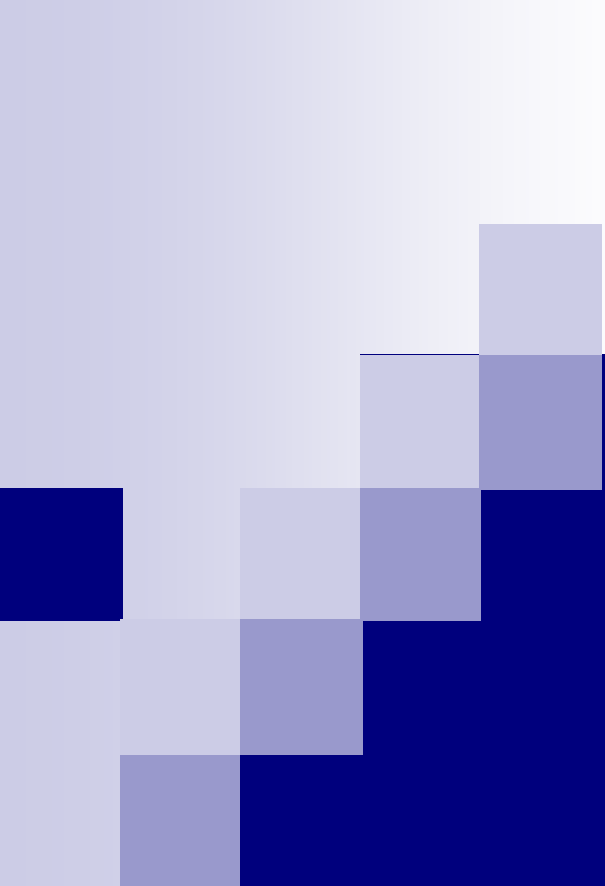


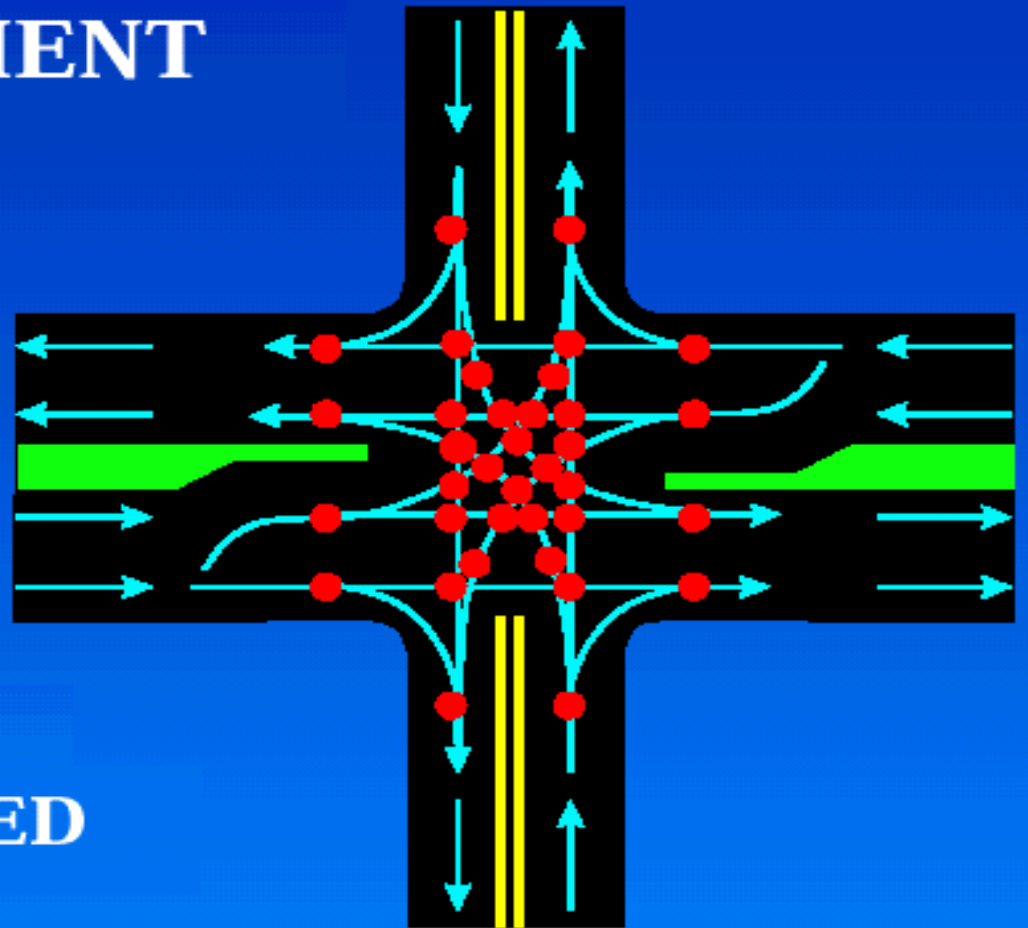


Urban Intersections

Slides prepared by Dale S.
Harrington, P.E.

