the right-of-way. The digit “1” is used because there is only one Roadway.

Figure F5 shows an example of how the Roadway labeling scheme works.

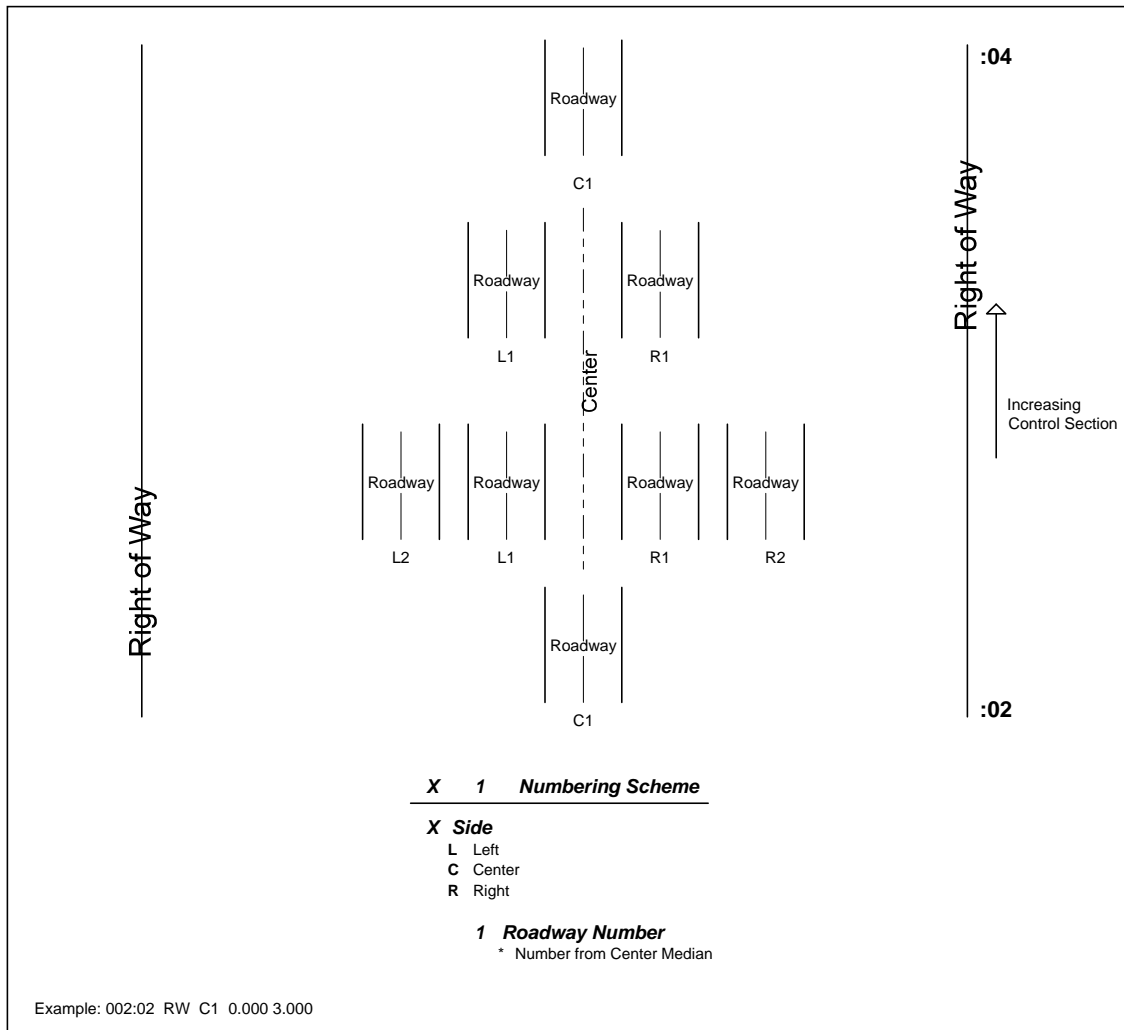


Figure F5: Roadway Labeling

1.3.2 Roadway Lane Numbering

Lane function and placement within a Roadway designate the Lane Numbering. Lane Numbers are assigned in accordance with the number of occurrences of each lane type within a Roadway segment. The Lane Number will represent the nth occurrence of the lane type referenced to the yellow line (refer to following Figures F6, F7, & F8 as examples).

Lanes will be referenced with respect to their placement from the yellow line as viewed up chainage. For undivided highways, the Roadway is referenced as “C1.” The driving lanes will effectively be referenced as “DL R1” for the first driving lane to the right of yellow line, and “DL L1” for the first driving lane left of yellow line (Figure F6).

