
Jointing Urban Intersections

This section describes examples on how to joint urban intersections. The process will be illustrated through examples of different types of streets, pavement thickness, and intakes. Even though not all urban intersections will be exactly like the one used in these examples, the process described is applicable to other layouts.

During construction, it is likely that location changes will be necessary for some joints within an intersection. The primary reason is to ensure that joints pass through fixtures like manholes or drainage inlets that are embedded in the pavement. As a result, it will be desirable for the construction crew to adjust the location of some joints so they coincide with the actual location of a nearby manhole. The designer should consider placing a note on the plans to give the field engineer and contractor the latitude to make appropriate adjustments.

It is common practice for some designers to leave intersection joint layout to the field engineer and contractor. These designers often justify this practice by citing the many field adjustments that occur during construction, which they contend negates the usefulness of a jointing plan. However, it is not desirable to eliminate the jointing plan except for very simple intersections. A jointing plan and appropriate field adjustments are both necessary for more complex intersections because islands, medians, and turning lanes complicate joint layout and require some forethought before construction. The jointing plan will also enable contractors to more accurately bid the project.

Example: This example is an intersection of a multi-lane street and a two-lane side street. The intersection is curbed, includes several intakes, and the pavement thickness is 10 inches.

Step 1: Set Joints with Predetermined Locations

Because the location of longitudinal joints for both streets is normally predetermined, these joints should be set first.

Within the intersection, the street that is paved first determines which joints are longitudinal and which are transverse. Generally, the mainline street will be paved prior to the side street. Therefore, the longitudinal joints running down the side street define the locations of the first transverse joints for the mainline (see Figure 5G-3.01).

To determine an appropriate longitudinal joint to use, refer to [SUDAS Specifications Figure 7010.901](#). The type of joint used may depend on the pavement thickness. Since the pavement thickness is greater than 8 inches in this case, either a KT-2 or an L-2 joint is appropriate.

Step 2: Locate Difficult Joints

Intake locations and the boxouts at the corner radii of the intersection are addressed next. After joints have been placed at these locations, the rest of the joints can be worked in around them.

1. **Joints at Intakes:** The location of intakes is determined before the joints are laid out, so joints have to be worked in around them. To start out with, straddle the intake with two transverse joints spaced according to the standard joint length. These joints can be repositioned later if it

helps with the placement of other joints. In the final layout, the intake should be centered between the joints, and adjacent joints should be adjusted accordingly. See the appropriate intake boxout figure in [SUDAS Specifications Section 6010](#) for boxout length requirements.

CD joints should be used on the mainline since the pavement thickness is greater than 8 inches. However, the CD joints straddling the intake do not extend all the way through the curb and gutter. The joints immediately surrounding the intake are specified on the detail plates and are shown in the example.

- 2. Joints at Boxouts:** Before the mainline is paved, small areas near the corners are boxed-out. These boxed-out areas (shaded in Figure 5G-3.01) are poured later, after the mainline has been paved. If the paver were to proceed straight through this area, instead of using boxouts, the returns of the city street would narrow to a point where they meet the mainline. Pavement less than 2 feet in width is weak and cracks readily. By using boxouts, this situation can be avoided without the expense of stopping the paver at the intersection.

Although the width of boxouts is normally the same as the roadway's gutter width, the size and shape of boxouts varies depending on where they are used. If placing joints around the boxout, remember to maintain intersecting angles greater than 70 degrees and joints at least 2 feet long. KT-2 or L-2 joints are used around the boxout. Figure 5G-3.01 illustrates joints properly placed, both around the boxouts and extending outward from them.

Step 3: Locate Remaining Joints

After the joints at intakes and boxouts are located, the remaining joints (generally transverse joints) are located in appropriate locations. The maximum spacing for CD joints is 17 feet (greater than 9 inch pavement) and the minimum spacing is typically 12 feet. Therefore, the remaining areas on the mainline that need transverse joints should have CD joints spaced within this range. Since the design year truck volume on the adjoining street is less than 200 vpd, C transverse joints are used there.

In Figure 5G-3.02, the C joints on the city street nearest the corners are skewed perpendicular to the free edge of the pavement. If this joint were carried straight through, instead of skewed, the acute angle between the joint and the free edge of the pavement would be less than 70 degrees, which is not acceptable.

After all joints are located, the layout should be checked to ensure that all joint spacings and angles are acceptable. Figure 5G-3.02 shows all of the transverse joints appropriately located.

Step 4: Label Joints

The completed jointing layout of the intersection is shown in Figure 5G-3.02. For pavements 8 inches or greater, the L-2 and KT-2 joints may be used interchangeably, at the contractor's discretion, depending on the paving sequence. Therefore, the designer may identify the longitudinal joints as either L-2 or KT-2 on the jointing layout.

It is not necessary to identify every joint on the jointing layout. A few key joints on the diagram should be identified and whenever a series of joints changes to a different type of joint, the joint at the location of the change should be identified. Also, any joint that may be a source of confusion should be identified.

Joint lengths are also shown on the jointing layout, normally rounded to the nearest foot. Similar to labeling joint types, not every length needs to be identified. However, any length that cannot be inferred from the diagram should be labeled.

