STATE OF ILLINOIS

McHENRY COUNTY HIGHWAY DEPARTMENT

WEST SOLON ROAD

RICHMOND ROAD DISTRICT

BRIDGE PROJECT 251

INDEX OF SHEETS

1. COVER SHEET
2. SUMMARY OF QUANTITIES & TYPICAL CROSS SECTION
3. PLAN AND PROFILE
4.-9. BRIDGE PLANS

See PROPOSAL BOOKLET for STANDARDS:

2113-2
2230-13
2298-5
2299-9
2300-2
2336-3
2340-3
BLR 21

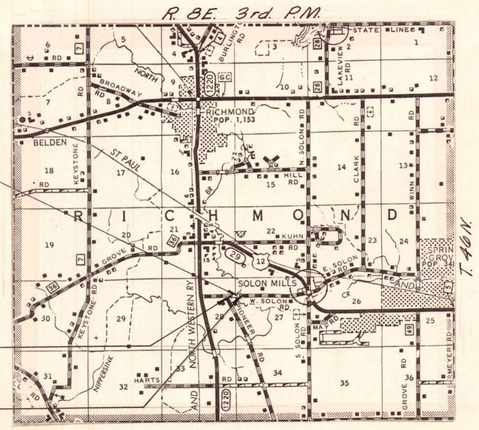
SCALES

PLAN	1 INCH = 50 FEET
PROFILE HORIZ.	1 INCH = 50 FEET
PROFILE VERT.	1 INCH = 5 FEET

Sta 10+03 Special Bridge Design
Precast prestressed concrete deck beam bridge. Three spans @ 28'-0".
27'-0" f.f. rail. Skew = 0°

Improvement Begins
Sta. 9+50

Improvement Ends
Sta. 10+56



N

LAYOUT

Approximate Scale: 1 Inch = 1 Mile

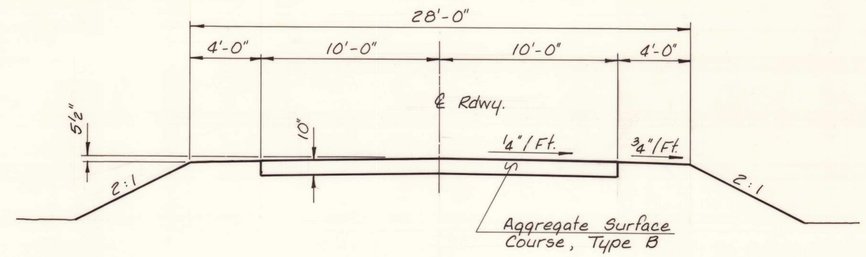
Net Length of Section = 106.0 Feet = 0.020 Miles

056-3142

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
T.R. 45		McHENRY	9	2
FED. ROAD DIST. NO. 7		ILLINOIS	PROJECT	

SUMMARY OF QUANTITIES

ITEM	UNIT	QUANTITY
TREE REMOVAL (6 TO 15 INCH DIAMETER)	IN. DIA.	14
CHANNEL EXCAVATION	CU. YD.	430
AGGREGATE SURFACE COURSE, TYPE B	TON	30
REMOVAL OF EXISTING STRUCTURES	EACH	1
CLASS X CONCRETE	CU. YD.	29.8
PRECAST PRESTRESSED CONCRETE DECK BEAMS (17" DEPTH)	SQ. FT.	2,268
REINFORCEMENT BARS	POUND	4,010
FURNISHING CONCRETE PILES	LIN. FT.	445
DRIVING CONCRETE PILES	LIN. FT.	445
TEST PILE CONCRETE	EACH	1
NAME PLATES	EACH	1
STEEL RAILING, TYPE S-1	LIN. FT.	170
TRAFFIC BARRIER TERMINAL, TYPE 1A	EACH	2
TRAFFIC BARRIER TERMINAL, TYPE 5A	EACH	2



Class Y Design

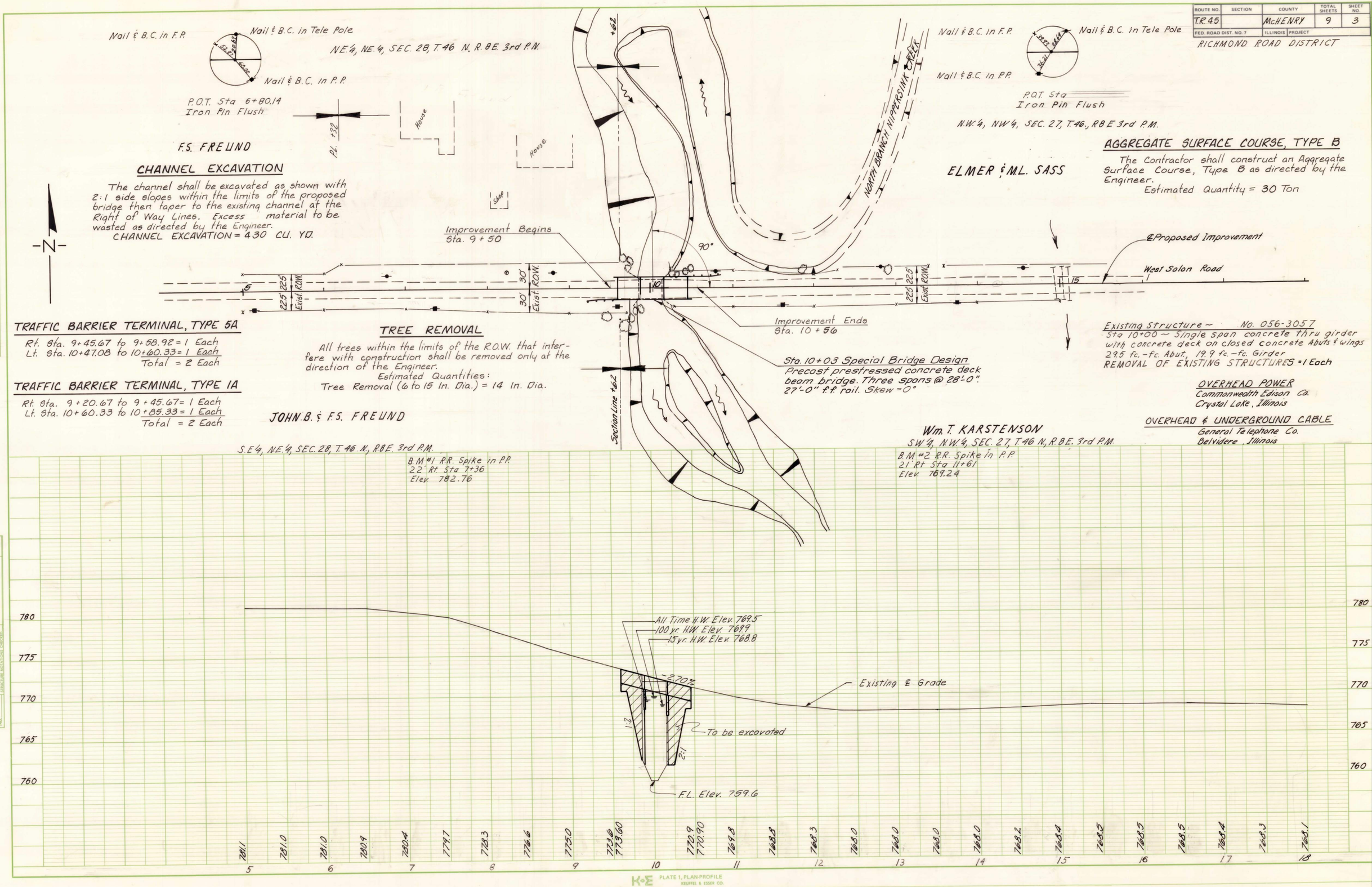
Current A.D.T. less than 150

TYPICAL CROSS SECTION

Sta. 9+50 to 9+60 &
Sta. 10+46 to 10+56

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
T.R. 45		McHENRY	9	3
FED. ROAD DIST. NO. 7		ILLINOIS	PROJECT	

