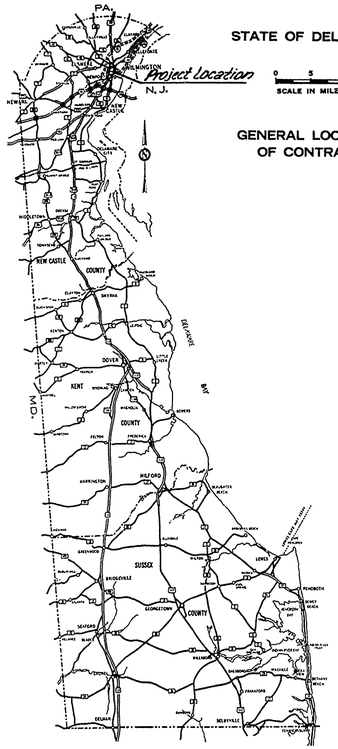


STATE OF DELAWARE

GENERAL LOCATION OF CONTRACT

DESIGN DESIGNATION	
FEDERAL CLASS	
A.D.T.	
D.H.V.	
DESIGN SPEED	M.P.H.
MIN. STOPPING SIGHT DISTANCE	FT.
MAX. S.E.	FT./FT.

THE STATE OF DELAWARE

DEPARTMENT OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

CONSTRUCTION PLAN FOR:

CONTRACT NUMBER 70-10-021

~~FEDERAL AID PROJECT NUMBER~~

BEGIN PROJECT: STATION NO. 18+27.85 END: STATION NO. 30+37.19

LENGTH: 1209.34' FEET = 0.229 MILES
AS BUILT PLANS 10-16-73 T.F.F.

CONTRACT	COUNTY	STATE	B.P.R. REG. NO.	FEDERAL AID PROJECT NUMBER	FISCAL YEAR	SHEET NUMBER	TOTAL SHEETS
70-10-021	N.C.	DEL.	2			1	15

BRIDGE No. 686, (WILMINGTON CAUSEWAY VIADUCT REHABILITATION)

SURVEY BOOKS

NONE

INDEX OF SHEETS

1 TITLE SHEET
2 Prop. Contr. Sequence ~~NOTICE TO BIDDERS~~ SHEETS
1 QUANTITY SHEET
3,4 PLANS & PROFILE SHEETS (General Plan)
5,6,7,8,10,11,12,13,15 BRIDGE SHEETS
9 P.I (Modified) STANDARD SHEET 14-D-7

UTILITIES

Diamond State Telephone Co.
Delmarva Power & Light Co.

REVISIONS

⚠ Revised Quantity and Equation Added (see note)	7/21/72 T.F.F.
AS BUILT PLANS IN RED	10-16-73 T.F.F.

CONTRACT QUANTITIES - PAY ITEMS

SECTION	DESCRIPTION	UNIT	PROPOSAL
S.P.	Removal Of Hot-Mix Asphaltic Concrete Wearing Surface (Bridge Deck) ~ HOT MIX "TY-B"	S.Y.	4168
S.P.	Type "A" Repair ~ Stairfying Bridge Deck ~ Resurfacing With ~~Latex Modified Mortar~~	S.Y.	4100
S.P.	Type "B" Repair ~ Patch Repair (Depth 2-2½ inches) (Bridge Deck)	S.Y.	770
S.P.	Type "C" Repair ~ Patch Repair (Depth Greater Than Type "B" ~ (Bridge Deck)	S.Y.	160
S.P.	Removal Of Existing Masonry (Abutment Backwalls And Bridge Railing)	C.Y.	10.5
602 *	Portland Cement Concrete Masonry ~ (Reconstruction of Abutment Backwalls & Bridge Railing)	C.Y.	10.6
S.P.	Curb Replacement (Bridge)	L.F.	1049
S.P.	Sidewalk Replacement (Bridge)	S.F.	1893
605	Bar Reinforcement (Curb And Sidewalk Replacement ~ Bridge)	LB.	2500
602	Portland Cement Concrete Drain Stops (Under Sidewalk)	EACH	16
S.P.	Expansion Joints ~ Abutments	L.F.	108
S.P.	Expansion Joints ~ Bents 6, 11, 22, and 27	L.F.	216
S.P.	Expansion Joints ~ Piers 16 And 17	L.F.	108
S.P.	Pilaster Repair	C.Y.	7
S.P.	Removal Of Hot-Mix Asphaltic Concrete Wearing Surface (Bridge Approaches)	S.Y.	1472
S.P.	Removal Of Existing Concrete Pavement (Bridge Approaches)	S.Y.	249
S.P.	Removal Of Existing Curbs (Bridge Approaches)	L.F.	~~714~~ ⚠ 648
S.P.	Removal Of Existing Sidewalk (Bridge Approaches)	S.F.	~~3094~~ ⚠ 2764
602 *	Portland Cement Concrete Masonry (Reinforced Concrete Approach Slabs) (Bridge Approaches)	C.Y.	70
501	Portland Cement Concrete Pavement (Bridge Approaches)	S.Y.	71
502	Patching Portland Cement Concrete Pavement (Bridge Approaches)	S.Y.	25
401	Hot-Mix, Hot Laid Asphaltic Concrete Wearing Surface (Bridge Approaches) Avg. Thickness 3 inches	TON	265
707	Integral Portland Cement Concrete Curb & Gutter (Bridge Approaches)	L.F.	~~610~~ ⚠ 544
S.P.	Sidewalk Replacement (Bridge Approaches)	S.F.	~~3094~~ ⚠ 2764
304	Quarry Waste Base Course	TON	369
711	Catch Basins (A)	EACH	~~4~~ ⚠ 2
615	Reinforced Concrete Pipe (12")	L.F.	~~24~~ ⚠ 12
S.P.	Timber Barrier Curb	L.S.	L.S.
735	Flagman	HOUR	1800
S.P.	Electrical Work	L.S.	L.S.

* Denotes Fixed Quantity Item (Section 109.06 of Std. Spec.)

~ GENERAL NOTES ~

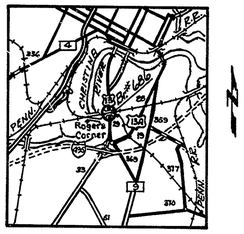
LOCATION:
Wilmington Causeway Viaduct carries U.S. Route 13 over the Shellpot Cut-off Branch of the Penn Central Railroad. The location is south of and adjacent to the Wilmington City Line. (See Title Sheet)

DESCRIPTION:
The viaduct is approximately 852 feet long (face to face backwalls on abutments), and consists of thirty (30) reinforced-concrete flat slab spans carried on three-column reinforced-concrete bents, and a single steel I-beam span crossing the Shellpot Cut-off Branch of the Penn Central Railroad. This span is supported on two (2) reinforced-concrete piers. Abutments are of reinforced concrete. The total project length, including approaches, is approximately 1210 feet.

The viaduct was constructed in 1937-38.

WORK TO BE DONE:
This contract is essentially a major construction maintenance and rehabilitation project, whose basic purpose is to restore the viaduct as nearly as practicable to its original condition while at the same time making some essential improvements to the original design. Refer to contract plans and special provisions for additional details, information, descriptions, and requirements concerning the project.

⚠ NOTE:
This Contract overlaps with Contract No. 65-01-006 by 33'-0". The following is the equation.
Contract No. 70-10-021 ~ Sta. 18+60.85 = End of Contract No. 65-01-006 ~ US Rt-13 S.B. ℄ Sta. 72+84.27
N.B. ℄ Sta. 72+68.84
US Rt. 13 Field ℄ Sta. 72+90.00 (7' Rt.)



LOCATION MAP
Scale: 1"=1 Mile

CONVENTIONAL SIGNS

PROPOSED CENTER LINE	2 1 3	WOODED AREA	
NEW RIGHT OF WAY LINE		TELEPHONE OR UTILITY POLE	
PROPERTY LINE	R	EXISTING CULVERT OR PIPE	
CONCRETE ROAD		RAILROAD	
MACADAM OR ASPHALT ROAD		GUARD RAIL	

SCALES

AS SHOWN ON PLANS

TITLE SHEET	1" =	FEET
CONSTRUCTION PLAN	1" =	FEET
VERTICAL PROFILE	1" =	FEET

DELAWARE DIVISION OF HIGHWAYS

RECOMMENDED

RECOMMENDED 3/16 19 72 E. F. Kemp
CHIEF, PLANS AND DESIGN

RECOMMENDED _____ 19__ _____
ASSISTANT CHIEF ENGINEER

APPROVED

APPROVED _____ 19__ _____
CHIEF ENGINEER

APPROVED 3-6 19 72 E. Shumaker
DIRECTOR OF OPERATIONS

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
BUREAU OF PUBLIC ROADS

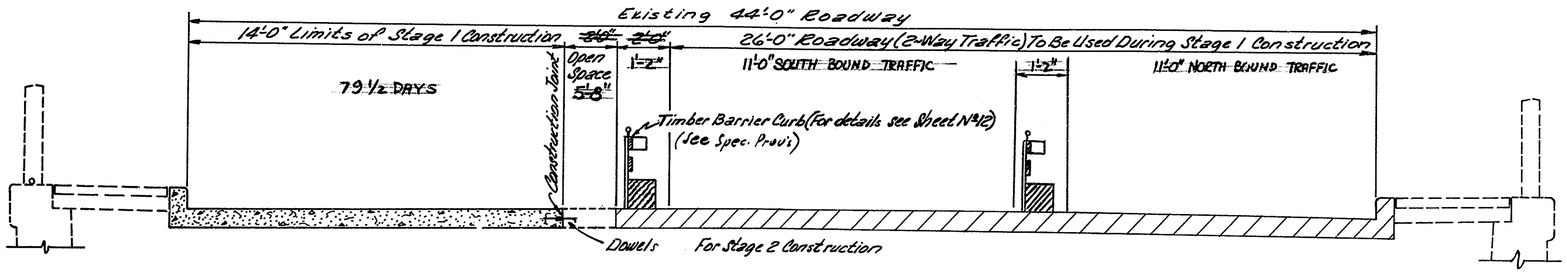
APPROVED _____ 19__

_____
DIVISION ENGINEER

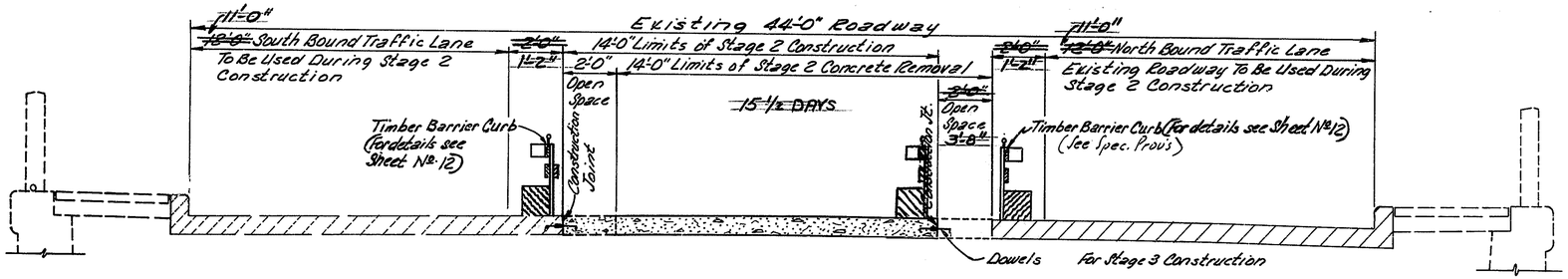
COUNTY	CONTRACT	P. R. A. REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.		2	15

BRIDGE No. 686 (WILMINGTON CAUSEWAY VIADUCT REHABILITATION)

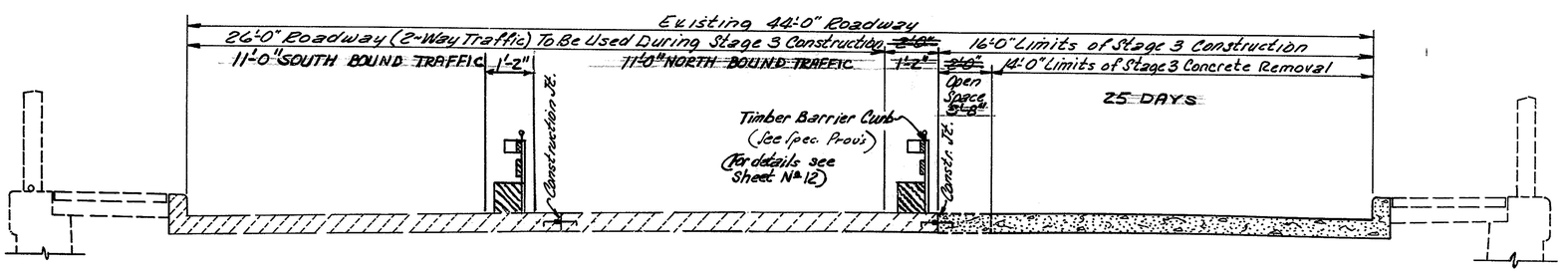
NO.	REVISIONS	BY	DATE
	AS BUILT PLANS IN RED	T.F.F.	10/16/73



STAGE 1
Facing North



STAGE 2
Facing North



STAGE 3
Facing North

PROPOSED CONSTRUCTION SEQUENCE

Stage 1. Work to be performed during this stage includes backwall, approach slab, approach pavement construction, and the replacement of all sidewalk and curb on the viaduct approaches within the construction limits shown. Work to be performed on the viaduct superstructure includes the removal of the existing Hot-Mix wearing surface on the roadway deck slab, the repair of deteriorated spalled areas; followed by the placing of new prefabricated expansion joints and the application of 2" inch coating of HOT MIX "TYPE-D" ~~latex modified mortar~~ to the entire roadway area within the construction limits shown. The work also includes sidewalk and curb repair and replacement, and other incidental work along the entire west side of the viaduct.

Stage 2. Work to be performed during this stage includes backwall, approach slab, and approach pavement construction on the viaduct approaches within the construction limits shown. Work to be performed on the viaduct superstructure follows the description outlined in Stage 1 for the roadway deck slab.

Stage 3. Work to be performed during this stage follows the description given for Stage 1, and includes sidewalk and curb repair and replacement, and other incidental work along the entire east side of the viaduct.
Although repair work on abutment pilasters will not be directly affected by traffic conditions, it will preferably be scheduled for the period during which the superstructure work is in progress adjacent to the respective pilasters. e.g. West Side Pilasters ~ Stage 1, East Side Pilasters ~ Stage 3.

It should be noted that details shown on the sequence stages are <u>for purpose of illustration only!</u> Refer to contract plans for construction details.

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION DIVISION OF HIGHWAYS		
PROPOSED CONSTRUCTION SEQUENCE		
D. U.a.g. T. T.F.F. C. U.a.g.	SCALE 3/8"=1'-0"	APPROVED BY: BRIDGE ENGINEER

DIAZO PRINT MYLAR

BRIDGE No 686, (WILMINGTON CAUSEWAY VIADUCT REHABILITATION)

COUNTY	CONTRACT	P.R.A. REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.		3	1

BEGIN CONTRACT STA 18+27.85 Sta 18+60.85 ℄ Crown of Roadway

Pt. 18+15.72 ℄ Crown of Roadway +13.69

℄ Crown of Roadway +17.83

P.U.C. 22+77.02 ℄ Crown of Road +29.95

Pvt. 24+34.02 El. 64.57 L=1331.48 ℄ Crown of Roadway +33.48

300'-0" Vertical Curve

+4.5% Grade

314'-0" Vertical Curve

Match Mark for Sheet #2

Junction Box *

4½" P.V.C. Conduit

Exp. Fix.

4 Pipe Bents

6 Trucks

7.8'-7.12'

23½" Clearance Minimum

EQUATION: Contract No 70-10-021 ~ Sta. 18+60.85 = End of Contract No 65-01-006 US Rt. 13 S.B. ℄ Sta. 72+84.27 N.B. ℄ Sta. 72+68.84 US Rt. 13 Field ℄ Sta. 72+90.00 (71 Ahd.)

* △ CONDUIT & JUNCTION BOXES ONLY ON WEST SIDE OF BRIDGE

NOTE:
S. = Sidewalk
C. = Curb
S.&C. = Sidewalk & Curb

ELEVATION
Scale: 1"=20'

Replace All Of Sidewalk and Curb Each Side of Bridge Approach

16' New P.C. Concrete Pavement

20' New P.C. Concrete Approach Slab

△ To Be Deleted

~~Remove Exist. C.B.~~

~~Construct C.B. Place 12'-12" R.C.P. Pipe (Std. Sheet D-7)~~

~~Clean out cross pipe and discharge pipe~~

~~to ensure free flow. Payment in C.B. & Pipe Items~~

686 W-2 Lighting Standard

686 W-4 Lighting Standard

686 W-6 Lighting Standard

Temporary Easement

(135'± Joint to Joint) Portions of Sidewalk & Curb to be Replaced

(45'6½" Joint to Joint)

Repair Pilaster (Sh. #13)

Construct Expansion Joint Sheet No. 6 & 7

Const. P.C.C. Drain Stop (Under Sidewalk) Sheet 5 & 10

Const. Exp. Jt. Sheet No. 10

Const. Exp. Jt. (Sheet No. 11)

B PATCH ~ PHASE #1

B PATCH ~ PHASE #3

C PATCH ~ PHASE #3

B PATCH PHASE #5

C PATCH ~ PHASE #5

1½" P.V.C. Conduit

8" Trans. Gas Line (Delmarva Power & Light Co.) Build P.C.C. Drain Stop (Under Sidewalk) Sh. #5 & 10

686 E-1 Lighting Standard

686 E-3 Lighting Standard

686 E-5 Lighting Standard

Bottom of Slope

Top of Slope

℄ Center Line of Roadway

To Dover Route U.S. 13

M.H.

J.B.

144.43'C.

PLAN
Scale: 1"=20'

INDEX ~ CONTRACT PLANS

CONTRACT QUANTITIES ~ PAY ITEMS	SHEET 1
PROPOSED CONSTRUCTION SEQUENCE	SHEET 2
GENERAL PLAN, SIDEWALK, CURB, P.C.C. PATCH & B/C PATCH	SHEET 3&4
DETAILS ~ DECK REPAIR	
CURB & SIDEWALK RECONSTRUCTION	SHEET 5
DETAILS ~ ABUTMENT BACKWALL RECONSTRUCTION	SHEET 6
TYPICAL EXPANSION JOINT SECTION	
JOINT DETAILS ~ ABUTMENTS	SHEET 7
DETAILS ~ APPROACH SLAB ~ APPROACH PAVEMENT	
CURB ~ SIDEWALK CONSTRUCTION	SHEET 8
STANDARD SHEET P-1 (MODIFIED)	SHEET 9
JOINT DETAILS ~ BENTS 6, 11, 22 & 27	SHEET 10
JOINT DETAILS ~ PIERS 16 & 17	SHEET 11
RAILING REPAIR	SHEET 12
PILASTER REPAIR	SHEET 13
STANDARD SHEET D-7	SHEET 14
DETAILS ~ ELECTRICAL SYSTEM	SHEET 15

CROSS SECTION THRU APPROACH FILL
Scale: 1"=1'-0"
57'-2" O. to O. Slab

CROSS SECTION THRU APPROACH SPANS
Scale: 1"=1'-0"

CROSS SECTION THRU CENTER SPAN
Scale: 1"=1'-0"

Revisions
△ Added Equation & deleted all repair work between Sta. 18+27.85 and Sta. 18+60.85 7-21-72 TFF
△ RELOCATE LIGHT POLES & PVC. CONDUIT TO WEST SIDE OF STRUCTURE — 8-21-72 S.P.C. 10-16-73 T.F.F.
AS BUILT PLANS IN RED

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

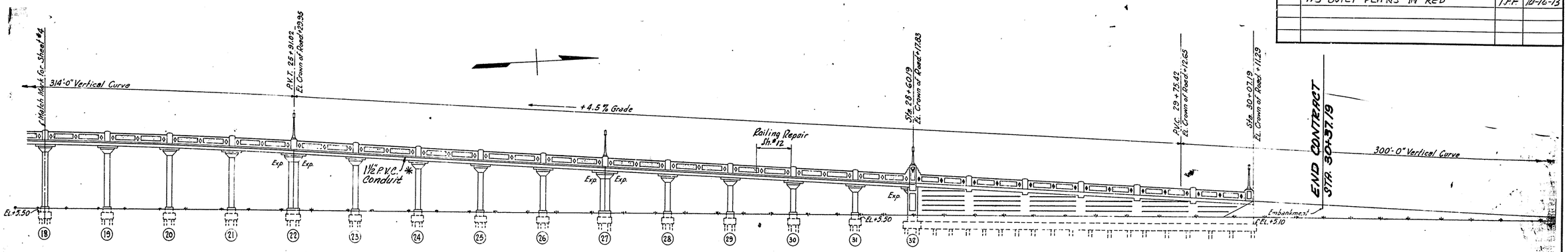
GENERAL PLAN

D. V.A.J.	SCALE	APPROVED BY:
T. T.F.F.	As Shown	
C. U.Q.J.		BRIDGE ENGINEER

COUNTY	CONTRACT	P R A REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.		4	15

BRIDGE Nº 686
(WILMINGTON CAUSEWAY VIADUCT REHABILITATION)

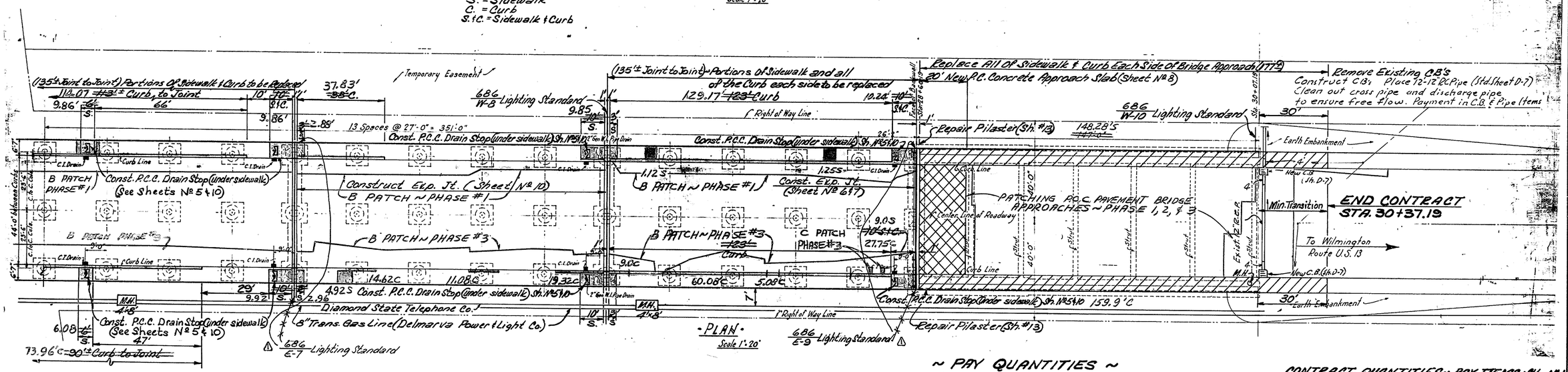
NO.	REVISIONS	BY	DATE
⚠	RELOCATE LIGHT POLES & P.V.C. CONDUIT		
	TO WEST SIDE OF STRUCTURE	S.P.C.	8-21-72
	AS BUILT PLANS IN RED	T.F.F.	10-16-73



* ⚠ CONDUIT ON WEST SIDE OF BRIDGE ONLY.

NOTE:
S. = Sidewalk
C. = Curb
S.t.C. = Sidewalk & Curb

• ELEVATION •
Scale 1"=20'



• PLAN •
Scale 1"=20'

~ PAY QUANTITIES ~

Plan locations of sidewalk areas and curb sections scheduled for replacement also roadway slab areas scheduled for repairs, were used as the basis of calculations for pay quantities shown on Sheet Nº 1 (Title Sheet)

The engineer reserves the right to increase, decrease, revise, or otherwise modify the amounts, quantities, and locations of the replacement and repair work shown on the plans, should field conditions, revealed during the performance of contract work make such changes necessary or advisable. An increase or decrease in the quantity for any item will not be regarded as sufficient ground for an increase or decrease in the unit prices, nor in the time allowed for the completion of the work.