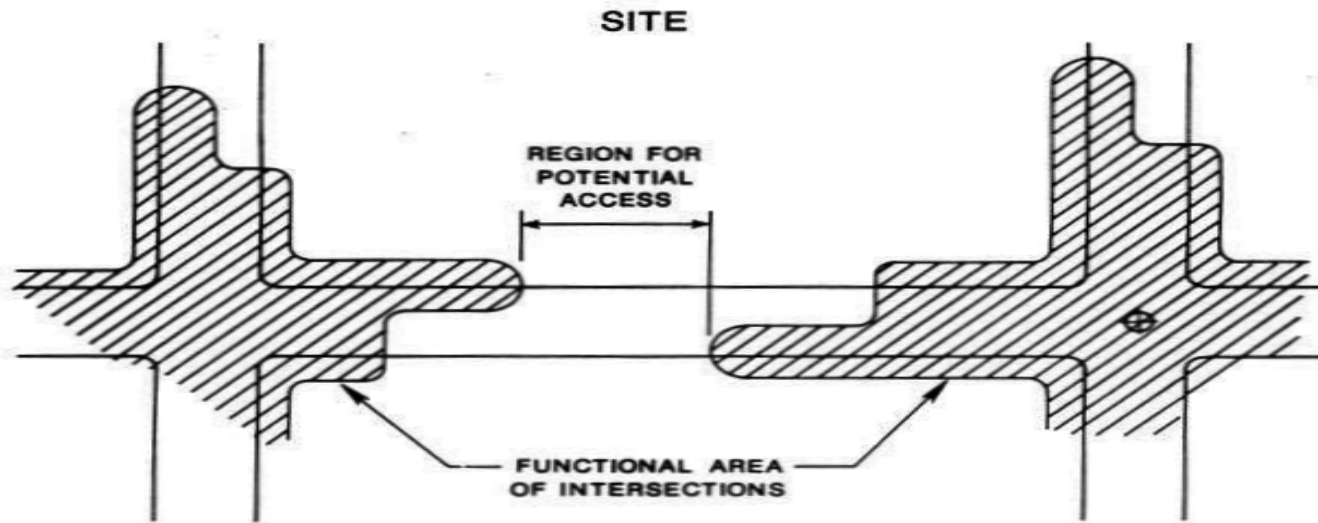
Conflict Points at Intersection

FULL MOVEMENT



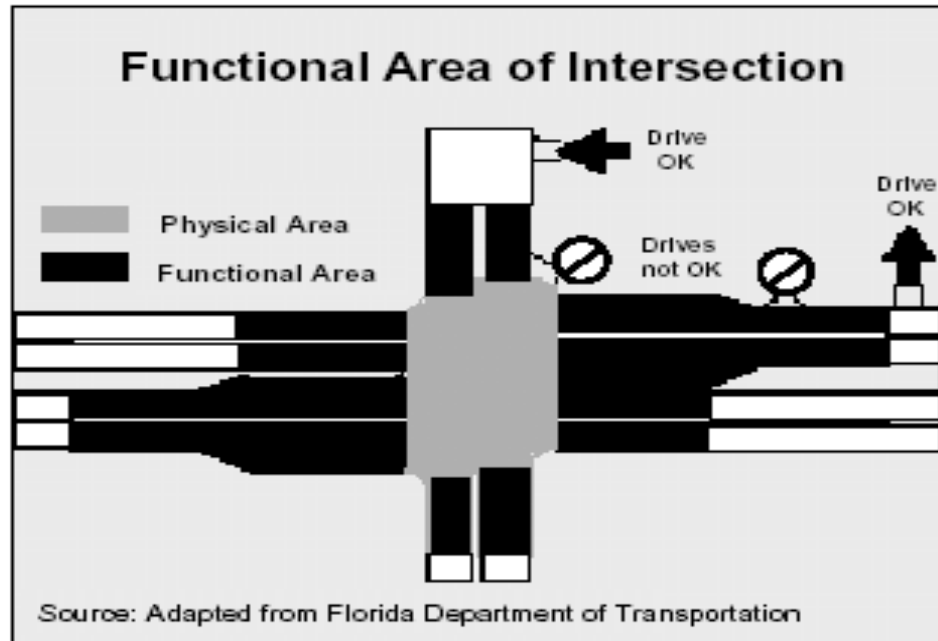
**36 CONFLICTS
22 IF SIGNALIZED**

Intersection Functional Area - an Overview



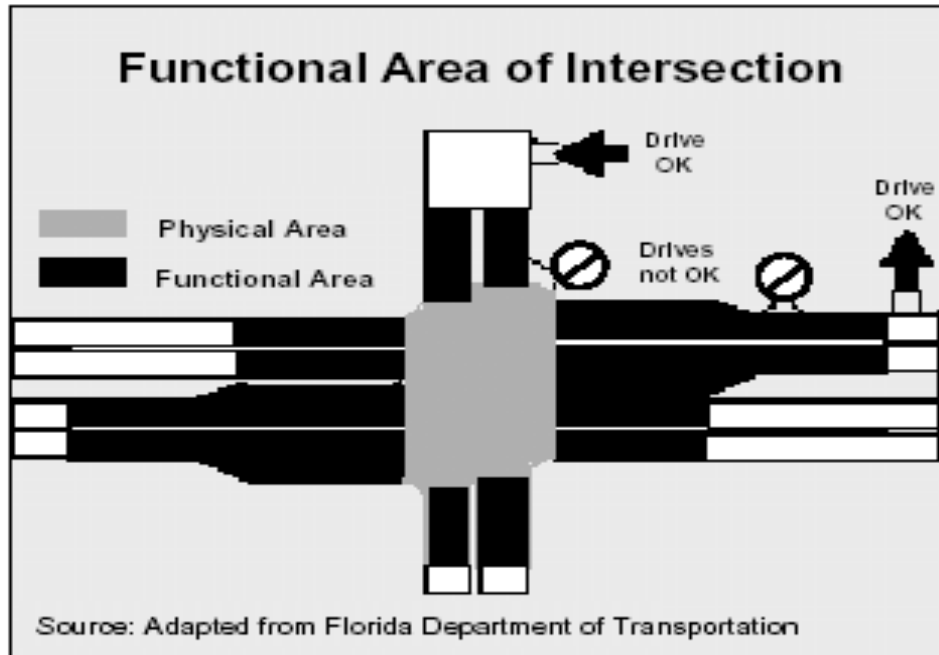
- The functional area of an intersection is that area beyond the physical intersection of two roadways that comprises decision and maneuvering distance, plus any required vehicle storage length.
- Where possible, driveways should be located outside the functional area.

Upstream



- The functional area includes the length of road upstream from an oncoming intersection needed by motorists to perceive the intersection, begin maneuvers to negotiate it, travel for deceleration and queue storage.

And Downstream



- The functional area also includes the length of road downstream from the intersection needed to reduce conflicts between through traffic and vehicles entering and exiting a property.