RICHMOND ROAD DISTRICT

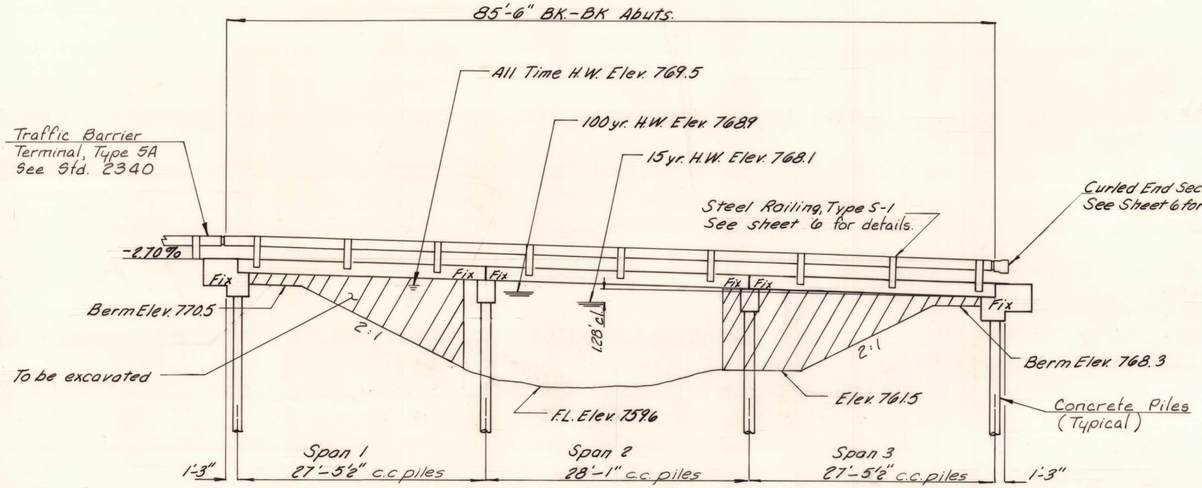


PLAN NOTE BOOK No. 056-1 — SURVEYED — PLOTTED — ALIGNMENT CHECKED — RT. OF WAY CHECKED — BY W.R. — DATE 11-30-79

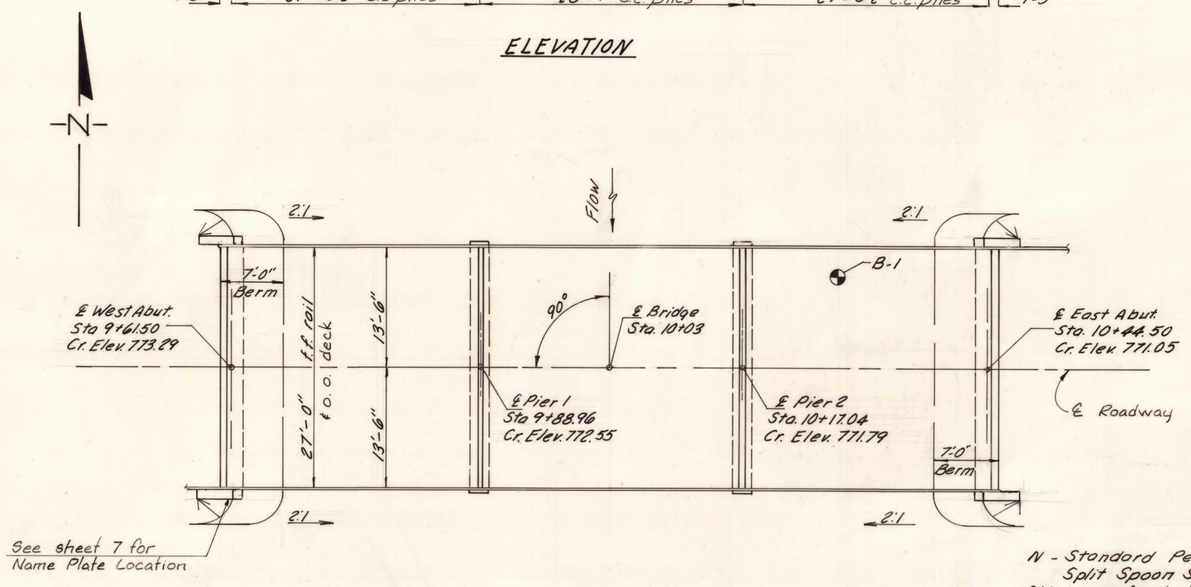
PROFILE NOTE BOOK No. — SURVEYED — PLOTTED (Kirsch) — GRADES CHECKED — B.M.'s NOTED — STRUCTURE NOTATIONS CHECKED — BY Dave M. — DATE 2/18/80

K+E PLATE 1, PLAN-PROFILE KEUFFEL & ESSER CO. 48 7024 MADE IN U.S.A.

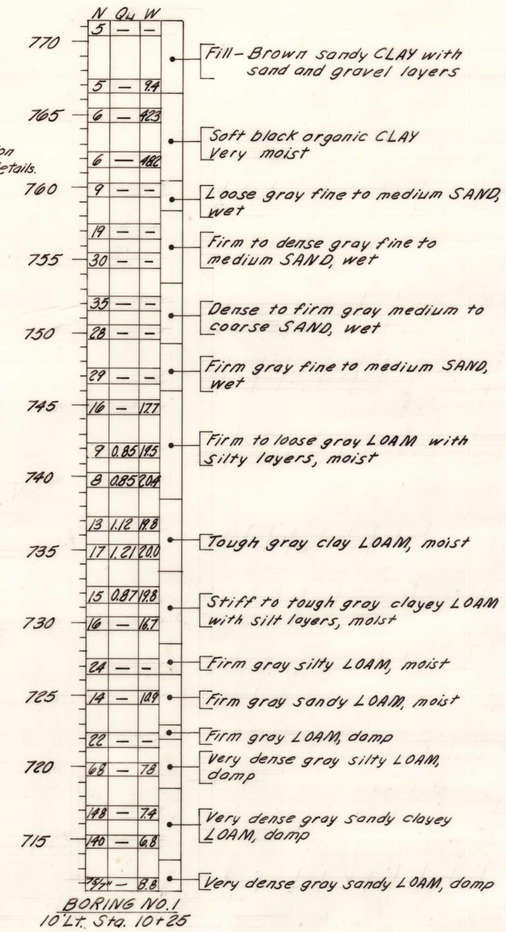
ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
T.R. 45		McHENRY	9	4
FED. ROAD DIST. NO. 7		ILLINOIS	PROJECT	



ELEVATION



PLAN



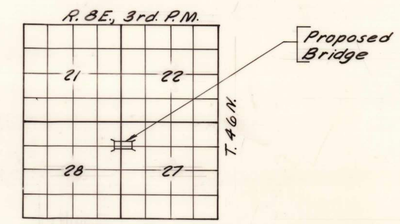
BORING NO. 1
10' Lt. Sta. 10+25

BORING DATA

N - Standard Penetration Test ~ Blows per foot to drive 2" O.D. Split Spoon Sampler 12" with 140# hammer falling 30".
QU - Unconfined Compressive Strength ~ Tons/sq. ft.
W - Water Content ~ percentage of oven dry weight ~ %.

