Design Considerations

The purpose of system detectors is to provide volume and occupancy information for dynamic traffic control.

More advanced equipment allows for independent control of multiple zones in the same system, so each system must be evaluated to determine its logical segments. (a.k.a. zones)

Subject to the noted limits, enough system detectors should be included to provide redundant detection of main and side street traffic in each zone of the system:

- . Main street detection should be provided in each direction at multiple intersections in each zone.
- . Side street detection should be provided at critical intersections in each zone and at additional locations when combined loops are possible and system detector limits are not compromised.

Design Engineer should consult with system timing group to determine ultimate system detector locations.

System Detector Limits

- 2070 Systems:
  - . Each master controller is limited to 64 system detectors.
  - . Each local controller is limited to 16 system detectors.
- NEMA TS-1 and TS-2 Systems:
  - . Each master controller is limited to 32 system detectors.
  - . Each local controller is limited to 8 system detectors.
- Other Considerations:
  - . Pole-mounted cabinets frequently have limited rack space for detectors, which may limit the number of system detectors.
  - . Keep some system detectors in reserve for future signal addition and/or addition of system detectors based on field experience.

Closed Loop Signal Systems – General information

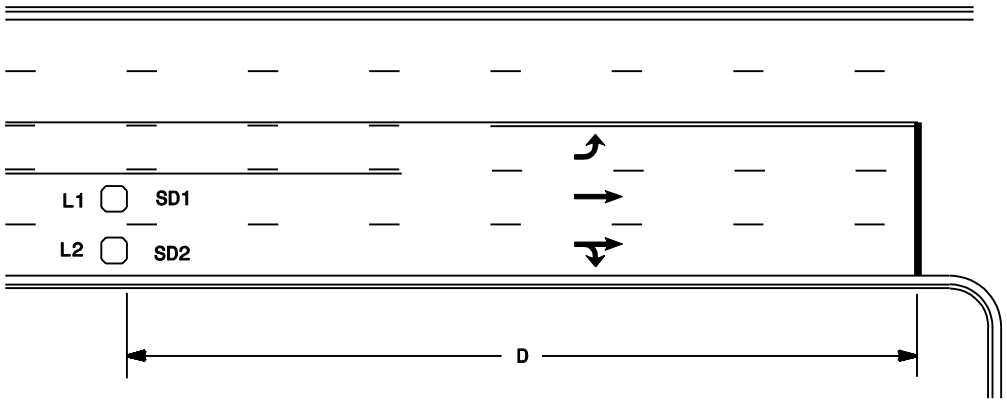
SIGNALS & GEOMETRICS SECTION
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

7-04

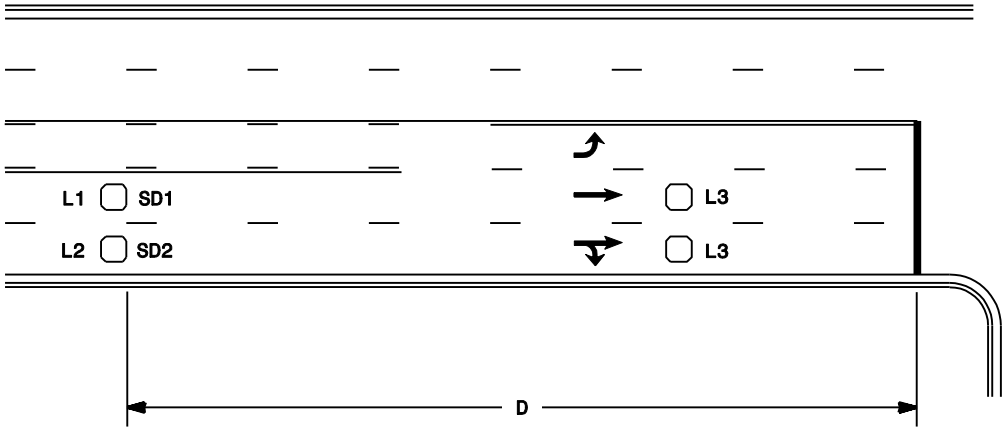
STD. NO.
14.0
SHEET 1 OF 1

Combined System and Main Street Detectors

System Detectors with Volume–Density Operation



System Detectors with Stretch Operation



Design Considerations:

- Preferred treatment for new 2070 system installations.
- Typically for use with D>=300′ (90m).
- Loop size, turns, and location based on Main Street detection.
- Set detectors to presence mode.
- Any delay or stretch (carry) times must be programmed in the controller, not on the detector unit (may not be possible in older controllers, especially NEMA TS-1).
- Combined loops must be wired to separate detectors/channels.
- With Volume-Density operation, combined loops can be used with or without DC/EC.
- Not for use with low speed detection.

