

B. MOORE



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

R. SAMUEL HUNT III
SECRETARY

MEMO TO: Project Engineers, Project Design Engineers
Bob Pearson, PE
FROM: Len Hill, PE *Len Hill*
Guardrail Committee Chairman
DATE: August 29, 1995
SUBJECT: Guardrail Items

There has been several questions concerning the use of guardrail on curb and gutter projects, guardrail lengths at underpasses, and buried end sections. In order to address some of these concerns and develop some consistency in guardrail use, please use the following guidelines in your project design.

I. Guardrail Warrants on Curb and Gutter Facilities
A: Design Speed = 45-50 mph.

- 1. Embankment Warrant: Use guardrail on fill heights greater than 10 feet and with 2:1 slopes. Guardrail is not needed for fill heights less than 10 feet and on any slope 3:1 or flatter. (NOTE: On high speed shoulder sections, 4:1 slopes are required to eliminate guardrail.)
- 2. Roadside Obstacles: Generally roadside obstacles within the clear zone should be shielded. An exception is for bridge piers located at y-line interchanges. In many cases, the guardrail placement will interfere with sight distance. In these situations, guardrail should not be used.

B: Design Speed = 35-40 mph.

- 1. Embankment Warrant: Guardrail is not needed for embankments, unless there are unusual circumstances.
- 2. Roadside Obstacles: Most roadside obstacles do not warrant guardrail protection. Exceptions are bridge and culvert approaches over water, highways, and railroads. However, if there are mitigating circumstances, guardrail is not required. Examples of some mitigating circumstances are driveways, sight distance, or aesthetic concerns.



II. Guardrail Placement on Curb and Gutter Facilities:
(Refer to Chapter 3-5 in the Roadway Design Manual).

1. The most desirable option is to place the guardrail 12 feet from face of curb. This placement requires a 14 foot berm width. Two feet of additional fill widening is all that is needed on curb and gutter facilities.
2. The second option is to place the guardrail at the face of curb. However, care should be taken at intersections not to interfere with sight distance. In these cases guardrail should be placed at the back of berm. (Refer to Chapter 3-3 in the Roadway Design Manual).
3. The third option is to place the rail at the back of the normal berm width. This method is acceptable at bridge approaches.

III. Guardrail End Treatment on Curb and Gutter Facilities:

1. The most desirable option is to bury the end in cut. This method will be developed as a special detail and is shown in the attachments.
2. On melt units with curb and gutter, the additional fill widening can be reduced to six feet (2'+ 4') as opposed to the nine feet (2'+ 7') currently used. A special detail will be developed to show this method.

IV. Guardrail Lengths at Bridge Underpasses - Shoulder Sections:

1. The end unit treatment at some bridge underpasses is to bury in cut if a natural or false cut is available. (Refer to Chapter 3-7, 6-10, and 6-11 in the Roadway Design Manual). The length of guardrail needed on the buried in cut section is shown in the attached memo dated June 5, 1991.

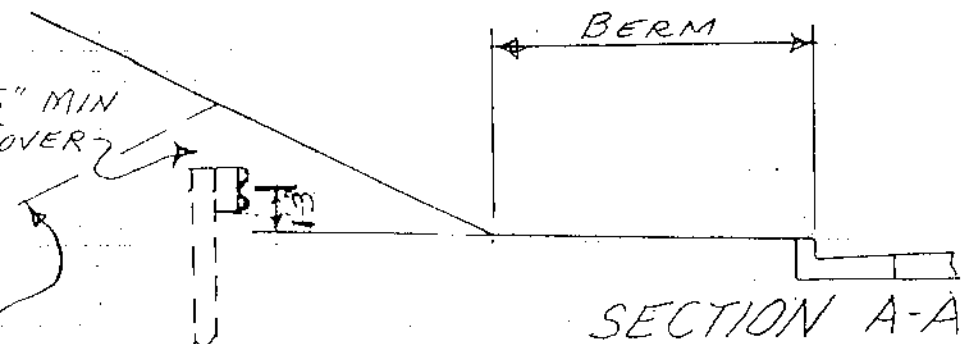
Please remember these are general guidelines to use in most situations. However, cases always occur where good engineering judgment dictates other methods. Please see me if you have any questions.