GENERAL NOTES

The Contractor shall drive one concrete test pile in a permanent location at Pier 1 as directed by the Engineer before ordering the remainder of the piles.



LOCATION PLAN

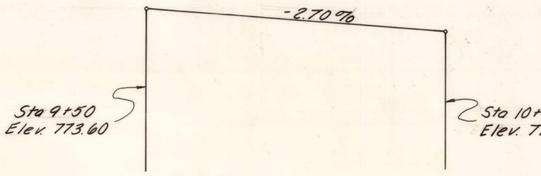
STRUCTURE NO. 056-3142
NORTH BRANCH NIPPERSINK CREEK
WEST SOLON ROAD BUILT 198_
RICHMOND ROAD DISTRICT
McHENRY COUNTY
LOADING HS 20

LETTERING FOR NAME PLATE

See Std. 2113

TOTAL BILL OF MATERIAL

ITEM	UNIT	SUPER	SUB	TOTAL
Precast Prestressed Concrete Deck Beams (17" Depth)	Sq. Ft.	2,268		2,268
Class X Concrete	Cu. Yd.		29.8	29.8
Reinforcement Bars	Pounds		4,010	4,010
Steel Railing, Type S-1	Lin. Ft.	170		170
Name Plates	Each		1	1
Concrete Piles	Lin. Ft.		445	445
Test Pile Concrete	Each		1	1



PROFILE GRADE

WATERWAY DATA

Drainage Area	68.1 Sq. Mi.
Existing Opening (15 yr.)	250 Sq. Ft.
Req'd Opening (15 yr.)	367 Sq. Ft.
Proposed Opening (15 yr.)	367 Sq. Ft.
East Approach	500 ± Sq. Ft.
Design Discharge (15 yr.)	1,610 C.F.S.
Created Head (15 yr.)	0.0 Ft. < 0.5'
Computed Discharge (100 yr.)	2,490 C.F.S.
Created Head (100 yr.)	0.0 Ft < 1.0'

East approach to remain low water approach

DESIGN STRESSES

f'c = 5,000 psi (Prestressed Beams)
f'ci = 4,000 psi (Prestressed Beams)
f'c = 1,400 psi (Class X Concrete)
fsi = 189,000 (Prestressed Strands)
fs = 20,000 psi (Reinf. Bars -- Fields Units)
fy = 60,000 psi (Reinf. Bars -- Precast Units)
f's = 270,000 psi (Prestressed Strands)
n = 9 (Class X Concrete)
Loading HS 20-44
Design Specifications: 1977 AASHTO 1978, 1979 & 1980 Interims
25#/Sq. Ft. included in dead load for future wearing surface.

Fred J. Stone Jr.
ILLINOIS STRUCTURAL NO. 2934

FRED J. STONE, JR. REGISTERED STRUCTURAL ENGINEER ILLINOIS

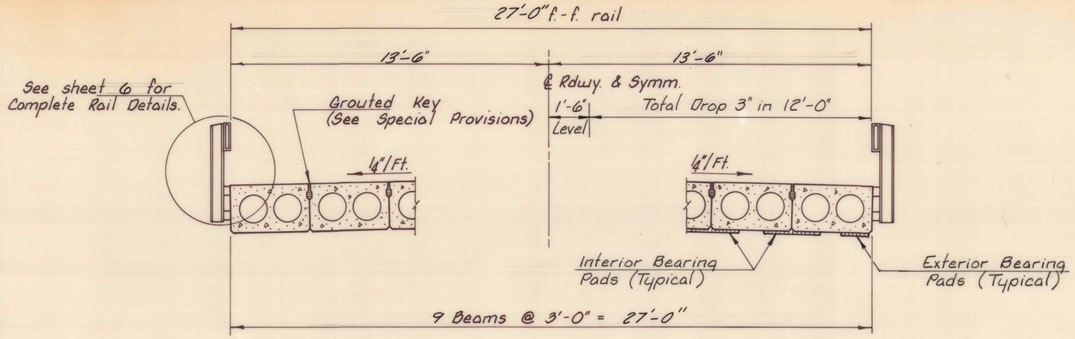
GENERAL PLAN & ELEVATION
WEST SOLON ROAD
RICHMOND ROAD DISTRICT
McHENRY COUNTY
STATION 10+03

COLLINS AND RICE
CONSULTING ENGINEERS

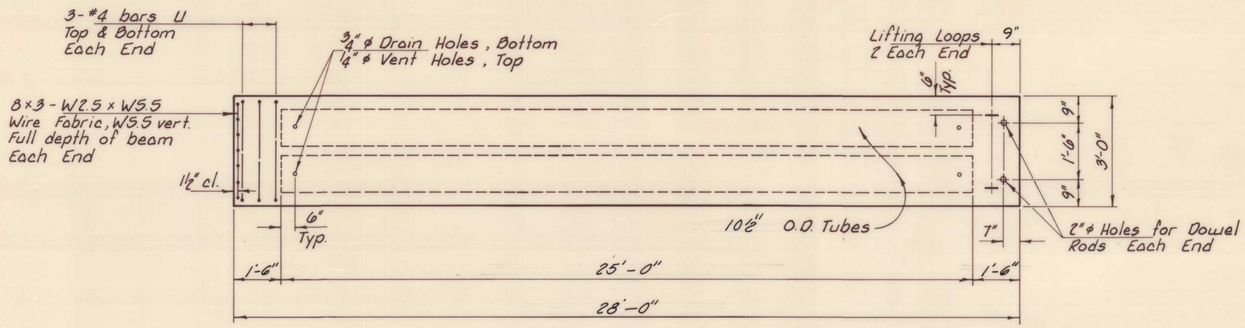
DESIGNED F.S. CHECKED T.S.
DRAWN W.R DATE 6-19-81 NO. 1516

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
T.R. 45		McHENRY	9	5
FED. ROAD DIST. NO. 7		ILLINOIS PROJECT		

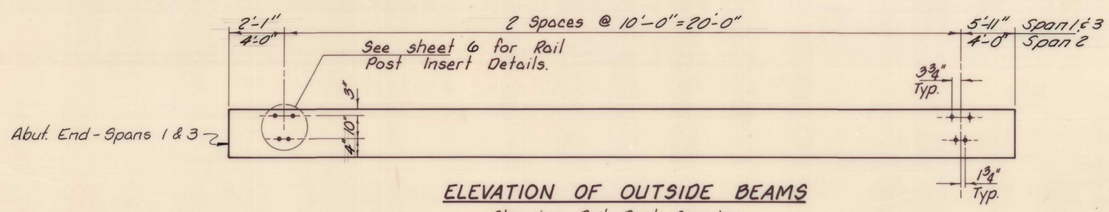
NOTE: Omit key on exterior face of outside beams.



