

CEAO BRIDGE WORKERS CONFERENCE

APRIL 13, 2016

HOCKING COUNTY PRECASTING OPERATIONS

- BRIEF HISTORY
- CASTING BUILDING
- ADVANTAGES OF PRECAST
- TYPES OF PRECAST
- PROJECT EXAMPLES
- FORCE ACCOUNT SHEETS

BRIDGE CONDITIONS 1980

- BRIDGE TYPES

Steel Truss	40		
Steel Beam	158		
		198	= 68%
Concrete (WPA)	47		
Precast Beam	0		
Prestressed	14		
Culvert/Multiplate	30		
Timber	<u>4</u>		
	293		

- 176 (60%) had span <30'
- 188 (64%) of 293 bridges posted with load limits

- POPULATION 22,350
- \$1.1 MILLION BUDGET
- 58 EMPLOYEES
- \$295,000 ROAD MATERIALS BUDGET
- \$40,000 BRIDGE MATERIALS BUDGET
- Bridge maintenance consisted of “plating” I beams and replacing wood plank to keep bridges open to car traffic (3 ton).



SAFETY FRIST - Rockbridge Elementary children going to and from school each day are required to walk – about 86 feet. The driver of bus 13, Paul Smathers, makes the children step off the vehicle and walk over a bridge on Starner Rd. before crossing the span with his bus empty and allowing the children to get back on. Smathers said county officials gave the word to unload his bus before crossing because the bridge is unsound. “They were supposed to fix it last year. They said the braces were bad, but they haven’t done anything to it,” he said. Bill Shaw, county engineer, said the bridge has not been rated as able to support weight equal to a loaded school bus, and there is not enough money available to fix it in the near future. An empty bus weighs about seven tons, according to Smathers. Shaw said the bridge is only one of many in the county that needs replacement. The Starner Rd. bridge would cost more than \$100,000 to replace, he said. The situation worries Mrs. Faye Paxton, 11979 Cantwell Cliff Rd., whose child rides bus 13. She says if the bridge collapses while the bus is crossing, the children would be forced to walk about one mile to the nearest home for help. (Daily News photo by Richard Hicks)

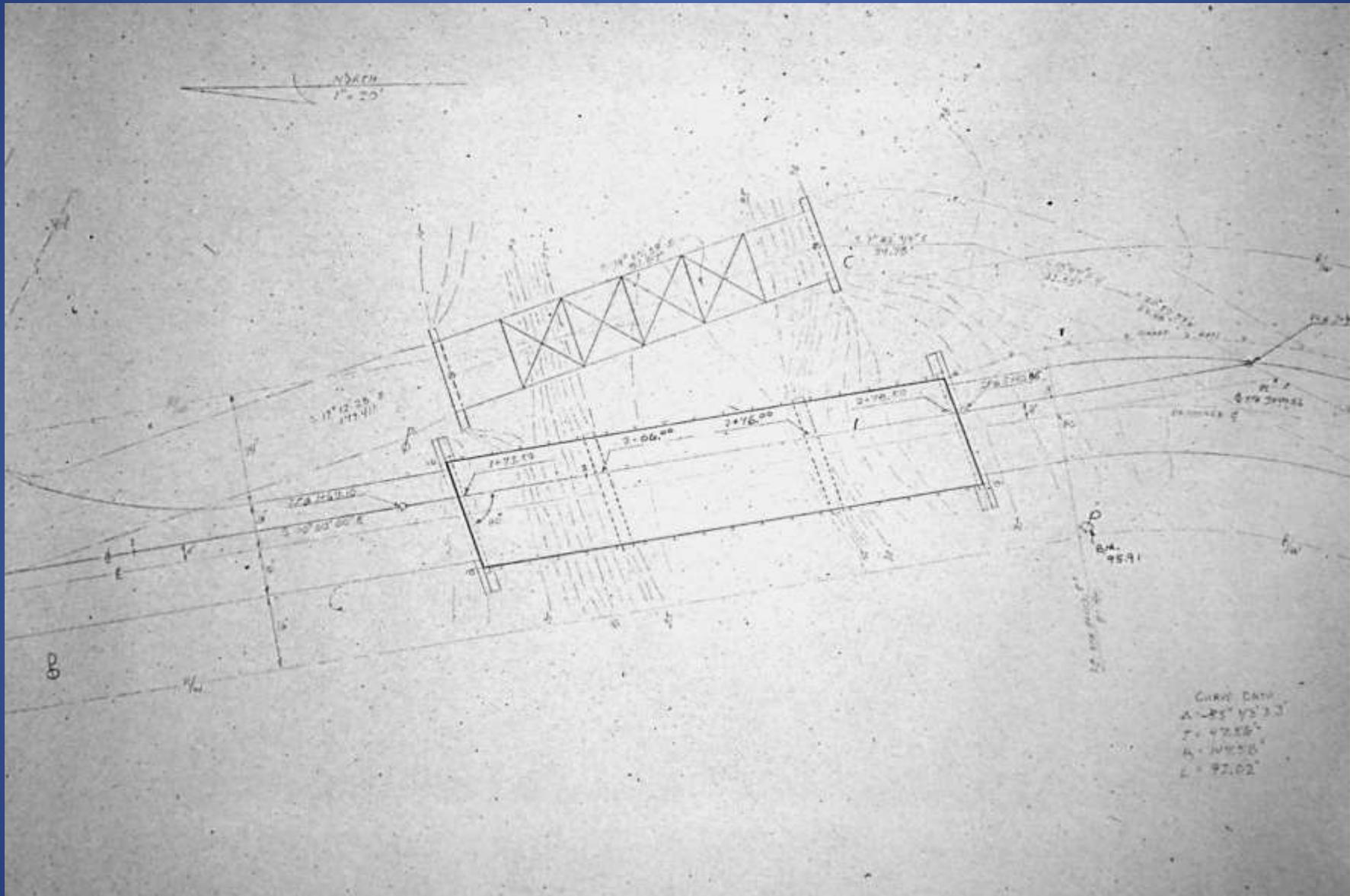
FIRST PRECAST (1983)

