

INDEX OF STANDARD "ROADWAY" DRAWINGS

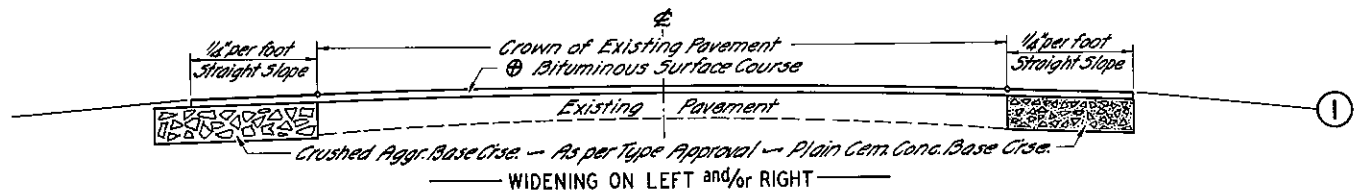
Issued June, 1966

Index will NOT be revised (or issued) for every revision to drawings. It may be kept up to date by the Individual as revised drawings are released.

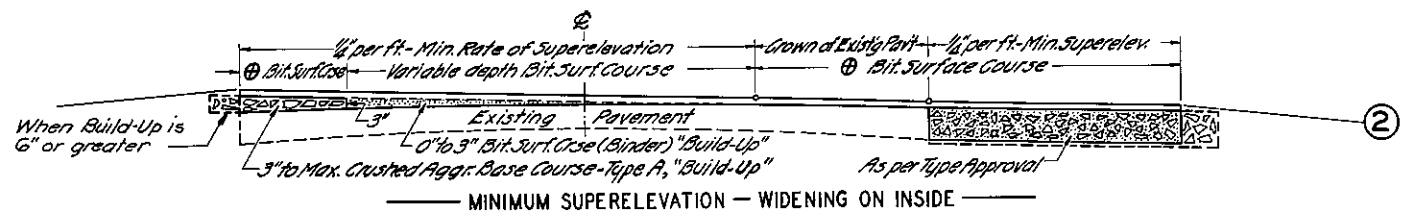
* - These drawings shall NOT be shown or called for on Construction Plans.

** - Not "Roadway"

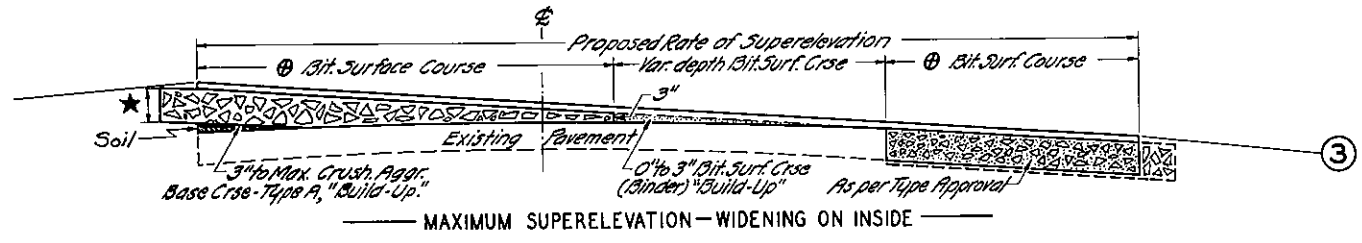
STD. DRAWING	DATE	ITEM
* DM - 2	Nov. 1, 1961	DESIGN METHODS - RESURFACING; TYPICAL SECTIONS
* DM - 3	Nov. 1, 1961	DESIGN METHODS - RESURFACING; BUILDING-UP, RUN-OUT, QUANTITIES
* DM - 4	Nov. 1, 1961	DESIGN METHODS - CONSTRUCTION & RECONSTRUCTION C.A.B.C. - A & B
* DM - 5	Nov. 1, 1961	DESIGN METHODS - CONSTRUCTION & RECONSTRUCTION C.A.B.C. - AP
* DM - 6	Nov. 1, 1961	DESIGN METHODS - SUB - BASE FOR PAVEMENT WIDENING
**DM - 10	June 1, 1965	DESIGN METHODS - LIGHTING - URBAN CLOVERLEAF
**DM - 11	June 1, 1965	DESIGN METHODS - LIGHTING - URBAN DIAMOND
**DM - 12	June 1, 1965	DESIGN METHODS - LIGHTING - URBAN TRUMPET
* DM - 15 (2 sheets)	April 3, 1962	DESIGN METHODS - SPEED CHANGE LANES
* DM - 16	Sept. 14, 1962	TYPICAL MEDIAL BARRIER - ADJACENT TO STRUCTURES
* DM - 17 (5 sheets)	Nov. 9, 1965	DESIGN METHODS - INTERSTATE Cl. 1, Cl. 2, Cl. 3, Cl. 4, & Cl. 5 ROADWAY
* E - 2	Nov. 1, 1961	DESIGN METHODS - BORROW, EXCAVATION, EMBANKMENT, ETC.
E - 5 (3 sheets)	Mar. 17, 1966	CLASSIFICATION OF EARTHWORK
B - 1	Feb. 28, 1966	REINFORCE C.C. PAVEMENT - JOINTS, JOINING, WIDENING, BRIDGE APPR, SLABS
* Type A		
* Type B		
* Type C	Sept. 10, 1964	LOAD TRANSFER UNITS - BEHRINGER METAL WORKS INC.
* Type D		
* Type E	March 28, 1962	LOAD TRANSFER UNITS - ELECTRIC WELD CO.
* Type F		
* Type G	March 28, 1962	LOAD TRANSFER UNITS - BETHLEHEM STEEL CO.
* Type H	March 28, 1962	LOAD TRANSFER UNITS - PITTSBURGH STEEL PRODUCTS
* Type I	Sept. 28, 1965	LOAD TRANSFER UNITS - BETHLEHEM STEEL CO.
* Type J	Sept. 28, 1965	LOAD TRANSFER UNITS - ELECTRIC WELD CO.
B-2 (5 sheets)	April 2, 1959	ROADWAY REINFORCEMENT - STD. TYPES
* B-2 Special	Nov. 1, 1961	EMERGENCY REINFORCEMENT - (SPECIAL PERMISSION ONLY)
SD-1	Nov. 1, 1961	CLASS B CONCRETE ENDWALLS, TYPES A & B TREE WALLS
SD-2	Nov. 1, 1961	CEM. RUB. MASRY ENDWALLS, TREE WALLS, F-1 & F-2 (CONC.) ENDWALLS
SD-6 (2 sheets)	Nov. 1, 1961	TYPES A, B, C & D MANHOLES
SD-7	Nov. 1, 1961	SPECIAL MORTARED STONE SLOPE WALL
SD-8	Nov. 1, 1961	REINF. CLASS A & B CEM. CONC. SLOPE WALL
SD-10	March 3, 1954	CURBS, GUTTERS, CURB GUTTERS
SD-11	Nov. 1, 1961	SLOPE PROTECTION - STONE, CONC. & ROCK; DITCH PAVING
SD-12	Nov. 1, 1961	MISC: A & B BARRICADES, GUARD POSTS, CEM. RUB. MASRY RETAINING WALLS
SD-13 (2 sheets)	May 13, 1966	CONCRETE MOUNTABLE CURBS TYPE A & B, CONCRETE TRAFFIC SEPARATOR TYPE A & B
SD-14 (2 sheets)	Apr. 18, 1966	SUBGRADE DRAINS, UNDERDRAINS, COMB. STORM SEWER & UDRAIN
SD-15	Nov. 6, 1953	REINFORCED CONCRETE TRAFFIC DIVIDERS - A & B
SD-16	Apr. 15, 1965	TYPES 1 & 2 RIGHT-OF-WAY FENCE
SD-20 (5 sheets)	Feb. 15, 1966	HIGHWAY LIGHTING - FOUNDATIONS, BOXES, POLES, DETAILS
Std. Inlets	Nov. 1, 1961	TYPES A, B, C, D, E & F INLETS
City Inlets	Nov. 1, 1961	NOS. 1 2 & 3 OPEN MOUTH CITY INLETS
S. 1, 4 & 6	Nov. 1, 1961	TYPES 4-FT, 6-FT, 4-FT SPECIAL & 6-FT SPECIAL INLETS
Misc. Inlets	Nov. 1, 1961	TYPES H, H MODIFIED & J INLETS
* Misc. Inlets - A	July 20, 1955	SUPPLEMENTAL SHEET: ALTERNATE GRATES FOR TYPE H INLETS
GF-1	Nov. 1, 1961	TYPES 1-A & 1-B GUARD FENCE (3 & 4 Cable)
GF-2	Nov. 1, 1961	TYPES 2-A & 2-B GUARD FENCE (10 & 12 GA. STEEL BEAM)
GF-C	Nov. 1, 1961	TYPE 1-C GUARD FENCE (2 Cable)
GF-SP (2 sheets)	Nov. 1, 1961	STEEL POSTS FOR TYPES 1-A, 1-B & 1-C GUARD FENCE
GF-RCP	Nov. 1, 1961	PRECAST REINF. CONC. POSTS FOR TYPES 1-A, 1-B & 1-C GUARD FENCE
W-6	May 7, 1937	STANDARD (CONCRETE) RETAINING WALLS
SK-465	Jan. 31, 1941	METAL TYPE COVERED GUTTERS (A, B, C & D)
SK-560	April 21, 1942	
ST-142	Feb. 25, 1965	METAL CRIBBING - UNCOATED
ST-143	Feb. 25, 1965	METAL CRIBBING - COATED
ST-144 (2 sheets)	Feb. 25, 1965	CONCRETE CRIBBING



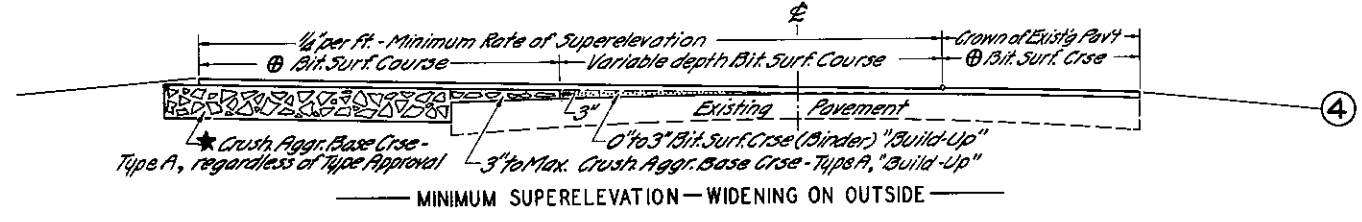
ON TANGENT ALIGNMENT



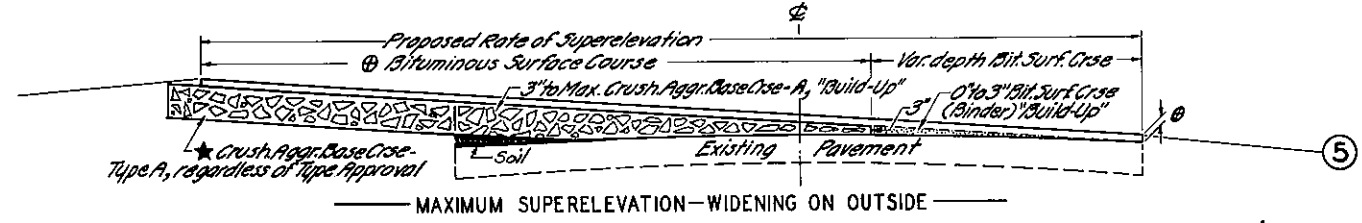
MINIMUM SUPERELEVATION - WIDENING ON INSIDE



MAXIMUM SUPERELEVATION - WIDENING ON INSIDE

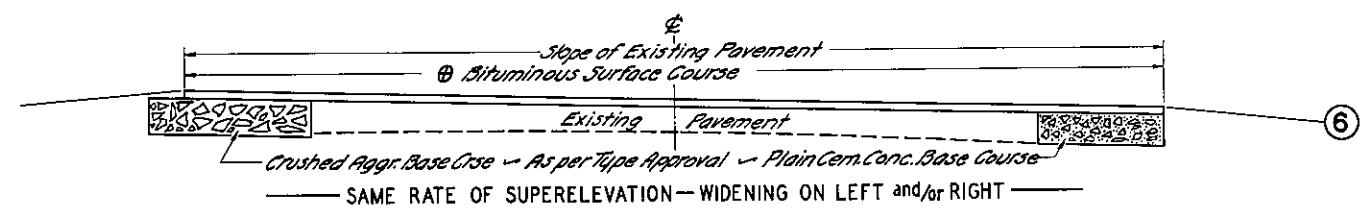


MINIMUM SUPERELEVATION - WIDENING ON OUTSIDE

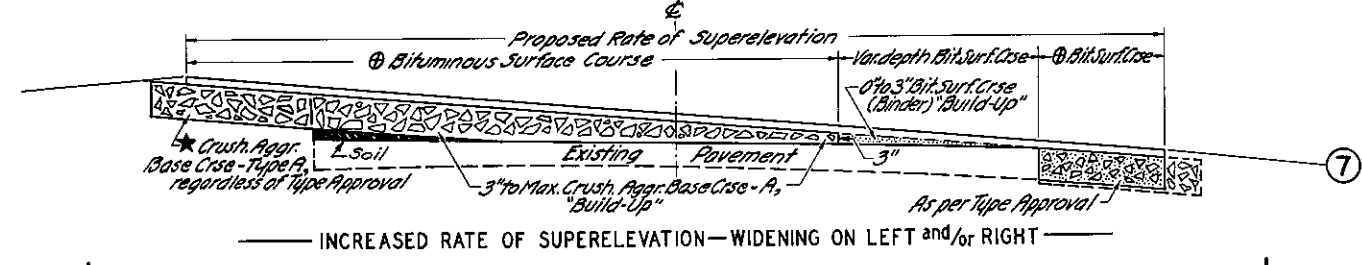


MAXIMUM SUPERELEVATION - WIDENING ON OUTSIDE

ON NON-SUPERELEVATED CURVES

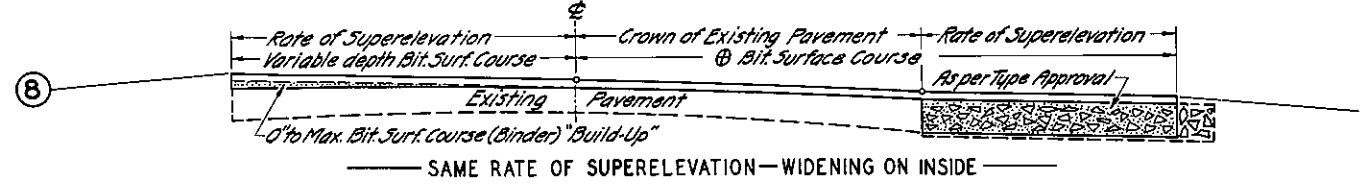


SAME RATE OF SUPERELEVATION - WIDENING ON LEFT and/or RIGHT

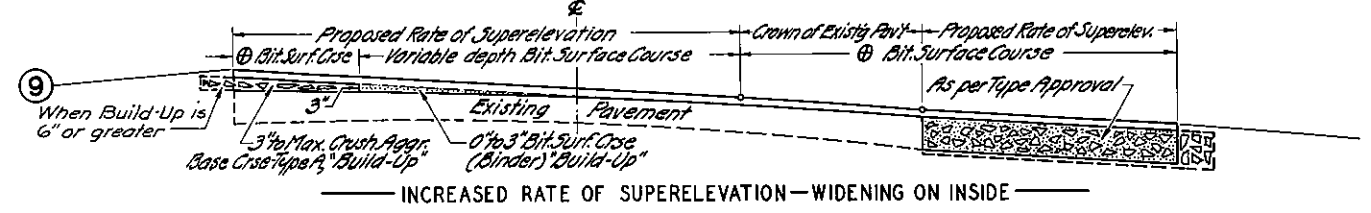


INCREASED RATE OF SUPERELEVATION - WIDENING ON LEFT and/or RIGHT

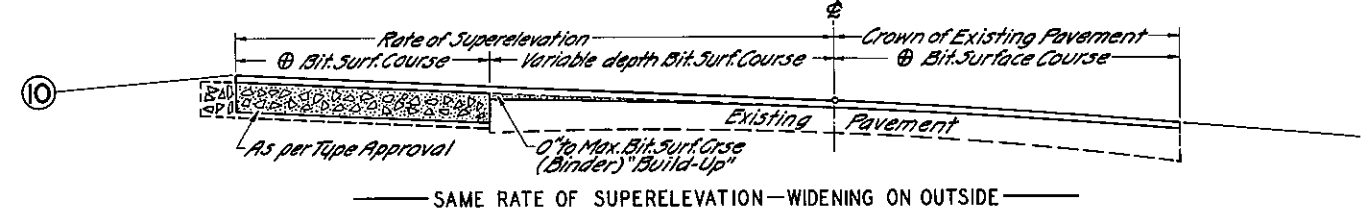
ON SUPERELEVATED CURVES WITH CROWN REMOVED



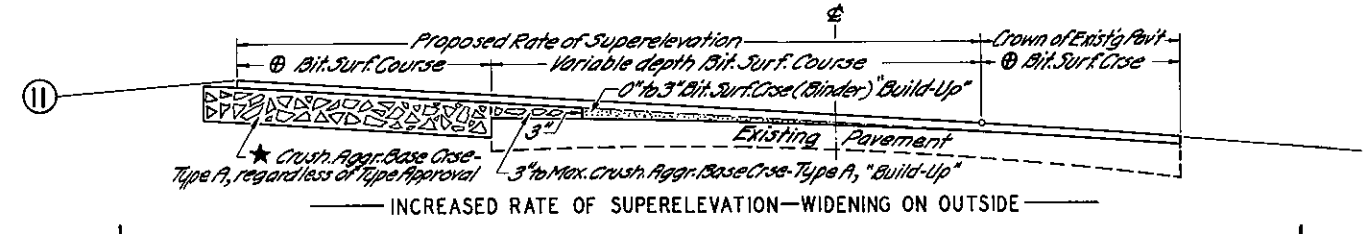
SAME RATE OF SUPERELEVATION - WIDENING ON INSIDE



INCREASED RATE OF SUPERELEVATION - WIDENING ON INSIDE

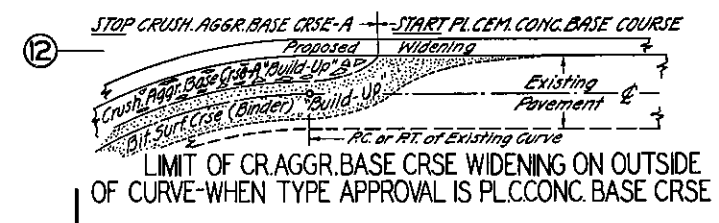


SAME RATE OF SUPERELEVATION - WIDENING ON OUTSIDE

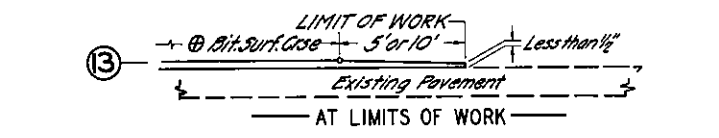


INCREASED RATE OF SUPERELEVATION - WIDENING ON OUTSIDE

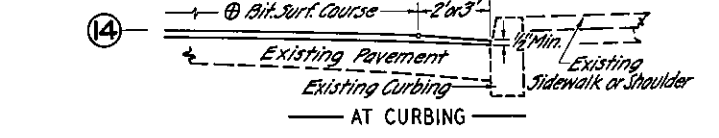
ON SUPERELEVATED CURVES WITH CROWN



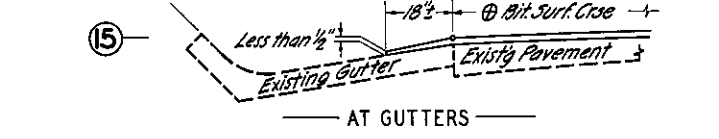
LIMIT OF CR. AGGR. BASE CRSE WIDENING ON OUTSIDE OF CURVE - WHEN TYPE APPROVAL IS PL. CONC. BASE CRSE



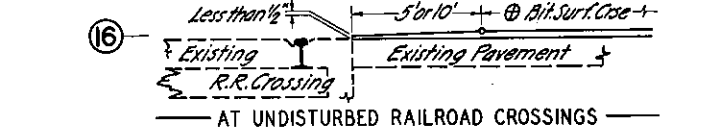
AT LIMITS OF WORK



AT CURBING



AT GUTTERS



AT UNDISTURBED RAILROAD CROSSINGS

MISCELLANEOUS ADJUSTMENTS

NOTES

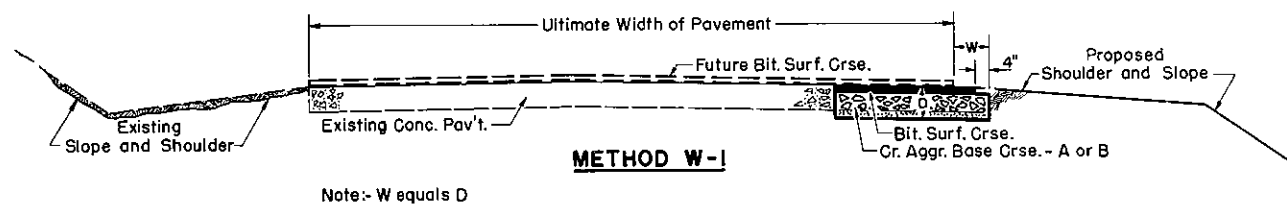
"Existing Pavement" indicated on this sheet represents the original pavement width plus any subsequent widening.
 When the superlevation of existing pavement is increased by 1/8 inch per foot only, the "Build-Up" shown on sketches 7, 9, 11 and 12 will consist entirely of Bit. Surf. Course (Binder) and the widening shown on sketches 7, 11 and 12 shall be in accordance with the "Type Approval".
 Additional materials for correcting surface irregularities in the existing pavement shall be provided as follows:
 2% of the "Build-Up" quantity of Crush. Aggr. Base Crse - Type A.
 5% of the quantity of Bit. Surf. Course - based on the surface area of the existing pavement.
 For projects involving resurfacing only, disregard all widening shown on this sheet.
 ⊕ indicates Uniform Depth as specified in the Type Approval Letter.
 ★ indicates 10" depth, except 12" when Type Approval Letter specifies Concrete or 12" depth Crushed Aggregate widening.
 Omit base course "laps" adjacent to PAVED SHOULDERS.

Revised to Indicate maximum depth of Crushed Aggregate "Build-Up", and for NOTES.
 APPROVED November 1, 1961. *Fred L. ...* CHIEF ENGINEER
 Revised to designate Crushed Aggregate Base Course as TYPE A, where required by Specifications.
 Approved July 11, 1947. *E. D. Schmidt* CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 -DESIGN METHODS-
 RESURFACING
 (WITH AND WITHOUT WIDENING)
 TYPICAL SECTIONS

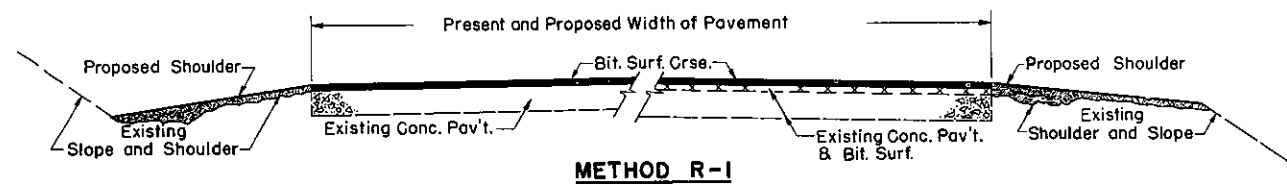
APPROVED Feb. 5, 1945
John L. Harber CHIEF ENGINEER

DM-2

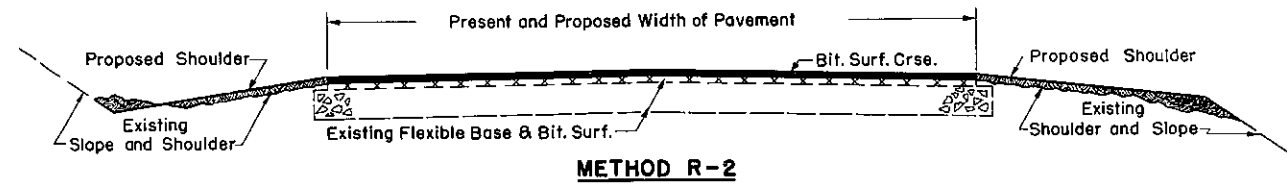


METHOD W-1

WIDENING

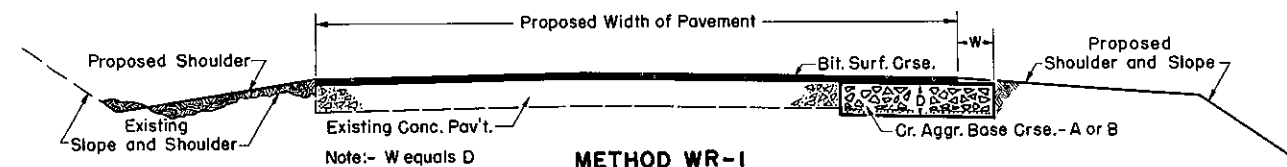


METHOD R-1

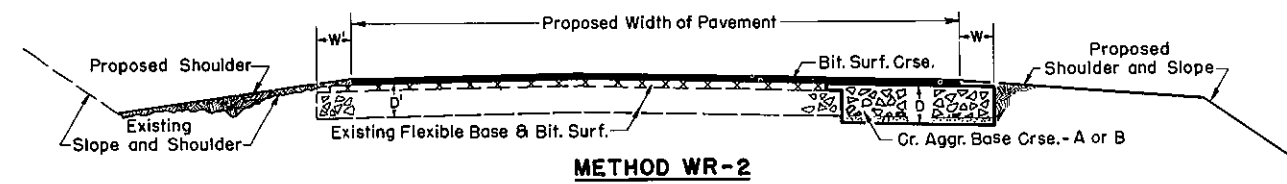


METHOD R-2

RESURFACING

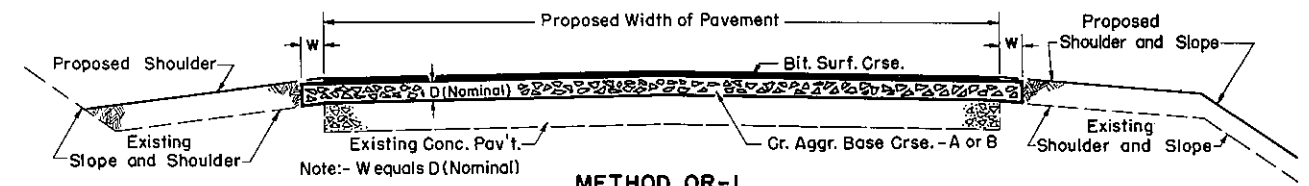


METHOD WR-1

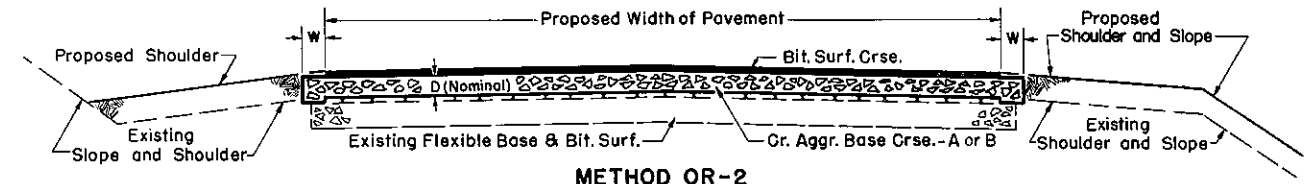


METHOD WR-2

WIDENING & RESURFACING

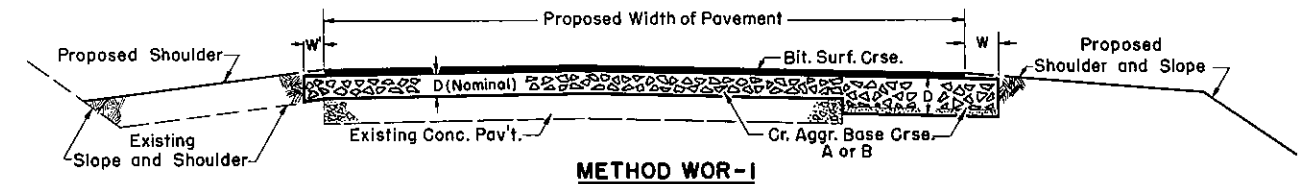


METHOD OR-1



METHOD OR-2

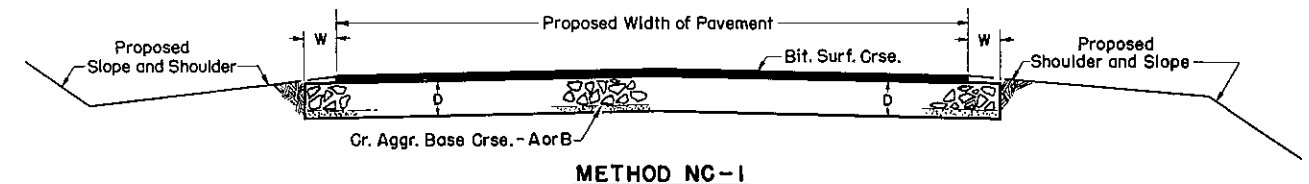
OVERLAY & RESURFACING



METHOD WOR-1

Note:- W equals D
W equals D (Nominal)

WIDENING, OVERLAY & RESURFACING



METHOD NC-1

NEW CONSTRUCTION

Revised for shoulder construction and "NOTES".

APPROVED November 4, 1961

R. S. ...
CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
— DESIGN METHODS —
WIDENING, RESURFACING, OVERLAY
AND NEW CONSTRUCTION WITH
CRUSHED AGGREGATE BASE COURSE - TYPE A OR B
AND BITUMINOUS SURFACE COURSE

APPROVED January 6, 1953

W. R. ...
CHIEF ENGINEER

DM-4

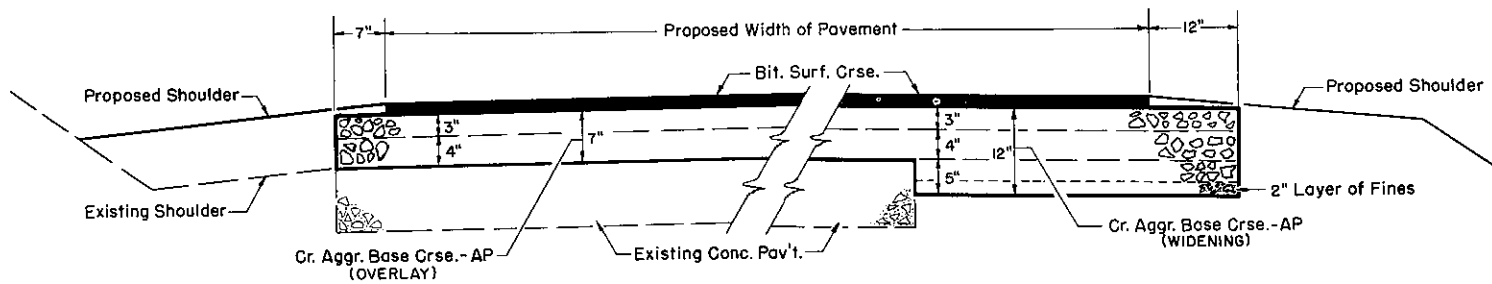
— NOTES —

Omit base course "lips" adjacent to PAVED SHOULDERS.

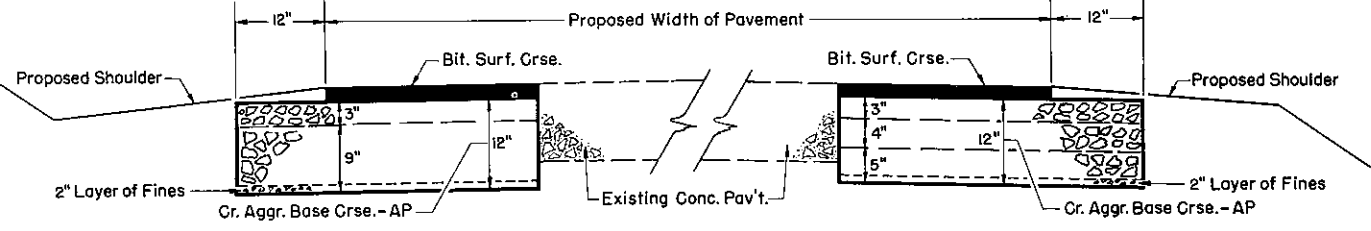
* Specified as "Special Subgrade" in SPECIFICATIONS FORM 408 DATED 1954.

Sub-base (X), if required for widened pavements, shall be in accordance with Department Standard DM-6.

THIS STANDARD ALSO APPLIES WHEN CRUSHED STONE BASE COURSE OR ANY TYPE OF CRUSHED AGGREGATE BASE COURSE IS USED.

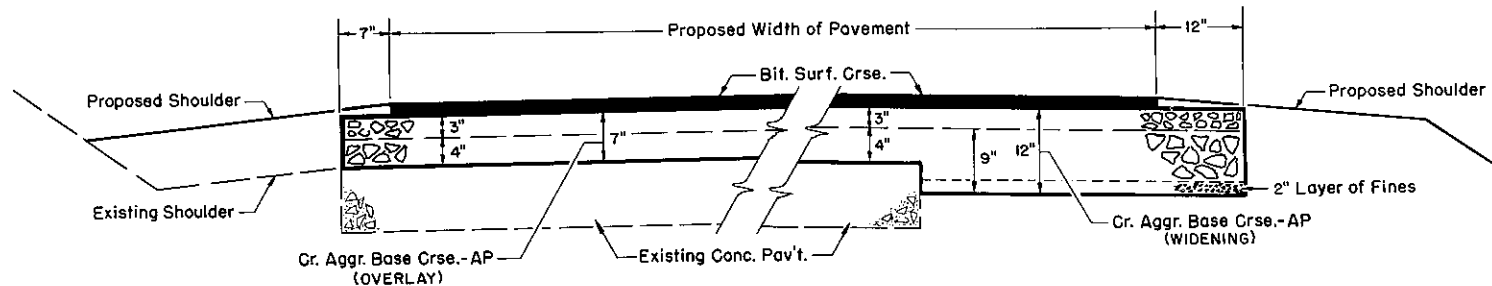


METHOD 1

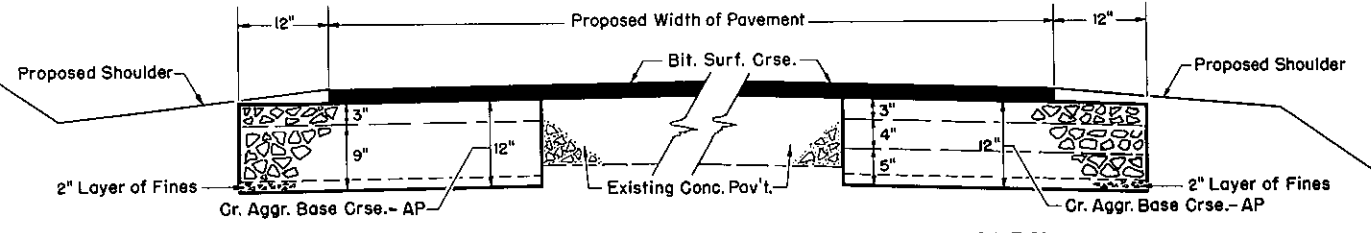


HALF SECTION
METHOD 6

HALF SECTION
METHOD 6A

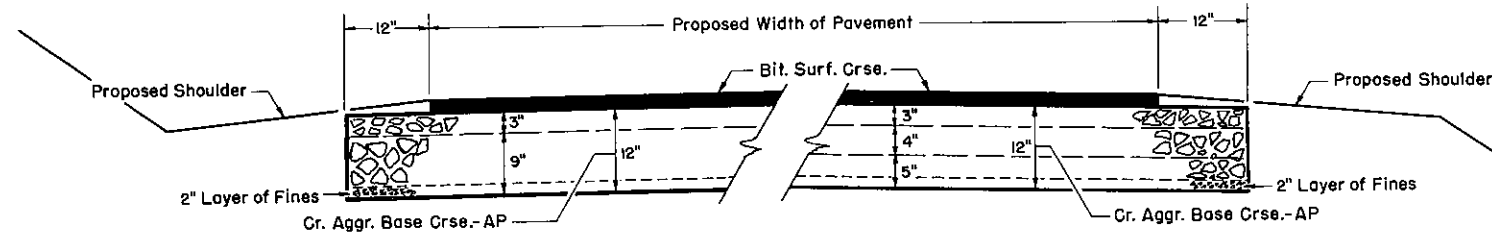


METHOD 2



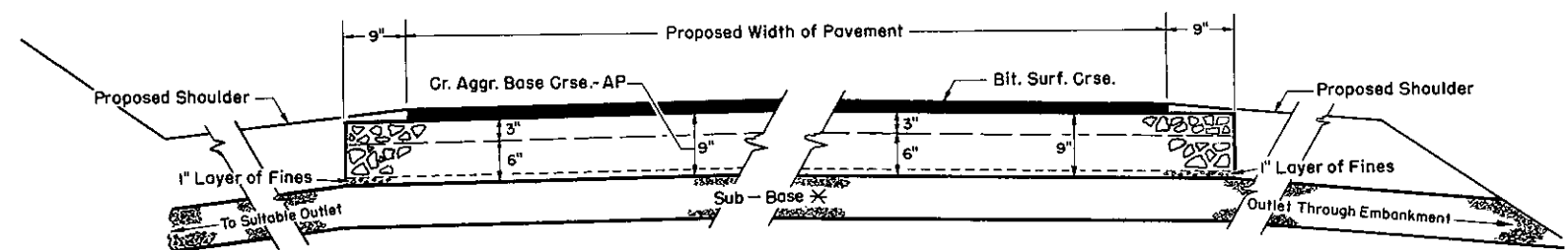
HALF SECTION
METHOD 7

HALF SECTION
METHOD 7A

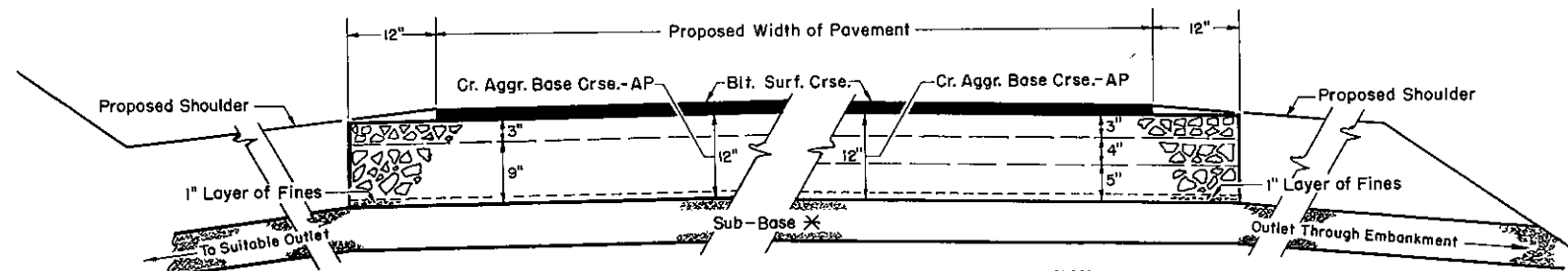


HALF SECTION
METHOD 3

HALF SECTION
METHOD 3A



METHOD 4



HALF SECTION
METHOD 5

HALF SECTION
METHOD 5A

NOTES

Omit Base Course "Lips" adjacent to PAVED SHOULDERS

Crushed Aggregate Base Course-Type AP will be considered on Class 1, 2 and 3 Highways. Its use on other Class Highways will be considered only under extenuating conditions and shall be approved by the Chief Engineer.

Sub-Base (X), if required for widened pavements, shall be in accordance with Standard DM-6.

(X) Specified as "Special Subgrade" in SPECIFICATIONS, FORM 408 dated 1954.

Revised for "Sub-Base" designation and for design of Crushed Aggregate Base Course - AP.
APPROVED *November 1, 1961*

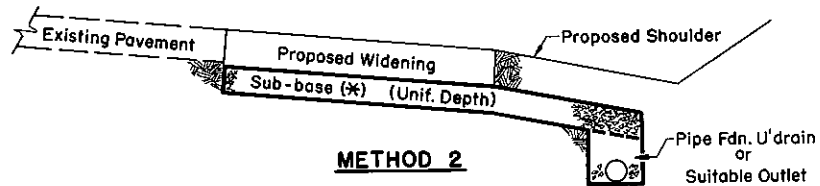
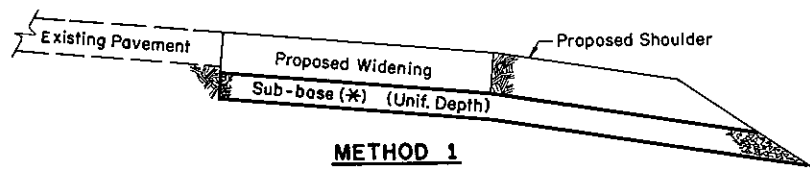
[Signature]
CHIEF ENGINEER

**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
— DESIGN METHODS —
WIDENING, OVERLAY & WIDENING
AND NEW CONSTRUCTION WITH
CRUSHED AGGREGATE BASE COURSE-TYPE AP
AND BITUMINOUS SURFACE COURSE**

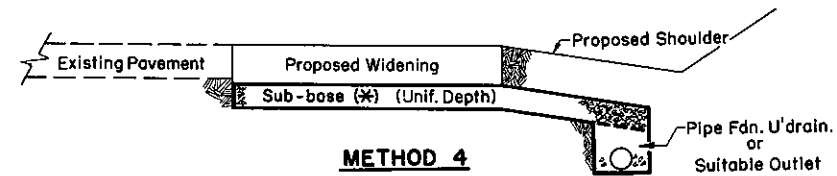
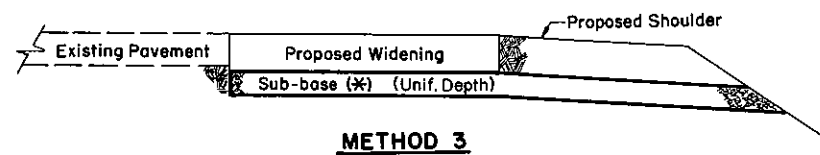
APPROVED *January 2, 1953*

[Signature]
CHIEF ENGINEER

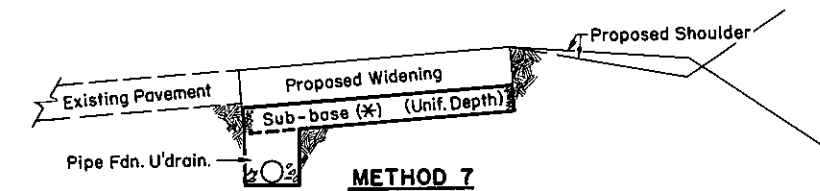
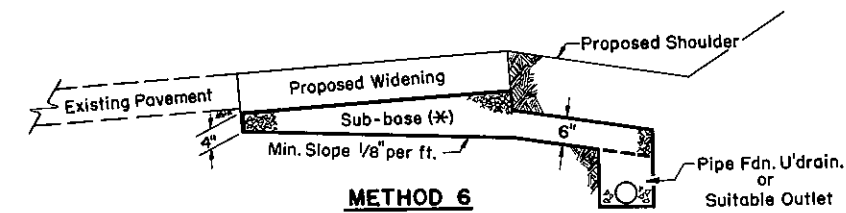
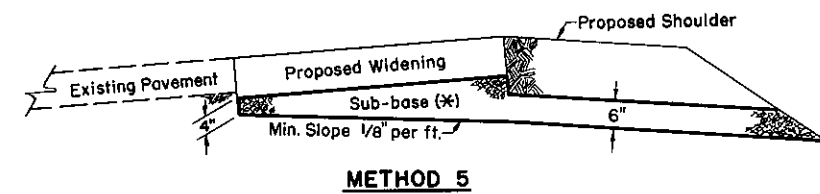
DM-5



WIDENING ON INSIDE OF SUPERELEVATED CURVES



WIDENING ON TANGENTS



WIDENING ON OUTSIDE OF SUPERELEVATED CURVES

(*) Specified as "Special Subgrade" in SPECIFICATIONS FORM 408 dated 1954

Revised for Sub-base Designation

Approved November 1, 1961 *[Signature]* CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
— DESIGN METHODS —
SUB-BASE (*)
IF REQUIRED WITH WIDENING OF PAVEMENTS

APPROVED January 6, 1953 *[Signature]*
CHIEF ENGINEER

[Signature]

DM-6

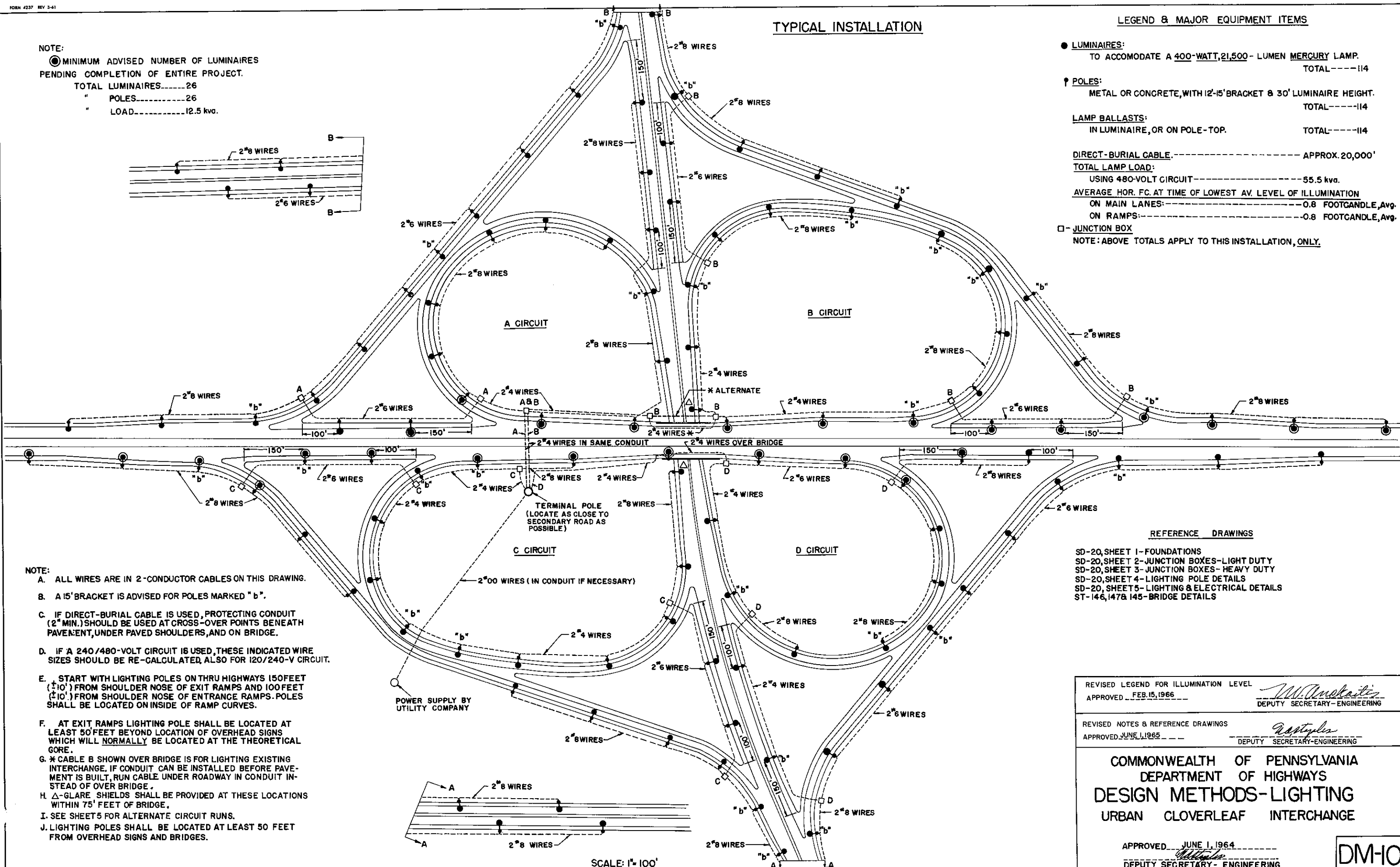
TYPICAL INSTALLATION

LEGEND & MAJOR EQUIPMENT ITEMS

NOTE:

- MINIMUM ADVISED NUMBER OF LUMINAIRES PENDING COMPLETION OF ENTIRE PROJECT.
- TOTAL LUMINAIRES.....26
- " POLES.....26
- " LOAD.....12.5 kva.

● LUMINAIRES:	TO ACCOMMODATE A 400-WATT, 21,500- LUMEN MERCURY LAMP.	TOTAL-----114
↑ POLES:	METAL OR CONCRETE, WITH 12'-15' BRACKET & 30' LUMINAIRE HEIGHT.	TOTAL-----114
LAMP BALLASTS:	IN LUMINAIRE, OR ON POLE-TOP.	TOTAL-----114
DIRECT-BURIAL CABLE:	-----	APPROX. 20,000'
TOTAL LAMP LOAD:	USING 480-VOLT CIRCUIT-----	55.5 kva.
AVERAGE HOR. FC. AT TIME OF LOWEST AV. LEVEL OF ILLUMINATION	ON MAIN LANES:-----	0.8 FOOTCANDLE, Avg.
	ON RAMP:-----	0.8 FOOTCANDLE, Avg.
□ JUNCTION BOX	NOTE: ABOVE TOTALS APPLY TO THIS INSTALLATION, ONLY.	



NOTE:

- A. ALL WIRES ARE IN 2-CONDUCTOR CABLES ON THIS DRAWING.
- B. A 15' BRACKET IS ADVISED FOR POLES MARKED "b".
- C. IF DIRECT-BURIAL CABLE IS USED, PROTECTING CONDUIT (2" MIN.) SHOULD BE USED AT CROSS-OVER POINTS BENEATH PAVEMENT, UNDER PAVED SHOULDERS, AND ON BRIDGE.
- D. IF A 240/480-VOLT CIRCUIT IS USED, THESE INDICATED WIRE SIZES SHOULD BE RE-CALCULATED, ALSO FOR 120/240-V CIRCUIT.
- E. START WITH LIGHTING POLES ON THRU HIGHWAYS 150 FEET (±10') FROM SHOULDER NOSE OF EXIT RAMP AND 100 FEET (±10') FROM SHOULDER NOSE OF ENTRANCE RAMP. POLES SHALL BE LOCATED ON INSIDE OF RAMP CURVES.
- F. AT EXIT RAMP LIGHTING POLE SHALL BE LOCATED AT LEAST 50 FEET BEYOND LOCATION OF OVERHEAD SIGNS WHICH WILL NORMALLY BE LOCATED AT THE THEORETICAL GORE.
- G. * CABLE B SHOWN OVER BRIDGE IS FOR LIGHTING EXISTING INTERCHANGE, IF CONDUIT CAN BE INSTALLED BEFORE PAVEMENT IS BUILT, RUN CABLE UNDER ROADWAY IN CONDUIT INSTEAD OF OVER BRIDGE.
- H. Δ-GLARE SHIELDS SHALL BE PROVIDED AT THESE LOCATIONS WITHIN 75' FEET OF BRIDGE.
- I. SEE SHEET 5 FOR ALTERNATE CIRCUIT RUNS.
- J. LIGHTING POLES SHALL BE LOCATED AT LEAST 50 FEET FROM OVERHEAD SIGNS AND BRIDGES.

REFERENCE DRAWINGS

- SD-20, SHEET 1-FOUNDATIONS
- SD-20, SHEET 2-JUNCTION BOXES-LIGHT DUTY
- SD-20, SHEET 3-JUNCTION BOXES- HEAVY DUTY
- SD-20, SHEET 4-LIGHTING POLE DETAILS
- SD-20, SHEET 5- LIGHTING & ELECTRICAL DETAILS
- ST-146, 147 & 145-BRIDGE DETAILS

REVISED LEGEND FOR ILLUMINATION LEVEL
 APPROVED FEB. 15, 1966
W. Anshel
 DEPUTY SECRETARY-ENGINEERING

REVISED NOTES & REFERENCE DRAWINGS
 APPROVED JUNE 1, 1965
R. Staples
 DEPUTY SECRETARY-ENGINEERING

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
DESIGN METHODS-LIGHTING
 URBAN CLOVERLEAF INTERCHANGE

APPROVED JUNE 1, 1964
W. Anshel
 DEPUTY SECRETARY-ENGINEERING

DM-10

TYPICAL INSTALLATION

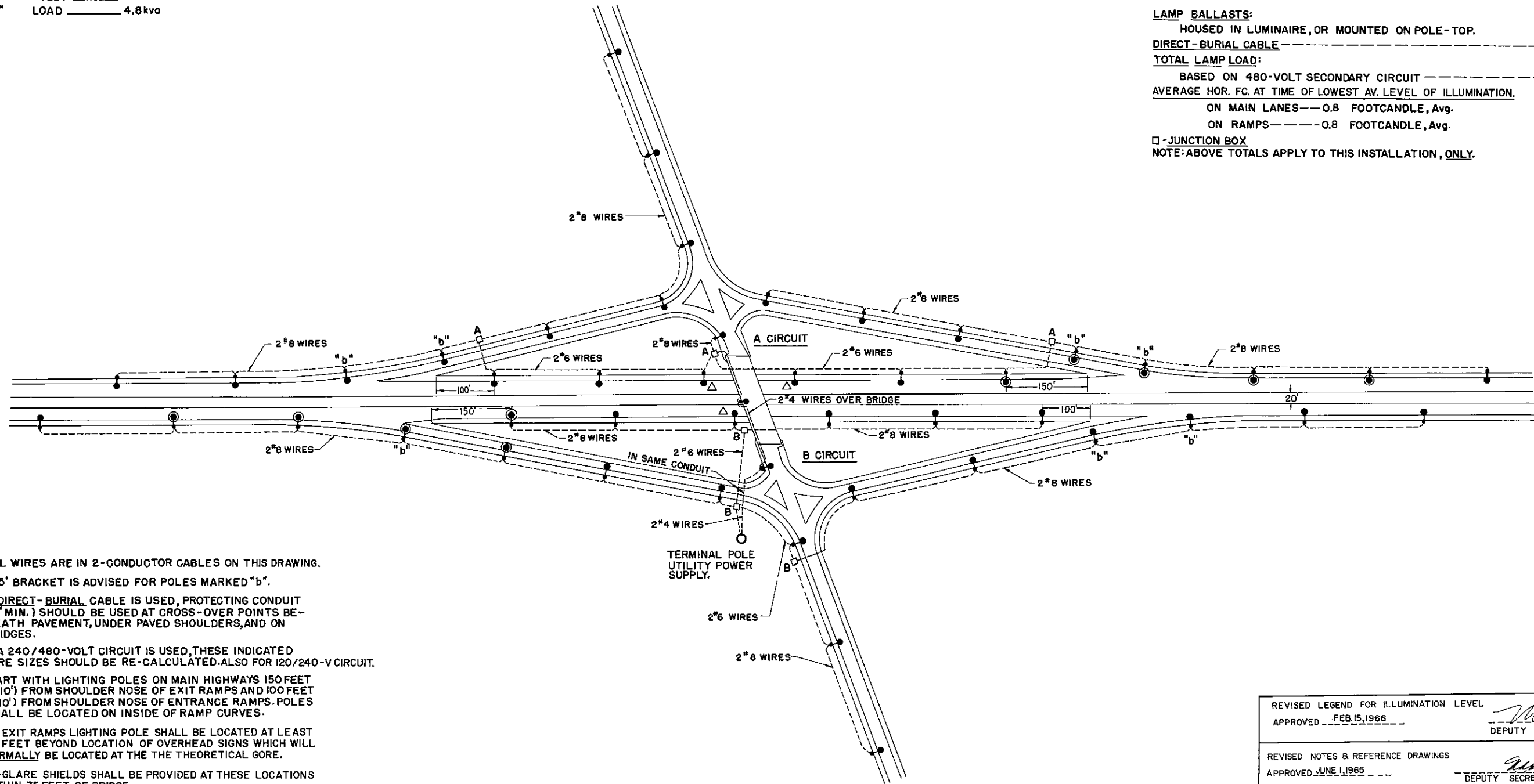
NOTE:

● MINIMUM ADVISED NUMBER OF LUMINAIRES
PENDING COMPLETION OF ENTIRE PROJECT.

TOTAL LUMINAIRES — 10
" POLES — 10
" LOAD — 4.8 kva

LEGEND & MAJOR EQUIPMENT ITEMS

- LUMINAIRES:
TO ACCOMMODATE 400-WATT, 21,500-LUMEN MERCURY LAMP. TOTAL --- 48
- † POLES:
METAL OR CONCRETE POLE WITH 12' BRACKET AND APPROX. 30' LUMINAIRE HEIGHT. TOTAL -- 48
- LAMP BALLASTS:
HOUSED IN LUMINAIRE, OR MOUNTED ON POLE-TOP. TOTAL -- 48
- DIRECT-BURIAL CABLE ----- APPROX. 9300'
- TOTAL LAMP LOAD:
BASED ON 480-VOLT SECONDARY CIRCUIT ----- 23.1 kva
AVERAGE HOR. FC. AT TIME OF LOWEST AV. LEVEL OF ILLUMINATION.
ON MAIN LANES --- 0.8 FOOTCANDLE, Avg.
ON RAMPS --- 0.8 FOOTCANDLE, Avg.
- - JUNCTION BOX
- NOTE: ABOVE TOTALS APPLY TO THIS INSTALLATION, ONLY.



NOTE:

- A. ALL WIRES ARE IN 2-CONDUCTOR CABLES ON THIS DRAWING.
- B. A 15' BRACKET IS ADVISED FOR POLES MARKED "b".
- C. IF DIRECT-BURIAL CABLE IS USED, PROTECTING CONDUIT (2" MIN.) SHOULD BE USED AT CROSS-OVER POINTS BE- NEATH PAVEMENT, UNDER PAVED SHOULDERS, AND ON BRIDGES.
- D. IF A 240/480-VOLT CIRCUIT IS USED, THESE INDICATED WIRE SIZES SHOULD BE RE-CALCULATED. ALSO FOR 120/240-V CIRCUIT.
- E. START WITH LIGHTING POLES ON MAIN HIGHWAYS 150 FEET (±10') FROM SHOULDER NOSE OF EXIT RAMPS AND 100 FEET (±10') FROM SHOULDER NOSE OF ENTRANCE RAMPS. POLES SHALL BE LOCATED ON INSIDE OF RAMP CURVES.
- F. AT EXIT RAMPS LIGHTING POLE SHALL BE LOCATED AT LEAST 50 FEET BEYOND LOCATION OF OVERHEAD SIGNS WHICH WILL NORMALLY BE LOCATED AT THE THEORETICAL GORE.
- G. Δ-GLARE SHIELDS SHALL BE PROVIDED AT THESE LOCATIONS WITHIN 75 FEET OF BRIDGE.
- I. SEE SHEET 5 FOR ALTERNATE CIRCUIT RUNS.
- J. LIGHTING POLES SHALL BE LOCATED AT LEAST 50 FEET FROM OVERHEAD SIGNS AND BRIDGES.

REFERENCE DRAWINGS

- SD-20, SHEET 1- FOUNDATIONS
- SD-20, SHEET 2- JUNCTION BOXES- LIGHT DUTY
- SD-20, SHEET 3- JUNCTION BOXES- HEAVY DUTY
- SD-20, SHEET 4- LIGHTING POLE DETAILS
- SD-20, SHEET 5- LIGHTING & ELECTRICAL DETAILS
- ST-146, 147, & 145 BRIDGE DETAILS

SCALE: 1" = 100'

REVISED LEGEND FOR ILLUMINATION LEVEL
APPROVED FEB. 15, 1965
W. A. ...
DEPUTY SECRETARY-ENGINEERING

REVISED NOTES & REFERENCE DRAWINGS
APPROVED JUNE 1, 1965
W. A. ...
DEPUTY SECRETARY-ENGINEERING

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
DESIGN METHODS- LIGHTING
URBAN DIAMOND INTERCHANGE

APPROVED JUNE 1, 1964
W. A. ...
DEPUTY SECRETARY-ENGINEERING

DM-11

TYPICAL INSTALLATION

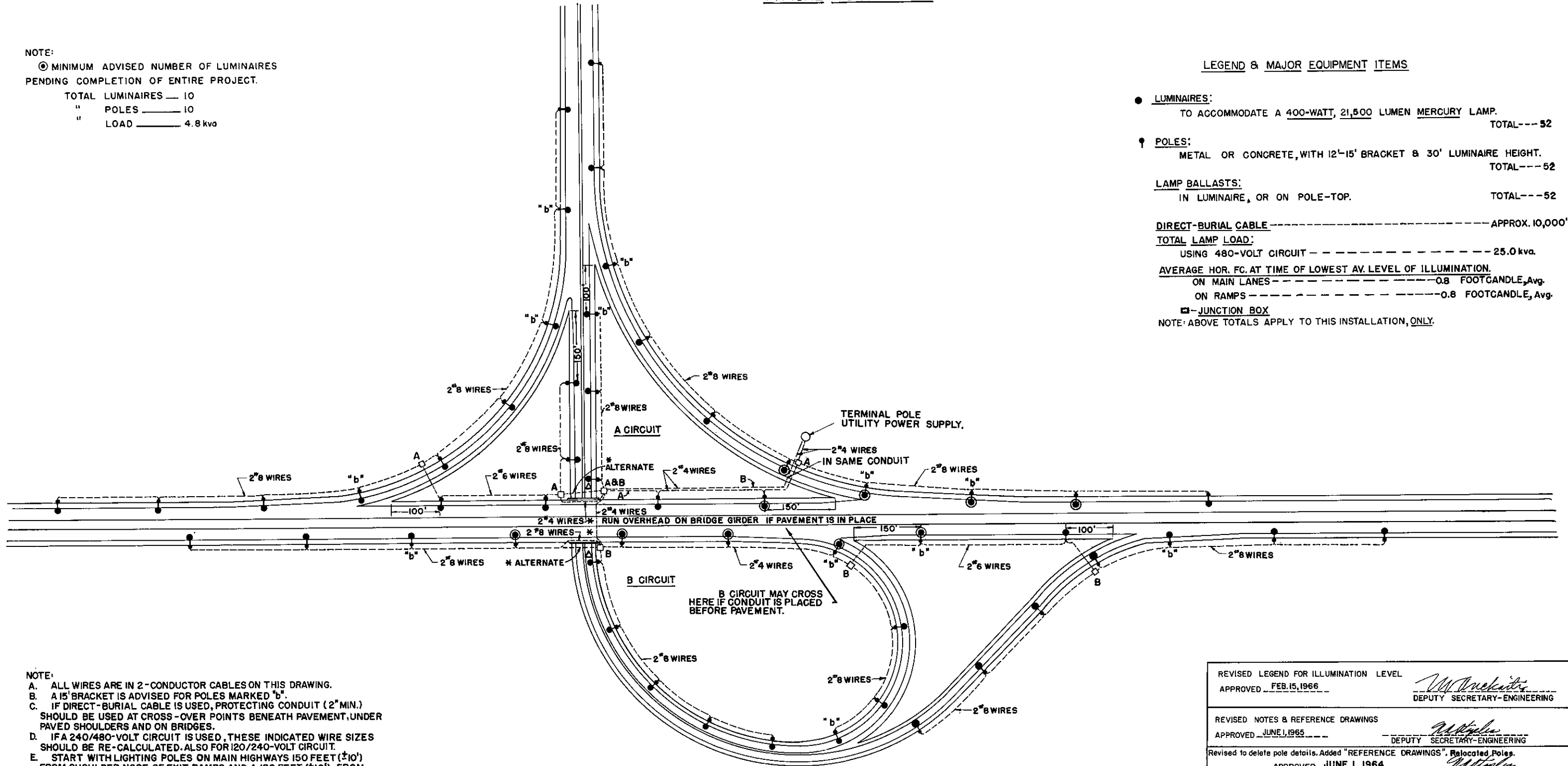
NOTE:

⊙ MINIMUM ADVISED NUMBER OF LUMINAIRES
PENDING COMPLETION OF ENTIRE PROJECT.

TOTAL LUMINAIRES — 10
" POLES — 10
" LOAD — 4.8 kva

LEGEND & MAJOR EQUIPMENT ITEMS

- LUMINAIRES:
TO ACCOMMODATE A 400-WATT, 21,500 LUMEN MERCURY LAMP. TOTAL --- 52
- ⚡ POLES:
METAL OR CONCRETE, WITH 12'-15' BRACKET & 30' LUMINAIRE HEIGHT. TOTAL --- 52
- LAMP BALLASTS:
IN LUMINAIRE, OR ON POLE-TOP. TOTAL --- 52
- DIRECT-BURIAL CABLE ----- APPROX. 10,000'
- TOTAL LAMP LOAD:
USING 480-VOLT CIRCUIT ----- 25.0 kva.
- AVERAGE HOR. FC. AT TIME OF LOWEST AV. LEVEL OF ILLUMINATION.
ON MAIN LANES ----- 0.8 FOOTCANDLE, Avg.
ON RAMPs ----- 0.8 FOOTCANDLE, Avg.
- ☐ JUNCTION BOX
- NOTE: ABOVE TOTALS APPLY TO THIS INSTALLATION, ONLY.



NOTE:

- A. ALL WIRES ARE IN 2-CONDUCTOR CABLES ON THIS DRAWING.
- B. A 15' BRACKET IS ADVISED FOR POLES MARKED "b".
- C. IF DIRECT-BURIAL CABLE IS USED, PROTECTING CONDUIT (2" MIN.) SHOULD BE USED AT CROSS-OVER POINTS BENEATH PAVEMENT, UNDER PAVED SHOULDERS AND ON BRIDGES.
- D. IF A 240/480-VOLT CIRCUIT IS USED, THESE INDICATED WIRE SIZES SHOULD BE RE-CALCULATED. ALSO FOR 120/240-VOLT CIRCUIT.
- E. START WITH LIGHTING POLES ON MAIN HIGHWAYS 150 FEET (±10') FROM SHOULDER NOSE OF EXIT RAMPs AND A 100 FEET (±10') FROM SHOULDER NOSE OF ENTRANCE RAMPs. POLES SHALL BE LOCATED ON INSIDE OF RAMP CURVES.
- F. *CABLES SHOWN OVER BRIDGE ARE FOR LIGHTING EXISTING INTERCHANGE. IF CONDUITS CAN BE INSTALLED BEFORE PAVEMENT IS BUILT, RUN CABLES UNDER ROADWAY IN CONDUIT INSTEAD OF OVER BRIDGE.
- G. AT EXIT RAMPs LIGHTING POLE SHALL BE LOCATED AT LEAST 50 FEET BEYOND LOCATION OF OVERHEAD SIGNS WHICH WILL NORMALLY BE LOCATED AT THE THEORETICAL GORE.
- H. Δ -GLARE SHIELDS SHALL BE PROVIDED AT THESE LOCATIONS WITHIN 75 FEET OF BRIDGE.
- I. SEE SHEET 5 FOR ALTERNATE CIRCUIT RUNS.
- J. LIGHTING POLES SHALL BE LOCATED AT LEAST 50 FEET FROM OVERHEAD SIGNS AND BRIDGES.

SCALE: 1"=100'

REFERENCE DRAWINGS

- SD-20, SHEET 1- FOUNDATIONS
- SD-20, SHEET 2- JUNCTION BOXES- LIGHT DUTY
- SD-20, SHEET 3- JUNCTION BOXES- HEAVY DUTY
- SD-20, SHEET 4- LIGHTING POLE DETAILS
- SD-20, SHEET 5- LIGHTING & ELECTRICAL DETAILS
- ST-146, 147, 145- BRIDGE DETAILS

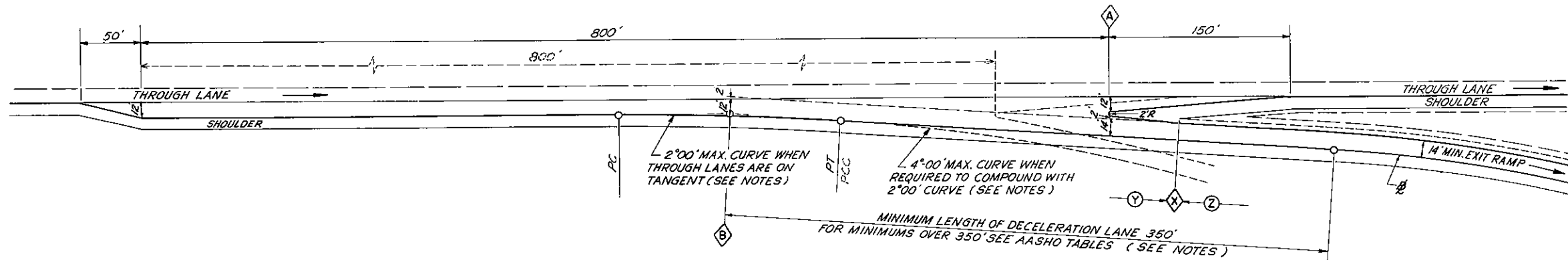
REVISED LEGEND FOR ILLUMINATION LEVEL APPROVED FEB. 15, 1966	<i>W. M. Keatinge</i> DEPUTY SECRETARY-ENGINEERING
REVISED NOTES & REFERENCE DRAWINGS APPROVED JUNE 1, 1965	<i>R. M. ...</i> DEPUTY SECRETARY-ENGINEERING
Revised to delete pole details. Added "REFERENCE DRAWINGS", Relocated Poles. APPROVED JUNE 1, 1964	<i>R. M. ...</i> DEPUTY SECRETARY-ENGINEERING
Revised for footcandle levels on main lanes and ramps. APPROVED JUNE 10, 1960	<i>R. M. ...</i> DEPUTY SECRETARY-ENGINEERING

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
DESIGN METHODS—LIGHTING
URBAN TRUMPET INTERCHANGE

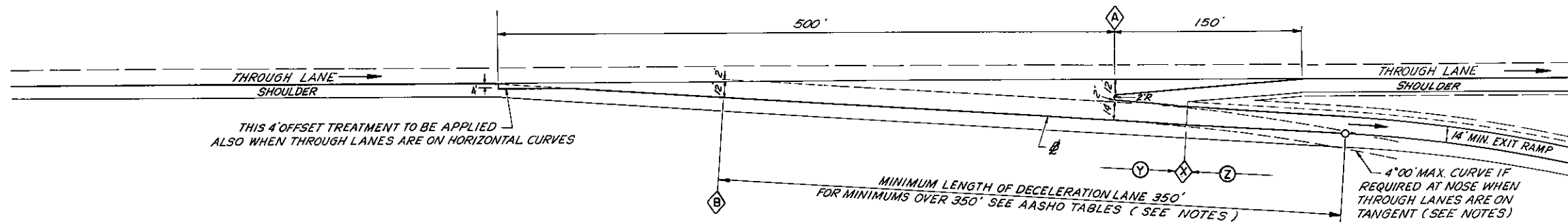
APPROVED *March 15, 1960*
DEPUTY SECRETARY-ENGINEERING

DM-12

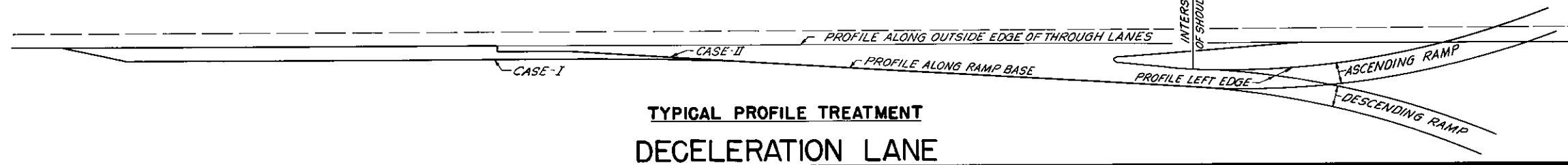
TRACED BY: C.H.F.
FINAL BY: C.H.F.



EXIT TERMINAL TREATMENT - CASE I



EXIT TERMINAL TREATMENT - CASE II



**TYPICAL PROFILE TREATMENT
DECELERATION LANE**

DESIGN PROCEDURE

FOR DESIRABLE DESIGN LENGTH OF SPEED-CHANGE LANES, SEE AASHO-GEOMETRIC HIGHWAY DESIGN-RURAL, TABLES VII-10 & VII-11, PAGES 288 & 289 OR AASHO-ARTERIAL HIGHWAYS-URBAN, TABLES D-9 & D-10, PAGES 169 & 170.

THE LENGTH GIVEN IN THE TABLES INCLUDES THE EFFECTIVE TAPER.

THE EFFECTIVE TAPER LENGTH FOR THESE TREATMENTS IS CONSIDERED TO BE INCLUDED IN THAT PORTION BETWEEN THE NOSE AT A TO A POINT WHERE THE TAPER IS TWELVE (12) FEET WIDE AT B.

THE LENGTH OF DECELERATION OR ACCELERATION LANE IS MEASURED TO THE FIRST SPEED CHANGE CURVE, WHEN REQUIRED, AT C.

CASE-I, THROUGH ROADWAY TOTAL EXCEEDS 15,000 A.D.T.
CASE-II, THROUGH ROADWAY TOTAL UNDER 15,000 A.D.T.

THE ALIGNMENT OF SPEED-CHANGE LANES DEVELOPED IN CONJUNCTION WITH CURVED PORTION OF HIGHWAY WILL BE DESIGNED IN ACCORDANCE WITH AASHO-GEOMETRIC DESIGN POLICY PAGE 278, FIG. VII-14 B & C, PAGE 488.

THE BASE LINE OF ALL RAMPS SHALL BE APPLIED THROUGH THE SPEED CHANGE LANES AND SINGLE LANE RAMPS ON THE RIGHT EDGE OF PAVEMENT IN THE DIRECTION OF TRAFFIC AND ON PARALLEL RAMPS IN THE CENTER OF THE DIVISOR AS INDICATED BY THE "DESIGN PROCEDURE OF INTERCHANGES" FIG. X-7, PAGE 605, GEOMETRIC DESIGN OF RURAL HIGHWAYS, AASHO.

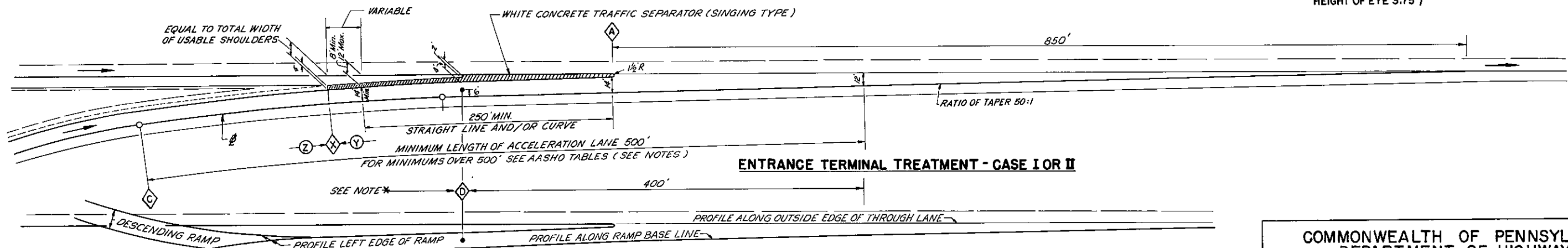
THE PROFILE GRADE WILL BE DEVELOPED ON THE BASE LINE AND IT WILL REFLECT THE ATTAINMENT OF SUPERELEVATION, AND WILL REFLECT THE PROCEDURE AS SHOWN BY THE PENNSYLVANIA DEPARTMENT OF HIGHWAYS STANDARD C-97. A PROFILE OF THE OPPOSITE EDGE MAY ALSO BE DRAWN. THIS PROFILE WILL BE DEVELOPED IN ACCORDANCE WITH "PROFILE DESIGN PROCEDURE" DESCRIBED ON PAGE 398, AASHO-GEOMETRIC DESIGN OF RURAL HIGHWAYS.

ON THE CONSTRUCTION DRAWINGS THE FINISHED ELEVATIONS FOR SPEED-CHANGE LANES AND BOTH EDGES OF RAMP PAVEMENT WILL BE SHOWN AT 25 FOOT INTERVAL EITHER BY PROFILE OR PLAN VIEW.

LIMITS OF ROADWAY STRUCTURE

- ◆ LOCATION OF PAVEMENT STRUCTURE CHANGE.
- Ⓚ PAVEMENT AND SHOULDER STRUCTURE SAME AS THROUGH ROADWAY.
- Ⓩ PAVEMENT STRUCTURE SIMILAR TO CONNECTING ROAD, SHOULDER STRUCTURE SIMILAR TO THROUGH ROADWAY.

NOTE:-
* PROVIDE FOR MIN. 600' VISIBILITY FROM A POINT DESIGNATED Ⓚ ON RAMP TO A POINT BACK ON THROUGH LANE WHEN ESTABLISHING HORIZONTAL AND VERTICAL ALIGNMENT. (VEHICLE HEIGHT OF 4.5' - HEIGHT OF EYE 3.75')



**TYPICAL PROFILE TREATMENT
ACCELERATION LANE**

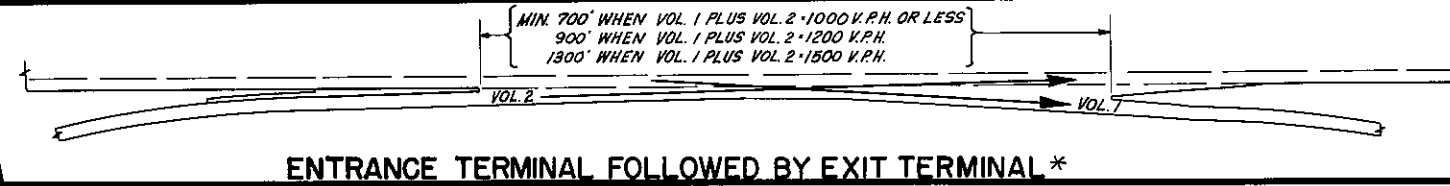
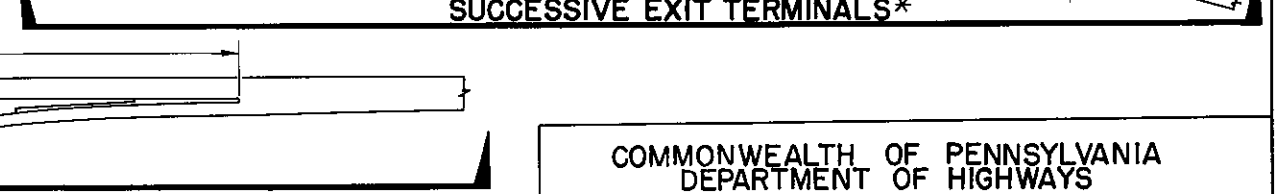
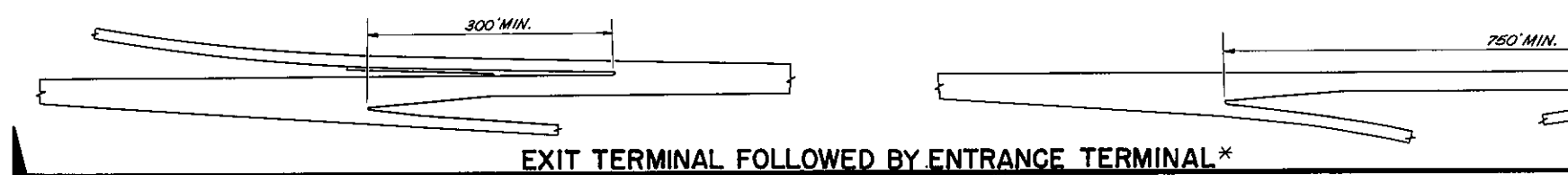
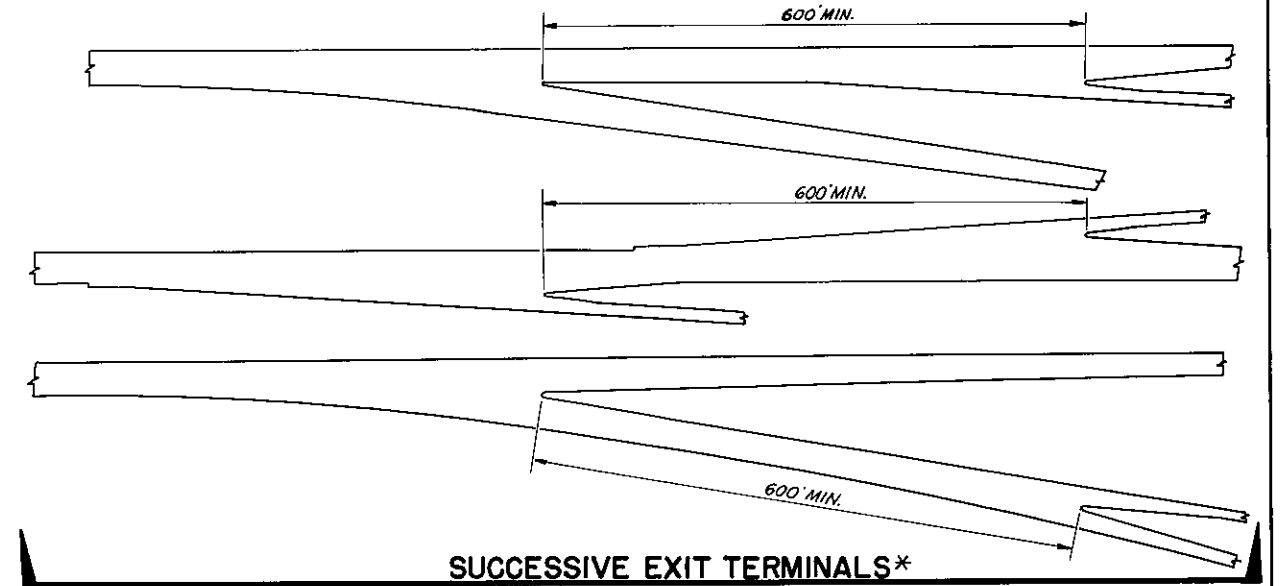
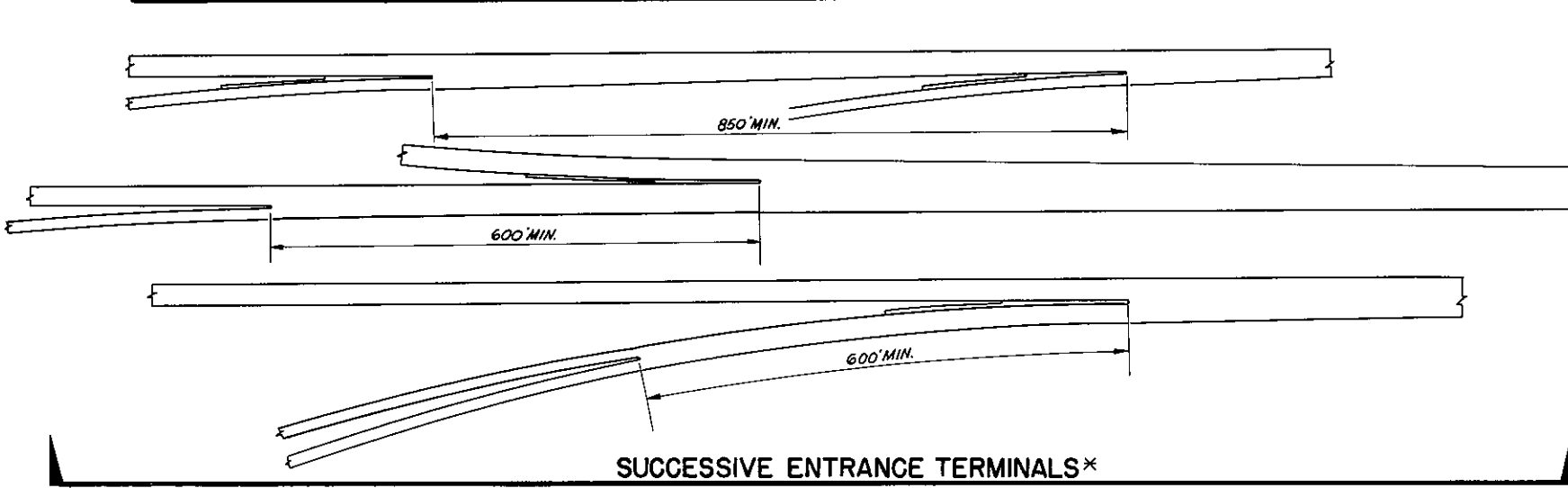
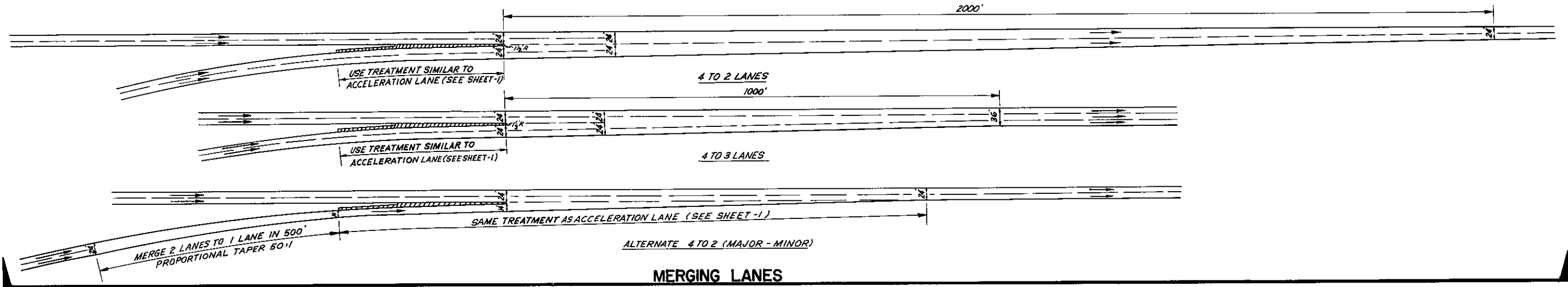
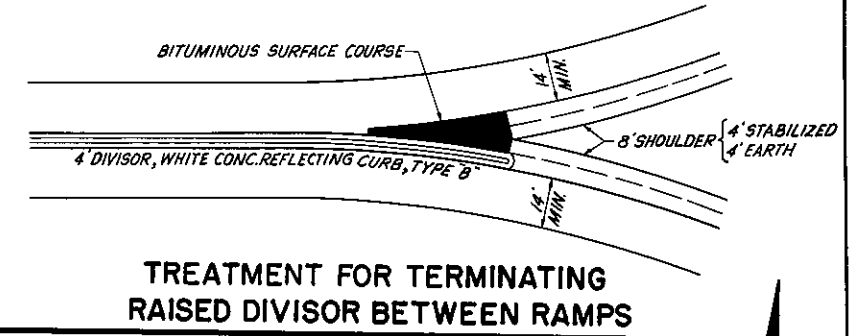
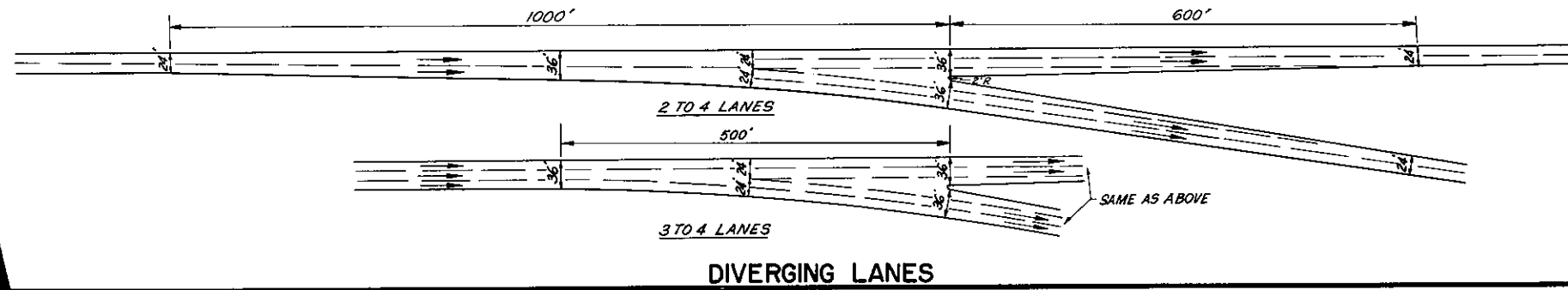
ENTRANCE TERMINAL TREATMENT - CASE I OR II

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
— DESIGN METHODS —
SPEED CHANGE LANES
DECELERATION AND ACCELERATION LANES

APPROVED April 3rd 1962
S. S. W. [Signature]
ASST. CHIEF ENGINEER

SHEET 1 OF 2
DM-15

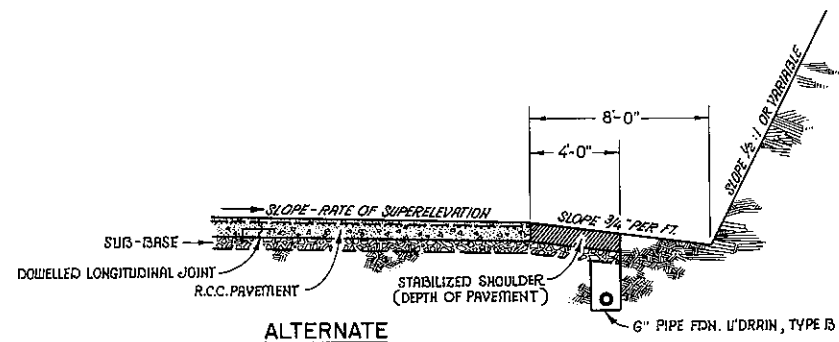
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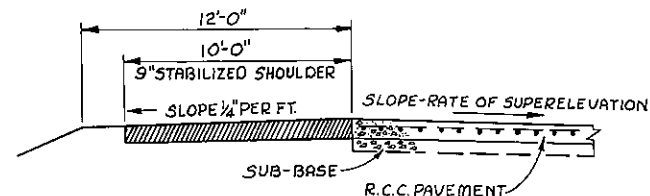
NOTE:-
 * PROVIDE FOR MINIMUM BUT NOT LESS THAN LENGTH REQUIRED FOR MANEUVERING OR SPEED CHANGE. TERMINAL ARRANGEMENTS SHOWN ARE APPLICABLE SYMMETRICALLY.

