



**CUY-90-14.90**

**PID 77332/85531**

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**APPENDIX EX-53**

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**CUY-090-1524 PID 12374**

**(Reference Document)**

State of Ohio  
Department of Transportation  
Jolene M. Molitoris, Director

**Innerbelt Bridge  
Construction Contract Group 1 (CCG1)**



**UTILITIES**

Listed below are all utilities located within the project construction limits together with their respective owners:

- Water                   The City of Cleveland Water Department  
1201 Lakeside Avenue  
Cleveland, Ohio 44114  
Attn: Donald Trebar  
216-664-2444
- Electric               Cleveland Electric Illuminating Company  
55 Public Square  
P.O. Box 5000  
Cleveland, Ohio 44101  
Attn: Glen Young  
216-479-3452
- Gas                    East Ohio Gas Company  
1201 East 55th Street  
Cleveland, Ohio 44103  
Attn: Milt Radovic  
216-736-6675
- Phone                 Ohio Bell Telephone Company  
1020 Bolivar Road, Room 421  
Cleveland, Ohio 44115  
216-822-8206  
  
American Telephone & Telegraph  
3833 Waymouth Road  
Medina, Ohio 44256  
Attn: Tom Summerfield  
216-723-9110
- Cable                 Cox Cable Company  
12221 Plaza  
Parma, Ohio 44130  
216-676-8300
- Sewer                 Northeast Ohio Regional Sewer District  
3826 Euclid Avenue  
Cleveland, Ohio

The location of the underground utilities shown on the plans are as obtained from the owners as required by Section 153.64 O.R.C.

**CONTINGENCY QUANTITIES**

The Contractor shall not order materials or perform work for items designated by plan note to be used "as directed by the Engineer" unless authorized by the Engineer. The actual work locations and quantities used for such items shall be incorporated into the final change order governing completion of this project.

**ELEVATION DATUM**

All elevations are based on U.S.G.S. datum.

**SUBSURFACE INVESTIGATION EQUIPMENT**

Slope inclinometers have been installed at the site to monitor subsurface ground water. These instruments shall be protected and avoided by the Contractor at all times.

Monitoring and measurement of the instruments is being performed at two month intervals by BBC&M, Inc., Columbus, Ohio under contract to ODOT. The Contractor shall cooperate with the testing company and allow access to the site and instruments.

**ITEM 659, SEEDING AND MULCHING AS PER PLAN**

All areas shall be seeded with Crown Vetch per 659.09.

Seeding and mulching shall be applied to all areas of exposed soil within the construction limits. Quantity calculations for Item 659, Seeding and Mulching, are based on these limits.

The following estimated quantity has been carried to the General Summary:

659, Seeding and Mulching, As Per Plan                    4306 Sq. Yd.

**WATERING AND MOWING PERMANENT SEEDED AREAS**

The following estimated quantities are to be used as directed by the Engineer to promote growth and to care for permanent seeded areas per 659.09:

659, Water    10 M. Gal.

**TEMPORARY SOIL EROSION AND SEDIMENT CONTROL**

The following estimated quantities are to be used as directed by the Engineer for temporary erosion and sediment control measures:

207, Temporary Seeding and Mulching                    4306 Sq. Yd.

207, Straw or Hay Bales                                        100 Each

207, Filter Fabric Fence                                      374 Lin. Ft.

659, Commercial Fertilizer                                 0.19 Ton

**CONSTRUCTION LIMITS**

The construction limits shown on these plans are for physical construction only. The installation and operation of all temporary traffic control and temporary traffic control devices required by these plans shall be provided by the Contractor whether inside or outside these construction limits.

**REVIEW OF DRAINAGE FACILITIES**

Before any work is started on the project and again before final acceptance by the State, representatives of the State and the Contractor, along with local representatives, shall make an inspection of all existing sewers which are to remain in service and which may be affected by the work. The condition of the the existing conduits and their appurtenances shall be determined from field observations. Records of the inspection shall be kept in writing by the State.

All new conduits, inlets, catch basins, and manholes constructed as a part of the project shall be free of all foreign matter and in a clean condition before the project will be accepted by the State.

All existing sewers inspected initially by the above mentioned parties shall be maintained and left in a condition reasonably comparable to that determined by the original inspection. Any change in the condition resulting from the Contractor's operation shall be corrected by the Contractor to the satisfaction of the Engineer.

Payment for all operations described above shall be included in the contract price for the pertinent 603 conduit items.

**CROSSINGS AND CONNECTIONS TO EXISTING PIPES AND UTILITIES**

Where plans provide for a proposed conduit to be connected to, or cross over or under an existing sewer or underground utility, the Contractor shall locate the existing pipes or utilities both as to line and grade before starting to lay the proposed conduit.

If it is determined that the elevation of the existing conduit, or existing appurtenance to be connected, differs from the plan elevation or results in a change in the plan conduit slope, the Engineer shall be notified before starting construction of any portion of the proposed conduit which will be affected by the variance in the existing elevations.

If it is determined that the proposed conduit will intersect an existing sewer or underground utility if constructed as shown on the plan, the Engineer shall be notified before starting construction of any portion of the proposed conduit which would be affected by the interference with an existing facility.

Payment for all the operations described above shall be included in the contract price for the pertinent 603 conduit item.

**PIPE CONNECTIONS TO CORRUGATED METAL STRUCTURES**

Connections of proposed longitudinal drainage to corrugated metal structures shall be made by means of a shop fabricated or field welded stub on the structure. The stub shall meet the requirements of 707 and have a minimum length of two feet and a minimum wall thickness of 0.064 inches.

The location and elevation of the stub are to be considered approximate and may be adjusted by the Engineer to avoid cutting through joints in the structure.

The field welded joint, if used, shall be thoroughly cleaned and regalvanized or otherwise suitably repaired. Welding shall meet the requirements of 513.17.

A masonry collar, as per Standard Drawing MC-4, will be required to connect the longitudinal drainage to the stub, when pipe other than corrugated metal is provided for the longitudinal drainage.

Payment for cutting into the structure and providing the connection described, shall be included in the contract price for Item 603.