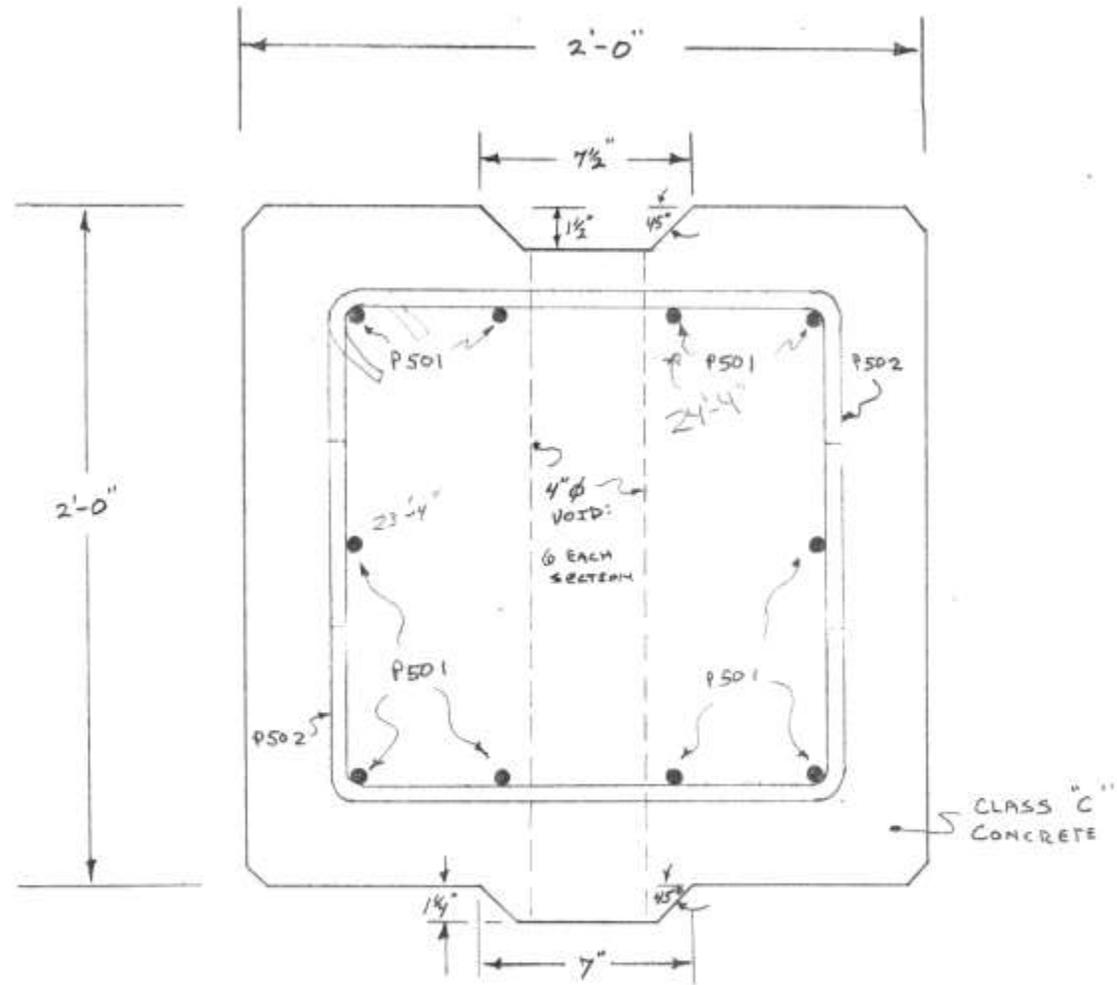
- Existing 90' ~ 100 yr. old truss in critical condition
- Heavily traveled federal aid road
- Very long detour if closed
- No time to wait 4-5 years for federal dollars nor could we afford consultant for design
- No OPWC or emergency dollars
- No experienced crews
- No specialized forms or construction equipment

- Wanted to get away from steel
- Decided on three span 24' x 107' prestressed box beam bridge on concrete abutments and piers to be built on new alignment so existing bridge could be kept open during construction
- Estimated contract price \$350,000
- 1983 bridge material budget = \$39,100

- Decided the only way we would get this bridge replaced was to build abutments and piers by force account and bid prestressed deck
- Abutments could be formed and poured rather easily with plywood forms
- How to construct piers?

