MICROFILMED
MAR 2 9 1984

FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

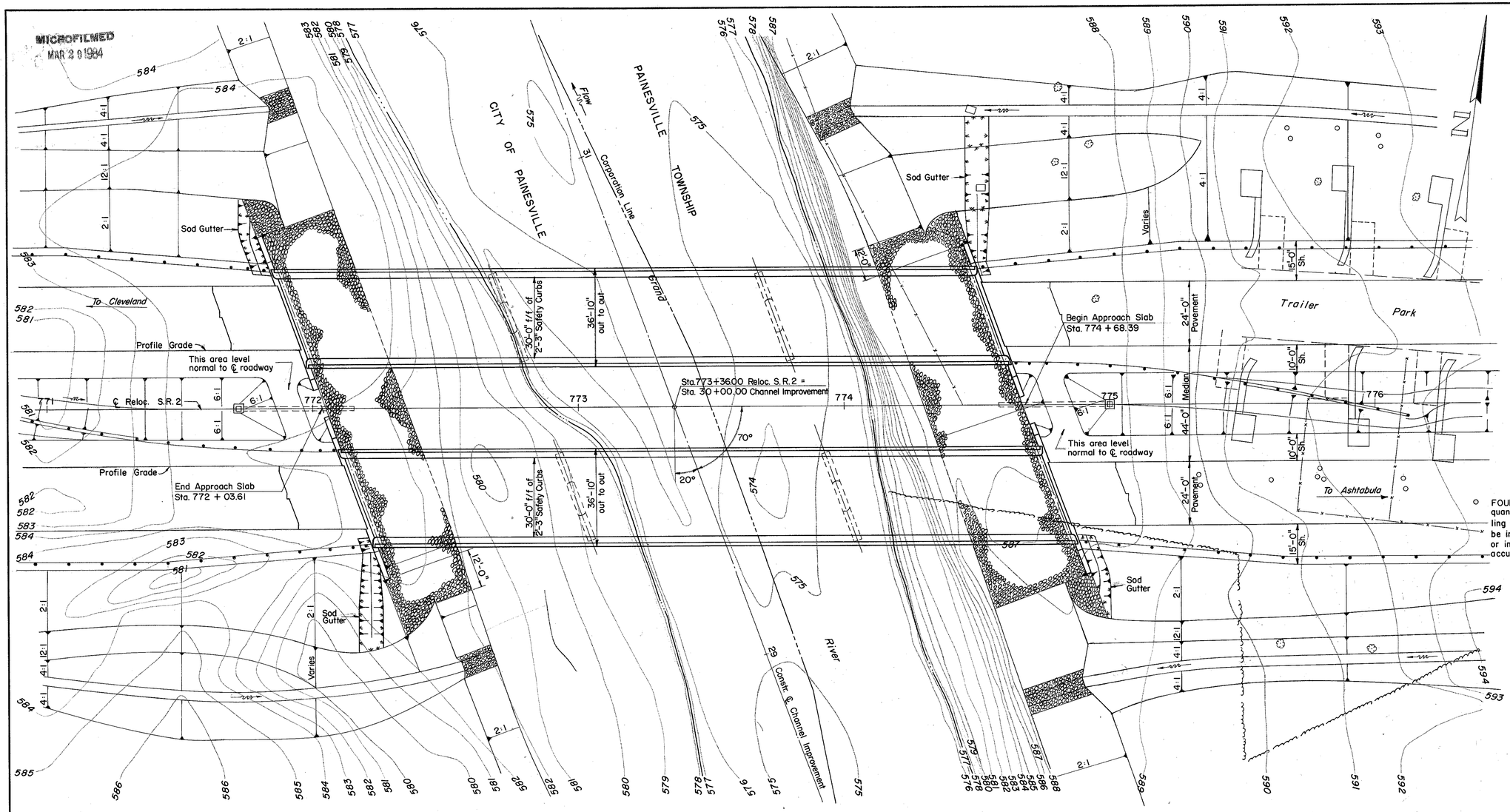
LAKE COUNTY
LAK-2-16.49

Located on East Corporation Line of Painesville

B.M. # 78 – Lag Bolt in root of 24" Poplar
267' Lt. of Sta. 773 + 87
Elev. 587.690

600'± Upstream – New York Central R.R.
Reinforced Concrete Arch Bridge
Center Span = 165.5', Rise = 64'