Functional Area

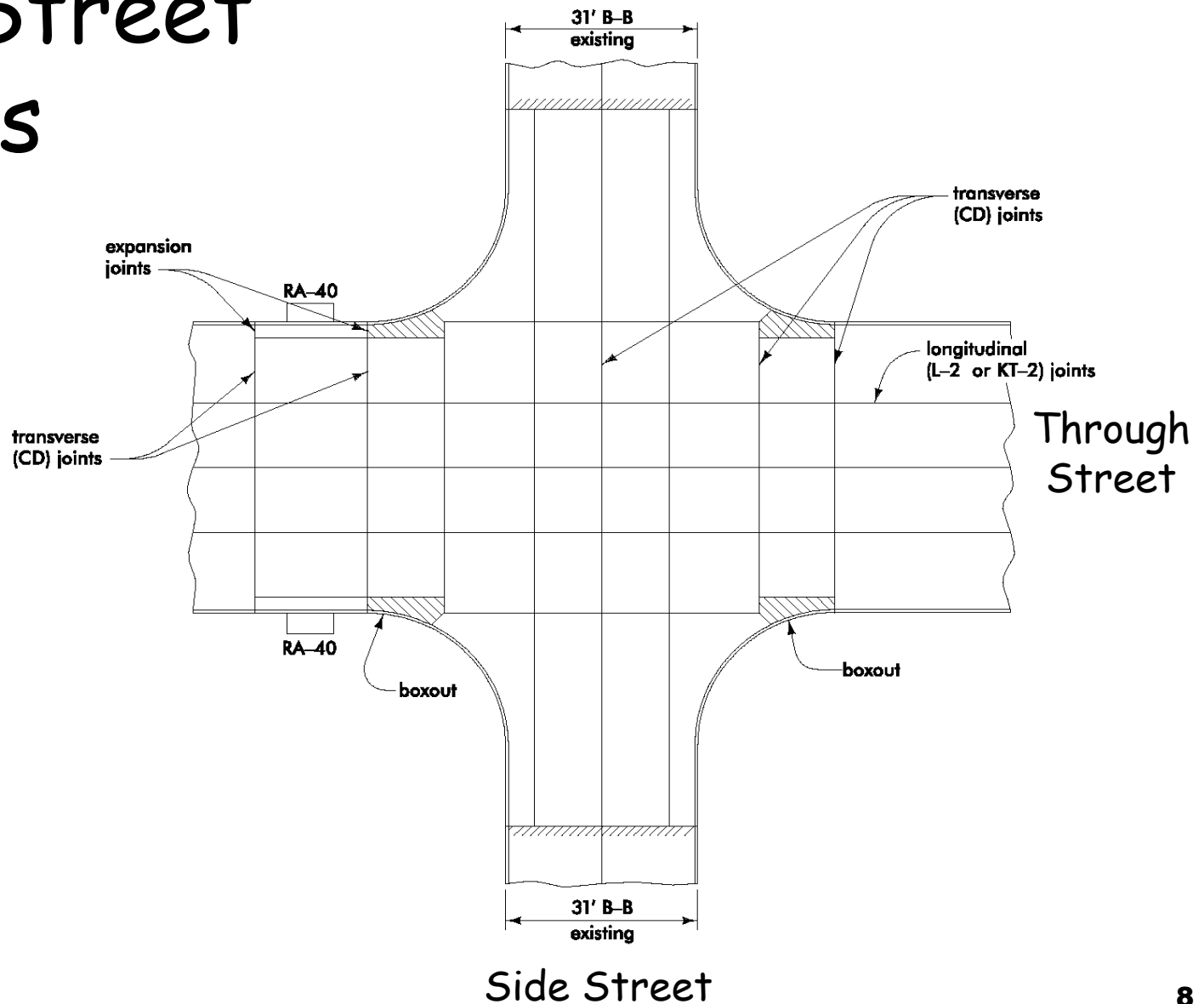
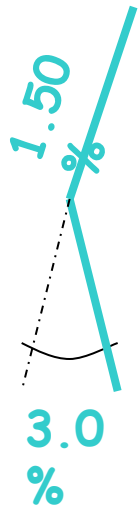
- Approaches for retrofitting existing intersections include
 - (1) consolidating driveways through shared drives and cross access.
 - (2) providing alternative access by relocating driveways to the cross road or a frontage or backage road.
 - (3) installing raised medians, which eliminate left turns into and out of driveways. Median openings ("breaks") should never be located within the functional area.