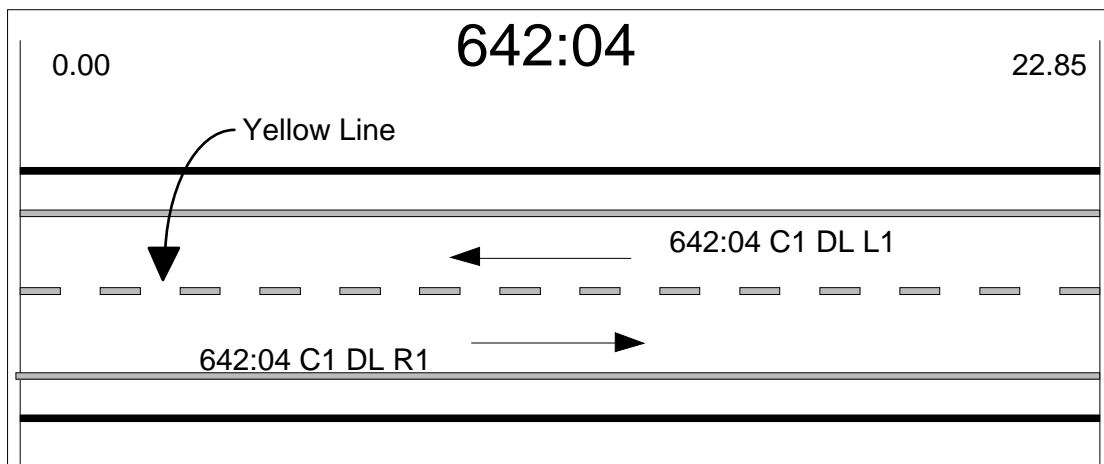


Figure F6: Lane labeling for an undivided highway

Multi-lane highways will have multiple driving lanes in each direction referenced as “DL R1”, “DL R2”, “DL R3”, “DL L1”, “DL L2”, “DL L3”, etc.

Other lanes will also be referenced in the same way. Table T1 lists other types of lanes:

| Code | Description |
|-------|------------------------------------|
| ALL | Acceleration Lane - Left |
| ALR | Acceleration Lane - Right |
| BR | Bridge |
| CL | Climbing Lane |
| CL/PL | Climbing/Passing Lane |
| DL | Driving Lane |
| DLL | Deceleration Lane - Left Turn |
| DLLT | Driving Lane - Optional Left Turn |
| DLR | Deceleration Lane - Right Turn |
| DLRT | Driving Lane - Optional Right Turn |
| PL | Passing Lane |
| TIL | Transition - Introduce Lane |
| TTL | Transition - Terminate Lane |
| UD | Undefined |

Table T1: Lane Label Description

The placement of the lane within the Roadway and the occurrence of the lane type follow the same conventions as driving lanes. Therefore, the expected sequence of lane types required to provide right turn acceleration and deceleration lanes at an intersection along the increasing chainage/control section direction of travel are:

- TIL R1 (Transition - Introduce Lane)
- DLR R1 (Deceleration Lane - Right)
- ALR R1 (Acceleration Lane - Right)
- TTL R1 (Transition - Terminate Lane).

If there were more than one lane of each type, the occurrence number would increase accordingly. For example, the addition of a dual right exit would have lane designations of “DLR R1” (or L1) and “DLR R2” (or L2).

Shoulders are treated in the same manner. Undivided highways will have two Shoulders referenced as “SH L1” and “SH R1” (Figure F7), while divided highways will have four shoulders referenced as, for example, 2:02 RW L1 SH L1, 2:02 RW L1 SH R1, 2:02 RW R1 SH L1, 2:02 RW R1 SH R1.

