TO:

George W. McAlpin
Chief Engineer
Bldg. 5 Room 401

SUPERSEDED BY EI 77-031
EFFECTIVE 5/1/1977

ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SUBJECT: Standard Details For Highway Bridges, Revision

Subject Code: 7.35-11

77-50

Distribution: ☐ Main Office ☐ Regions ☒ Special

Code: EI 74 - 26

Date: 2/26/74

Supersedes:

APPROVED:

R. N. Kamp
Deputy Chief Engineer (Structures)

The attached pages are revisions to Standard Details for Highway Bridges and should be inserted in your manual immediately:

Page III - Item 24.18.5 Added

" IV - No change

" 20A - Revised. Back of page 20A is blank.

" 27 - Item 21.13 Revised

" 28 - No change

" 47 - Last paragraph-Revised

" 48 - Revised

" 49 - Sub Items G3 and G4-New material item numbers shown

" 50 - Sub Item G7-New material item number shown

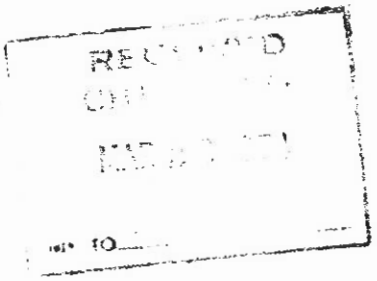
" 51 - Sub Item SUB1-In 5th line "BEAMING" corrected to "BEARING"

" 52 - No change

" 53 - Paragraph 2-Revised

" 54 - Sub Item SUP 7-New material item number shown

" 59 - Sub Items SUB 1-A and SUB 1-B revised to agree with new material specifications and item numbers. Sub Item SUB 1-C-Notation in parenthesis rewritten for clarification. Last two lines referring to Orange County-Deleted.



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Page 60 - Sub Items SUB 1-D and SUB 1-E-New material item numbers shown

" 65 - Sub-Items SUB 9 and SUB 10-New material item numbers shown

" 66 - In first line-Material item number added

" 71 - Sub Item CAR1-Revised
Sub Item CAR 2(A)-No change

" 72 - Sub Items CAR 2(A)-Continued and
CAR 2(B)-No change
Pages 71 and 72 had to be rewritten due to revision to CAR1

" 85 - No change

" 86 - Item 24.3-Revised to show new material item number only
Item 24.4-Title of item corrected and item revised

" 92 - Item 24.18.5-Added-Back of page 92 is blank

" 94 - Item 25.2-Reference to Section 25.1 added

" 94A - No change

" 99 - No change

" 100 - At top of page-Spacing of diaphragms - Item C - Revised
Item 26.4-Last sentence revised

" 105 - Item 27.8-Added to this page from old page 106.
No change in sub-items A or B

" 106 - Sub-item C on Sag Cambers-Added

" 106A - New page due to rewriting page 106. No change in item 27.8.1. Back of page 106A is blank.

" 107 - No change

" 108 - At top of page part of line 2 and all of line 3 deleted

" 109 - Item 27.11-Second paragraph-added

" 110 - No change

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The following figure illustrates an example of a complete "Table of Quantities." In actual use it will probably be necessary to revise the item numbers to agree with current specifications.

(NOTE: "Table of Quantities" replaces pages 21 and 22.)

21.11 REINFORCED CONCRETE APPROACH SLABS

All bridges shall be provided with a reinforced concrete approach slab. (See current BDD Sheets.)

21.12 DEPTH OF CONCRETE FASCIA ON MULTIPLE SPAN STRUCTURES

On multiple span structures, it is desirable that a uniform depth of concrete fascia be kept for the full length of the exposed fascia. To accomplish this will require that all fascia beams be set so that the bottom of the top flanges will be aligned.

21.13 GRANITE CURBS

Granite curbs shall be used on all bridges where curbs are required and should be so shown on the plans.

21.14 SIDEWALKS ON BRIDGES

When required, raised sidewalks shall have a minimum clear width of 4 feet. Sidewalks, adjacent to walls, shall be supported on the embankment and walls.

21.15 DETAILS OF RAILINGS

Complete plan or elevation of railing shall be detailed. These views may be schematic. The location of the railing shall be set by tying in one or more posts to the end of slab or end of wingwall. Location of special posts and rail expansion joints shall be shown.