CROSS SECTION

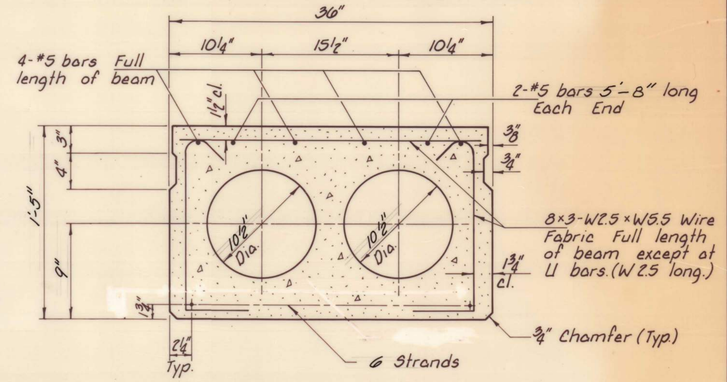


TYPICAL PLAN OF BEAMS



ELEVATION OF OUTSIDE BEAMS

Showing Rail Post Spacing



TYPICAL SECTION THRU BEAM

6 - ½"ϕ Strands Stressed to 28,900 Lbs. Each.
Place strands symmetrically about ℄ of beam.
Use Standard Grid Pattern.

NOTES

Prestressing steel shall be non-galvanized high strength, stress-relieved 7-wire strand, Grade 270.

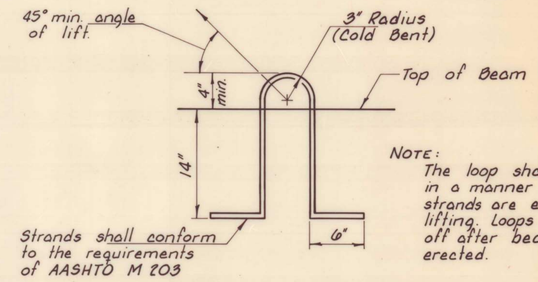
The nominal diameter shall be ½", and the nominal cross-sectional area shall be 0.153 sq. in.

Lifting loops shall be 7-wire stress-relieved, 2-½"ϕ - 270 ksi strands.

Reinforcement bars shall conform to AASHTO: M-31 or M-53, Grade 60.

The bearing seat surfaces shall be adjusted by shimming to assure firm and even bearing. Two ⅛" fabric adjusting shims of the dimensions of the Exterior Bearing Pad shall be provided for each bearing.

A Calcium Nitrite Corrosion Inhibitor, as covered in the Special Provisions, shall be used in the concrete for precast prestressed concrete deck beams.



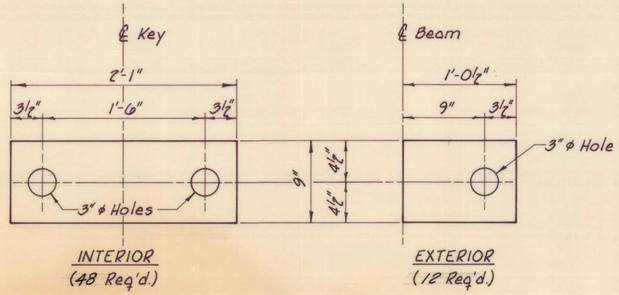
NOTE: The loop shall be formed in a manner such that all strands are engaged during lifting. Loops shall be burned off after beams have been erected.

LIFTING LOOP DETAIL

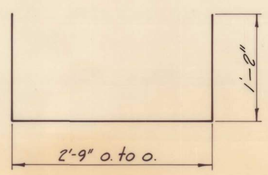
Approved alternate may be substituted for the above.

BILL OF MATERIAL

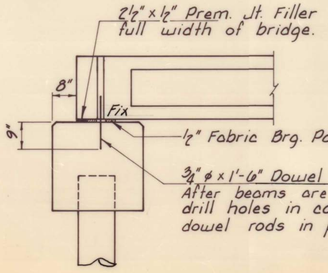
ITEM	UNIT	QUANTITY
Precast Prestressed Concrete Deck Beams (17" Depth)	Sq. Ft.	2,268



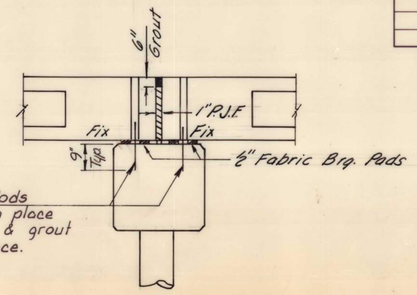
BEARING PAD DETAILS



BAR U



SECTION AT ABUTMENTS



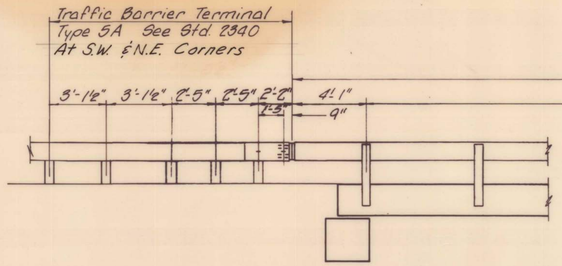
SECTION AT PIERS

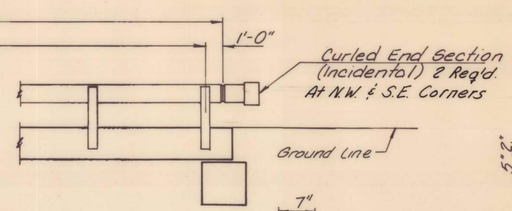
SUPERSTRUCTURE
WEST SOLON ROAD
RICHMOND ROAD DISTRICT
McHENRY COUNTY
STATION 10+03

COLLINS AND RICE
CONSULTING ENGINEERS

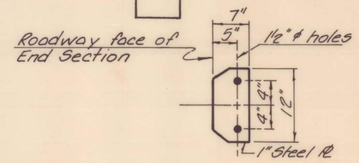
DESIGNED F.S. CHECKED T.S.
DRAWN W.R. DATE 6-19-81 NO. 1516

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
T.R. 45		McHENRY	9	6
FED. ROAD DIST. NO. 7		ILLINOIS PROJECT		