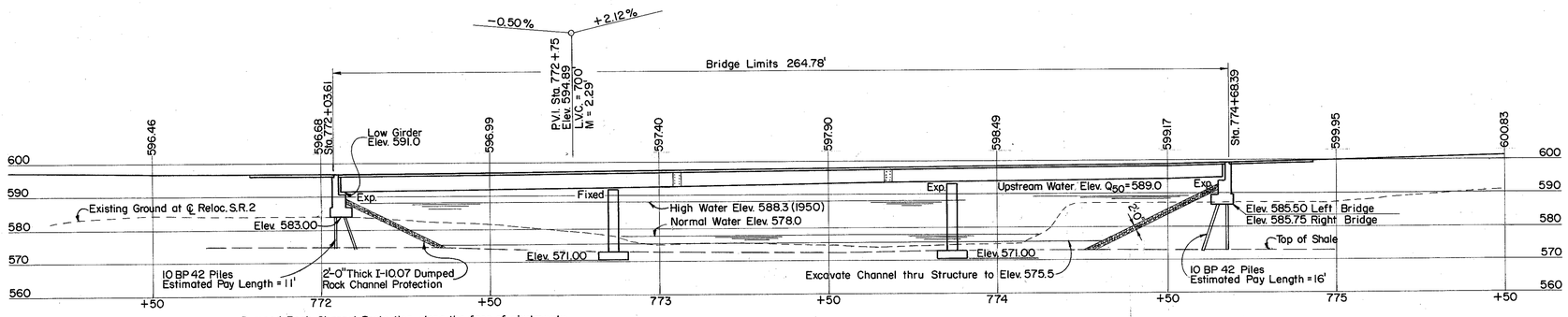
800'± Upstream – U.S. 20
Reinforced Concrete Arch Bridge
Center Span = 122', Rise = 37.8'
Side Spans = 50', Rise = 37.8'



○ FOUNDATION SOUNDINGS: Foundation design and foundation quantities are based on a study of rod soundings and soil-sampling soundings made at the site. This sounding information may be inspected in the office of the Bureau of Bridges in Columbus or in the Division office, but the State does not guarantee the accuracy thereof.

PROPOSED STRUCTURE

TYPE: Two 3 Span continuous welded plate girder with Reinf. Conc. Deck & Substructure.
SPANS: 80'-0", 100'-0", 80'-0" ℃ Brgs.
ROADWAY: 30' f/f of 2'-3" Safety Curbs.
LOAD FREQUENCY: CF = 2000 (57)
WEARING SURFACE: 1" monolithic concrete.
APPROACH SLABS: AS-1-54 (25'-0" Long)
ALIGNMENT: Tangent
SKEW: 20° R.F.
A.D.T. 17,160 (1980)
DRAINAGE AREA: 680 Sq. Miles
50 YEAR Q = 20,500 c.f.s.
BACKWATER: 0.2'
WATERWAY AREA Q_{50} = 3,150 Sq. Ft.



Dumped Rock Channel Protection along the face of abutments shall extend downward to the bottom of channel where the channel is in shale, and to an Elev. 2 feet below the bottom of the channel where the channel is not in shale.

PREPARED BY
CAPITOL ENGINEERING ASSOCIATES, DILLSBURG, PA.
FOR

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
DIVISION OF DESIGN AND CONSTRUCTION
BUREAU OF BRIDGES

SITE PLAN
BRIDGE NO. LAK-2-1652 L & R
RELOC. S.R. 2 OVER GRAND RIVER
LAKE COUNTY
STA. 772 + 03.61
STA. 774 + 68.39

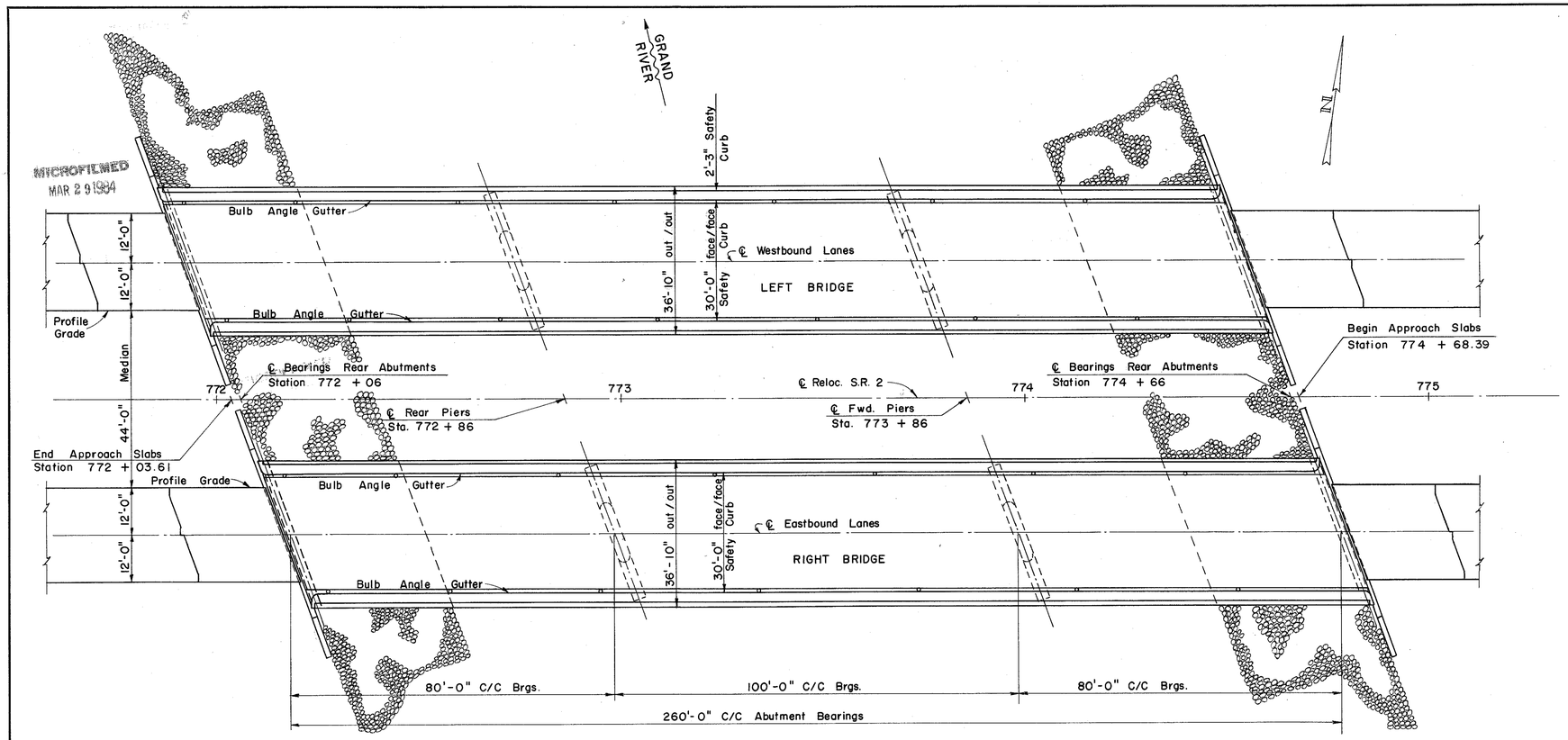
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	M. J. F.	F. W. B.	J. H. T.		

FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

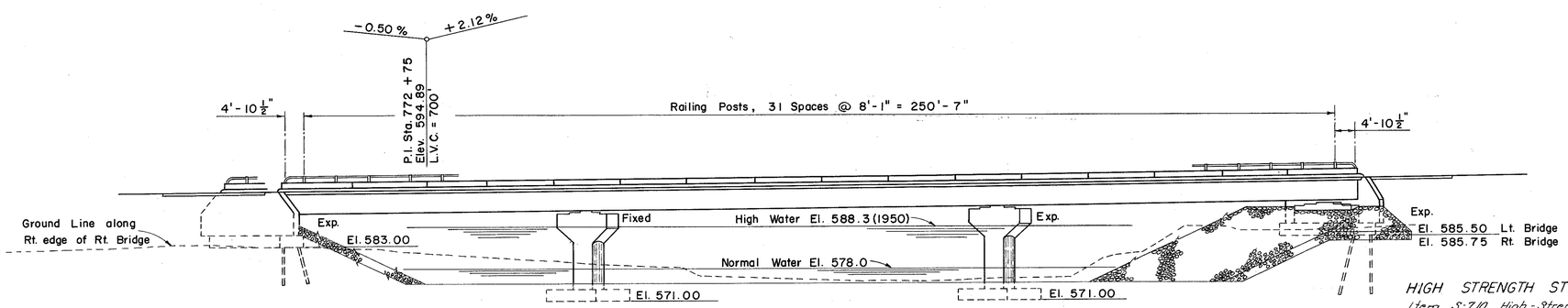
227/313

LAKE COUNTY
LAK-2-16.49

MICROFILMED
MAR 29 1984



PLAN



ELEVATION

Pier Footings shall extend a minimum of 3" into undisturbed shale or to the elevation shown, whichever is lower.

Piles shall be driven with a hammer of not less than 7,000 ft. lbs. per blow to firm contact with shale. If the length of penetration is approximately equal to the depth to shale according to the bridge foundation investigation report, the firm contact shall be considered as attained when the capacity according to the formula in Sec. 18.05 is not less than the following value for a pile hammer of the indicated energy rating.

HAMMER FT. LB.	ABUT'S, TONS PER PILE
7,000	40
11,000	35
15,000	30

If the energy rating of the hammer is between the ratings as shown above, the required formula capacity shall be determined by interpolation.
The design load is 26 tons per pile.

GENERAL NOTES

REFERENCE shall be made to Standard Drawings CSB-2-56, sheets No. 2 and No. 3 of 6 revised 2-2-59, RB-1-55 revised 2-2-59, AR-1-57 revised 4-2-62, AS-1-54 revised 7-5-62, and to Supplemental Specifications S-101 dated 7-12-62, and S-307 dated 8-23-60.

DESIGN SPECIFICATIONS: This structure conforms to the requirements of "Design Specifications for Highway Structures" of the State of Ohio Department of Highways, dated 9-1-57, together with current revisions thereof.

PROCEDURE: The embankment for the abutments shall be placed & compacted up to the base of the rock channel protection at the top of the spill-thru slope after which excavation shall be made for the abutments and the piles driven.

EXCAVATION QUANTITY includes the removal of fill material required for construction of the abutments.

PIER FOOTINGS are designed for a max. bearing pressure of 5 tons per sq. ft.

WELDING of structural steel shall be Class "A" except as otherwise shown. Welds shown as field welds may, at the option of the Contractor, be made in the shop.