Attachments

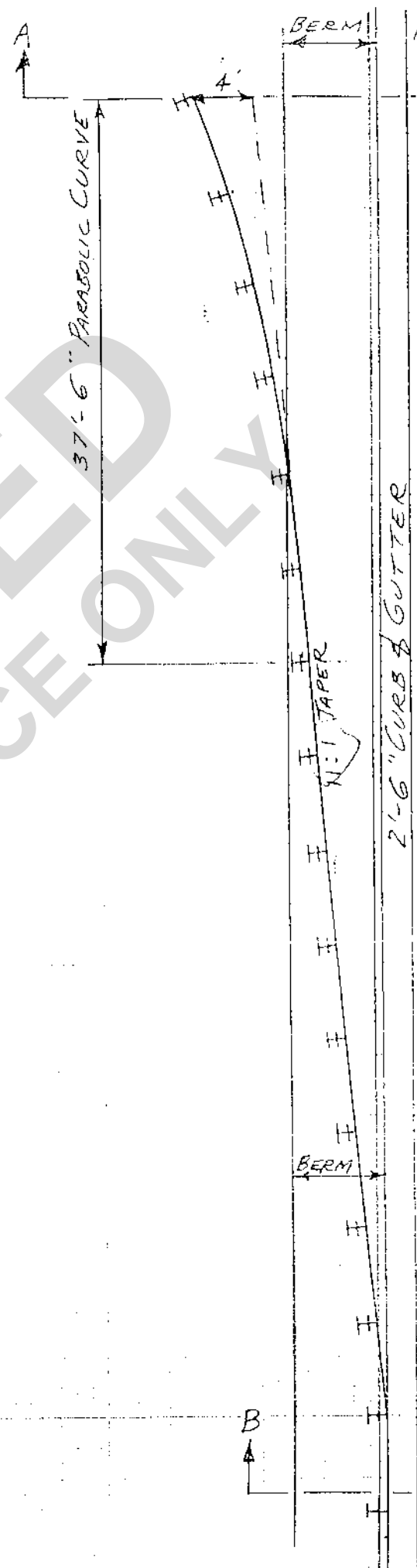
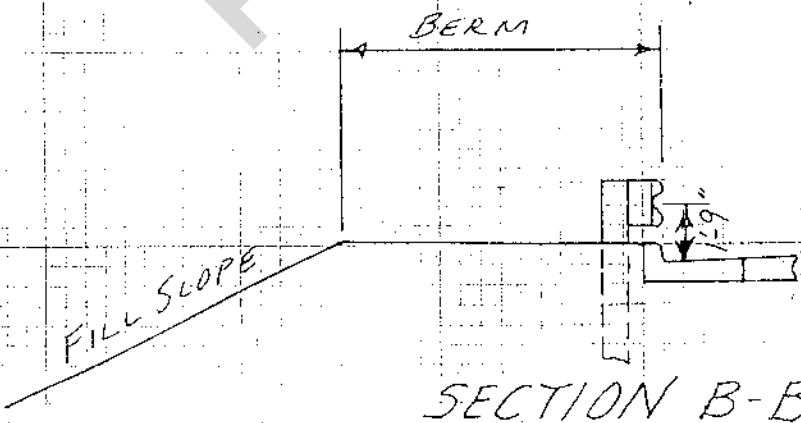
RLH:

cc: Tom Shearin, PE
Harry Thompson, PE
Don Morton, PE
Jim Graham, PE
Garry Lee, PE
Lori Cove, FHWA

FACE OF GUARDRAIL AT FACE OF CURB BEGINNING IN CUT.