21.16 BRIDGE DRAINAGE

The spacing of bridge drains shall be based on a 5-minute storm of a 10-year frequency. Bridge drains are to be provided to maintain a maximum puddle width determined by the following conditions:

a. Maximum puddle width is limited to 12 feet.

b. Maximum puddle depth is one-half inch less than the curb height.

c. Lane width clear of puddle must be a minimum of 8 feet.

Recommended design practice for hydraulic computations shall be those of the Federal Highway Administration as published in Circular HEC No. 12 - Drainage of Highway Pavements, March 1969.

Bridge drains on stream bridges with curbs shall be located midway between diaphragms or crossframes and shall discharge directly into the stream.

For bridge drains on bridges over land, horizontal runs of drain pipe shall be avoided whenever a reasonable modification of the design scupper spacing will permit placement of drains adjacent to piers at the low end of spans. Scuppers shall not be discharged on embankments or ungrouted block paved slopes.

Drainage from bridge superstructure or embankments shall not discharge onto or drain across a railroad right-of-way without the approval of the railroad company.

the obstruction, backfilling the hole with approved suitable material which shall be thoroughly compacted to the satisfaction of the Engineer. However, no partially driven pile shall be removed until the Engineer is satisfied that the Contractor has made every effort to drive the pile through the obstruction. Payment for the excavation will be made at the unit price bid for the Structure Excavation Item and for the temporary sheeting under Item (number)* when sheeting is used. No other extra payment will be made for this work.
*Indicate the type of sheeting at lowest price.

WHEN PILES ARE DRIVEN THROUGH NEWLY COMPACTED EMBANKMENT OR EXISTING MATERIAL WHERE DIFFICULT DRIVING IS ANTICIPATED OR WHERE PILES ARE REQUIRED FOR SCOUR IN OR ADJACENT TO STREAM CROSSINGS: It is anticipated that difficult driving of piles may be encountered and it may be necessary to utilize mechanical equipment for removing consolidated material from the location of the piles. This may be accomplished by various types of earth augers, well drilling equipment, or other devices to remove the consolidated material to permit the piles to be driven to the desired depth or required resistance without distortion.

FOR ALL STRUCTURES: The Contractor's attention is directed to the necessity of recognizing the elevation of ground water at structures and to the fact that the item "Cofferdams" may not appear in certain stream structures. For Drainage of Excavation at Structures refer to Section 206, Trench,

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Culvert and Structure Excavation, page 125 of the Standard Specifications dated January 2, 1973.

21.21.2 - GENERAL NOTES: (To be placed on Plans.)

G1 Design Specifications: Current New York State Department of Transportation Standard Specifications for Highway Bridges and 1973 American Welding Society, modified.

Live Load: HS20-44 or two 24,000-lb. axles spaced 4'-0" on centers.

Note: The latter loading is to be noted only for the bridges carrying either the main line of Interstate highways or the Southern Tier Expressway.

G2 Material and Construction Specifications: Specifications of New York State Department of Transportation dated January 2, 1973.

G3 The cost of furnishing and placing water used for selected granular fill will be paid for under Item 203.15 and 203.16 of the highway portion of the Contract.

G4 The cost of furnishing and placing water used for sod gutters will be paid for under Item 615.03 included in the bridge estimate.

G5 The cost of all joint material will be included in the price bid for the various items of the Contract, except as otherwise specified.

G6 Stress graded lumber and timber has been designed for the following allowable stresses and the type used must meet these minimum requirements:

Extreme fiber in bending and tension parallel to grain . . . . . .

Compression perpendicular to grain . . . . . .

Modulus of elasticity . . . . . .

G7 All concrete anchor studs which are attached to the various steel details shall meet the requirements listed in Subsection 709 - 05. Stud Shear Connectors for Bridges, of Section 602 Concrete Reinforcing Steel for Structures. Payment for furnishing and placing the concrete anchors will be included in the unit price bid for the item to which the anchors are attached.

21.21.3 SUPERSTRUCTURE NOTES: (To be placed on plans.)

SUP 1 With slab haunches, use the following note:

After all superstructure beams have been erected, elevations shall be taken on the top of the beam at the centerline of web at each centerline of bearing, center of the span and at other locations where theoretical bottom of the slab elevations are indicated on the plans.

The depth of haunch required to position the slab forms is obtained as follows: From the measured top of beam elevations subtract the deflections due to slab and superimposed dead load. Subtract this result from the listed bottom of slab elevation.