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 — DESIGN METHODS —
 SPEED CHANGE LANES
 TREATMENT FOR TERMINATING DIVISOR BETWEEN RAMPS
 MERGING AND DIVERGING LANES
 SUCCESSIVE PAMP TERMINALS

SHEET 2 OF 2
DM-15

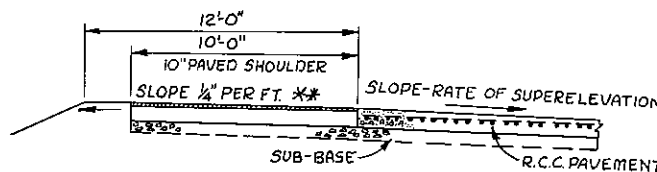


ALTERNATE



TYPICAL SECTIONS ON SUPERELEVATED CURVES-STABILIZED SHOULDERS

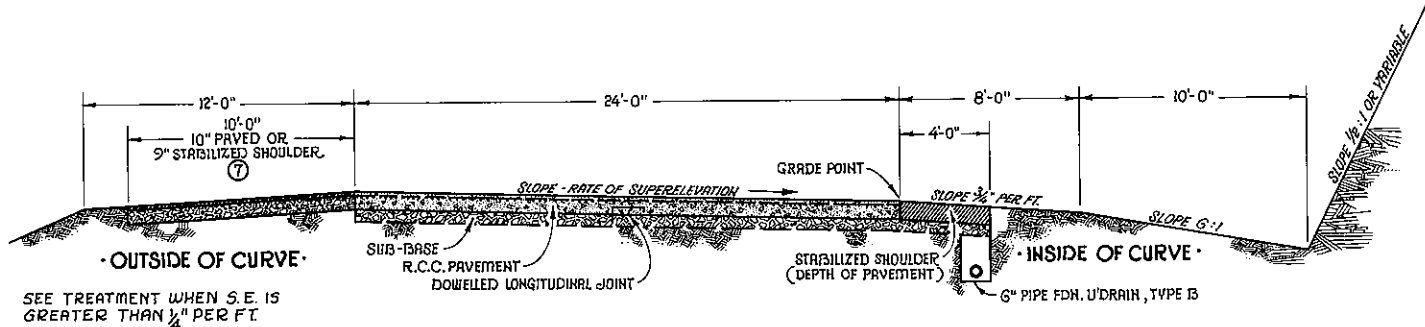
DETAILS TO BE ALTERED AS REQUIRED FOR FLEXIBLE TYPE PAVEMENT.



TYPICAL SECTIONS ON SUPERELEVATED CURVES-PAVED SHOULDERS

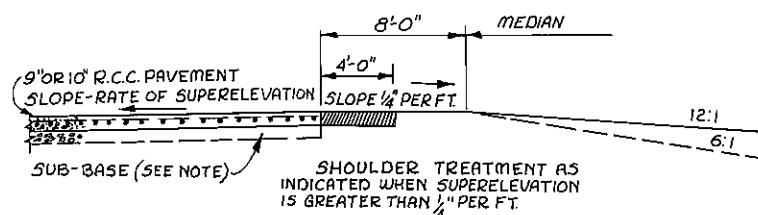
DETAILS TO BE ALTERED AS REQUIRED FOR FLEXIBLE TYPE PAVEMENT.

** SLOPE SHOULDER 1/4 PER FT. AWAY FROM PAVEMENT WHEN SUPERELEVATION IS GREATER THAN 1/4 PER FT. AND UP TO 5/8 PER FT. INCLUSIVE. NO SUB-BASE UNDER THE SHOULDER IS REQUIRED. WHEN SUPERELEVATION IS GREATER THAN 5/8 PER FT. SLOPE SHOULDER 1/4 PER FT. TOWARDS THE PAVEMENT AND INCLUDE SUB-BASE MATERIAL AS INDICATED.



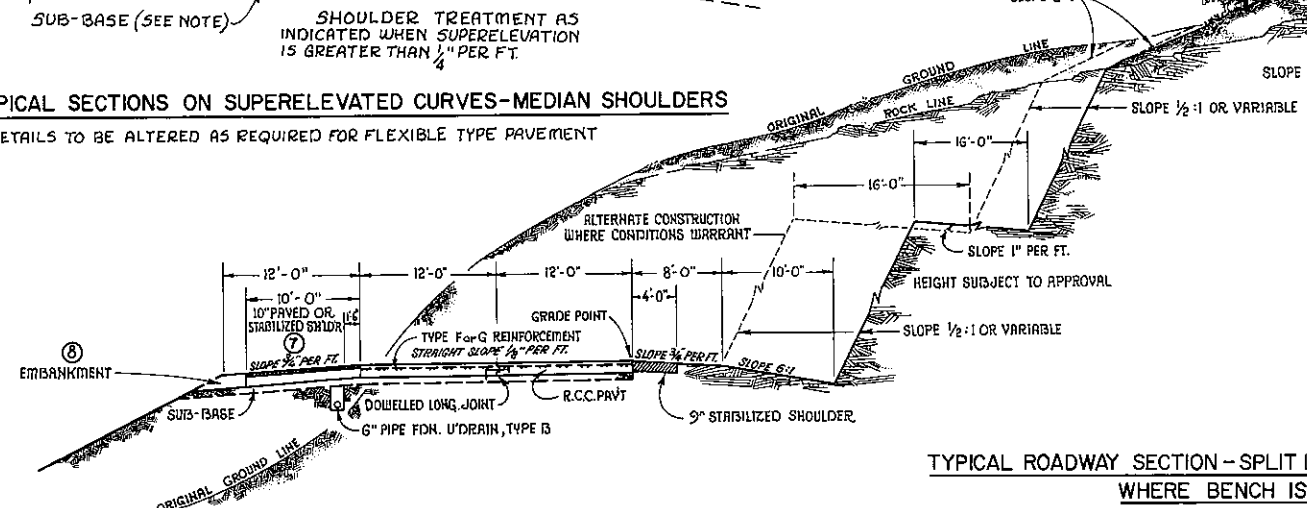
TYPICAL SECTION ON SUPERELEVATED CURVES

SEE TREATMENT WHEN S.E. IS GREATER THAN 1/4 PER FT

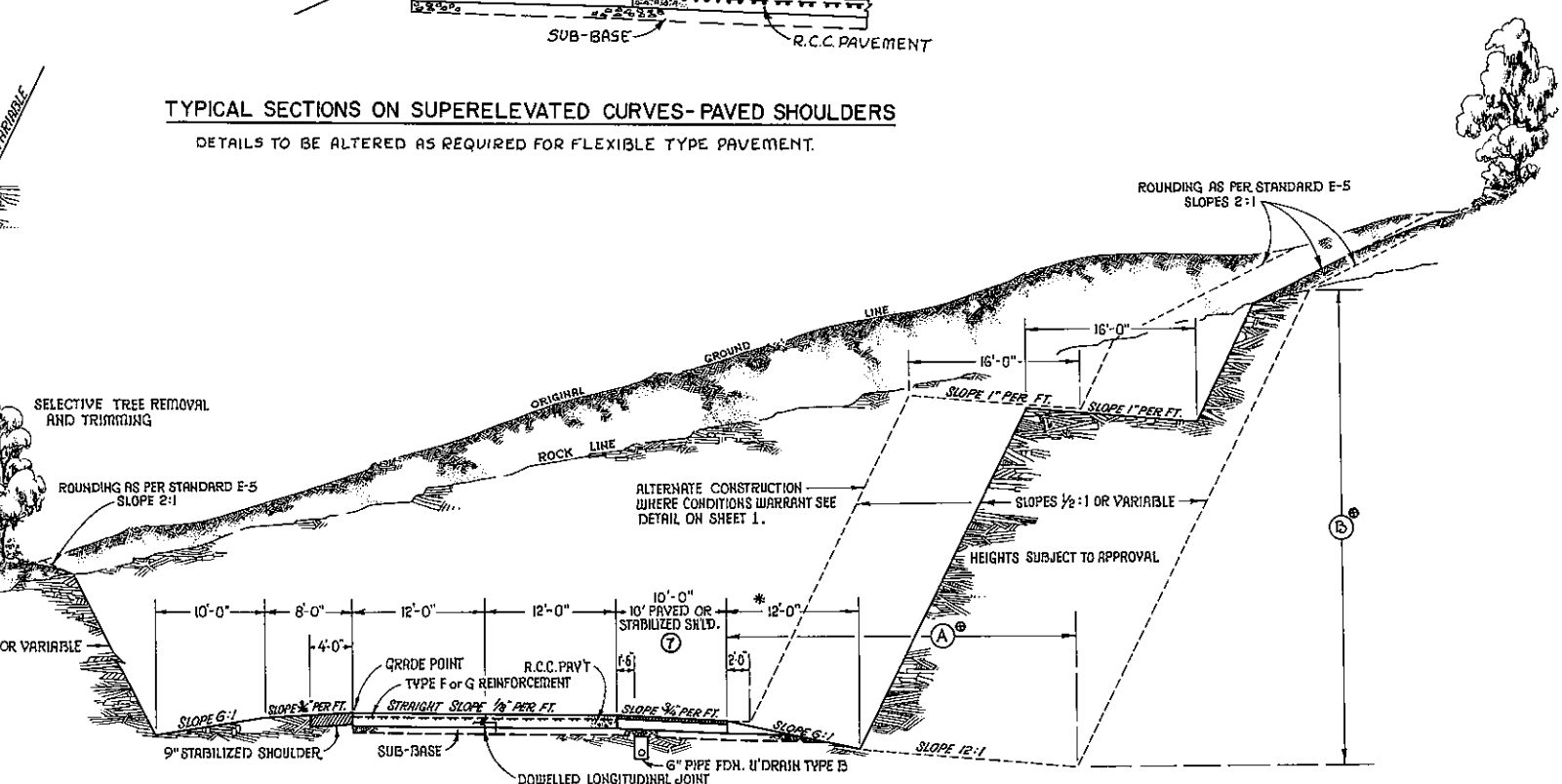


TYPICAL SECTIONS ON SUPERELEVATED CURVES-MEDIAN SHOULDERS

DETAILS TO BE ALTERED AS REQUIRED FOR FLEXIBLE TYPE PAVEMENT



TYPICAL ROADWAY SECTION - SPLIT LEVEL & SEPARATED ROADWAYS WHERE BENCH IS REQUIRED



NOTE - INSIDE OF SUPERELEVATED CURVES TO BE DAYLIGHTED AS REQUIRED FOR NECESSARY SIGHT DISTANCE. DETAILS TO BE ALTERED AS REQUIRED FOR FLEXIBLE TYPE PAVEMENT. SEE SHEET N° 1

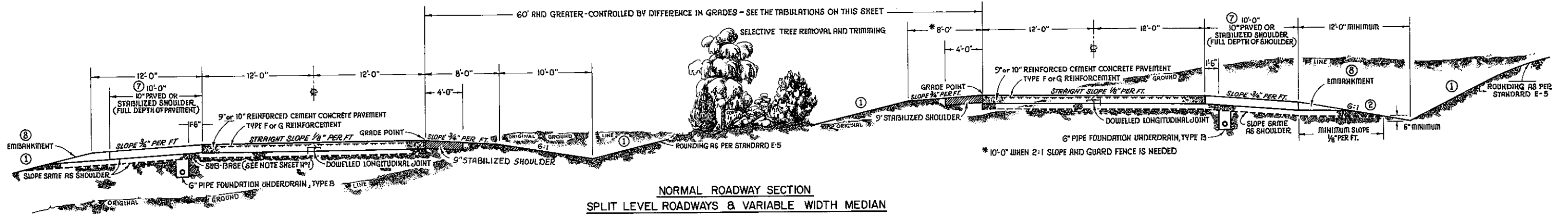
* MINIMUM SWALE WIDTH WHEN BENCHES ARE USED. WHEN BENCHES ARE ELIMINATED THE DIMENSIONS DESIGNATED (A) AND (B) SHALL BE DEPENDENT UPON RECOMMENDATION OF THE SOIL SURVEY REPORT.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
ROADWAY SECTIONS
INTERSTATE AND CLASS I

⊗ SEE NOTES ON SHEET N° 1

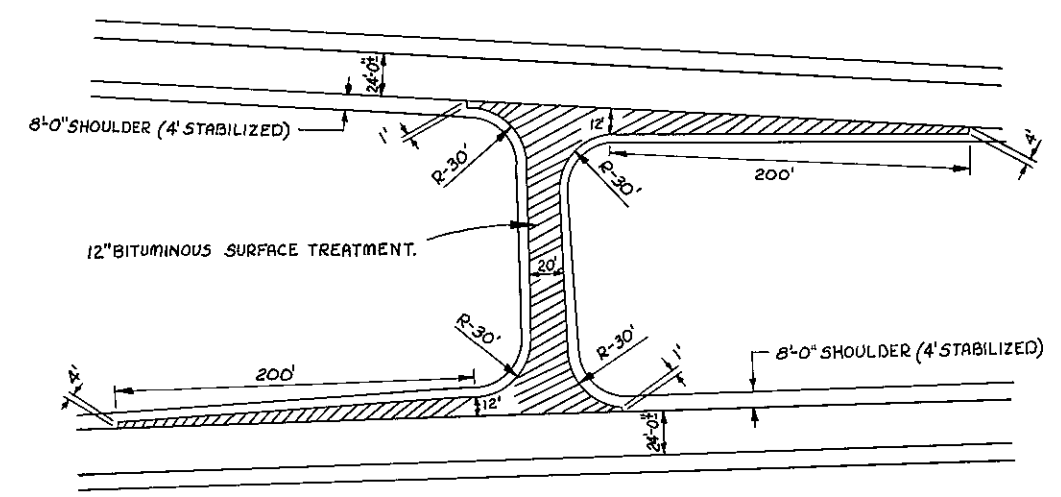
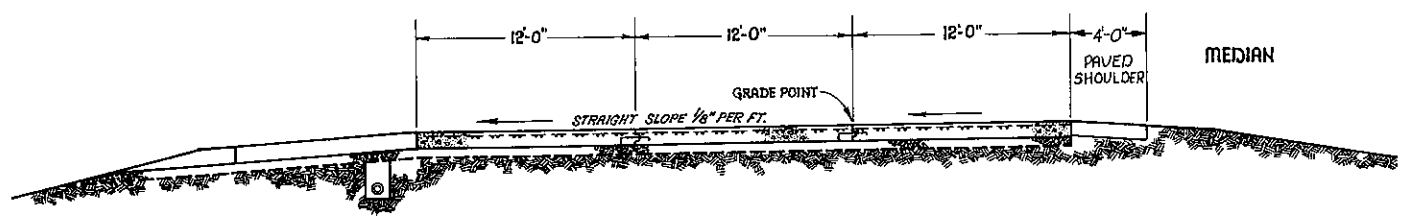
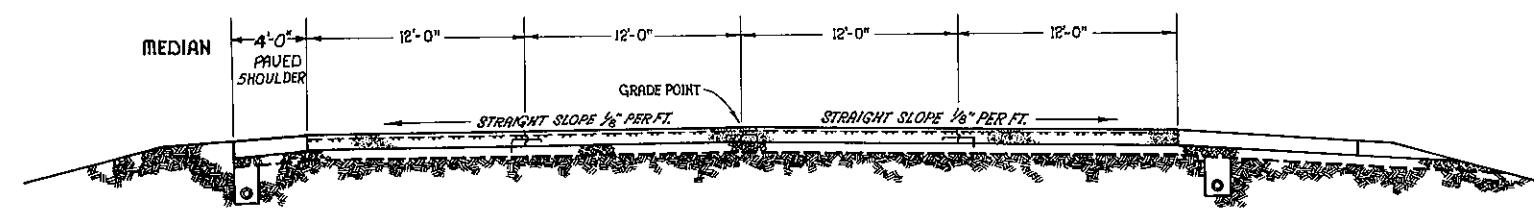
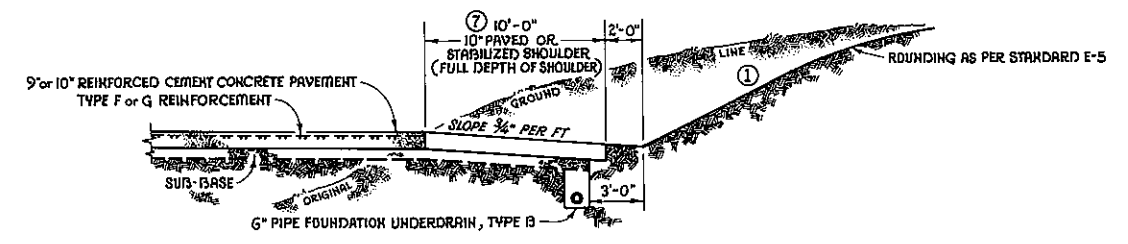
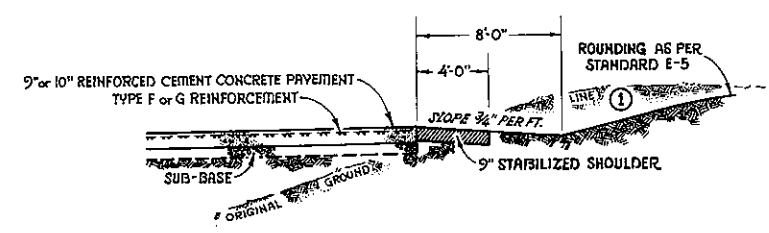
SHEET 2 OF 5

DM-17



DIFFERENCE IN FINISHED GRADES	MINIMUM DISTANCE BETWEEN PAVEMENT EDGE USING 2:1 SLOPE
10'	75'
20'	100'
30'	120'
40'	140'
50'	160'
100'	280'

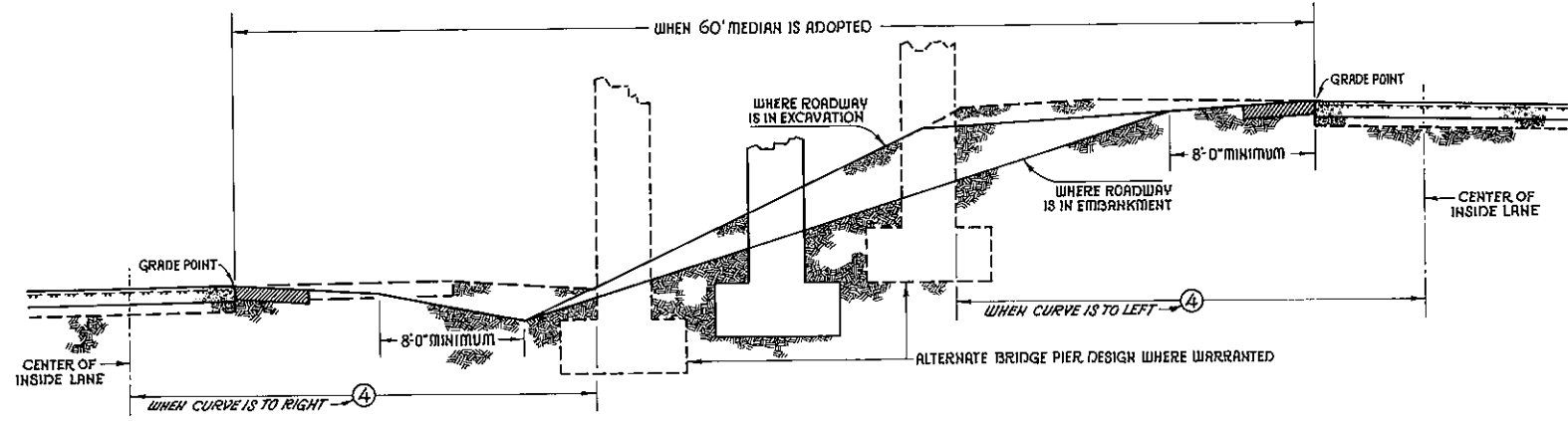
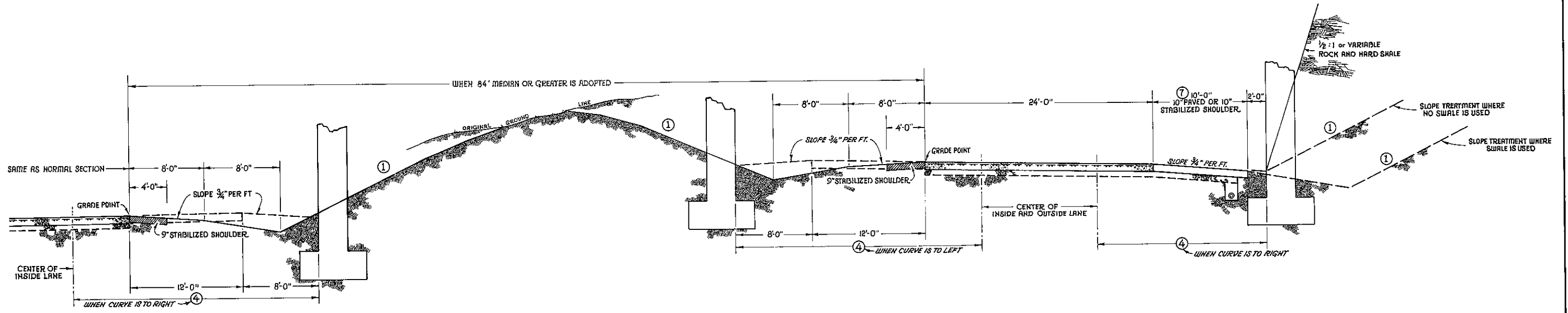
NOTE: THESE LIMITS SHALL BE ADJUSTED AS REQUIRED WHERE DIFFERENT SLOPES ARE USED.



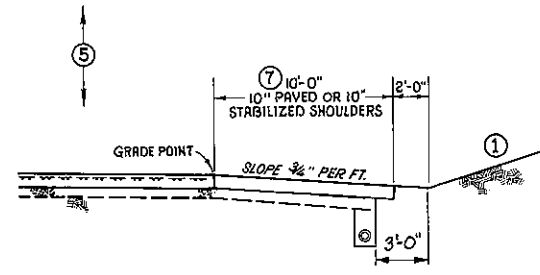
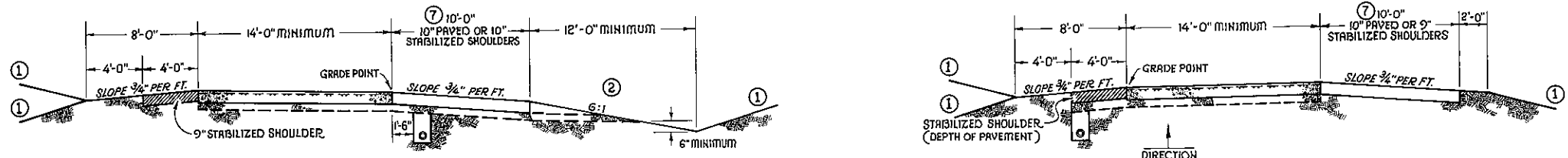
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
ROADWAY SECTIONS
INTERSTATE AND CLASS I

SHEET 3 OF 5
DM-17

⊗ SEE NOTES ON SHEET NO 1



ROADWAY SECTION AT STRUCTURE

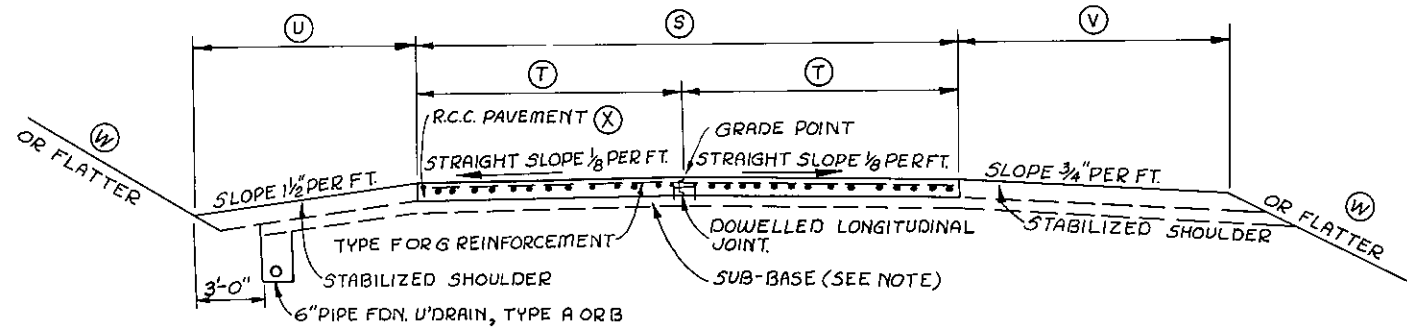


SINGLE LANE RAMP

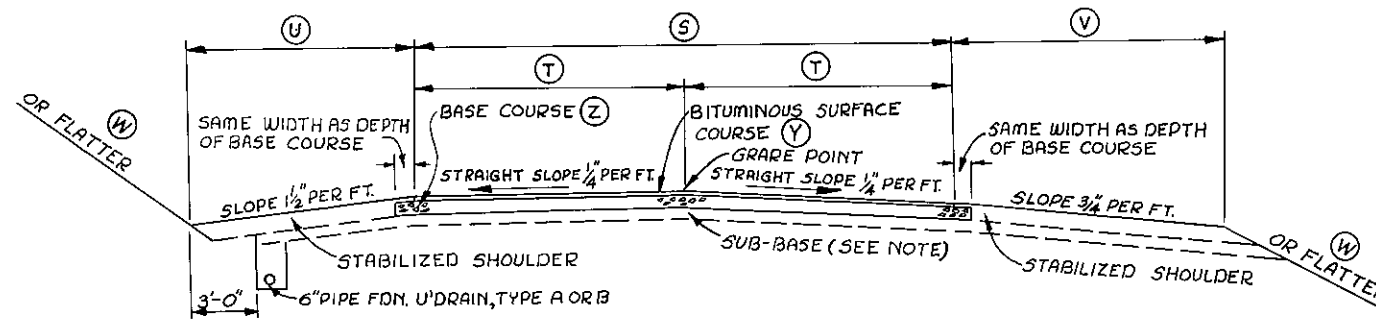
NOTE: PAVEMENT STRUCTURE SIMILAR TO MAIN LINE
 FOR SHOULDER TREATMENT ON HIGH SIDE OF SUPERELEVATION REFER TO SHEET 2 OF 5.

⊗ SEE NOTES ON SHEET NO 1

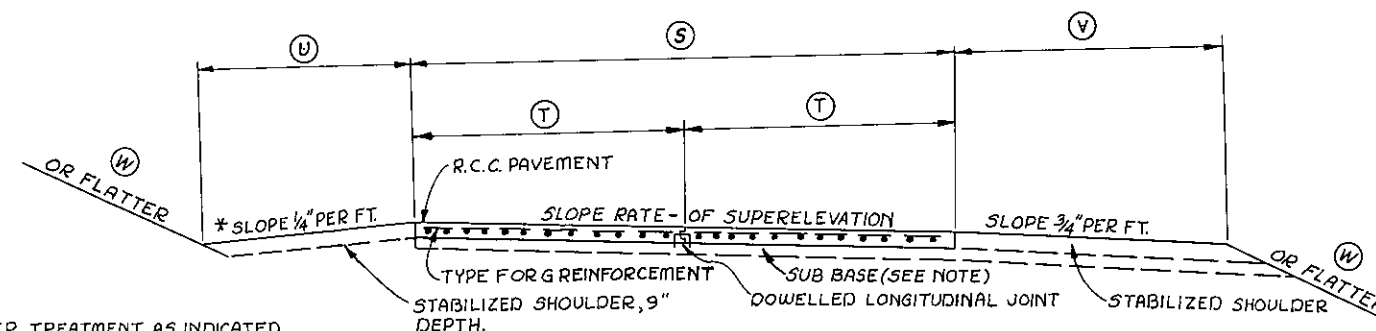
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 ROADWAY SECTIONS
 INTERSTATE AND CLASS I
 SHEET 4 OF 5
DM-17



NORMAL ROADWAY SECTION (RIGID PAVEMENT)



NORMAL ROADWAY SECTION (FLEXIBLE PAVEMENT)



* SHOULDER TREATMENT AS INDICATED WHEN SUPERELEVATION IS GREATER THAN 1/4" PER FT.

TYPICAL SECTION ON SUPERELEVATED CURVES

DETAILS TO BE ALTERED AS REQUIRED FOR FLEXIBLE TYPE PAVEMENT

GENERAL NOTES (CONTINUED)

SUB-BASE: DEPTH OF SUB-BASE IS DEPENDENT UPON RESULTS OF SOIL INVESTIGATION AND SHALL BE DETERMINED BY THE GREATEST OF THE FOLLOWING DEPTHS.

- (A) MINIMUM DEPTH OF SUB-BASE TO BE 6 INCHES.
- (B) STRUCTURAL DEPTHS SHALL BE AS DETERMINED BY PAVEMENT DESIGN CALCULATIONS SHOWN ON FORM 4225 AND IN THE SOIL REPORT.
- (C) FROST PROTECTION SHALL BE FURNISHED BY PROVIDING THE FOLLOWING DEPTHS OF FROST RESISTANT MATERIAL (PAVEMENT, BASE AND SUB-BASE) IN THE PAVEMENT STRUCTURE:
 - (a) RIGID PAVEMENT: ONE-HALF THE FROST PENETRATION DEPTH AS CALCULATED IN THE PAVEMENT DESIGN COMPUTATIONS.
 - (b) FLEXIBLE PAVEMENT: TOTAL FROST PENETRATION DEPTH AS CALCULATED IN THE PAVEMENT DESIGN COMPUTATIONS.

NO	HIGHWAYS CLASS 2	CLASS 3	CLASS 4	CLASS 5
(S)	24'-0"	22'-0"	20'-0"	18'-0"
(T)	12'-0"	11'-0"	10'-0"	9'-0"
(U)	10'-0"	6'-0"	6'-0"	6'-0"
(V)	12'-0"	8'-0"	8'-0"	8'-0"
(W)	2:1	2:1	1 1/2:1	1 1/2:1
(X) (Y) (Z)	TO BE DETERMINED ON FORM 4225 SUBMISSION, BASED ON SOILS REPORT.			

STABILIZED SHOULDERS TO BE FULL DEPTH OF SURFACE COURSE AND BASE COURSE OVER SUB-BASE. MAXIMUM 9" DEPTH WHEN NO SUB-BASE IS PROVIDED.
 INSIDE OF SUPERELEVATED CURVES TO BE DAY LIGHTED AS REQUIRED FOR NECESSARY SIGHT DISTANCE.
 REFER TO STANDARD C-97 FOR SUPERELEVATION CONTROLS. MINIMUM SPIRAL LENGTH AND WIDENING.
 ROUNDING ON CUT SLOPES AS PER STANDARD DRAWING E-5.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS

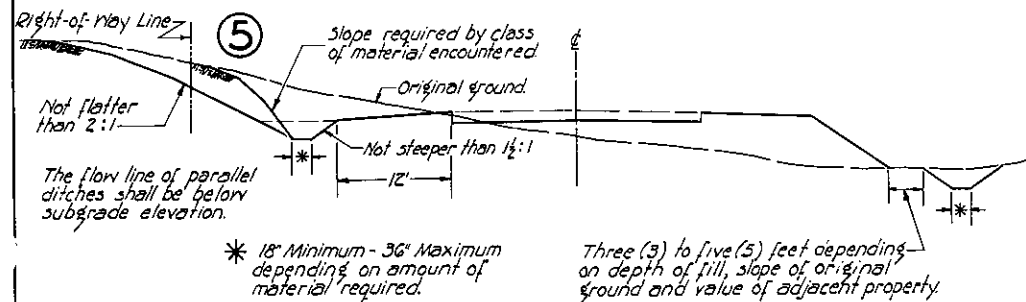
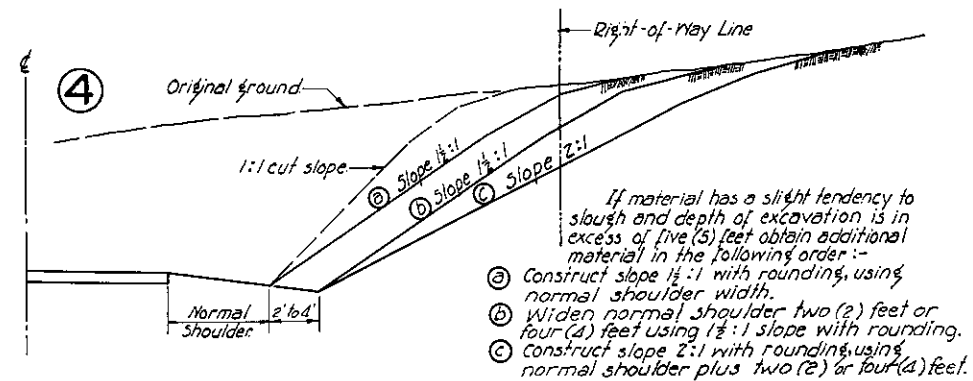
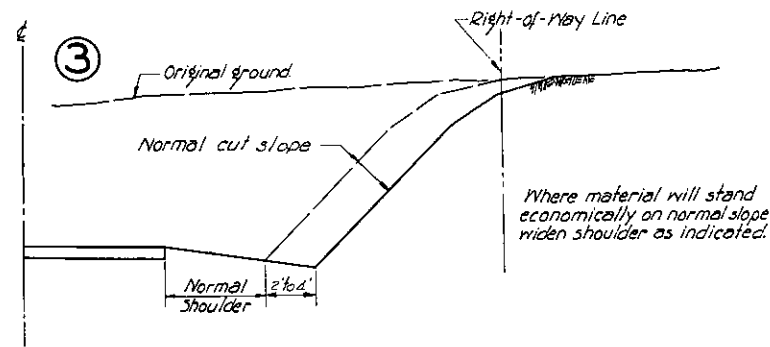
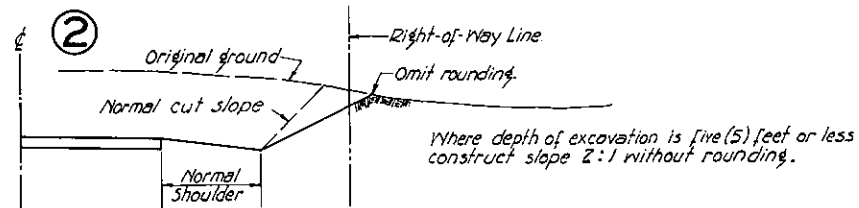
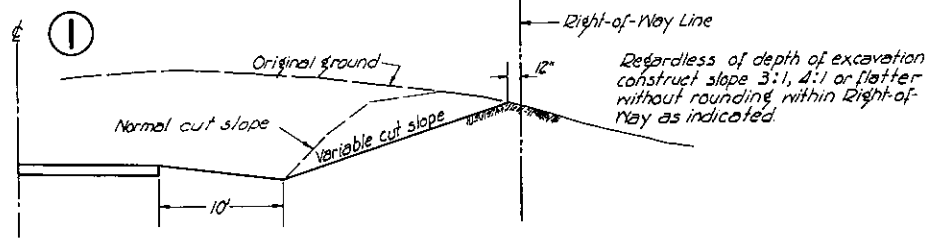
ROADWAY SECTIONS
CLASS 2, 3, 4 & 5

SHEET 5 OF 5

DM-17

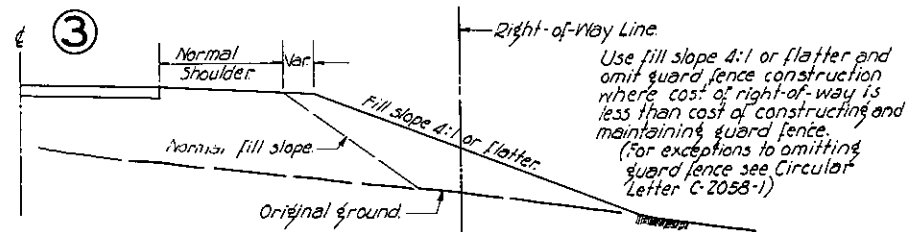
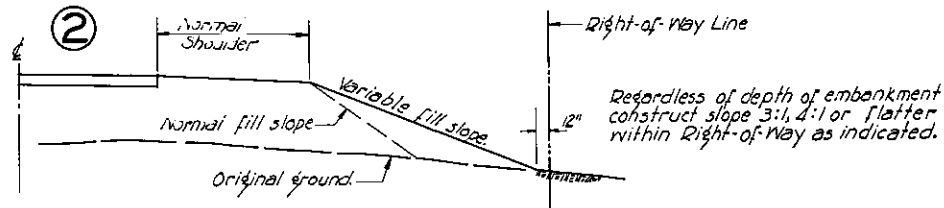
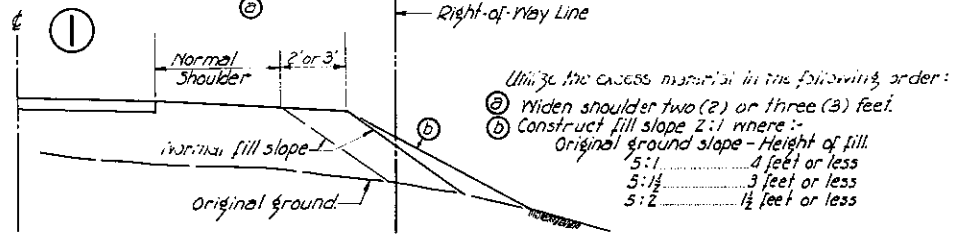
METHODS FOR REDUCING OR ELIMINATING BORROW EXCAVATION

(Provided cost of additional Right of Way is nominal)

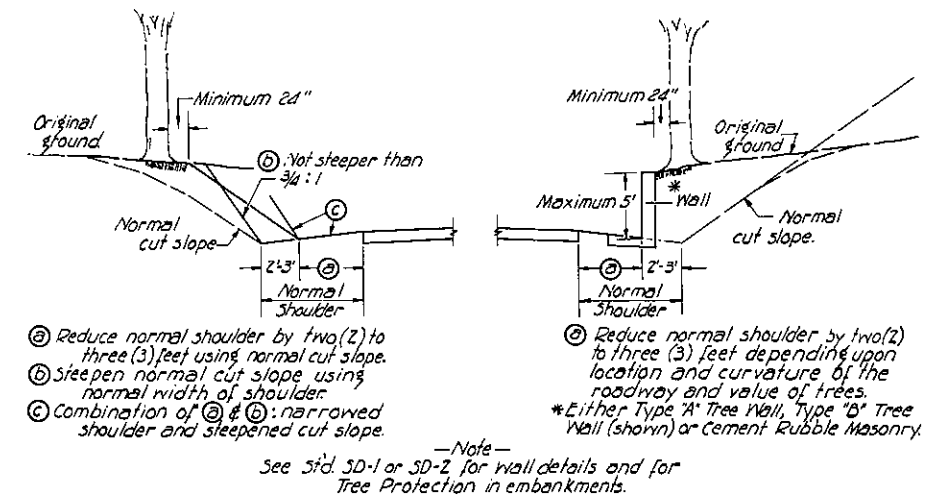


METHODS FOR DISPOSAL OF EXCESS EXCAVATION

(Provided cost of additional Right of Way is nominal)



METHODS FOR PROTECTING VALUABLE TREES

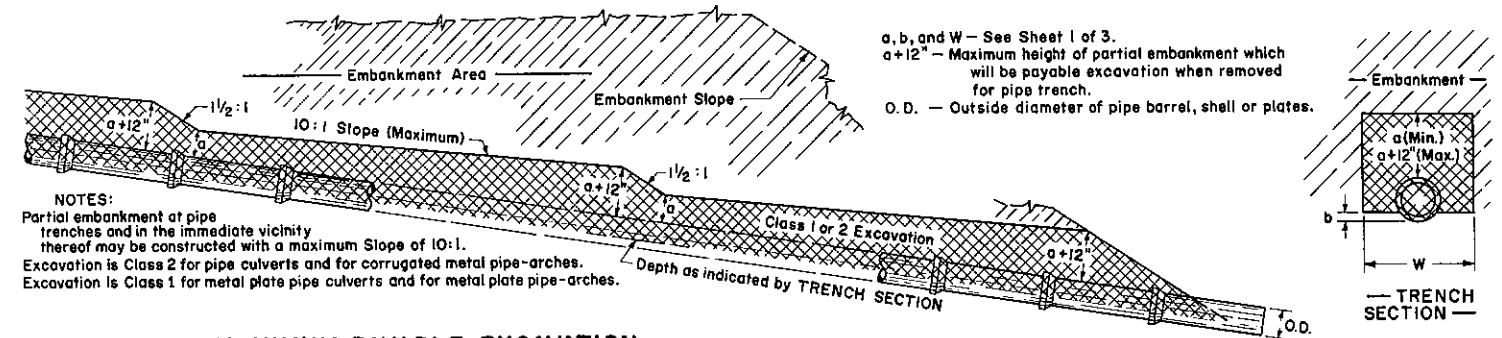


Revised to delete fixed shoulder width and slope easement wording, also to increase tree clearance. Added "NOTE".
 Approved November 1, 1961
 [Signature] CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
-DESIGN METHODS-
 REDUCING OR ELIMINATING BORROW EXCAV.,
 DISPOSAL OF EXCESS EXCAV. AND PROTECTING
 VALUABLE TREES - CIRCULAR LETTER C-2058-1

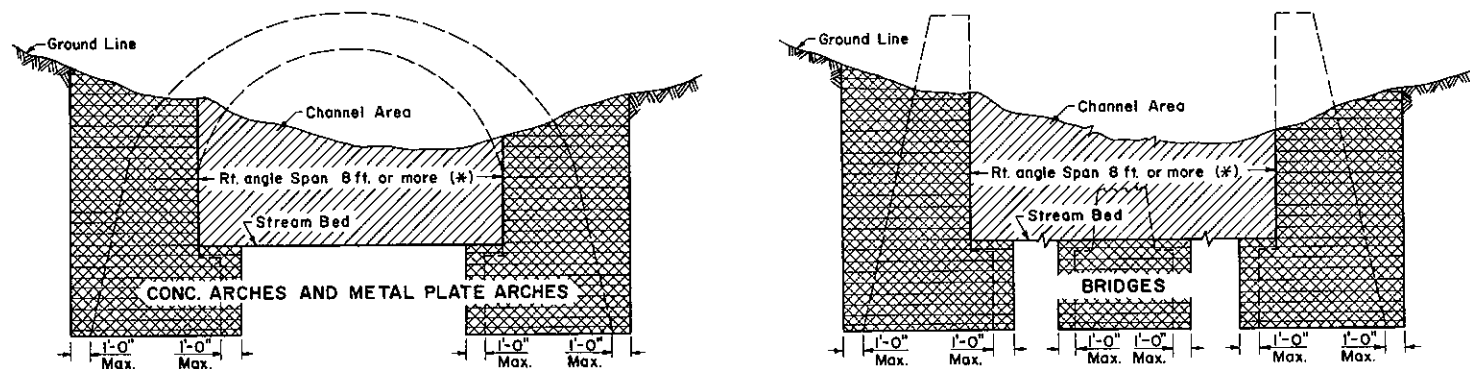
APPROVED November 23, 1943
 [Signature] CHIEF ENGINEER

NOTE: Adjust Right-of-Way to conform with current practices.

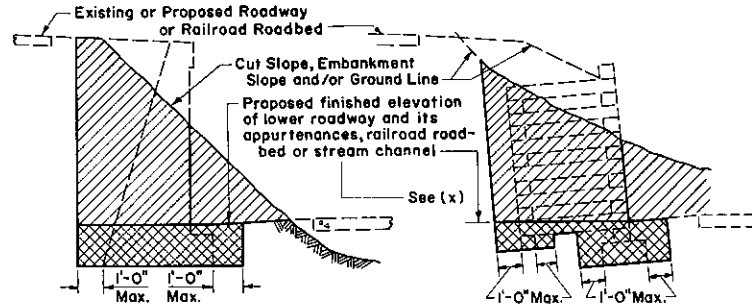


NOTES:
 Partial embankment at pipe trenches and in the immediate vicinity thereof may be constructed with a maximum Slope of 10:1.
 Excavation is Class 2 for pipe culverts and for corrugated metal pipe-arches.
 Excavation is Class 1 for metal plate pipe culverts and for metal plate pipe-arches.

**MAXIMUM PAYABLE EXCAVATION
 IN EMBANKMENT AREAS FOR TRENCHES OF PIPE CULVERTS,
 CORRUGATED METAL PIPE-ARCHES, METAL PLATE PIPE CULVERTS & METAL PLATE PIPE-ARCHES**

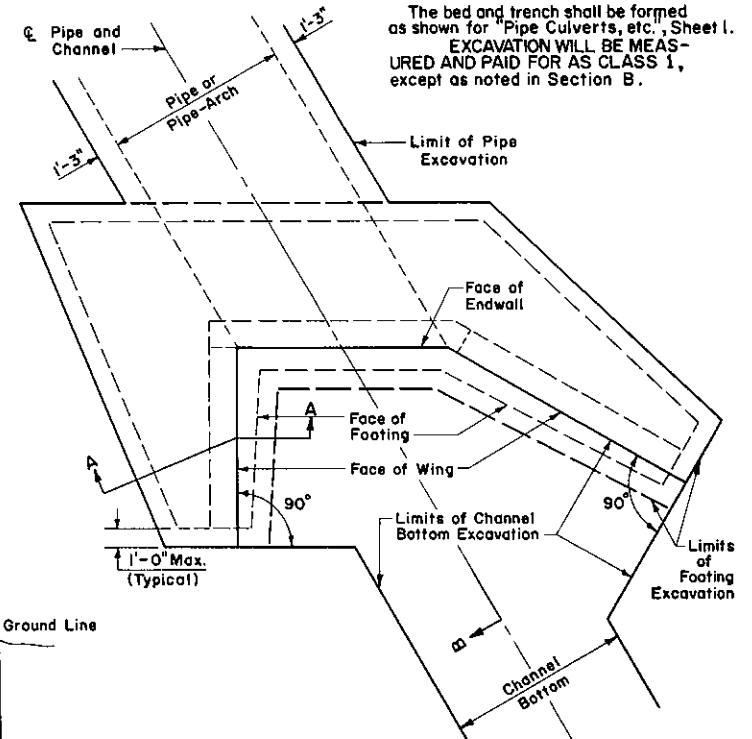


BRIDGES and ARCHES over STREAM CHANNELS



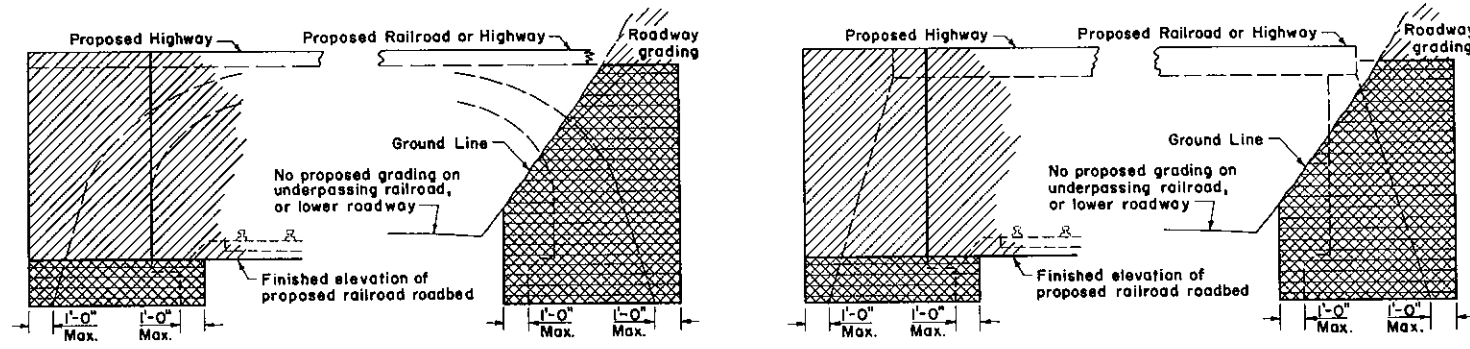
(x) - Where no excavation is to be performed on the lower roadway, railroad roadbed, stream channel or adjacent area in front of the retaining wall or cribbing, all excavation is Class 2.

RETAINING WALLS and CRIBBING

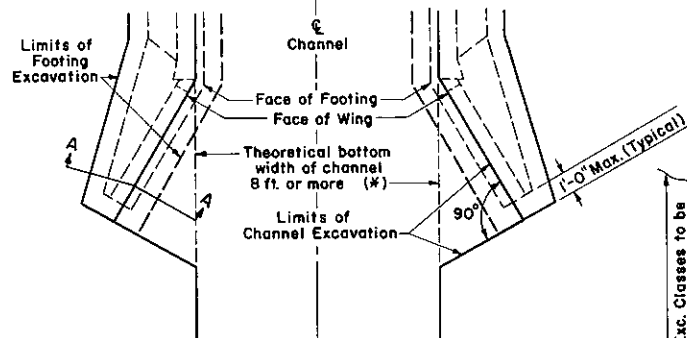


The bed and trench shall be formed as shown for 'Pipe Culverts, etc.', Sheet I. EXCAVATION WILL BE MEASURED AND PAID FOR AS CLASS 1, except as noted in Section B.

METAL PLATE PIPES and METAL PLATE PIPE-ARCHES with ENDWALL



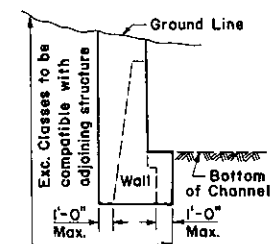
OVERPASS STRUCTURES



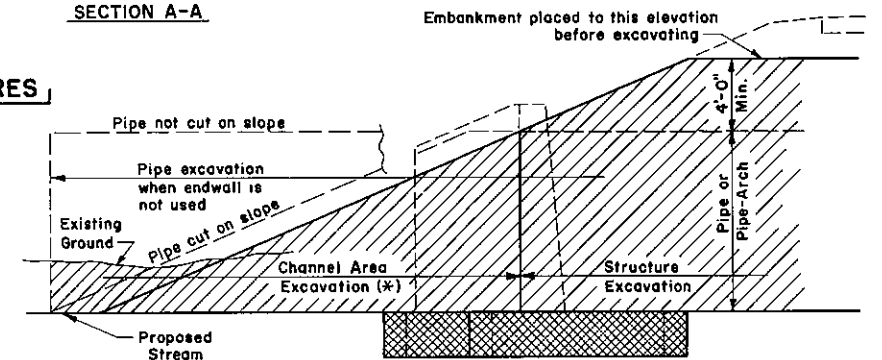
NOTE: Walls forming a part of bridge structures will be considered WING WALLS unless designated as RETAINING WALLS on the design drawings.

(*) - When the theoretical bottom width of the channel is less than 8 ft., all excavation is Class 2.

BETWEEN ANGLED WING WALLS OF BRIDGES, ARCHES, BOX CULVERTS or SIMILAR STRUCTURES

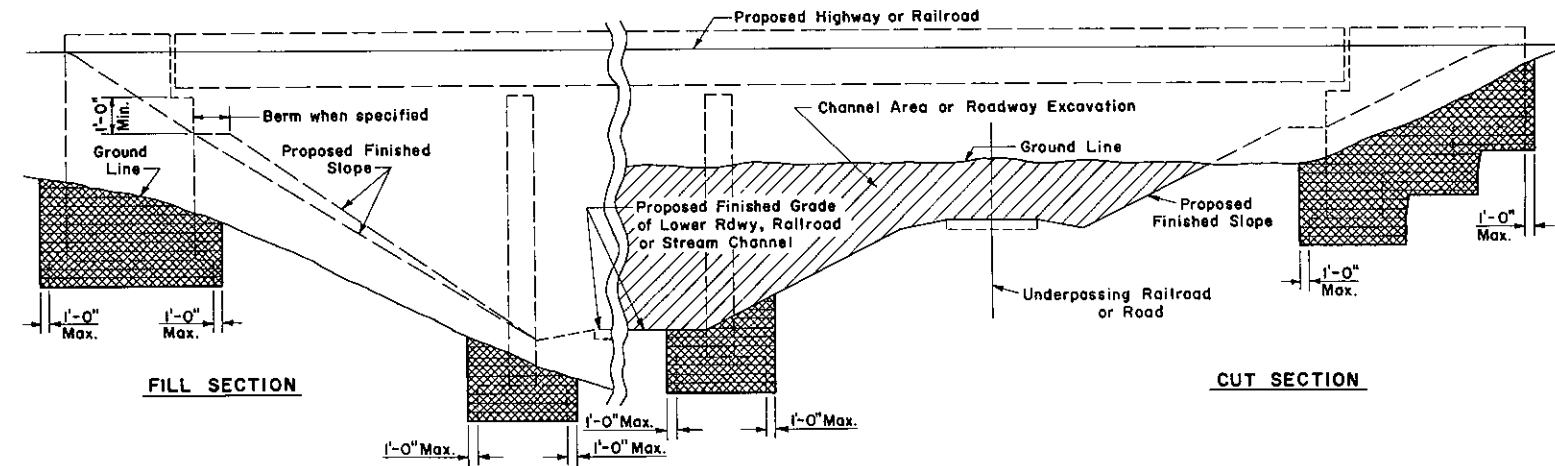


SECTION A-A

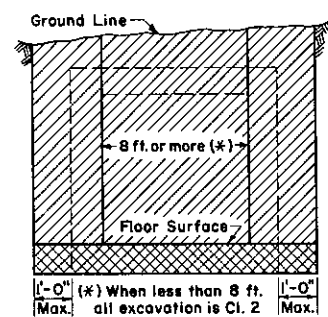


SECTION B

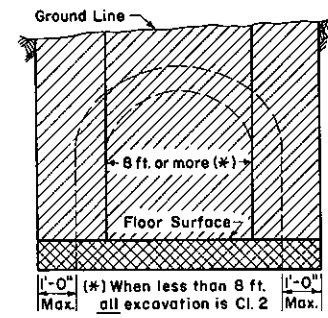
(*) - Class 2 Excavation when channel bottom is less than 8 ft.



MULTI-SPAN BRIDGES with STUB ABUTMENTS and PARALLEL WINGS

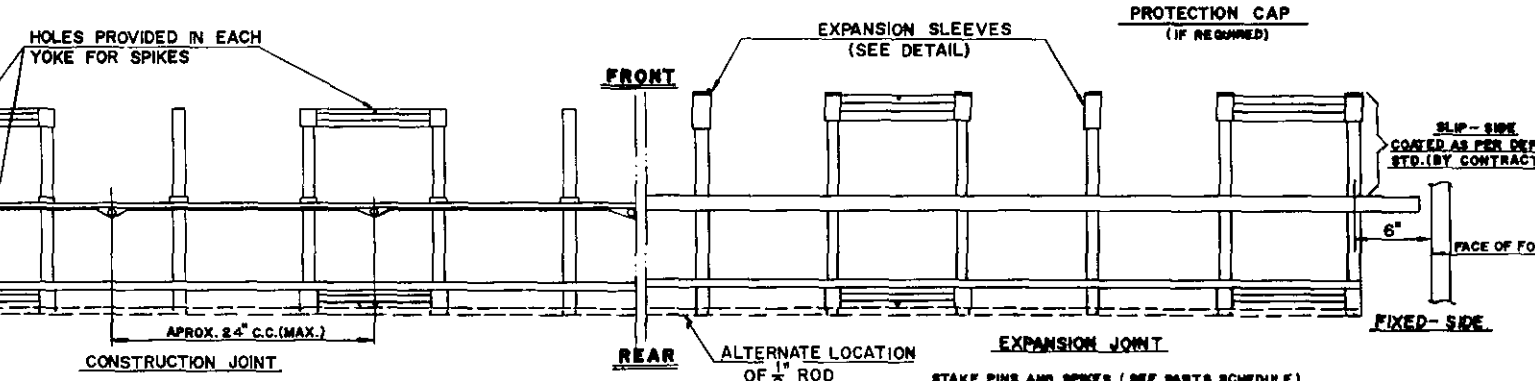
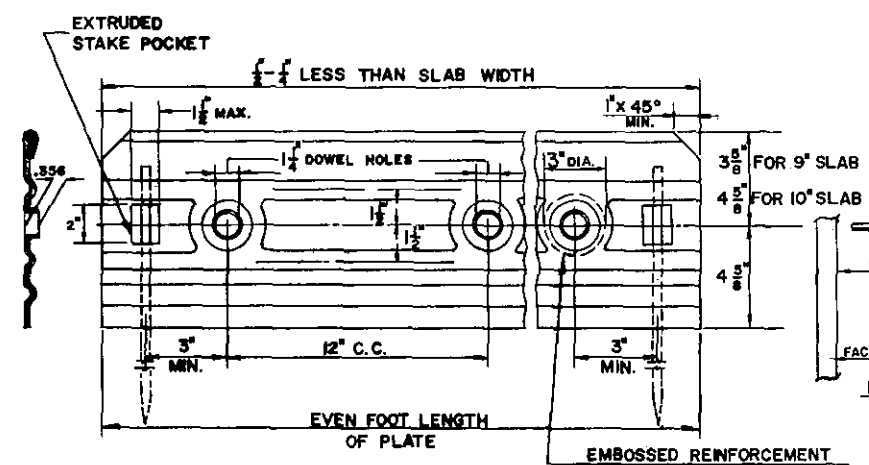
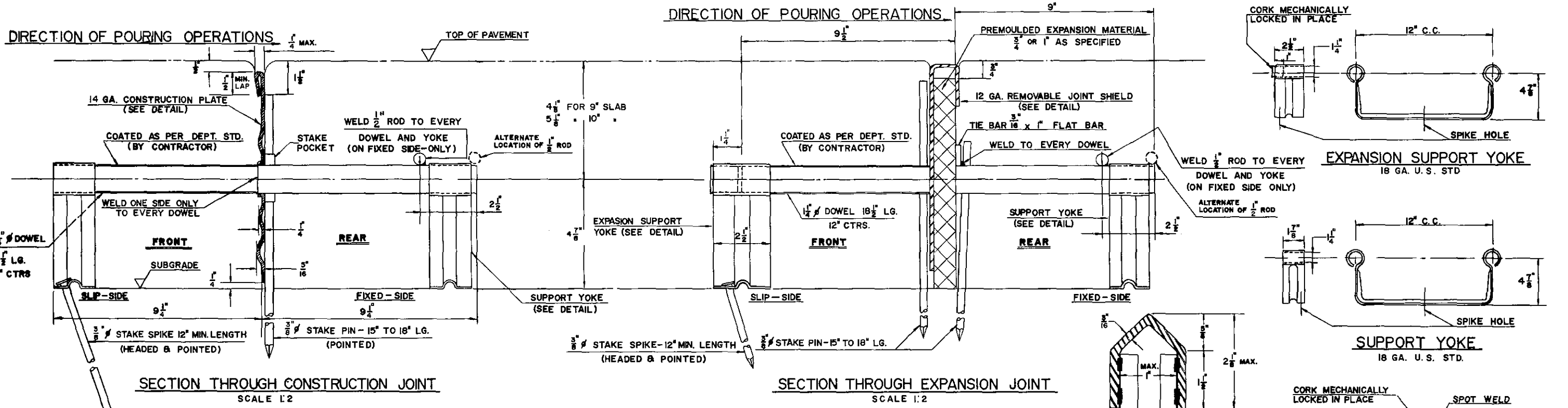


BOX CULVERTS



TIED ARCHES

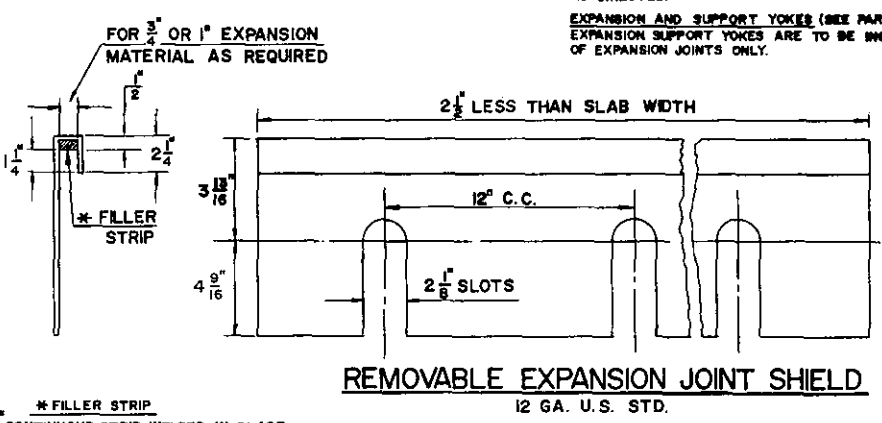
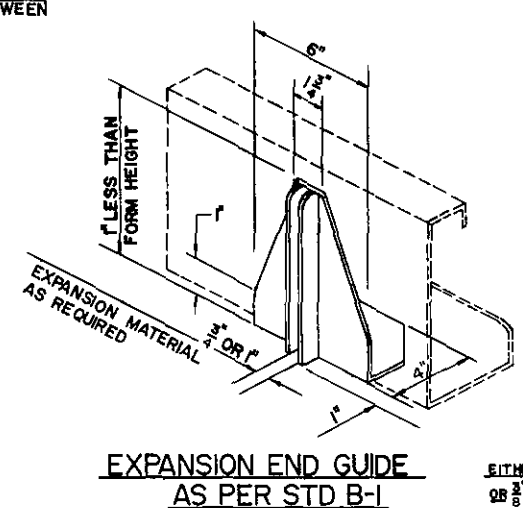
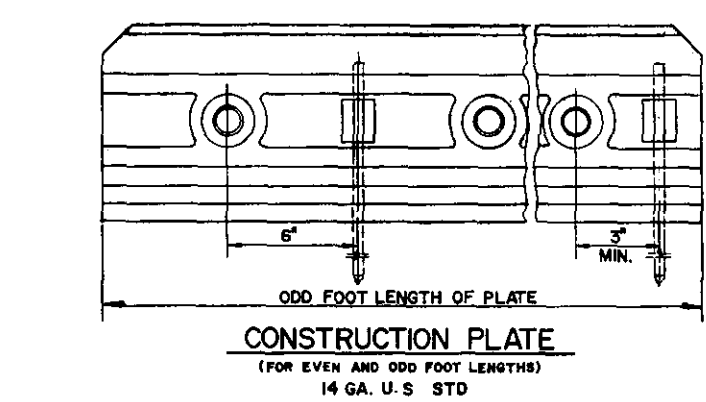
CLASS 1 EXCAV. → [diagonal hatching] CLASS 3 EXCAV. → [cross-hatching]
 CLASS 2 EXCAV. → [grid hatching]



NUMBER AND LENGTH OF SPIKES AND PINS SHALL BE INCREASED IF REQUIRED DUE TO SUBGRADE CONDITIONS.

MINIMUM PARTS SCHEDULE FOR VARIOUS JOINT LENGTHS

JOINT LENGTH	STAKE PINS		SINGLE SLEEVES		SUPPORT YOKE	
	EXP. JT.	CON. JT.	EXP. JT.	CON. JT.	FRONT	REAR
4 FT	2	3	3	0	2	2
5	2	3	3	1	2	2
6	2	3	4	2	2	2
7	3	4	4	1	3	3
8	3	4	5	2	3	3
9	3	5	5	3	3	3
10	3	5	6	4	3	3
11	4	6	6	3	4	4
12	4	6	7	4	4	4
13	4	7	7	5	4	4
14	4	7	8	6	4	4
15	5	8	8	5	5	5
16	5	8	9	6	5	5



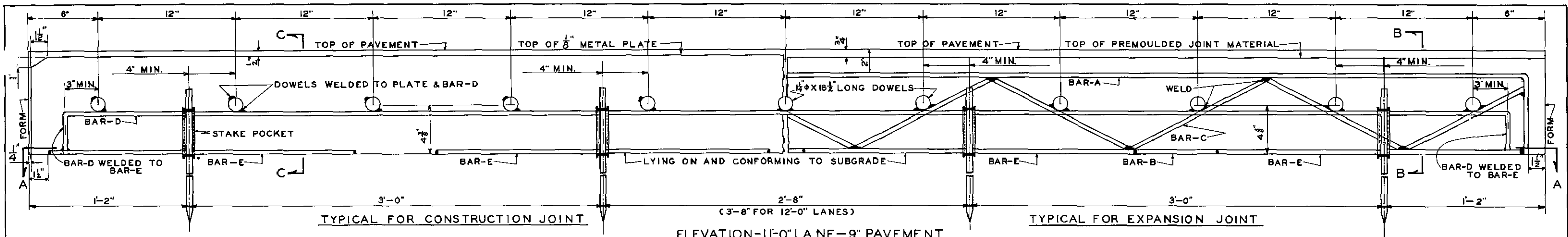
M.F'D BY:
BEHRINGER METAL WORKS INC., NEWARK 5, N.J.
BMW-5

* FILLER STRIP
EITHER 3/8" CONTINUOUS STRIP WELDED IN PLACE
OR 3/8" x 2" LG. SPACERS WELDED AT CENTER AND BOTH ENDS OF SHIELD.
OR CONTINUOUS CHANNEL WELDED IN PLACE

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
ASSEMBLY DETAILS
LOAD TRANSFER UNITS
IN ACCORDANCE WITH DEPARTMENT STANDARD B-1
APPROVED: *September 10, 1964*
M. J. ...
CHIEF ENGINEER

TYPE-C

LSM-7/16/64 4/14/64



ELEVATION-11'-0" LANE-9" PAVEMENT
SCALE-3"=1'-0"
ALL JOINTS & CONNECTIONS WELDED

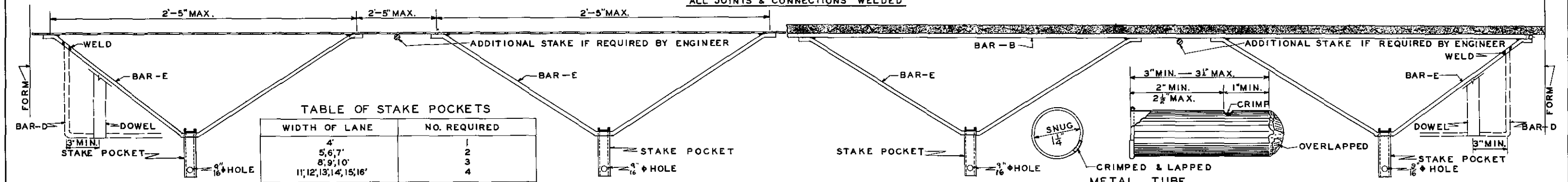


TABLE OF STAKE POCKETS

WIDTH OF LANE	NO. REQUIRED
4'	1
5', 6', 7'	2
8', 9', 10'	3
11', 12', 13', 14', 15', 16'	4

SECTION-AA
SCALE-3"=1'-0"

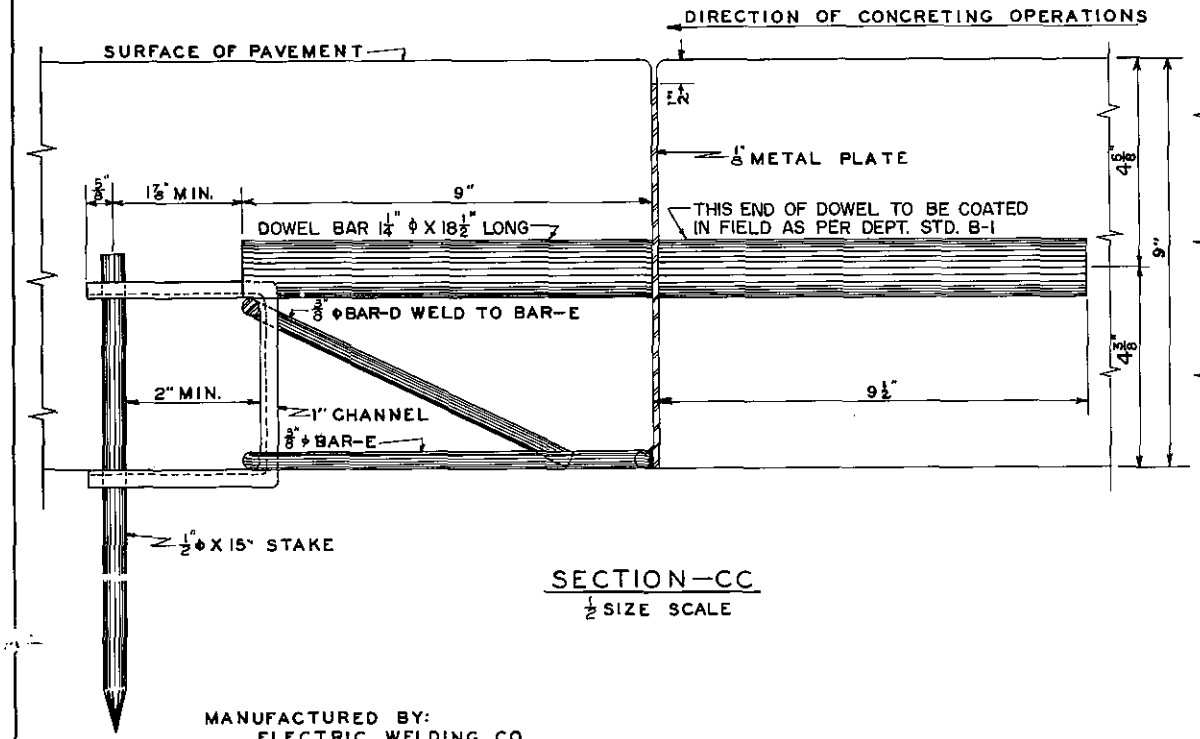
NOTES

THE LOAD TRANSFER UNIT SHOWN IS FOR A 11'-0" LANE OF 9" UNIFORM DEPTH. FOR NARROWER OR WIDER LANES THE NUMBER OF DOWELS IS DECREASED OR INCREASED ACCORDINGLY. THE END DETAILS REMAIN AS SHOWN AND 12" SPACING OF DOWELS MAINTAINED. FOR NUMBER OF STAKE POCKETS REQUIRED FOR VARIOUS PAVEMENT WIDTHS - SEE TABLE.

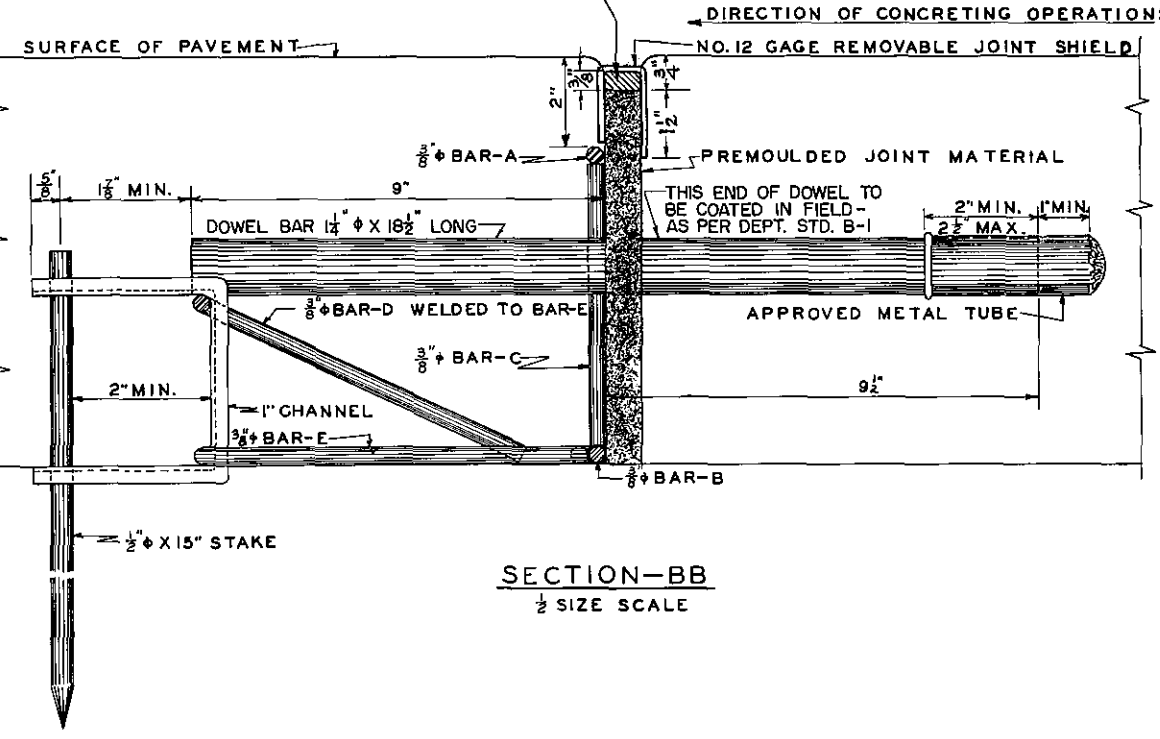
THE CENTER OF DOWELS SHALL BE LOCATED VERTICALLY 1/8" BELOW THE CENTER OF THE SLAB. FOR 8" AND 10" DEPTHS OF PAVING THE DISTANCE FROM SUBGRADE TO CENTER LINE OF DOWELS SHOWN AS 4 3/8" FOR 9" PAVING BECOMES 3 7/8" AND 4 7/8" RESPECTIVELY FOR 8" & 10" PAVING

STANDARD END GUIDES AS SHOWN ON STANDARD B-1 OF DEPARTMENT OF HIGHWAYS SHALL BE USED AT ALL TRANSVERSE EXPANSION JOINTS.

UNDER NORMAL CONDITIONS PROVIDE 15" STAKES FOR STAKE POCKETS SHOWN. ADDITIONAL STAKES TO BE FURNISHED AND PLACED AS MAY BE DIRECTED BY THE ENGINEER WHERE POOR SUBSOIL CONDITIONS ARE ENCOUNTERED DURING CONSTRUCTION. THE LENGTH OF STAKES MAY BE INCREASED OR DECREASED DEPENDING ON SUBGRADE CONDITIONS.



SECTION-CC
1/2 SIZE SCALE



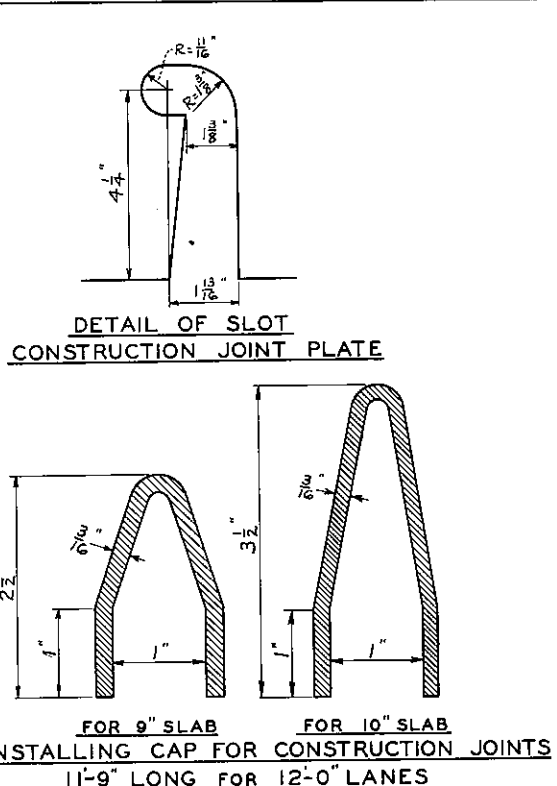
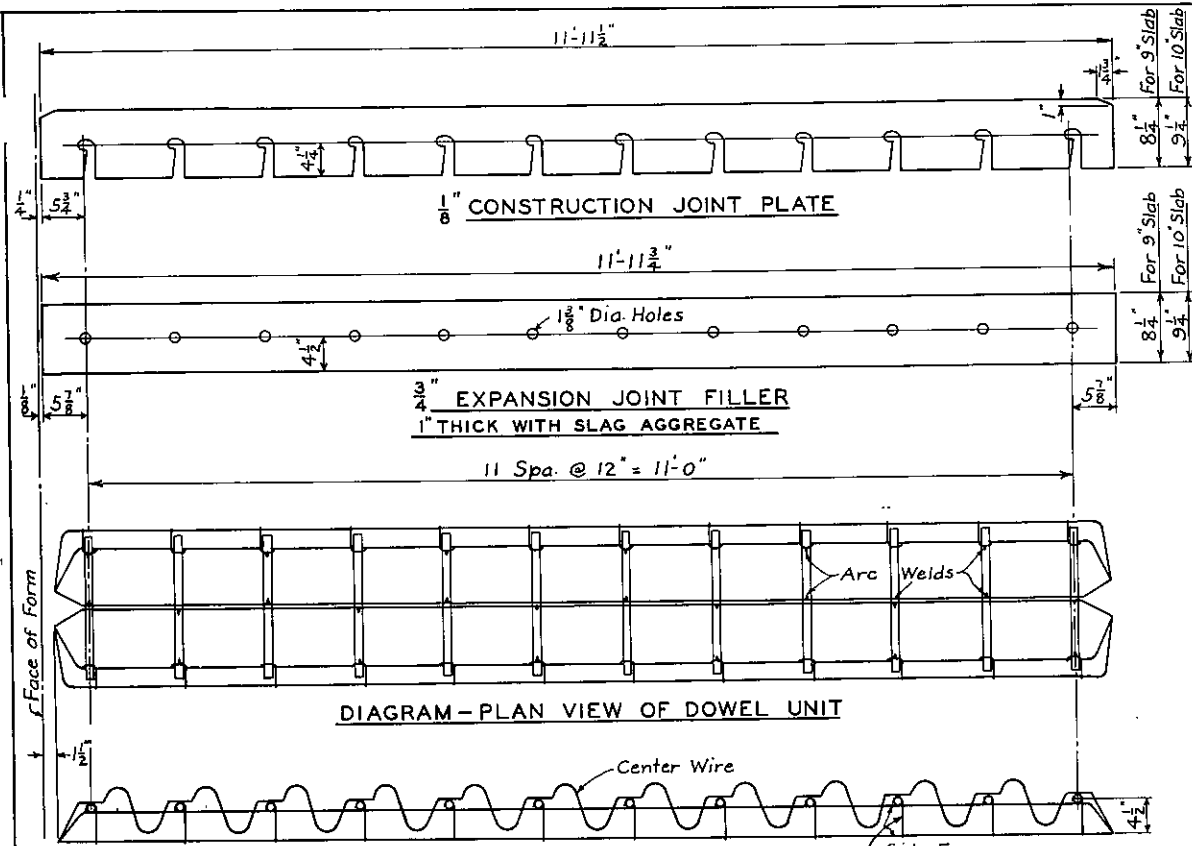
SECTION-BB
1/2 SIZE SCALE

Revised to provide for 1/2" diameter Dowels
Approved March 28, 1962
Revised to conform with Std. B-1
Approved April 22, 1955

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
LOAD TRANSFER UNITS
ASSEMBLY DETAILS
IN ACCORDANCE WITH DEPARTMENT STANDARD B-1
APPROVED February 27, 1952
CHIEF ENGINEER

MANUFACTURED BY:
ELECTRIC WELDING CO.
PITTSBURGH 22, PA.

TYPE-E



GENERAL NOTES

The Unit shown on this drawing is correct for a 12'-0" lane width. For lanes wider or narrower, dowels are added to or omitted from the unit as shown, always on the basis of 12" center to center spacing.

End Details are standard for all units regardless of number of dowels. Usual lane widths are as follows:

Lane Width	Over-all length of Unit	No. of Dowels
10'-0"	9'-9"	10
11'-0"	10'-9"	11
12'-0"	11'-9"	12
13'-0"	12'-9"	13

These load transfer units can be used as received for either expansion or construction joints.

For expansion joints, the expansion joint material of proper thickness (3/4" or 1"), the metal tubes for dowels with space for expansion, the coating for slip ends of dowels, and the installing cap for joint are to be added to the assembly in the field.

For construction joints, the steel plate, the installing cap and the coating for slip ends of dowels are to be added to the assembly in the field. The metal tubes are not required.

Standard end guides for holding the expansion joint filler in place shall be provided as required on Standard Drawing B-1. No end guides are required for construction joints.