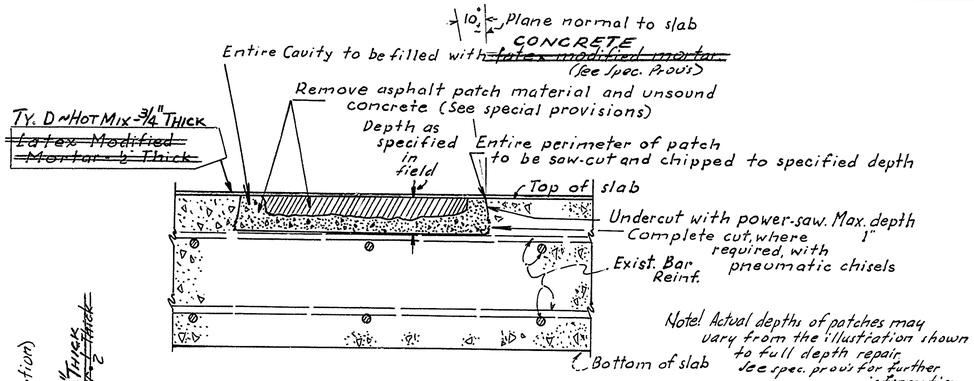
CONTRACT QUANTITIES ~ PAY ITEMS ~ SH. Nº 1
INDEX CONTRACT PLANS
SHEET Nº 3

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION DIVISION OF HIGHWAYS		
GENERAL PLAN		
D. T. T.F.F. C. U.Q.J.	SCALE As Shown	APPROVED BY: BRIDGE ENGINEER

COUNTY	CONTRACT	P. R. A. REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.		5	15

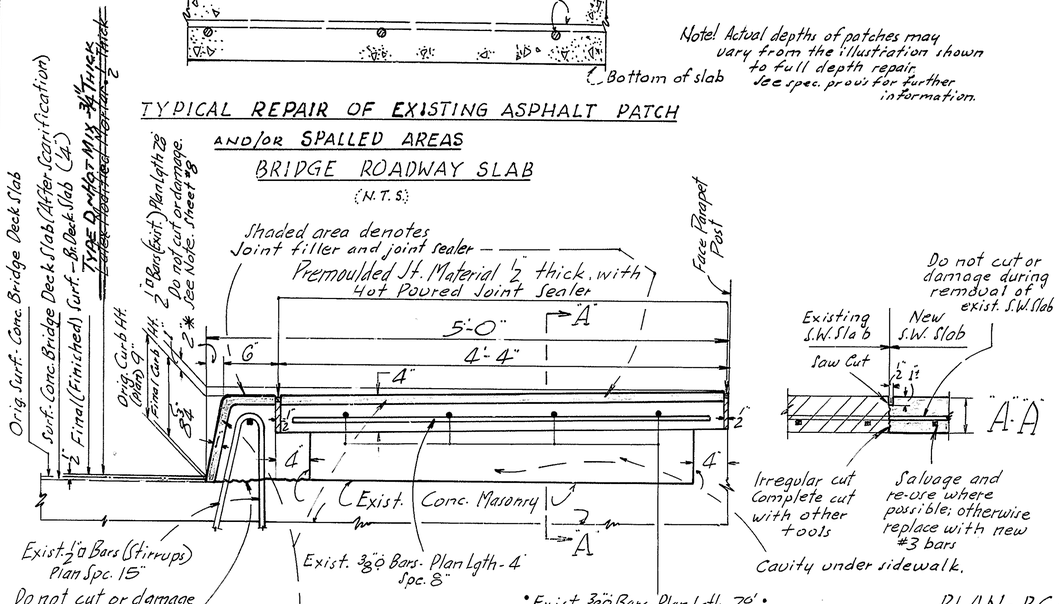
BRIDGE No. 686 WILMINGTON CAUSEWAY VIADUCT REHABILITATION

NO.	REVISIONS	BY	DATE
	AS BUILT PLANS IN RED	T.F.F.	10-16-73



TYPICAL REPAIR OF EXISTING ASPHALT PATCH AND/OR SPALLED AREAS BRIDGE ROADWAY SLAB

(N.T.S.)



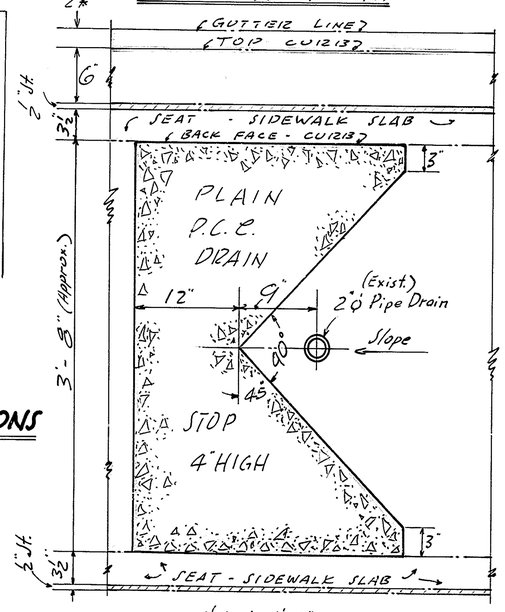
Remove existing curb concrete to this line, exposing a roughened surface. (Refer to spec. prov's)

Make saw cut in curb face and sidewalk slab as reqd (Approx. depth-1½"). Complete cut with other tools. Do not cut through or damage existing bar reinforcement, which is to be bonded into the concrete of the new curb and sidewalk sections. Place temporary joint filler along the entire perimeter of the curb and sidewalk joints, to form a continuous opening ½ inch wide and 1 inch deep. Pour concrete. Remove temporary joint filler. Replace with permanent filler, and seal with polysulfide base synthetic rubber sealant ..... (non-sag type.) Refer to special provisions for additional description and requirements.

TYPICAL CONSTRUCTION JOINT DETAILS BETWEEN NEW AND EXISTING CURB AND SIDEWALK SECTIONS

½ inch = 1'-0"

PLAN - P.C.C. DRAIN STOP (UNDER SIDEWALK)



½ inch = 1'-0"

SUGGESTED CONSTRUCTION PROCEDURE - CURB REPAIR

The procedure of curb repair is based on the assumption that the sidewalk adjacent to the curb repair locations is in satisfactory condition.

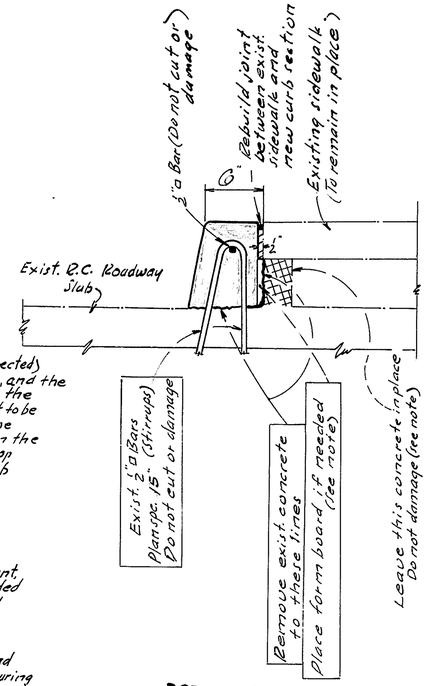
Remove existing curb concrete within limits shown. The small cross-hatched segment of original concrete located directly under the edge of the sidewalk is to remain in place, to act as a back form for the new curb concrete. Should this concrete be broken into and disintegrate as the result of careless removal methods, the gaps or openings shall be blocked by a thin strip of form board, or by other acceptable means. (See detail)

Removal of existing curb concrete, the formation of joints between old and new curb sections, and the placement of concrete in the curb section shall be as described in the case of new curb and sidewalk construction.

CONSTRUCTION PROCEDURE - P.C.C. DRAIN STOPS (UNDER SIDEWALKS)

For locations, refer to Sheets 3, 4, and 10 of the contract plans.

1. Remove a section of sidewalk slab at each drain stop location. (5' Minimum or as directed) Sidewalk replacement is scheduled at each drain stop location, and the construction procedure shall follow details shown on the plans or described in the special provisions. As noted, the height of the new drain stop concrete is set to be 4 inches above the level of the existing floor under the sidewalk at the drain pipe location. This will provide an approximate clearance of 1 inch between the bottom of the new sidewalk slab and the top surface of the drain stop concrete. Under no circumstances shall the bottom of the concrete sidewalk slab come in contact with, or be poured in contact with the drain stop concrete.



DETAILS CURB REPAIR

½ inch = 1'-0"

Compensation for all materials, tools, equipment, and labor necessary to complete the work shall be included in the contract unit price bid for Section 602 - Portland Cement Concrete Drain Stops (Under Sidewalk)

Contact surfaces of existing concrete shall be sound, clean, and free from all dust, dirt, or other foreign materials. Before pouring concrete, all contact surfaces shall be coated with an approved bonding compound as described elsewhere in the special provisions.

Material requirements and composition of the mix shall conform with the requirements of Sections 501 and 602 of the current Standard Specifications

Top surfaces and exposed sides of the drain stop(s) shall have an ordinary surface finish.

Existing fill (if present) shall be removed for an approx. distance of 2 feet up grade from the drain pipe location, and replaced with an equivalent amount of clean fine and coarse aggregate mixture, to filter drainage, and prevent future clogging of the drain pipe.

NOTE! No differential, or distinction, for pay purposes, will be made between full section curb replacement (see details on left hand side of this sheet), and curb repair (see details above). The pay item including both types of construction is listed on the title sheet thus:
CURB REPLACEMENT (BRIDGE) - PAYMENT - LINEAL FOOT BASIS.
Refer to special provisions for additial information, etc.

CONTRACT QUANTITIES
PAY ITEMS - SHEET NO. 1
INDEX - CONTRACT PLANS - SH. NO. 3
LOCATIONS - SHEETS NO. 3, 4, & 10

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

DETAILS DECK REPAIRS CURB & SIDEWALK RECONSTRUCTION

D. T. S.	SCALES	APPROVED BY:
C. V.A.G.	AS SHOWN	BRIDGE ENGINEER

13-1

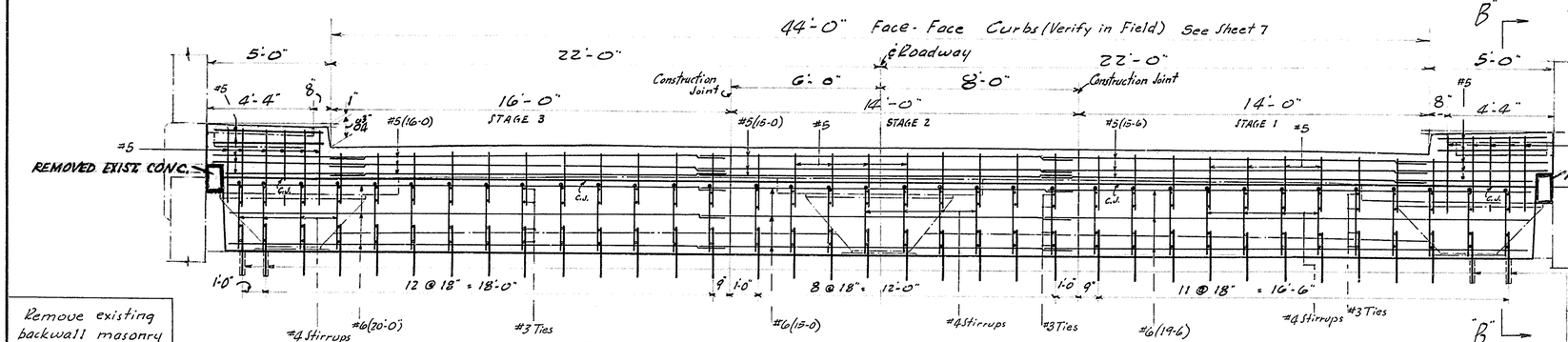
COUNTY	CONTRACT	P. R. A. REG. NO.	STATE	FED. AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.			6	15

BRIDGE No. 686, (WILMINGTON CAUSEWAY VIADUCT REHABILITATION)

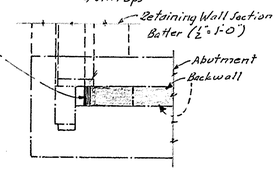
SOUTH ABUTMENT BACKWALL RECONSTRUCTION

FACING SOUTH

3/8 inch = 1'-0"



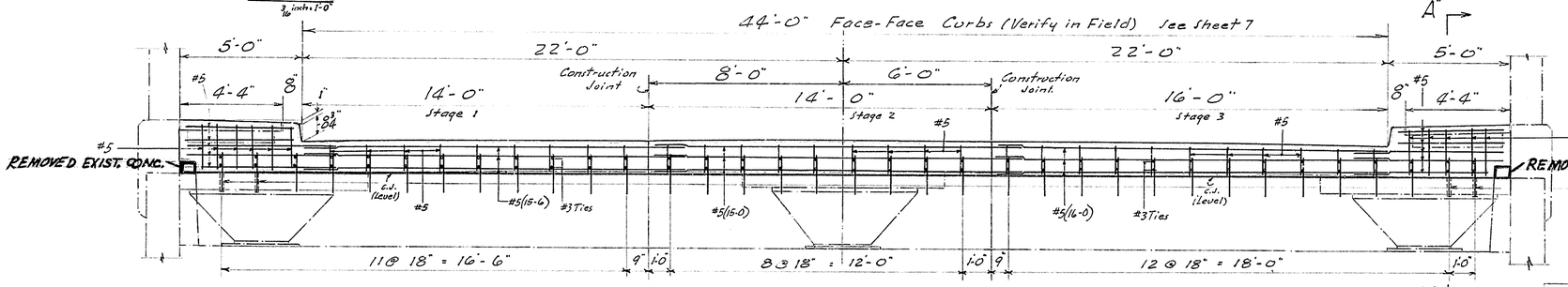
Remove existing backwall masonry to this line, matching the batter of the existing masonry



WEST

PART PLAN

3/16 inch = 1'-0"



EAST

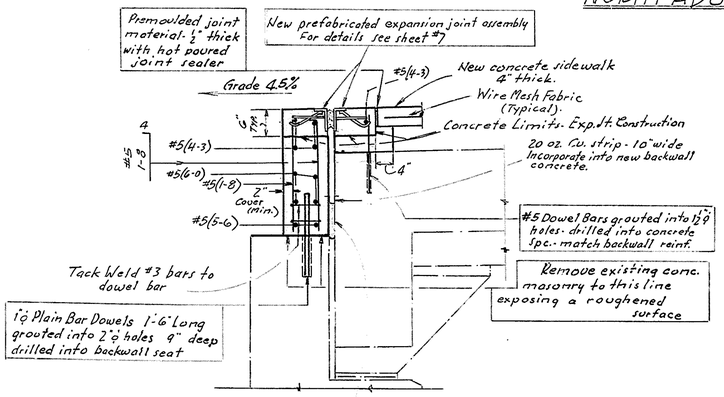
"A"

"A"

NORTH ABUTMENT BACKWALL RECONSTRUCTION

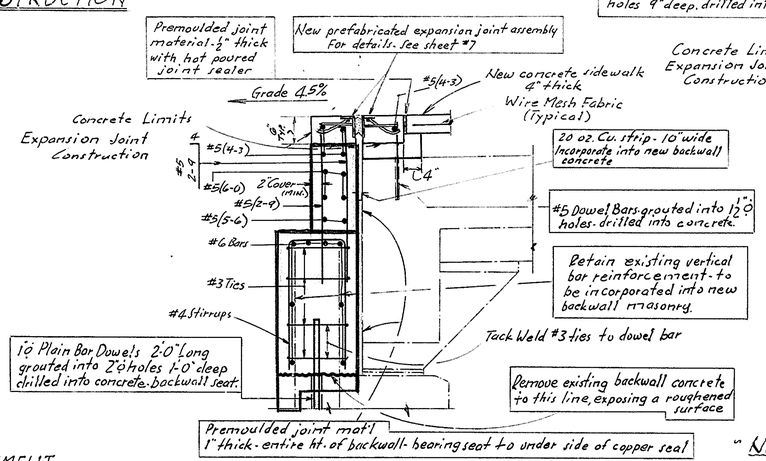
FACING NORTH

3/8 inch = 1'-0"



"A" - "A"

¾ inch = 1'-0"



"B" - "B"

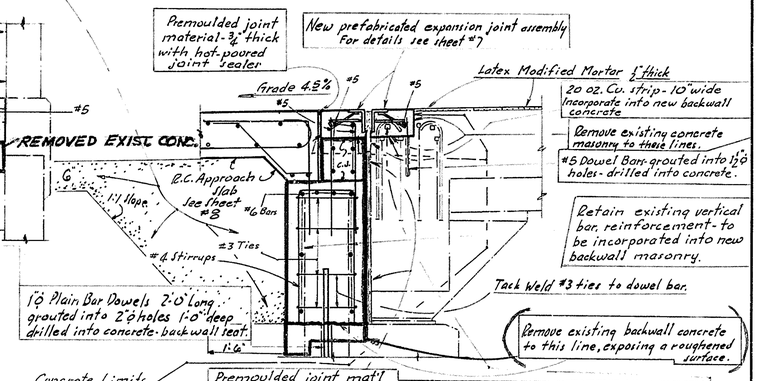
¾ inch = 1'-0"

CONTRACT QUANTITIES
PAY ITEMS - SHEET NO.1
INDEX - CONTRACT PLANS - SHEET NO.3
LOCATIONS - SHEETS NO.3 & 4
DETAILS - APPROACH SLABS - APPROACH PAVEMENT CURB - SIDEWALK CONSTRUCTION - SHEET NO.8

WEST

"B"

Pay Limits
Quarry Waste Base Course
Backfill

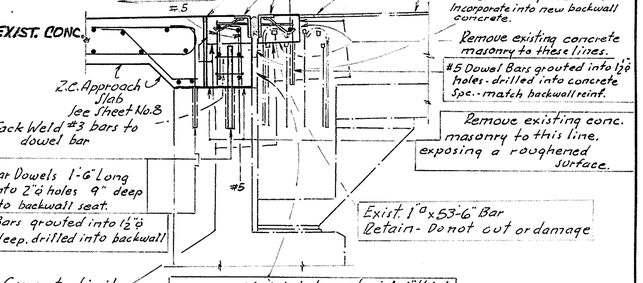


TYPICAL ROADWAY SECTION THRU SOUTH ABUTMENT

FACING WEST

¾ inch = 1'-0"

"A"



TYPICAL ROADWAY SECTION THRU NORTH ABUTMENT

FACING EAST

¾ inch = 1'-0"

"A"

"NOTE"

The contractor will be required to furnish detailed bar lists and bending diagrams for all bar reinforcement to be placed in the new backwall masonry.

"NOTE"

Contact surfaces at construction joints shall be bonded by the use of an approved bonding compound. See Special Provisions.

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

- DETAILS -

ABUTMENT BACKWALL RECONSTRUCTION

D. J. Victor A. Just	SCALES AS SHOWN	APPROVED BY:
T. J. C. U.A.g.		BRIDGE ENGINEER

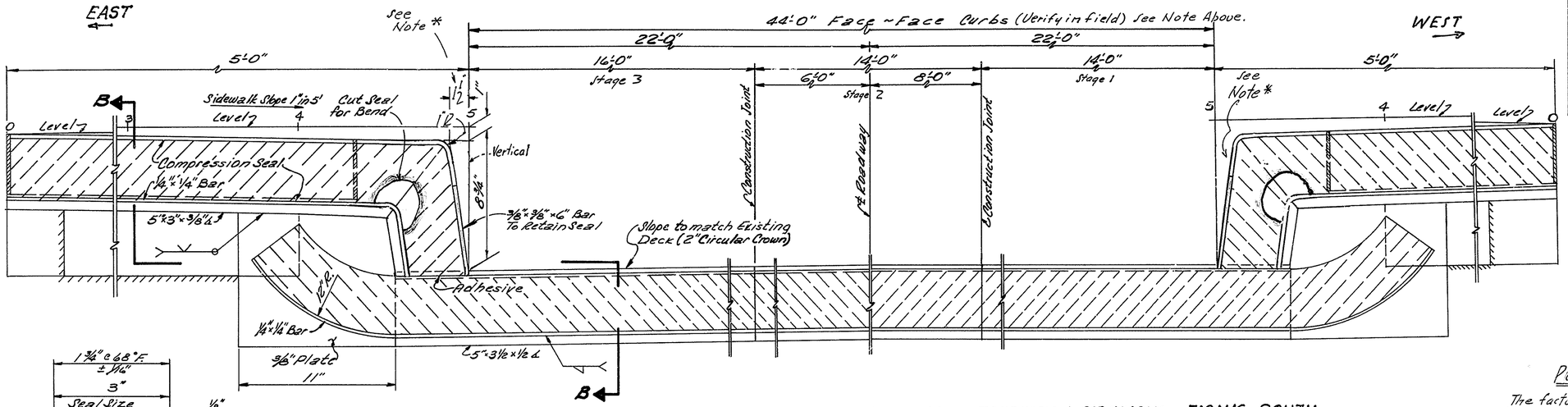
K & E CO. NO. 197

COUNTY	CONTRACT	P. D. A. REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.		7	12

BRIDGE No. 686 (WILMINGTON CAUSEWAY VIADUCT REHABILITATION)

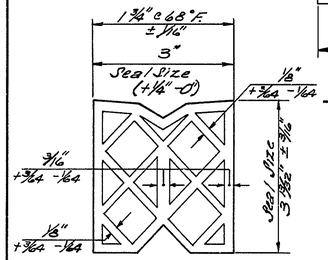
NO.	REVISIONS	BY	DATE

Note! Dimensions shown have been copied from original contract plans, and their accuracy is not guaranteed. It shall be the contractor's responsibility to verify in the field and obtain accurate dimensions at each expansion joint location before beginning the preparation of detailed shop plans.



TYPICAL JOINT SECTION THRU ROADWAY & SIDEWALK - FACING SOUTH

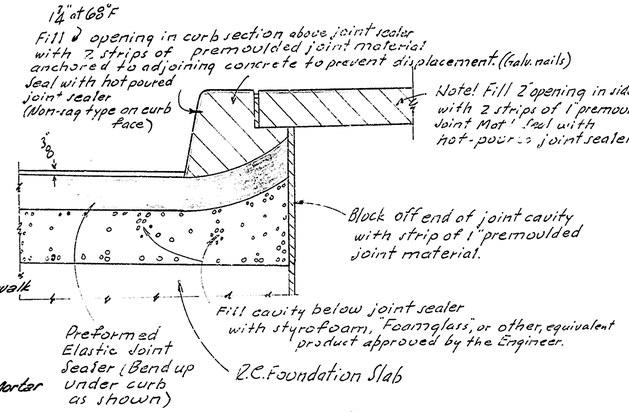
Scale: 3"=1'-0"



PART SECTION A-A

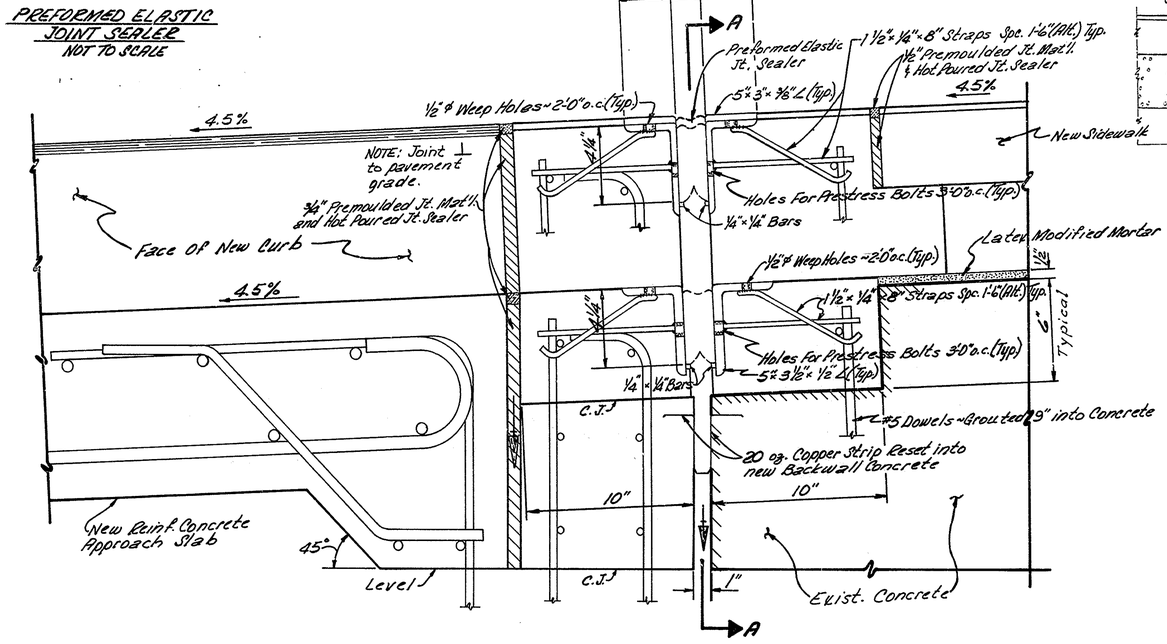
Scale: 3"=1'-0"

PREFORMED ELASTIC JOINT SEALER
NOT TO SCALE



EXPANSION JOINT DETAILS THRU APPROACH SLAB, CURB & SIDEWALK

1 1/2 inch = 1'-0"



SECTION B-B ~ NORTH ABUTMENT - FACING EAST

ROADWAY AND SIDEWALK JOINT DETAILS

Scale: 3"=1'-0"

Note! This section is also applicable for SOUTH ABUTMENT - FACING WEST

NOTE *

The curb face slope shown is approximate only. The contractor shall verify in the field the existing curb face slopes at each expansion joint location, before beginning preparation of detailed shop plans for the various preformed expansion joint assemblies to be installed under this contract.