SUP 2 The structural slab on this structure shall be formed with _____.
(Here indicate either permanent corrugated metal forms for concrete decks or removable forms.)

SUP 3 The following note shall be used with girders when transverse intermediate stiffeners, used as connection plates, are used on both sides of the web.

All connection plates used in pairs shall be welded to the web and be placed paint tight against both flanges.

This may be accomplished by cutting the connection plates to fit or by cutting the connection plates 1/8 inch short and then placing the connection plate tightly against the tension flange and welding the opposite end to the compression flange. Fitted connection plates shall not be driven in place with sufficient force to distort the flange, web or connection plates.

SUP 4 The following note shall be used on all girders when intermediate stiffeners are used on one side only or staggered on both sides.

All intermediate stiffeners and/or connection plates used singly on one side only or staggered on both sides shall be placed paint tight against the flange which is in tension under dead load and welded to the web and flange which is in compression.

SUP 5 Use whichever of the following notes that may be appropriate on jobs with bearing stiffeners.

Bearing stiffeners on straight, simply supported girders shall be fillet welded to the web, shall be either fillet welded or tightly fitted to the top flange, and shall be either welded to the bottom flange with a full penetration groove weld or milled to bear against the bottom flange.

Bearing stiffeners on curved, simply supported girders shall be fillet welded to the web, shall be either fillet welded or tightly fitted to the top flange, and shall be welded to the bottom flange with a full penetration groove weld.

Bearing stiffeners on straight, continuous girders shall be fillet welded to the web and either welded to the bottom flange with a full penetration groove weld or milled to bear against the bottom flange. Where the top flange is in compression, the bearing stiffener may be either fillet welded to the top flange or tightly fitted to the top flange. Where the top flange is in tension, the bearing stiffener shall be placed tight aginst the top flange without the fillet weld.

Bearing stiffeners on curved, continuous girders shall be fillet welded to the web and shall be welded to the bottom flange with a full penetration groove weld. Where the top flange is in compression, the bearing stiffener may be either fillet welded to the top flange or tightly fitted to the top flange. Where the top flange is in tension, the bearing stiffener shall be placed tight against the top flange without the fillet weld

SUP 6 The following note shall be used, when applicable, either in whole or in part, for built-up girders and/or beams:

The ends of all girders and beams and the bearing stiffeners shall be vertical. All intermediate transverse stiffeners may be placed perpendicular to the top flange.

SUP 7 All anchor bolts, nuts and washers shall be galvanized in accordance with the requirements of 1973 Material Specification 719-01.

SUP 8 All surfaces of structural steel members, including surfaces which are embedded or in contact with cast or pneumatically projected concrete, shall be painted except those portions of the surface where welding is to be performed, such as the portions of the top flange of stringers where stud shear connectors are to be attached by welding.

SUP 9 Machine-finished sliding surfaces in contact shall receive one coat of any common fibrous automotive grease as soon as machining is complete. The contacting surface of the rolled copper alloy plate shall also be coated with grease. The Contractor shall maintain all protective coatings to prevent corrosion. All protective coatings applied in the shop shall be removed immediately prior to assembly of the members in the field. When the protective

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21.21.4 - SUBSTRUCTURE NOTES

SUB 1-A - All sod, topsoil and unsuitable material under the substructure embankment shall be removed as specified under Section 203, Excavation and Embankment, and replaced by the same item as the layer of embankment adjacent and above as shown on the plans.

SUB 1-B - All embankments of Select Structure Fill, Item 203.21 shall be compacted to a minimum dry density of 100 percent of Maximum Density as defined under Subsection 203-3.12 - Compaction,

(Use the paragraph below if applicable.)

However, where piles are to be placed through the embankment, a minimum dry density of 90 percent of the Maximum Density will be required.

SUB 1-C - The Contractor shall place and compact all fill for bridges between the final toes of slope in accordance with the plans and specifications in a manner satisfactory to the Deputy Chief Engineer (Structures).

Use one of the following applicable paragrphs.

1. The embankment constructed to the required grade shall be allowed to stand a maximum of _____ days or for a period of time as determined by the Deputy Chief Engineer (Structures) prior to any substructure construction.
2. The embankment shall be allowed to stand for a period of time satisfactory to the Deputy Chief Engineer (Structures) prior to any substructure construction.