Urban Intersection Grades

Design Criteria

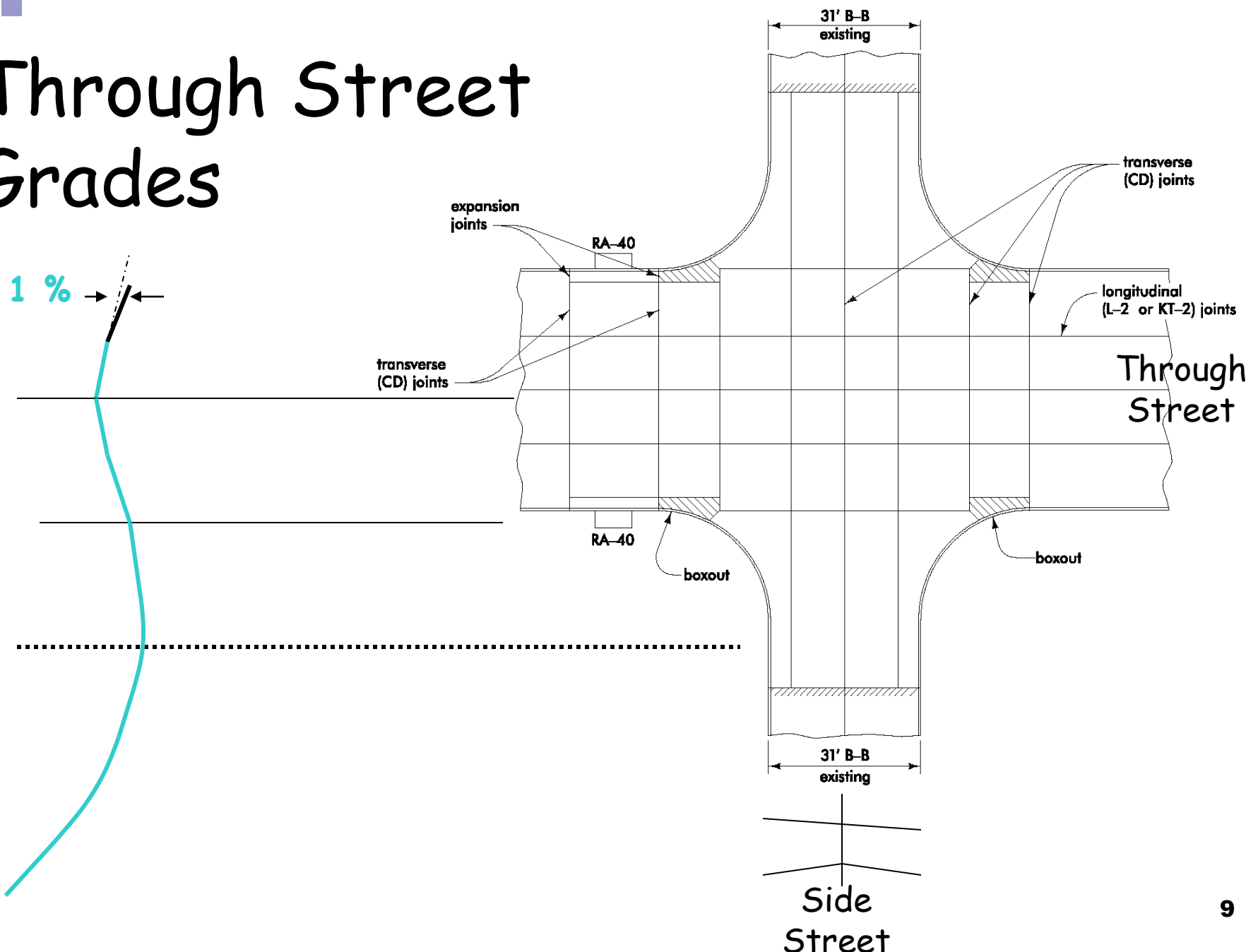
- The grades of through streets take precedence at intersections.
 - ✓ Carrying the crown of the side street into through street is not permitted in most cases (but remember we talked about this in the drainage discussion).
- Side streets shall warp to match through streets.
 - ✓ Short transition as possible for smooth ride.
 - ✓ Minimize sheet flow of stormwater across side street due to loss of crown.