PREFABRICATED EXPANSION JOINT SYSTEM

The factory prefabricated expansion joint sealing system shall be constructed of structural steel shapes with a polychloruprene (neoprene) sealer as shown on the plans, and securely bonded in place with lubricant adhesive as specified.

Refer to special provisions for description of materials, methods of manufacture, and installation procedure.

As noted above, the manufacturer shall submit for the Engineer's approval complete detailed shop plans for the various expansion joint assemblies to be installed under this contract.

APPROACH SLAB JOINTS

Installation of preformed elastic joint sealer in approach slab joints shall conform with details shown on this sheet (also sheet 8 of the plans), and with the requirements of the special provisions.

CONTRACT QUANTITIES - PAY ITEMS - SHEET NO.1
INDEX - CONTRACT PLANS - LOCATION - SHEETS NO.3 & 4
DETAILS - ABUTMENT BACKWALL RECONSTRUCTION - SHEET NO.6
DETAILS - APPROACH SLAB - APPROACH PAVEMENT CURB - SIDEWALK CONSTRUCTION - SHEET NO.8
JOINT DETAILS - BENTS 6, 11, 22 & 27 - SHEET NO.10
JOINT DETAILS - PIERS 16 & 17 - SHEET NO.11

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

TYPICAL EXPANSION JOINT SECTION
JOINT DETAILS
ABUTMENTS

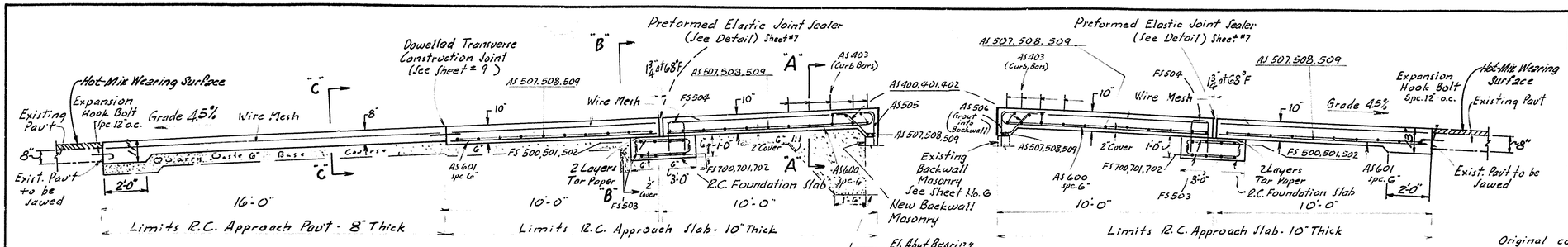
D. V.P.J.	SCALE	APPROVED BY:
T. T.F.F., V.A.J.	AS SHOWN	BRIDGE ENGINEER
C. U.A.J.		

DARKPRINT MYLAR

COUNTY	CONTRACT	P.R.A. REG. NO.	STATE	FED. AID PROJECT NO.	LOCAL YEAR	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.			8	15

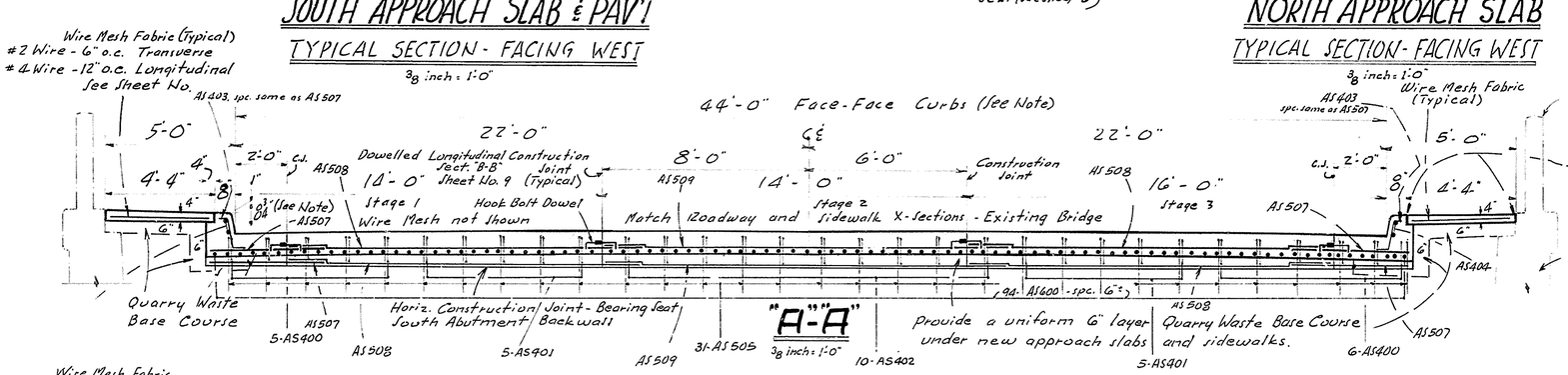
BRIDGE NO. 686 WILMINGTON CAUSEWAY VIADUCT REHABILITATION

No.	REVISIONS	BY	DATE



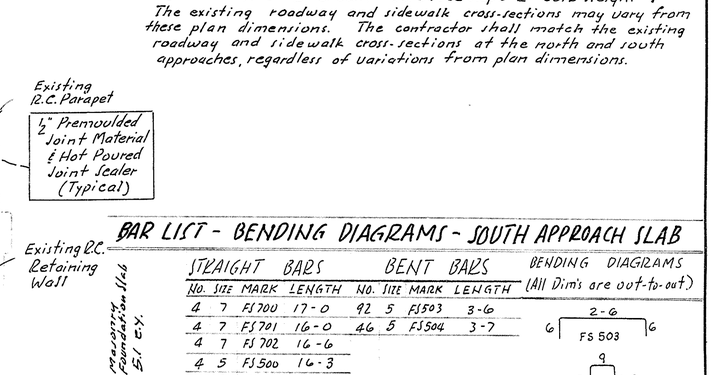
SOUTH APPROACH SLAB & PAV'T

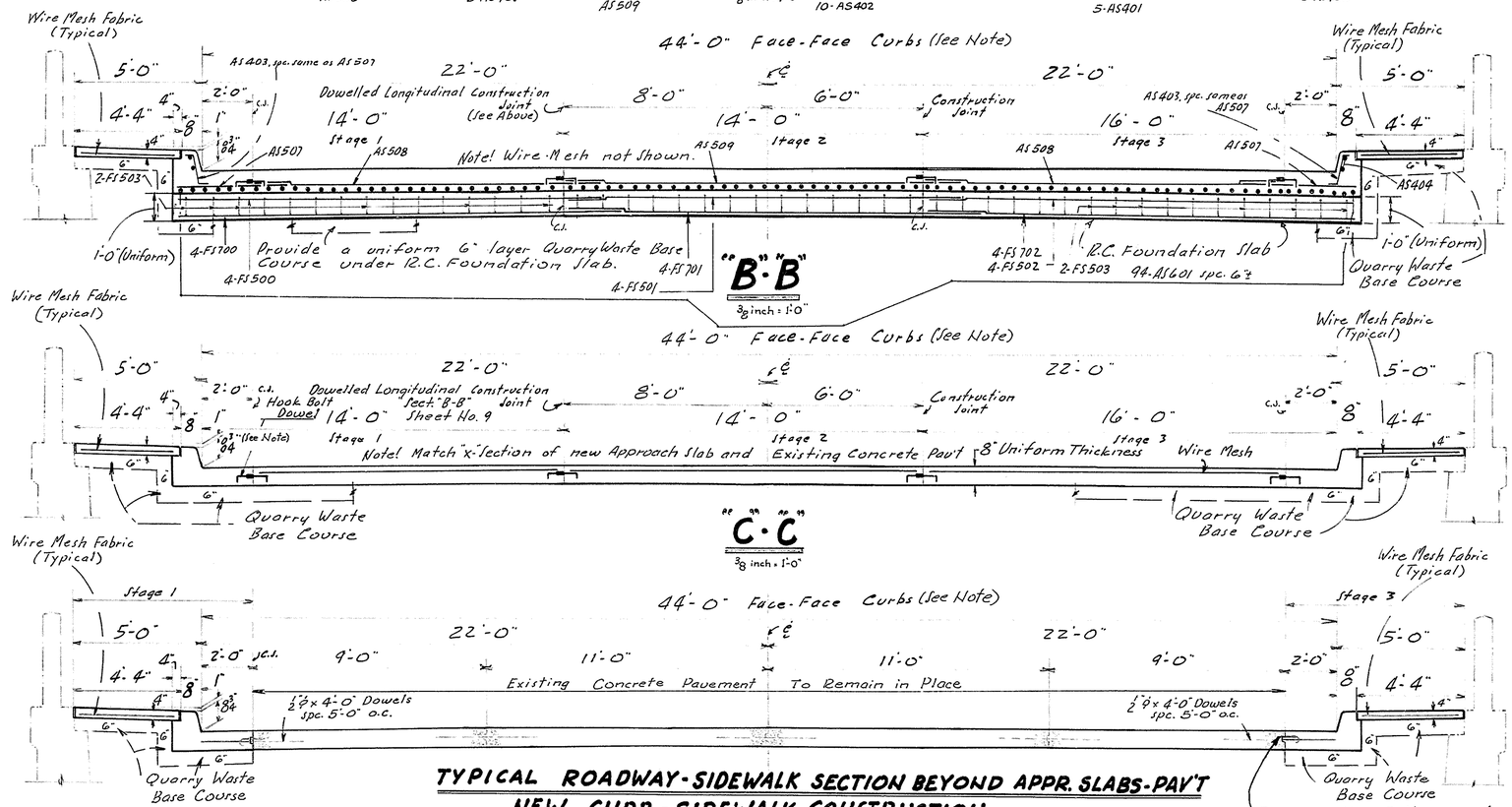
TYPICAL SECTION - FACING WEST



NORTH APPROACH SLAB

TYPICAL SECTION - FACING WEST





TYPICAL ROADWAY - SIDEWALK SECTION BEYOND APPR. SLABS - PAV'T

NEW CURB - SIDEWALK CONSTRUCTION

3/8 inch = 1'-0"

"NOTE"

Original contract plans called for 44'-0" face to face Curbs - Circular Arc - 2" Crown - Curb Face Slope 2" Curb Height - 9" The existing roadway and sidewalk cross-sections may vary from these plan dimensions. The contractor shall match the existing roadway and sidewalk cross-sections at the north and south approaches, regardless of variations from plan dimensions.

BAR LIST - BENDING DIAGRAMS - SOUTH APPROACH SLAB

P.C.C. Masonry 12" C. Foundation Slab 51 C.Y.

STRAIGHT BARS				BENT BARS				BENDING DIAGRAMS (All Dim's are out-to-out.)
NO.	SIZE	MARK	LENGTH	NO.	SIZE	MARK	LENGTH	
4	7	FS 700	17-0	92	5	FS 503	3-6	
4	7	FS 701	16-0	46	5	FS 504	3-7	
4	7	FS 702	16-6					
4	5	FS 500	16-3					
4	5	FS 501	15-3					
4	5	FS 502	16-6					
52	5	AS 507	4-6	94	6	AS 600	10-4	
52	5	AS 508	15-6	11	4	AS 400	2-2	
26	5	AS 509	15-6	10	4	AS 401	2-4	
8	4	AS 404	9-8	10	4	AS 402	2-5	
94	6	AS 601	9-8	31	5	AS 505*	4-1	
				42	4	AS 403	2-0	

P.C.C. Masonry & C. Approach Slab 244 C.Y.

* Substitute for AS 505 North Approach Slab

* Denotes Est. Fixed Quantity Item

Note! Bar lists and bending diagrams shown above are for the contractor's convenience. Bar reinforcement furnished and placed in approach slab and foundation slab construction will be included for payment in the contract unit price per cubic yard paid for:

* Section 602 - Portland Cement Concrete Masonry (Reinforced Concrete Approach Slabs) (Bridge Approaches)

The contractor will be required to furnish detailed bar lists and bending diagrams for all bar reinforcement to be placed in the approach slab and foundation slab construction.

AS 505 S.A.
AS 506 N.A.

CONTRACT QUANTITIES - PAY ITEMS - SHEET NO. 1
INDEX - CONTRACT PLANS - LOCATION - SHEETS NO. 3 & 4
DETAILS - ABUTMENT BACKWALL RECONSTRUCTION - SHEET NO. 6
STANDARD SHEET P-1 (MODIFIED) - SHEET NO. 9

CONSTRUCTION NOTE

Remove existing curbs and sidewalks, taking care not to cut off or destroy the existing 1/2" ø bar dowels, which are to be incorporated into the new integral curb & gutter sections. If a 1/2" ø dowel is cut off or destroyed, an expansion hook bolt shall be installed in close proximity to the location of the cut-off dowel. Place expansion hook bolts as shown, pour new curbs and sidewalks on compacted quarry waste base course.

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

"DETAILS"
APPROACH SLABS - APPR. PAV'T
CURB - SIDEWALK CONSTRUCTION

D. T. Nicholas A. Just	C. U.A.G.	SCALE AS SHOWN	APPROVED BY: John M. Gilchrist BRIDGE ENGINEER

K & E CO. NO. 197

COUNTY	CONTRACT	P.R.A. REG. NO	STATE	FED. AID PROJECT NO	SHEET NO.	TOTAL SHEETS
N.C.	70.10.021	2	DEL.		9	15

STANDARD SHEET P-1

REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT

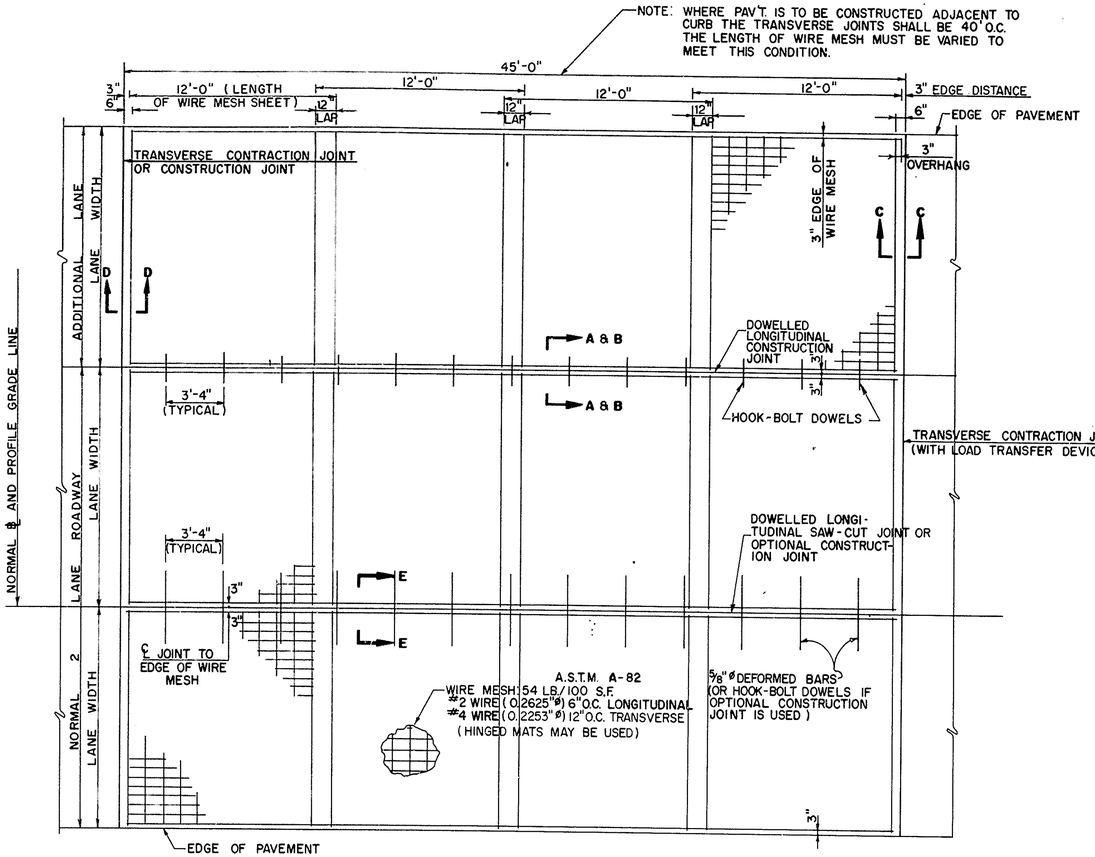
PREL. TRACING H.R.C. DESIGN J.E.R. CHKD. E.L.W.

REVISIONS

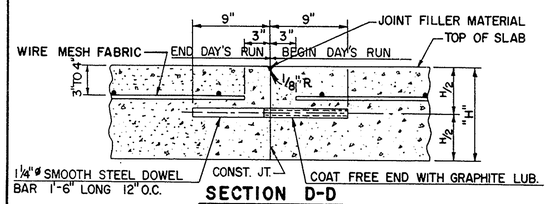
APPROVED _____ DIRECTOR OF OPERATIONS 6-22-70 DATE

_____ DEPUTY DIRECTOR-CHIEF ENGINEER 6/22/70 DATE

BRIDGE NO. 686
WILMINGTON CAUSEWAY
VIADUCT REHABILITATION



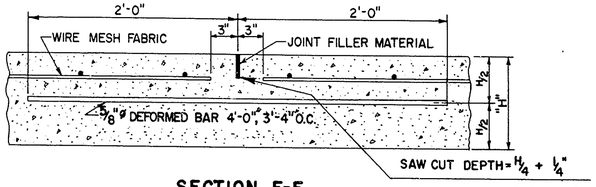
PLAN OF WIRE MESH & JOINTS FOR 45'-0" SLAB



SECTION D-D

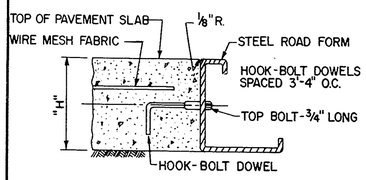
TRANSVERSE CONSTRUCTION JOINT

NOTES: 1. TO BE USED ONLY WHERE SPECIFIED AND AT THE END OF A DAY'S POUR.

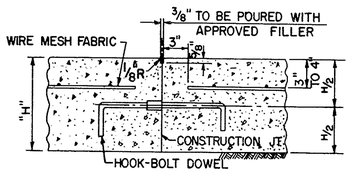


SECTION E-E

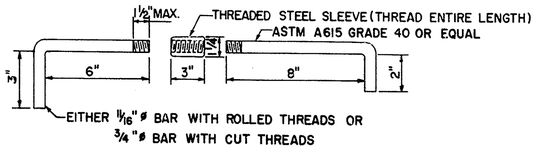
DOWELLED LONGITUDINAL SAW-CUT JOINT



SECTION A-A

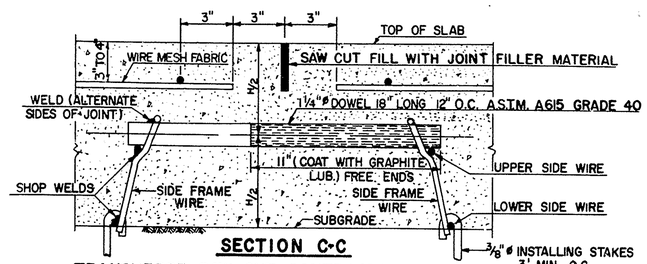


SECTION B-B



DETAIL OF HOOK-BOLT DOWEL

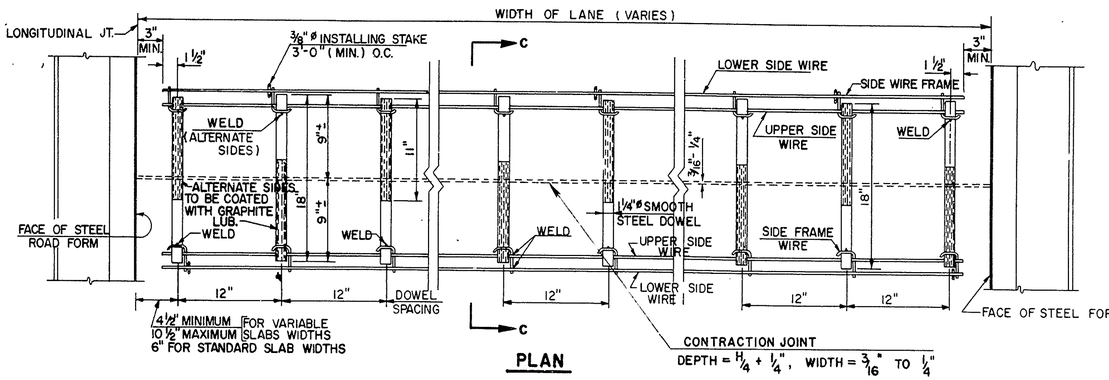
DOWELLED LONGITUDINAL CONSTRUCTION JOINT



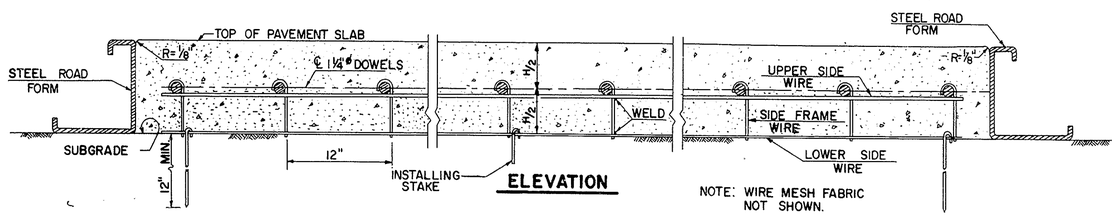
SECTION C-C

TRANSVERSE SAW CUT CONTRACTION JOINT

NOTES: 1. ALL WIRES IN SIDE FRAMES TO BE 5/16" DIAMETER. ASTM-A82 THE JUNCTION OF ALL WIRES SHALL BE WELDED.
2. TRANSVERSE CONTRACTION JOINTS SHALL BE SAWED AS REQ'D. OR AS SPECIFIED
3. FIELD ASSEMBLY OF LOAD TRANSFER DEVICE WILL NOT BE PERMITTED.