SUB 1-D. Items 203.03 and 203.21 shall be placed simultaneously, in contact, on both sides of the vertical payment line. Sheeting or other means shall not be used to separate the two materials.

SUB 1-E. The installation of Selected Fill (Bridge Foundation), Item 203.21, as shown on the structural plans, shall be completed immediately following the completion of abutments or walls.

SUB 1-F. ALL FOOTINGS ON ROCK: All disintegrated or shattered material shall be removed to the lines and levels ordered by the Engineer. Where sound rock is found two feet or less below the planned levels of the bottom of the footing, backfill of Class B Concrete shall be installed to the levels shown on the plans. Where sound rock is found to be more than two feet below the planned

SUB 7 The following note shall be placed on the Contract Plans when cofferdams are to be used at a structure with batter piles except in cases where the cofferdam has been designed and is detailed on the plans.

"It shall be the Contractor's responsibility to place the cofferdam so that it will not interfere with the batter piles. Pay lines for cofferdam shall be as shown on these plans."

SUB 8 Existing substructures shall be removed to within the limits shown on the plans under Item _____ in the _____ quantities. (Insert either HIGHWAY or BRIDGE in last blank space.)

SUB 9 Top of backwalls on which asbestos sheet packing Subsection (728-06) is to be placed shall be steel-trowel finished.

SUB 10 Bituminous material, Item 622.01 shall be applied to the backs of all abutments and wingwalls above top of footings where fill is in contact with the walls.

SUB 11 Epoxy protective coating for concrete, Item 621.01, shall be applied to the following surfaces:

ABUTMENTS All exposed pedestal surfaces, bridge seats, including the area under the bearings, exposed vertical surfaces of backwall and curtain walls facing the superstructure.

SOLID PIERS All pedestal surfaces including the area under the bearings, and the top surface of pier between pedestals including the edge chamfer at top edge of pier.

PIERS WITH COLUMNS Top and sides of pier beams and pedestals including the surfaces under the bearings.

SUB 12 When round columns, which may be constructed with the use of fiber forms, are provided on a project, the following note shall be placed on the plans:

"The use of fiber forms will be permitted only if the interior surface of the forms has been treated in such a manner as to prevent helical corrugation marks on the finished concrete surface."

Forms are not to be removed in a manner that will damage the concrete.

21.21.6 CONCRETE BOX CULVERTS, ARCHES AND RIGID FRAMES

CAR 1 The surface of the structural slab placed under Item 601.01 shall be subject to final finishing in accordance with Subsection 502-3.09, "FINISHING AND TEXTURING," page 239 of the Standard Specifications dated January 2, 1973.

NOTE: For work being contracted for under the Department of Public Works Specifications dated January 2, 1962, use the following note:

The surface of the structural slab placed under Item 18 shall be subject to final finishing in accordance with Part II, Section 7, Portland Cement Concrete; Pavement Concrete, Finishing Concrete, page 235 of the Department of Transportation Specifications dated January 2, 1973 and applicable addenda.

CAR 2 One of the following notes shall be used for multibox culverts.

A. The details shown for the culvert barrel are based on the assumption that the water in the stream channel will be diverted or carried in a flume during the entire construction of the barrel. Should the Contractor desire to divert the water through one of the cells before completion of the entire barrel, he shall submit to the Deputy Chief

Engineer (Structures) for approval, the construction procedures he intends to follow with the sketches showing the location of the proposed construction and contraction joints and the changes in the bar reinforcement details.

B. The details shown for the culvert barrel are based on the assumption that the water in the stream channel will be diverted through one of the cells before completion of the entire barrel. Should the Contractor desire, or find it feasible to divert the water or carry it in a flume during the entire construction of the barrel, he shall submit to the Deputy Chief Engineer (Structures) for approval, the construction procedure he intends to follow with sketches indicating any changes in the location of construction and contraction joints and in the bar reinforcement details.

SECTION 24 - SUBSTRUCTURE AND RETAINING WALLS

24.1 - ROCK LINES

Rock lines shall be shown only where footings are on or in rock or where tubular cast-in-place concrete piles are socketed into the rock.

The rock lines shall be as shown on the "Subsurface Profile Sheet" which is prepared by the Soil Mechanics Bureau. The Subsurface Profile Sheet shall be included in the Contract Plans.