Figure 5G-3.01: Locating Predetermined and Difficult Joints

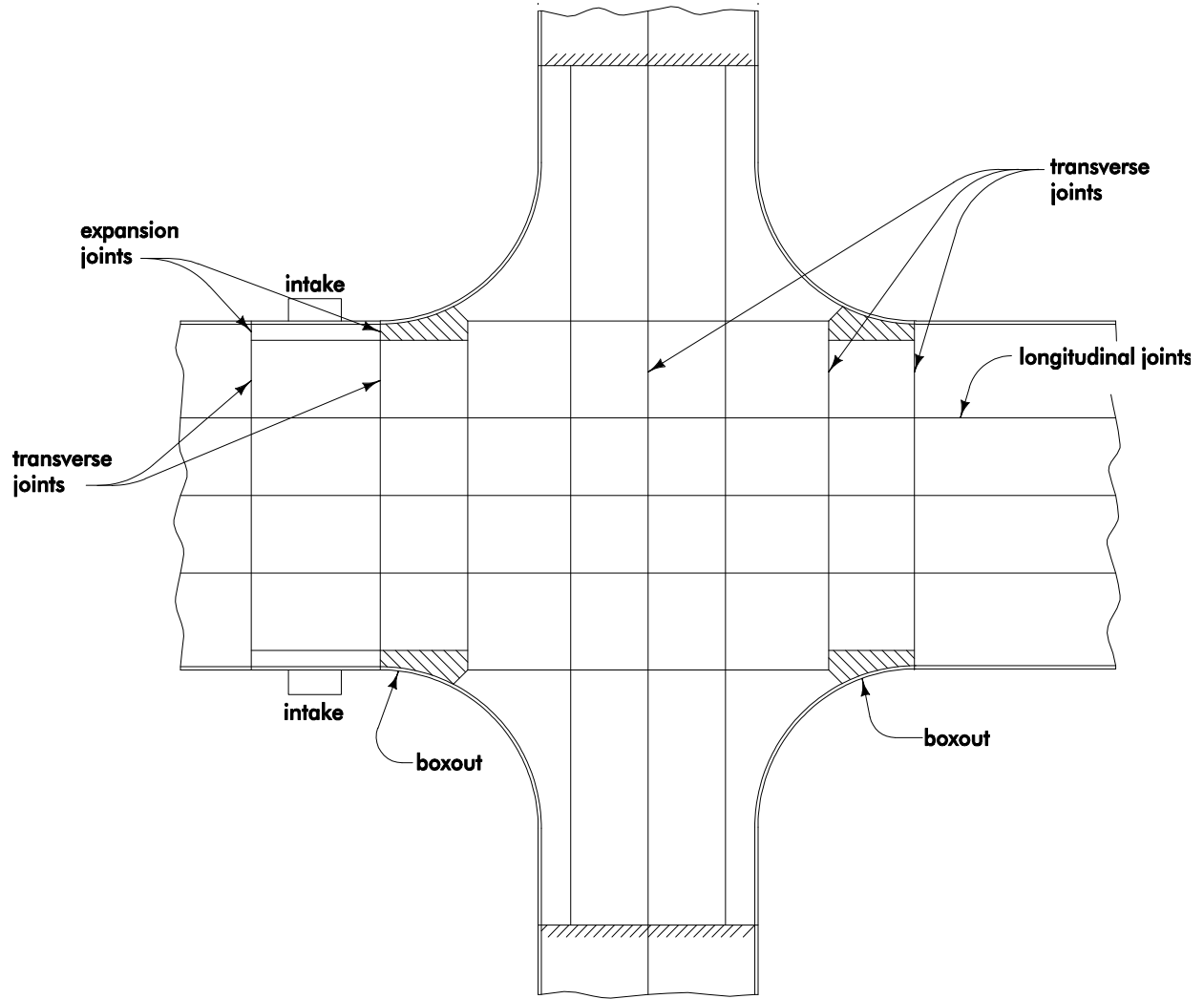
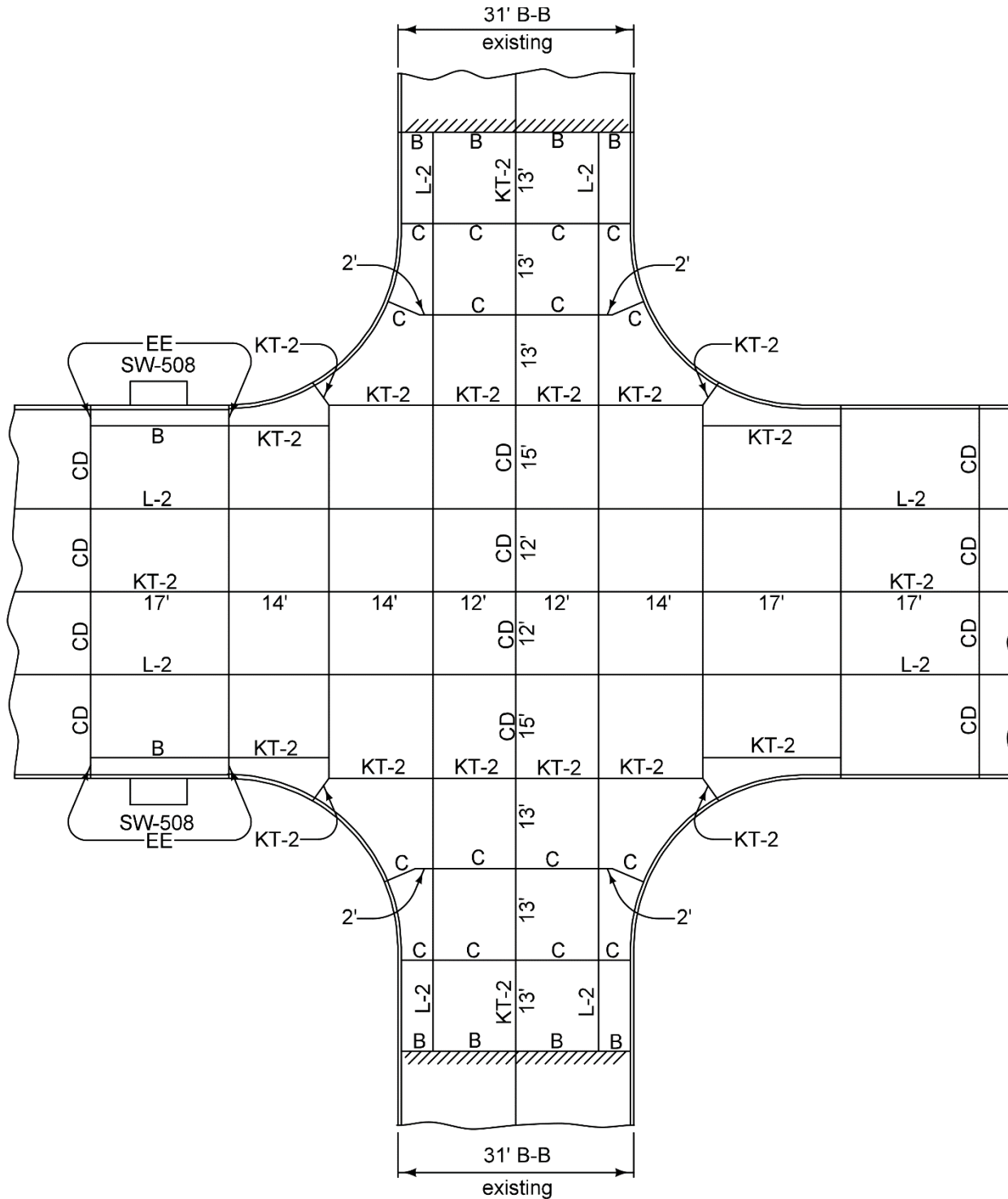


Figure 5G-3.02: Final Jointing Layout

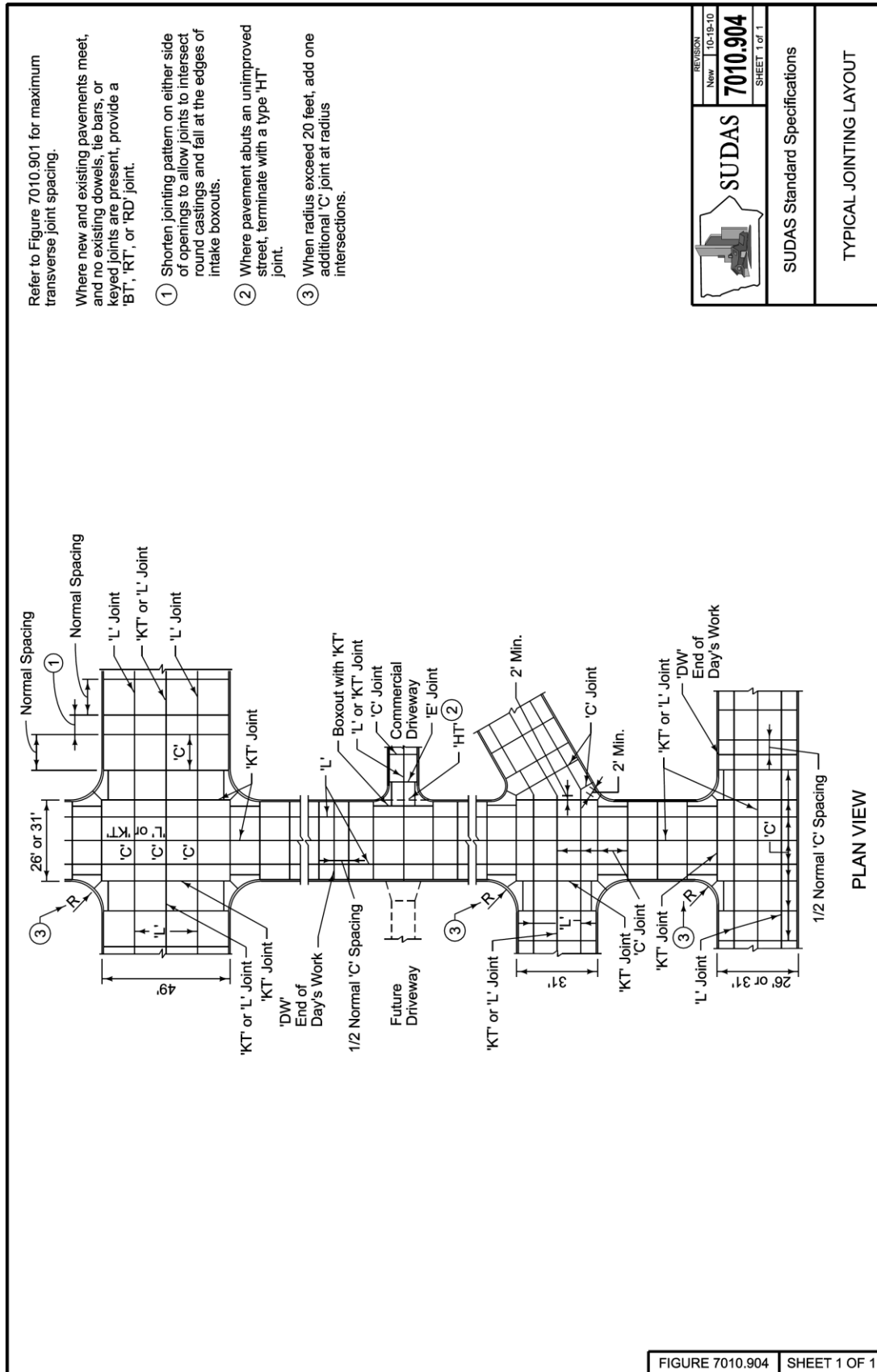


Note:

- 1) All longitudinal joints will be either KT-2 or L-2 unless indicated otherwise.