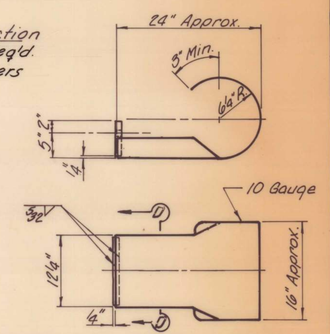




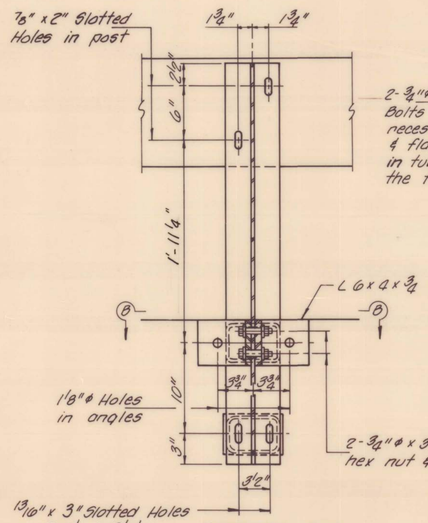
ELEVATION



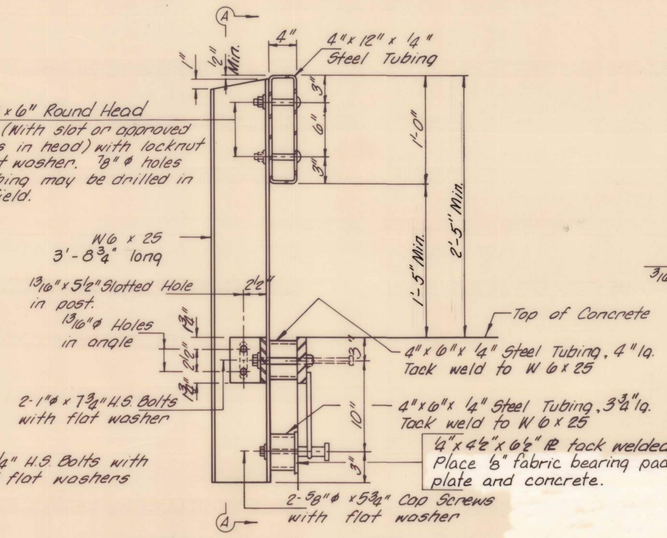
SECTION D-D



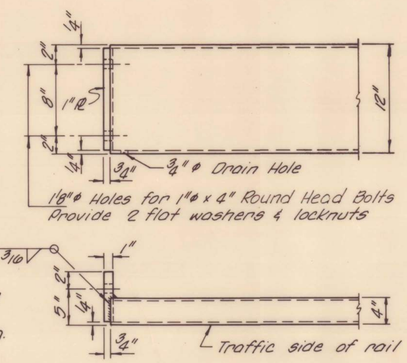
CURLED END SECTION DETAILS



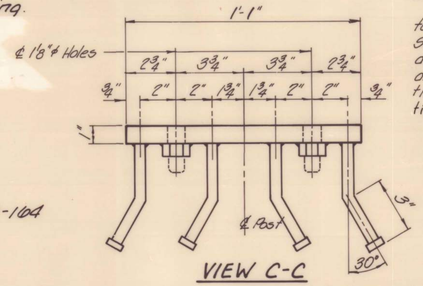
SECTION A-A



SECTION AT RAIL POST



END OF RAIL DETAILS



VIEW C-C

NOTES

Hollow structural steel tubing shall conform to the requirements of A.S.T.M. designation A-500 Grade B Structural Steel Tubing.

All other steel shapes and plates shall conform to the requirements of A.A.S.H.T.O. designation M-183 except posts and angles shall conform to A.A.S.H.T.O. M-223, Grade 50.

Bolts, cap screws, and nuts shall conform to the requirement of A.S.T.M. designation A-307 except for high strength bolts, nuts and washers noted which shall conform to A.A.S.H.T.O. designation M-164.

All bolts, nuts, cap screws, washers and lockwashers shall be galvanized in accordance with A.A.S.H.T.O. designation M-232.

All posts, railing, rail splices, anchor devices and angles shall be galvanized after shop fabrication in accordance with A.S.T.M. A-385 and A.A.S.H.T.O. M-111. Galvanized rail shall not be painted.

Railing shall be in accordance with Section 508 of the Standard Specifications, except as noted, and shall be paid for at the contract unit price per lineal foot for STEEL RAILING, TYPE S-1.

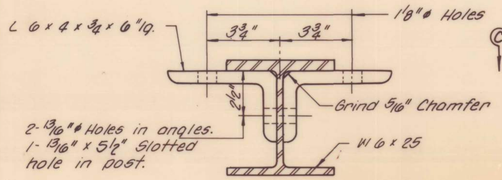
All field drilled holes shall be coated with an approved zinc rich paint before erection.

For multi-span bridges, sufficient ¼" x 6" x 1'-4" galvanized steel shims shall be provided to align rail between adjacent spans. Cost incidental to Steel Railing.

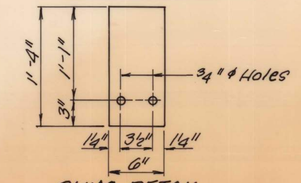
The ¾"ϕ high strength bolts used to connect the 6 x 4 x ¾ angles to the post shall be tightened in accordance with Art. 507.04(g)(3) of the Standard Specifications. The 1"ϕ high strength bolts connecting the angles to the concrete shall be tightened to a snug fit and given an additional ⅛ turn. The ⅝"ϕ cap screws in bottom of post shall be tightened to a snug fit only, after the ¾"ϕ high strength bolts have been tightened in accordance with Article 507.04 (g) (3).

BILL OF MATERIAL

Item	Unit	Quantity
Steel Railing, Type S-1	Lin. Ft.	170

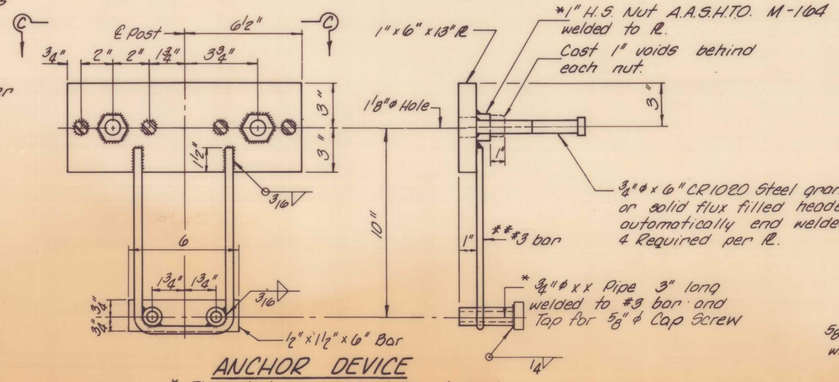


SECTION B-B



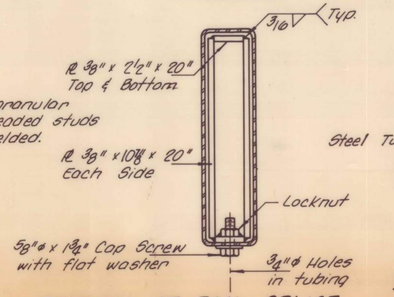
SHIM DETAIL

** Whenever the lower insert assemblies interfere with strand locations, the #3 bars shall be cut and adjusted in order to allow raising or lowering of the lower inserts. Maximum adjustment not to exceed ½".