Side Street Grades



Through Street Grades

1 %



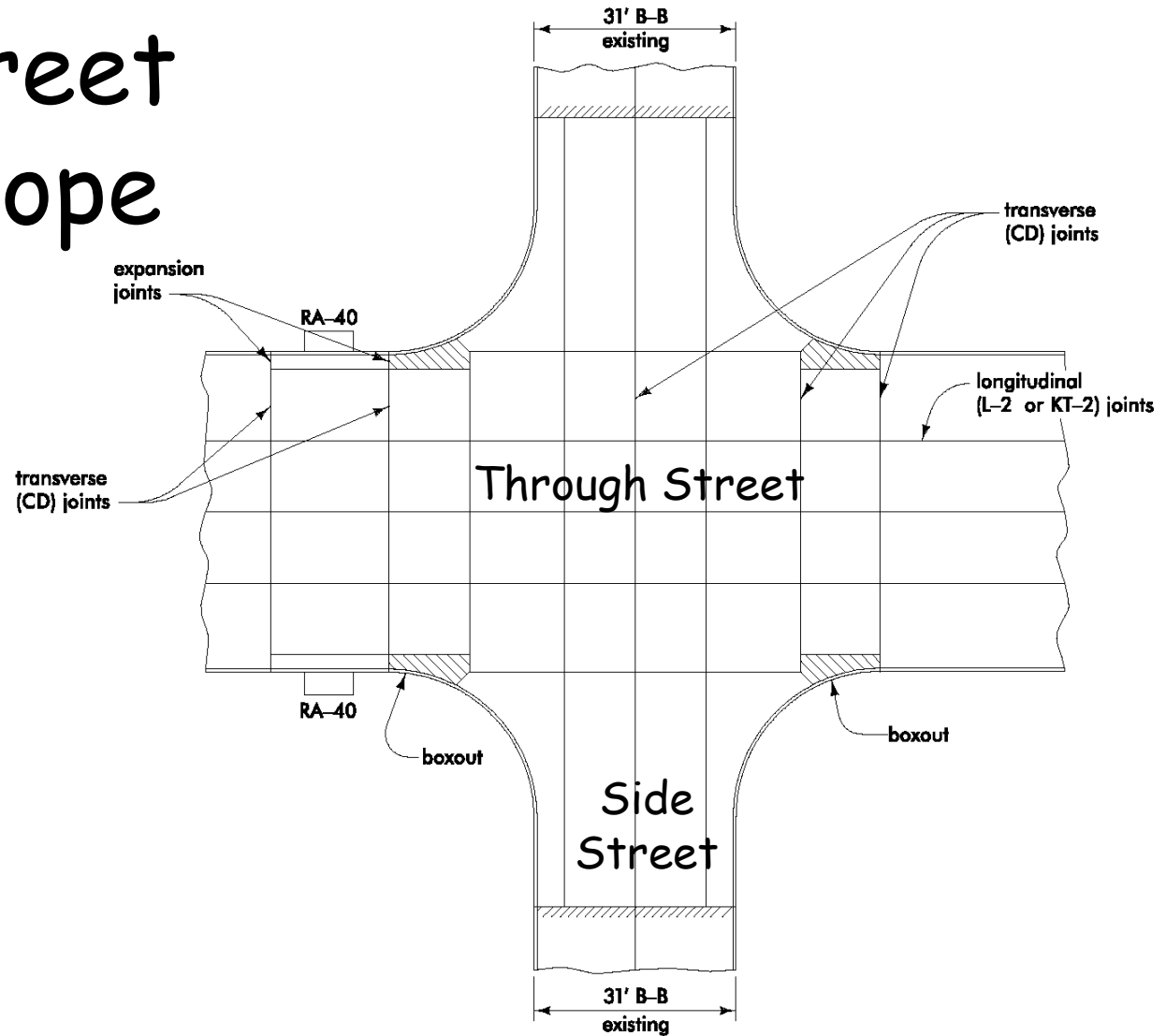
Intersection Drainage



Side Street Cross Slope Design Criteria

- Carrying the crown of the side street into through street is not permitted.
- In most cases, the pavement cross slope of the warped side street should not exceed the grade of the through street.
- The max. desirable grades of the through street at the intersection and thus the side street cross slope should be 2% and should not exceed 3%.