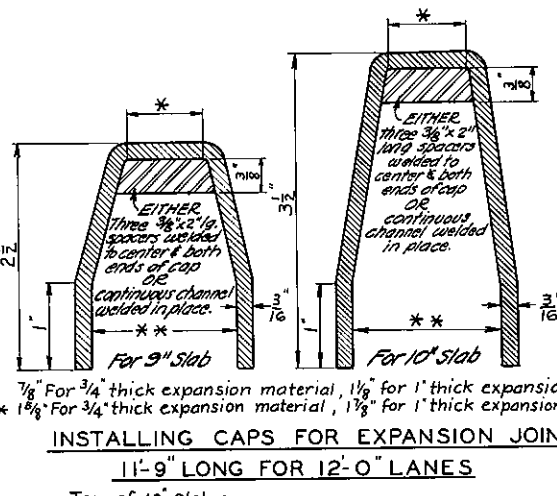
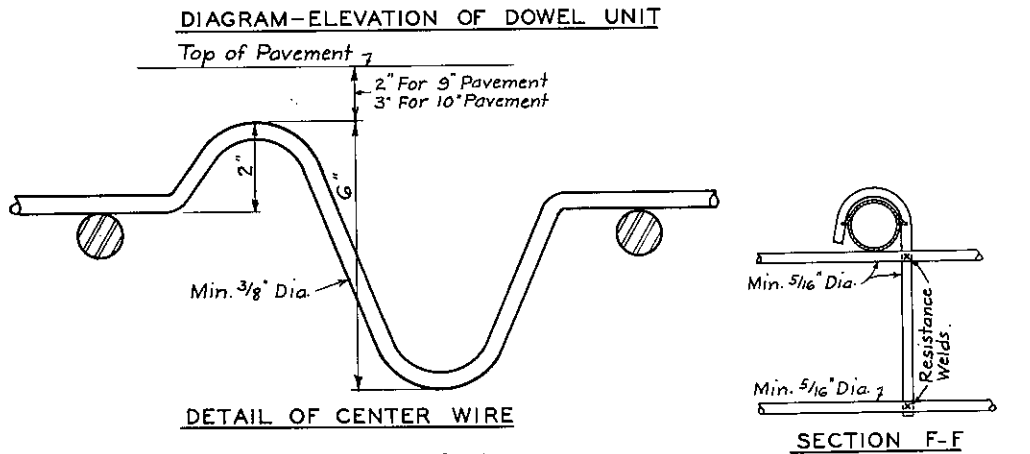
At least eight stakes shall be furnished for each assembly. They shall be placed as directed by the Engineer. Stakes shall be at least 1/2" in diameter and 15" to 18" in length.

Additional stakes shall be furnished and placed as directed by the Engineer where poor subsoil conditions are encountered during construction.

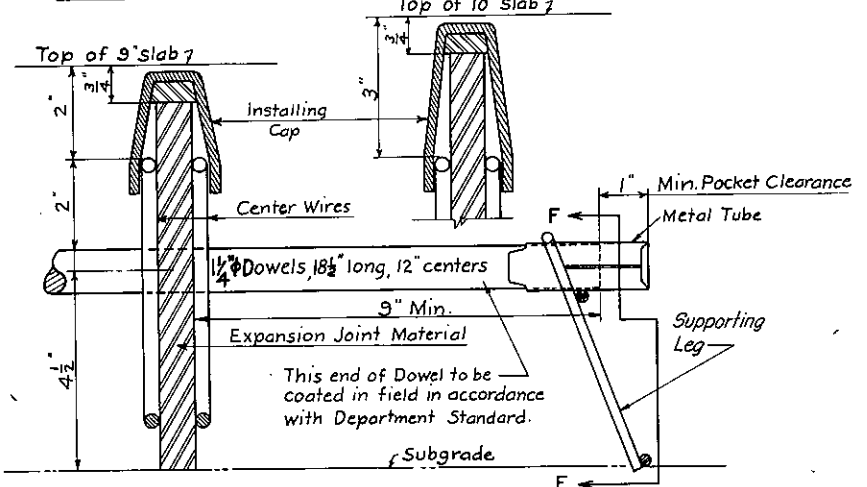
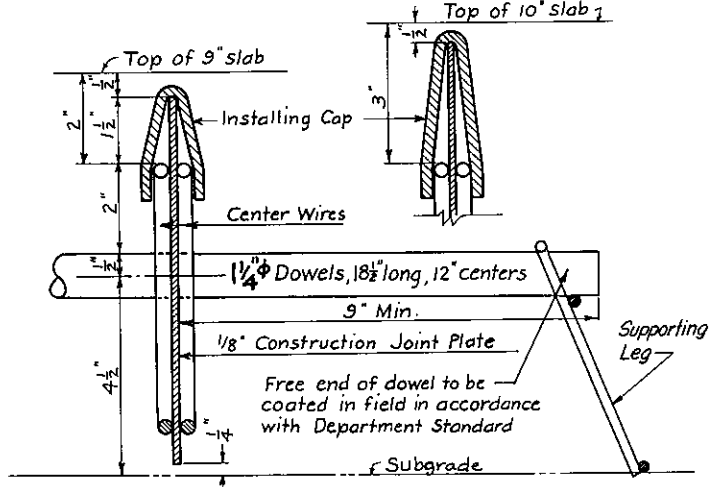
The length of stakes may be increased or decreased as directed by the Engineer, depending upon the subgrade conditions encountered.

The installing cap shall be removed after the first, or after the second pass of the finishing machine, at the discretion of the Engineer.

Upon removal of the installing cap the resultant space shall be filled promptly with fresh concrete carried back from the mixer.



* 7/8" For 3/4" thick expansion material, 1 1/8" for 1" thick expansion material.
 ** 1 5/8" For 3/4" thick expansion material, 1 7/8" for 1" thick expansion material.



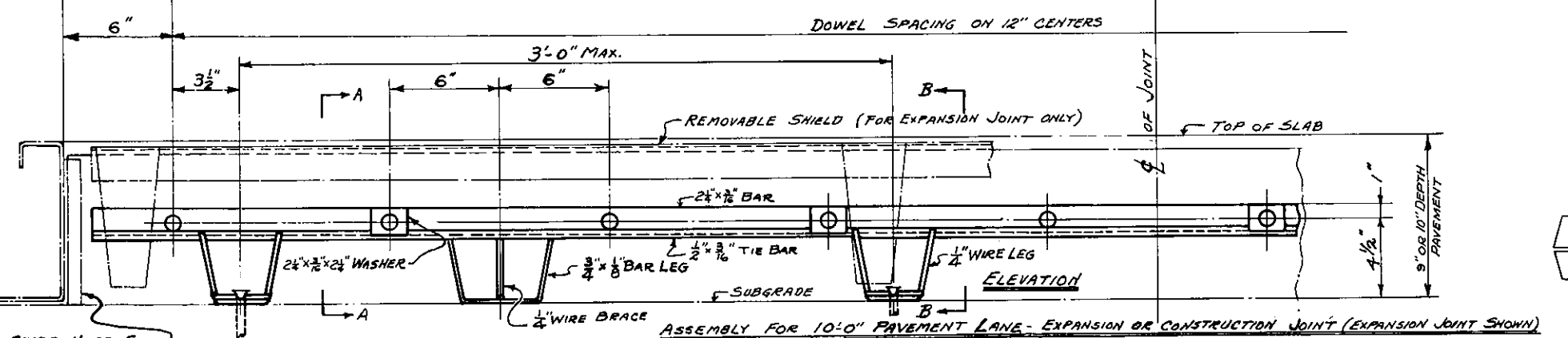
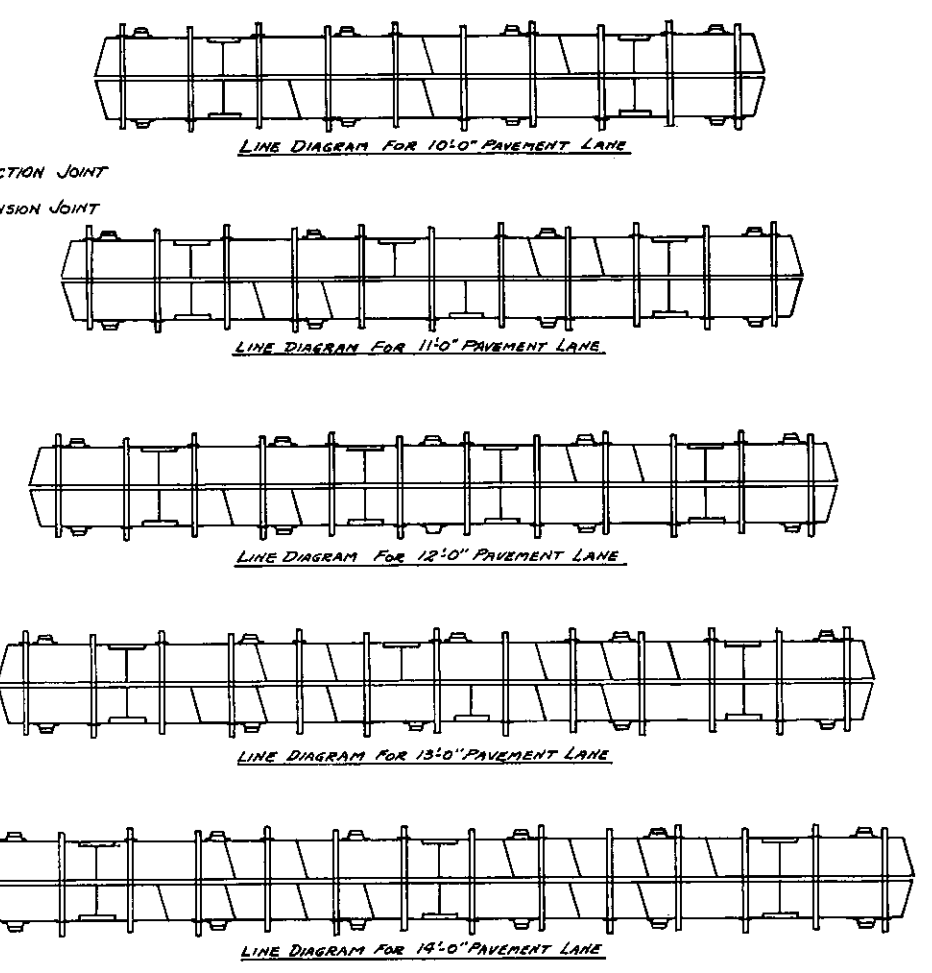
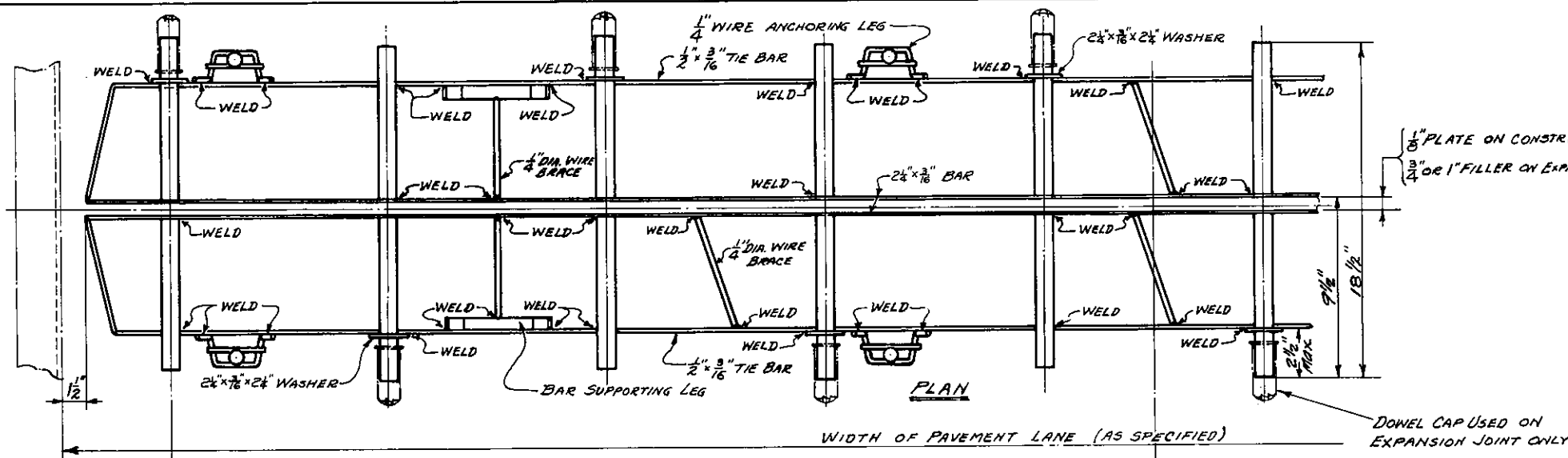
Revised to provide for 1 1/4" Dowels
 Approved *March 28, 1962*
 Revised to straighten Supporting Leg.
 APPROVED *November 1, 1961*

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 ASSEMBLY DETAILS
 LOAD TRANSFER UNITS
 AS REQUIRED ON STANDARD DRAWING B-1

APPROVED *December 27, 1952*
Ch. Quibine
 CHIEF ENGINEER

Shut 1 of 2

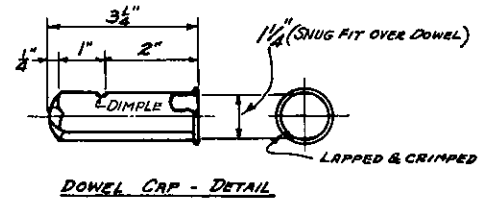
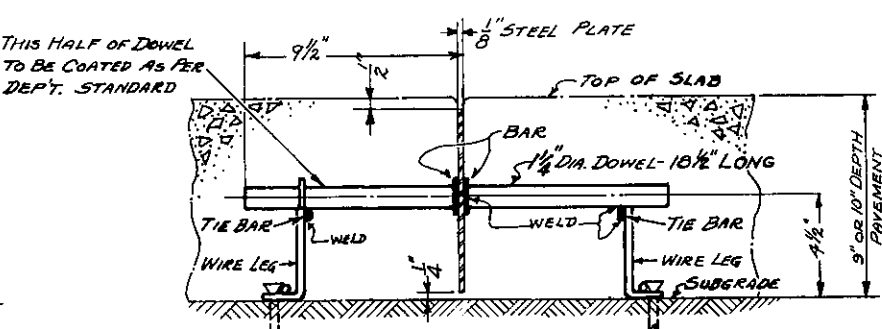
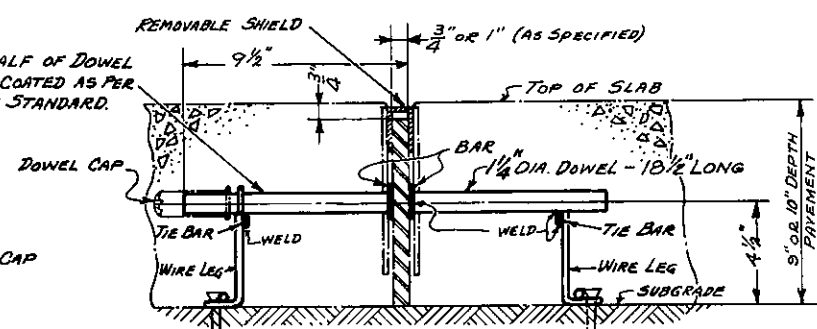
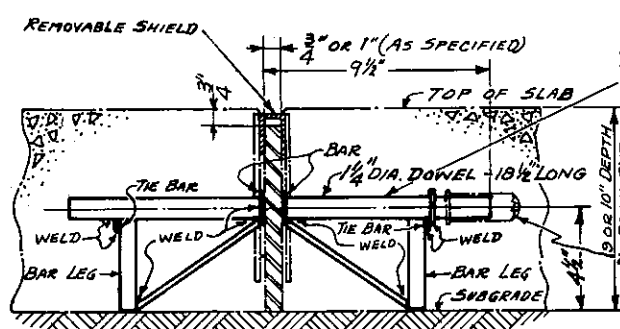
TYPE-G



END GUIDE USED FOR EXPANSION JOINT ONLY

ASSEMBLY FOR 10'-0" PAVEMENT LANE - EXPANSION OR CONSTRUCTION JOINT (EXPANSION JOINT SHOWN)

NOTE: FOR COMPLETE ASSEMBLIES FOR ALL WIDTHS OF PAVEMENT LANES SEE LINE DIAGRAMS.



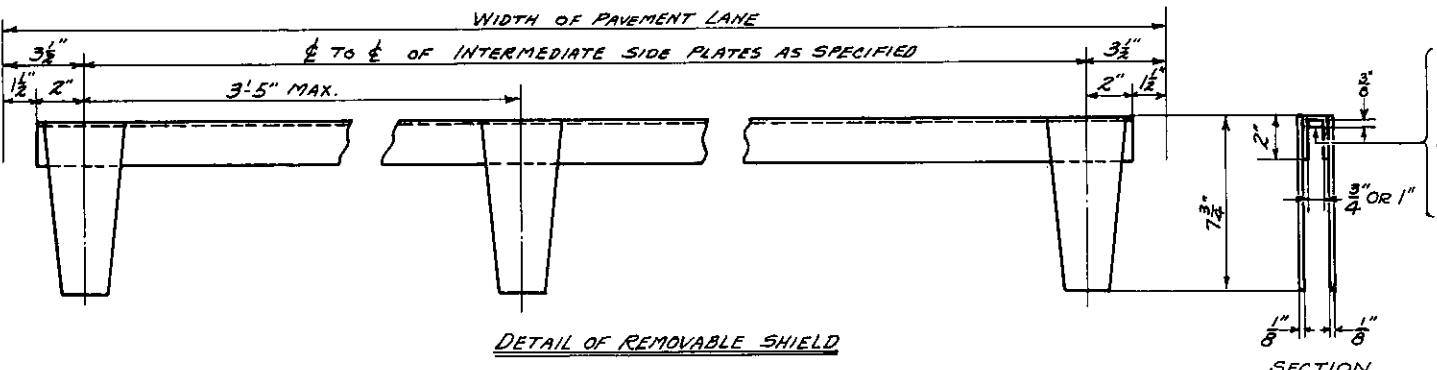
NOTES

End guides as shown on Standard Drawing B-1 shall be used at all transverse expansion joints. End guides are not required for transverse construction joints.

Dowel caps are not required for transverse construction joints.

Holes for dowels in premolded expansion material shall be punched to provide a snug fit without loss in thickness of material.

Spikes shall be used in all wire legs. The length of spikes shall be varied as directed by the engineer, depending on subgrade and subsoil conditions.



Revised to provide for 1/4" Dowels
 Approved: *[Signature]* 11/23/1962
 CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
ASSEMBLY DETAILS
LOAD TRANSFER UNITS
 IN ACCORDANCE WITH DEPARTMENT STANDARD B-1

APPROVED *[Signature]* November 1, 1961
 CHIEF ENGINEER

TYPE H

GENERAL NOTES

The unit shown on this drawing is correct for a 12'-0" lane width. For lanes wider or narrower, dowels are added to or omitted from the unit as shown, always on the basis of 12" center to center spacing. End details are standard for all units regardless of number of dowels. Usual lane widths are as follows:

LANE WIDTH	OVER ALL LENGTH OF UNIT	NO. OF DOWELS
10'-0"	9'-3"	10
11'-0"	10'-3"	11
12'-0"	11'-3"	12
13'-0"	12'-3"	13

For expansion joints, the expansion joint material of proper thickness (3/4" or 1"), the metal tubes for dowels with space for expansion, the coating for slip ends of dowels, and the installing cap for joint are to be added to the assembly in the field.

For sawed construction joints the coating for slip ends of dowels are to be added to the assembly in the field. The metal tubes are not required.

Standard end guides for holding the expansion joint filler in place shall be provided as required on Standard Drawing B-1. No end guides are required for sawed construction joints.

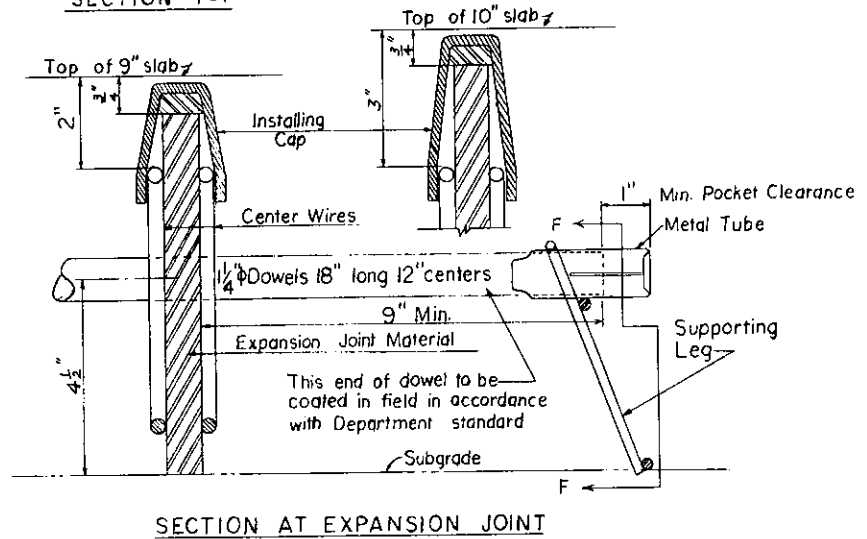
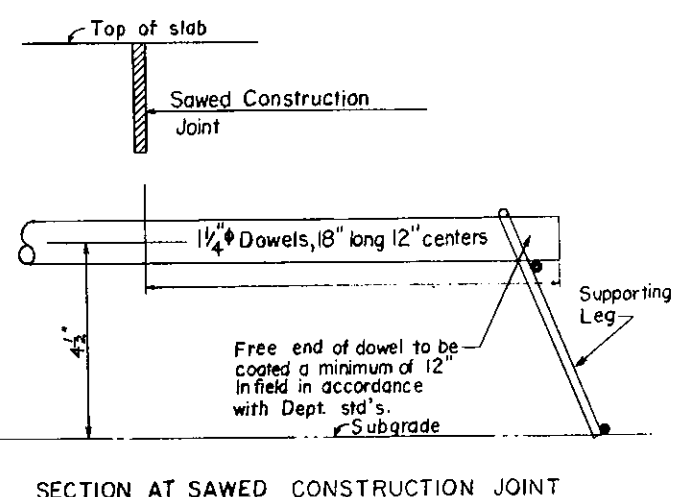
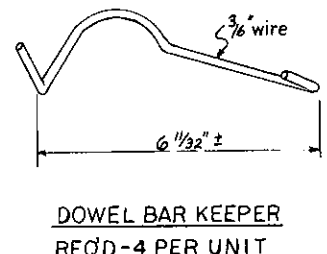
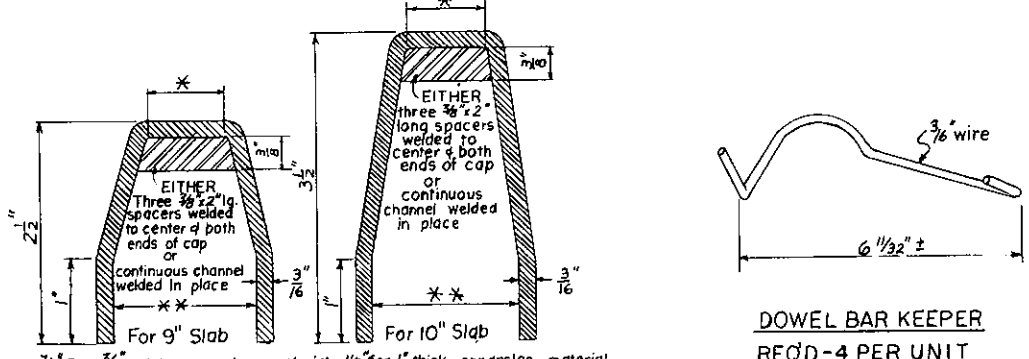
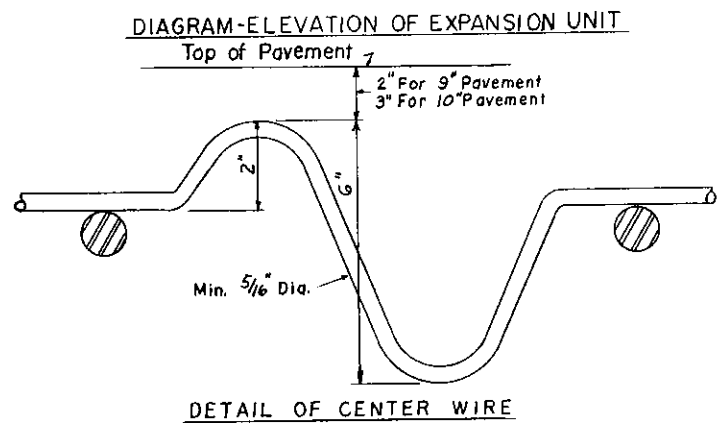
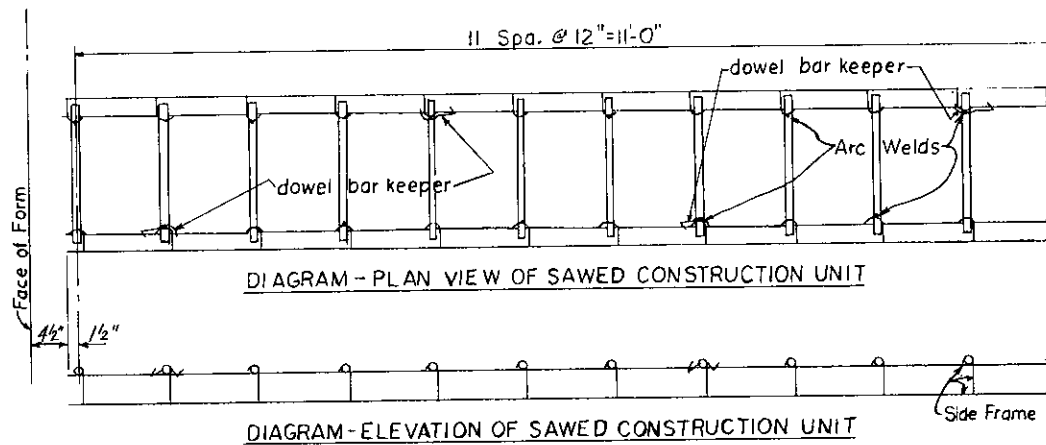
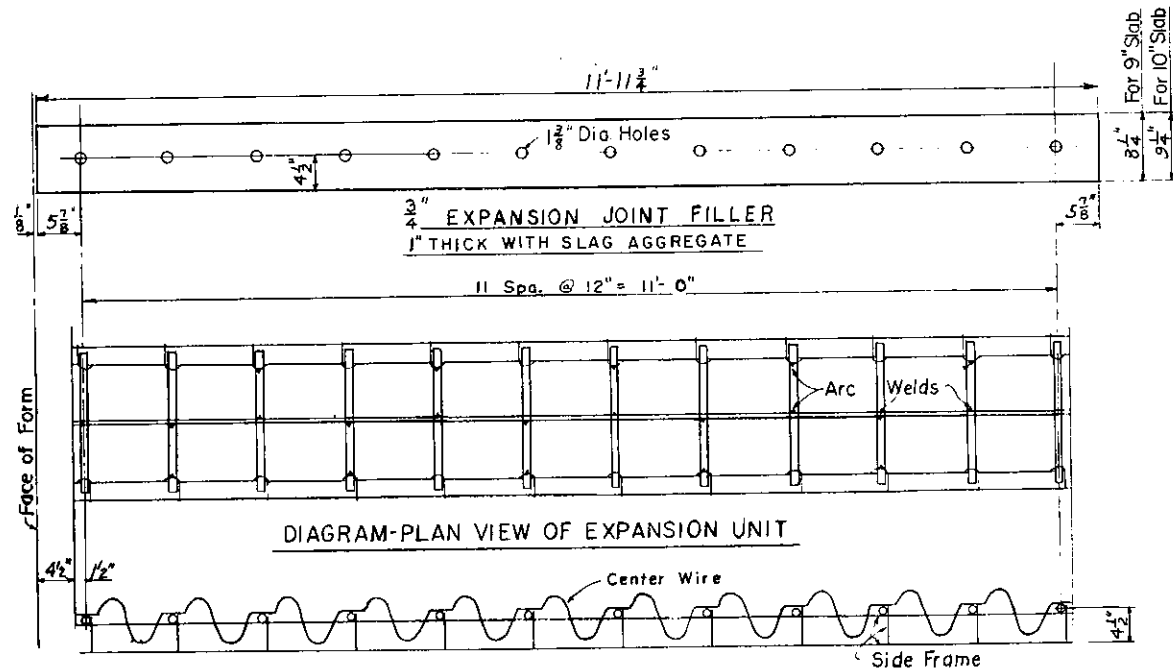
At least eight stakes shall be furnished for each assembly. They shall be placed as directed by the Engineer. Stakes shall be at least 1/2" in diameter and 15" to 18" in length.

Additional stakes shall be furnished and placed as directed by the Engineer where poor subsoil conditions are encountered during construction.

The length of stakes may be increased or decreased as directed by the Engineer, depending upon the subgrade conditions encountered.

The installing cap shall be removed after the first, or after the second pass of the finishing machine at the discretion of the Engineer.

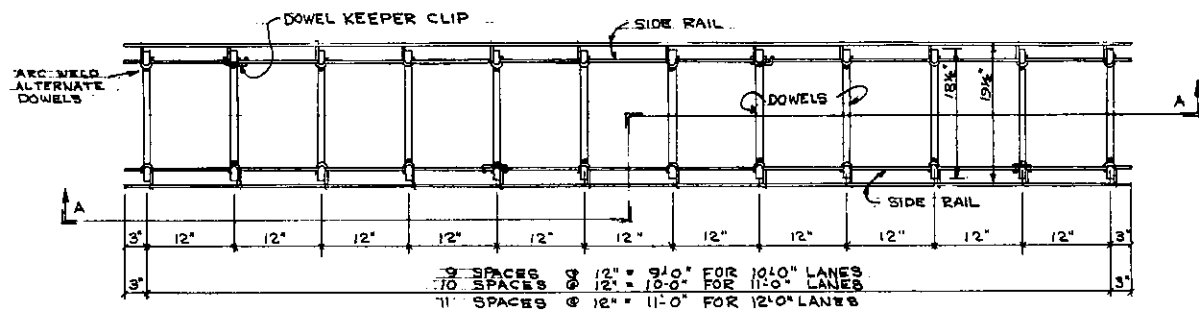
Upon removal of the installing cap, the resultant space shall be filled promptly with fresh concrete carried back from the mixer.



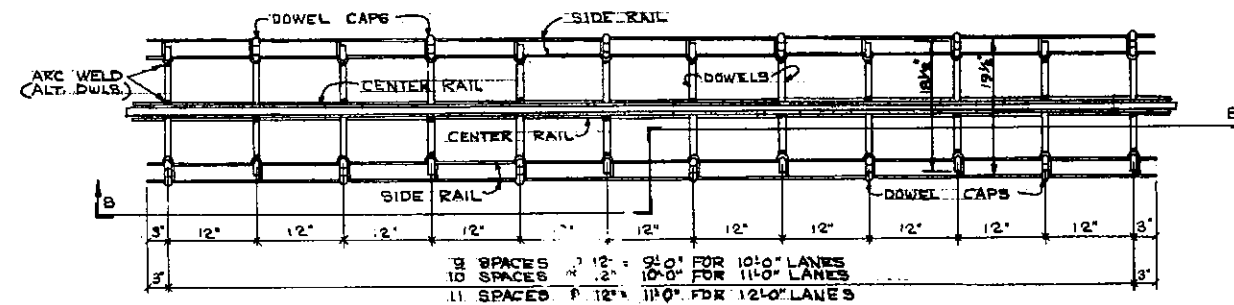
Revised to show 18" length for Dowels
 APPROVED: April 14, 1966
 M. Buckle
 CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 LOAD TRANSFER UNITS
 ASSEMBLY DETAILS - SAWED JOINT
 IN ACCORDANCE WITH DEPARTMENT STANDARD B1
 APPROVED: [Signature]
 CHIEF ENGINEER

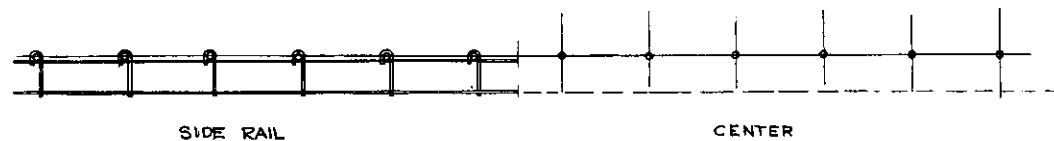
TYPE-I



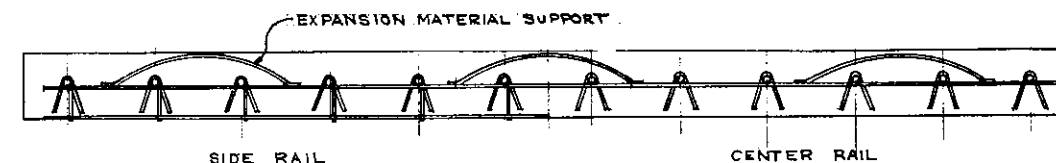
PLAN OF DOWEL UNIT



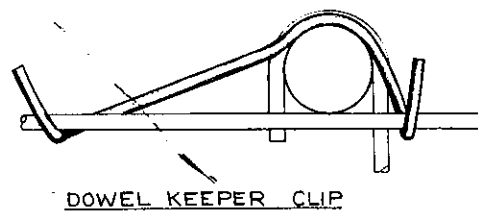
PLAN OF DOWEL UNIT



SECTION A-A



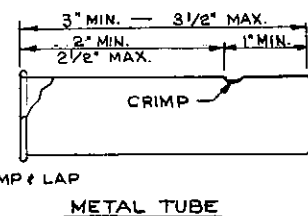
SECTION B-B



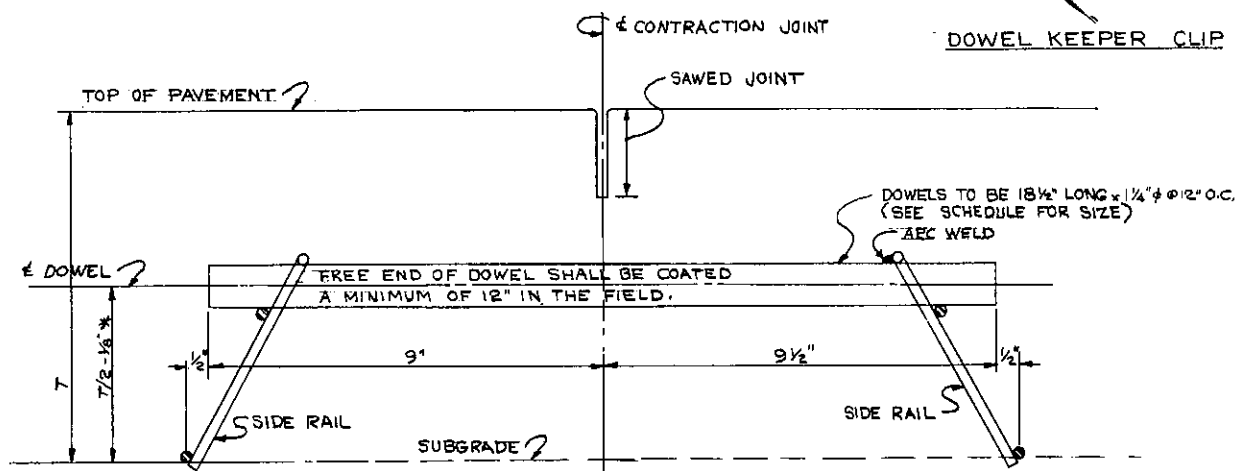
DOWEL KEEPER CLIP



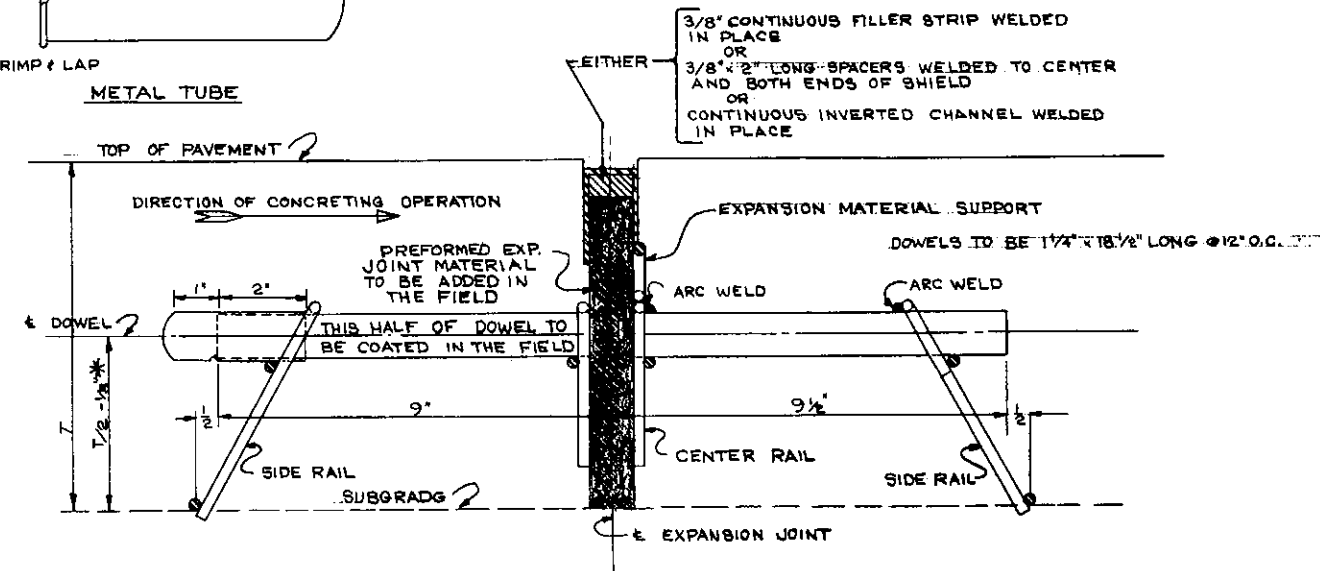
CRIMP & LAP



METAL TUBE



SECTION THRU CONTRACTION JOINT



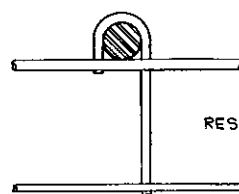
SECTION THRU EXPANSION JOINT

GENERAL NOTES :

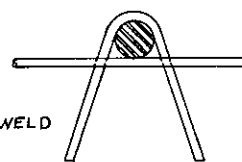
THE DIAMETER OF ALL WIRE SHALL NOT BE LESS THAN 5/16"
 THE UNITS ARE TO BE SHOP ASSEMBLED AS TO DOWELS AND SIDE RAILS AND SHIPPED NESTED.

* THE CENTER OF DOWELS SHALL BE LOCATED VERTICALLY 1/8" BELOW THE CENTER OF THE SLAB, FOR 8" AND 10" DEPTHS OF PAVING THE DISTANCE FROM SUBGRADE TO THE CENTER LINE OF DOWELS SHOWN AS 4 3/8" FOR 9" PAVING BECOMES 3 7/8" AND 4 7/8" RESPECTIVELY FOR 8" & 10" PAVING.

THE UNITS TO BE STAKED IN PLACE BY 1/2" x 18" PINS TO A DEPTH AS SUBGRADE CONDITIONS MAKE NECESSARY ALONG BOTH SIDES OF SIDE RAIL A MINIMUM OF 8 STAKES SHALL BE USED FOR EACH ASSEMBLY.



SIDE RAIL DETAIL



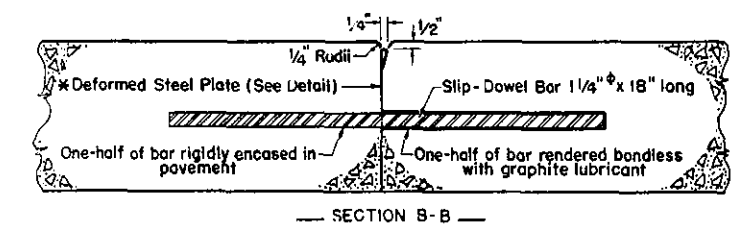
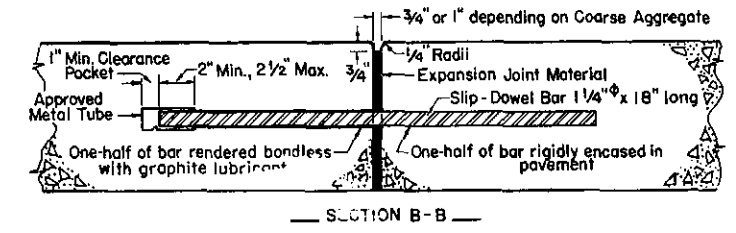
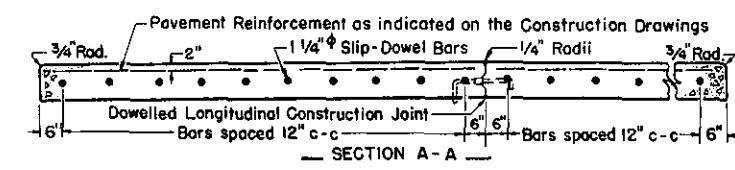
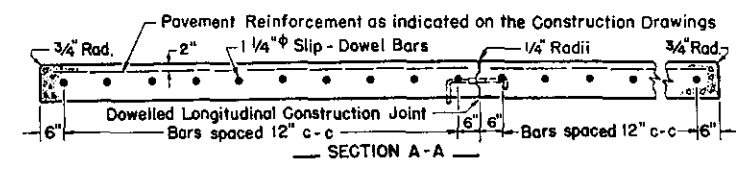
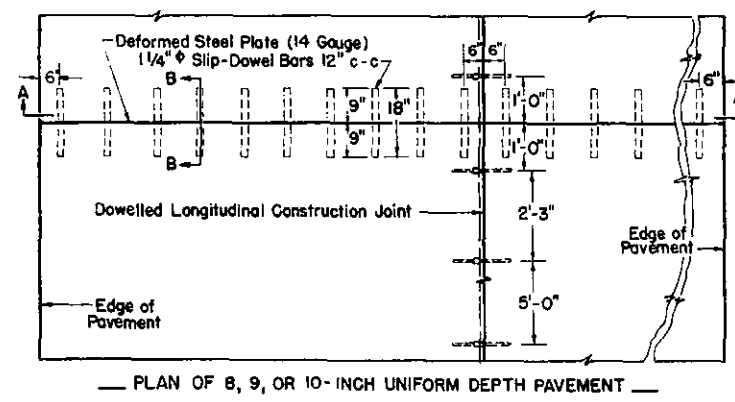
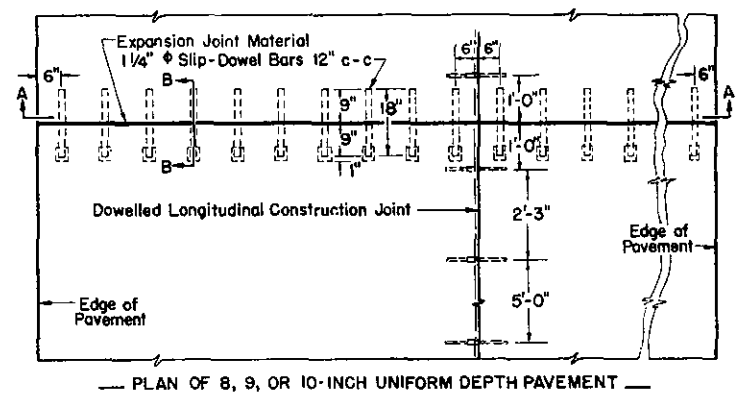
CENTER RAIL DETAIL

NOTE :

EITHER THE ABOVE EXPANSION JOINT ASSEMBLY OR TYPE E EXPANSION JOINT ASSEMBLY AS SHOWN ON ATTACHED DWG WILL BE USED

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 LOAD TRANSFER UNITS
 ASSEMBLY DETAILS - SAWED JOINT
 IN ACCORDANCE WITH DEPARTMENT STANDARD B-1
 APPROVED - Septemp. 28, 1945
 W. Anshutz
 CHIEF ENGINEER

TYPE-J



Expansion joint material shall have a minimum thickness of 1 inch if slag is used as a coarse aggregate and 3/4 of an inch if stone or gravel is used. It shall be cut to conform to the cross section of the pavement, except that the width shall be 3/4 of an inch less than the depth of the pavement, and shall be furnished in strips equal to the width of the pavement slab. The top surface shall be smooth, and holes punched for the slip-dowel bars (load transfer units) shall provide a snug fit without loss in thickness of the material.

A removable steel joint shield conforming to the crown of the pavement slab shall be used over transverse expansion joints. It shall be not thinner than 14 gauge, U.S. Std., and of sufficient stiffness to retain its shape. It shall be formed to provide a snug fit over the joint material and shall extend downward a distance of 246 feet to prevent displacement or bending of the joint material from its vertical position. The ends of the joint shield shall be bevelled as may be necessary to clear mechanical finishing equipment.

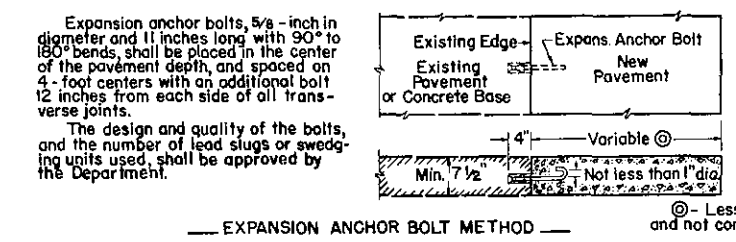
An approved metal tube shall be placed over the grouted end of all slip-dowel bars. This tube shall provide a snug fit for a distance of 2 inches and shall provide a minimum 1 inch clearance pocket assured by means of a positive spacing device.

Steel end guides shall be not thinner than 16 gauge, U.S. Std., and shall be used at each end of the joint.

In open country, joints shall be placed at normal intervals of not over 615 feet when stone or gravel is used as a coarse aggregate and of not over 492 feet when slag is used. When the normal spacing does not provide a joint within 246 feet of the P.C. and/or P.T. of a horizontal curve, a joint shall be placed at or within 61 1/2 feet of said P.C. and/or P.T. When the normal spacing provides a joint within 246 feet of the P.C. and/or P.T. of a horizontal curve, no additional joint will be required at said P.C. and/or P.T.

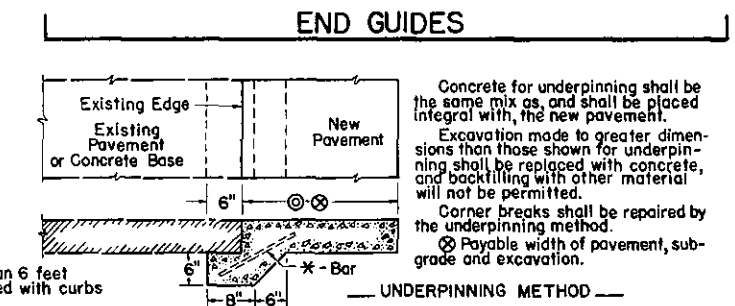
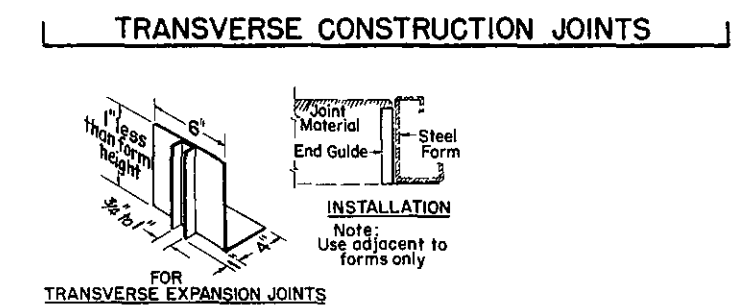
In built-up areas, joints shall be placed at normal intervals of not over 246 feet regardless of the type of coarse aggregate used. They shall be placed in the main roadway pavement opposite the P.C. and P.T. of return curves for side streets. They shall also be placed in the side street pavement opposite the P.C. and P.T. of said return curves.

Joints without load transfer units shall be placed in the paving notches provided at ends of structures, adjacent to rigid paving of railroad grade crossings and adjacent to existing rigid pavement or base course; both in open country and in built-up areas. The limits of "Open Country" and "Built-Up Areas" will be designated on the construction drawings for each project.



Either method shall be used to join new pavement which is less than 6 feet in width and not confined with curbs, except that only the underpinning method shall be used where the depth of existing pavement or concrete base is less than 7 1/2 inches. New pavement confined with curbs, or new pavement 6 feet or over in width, need not be joined. Where dowel bars are broken off or are omitted from dowelled longitudinal construction joints, either an expansion anchor bolt or a 2-foot strip of underpinning shall be used. * - This bar (#4 x 1'-6" long) is required only in underpinning where dowel bars are broken off or omitted from longitudinal construction joints. Premolded expansion joint material shall be cut to the cross section of the new pavement. Two sections of material, if satisfactorily lapped or clipped together, may be used with the underpinning method. No separate or additional payment will be allowed for materials or labor involved in joining pavement by either method.

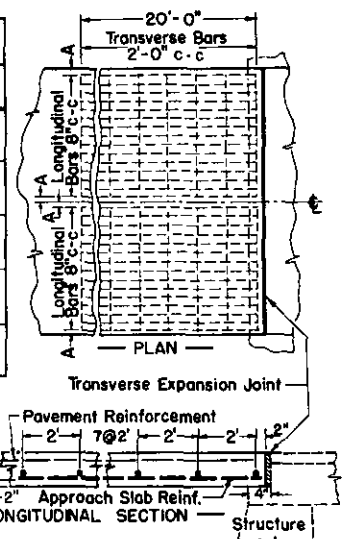
The deformed steel plate shall be furnished and placed in each transverse construction joint. It shall be not thinner than 14 gauge, U.S. Std., and free from kinks, warps, bends, etc. The ends of the plate shall be bevelled as may be necessary to clear mechanical finishing equipment and holes for slip-dowel bars (load transfer units) shall provide a reasonably snug fit. No joint shield will be required. Metal tubes will not be required on any slip-dowel bars. * The deformed steel plate shall be omitted when sawed transverse construction joints are used. Joints shall be placed both in open country and in built-up areas at intervals of not over 61 1/2 feet and at 61 1/2 feet from expansion joints.



Concrete for underpinning shall be the same mix as, and shall be placed integral with, the new pavement. Excavation made to greater dimensions than those shown for underpinning shall be replaced with concrete, and backfilling with other material will not be permitted. Corner breaks shall be repaired by the underpinning method. * Payable width of pavement, subgrade and excavation.

STEEL IN ONE APPROACH FOR ONE PAVEMENT LANE			
Width of Lane	Number of Bars	Stack for 90° Skew *	Weight Lbs.
10'	4"	11 #4 x 9'-6"	270
		15 #4 x 20'-0"	
11'	2"	11 #4 x 10'-10"	307
		17 #4 x 20'-0"	
12'	4"	11 #4 x 11'-6"	325
		18 #4 x 20'-0"	
13'	2"	11 #4 x 12'-10"	362
		20 #4 x 20'-0"	
14'	4"	11 #4 x 13'-6"	380
		21 #4 x 20'-0"	

* For other Skews: Use number of bars and spacings shown. Use 20 ft. length of longitudinal bars. Adjust length of transverse bars as necessary.



REINFORCEMENT FOR APPROACH SLABS TO STRUCTURES

GENERAL NOTES

LOAD TRANSFER UNITS FOR TRANSVERSE EXPANSION AND TRANSVERSE CONSTRUCTION JOINTS
Slip-dowel bars of the size, spacing and position shown on this drawing shall be used as load transfer units in all transverse expansion and construction joints. The center of bars shall be located vertically at least 3/2 inches below the finished pavement surface or 3/2 inches above the theoretical subgrade or between these limits as desired.

The perimeter of the free end of all slip-dowel bars in expansion and construction joints shall be a true circle and free from burrs.

One-half the length of each bar shall be rendered bondless by a coating of graphite lubricant, and this half of the bars in a transverse joint assembly may be placed all on one side of the joint or may be placed alternately on either side of said joint. The uncoated half of the bar shall be rigidly encased in the pavement.

This Standard does not indicate details for the method of supporting the slip-dowel bars required as load transfer units in all transverse expansion and transverse construction joints. A drawing (22 inches by 36 inches) showing necessary assembly details for supporting the bars in correct vertical and horizontal position for expansion and for construction joint assemblies shall be prepared by the manufacturer or his representative, and it shall be submitted to and be approved by the Chief Engineer prior to furnishing assemblies on any purchase order or for use on any contract. The drawing shall be in ink on tracing cloth.

CLEFT TYPE JOINTS
Cleft type dowelled longitudinal construction joints will not be permitted.

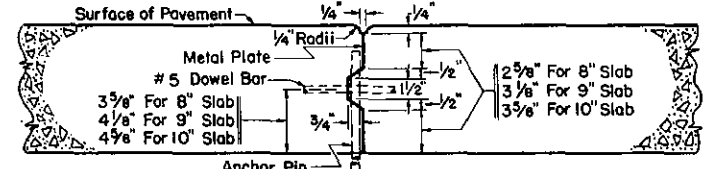
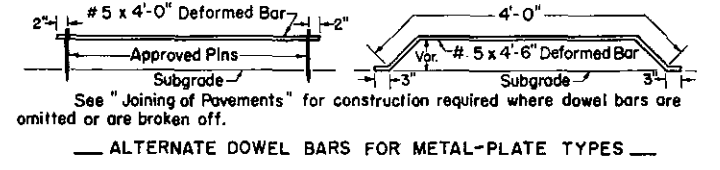
PAVEMENT WIDENING
Pavement which is 4 feet or less in width shall be reinforced longitudinally with two (2) #5 bars, each placed and held securely by an approved method 4 inches from the edges and 2 inches below the surface of the pavement. The minimum lap of bars shall be 12 inches.

Pavement which is more than 4 feet in width shall be reinforced with the approved type required on the construction drawings, or specified, for the project.

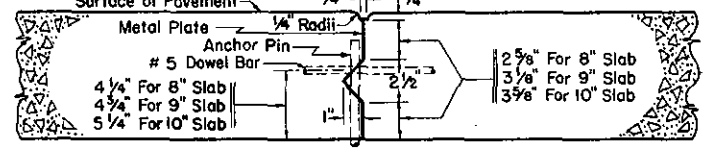
Transverse expansion joints shall be placed opposite existing expansion joints except that they shall not be closer than 6 1/2 feet. Transverse construction joints shall be placed opposite existing construction joints, cleft-type joints or cracks except that they shall not be closer than 31 feet to adjacent transverse expansion or construction joints.

- Revised for omission of deformed steel plate at sawed joints. *W. A. Duckert* CHIEF ENGINEER
- Approved February 23, 1966
- Revised to require 1 1/4" x 18" long Slip-Dowel Bars in Transverse Expansion and Construction Joints. *C. Owen Beckler* ASST. CHIEF ENGINEER'S DESIGN
- Approved March 28, 1962
- Revised for Dowelled Longitudinal Construction Joints, Transverse Construction Joints and General Notes (4th note). *W. A. Duckert* CHIEF ENGINEER
- Approved Sept. 15, 1954
- Revised for Graphite Lubricant, Width of Expansion Joint Material, Deletion of End Guides for Transverse Construction Joints, etc. *W. A. Duckert* CHIEF ENGINEER
- Approved January 20, 1953
- Revised for Single Lane Construction B for Deletion of Cleft Type Longitudinal Joints. *W. A. Duckert* CHIEF ENGINEER
- Approved September 9, 1949

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
REINFORCED CEMENT CONCRETE PAVEMENT
APPROVED *W. A. Duckert* 15, 1947
CHIEF ENGINEER

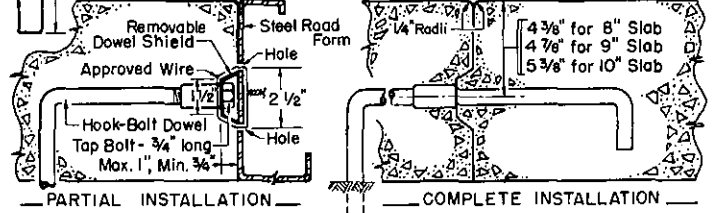
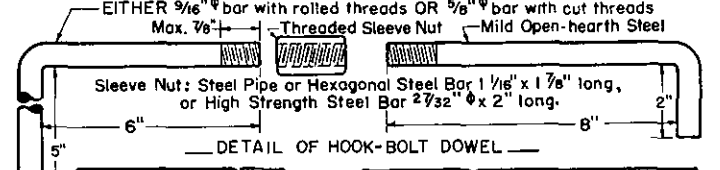


NOTE: - In lieu of the indicated # 5 dowel bar, the Department will permit the use of the Hook-Bolt dowel with the above type metal plate.



Anchor pins shall be steel or iron; either 1/2-inch rods or pressed metal not less than 12 gauge, U.S. Std., of approved design. Pins shall be satisfactorily pointed, and be not less than 10 inches nor more than 15 inches in length. Pins shall be spaced 2 1/2 feet center to center, with a pin in each end of each metal plate.

The metal plate shall be steel or iron not thinner than 14 gauge, U.S. Std., and be furnished in sections (continuous strips) without welds or laps. Each section shall provide a laying length of 15 feet and have approved connections. The width shall be 1/4-inch less than the depth of the pavement and shall be punched for dowel bars and anchor pins in an approved manner, five (5) dowel bar holes and seven (7) sets of anchor pin holes to each section.

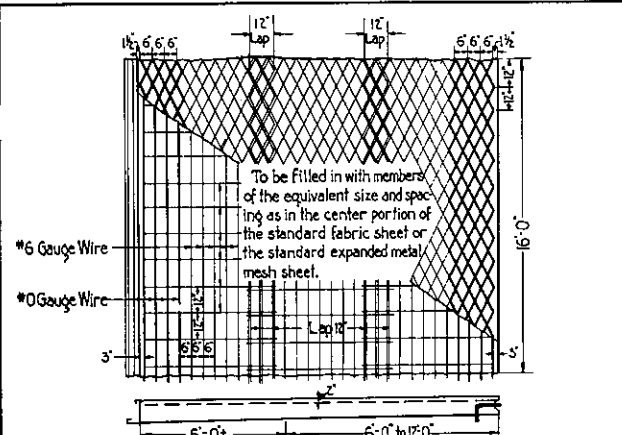


The assembled dowel shall withstand a minimum load of 15,000 pounds. The 5' leg of the dowel will extend into the subgrade for all pavement depths. The dowel shield shall stop 6" to 8" each side of all transverse joints. The removable dowel shield, either steel or iron not thinner than 16 gauge, U.S. Std., shall be securely wired to the steel forms. Holes in the shield shall be punched so as to permit the placing of the hook bolt dowels in the shield at the required spacings. Two holes shall be provided in the roadway forms 2 1/2' apart vertically, for wiring the dowel bar shield in the slab, with a maximum horizontal spacing of 3 feet between sets of holes.

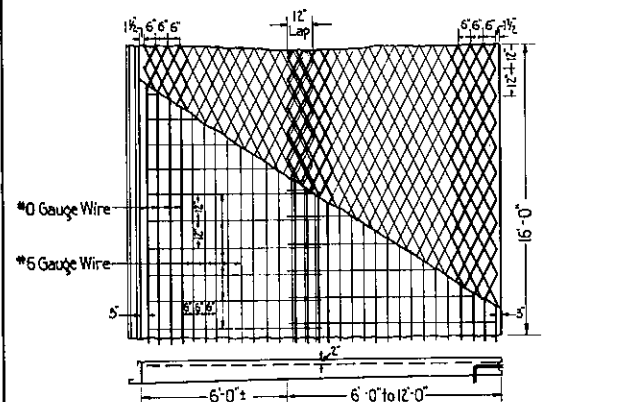
HOOK-BOLT DOWEL & REMOVABLE DOWEL SHIELD FOR CONSTRUCTION OF ONE LANE AT A TIME

DOWELLED LONGITUDINAL CONSTRUCTION JOINTS

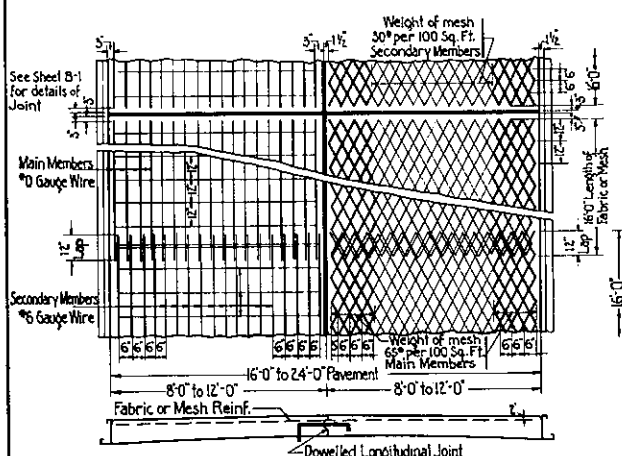
JOINING OF PAVEMENTS



METHOD OF PLACING FABRIC OR EXPANDED METAL MESH WHERE THE WIDTH OF SLAB IS MORE THAN STANDARD WIDTH BY SPLITTING THE STANDARD SHEET AND SPREADING THE EDGE SECTIONS



METHOD OF PLACING FABRIC OR EXPANDED METAL MESH WHERE THE WIDTH OF SLAB VARIES FROM THE STANDARD WIDTH, BY ADDING ALONG ONE EDGE THE REQUIRED PORTION OF A FABRIC SHEET OR EXPANDED METAL MESH SHEET WITH THE HEAVY EDGE MEMBERS ADJACENT TO THE EDGE OF THE SLAB. THE SAME METHOD OF PLACING FABRIC OR EXPANDED METAL MESH WILL BE USED FOR SLABS LESS THAN STANDARD WIDTH UNLESS SPECIAL SHEETS FOR REQUIRED WIDTH ARE FURNISHED

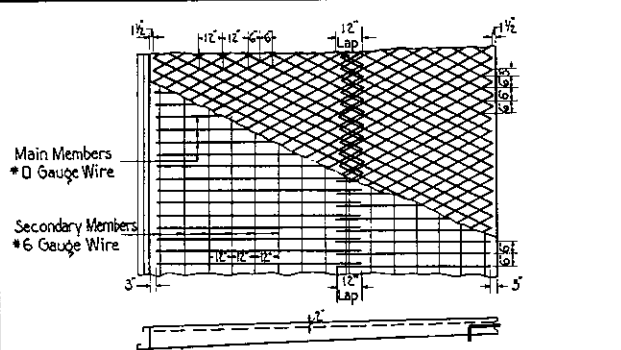


METHOD OF LAPPING FABRIC OR EXPANDED METAL MESH PERPENDICULAR TO ϕ OF ROAD

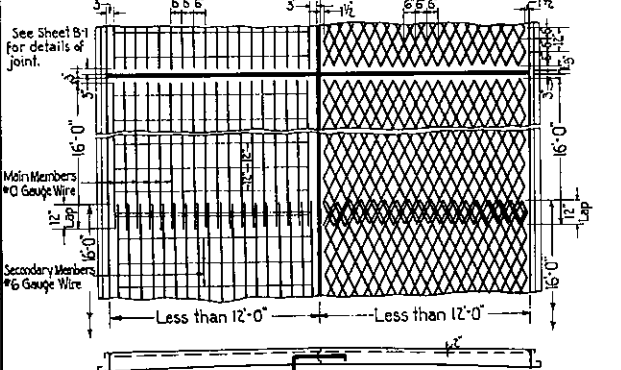
FABRIC REINFORCEMENT NOTES
 Fabric Reinforcement shall consist of members rigidly attached at all joints or points of intersection.
 The size and spacing of main and secondary members shall be as shown on this drawing.
 The minimum lap of fabric shall be twelve (12) inches from end to end of the wires measured along the line of the lap of the wires.

EXPANDED METAL MESH REINFORCEMENT NOTES
 The diamonds in the mesh shall be twelve (12) inches long and not less than five (5) inches nor more than six and one half (6 1/2) inches in width.
 The weight and spacing of main and secondary members shall be as shown on this drawing.
 The minimum lap of Expanded Metal Mesh Reinforcement shall be twelve (12) inches or two (2) diamonds transversely and twelve (12) inches or one (1) diamond longitudinally.

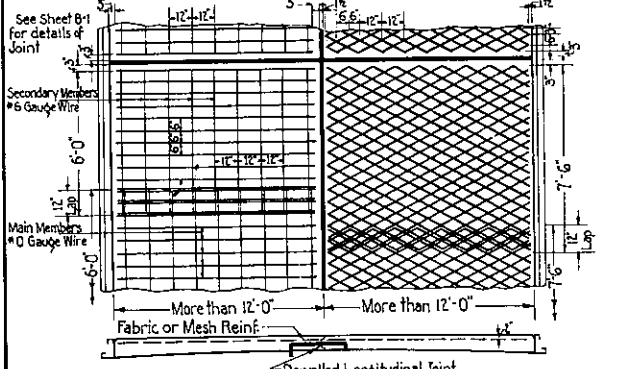
TYPE A REINFORCEMENT - FABRIC OR EXPANDED METAL MESH



LAPPING REINFORCEMENT PARALLEL TO ϕ OF ROAD



LAPPING REINFORCEMENT AT RIGHT-ANGLES TO ϕ OF ROAD

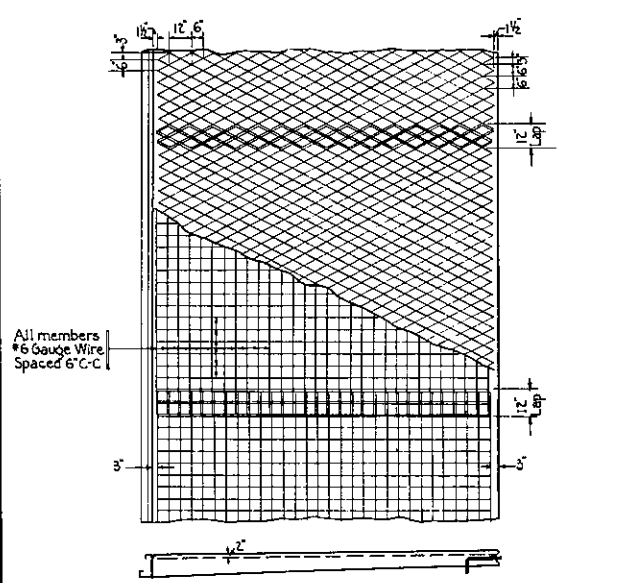


LAPPING REINFORCEMENT AT RIGHT-ANGLES TO ϕ OF ROAD

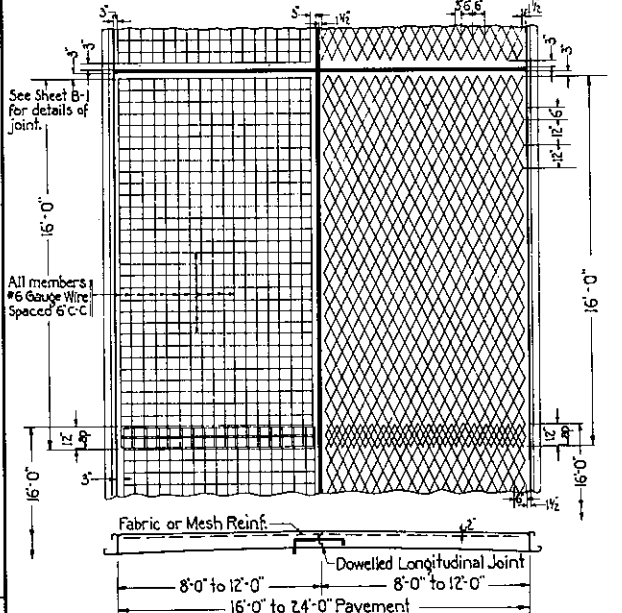
FABRIC REINFORCEMENT NOTES
 Fabric Reinforcement shall consist of members rigidly attached at all joints or points of intersection and shall have an effective weight of not less than sixty-five (65) pounds per one-hundred (100) square feet.
 The size and spacing of main and secondary members shall be as shown on this drawing.
 The Fabric Reinforcement shall be placed in slabs twelve (12) feet or more in width, with the main members at right-angles to the center line of the roadway and the secondary members parallel to the center line of the roadway. In slabs less than twelve (12) feet in width, the main members may be placed parallel to the center line of the roadway and the secondary members at right-angles to the center line of the roadway.
 The minimum lap of Fabric shall be twelve (12) inches from end to end of the wires measured along the line of the lap of the wires.

EXPANDED METAL MESH REINFORCEMENT NOTES
 The Expanded Metal Mesh Reinforcement shall have an effective weight of not less than sixty-five (65) pounds per one-hundred (100) square feet.
 The diamonds in the mesh shall be twelve (12) inches long and not less than five (5) inches nor more than six and one-half (6 1/2) inches in width.
 The Expanded Metal Mesh Reinforcement shall be placed in slabs twelve (12) feet or more in width with the twelve (12) inch length of diamonds at right-angles to the center line of the roadway. In slabs less than twelve (12) feet in width, the twelve (12) inch length of the diamonds may be placed parallel to the center line of the roadway.
 The minimum lap of the Expanded Metal Mesh Reinforcement shall be two (2) diamonds transversely or one (1) diamond longitudinally as shown.

TYPE C REINFORCEMENT - FABRIC OR EXPANDED METAL MESH



METHOD OF PLACING FABRIC OR EXPANDED METAL MESH WHERE THE WIDTH OF SLAB IS MORE THAN TEN FEET

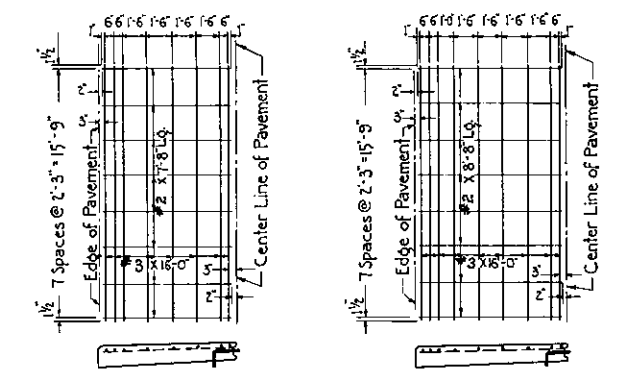


METHOD OF LAPPING FABRIC OR EXPANDED METAL MESH AT RIGHT-ANGLES TO ϕ OF ROAD

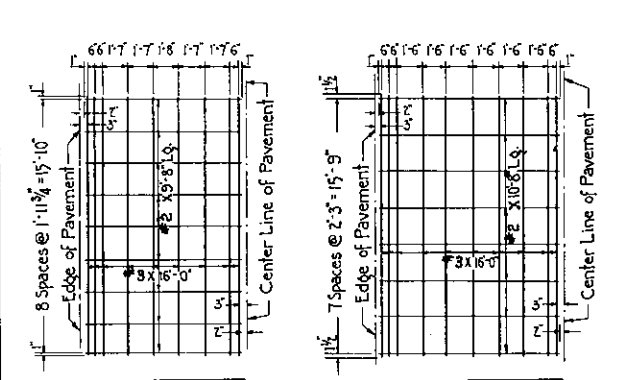
FABRIC REINFORCEMENT NOTES
 Fabric Reinforcement shall consist of members rigidly attached at all joints or points of intersection and shall have an effective weight of not less than forty-two (42) pounds per one-hundred (100) square feet.
 The diamonds in the mesh shall be twelve (12) inches long and not less than five (5) inches nor more than six and one-half (6 1/2) inches in width.
 The minimum lap of Fabric shall be twelve (12) inches measured from end cross wires.

EXPANDED METAL MESH REINFORCEMENT NOTES
 The Expanded Metal Mesh Reinforcement shall have an effective weight of not less than forty-two (42) pounds per one-hundred (100) square feet.
 The diamonds in the mesh shall be twelve (12) inches long and not less than five (5) inches nor more than six and one-half (6 1/2) inches in width.
 The minimum lap of Expanded Metal Mesh Reinforcement shall be twelve (12) inches.

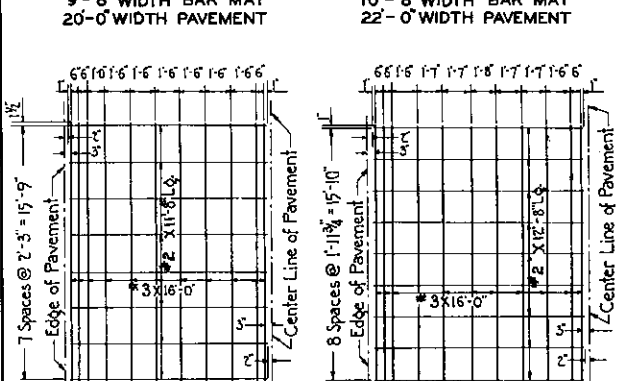
TYPE E REINFORCEMENT - FABRIC OR EXPANDED METAL MESH



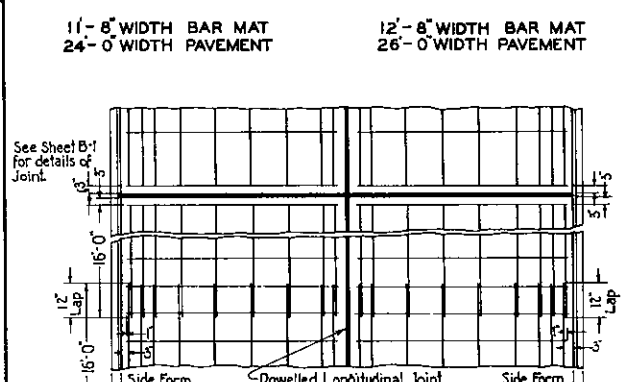
7'-8" WIDTH BAR MAT
16'-0" WIDTH PAVEMENT



8'-8" WIDTH BAR MAT
16'-0" WIDTH PAVEMENT



9'-8" WIDTH BAR MAT
20'-0" WIDTH PAVEMENT

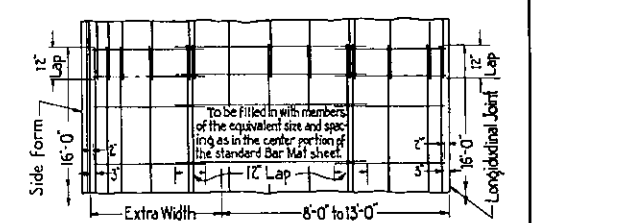


11'-8" WIDTH BAR MAT
24'-0" WIDTH PAVEMENT

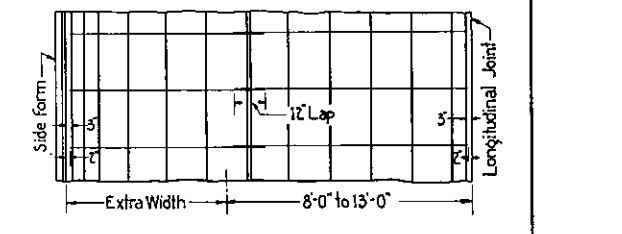


12'-8" WIDTH BAR MAT
26'-0" WIDTH PAVEMENT

METHOD OF LAPPING BAR MAT PERPENDICULAR TO ϕ OF ROAD
TYPE D REINFORCEMENT - BAR MAT



METHOD OF PLACING BAR MAT WHERE THE WIDTH OF SLAB IS MORE THAN THE STANDARD WIDTH, BY SPLITTING THE STANDARD MAT AND SPREADING TO EDGE SECTIONS



METHOD OF PLACING BAR MAT WHERE THE WIDTH OF SLAB IS MORE THAN THE STANDARD WIDTH, BY ADDING ALONG ONE EDGE THE REQUIRED PORTION OF MAT WITH THE THREE SIX (6) INCH SPACED BARS AT THE OUTER EDGE OF THE PAVEMENT. THIS SAME METHOD OF PLACING MATS WILL BE USED FOR SLABS LESS THAN THE REQUIRED WIDTH UNLESS SPECIAL MATS FOR REQUIRED WIDTH ARE FURNISHED.

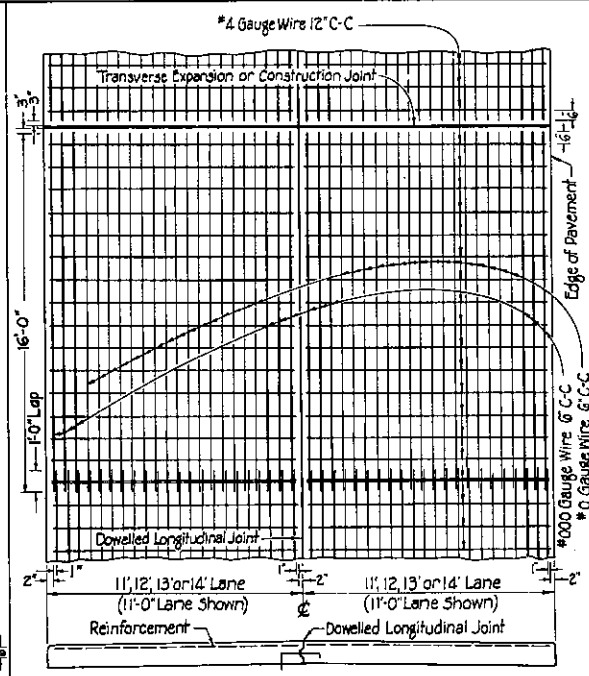
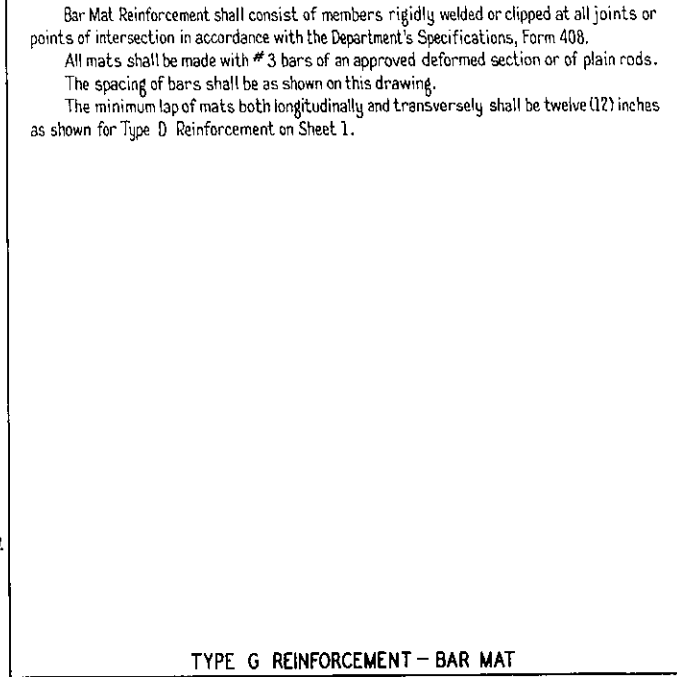
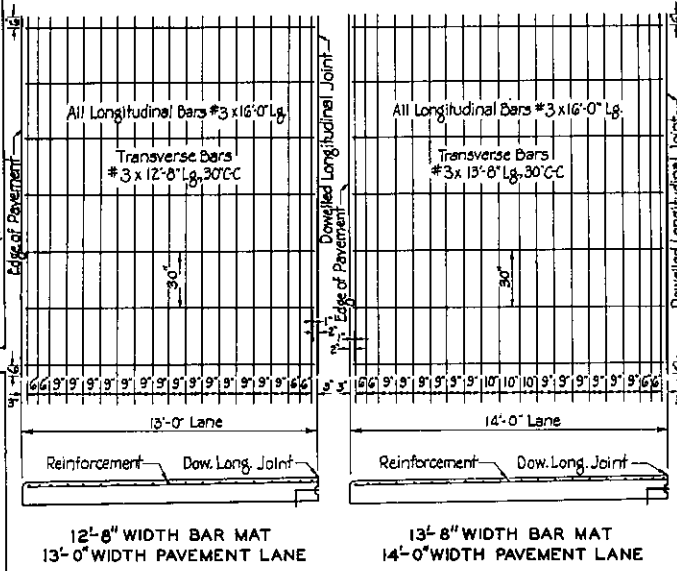
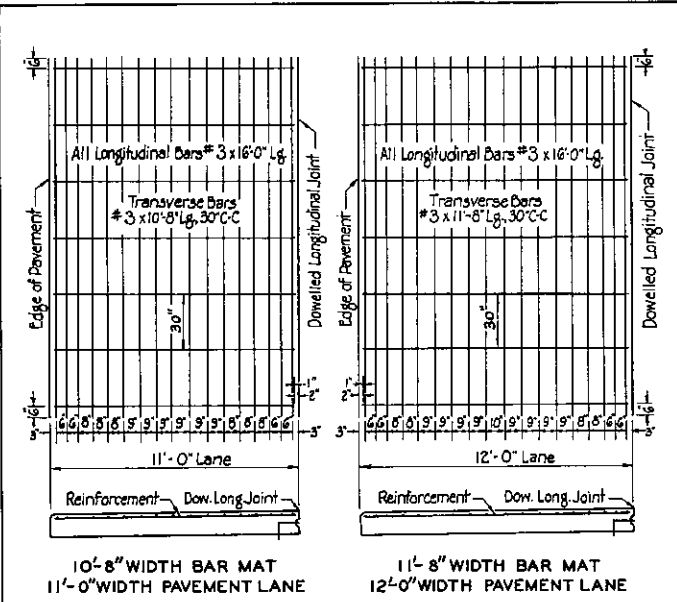
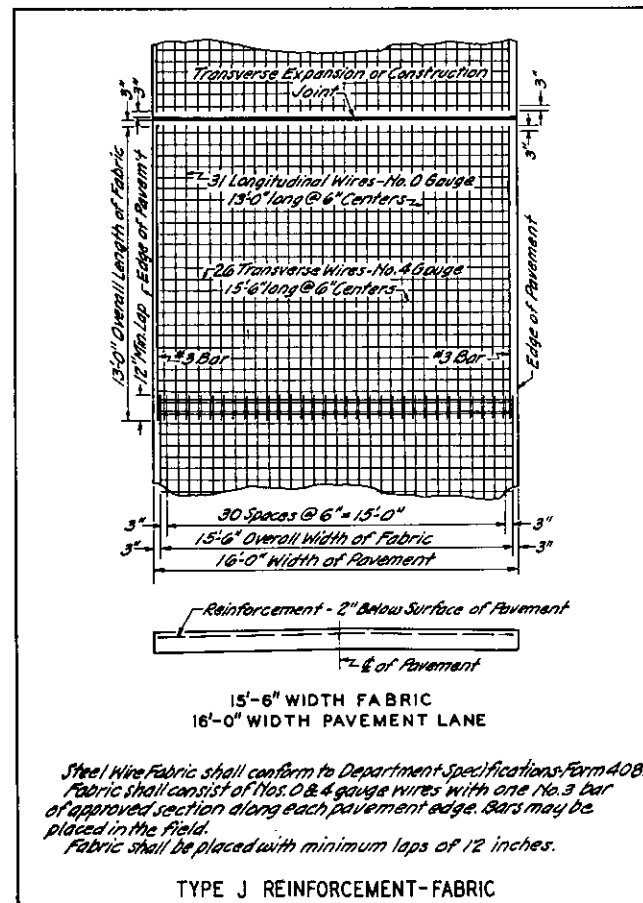
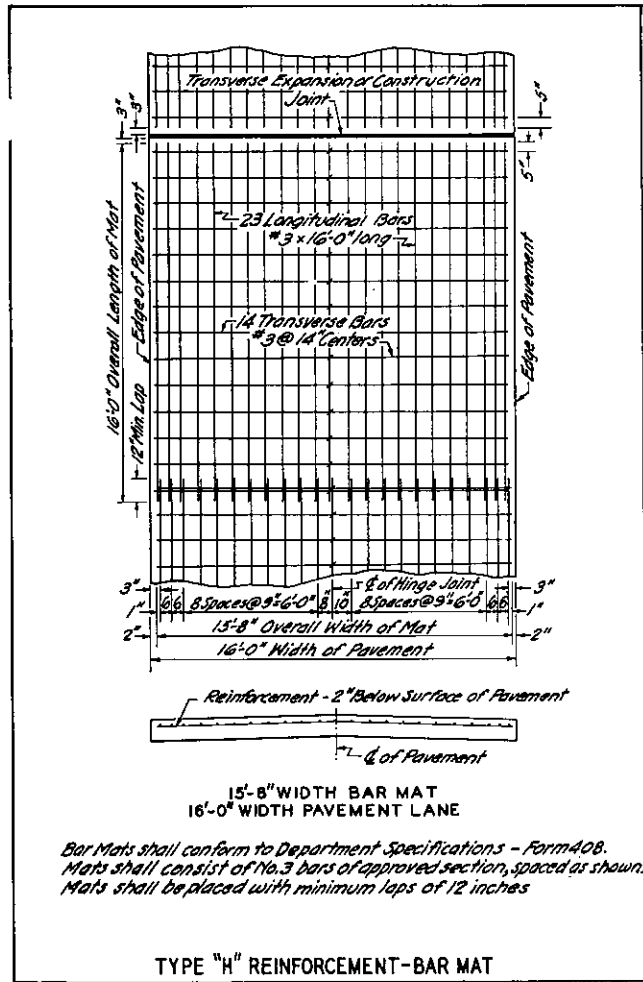
BAR MAT REINFORCEMENT NOTES
 Bar Mat Reinforcement shall consist of members rigidly welded or clipped at all joints or points of intersection in accordance with the Department's Specifications, Form 408.
 The size and spacing of main and secondary members shall be as shown on this drawing.
 All mats shall be made with bars of an approved deformed section or of plain rods.
 The minimum lap of the mats both longitudinally and transversely shall be twelve (12) inches as shown.