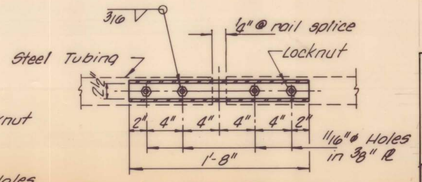


ANCHOR DEVICE

* Threaded areas shall be plugged or blocked off during casting of beam.



SECTION AT RAIL SPLICE



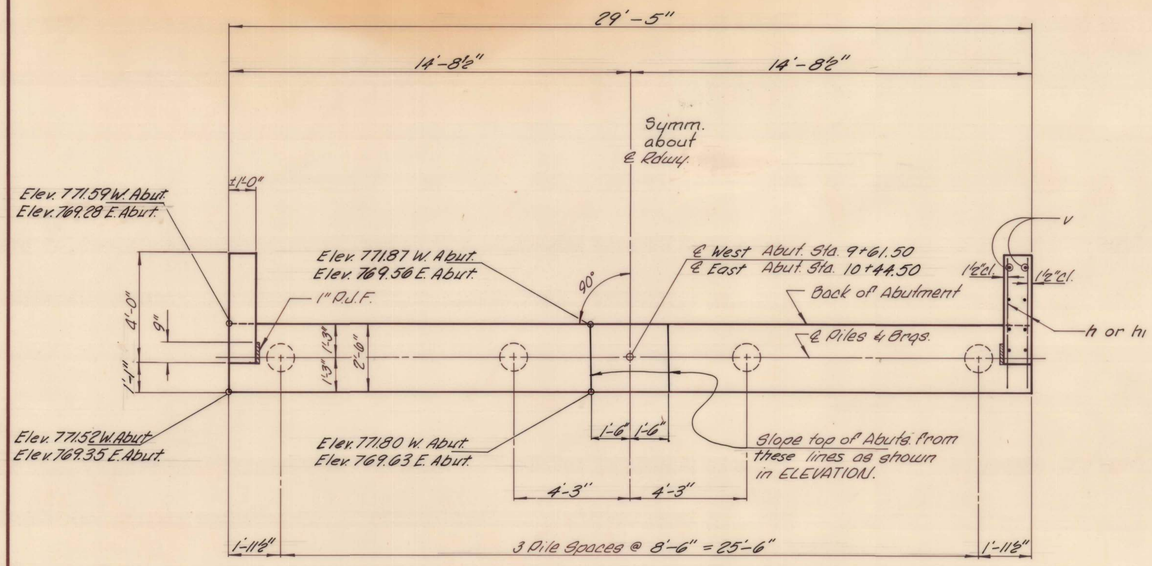
PLAN - BOTT. SPLICE Pl.

RAILING DETAILS
WEST SOLON ROAD
RICHMOND ROAD DISTRICT
McHENRY COUNTY
STATION 10+03

COLLINS AND RICE
CONSULTING ENGINEERS

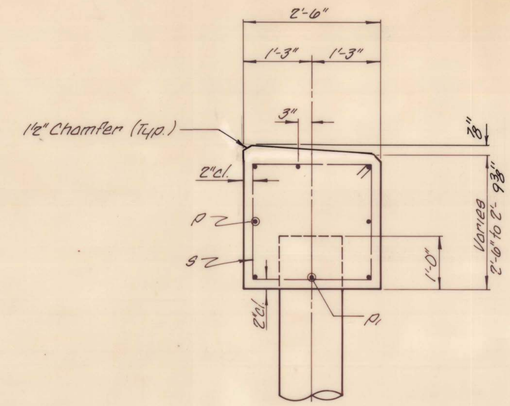
DESIGNED F.S. CHECKED T.S.
DRAWN W.R. DATE 6-19-81 NO. 1516

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
T.R. 45		McHENRY	9	7
FED. ROAD DIST. NO. 7		ILLINOIS	PROJECT	

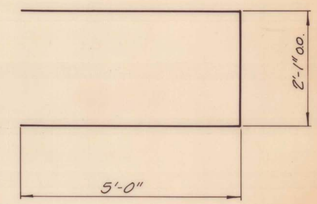


PLAN

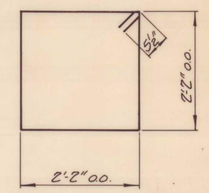
Note: Elevations given in Plan are to top of cap.



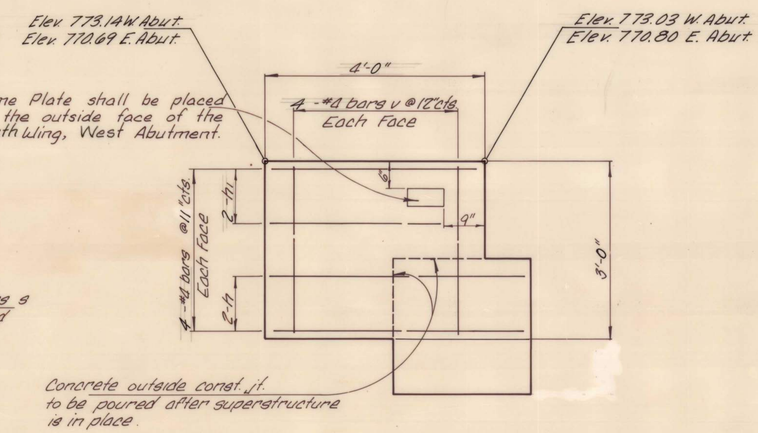
SECTION A-A



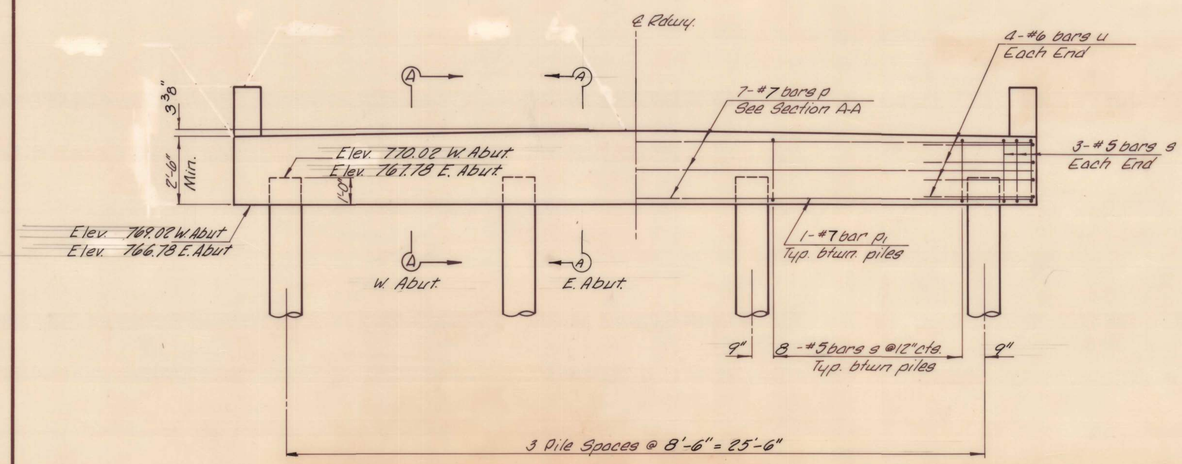
BAR u



BAR s



ELEVATION - WING



ELEVATION

BILL OF MATERIALS - 2 ABUTS.