~~**WORK IN THE CUYAHOGA RIVER**~~

~~Any work requiring equipment in the Cuyahoga River, must be coordinated with the Ninth Coast District, 1240 East Ninth St., Cleveland, Ohio 44199, Telephone (216) 522-3993, Cleveland Cuyahoga Co. Port Authority, 101 Euclid Ave., Cleveland, Ohio 44114, Telephone (216) 244-8004, and the Army Corps of Engineers, E. 9th Street, Cleveland, Ohio 44114, Telephone (216) 522-1960.~~



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ITEM 601 - CONCRETE SLOPE PROTECTION, AS PER PLAN

THIS WORK SHALL INCLUDE THE FOLLOWING:

- A. EXCAVATION OF EXISTING SLOPE PROTECTION MATERIAL TO A DEPTH NECESSARY TO ESTABLISH A PROPER SUBGRADE DEPTH WHICH WILL ACCEPT THE PROPOSED SIX INCH THICK CONCRETE SLOPE PROTECTION. THE EXISTING SLOPE PROTECTION MATERIAL NEED NOT BE REMOVED IN ITS ENTIRETY, HOWEVER, THE CONTRACTOR SHALL GRADE THE MATERIAL TO PROVIDE A UNIFORM PLANE FOR THE SUBGRADE. ADDITIONAL MATERIAL MEETING THE REQUIREMENTS OF ITEM 203 WILL BE REQUIRED WHERE THE EXISTING SLOPE HAS ERODED. ALL ADDITIONAL MATERIAL REQUIRED TO REGRADE THE SLOPE TO SIX INSHES BELOW THE FINAL GRADE OF THE PROPOSED CONCRETE SLOPE PROTECTION SHALL BE INCLUDED AND PAID FOR UNDER ITEM 601.
- B. PROPOSED SLOPE PROTECTION: THE INSTALLATION OF THE NEW WELDED STEEL WIRE FABRIC REINFORCED SLOPE PROTECTION AS SHOWN IN THE PLANS, INCLUDING REINFORCING STEEL, WELDED STEEL FABRIC, DOWEL HOLES AND GROUT, GEOTEXTILE FILTER FABRIC, JOINT SEALER AND PREFORMED JOINT MATERIAL, AND CONCRETE. THE FILTER FABRIC SHALL MEET THE REQUIREMENTS OF 712.09, TYPE B (NONWOVEN). FIELD LAPS SHALL CONSIST OF 12 INCHES OF OVERLAP SECURED IN A MANNER SUITABLE TO THE ENGINEER THAT WILL ASSURE THAT THE OVERLAP IS MAINTAINED. OVERLAP CLOSURE AT THE TOP OF THE TRENCH SHALL BE 18 INCHES AND SECURED AS SHOWN IN THE PLAN DETAILS.
- C. ALSO INCLUDED UNDER THIS ITEM SHALL BE THE TRIMMING OF THE SIX- INCH DIAMETER DOWNSPOUT AT ABUTMENT W-2. THIS PIPE SHALL BE CUT SUCH THAT THE OUTLET IS NINE-INCHES ABOVE THE FINAL GRADE OF THE PROPOSED CONCRETE AND TO PREVENT INTERFERENCE WITH THE PLACEMENT OF THE SLOPE PROTECTION. THE CUT SURFACE SHALL BE COATED WITH A ZINC COATING.

ALL COSTS OF CONSTRUCTING THE NEW SLOPE PROTECTION, INCLUDING ALL NECESSARY EMBANKMENT, EXCAVATION, REINFORCING STEEL, DOWEL HOLES AND GROUT, WELDED STEEL WIRE FABRIC, FILTER FABRIC, PREFORMED EXPANSION JOINT FILLER, JOINT SEALER, TRIMMING OF SIX INCH DIAMETER DOWNSPOUT, AND CONCRETE SHALL BE INCLUDED UNDER ITEM 601 - CONCRETE SLOPE PROTECTIO, AS PER PLAN.

THE FOLLOWING ESTIMATED QUANTITIES HAVE BEEN CARRIED TO THE GENERAL SUMMARY:

ITEM 601- CONCRETE SLOPE PROTECTION, AS PER PLAN .....372 SQ. YD.  
 ITEM 609- CURB, TYPE 2-A.....107 LIN. FT.



# MAINTENANCE OF TRAFFIC GENERAL NOTES

CALCULATED  
LVB 9/96  
CHECKED  
ELL 11/96

## ITEM 614 - MAINTAINING TRAFFIC

All existing lanes shall be open to traffic between November 15 and March 15. Short term lane closures are permitted as per the "Schedule of Lanes to be Maintained" and as approved by the Project Engineer. The Contractor shall schedule his work to meet this requirement. Short term temporary closure of IR-90 westbound lanes for the repair of the finger joint at the west end pier will be permitted. A short term closure of IR-90 with detour for the jacking and west end pier bearing removal will be permitted.

No lanes shall be closed on IR-90 during the following designated holidays or events:

Christmas	New Years
Memorial Day	Fourth of July
Labor Day	Thanksgiving

The period of time that all lanes are to be open depends upon the day of the week on which the holiday or event falls. The following schedule shall be used to determine this period:

Day of the Week	Time All Lanes are to be Opened
Sunday	12:00 N Friday through 12:00 N Monday
Monday	12:00 N Friday through 12:00 N Tuesday
Tuesday	12:00 N Monday through 12:00 N Wednesday
Wednesday	12:00 N Tuesday through 12:00 N Thursday
Thursday	12:00 N Wednesday through 12:00 N Monday
Friday	12:00 N Thursday through 12:00 N Monday
Saturday	12:00 N Friday through 12:00 N Monday

No lane closures on IR-90 shall be permitted for downtown events exceeding 15,000 seating capacity for 2 hours prior and 2 hours after.

Should the Contractor fail to meet any of these requirements, the Contractor shall be assessed liquidated damages in the amount of \$90.00 per minute.

## SPECIAL NOTES

The Contractor shall be required to conduct his work in conjunction with other projects proposed within the limits of this project in accordance with 105.07. The following projects may also be under construction within the project limits:

A. CUY-90-15.99

The CUY-90-15.99 project shall be considered the primary contract and shall take precedence for maintenance of traffic.

The contractor shall be required to coordinate his work with other Contractors and the Engineer. This work shall include the coordination of the 614 Maintaining Traffic.

