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CHAPTER FIVE:

CURBS

This chapter discusses the construction and inspection of the various types of curbs. Curbs are used to channelize both traffic and water. They are mainly used in or near urban areas where traffic speeds are low. Curbs are also used in rural areas where traffic speeds are higher, but usually only in conjunction with guardrail for safety reasons.

Curbs vary in exposed height with the higher curbs providing more traffic restriction abilities and allowing for future resurfacing without losing all of the curb exposure.

CURB TYPES

The various types of curbs indicated on Standard Sheets **E605-CCSJ-01**, **E605-CCCG-01**, and **E605-CCIN-01**. The types of curbs are as follows.

- 1) Curb -- This is a free standing curb, 20 in. in height with the top 6 to 8 in. exposed. Good drainage is difficult to maintain with this type of curb where grades are relatively flat.
- 2) Combined Curb and Gutter (Figure 5-1) -- This type of curb with a gutter is good for maintaining drainage where grades are relatively flat. There are three types of combined curb and gutter:
 - a. Combined concrete curb and gutter has a 6 in. exposure.
 - b. Combined concrete curb and gutter, Type B (Mountable) has a 4 in. exposure.
 - c. Combined concrete curb and gutter, Type C has an 8 in. exposure.



Figure 5-1. Combined Curb and Gutter

- 3) Integral Curb -- This type of curb is used in conjunction with concrete pavement and is normally poured monolithic with the pavement. Stirrup bars are placed in the curb base concrete at the time the pavement is placed. The exposed portion of the curb is then placed over the base with the stirrup bars permanently connecting the two parts. There are three types of integral curbs:
 - a. Integral concrete curb has a 6 in. exposure.
 - b. Integral concrete curb Type B (Mountable) has a 4 in. exposure.
 - c. Integral concrete curb Type C has an 8 in. exposure.
- 4) Integral Curbwalk -- This type of curb is poured monolithic with a sidewalk. Integral curbwalk is seldom used and if specified would be detailed only in the plans.
- 5) Concrete Center Curb (Figure 5-2) -- This type of curb is used mainly to separate traffic. Types A, B, C, and D are the four types of center curbs. Each curb has a different exposed height as indicated on Standard Sheets **E605-CNCC-01** through **E605-CNCC-03**



Figure 5-2. Concrete Center Curb

- 6) HMA Curbing -- There are three types of HMA curbs that may be used. They include HMA curb, HMA Center Curb Type A, and HMA Center Curb Type B. These curbs are indicated on Standard Sheets **E605-CCSJ-01**, **E605-CNCB-01**, and **E605-CHCB-02**. The HMA curb is usually placed on HMA pavement to separate traffic.

HMA curbs are easily damaged by snowplows and are best used on a shoulder where guardrail is placed. When HMA curbing is placed on a paved shoulder or pavement, the surface upon which the curb is placed is required to be cleaned and tacked as specified in Section **605.07(b)**. The HMA curb mixture is required to be HMA Surface Type A in accordance with Section **402.07(d)** and **605.07(c)** and is placed with a HMA curb machine or paver with a curb attachment.

HMA curb is considered unsatisfactory if any of the following characteristics are evident:

- a. Incorrect alignment
- b. Poor density
- c. Improper section
- d. Does not meet straight edge requirements of 1/4 in. in 10 ft

Curb having any of these characteristics is required to be removed immediately while the curb is still hot and replaced with curb that meets Specification requirements.

PRECAST CONCRETE CURB

If a precast concrete curb is specified, the curb is detailed in the plans. The only curb of this type that has been used recently is the type used in parking lots. The curb is used to retain soil at a turn lane.

The placement requirements for precast curbs are specified in the plans or contract proposal. The Specifications that apply to precast curb are the applicable portions of Section **605.03** that are not in conflict with the plans or contract proposal.

CAST-IN-PLACE CONCRETE CURB

Cast in place curb is the curb that is predominately used. This curb is placed using forms or with a slipform curb machine. All of the concrete curbs indicated on the Standard Sheets are constructed using these methods.

GRADE PREPARATION

The subgrade is cut so that the required curb grade is obtained when the curb is placed. Any soft or yielding material is removed and replaced with suitable material. The curb subgrade is compacted to a firm even surface. Although there are no specific density requirements, soft or non-compacted areas allow the curb to settle causing water to pond. For this reason, the Technician is required to observe the compactor during this operation to determine if any correction is required.

FORMS

Curb forms (Figure 5-3) may be made of wood or metal. They are required to be straight and free of warping, extend for the full depth of the curb, and secured so that they maintain the correct grade and alignment.