GENERAL NOTES

All types of reinforcement may be furnished with an approved type of hinged joint. The spacing of longitudinal members affected by the hinge shall not vary more than 1 inch from the spacings shown on these drawings. The hinge shall be placed parallel to the ϕ of the pavement.
 All types of reinforcement, if not assembled on the project, shall be delivered in flat sheets of the indicated dimensions at the site of the work.
 For variable width pavement and for widths not shown, the mats, sheets or mesh shall be cut as required and placed with the closely spaced or heavy members adjacent to the pavement edges.

Revised for addition of Sheet 5: Types F, B, J Reinf.-Fabric, Hinged.
 Approved April 3, 1952
 J. P. ...
 DEPUTY SECRETARY - ENGINEERING

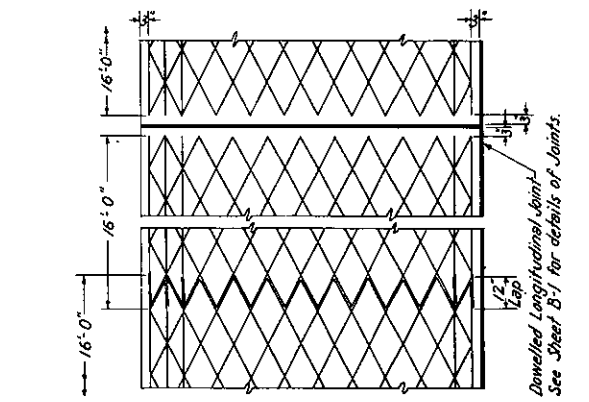
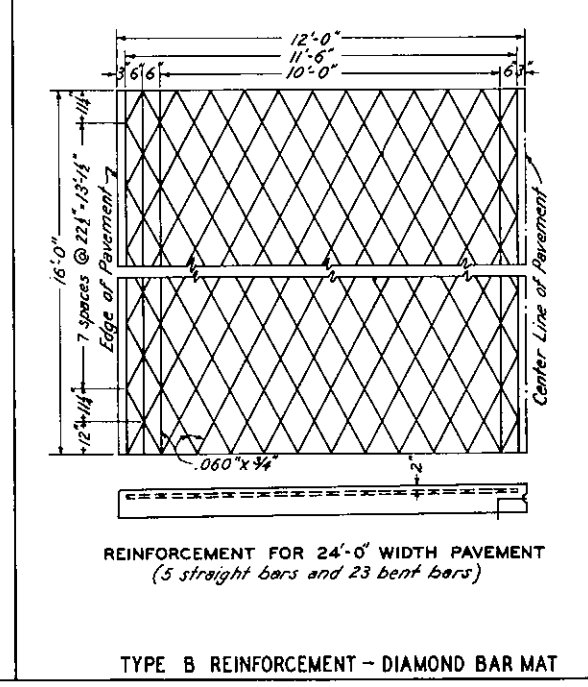
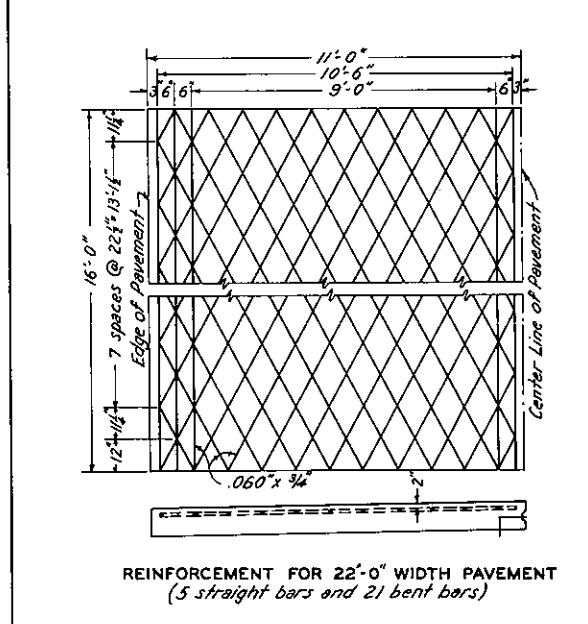
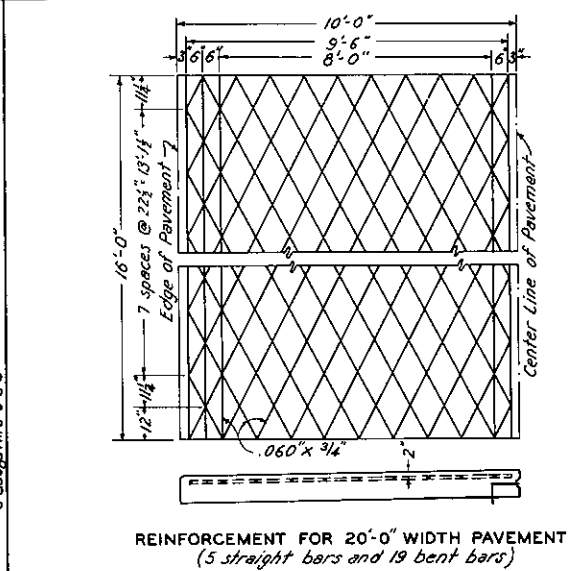
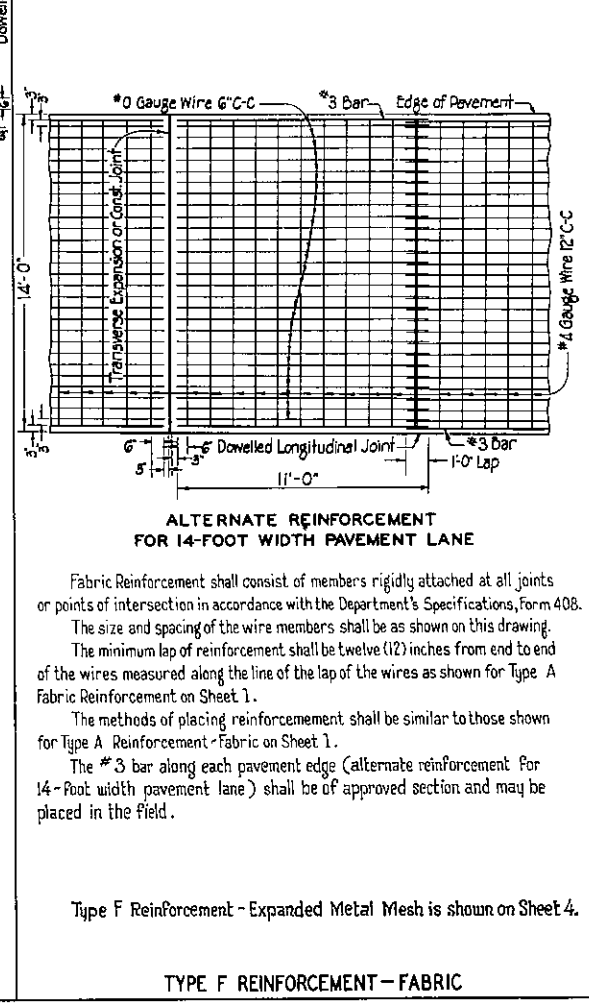
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
STANDARD TYPES OF REINFORCEMENT
 APPROVED May 1, 1958
 Robert A. Farney, Sr.
 CHIEF ENGINEER



The number and spacing of #4 and #000 gauge wires for 11-foot, 12-foot, 13-foot and 14-foot width of pavement lanes shall be as shown above.

11-foot width lane	requires sixteen (16) #0 gauge wires 6'-0" C-C
12 "	" " " " eighteen (18) " " " "
13 "	" " " " twenty (20) " " " "
14 "	" " " " twenty-two (22) " " " "

REINFORCEMENT AND METHOD OF LAPPING AT RIGHT-ANGLES TO CL OF ROAD



DIAMOND BAR MAT REINFORCEMENT NOTES

Diamond Bar Mat Reinforcement shall consist of rectangular bars rigidly clipped at all joints or points of intersection in accordance with the Department's Specifications, Form 408. The size and spacing of the bars shall be as shown. The minimum lap of the mats shall be twelve (12) inches as shown. For pavements over twenty-four (24) feet in width two (2) additional bent bars shall be used for each additional foot of half width of pavement. Type B Reinforcement if not assembled on the work shall be delivered in flat sheets sixteen (16) feet in length.

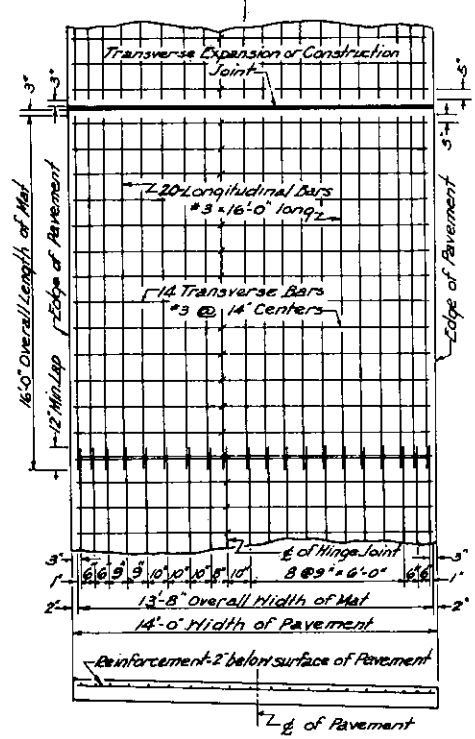
NOTES

The methods of placing Types G and H reinforcement shall be similar to those shown for Type D on Sheet 1.

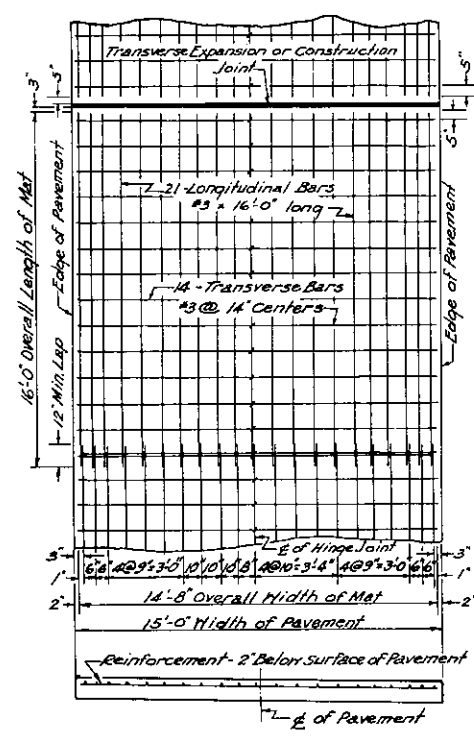
Type F reinforcement - expanded metal mesh is shown on Sheet 4.

Types H and J reinforcement shown on this sheet are for use with 16-foot width pavement lanes without longitudinal joint. Types H and J reinforcement for 14-foot, 15-foot, 17-foot and 18-foot width pavement lanes are shown on Sheet 3.

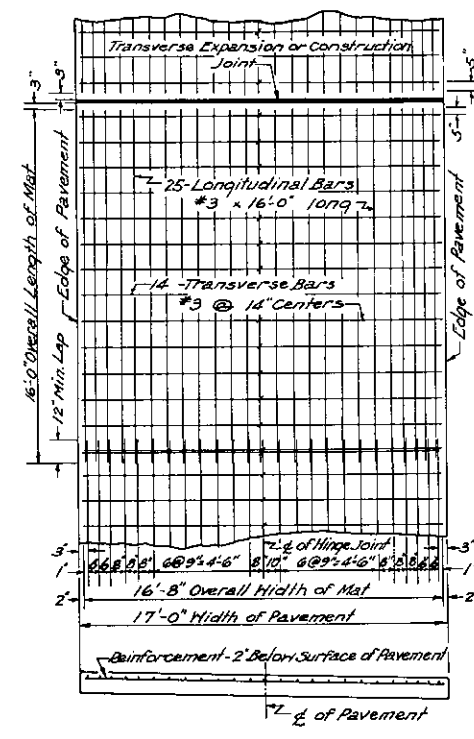
Types F and J reinforcement with approved hinges are shown on Sheet 5.



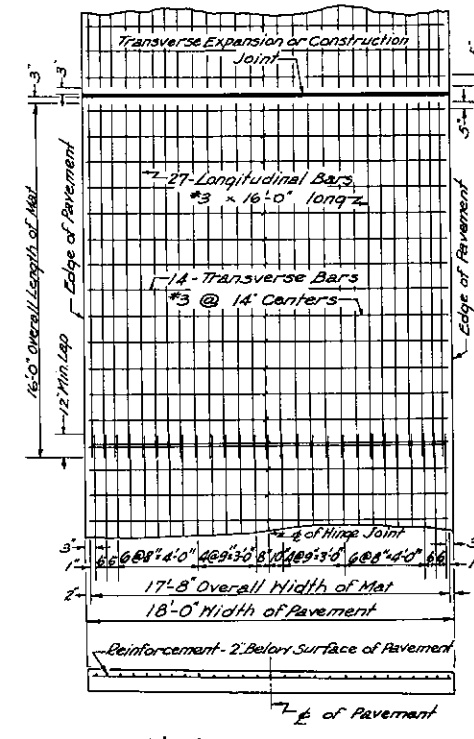
13'-6" WIDTH BAR MAT
14'-0" WIDTH PAVEMENT LANE



14'-8" WIDTH BAR MAT
15'-0" WIDTH PAVEMENT LANE

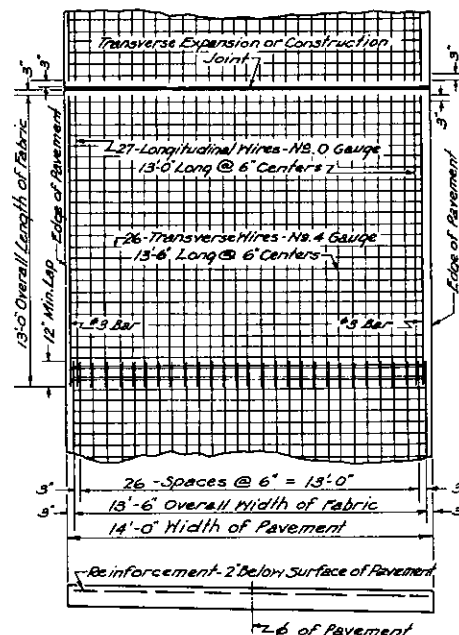


16'-8" WIDTH BAR MAT
17'-0" WIDTH PAVEMENT LANE

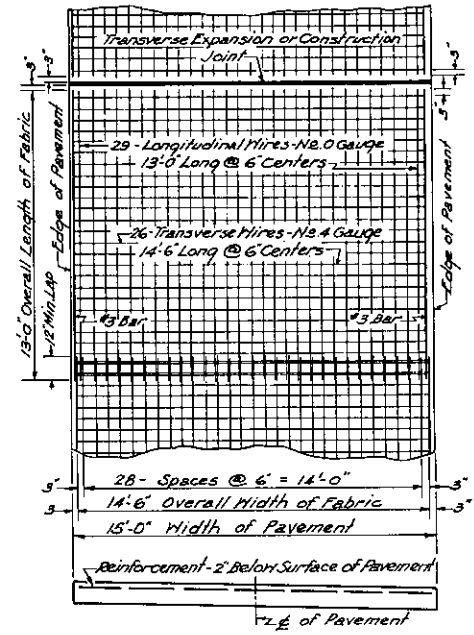


17'-8" WIDTH BAR MAT
18'-0" WIDTH PAVEMENT LANE

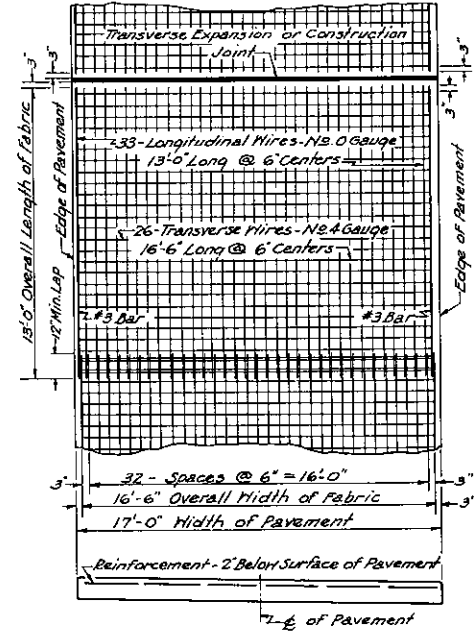
TYPE H REINFORCEMENT - BAR MAT



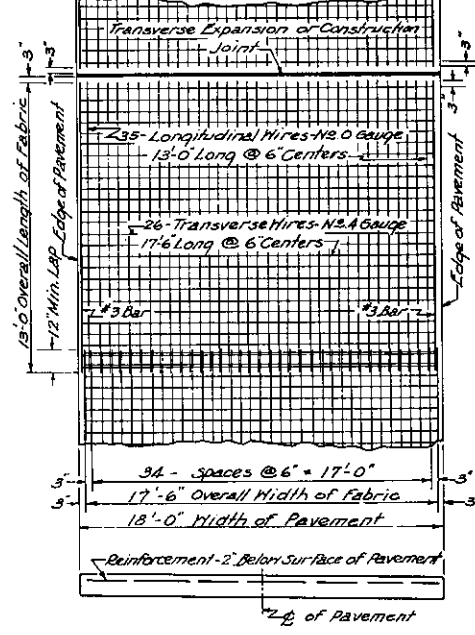
13'-6" WIDTH FABRIC
14'-0" WIDTH PAVEMENT LANE



14'-6" WIDTH FABRIC
15'-0" WIDTH PAVEMENT LANE



16'-6" WIDTH FABRIC
17'-0" WIDTH PAVEMENT LANE



17'-6" WIDTH FABRIC
18'-0" WIDTH PAVEMENT LANE

TYPE J REINFORCEMENT - FABRIC

NOTES

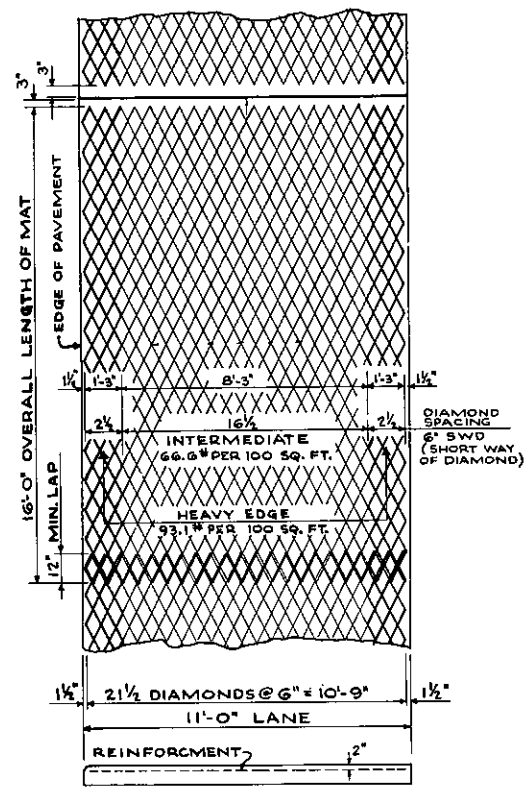
Types H and J reinforcement are for use with 14-foot, 15-foot, 16-foot, 17-foot and 18-foot width pavement lanes without longitudinal joint.

Types H and J reinforcement for 16-foot width pavement lane are shown on Sheet 2.

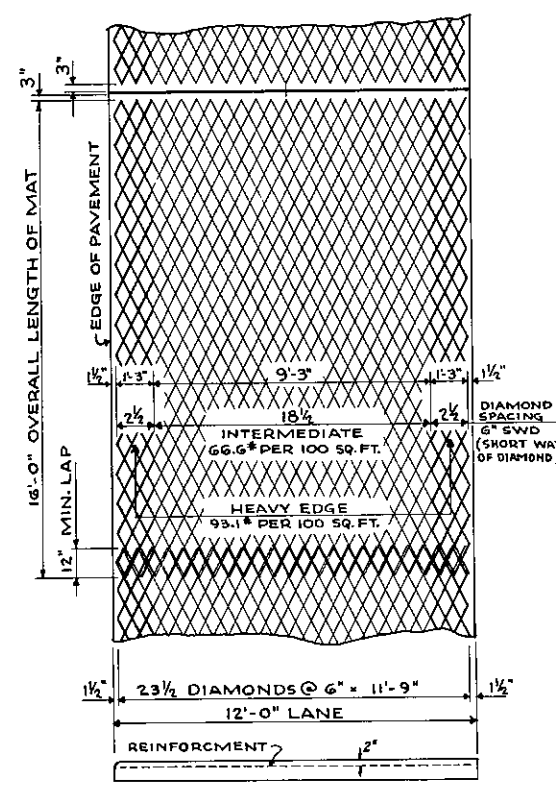
Type H - Bar Mat:
Bar mats shall conform to Department Specifications - Form 408.
Mats shall consist of No. 3 bars of approved section spaced as shown.
Mats shall be placed with minimum laps of 12 inches.

Type J - Fabric:
Steel wire fabric shall conform to Department Specifications - Form 408.
Fabric shall consist of Nos. 4 and 6 gauge wires spaced as shown with one No. 3 bar of approved section along each pavement edge.
Bars may be placed in the field.
Fabric shall be placed with minimum laps of 12 inches.
Fabric with approved hinges is shown on Sheet 5.

STANDARD TYPES OF REINFORCEMENT

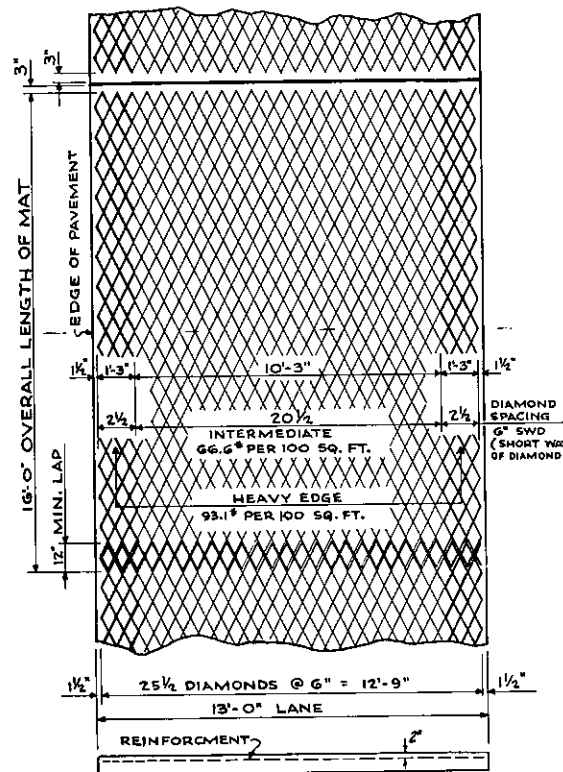


10'-9" WIDTH EXPANDED METAL
11'-0" WIDTH PAVEMENT LANE

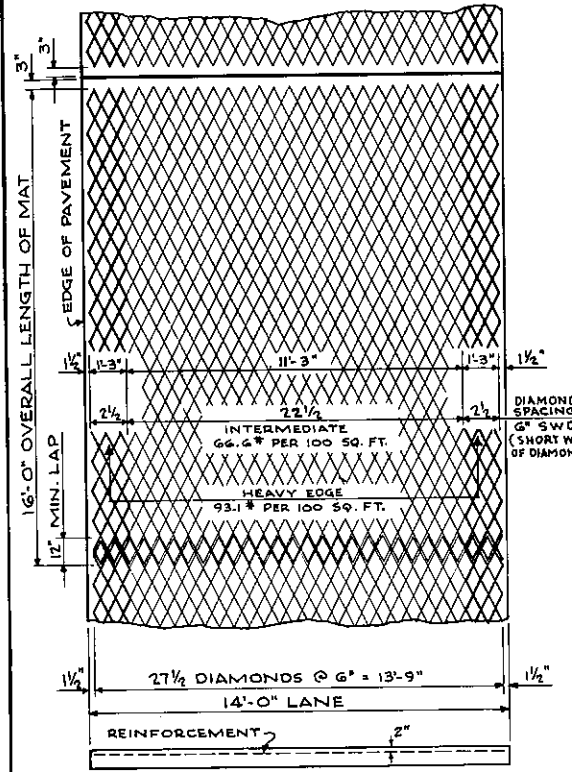


11'-9" WIDTH EXPANDED METAL
12'-0" WIDTH PAVEMENT LANE

TYPE F REINFORCEMENT-EXPANDED METAL MESH



12'-9" WIDTH EXPANDED METAL
13'-0" WIDTH PAVEMENT LANE



13'-9" WIDTH EXPANDED METAL
14'-0" WIDTH PAVEMENT LANE

NOTES

TYPE F - EXPANDED METAL MESH:

Where Type F reinforcement is indicated on the drawings or specified, either Type F expanded metal mesh or Type F fabric (wire-as shown on Sheet 2) may be used.

The diamonds of the mesh shall be 12 inches long and not less than 5 nor more than 6 1/2 inches in width. The weights shall be not less than those shown. The minimum lap shall be 12 inches or 1 diamond longitudinally as shown.

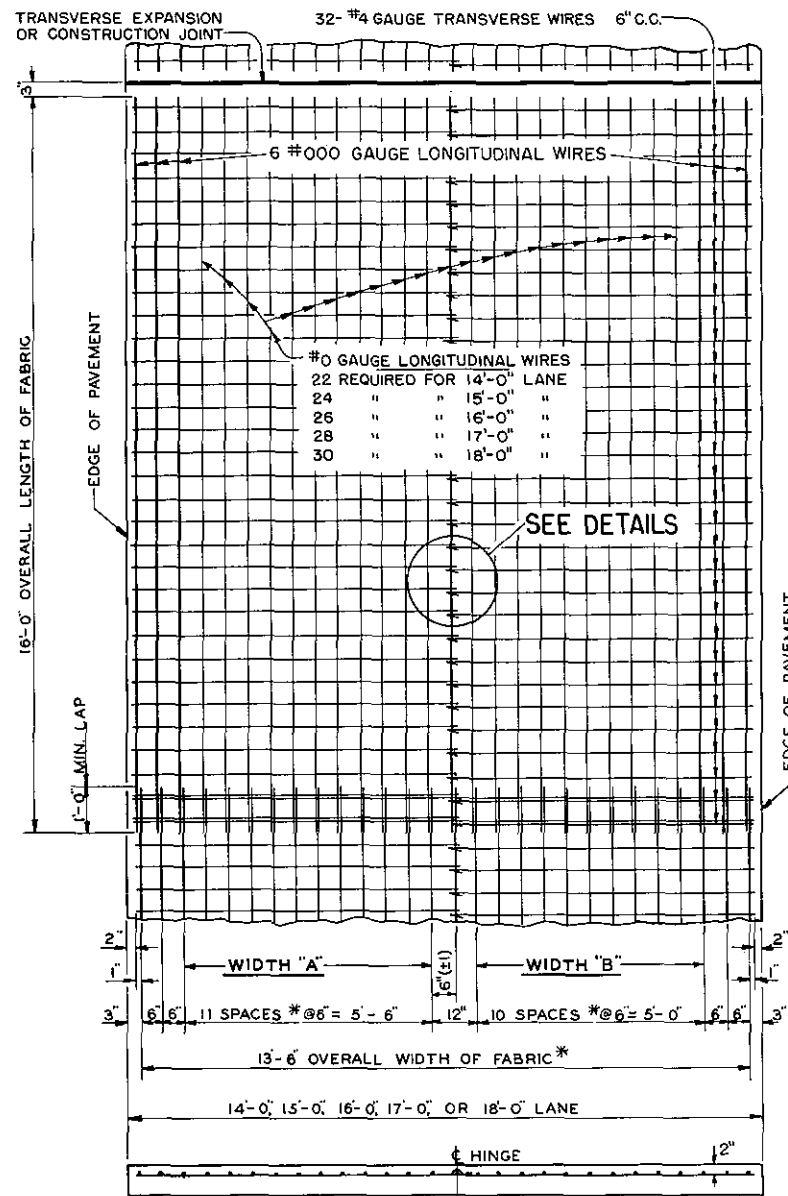
Mesh shall be placed with minimum laps of 12 inches.

**STANDARD TYPES
OF REINFORCEMENT**

SHEET
4 OF 5

April 2, 1959
May 1, 1959

B-2



*FOR 14'-0" WIDTH LANE; FOR OTHER WIDTHS - SEE TABULATION

TYPE J REINFORCEMENT-FABRIC, HINGED

WHERE LANES WIDER THAN 14'-0" ARE USED, THE FOLLOWING DIMENSIONS APPLY

LANE WIDTH	WIDTH A	WIDTH B	OVERALL WIDTH OF FABRIC
15'-0"	12 SPACES @ 6" = 6'-0"	11 SPACES @ 6" = 5'-6"	14'-6"
16'-0"	13 " @ 6" = 6'-6"	12 " @ 6" = 6'-0"	15'-6"
17'-0"	14 " @ 6" = 7'-0"	13 " @ 6" = 6'-6"	16'-6"
18'-0"	15 " @ 6" = 7'-0"	14 " @ 6" = 7'-0"	17'-6"

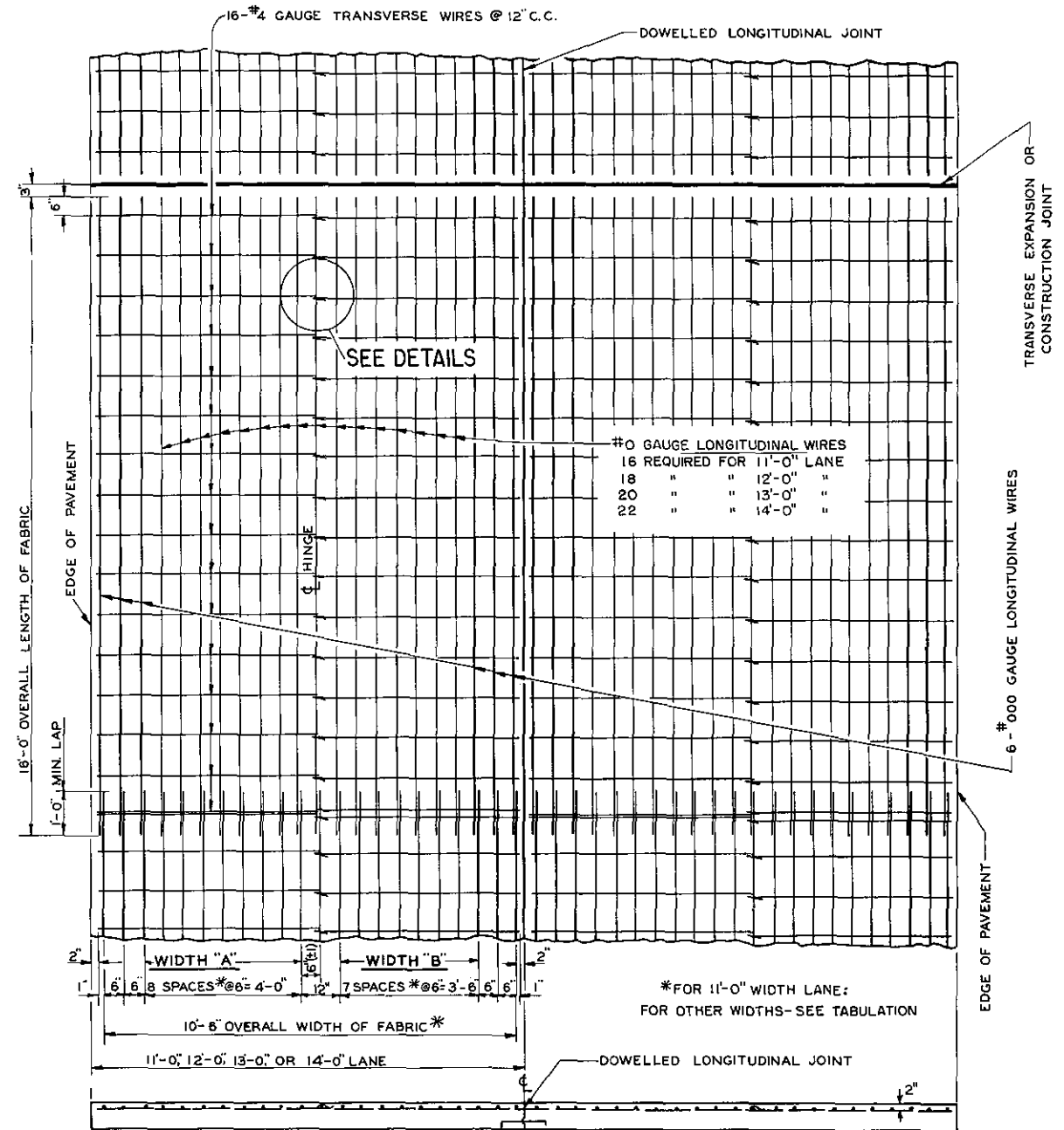
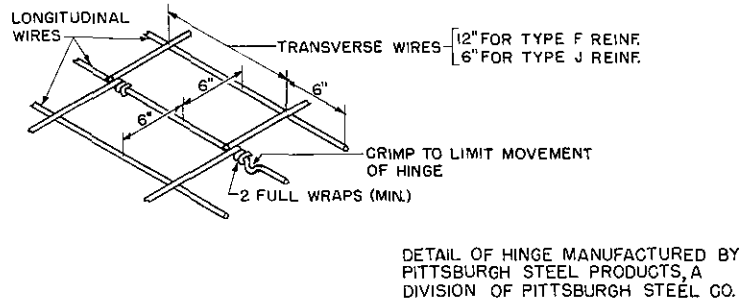
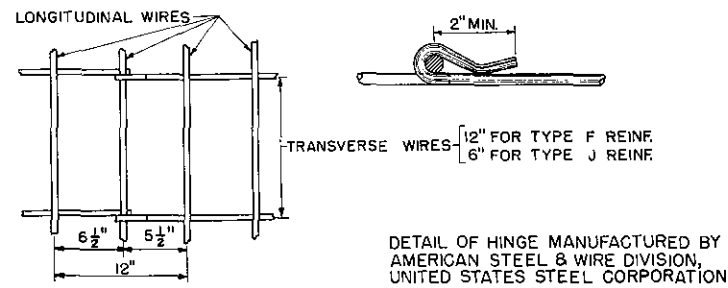
HINGED TYPE J REINFORCEMENT IS TO BE USED FOR 14'-0", 15'-0", 16'-0", 17'-0" AND 18'-0" WIDTH PAVEMENT LANES WHERE LONGITUDINAL JOINTS ARE NOT PERMITTED.

STEEL WIRE FABRIC SHALL CONFORM TO THE DEPARTMENT'S SPECIFICATIONS, FORM 408, AND SHALL CONSIST OF HINGED SHEETS OF MEMBERS RIGIDLY ATTACHED AT POINTS OF INTERSECTION.

THE GAUGE, NUMBER, AND SPACING OF THE LONGITUDINAL AND TRANSVERSE WIRES FOR VARIOUS WIDTHS OF PAVING LANES SHALL BE AS SHOWN ABOVE.

THE MINIMUM LAP OF REINFORCEMENT SHALL BE 1'-0" FROM END TO END OF WIRES MEASURED ALONG THE LINE OF LAP OF THE WIRES AS SHOWN.

THE LOCATION OF THE HINGE WITH RESPECT TO THE WIDTH OF THE LANE MAY BE VARIED FROM THE LOCATION SHOWN, WITH ACCOMPANYING CHANGES IN DIMENSIONS "A" AND "B".



TYPE F REINFORCEMENT-FABRIC, HINGED

WHERE LANES WIDER THAN 11'-0" ARE USED, THE FOLLOWING DIMENSIONS APPLY

LANE WIDTH	WIDTH A	WIDTH B	OVERALL WIDTH OF FABRIC
12'-0"	9 SPACES @ 6" = 4'-6"	8 SPACES @ 6" = 4'-0"	11'-6"
13'-0"	10 " @ 6" = 5'-0"	9 " @ 6" = 4'-6"	12'-6"
14'-0"	11 " @ 6" = 5'-6"	10 " @ 6" = 5'-0"	13'-6"

HINGED TYPE F REINFORCEMENT IS TO BE USED FOR 11'-0", 12'-0", 13'-0" AND 14'-0" WIDTH PAVEMENT LANES WHERE DOWELLED LONGITUDINAL JOINTS ARE NOT PERMITTED

STEEL WIRE FABRIC SHALL CONFORM TO THE DEPARTMENT'S SPECIFICATIONS, FORM 408, AND SHALL CONSIST OF HINGED SHEETS OF MEMBERS RIGIDLY ATTACHED AT POINTS OF INTERSECTION.

THE GAUGE, NUMBER, AND SPACING OF THE LONGITUDINAL AND TRANSVERSE WIRES FOR THE VARIOUS WIDTHS OF PAVING LANES SHALL BE AS SHOWN ABOVE.

THE MINIMUM LAP OF REINFORCEMENT SHALL BE 1'-0" FROM END TO END OF WIRES MEASURED ALONG THE LINE OF LAP OF THE WIRES AS SHOWN.

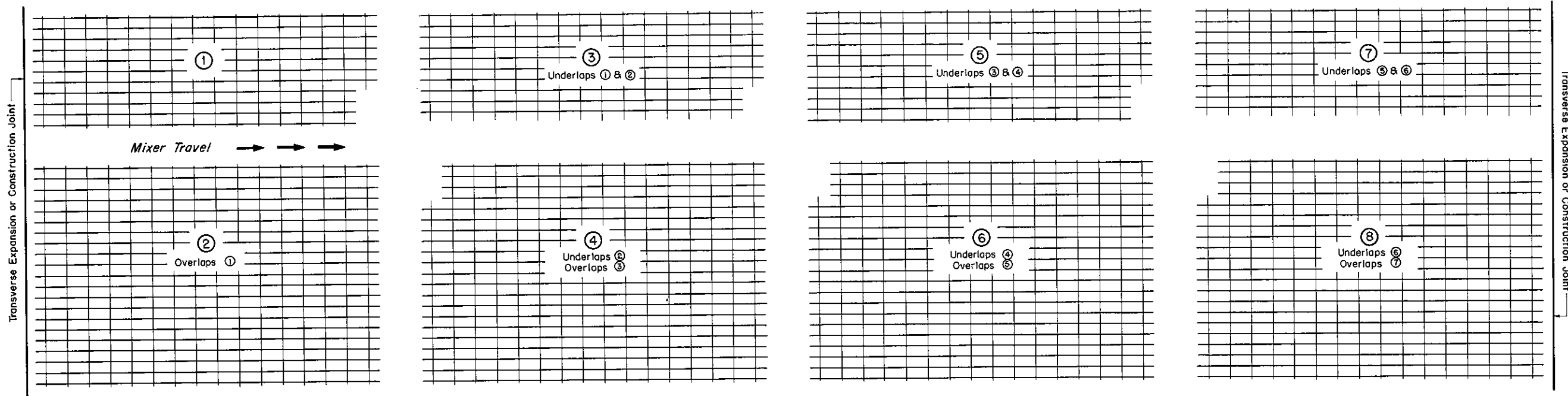
THE LOCATION OF THE HINGE WITH RESPECT TO THE WIDTH OF THE LANE MAY BE VARIED FROM THE LOCATION SHOWN, WITH ACCOMPANYING CHANGES IN DIMENSIONS "A" AND "B".

STANDARD TYPES OF REINFORCEMENT

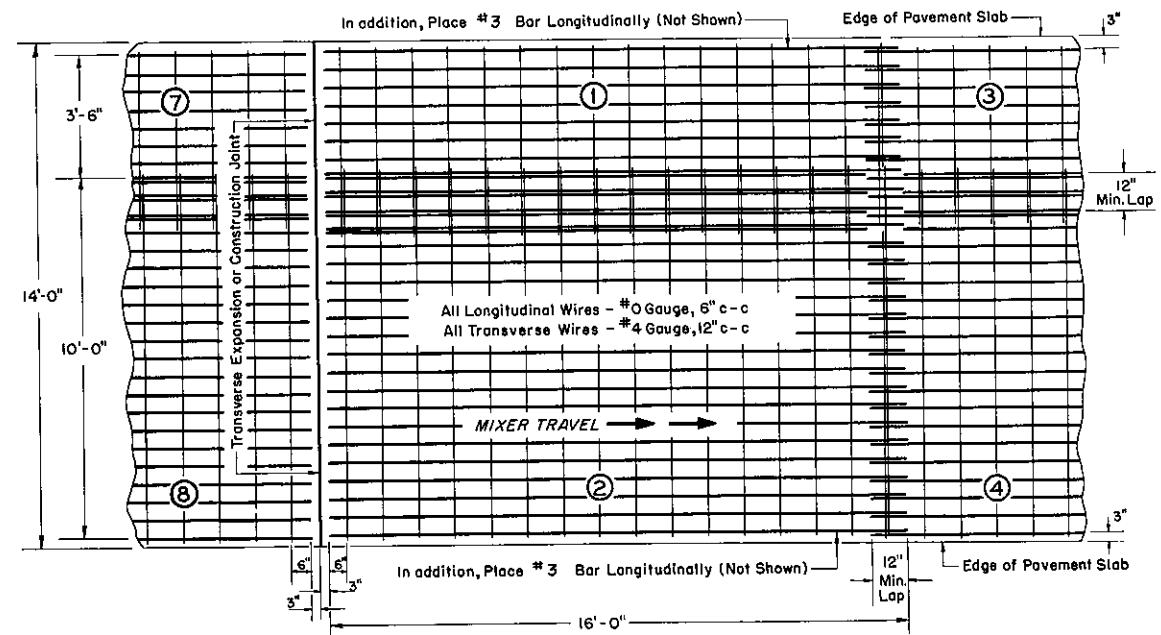
SHEET 5 OF 5

B-2

April 2, 1959



RECOMMENDED METHOD OF CUTTING AND PLACING REINFORCEMENT FOR ONE PAVEMENT SLAB



DETAILS OF REINFORCEMENT AND METHOD OF LAPPING

Reinforcement shall be 10'-0" wide, outside to outside of longitudinal wires, plus 1" overhang on each side.

Reinforcement shall be 6" x 12", #0 and #4 Gauge wires in sheets 10' wide by 16' long.

A #3 reinforcement bar shall be placed along each longitudinal edge.

The minimum laps of reinforcement shall be twelve (12) inches from end to end of the wires measured along the line of the lap, both longitudinally and transversely.

This method of cutting and placing reinforcement may also be used for slabs more than fourteen (14) feet in width where no longitudinal joint is specified.

NOT TO BE USED ON ANY PROJECT WITHOUT SPECIFIC APPROVAL

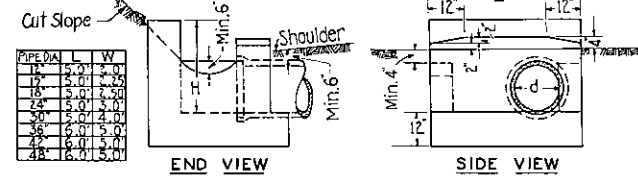
Revised for Bar Designation.
 APPROVED *November 6, 1961*
 CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
EMERGENCY REINFORCEMENT
 FOR 14-FOOT WIDTH PAVEMENT SLAB

APPROVED *Nov. 15, 1951*
 CHIEF ENGINEER

**B-2
 SPECIAL**

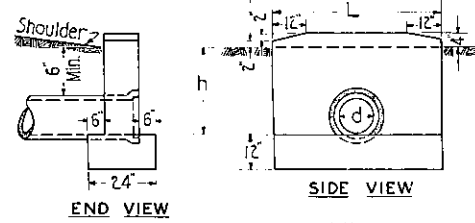
If pipe is on grade, place pipe in down grade end of box, upgrade spacer wall concave, downgrade spacer wall level.
If pipe is at low point, place pipe in middle of shoulder wall and both spacer walls concave.
Exposed edges of endwall shall be chamfered one (1) inch.



TYPE A ENDWALL

Cut slope governs dimension H

$L = 2h + d - 24"$
Minimum $L = 5'-0"$
Exposed edges shall be chamfered one (1) inch.

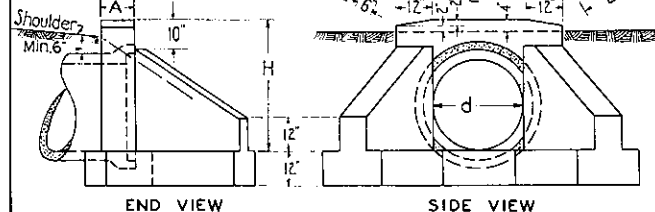


TYPE B ENDWALL

When shoulder fill above top of pipe exceeds two (2) ft. use Type D endwall and additional pipe.

PIPE DIA.	L	A
36	5.0	12
42	6.0	12
48	7.0	12
60	8.5	12

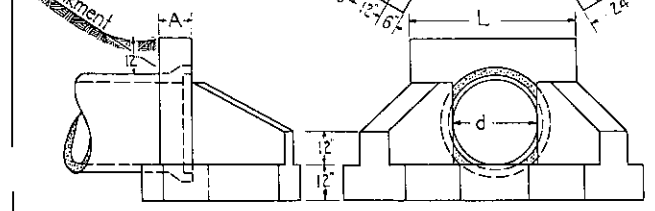
Height of wall (H) governs dimension W
Exposed edges shall be chamfered one (1) inch.



TYPE B-W ENDWALL

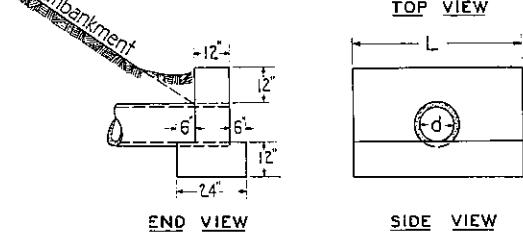
PIPE DIA.	L	W	A
36	5.5	3.5	12
42	6.0	4.4	12
48	6.5	5.25	12
60	7.0	6.1	12
72	8.5	8.65	15

Exposed edges shall be chamfered one (1) inch.



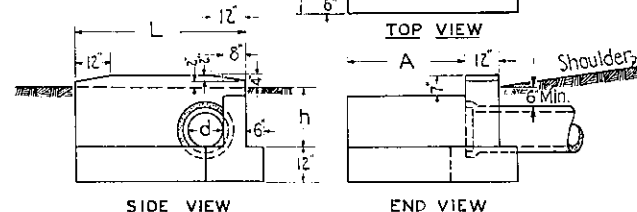
TYPE D-W ENDWALL

$L = 3d - 24"$
Minimum $L = 4'$
Exposed edges shall be chamfered one (1) inch.



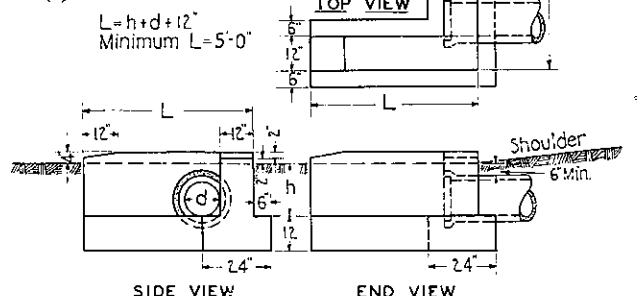
TYPE D ENDWALL

A (Min.) = 3'-0" for 12", 15", & 18" pipe
A (Min.) = 4'-0" for 24", 30", & 36" pipe
A (Min.) = 5'-0" for 42" & 48" pipe
Local conditions will govern dimension A (Max.)
 $L = h + d$
Minimum $L = 5'-0"$
Exposed edges shall be chamfered one (1) inch.



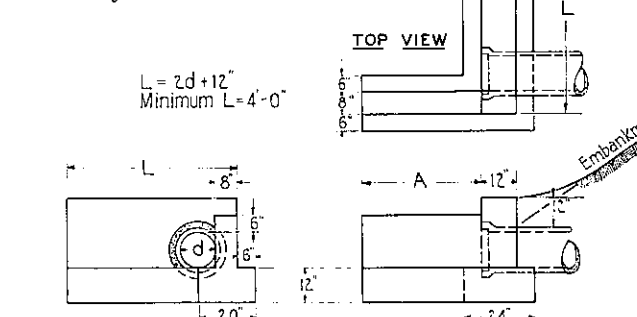
TYPE E ENDWALL

Side road wall to be parallel to side road, both as to line and grade.
Exposed edges shall be chamfered one (1) inch.



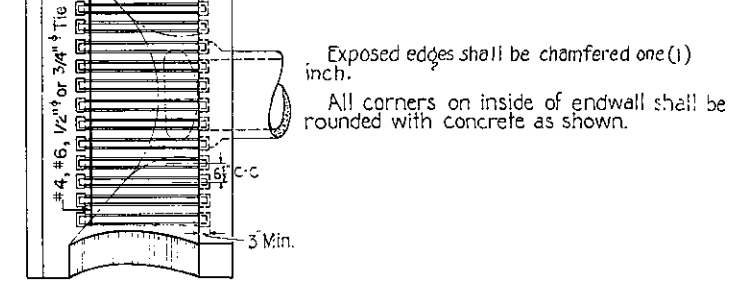
TYPE E-S ENDWALL

Local conditions will govern dimension A
Exposed edges shall be chamfered one (1) inch.

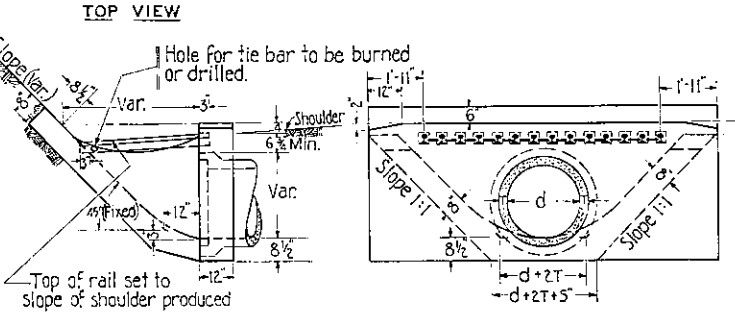


TYPE D-E ENDWALL

$3\frac{1}{2}$ - 40# A.S.C.E. rails spaced $6\frac{1}{2}$ on centers.
Length of rails variable. Slope wall end of rail rests in slot with 3" seat. Near end of rail extends into socket with 3" seat.



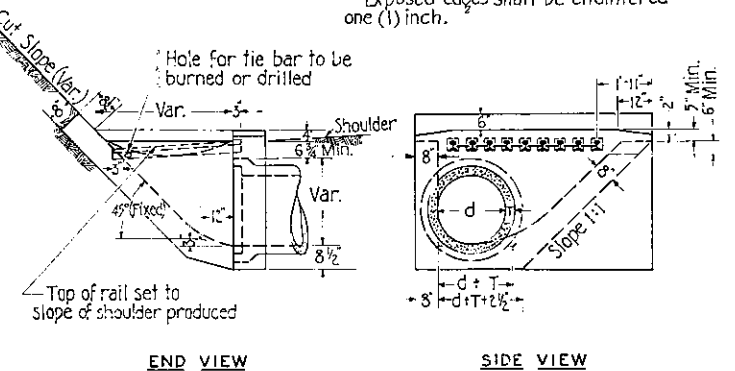
TYPE F-1 ENDWALL



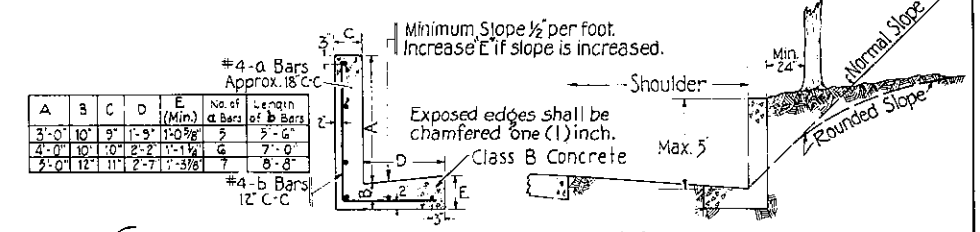
TYPE F-2 ENDWALL

$3\frac{1}{2}$ - 40# A.S.C.E. rails spaced $6\frac{1}{2}$ on centers. Length of rails variable.
Slope wall end of rail rests in slot with 3" seat. Near end of rail extends into socket with 3" seat.

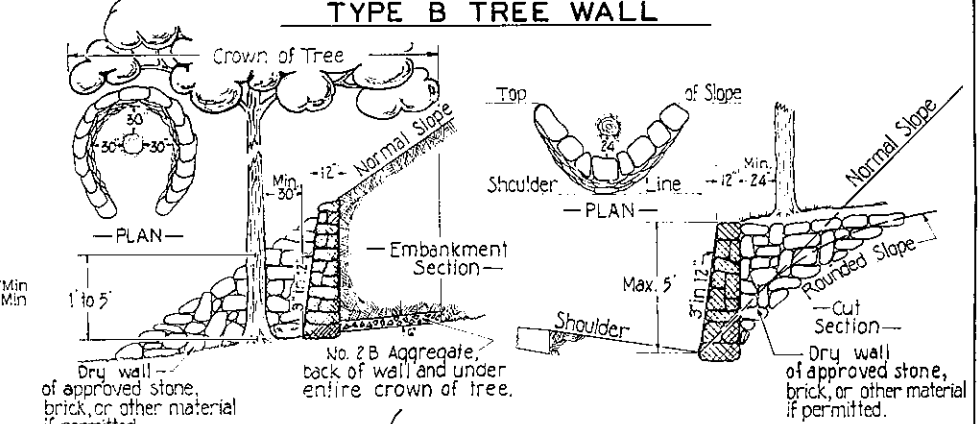
All corners on inside of endwall shall be rounded with concrete as shown.
Exposed edges shall be chamfered one (1) inch.



PIPE UNDERDRAIN OUTLET ENDWALL



TYPE B TREE WALL



TYPE A TREE WALLS

Revised to require rails for F Type Endwalls, and for Bar Designations.	APPROVED <i>November 1, 1961</i>	<i>J. J. ...</i> CHIEF ENGINEER
Revised for Construction Details of Types A and B Tree Walls.	APPROVED <i>March 25, 1947</i>	<i>E. S. ...</i> CHIEF ENGINEER
Revised for Construction Details and to delete Guard Posts	APPROVED <i>January 2, 1941</i>	<i>J. J. ...</i> CHIEF ENGINEER
Revised to include Guard Posts.	APPROVED <i>May 13, 1940</i>	<i>J. J. ...</i> CHIEF ENGINEER
Revised for construction details of Types B-W and D-W Endwalls	APPROVED <i>1939</i>	<i>J. J. ...</i> CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS

—STANDARD DETAILS—

CLASS B CONCRETE ENDWALLS
AND TYPES A & B TREE WALLS

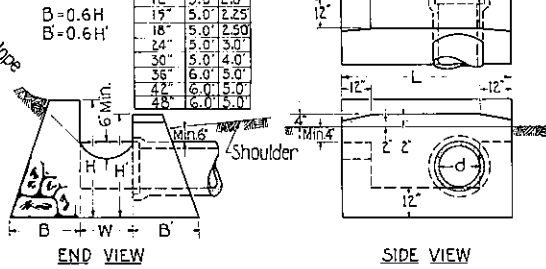
APPROVED *1939*

J. J. ...
CHIEF ENGINEER

SD-1

Cut slope governs dimension H. If pipe is on grade, place pipe in down grade end of box, upgrade spacer wall concave, downgrade spacer wall level. If pipe is at low point, place pipe in middle of shoulder wall and both spacer walls concave.

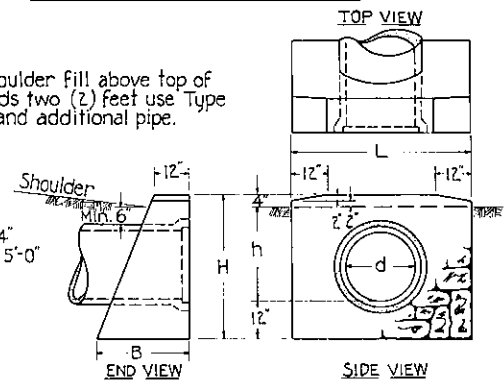
PIPE DIA.	L	W
12"	5'-0"	2'-0"
15"	5'-0"	2'-25"
18"	5'-0"	2'-50"
24"	5'-0"	3'-0"
30"	5'-0"	4'-0"
36"	6'-0"	5'-0"
42"	6'-0"	5'-0"
48"	6'-0"	5'-0"



TYPE A ENDWALL

When shoulder fill above top of pipe exceeds two (2) feet use Type D endwall and additional pipe.

$L = 2h + d - 24"$
Minimum $L = 5'-0"$
 $B = 0.6H$

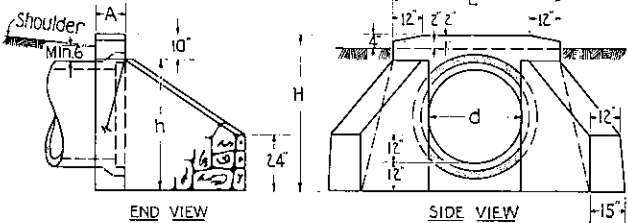


TYPE B ENDWALL

Height of wall h governs dimension W

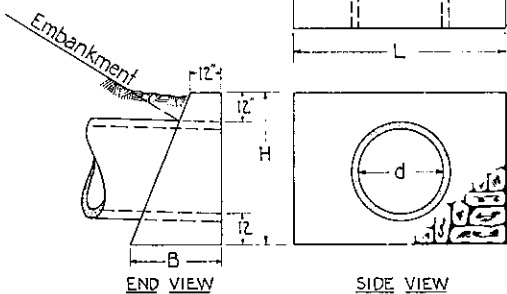
$B = 0.6h$

PIPE DIA.	L	A
36"	6'-5"	12"
42"	6'-0"	12"
48"	6'-5"	12"
54"	7'-0"	15"
60"	7'-5"	18"
72"	8'-3"	24"



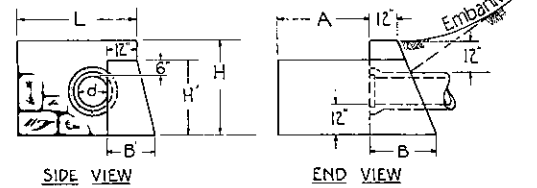
TYPE B-W ENDWALL

$L = 3d - 24"$
Minimum $L = 4'-0"$
 $B = 0.6H$



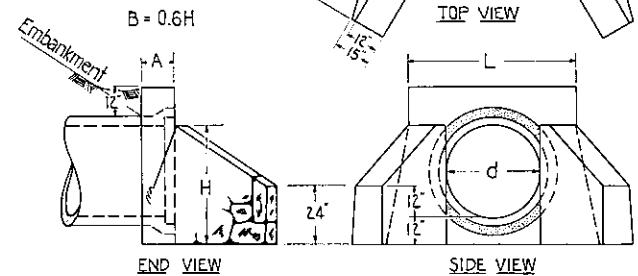
TYPE D ENDWALL

Local conditions govern dimension A
 $L = 2d + 12"$
Minimum $L = 4'-0"$
 $B = 0.6H$
 $B = 0.6H'$



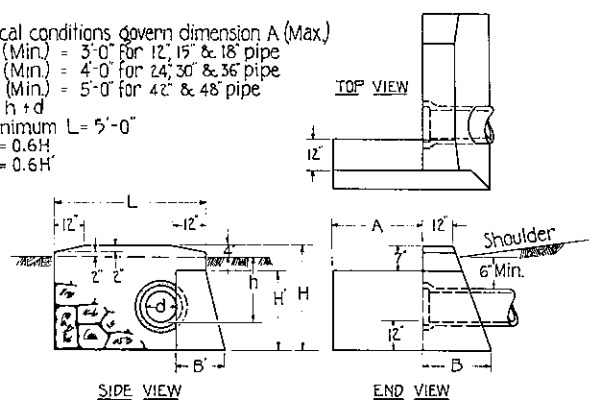
TYPE D-E ENDWALL

PIPE DIA.	L	W	A
36"	7'-5"	5'-0"	12"
42"	6'-0"	4'-0"	12"
48"	6'-5"	5'-25"	12"
54"	7'-0"	6'-15"	15"
60"	7'-5"	7'-0"	18"
72"	8'-5"	8'-5"	24"



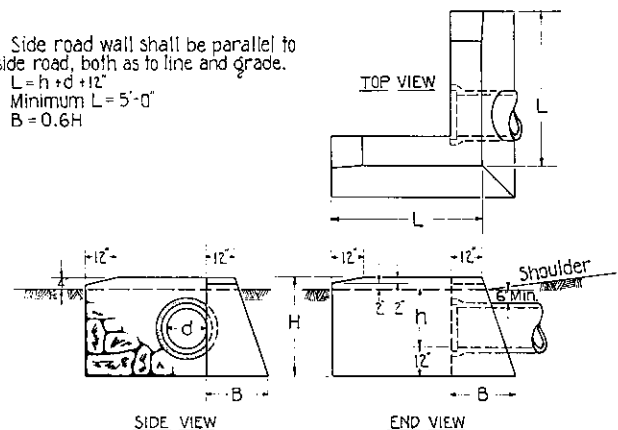
TYPE D-W ENDWALL

Local conditions govern dimension A (Max.)
A (Min.) = 3'-0" for 12", 15" & 18" pipe
A (Min.) = 4'-0" for 24", 30" & 36" pipe
A (Min.) = 5'-0" for 42" & 48" pipe
 $L = h + d$
Minimum $L = 5'-0"$
 $B = 0.6H$
 $B = 0.6H'$

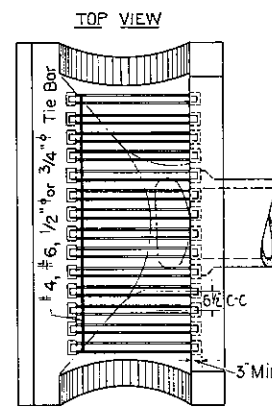


TYPE E ENDWALL

Side road wall shall be parallel to side road, both as to line and grade.
 $L = h + d + 12"$
Minimum $L = 5'-0"$
 $B = 0.6H$

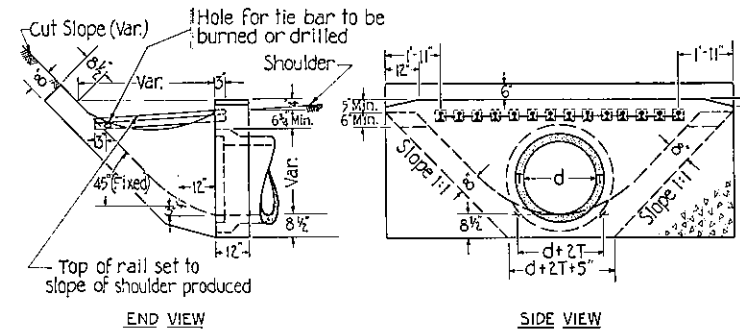


TYPE E-S ENDWALL

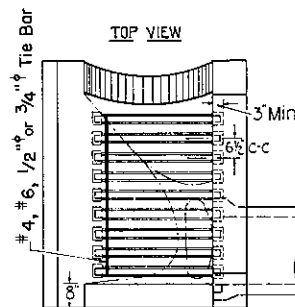


3/2 - 40* A. S. C. E. rails spaced 6 1/2 on centers. Length of rails variable. Slope wall end of rail rests in slot with 3 seat. Near end of rail extends into socket with 3 seat.

All corners on inside of endwall shall be rounded with concrete as shown. Exposed edges shall be chamfered one (1) inch. This endwall to be used at low point, and shall at all times be constructed of Class B Concrete.

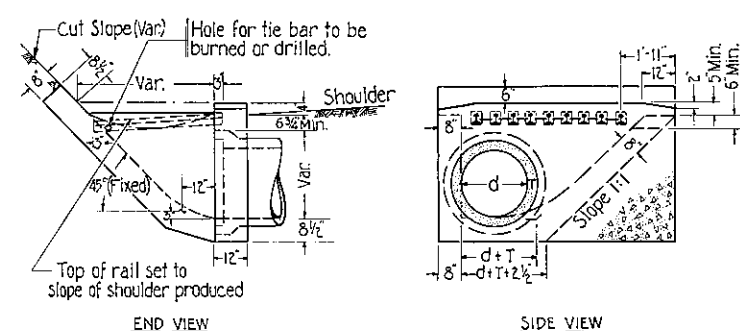


TYPE F-1 ENDWALL

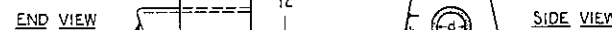


3/2 - 40* A. S. C. E. rails spaced 6 1/2 on centers. Length of rails variable. Slope wall end of rail rests in slot with 3 seat. Near end of rail extends into socket with 3 seat.

All corners on inside of endwall shall be rounded with concrete as shown. Exposed edges shall be chamfered one (1) inch. This endwall to be used on grade, and shall at all times be constructed of Class B Concrete.

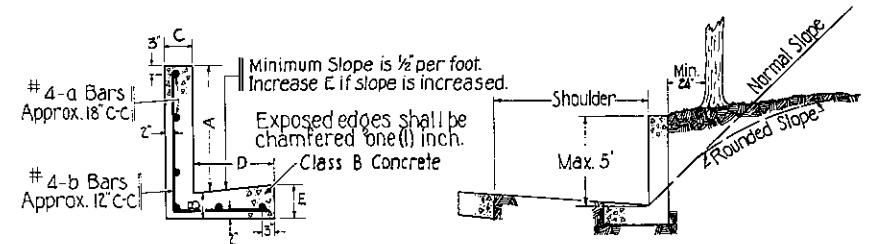


TYPE F-2 ENDWALL



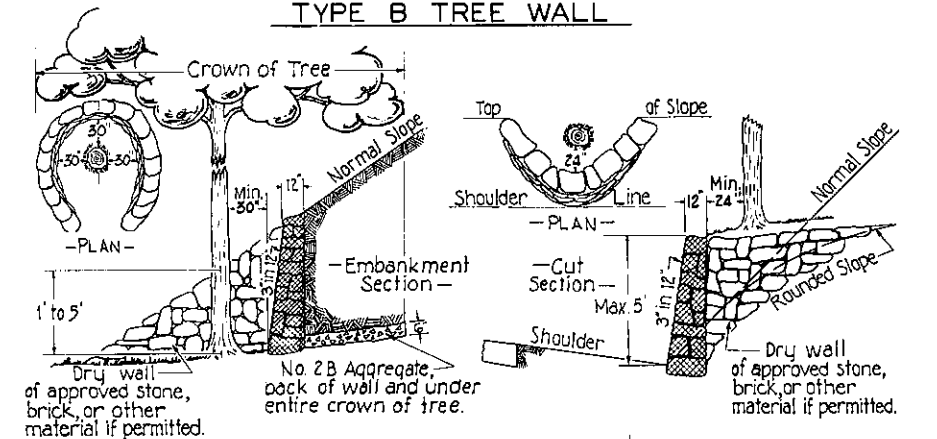
PIPE UNDERDRAIN OUTLET ENDWALL

The design of this endwall shall be varied to suit location of outlet.



A	B	C	D	E	No. of Bars	Length of Bars
3'-0"	10"	9"	1'-9"	1'-0 3/8"	5	5'-6"
4'-0"	10"	10"	2'-2"	1'-1 1/2"	6	7'-0"
5'-0"	12"	11"	2'-7"	1'-3 3/8"	7	8'-8"

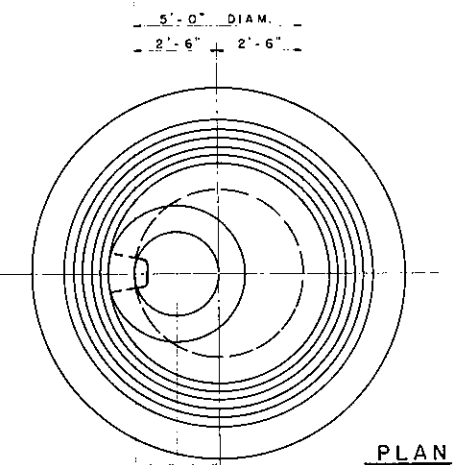
TYPE B TREE WALL



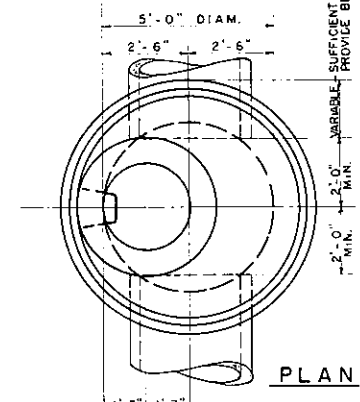
TYPE A TREE WALLS

Revised to require rails for F Type Endwalls, and for Bar Designations.	Approved <i>November 1, 1961</i>	<i>Frederick J. ...</i>	CHIEF ENGINEER
Revised for Construction Details of Types A and B Tree Walls.	APPROVED <i>March 24, 1947</i>	<i>Ed. ...</i>	CHIEF ENGINEER
Revised for Construction Details and to delete Guard Posts.	APPROVED <i>January 2, 1941</i>	<i>J. ...</i>	CHIEF ENGINEER
Revised to include Guard Posts.	APPROVED <i>July 12, 1940</i>	<i>R. ...</i>	CHIEF ENGINEER
Revised for construction details of Types B-W and D-W Endwalls.	APPROVED <i>1939</i>		CHIEF ENGINEER

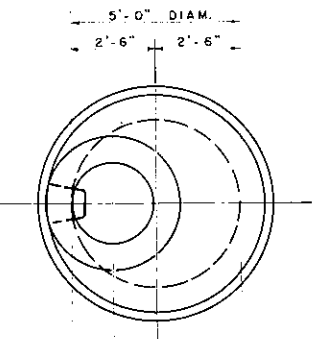
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
— STANDARD DETAILS —
CEMENT RUBBLE MASONRY ENDWALLS
TYPES F-1 & F-2 ENDWALLS (CONCRETE)
AND TYPES A & B TREE WALLS
APPROVED *April 14, 1939*
R. ...
CHIEF ENGINEER



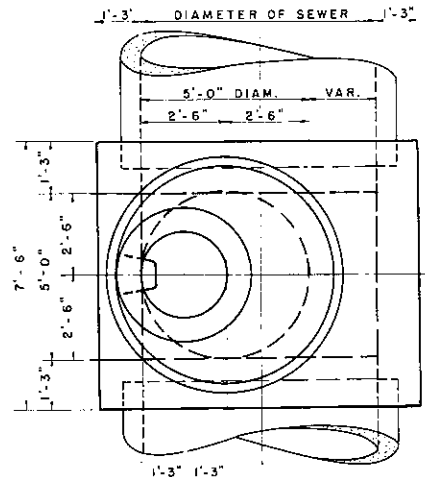
PLAN



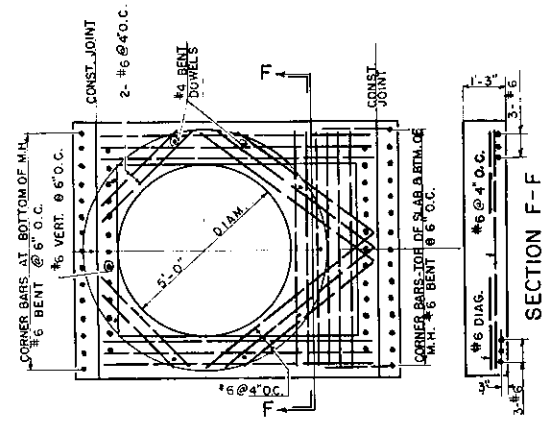
PLAN



PLAN

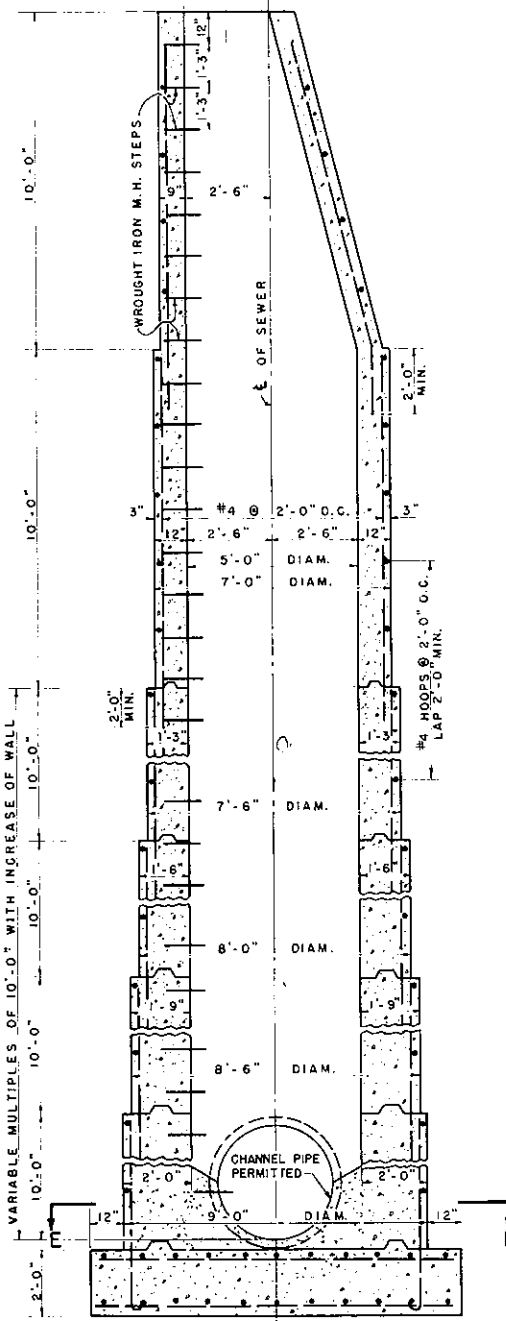


PLAN

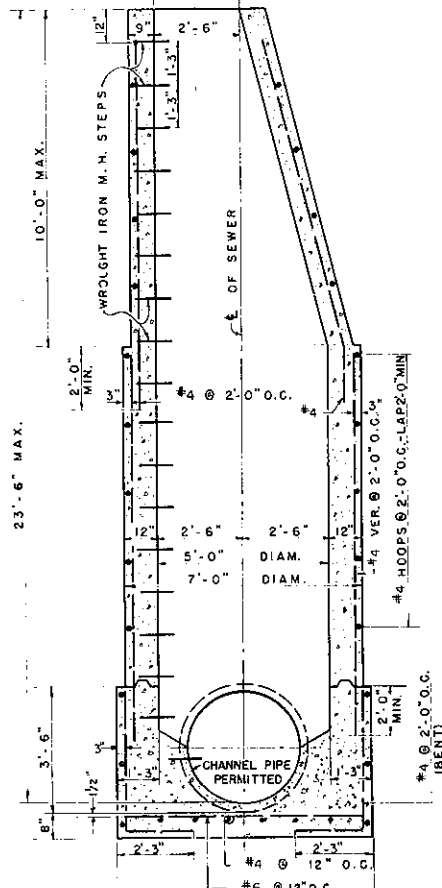


PLAN OF SLAB OVER PIPE INDICATING PLACING OF BARS

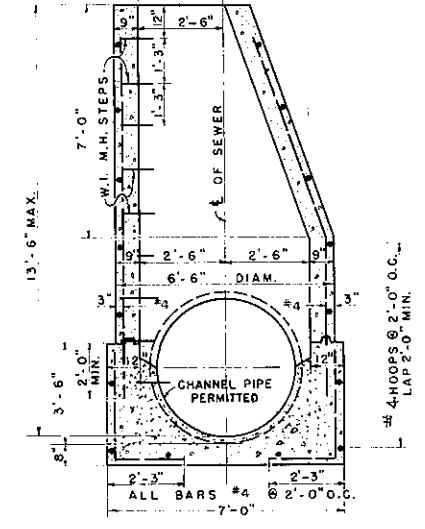
SECTION F-F



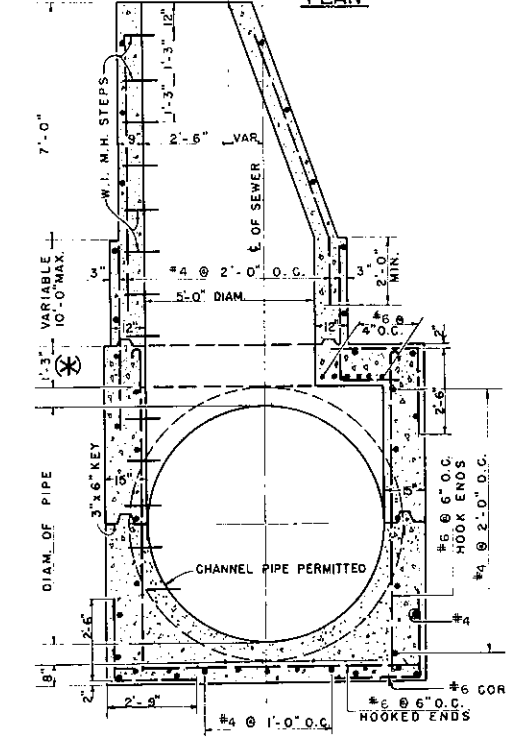
SECTION - TYPE D (FOR PIPES 42" DIA. & LESS)



SECTION - TYPE C (FOR PIPES 42" DIA. & LESS)

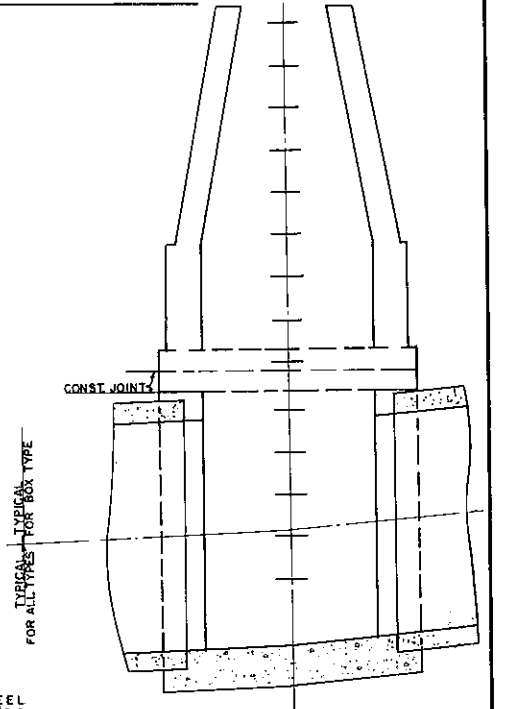


SECTION - TYPE B (FOR PIPES 42" DIA. & LESS)

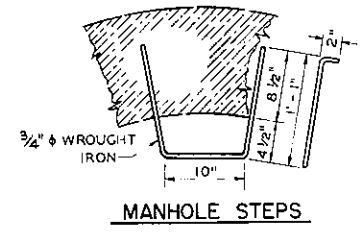


SECTION (FOR PIPES 48" DIA. AND GREATER)

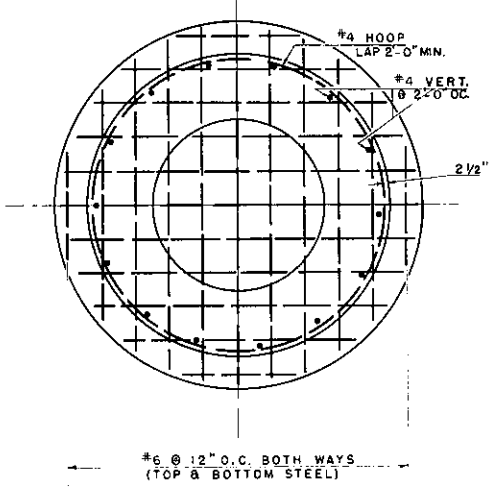
TYPE B or C - CONSTRUCT AS SHOWN.
TYPE D - CONSTRUCT SIMILAR TO ABOVE USING 1'-6" THICKNESS FOR TOP OF BOX STRUCTURE (*), AND THE WALL THICKNESSES, BASE THICKNESS AND REINFORCEMENT SHOWN ON "SECTION - TYPE D."



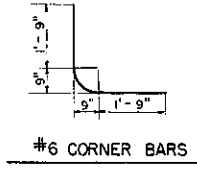
TYPICAL LONGITUDINAL SECTION FOR REINFORCEMENT SEE PLAN & X-SECTION



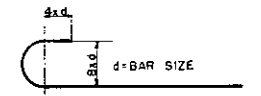
MANHOLE STEPS



SEC. E-E OF MANHOLE - TYPE D INDICATING FOUNDATION REINFORCEMENT



#6 CORNER BARS



TYPICAL HOOKED ENDS

NOTES
ALL CONCRETE SHALL BE CLASS A.
ALL BARS STRAIGHT UNLESS MARKED OTHERWISE.
MINIMUM LAP OF BARS = 45 DIAM.
DEPTH & SIZE OF FOOTING SUBJECT TO CHANGE DUE TO SOIL - TO BE DETERMINED BY THE ENGR.
3"x6" KEYS AT CONSTRUCTION JOINTS.
SCALE ON THIS SHEET 3/8" = 1'-0"

Revised for Bar designations - Sheets 1 and 2.
APPROVED *November 1, 1961*
Chief Engineer
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
— STANDARD DETAILS —
MANHOLES - TYPES A, B, C & D
APPROVED *September 3, 1946*
Chief Engineer
SHEET 1 OF 2
SD-6

TRACED BY
FINAL BY

-o-NOTE-o-

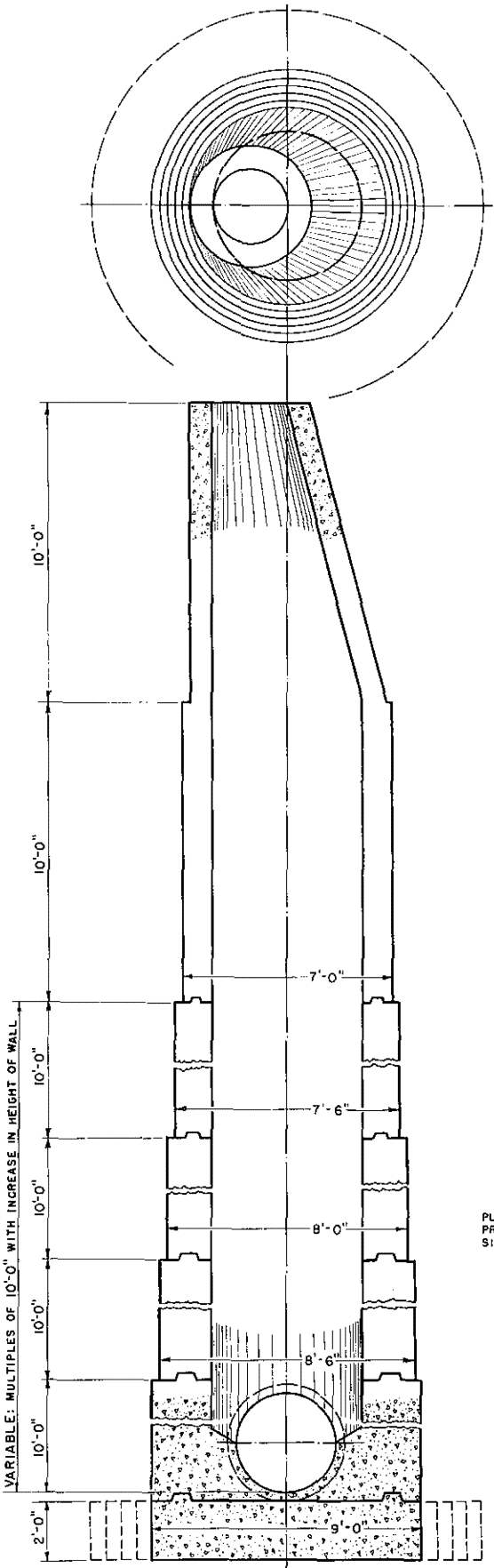
The base pressures in pounds per square foot are shown for each type of manhole. Where the supporting ground at the bottom of footing of any manhole is incapable of sustaining the indicated loading, the footings shall be increased in size in accordance with the dimensions shown in the tabulation below. Proper allowance shall be made for variations in height of the various types of manholes. In general it has been presumed that a safe loading of one ton per square foot will obtain. The contractor

shall not proceed with the construction of any manhole until the engineer has made tests of the foundation and determined the load capacity of the underlying soil. Where necessary to increase the size of footing over and above the dimensions shown for any type of manhole at any specified depth, the contractor will be reimbursed for the increased quantity of Class A Concrete and Reinforcement Bars at the

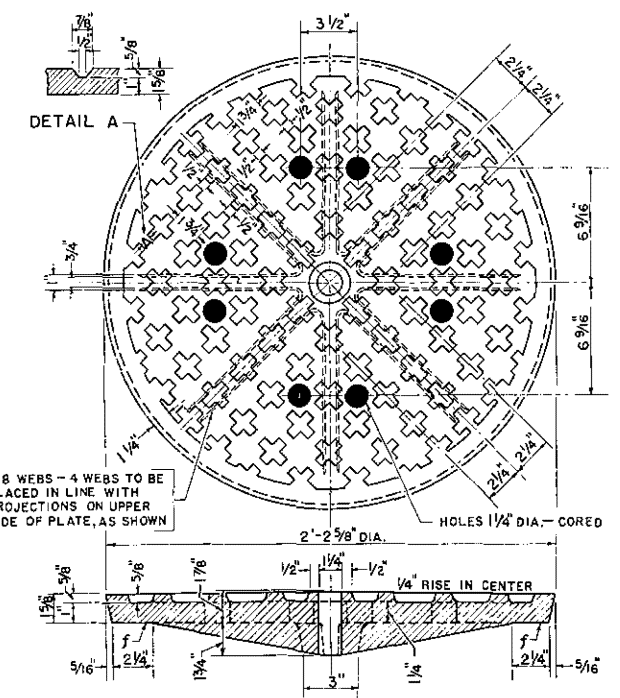
contract unit price for each of these items in accordance with the quantities shown in the tabulation. In such cases the lengths of reinforcement bars shall be increased to conform to the increased size of footing. The depth or thickness of footing below the bottom of the pipe shall be not less than the dimension shown in the tabulation for each type of manhole. The maximum depth of each type shall not

exceed the total maximum shown i.e. 10'-0" for Type A; 13'-6" for Type B; 23'-6" for Type C; and 60'-0" for Type D. The minimum base dimensions shall conform in all cases to the minimum shown on these drawings.