## SCHEDULE OF LANES TO BE MAINTAINED

ROUTE	NUMBER OF EXISTING LANES (NORMAL)	PERMISSIBLE SHORT TERM LANE CLOSURES					
		WEEKDAYS			WEEKENDS		
		1 LANE CLOSED	2 LANES CLOSED	ALL LANES CLOSED	1 LANE CLOSED	2 LANES CLOSED	ALL LANES CLOSED
I-90	3	7PM-6AM	11PM-6AM	MIDNIGHT-5AM	7PM FRI-6AM MON	MIDNIGHT-9AM SAT MIDNIGHT-11AM SUN 11PM SUN-6AM MON	MIDNIGHT-5AM SAT MIDNIGHT-8AM SUN
	4	9AM-3PM 7PM-6AM	8PM-6AM	MIDNIGHT-5AM	7PM FRI-6AM MON	10PM FRI-11AM SAT 9PM SAT-MIDNIGHT SUN 10PM SUN-6AM MON	MIDNIGHT-5AM SAT MIDNIGHT-8AM SUN

NOTES: Weekdays: Monday A.M. To Friday A.M.  
Weekends: Friday P.M. To Monday A.M.  
Work related to the lane closures listed above must be in progress during the time the lane is closed

## IR-90 WESTBOUND LANES CLOSURE

IR-90 westbound lanes closure shall be as per Std. Dwg. MT-95.30 (Using Drums) and "OMUTCD". Additional OW-134 (ROAD WORK AHEAD) and the appropriate OW-122 or OW-123 series of signs (LANE or LANES CLOSED AHEAD) signs will be required at ramps E-1 and E-3. No Pavement marking will be required. The Contractor shall have the option to schedule the lane closure work concurrent with similar lane closures for the CUY-90-15.99 Project.

## CLOSURE OF IR-90 WITH DETOUR

Closure of IR-90 with Detour shall be as per "OMUTCD" and as per the Detour plan. The closing of lanes to reduce the number of lanes to one at the exit ramps starting the detours shall be as per Std. Dwg. MT-95.30. The contractor may start closing the roadways down to one lane one hour prior to the scheduled closing time. Three Law Enforcement Officers (L.E.O.'s) shall be used at each closing location, two L.E.O.'s shall remain during closure, three L.E.O.'s shall be used at each opening location and one L.E.O at each closed Ramp during the closure.

## GENERAL CONSTRUCTION SEQUENCE

The Contractor is reminded that, in the scheduling of this project, his sequence of operations shall be planned and executed in such a way as to minimize the number of times lane closures or closure of IR-90 is required for the project.

## PROJECT PROGRESS MEETINGS

Progress meetings will be held every four (4) weeks at the project office, or other location designated by the Construction Engineer, and attended by O.D.O.T. and construction decision making personnel.

The purpose of these meetings will be to discuss critical operations and potential problems. The Contractor will confirm the number and duration of work shifts, number of work crews, and specific portions of the work to be performed during the following weeks.

These meetings can only be waived by the Construction Engineer.

## PROGRESS SCHEDULE (CRITICAL PATH METHOD)

The pre-construction meeting shall be held no later than 30 calendar days after the contract is signed. The Contractor shall submit their proposed CPM schedule at the pre-construction meeting for the review by the Construction Engineer. Written comments regarding the CPM schedule will be forwarded to the Contractor by the Construction Engineer within 14 calendar days after the pre-construction meeting.

A final CPM schedule shall be submitted to the Construction Engineer within 30 calendar days from the date of the pre-construction meeting but at least seven (7) calendar days prior to the date designated as the starting date in the CPM schedule. The schedule shall be signed and dated by the prime contractor and named subcontractors.

## ADJUSTMENTS IN CONTRACT TIME

Time extensions will only be considered when controlling items of work on the approved CPM schedule are affected due to no fault of the Contractor.

When additional work is required, time extensions will only be granted for controlling items on the CPM schedule.

## FAILURE TO COMPLY

If there is any failure to comply with provisions for traffic control set out in these plans and notes, or with the provisions of the "Manual," the highway in the vicinity of the work area shall not be considered in a condition for the safe and convenient use by the traveling public. Any failure to keep the highway in the vicinity of the work area in a condition for the safe and convenient use by the traveling public shall be considered a breach of this contract. Work shall be suspended until the Contractor complies with the provisions of the aforementioned items.

Job No. 93111MN Date 12/23/96 Drawn By SAM/SB

MAINTENANCE OF TRAFFIC GENERAL NOTES

CUY-90-15.24

# MAINTENANCE OF TRAFFIC GENERAL NOTES

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MAINTENANCE OF TRAFFIC GENERAL NOTES

## TRAFFIC CONTROL MATERIALS

### A. Signs

Sign dimensions and specifications, including letter sizes, shall be as provided in the OMUTCD, or in sign design drawings provided by the Department of Transportation. The signs shall be subject to approval of the Engineer prior to the start of the project. All signs shall have a reflectorized background of reflective materials as described in the OMUTCD.

### B. Sign Supports

Supports shall be adequate in mass and stability to prevent the signs being blown over by wind or vehicular generated air turbulence. (See MT-105.10 & 105.11)

### C. Drums

Drums shall be in accordance with pertinent sections of the OMUTCD. All costs for installing, maintaining and subsequent removal of said drums shall be included in the lump sum bid price for Item 614-Maintaining Traffic.

### D. Flashers

Flashers shall be 12 volt battery-operated models with 7 inch diameter yellow lenses illuminated by rapid intermittent flashes of short duration and shall be placed and operated as per Std. Dwg. MT-95.30. Payment for the above shall be included in the lump sum bid for Item 614-Maintaining Traffic.

### E. Flashing Arrow Barricade

Whenever any part of the traveled surface is closed, the motorist shall be warned and diverted by the Contractor through the use of one flashing arrow barricade for each lane closed. The flashing arrow panel shall be positioned to assure clear visibility. Locations shall be directed by the Engineer. The Contractor shall refer to Std. Dwg. TC-35.10 and the provision set forth in Ohio Manual of Uniform Traffic Control Devices for Streets and Highways for all information regarding furnishing, maintaining and use of flashing arrow barricades. Payment for the above shall be included in the lump sum bid for Item 614-Maintaining Traffic.

## COVERING OF SIGNS

Where the plans call for a permanent sign to be covered, the Contractor shall do so in such a manner as to avoid damaging the permanent sign when the cover is removed. The cover shall be totally opaque. The use of adhesive tape applied directly to a sign face is strictly prohibited.

## ITEM 614 - PORTABLE CHANGEABLE MESSAGE SIGN, BY CLASS, AS PER PLAN

The Contractor shall furnish, install, maintain and remove, when no longer needed, a changeable message sign, on site, for the duration of the project. The sign shall be of a type shown on the list of approved PCMS units maintained by the Director.

Each sign shall be trailer mounted and equipped with a functional dimming mechanism to dim the sign during darkness and a tamper and vandal proof enclosure. Each sign shall be provided with appropriate training and operation instructions to enable on-site personnel to operate and troubleshoot the unit. The sign shall also be capable of being powered by an electrical service drop from a local utility company.

The locations and work limits for those locations will be as directed by the Engineer. Placement, operation, maintenance and all activation of the signs by the Contractor shall be as directed by the Engineer. The PCMS shall be located in a highly visible position yet protected from traffic. The Contractor shall, at the direction of the Engineer, relocate the PCMS to improve visibility or accommodate changed conditions. When not in use, the PCMS will be off.