Side Street Cross Slope

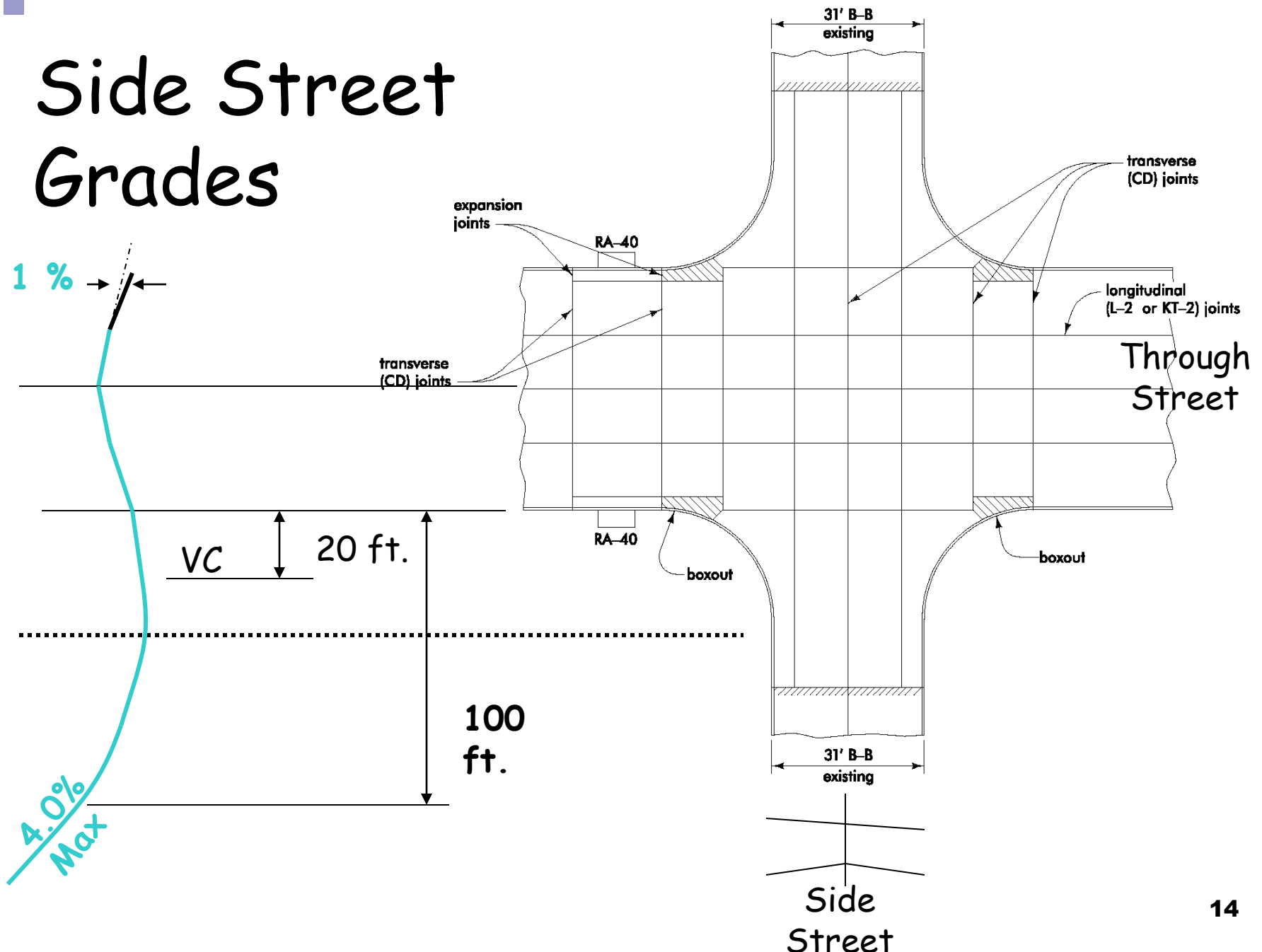


3% Max.; 0.5 % Min. Grades thru intersection

Side Street Grades Design Criteria

- The max. desirable approach grade of the side street should not exceed 4% for a distance of 100 feet from the curb of the through street.
- The cross slope of the through street should extend along the side street at least 20 feet beyond the through street curb before starting a vertical curve.