- “Tractor seat” engineering used
- Designed 2' x 2' pier sections with 3' x 2' pier caps set on cast in place footers
- Simple reusable wooden forms used to pour pier sections outside in our yard in the spring



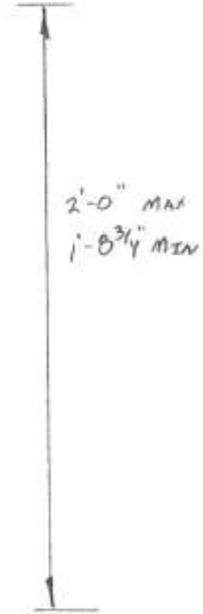
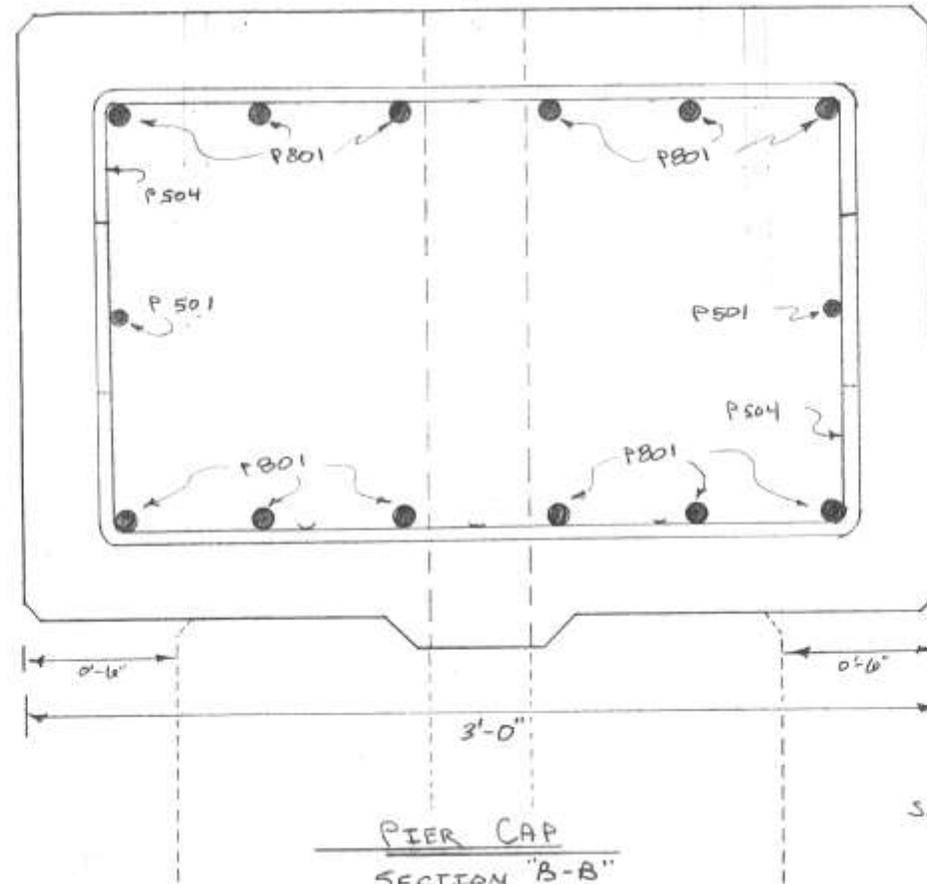
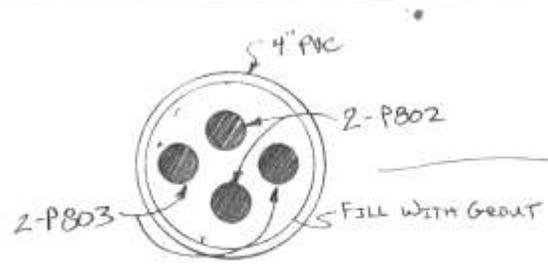


PIER SECTION

SECTION "A-A"

SCALE: 1" = 6"