PLATE GIRDER ERECTION: The Contractor shall submit to the director, for approval, three prints showing proposed erection procedures for the plate girders.

CONCRETE DECK PLACING: In order to faciliate water curing of the concrete of the deck slab, the placing of concrete shall progress upgrade. The slab may be placed in sections, between transverse construction joints which are parallel to transverse reinforcing steel and are located near the center of any span.

MACHINE FINISH: The concrete bridge deck shall be finished by the use of a finishing machine.

ALL STRUCTURAL STEEL: ASTM A36

DESIGN LOADING: CF 2,000(57)

BASIC UNIT WORKING STRESSES:

Concrete, Class C:	1,333 p.s.i.
Concrete, Class E:	1,133 p.s.i.
Structural Steel, ASTM A 36: *(except piling)*	20,000 p.s.i.
Reinforcing Steel, ASTM A 15, A 16 & A 160 Deformed, Intermediate or Hard Grade:	20,000 p.s.i.
Spiral Reinforcement, Plain, Structural Grade:	18,000 p.s.i.

HIGH STRENGTH STEEL BOLTS:

Item S-710, High-Strength Steel Bolts, Nuts and Washers, paragraph two (2), shall be completely revised and the last sentence of paragraph four (4), revised to read as follows:

"In the final assembly of the parts to be bolted, drift pins shall be placed in a sufficient number of holes (not less than 25 percent for field erection) to provide and maintain accurate alignment of holes and parts, and sufficient bolts shall be installed and brought to a snug tight condition to bring the parts into complete contact. Bolts shall then be installed in any remaining open holes and tightened to a snug tight fit, after which all bolts shall be tightened completely by calibrated wrenches or by the turn-of-nut method. Drift pins shall then be replaced with bolts, tightened in the same manner."

"Bolt lengths determined by the use of Table No. 1 shall be adjusted to the next ¼-inch length increment."

PREPARED BY
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FOR

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
DIVISION OF DESIGN AND CONSTRUCTION
BUREAU OF BRIDGES

GENERAL PLAN

BRIDGE NO. LAK-2-1652 L&R
RELOC. SR.-2 OVER GRAND RIVER
LAKE COUNTY
STA. 772 + 03.61
STA. 774 + 68.39

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
	M.J.F.	FWB	L.L.D. M.J.F.	G.S.W. M.C.P.		

MICROFILMED
MAR 29 1984

FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

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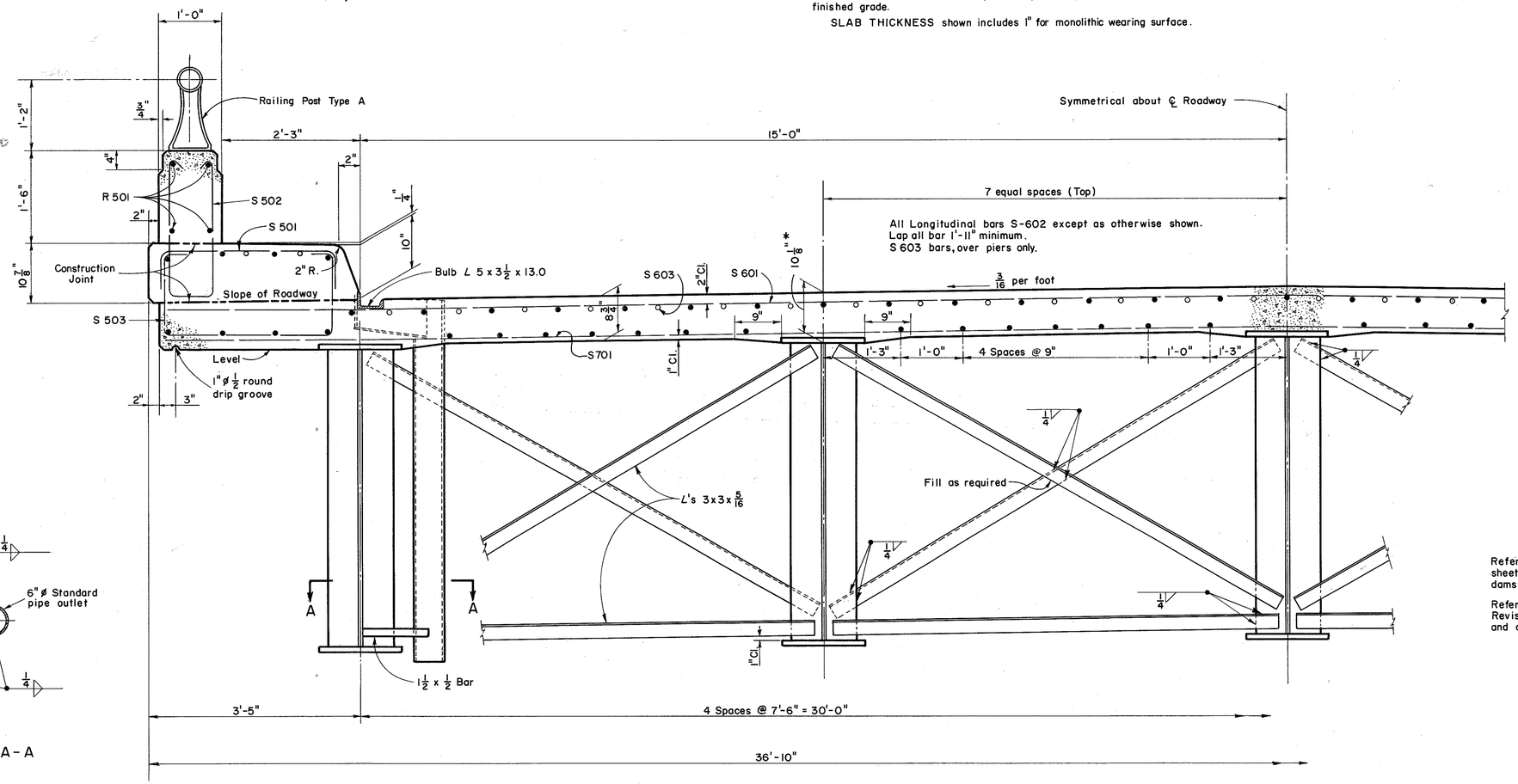
LAKE COUNTY
LAK-2-16.49