BAR	NO.	SIZE	LENGTH	SHAPE
h	16	#4	4'-10"	
h1	16	#4	3'-9"	
p	14	#7	29'-1"	
p1	6	#7	7'-1"	
s	60	#5	9'-7"	
u	16	#6	12'-1"	
v	32	#4	2'-9"	
Class X Concrete			Cu. Yd.	15.9
Reinforcement Bars			Pound	1,960
Name Plates			Each	1
Concrete Piles			Lin. Ft.	200

See Sheet 9 for concrete pile alternates

PILE DATA

Type _____ Concrete
No. Req'd. (2 Abuts.) _____ 8
Capacity _____ 25 Tons / Pile
Est. Length _____ 25 Feet / Pile

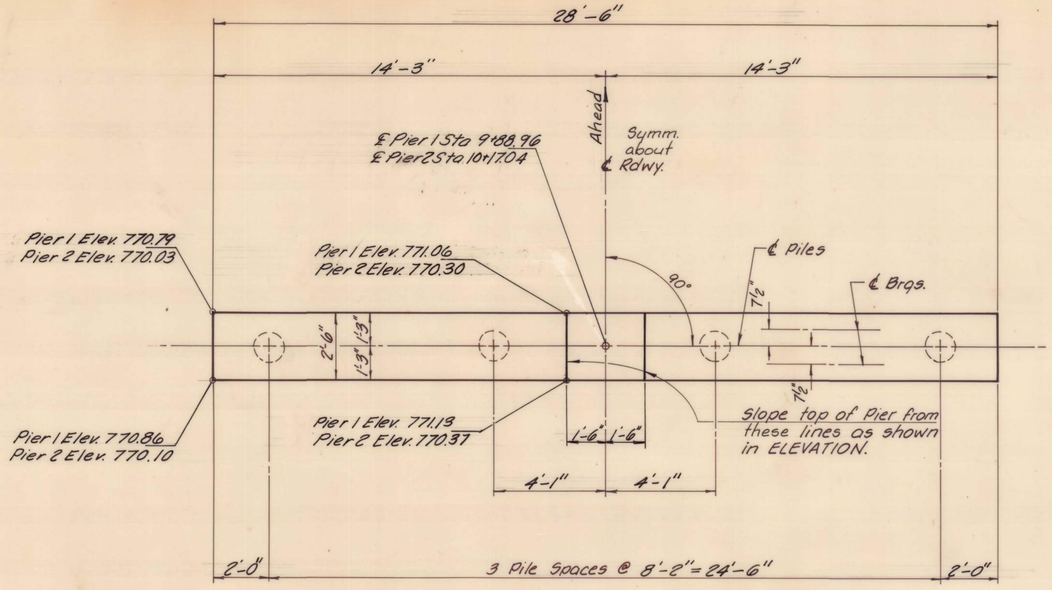
ABUTMENTS

WEST SOLON ROAD
RICHMOND ROAD DISTRICT
McHENRY COUNTY
STATION 10+03

COLLINS AND RICE
CONSULTING ENGINEERS

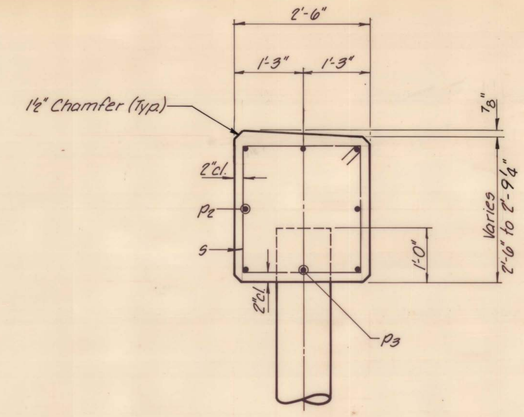
DESIGNED F.S. CHECKED T.S.
DRAWN W.R. DATE 6-19-81 NO. 1516

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
T.R. 45		McHENRY	9	8
FED. ROAD DIST. NO. 7		ILLINOIS	PROJECT	

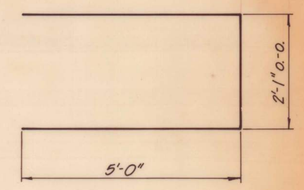


PLAN

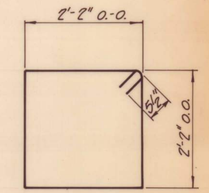
Note: Elevations given in Plan are to top of cap.



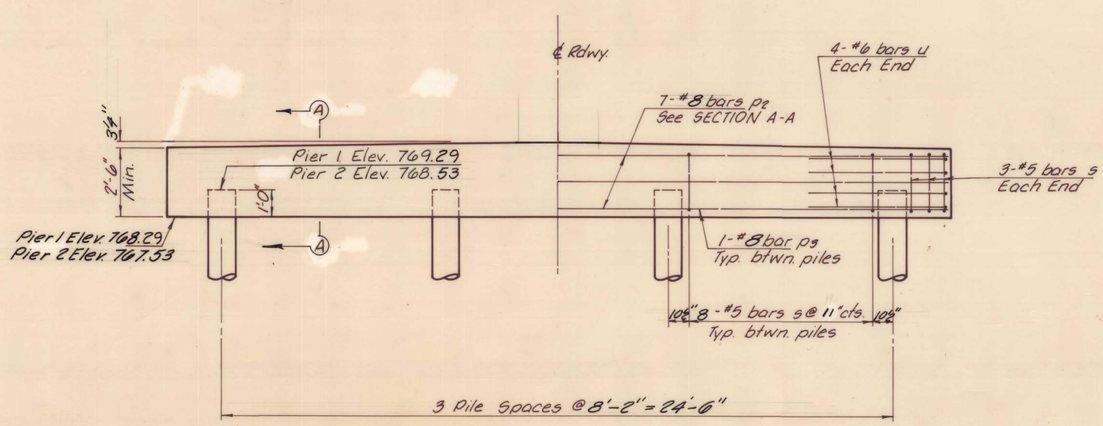
SECTION A-A



BAR u



BAR s



ELEVATION

Looking East

BILL OF MATERIAL - 2 PIERS

BAR	NO.	SIZE	LENGTH	SHAPE
p2	14	#8	28'-2"	
p3	6	#8	6'-9"	
s	60	#5	9'-7"	
u	16	#6	12'-1"	
Class X Concrete			Cu. Yd.	13.9
Reinforcement Bars			Pound	2,050
Concrete Piles			Lin. Ft.	245
Test Pile Concrete			Each	1

See sheet 9 for pile alternates. Precast prestressed concrete piles will not be permitted at the piers.