The Engineer shall be provided access to each sign unit and shall be provided with appropriate training and operation instructions to enable ODOT personnel to operate and troubleshoot the unit and to revise sign messages, if necessary.

The PCMS unit shall be maintained in good working order by the Contractor in accordance with the provisions of 614.03(C). The Contractor shall, prior to activating the unit, make arrangements with an authorized service agent for the PCMS to assure prompt service in the event of failure. Any failure shall not result in the sign being out of service for more than 12 hours including weekends. Failure to comply may result in an order to stop work and open all traffic lanes and/or in the department taking appropriate action to safely control traffic and the entire cost to control traffic accrued by the department will be deducted from moneys due, or to become due the Contractor on his contract.

The Contractor shall be responsible for 24 hours per day operation and maintenance of these signs on the project for the duration of the phases when the plan requires their use. The requirement to furnish, install, maintain and remove a PCMS unit on this project shall not in any way relieve the Contractor of his responsibilities as outlined in 104.04.

Payment for the above described item shall be at the contract unit price bid per sign month for each Item 614 Portable Changeable Message Sign, as per plan and shall include all labor, materials, equipment, fuels, lubricating oils, software, hardware and incidentals to perform the above described work.

The PCMS shall contain a cellular telephone data link which will (in active cellular phone areas) allow remote sign activation, deactivation, message changes, message additions and revisions to time of day programs. The system shall also permit verification of current and programmed messages. One remote data input device (laptop computer plus modem) shall be furnished for use by the district work zone traffic control engineer and shall be insured against theft.

Each PCMS shall be equipped with a Myraid Safety Beam or an approved equal as determined by the Engineer. The Myraid Safety Beam sends out a signal that activates radar detectors and the beam is approved by the F.C.C. The Myraid Safety Beam shall be able to be activated with the sign running or not. The Myraid Safety Beam is distributed exclusively by:

The Triplex Group, Inc.  
P. O. Box 428  
New Hope, PA 18938  
Phone: (215) 862-5077

### Notes:

1. Class I PCMS are visible from 1200 ft.
2. All portable changeable message signs shall be a Class I. Two PCMS will be available two weeks before the closing of the left two lanes of IR-90 and will be used for the duration of the closing. Nine PCMS will be available two weeks before the closing of IR-90 with Detour and will be used for the duration of the closing and Detour.

If the PCMS are not being used as determined by the Engineer, or when construction has been suspended for the winter season, the project engineer may direct the Contractor to remove the PCMS and discontinue payments for this time.

The following estimated quantity has been carried to the General Summary:

IR-90 WESTBOUND LEFT TWO LANES CLOSURE  
(Estimated quantity - 2 Class I @ 2 month each = 4 sign months.)

CLOSURE OF IR-90 WITH DETOUR  
(Estimated quantity -9 Class I @ 2 month each = 18 sign months.)

Item 614 - Portable Changeable Message Sign, Class I, As Per Plan 22 sign months

Job No. 93111MN Date 12/23/96 Drawn By SHM/SB

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# MAINTENANCE OF TRAFFIC GENERAL NOTES

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MAINTENANCE OF TRAFFIC GENERAL NOTES

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## TRAFFIC CONTROL DEVICES LOCATED OUTSIDE OF THE LIMITS OF CONSTRUCTION

In addition to the requirements of 614.03 (b) of the CMS, the Contractor shall furnish, erect, maintain, and subsequently remove such additional traffic control devices located outside of the limits of construction as are required on highways which are used as detours, including the road closed signs upon the barricades at the point where the highway is closed.

## CONTRACTOR'S EQUIPMENT AND OPERATION

All vehicles and equipment that are not working behind portable concrete barrier or must enter the highway more than once a day must be equipped with at least one flashing, rotating, or oscillating amber light. The light must be visible to all directions or traffic for at least one quarter mile, day or night.

The Contractor's equipment shall be operated in the direction of traffic.

## ITEM SPECIAL - SIGNING MISC: ADDITIONAL SIGNS, GROUND MOUNTED, AS DIRECTED BY THE ENGINEER

When additional signing is needed to maintain traffic the Contractor shall furnish the sign or signs as directed by the Engineer. These signs shall be ground mounted and meet all the specifications of the plan. Proposal and current year State of Ohio, Department of Transportation Construction and Material Specifications.

Payment for this item shall include but not be limited to the cost to furnish the sign, erect it, including drive posts or other approved method of support, maintain it, and remove it.

Payment shall be by the square foot.

Item Special-Signing Misc: Additional Signs, Ground Mounted, As Directed By The Engineer = 400 Sq. Ft.

## TRUCK MOUNTED ATTENUATOR

When the Contractor is performing short term work on berms or medians less than 10 feet in width, and on a road with speeds of 45 MPH or higher, a truck mounted attenuator must trail the operation. This same truck must have a Type B flashing arrow panel mounted on it facing the rear of the truck.

The T.M.A. shall be an Alpha 60 M.D., manufactured by

Energy Absorption Systems, Inc.  
One East Wacker Drive  
Chicago, Illinois 60601-2076  
(312)467-6750

An equal product may be submitted for approval by the Engineer. The T.M.A. must bring a vehicle weighing about 1,800 to 4,500 Lbs. and traveling at 60 MPH to a safe, controlled stop, per NCHRP 350 criteria. The manufacture's specification must be followed concerning the size of the truck and the connections to the T.M.A.

Operations that the T.M.A. and flashing arrow panel are intended for, but not limited to, are the following:

1. Installation, covering, uncovering of construction of signs.
2. Set-up and tear-down of a lane closure.
3. Placing or picking up drums, cones, or equipment.
4. Anytime as Directed By the Engineer.

All costs associated with this item are to be included in Item 614, Maintaining Traffic.

## TEMPORARY OVERLAY

For existing overhead signs with proposed temporary overlays larger than the sign itself, a temporary extrusheet extension panel(s) shall be fastened to the top of the existing sign in accordance with standard drawing TC-42.10. The height of the extension shall be enough to make the size of the existing sign the same size as the temporary overlay. The temporary extrusheet extension panel(s) shall be added to the sign prior to the temporary overlay being fastened to the sign. The existing exit panel shall be temporarily removed and reattached after the temporary overlay and extrusheet extensions are removed. The cost to perform the above mentioned work shall be included under the lump sum bid for Item 614-Maintaining Traffic.