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Figure 5G-3.03: Typical Municipal Jointing at Multiple Intersection Locations
 (SUDAS Specifications Figure 7010.904)



A. Jointing Urban Transition Areas

This section provides examples of how to joint transition areas, such as approaches, to intersections. Many times, approaches to intersections are wider than the street and thus require a transition section.

The importance of considering constructability when developing jointing layouts for transition areas cannot be overstated. As previously noted, lane delineation with jointing should not be the predominate factor in joint layouts, particularly in urban areas. Critical lane delineation can be handled with other methods, such as pavement markings and a raised island.

Therefore, adequate jointing should be governed by the function of the joint, proper load transfer, and constructability.

Two basic widening types (with and without medians) are shown in the following figures. There are:

1. Two-lane to Three-lane: (i.e. 31 foot to 41 foot)

- Quarter-point jointing
 - Concentric widening (Figure 5G-3.04)
 - One side widening (Figure 5G-3.05)
- Third-point jointing
 - Concentric widening (Figure 5G-3.06)
 - One side widening (Figure 5G-3.07)
- Gutterline jointing
 - Concentric widening (Figure 5G-3.08)
 - One side widening (Figure 5G-3.09)

2. Four-lane to Five-lane:

- Concentric widening (Figure 5G-3.10)
- Widening one side (Figure 5G-3.11)

Figure 5G-3.04: Quarter-Point Jointing - Concentric Widening (31 Foot to 41 Foot)

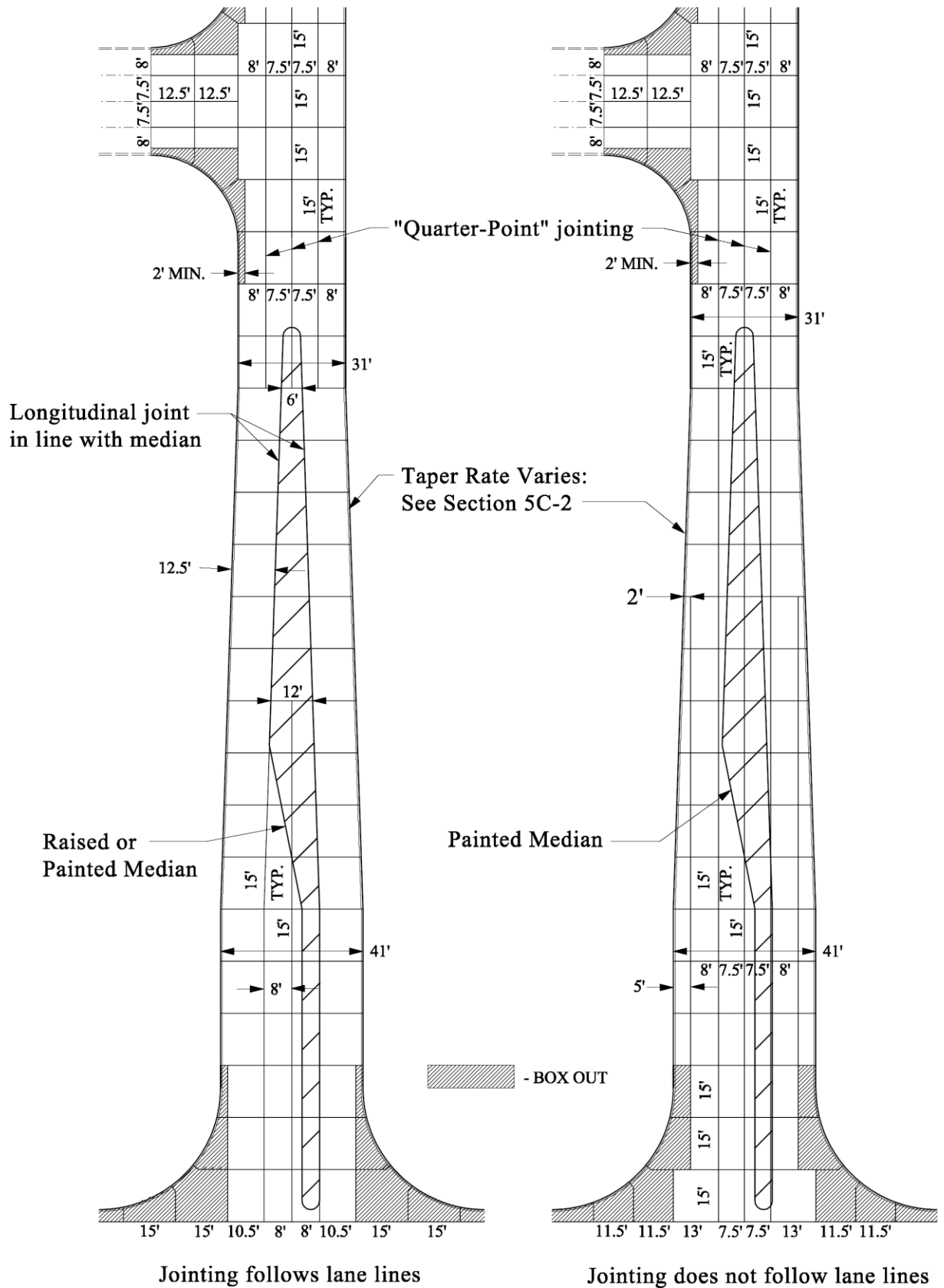


Figure 5G-3.05: Quarter-Point Jointing - Widening One Side (31 Foot to 41 Foot)