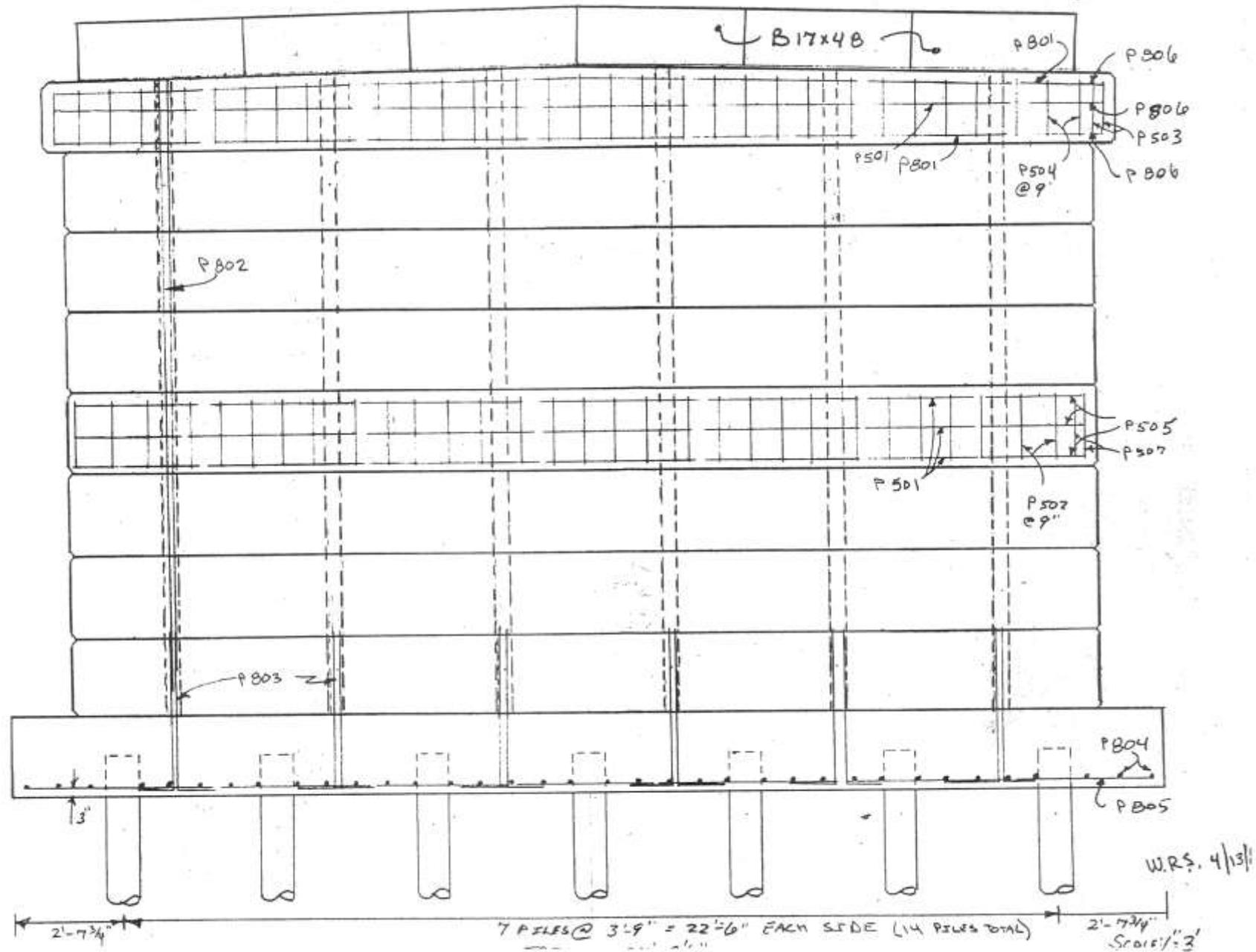
W.R.S. 4/13/03



PIER CAP
SECTION "B-B"

SCALE 1"=6"