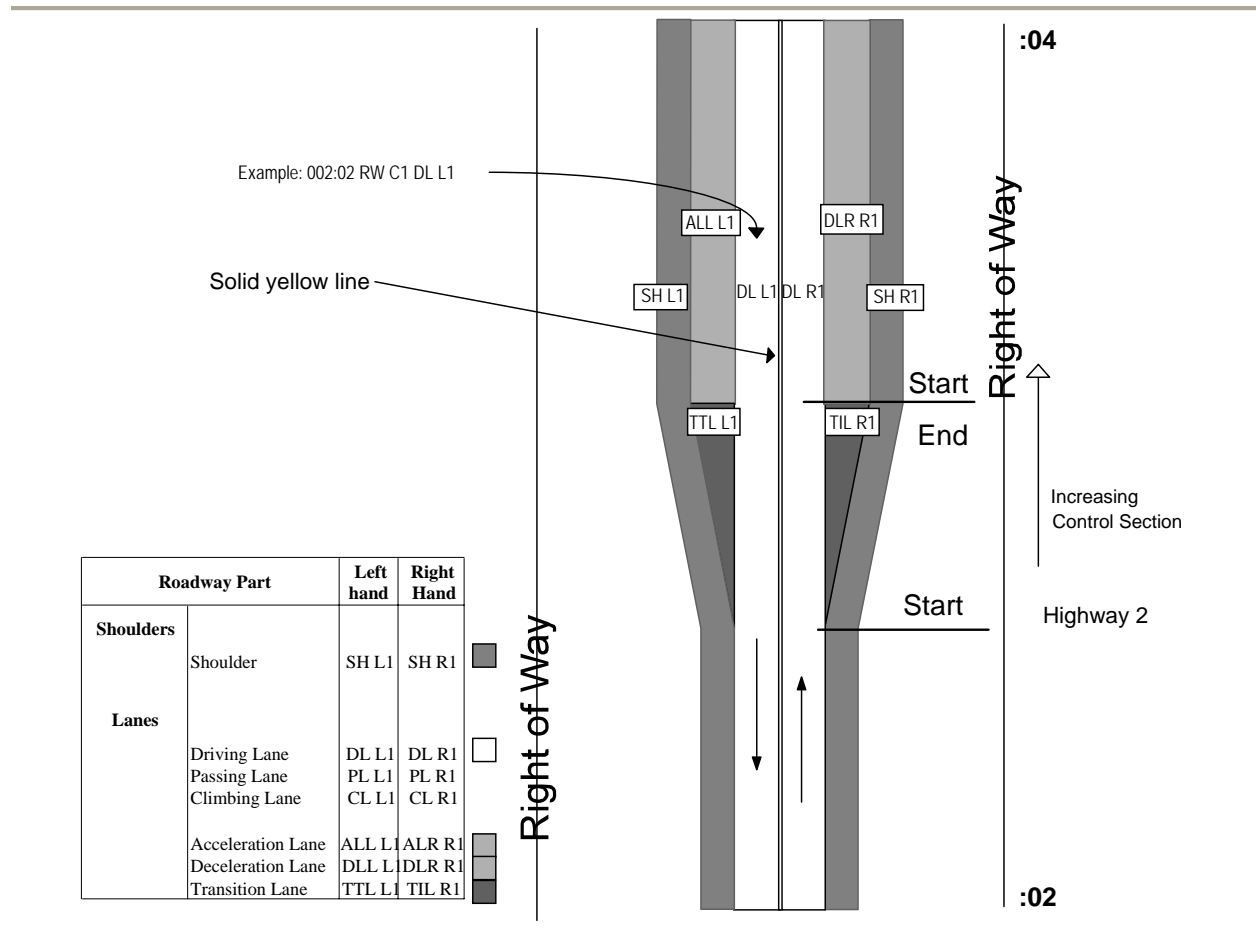


Figure F7: Lane labeling for an undivided highway

Notice that the R1 roadway has a SH L1 because there is a shoulder left of the yellow line (Figure F8).