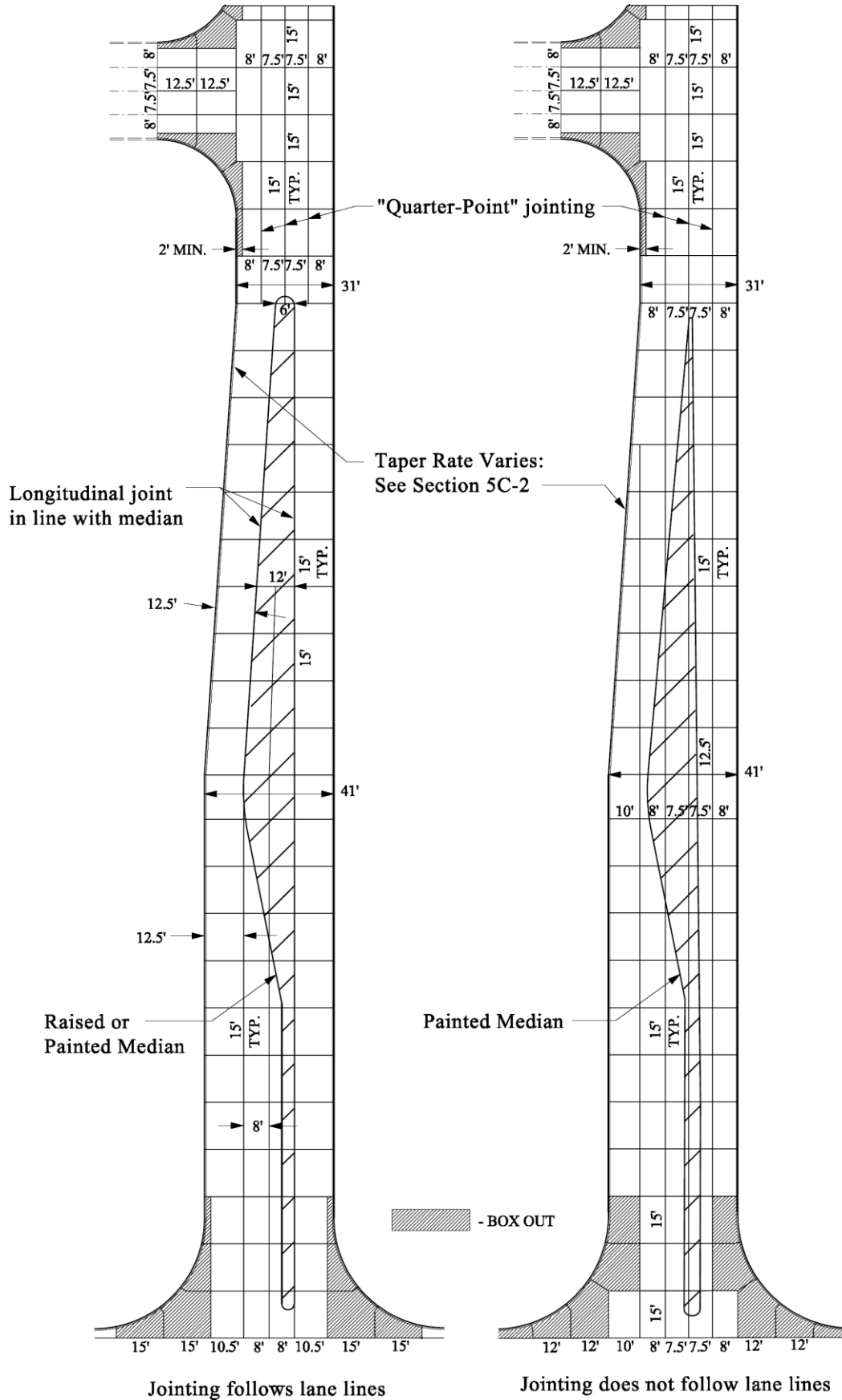


Figure 5G-3.06: Third-Point Jointing - Concentric Widening (31 Foot to 41 Foot)

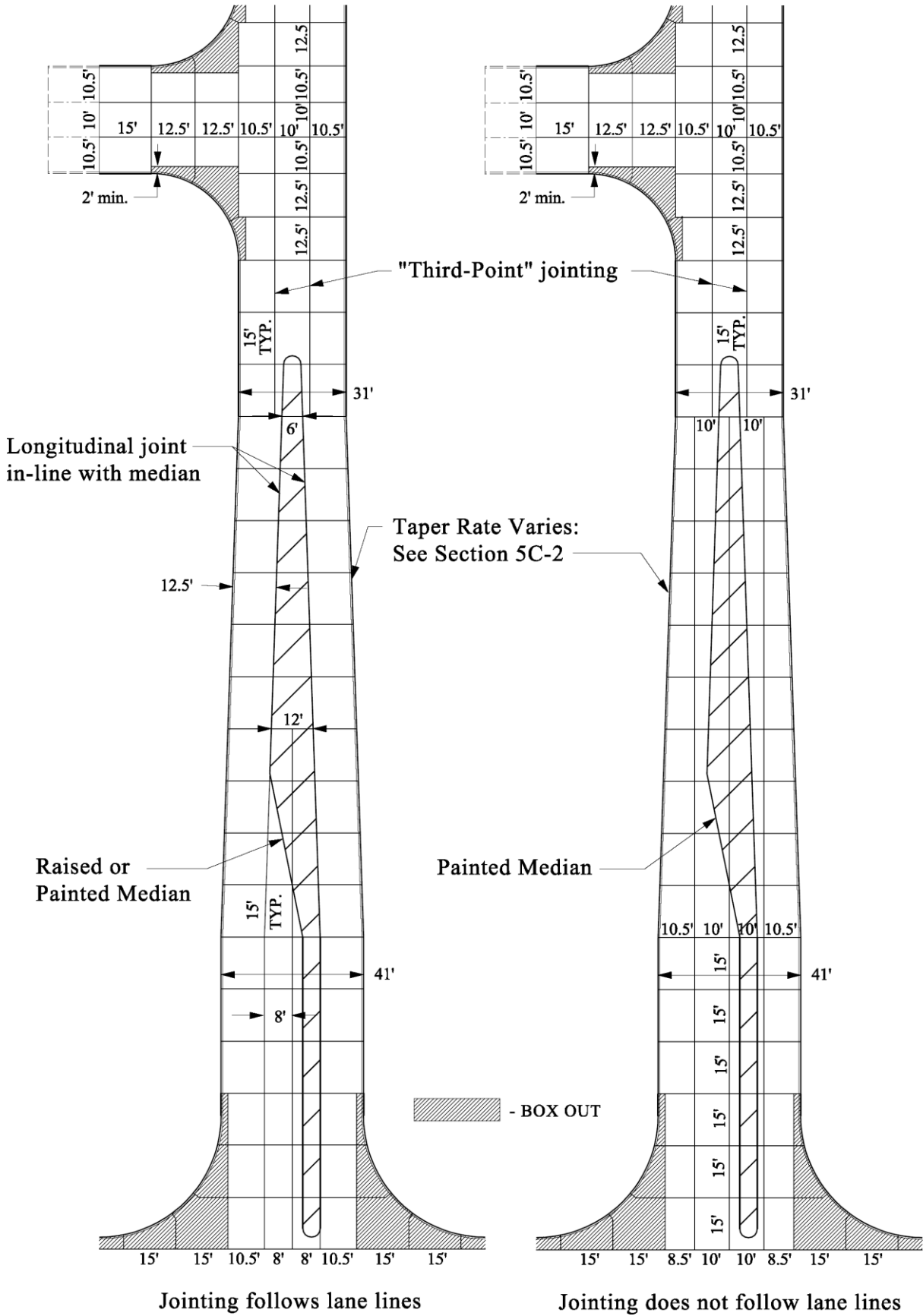


Figure 5G-3.07: Third-Point Jointing - Widening One Side (31 Foot to 41 Foot)