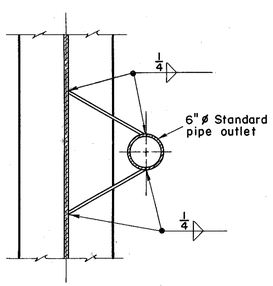
DECK SLAB HAUNCH: The haunch in the deck slab adjacent to the top of steel girders, which is shown as 9" wide, may vary from this dimension between the limits of 6" and 12" except the maximum slope shall not exceed 3" inches per foot. Payment for slab concrete shall be based on the 9" width.

* This is the nominal dimension from top of slab to top of web plate. The quantity of deck concrete to be paid for shall be based on this dimension minus the girder flange thickness, even though deviation from it may be necessary because the top edge of web ℞ may not have the exact camber or conformation required to place it parallel to the finished grade.

SLAB THICKNESS shown includes 1" for monolithic wearing surface.



HALF - SECTION OF SUPERSTRUCTURE



SECTION A-A

Reference shall be made to Standard Drawing CSB-2-56, sheets 2 & 3 of 6, Revised 2-2-59 for details of end dams, gutters, & pipe drains.

Reference shall be made to Standard Drawing AR-1-57, Revised 4-2-62 for details of aluminum railing and details of concrete parapet.

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BUREAU OF BRIDGES

SUPERSTRUCTURE DETAILS

BRIDGE NO. LAK-2-1652 L & R
RELOC. SR. 2 OVER GRAND RIVER
LAKE COUNTY
STA. 772 + 03.61
STA. 774 + 68.39

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
C.H.	M.J.F.	FWB	L.L.D. M.J.F.	G.S.W. M.C.P.		

FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

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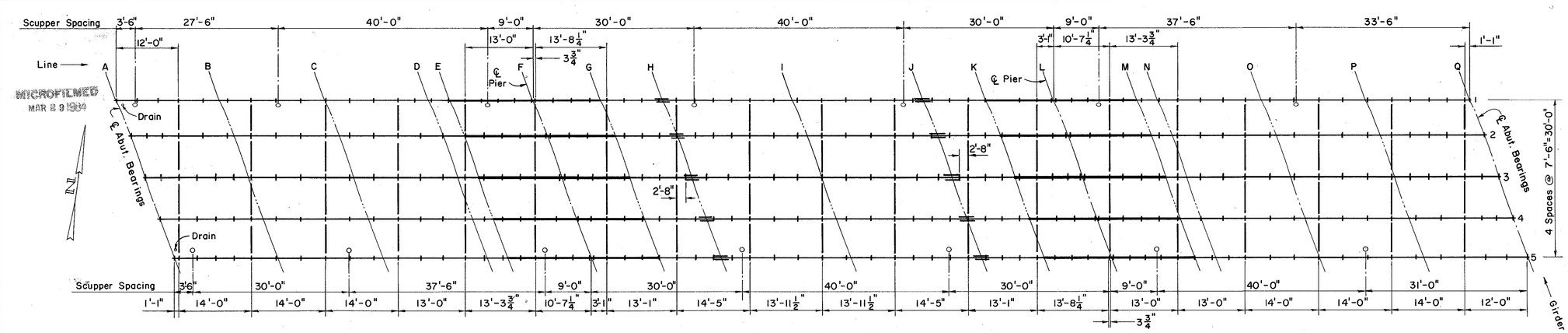
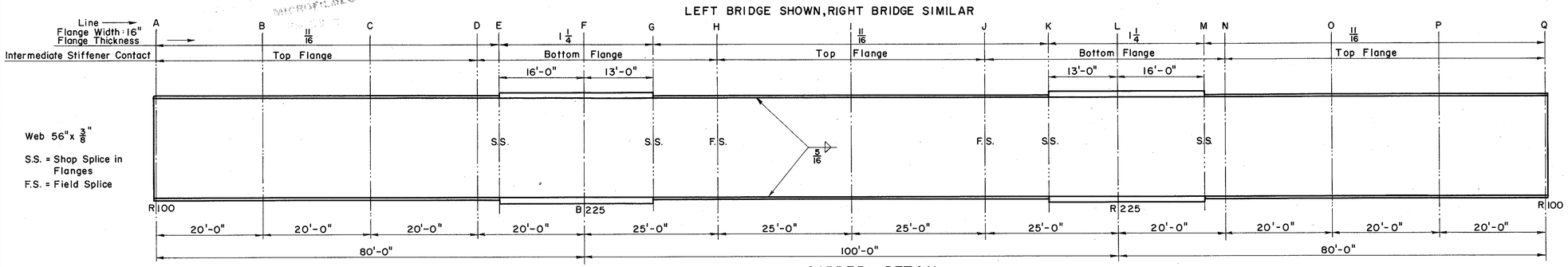
LAKE COUNTY
LAK-2-16.49