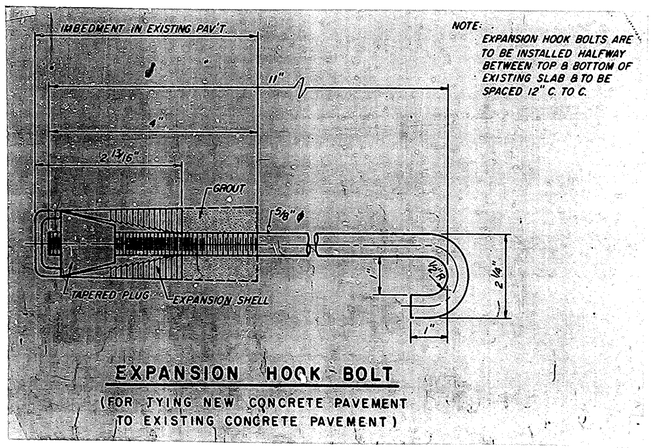
PLAN



ELEVATION

LOAD TRANSFER DEVICE

(TO BE USED AT CONTRACTION JOINTS)



EXPANSION HOOK-BOLT

(FOR TYING NEW CONCRETE PAVEMENT TO EXISTING CONCRETE PAVEMENT)

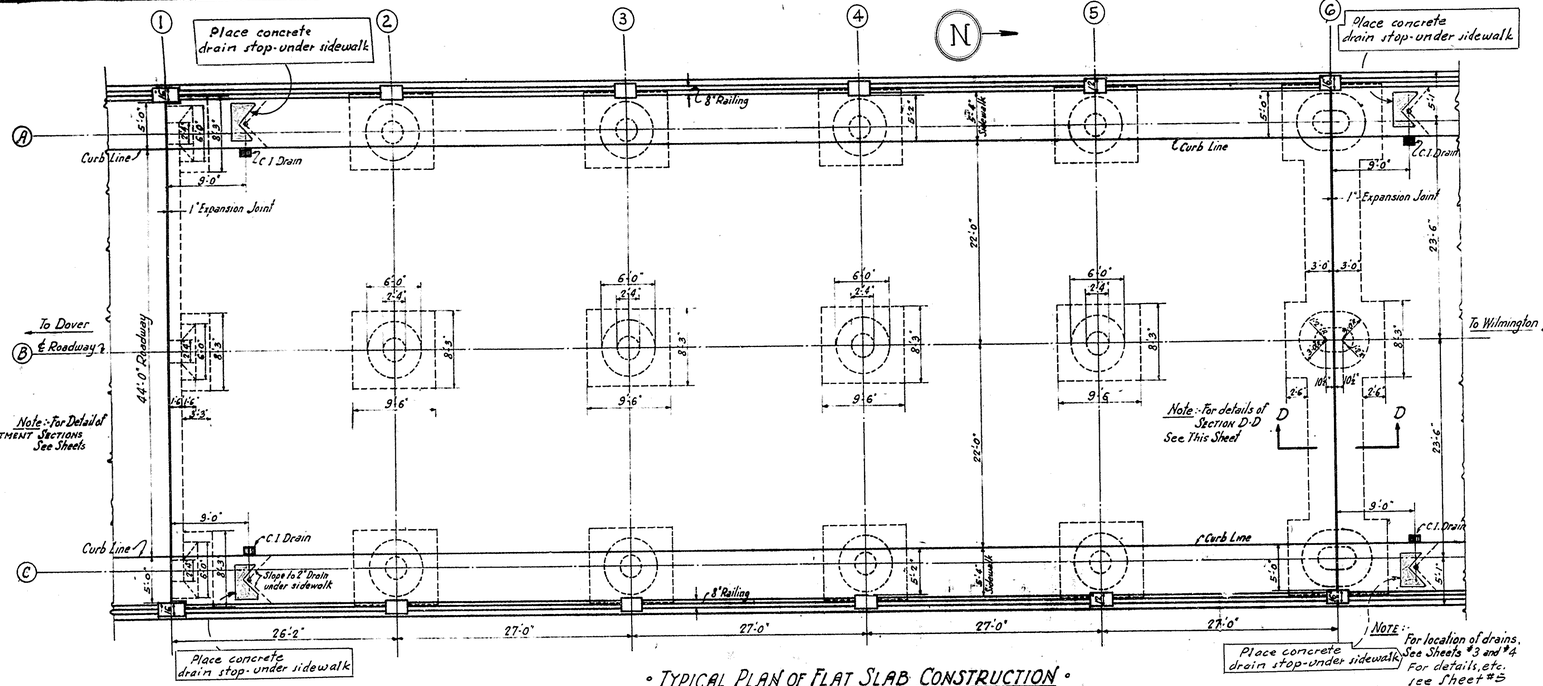
REFER TO SHEETS 3,4,&8 OF THE CONTRACT PLANS

DIETZGEN Philadelphia 135 Imperial Tracing Cloth

COUNTY	CONTRACT	P.R.O. ITEM NO	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
N. C.	70-10-021	2	DEL.		10	15

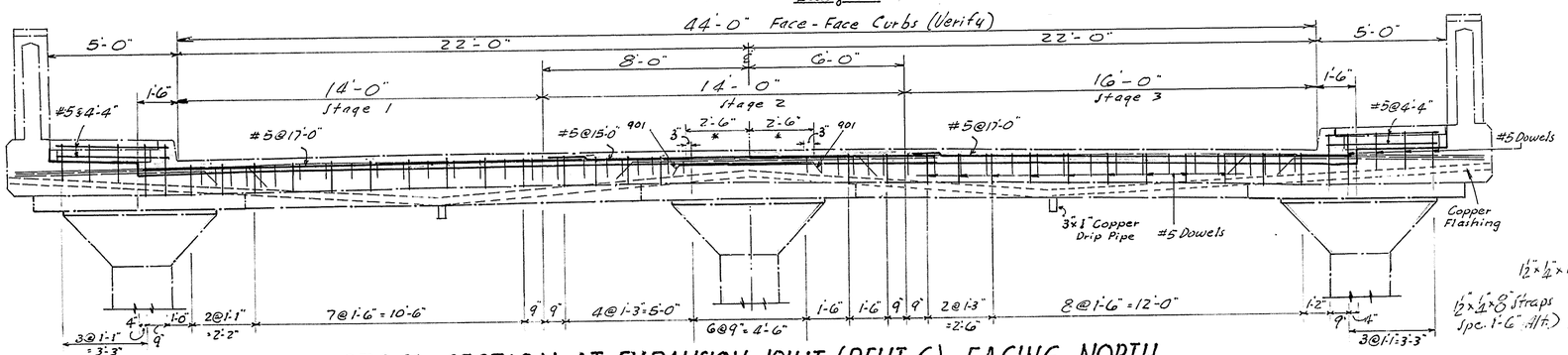
BRIDGE NO. 686 WILMINGTON CAUSEWAY VIADUCT REHABILITATION

NO.	REVISIONS	BY	DATE
	AS BUILT PLANS IN RED	T.F.F.	10-16-73



TYPICAL PLAN OF FLAT SLAB CONSTRUCTION

Scale 1/8" = 1'-0"

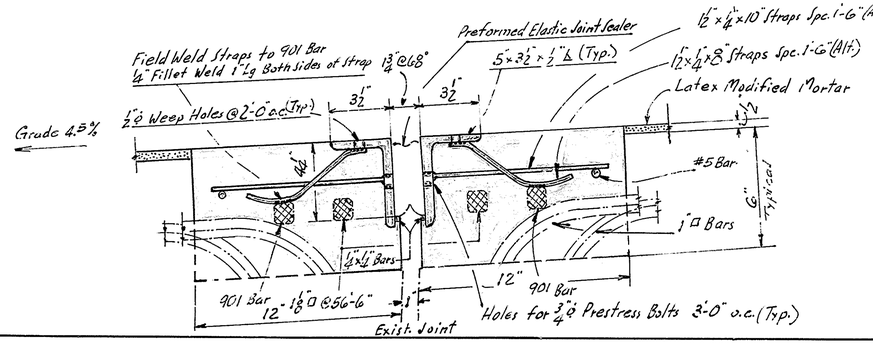


CROSS SECTION AT EXPANSION JOINT (BENT 6) FACING NORTH

3/8 inch = 1'-0"

DETAIL - SECTION THRU CENTER COLUMN

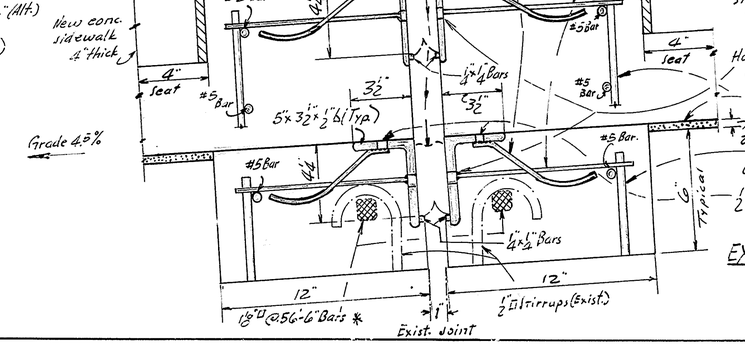
3 inches = 1'-0"



ROADWAY AND SIDEWALK JOINT DETAILS

FACING WEST

3 inches = 1'-0"

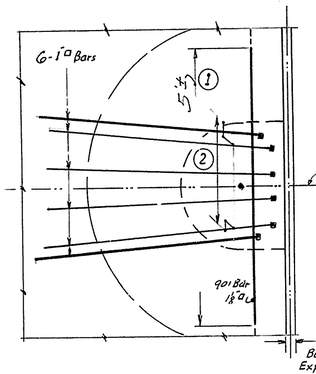


CONTRACT PAY ITEM

EXPANSION JOINTS - BENTS 6, 11, 22 & 27

1/2 TOP VIEW

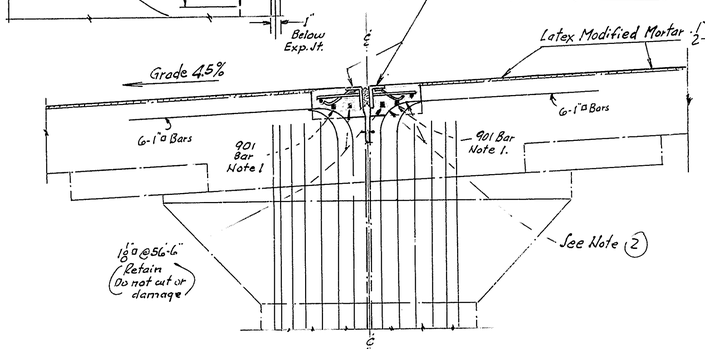
3/4 inch = 1'-0"



(1.) Field weld ∫ straps (spc. 18") to top of 901 bars within limits shown
— ɪ straps (spc. 18") spaced midway between ∫ straps within limits shown

(2) Within limits shown, remove existing concrete masonry to expose upper surfaces of the 1" □ bars shown. Under no circumstances shall existing concrete masonry be removed alongside of or underneath these bars. See section below, also "Detail-Section Thru Center Column"

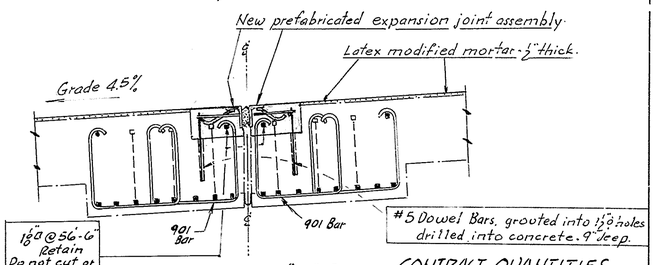
New prefabricated expansion joint assembly



SECTION THRU CENTER COLUMN

FACING WEST

3/4 inch = 1'-0"



SECTION "D-D"

3/4 inch = 1'-0"

CONTRACT QUANTITIES
PAY ITEMS - SHEET NO. 1
INDEX - CONTRACT PLANS - SH. NO. 3
LOCATIONS - SHEETS NO. 3 & 4
TYPICAL EXPANSION JOINT SECTION - SHEET NO. 7

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

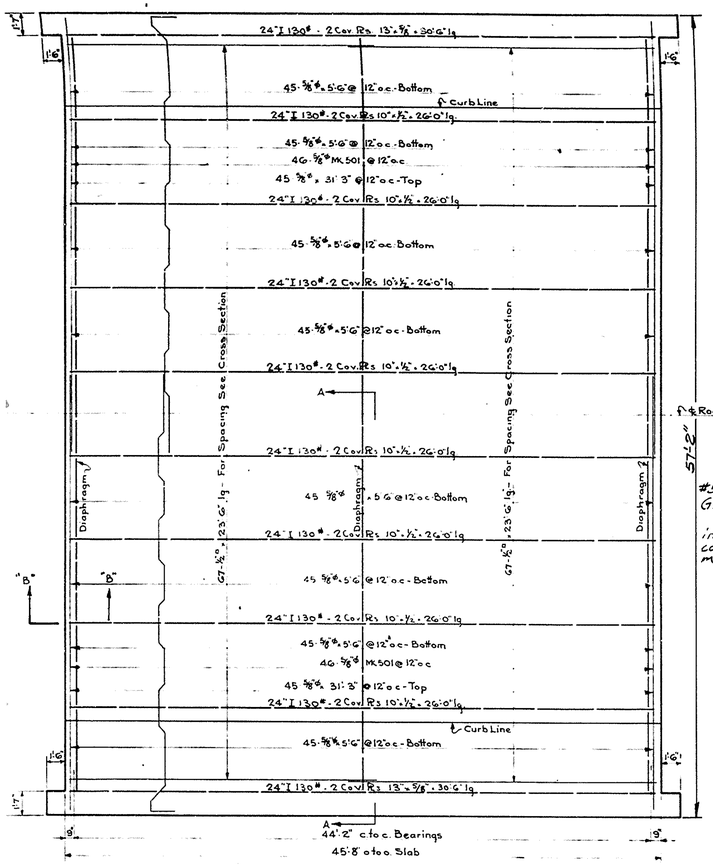
JOINT DETAILS BENTS 6, 11, 22, & 27

D. T. C. U. I. 9.	SCALES AS SHOWN	APPROVED BY: BRIDGE ENGINEER
D. Victor A. Yost		

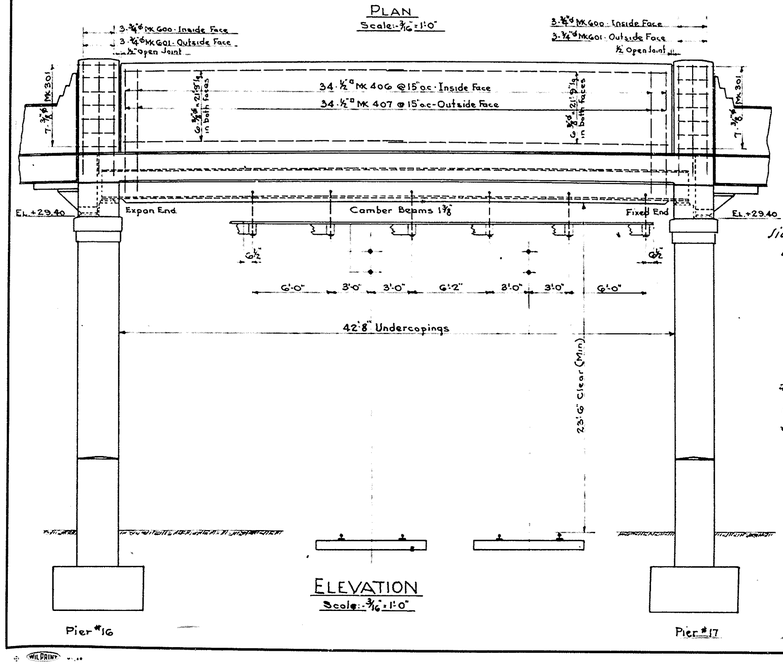
COUNTY	CONTRACT	F.A.P. REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.		11	15

BRIDGE No. 686 (WILMINGTON CAUSEWAY VIADUCT REHABILITATION)

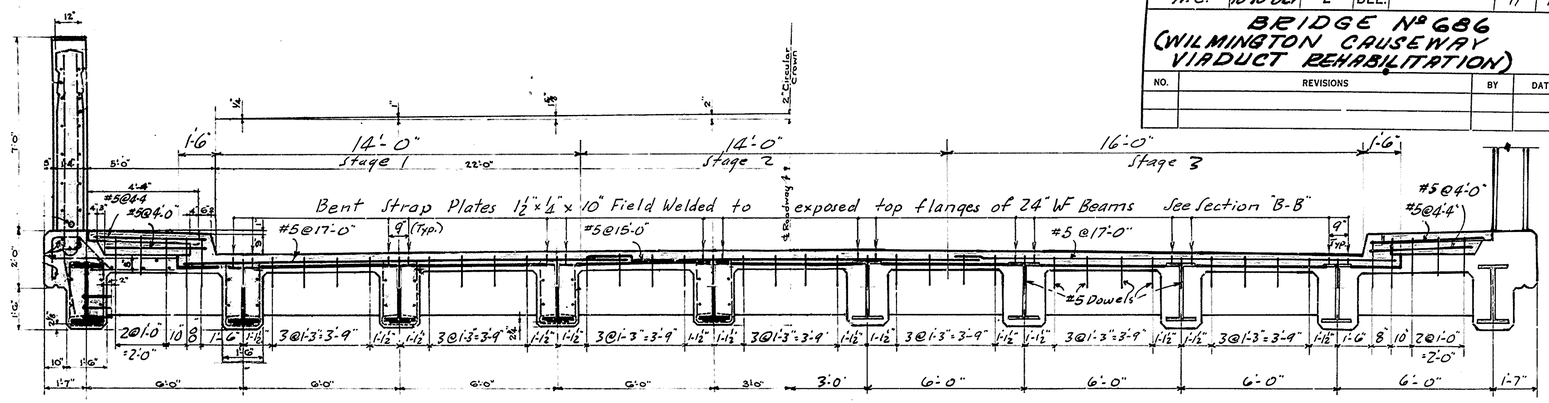
NO.	REVISIONS	BY	DATE



PLAN
Scale: 3/16" = 1'-0"

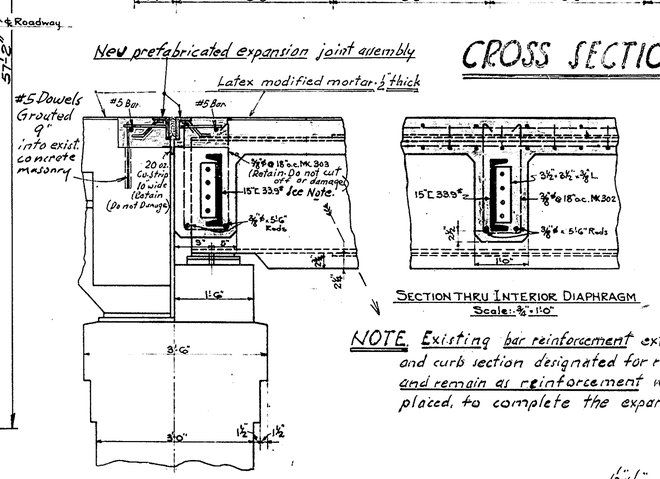


ELEVATION
Scale: 3/16" = 1'-0"



CROSS SECTION AT EXPANSION JOINT (PIER 16) FACING NORTH

3/8 inch = 1'-0"



SECTION THRU INTERIOR DIAPHRAGM
Scale: ⅜" = 1'-0"

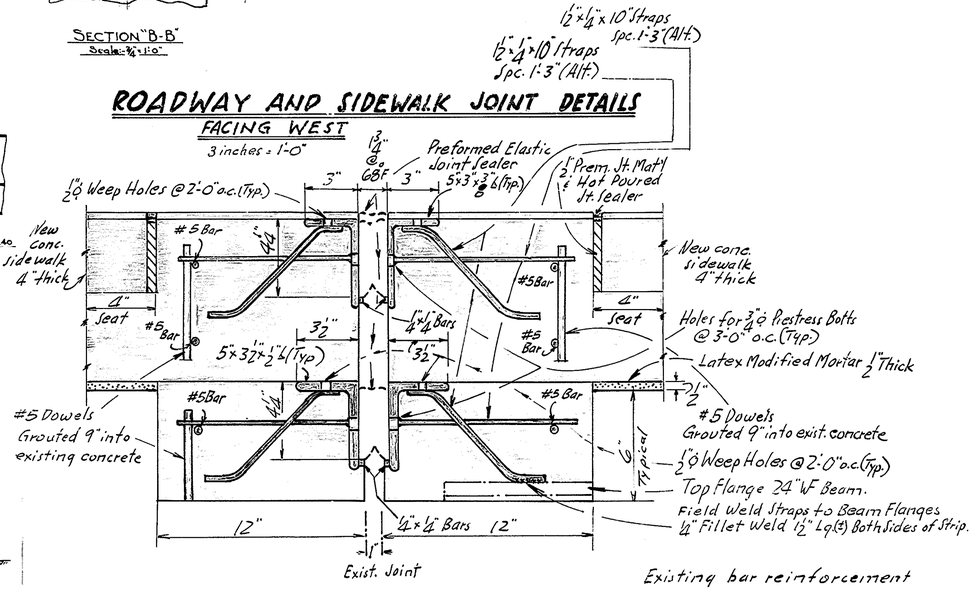
SECTION "B-B"
Scale: ⅜" = 1'-0"

NOTE Existing bar reinforcement extending into and located in the roadway and curb section designated for removal shall be protected from damage and remain as reinforcement when the new concrete masonry is placed, to complete the expansion joint construction.

ROADWAY AND SIDEWALK JOINT DETAILS

FACING WEST

3 inches = 1'-0"



Existing bar reinforcement not shown. See Note above

CONTRACT QUANTITIES - PAY ITEMS - SHEET NO. 1
INDEX - CONTRACT PLANS - LOCATION - SHEET NO. 3
TYPICAL EXPANSION JOINT SECTION - SHEET NO. 7

CONTRACT PAY ITEM
EXPANSION JOINTS - PIERS 16 & 17

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

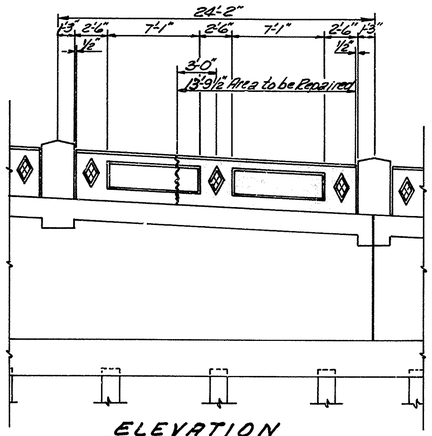
JOINT DETAILS PIERS 16 & 17

D. T. & C.U.G.	SCALE	APPROVED:
Victor A. Jost	AS SHOWN	BRIDGE ENGINEER

COUNTY	CONTRACT	P. R. A. REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.		12	15

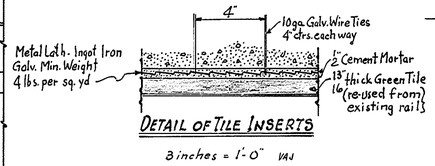
BRIDGE No 686 (WILMINGTON CAUSEWAY VIADUCT REHABILITATION)

NO.	REVISIONS	BY	DATE

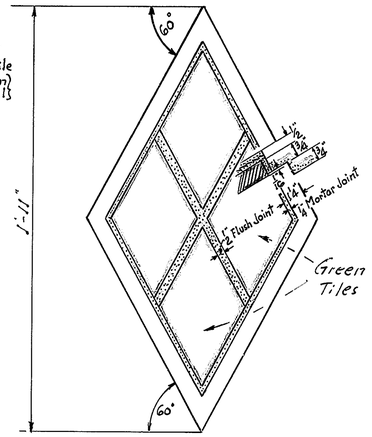


ELEVATION
Scale: 3/16"=1'-0"

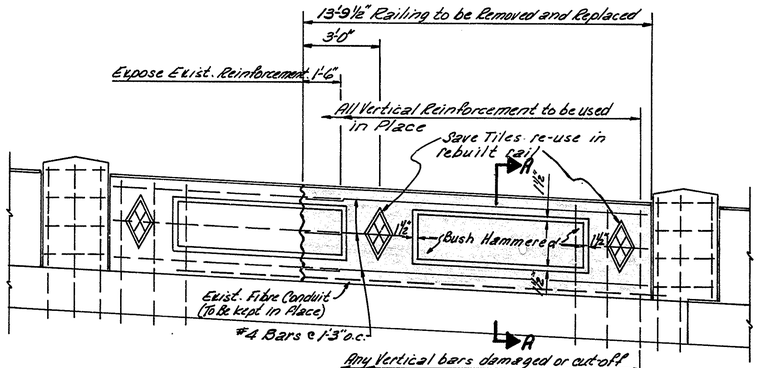
3rd. PANEL FROM END OF APPROACH ON EAST SIDE



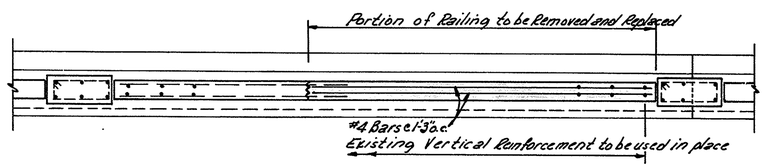
DETAIL OF TILE INSERTS
3 inches = 1'-0" VAJ



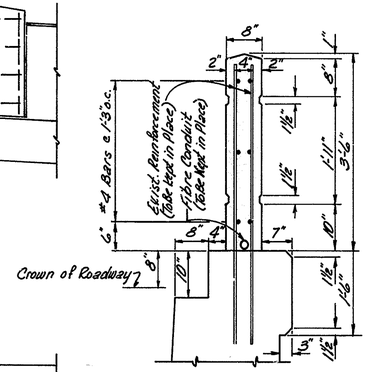
DETAIL OF PANEL
3 inches = 1'-0" VAJ



ELEVATION
3rd. PANEL FROM END OF APPROACH ON EAST SIDE
Scale: 3/8"=1'-0"



TYPICAL RAILING DETAILS
Scale: 3/8"=1'-0"



SECTION A-A
Scale: ¾"=1'-0"

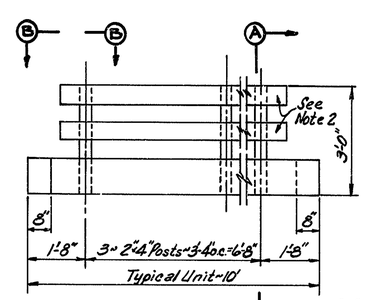
NOTE: For Location See Sheet No. 4

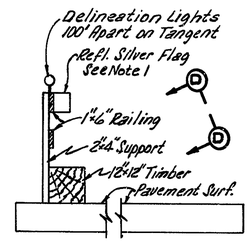
~ GENERAL NOTES ~

Compensation for removal and disposal of existing masonry and other surplus materials contained in the damaged railing section (panel tiles excepted) shall be included for payment in the contract unit price per cubic yard bid for Removal of Existing Masonry (Abutment Backwalls and Bridge Railing") See Special Provisions.