Side Street Grades



Extended Cross Slope



Side Street Approach Grades

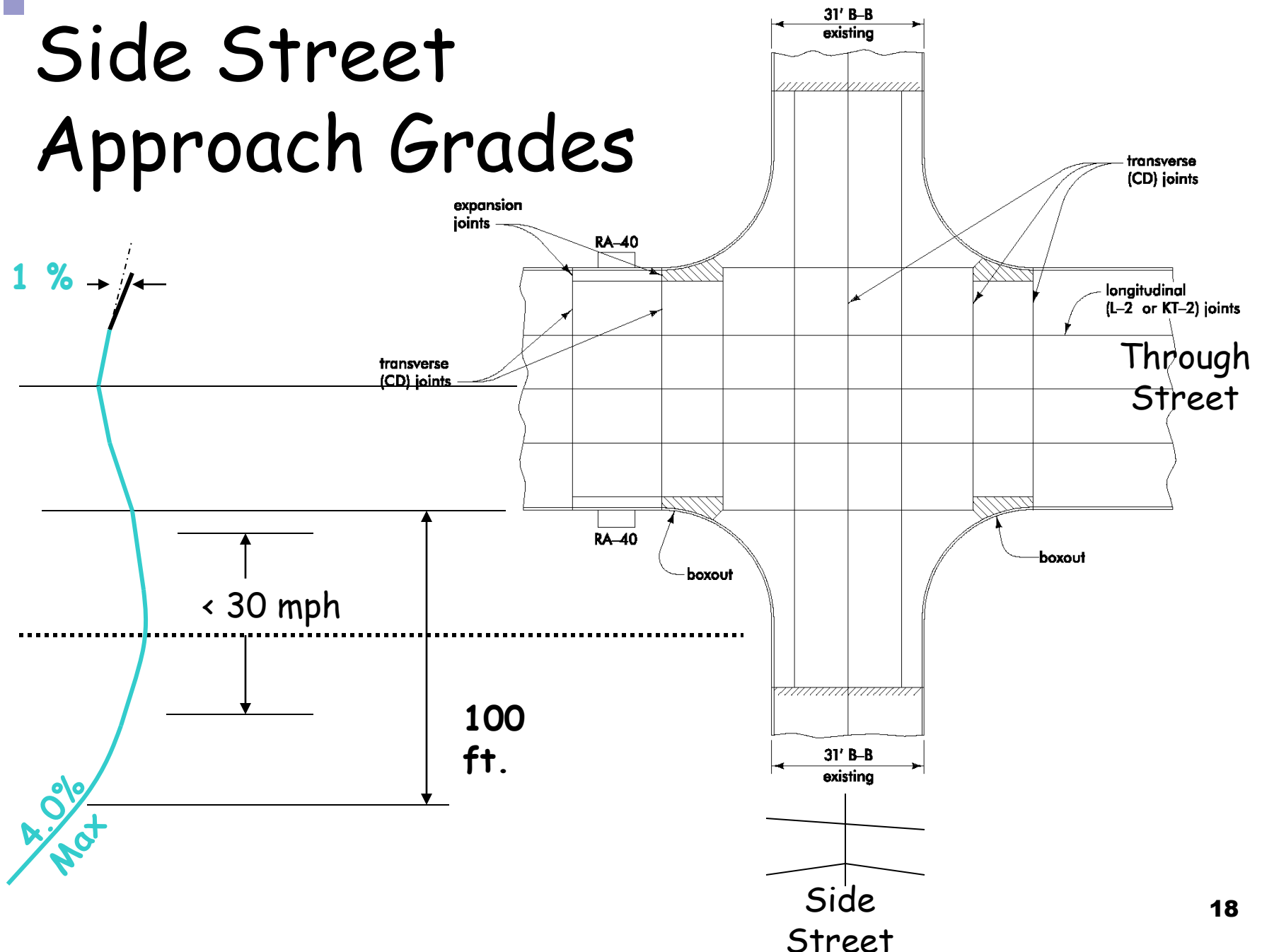




Side Street Grades Design Criteria

- The length of vertical curve of the side street should not be lower than for a 30 mph design speed.
- A 1% side street grade break is permitted without a vertical curve.
- A minimum street grade is 0.5%