All rock lines shown shall be marked "Assumed Rock Surface" and no elevations of the rock are to be shown on the plans.

When it is planned to place the footings on or in rock, the plans shall show the top-of-footing elevation and the minimum depth of footing. This will enable adjustments to be made in the depth of footing, keeping the top-of-footing elevation constant, where the actual rock line varies from that assumed during design.

24.2 - SHEETING AND COFFERDAMS:

Payment lines for each item shall be as shown on the applicable BDD and BR Sheets and as called for in the specification for the item. Sheeting used to sustain railroad tracks, highways, or structures shall be fully detailed, showing the size and limits of the sheeting and all necessary waling, bracing and deadmen.

Where cofferdams are required on the water side, but not on the land side, use the cofferdam item all the way around.

24.3 - COFFERDAMS (WATER DISCHARGE CONTROL)

Item 628.07 is to be used only when the criteria of the Department of Invironmental Conservation require that sheeting be used for cofferdams.

24.4 - SAFE OPERATION SHEET PILING

Item 628.05 shall be used when the depth of excavation exceeds five feet and the Department has no reason to prefer a specific type of sheeting or sheeting detail. Payment lines for this item shall be as shown on the applicable BDD Sheet and as called for in the specification for this item.

24.5 - EXCAVATION AND BACKFILL AT STRUCTURES

The details and payment lines shall be shown on all Contract Plans and shall conform to the details shown on the applicable BDD Sheet, and as described in the foundation design report.

24.6 - BERMS

A wash of one inch per foot shall be used on the top of all earth berams (paved or not paved). Refer to Standard Sheet 61-106.

24.7 - SLOPE PROTECTION

The preliminary drawing for each bridge over a highway shall show concrete block paving, six-inch poured slab, or other slope protection, to be used on all fill side slopes under the structure. The slope protection shall extend a minimum of three feet beyond the fascia lines of the structure.

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24.18.5 U-WALL ABUTMENTS

The theoretical and actual length of wingwall shall be the same.

No. 5 bars used solely as temperature reinforcement in the exposed face of an abutment or wall are not required to be doweled into the footing.

Transverse reinforcement in footings will be provided only where required by design (generally bottom of toe and top of heel).

Hooks required only where embedment length to develop bars beyond point of maximum moment is not adequate.

Vertical dowels No. 6 or smaller may be straight if depth of footing permits sufficient embedment; i.e., the minimum embedment of dowels used to develop tension bars, as shown in the table on page 93. Otherwise, dowels may be hooked and/or bent into toe of footing to provide toe reinforcement or a portion thereof.

Longitudinal reinforcement in footings shall be No. 5 bars at 2'-0" maximum spacing adjacent to all transverse reinforcement and dowels to form MATS, unless a larger area of steel is required by design.

25.2 - SPACING

Except as noted in Sections 24.11 and 25.1 , the clear distance between parallel bars shall not be more than 18 inches, nor less than 1-1/2 times the nominal diameter of the bars, 1-1/2 times the maximum size of the coarse aggregate, nor 1-1/2 inch.

The maximum spacing of design reinforcement in the back of walls and abutments shall be 2'-0".

Where reinforcement in beams or girders is placed in two or more layers, the bars in the upper layers shall be placed directly above those in the bottom layer.

The clear distance between bars shall also apply to the clear distance between the contact splice and adjacent splices or bars.

25.3 - COVERING

The following cover shall be used:

Structural Deck Slabs on Beams or Stringers

Top of slab with separate wearing surface ..... 1 in.

Top of slab with integral wearing surface ..... 2 in.

Bottom of slab ..... 1 in.

Beams and columns ..... 2 in.

Walls and piers above footings (including those adjacent to water) ..... 2 in.

Footings (including unformed bottom) ..... 3 in.
This may be increased to accommodate piles when necessary.

SECTION 26 - PRESTRESSED CONCRETE

26.1 - DESIGN

Draped strands are not to be used unless absolutely necessary.

In selecting a beam section, the following design sequence shall be followed:

a. Straight strands, f'_c = 5000 psi

b. Straight strands, f'_c = 6000 psi

c. Draped strands, f'_c = 5000 psi

d. Draped strands, f'_c = 6000 psi

Allowable tension: $3\sqrt{f'_c}$, unless a higher value is accepted by the Deputy Chief Engineer (Structures).

NOTE: For box beams, the thickness of the top flange at the ends may be increased to avoid draped strands.