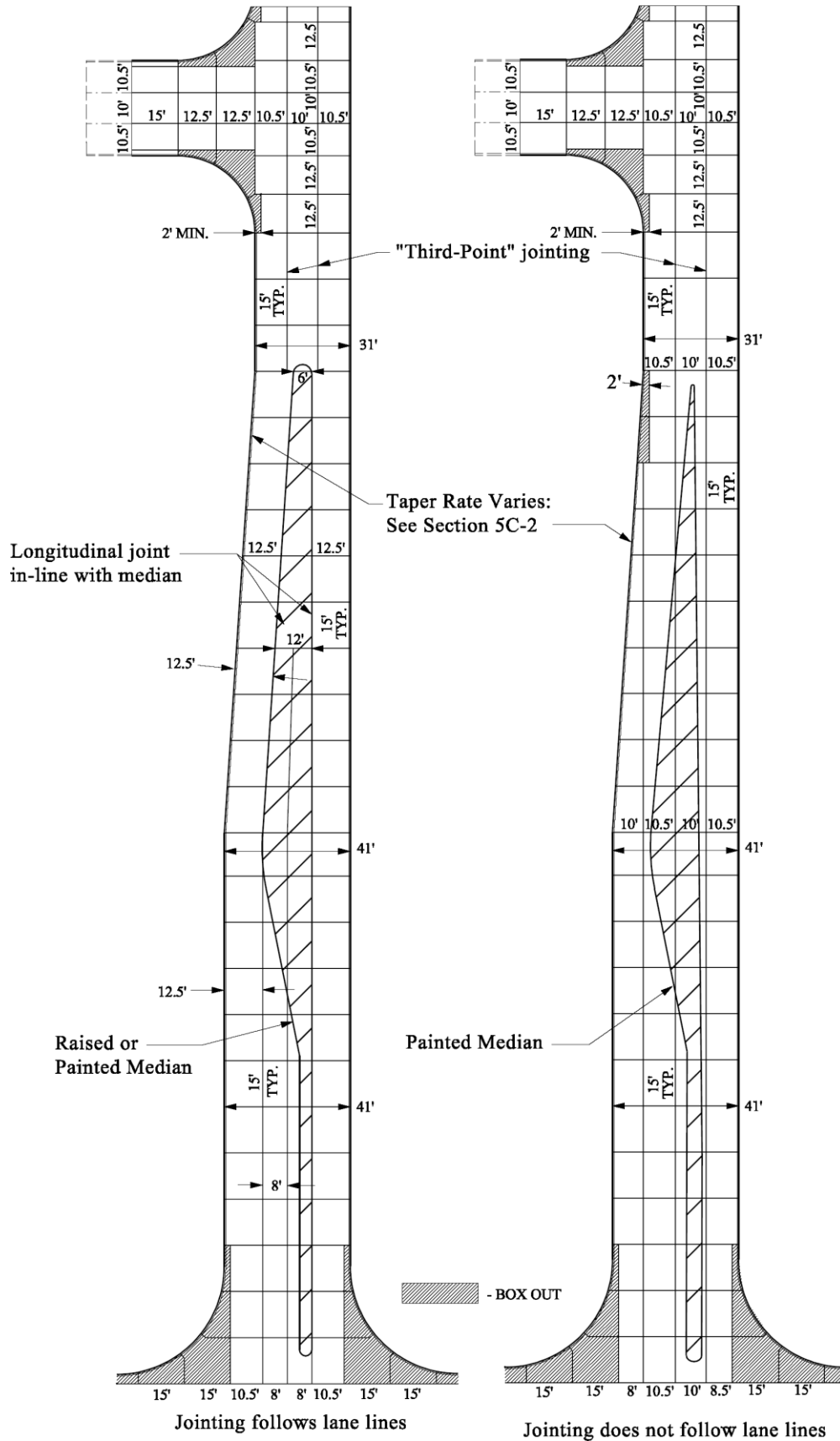


Figure 5G-3.08: Gutterline Jointing - Concentric Widening (31 Foot to 41 Foot)

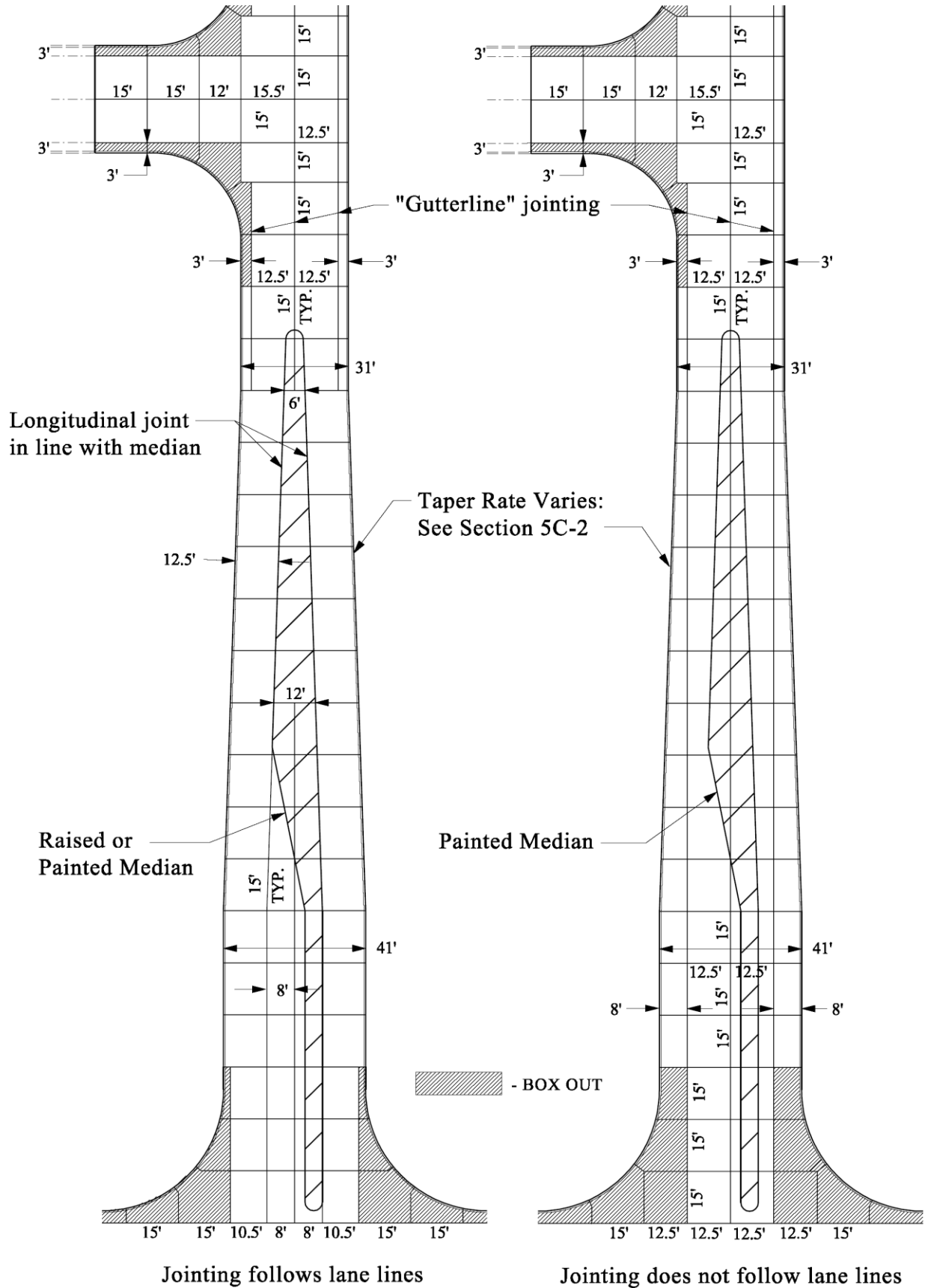


Figure 5G-3.09: Gutterline Jointing - Widening One Side (31 Foot to 41 Foot)