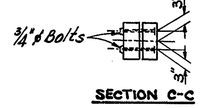
Compensation for construction of the railing panel, complete in place and accepted shall be included for payment in the contract unit price per cubic yard bid for Section 602, Portland Cement Concrete Masonry (Reconstruction of Abutment Backwalls and Bridge Railing) See Special Provisions.

A protective coating will be applied to the inside roadway face of the new railing masonry. See paragraph 602.35 of the standard specifications.



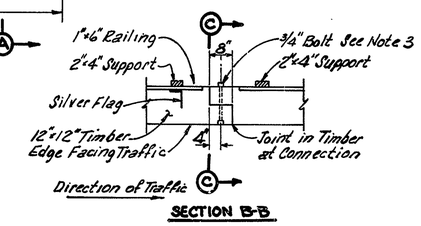


SECTION A-A

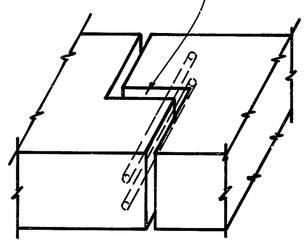


ELEVATION

SECTION C-C



SECTION B-B



SECTION D-D

TIMBER BARRIER CURB
Scale ½"=1'-0"

NOTES:

1- Barrier Curb to have reflectorized silver flag on metal backing 6" Sq., max. Spacing 25' o.c.
2- Barrier Curb supports and railings to be painted as noted in Specifications.
3- Barrier Curb Sections shall be connected by bolting together 12"x12" timber sections with ¾" ø bolts, nuts and washers. Countersink Bolt head in front edge of curb.

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

RAILING REPAIR

TIMBER BARRIER CURB

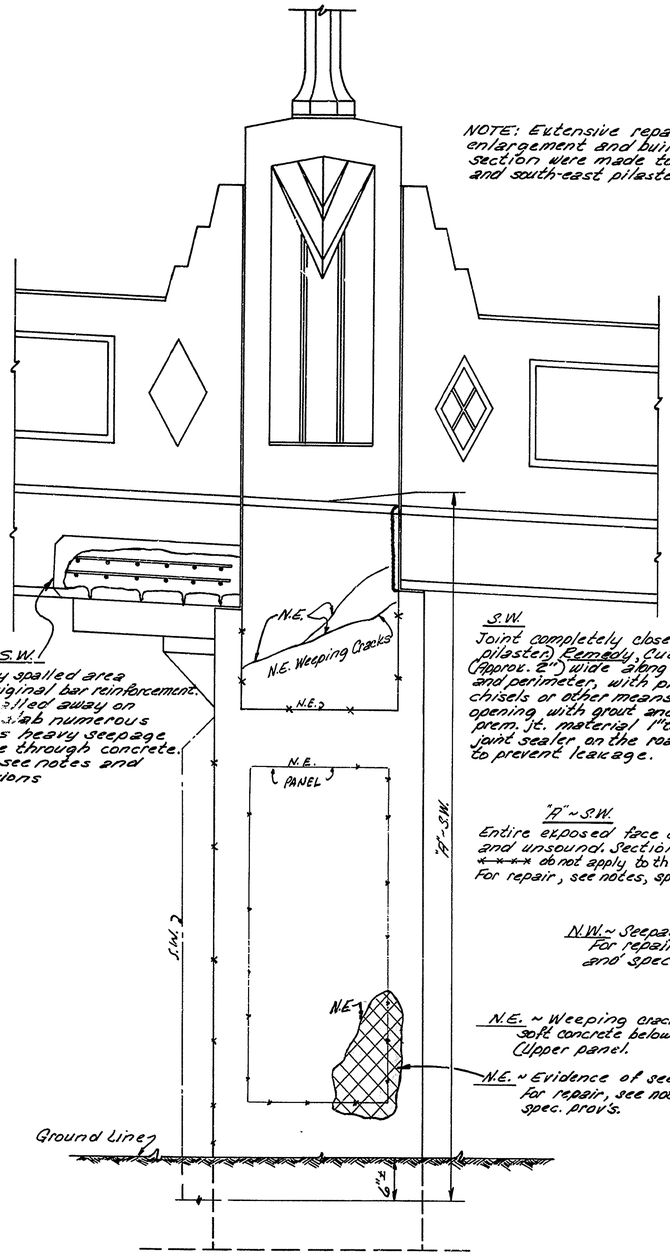
D. V.A.J. E.T.F.F.	SCALE	APPROVED BY:
T. T.F.F. V.A.J.	AS SHOWN	John E. Linkins
C. V.A.J.		BRIDGE ENGINEER

COUNTY	CONTRACT	P.R.A. REQ. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.		13	15

BRIDGE No. 686
(WILMINGTON CAUSEWAY VIADUCT REHABILITATION)

NO.	REVISIONS	BY	DATE

S.W. · N.E.



NOTE: Extensive repairs, including enlargement and build up of concrete section were made to the south-west and south-east pilasters in 1946-47.

S.W.
Large, deeply spalled area exposing original bar reinforcement. Concrete spalled away on underside of slab numerous stalactites heavy seepage and leakage through concrete. For repairs, see notes and special provisions

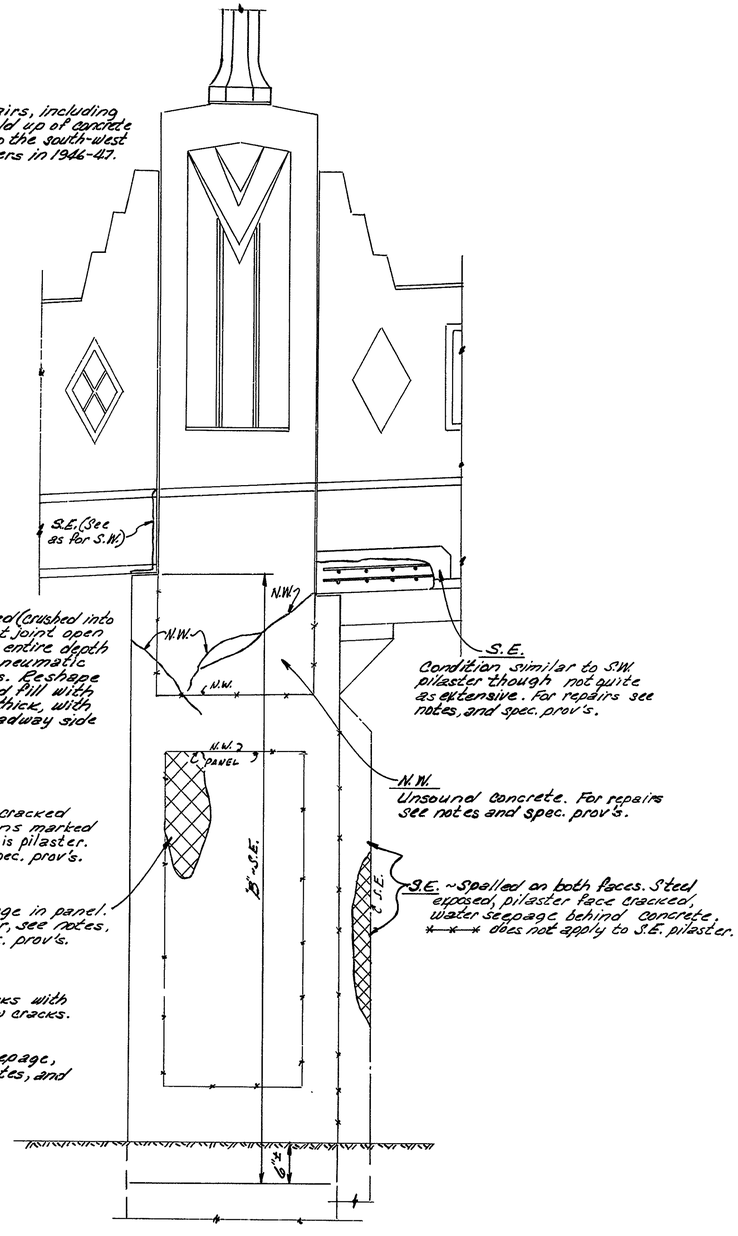
S.W.
Joint completely closed (crushed into pilaster) Remedy, Cut joint open (Approx. 2") wide along entire depth and perimeter, with pneumatic chisels or other means. Reshape opening with grout and fill with prem. jt. material 1" thick, with joint sealer on the roadway side to prevent leakage.

"A" ~ S.W.
Entire exposed face cracked and unsound. Sections marked ×—×—× do not apply to this pilaster. For repair, see notes, spec. prov's.

N.E. ~ Weeping cracks with soft concrete below cracks. Upper panel.

N.E. ~ Evidence of seepage, for repair, see notes, and spec. prov's.

S.E.-N.W.



S.E.
Condition similar to S.W. pilaster though not quite as extensive. For repairs see notes, and spec. prov's.

N.W.
Unsound concrete. For repairs see notes and spec. prov's.

S.E. ~ Spalled on both faces. Steel exposed, pilaster face cracked, water seepage behind concrete, ×—×—× does not apply to S.E. pilaster.

N.W. ~ Seepage in panel. For repair, see notes, and spec. prov's.

~ GENERAL NOTES ~

The pilaster elevations, accompanied by illustrations of visible damage, and notes describing existing conditions, represent an attempt to convey to interested bidders the extent of deterioration and damage; however it must be acknowledged that the actual extent of masonry removal and repair requirements will only be determined after field operations resulting in the removal of defective masonry have been undertaken and completed.

Prospective bidders are therefore advised to make a careful field inspection of the pilasters, and after examination of the plans and special provisions, to make their own estimates as to the cost of restoration, taking into account all factors involved, and making a reasonable allowance for all costs, labor, materials, tools, incidentals, and contingencies expected to be encountered in the performance of this portion of the contract.

All work performed under this item shall be under the constant supervision and control of the Engineer, who will determine, as work progresses, the nature and extent of corrective measures required for the acceptable completion of the work.

DELAWARE DEPARTMENT
OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

PILASTER REPAIR

D. J.A.J. T. T.F.F. C. V.A.J.	SCALE 3/4" = 1'-0"	APPROVED BY: John A. Fulton BRIDGE ENGINEER

COUNTY	CONTRACT	P.R.# REQ. NO	STATE	FED. AID PROJECT NO	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.		14	15

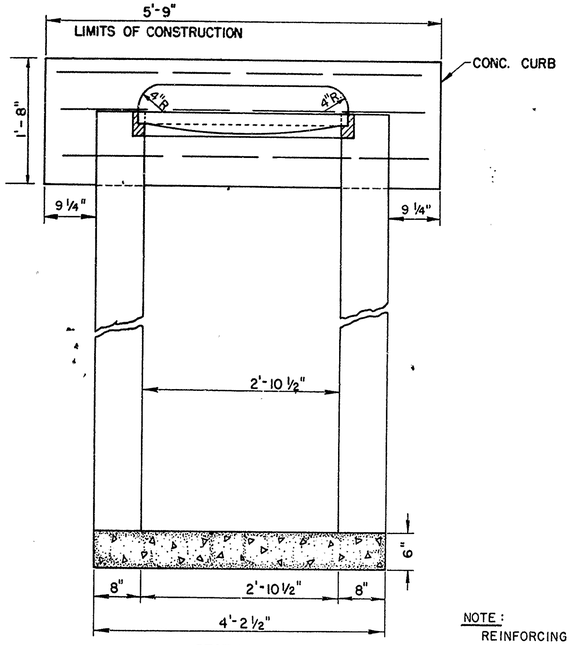
STANDARD SHEET D-7
CATCH BASINS TYPE A & B

PREL. TRACING J. WHITE DESIGN E. L. W. CHKD. J. T. B.

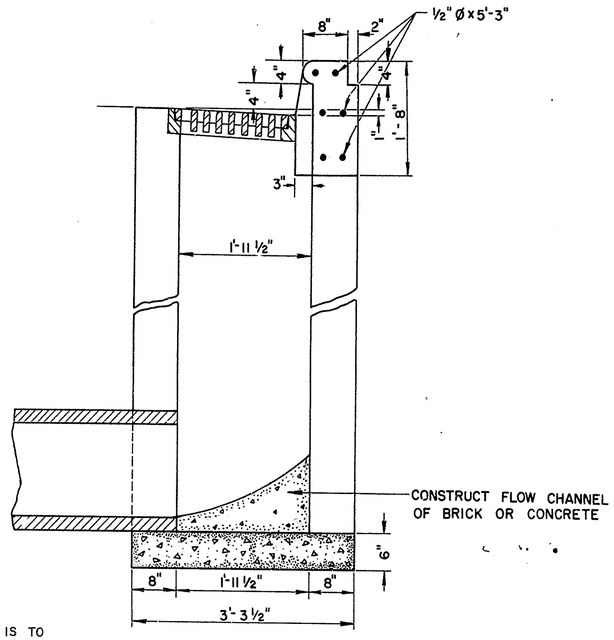
APPROVED _____ 6-22-70
DIRECTOR OF OPERATIONS DATE

_____ 6/22/70
DEPUTY DIRECTOR--CHIEF ENGINEER DATE

COVER OUTSIDE OF STRUCTURE WITH ½" CEMENT PLASTER COAT

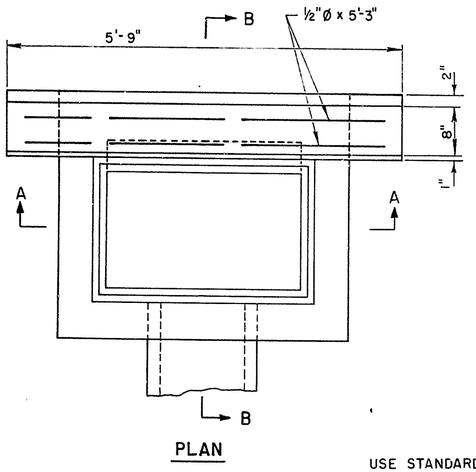


SECTION A-A



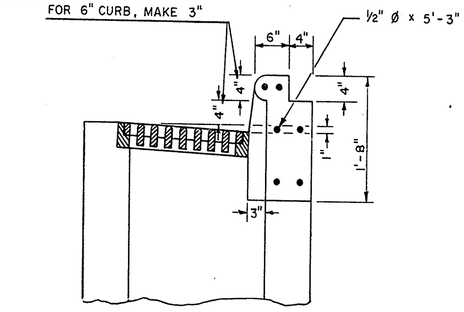
SECTION B-B(1)

NOTE:
REINFORCING STEEL IS TO BE INCLUDED IN UNIT PRICE BID FOR TYPE "A" CATCH BASIN.



PLAN

NOTE:
FOR 6" CURB, MAKE 3"



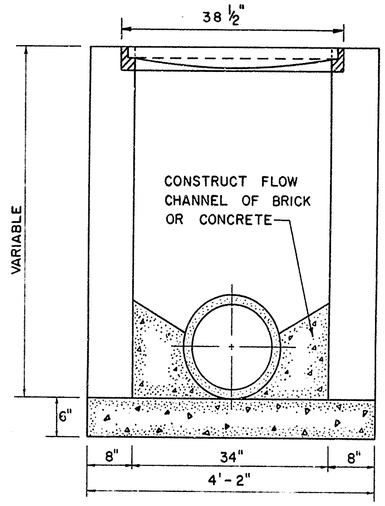
SECTION B-B(2)

USE STANDARD CATCH BASIN FRAME & GRATE

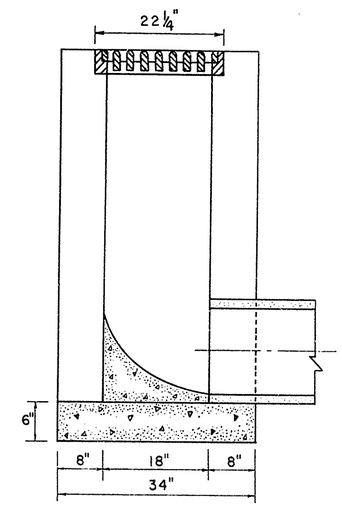
TYPE "A" CATCH BASIN (Use for Cont. 70-10-021)

1 0 1 2

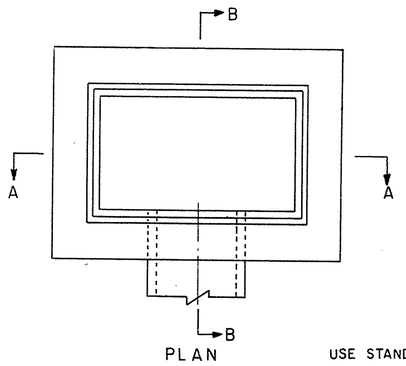
COVER OUTSIDE OF STRUCTURE WITH ½" CEMENT PLASTER COAT



SECTION A-A



SECTION B-B



PLAN

USE STANDARD CATCH BASIN FRAME & GRATE

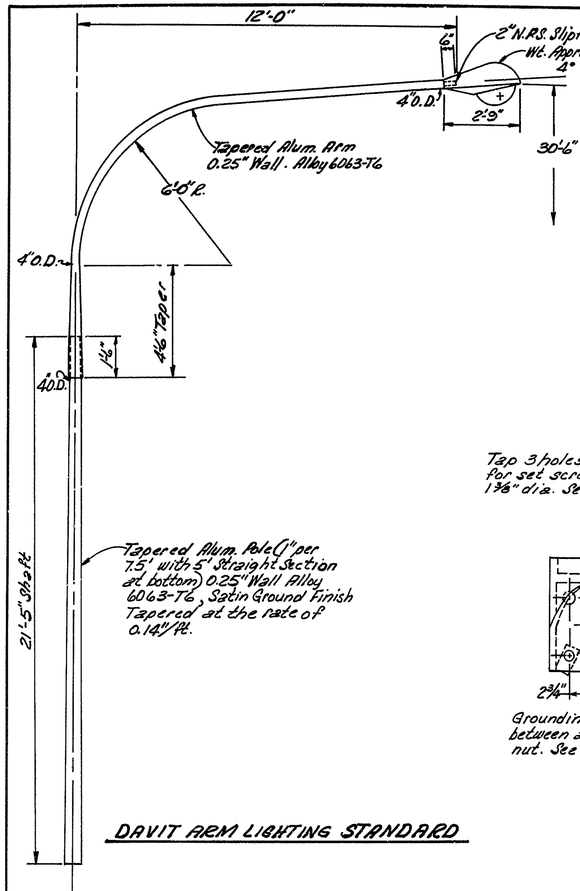
STANDARD CATCH BASIN TYPE "B"

1 0 1 2

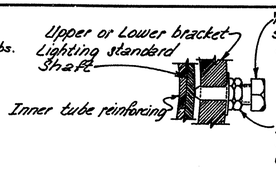
COUNTY	CONTRACT	P. R. A. REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	70-10-021	2	DEL.		15	15

BRIDGE No. 686 (WILMINGTON CAUSEWAY VIADUCT REHABILITATION)

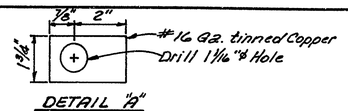
NO.	REVISIONS	BY	DATE
1	RELOCATE ALL LIGHT POLES & CONDUITS TO WEST SIDE OF BRIDGE	S.P.C.	8-21-72



DAVIT ARM LIGHTING STANDARD

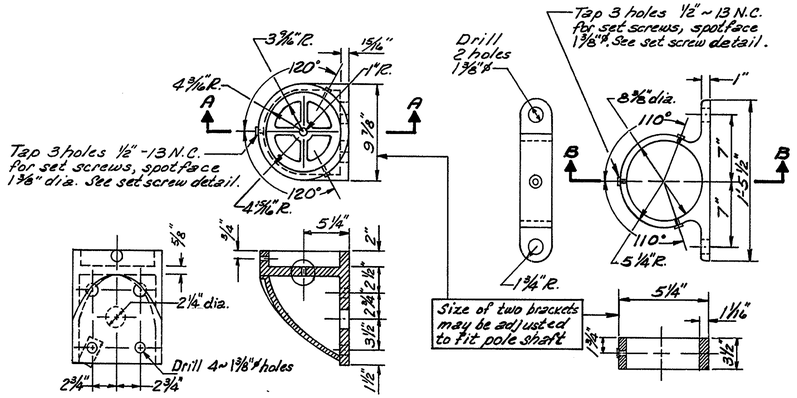


SET SCREW DETAIL



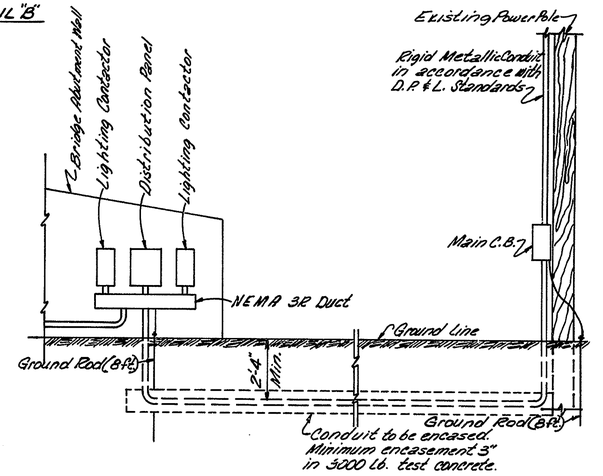
DETAIL "A"
GROUNDING TERMINAL

DETAIL "B"

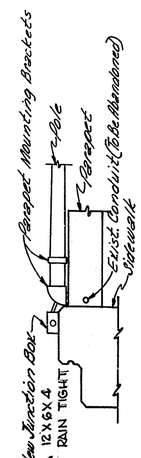


SECTION A-A
LOWER BRACKET

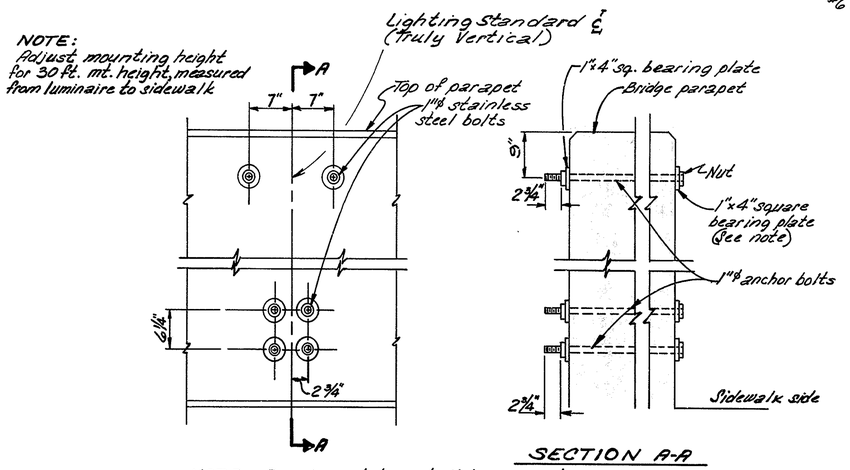
SECTION B-B
UPPER BRACKET



ELEVATION SHOWING ELECTRICAL LAYOUT



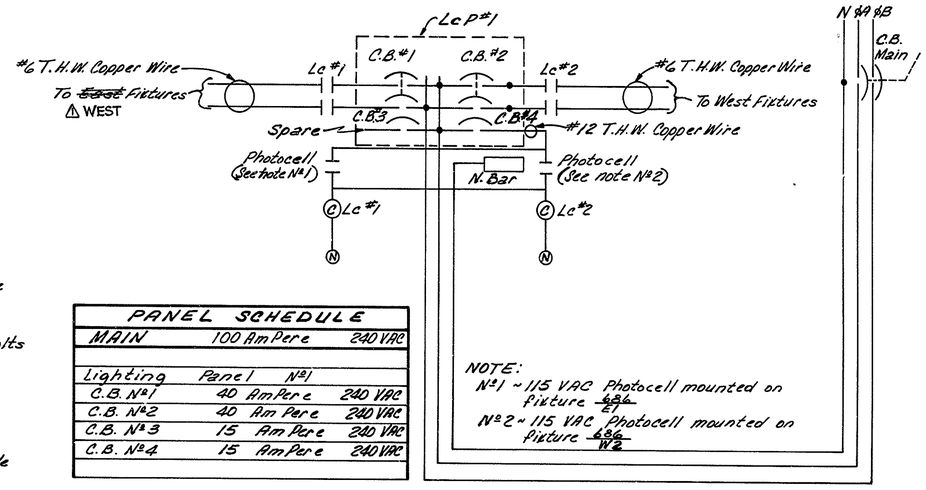
PARAPET LIGHTING STANDARD INSTALLATION



SECTION A-A

NOTE: Bearing plates shall have no sharp edges.