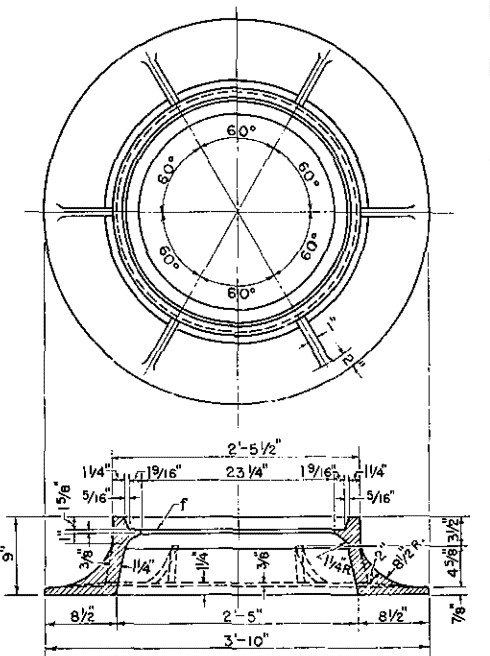
MAXIMUM DIAMETER OF PIPE	TYPE OF MANHOLE	DEPTH FROM TOP OF MANHOLE TO INVERT OF PIPE	AS DESIGNED		BASE PRESSURES FOR VARIOUS SIZE FOOTINGS IN INCREMENTS OF TWELVE INCHES (12") OVERALL DIMENSION								(SEE SECTIONS ON THIS SHEET)				REMARKS					
			TONS PER SQ. FT.	WIDTH OF BASE	MIN. THICKNESS OF BASE	LOADING IN TONS/SQ. FT.	MAX. WIDTH OF BASE	ADDITIONAL QUANTITIES CLASS A CONC. CU. YDS.	REINFORCEMENT BARS-LBS.	LOADING IN TONS/SQ. FT.	MAX. WIDTH OF BASE	ADDITIONAL QUANTITIES CLASS A CONC. CU. YDS.	REINFORCEMENT BARS-LBS.	LOADING IN TONS/SQ. FT.	MAX. WIDTH OF BASE	ADDITIONAL QUANTITIES CLASS A CONC. CU. YDS.		REINFORCEMENT BARS-LBS.				
42"	B	10'-0" to 13'-6"	0.60	7'-0" DIA.	0'-6"														CIRCULAR BASE			
42"	C	13'-6" to 20'-0"	0.95	7'-0" DIA.	0'-8"														" "			
42"	C	20'-0" to 23'-6"	1.15	7'-6" DIA.	0'-8"	0.90	8'-6" DIA.	0.30	51										" "			
42"	D	MAX. 30'-0"	1.43	7'-6" DIA.	1'-0"	1.12	8'-6" DIA.	0.50	85	0.89	9'-6" DIA.	1'-0"	170						" "			
42"	D	MAX. 40'-0"	1.90	8'-0" DIA.	1'-6"	1.50	9'-0" DIA.	0.70	119	1.22	10'-0" DIA.	1'-6"	274	1.01	11'-0" DIA.	2.5	428	0.84	12'-0" DIA.	3.5	600	" "
42"	D	MAX. 50'-0"		8'-6" DIA.			9'-6" DIA.				10'-6" DIA.				11'-6" DIA.				12'-6" DIA.			" "
42"	D	MAX. 60'-0"	2.60	9'-0" DIA.	2'-0"		10'-0" DIA.			1.80	11'-0" DIA.	NONE	NONE	1.45	12'-0" DIA.	1.3	222	1.25	13'-0" DIA.	2.8	480	" "
78"	C	MAX. 23'-6"	1.05	7'-6" x 7'-6"	0'-8"	0.80	8'-6" x 8'-6"	0.4	54													SQUARE BASE
78"	D	MAX. 30'-0"	1.33	7'-6" x 7'-6"	1'-0"	1.04	8'-6" x 8'-6"	0.6	80													" "
78"	D	MAX. 40'-0"	1.67	8'-0" x 8'-0"	1'-6"	1.32	9'-0" x 9'-0"	0.9	120	1.07	10'-0" x 10'-0"	2'-0"	285									" "



SECTION - TYPES B-C-D
SCALE: 3/8" = 1'-0"



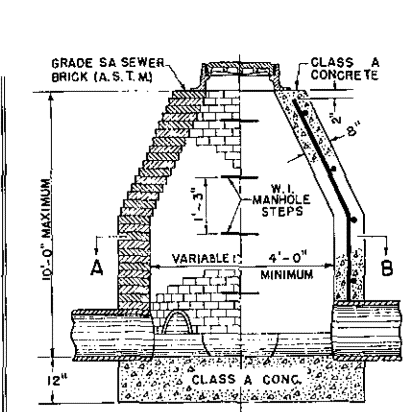
SECTION ON ϕ COVER CASTING
ESTIMATED WEIGHT 205 LBS.



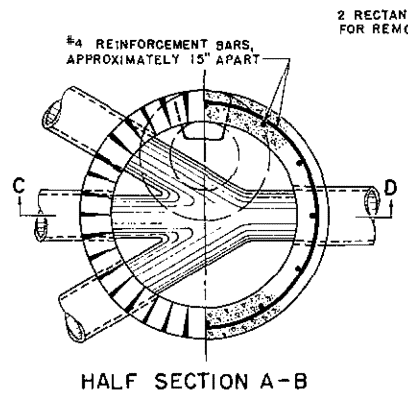
SECTION ON ϕ FRAME CASTING
ESTIMATED WEIGHT 555 LBS.

CASTINGS FOR MANHOLES - TYPES B-C-D

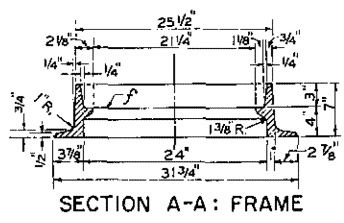
NOTE: - FOR ALL MANHOLE CASTINGS.
ALL FILLETS TO BE 1/8" RADIUS.
ALL EDGES AND CORNERS TO BE ROUNDED TO 1/16" RADIUS UNLESS OTHERWISE SHOWN.
DEVIATION IN WEIGHT OF CASTINGS NOT TO EXCEED 5% UNDER WEIGHTS SPECIFIED.
THE METAL BEARING AREAS OF FRAMES AND COVERS IN CONTACT SHALL BE MACHINE GROUND TO FIT IN PAIRS, SHALL BE MARKED AS PAIRS AND EACH PAIR SHALL BE MATCH MARKED WITH NOTCHES.



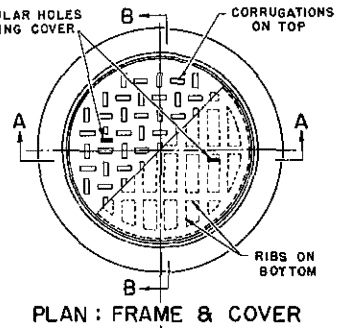
HALF SECTION C-D
(NOTE ALTERNATE MATERIALS)
ESTIMATED WEIGHT OF COVER 220 LBS.
ESTIMATED WEIGHT OF FRAME 220 LBS.
SCALE - { MANHOLE STRUCTURE: NONE
CASTINGS: 1" = 1'-0"



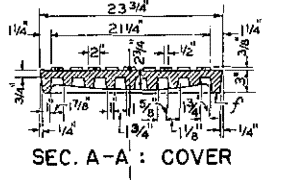
HALF SECTION A-B



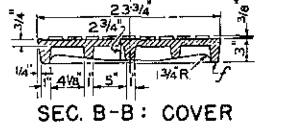
SECTION A-A: FRAME



PLAN: FRAME & COVER



SEC. A-A: COVER



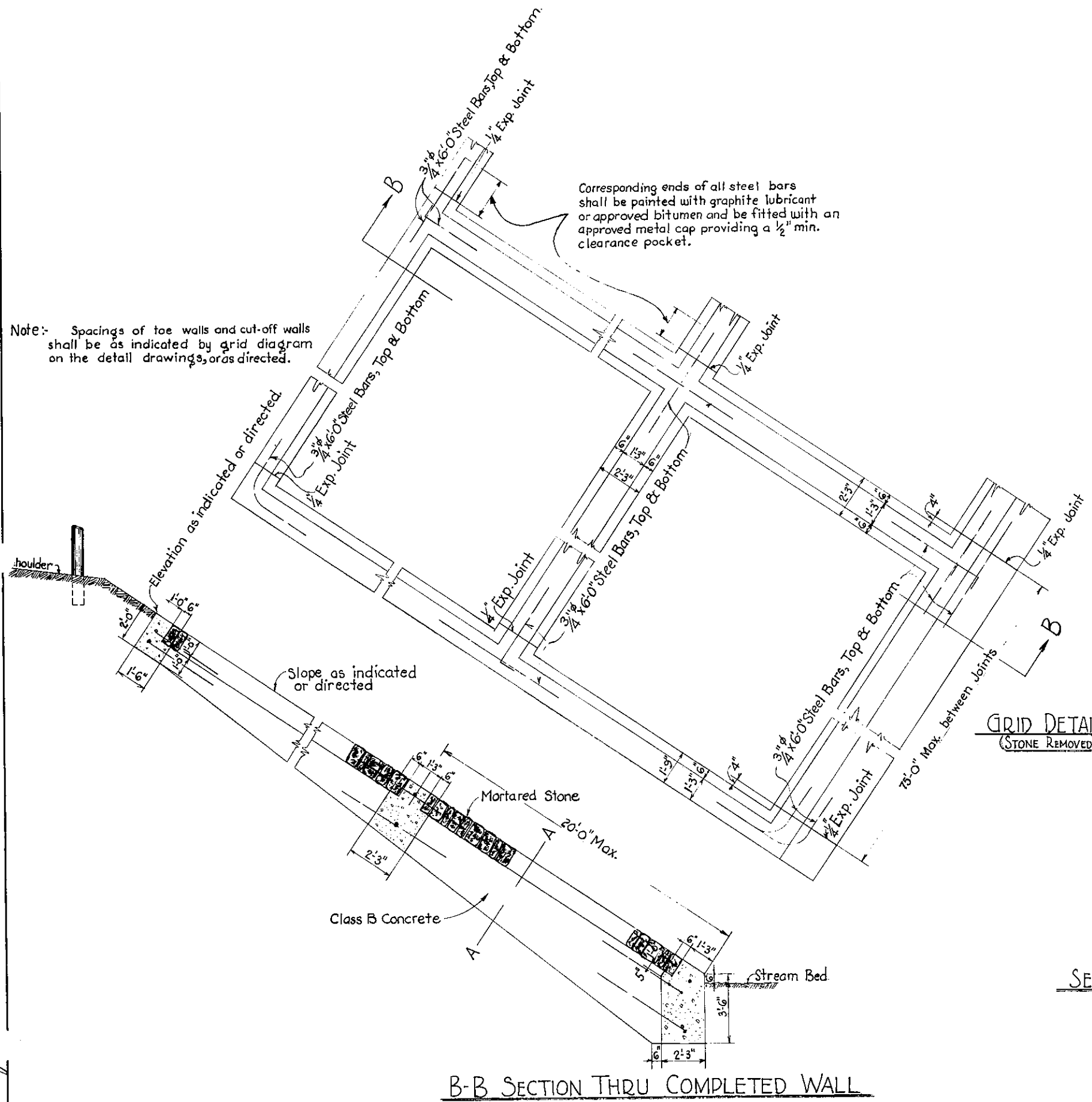
SEC. B-B: COVER

MANHOLE - TYPE A

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
- STANDARD DETAILS -
MANHOLES - TYPES A, B, C & D

Nov. 1, 1961

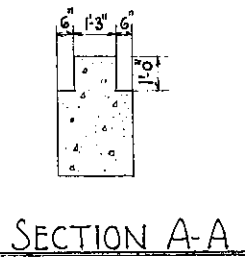
Welder '61



Note: Spacings of toe walls and cut-off walls shall be as indicated by grid diagram on the detail drawings, or as directed.

Corresponding ends of all steel bars shall be painted with graphite lubricant or approved bitumen and be fitted with an approved metal cap providing a 1/2" min. clearance pocket.

GRID DETAIL
(STONE REMOVED)



B-B SECTION THRU COMPLETED WALL

Revised for lubricant and to provide for metal expansion cap.
 APPROVED: *[Signature]* November 1, 1961
 CHIEF ENGINEER

REVISED:
 APPROVED: *[Signature]* May 13, 1946
 CHIEF ENGINEER

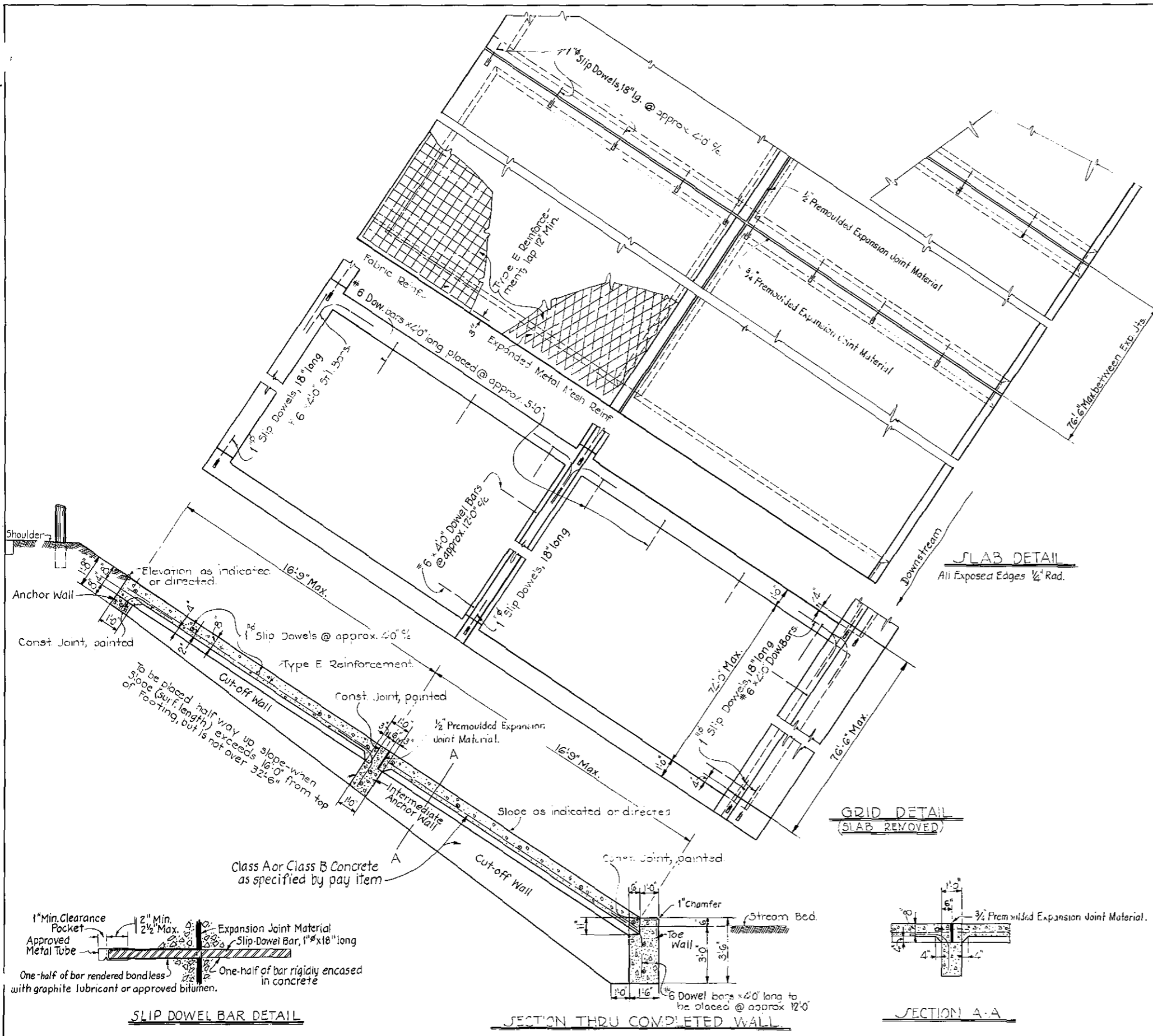
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS

—STANDARD DETAILS—

SPECIAL
 MORTARED STONE SLOPE WALL

APPROVED: *[Signature]* Sept 10, 1941
 CHIEF ENGINEER

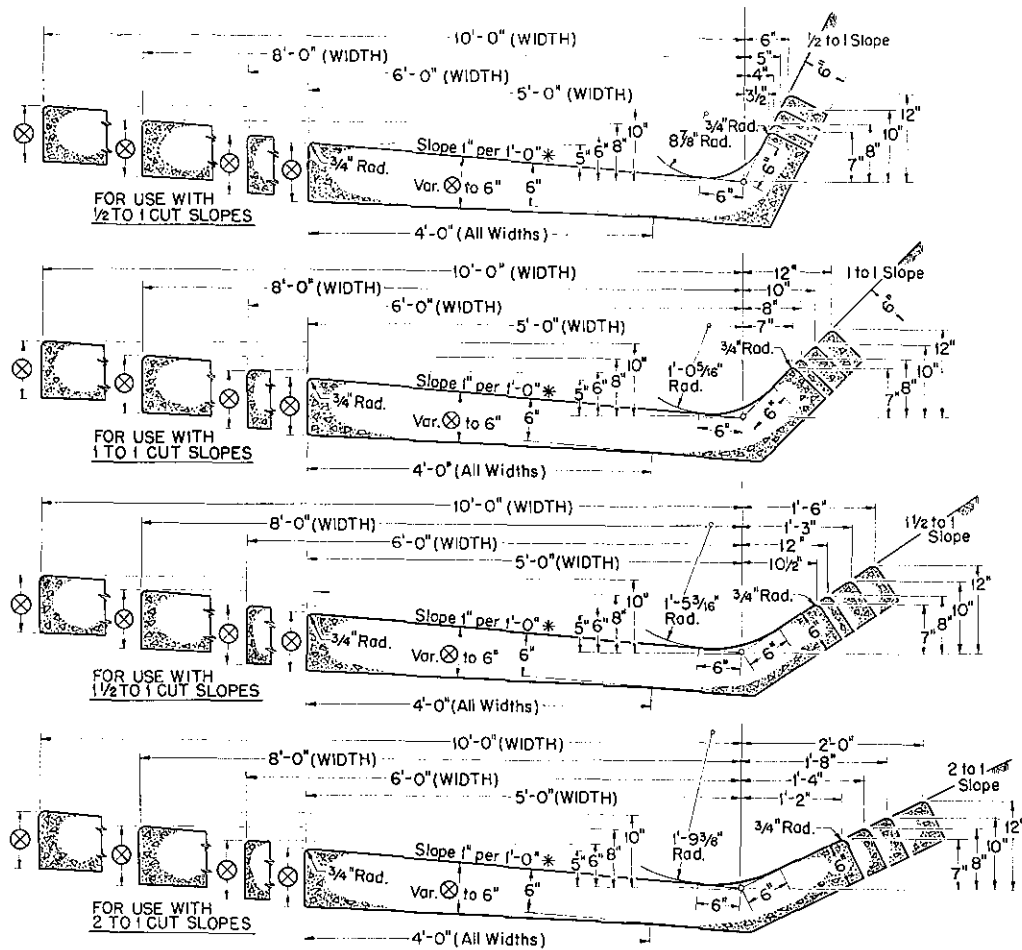
SD-7



Revised for bar size designation and for panel width and length.
Approved *November 6, 1961*
CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
— STANDARD DETAILS —
REINF. CLASS A CEM. CONC. SLOPE WALL
REINF. CLASS B CEM. CONC. SLOPE WALL
APPROVED *February 2, 1950*
CHIEF ENGINEER

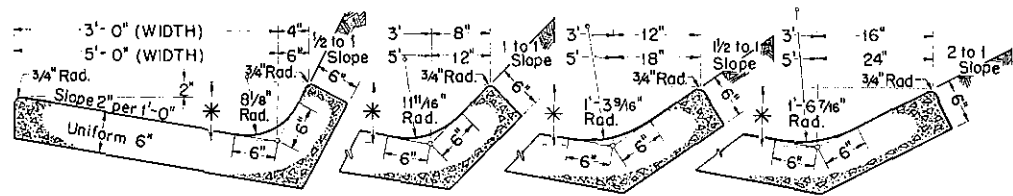
SD-8



⊗ 8 inches - when gutter is in contact with 8-inch rigid type pavements and with all flexible type pavements.
 ⊗ 9 inches - when gutter is in contact with 9-inch and 10-inch rigid type pavements and with all rigid type bases.
 * Or as directed. Always adjust back edge of gutter to maintain the required 2 inches above the edge adjacent to paving.

NOTE: THESE DESIGNS SHALL BE USED WHEN GUTTER IS IN CONTACT WITH ADJACENT PAVING.

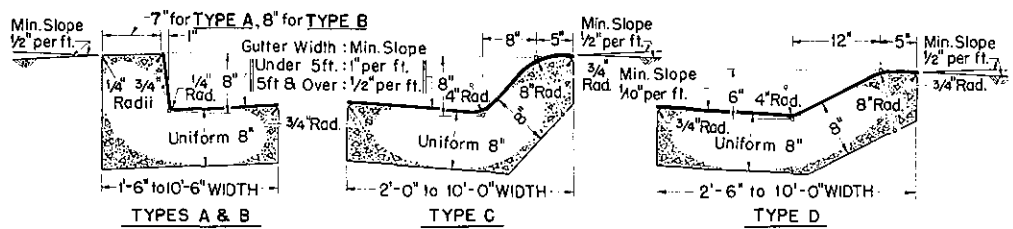
5, 6, 8 & 10-FOOT PLAIN CEMENT CONCRETE GUTTERS - TYPE A



* 8 inches for the 3'-0" width of gutter.
 * 12 inches for the 5'-0" width of gutter.
 The slope of shoulder from edge of pavement to gutter shall be 1/2-inch per foot.

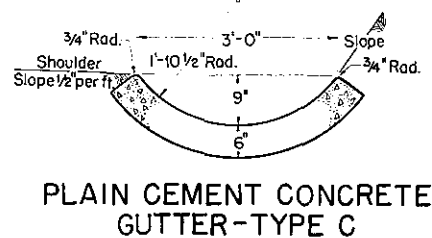
NOTE: THESE DESIGNS SHALL BE USED WHEN GUTTER IS NOT IN CONTACT WITH ADJACENT PAVING.

3 & 5-FOOT PLAIN CEMENT CONCRETE GUTTERS - TYPE B

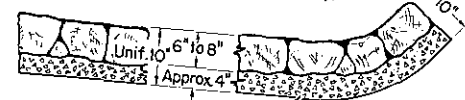


The width of gutter used in computing the pay area is indicated by _____.
 These gutters shall be reinforced when indicated on the drawings or specified.
 Curb face of Types A & B may be constructed vertical as permitted for PLAIN CEMENT CONCRETE CURB TYPES-A & B.

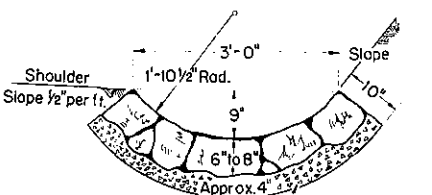
PLAIN CEMENT CONCRETE CURB GUTTERS - TYPES A, B, C & D



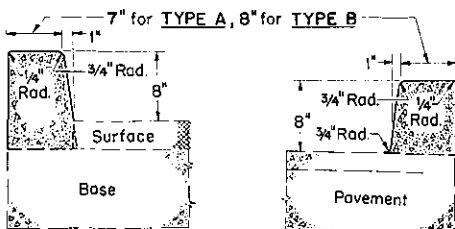
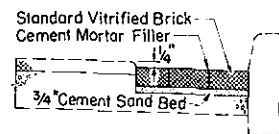
Dimensions other than shown shall conform to those of Plain Cement Concrete Gutters-Types A and B.



No.1 or No.1B Coarse Aggregate

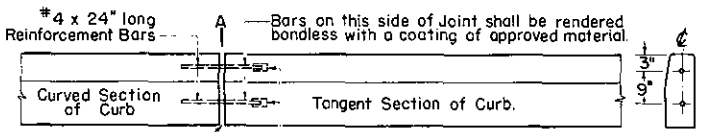
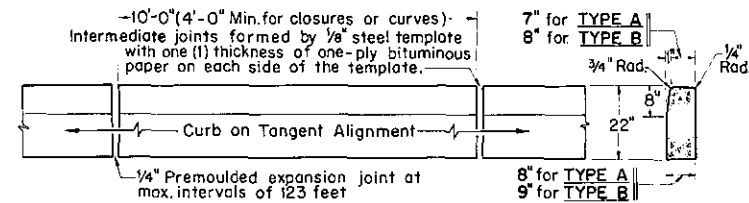
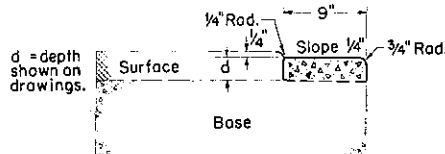


No.1 or No.1B Coarse Aggregate



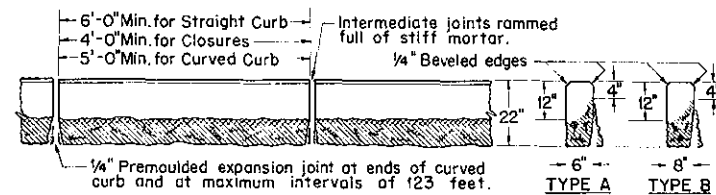
Curb face may be constructed vertical as permitted for PLAIN CEMENT CONCRETE CURB TYPES-A & B.

INTEGRAL CEMENT CONCRETE CURB-TYPES A & B



Note: Curb placed on curves having a radius of less than 50 feet may be constructed with a vertical face, warped as necessary to obtain the 1" batter (required on tangent alignment) at the P.C. and P.T. of the curve. Vertical face curb shall have a uniform width of 8 inches for Type A and 9 inches for Type B.

PLAIN CEMENT CONCRETE CURB-TYPES A & B



The top, the face for a depth of 12 inches and the back for a depth of 4 inches, as indicated, shall be peen-hammer dressed. The bottom of curb may have a tolerance of 1 inch less or 2 inches more than the specified width. Joints shall not exceed 1/4-inch in width for a distance of 12 inches below the top of curb and 1/2-inch in width for the remainder of the joint.

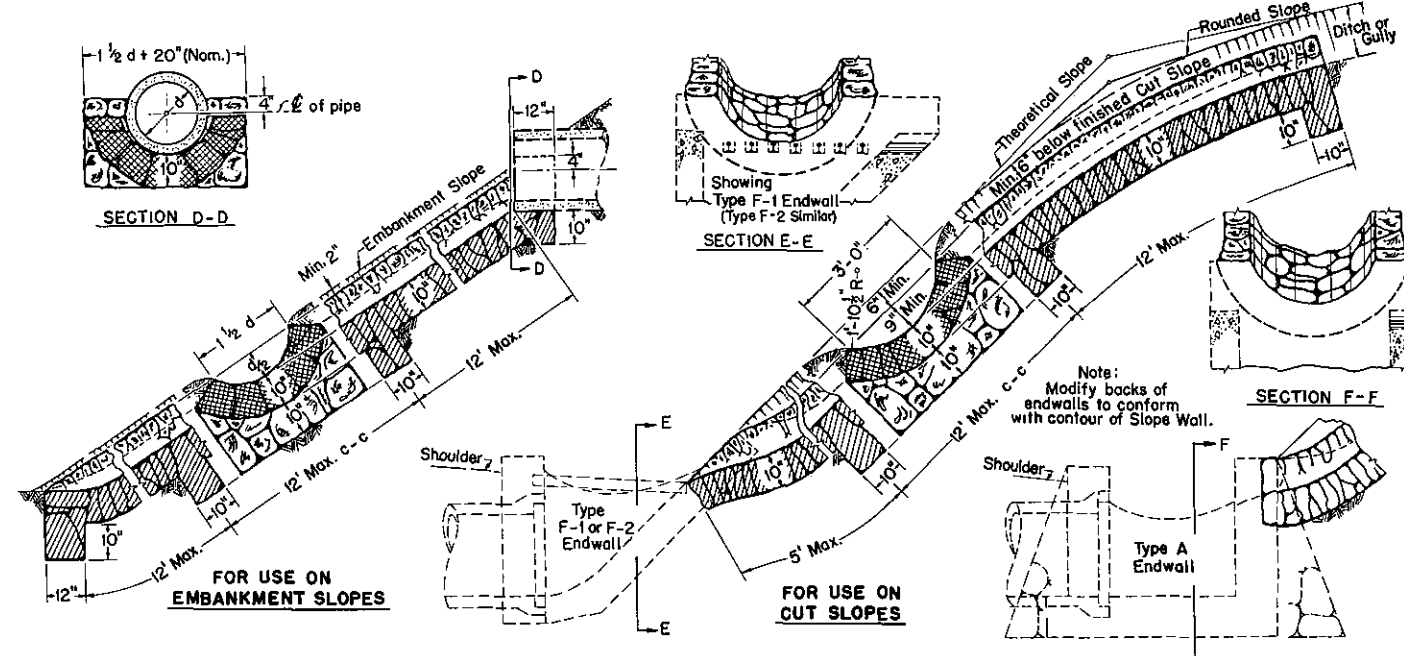
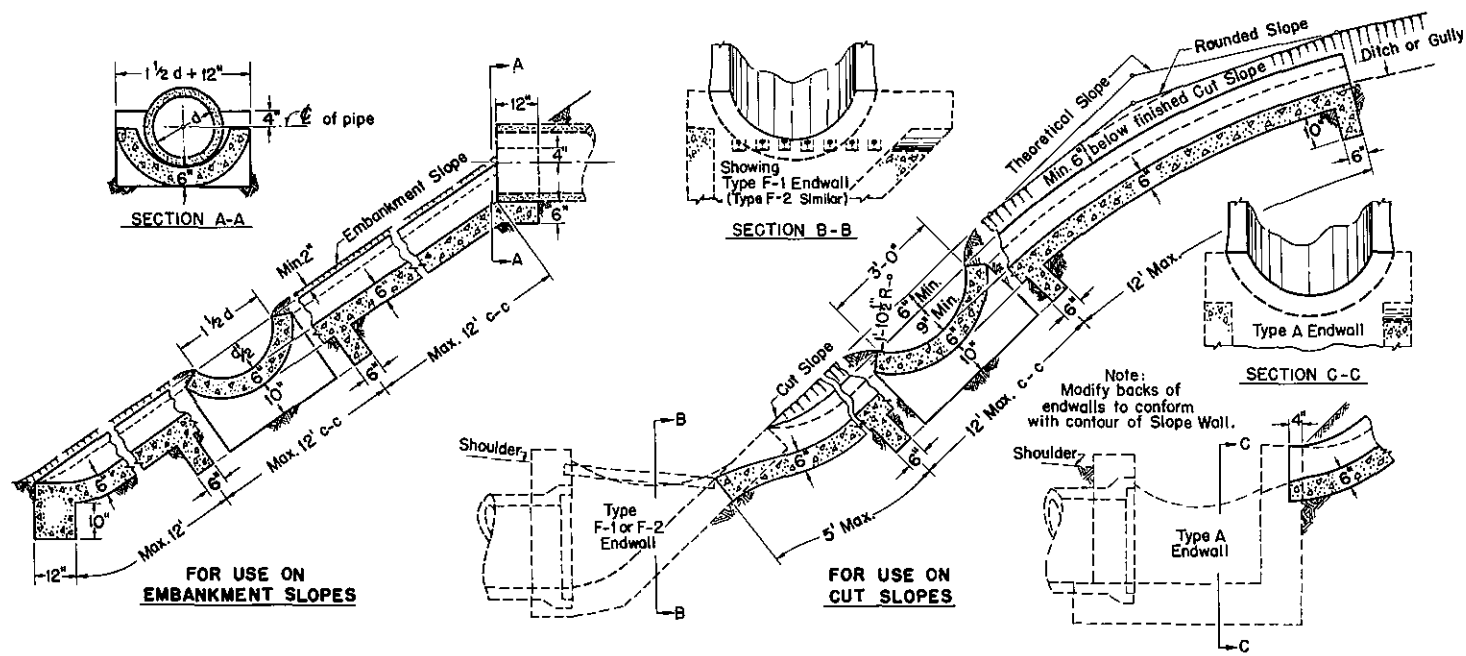
Revised to permit vertical face construction on P.C.C. Curb, P.C.C. Curb Gutters and Integral C.C. Curb. Also corrected Vit. Brick Gutter and C.C. Header Curb.
 Approved March 3, 1954
 S. T. Baker
 ASST. CHIEF ENGR. IN CHARGE OF DESIGN

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF HIGHWAYS -STANDARD DETAILS- CURBS AND GUTTERS

APPROVED March 24, 1947

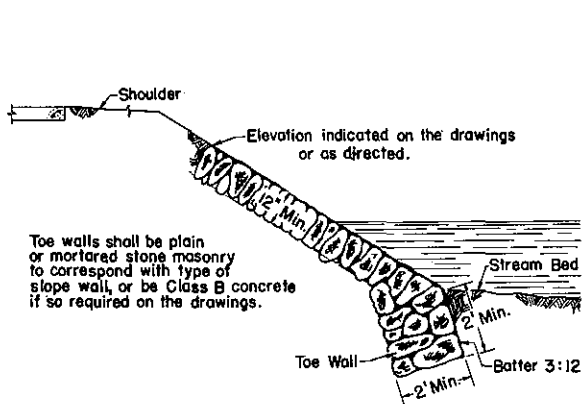
E. A. Schindler
 CHIEF ENGINEER

SD-10

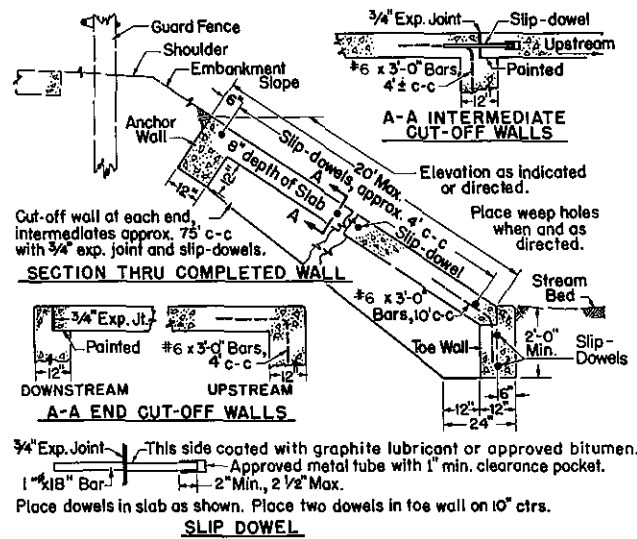


CLASS B CEMENT CONCRETE SLOPE WALLS (FOR SPILLWAYS)

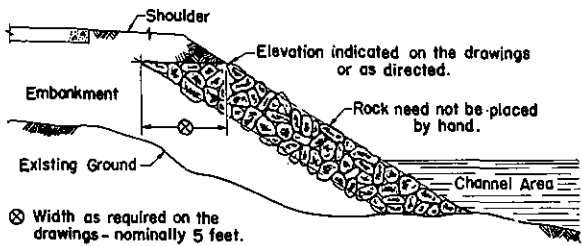
MORTARED STONE SLOPE WALLS (FOR SPILLWAYS)



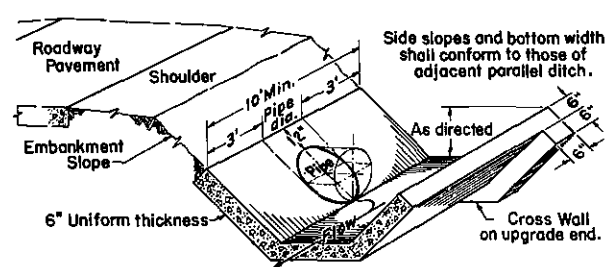
PLAIN AND MORTARED STONE SLOPE WALL



CLASS A and B CEM. CONC. SLOPE WALL

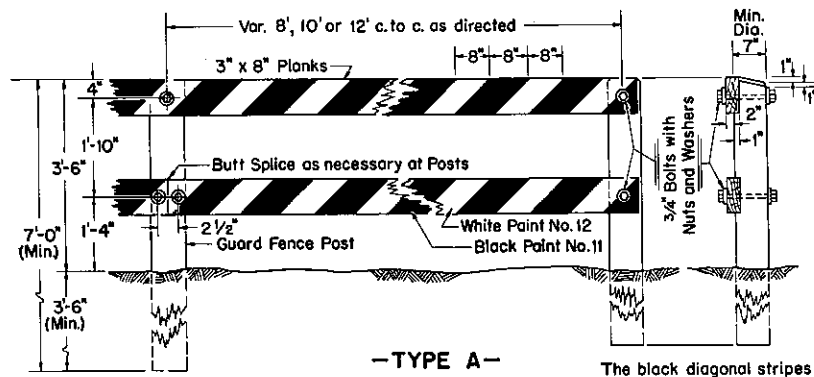


ROCK EMBANKMENT FOR SLOPE PROTECTION

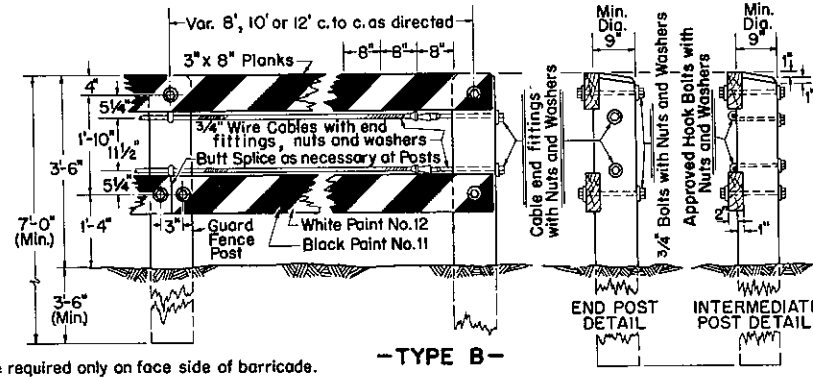


CLASS B CEM. CONC. PAV'G. for STREAM BEDS (PAVED PARALLEL DITCH)

Revised for Bar Designation and for Slip-Dowel Size
 Approved *November 1, 1961*
 COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 —STANDARD DETAILS—
 SLOPE PROTECTION
 APPROVED *March 24, 1947*
 CHIEF ENGINEER
 SD-11

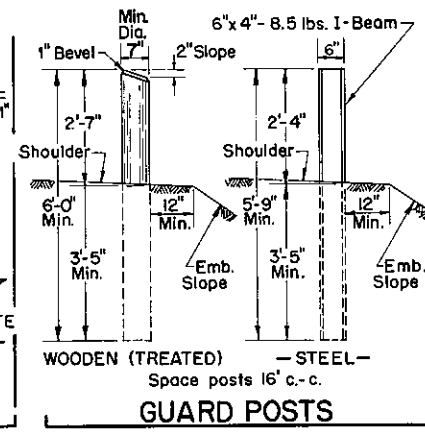


-TYPE A-



-TYPE B-

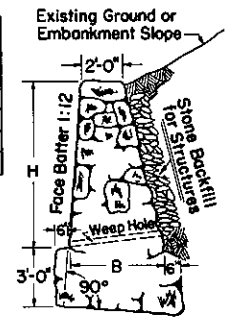
The black diagonal stripes are required only on face side of barricade.
PERMANENT BARRICADES-TYPES A AND B



GUARD POSTS

H	2'-0"	3'-0"	4'-0"	5'-0"	6'-0"	7'-0"	8'-0"	9'-0"	10'-0"	11'-0"	12'-0"	13'-0"	14'-0"	15'-0"
— TYPE 1 - SUSTAINING ROADWAY AND TWENTY (20) TON ROLLER —														
B	2'-7"	3'-1"	3'-7"	4'-1"	4'-7"	5'-1"	5'-7"	6'-1"	6'-7"	7'-1"	7'-7"	8'-1"	8'-7"	9'-1"
— TYPE 2 - SUSTAINING SLOPING BANKS OF EARTH —														
B	2'-2"	2'-5"	2'-9"	3'-2"	3'-8"	4'-3"	4'-11"	5'-6"	6'-2"	6'-10"	7'-6"	8'-1"	8'-9"	9'-5"
— TYPE 3 - SUSTAINING LEVEL BANKS OF EARTH —														
B	2'-2"	2'-3"	2'-5"	2'-8"	3'-1"	3'-6"	4'-0"	4'-5"	4'-11"	5'-5"	5'-10"	6'-4"	6'-9"	7'-3"

Masonry courses in wall and footing shall be perpendicular to the face batter and shall be laid so that no course will be continuous through thickness of wall.
 Footers shall have a minimum depth of three (3) feet except where rock is encountered.
 Weep holes shall be placed when and as directed by the Engineer.
 Stone backfill shall be placed when specified on the construction drawings for the project.



CEMENT RUBBLE MASONRY RETAINING WALLS

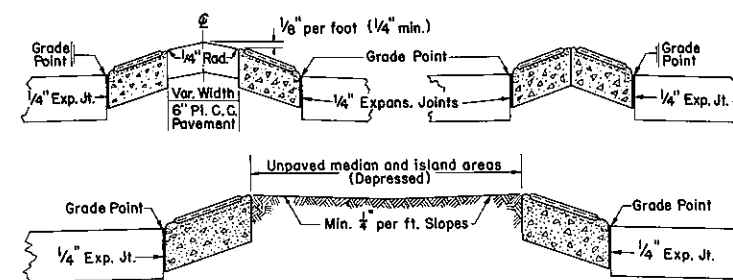
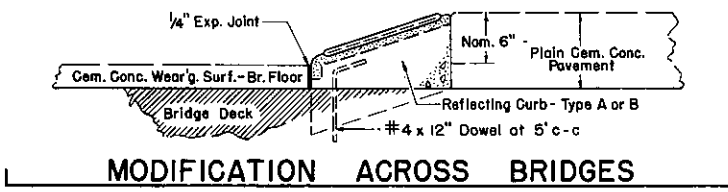
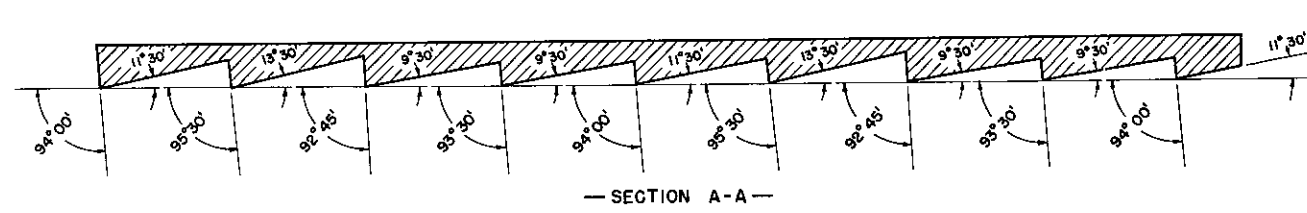
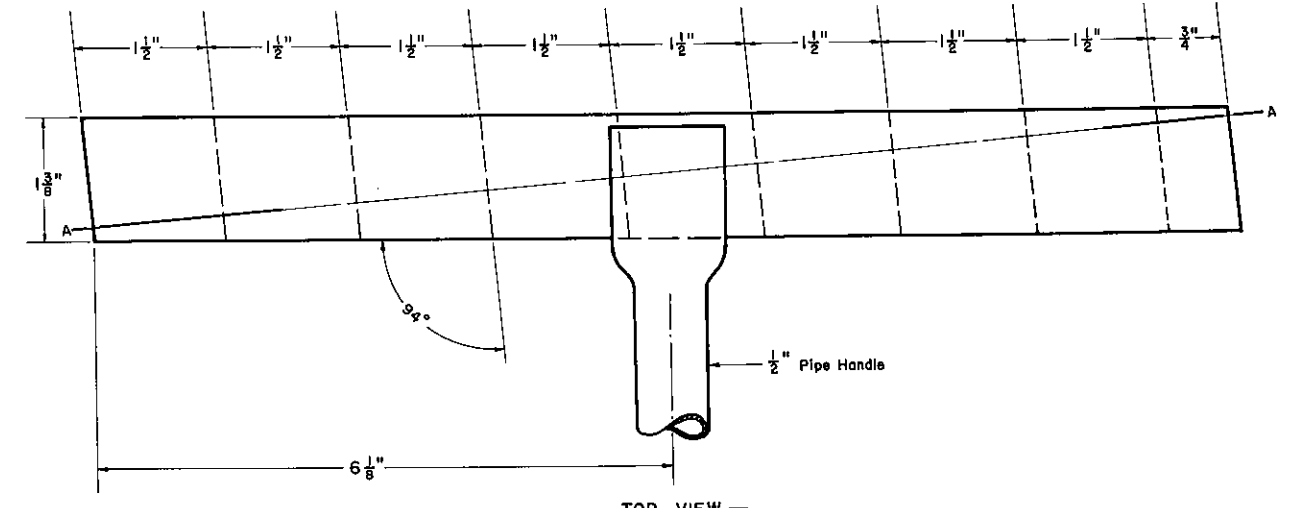
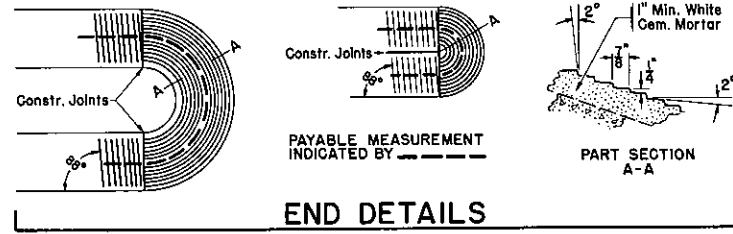
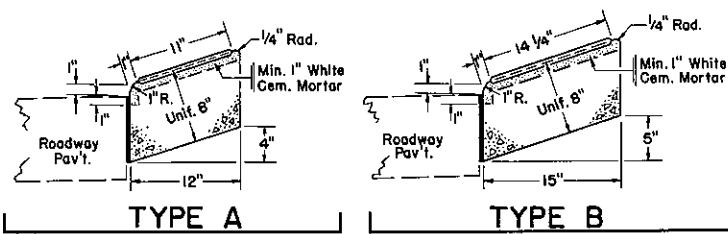
Revised for Addition of Steel Guard Post
 Approved November 1, 1961
 Revised for Deletion of Post Painting
 Approved July 24, 1956
 Revised for Guard Post Painting
 Approved February 2, 1953

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 —STANDARD DETAILS—
 MISCELLANEOUS

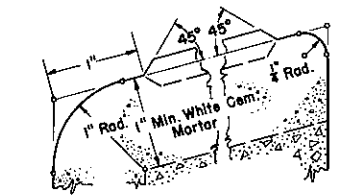
APPROVED March 24, 1947
 CHIEF ENGINEER

SD-12

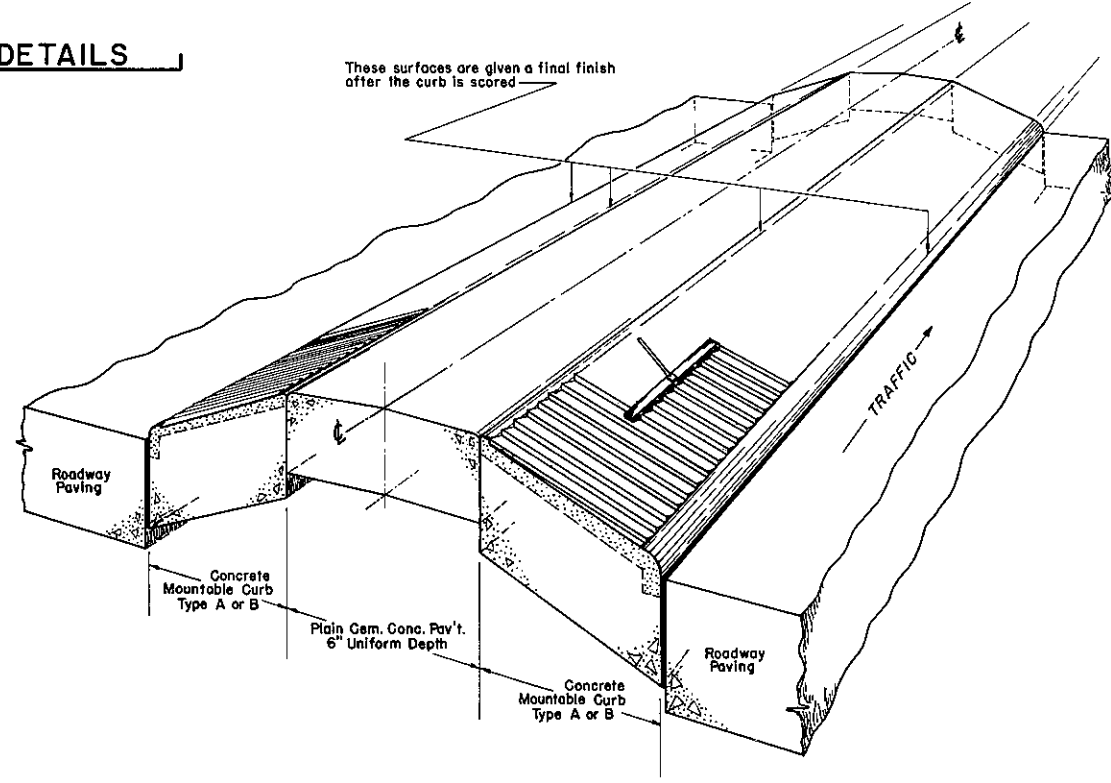
Muller 610



Note: Omit the indicated 1/4 expansion joints when curb is adjacent to bituminous surface courses.



EDGING DETAILS



TYPICAL DIVISOR AREA AND SCORING TOOL

TABULATION OF MOUNTABLE CURBS

TYPE OF CURB	DESIGN DETAILS
White Concrete Mountable Reflecting Curb, Types A & B	As shown in sketches
Plain Concrete Mountable Reflecting Curb, Types A & B	As shown in sketches, except replace white cement mortar with plain cement mortar.
Plain Concrete Mountable Curb, Types A & B	As shown in sketch, except replace white cement mortar with plain cement mortar and eliminate scoring.

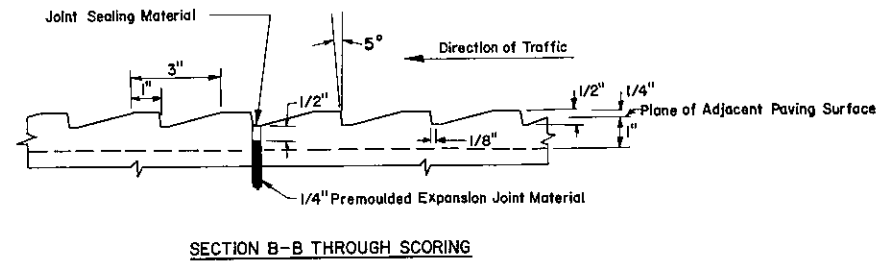
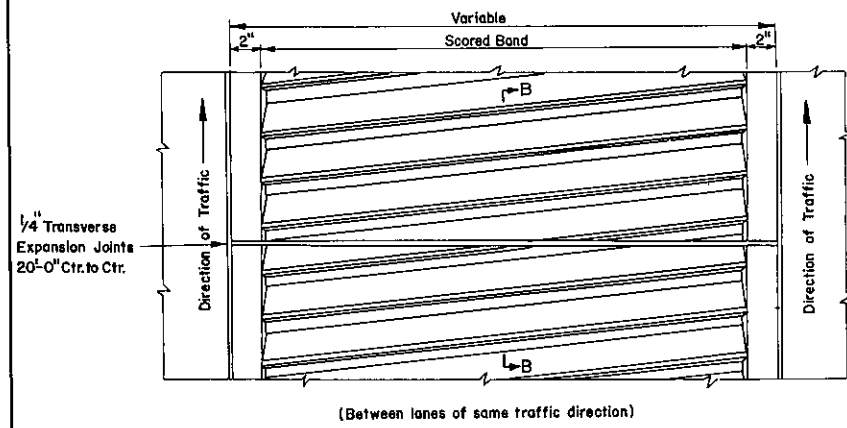
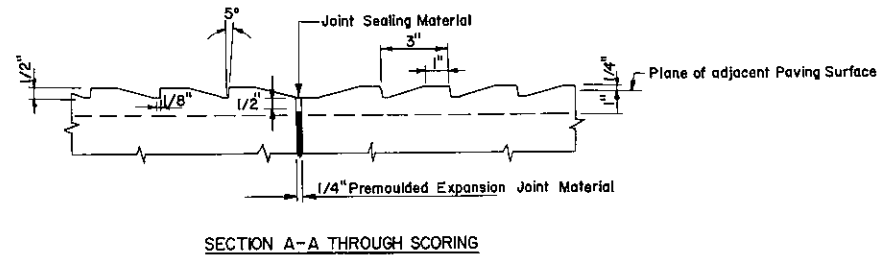
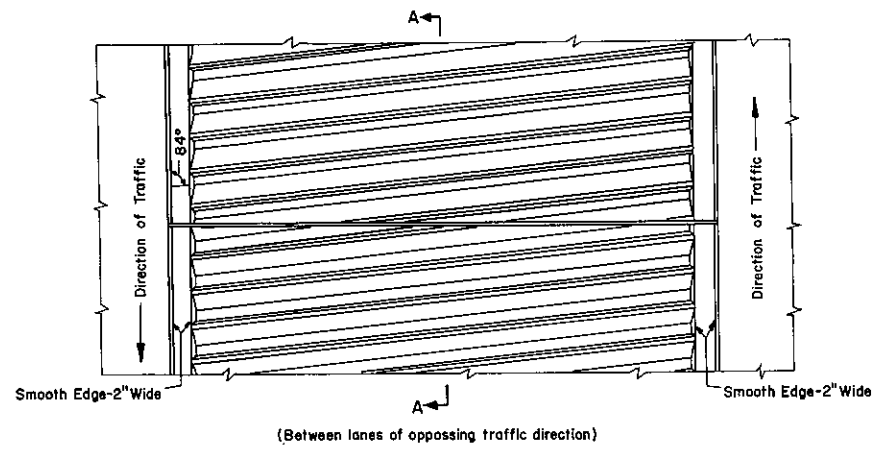
Revised for name of drawing, added tabulation of types, and sheet 2
 Approved May 13, 1966
 Revised for dowel bar size designation.
 Approved November 1, 1961

Assistant Chief Engineer-Design
 Chief Engineer

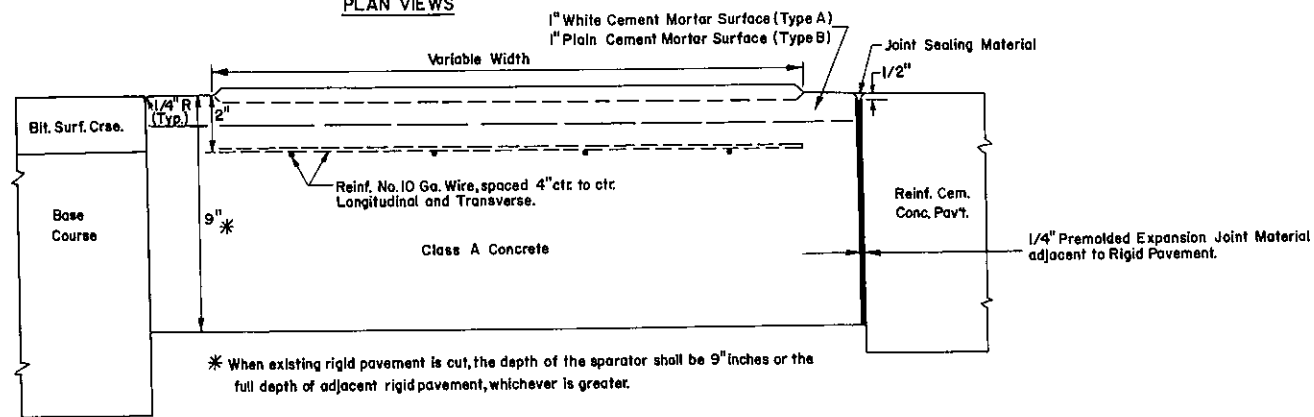
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 CONCRETE MOUNTABLE CURBS
 TYPES A & B

APPROVED May 11 1948
 Chief Engineer

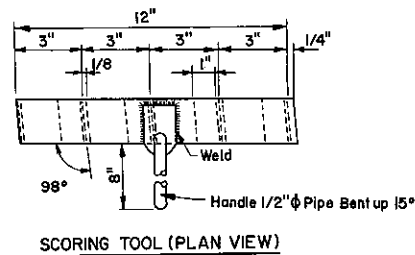
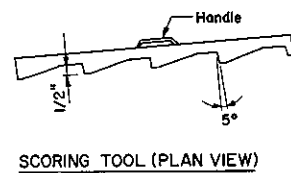
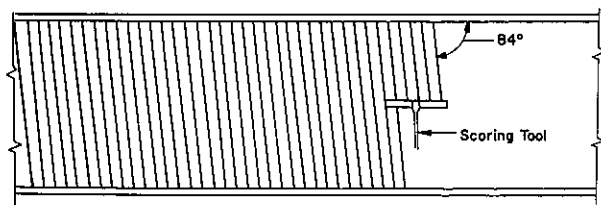
SHEET 1 OF 2
 SD-13



PLAN VIEWS



TYPICAL CROSS SECTION



NOTES

The scoring operation shall be done twice. The first scoring shall be done immediately after the mortar surface has been screeded and smoothed to the proper grade. The second scoring operation shall be done after the excess water has disappeared from the surface and the mortar has acquired sufficient stiffness to remain in place without slumping. All surfaces of the scored band shall be smooth, with true inclinations and draft. All corners shall be sharp. The edging on each side of the scored band shall be smooth, true to grade and alignment and shall be free from an excess of mortar at its junction with the scored band.

Transverse Expansion Joints of corresponding thickness shall be placed directly opposite those in the adjacent pavement. Also 1/4" expansion joints shall be placed in line with construction joint in the adjacent concrete pavement and at intermediate intervals of approximately 20 feet.

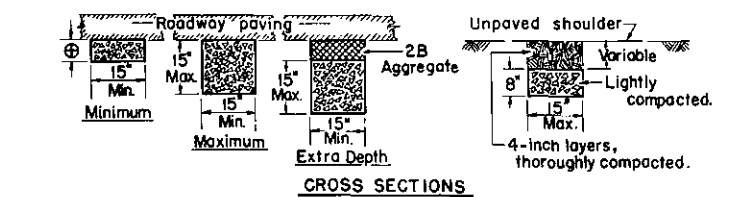
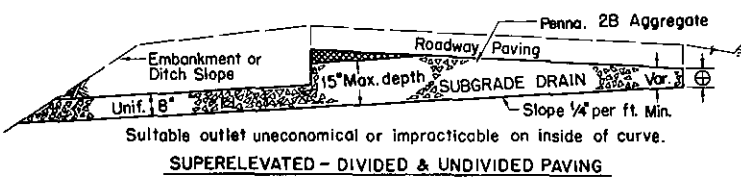
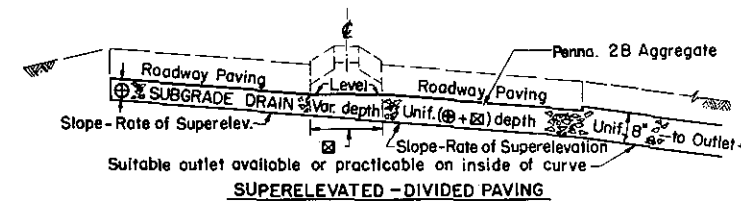
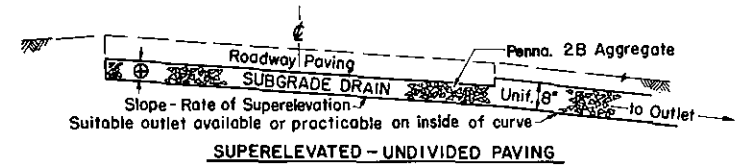
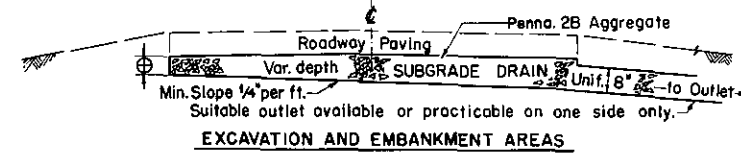
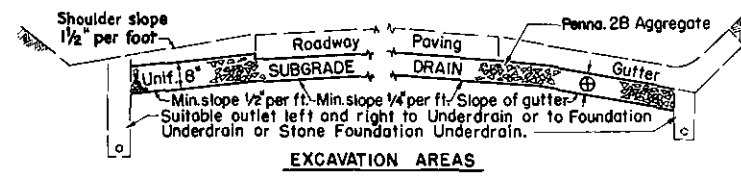
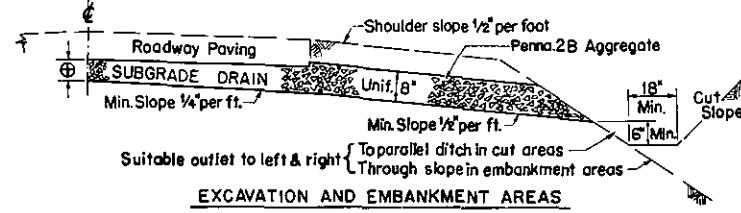
Concrete Traffic Separator, Type A shall be used in areas not artificially lighted.

Concrete Traffic Separator, Type B shall be used in areas artificially lighted.

CONCRETE TRAFFIC SEPARATOR
TYPE A & B

SHEET 2 OF 2

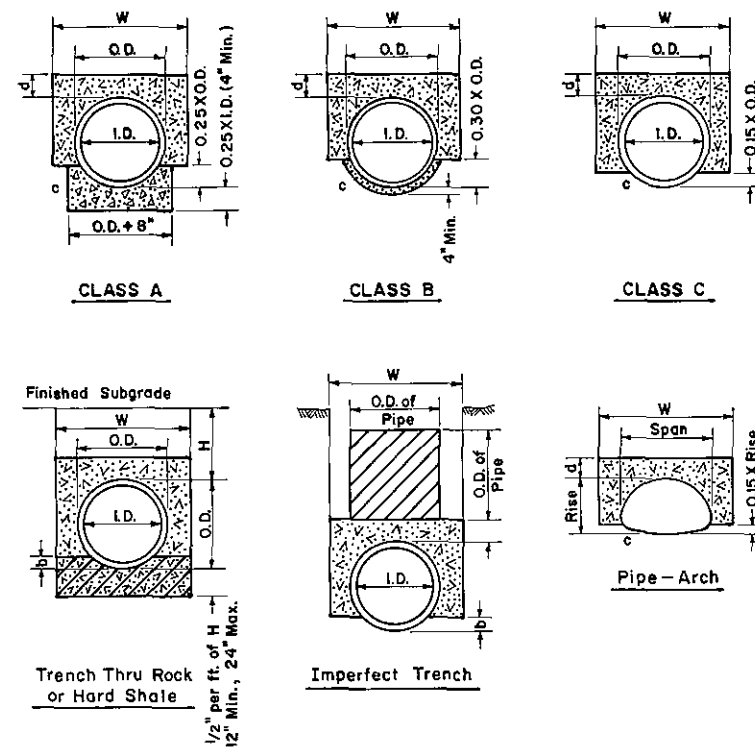
SD-13



⊕ Six (6) inches minimum - or depth of adjacent insulation material or Sub-base.
⊞ Aggregate in excess of 15-inch depth is payable as 2B Coarse Aggregate.
⊟ Excavation in excess of 15-inch depth is payable as Class 2 Excavation.
⊠ One quarter (1/4) inch per foot for the width of divisor area.

The top of aggregate under concrete pavement, base or gutter and through the unpaved shoulder area shall be covered with either one (1) layer of approved tar paper or one (1) layer of subgrade paper (A.A.S.H.O. M74-38), twenty-four (24) inches in width.
Under Rigid Type Base Courses where Sub-base is not specified either on the drawings or in the Proposal Subgrade Drains shall be placed on the upper side of all transverse construction joints and as herein specified for Flexible type base courses.
Under Reinforced Cement Concrete Pavements where Sub-base is not specified either on the drawings or in the Proposal: Subgrade Drains shall be placed on the upper side of all transverse expansion and construction joints and at low points of grade. They shall be skewed one (1) foot per traffic lane and the nearest point of the drain shall be two (2) feet from the transverse joint.
Under Flexible Type Base Courses: Subgrade Drains shall be placed at low points of grade, at transitions between excavation and embankment areas, and where directed by the Engineer.

SUBGRADE DRAINS



PIPE BEDDING AND BACKFILL

- ⊞ GRANULAR MATERIAL
- ⊟ CONCRETE
- ⊠ FINE AGGREGATE
- ⊡ SELECTED FINE COMPRESSIBLE MATERIAL or when directed GRANULAR MATERIAL
- ⊢ LOOSE, HIGHLY COMPRESSIBLE EARTH or other APPROVED MATERIAL

- I.D. - Nominal inside diameter of pipe.
- O.D. - Outside diameter of pipe barrel or shell.
- H.D. (Hub Diameter) - Outside diameter of pipe at bell or band.
- W - 2.0 ft. + H.D. for pipes or pipe-arches not exceeding 48" I.D. or Span, respectively.
2.5 ft. + H.D. for pipes or pipe-arches exceeding 48" I.D. or Span, respectively.
- b - Varies in conformance with class of bedding applicable to pipe installation.
- c - When unstable material under the pipe has been removed, it shall be replaced with suitable material compacted to a satisfactory density, and the bed shaped as specified in Section 6.31.
- d - 1.0 ft. minimum, where practicable.
- H - Height of fill over top of pipe.

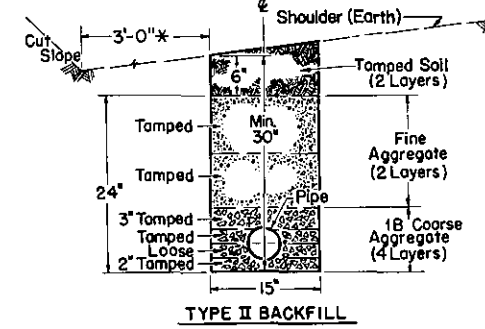
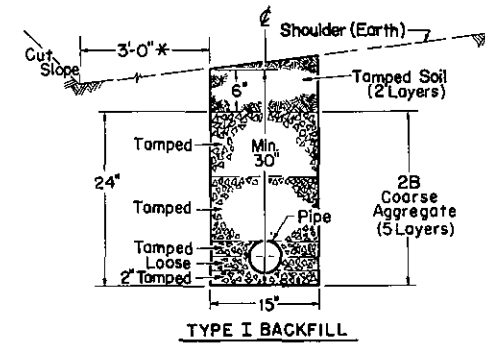
Note: The use of Granular Material for pipe backfill will be based upon the location and type of pipe installation. The material and method of backfill shall be in accordance with Section 6.31. Except as noted, it will be used for all pipes carrying surface drainage located within the limits bounded by the outer edges of shoulders in cut sections, or by the toes of slopes in embankment sections.

The exceptions are:

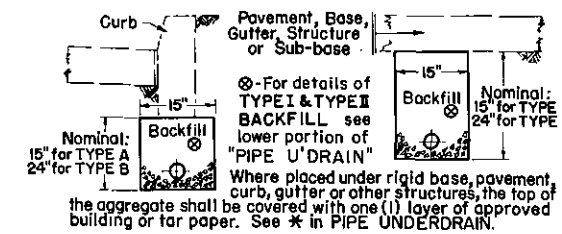
- (1) Pipes located in medians.
- (2) Pipes located under swales or ditch lines.
- (3) Slope pipes in cut or fill.
- (4) Pipes under drives to private properties.
- (5) Combination storm sewer and underdrain.
- (6) Pipes located in graded sections of interchange areas.

PIPE CULVERTS & CORR. METAL PIPE-ARCHES

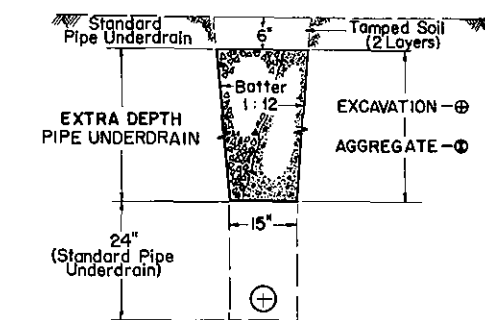
Revised for the change in minimum diameter of slope pipes on Sheet 2.
Approved April 12, 1966



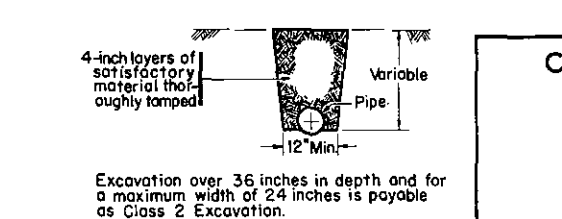
PIPE UNDERDRAIN-TYPES I & II BACKFILL



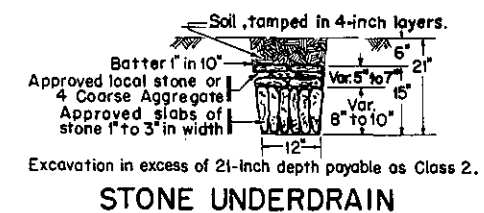
PIPE FOUNDATION UNDERDRAIN TYPES A & B, TYPES I & II BACKFILL



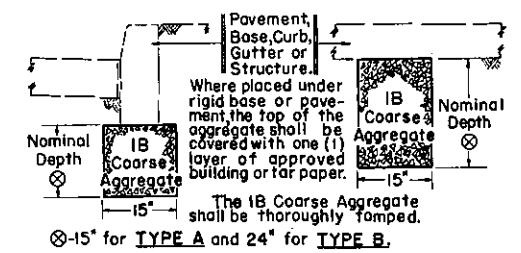
EXTRA DEPTH PIPE UNDERDRAIN



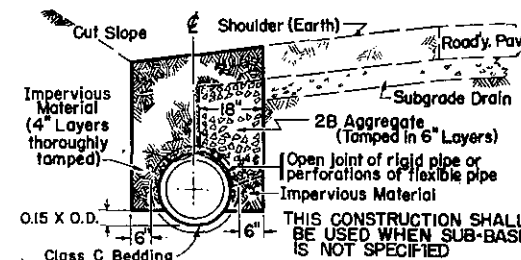
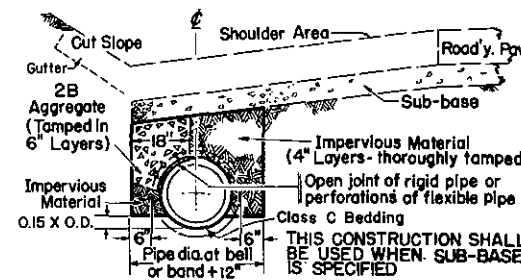
PIPE UNDERDRAIN OUTLETS



STONE UNDERDRAIN



STONE FOUNDATION UNDERDRAIN TYPES A & B



ALTERNATE CONSTRUCTION IN CURBED AREAS

Reinf. Cem. Conc., Vit. Clay Lined Reinf. Cem. Conc., Extra Str. Pl. Cem. Conc. or Extra Str. Vit. Clay - with open joint adjacent to Coarse Aggregate
Perf. Corr. Metal or Perf. Asph. Coated Corr. Metal - with perforations grouped within:
125" for 15" pipe 80" for 30" pipe
110" for 18" pipe 70" for 36" pipe
90" for 24" pipe 60" for 48" pipe

Aggregate - 2B: On cu. yd. basis - Compacted & complete in place.
Excavation - Class 2: Width - outside dia. of pipe at bell or band + 1 foot.