NOTE: On box beams, do not use double strands in each web unless absolutely necessary.

26.2 - CAMBER

Design camber shall appear on the plans. It shall include the initial camber due to prestress force and beam dead load, and the camber due to prestress force, beam dead load and slab dead load. Camber for vertical curve correction shall be provided for in the thickness of the wearing surface.

26.3 - DIAPHRAGMS

26.3.1 Box Beams

Internal diaphragms for voided boxes shall be placed normal to the length of the box beam.

Transverse tendons shall be placed parallel to the skew.

Spacing of diaphragms

a. No transverse tendon on spans up to 50 feet.

b. Transverse tendon at the center for spans greater than 50 feet and up to 75 feet.

c. Transverse tendons at the outer quarter points on spans greater than 75 feet.

26.3.2 I-Beams

I-Beam structures shall have end diaphragms.

Diaphragms shall be placed parallel to the skew.

Spacing of Diaphragms

a. No intermediate diaphragms on spans up to 40 feet.

b. Midspan diaphragms for spans greater than 40 feet and up to 80 feet.

c. Diaphragms at the third points for spans greater than 80 feet.

26.4 - WIDTH OF BOX BEAMS

Widths of box beams shall be detailed as 4'-0" or 3'-0". The beam deck shall consist of (1) multiples of 4'-0" beams, or (2) multiples of 3'-0" beams, or (3) a combination of 4'-0" beams and a minimum number of 3'-0" beams. The beam deck shall be selected in the order listed. The overall beam deck width shall be the sum of the nominal beam widths plus 1/2" per joint.

E.G. (to be shown on plans)

11 beams @ 4'-0" nominal = 44'-5"

27.6 DESIGNATION OF TENSION ZONES

For other than simple spans, the Contract Plans shall clearly indicate the limits of the flanges of all stringers which are subject to tensile stresses under dead load. This shall be done to facilitate radiographic inspection and the control of welding during fabrication and erection.

27.7 COMBINATION OF DIFFERENT TYPES OF STRUCTURAL STEEL

In general, when more than one type of steel, such as A36, A441 or A588 is used in one contract, the types used shall be clearly described in the plans. The payment for furnishing and placing these steels shall be made under the current structural steel item.

A table shall be placed on the plans, adjacent to the estimate table, indicating the neat quantities of each type of steel.

27.8 CAMBER

A. Simple Spans. The Contract Plans shall show the design cambers for structural steel, concrete and superimposed dead load, vertical curve and total dead load plus vertical curve at the centerpoint of each stringer for spans under 125 feet and at quarter points for spans over 125 feet.

B. Continuous and Cantilever Spans. The Contract Plans shall show the design cambers for structural steel, concrete and superimposed dead load, vertical curve and total dead load plus vertical curve at inflection points and at

tenth point of spans.

See Appendix A on page 113 for an example of a camber table for a continuous girder.

C. Sag Cambers. Because of the objectional appearance of a sag camber in a stringer, sag or negative cambers should be avoided. The following are a few guidelines on possible means of avoiding the necessity of having to call for a negative camber in a stringer: (1) Avoid sag vertical curves on bridges. (2) Never begin or end a superelevation transition or runoff in the middle of a span. Always begin or end transitions off the structure or, if this is impossible, begin or end the transition at a centerline of bearings or a centerline of pier. (3) Never place a sag camber in a straight stringer on a curved roadway in order to accommodate the variation in the theoretical bottom of slab elevations. The variation should be taken up in the haunch. (4) In the case of a continuous girder where the spans are enough unequal to cause some area of upward dead load deflection, thought should be given to specifying less than the full negative camber calculated to offset all of the anticipated upward deflection. This is suggested because of the possibility of not all of the negative camber coming out of the girder upon the application of the dead load, thereby leaving an objectionable sag in the girder.

27.8.1 BOTTOM OF SLAB ELEVATIONS

A. Spans with constant widths (tangent or curved) and straight stringers.

1. Simple spans up to 125 feet - bottom of slab elevations shall be shown over each stringer at centerlines of bearings and center of span.

2. Simple spans over 125 feet - bottom of slab elevations shall be shown over each stringer at centerlines of bearings and at the quarter points of span.

3. Continuous and cantilever spans - bottom of slab elevations shall be shown over each stringer at centerlines of bearings, inflection points and at tenth points of spans.