MICROFILMED
MAR 29 1984



FRAMING PLAN

LEFT BRIDGE SHOWN, RIGHT BRIDGE SIMILAR



GIRDER DETAIL

Intermediate stiffeners are spaced equally between control dimensions shown.

REFERENCE shall be made to Standard Drawing RB-1-55 revised 2-2-59 for details of bearings.

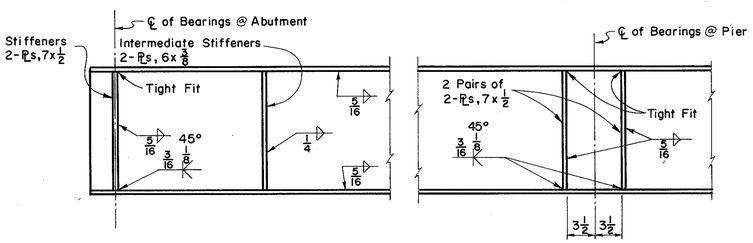
SHOP SPLICES: If additional shop splices are necessary, their location and detail shall be submitted to the Director for approval prior to ordering of material.

WELDING OF STRUCTURAL STEEL shall be Class 'A' except as otherwise shown.

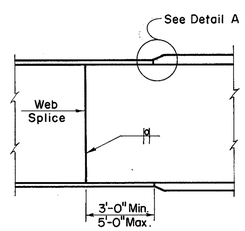
ALL BUTT WELDS shall be radiographically inspected according to Supplemental Specification S-307 dated 8-23-62.

BUTT WELDS shall be formed by welding from both sides with back gouging before welding from the second side.

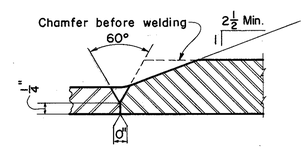
INTERMEDIATE STIFFENERS: Supplementary to Section S-7.14 of the Construction and Material Specifications, intermediate stiffeners of welded, built-up girders shall have contact bearing with the compression flange, but may have a clearance of not more than 1/8 inch from the tension flange at the locations shown. In shop painting, care shall be taken to make certain that paint is forced through from one side to the other of the 1/8 inch opening.



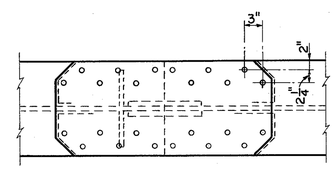
STIFFENER DETAILS



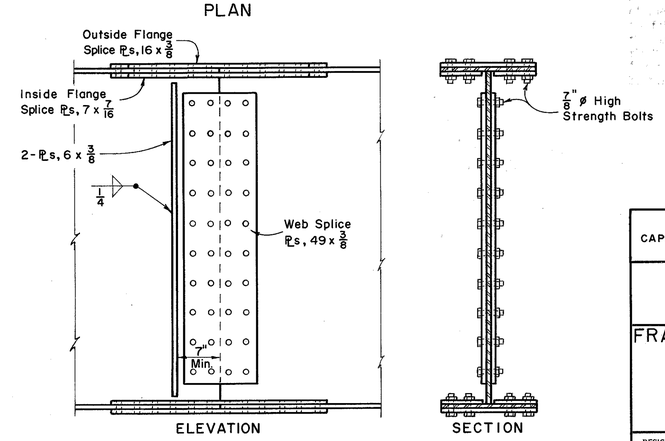
SHOP SPLICE DETAILS



DETAIL A



PLAN



ELEVATION SECTION

FIELD SPLICE DETAILS

DEFLECTION & CAMBER DATA

LINE →	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Deflection due to weight of steel, each girder	—	1/16"	1/8"	1/16"	1/16"	—	0	1/16"	1/8"	1/16"	0	—	1/16"	1/16"	1/8"	1/16"	—
Deflection due to remaining dead load, each girder	—	7/16"	7/16"	1/4"	3/16"	—	1/16"	3/16"	1/2"	3/16"	1/16"	—	3/16"	1/4"	7/16"	7/16"	—
Vertical Curve Convexity	—	-1/4"	-3/8"	-1/4"	-1/4"	—	-1/4"	-7/16"	-9/16"	-7/16"	-1/4"	—	-1/4"	-1/4"	-3/8"	-1/4"	—
Required Camber	—	0	0	0	0	—	0	0	0	0	0	—	0	0	0	0	—