PARAPET LIGHTING STANDARD MOUNT



PANEL SCHEDULE			
MAIN	100 Am Pere		240 VAC
Lighting	Panel	N#1	
C.B. N#1	40	Am Pere	240 VAC
C.B. N#2	40	Am Pere	240 VAC
C.B. N#3	15	Am Pere	240 VAC
C.B. N#4	15	Am Pere	240 VAC

NOTE:
N#1 ~ 115 VAC Photocell mounted on fixture ~~6&7~~ #1
N#2 ~ 115 VAC Photocell mounted on fixture ~~6&7~~ #2

WIRING DIAGRAM

*⚠ BOTH CIRCUITS SHALL BE RUN IN ONE 1 1/2" P.V.C. CONDUIT ON WEST SIDE OF BRIDGE STRUCTURE.

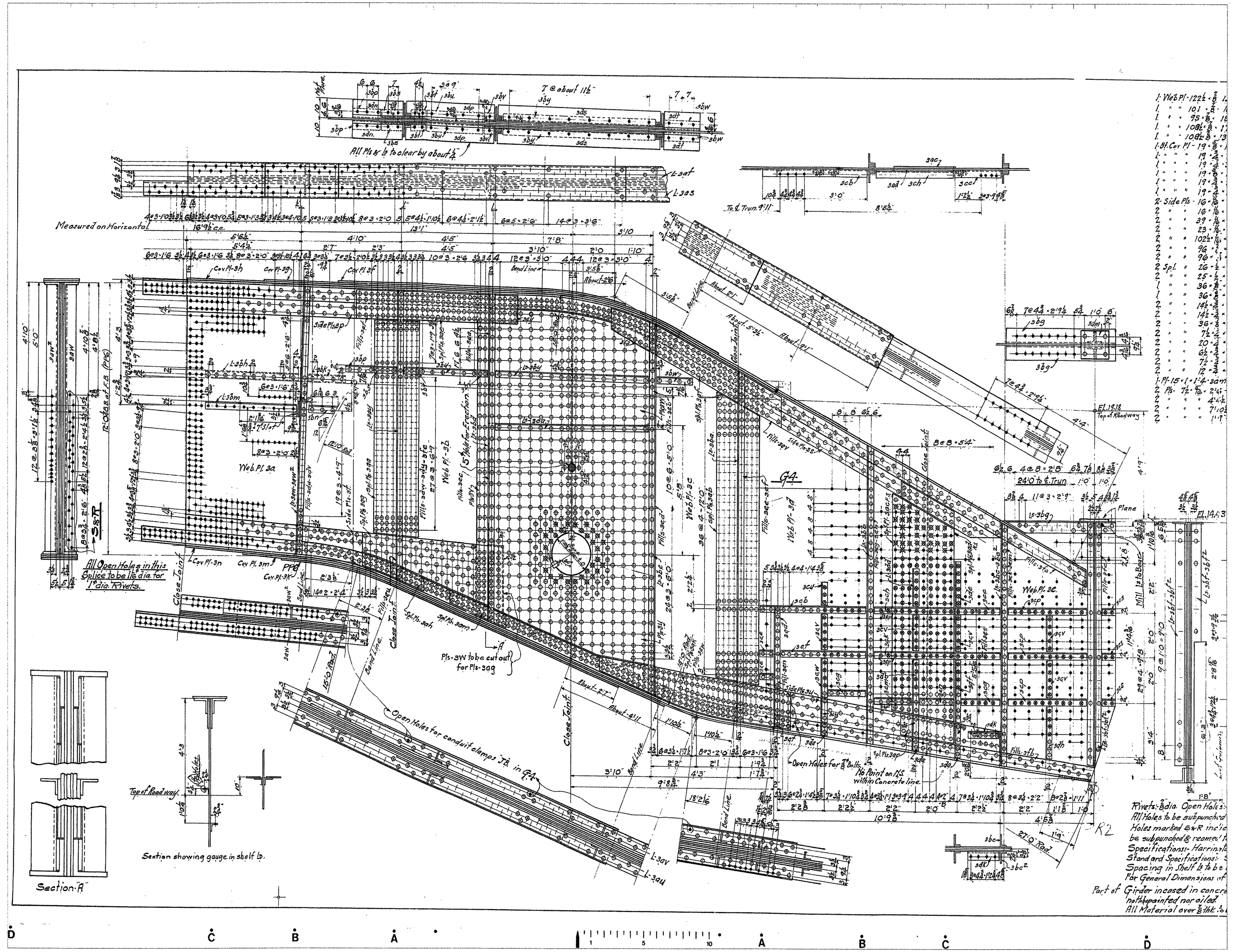
CONTRACT QUANTITIES
PAY ITEMS - SHEET NO. 1
INDEX - CONTRACT PLANS - SH. NO. 3
LOCATIONS - SHEETS NO. 3 & 4

DELAWARE DEPARTMENT OF HIGHWAYS & TRANSPORTATION
DIVISION OF HIGHWAYS

DETAILS
LIGHTING SYSTEM

D. T.F.F. & W.S.	SCALE	APPROVED BY:
T. T.F.F.	NO SCALE	BRIDGE ENGINEER
C. V.Q.J.		

© KEUFFEL & ESSER CO. MYLAR



CONTRACT No. 21-074-07

REPRODUCED

ORIGINAL SHOP DRAWING

INCLUDED FOR INFORMATIONAL PURPOSES

MODJESKI and MASTERS
Consulting Engineers
SINCE 1893

DRAWING No. 147 of 1109

Name: Cd_050.CAL
Dimensions: 8800 x 6784 pixels

MICROFILMED

CONTRACT No. 21-014-07
REPRODUCED
ORIGINAL SHOP DRAWING
INCLUDED FOR INFORMATIONAL PURPOSES
DRAWING No. 148 of 169
MODJESKI-MASTERS CONSTRUCTION ENGINEERS SINCE 1893

Sym. about ℄.

Holes for ¾" Bolts

4 @ 2'-0" = 12'-0"

1'-1½" 10½" 2'-0" 2'-0" 1'-8"

Top of Roadway

Top of Stringer

Note
Scribe Center Line top and bottom flange for all Floorbeams

40-1½ c. to c. Cdrs.
40-2½ c. to c. End Holes

2'-11" 5'-10" 2'-11" 5'-10" 2'-11" 5'-10" 2'-11" 2'-11" 2'-11" 2'-8½"

10 @ 3½" = 2'-11" 9 @ 3½" = 2'-7½" 10 @ 3½" = 2'-11" 10 @ 3½" = 2'-11" 7 @ 3½" = 2'-0½"

L 6"x6"x⅞" 10-5½ 4th F.S. 39-7 4th N.S.

FB1

Holes in top

Holes for Conduit

Elevation of Floorbeam FB1

40-2½ c. to c. End Holes for FB2-¾/3 FB4
40-0
Balance of Spacing same as FB1
Spacing same as FB1

For FB4 FB2-¾/3

L 6"x6"x⅞" 10-5½ 4th F.S. 39-7 4th N.S. For FB2-¾/3.

L 6"x6"x⅞" 10-3 4th F.S. 33-11½ 4th N.S. For FB4

FB3 FB2 FB4 FB3 FB2 FB4

Spacing same as FB1

FB2-FB3-FB4

Holes FB4

L 6"x6"x⅞" 10-3 4th F.S. 39-11½ 4th N.S.

40-0 c. to c. End Holes

Spacing same as FB4.

Slot 8"x⅞" for ⅞" dtop.

FB5

Spacing same as FB1

17'-2½"

Drill 1⅛" Holes in field to match Casting 7M2.

Sym. about ℄.

KB1R

1-Pl. 14"x⅜"x 2'-8½" 4gu
1-L 3½"x3½"x⅜"x 2'-7" 4av
1-L 4"x3½"x⅜"x 1'-7½" 4aw
1-L 4"x3½"x⅜"x 2'-0½" 4ay
1 Bent Pl. 6"x⅜"x 0'-11" 4cu

Back of ℄

KB2R

1-Pl. 23"x⅜"x 2'-8½" 4cb
1 L 3½"x3½"x⅜"x 3'-0" 4cc
1-L 4"x3½"x⅜"x 1'-9½" 4cd
1-L 4"x3½"x⅜"x 2'-2½" 4ce
1 Bl. Pl. 6"x⅜"x 0'-11" 4cf

KB3R

1-Pl. 33½"x⅜"x 2'-8½" 4cg
1-L 4"x3½"x⅜"x 2'-3½" 4ch
1-L 4"x3½"x⅜"x 1'-10½" 4ck
1 L 3½"x3½"x⅜"x 2'-7½" 4cm
1-Bl. Pl. 8"x⅜"x 0'-11" 4cn

North Span

N

℄ Bolsters Leaves

South Span revolves abt ℄

Required List

2	Floorbeams	FB1.
4	"	FB2.
2	"	FB3.
4	"	FB4.
2	"	FB5.
2	Knee Braces.	KB1R
2	"	KB1L
2	"	KB2R
2	"	KB2L
2	"	KB3R
2	"	KB3L

Specifications. Harrington, Howard & Ash
Standard specifications, section M.M.E.M.MS.

Note to Erector
Paint top of FB1 with hot asphalt before timbers are placed. Waterproofing on top of Floorbeams FB2, 3 & 4 to be two layers of woven cotton fabric saturated with asphaltic bitumen, weighing untreated at least 3½ oz. and treated at least 14½ oz. per sq. yd. When placing waterproofing the top of the Floorbeams shall be dry and clean of dust. Then hot asphalt shall be applied on which the membrane shall be immediately laid. This shall be swabbed with a heavy coating of hot asphaltic cement and the second layer shall be applied which shall then be swabbed with a heavy finish coating of asphaltic cement. Each layer shall be adequately lapped at ends.

Rivets ⅞"
Open Holes 1" unless noted
All holes to be sub-punched ¾"
and reamed to 1"
All field connections to be sub-punched and reamed to a metal templet except holes for lateral Bracing

Bills 11, 11 & 12

BETHLEHEM STEEL COMPANY
Bridge and Fabrication Dept. - - BETHLEHEM, PA.

DETAIL OF Floorbeams & Knee Braces.
STRUCTURE Christiana River Wilmington Del.
CUSTOMER State of Delaware.
SHOP PAINT One coat of Dupont Krymate. Metal Primer. Same for assembling.
RIVETS OPEN HOLES UNLESS NOTED

DRAWN BY	DATE	CHECKED BY	DATE	SQUAD
W	1.11.27	E.D.S.	1-24-31	C.H.Wachs

REVISIONS No.	DATE	BY	DESCRIPTION

FILE F5579 CONT. EB4013 DWG. 4

D C B A 1 5 10 A B C D

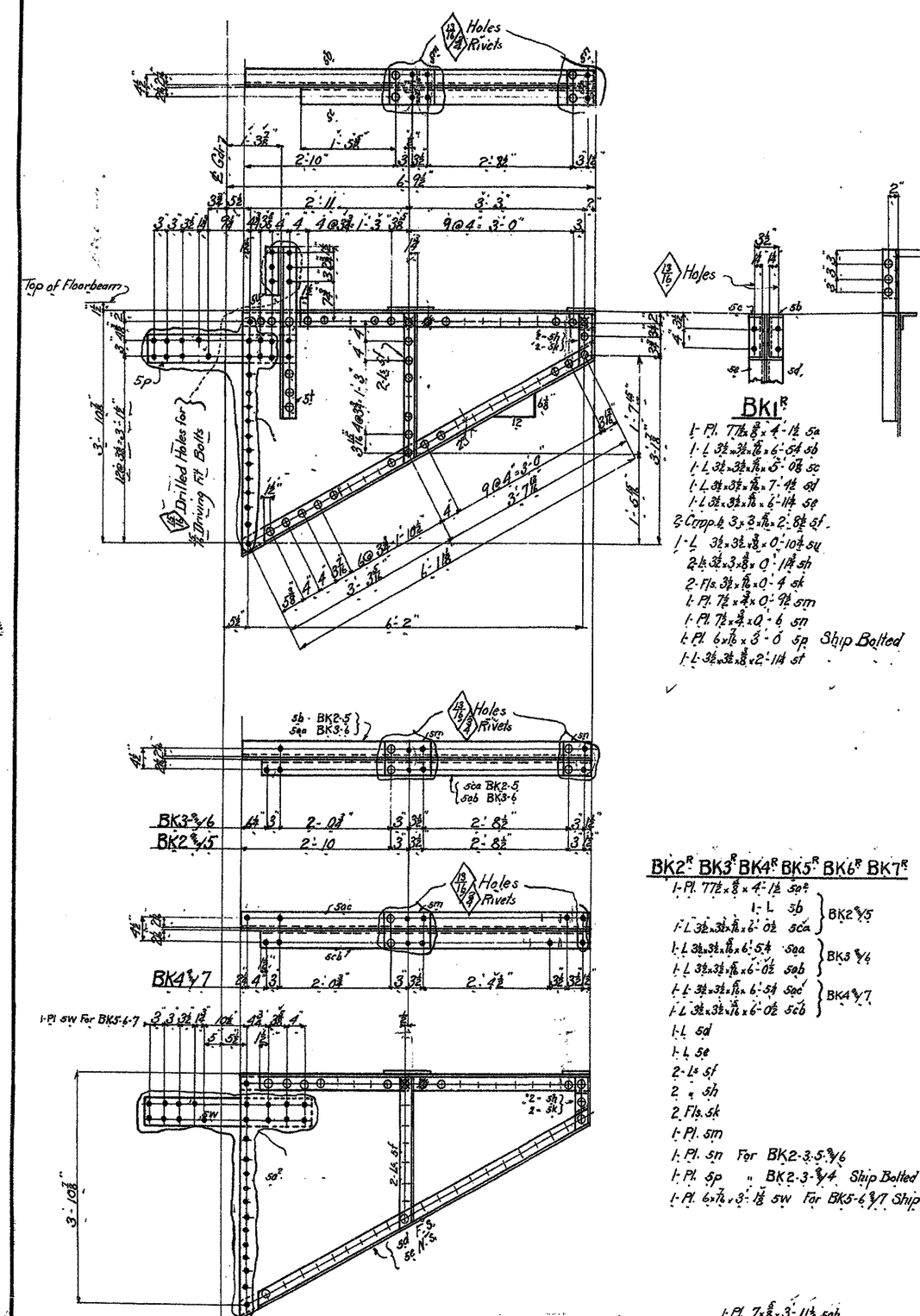
Name: Cd_051.CAL
Dimensions: 8800 x 6784 pixels

CONTRACT No. 21-074-07

REPRODUCED
ORIGINAL SHOP DRAWING
INCLUDED FOR INFORMATIONAL PURPOSES

MOUSLEY MASTERS CONSULTING ENGINEERS

DRAWING No. 149 of 169



Required List

One	Bracket	BK1R
One	"	BK1L
3	"	BK2R
3	"	BK2L
2	"	BK3R
2	"	BK3L
2	"	BK4R
2	"	BK4L
2	"	BK5R
2	"	BK5L
2	"	BK6R
2	"	BK6L
2	"	BK7R
2	"	BK7L
2	Stringers	S1R
2	"	S1L
6	"	S2R
6	"	S2L
2	"	S3R
2	"	S3L
2	"	S4R
2	"	S4L
2	"	S5R
2	"	S5L
6	"	S6R
6	"	S6L
2	"	S7R
2	"	S7L
2	"	S8R
2	"	S8L
2	"	S9R
2	"	S9L
6	"	S10R
6	"	S10L
2	"	S11R
2	"	S11L
2	"	S12R
2	"	S12L
6	"	S13R
6	"	S13L
2	"	S14R
2	"	S14L
6	"	S15
2	"	S16
6	"	Opp Hand S17
2	"	Opp Hand S18
2	"	S19R
2	"	S19L
1	"	S20
1	"	Opp Hand S21
2	"	S22R
2	"	S22L
2	"	S23
2	"	Opp Hand S24
24	"	S25
12	"	S26
1	"	Opp Hand S28

- Rivets ⅞" except as noted
- Open Holes 1" unless noted
- All holes to be subpunched ¾" smaller than diam of Rivet
- All field connections to be subpunched and reamed to a metal templet except holes for lateral Bracing.

BETHLEHEM STEEL COMPANY
Bridge and Fabrication Dept. - - BETHLEHEM, PA.

DETAIL OF Brackets & Stringers
STRUCTURE Claymont Road-Wilmington Del.
CUSTOMER State of Delaware
SHOP PAINT One coat of DuPont Namsate Metal Primer
RIVETS ✓ OPEN HOLES ✓ UNLESS NOTED

DRAWN BY	DATE	CHECKED BY	DATE	SQUAD
VV	1.16.27	CE Gish	1-27-27	CM Woods

REVISIONS	No.	DATE	BY	DESCRIPTION
	R1	3.16.27	VV	Transition Marks.
	R2	3.22.27	VV	Follow general notes for Rivets & Holes.

FILE F5579 CONT. EB4013 DWG. 5

D C B A 1 5 10 A B C D

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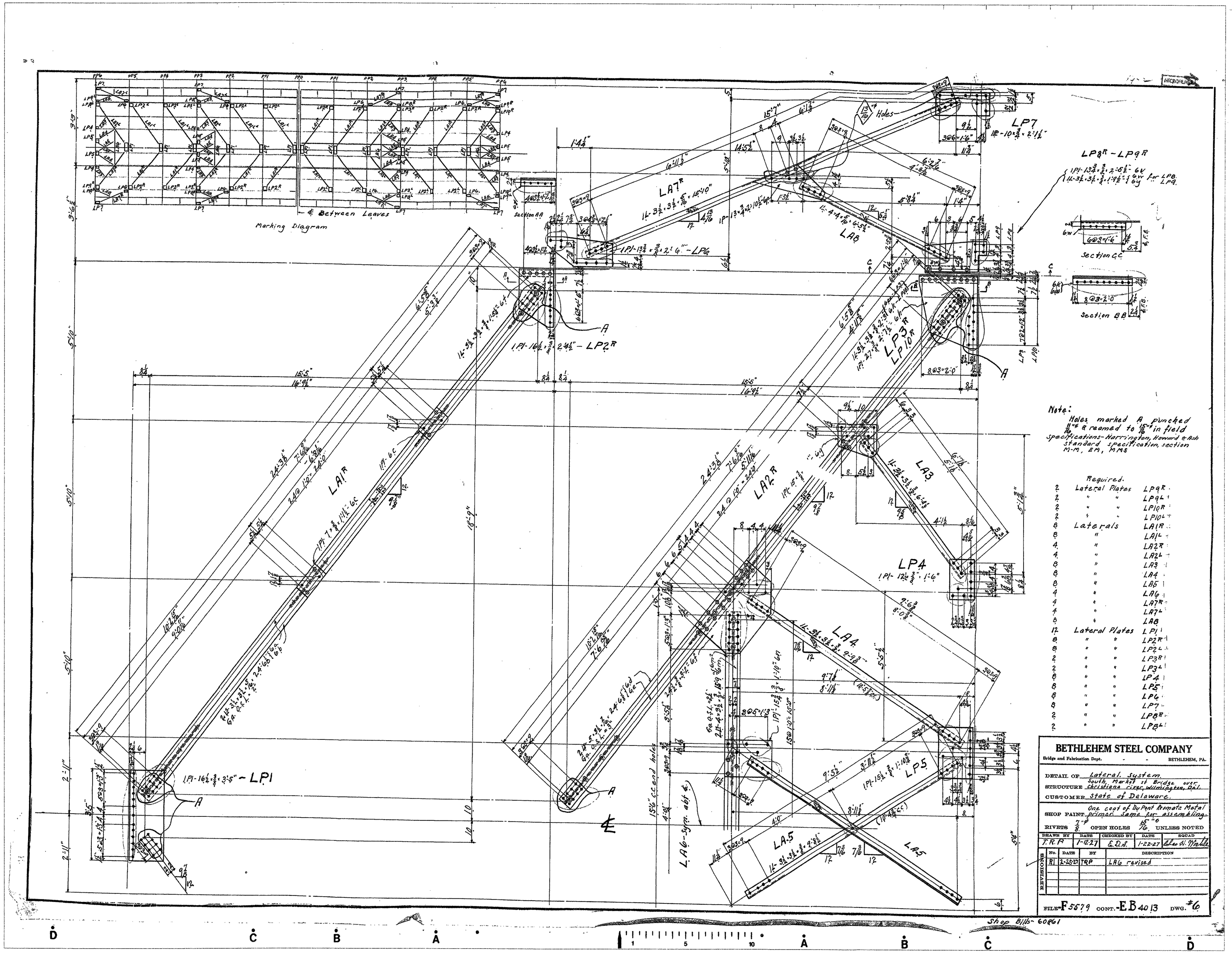

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MODJESKI and MASTERS

DRAWING No. 150 of 169

Name: Cd_053.CAL
Dimensions: 8800 x 6784 pixels

Name: Cd_056.CAL
Dimensions: 8800 x 6784 pixels

BETHLEHEM STEEL COMPANY

Bridge and Structures Dept. — BETHLEHEM, PA.