B. Spans with constant widths (partially or fully curved) and horizontally curved stringers.

1. Fully curved stringers - bottom of slab elevations shall be shown over each stringer at centerlines of bearings and at tenth points of span.

2. Partially curved stringers - bottom of slab elevations shall be shown over each stringer at centerlines of bearings, at tenth points of span and at each point of change of horizontal alignment.

C. Spans with variable widths.

1. Straight stringers - bottom of slab elevations shall be shown over each stringer as indicated in Section A.

2. Partially or fully curved stringers - bottom of slab elevations shall be shown over each stringer as indicated in Section B and also at intervals not exceeding 20 feet unless a smaller interval is required by the limitations indicated in Section B.

27.8.2 STRINGER HAUNCH

When stringers or floor beams are supported by steel beams, girders or trusses, the stringer haunch shall be increased by

the deflection of each of these latter structural units due to superimposed dead loads.

27.9 TRANSVERSE INTERMEDIATE STIFFENERS

Intermediate stiffeners for plate girders shall consist of single plates welded to one side of the plate girder web at each location and to the flange which is in compression at that point. They shall be placed perpendicular to the top flange at each location. On interior stringers, they shall be located on alternate sides of the web except where they are used in conjunction with a longitudinal stiffener on the other side. On fascia stringers and girders, they shall preferably be placed on the side of the web that is not exposed to view. Fillet weld sizes shall be in accordance with Article 1.7.27 of the Standard Specifications. Transverse Intermediate Stiffeners may be attached to fascia stringers with 1/4 fillet welds provided the web thickness does not exceed 5/8 inches.

27.10 LONGITUDINAL STIFFENERS

The details should be prepared to show that longitudinal stiffeners shall be placed on one side of the web only. On fascia girders they shall be placed on the web surface exposed to view. The intermediate stiffeners shall be placed on the opposite side of the web. Transverse connection plates intersecting longitudinal stiffeners shall be notched or interrupted to fit around the longitudinal stiffener. The longitudinal stiffeners will be attached

to the web plate with full length continuous fillet welds that meet the requirements of Article 1.7.27 of the Standard Specifications.

27.11 - BEARING STIFFENERS

Bearing stiffeners shall be attached to the flange through which they receive their reaction by full penetration groove welds or in the case of straight girders that may be milled to bear. The bearing stiffeners shall be fillet welded to the web and either fillet welded to the opposite flange or placed tight against the opposite flange unless that flange is in tension, in which case they shall be placed tight against the flange without the fillet weld. The bearing stiffeners shall be vertical. Fillet weld sizes are to be in accordance with Article 1.7.27 Standard Specifications.

If it is desirable to slope exposed vertical bearing stiffeners on the fascia stringers for aesthetic reasons, approval must be obtained from the Deputy Chief Engineer (Structures).

27.12 - Item deleted.

27.13 - FLANGE SPLICES AT THICKNESS CHANGES:

The thickness ratio of two flange plates at a joint shall not exceed two to one and the transition in thickness between flanges of different thicknesses shall have a slope not greater than 1 on 2-1/2.

27.14 FASTENERS

27.14.1 SIZE OF FASTENERS (HIGH STRENGTH BOLTS)

Fasteners shall be of the size shown on the drawings, but generally shall be 3/4 inch or 7/8 inch in diameter. Fasteners 5/8 inch in diameter shall not be used in members carrying calculated stress except in 2-1/2 inch legs of angles and in flanges of sections requiring 5/8 inch fasteners.

The diameter of fasteners in angles carrying calculated stress shall not exceed 1/4 the width of the leg in which they are placed.

In angles whose size is not determined by calculated stress, 5/8 inch fasteners may be used in 2 inch legs, 3/4 inch fasteners in 2-1/2 inch legs, 7/8 inch fasteners in 3 inch legs, and 1 inch fasteners in 3-1/2 inch legs.

Structural shapes which do not admit the use of 5/8 inch diameter fasteners shall not be used except in handrails.

27.14.2 SPACING OF FASTENERS

The pitch of fasteners is the distance along the line of principal stress, in inches, between centers of adjacent fasteners, measured along one or more fastener lines. The gage of fasteners is the distance in inches between adjacent lines of fasteners or the distance from the back of angle or other shape to the first line of fasteners. The pitch of fasteners shall be governed by the requirements for sealing.