W.R.S 4/13/



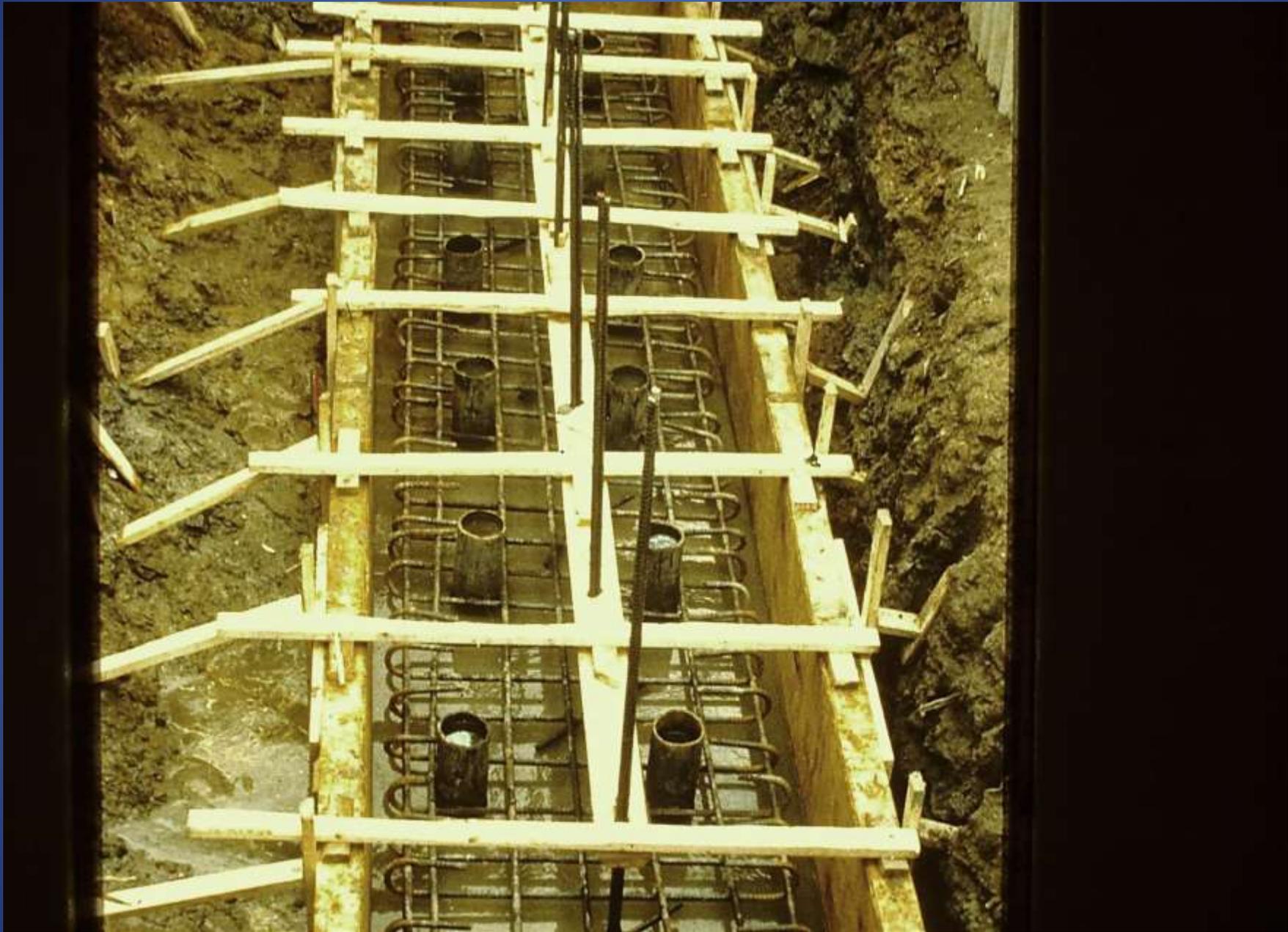






























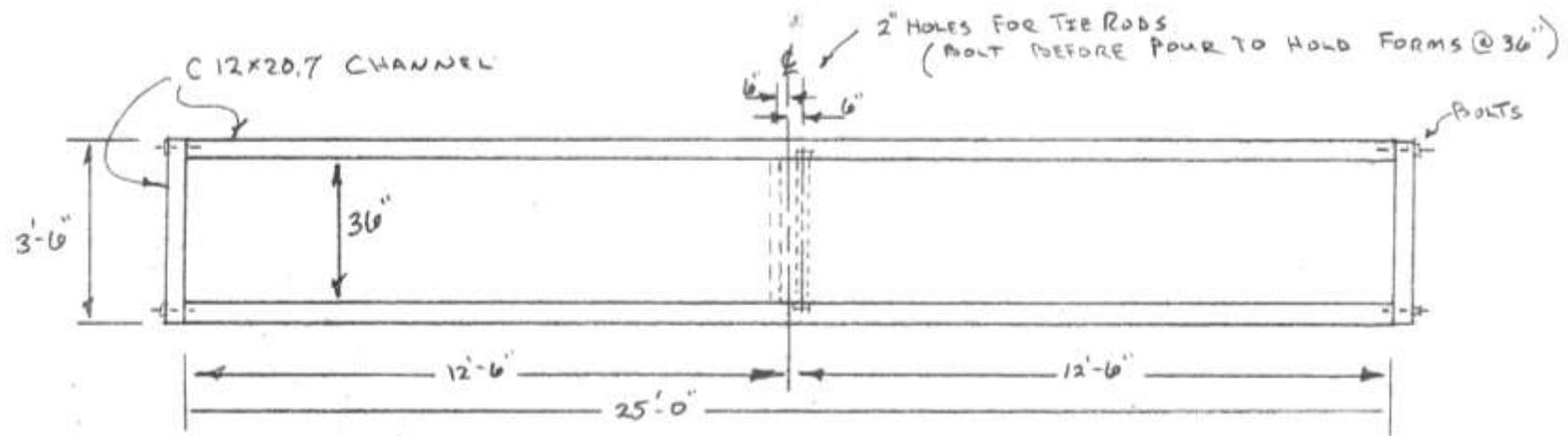
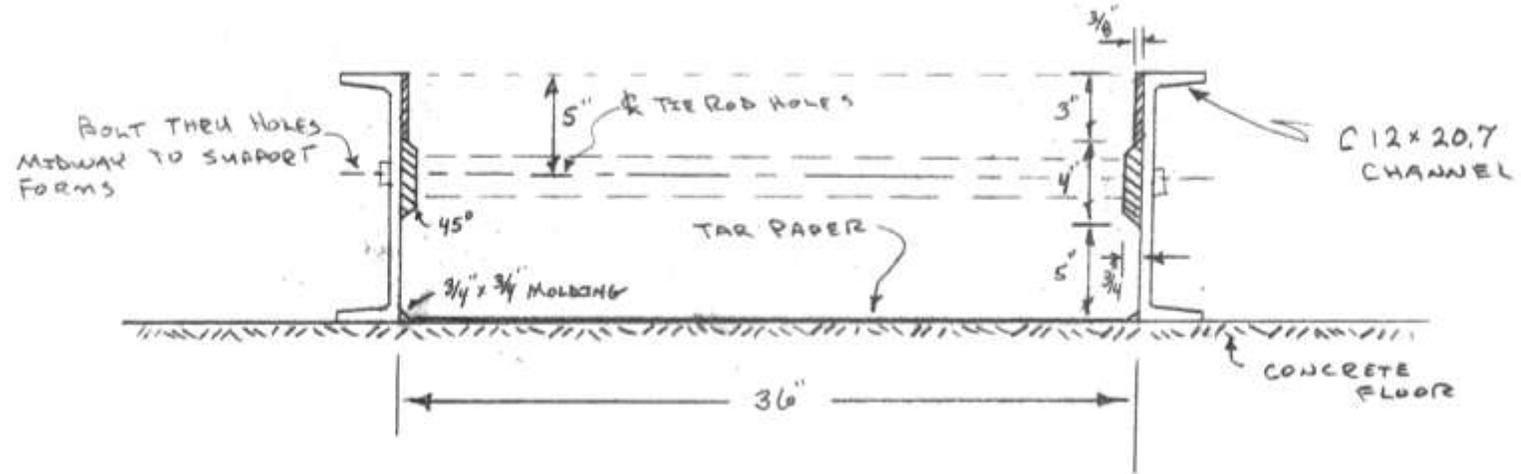