Closed Loop Signal Systems – Main Street Detection

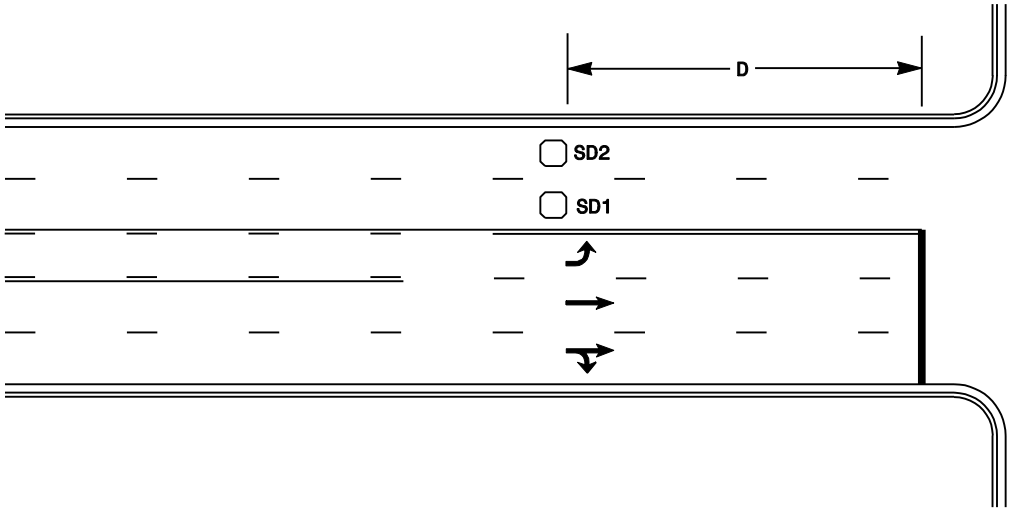
SIGNALS & GEOMETRICS SECTION
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

7-04

STD. NO.
14.1
SHEET 1 OF 2

Downstream Main Street System Detectors

Downstream System Detector Placement



Design Considerations:

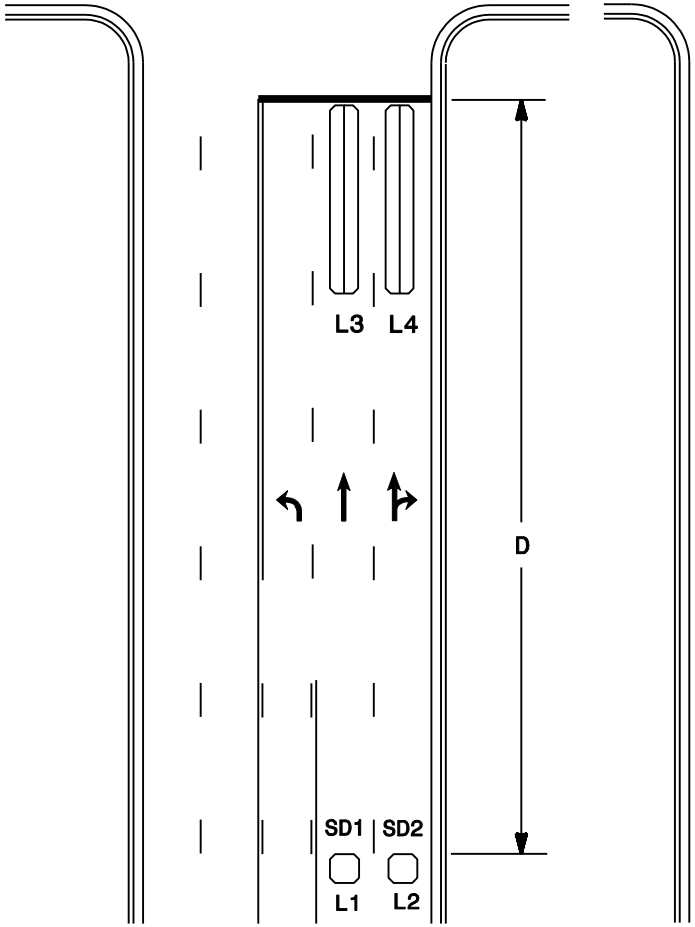
- Preferred for consistency at signals in existing systems with downstream system detectors, especially older NEMA systems.
- May also be appropriate in new systems at locations with heavy undetected turns from the side street to the main street (where side street system detectors are not appropriate).
- Set detectors to presence mode.
- Locate downstream system detectors past the point where traffic has selected a lane while also avoiding driveways.