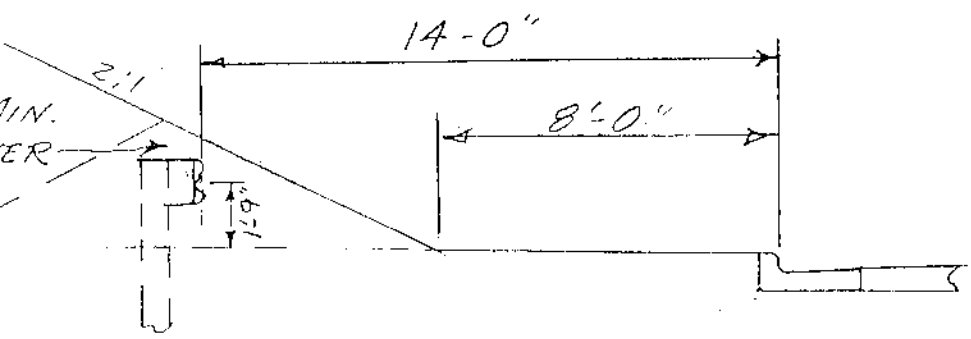


FALSE CUTS MAY BE CONSTRUCTED TO SHORTEN GUARDRAIL



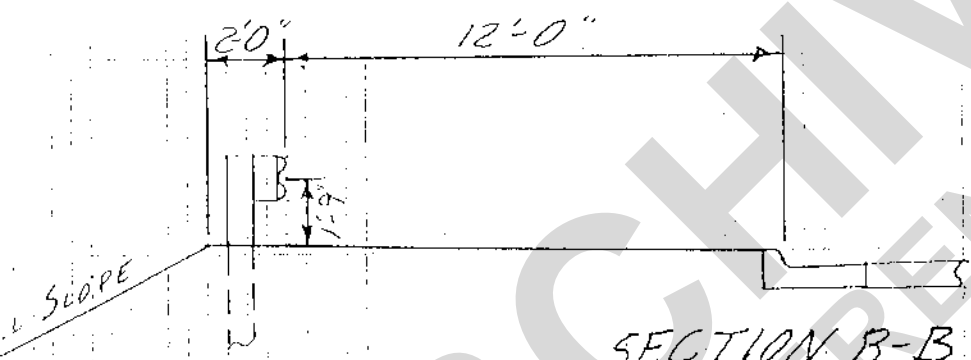
ARCHIVED FOR REFERENCE ONLY

12' OFFSET BEGINNING IN CUT

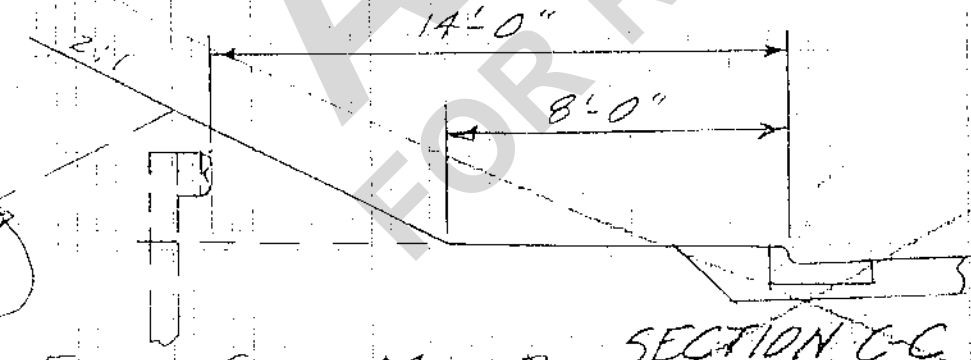


FALSE CUTS MAY BE CONSTRUCTED TO SHORTEN GUARDRAIL

SECTION A-A

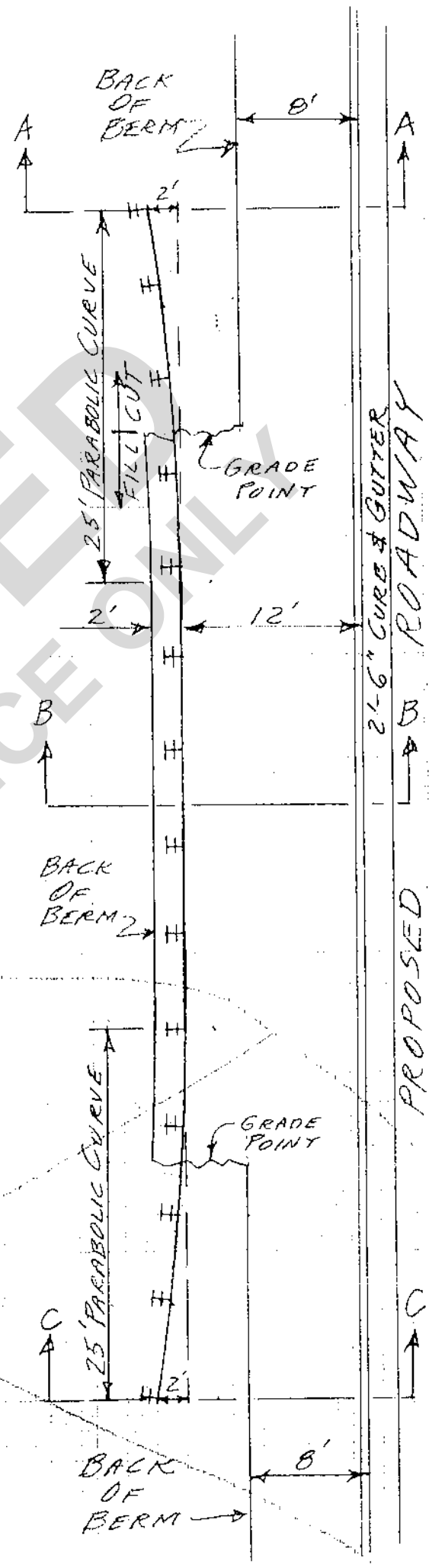


SECTION B-B

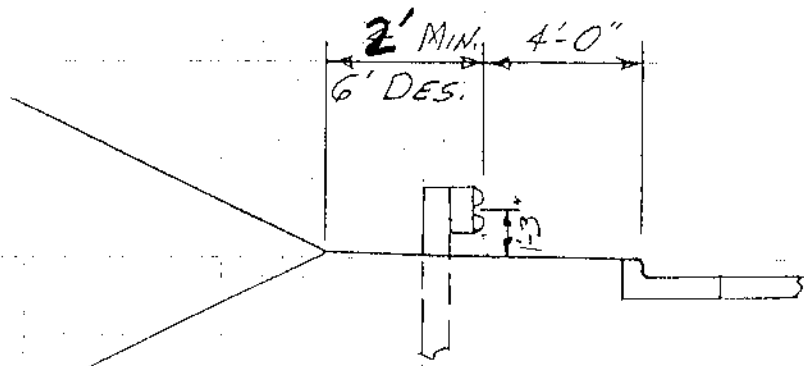


FALSE CUTS MAY BE CONSTRUCTED TO SHORTEN GUARDRAIL

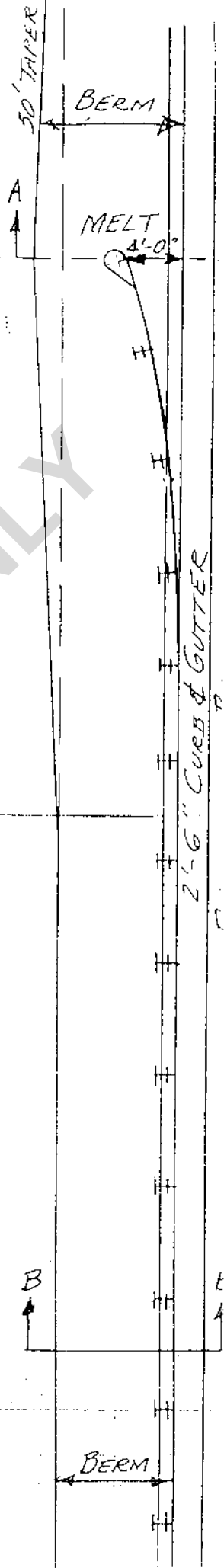
SECTION C-C



FACE OF GUARDRAIL AT FACE OF CURB BEGINNING WITH MELT