PROJECT COST

Substructure Materials	\$20,970	
Prestressed Deck Set In Place	<u>38,850</u>	
	\$59,820	(\$23.29 ft ²)
Paving Contract	<u>7,672</u>	
	\$67,492	(\$26.28 ft ²)
County Labor	<u>18,919</u>	
Total Project	\$86,411	(\$33.65 ft ²)

Project Completed 6/25 – 8/5 (30 work days)

- 1983 – 1986 Bridge Materials
Budget stayed < \$40,000
- Bridge conditions continued to decline
- 1987 converted a 24' X 30' garage to a casting area
- Built simple 12" x 3' x 25' forms from channel for bridge decks
- Used 2' x 2' pier section forms to precast abutment sections (had to pour outside when weather permitted)
SLOW



WRS. 6-10-84

1987 MATERIAL COST
FOR COMPLETE 24' x 25'
PRECAST BRIDGE

Precast 12" Deck	\$ 4,904 (\$8.17 ft ²)
Precast Abutment	<u>9,654</u>
	\$14,558 (\$24.26 ft ²)

CASTING BUILDING 1993 – 1994

- Needed a good place to pour year round
- Purchased “waffle-crete” form to pour 8’ x 16’ panels for walls
- Bid steel superstructure/roof erected by contract
- County crews installed precast walls

SIZE 72' x 134'

COST:	DESIGN	\$ 10,377	
	BUILDING	172,766	(\$17.91 ft ²)
	EQUIPMENT	<u>88,333</u>	
		\$271,476	(\$28.14 ft ²)

EQUIPMENT

3' x 80' bed for 12" and 17" decks (\$11,758)

2' x 80' bed for 2' x 2' abutment sections (\$12,123)

15 ton bridge crane (\$55,900)

Casting Building























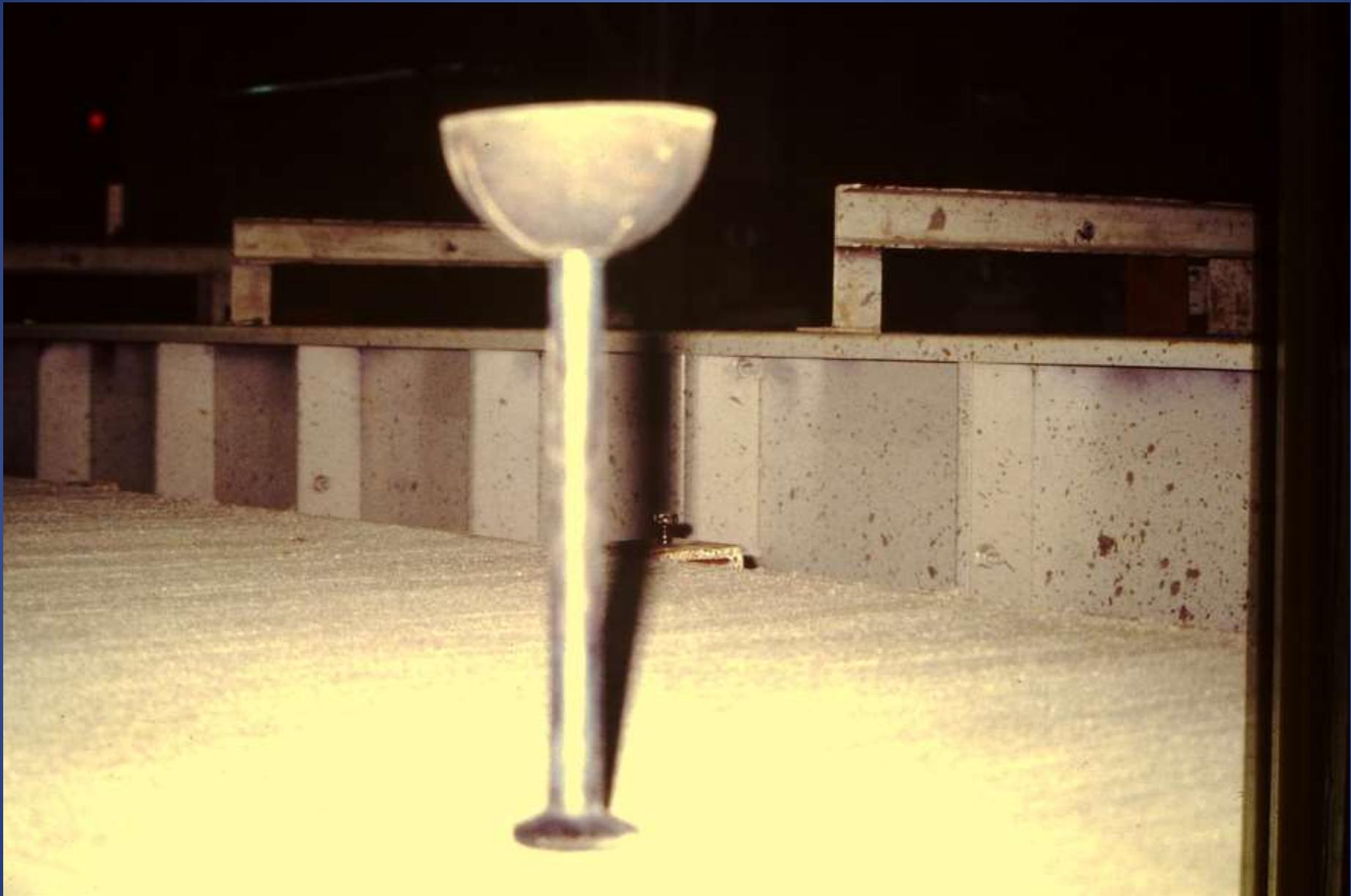














ADVANTAGES OF PRECASTING

- Can be poured in a controlled environment
- Can be poured any time of the year, any type of weather (rain days or snow days after roads are cleared) - There are no “nothing to do” days
- No specialized forms needed in the field
- Tremendous savings in construction time and cost
- Public loves it
- Cost savings
- Employee pride
- More bang for the buck!!