## ITEM SPECIAL - LAW ENFORCEMENT OFFICER WITH PATROL CAR (L.E.O.'s)

In addition to the requirements of 614 and the latest edition of the Ohio Manual of Uniform Traffic Control Devices (OMUTCD), uniformed law enforcement officers and official patrol cars with working top mounted emergency flashing lights shall be provided for controlling traffic for the following tasks:

### IR-90 WESTBOUND LANES CLOSURE

For closures, of IR-90 westbound lanes during initial set-up periods, tear down periods, and during the entire time of the closing. (3 L.E.O.'s required)

### CLOSURE OF IR-90 WITH DETOUR

During the entire closure sequence and closure of IR-90 (Three L.E.O.'s shall be at each closure location, during the closure sequence two L.E.O.'s shall remain during the closure, 1 L.E.O. shall be required at each closed ramp during closure and three L.E.O.'s shall be used at each opening location.)

The LEO's are considered to be employed by the Contractor and the Contractor shall be responsible for their actions. Although they are employed by the Contractor, the project engineer shall have control over their placement. The official patrol car shall be a public safety vehicle as required by the Ohio Revised Code.

The Contractor shall make arrangements for these services with:

City of Cleveland  
Police Department, Third District  
2001 Payne Avenue  
Cleveland, Ohio 44114  
Phone (216) 623-5300

Law enforcement officers with patrol car required by the traffic maintenance tasks above shall be paid for on a unit price hourly basis under Item Special-Law Enforcement Officer With Patrol Car. The following estimated quantities have been carried to the General Summary:

### IR-90 WESTBOUND LANES CLOSURE

(Estimated quantity 3 L.E.O @ 13 hrs. x 9 times = 351 hours)

### CLOSURE OF IR-90 WITH DETOUR

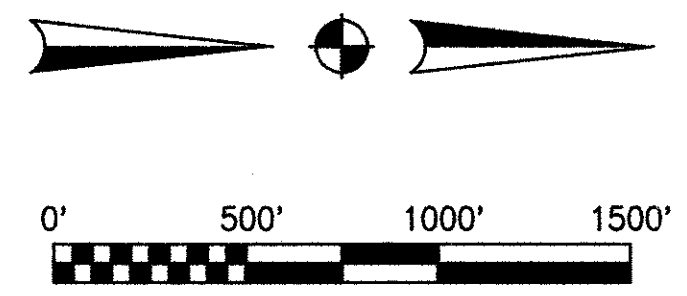
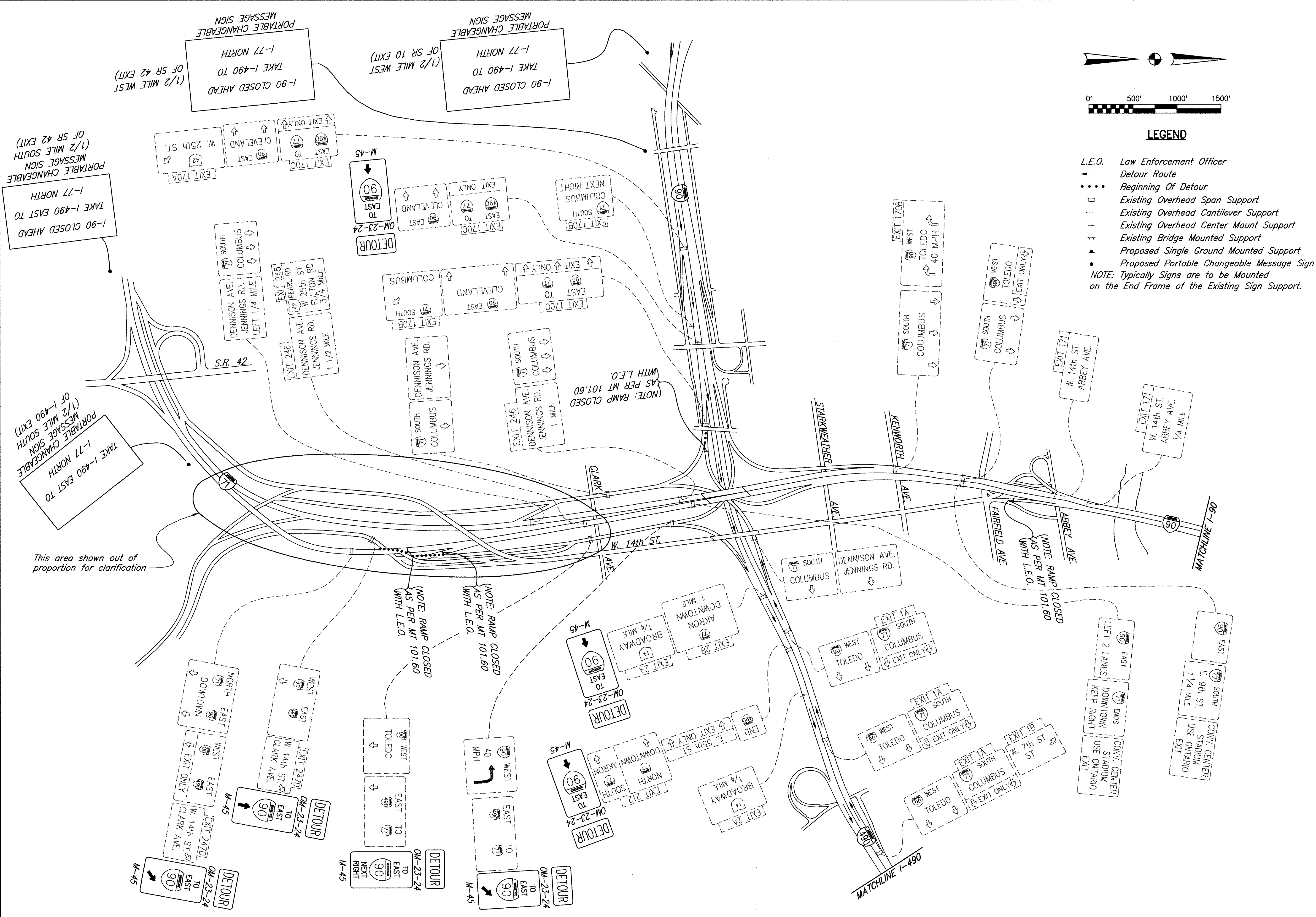
(Estimated quantity 9 L.E.O @ 12 hrs. x 5 times = 540 hours)

Item Special - Law Enforcement Officer With Patrol Car 891 hours

The hours paid shall include minimum show-up time required by the law enforcement agency involved.

If the Contractor wishes to utilize LEO's for flagging and traffic control other than for that required in these plans, he may do so at his own expense. Payment for the excess above the contract requirements will be included under Item 614-Maintaining Traffic.