COMBINATION STORM SEWER & U'DRAIN

Revised to include Pipe Culvert and C.M. Pipe-Arch Bedding and Backfill, and to delete references to Special Subgrade; also the addition of Sheet 2.
Approved March 11, 1966

Revised to conform to SPECIFICATIONS, Form 408 dated 1960.
Approved November 1, 1961

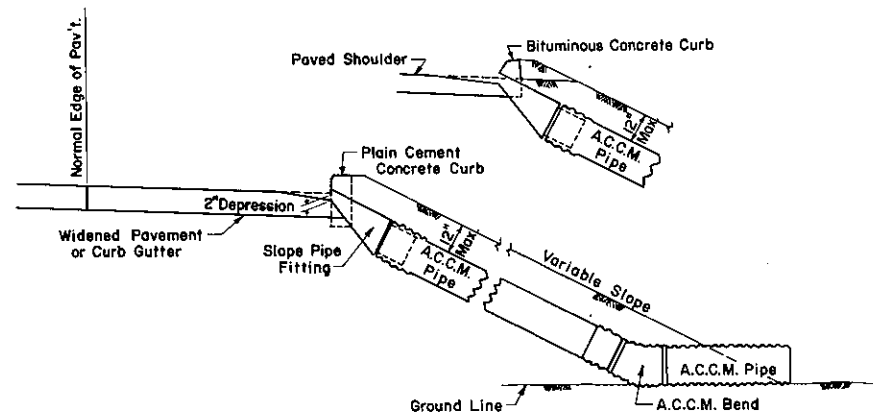
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF HIGHWAYS - STANDARD DETAILS - SUB-SURFACE DRAINS

APPROVED October 12, 1950 SHEET 1 OF 2

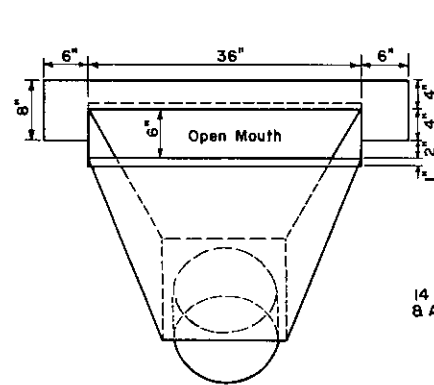
CHIEF ENGINEER

SD-14

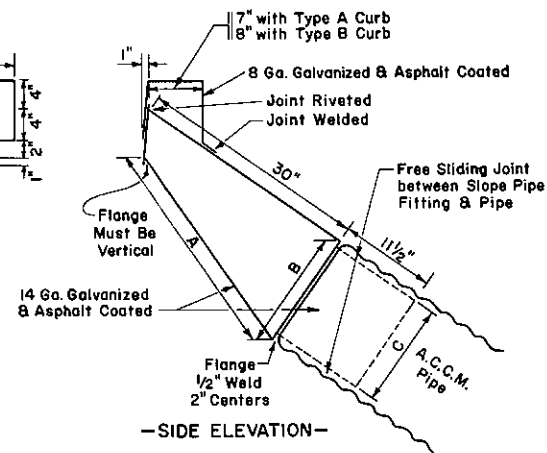
Number 61



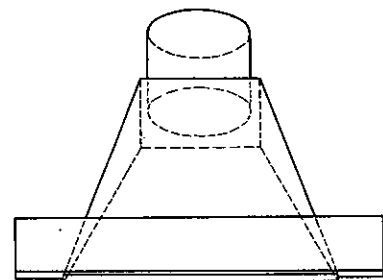
ADJACENT TO STRUCTURE AND/OR PAVED SHOULDER



- FRONT ELEVATION -



- SIDE ELEVATION -

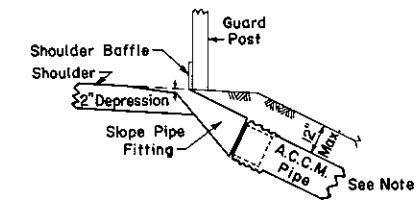


- PLAN -

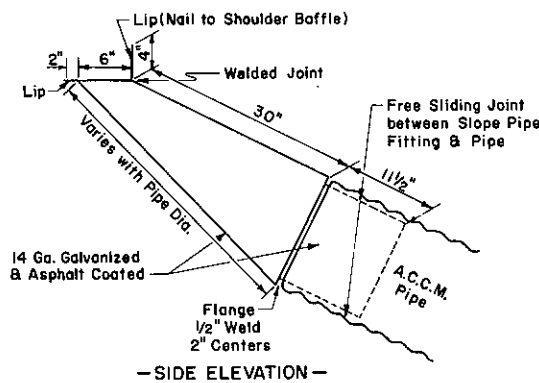
SLOPE PIPE FITTING - TYPE A

Nominal Diameter of Pipe*	Dimensions (Inches) for 2:1 Slopes		
	A	B	C
12"	28 ¹⁵ / ₁₆	13	11
15"	29 ¹³ / ₁₆	16	14

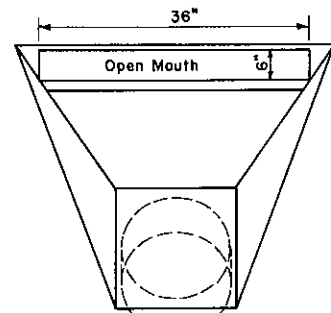
* See Note



DRAINAGE IN FILL AREA



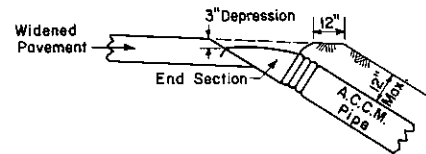
- SIDE ELEVATION -



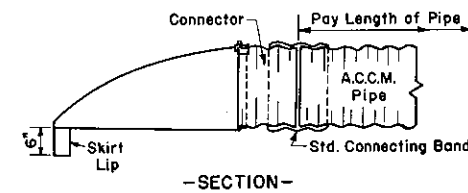
- COMPOSITE -

SLOPE PIPE FITTING - TYPE B

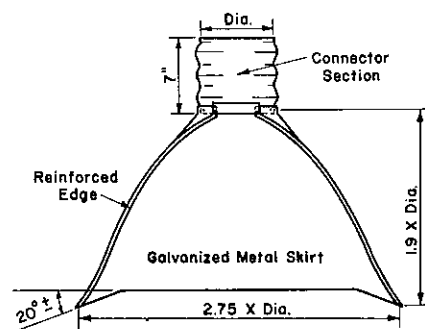
Note: Slope pipes draining only shoulder areas in embankments, other than those adjacent to structures, shall be restricted to 12" in diameter (Minimum)



ADJACENT TO STRUCTURE

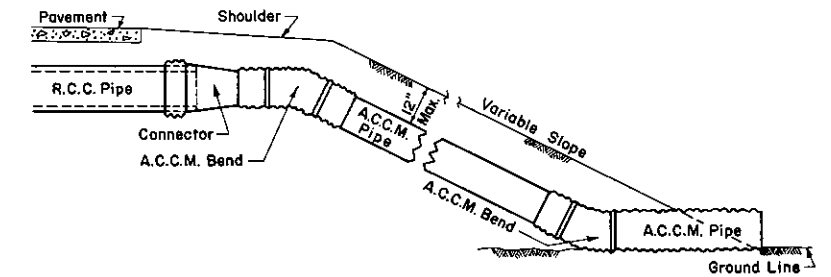


- SECTION -

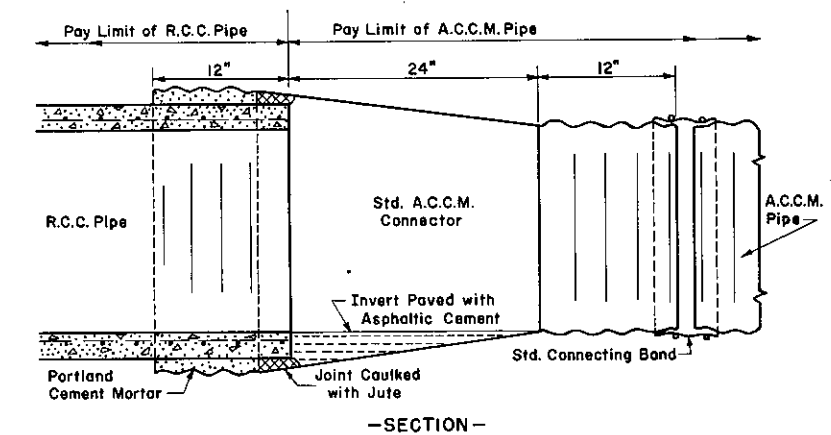


- PLAN -

END SECTION



OUTLET PIPE THRU EMBANKMENT SLOPE



- SECTION -

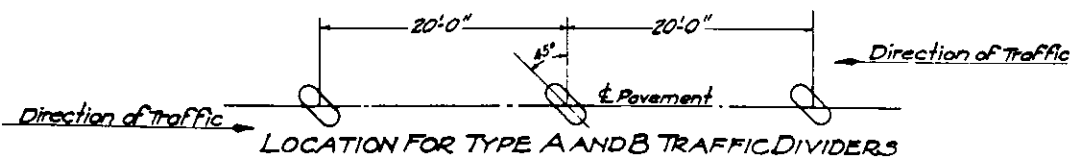
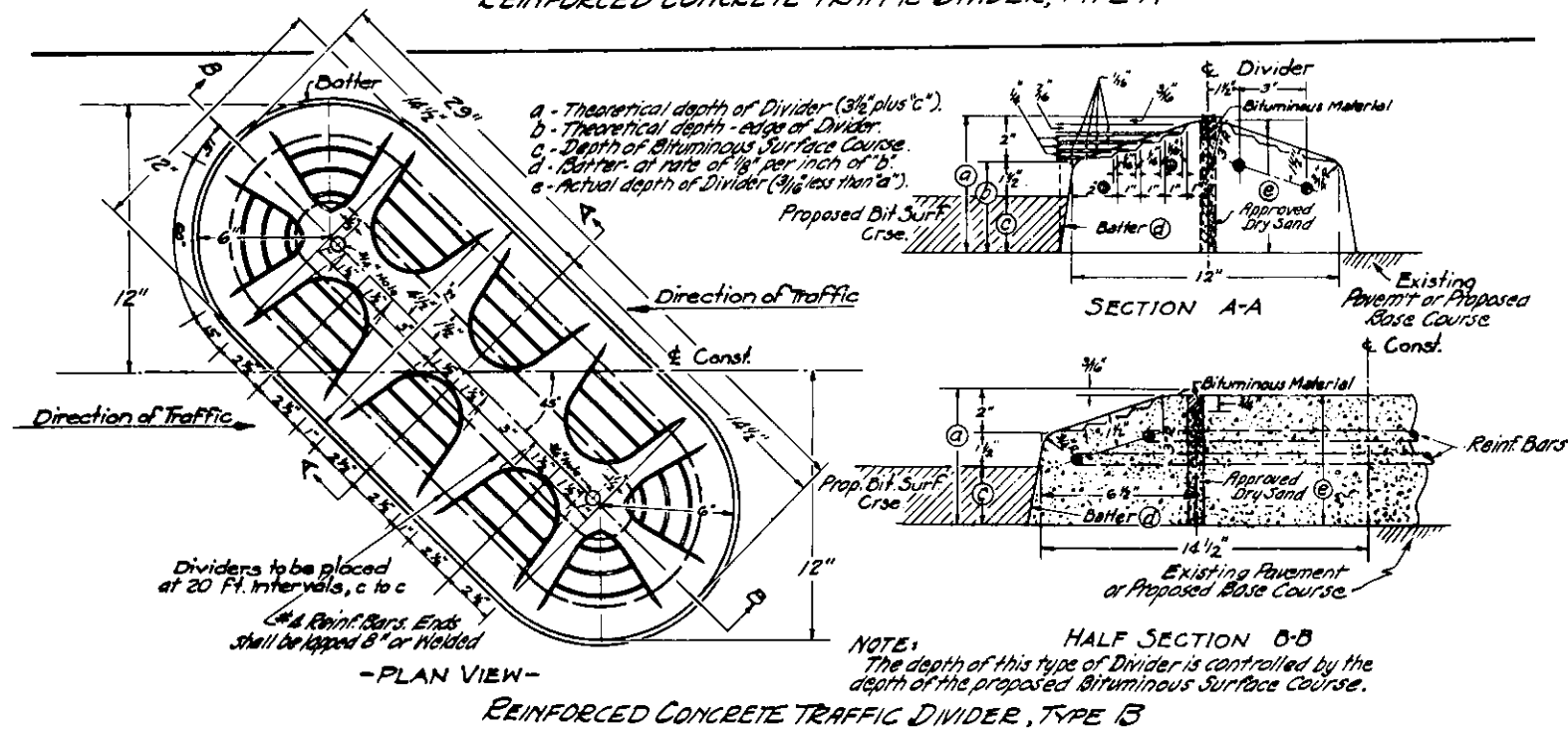
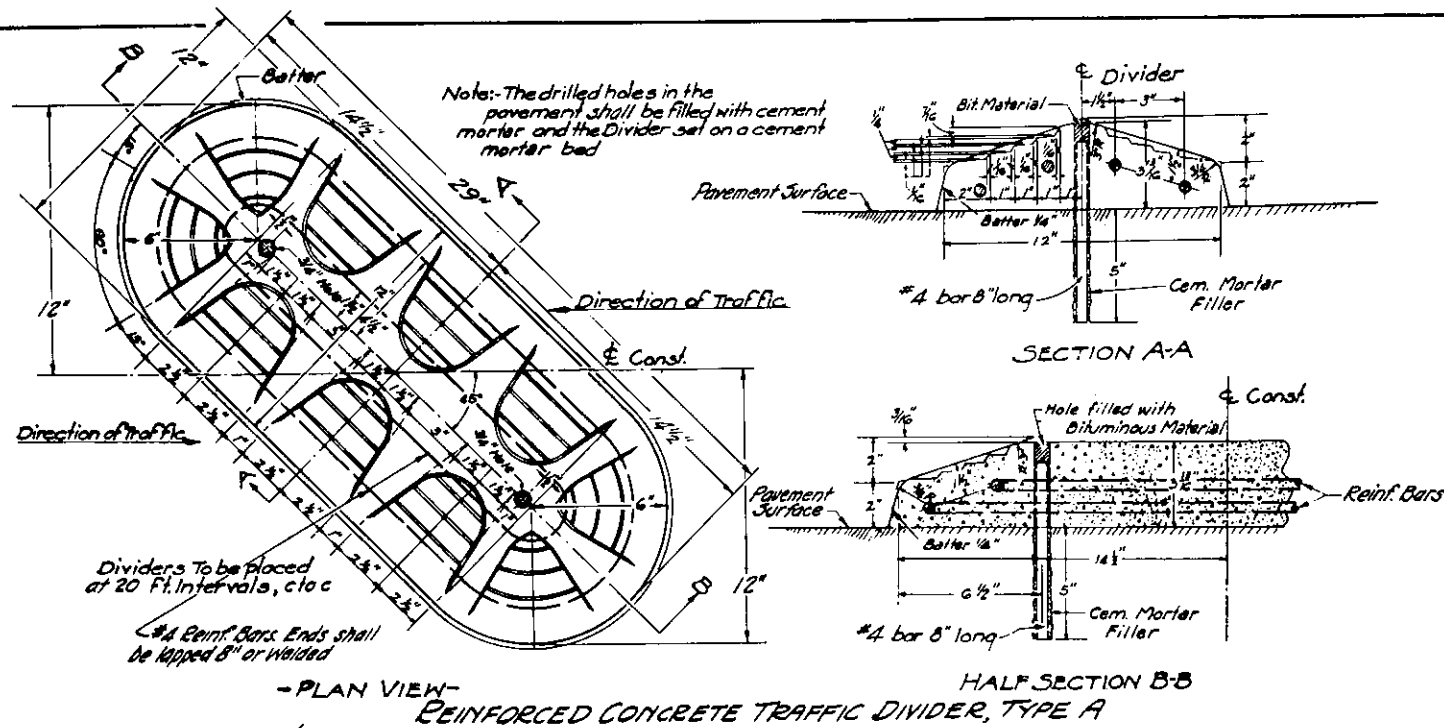
ASPHALT COATED CORRUGATED METAL PIPE CONNECTOR

Rev. April 18, 1966

SUB-SURFACE DRAINS

SHEET 2 OF 2

SD-14



Revised Divider Spacing to 20 Feet
 Approved November 6, 1953

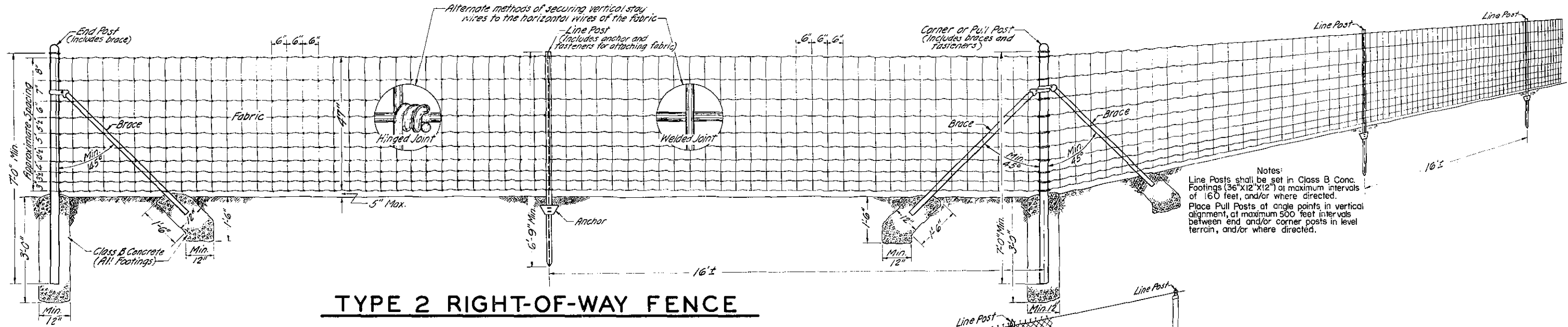
R. T. Baker
 ASST. CHIEF ENGR. IN CHARGE OF DESIGN

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS

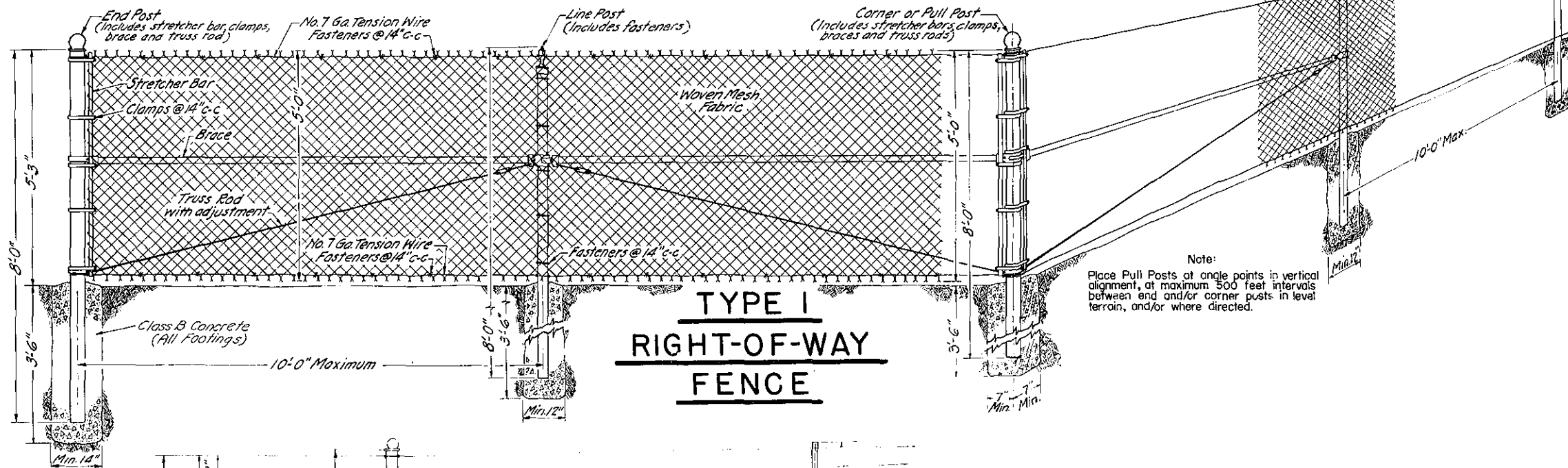
REINFORCED CONCRETE TRAFFIC
 DIVIDERS - TYPES A & B

APPROVED *April 13, 1953*
Ch. Rushing
 CHIEF ENGINEER

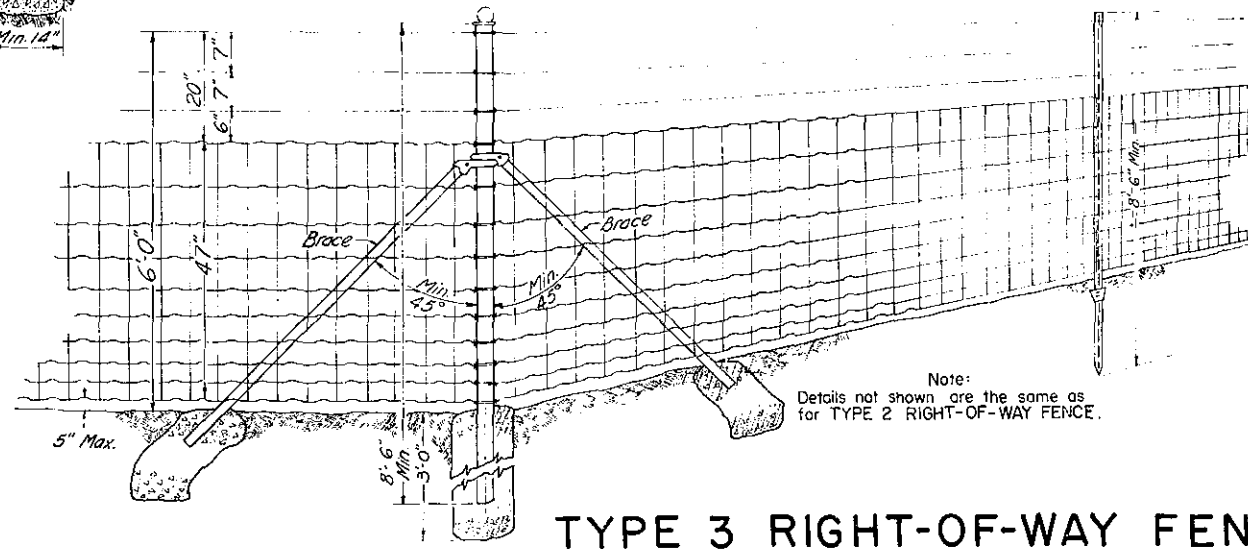
SD-15



TYPE 2 RIGHT-OF-WAY FENCE



TYPE 1 RIGHT-OF-WAY FENCE



TYPE 3 RIGHT-OF-WAY FENCE

Revised for addition of TYPE 3 RIGHT-OF-WAY FENCE, ETC.
Approved April 15, 1965
M. J. ... CHIEF ENGINEER

Revised for addition of NOTES.
Approved November 4, 1961
J. ... CHIEF ENGINEER

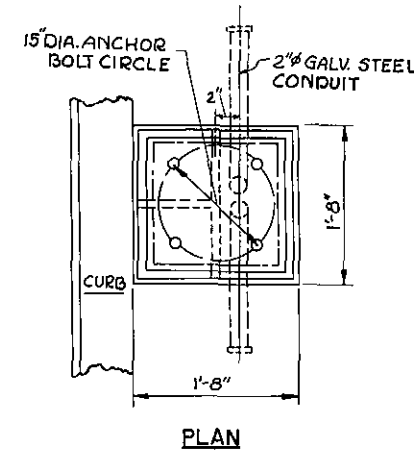
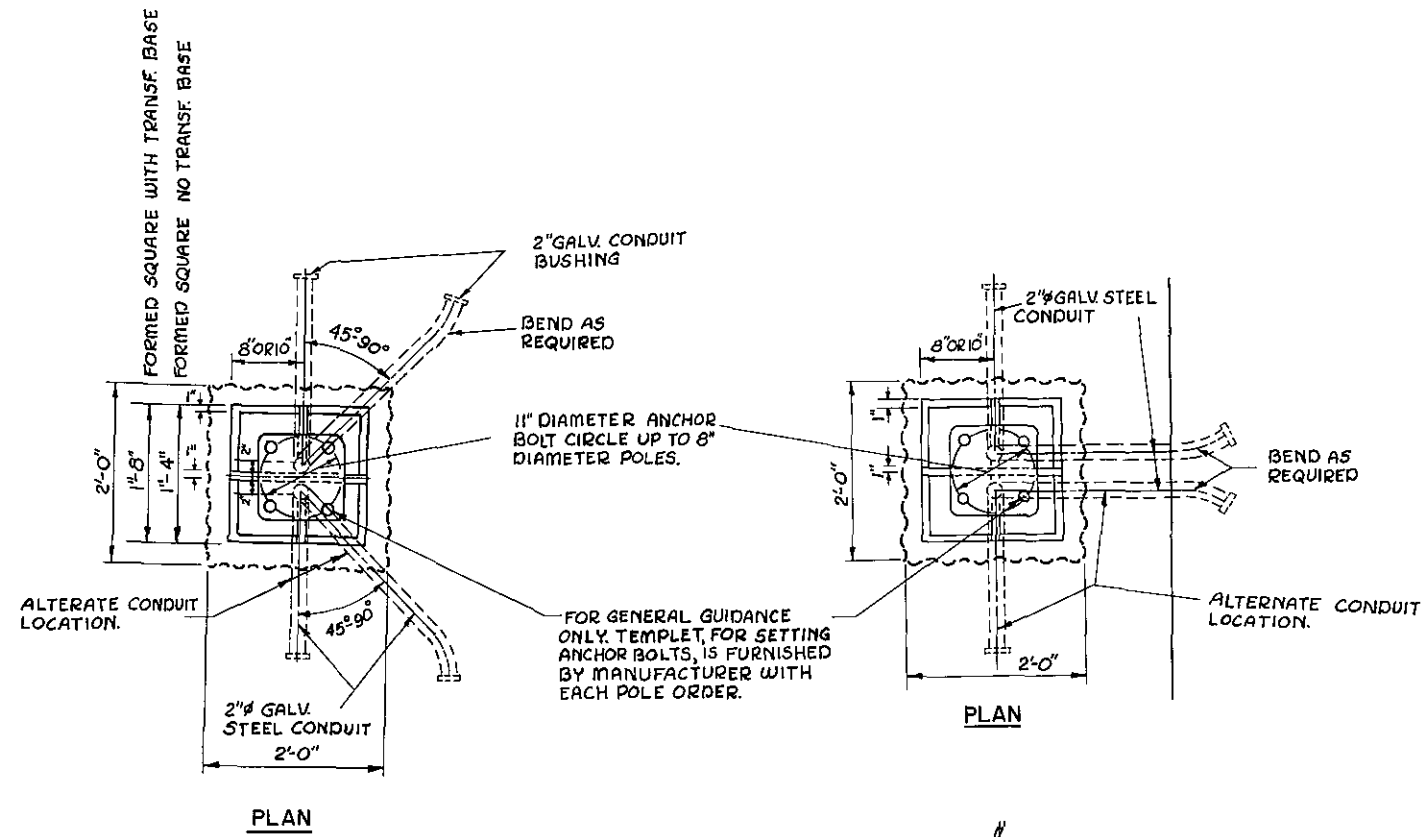
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS

**TYPES 1, 2 AND 3
RIGHT-OF-WAY FENCE**

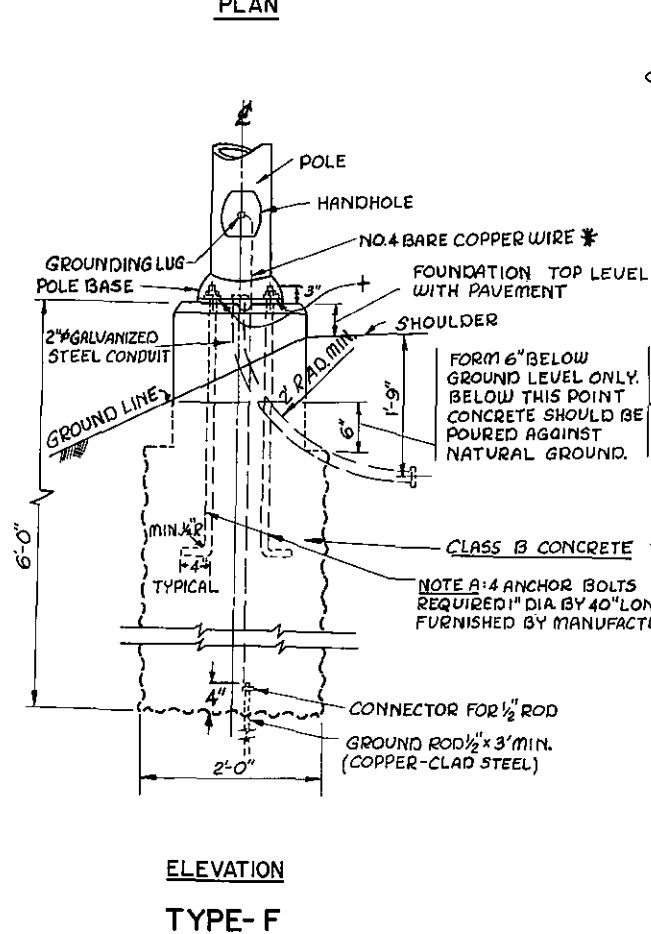
APPROVED September 25, 1953
J. ... CHIEF ENGINEER

SD-16

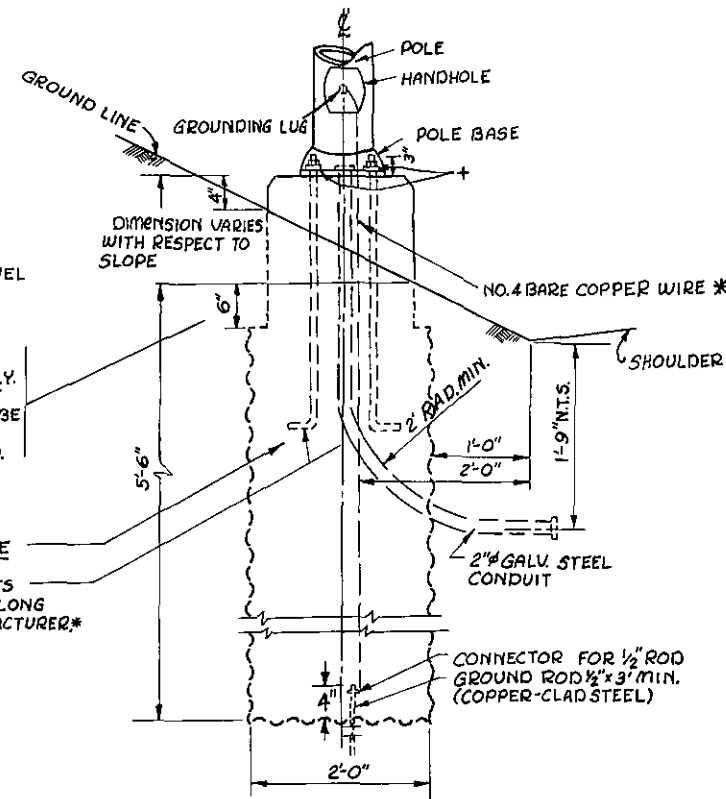
Revised 65



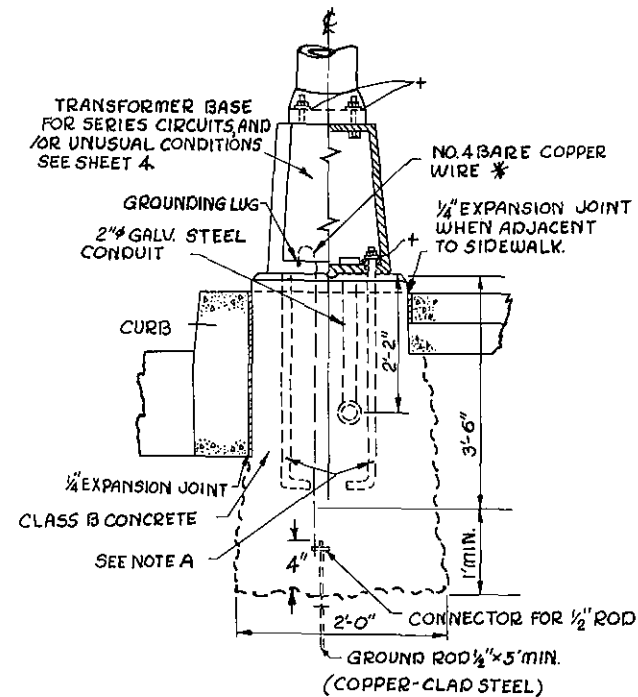
- NOTES:**
- *-ANCHOR BOLTS SHALL EXTEND 9" MIN. BELOW FORMED SECTION
 - + GALVANIZED STEEL SPRING LOCK WASHER
 - B- INSTEAD OF DIGGING 2'-0" SQUARE HOLE, A 2'-0" ROUND AUGER MAY BE USED
 - C- TOP OF FORMS SHALL BE LEVEL IN BOTH DIRECTIONS
 - D- ALL ANCHOR BOLTS NUTS & WASHERS AND TOP 8" OF ANCHOR BOLTS SHALL BE GALVANIZED
 - E- MAXIMUM RESISTANCE OF GROUND RODS SHALL BE 25 OHMS
 - F- SEE SHEET 4 FOR POLE DETAILS
 - G- FOR FOUNDATIONS ON BRIDGES SEE STANDARD DRAWINGS ST-140 AND ST-141
 - *- LEAVE 30 INCHES OF GROUND WIRE COILED ABOVE FOUNDATION. (WIRE EXTENDS THROUGH CENTER OF FOUNDATION)
 - H- FOUNDATIONS ARE DESIGNED FOR 30-FOOT MOUNTING HEIGHT OF LUMINAIRES. FOR HIGHER MOUNTINGS CHECK DESIGN AND REVISE, IF NECESSARY, FOR ADEQUATE STRENGTH.



ELEVATION
TYPE-F



ELEVATION
TYPE-C



ELEVATION
TYPE-P

SCALE: 1"=1'-0" UNLESS NOTED

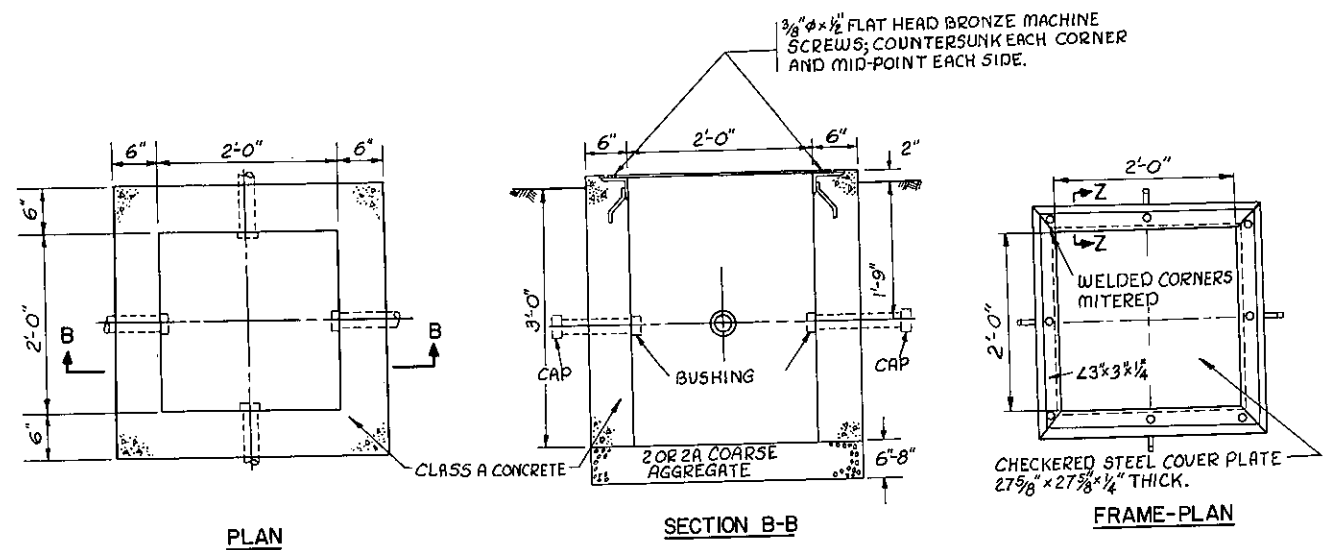
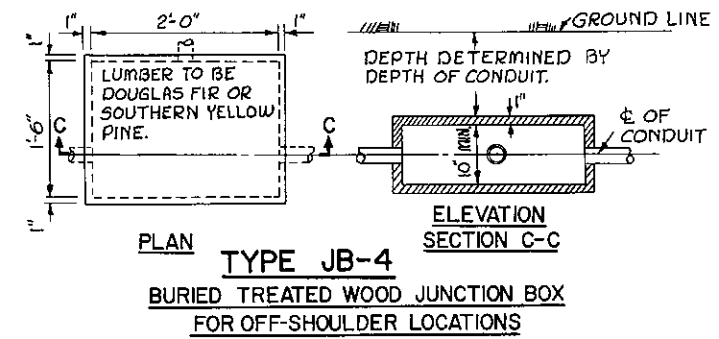
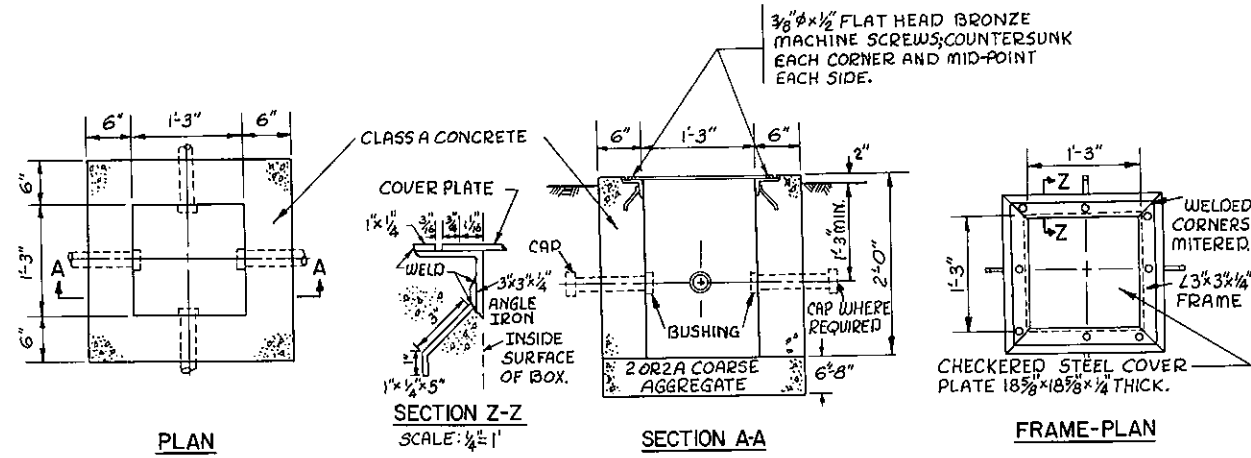
ADDED NOTE H.
APPROVED FEB. 15, 1966
DEPUTY SECRETARY-ENGINEERING
REMOVED JUNCTION & PULL BOXES. GENERAL REVISIONS.
APPROVED JUNE 1965
DEPUTY SECRETARY-ENGINEERING

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
HIGHWAY LIGHTING
FOUNDATIONS

APPROVED JUNE 1, 1964
DEPUTY SECRETARY-ENGINEERING

SHEET 1 OF 5

SD-20



NOTES:

JB-1 AND JB-2 SHALL BE USED IN LOCATIONS WHERE THEY WILL BE SUBJECT TO LOADS NO HEAVIER THAN PEDESTRIAN TRAFFIC.

FOR OTHER LOCATIONS USE JB-11 OR JB-12 SHOWN ON SHEET 3.

EQUIVALENT APPROVED PRECAST JUNCTION BOXES MAY BE SUBSTITUTED FOR JB-1 AND JB-2 SHOWN.

AFTER INSTALLATION, ALL EXPOSED STEEL SHALL BE PAINTED WITH ONE COAT OF RED LEAD AND ONE COAT APPROVED BITUMINOUS PAINT.

SCALE: 1"=1'-0" UNLESS NOTED

GENERAL REVISIONS. SHEET NUMBER CHANGED. WAS ON SHEET 1

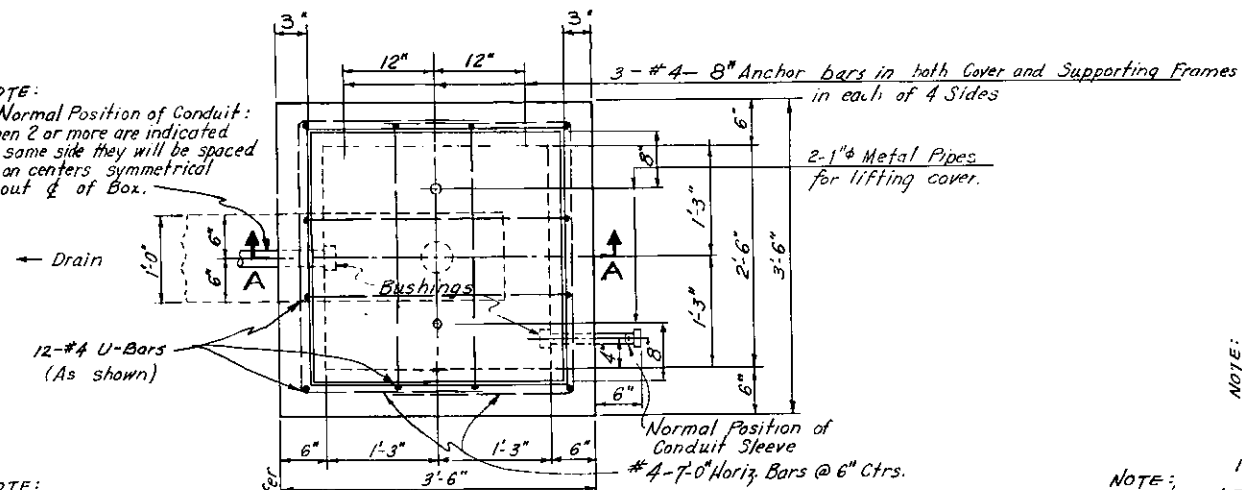
APPROVED JUNE 1, 1965 _____
 DEPUTY SECRETARY-ENGINEERING

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 HIGHWAY LIGHTING
 JUNCTION BOXES-LIGHT DUTY

APPROVED JUNE 1, 1965 _____
 DEPUTY SECRETARY-ENGINEERING

SHEET 2 OF 5
SD-20

NOTE:
Normal Position of Conduit:
When 2 or more are indicated
on same side they will be spaced
6" on centers symmetrical
about $\frac{1}{2}$ of Box.

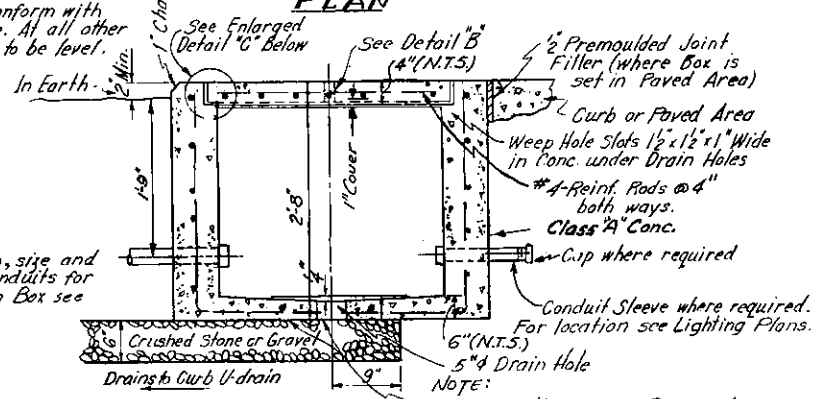


NOTE:
Where Junction Box is in Sidewalk
Area, top to conform with
Sidewalk Slope. At all other
locations top to be level.

NOTE:
For location, size and
Number of Conduits for
each Junction Box see
Lighting Plans.

NOTE:
Provide Two(2) Cu. Ft. of No. 2B
Aggregate for Drain when no
Underdrain is Available.

SECTION A-A
JUNCTION BOX JB-11
Scale: 1"=1'-0"



NOTE:
Cover with 3-Ply Tar Paper and
Break through Hole after completion.

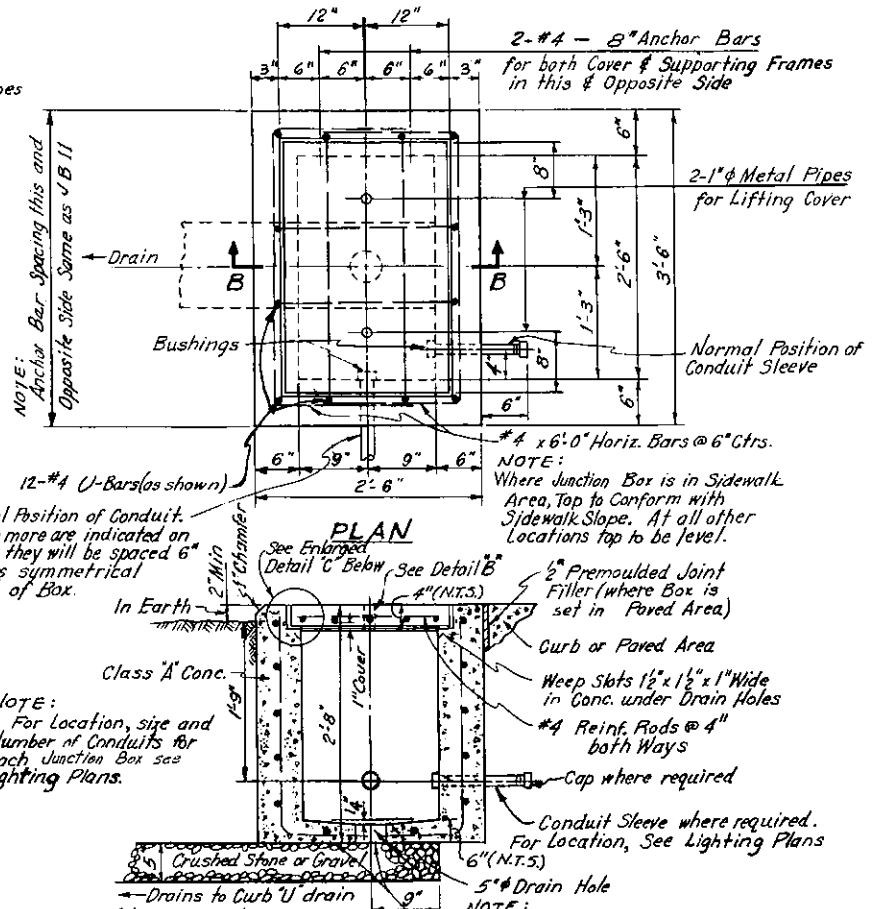
NOTE:
Anchor Bar Spacing this and
Opposite Side Same as U B 11

NOTE:
Normal Position of Conduit.
When 2 or more are indicated on
same side they will be spaced 6"
on centers symmetrical
about $\frac{1}{2}$ of Box.

NOTE:
For location, size and
Number of Conduits for
each Junction Box see
Lighting Plans.

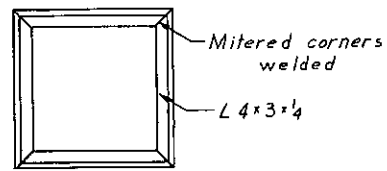
NOTE:
Provide Two(2) Cu. Ft. of No. 2B
Aggregate for Drain when no
Underdrain is Available.

SECTION B-B
JUNCTION BOX JB-12
Scale: 1"=1'-0"

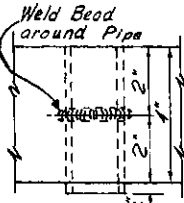


NOTES:

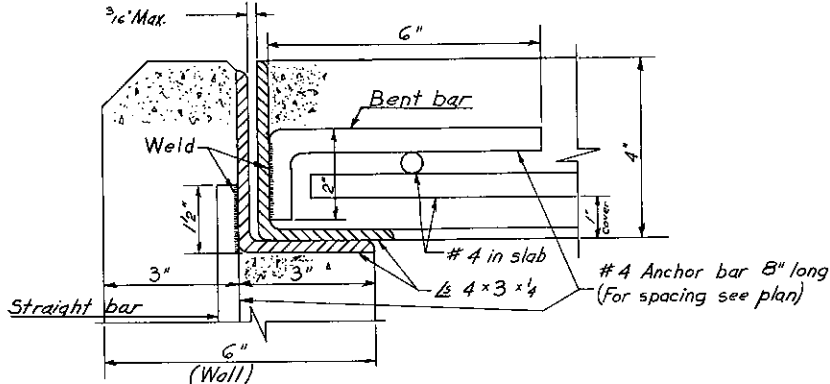
- 1- JB-11 and JB-12 shall be Used
in Shoulders or other Locations
where they will be subject to Vehicular Loads.
- 2- For other Locations Use JB-1 or JB-2
Shown on Sheet 2.
- 3- Equivalent Approved Precast Junction Boxes
May be Substituted for JB-11 and JB-12 Shown.



L-FRAME PLAN
(Steel or Aluminum)
No Scale



DETAIL "B"



ENLARGED DETAIL "C"
COVER FRAME & SUPPORTING FRAME
Scale: 1/2 Size

Structural Steel shall conform to ASTM A-36 designation.
Structural Aluminum shall conform to 6061-T6 designation.
All concrete to be Class "A".

General revisions and replaced Detail "C".
APPROVED FEB. 15, 1966 DEPUTY SECRETARY - ENGINEERING

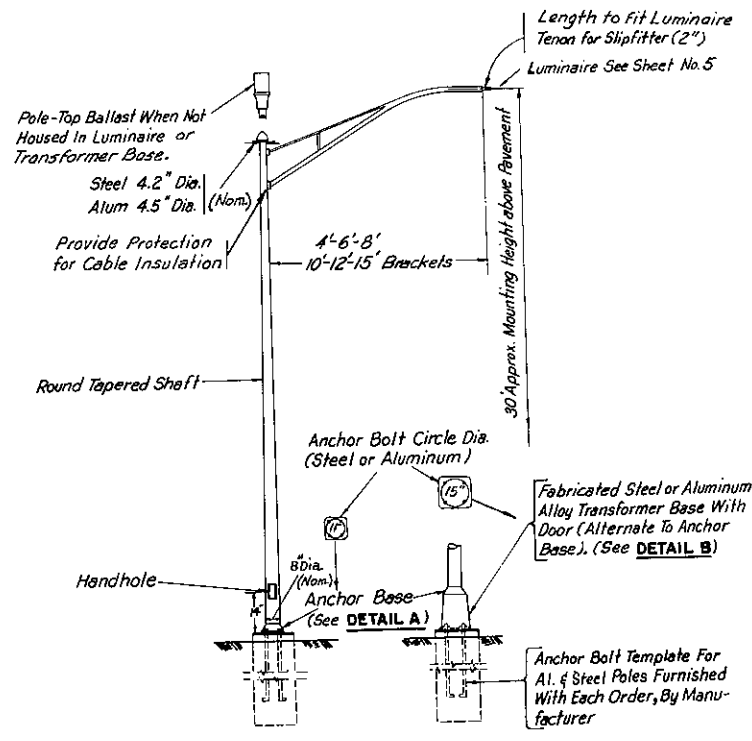
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
HIGHWAY LIGHTING
JUNCTION BOXES-HEAVY DUTY

APPROVED JUNE 1, 1965
DEPUTY SECRETARY - ENGINEERING

SHEET 3 OF 5

SD-20

ROUND ALUMINUM and STEEL POLES



NOTE: SEE SHEET NO. 1 FOR DETAILS ON POLE FOUNDATIONS

POLE SIZES (EXCEPT DAVIT-TYPE)

(DIMENSIONS MINIMUM)

Type of Material	Nom. Mtg. Ht.	Type	Bracket Spread				Wall Thickness
			8'	10'	12'	15'	
Steel	25'	Single	7' x 3.9" x 22'-0"	7' x 3.9" x 22'-0"	7.5' x 4.4" x 22'-0"	8.0' x 4.9" x 22'-0"	11 ga.
		Twin	7.0' x 3.9" x 22'-0"	7.0' x 3.9" x 22'-0"	7.5' x 4.4" x 22'-0"	8.0' x 4.9" x 22'-0"	
	30'	Single	8.0' x 4.2" x 27'-0"	8.0' x 4.2" x 27'-0"	8.0' x 4.2" x 27'-0"	8.5' x 4.7" x 27'-0"	
		Twin	8.0' x 4.2" x 27'-0"	8.0' x 4.2" x 27'-0"	8.0' x 4.2" x 27'-0"	8.5' x 4.7" x 27'-0"	
Spun Aluminum	25'	Single	7.0' x 4.5" x 22'-2"	7.0' x 4.5" x 22'-2"	7.0' x 4.5" x 22'-2"	7.0' x 4.5" x 22'-2"	0.188*
		Twin	7.0' x 4.5" x 22'-2"	7.0' x 4.5" x 22'-2"	8.0' x 4.5" x 22'-2"	8.0' x 4.5" x 22'-2"	
	30'	Single	8.0' x 4.5" x 27'-2"	8.0' x 4.5" x 27'-2"	8.0' x 4.5" x 27'-2"	8.0' x 4.5" x 27'-2"	
		Twin	9.0' x 6.0" x 27'-2"	9.0' x 6.0" x 27'-2"	10.0' x 6.0" x 27'-2"	10.0' x 6.0" x 27'-2"	

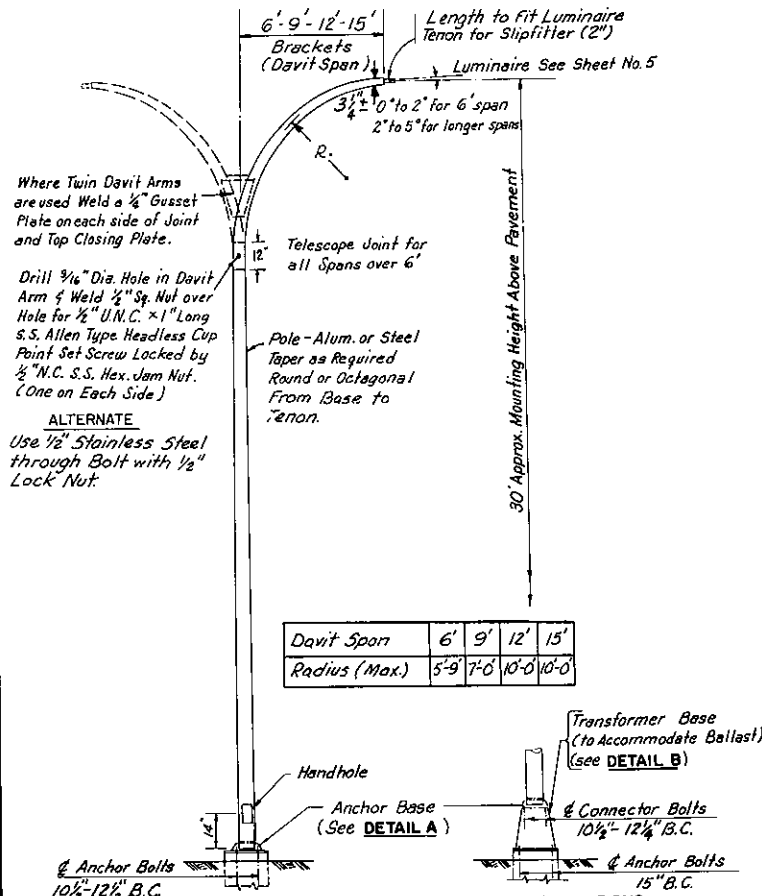
*Wall Thickness May Increase to 0.250" Where Necessary, and for 30' Twin where 8" Diameter of Base may be Supplied.

NOTE: DEDUCT HEIGHT OF TRANSFORMER BASE FROM POLE HEIGHT WHEN BASE IS SPECIFIED FOR ALL TYPES OF POLES.

WHERE ALL STEEL AND ALUMINUM POLES OR TRANSFORMER BASES ARE IN CONTACT WITH CONCRETE, A CAULKING COMPOUND SHALL BE USED WHICH WILL BE AN APPROVED ALUMINUM-IMPREGNATED GRAY-MASTIC TYPE, MEETING THE TEST REQUIREMENTS OF THE FEDERAL SPECIFICATION TT-C598 (2).

FOR ALL POLES, APPROVED IDENTIFICATION PLATE SHALL BE PROVIDED. ALL DIMENSIONS ARE BASED UPON 30-FOOT MOUNTING HEIGHT OF LUMINAIRE. FOR HIGHER MOUNTINGS SOME DIMENSIONS WILL INCREASE.

DAVIT-TYPE POLES

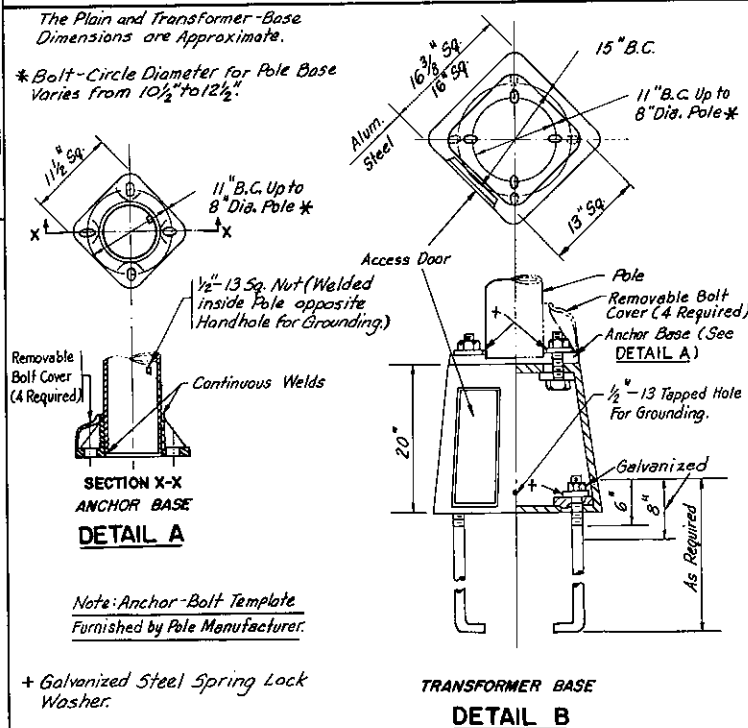


NOTE: SEE SHEET NO. 1 FOR DETAILS ON POLE FOUNDATIONS

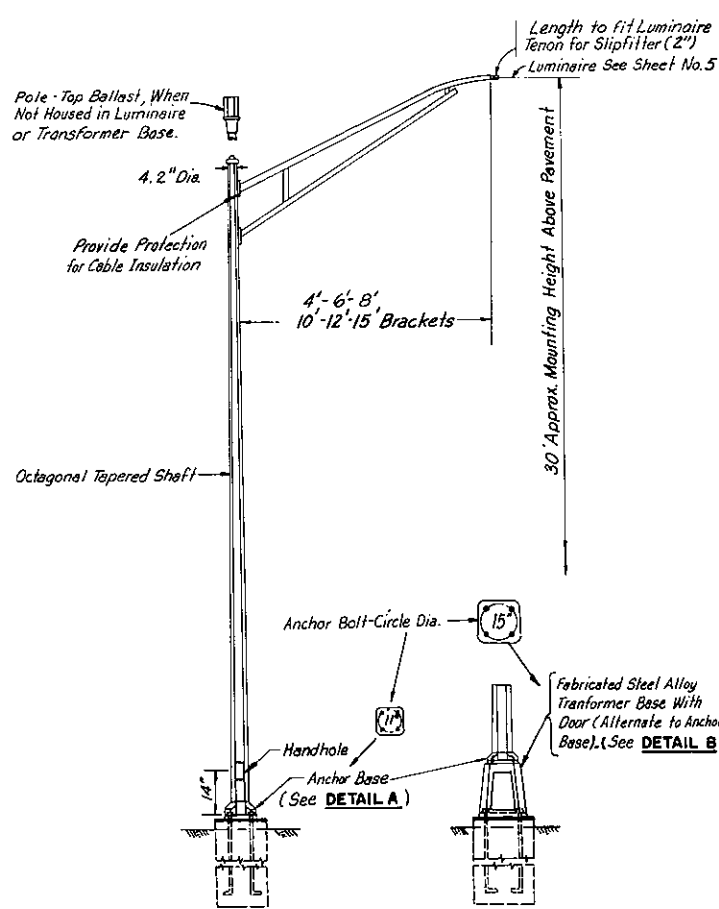
Type of Material	Nom. Mtg. Ht.	DIAMETER AT BASE (Min)				Wall Thick.	Type
		6' Davit Span	9' Davit Span	12' Davit Span	15' Davit Span		
Steel	25'	7.5"	7.5"	8.0"	8.5"	11 GA.	Single or Twin
	30'	8.0"	8.0"	8.5"	9.0"		
Aluminum	25'	8.0"	8.0"	8.0"	8.0"	0.188*	Single or Twin
	30'	8.0"	8.0"	8.0"	8.0"		

The Plain and Transformer-Base Dimensions are Approximate.

* Bolt-Circle Diameter for Pole Base Varies from 10 1/2" to 12 1/2"

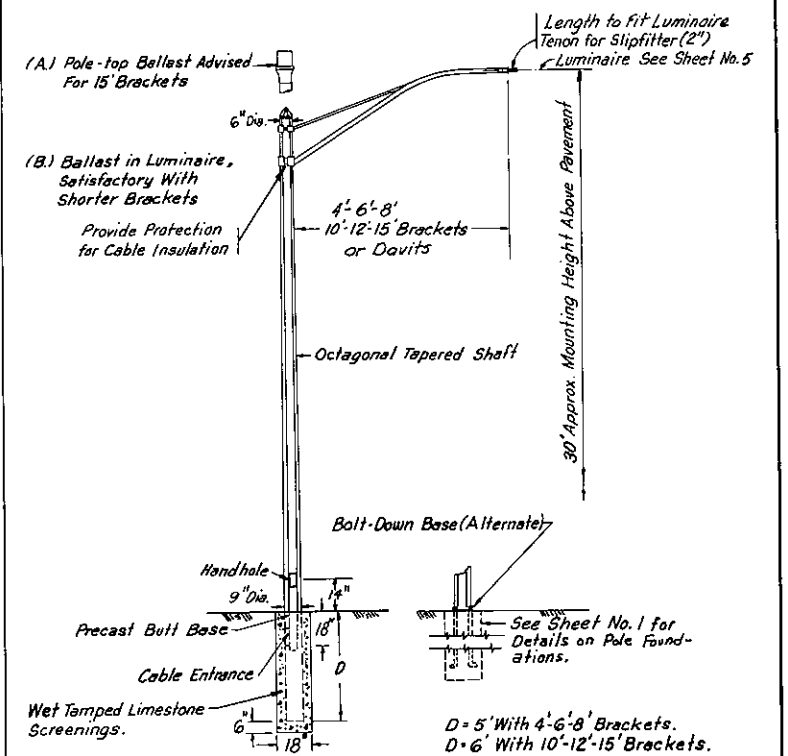


OCTAGONAL STEEL POLES (FLAT OR FLUTED)



NOTE: SEE SHEET NO. 1 FOR DETAILS ON POLE FOUNDATIONS

CONCRETE POLES (PRESTRESSED REINFORCED)



REVISED BASE DIMENSIONS FOR 12' & 15' ALUMINUM DAVIT POLES AND ADDED GENERAL NOTE. APPROVED FEB. 15, 1966

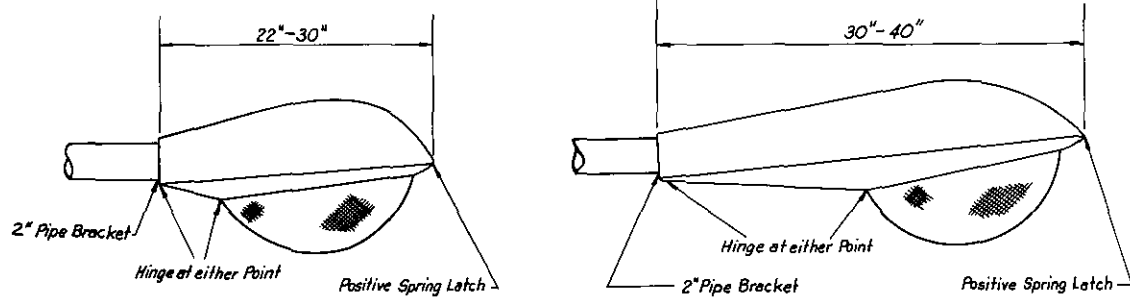
GENERAL REVISIONS & CHANGED SHEET NUMBER FROM 2 TO 4. APPROVED JUNE 1, 1965

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
HIGHWAY LIGHTING
LIGHTING POLE DETAILS

APPROVED JUNE 1, 1964
DEPUTY SECRETARY-ENGINEERING

SHEET 4 OF 5
SD-20

LUMINAIRES FOR MERCURY LAMPS

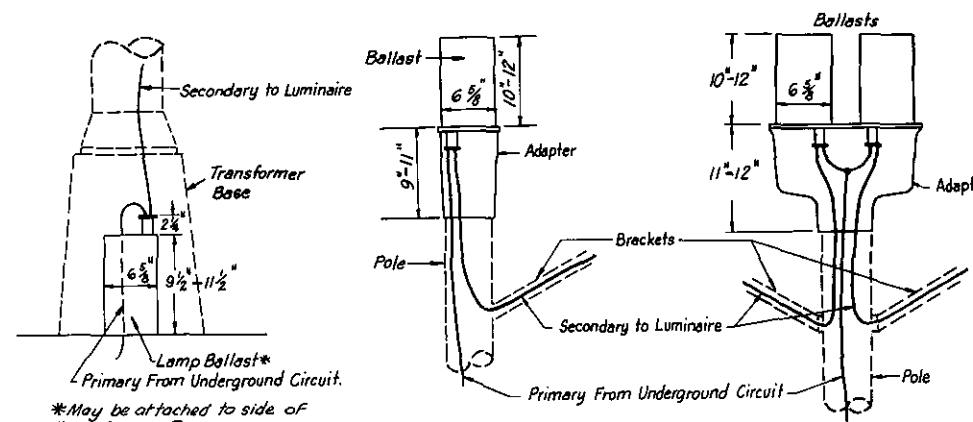


FOR EXTERNALLY MOUNTED BALLAST

WITH BALLAST HOUSED IN LUMINAIRE

Luminaires to have Reflector - Refractor Type Optical Systems; With either Acrylic or Clear Glass Prismatic Refractor.
Luminaires to accommodate 250-Watt and 400-Watt Mercury Lamps, in Approx. Horizontal Position. Use 250-Watt Luminaires Where Only 250-Watt Lamps Are Used.

BALLASTS FOR MERCURY LAMPS



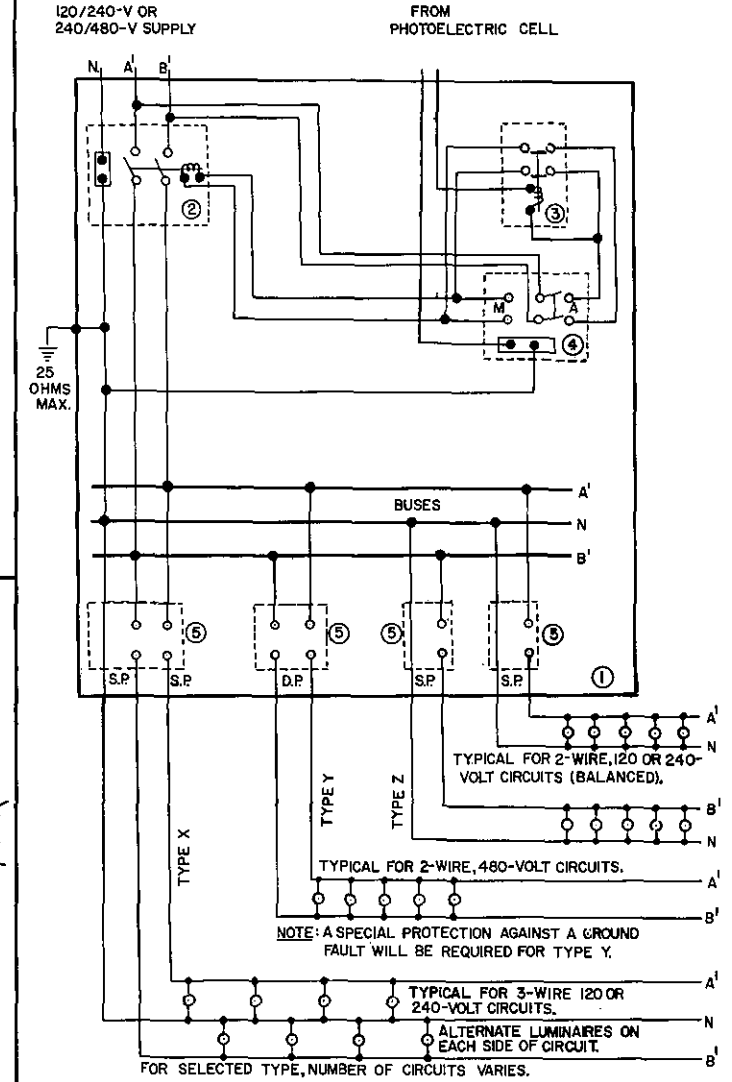
POLE-BASE TYPE

POLE-TOP (SINGLE)

POLE-TOP (TWIN)

Note: Ballasts normally housed in Luminaires where Multiple Circuits are used.

CONTROL CABINET SCHEMATIC WIRING DIAGRAM (TYPICAL)

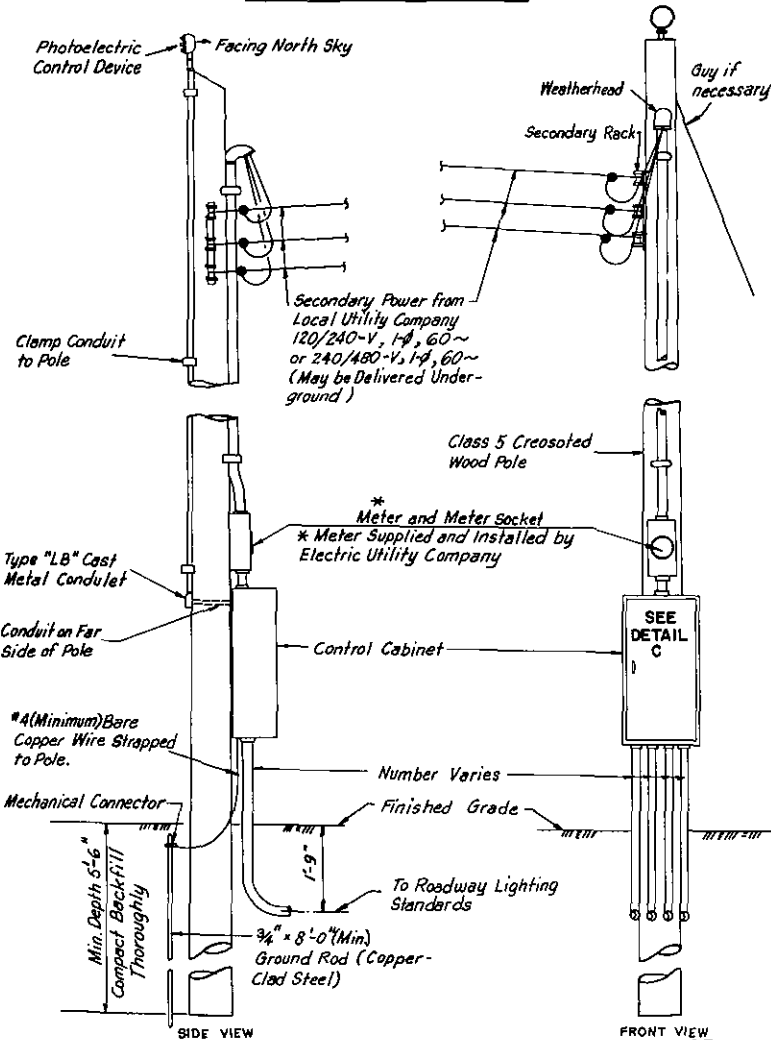


M- MANUAL
A- AUTOMATIC
1- CONTROL CABINET
2- MAIN BREAKER*
3- PHOTOELECTRIC RELAY
4- SELECTOR SWITCH
5- DISTRIBUTION BREAKERS*
* OR CONTACTORS

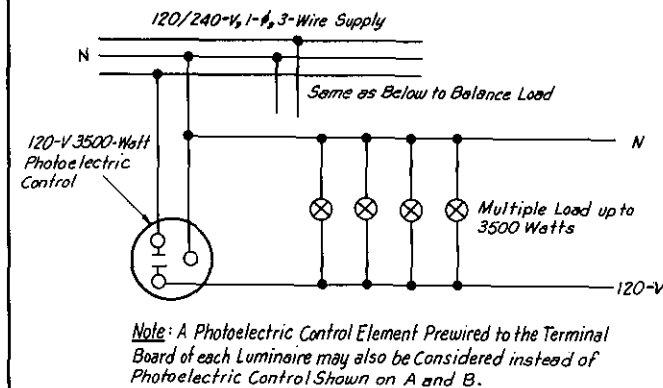
NOTES:
1- ITEM 3 NOT REQUIRED IF PHOTOELECTRIC CELL HAS SUFFICIENT CAPACITY TO CARRY BREAKER COIL.
2- ITEM 3 & 4 NOT REQUIRED IF EACH LUMINAIRE HAS PHOTOELECTRIC CONTROL ELEMENT
3- ITEM 5 AND BUSES NOT REQUIRED FOR SINGLE CIRCUITS.

DELETED CONDUIT EXPANSION JOINT AND REVISED SCHEMATIC WIRING DIAGRAMS. CHANGED SHEET NO. 3 TO 5
APPROVED: JUNE 1, 1965
DEPUTY SECRETARY - ENGINEERING

TYPICAL TERMINAL POLE EQUIPMENT ARRANGEMENT FOR POWER SUPPLY

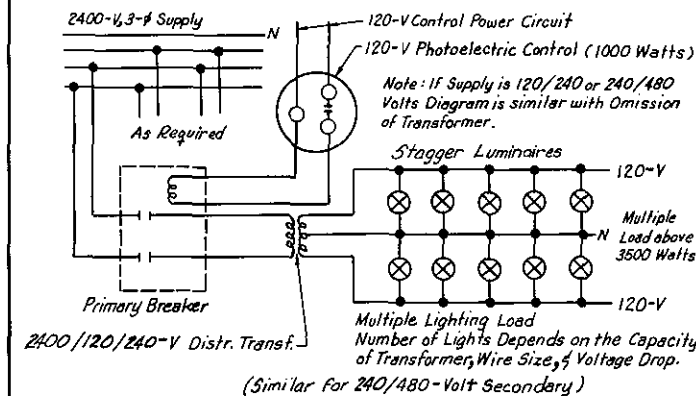


SCHEMATIC MULTIPLE - CIRCUIT DIAGRAMS



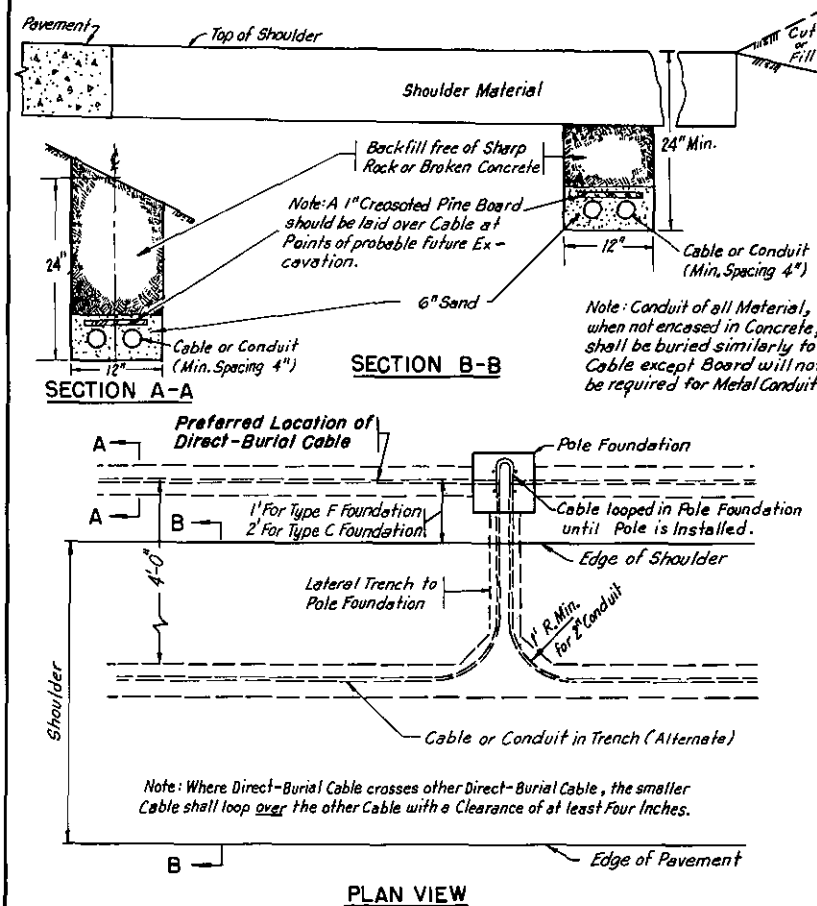
Note: A Photoelectric Control Element Prewired to the Terminal Board of each Luminaire may also be Considered instead of Photoelectric Control Shown on A and B.

A - MULTIPLE - CIRCUIT DIAGRAM SECONDARY DISTRIBUTION



B - MULTIPLE - CIRCUIT DIAGRAM - PRIMARY DISTRIBUTION PHOTOELECTRIC CONTROL IN PRIMARY CIRCUIT

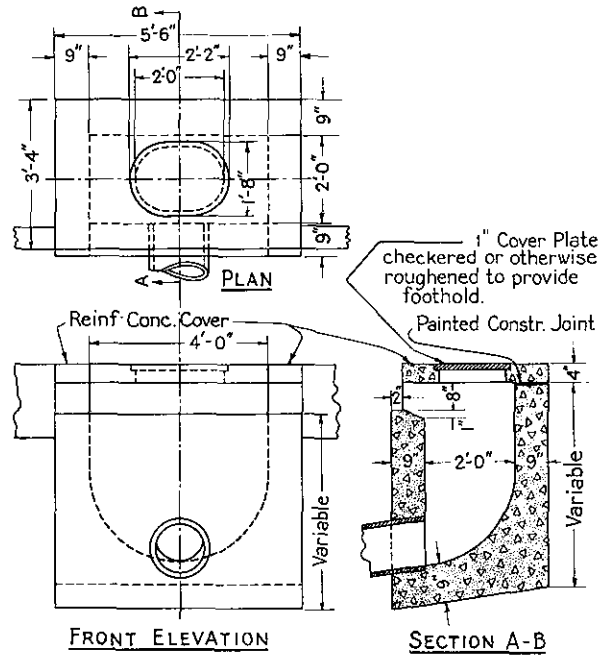
DIRECT-BURIAL CABLE & CONDUIT



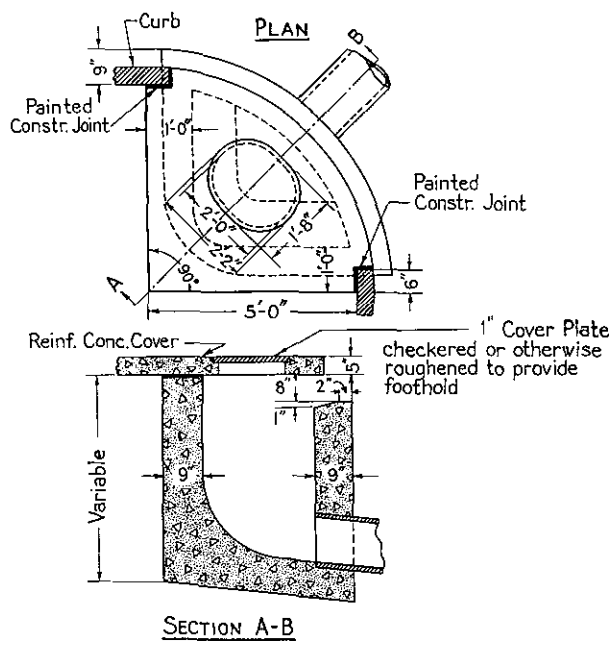
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF HIGHWAYS HIGHWAY LIGHTING LIGHTING & ELECTRICAL DETAILS

APPROVED: JUNE 1, 1964
DEPUTY SECRETARY - ENGINEERING

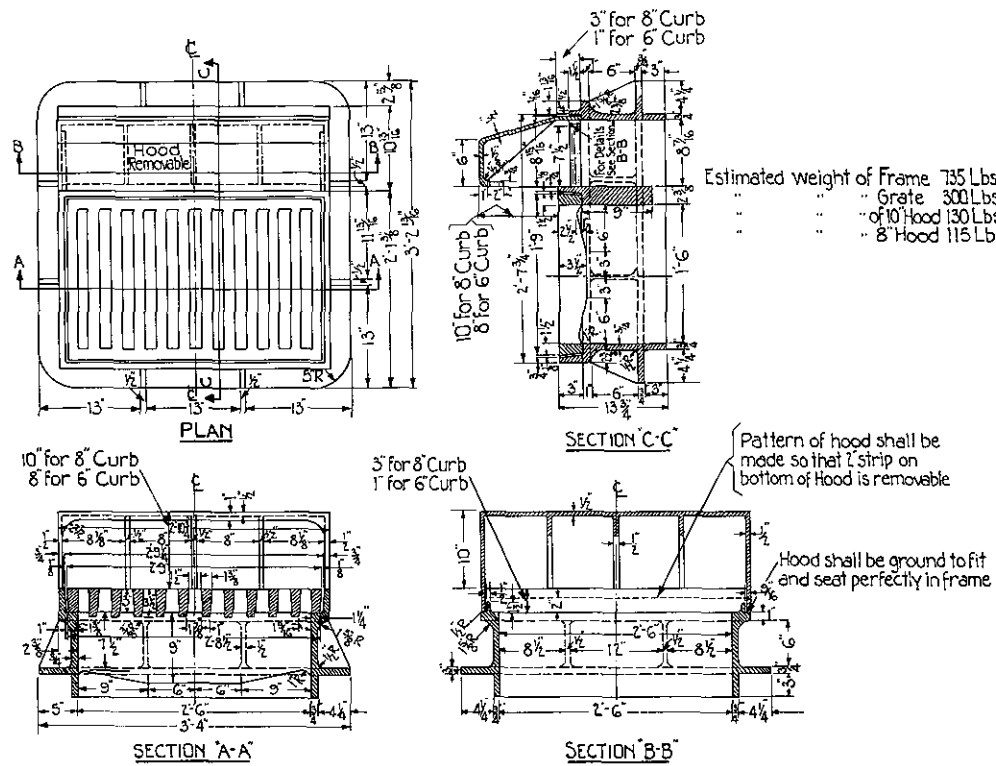
SHEET 5 OF 5
SD-20



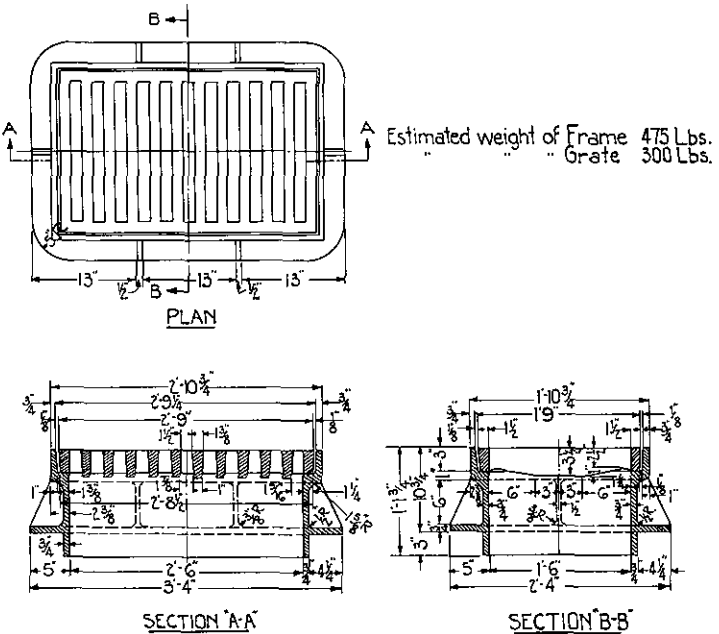
OPEN MOUTH SIDE INLET
TYPE A



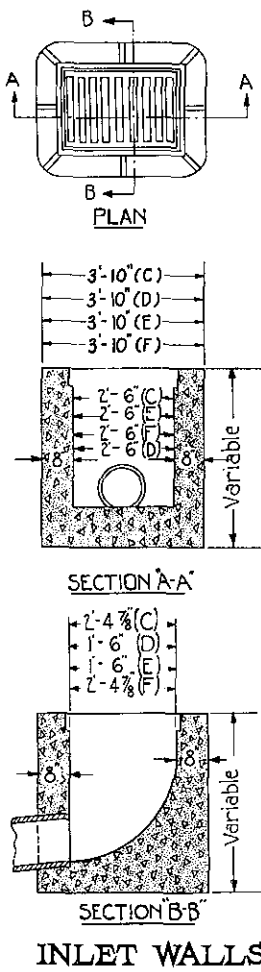
OPEN MOUTH CORNER INLET
TYPE B



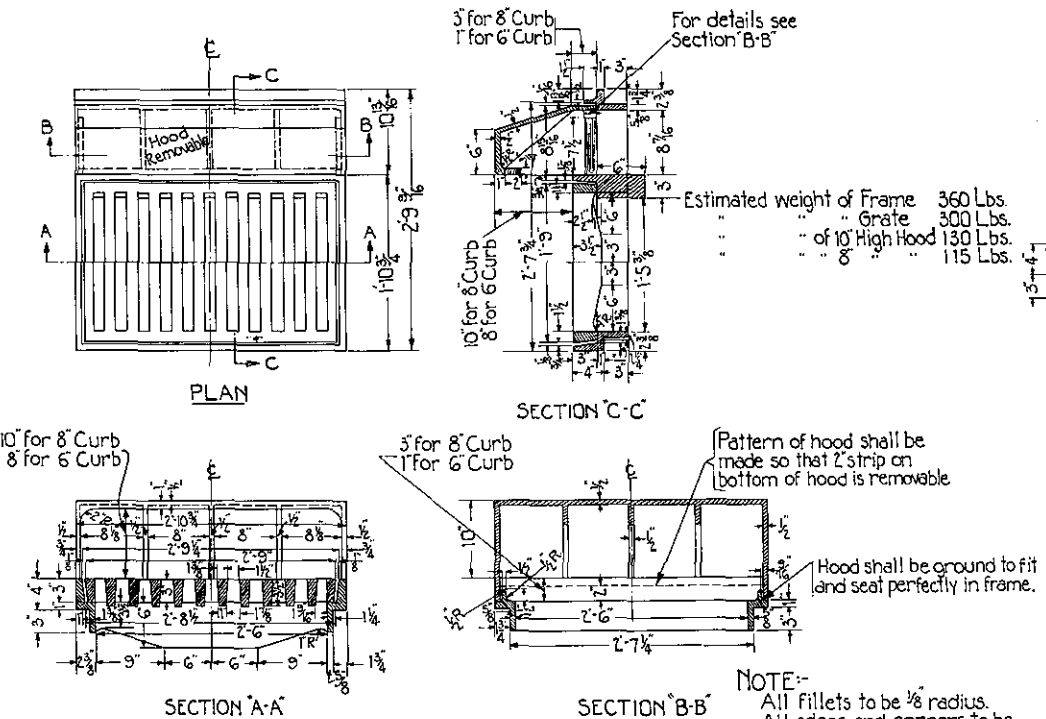
COMBINATION
GRATE OPEN MOUTH INLET
TYPE C



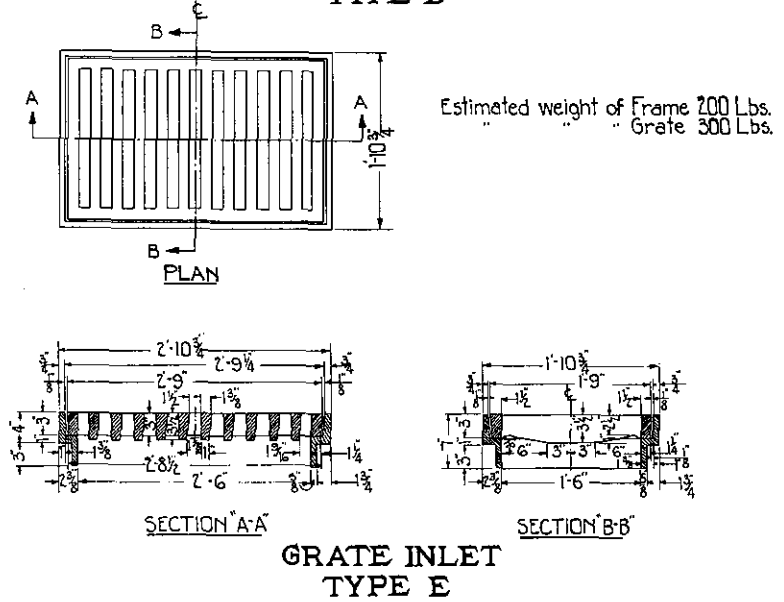
GRATE INLET
TYPE D



INLET WALLS



COMBINATION
GRATE OPEN MOUTH INLET
TYPE F



GRATE INLET
TYPE E

Estimated weight of Frame 735 Lbs.
Grate 300 Lbs.
of 10" Hood 130 Lbs.
8" Hood 115 Lbs.

Estimated weight of Frame 475 Lbs.
Grate 300 Lbs.

Estimated weight of Frame 200 Lbs.
Grate 300 Lbs.

Estimated weight of Frame 360 Lbs.
Grate 300 Lbs.
of 10" High Hood 130 Lbs.
8" Hood 115 Lbs.

NOTE:- Walls of inlets shall be modified similar to manhole construction (Std. Dwg. SD-6) when the diameter of the required pipe exceeds the dimensions shown for the specified inlet box.

Revised for deletion of Manhole and for NOTES
Approved November 1, 1961
Chief Engineer

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
STANDARD INLETS

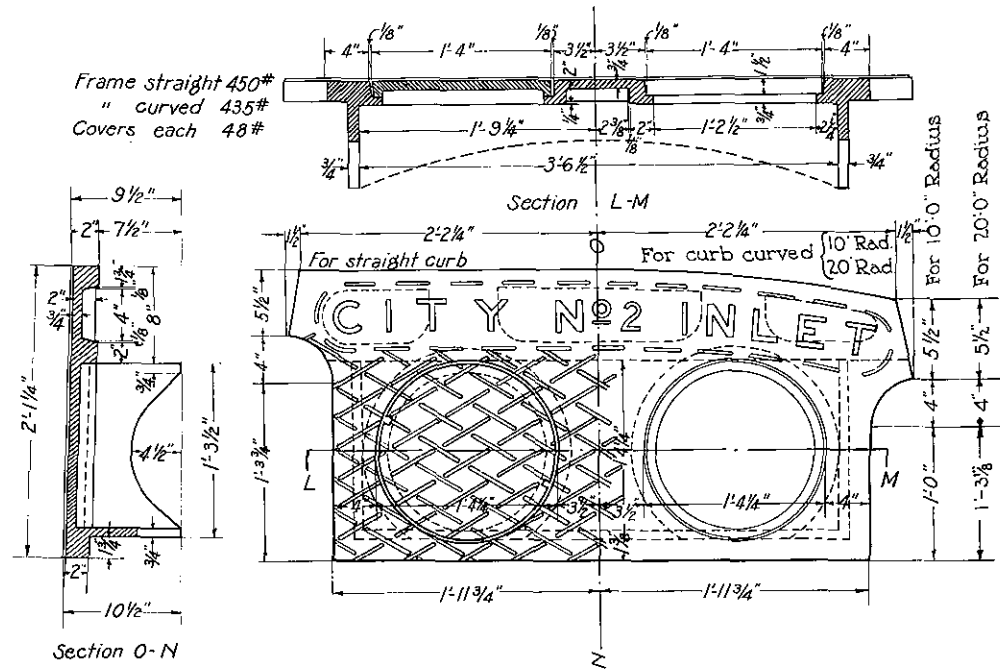
Approved June 5, 1929
Chief Engineer

STD. INLETS

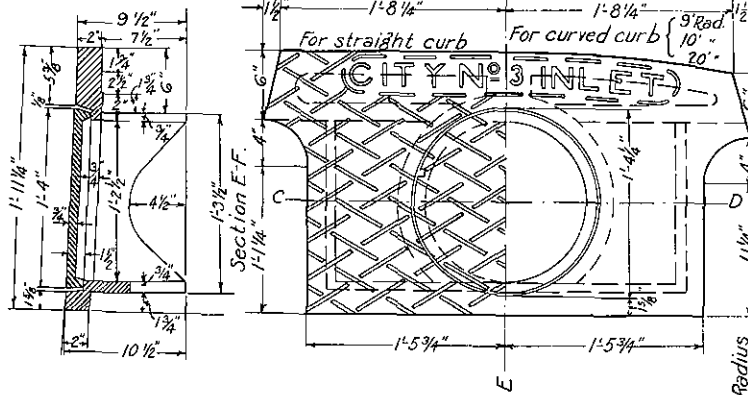
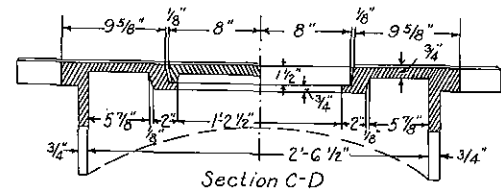
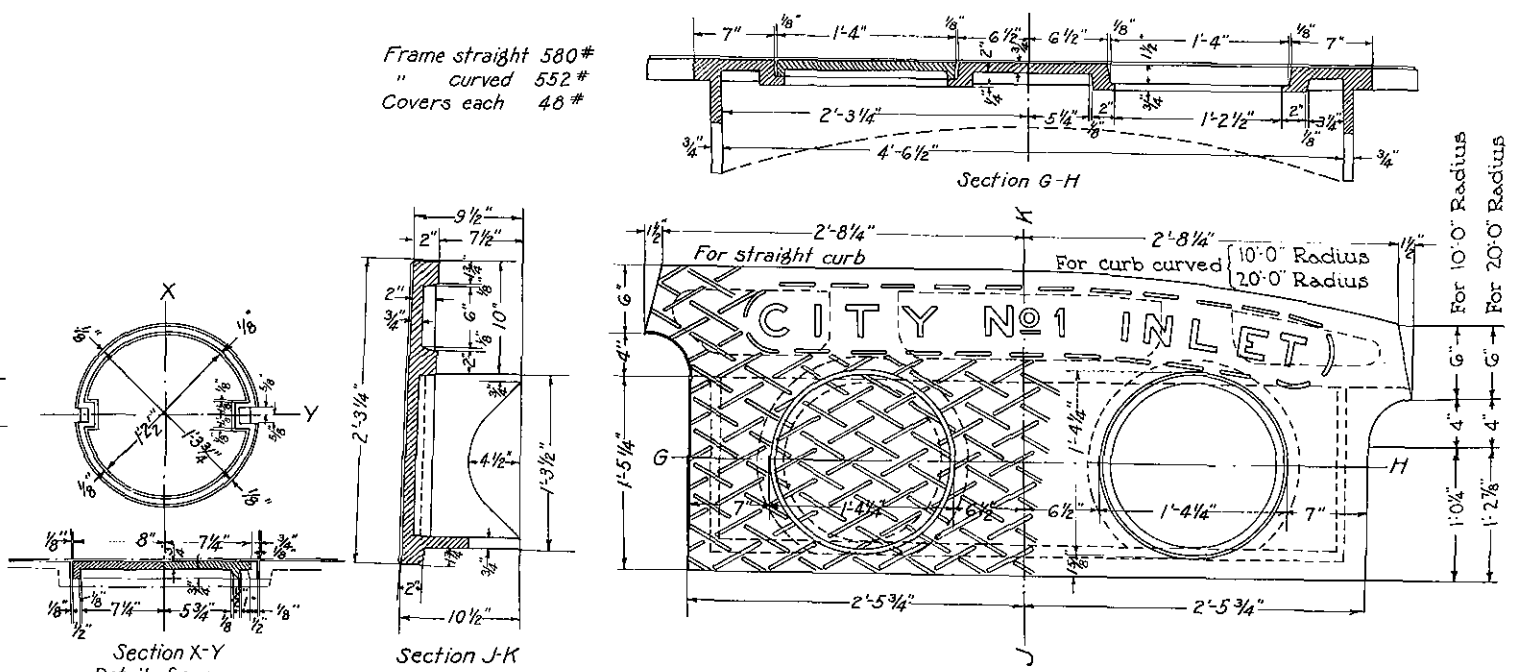
NOTE:-
All fillets to be 1/8" radius.
All edges and corners to be rounded to 1/16" radius unless otherwise shown.
All inlets shall be set approximately 2" below the grade of the gutter, or ditch as directed by the Engineer in each case.
Deviation in weight of castings not to exceed 5% under weights specified on drawings.