-SD = 6ft X 6ft,(1.8m X 1.8m)
Wired to separate channels

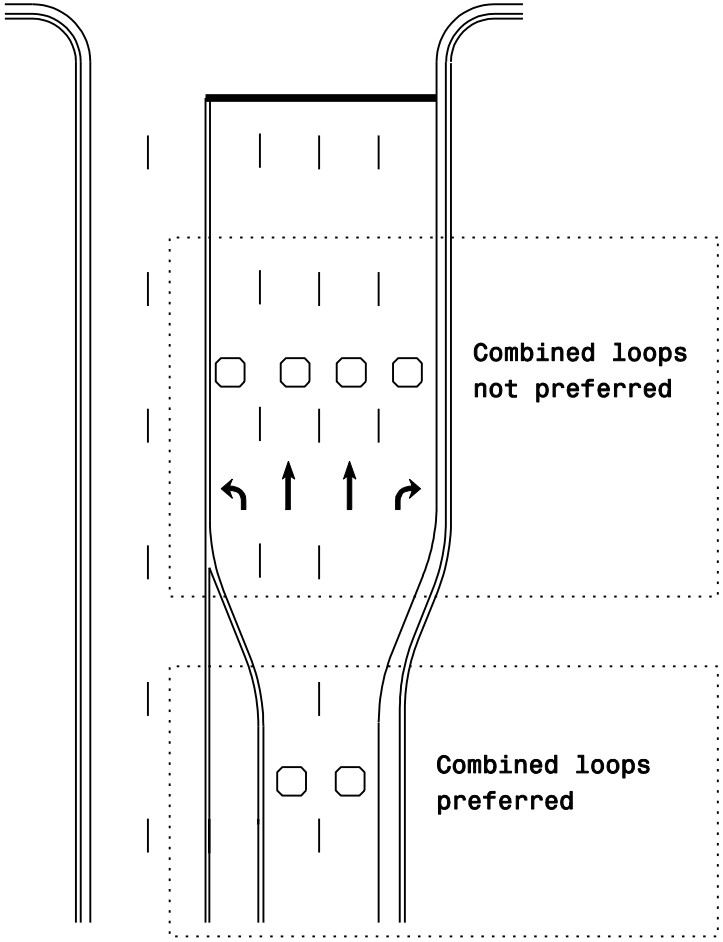
-D=50-250′ (15m-75m) beyond intersection

Combined System and Side Street Detectors

SDs with Volume–Density or Stretch Operation



When to use combined loops



Design Considerations:

- Side street system detectors should be provided when combination loops are possible, provided system detector limits are not compromised.
- Combined system detectors are NOT preferred when loop placement is past the entrance to the left or right turn lane (when combined system detectors will miss traffic turning onto the main street -see figure).
- Typically for use with D>=300′ (90m).
- Loop size, turns, and location based on side street detection.
- Set detection to presence mode.
- May not be possible in older controllers, especially NEMA TS-1.
- Combined loops must be wired to separate detectors/channels.

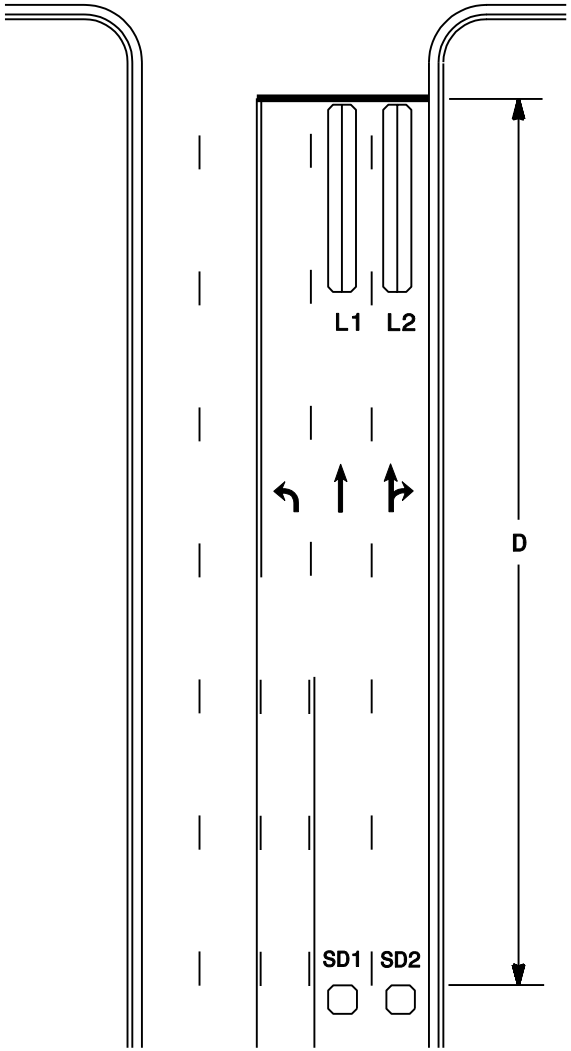
Closed Loop Signal Systems – Side Street Detection

SIGNALS & GEOMETRICS SECTION
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

7-04

STD. NO.
14.2
SHEET 1 OF 2

Upstream Side Street – System Detectors



-SD = 6ft X 6ft,(1.8m X 1.8m)
Wired to separate channels

-D = 300′-500′, (90m-150m)

Design Considerations:

- When combination loops are not possible or not preferred, this treatment may be used at the critical intersection in each zone of new system installation.
- Set detectors to presence mode.
- D should be chosen to ensure all volume is counted before entering left or right turn lanes.
- If turn lane consideration makes D unreasonably large, consider placing a system detector in the turn lane (preferred) or using downstream main street system detectors at this location (less preferred)

Closed Loop Signal Systems – Side Street Detection

SIGNALS & GEOMETRICS SECTION
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

7-04

STD. NO.
14.2
SHEET 2 OF 2