**LEGEND**

- L.E.O. Law Enforcement Officer
  - Detour Route
  - Beginning Of Detour
  - || Existing Overhead Span Support
  - || Existing Overhead Cantilever Support
  - || Existing Overhead Center Mount Support
  - || Existing Bridge Mounted Support
  - Proposed Single Ground Mounted Support
  - Proposed Portable Changeable Message Sign
- NOTE: Typically Signs are to be Mounted on the End Frame of the Existing Sign Support.

This area shown out of proportion for clarification









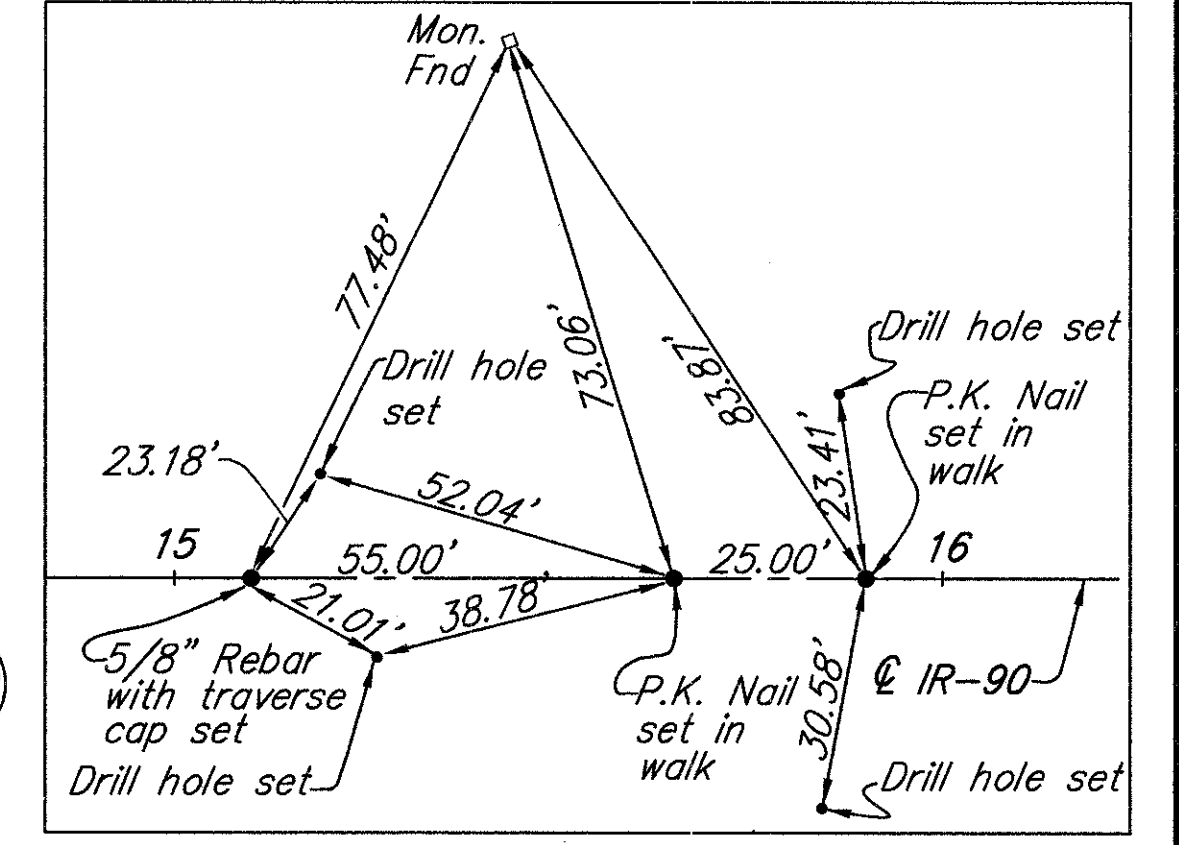
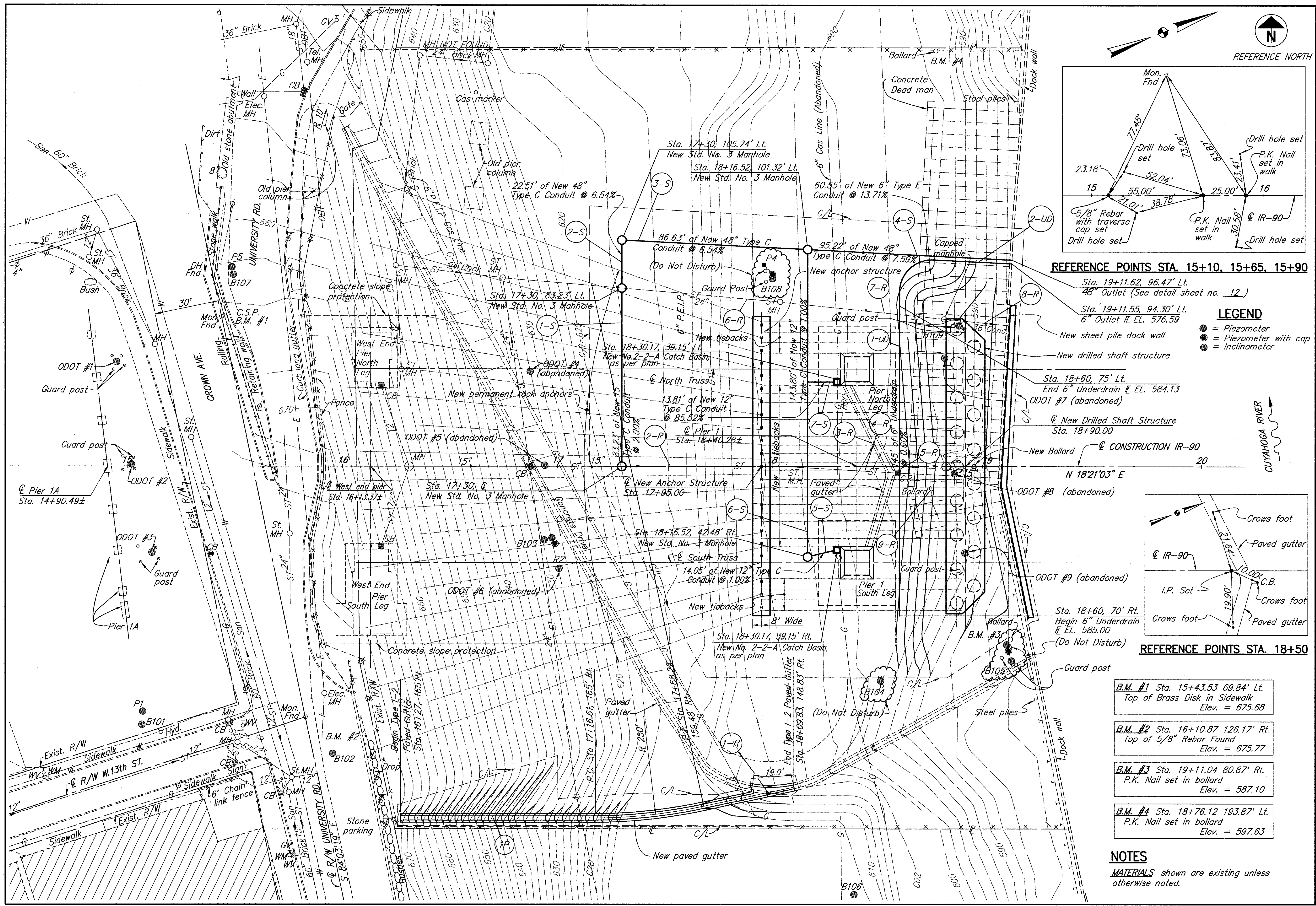
REF. NO.	SIDE	STATION		603				603		605	202								
				6" CONDUIT, TYPE E	12" CONDUIT, TYPE C	15" CONDUIT, TYPE C	48" CONDUIT, TYPE C	CATCH BASIN, NO. 2-2-A, AS PER PLAN	MANHOLE, NO. 3	6" DEEP PIPE UNDERDRAIN, AS PER PLAN	GUTTER REMOVED	PIPE REMOVED, 24" AND UNDER	PIPE REMOVED, OVER 24"	MANHOLE REMOVED	CATCH BASIN REMOVED	REMOVAL MISC. BOLLARD			
																	LIN FT.	LIN FT.	LIN FT.
1-S	LT.	17+30	17+30			83.23				1									
2-S	LT.	17+30	17+30				22.51			1									
3-S	LT.	17+30	18+16.52				86.63			1									
4-S	LT.	18+16.52	19+11.62				95.22			1									
5-S	RT.	18+30.17	18+16.52		14.05			1											
6-S	RT. & LT.	18+62.52	18+16.52		143.80				1										
7-S	LT.	18+30.17	18+16.52		13.81			1											
1-UD	RT. & LT.	18+60	18+60							145									
2-UD	LT.	18+60	19+11.55	60.55															
1-R	RT.	17+90.83	19+09.83								19								
2-R	CL	17+30	18+05									75		1					
3-R	LT. & RT.	18+35	18+45								81								
4-R	CL.	18+05	18+55									50			1				
5-R	CL.	18+55	19+06									51							
6-R	LT.	17+30	18+04									74		1					
7-R	LT.	18+04	18+80									76		1					
8-R	LT.	18+80	19+10										30						
9-R	RT.	18+75																1	
TOTAL				61	172	84	205	2	5	145	100	326	30	3	1	1			