PILE DATA

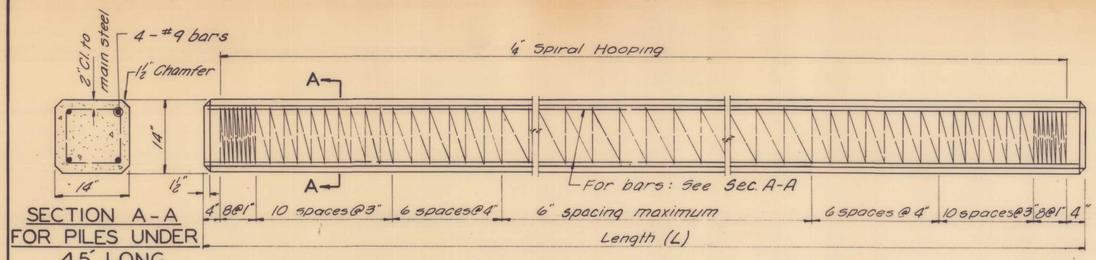
Type _____ Concrete
No. Req'd (2 Piers) _____ 8*
Capacity _____ 35 Tons / Pile
Est. Length _____ 35 Feet / Pile
* Includes one test pile to be driven in a permanent location at Pier 1.

PIERS
WEST SOLON ROAD
RICHMOND ROAD DISTRICT
McHENRY COUNTY
STATION 10+03

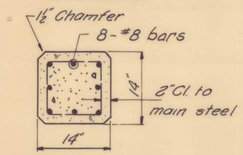
COLLINS AND RICE
CONSULTING ENGINEERS

DESIGNED F.S. CHECKED T.S.
DRAWN W.R. DATE 6-19-81 NO. 1516

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
T.R.45		McHENRY	9	9
FED. ROAD DIST. NO. 7		ILLINOIS	PROJECT	



SECTION A-A
FOR PILES UNDER 45' LONG

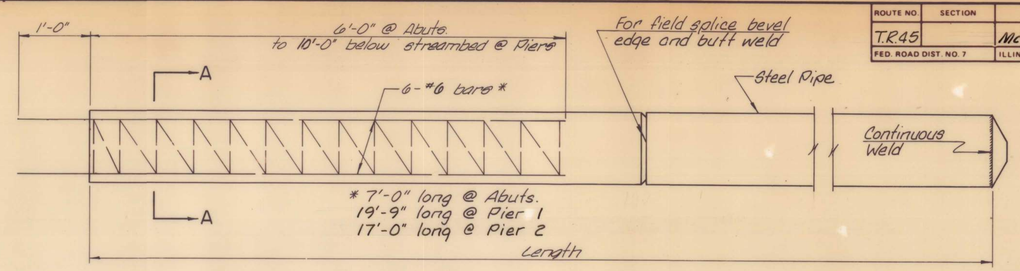


SECTION A-A
FOR PILES 45' OR MORE

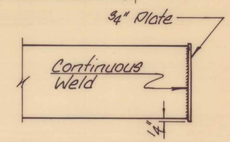
Handling:
For Pile Lengths up to 45 ft. use two slings placed at a distance of 0.21L* from each end. For piles longer than 45 ft. use three slings placed at a distance of 0.12L* from each end and at mid-point of pile.

*L = Over all length of pile to be handled.

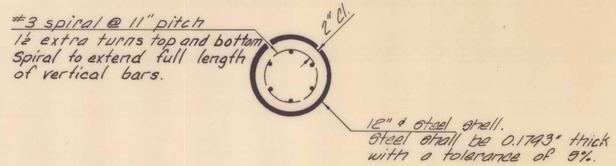
DETAIL OF PRECAST CONCRETE PILES



Note:
Metal shell piles used at piers shall receive one coat of red lead paint and two coats of aluminum paint in accordance with Section 909 of the Standard Specifications after the pier forms have been removed. The paint shall extend from the bottom of the concrete cap to streambed. Painting the metal shells is incidental to the cost of furnishing the piles.



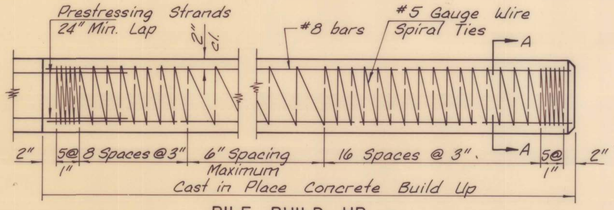
OPTIONAL FLAT END



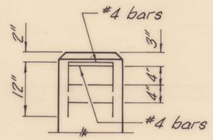
SECTION A-A

Note: Cost of reinforcement in piling is incidental to the cost of furnishing piles.

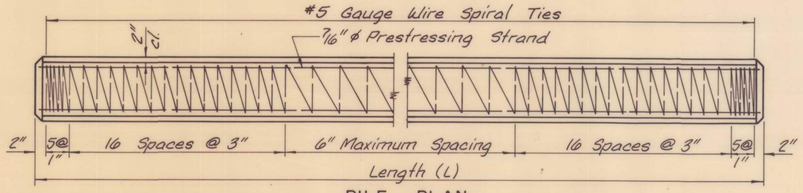
DETAIL OF CAST IN PLACE CONCRETE PILES



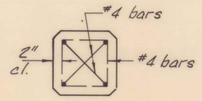
PILE BUILD UP



ELEVATION
(End Reinforcement)



PILE PLAN



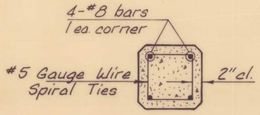
PLAN
(End Reinforcement)

DESIGN STRESSES

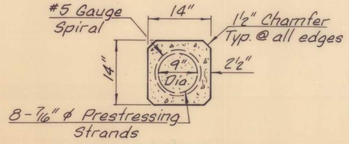
$f_c' = 5{,}000$ p.s.i.
$f_c'i = 4{,}000$ p.s.i.
$f_s' = 270{,}000$ p.s.i. (31,000 lbs.) — 7/16" ϕ
$f_si = 189{,}000$ p.s.i. (21,700 lbs.) — 7/16" ϕ
$f_s' = 270{,}000$ p.s.i. (41,300 lbs.) — ½" ϕ
$f_si = 189{,}000$ p.s.i. (28,900 lbs.) — ½" ϕ

NOTE

Precast prestressed concrete piles will not be permitted in pile bent piers.



SECTION A-A



SECTION THRU PILE

NOTES

Prestressing steel shall be non-galvanized extra high strength stress-relieved 7-wire strand. The nominal diameter shall be 7/16" and the minimum nominal cross-sectional area shall be 0.115 sq. in. or the equivalent 6 - ½" ϕ strands with a cross-sectional area of 0.153 sq. in. may be used.

For Pile lengths up to 65', use two slings placed at a distance of 0.21 L* from each end. For Piles longer than 65', use three slings place at a distance of 0.12 L* from each end and at midpoint of pile.

*L = Overall Length of Pile to be handled.

DETAIL OF PRECAST PRESTRESSED CONCRETE PILES

CONCRETE PILE DETAILS
WEST SOLON ROAD
RICHMOND ROAD DISTRICT
McHENRY COUNTY
STATION 10+03

COLLINS AND RICE
CONSULTING ENGINEERS

DESIGNED F.S. CHECKED T.S.
DRAWN W.R. DATE 6-19-81 NO. 1516