DETAIL OF Multitrack Frame

STRUCTURE Market St. Bridge-Elevation R. Wilmington

OWNER OF STRUCTURE Dept. of Highways

SHOP PAINT: Primer as per AASHTO M 72 Type II or equivalent, one coat

SHRINKAGE	No.	DATE	BY	DESCRIPTION
	E1	4-21-21	F.L.M.	T-R1-T-R4, T-R5

DRAWN BY	DATE	CHECKED BY	DATE	SCALE
F.L.M.	12-30-20	A.D.K.	1-18-21	As Noted

UNLESS NOTED OTHERWISE: HOLES — OPEN HOLES

FILE# F5579 CONTR. EB 4013 DWG. 9

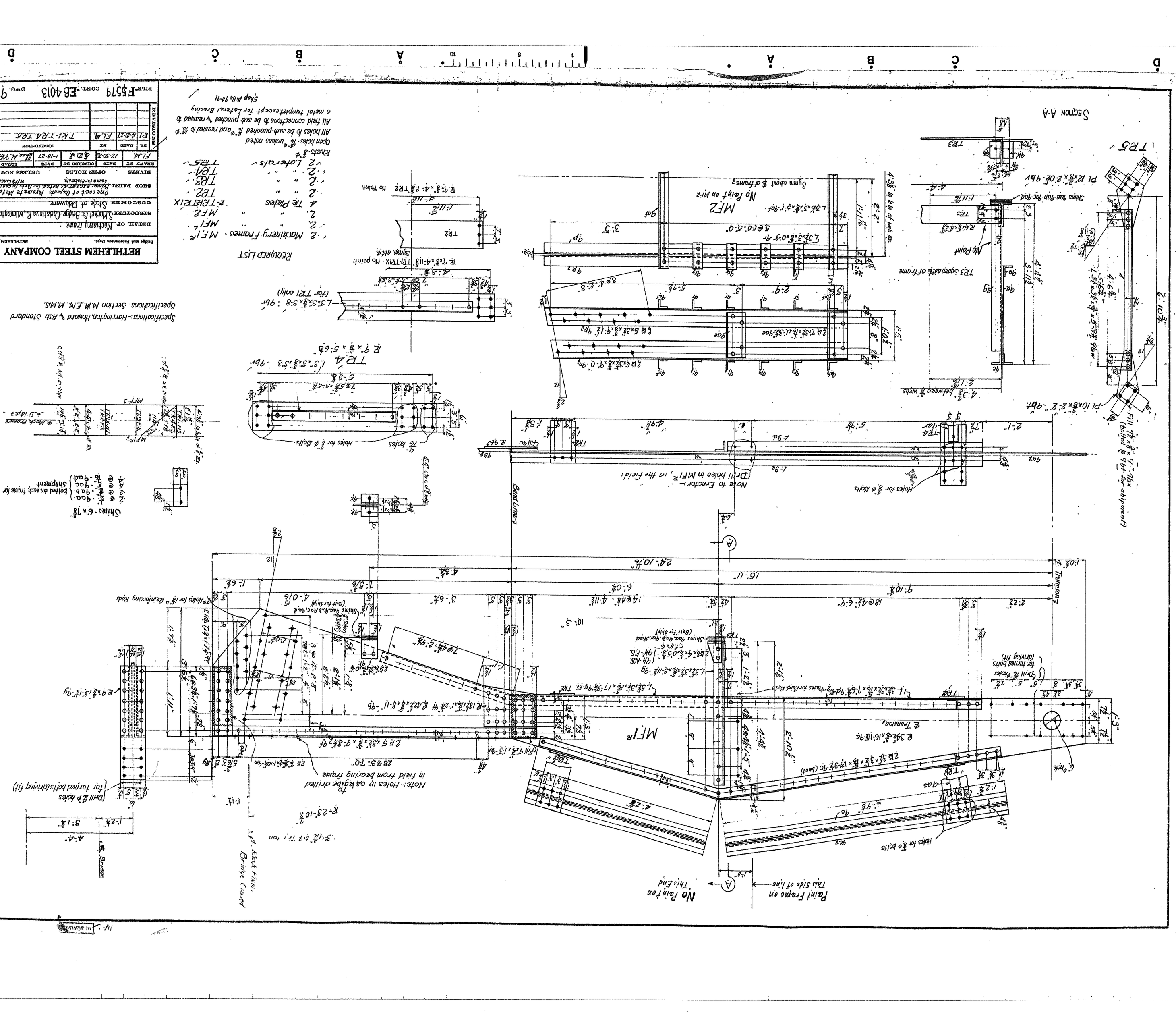
Holes: $\frac{13}{16}$" unless noted
Open holes: $\frac{15}{16}$" unless noted
All holes to be sub-punched $\frac{11}{16}$" and reamed to $\frac{13}{16}$"
All field connections to be sub-punched $\frac{7}{8}$" and reamed to $\frac{15}{16}$"
a metal Templeteceipt for Lateral Bracing

Shop Bills 16-11

REQUIRED LIST

2	Machinery Frames	MF1R
2	" "	MF1
2	" "	MF2
4	Tie Plates	T-TIE PLATE IX
2	" "	TR2
2	" "	TR3
2	" "	TR4
2	Laterals	TR5

Specifications: Harrington, Howard & Ash Standard
Specifications, Section M.M.E.M. M.M.S.



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MODJESKI MASTERS — CONSULTING ENGINEERS

DRAWING No. 151 OF 167

CONTRACT No. 21-074-07

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MODJESKI and MASTERS
CONSULTING ENGINEERS
SINCE 1929

DRAWING No.
152 of 169

TB3.
2-Chans-10-20-7'2"-1ba-1ba²
1-Pl-36-¾-2'5-1bb
2-Le-8-6-¾-3'0-1bc
2-Pls-20-¾-3'8½-1bd
2-" -10-⅞-2'3½-1be
2-Fills-10-½-1'8½-1bf
4-Tie Pls-12-⅜-1'3½-1bg
8-Lat Bars-2½-⅜-1'3½ cc-1bh.

TB2.
2-Chans. 15-33.9#-1'11¾"-1aU
1-Pl-15-¾-2'10½-1aV
2-Le-8-6-¾-1'4⅜-1aW
2-Tie Pls-6-⅜-1'10-1aY
Bolt together for Shipt.

TB1
2-Chans-15-33.9#-3'4"-1an
1-Pl-15-¾-2'10½-1aV
2-Le-8-6-1-1'4⅜-1aS
2-Tie Pls-12-½-1'10-1aT
Bolt together for Shipt.

TB4.
6-Lat Bars-1bh
2-Chans-10-20-9'0¾-1bm-1bm²
7-Lat Bars-1bh

Section AA

Material for Base.
1-Base Pl-34-1-4'0-1e
2-Side Pls-22⅜-½-4'0-1f (Pl fr 23-½)
2-" -23⅛-⅜-1'22-1g (Pl fr 24-⅜)
2-Le-8-8-¾-4'0-1h
1-" -8-8-¾-1'10½-1K
8-" -5-3½-½-1'3-1m
4-" -5-3½-½-0'11½-1n
4-" -4-3½-½-1'0-1P
2-Chans-15-33.9#-1'0-1s
2-Le-6-4-½-1'2½-1f
4-" -4-4-½-0'7-1H
4-Fills-3-½-1'0-1V
4-" -3½-½-0'3⅝-1W

Material for Cap
1-Cap Pl-17-1⅛-2'11½-1ab (Pl. both sides fr. 2')
2-Side Pls-27⅛-⅜-3'7-1ac (Pl fr 28-⅜)
1-" -20½-⅜-1'11⅝-1ad (Pl fr 21-⅜)
1-" -20½-⅜-1'12⅛-1ae
2-Le-8-6-½-1'3-1af
4-Le-5-3½-½×1'2-1ag
4-Fills-5-½-0'7⅛-1ah
1-L-8-4-½-1'9½-1ak (Cut fr 8-6)

Required List
2-Trunnion Cols-TC1R
2-" " TC1L
4-Col Braces-TB1.
4-" " TB2.
4-" " TB3. To be riveted
4-" " TB4. to Cols in field before Col is placed in position.

Cols. are to be filled with concrete.
Cols. are to be painted on the outside only.

All Holes to be sub punched 13/16 dia and reamed to 15/16 dia.
Specifications:- Harrington, Howard & Ash. Standard Specifications:- Sec. M-M.

BILLS - B310-B311

BETHLEHEM STEEL COMPANY
Bridge and Fabrication Dept. - - BETHLEHEM, PA.

DETAIL OF Trunnion Cols. & Braces
STRUCTURE South Market Street Bridge over Christiana River - Wilmington, Del.
CUSTOMER State of Delaware.
SHOP PAINT 1 Coat of DuPont's Kromdemeta/ Apply to Clean Surface Primer. No paint to parts in contact with concrete
RIVETS ⅞ OPEN HOLES 15/16 UNLESS NOTED

DRAWN BY	DATE	CHECKED BY	DATE	SQUAD
T.G.M.	12-21-26	E.D.S.	1-13-27	Adm. & Wks.

REVISIONS No.	DATE	BY	DESCRIPTION
R1	(1787)	T.G.M.	Ducts Inbetweens of Girders.

FILE F5579 CONT EB4014 DWG. 1

Name: Cd_058.CAL
Dimensions: 8800 x 6784 pixels

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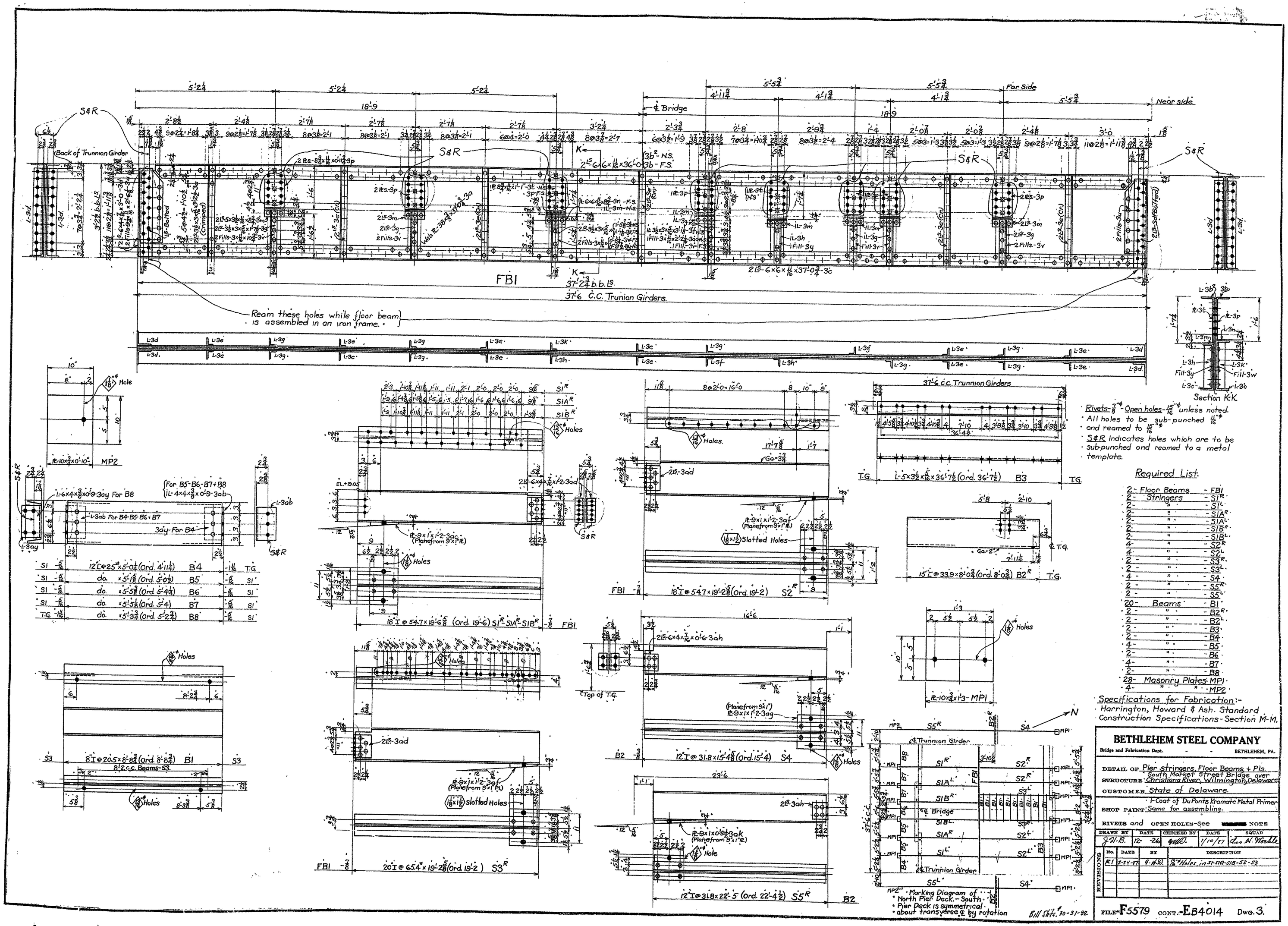
MODJESKI and MASTERS
Consulting Engineers
SINCE 1893
DRAWING No.
153 of 169

Name: Cd_059.CAL
Dimensions: 8800 x 6784 pixels

CONTRACT No. 21-074-07
REPRODUCED
ORIGINAL SHOP DRAWING
INCLUDED FOR INFORMATIONAL PURPOSES
MODJESKI and MASTERS
DRAWING No. 154 of 169



Rivets - 7/8" - Open holes - 15/16" unless noted.
All holes to be sub-punched and reamed to 15/16"
S&R indicates holes which are to be sub-punched and reamed to a metal template.

Required List:

2 -	Floor Beams	- FBI
2 -	Stringers	- S1R
2 -	"	- S1L
2 -	"	- S1AR
2 -	"	- S1AL
2 -	"	- S1BR
2 -	"	- S1BL
4 -	"	- S2R
4 -	"	- S2L
2 -	"	- S3R
2 -	"	- S3L
4 -	"	- S4
2 -	"	- S5R
2 -	"	- S5L
20 -	Beams	- B1
2 -	"	- B2R
2 -	"	- B2L
2 -	"	- B3
4 -	"	- B4
4 -	"	- B5
2 -	"	- B6
4 -	"	- B7
2 -	"	- B8
28 -	Masonry Plates	MP1
4 -	"	" MP2

Specifications for Fabrication:-
Harrington, Howard & Ash. Standard Construction Specifications-Section M-M.

BETHLEHEM STEEL COMPANY
Bridge and Fabrication Dept. - - BETHLEHEM, PA.

DETAIL OF Pier Stringers, Floor Beams + Pls.
STRUCTURE South Market Street Bridge over Christiana River, Wilmington, Delaware.
CUSTOMER State of Delaware.
SHOP PAINT 1 Coat of DuPonts Kromote Metal Primer
Same for assembling.
RIVETS and OPEN HOLES-See ■■■■ NOTE

DRAWN BY	DATE	CHECKED BY	DATE	SQUAD
J.H.B.	12-26	[illegible]	1/10/27	Chas. N. Hewitt

REVISIONS	No.	DATE	BY	DESCRIPTION
	R1	2-21-27	[illegible]	3/4" Holes in S1-S1A-S1B-S2-S3

FILE-F5579 CONT.-EB4014 Dwg. 3.

Bill Sht. 30-31-32

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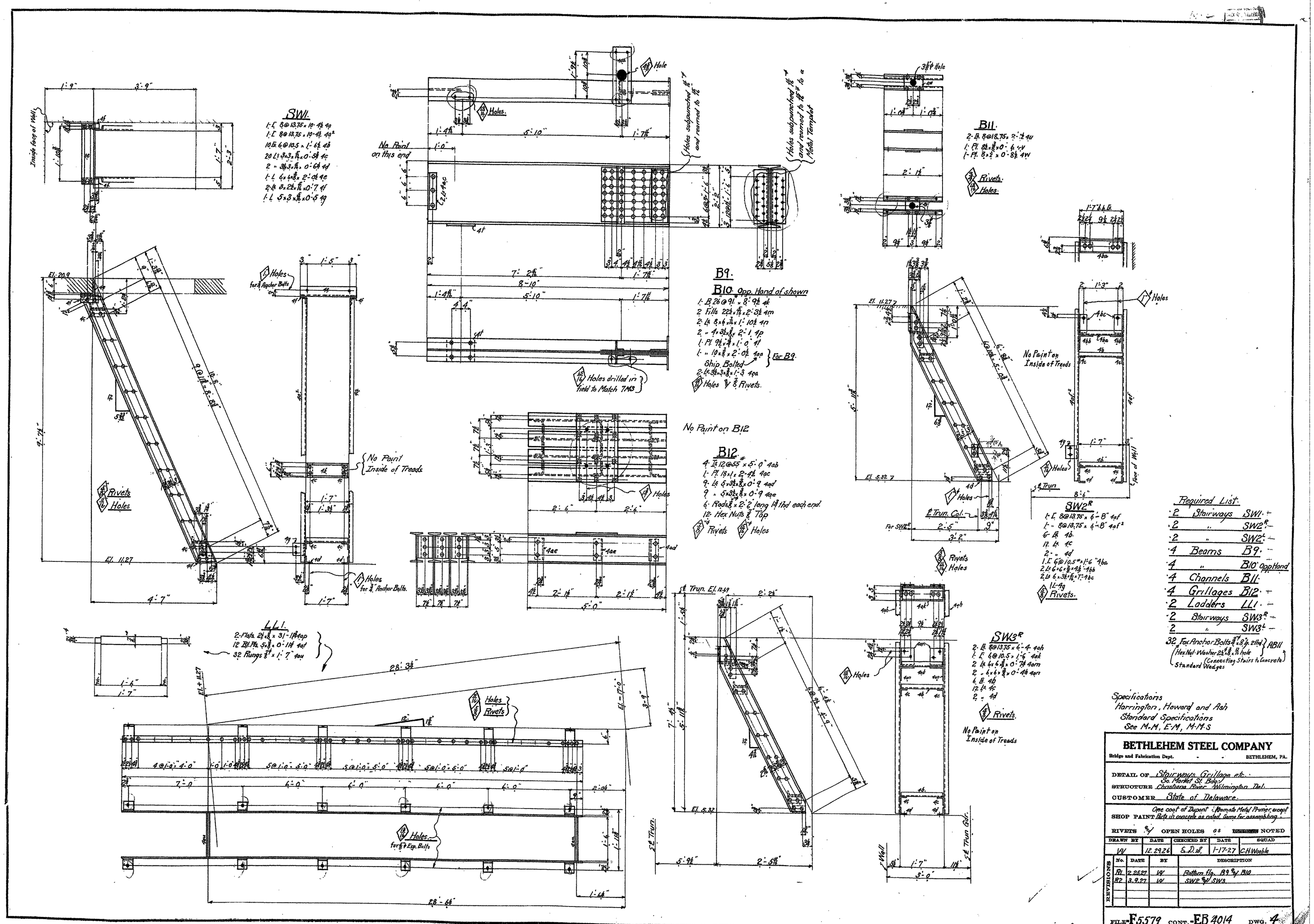

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DRAWING No. 155 of 1409

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DRAWING No. 156 of 169

BETHLEHEM STEEL COMPANY

Bridge and Fabrication Dept. BETHLEHEM, PA.

DETAIL OF Machinery Supports & Railing

STRUCTURE-So. Market St. Bridge Christiana River Wilmington Del.

CUSTOMER State of Delaware

SHOP PAINT- One coat of DuPont Kromate Metal Primer. Same for assembling. Except as shown for parts in contact with concrete.

RIVETS 3/4 OPEN HOLES 13/16 UNLESS NOTED

DRAWN BY	DATE	CHECKED BY	DATE	SQUAD
W	1.4.27	Railing by E.D.L. G.W.D.	2-15-27	C.H. Weeble

REVISIONS No.	DATE	BY	DESCRIPTION

FILE-F5579 CONT.-EB4014 DWG.6

Specifications Harrington Howard & Ash standard specifications section M.M. E.M. M.M.S.

Name: Cd_063.CAL
Dimensions: 8800 x 6784 pixels

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DRAWING No.
157 of 169

Name: Cd_064.CAL
Dimensions: 8800 x 6784 pixels

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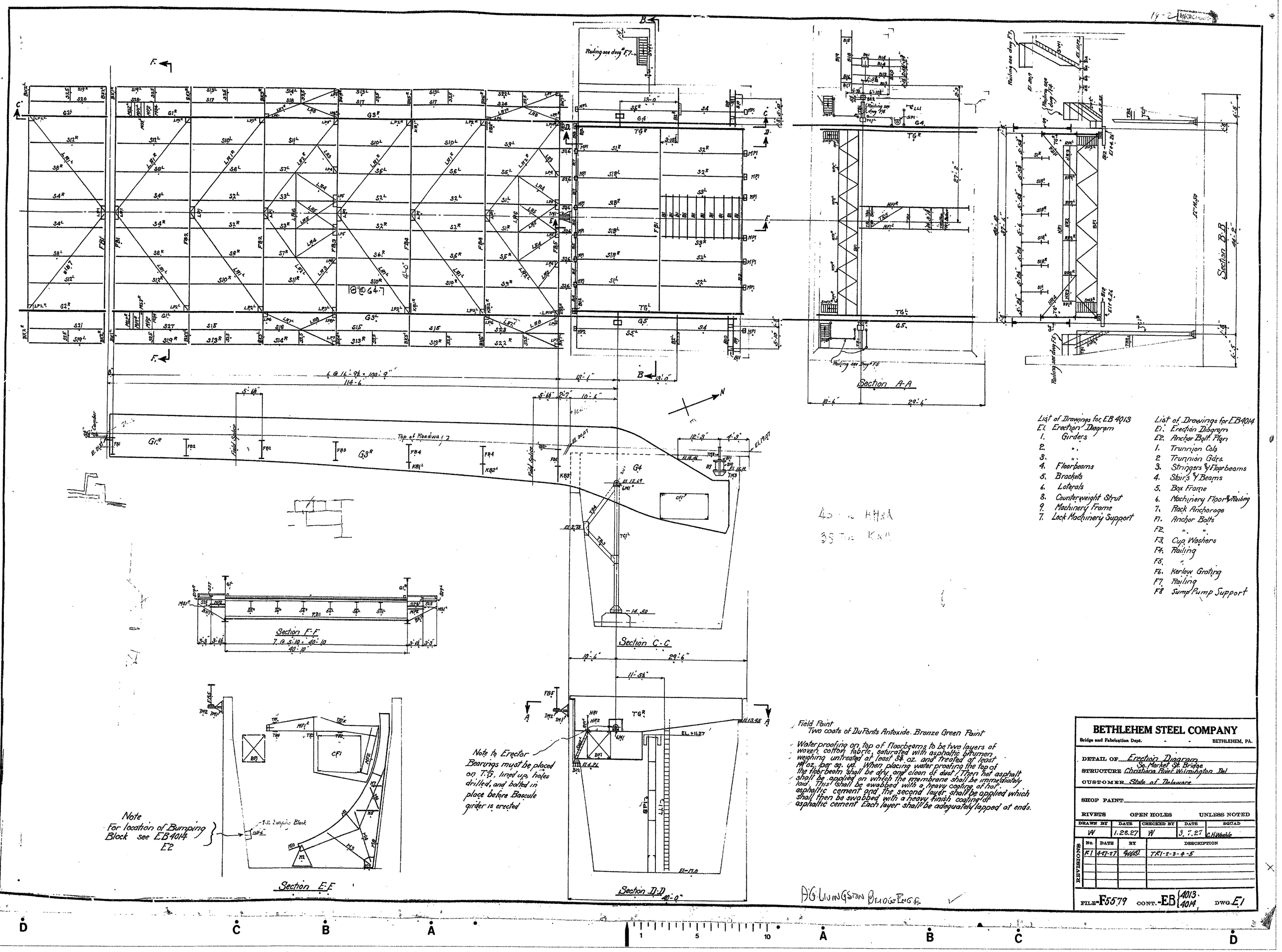
158 of 169

Name: Cd_065.CAL
Dimensions: 8800 x 6784 pixels



List of Drawings for EB 4013
E1. Erection Diagram
1. Girders
2. "
3. "
4. Floorbeams
5. Brackets
6. Laterals
8. Counterweight Strut
9. Machinery Frame
7. Lock Machinery Support

List of Drawings for EB4014
E1. Erection Diagram
E2. Anchor Bolt Plan
1. Trunnion Cols
2. Trunnion Gdrs.
3. Stringers & Floorbeams
4. Stairs & Beams
5. Box Frame
6. Machinery Floor & Railing
7. Rack Anchorage
F1. Anchor Bolts
F2. " "
F3. Cup Washers
F4. Railing
F5. "
F6. Kerlow Grating
F7. Railing
F8. Sump Pump Support

Field Paint
Two coats of DuPonts Antoxide. Bronze Green Paint

Waterproofing on top of Floorbeams to be two layers of woven cotton fabric, saturated with asphaltic bitumen weighing untreated at least 3# oz. and treated at least 14# oz. per sq. yd. When placing water proofing the top of the floorbeam shall be dry and clean of dust. Then hot asphalt shall be applied on which the membrane shall be immediately laid. This shall be swabbed with a heavy coating of hot asphaltic cement and the second layer shall be applied which shall then be swabbed with a heavy finish coating of asphaltic cement. Each layer shall be adequately lapped at ends.