Figure 5-3. Curb Forms

CONCRETE CURB MACHINES

Concrete curb machines (Figure 5-4) may be used provided they produce a curb that meets the Specifications. Curb machines use low slump concrete and vibration for consolidation.

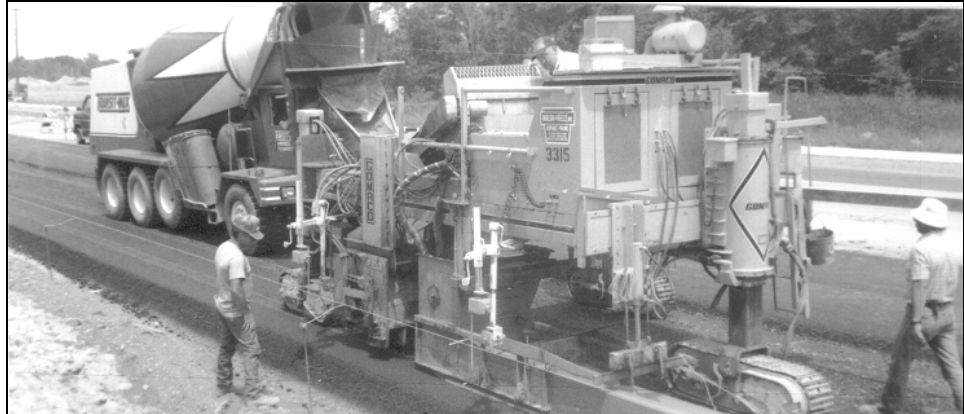


Figure 5-4. Concrete Curb Machine

CONCRETE COMPOSITION AND PLACEMENT

Integral curb or integral curb and gutter usually has the portion of the curb below the surface of the pavement poured with the pavement. The concrete used for this purpose is paving concrete as specified in Section **500**. All other concrete for curb, integral curb, and integral curb and gutter is required to be class A concrete in accordance with Section **702**.

After the concrete is placed in the forms, the concrete is consolidated by tamping, spading, or vibrating. Forms are left in place until the concrete has set sufficiently so that removal of the forms does not cause damage to the curb surface or cause the concrete to slump.

After the forms are removed, the exposed surfaces are rubbed immediately to a uniform surface. Curb machines use vibrators for consolidation, and as little hand finishing as possible is done behind the machine. Excess hand finishing in conjunction with a curb machine may cause the curb to slump or be pushed out of alignment. A fine broom finish is normally used. This procedure produces an acceptable finish for either formed or machine placed curbs.

JOINTS

Pavement joints are continued through integral concrete curb. Pavement contraction joints are required to be continued through the integral concrete curb with preformed joint material 1/4 in. thick.

Curb that is not integral is required to have joints at 10 ft intervals. These joints may be sawed or formed at a depth and width indicated in the plans or standards. Preformed expansion material is placed at the beginning and end of all radii and at castings. This material is required to be 1/4 in. thick.

CURING

As soon as the finishing of the curb is complete, the curb is cured by keeping the curb wet for three days or by applying a liquid membrane curing compound (Figure 5-5) as used for pavement.



Figure 5-5. Applying Curing Compound

ADDITIONAL REQUIREMENTS FOR CONCRETE CENTER CURB

The subgrade is required to be prepared the same for concrete center curb as for the adjacent pavement. If the adjacent pavement has subbase, the subbase is carried through the full width of the center curb and at the same thickness. Likewise, the joints in the center curbs adjacent to the PCCP are to be aligned with joints in the adjoining PCCP. In addition, where joints are constructed in the PCCP adjacent to the concrete center curb, these joints are extended to the center curb in accordance with 503.04(f).

If the concrete center curb is placed adjacent to HMA, then the joints are to be spaced a maximum of 18 ft apart.

A minimum 3/8 in. thick expansion material is also placed at the beginning and end of all concrete center curb where the ends are adjacent to concrete pavement.

CONSTRUCTION AND INSPECTION PROCEDURES

All dimensions of curbs are required to be checked for compliance to the plans and standards. The tops and faces of all curbs are measured with a straight-edge to check the 1/4 in. in 10 ft tolerance. With experience, a visual inspection may reduce this checking to areas that appear to be out of tolerance. All curb that does not meet the straight-edge requirement is removed and replaced. All materials are required to be checked for compliance to the Specification as noted in the Frequency Manual.

MEASUREMENT AND PAYMENT

Curbing is measured by the linear foot along the front face. Curb and gutter is measured along the face of the curb. No deduction is made for castings installed in the curbing. Center curb is measured by the linear foot or by the square yard as specified in the plans. Curbing is paid by the linear foot for each kind and type specified. Bed course material is paid for at the contract unit price per ton, complete in place.