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FOR

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
DIVISION OF DESIGN AND CONSTRUCTION
BUREAU OF BRIDGES

FRAMING PLAN & GIRDER DETAILS

BRIDGE NO. LAK-2-1652 L & R
RELOC. SR. 2 OVER GRAND RIVER
LAKE COUNTY
STA. 772 + 03.61
STA. 774 + 68.39

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
M.C.P. L.L.D.	M.J.F.	FWB	L.L.D. M.J.F.	G.S.W. M.C.P.		

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MAR 29 1984

NOTES : All dimensions are out to out of the bar.
Type "S" is straight bar.
Bar Size is indicated in the bar mark. The first digit where three digits are used, and the first two where four are used, indicate the bar size number. For example, A 700 is a No. 7 size bar & A 1014 is a No. 10 size.

FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

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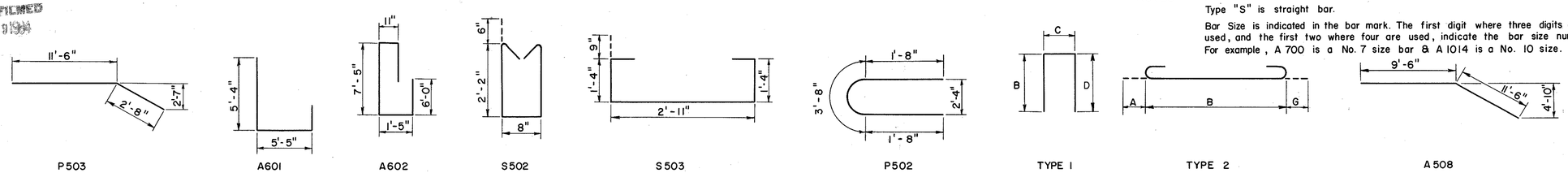
LAKE COUNTY
LAK-2-16.49



REINFORCING STEEL LIST

ABUTMENTS

MARK	LEFT REAR	RIGHT REAR	LEFT FWD.	RIGHT FWD.	TOTAL	LENGTH	WEIGHT LT. BRIDGE	WEIGHT RT. BRIDGE	TYPE	B	C	D	VARIES BY	NO. OF EACH
A801	14	14	14	14	56	26'-1"	1,950	1,950	S					
A601	54	54	54	54	216	12'-6"	2,028	2,028	–					
A602	28	28	28	28	112	18'-0"	1,514	1,514	–					
A603	10	10	10	10	40	17'-2"	516	516	1	8'-0"	1'-5"	8'-0"		
A501	54	54	54	54	216	9'-6"	1,070	1,070	1	2'-2"	5'-5"	2'-2"		
A502	54	54	54	54	216	6'-2"	695	695	1	5'-6"	9"	0		
A503	38	38	38	38	152	10'-0"	793	793	1	3'-5"	3'-5"	3'-5"		
A504	12	12	12	12	48	18'-3"	457	457	S					
A505	12	12	12	12	48	33'-9"	845	845	S					
A506	4	4	4	4	16	32'-0"	267	267	S					
A507	4	4	4	4	16	28'-9"	240	240	S					
A508	4	4	4	4	16	21'-0"	175	175	–					
A509	22	22	22	22	88	9'-9"	447	447	S					
A510	28	28	28	28	112	5'-5" to 9'-9 1/4"	444	444	S				8 3/4"	16
A511	44	44	44	44	176	6'-1"	558	558	1	2'-8"	1'-0"	2'-8"		

SUPERSTRUCTURE

MARK	LEFT BRIDGE	RIGHT BRIDGE	TOTAL	LENGTH	WEIGHT LT. BRIDGE	WEIGHT RT. BRIDGE	TYPE	B	C	D	VARIES BY	NO. OF EACH
S701	361	361	722	36'-2"	26,689	26,689	S					
S701A	32	32	64	34'-10" to 7'-6"	1,385	1,385	S				1'-10"	4
S701B	6	6	12	5'-6"	67	67	S					
S601	361	361	722	36'-2"	19,612	19,612	S					
S601A	32	32	64	34'-10" to 7'-6"	1,018	1,018	S				1'-10"	4
S601B	6	6	12	5'-6"	49	49	S					
S602	730	730	1,460	28'-0"	30,701	30,701	S					
S603	64	64	128	40'-0"	3,845	3,845	S					
S501	360	360	720	4'-2"	1,566	1,566	1	9"	2'-11"	9"		
S502	360	360	720	5'-9"	2,160	2,160	–					
S503	360	360	720	6'-10"	2,563	2,563	–					