TYPES OF PRECAST

- 12" x 3' x 25' Precast Deck Beams
- 17" x 3' x 30' Precast Deck Beams
- 3 – Sided Box on Precast Footers
- 3 – Sided Box on Precast Bottom
- 2' x 2' and 1' x 3' Abutment Sections
- Box Culvert Wingwalls
- Non Typical Precast Abutment for Long Span Structures

12" x 3' x 25' Deck Beam

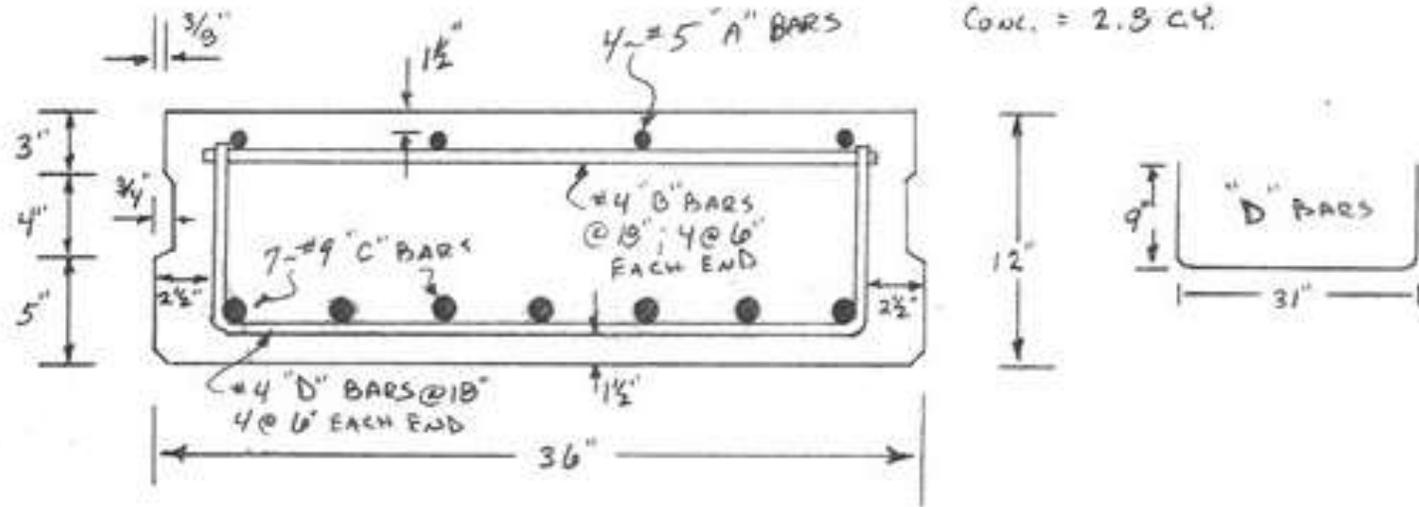
V/2

FOR A 25' BEAM

MARK	SIZE	NO.	LENGTH	WEIGHT
"A"	#5	4	24'-9"	103.3
"B"	#4	21	2'-8"	37.4
"C"	#9	7	24'-9"	589.1
"D"	#4	21	4'-1"	57.3

TOTAL 707.1#

CONC. = 2.8 CY.