Side Street Approach Grades



Side Street Approach Grades

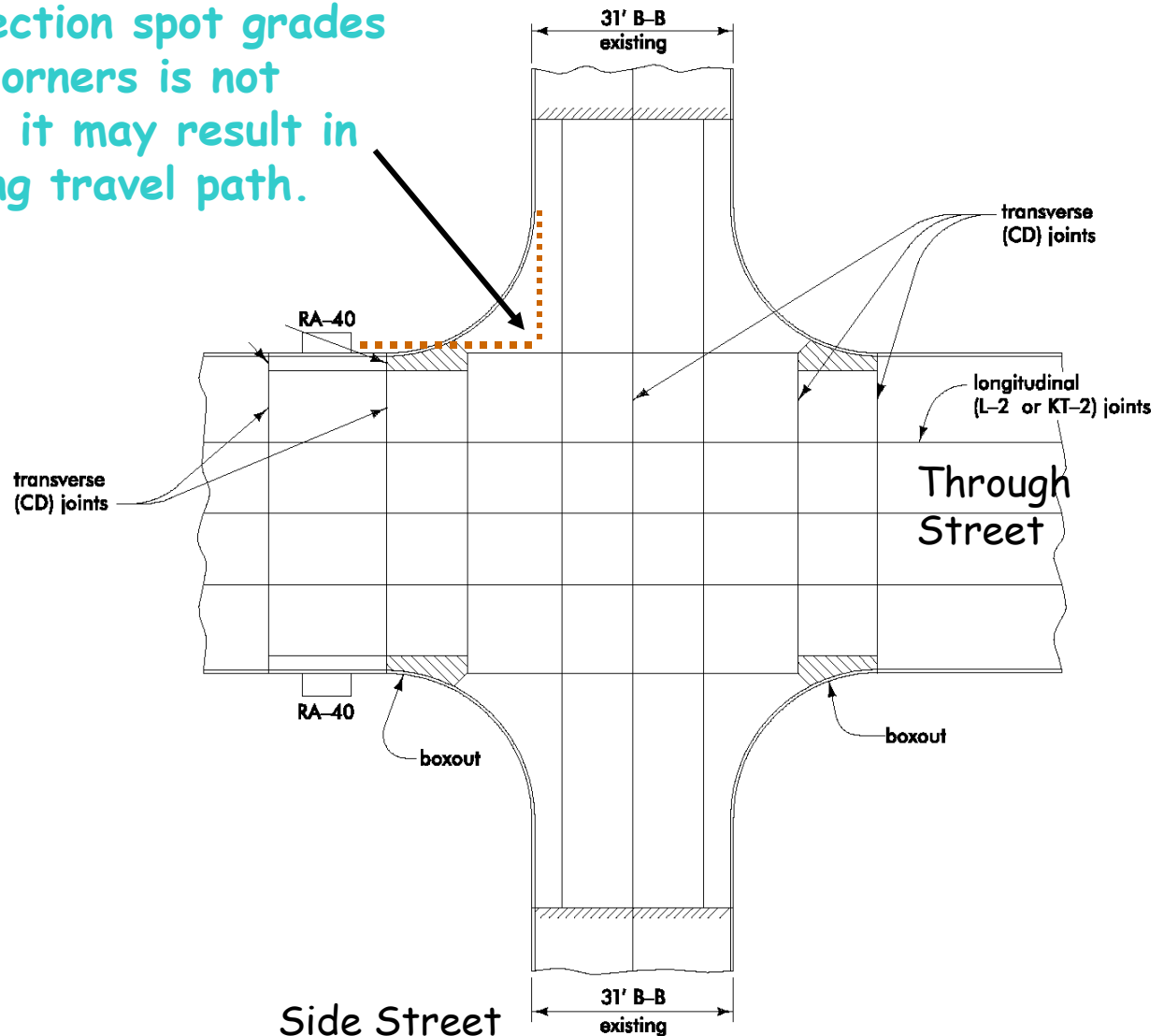


Side Street Approach Grades



Curb Corners

Establishing intersection spot grades by matching curb corners is not recommended since it may result in bumps in the turning travel path.



Collector Street/Local Street Intersection- Good Design



Side Street Approach Grades



Side Street Approach Grades



Side Street Approach Grades



Side Street Approach Grades



Side Street Approach Grades