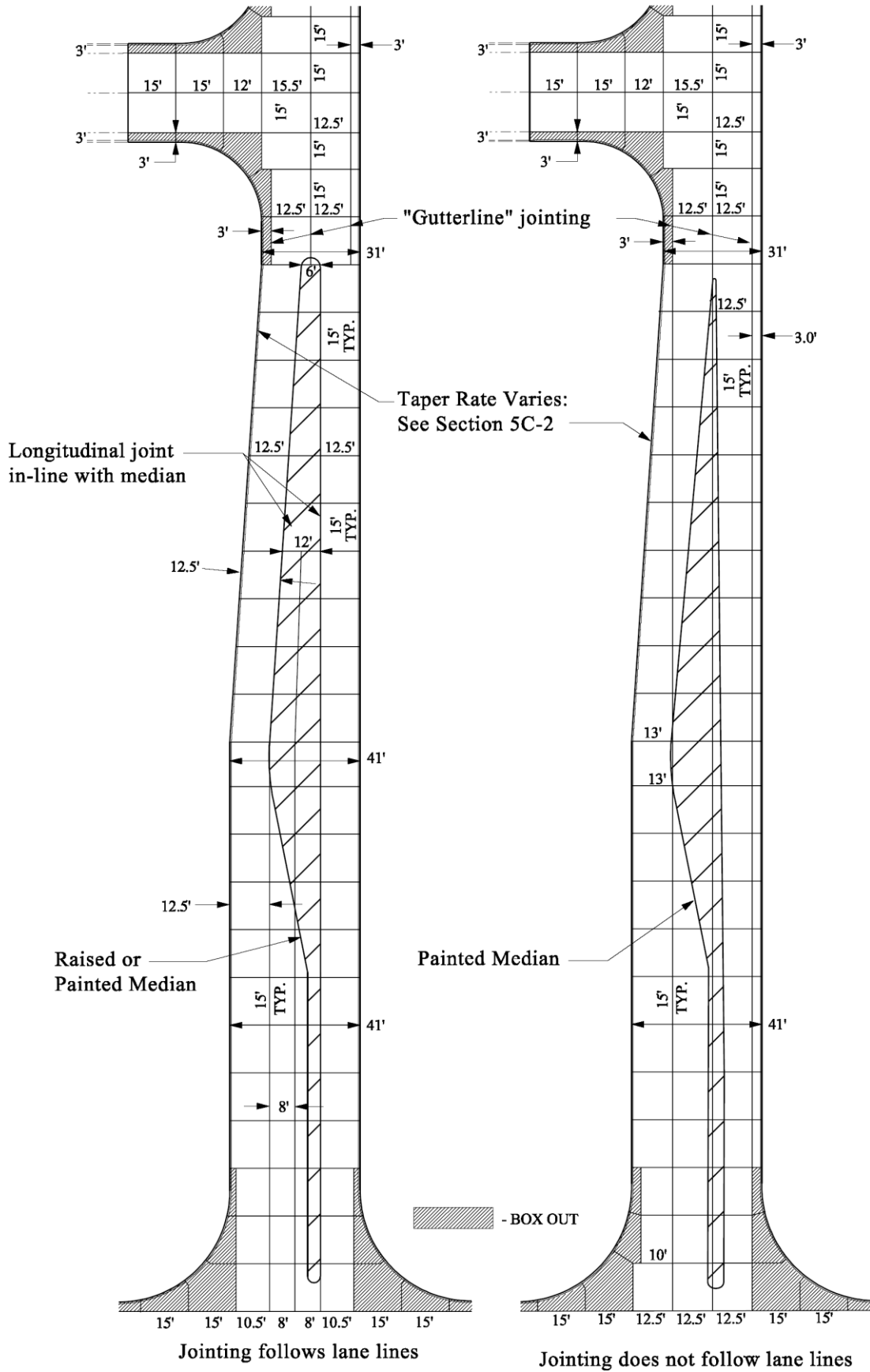


Figure 5G-3.10: Concentric Widening - Four Lane to Five Lane

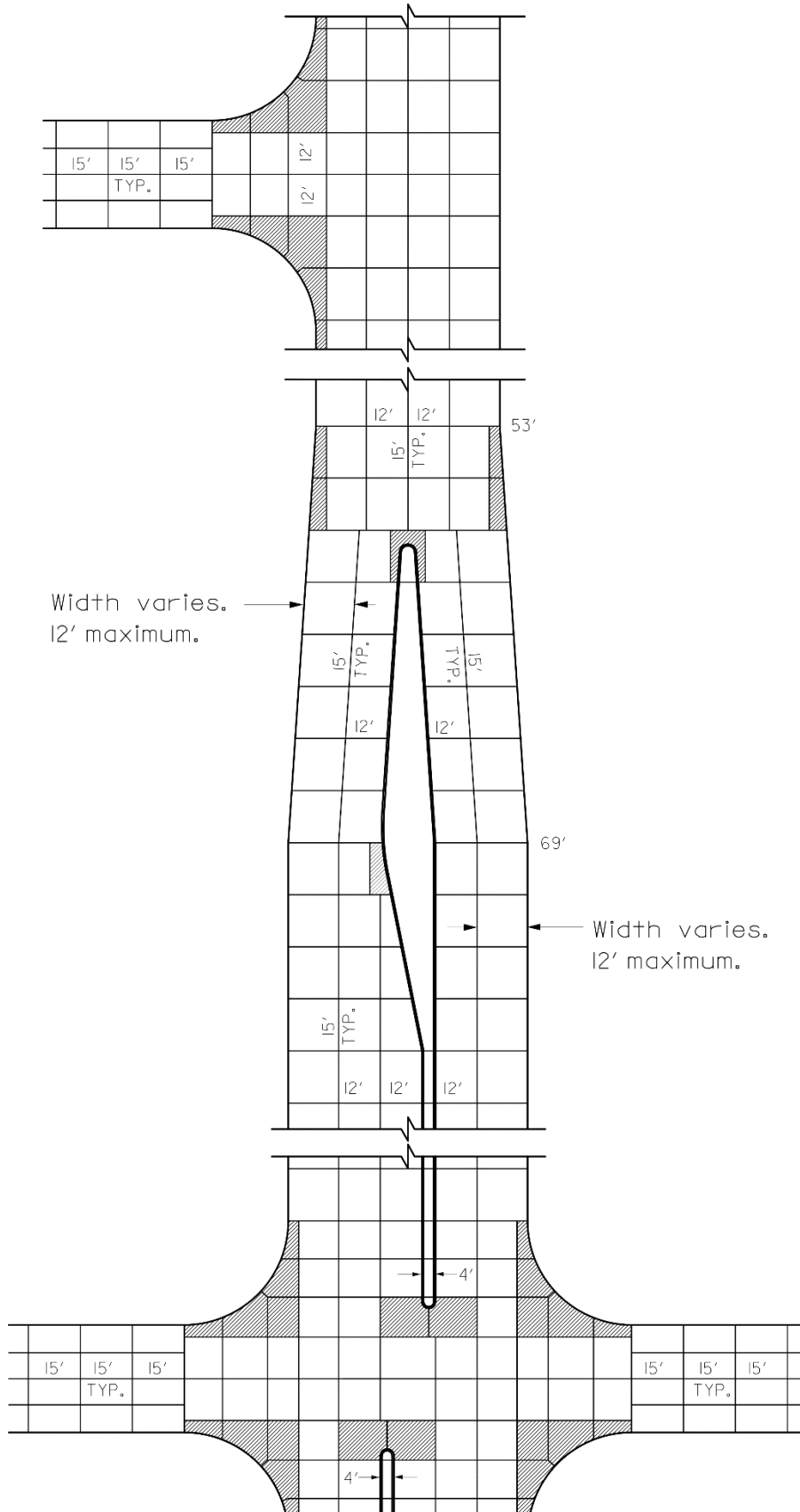
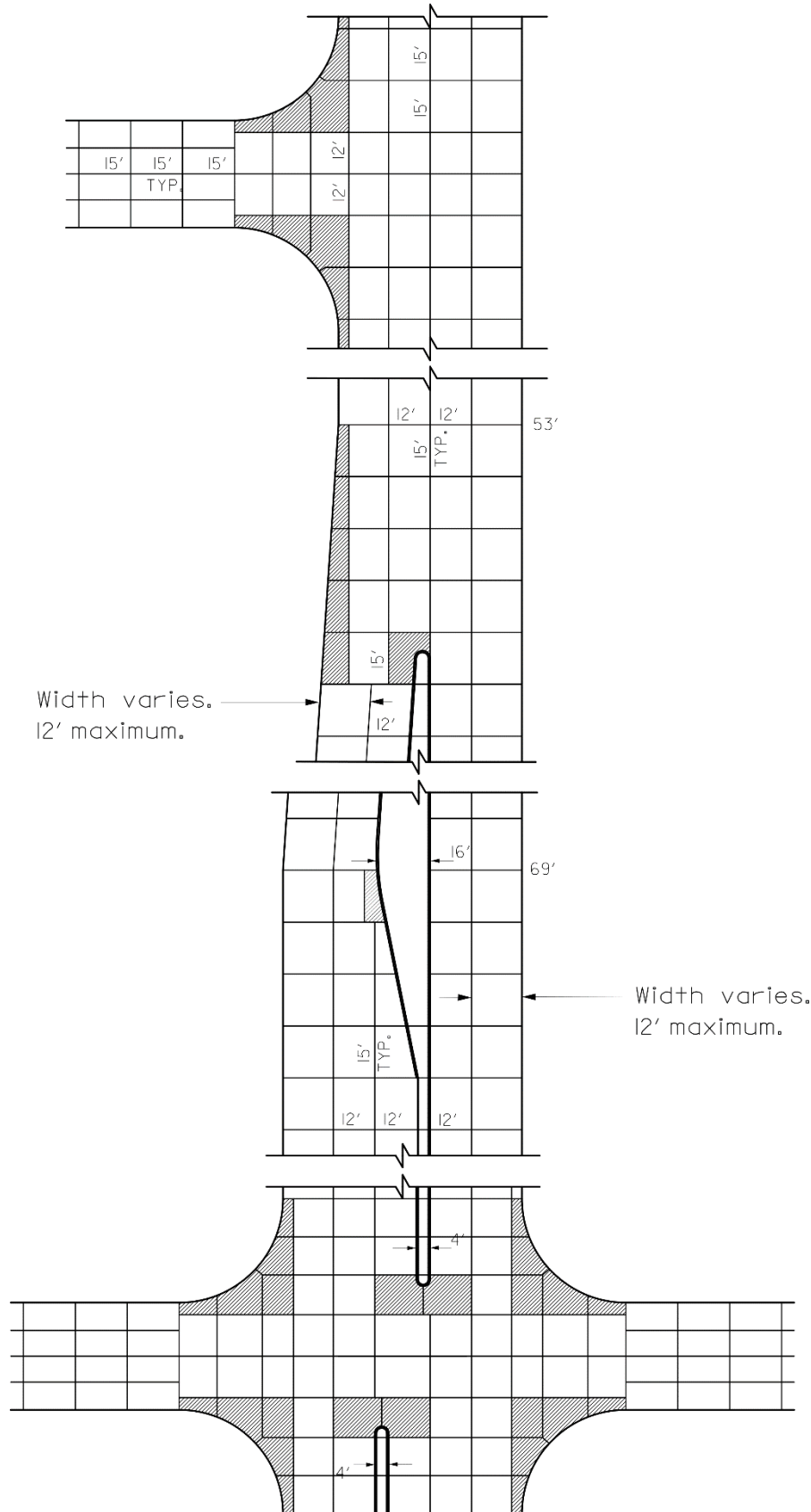


Figure 5G-3.11: Widening One Side - Four Lane to Five Lane



B. Jointing Cul-de-sacs

This section describes how to joint a cul-de-sac. The process is illustrated through an example of a street that is terminated with a cul-de-sac. Assume the pavement thickness is 7 inches.