Traced by
Final by

Frame straight 450*
" curved 435*
Covers each 48#

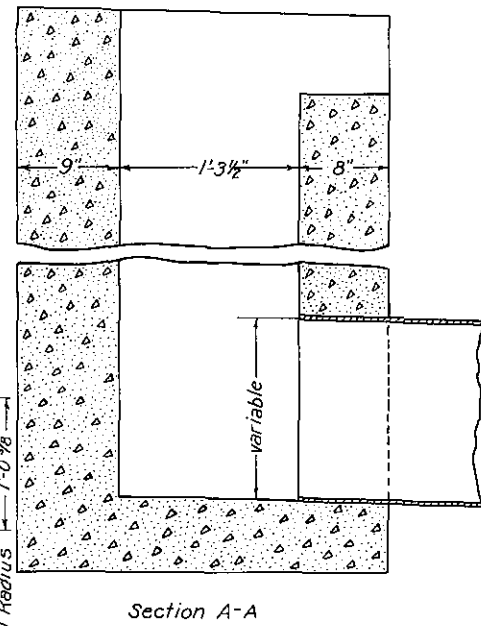


Frame straight 580*
" curved 552*
Covers each 48#



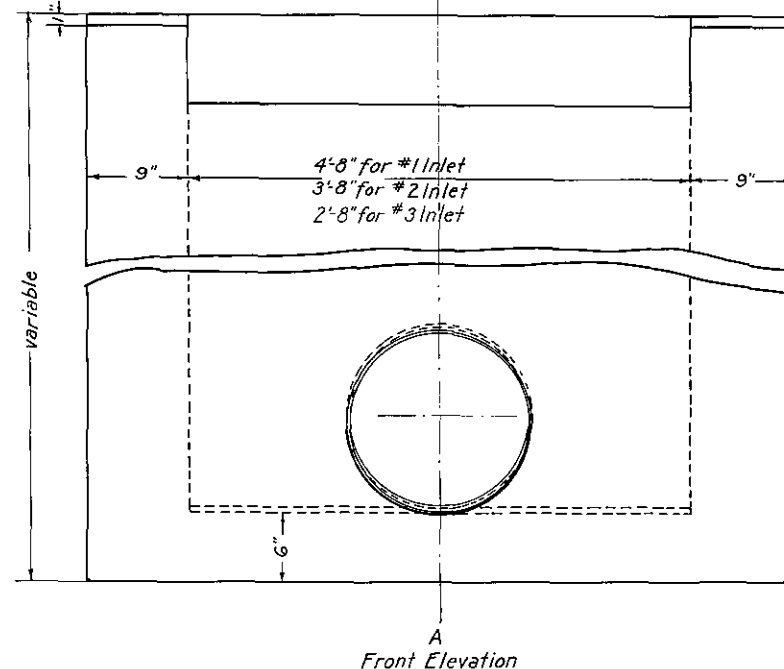
Frame - Straight 333*
Cover - 48#

For 9'-0" Radius
For 10'-0" Radius
For 20'-0" Radius



BASIN FOR CITY INLETS

Scale: 1/2" = 1'



DETAILS OF OPEN MOUTH CITY INLETS

Scale 1/2" = 1'

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS

— STANDARD DETAILS —

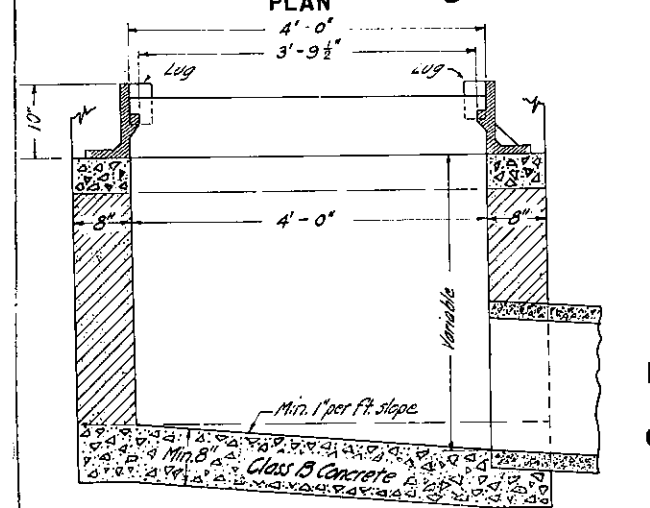
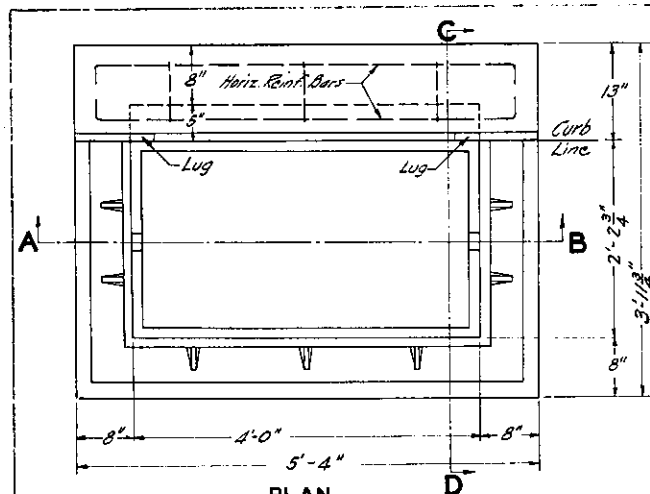
OPEN MOUTH CITY INLETS

APPROVED

November 1, 1961

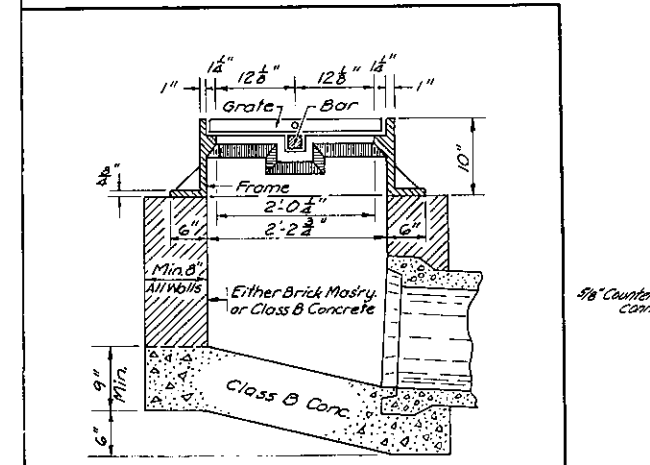
CITY INLETS

Traced by DON HEAGY
Final by

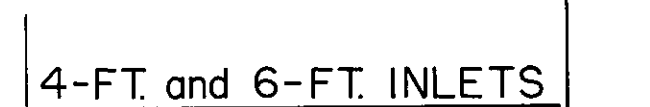


SECTION A-B
For Notes - See 6-FT. SPECIAL INLET

4-FT. SPECIAL INLET



SECTION C-D



PLAN OF FRAME



SECTION E-F

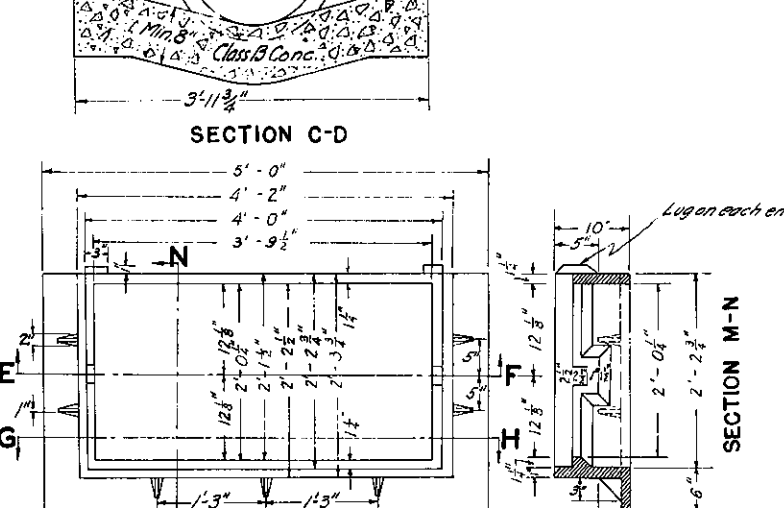
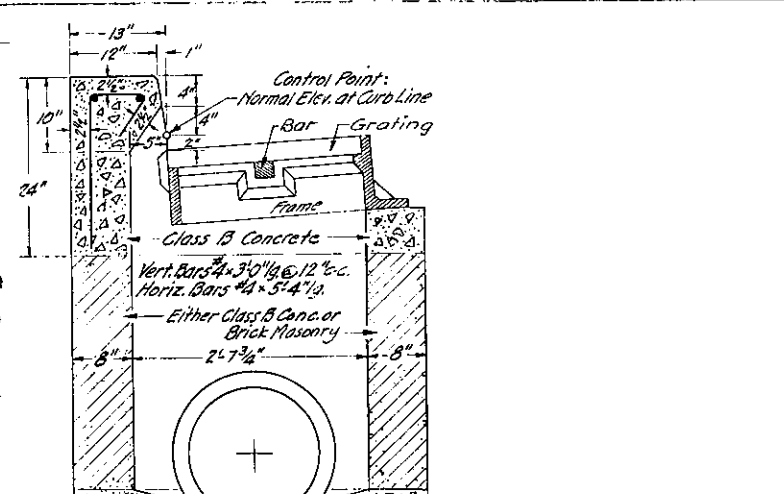
SECTION G-H

PLAN OF GRATING

BAR

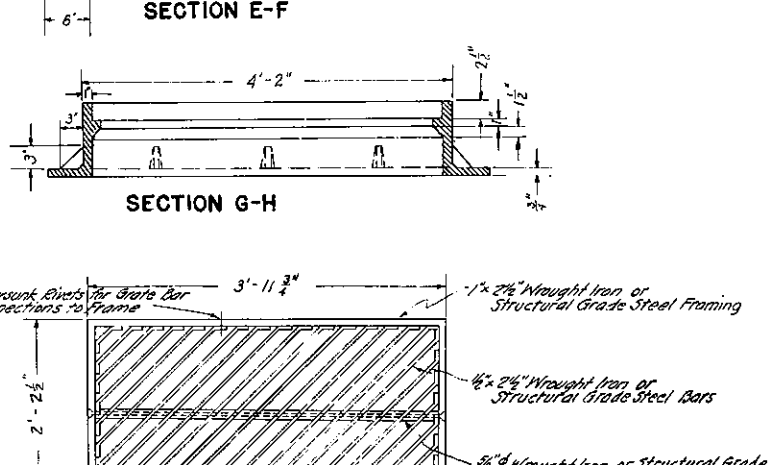
For Notes and additional Grate, Frame and Bar details see 4-FT. SPECIAL INLET, and/or 6-FT. SPECIAL INLET.

4-FT. and 6-FT. INLETS



SECTION A-B

6-FT. SPECIAL INLET



SECTION C-D



PLAN OF FRAME



SECTION E-F

SECTION G-H

PLAN OF GRATING

BAR

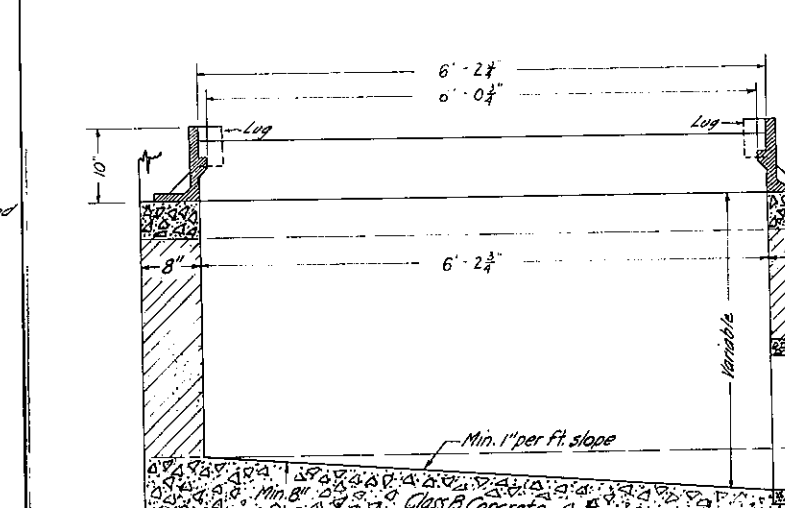
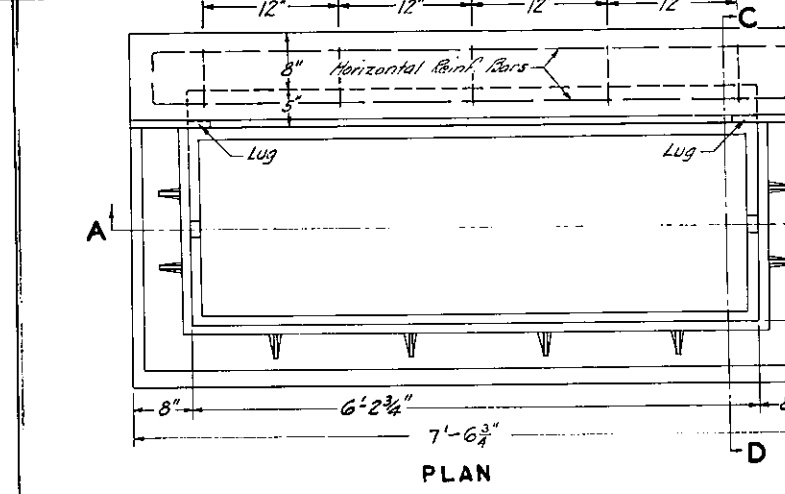
Countersink all Rivet Heads on outside face of Frame

1" x 2 1/2" Wrought Iron or Structural Grade Steel Framing

3/8" Countersunk Rivets for Grate Bar connections to Frame

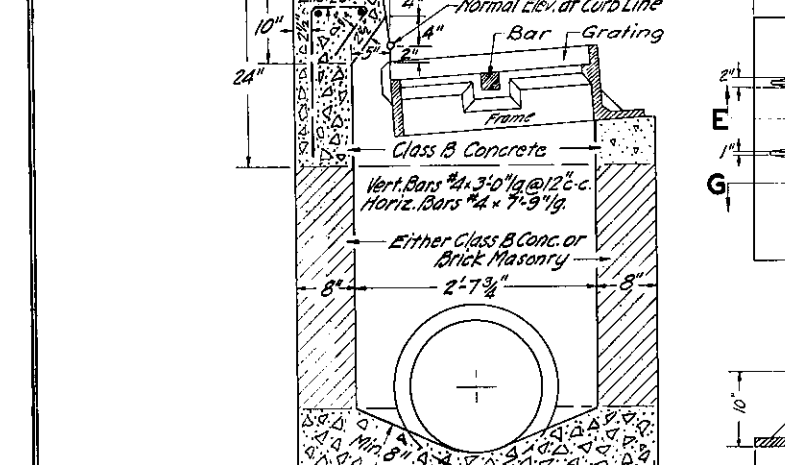
5/8" Wrought Iron or Structural Grade Steel Thru Rod with Pipe Separators

2" Center to Center



SECTION A-B

6-FT. SPECIAL INLET



SECTION C-D



PLAN OF FRAME



SECTION E-F

SECTION G-H

PLAN OF GRATING

BAR

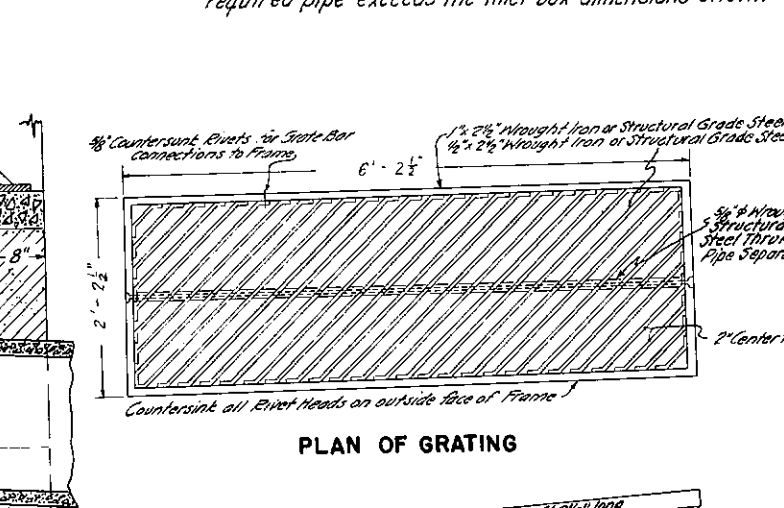
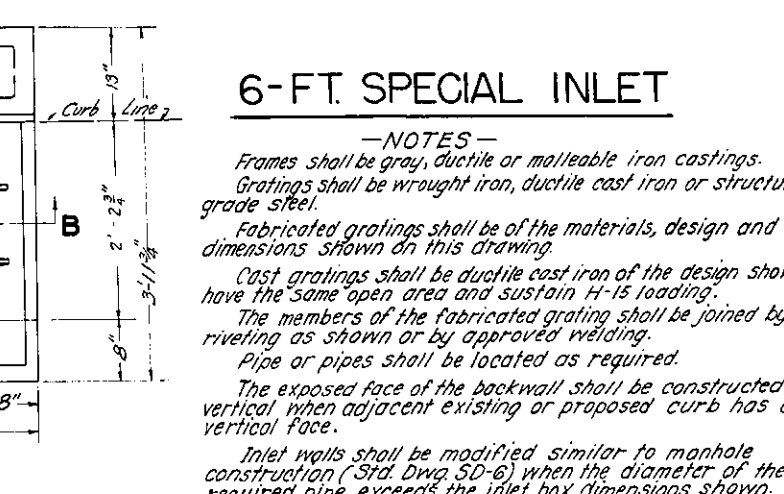
Countersink all Rivet Heads on outside face of Frame

1" x 2 1/2" Wrought Iron or Structural Grade Steel Framing

3/8" Countersunk Rivets for Grate Bar connections to Frame

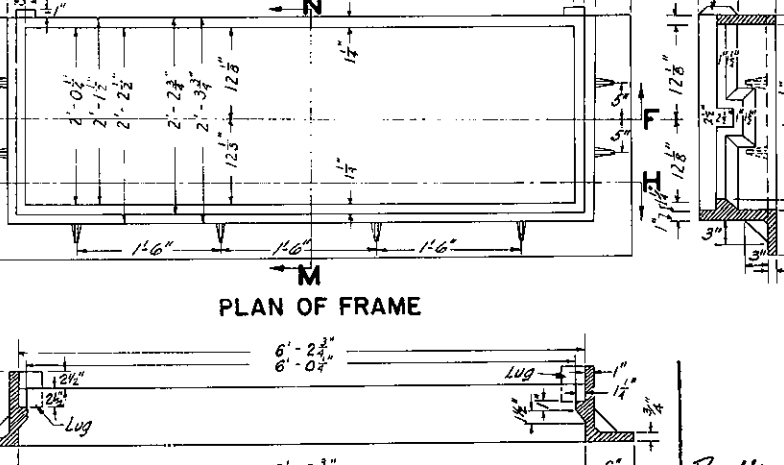
5/8" Wrought Iron or Structural Grade Steel Thru Rod with Pipe Separators

2" Center to Center



SECTION A-B

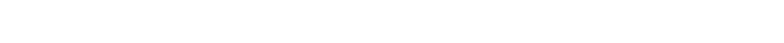
6-FT. SPECIAL INLET



SECTION C-D



PLAN OF FRAME



SECTION E-F

SECTION G-H

PLAN OF GRATING

BAR

Countersink all Rivet Heads on outside face of Frame

1" x 2 1/2" Wrought Iron or Structural Grade Steel Framing

3/8" Countersunk Rivets for Grate Bar connections to Frame

5/8" Wrought Iron or Structural Grade Steel Thru Rod with Pipe Separators

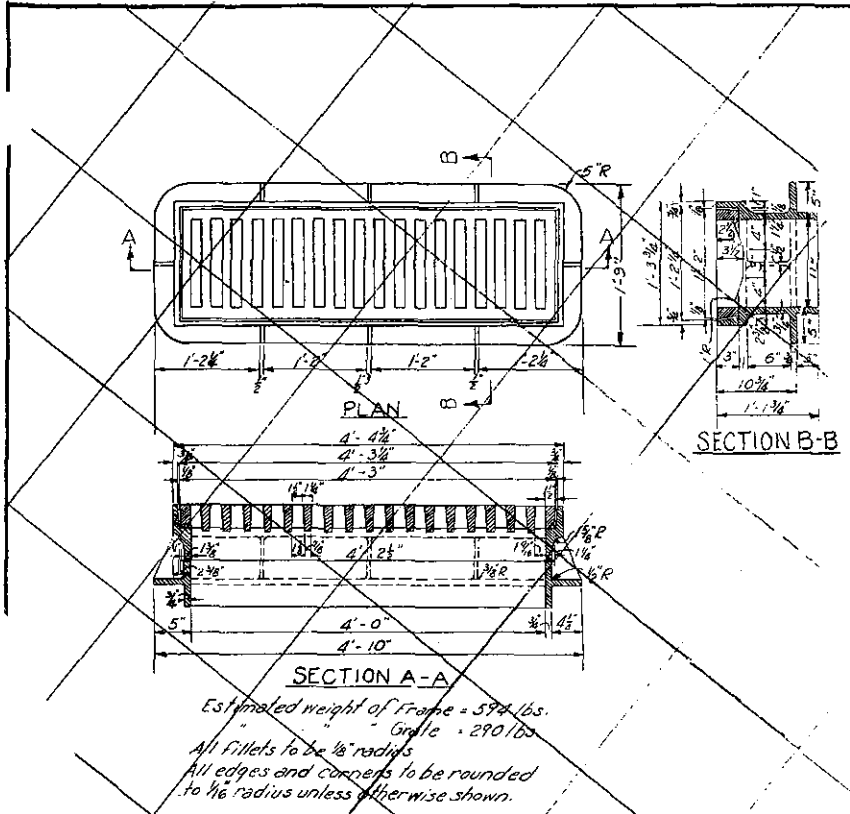
2" Center to Center

6-FT. SPECIAL INLET

NOTES
Frames shall be gray, ductile or malleable iron castings. Gratings shall be wrought iron, ductile cast iron or structural grade steel.
Fabricated gratings shall be of the materials, design and dimensions shown on this drawing.
Cast gratings shall be ductile cast iron of the design shown, have the same open area and sustain H-15 loading.
The members of the fabricated grating shall be joined by riveting as shown or by approved welding.
Pipe or pipes shall be located as required.
The exposed face of the backwall shall be constructed vertical when adjacent existing or proposed curb has a vertical face.
Inlet walls shall be modified similar to manhole construction (Std. Dwg. SD-6) when the diameter of the required pipe exceeds the inlet box dimensions shown.

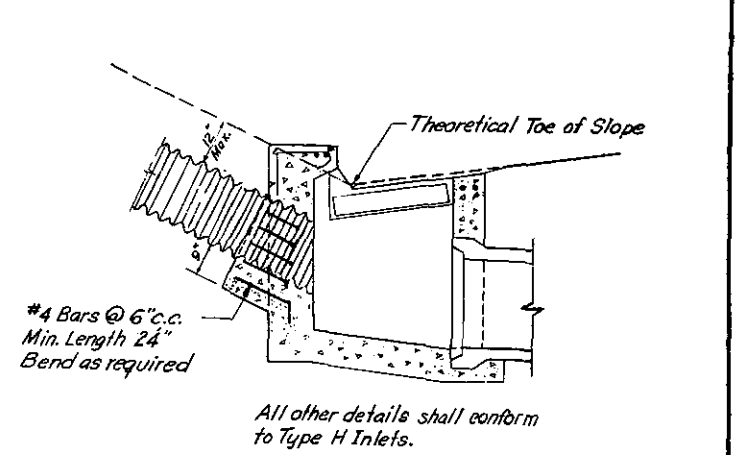
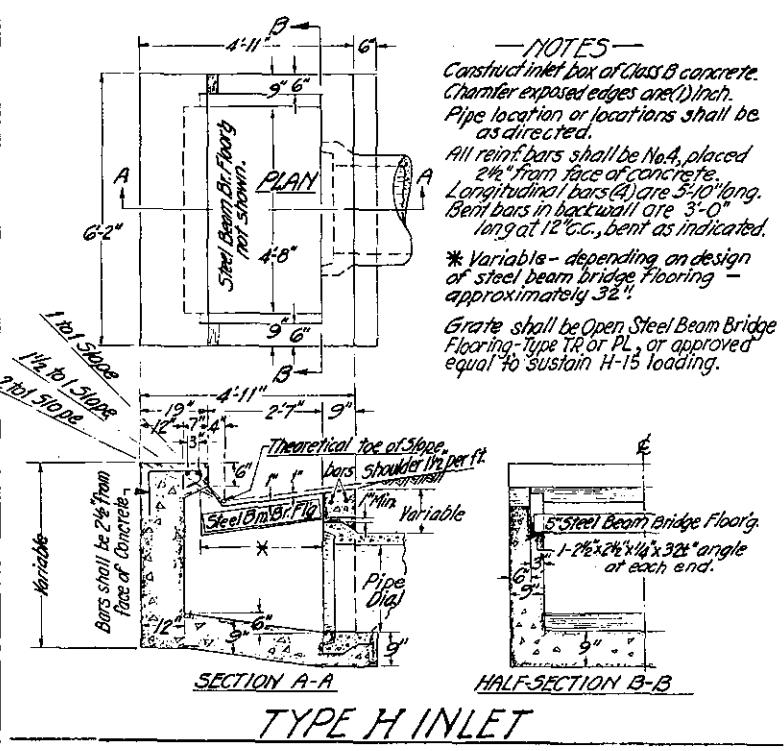
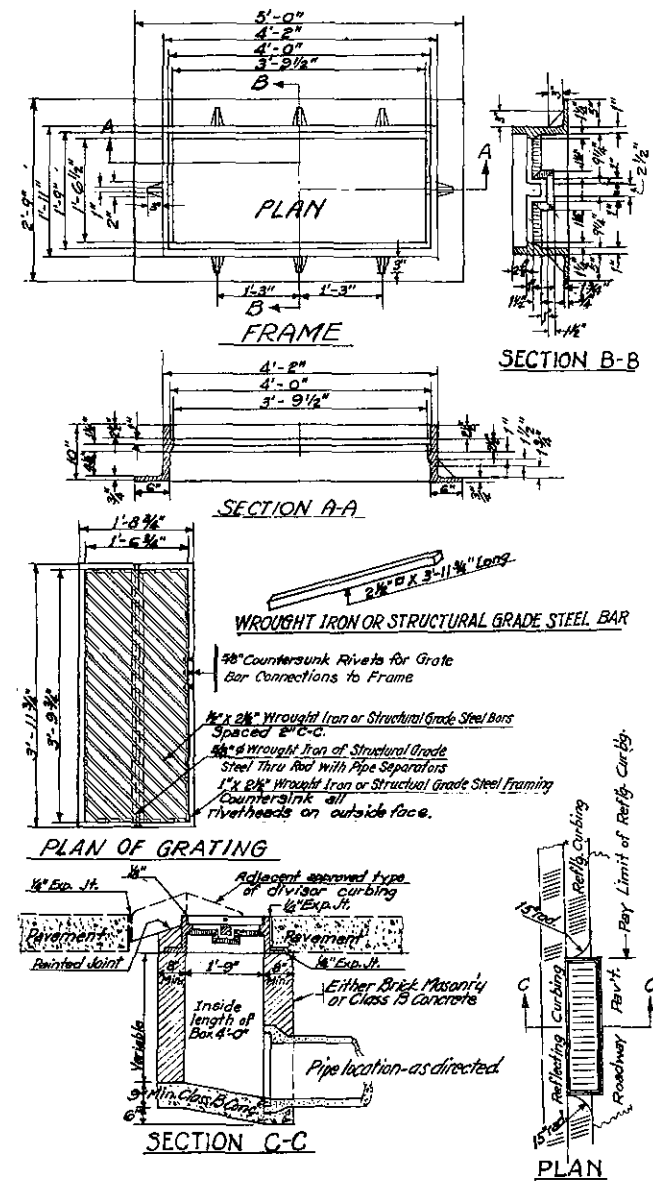
Rev. Nov. 1, 1961
Rev. Aug. 25, 1953

S.I. 4 & 6



TYPE J INLET

— NOTES —
 Frames shall be gray, ductile or malleable iron castings.
 Gratings shall be wrought iron, ductile cast iron or structural grade steel.
 Fabricated gratings shall be of the materials, design and dimensions shown on this drawing.
 Cast gratings shall be ductile cast iron of the design shown, have the same open area and sustain H-15 loading.
 The members of the fabricated grating shall be joined by riveting as shown or by approved welding.
 Pipe or Pipes shall be located as required.
 The exposed face of the back wall shall be constructed vertical when adjacent existing or proposed curb has a vertical face.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS

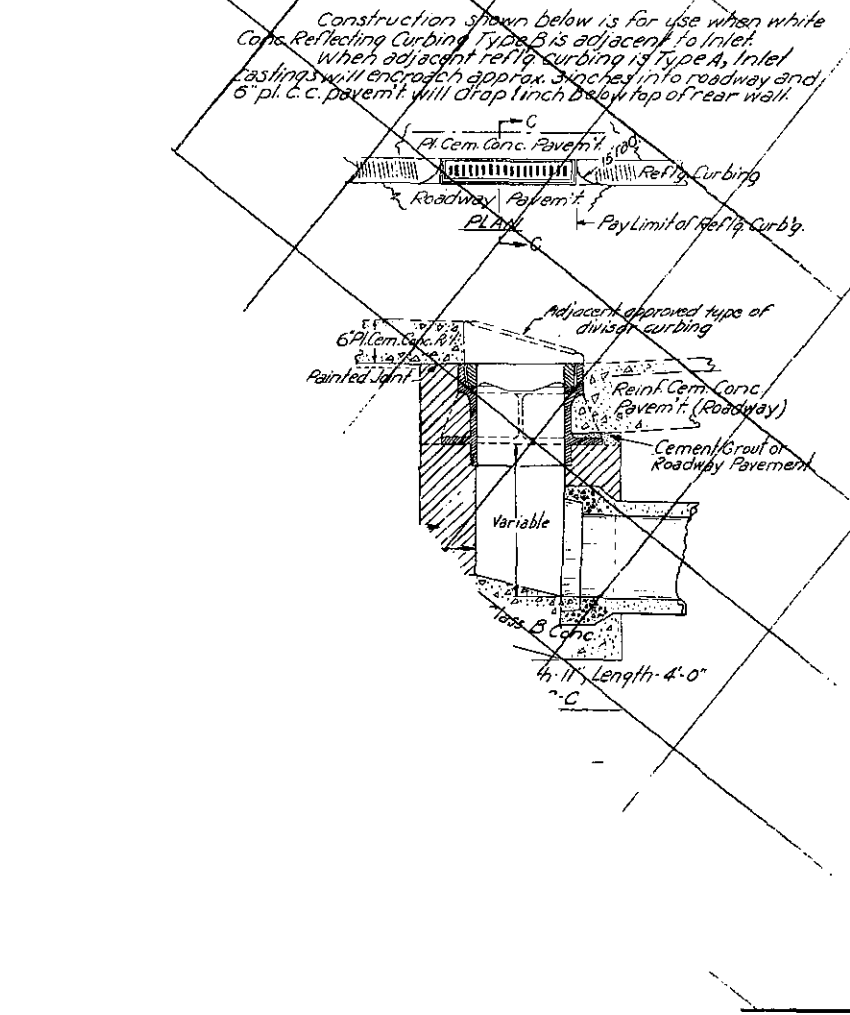
— STANDARD DETAILS —

MISC. INLETS

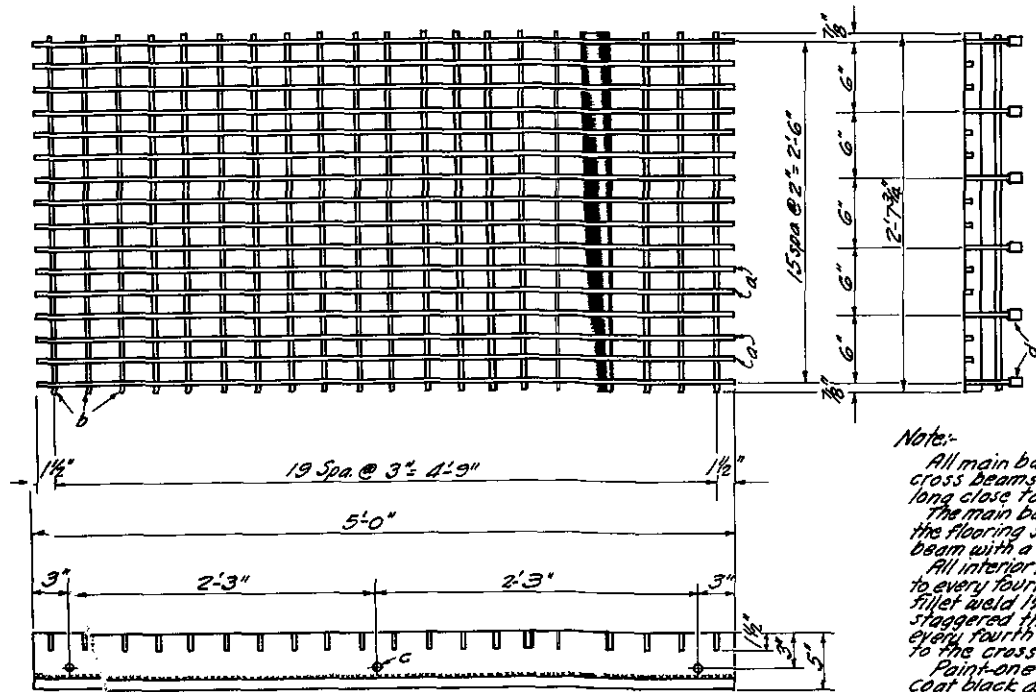
APPROVED *November 1, 1961*

[Signature]
 CHIEF ENGINEER

MISC. INLETS



NOTE - ALL INLETS
 Inlet walls shall be modified similar to manhole construction (Std. Dwg. SD-6) when the diameter of the required pipe exceeds the inlet box dimensions shown.



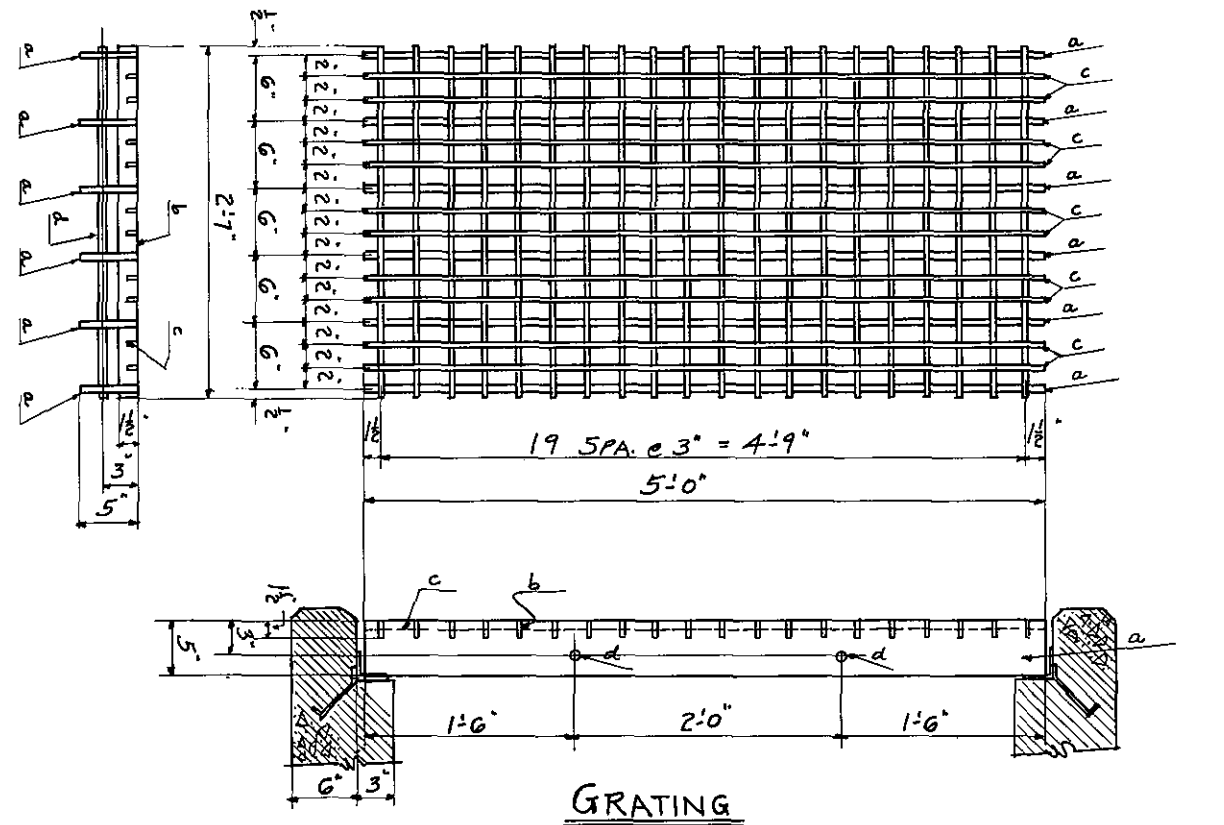
Note:-
 All main bars shall be welded to the cross beams with a $\frac{1}{4}$ " fillet weld $1\frac{1}{2}$ " long close to the end of the bar.
 The main bar along the outer edge of the flooring shall be welded to each cross beam with a fillet weld $1\frac{1}{2}$ " long.
 All interior main bars shall be welded to every fourth cross beam with a $\frac{1}{4}$ " fillet weld $1\frac{1}{2}$ " long and with welds so staggered that at each cross beam every fourth main bar will be welded to the cross beam.
 Paint one coat red lead and one coat black asphaltic paint.

MATERIAL FOR ONE GRATE *			
MARK	NO. REQ'D	SECTION	LENGTH
a	10	$\frac{3}{4}$ " x $1\frac{1}{2}$ "	5'-0"
b	20	$1\frac{1}{2}$ " x $1\frac{1}{2}$ "	2'-7" $\frac{1}{4}$ "
c	3	$\frac{5}{8}$ " ϕ bars	2'-6" $\frac{3}{4}$ "
d	6	4" x $1\frac{1}{4}$ "	5'-0"
	6	1" x $1\frac{1}{2}$ "	5'-0"

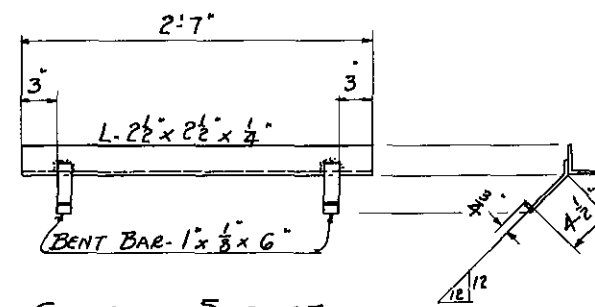
* In addition, support angles are required in accordance with Std. Dwg. "MISC. INLETS".

**ALTERNATE
 GRATE ASSEMBLY
 FOR
 TYPE H INLET**

Manufactured by
 Edmund R. Quirin Machine Shop & Foundry
 St. Clair, Pa.



GRATING



**GRATING SUPPORT
 2 FOR EACH GRATING.**

BILL OF MATERIAL		
MARK	REQ'D	DESCRIPTION
a	6	BAR- 5" x $1\frac{1}{2}$ " x 5'-0"
b	20	BAR- $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x 2'-7"
c	10	BAR- $\frac{3}{4}$ " x $\frac{1}{2}$ " x 5'-0"
d	2	ROD- $\frac{3}{4}$ " ϕ x 2'-7"

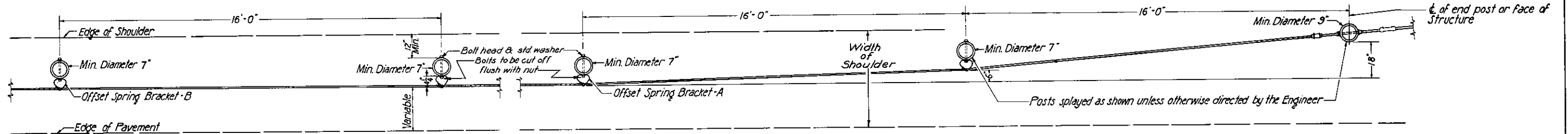
SHOP PAINT- ONE COAT

Manufactured by
 Scottdale Machine, Foundry & Construction Co.
 Scottdale, Pa.

**ALTERNATE
 GRATE ASSEMBLY
 FOR
 TYPE H INLET**

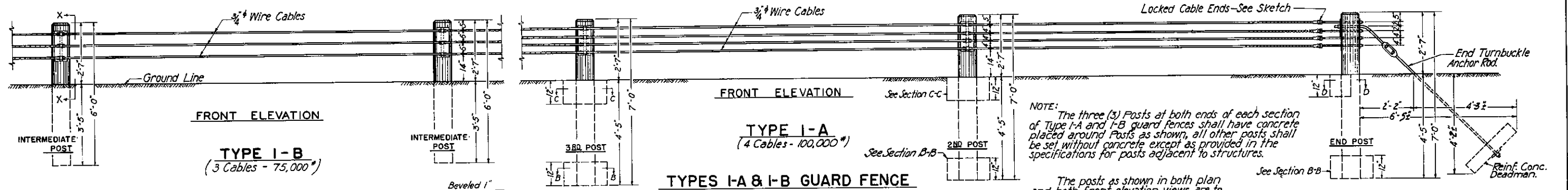
Revised for Addition of
 "Quirin" Grate Assembly.
 Approved:
 July 20, 1955
 ASST. CHIEF ENGR. IN CHARGE OF DESIGN
 Approved Feb. 5, 1954
 Z. T. Behr
 ASST. CHIEF ENGR. IN CHARGE OF DESIGN

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
**MISCELLANEOUS INLETS-
 SUPPLEMENTAL SHEET A**



PLAN

PLAN



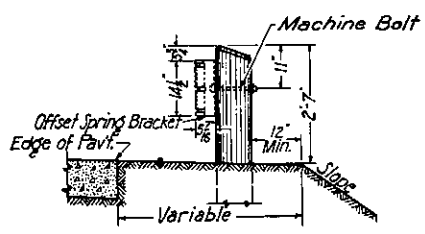
FRONT ELEVATION

FRONT ELEVATION

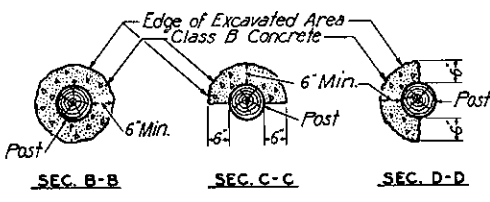
TYPES I-A & I-B GUARD FENCE

NOTE: The three (3) Posts at both ends of each section of Type I-A and I-B guard fences shall have concrete placed around Posts as shown, all other posts shall be set without concrete except as provided in the specifications for posts adjacent to structures.

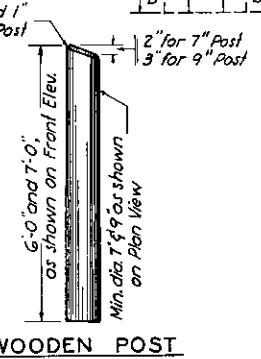
The posts as shown in both plan and both front elevation views are to be used for both Types I-A and I-B Guard Fence.



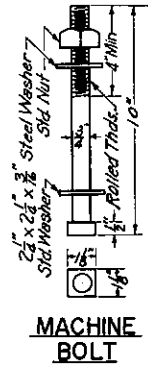
TYPICAL SECTION X-X
(Through Intermediate Posts)
On super-elevated curves place posts to conform to the appropriate cross sections



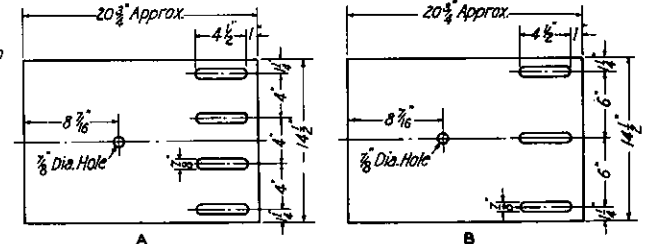
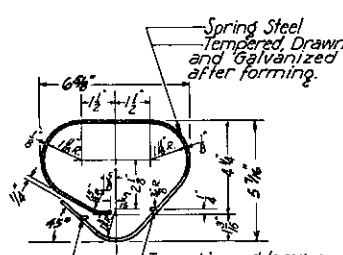
METHOD OF PLACING CONC. AROUND POSTS



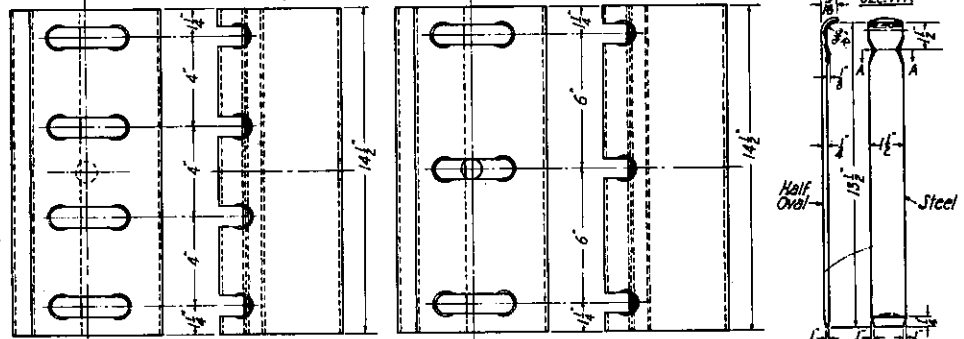
WOODEN POST



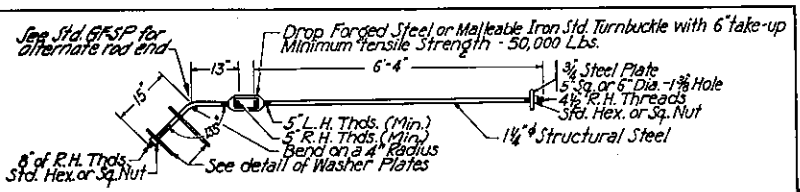
MACHINE BOLT



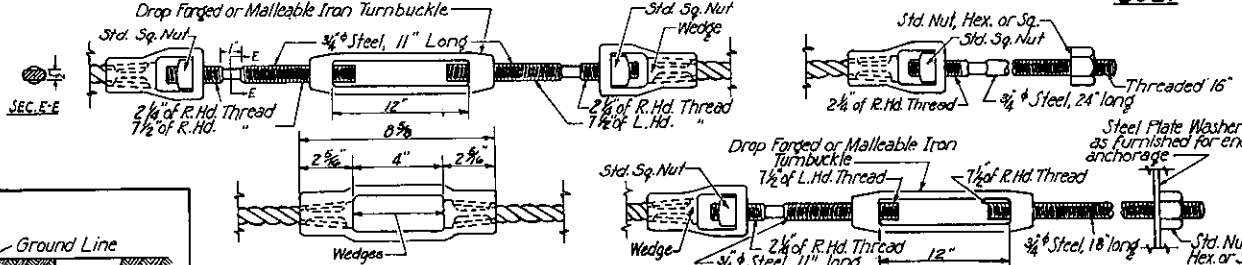
SPRING BLANKS
(Spring Steel Plate 1/4\"/>



TYPE A OFFSET SPRING BRACKETS TYPE B

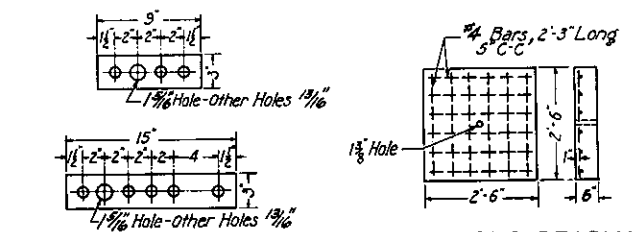


END TURNBUCKLE ANCHOR ROD
Minimum Tensile Strength of Assembly 50,000#

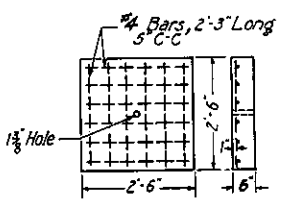


CABLE SPLICES
Minimum Tensile Strength-25,000#
NOTE: Cable splices and Cable Ends shall be positive and of any type, and design coinciding with the intent, design and strength of the structure, and meeting with the approval of the Engineer.

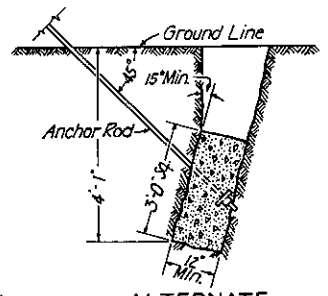
CABLE ENDS
Minimum Tensile Strength-25,000#



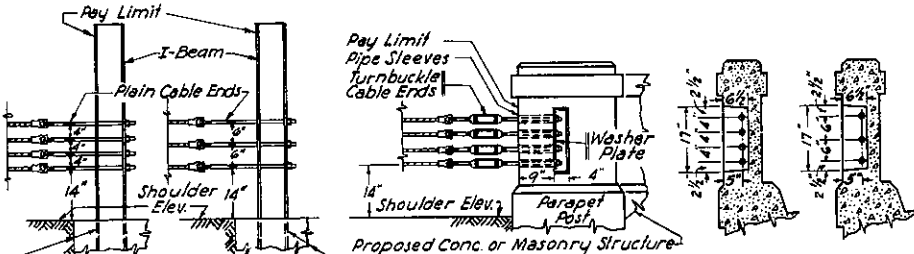
WASHER PLATES
(3\"/>



REINF. CONC. DEADMAN
18 Lbs. Reinforcement Bars.
3.1 Cu. Ft. Class A Concrete



ALTERNATE CONC. DEADMAN
Min. 9.0 Cu. Ft. Class A Conc.



REAR ELEVATIONS TYPE I-A TYPE I-B

Pipe sleeve diameter shall accommodate required cable end with 1/8 inch max. clearance. Three (3) pocket surfaces shall be tapered 1/4 inch as indicated

CONNECTIONS TO STRUCTURES

NOTE: All metal shall be galvanized as provided in the Specifications.

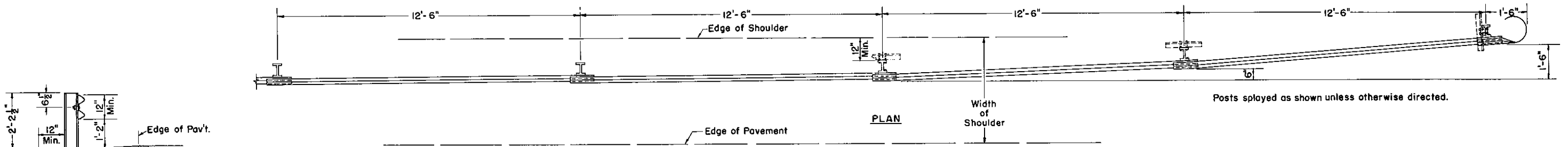
NOTE: The American Steel and Wire Company has waived all claims for royalty or other indemnity under Letters Patent of the United States, which have been issued or for which applications are pending, on this guard fence insofar as the Commonwealth of Pennsylvania or any of its political subdivisions using said guard fence on projects under the supervision of said Commonwealth are concerned, either directly or through contractors on work for the Commonwealth or such political subdivision.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
TYPES I-A & I-B GUARD FENCE
(4 & 3 WIRE CABLES-FULL FLOATING)

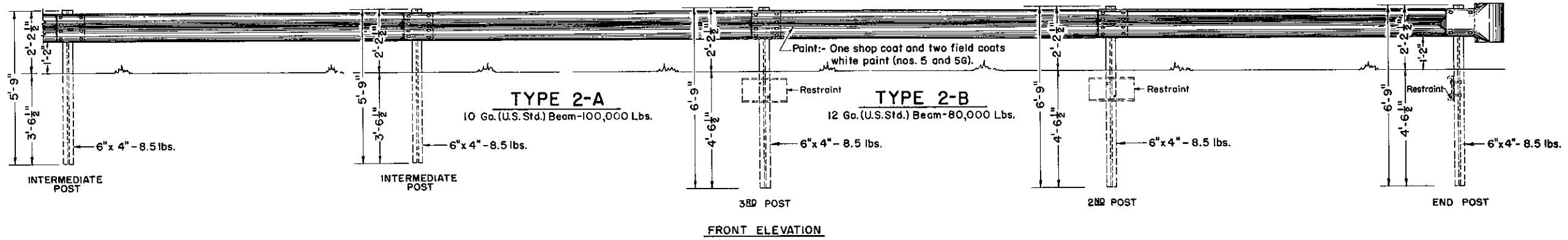
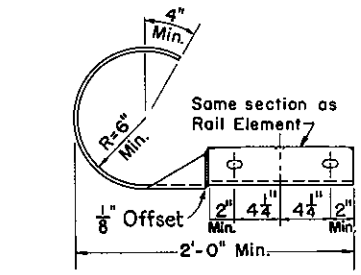
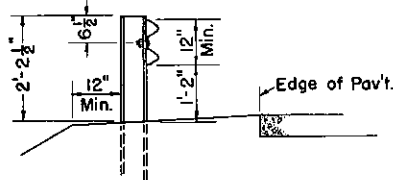
APPROVED November 1, 1961

Reddeman
CHIEF ENGINEER

GF-1

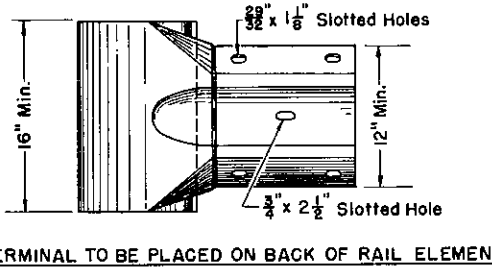


TYPICAL SECTION

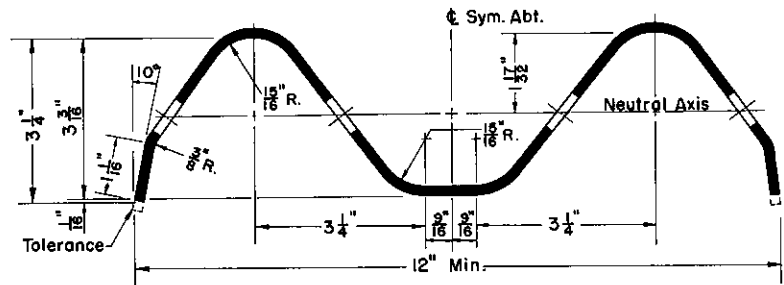


TYPES 2-A & 2-B GUARD FENCE

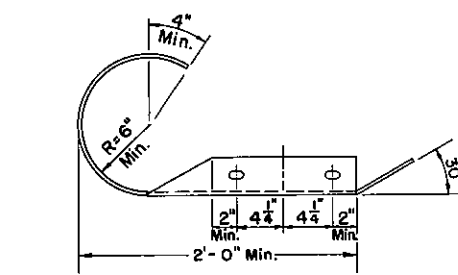
NOTE:-
 Restraints shall be bolted on posts before or after posts are driven into ground as provided in the Specifications.
 Bolts for restraints shall be 3/4" x 3 5/8" long with hex nuts.
 All bolts and nuts shall be galvanized in accordance with Department Specifications.
 Splice bolts shall develop the design strength of the rail element.
 Post bolts shall withstand a 5000 pound side pull in either direction.
 Where guard fence is required on curves having a radius of less than 150 feet, the rail element shall be shop formed.



TERMINAL TO BE PLACED ON BACK OF RAIL ELEMENT

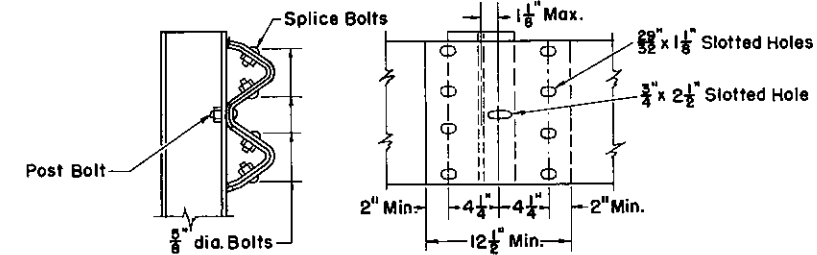


SECTION THRU RAIL ELEMENT



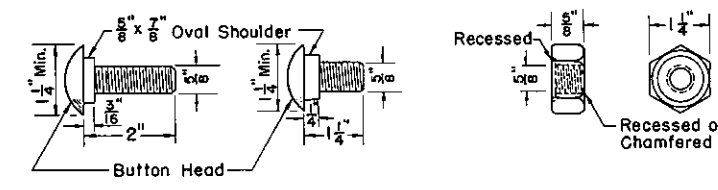
TERMINAL TO BE PLACED ON FACE OF RAIL ELEMENT

ALTERNATE TERMINAL SECTIONS
 Min. 12 Ga. (U.S. Std.)

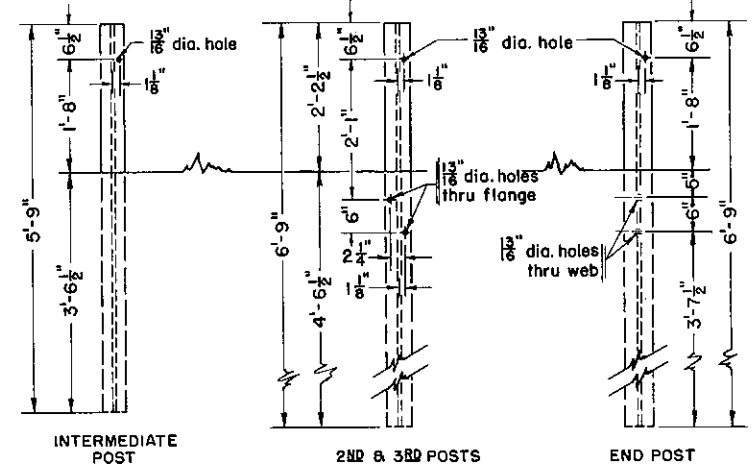


(Lap splice in direction of traffic)

RAIL SPLICE

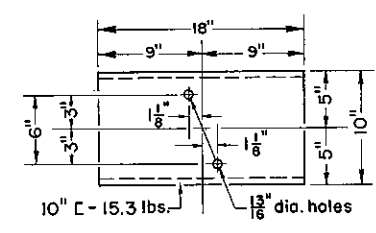


POST BOLT SPLICE BOLT NUT



FRONT ELEVATION

STEEL POSTS



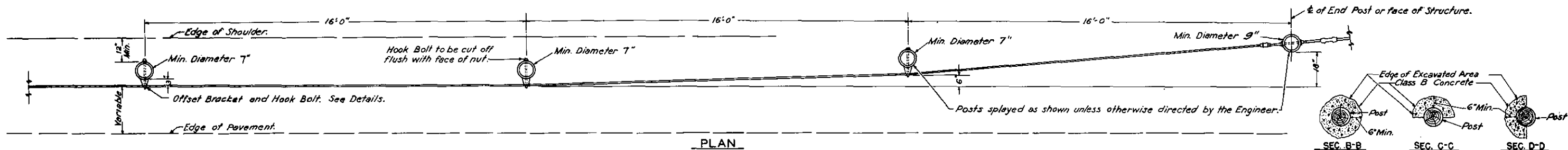
CHANNEL RESTRAINT

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
TYPES 2-A & 2-B GUARD FENCE
 (10 & 12 GAUGE-STEEL BEAM)

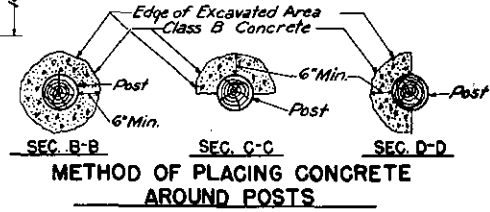
APPROVED November 4, 1961

Fred ...
 CHIEF ENGINEER

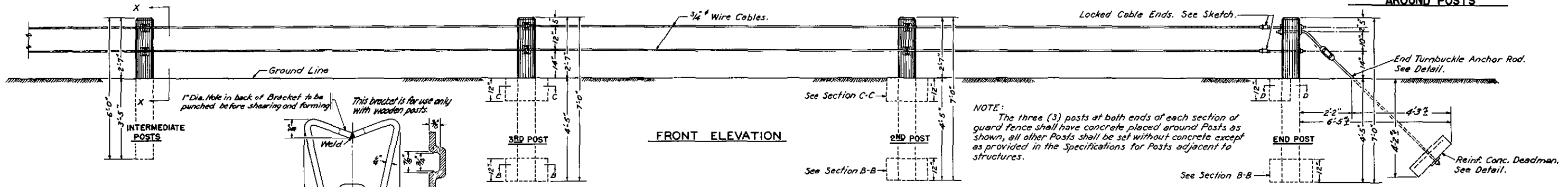
GF-2



PLAN



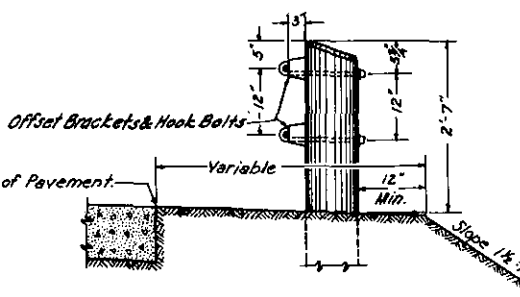
METHOD OF PLACING CONCRETE AROUND POSTS



FRONT ELEVATION

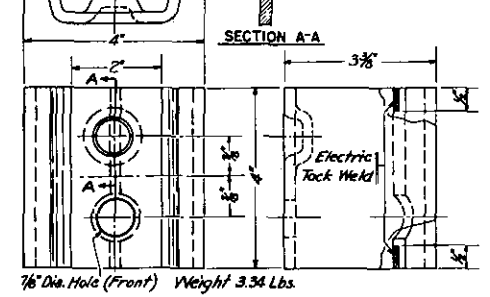
TYPE I-C GUARD FENCE
(2 Cables - 50,000 Lbs.)

TYPE C END ANCHORAGE



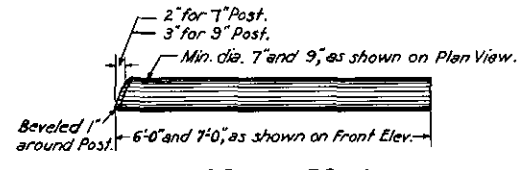
TYPICAL SECTION X-X
(Through Intermediate Posts)

On super-elevated curves place posts to conform to the appropriate cross sections.

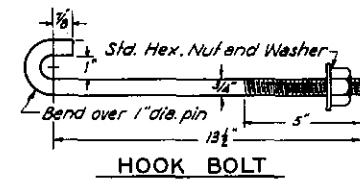


SECTION A-A
PRESSED STEEL OFFSET BRACKET

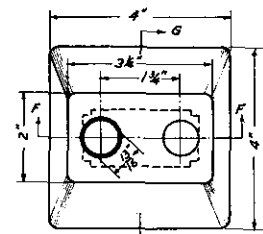
Bracket formed from 1/2"x4" bars with mill rounded edges



WOODEN POST

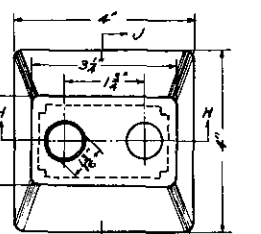


HOOK BOLT



CAST IRON

These castings are for use only with wooden and reinf. concrete posts.

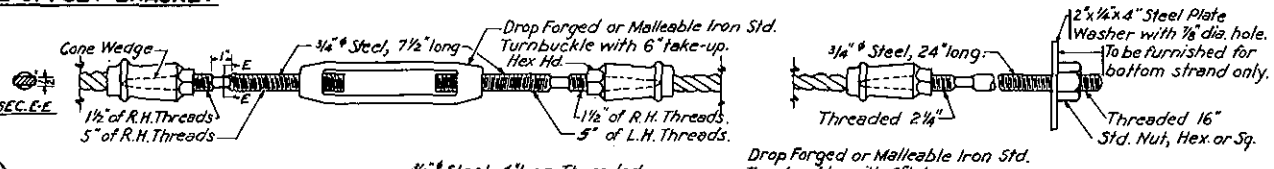


MALLEABLE IRON

Approx. Wgt. - 4.25 Lbs. - Min. Wgt. 4.0 Lbs.

CAST OFFSET BRACKETS

NOTES:
All metal, except offset brackets, shall be galvanized.
Cast-iron and malleable iron offset brackets shall be painted.
Pressed steel offset brackets may be either painted or galvanized.
Painting and galvanizing shall be in accordance with the Specifications.

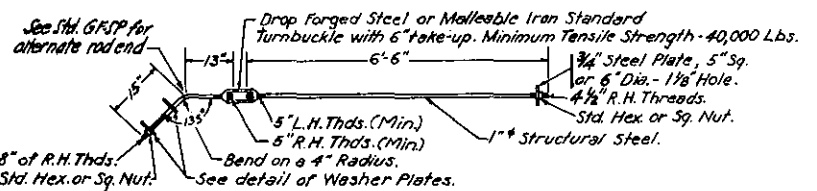


CABLE SPLICES

Minimum Tensile Strength - 25,000#
NOTE: Cable Splices and Cable Ends shall be positive and of any type and design coinciding with the intent, design and strength of the structure, and meeting with the approval of the Engineer.

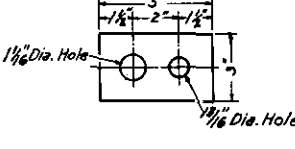
CABLE ENDS

Minimum Tensile Strength - 25,000#

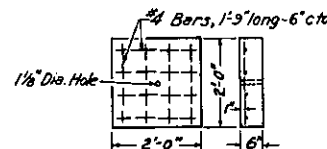


END TURNBUCKLE ANCHOR ROD

Minimum Tensile Strength of Assembly - 40,000#

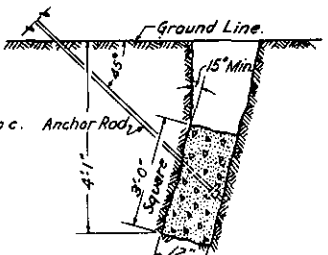


WASHER PLATE
(3"x1/4"x5" Steel Plate.)



REINF. CONC. DEADMAN

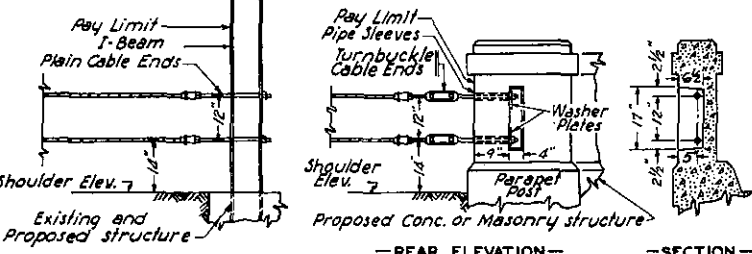
10 Lbs. Reinforcement Bars
2 Cu. Ft. of Class A Concrete.



ALTERNATE CONC. DEADMAN

Min. 9.0 Cu. Ft. Class A Conc.

TYPE C END ANCHORAGE



CONNECTIONS TO STRUCTURES

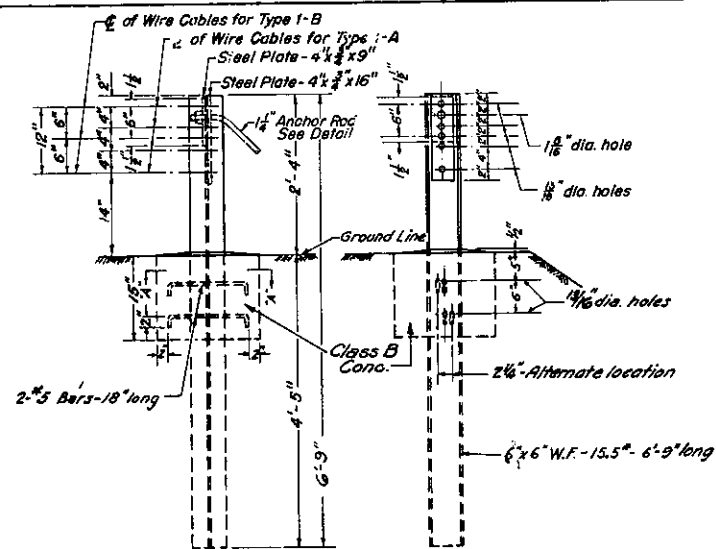
Pipe sleeve diameter shall accommodate required cable end with 1/8-inch max. clearance. Three (3) pocket surfaces shall be tapered 1/4-inch as indicated.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
TYPE I-C GUARD FENCE
(2 WIRE CABLES-FULL FLOATING)

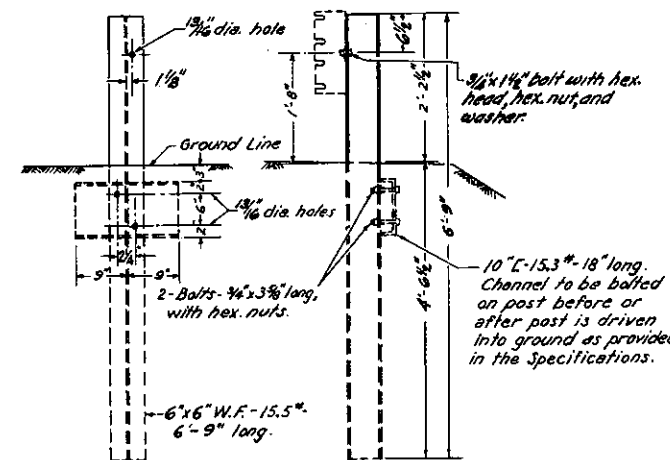
APPROVED: November 1, 1961

CHIEF ENGINEER

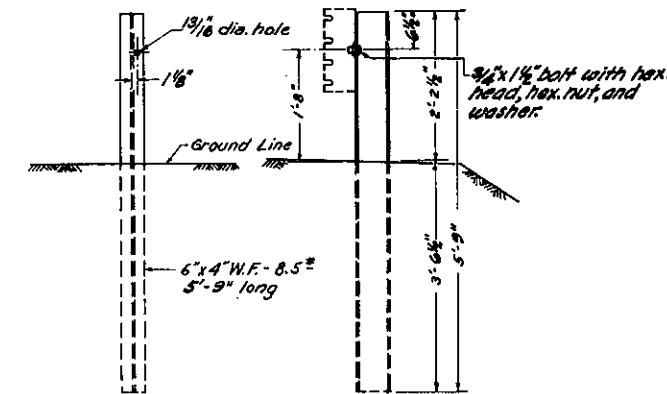
GF-C



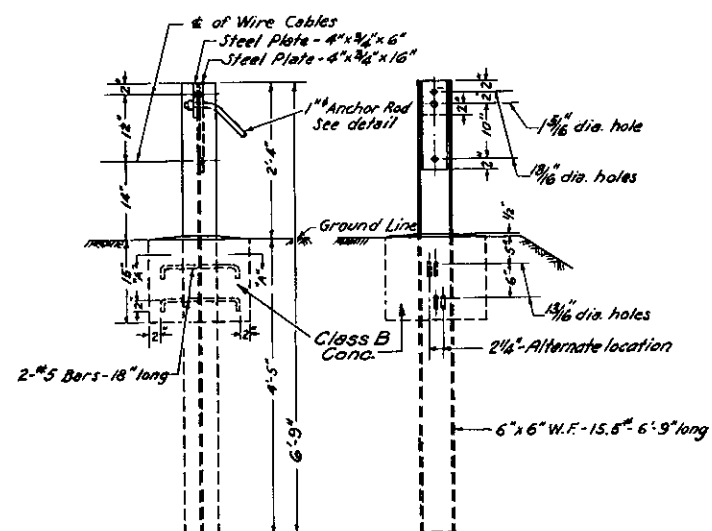
DRIVEN END POST FOR TYPES 1-A AND 1-B



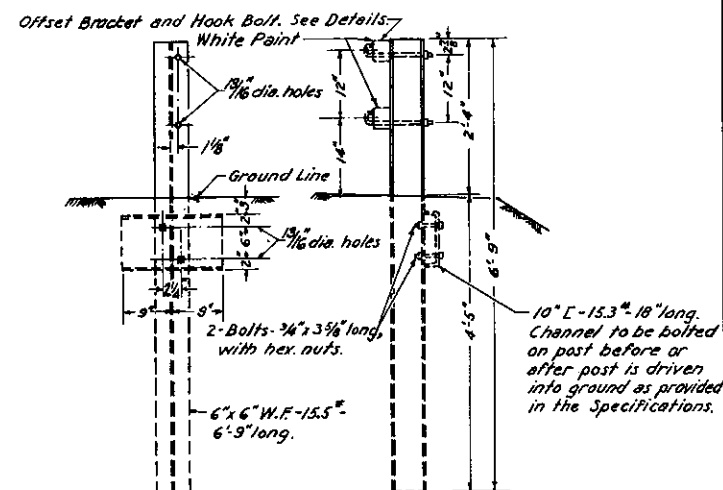
DRIVEN 2ND & 3RD POSTS FOR TYPES 1-A & 1-B



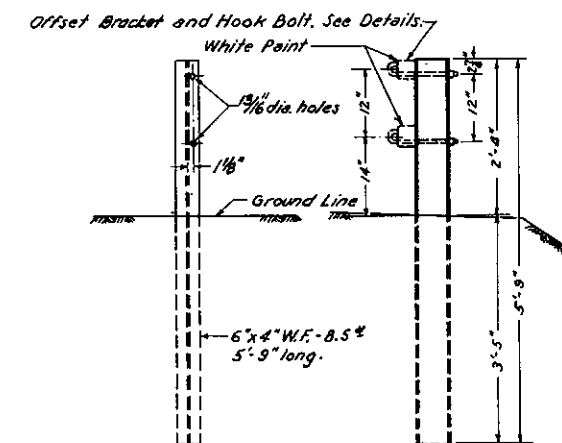
DRIVEN OR SET INTERMEDIATE POSTS FOR TYPES 1-A & 1-B



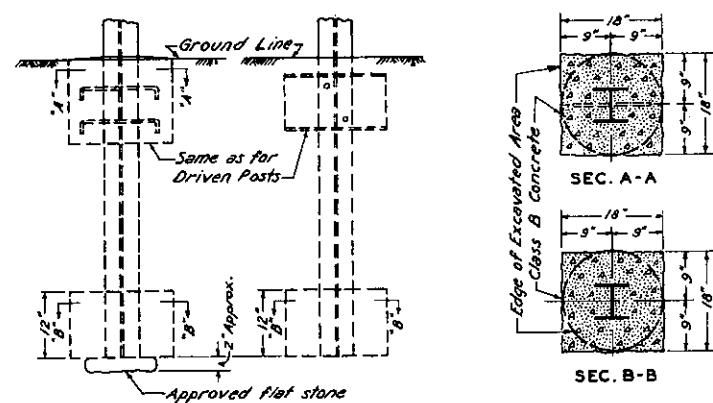
DRIVEN END POST FOR TYPE 1-C



DRIVEN 2ND & 3RD POSTS FOR TYPE 1-C



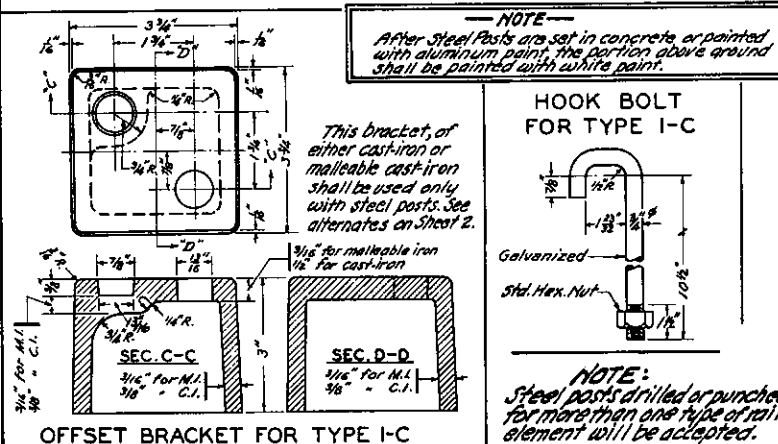
DRIVEN OR SET INTERMEDIATE POSTS FOR TYPE 1-C



SET END POST SET 2ND AND 3RD POSTS (AT BOTH ENDS OF EACH SECTION OF GUARD FENCE)

SET POSTS IN EXCAVATED HOLES FOR TYPES 1-A, 1-B & 1-C

NOTE:- Details of posts shown elsewhere on this drawing.

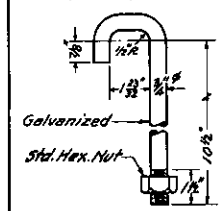


OFFSET BRACKET FOR TYPE 1-C

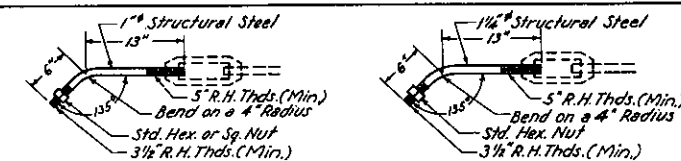
NOTE:- After Steel Posts are set in concrete or painted with aluminum paint, the portion above ground shall be painted with white paint.

This bracket, of either cast-iron or malleable cast-iron shall be used only with steel posts. See alternates on Sheet 2.

HOOK BOLT FOR TYPE 1-C



NOTE:- Steel posts drilled or punched for more than one type of rail element will be accepted.



BENT SECTIONS OF END TURNBUCKLE ANCHOR RODS FOR STEEL END POSTS
 Note:- Bent Sections to be used in End Turnbuckle Anchor Rod Assemblies in lieu of bent sections shown in details on Standard Drawings GF-1 and GF-C.

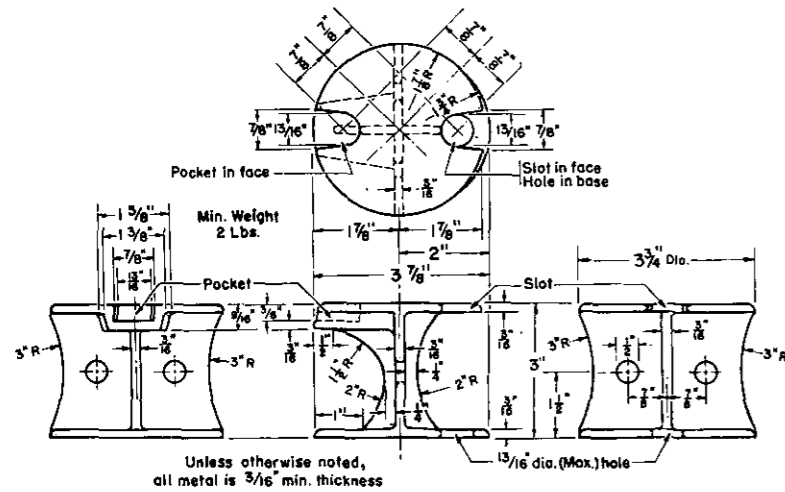
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 STEEL POSTS
 FOR
 TYPES 1-A, 1-B & 1-C GUARD FENCE

APPROVED November 1, 1961

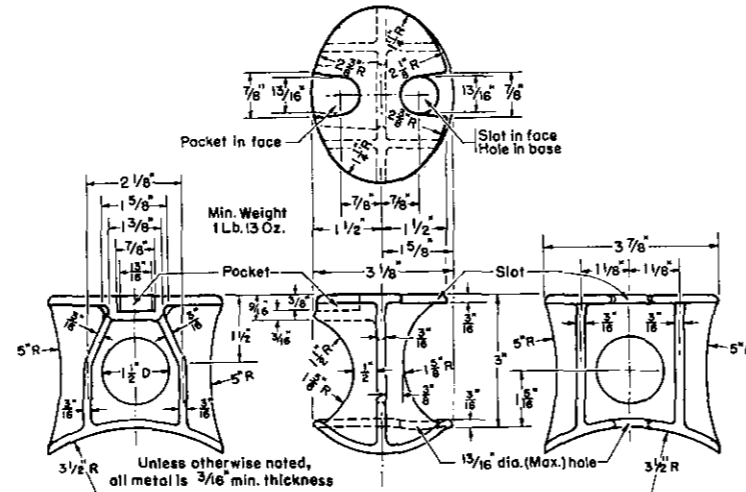
Chief Engineer

SHEET 1 OF 2

GF-SP

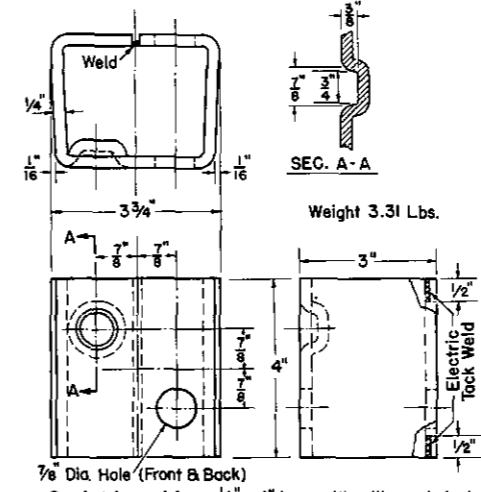


FOR STEEL POSTS

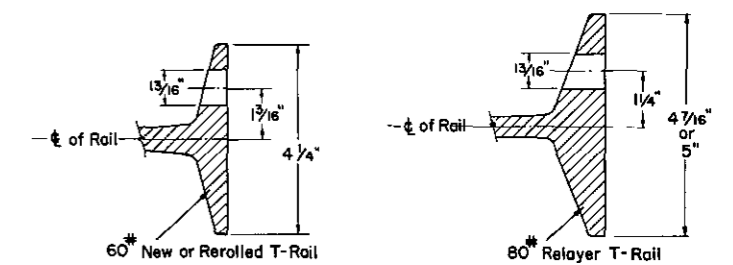


FOR WOOD AND CONCRETE POSTS

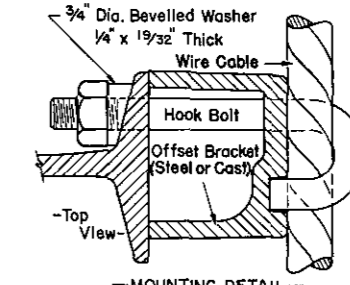
ALTERNATE MALLEABLE IRON OFFSET BRACKETS FOR TYPE I-C GUARD FENCE



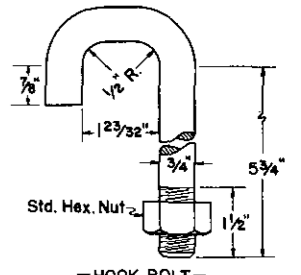
PRESSED STEEL OFFSET BRACKET
(FOR STEEL POSTS OF TYPE I-C GUARD FENCE)



-LOCATION OF HOLES-

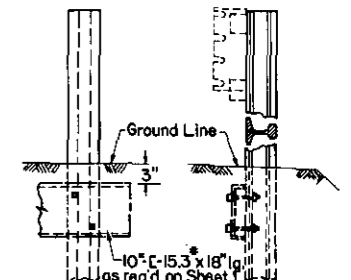
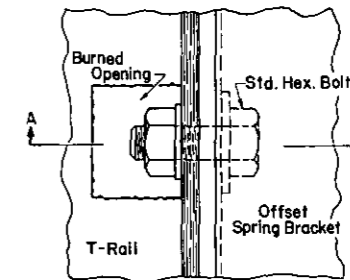


-MOUNTING DETAIL-

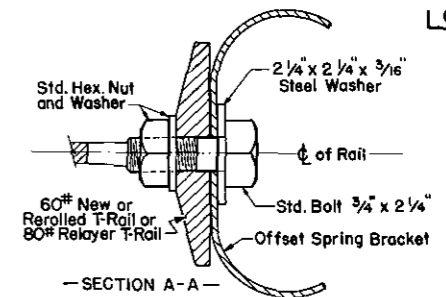


-HOOK BOLT-

FOR TYPE I-C GUARD FENCE



LOCATION OF
CHANNEL RESTRAINT



-SECTION A-A-

-NOTES-

Bolts for restraints shall be 3/4" dia. x 4 1/2" long, equipped with 1/4 x 1 9/32" bevelled washer.
Hole for 3/4" bolt may be burned or drilled. If burned, flange face shall be smoothed to provide good bearing for offset spring bracket.
For other details of construction see Standard corresponding to type of guard fence used.