A.G. Livingston Bridge Engr.

BETHLEHEM STEEL COMPANY
Bridge and Fabrication Dept. - - BETHLEHEM, PA.

DETAIL OF Erection Diagram
STRUCTURE So. Market St. Bridge Christiana River Wilmington Del
CUSTOMER State of Delaware

SHOP PAINT

RIVETS OPEN HOLES UNLESS NOTED

DRAWN BY	DATE	CHECKED BY	DATE	SQUAD
W	1.28.27	W	3.7.27	C.H. Webb

REVISIONS No.	DATE	BY	DESCRIPTION
R1	4-27-27	[illegible]	TR1-2-3-4-5

FILE-F5579 CONT.-EB 4013 4014 DWG. E1

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Name: Cd_066.CAL
Dimensions: 8800 x 6784 pixels

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ORIGINAL SHOP DRAWING
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DRAWING No. 100 of 167

MODJESKI-MASTERS
Consulting Engineers

Solenoid Brake Type AI-167-M

100 H.P.-220 v.-3Phase-60 Cycles 680 R.P.M. Type CI Motor Frame 7564-D W.E. & M'f'g. Co.

Grundy Flexible Coupling #12, Foote Bros. Co., Chicago

℄ Motor

Cutter-Hammer Type "FS" - Size #16, Motor Operated Brake Shims {12M9 · 12M10 ·

Support-8B2

℄ Trunnion Girder

℄ Bascule Girder

Shims-12M8

Shims-12M9

Shims-12M4

Shims-12M5

Shims-12M6

Shims-12M12

Machinery For North Leaf

Machinery for South Leaf is symmetrical about transverse ℄ of Bridge by rotation

Note to Erector:
· Trunnion Bearing in Trunnion Girder must be placed, and holes drilled for holding down bolts, before Bascule Girder is placed.

Section C-C.

℄ of Trunnion

Section E-E.

South Leaf

North Leaf

℄ Between Leaves

Elevation G-G.

Motor Coupling-Grundy #12

EL. +12.69

Top of Floor

10" Beth. I.

Section D-D

Base of Motor

Sect. H-H.

Long ℄ of Bridge

Trap door

Hole in Grid

Key-M1

Shims 12M12

Furnished with Motor by W.E. & M'f'g. Co.

Foote Bros. Chicago, Worm Gear Reducer IXL, Style 15W, Ratio-34 to 1.

PLAN

Section F-F

3HP-870 R.P.M. Type CS Motor Frame 284-C (Totally Enclosed) 220 V.-3 Phase-60 Cycles W.E. & M'f'g. Co.

Center Lock is symmetrical about Longitudinal ℄ of Bridge.

Longitudinal ℄ Bridge

Note to Erector:- Holes in structural steel support for bearing 8M1 are to be drilled in the field from a templet

2.5% Grade → Down

℄ Trunnion EL+12.69

25'-0 Pitch R. of Rack

Section B-B

(Note to Erector: Concrete for Counter weight must be poured before machinery is erected)

End View-A-A.

Sect. K-K.

Section M-M

Assembly of Live Load Adjustment.

List of Drawings

Basic
1- Rack & Gearing
2- Gearing
3- "
4- Center Lock.
5- Lock Details
6- Trunnion Shaft & Brgs.
7- Wind Castings & Adj. Dt'ls.
8- Bearing Frame
9- Bearing Frame
10- " "
11- Shafting
12- Shims.
13- Gear Guards.
F4- Motor Bolts.
F1- Pedestals
F2- Wrenches
F3- Alemite Gun.
+ E1- Operating Machinery.

List of Gearing.

Assem Mark.	No. Teeth	Pitch Dia.	Face	Remarks.
1M1	15	26.241"	11"	20° Inv. Cut teeth
1M2	13	25'-0"	11 5/8"	Rack
1M3	14	25'-0"	11 5/8"	Rack
2M1	64	60.161"	10"	" " "
2M2	14	15.597"	13 3/8"	" " "
2M3	52	41.380"	5 1/2"	" " "
2M4	17	15.628"	7 1/8"	" " "
2M5	32	41.380"	5 1/2"	" " "
2M6	18	16.824"	7 1/8"	" " "
3M1	17	13.528"	4 1/2"	" " "
3M2	33	26.241"	4 1/2"	" " "
3M3	14	7.789"	4"	" " "
3M4	48	26.736"	3"	" " "
3M5	17	8.10"	5"	Link Belt SR Chain
3M6	40	19.09"	5"	" " "
3M8	25	7.958"	1 1/8"	20° Inv. Cut teeth
3M9	64	30.375"	7 1/8"	" " "
3M10	18	8.736"	1 1/2"	" " "
3M11	16 Teeth	—	1 1/2"	Rack

BETHLEHEM STEEL COMPANY
Bridge and Fabrication Dept. - BETHLEHEM, PA.

DETAIL OF OPERATING MACHINERY
STRUCTURE SOUTH MARKET STREET BRIDGE OVER CHRISTIANA RIVER-WILMINGTON, DEL.
CUSTOMER STATE OF DELAWARE
SHOP PAINT

RIVETS OPEN HOLES UNLESS NOTED

DRAWN BY	DATE	CHECKED BY	DATE	SQUAD
J.N.B.	12-31-26	[illegible]	2-18-27	

REVISIONS	No.	DATE	BY	DESCRIPTION
	1	6-11-27	[illegible]	Lock Motor Changed.
	2	9-28-27	H.K.K.	Operating Mech. Bevel Gear Bearing Frame Changed.

FILE-F5579 CONT.-E.B4015 DWG.E1.

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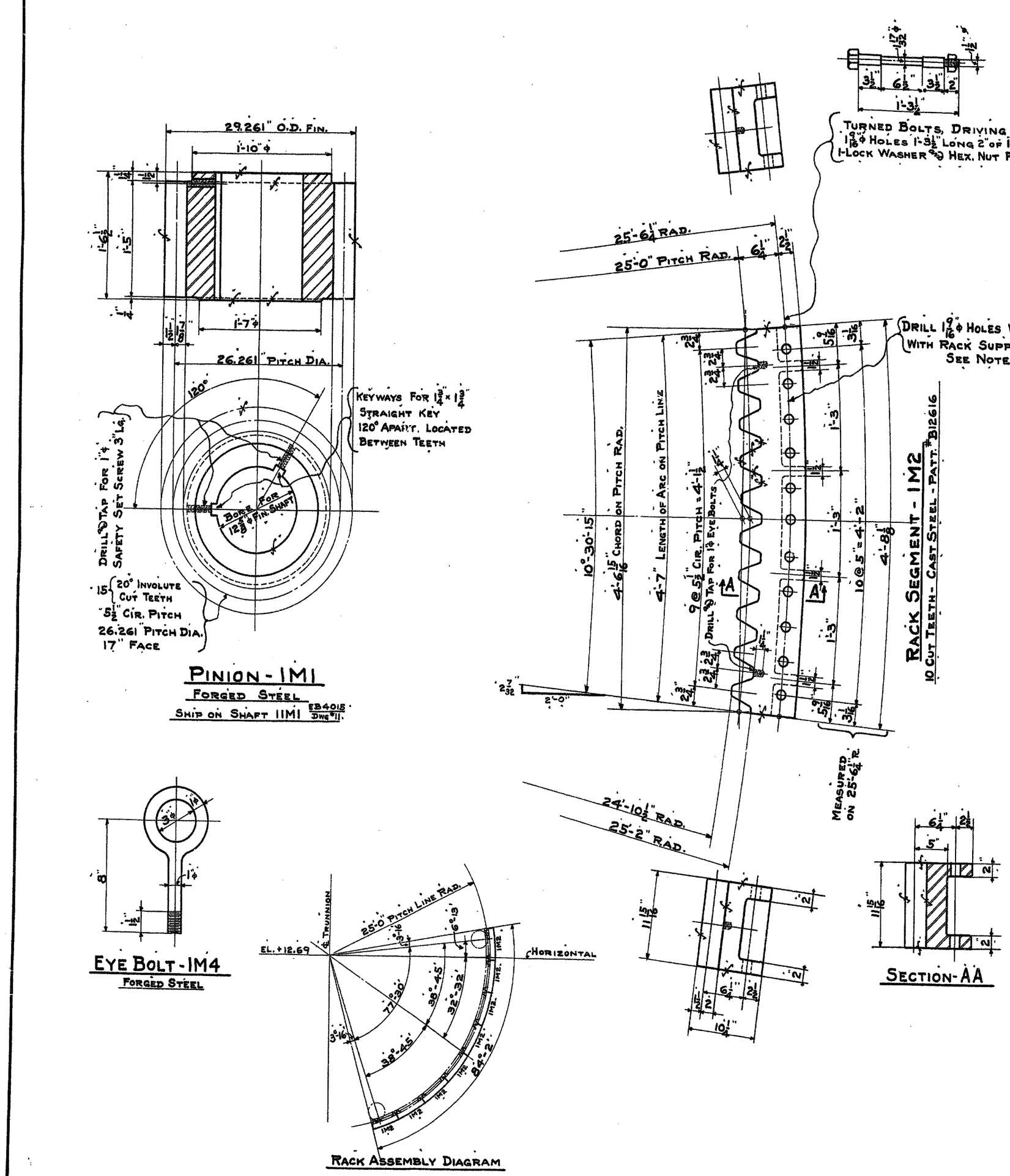

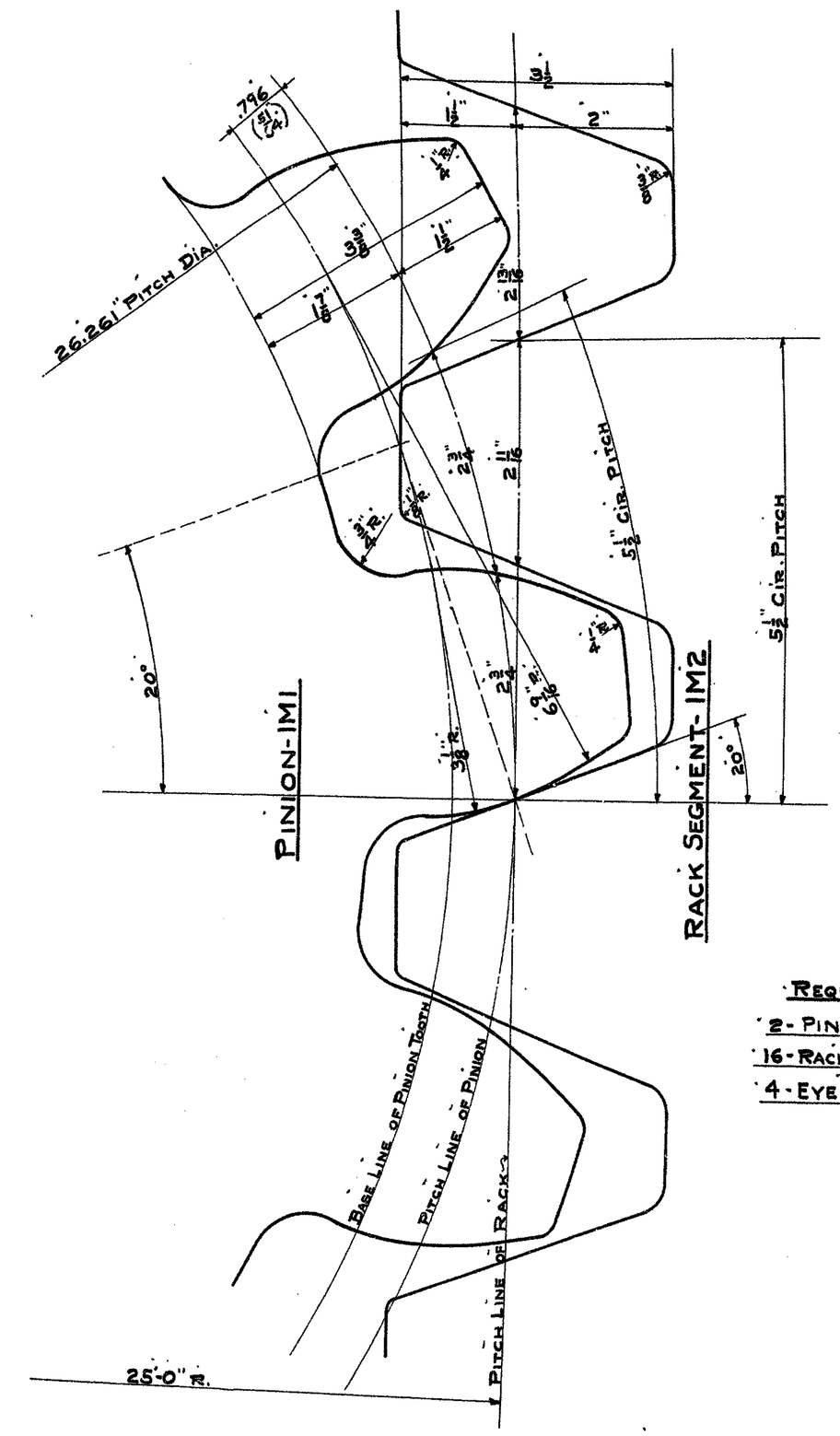

Required List
2 - Pinions — 1M1
16 - Rack Segments - 1M2
4 - Eye Bolts — 1M4

Note:- Rack Castings & its Supporting Frame Shall Be Assembled in Shop & Holes Drilled, Ship Assembled. All Forgings & Steel Castings To Be Thoroughly Annealed. Rack & Pinion To Have 20° Involute Machine Cut Teeth & Pitch Line To Be Scribed on Both Sides of Teeth. All Nuts To Be Faced on Bearing Surfaces. Specifications:- H.H. & A. Sec. MM-MMS-EM Except as Modified By Special Spec.

This Drawing Supersedes Drwg of Same Number.

BETHLEHEM STEEL COMPANY
Bridge and Fabrication Dept. - - BETHLEHEM, PA.

DETAIL OF Rack and Pinion
STRUCTURE South Market Street Bridge over Christiana River Wilmington Del.
CUSTOMER State of Delaware
SHOP PAINT On: Coat of DuPont's Kromate Metal Primer. Machine Surfaces Coated With White Lead & Tallow
RIVETS ~~~ OPEN HOLES ~~~ UNLESS NOTED

DRAWN BY	DATE	CHECKED BY	DATE	SQUAD
R.V.K.	3/1/27	[illegible]	3-1-27	[illegible]

REVISIONS No.	DATE	BY	DESCRIPTION
R1	3/1/27	R.V.K.	This Drwg. Supersedes Dwg. of Same No.

FILE F5579 CONT. EB4015 DWG. 1

CONTRACT No. 21-074-07
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DRAWING No. 1161 of 1169
MODJESKI and MASTERS Consulting Engineers SINCE 1880

Name: Cd_068.CAL
Dimensions: 8800 x 6784 pixels

CONTRACT No. 21-074-07

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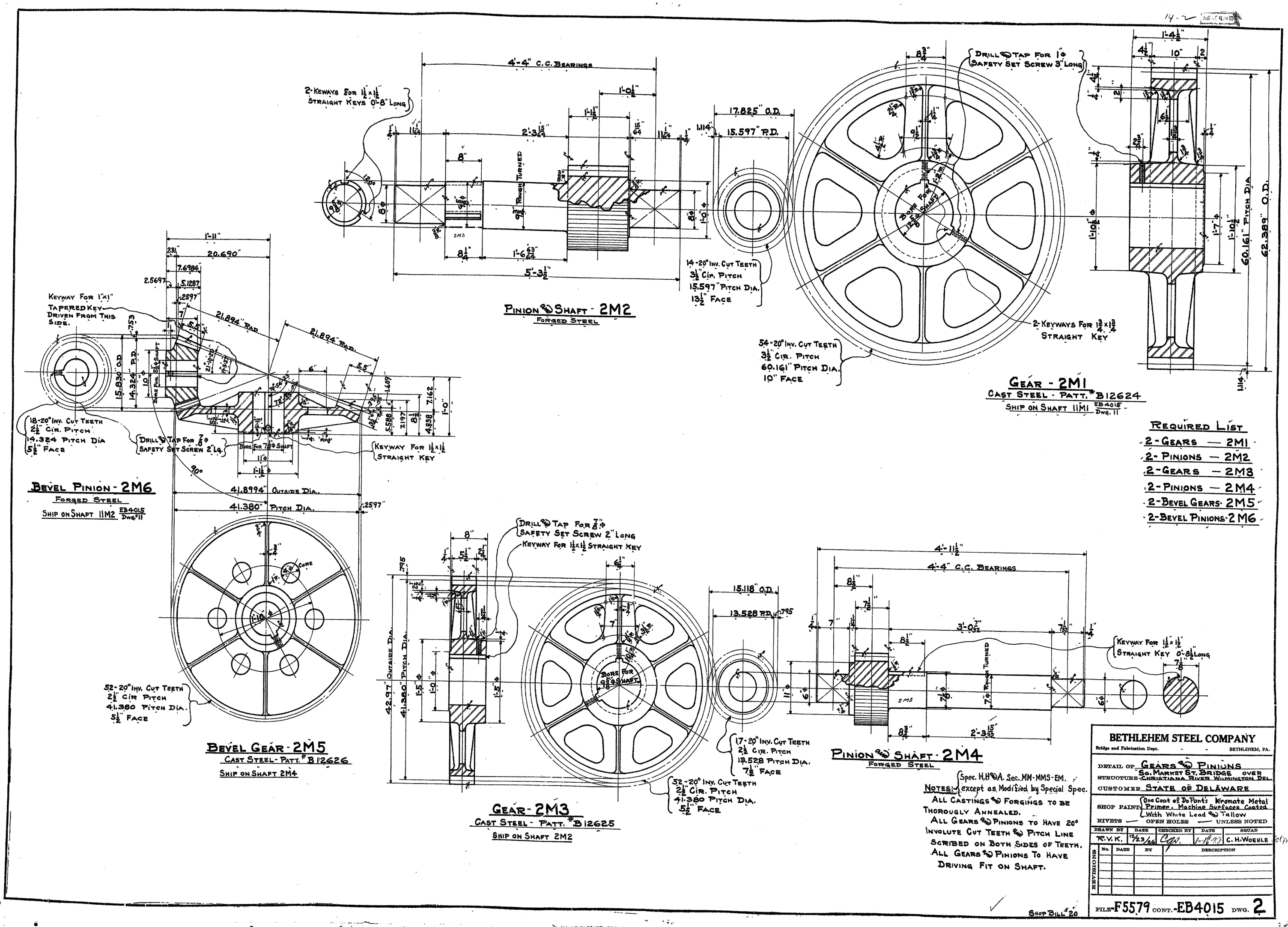
DRAWING No. 102 of 109

MODJESKI and MASTERS
CONSULTING ENGINEERS



Required List

- 2-Gears — 2M1
- 2-Pinions — 2M2
- 2-Gears — 2M3
- 2-Pinions — 2M4
- 2-Bevel Gears - 2M5
- 2-Bevel Pinions - 2M6

Spec. H.H.D.A. Sec. MM-MMS-EM. except as Modified by Special Spec.

Notes:

All Castings & Forgings to be Thoroughly Annealed.

All Gears & Pinions to Have 20° Involute Cut Teeth & Pitch Line Scribed on Both Sides of Teeth.

All Gears & Pinions To Have Driving Fit on Shaft.

Shop Bill 20

BETHLEHEM STEEL COMPANY
Bridge and Fabrication Dept. - - BETHLEHEM, PA.

DETAIL OF Gears & Pinions
STRUCTURE So. Market St. Bridge over Christiana River Wilmington Del.
CUSTOMER State of Delaware
SHOP PAINT One Coat of DuPont's Kromatic Metal Primer, Machine Surfaces Coated With White Lead & Tallow
RIVETS — OPEN HOLES — UNLESS NOTED

DRAWN BY	DATE	CHECKED BY	DATE	SQUAD
R.W.K.	12/23/20	Copy	1-11-21	C. H. WOEHLE

REVISIONS	No.	DATE	BY	DESCRIPTION

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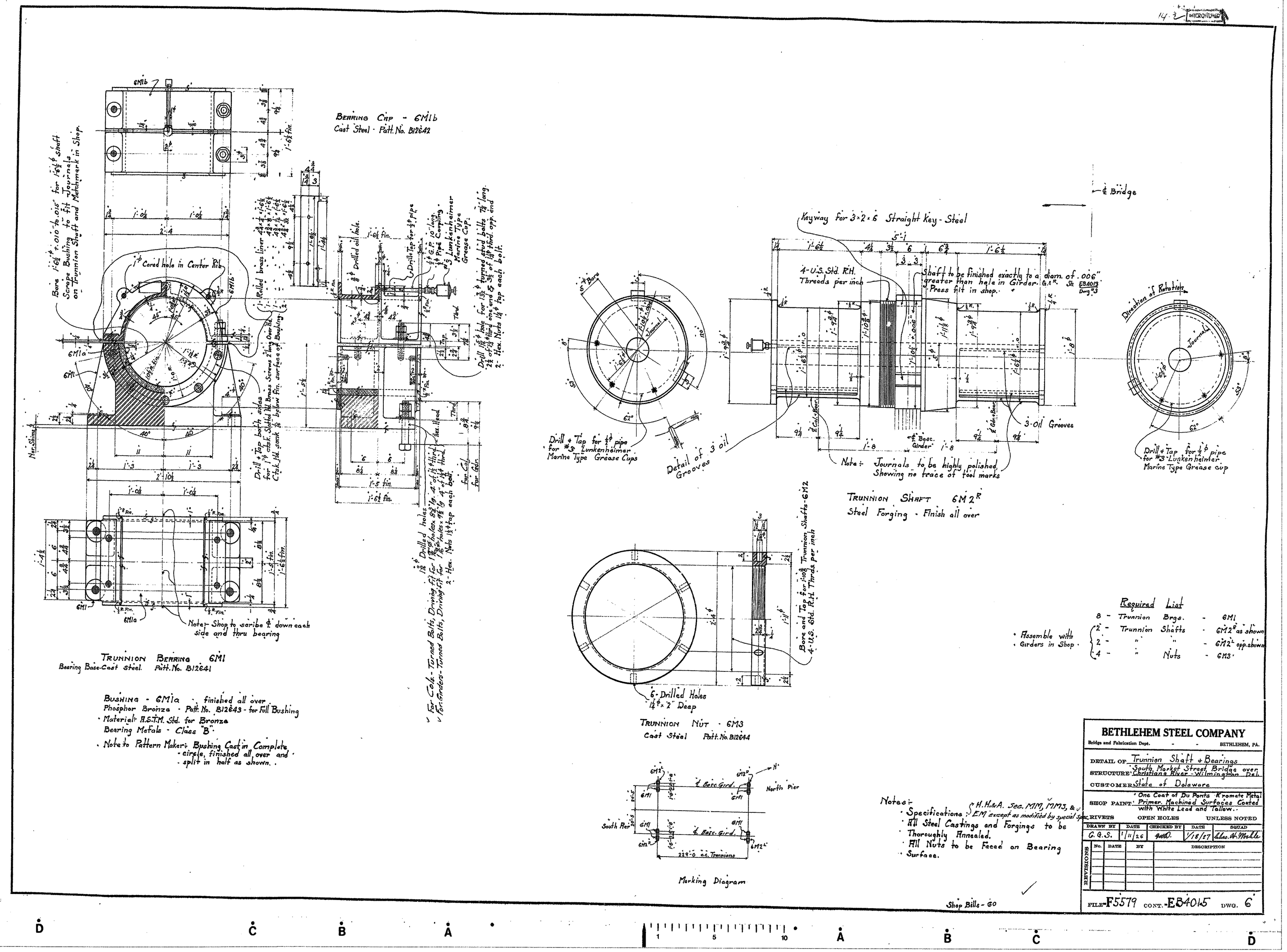

CONTRACT No. 21-074-07
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MODESKI and MASTERS
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