Step 1: Locate Longitudinal Joints

The longitudinal joints running down the street should be extended into the cul-de-sac. The remaining longitudinal joints in the cul-de-sac should be placed roughly a lane width apart - somewhere in the range of 8 to 12 feet is acceptable.

A BT-1 or L-1 is an appropriate longitudinal joint, since the pavement thickness is less than 8 inches.

Step 2: Locate Transverse Joints

The next step is to place the transverse joints. The maximum spacing for transverse joints is 15 feet and the minimum spacing is 12 feet. Therefore, the joints within the cul-de-sac should be spaced within this range (see Figure 5G-3.12).

A C joint is the appropriate joint to use since the pavement thickness is less than 8 inches.

Step 3: Extend Joints Through the Free Edge of the Pavement

When extending the previously placed joints through the free edge of the pavement, the acute angle between the joint and the pavement edge (and between the joint and other joints) must be greater than or equal to 70 degrees. Also, all joints should be at least two feet long. Details A, B, and C in Figure 5G-3.13 illustrate how this can be accomplished.

- Detail A shows a transverse joint that is extended through the free edge of the pavement unaltered. These are acceptable because all angles between the transverse joint and the longitudinal joints and between the transverse joint and the free edge of the pavement are greater than 70 degrees.
- Detail B uses a dashed line to show the original position of a transverse joint whose angle, with the free edge of the pavement, is less than 70 degrees. This joint should be skewed to make it perpendicular to the free edge of the pavement, as shown by the solid line.
- Detail C illustrates a situation where skewing the joint to make it perpendicular to the free edge of the pavement would cause the angle between the joint and a longitudinal joint to be less than 70 degrees (shown by the dashed line). When this situation occurs, the joint is extended a minimum of two feet beyond the longitudinal joint, and then it is skewed to make it perpendicular to the free edge of the pavement. Both segments of the joint should be at least two feet long.

Step 4: Label Joints

The completed jointing layout for the cul-de-sac is shown in the figures that follow. The L-1 and BT-1 joints may be used interchangeably, at the contractor's discretion, depending on the paving sequence. Therefore, the designer may identify the longitudinal joints as either L-1 or BT-1 on the jointing layout.

Because the majority of the joints are either the C or the BT-1 or L-1, it is not necessary to identify every joint on the jointing layout. A note on the plan describing the transverse joints as C and longitudinal joints as L-1 or BT-1 except as noted otherwise is sufficient, provided that a few key joints on the diagram are identified. Whenever a series of joints changes to a different type of joint, the joint at the location of change is identified. Any joint that may be a source of confusion should also be labeled.

Joint lengths are also shown on the jointing layout, normally rounded to the nearest foot. Similar to labeling joint types, not every length needs to be indicated. However, any length that cannot be inferred from the diagram should be labeled.

Figure 5G-3.12: Placement of Longitudinal and Transverse Joints

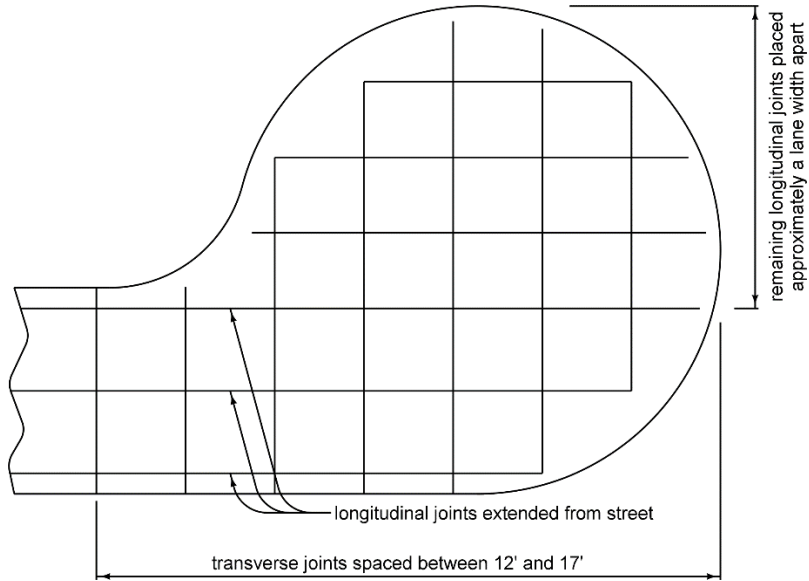
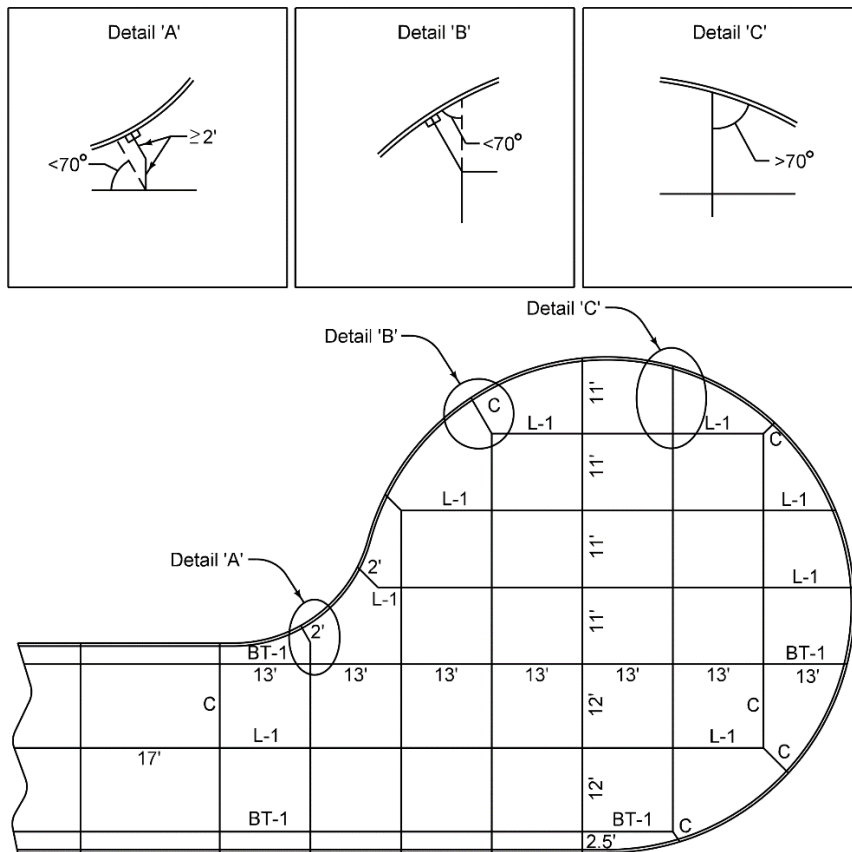


Figure 5G-3.13: Final Jointing Layout - Gutterline Jointing Examples



- NOTE:
- 1) All transverse joints will be 'C' unless indicated otherwise.
 - 2) All longitudinal joints will be either 'BT-1' or 'L-1' unless indicated otherwise.