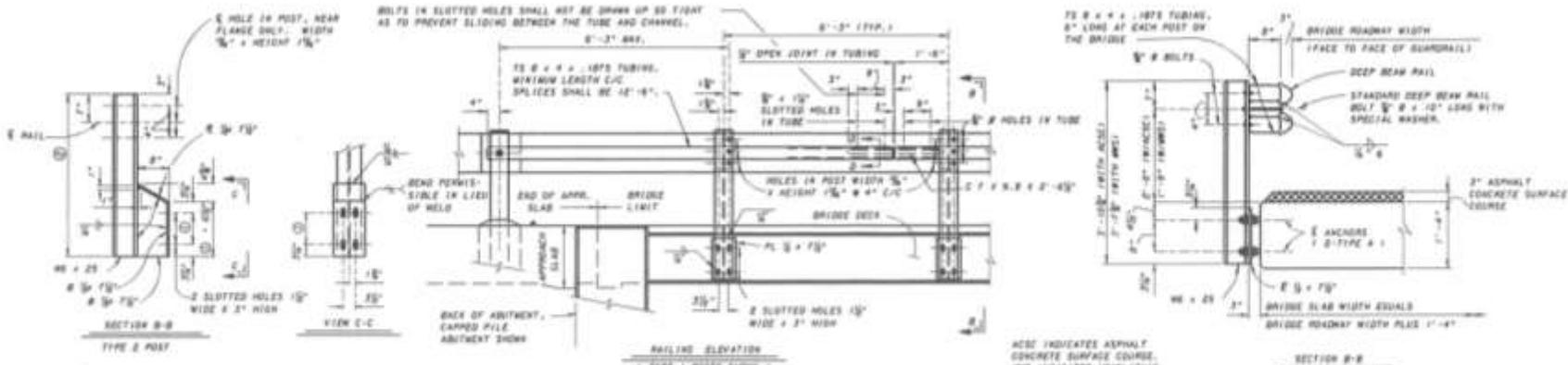






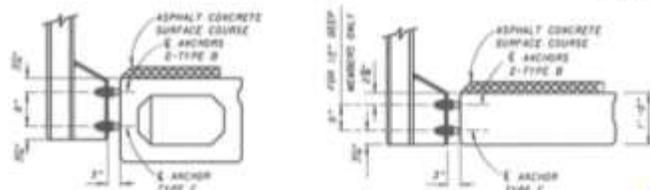




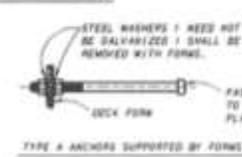
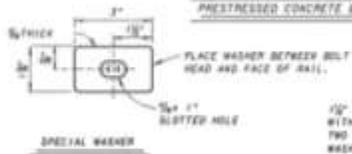


DIMENSION ① IS 8" OR 6" DEPENDING ON BOX BEAM DEPTH. SEE PROJECT PLANS AND POST ANCHORAGE DETAILS. PRESTRESSED CONCRETE BOX BEAMS. FOR DIMENSION ② SEE PROJECT PLANS.

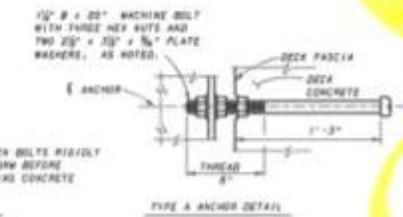
TYPE 1 USE WITH PRESTRESSED CONCRETE BOX BEAMS:



POST ANCHORAGE DETAILS FOR PRESTRESSED CONCRETE BOX BEAMS



TYPE A ANCHORS SUPPORTED BY FORMS

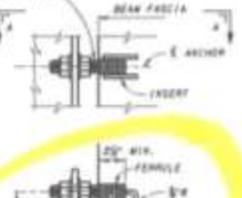


TYPE A ANCHOR DETAIL

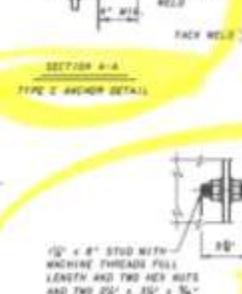
TYPE A ANCHORS SHOULD ONLY BE USED ON PROJECTS WHERE THE ORIGINAL ANCHORS WERE TYPE A. AND ALL ANCHORS ON ANY SINGLE STRUCTURE AND NOT BEING REMOVED OR REPLACED

TWO 1/2" x 8" STUDS WITH MACHINING THREADS FULL LENGTH AND TWO HEX NUTS AND TWO 20" x 30" x 1/4" PLATE WASHERS PER STUD.

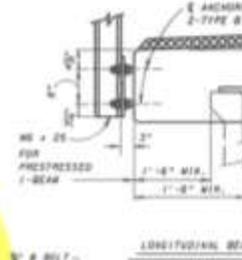
ANCHORS 2-TYPE B



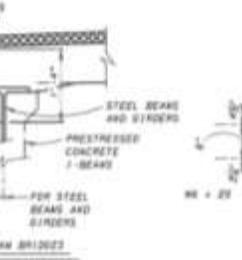
SECTION B-B
TYPE B ANCHOR DETAIL



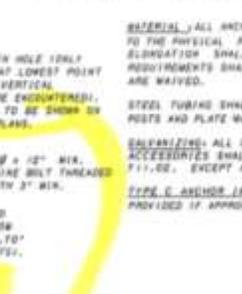
TYPE B ANCHOR DETAIL



LONGITUDINAL BEAM BRIDGES



SECTION B-B
TYPE C ANCHOR DETAIL



TYPE C ANCHOR DETAIL

MATERIAL - ALL ANCHOR BOLTS, NUTS AND STUDS SHALL CONFORM TO THE PHYSICAL PROPERTIES OF ASTM-A305 EXCEPT THAT THE ELONGATION SHALL BE 10% AND THE THREAD LENGTH REQUIREMENTS SHALL BE WAIVED. THE CHEMICAL PROPERTIES ARE WAIVED.

STEEL TUBING SHALL BE AS PER ITEM 707.10. ALL GUARDRAIL POSTS AND PLATE WASHERS SHALL BE ASTM A709 GRADE 36 OR 50.

DEGALVANIZING: ALL GUARDRAIL POSTS, TUBES, HARDWARE AND ACCESSORIES SHALL BE GALVANIZED IN ACCORDANCE WITH 711.02, EXCEPT AS OTHERWISE NOTED.

TYPE C ANCHOR INSERTS OF A DIFFERENT TYPE MAY BE PROVIDED IF APPROVED BY THE DIRECTOR.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF STRUCTURAL ENGINEERING

DATE: 4-10-12

DESIGNED BY: [Signature]

SCALE: 1/8" = 1'-0"

PROJECT: [Signature]

BRIDGE GUARDRAIL

DEEP BEAM

1/1





17" x 3' x 30" Deck Beam