FOR TYPES I-A AND I-B GUARD FENCE

RAILROAD T-RAIL POSTS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
STEEL POSTS
FOR
TYPES I-A, I-B & I-C GUARD FENCE
ALSO
OFFSET BRACKETS FOR TYPE I-C

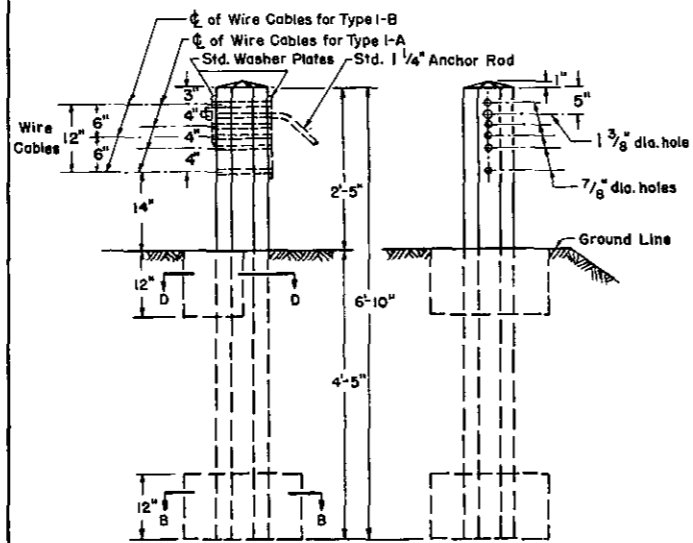
SHEET 2 OF 2

GF-SP

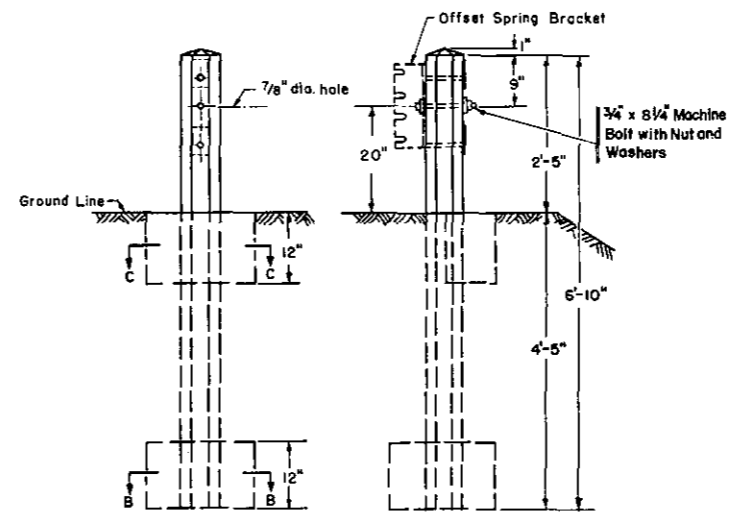
Nov. 1, 1961

Muller

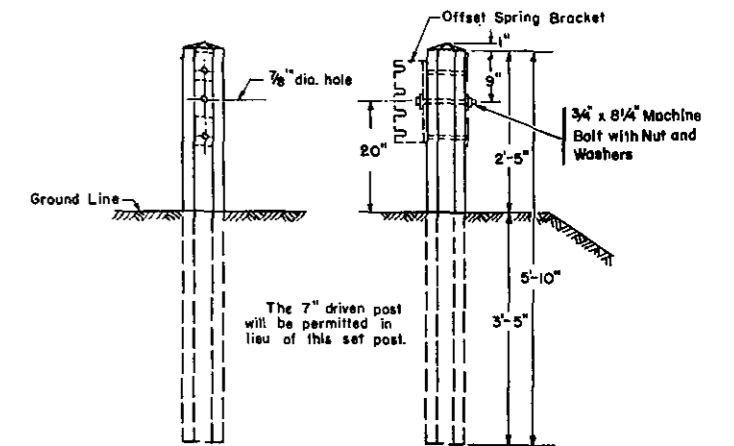
Muller



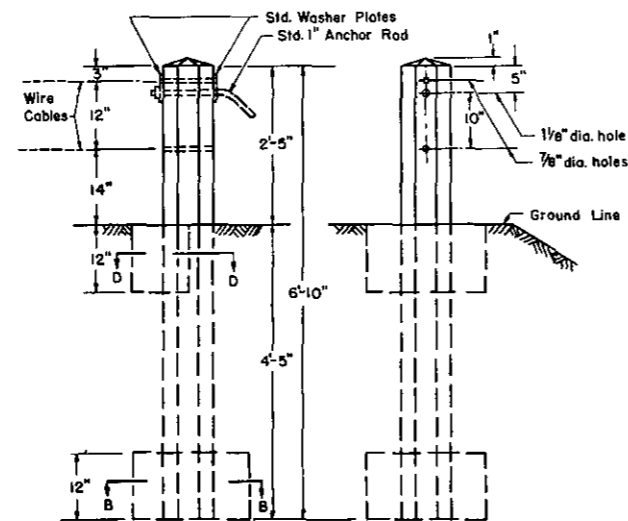
9" END POST FOR TYPES I-A AND I-B



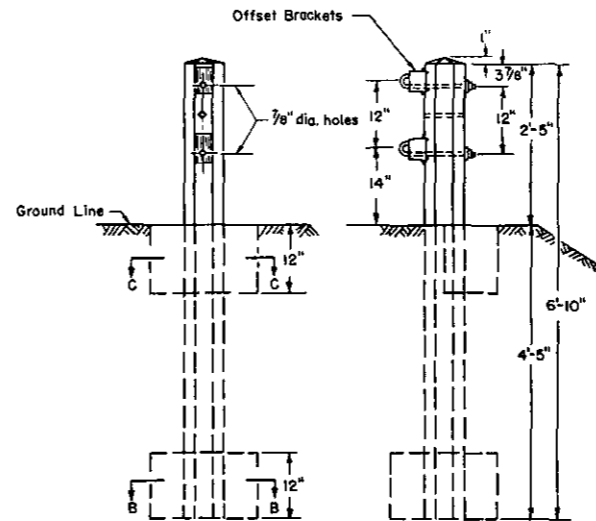
7" 2ND & 3RD POSTS FOR TYPES I-A AND I-B



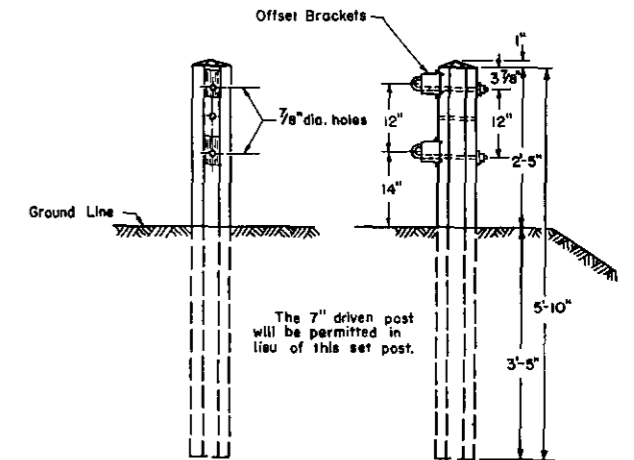
7" INTERMEDIATE POSTS FOR TYPES I-A AND I-B



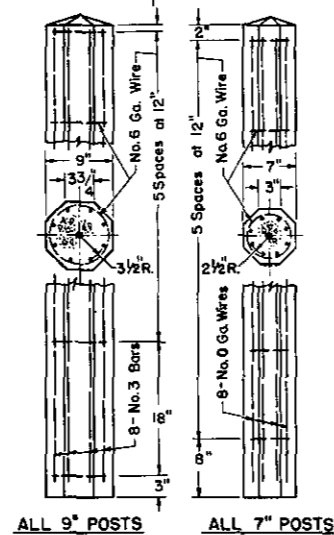
9" END POST FOR TYPE I-C



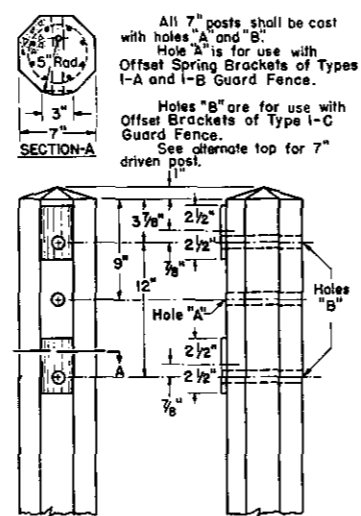
7" 2ND & 3RD POSTS FOR TYPE I-C



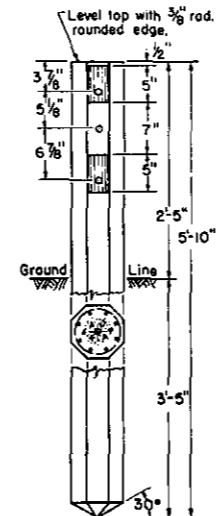
7" INTERMEDIATE POSTS FOR TYPE I-C



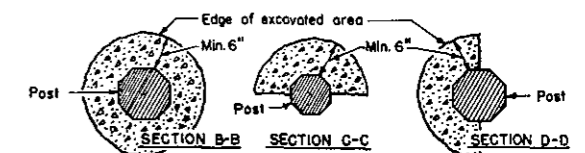
ALL 9" POSTS
ALL 7" POSTS
REINFORCEMENT



DETAIL OF ALL 7" POSTS



ALTERNATE
7" DRIVEN POST



METHOD OF PLACING CLASS B CONC. AROUND POSTS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
PRECAST REINF. CONC. POSTS
FOR
TYPES I-A, I-B & I-C GUARD FENCE

APPROVED November 1, 1961

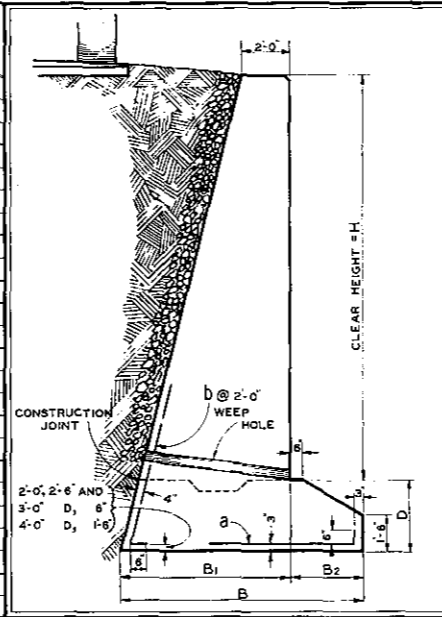
Frank J. ...
CHIEF ENGINEER

GF-RCP

TYPE-1

WALLS SUSTAINING ROADWAY AND 20 TON ROLLER

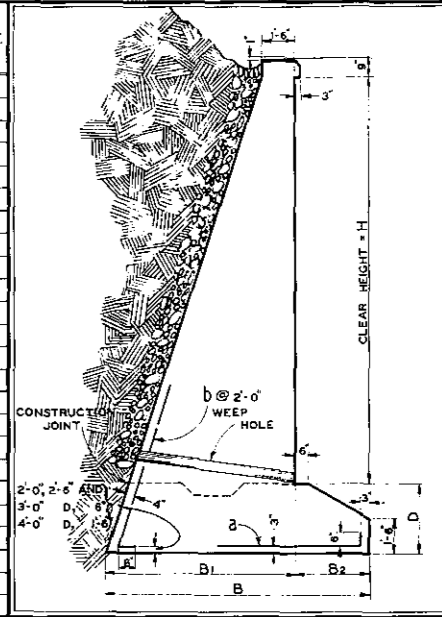
CLEAR HEIGHT H	TOTAL BASE B	WALL BASE B ₁	TOE BASE B ₂	FOOTING DEPTH D	TOE REINFORCEMENT a	DOWELS b	WALL PER LIN. FT. CU. YDS.	FOOTING PER LIN. FT. CU. YDS.	STEEL PER LIN. FT. LBS.	TOE PRESS PER SQ. FT. LBS.
2'-0"	3'-6"	2'-0"	1'-6"	2'-0"		3/4" x 3'-6"	.148	.250	2,629	950
3'-0"	3'-9"	2'-2"	1'-7"	2'-0"		4'-6"	.228	.265	3,380	1,150
4'-0"	4'-2"	2'-6"	1'-8"	2'-0"		5'-0"	.320	.292	3,755	1,400
5'-0"	4'-10"	3'-0"	1'-10"	2'-6"		5'-6"	.432	.407	4,131	1,700
6'-0"	5'-3"	3'-4"	1'-11"	2'-6"		5'-6"	.589	.442	4,131	1,850
7'-0"	5'-8"	3'-8"	2'-0"	2'-6"		5'-6"	.678	.476	4,131	2,000
8'-0"	6'-2"	4'-0"	2'-2"	2'-6"	3/4" x 6'-0" LG., 2'-0" OCC	5'-6"	.818	.519	8,636	2,150
9'-0"	6'-7"	4'-4"	2'-3"	2'-6"	6'-0" x 2'-0"	5'-6"	.970	.554	8,636	2,300
10'-0"	7'-3"	4'-10"	2'-5"	3'-0"	6'-3" x 2'-0"	6'-0"	1.152	.716	9,200	2,600
11'-0"	7'-8"	5'-2"	2'-6"	3'-0"	6'-3" x 2'-0"	6'-0"	1.321	.759	9,200	2,870
12'-0"	8'-1"	5'-6"	2'-7"	3'-0"	6'-3" x 2'-0"	6'-0"	1.511	.802	9,200	3,140
13'-0"	8'-6"	5'-10"	2'-8"	3'-0"	6'-6" x 2'-0"	6'-0"	1.715	.845	9,388	3,400
14'-0"	9'-0"	6'-2"	2'-10"	3'-0"	6'-6" x 2'-0"	6'-0"	1.926	.894	9,388	3,670
15'-0"	9'-5"	6'-6"	2'-11"	3'-0"	6'-9" x 1'-8"	6'-0"	2.153	.938	10,589	3,900
16'-0"	9'-10"	6'-10"	3'-0"	3'-0"	6'-9" x 1'-4"	6'-0"	2.390	.981	12,110	4,160
17'-0"	10'-3"	7'-2"	3'-1"	3'-0"	6'-9" x 1'-2"	6'-0"	2.645	1.025	13,196	4,430
18'-0"	10'-8"	7'-6"	3'-2"	3'-0"	7'-0" x 1'-0"	6'-0"	2.905	1.068	15,020	4,590
19'-0"	11'-2"	7'-10"	3'-4"	3'-0"	7'-0" x 1'-1"	6'-0"	3.178	1.118	15,975	4,760
20'-0"	12'-0"	8'-6"	3'-6"	4'-0"	7'-3" x 1'-5"	6'-0"	3.411	1.580	12,192	5,300
21'-0"	12'-5"	8'-10"	3'-7"	4'-0"	7'-3" x 1'-1"	6'-0"	3.789	1.616	14,558	5,500
22'-0"	12'-10"	9'-2"	3'-8"	4'-0"	7'-6" x 1'-1"	6'-0"	4.092	1.674	16,795	5,700
23'-0"	13'-4"	9'-6"	3'-10"	4'-0"	7'-6" x 9/16"	6'-0"	4.421	1.739	18,735	5,900
24'-0"	13'-9"	9'-10"	3'-11"	4'-0"	7'-9" x 8/16"	6'-0"	4.764	1.796	20,940	6,100
25'-0"	14'-2"	10'-2"	4'-0"	4'-0"	7'-9" x 7"	6'-0"	5.112	1.853	24,462	6,300



TYPE-2

WALLS SUSTAINING SLOPING BANKS OF EARTH OF INDEFINITE HEIGHT

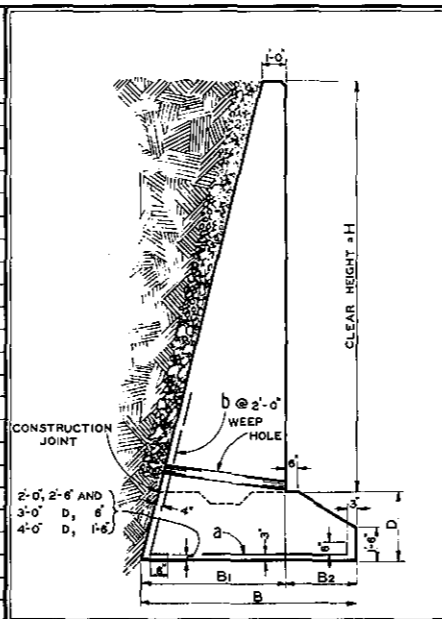
CLEAR HEIGHT H	TOTAL BASE B	WALL BASE B ₁	TOE BASE B ₂	FOOTING DEPTH D	TOE REINFORCEMENT a	DOWELS b	WALL PER LIN. FT. CU. YDS.	FOOTING PER LIN. FT. CU. YDS.	STEEL PER LIN. FT. LBS.	TOE PRESS PER SQ. FT. LBS.
2'-0"	2'-0"	1'-6"	6"	2'-0"		3/4" x 3'-6"	.111	.148	2,629	1,300
3'-0"	2'-2"	1'-6"	8"	2'-0"		4'-6"	.167	.160	3,380	1,644
4'-0"	2'-6"	1'-6"	1'-0"	2'-0"		5'-0"	.222	.179	3,755	1,975
5'-0"	3'-6"	2'-2"	1'-4"	2'-6"		5'-6"	.319	.298	4,131	2,375
6'-0"	4'-2"	2'-8"	1'-6"	2'-6"		5'-6"	.424	.351	4,131	2,750
7'-0"	4'-9"	3'-1"	1'-8"	2'-6"	3/4" x 5'-0" LG., 2'-0" OCC	5'-6"	.588	.399	7,886	3,140
8'-0"	5'-4"	3'-7"	1'-9"	2'-6"	5'-6" x 2'-0"	5'-6"	.680	.448	8,262	3,540
9'-0"	5'-11"	4'-0"	1'-11"	2'-6"	5'-9" x 2'-0"	5'-6"	.826	.498	8,449	3,930
10'-0"	6'-9"	4'-8"	2'-1"	3'-0"	5'-9" x 2'-0"	6'-0"	1.061	.666	8,824	4,320
11'-0"	7'-5"	5'-2"	2'-3"	3'-0"	6'-0" x 2'-0"	6'-0"	1.197	.732	9,012	4,660
12'-0"	8'-0"	5'-8"	2'-4"	3'-0"	6'-0" x 2'-0"	6'-0"	1.450	.792	9,012	5,000
13'-0"	8'-7"	6'-1"	2'-6"	3'-0"	6'-3" x 1'-8"	6'-0"	1.619	.851	10,139	5,340
14'-0"	9'-2"	6'-6"	2'-8"	3'-0"	6'-6" x 1'-4"	6'-0"	1.848	.909	11,828	5,680
15'-0"	9'-9"	7'-0"	2'-9"	3'-0"	6'-6" x 1'-0"	6'-0"	2.108	.970	14,269	6,027
16'-0"	10'-4"	7'-5"	2'-11"	3'-0"	6'-9" x 10"	6'-0"	2.367	1.029	16,672	6,400
17'-0"	11'-0"	7'-11"	3'-1"	3'-0"	6'-9" x 8 1/2"	6'-0"	2.662	1.097	18,820	6,800
18'-0"	11'-6"	8'-4"	3'-2"	3'-0"	7'-0" x 7"	6'-0"	2.955	1.140	22,530	7,200
19'-0"	12'-2"	8'-10"	3'-4"	3'-0"	7'-0" x 6"	6'-0"	3.284	1.218	25,534	7,600
20'-0"	13'-4"	9'-9"	3'-7"	4'-0"	7'-3" x 8"	6'-0"	3.654	1.731	20,840	8,000
21'-0"	13'-11"	10'-2"	3'-9"	4'-0"	7'-3" x 6 1/2"	6'-0"	3.999	1.808	24,608	8,400
22'-0"	14'-6"	10'-8"	3'-10"	4'-0"	7'-6" x 5 1/2"	6'-0"	4.380	1.889	29,084	8,800
23'-0"	15'-1"	11'-1"	4'-0"	4'-0"	7'-9" x 5"	6'-0"	4.755	1.967	32,443	9,170
24'-0"	15'-8"	11'-7"	4'-1"	4'-0"	7'-9" x 4 1/2"	6'-0"	5.173	2.049	35,547	9,570
25'-0"	16'-3"	12'-0"	4'-3"	4'-0"	8'-0" x 4"	6'-0"	5.575	2.125	40,554	9,940



TYPE-3

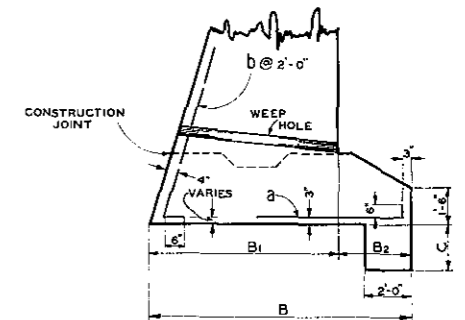
WALLS SUSTAINING LEVEL BANKS OF EARTH

CLEAR HEIGHT H	TOTAL BASE B	WALL BASE B ₁	TOE BASE B ₂	FOOTING DEPTH D	TOE REINFORCEMENT a	DOWELS b	WALL PER LIN. FT. CU. YDS.	FOOTING PER LIN. FT. CU. YDS.	STEEL PER LIN. FT. LBS.	TOE PRESS PER SQ. FT. LBS.
2'-0"	1'-10"	1'-3"	7"	2'-0"		3/4" x 3'-6"	.079	.132	2,629	870
3'-0"	2'-3"	1'-6"	9"	2'-0"		4'-6"	.128	.159	3,380	1,020
4'-0"	2'-9"	1'-10"	11"	2'-0"		5'-0"	.189	.190	3,755	1,179
5'-0"	3'-5"	2'-3"	1'-2"	2'-6"		5'-6"	.262	.285	4,131	1,433
6'-0"	3'-10"	2'-7"	1'-3"	2'-6"		5'-6"	.347	.320	4,131	1,603
7'-0"	4'-3"	2'-10"	1'-5"	2'-6"		5'-6"	.435	.354	4,131	1,773
8'-0"	4'-9"	3'-2"	1'-7"	2'-6"		5'-6"	.541	.396	4,131	1,943
9'-0"	5'-3"	3'-6"	1'-9"	2'-6"		5'-6"	.658	.435	4,131	2,113
10'-0"	5'-11"	3'-11"	2'-0"	3'-0"		6'-0"	.786	.578	4,506	2,280
11'-0"	6'-4"	4'-3"	2'-1"	3'-0"		6'-0"	.927	.621	4,506	2,430
12'-0"	6'-9"	4'-6"	2'-3"	3'-0"	3/4" x 6'-0" LG., 2'-0" OCC	6'-0"	1.067	.663	9,012	2,580
13'-0"	7'-3"	4'-10"	2'-5"	3'-0"	6'-3" x 2'-0"	6'-0"	1.230	.712	9,200	2,730
14'-0"	7'-8"	5'-1"	2'-7"	3'-0"	6'-3" x 2'-0"	6'-0"	1.410	.754	9,200	2,880
15'-0"	8'-2"	5'-5"	2'-9"	3'-0"	6'-6" x 2'-0"	6'-0"	1.576	.804	9,388	3,100
16'-0"	8'-7"	5'-9"	2'-10"	3'-0"	6'-6" x 2'-0"	6'-0"	1.778	.847	9,388	3,250
17'-0"	9'-0"	6'-0"	3'-0"	3'-0"	6'-9" x 2'-0"	6'-0"	1.968	.889	9,575	3,400
18'-0"	9'-6"	6'-4"	3'-2"	3'-0"	7'-0" x 1'-8"	6'-0"	2.192	.939	10,814	3,550
19'-0"	9'-11"	6'-7"	3'-4"	3'-0"	7'-0" x 1'-4"	6'-0"	2.403	.981	12,392	3,700
20'-0"	10'-10"	7'-3"	3'-7"	4'-0"	7'-3" x 1'-10"	6'-0"	2.667	1.385	10,446	4,272
21'-0"	11'-3"	7'-6"	3'-9"	4'-0"	7'-6" x 1'-6"	6'-0"	2.901	1.439	12,016	4,412
22'-0"	11'-9"	7'-10"	3'-11"	4'-0"	7'-9" x 1'-2"	6'-0"	3.167	1.503	14,483	4,552
23'-0"	12'-2"	8'-1"	4'-1"	4'-0"	7'-9" x 1'-0"	6'-0"	3.424	1.559	16,147	4,692
24'-0"	12'-7"	8'-5"	4'-2"	4'-0"	8'-0" x 9/16"	6'-0"	3.712	1.610	19,689	4,822
25'-0"	13'-1"	8'-9"	4'-4"	4'-0"	8'-0" x 8/16"	6'-0"	4.022	1.662	21,470	4,970



NOTES:

- All exposed edges shall be chamfered 1 inch.
- Construction joints shall be bonded with dowels and keys.
- Expansion joints, with 4"x4" beveled keyways, shall be 25 ft. to 35 ft. apart and at all breaks in face of wall. Entire joint shall be surfaced with 1/4 inch of tar paper covered with hot asphaltum, or equal.
- Stone backfill 12 inches thick as shown.
- Weep holes as shown, 15 feet apart or as directed.
- Type-2 walls, having roadway at foot, shall have cap as shown and rubble gutter full length.
- With rock foundations for all types and heights, eliminate footings and consider clear height as distance from rock to top of wall.
- For sloping banks with roadway on top use Type-1 for all heights to include 12 feet. For greater heights use Type-2.
- Curtin wall shall be used when wall stands on sloping bank of earth or where scour may become excessive.
- All concrete shall be Class "B".



TYPE-1 C = .04H+1
 TYPE-2 C = .06H+1
 TYPE-3 C = .03H+1

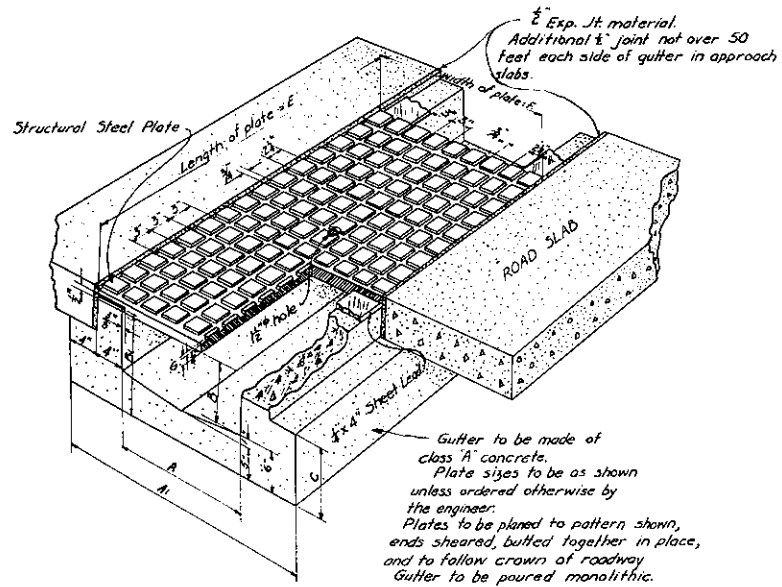
CURTIN WALL

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF HIGHWAYS
 BRIDGE UNIT
STANDARD
RETAINING WALLS
 CLEAR HEIGHTS 2 TO 25 FEET
 TYPES 1, 2 & 3

Approved July 9/32
E.E. Mandors
 BRIDGE ENGINEER

Revised 9-24-34 Type-1 25' Clear "B"
 Revised 5-7-37 Type-2 12' Clear, Wall Quon.

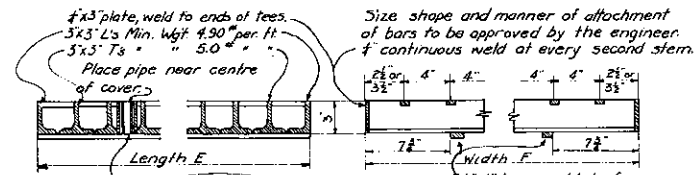


Gutter to be made of class A concrete. Plate sizes to be as shown unless ordered otherwise by the engineer. Plates to be planed to pattern shown, ends sheared, butted together in place, and to follow crown of roadway. Gutter to be poured monolithic.

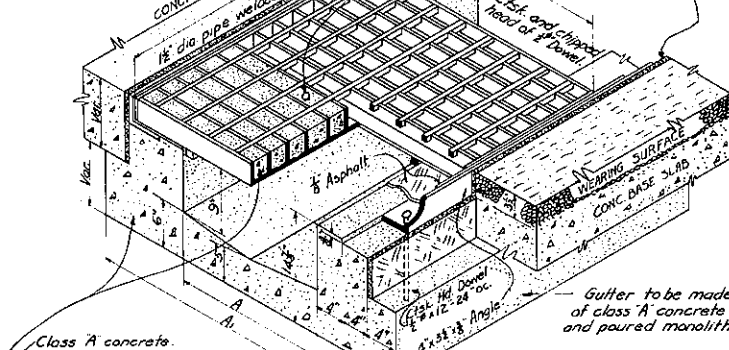
Gutter Dimen.		Plate Dimen.			Quantities per lin. ft.			Net Wgt
A	B	A ₁	B ₁	C	E	F	G	1 Plate lbs.
12"	9"	2'-4"	15 1/2"	7 1/8"	5'-0"	20"	1 1/8"	54.6
18"	9"	2'-10"	15 1/2"	7 1/8"	4'-0"	26"	1 1/8"	47.7
24"	9"	3'-4"	15 1/2"	7 1/8"	3'-0"	32"	1 1/8"	49.1
30"	9"	3'-10"	15 1/2"	8"	3'-0"	38"	2"	69.0

* computed on basis of 9" pavement.

TYPE A FOR ROADWAY GUTTERS



Gutter cover to conform to crown of roadway and to be constructed in sections of E length. For rigid type pavements or bases, 1/2" expansion joint material. Additional 1/2" joint not over 50 feet each side of gutter in approach slabs.

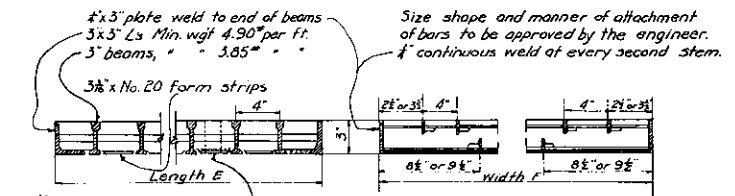


Vibrated or tamped to satisfaction of Engineer. T-beam floor plates may be pre-moulded and ready to set in place.

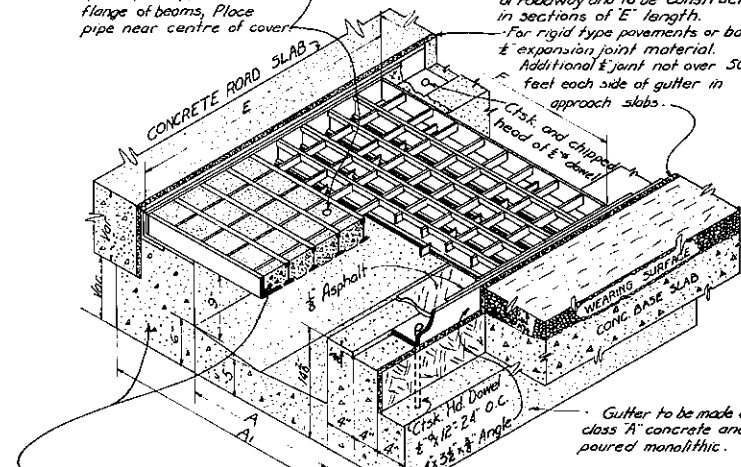
Gutter Dimen.		Cover Dimen.		Quantities per lin. ft.		
A	A ₁	E	F	1 Conc. Cu. Yds.	Excav. Cu. Yds.	Cover Sq. Ft.
12"	3'-0"	4'-0"	27"	.096	.216	2.25
18"	3'-6"	4'-0"	32"	.104	.306	2.75
24"	4'-0"	3'-0"	39"	.113	.333	3.25
30"	4'-6"	3'-0"	45"	.121	.361	3.75

* Computed on basis of 9" pavement

TYPE B FOR ROADWAY GUTTERS



Gutter cover to conform to crown of roadway and to be constructed in sections of E length. For rigid type pavements or bases, 1/2" expansion joint material. Additional 1/2" joint not over 50 feet each side of gutter in approach slabs.

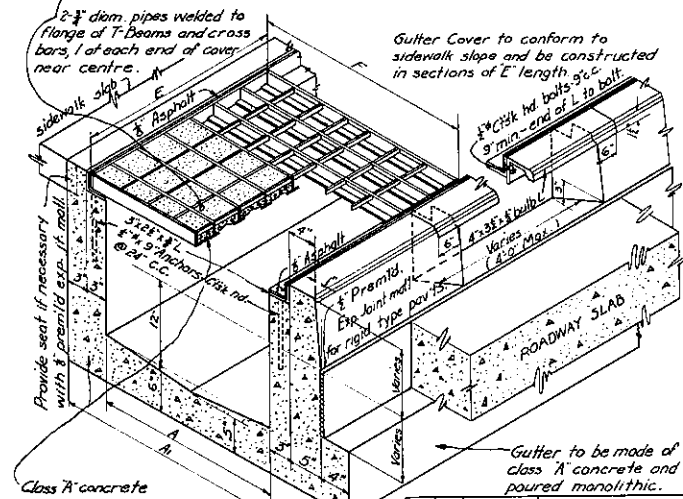
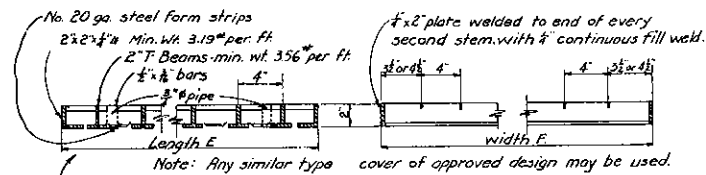


Vibrated or tamped to satisfaction of Engineer. Covers may be pre-moulded and ready to set in place.

Gutter Dimen.		Cover Dimen.		Quantities per lin. ft.		
A	A ₁	E	F	1 Conc. Cu. Yds.	Excav. Cu. Yds.	Cover Sq. Ft.
12"	3'-0"	4'-0"	27"	.096	.216	2.25
18"	3'-6"	4'-0"	32"	.104	.306	2.75
24"	4'-0"	3'-0"	39"	.113	.333	3.25
30"	4'-6"	3'-0"	45"	.121	.361	3.75

* Computed on basis of 9" pavement

TYPE C FOR ROADWAY GUTTERS



vibrated or tamped to satisfaction of Engineer. Covers may be pre-moulded and ready to set in place.

Gutter Dimen.		Cover Dimen.		Quantities per lin. ft.		
A	A ₁	E	F	1 Conc. Cu. Yds.	Excav. Cu. Yds.	Cover Sq. Ft.
12"	2'-6"	4'-0"	17"	.119	.362	1.417
18"	3'-0"	4'-0"	23"	.1234	.402	1.917
24"	3'-6"	3'-0"	29"	.1319	.442	2.417
30"	4'-0"	3'-0"	35"	.1404	.482	2.917

Computed on basis of 9" pavement @ 8" curb

TYPE D FOR SIDEWALK GUTTERS

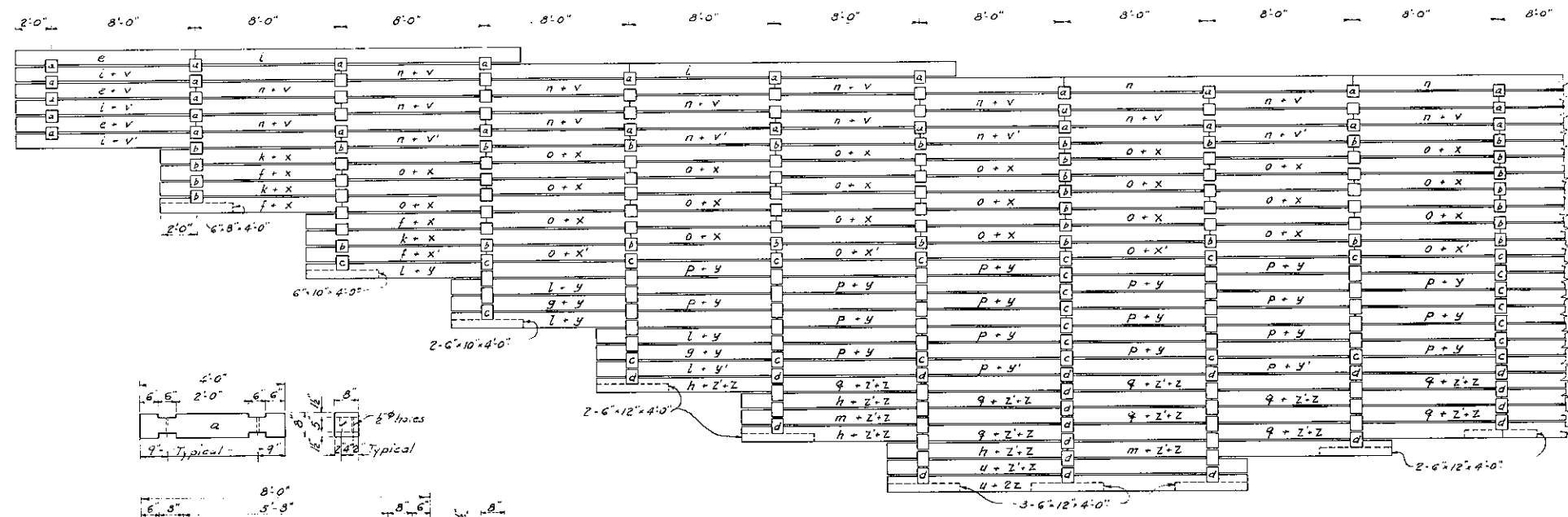
Drawn by: C.S.

Approved Jan. 31, 1941

E.E. Donnell
Bridge Engineer.

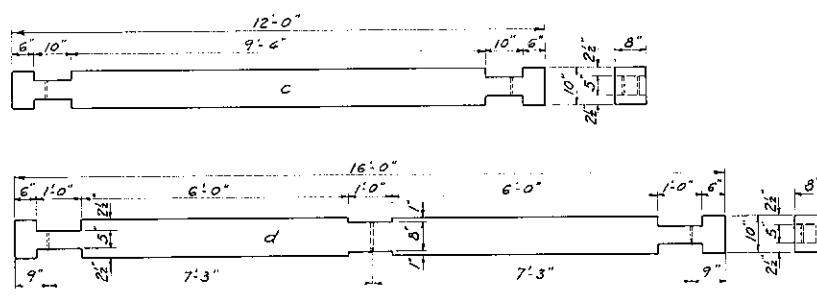
Commonwealth of Pennsylvania
Department of Highways
BRIDGE UNIT

METAL TYPE COVERED GUTTERS

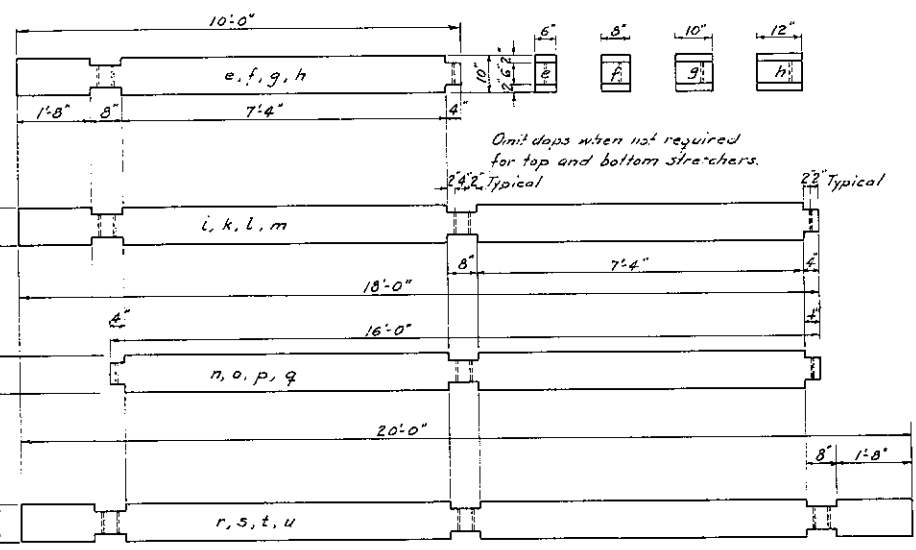


ELEVATION

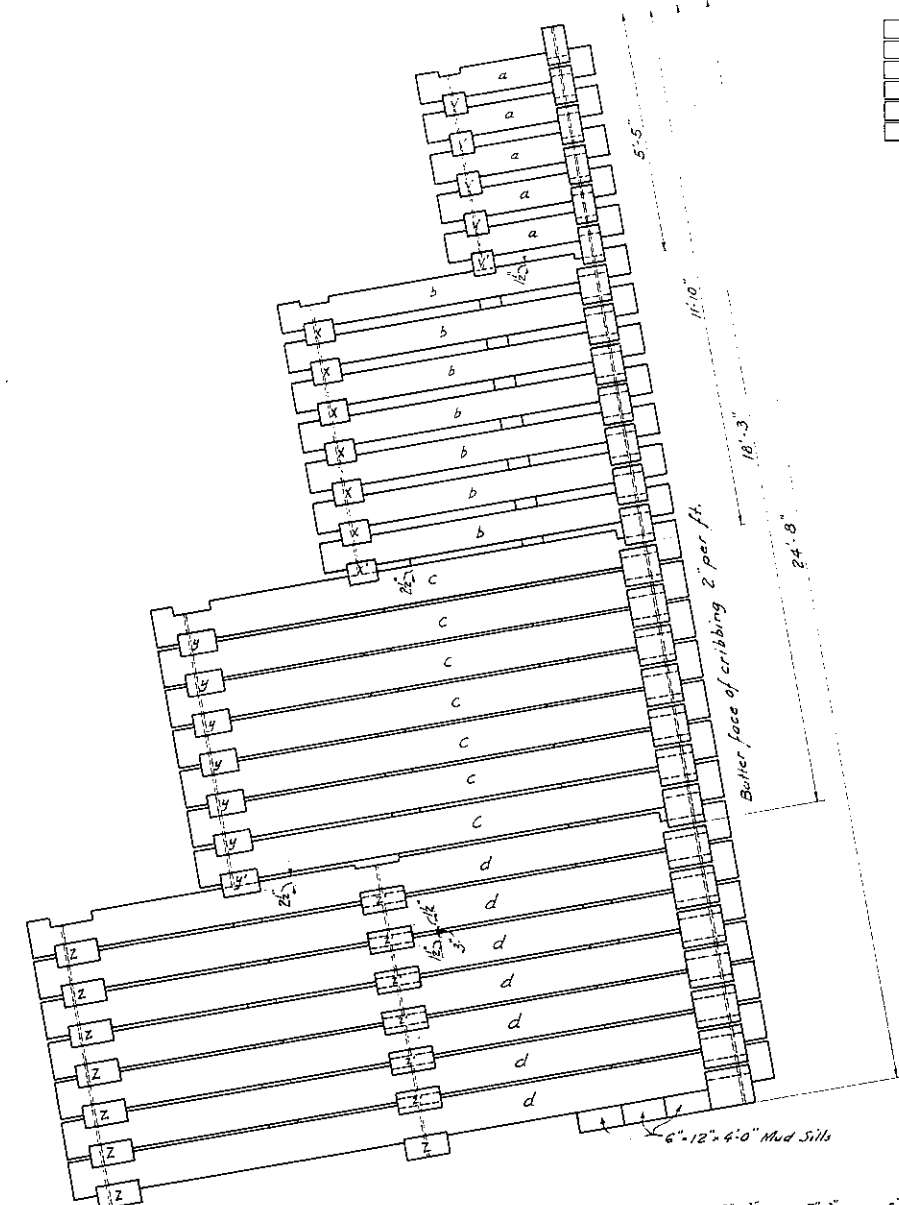
Notes:-
 Rear Stretchers v and v' are 6" x 6", length same as front stretchers
 " " x " x' " 6" x 8", " " " " "
 " " y " y' " 6" x 10", " " " " "
 " " z " z' " 6" x 12", " " " " "
 v', x', y' and z' to be dapped as shown in section.
 Shims are 3" x 6" x 8", 2" x 6" x 8" and 1" x 8" x 8"
 For Cribbing of maximum height of 6'-4" to 8'-2", make headers marked b 6'-0" long
 " " " " " " " " " " " " " " c 10'-0" "
 " " " " " " " " " " " " " " d 14'-0" "
 Mud sills may be omitted, or increased in number, as required and ordered by the Engineer.
 Members shall be secured in place by 1/2" metal dowels driven in 1/2" drilled holes, except shims shall be spiked.



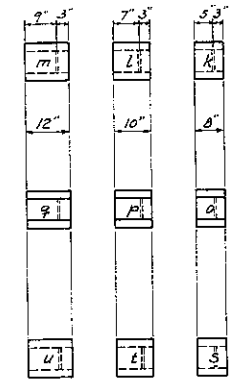
HEADERS



FRONT STRETCHERS



SECTION



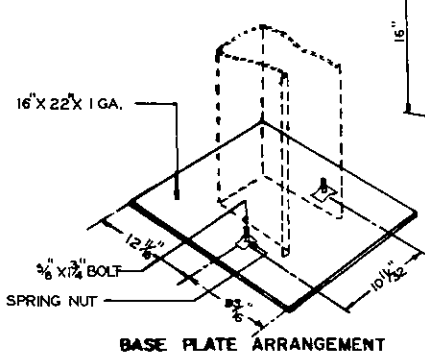
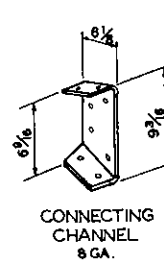
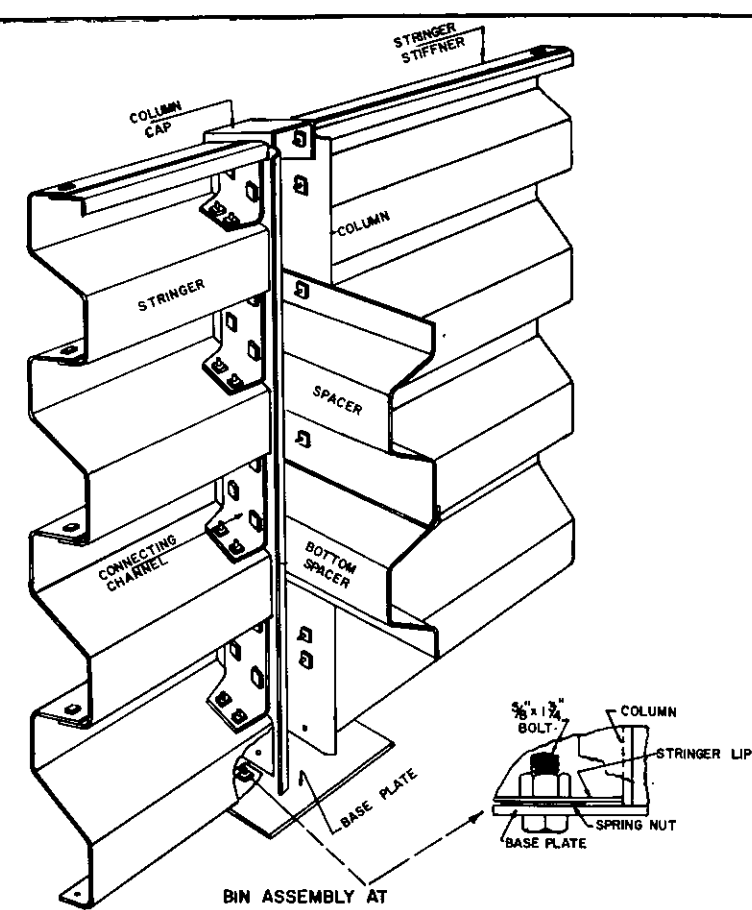
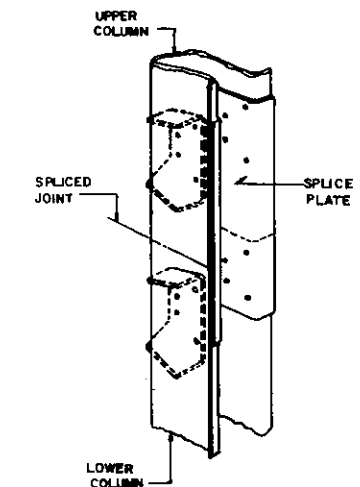
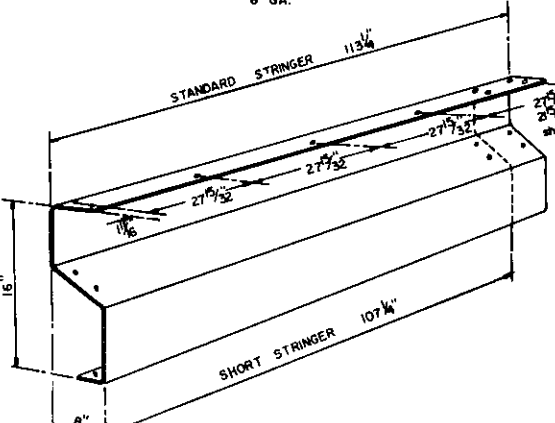
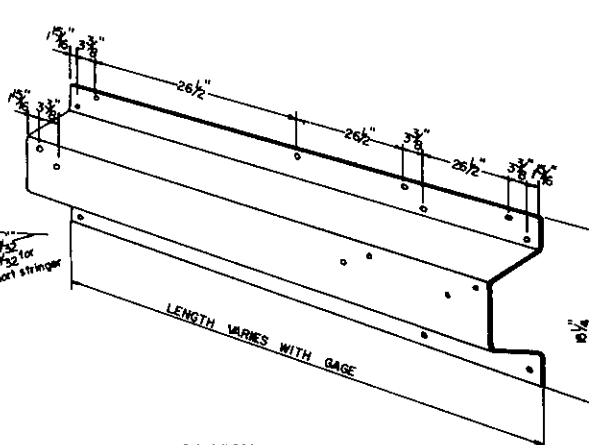
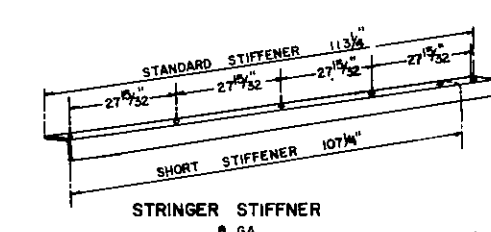
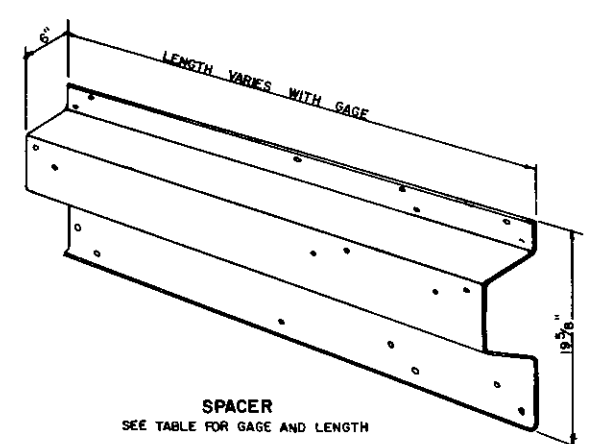
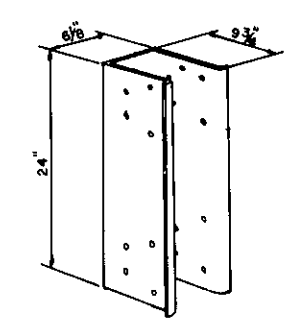
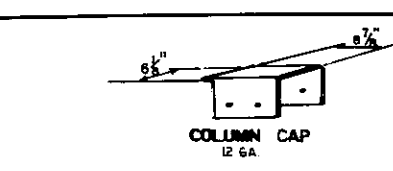
Commonwealth of Pennsylvania
 Department of Highways
 BRIDGE UNIT

STANDARD
 TIMBER CRIBBING

SK-560

APPROVED: *Asail 20 1922*
 E.E. Drummond
 BRIDGE ENGINEER

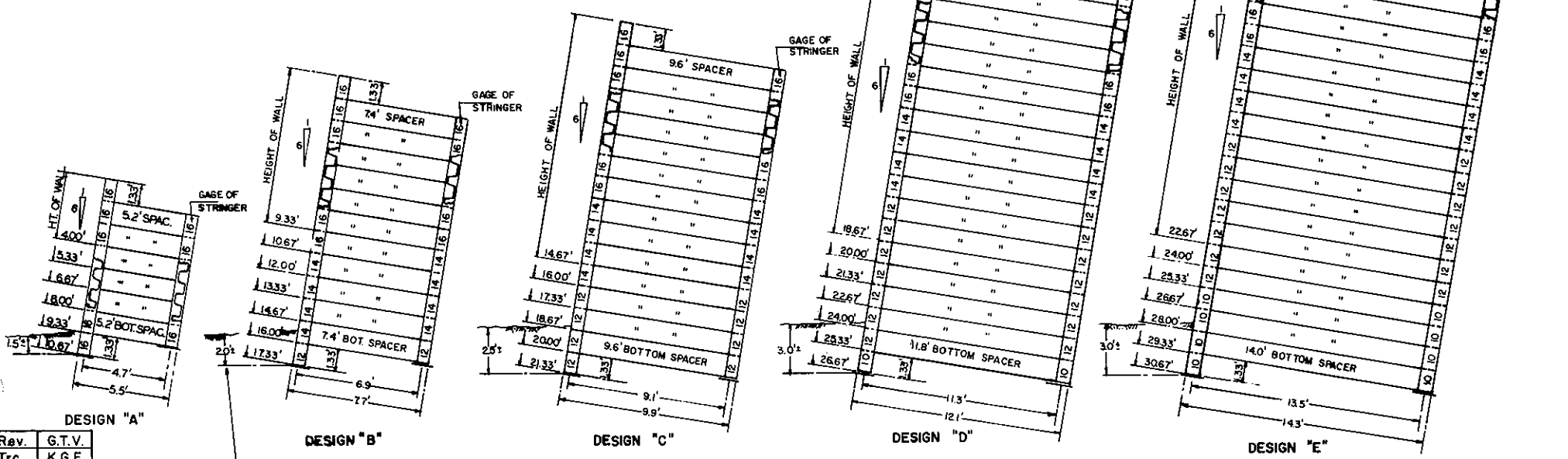
SCALE 1/4" & 1/2" = 1'-0"



DETAIL OF SPACERS					
DESIGN	A	B	C	D	E
GAGE	16	18	14	12	12
LENGTH	5.2'	7.4'	9.6'	11.8'	14.0'

GENERAL NOTES:

- All materials and workmanship shall be in accordance with PDH Form 408, Sec. 6.29.
- Metal base plates will be required.



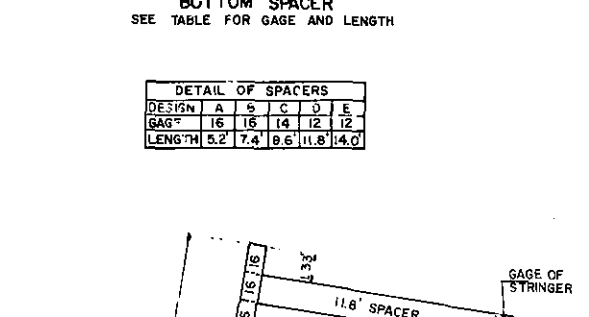
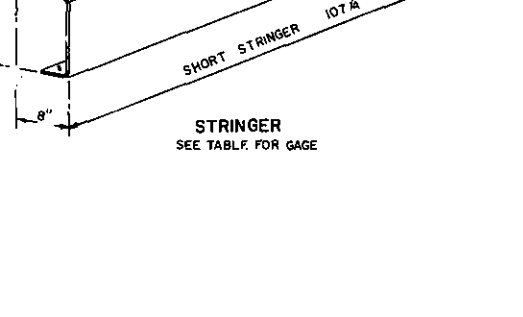
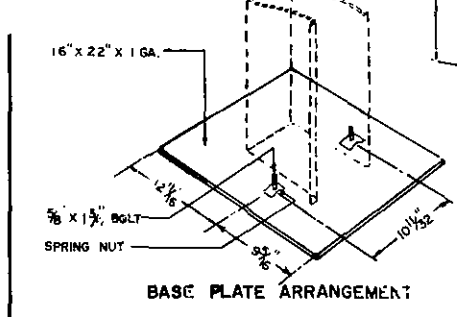
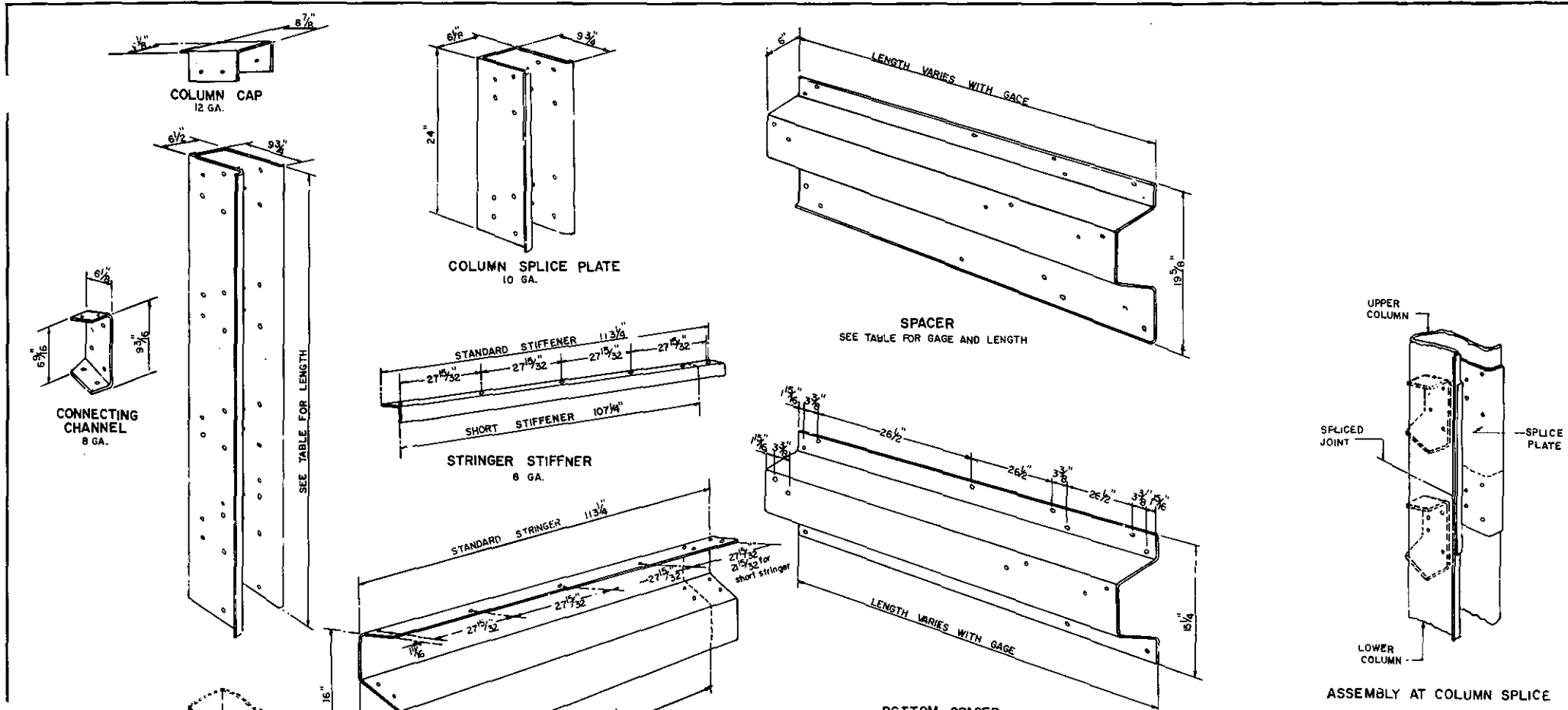
Rev.	G.T.V.
Trc.	K.G.F.
Ckd.	BFK/HJ

NOTE: THESE DEPTHS MAY VARY TO SUIT CONDITIONS

Approved: FEB. 25, 1965
J.H. Jensen
 Bridge Engineer

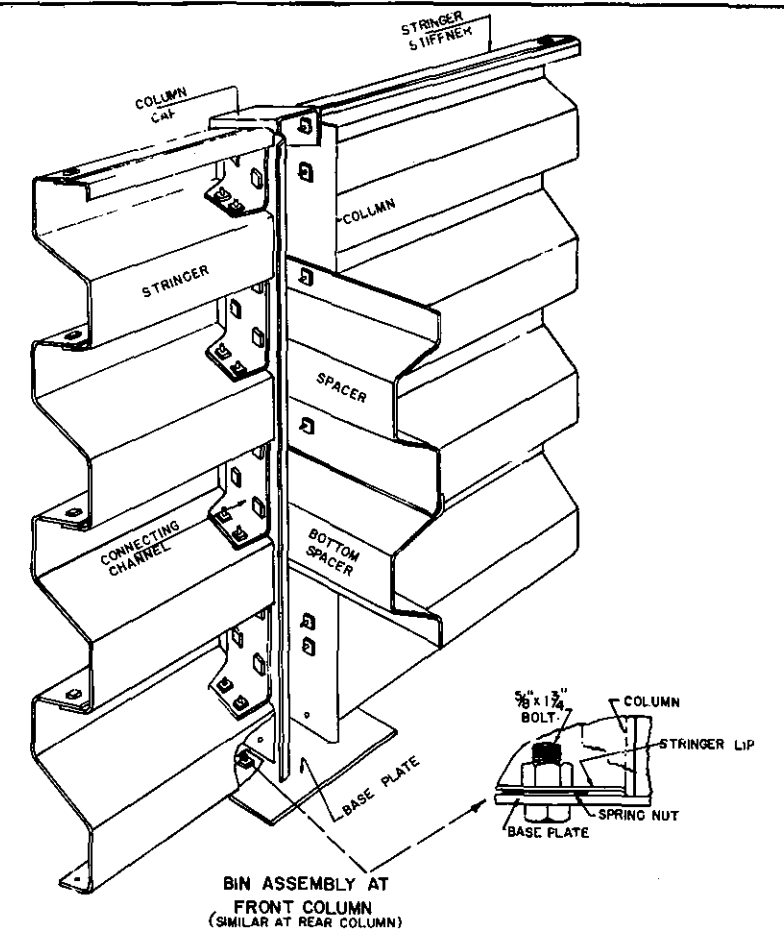
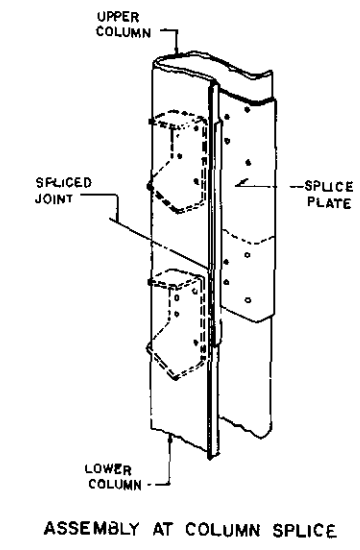
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF HIGHWAYS
 BRIDGE DIVISION

STANDARD
 METAL CRIBBING-UNCOATED



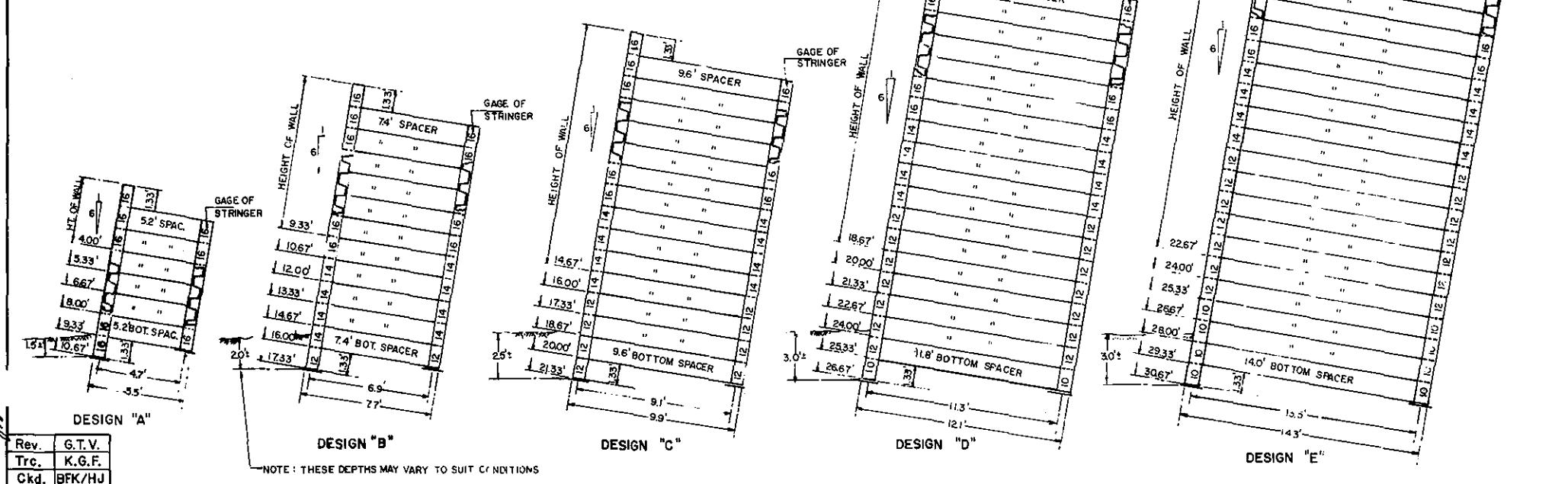
DETAIL OF SPACERS

DESIGN	A	B	C	D	E
GAGE	16	16	14	12	12
LENGTH	5.2	7.4	9.6	11.8	14.0



GENERAL NOTES:

- All materials and workmanship shall be in accordance with PDH Form 408, Sec. 6.29
- All exposed interior and exterior metal sheets used to form the members of the closed face metal cribbing shall be coated by (A) or (B), when specified for Metal Cribbing-Coated:
 - (A). Coated on both sides with a layer of asbestos fibers applied in a sheet form by pressing it into a molten metallic bonding medium. Immediately after the metallic bond has solidified, the asbestos fibers shall be thoroughly saturated with a bituminous saturant. The finished sheets shall be of first class commercial quality free from blister and unsaturated spots.
 - (B). Galvanized on both sides by the hot dip process as specified in Section 6.29.2 (2) of Form 408, and field coated with bituminous materials. Immediately prior to application of coating, galvanized surfaces are to be either sand blasted to lightly etch surfaces and to remove any greasy film present by blasting in accordance with Field Structures Painting Council Specification NQ 7, brush off blast cleaning or saturate all surfaces with vinegar (acetic acid) and when dry wipe off any bloom which has formed.
- Apply two (2) coats of coal tar based paint (Federal Specification MIL-18480). To be applied at the rate of 55-70 square feet per gallon per coat. One coat of Coal Tar Emulsion to conform to Federal Specification MIL-C-15203 at the rate of 60 square feet per gallon. Twenty Four hours drying time to be allowed between coats.
- Metal base plates will be required.



Rev. G.T.V.
Trc. K.G.F.
Ckd. BFK/HJ

NOTE: THESE DEPTHS MAY VARY TO SUIT CONDITIONS

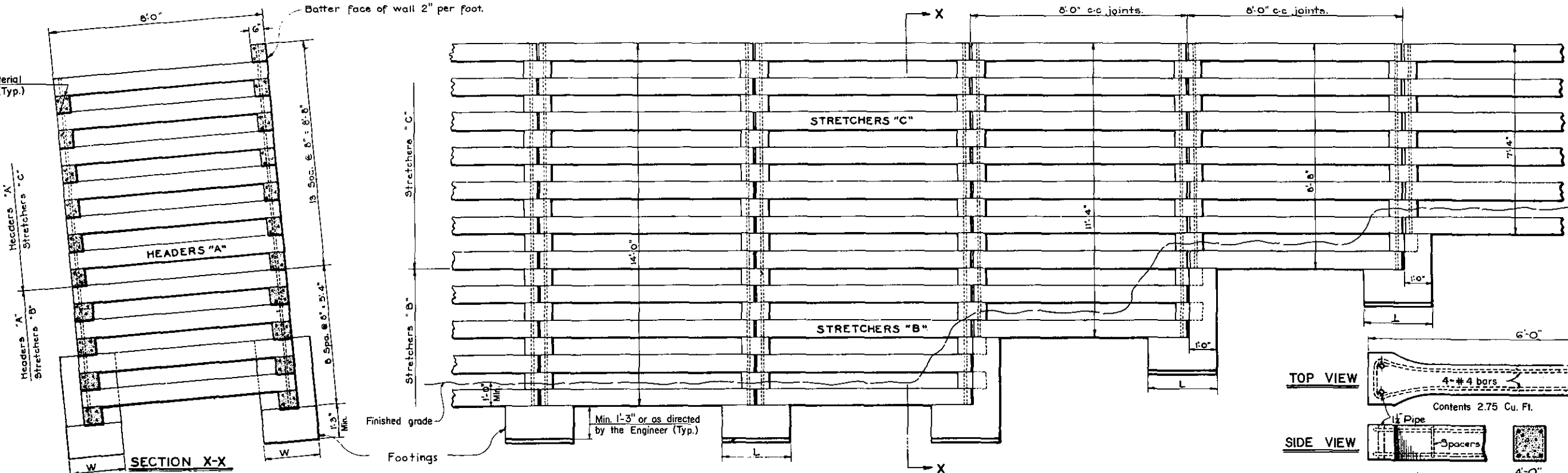
Approved: FEB. 25, 1965
R.H. Jensen
Bridge Engineer

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
BRIDGE DIVISION

STANDARD
METAL CRIBBING-COATED

Batter face of wall 2" per foot.

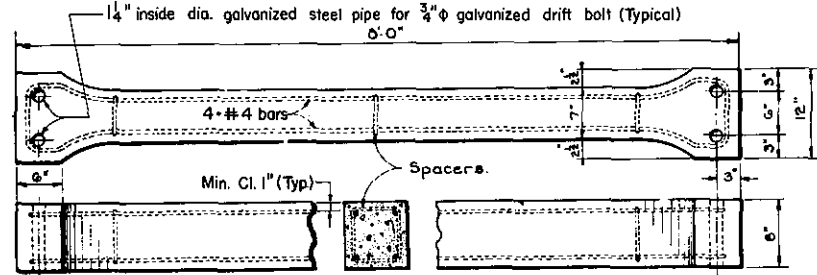
1/4" Prem. Exp. Jt. Material over bearing area (Typ.)



Min. 1'-3" or as directed by the Engineer (Typ.)

TYPICAL ELEVATION

TOP VIEW

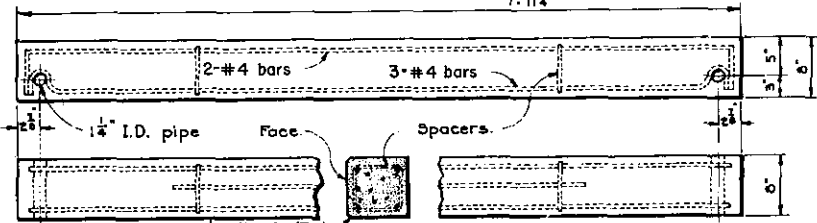


Contents 3.5 Cu. Ft.

HEADER "A"

SIDE VIEW

TOP VIEW



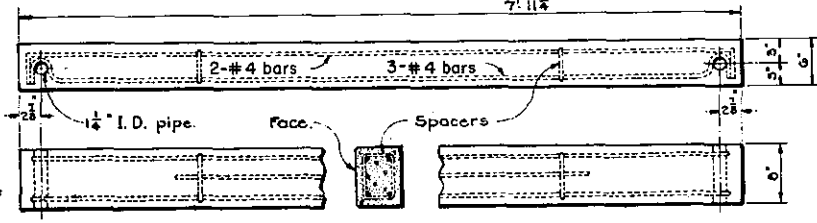
Contents 3.55 Cu. Ft.

STRETCHER "B"

All spacers No. 6 ga. Malleable Iron Wire

FRONT VIEW

TOP VIEW



Contents 2.66 Cu. Ft.

STRETCHER "C"

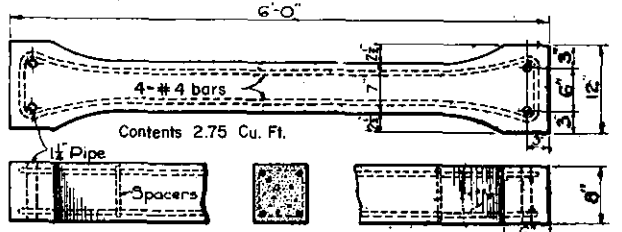
FRONT VIEW

GENERAL NOTES:

- All Materials and Workmanship shall be in accordance with PDH Form 408, Section 6.29.
- Concrete Crib members shall be Class "A" Concrete.
- Footings shall be Class "B" Concrete.
- Where total height of cribbing is not more than 5'-4" use headers 4 ft. long, and where total height of cribbing is between 6'-0" and 11'-4" use headers 6 ft. long. For heights between 12'-0" and 15'-4" use headers 8 ft. long. Higher cribbing walls to be of special design.
- All stretchers to have letter "F" plainly impressed in the face to indicate the exposed surface in the finished wall.
- Batter of wall other than 2" in 12" subject to approval by the Engineer.
- If approved by the Engineer, other types of Concrete Cribbing design may be used.
- Footings may be ordered by the Engineer to be at any elevation or of any dimensions necessary to provide a proper foundation.
- Reinforcement bars shall be of intermediate or hard grade or rail steel designed for $f_s = 20,000$ psi and detailed in accordance with ACI Code.

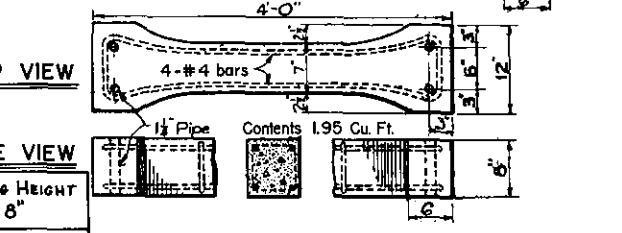
TYPE OF SOIL	SAFE BEARING PRESSURE Tons/sq.ft.	CRIBBING HEIGHT 14'-0"		CRIBBING HEIGHT 11'-4"		CRIBBING HEIGHT 8'-8"	
		FRONT (W x L)	REAR (W x L)	FRONT (W x L)	REAR (W x L)	FRONT (W x L)	REAR (W x L)
Rock	20	None	None	None	None	None	None
Shale	10	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"
Gravel	8	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"
Clay (Dry)	5	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"
Clay (Moist)	2	2'-0" x 8'-0"	3'-0" x 3'-6" or 1'-4" x 8'-0"	2'-0" x 4'-0" or 1'-6" x 8'-0"	3'-0" x 3'-0" or 1'-6" x 8'-0"	2'-0" x 2'-6"	"
Clay (Soft)	1	2'-0" x 8'-0"	2'-6" x 8'-0"	2'-5" x 8'-0"	2'-0" x 8'-0"	3'-0" x 4'-0" or 1'-6" x 8'-0"	3'-0" x 3'-0"
Loam	1	2'-0" x 8'-0"	2'-6" x 8'-0"	2'-5" x 8'-0"	2'-0" x 8'-0"	"	3'-0" x 3'-0"

TOP VIEW



SIDE VIEW

TOP VIEW



SIDE VIEW

HEADERS "A"

Approved: FEB. 25, 1965

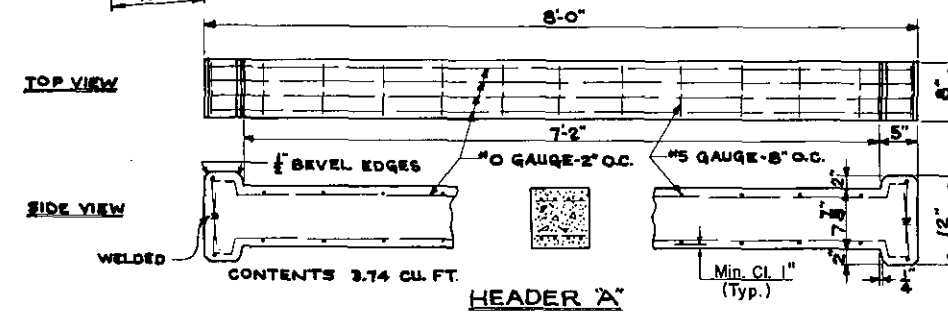
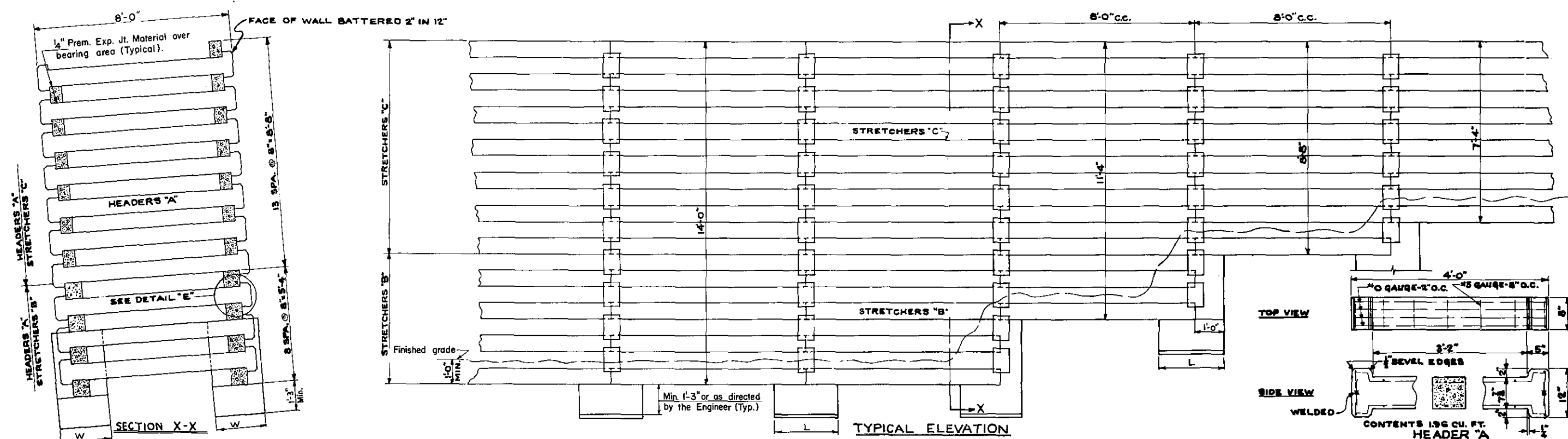
J. H. Jensen
Bridge Engineer

COMMONWEALTH OF PENNSYLVANIA

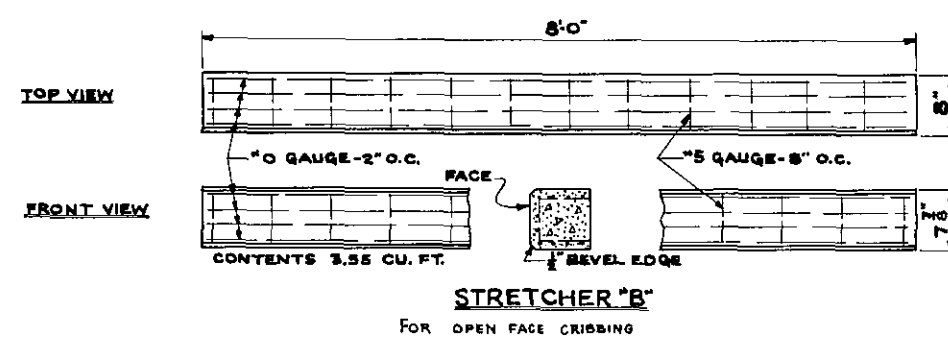
DEPARTMENT OF HIGHWAYS
BRIDGE DIVISION

STANDARD
CONCRETE CRIBBING
TYPE I

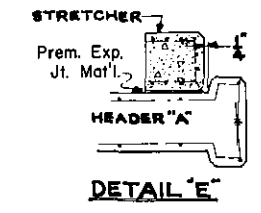
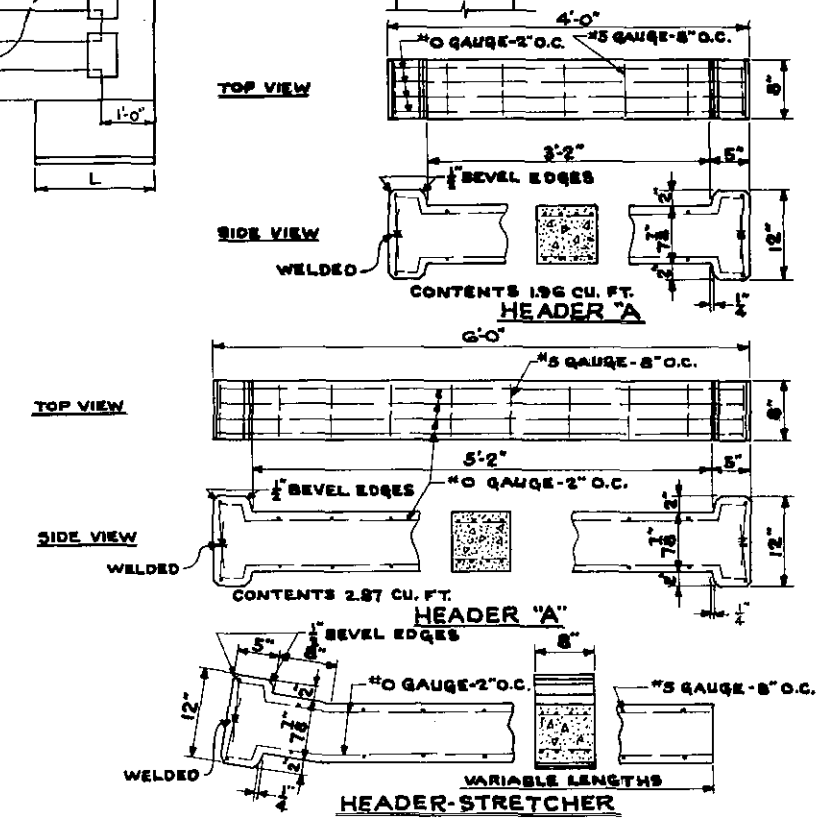
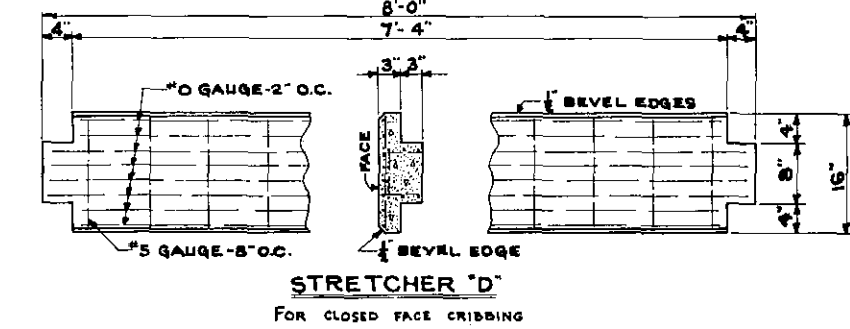
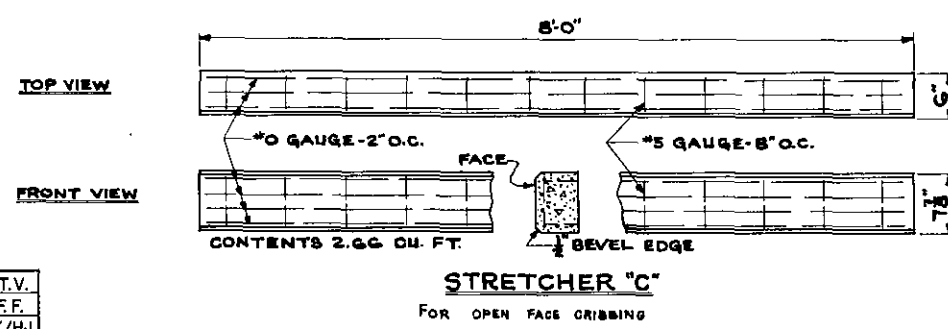
Rev.	G.T.V.
Trc.	F.F.F.
Ckd.	BFK/HJ



- NOTES:**
- For General Notes refer to Sheet 1.
 - Closed face cribbing wall shall be used only if specified.
 - Steel wire reinforcement shall conform to ASTM Designation A82.



TYPE OF SOIL	SAFE BEARING PRESSURE TONS/SQ.FT.	CRIBBING HEIGHT 14'-0"		CRIBBING HEIGHT 11'-4"		CRIBBING HEIGHT 8'-8"	
		FOOTING SIZE		FOOTING SIZE		FOOTING SIZE	
		FRONT (W x L)	REAR (W x L)	FRONT (W x L)	REAR (W x L)	FRONT (W x L)	REAR (W x L)
ROCK	20	NONE	NONE	NONE	NONE	NONE	NONE
SHALE	10	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"
GRAVEL	8	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"
CLAY (DRY)	5	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"	2'-0" x 2'-6"	"
CLAY (MOIST)	2	2'-0" x 8'-0" or 3'-0" x 3'-6" or 1'-4" x 8'-0"	3'-0" x 3'-6" or 1'-4" x 8'-0"	3'-0" x 4'-0" or 1'-6" x 8'-0"	3'-0" x 3'-0"	2'-6" x 2'-6"	"
CLAY (SOFT)	1	3'-9" x 8'-0"	2'-6" x 8'-0"	2'-9" x 8'-0"	2'-0" x 8'-0"	3'-0" x 4'-0" or 1'-6" x 8'-0"	3'-0" x 3'-0"
LOAM	1	3'-9" x 8'-0"	2'-6" x 8'-0"	2'-9" x 8'-0"	2'-0" x 8'-0"	3'-0" x 4'-0" or 1'-6" x 8'-0"	3'-0" x 3'-0"



Approved: FEB. 25, 1965

J. H. Jones
Bridge Engineer

Commonwealth of Pennsylvania
Department of Highways
BRIDGE DIVISION

**STANDARD
CONCRETE CRIBBING
TYPE II**

Rev.	G.T.V.
Trc.	E.F.F.
Ckd.	BFK/HJ