Figure 5G-3.14: Cul-de-sac Joint Locations - Quarter-point Jointing Examples
(SUDAS Specifications Figure 7010.905, sheet 1)

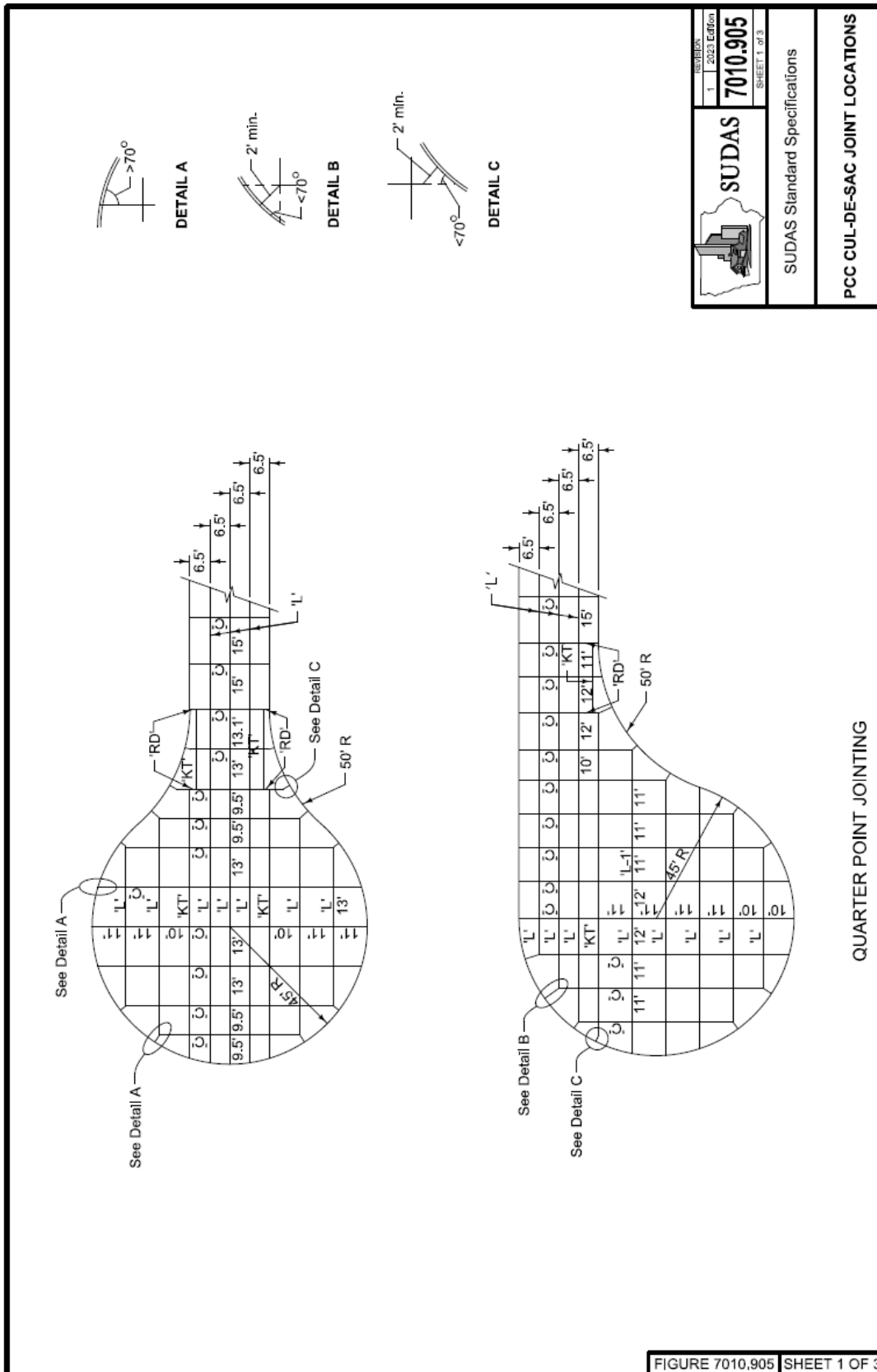


Figure 5G-3.15: Cul-de-sac Joint Locations - Third-point Jointing Examples
(SUDAS Specifications Figure 7010.905, sheet 2)

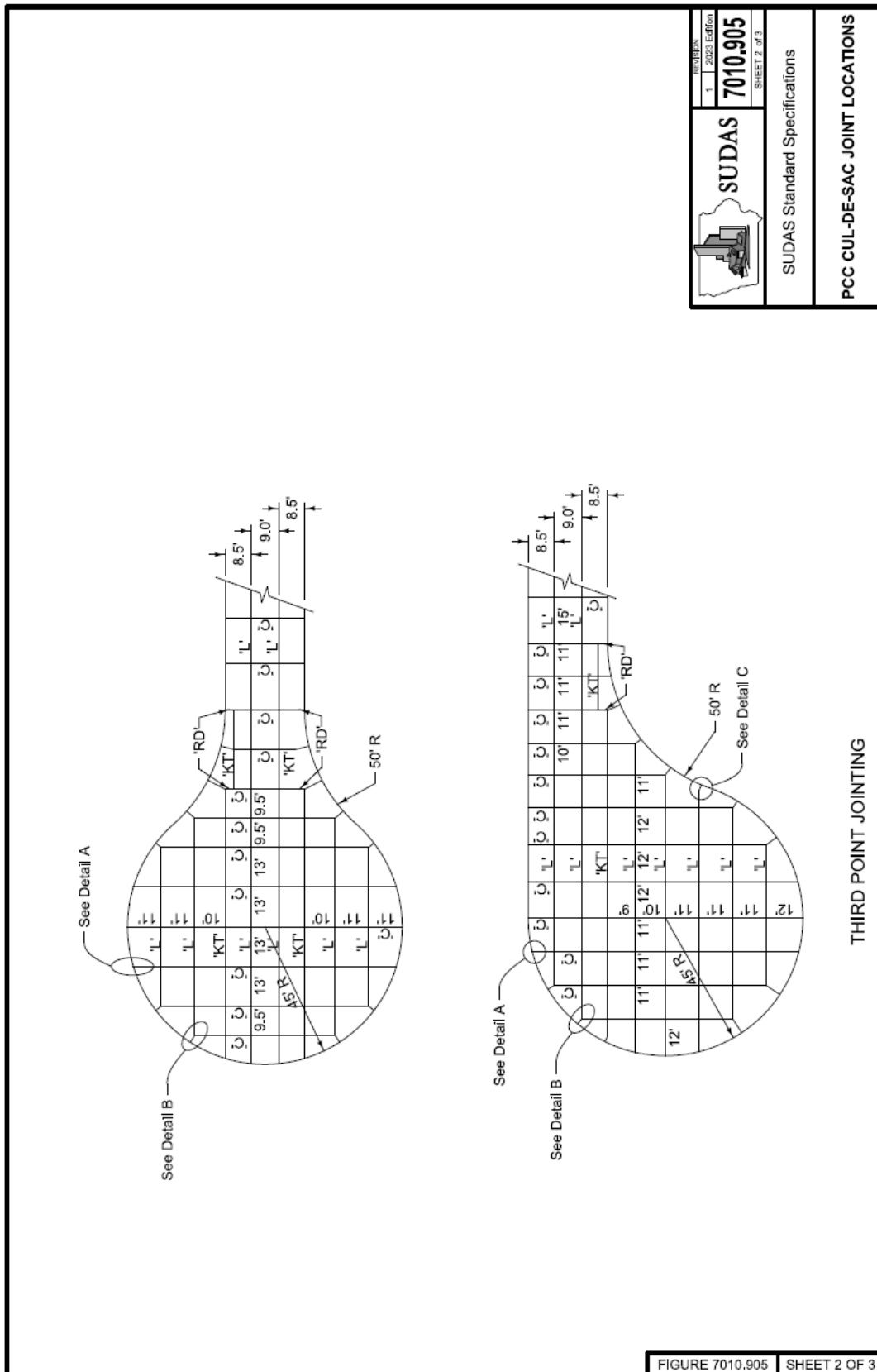


Figure 5G-3.16: Cul-de-sac Joint Locations - Gutterline Jointing Examples
 (SUDAS Specifications Figure 7010.905, sheet 3)