PIERS

MARK	LEFT REAR	RIGHT REAR	LEFT FWD.	RIGHT FWD.	3	4	5	6	TOTAL	LENGTH	WEIGHT LT. BRIDGE	WEIGHT RT. BRIDGE	TYPE	A	B	C	D	G
P1101	6	6	6	6					24	38'-10"	2,475	2,475	2	1'-7"	35'-8"			1'-7"
P1102	6	6	6	6					24	35'-8"	2,274	2,274	S					
P 801	25	25	25	25					100	16'-6"	2,203	2,203	S					
P 802	28	28	28	28					112	5'-6"	822	822	1		4'-9"	1'-0"	0	
P 601	10	10	10	10					40	8'-6"	255	255	S					
P 602	12	12	12	12					48	14'-6"	523	523	S					
P 603	12	12	12	12					48	7'-8"	276	276	1		2'-8"	2'-8"	2'-8"	
P 604	28	28	28	28					112	9'-4"	785	785	1		3'-6"	2'-8"	3'-6"	
P 605	12	12	12	12					48	10'-4"	372	372	1		4'-0"	2'-8"	4'-0"	
P 501	12	12	12	12					48	12'-0"	300	300	S					
P 502	12	12	12	12					48	7'-0"	175	175	–					
P 503	4	4	4	4					16	14'-2"	118	118	–					
P 504	10	10	10	10					40	6'-0"	125	125	S					
P 505	2	2	2	2					8	20'-3"	84	84	S					
P 506	4	4	4	4					16	17'-0"	142	142	S					
P 507	4	4	4	4					16	18'-8"	156	156	S					

ESTIMATED QUANTITIES

ITEM	TOTAL	UNIT	DESCRIPTION	LEFT BRIDGE SUPER	LEFT BRIDGE ABUTS.	LEFT BRIDGE PIERS	LEFT BRIDGE GEN'L	RIGHT BRIDGE SUPER	RIGHT BRIDGE ABUTS.	RIGHT BRIDGE PIERS	RIGHT BRIDGE GEN'L	URBAN	RURAL
E- 2	Lump	Sum	Cofferdams, Cribs and Sheeting				Lump				Lump	Lump/2	Lump/2
E- 2	450	Cu. Yds.	Unclassified Excavation		186	39			186	39		225	225
E- 2	72	Cu. Yds.	Shale Excavation			36				36		36	36
S- 1	646	Cu. Yds.	Class C Concrete, Superstructure	323				323				323	323
S- 1	153	Cu. Yds.	Class C Concrete, Piers above Footings			76				77		76	77
S- 1	209	Cu. Yds.	Class E Concrete, Abut. above Footings		104				105			104	105
S- 1	198	Cu. Yds.	Class E Concrete, Footings		71	28			71	28		99	99
S- 4	225,478	Lbs.	Reinforcing Steel	89,655	11,999	11,085		89,655	11,999	11,085		112,739	112,739
S- 7	554,940	Lbs.	Structural Steel	277,470				277,470				277,470	277,470
S- 8	554,940	Lbs.	Field Painting of Structural Steel	277,470				277,470				277,470	277,470
S- 14	1,046.66	Lin. Ft.	Railing (Aluminum Rail. & Type A Posts w/Conc. Parapets)	523.33				523.33				523.33	523.33
S- 16	Lump	Sum	First Test Pile *		Lump							Lump/2	Lump/2
S- 18	918	Lin. Ft.	10 BP 42 Piles		459				459			374	544
S- 29	114	Cu. Yds.	Porous Backfill		57				57			57	57
S- 29	28	Each	Scuppers, Including Supports	14				14				14	14
S-101	646	Each	Water-reducing, Set-retarding Admixtures	323				323				323	323
I- 10	874	Cu. Yds.	Dumped Rock Channel Protection, 2'-0" Thick				437				437	403	471
E- 3	12,048	Cu. Yds.	Channel Excavation									6764	5884

* Payment will be made for only one first test pile. It may be driven for either the Left or Right Bridge.

RAILING

MARK	LEFT BRIDGE	RIGHT BRIDGE	TOTAL	LENGTH	WEIGHT	TYPE	A	B
R501	112	112	224	15'-10"	*	S		
R501A	16	16	32	17'-4"	*	S		

* Included with Item S-14 for Payment.

REPLACEMENT BARS

MARK	NO.	LENGTH	WEIGHT	TYPE
RE 500	2	5'-7"		S
RE 600	6	5'-11"		S
RE 700	3	6'-3"		S
RE 800	1	6'-6"		S
RE 1100	1	7'-7"		S

PREPARED BY
CAPITOL ENGINEERING ASSOCIATES, DILLSBURG, PA.
FOR
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DEPARTMENT OF HIGHWAYS
DIVISION OF DESIGN AND CONSTRUCTION
BUREAU OF BRIDGES

ESTIMATED QUANTITIES & REINFORCING STEEL LIST

BRIDGE NO. LAK-2-1652 L & R
RELOC. SR. 2 OVER GRAND RIVER
LAKE COUNTY
STA. 772 + 03.61
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DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
M.J.F. L.L.D.	M.J.F.	FWB	L.L.D. M.J.F.	G.S.W. M.C.P.		