SUBSUMMARY

LINE NO.	CALCULATIONS		
<b>ITEM 601 PAVED GUTTER TYPE 1-2</b>			
1-P 1	STA. 16 + 27.00		
2	STA. 17 + 30.00	= 103.00 L.F. x 1.1180 2:1 SLOPE	= 115.16 L.F.
3	STA. 18 + 09.83		= 79.83 L.F.
4	STA. 17 + 90.83		
5	STA. 18 + 09.83		= 19.00 L.F.
6	TOTAL LINES 1 TO 5		TOTAL (601) = 213.99 L.F.
			USE 214 L.F.
<b>ITEM 659 SEEDING AND MULCHING, AS PER PLAN</b>			
7	STA. 16 + 25.00		
8	STA. 17 + 30.00	COMPUTER CALC. = 1588.00 S.F. x 1.1180 2:1 SLOPE / 9	= 197.27 S.Y.
9	STA. 18 + 09.83	COMPUTER CALC. = 1778.00 S.F. / 9	= 197.56 S.Y.
10	STA. 17 + 15.00		
11	STA. 19 + 57.00	COMPUTER CALC. = 40081.00 S.F. / 9	= 4453.44 S.Y.
12	LESS PAVED GUTTER	213.99 L.F. x 6 L.F. / 9	= -142.66 S.Y.
13	LESS PIERS	236.00 S.F. x 2 / 9	= -52.44 S.Y.
14	LESS DRILLED SHAFT STRUCTURE	2708.00 L.F. / 9	= -300.89 S.Y.
15	LESS AREA OVER WATER	212.00 L.F. x 2 L.F. / 9	= -47.11 S.Y.
16	TOTAL LINES 7 TO 15		TOTAL (659) = 4305.17 S.Y.
			TO GEN. NOTES 4306 S.Y.
<b>ITEM 659 COMMERCIAL FERTILIZER</b>			
17	LINE 16	= 4305.17 S.Y. x 9 / 1000 x 20 / 2000	TOTAL (659) = 0.39 TON
			USE 0.39 TON
<b>ITEM 659 WATER</b>			
18	LINE 16	= 4305.17 S.Y. x 9 x 120 x 2 / 1000 / 1000	TOTAL (659) = 9.30 M GAL.
			TO GEN. NOTES 10 M GAL.
<b>TEMPORARY EROSION CONTROL</b>			
<b>ITEM 207 TEMPORARY SEEDING AND MULCHING</b>			
19	LINE 16		TOTAL (207) = 4305.83 S.Y.
			TO GEN. NOTES 4306 S.Y.
<b>ITEM 207 COMMERCIAL FERTILIZER</b>			
20	LINE 19	= 4305.17 S.Y. x 9 / 1000 x 10 / 2000	TOTAL (659) = 0.19 TON
			TO GEN. NOTES 0.19 TON
<b>ITEM 207 FILTER FABRIC FENCE</b>			
21	STA. 19 + 17.00, 194.00 FT. LT.		
22	STA. 19 + 38.00, 169.00 FT. RT.	= SQ. RT. ( 21.00 L.F. ^2 + 363.00 L.F. ^2 ) = 363.61 L.F. + 10 L.F.	= 373.61
23	LINE 22		TOTAL (207) = 373.61 L.F.
			TO GEN. NOTES 374 L.F.
<b>ITEM 203 EXCAVATION INCLUDING EMBANKMENT CONSTRUCTION</b>			
<i>(PAVED GUTTER)</i>			
24	STA. 16 + 25.00		
25	STA. 16 + 99.00	= 74.00 L.F. x 17 L.F. AVG. x 0.3' DEPTH / 27 x 1.1180 2:1 SLOPE	= 15.54 C.Y.
26	STA. 18 + 09.83	= 110.83 L.F. x 14 L.F. AVG. x 0.3' DEPTH / 27	= 17.24 C.Y.
<i>(AREA AROUND DRILLED SHAFT STRUCTURE)</i>			
27	FROM SHEET NO. 11		= 881.00 C.Y.
28	TOTAL LINES 24 TO 27		TOTAL (203) = 913.78 C.Y.
			USE 914 C.Y.