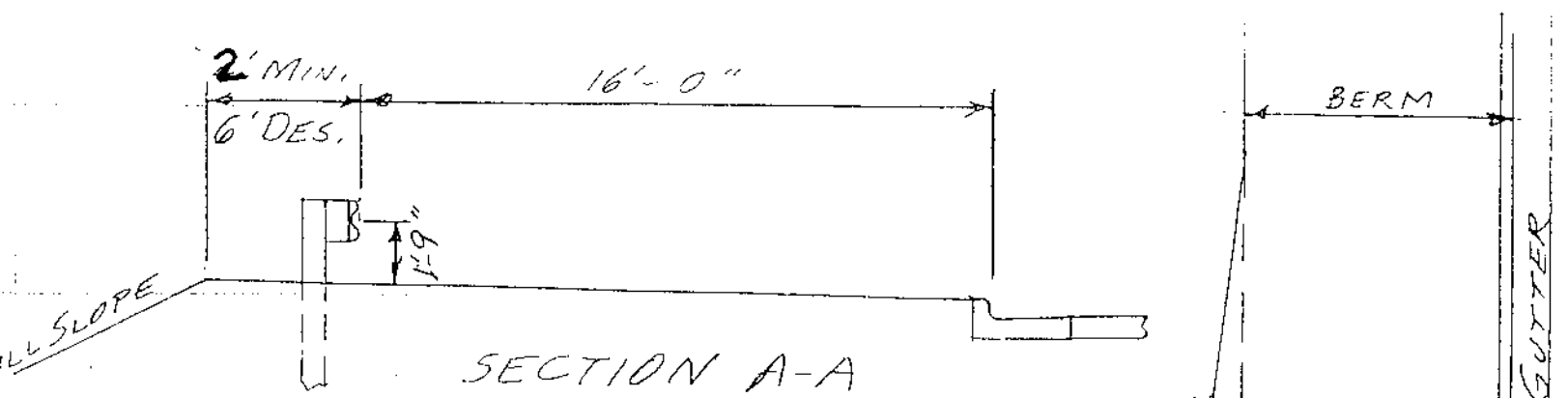
37'-6" PARABOLIC CURVE



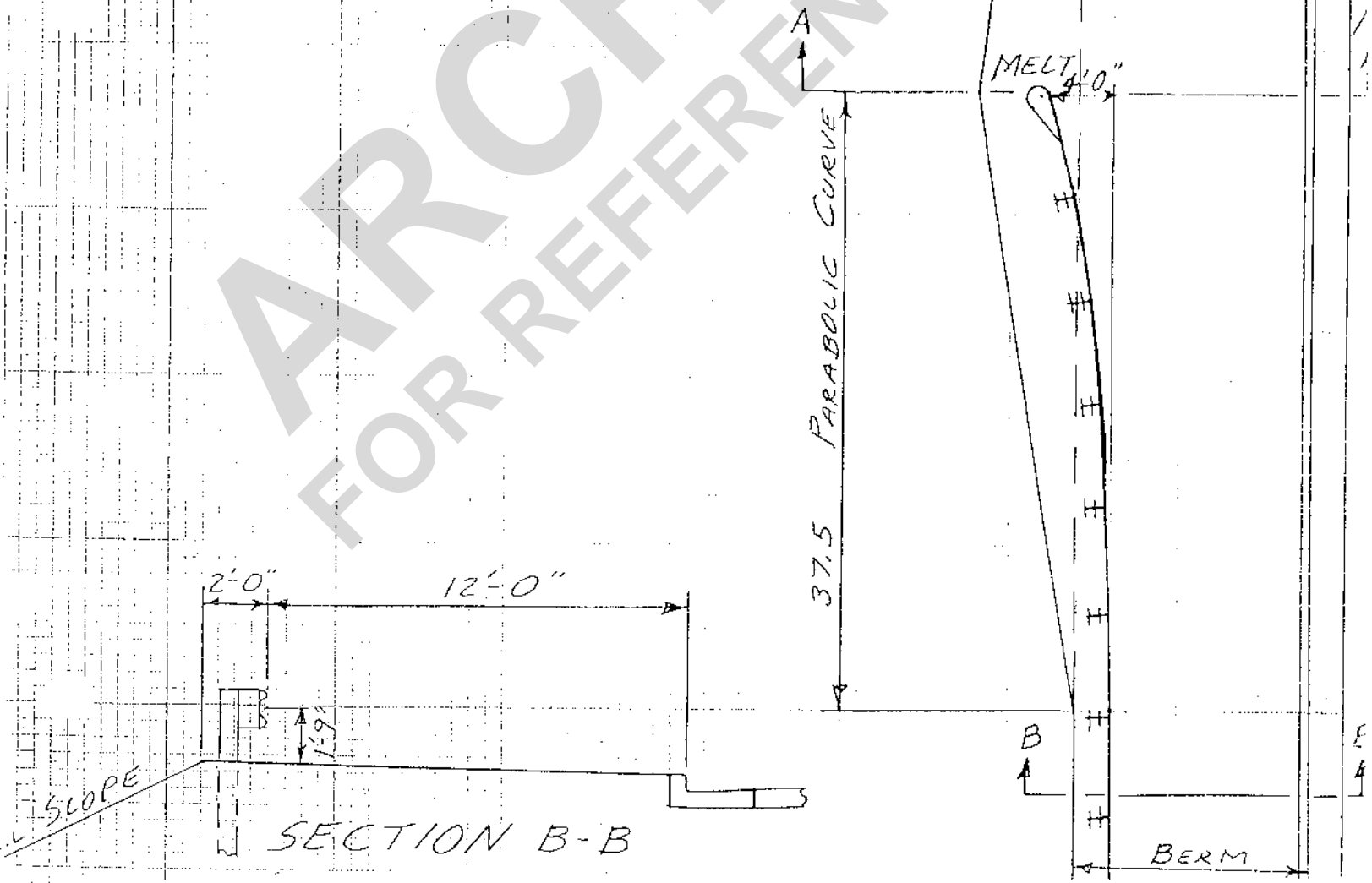
FILL SLOPE

SECTION B-B

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12' OFFSET BEGINNING WITH MELT



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2'-6" CURB & GUTTER

50' TAPER

MELT 4'-0"

37.5 PARABOLIC CURVE

BERM

BERM

SLOPE

SLOPE



Len Hill

cc.

JUN. 6 1991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
P.O. BOX 25201
RALEIGH 27611-5201

JAMES G. MARTIN
GOVERNOR

DIVISION OF HIGHWAYS

THOMAS J. HARRELSON
SECRETARY

June 5, 1991

WILLIAM G. MARLEY, JR., P.E.
STATE HIGHWAY ADMINISTRATOR

MEMORANDUM TO: Project Engineers and Squad Leaders
FROM: Len Hill *Len Hill*
SUBJECT: Guardrail Lengths for Bridge Pier Protection

The formula shown on the new Guardrail Standard Number 862.01 - Sheet 6 of 10 (See Howard Critcher's memo of May 8, 1991) will compute lengths for standard cut to fill transitions. However, this formula will not work for burying guardrail in conjunction with bridge pier protection. When using the "Standard Guide For Shoulder and Ditch Transition at Grade Separations", (See Critcher's memo) the guardrail lengths should be constant for most conditions. To save everyone some time, the lengths for burying guardrail in conjunction with bridge pier protection are as follows:

- With a concrete barrier placed 1'-11" from face of pier:
*This length includes 25' for the barrier anchor unit.

Flare Rate	Guardrail Length*
11:1 (50 mph)	150'
13:1 (60 mph)	175'
15:1 (70 mph)	200'

- With guardrail as pier protection placed 5'6" from face of pier:

Flare Rate	Guardrail Length
11:1 (50 mph)	162.5'
13:1 (60 mph)	200'
15:1 (70 mph)	250'