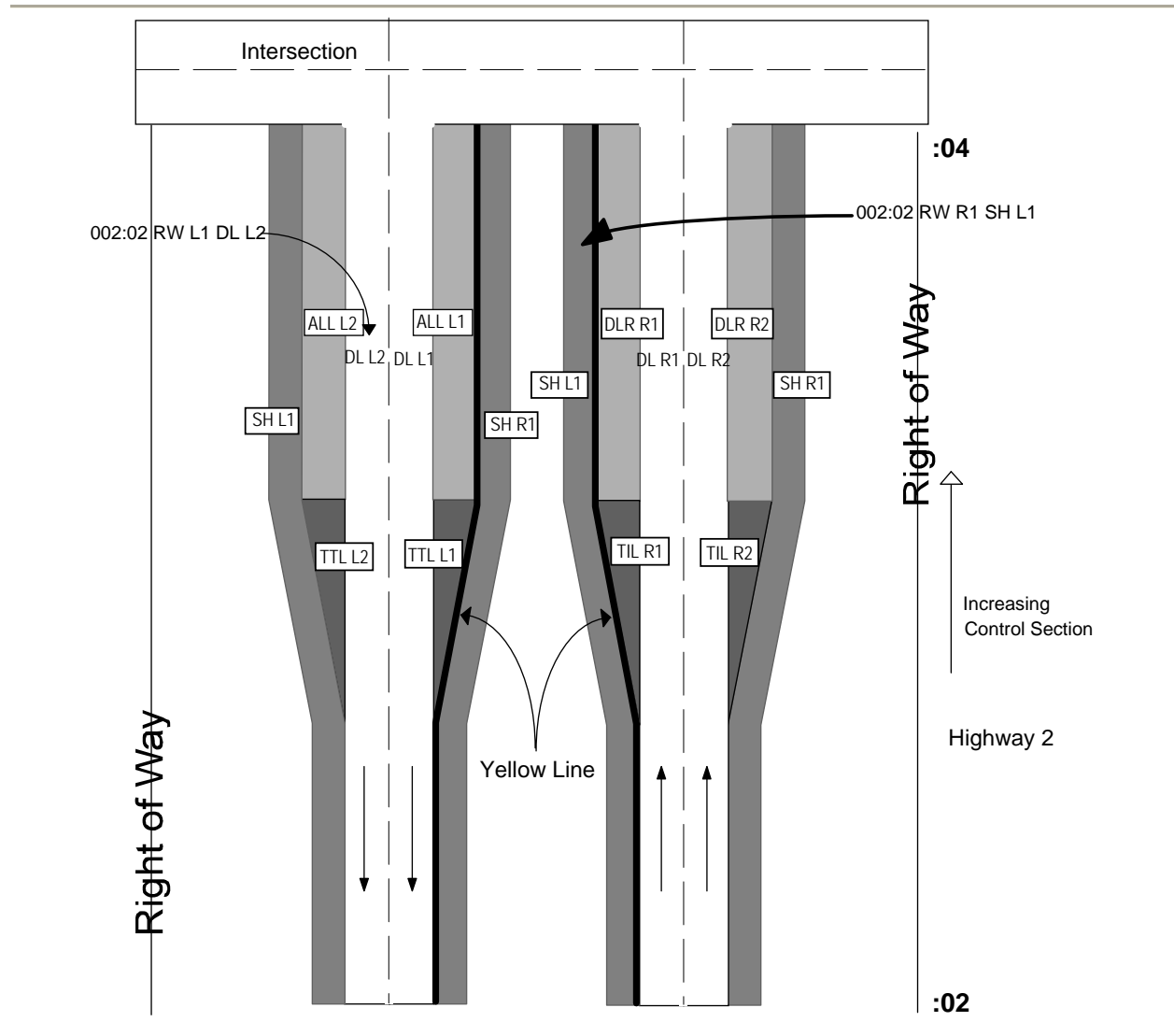


Figure F8: Lane labeling for a divided highway

1.3.2 Roadside

The Roadside (RS) is the part of a road between the edge of the Roadway and the right-of-way boundary. To label Roadside, follow the same naming scheme as Roadway (see Figure F9).

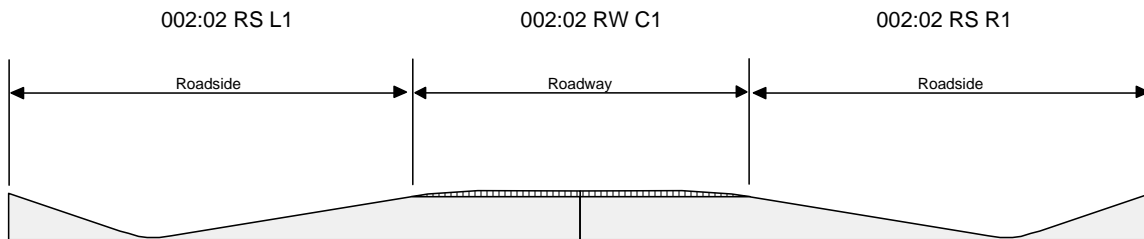


Figure F9: Roadside Labeling

1.3.3 Median

The Median is the part of a road that separates two Roadways within the same road. To label Medians, follow the same naming scheme as Roadway (see Figure F10 below).

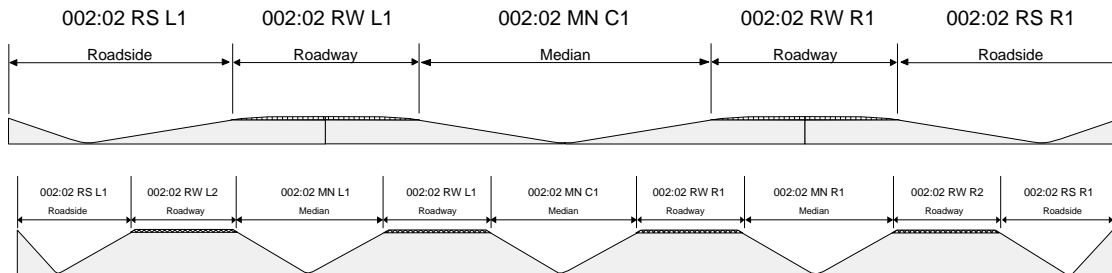


Figure F10: Median Labeling

1.4 Segment

A Segment is a longitudinal partitioning of a road that has homogeneous conditions or special significance. A Segment start and end points are relative to the beginning of a Roadway. There are many kinds of segments including but not limited to:

- Traffic Segments -- have uniform traffic flow over its length.
- Collision Segments -- have uniform collision rates over its length
- Surface Width Segments -- have uniform surface width
- Material Layer Segments -- have uniform material type in specific layer
- Material Layer Thickness -- have uniform thickness in specified layer
- Roadway Test Segments -- road sections that have been constructed to test particular materials, procedures, or performance characteristics. Test Segments are typically associated with Research & Development projects.