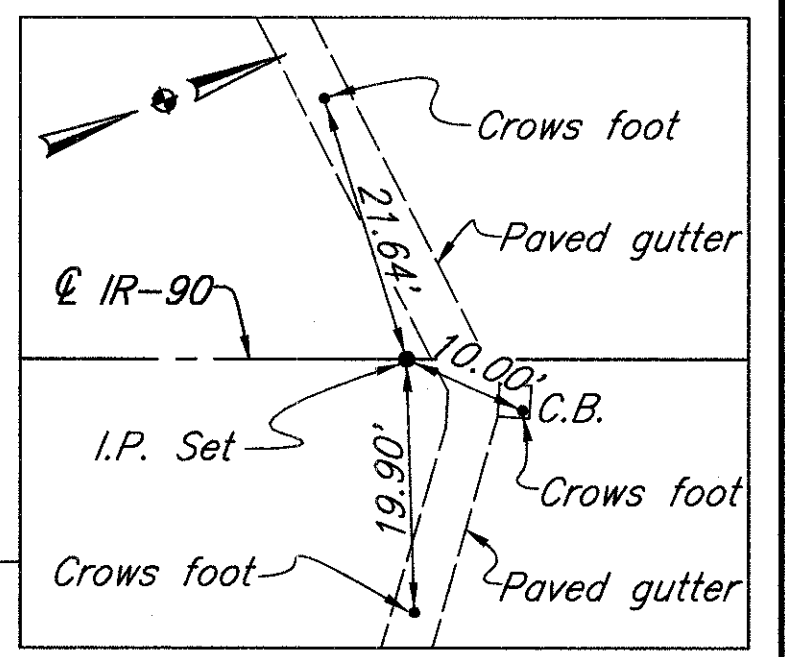
Job No. 93111DSP Date 12/26/96 Drawn By SB/RB



REFERENCE POINTS STA. 15+10, 15+65, 15+90

**LEGEND**

- = Piezometer
- = Piezometer with cap
- = Inclinometer



REFERENCE POINTS STA. 18+50

**B.M. #1** Sta. 15+43.53 69.84' Lt.  
Top of Brass Disk in Sidewalk  
Elev. = 675.68

**B.M. #2** Sta. 16+10.87 126.17' Rt.  
Top of 5/8" Rebar Found  
Elev. = 675.77

**B.M. #3** Sta. 19+11.04 80.87' Rt.  
P.K. Nail set in bollard  
Elev. = 587.10

**B.M. #4** Sta. 18+76.12 193.87' Lt.  
P.K. Nail set in bollard  
Elev. = 597.63

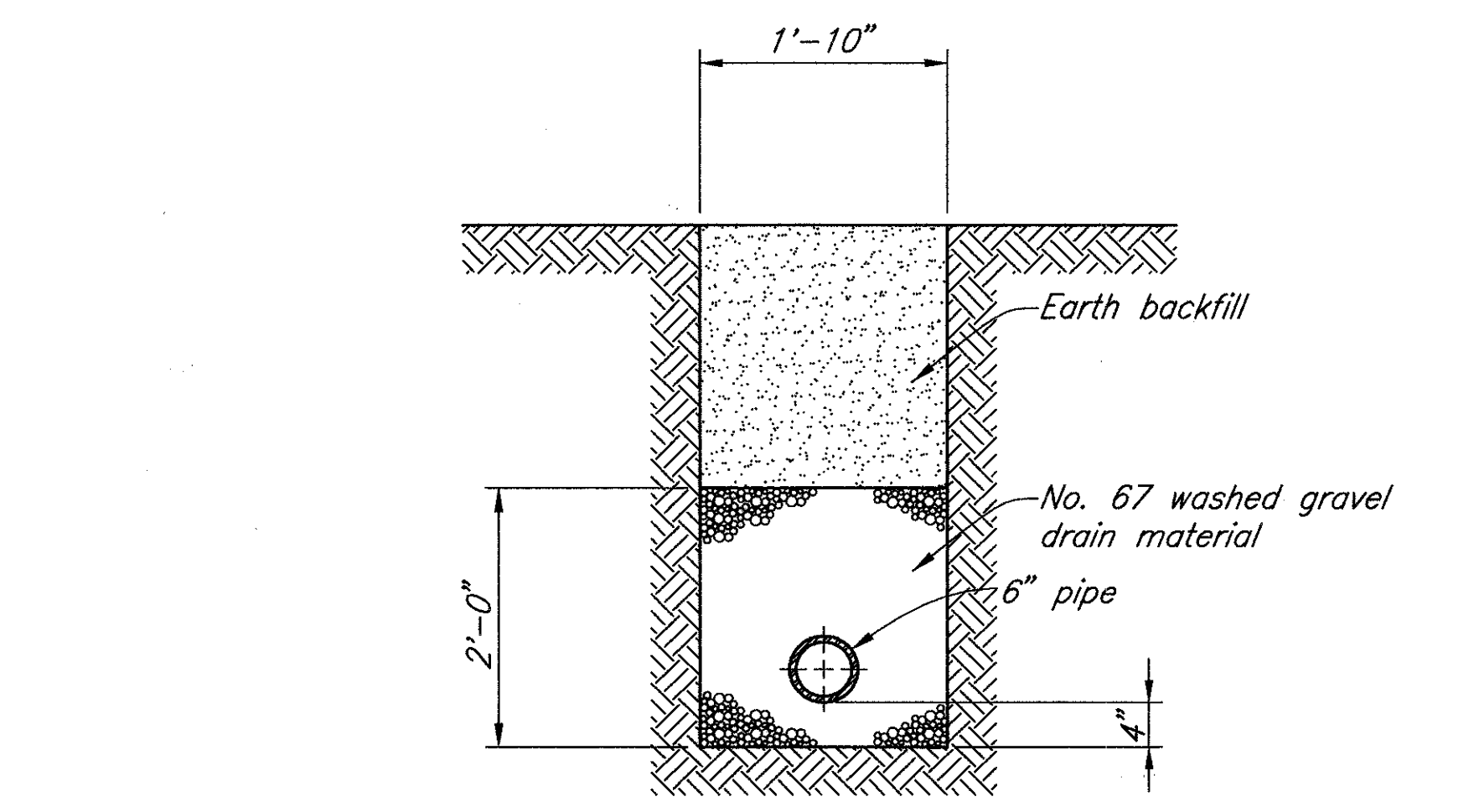
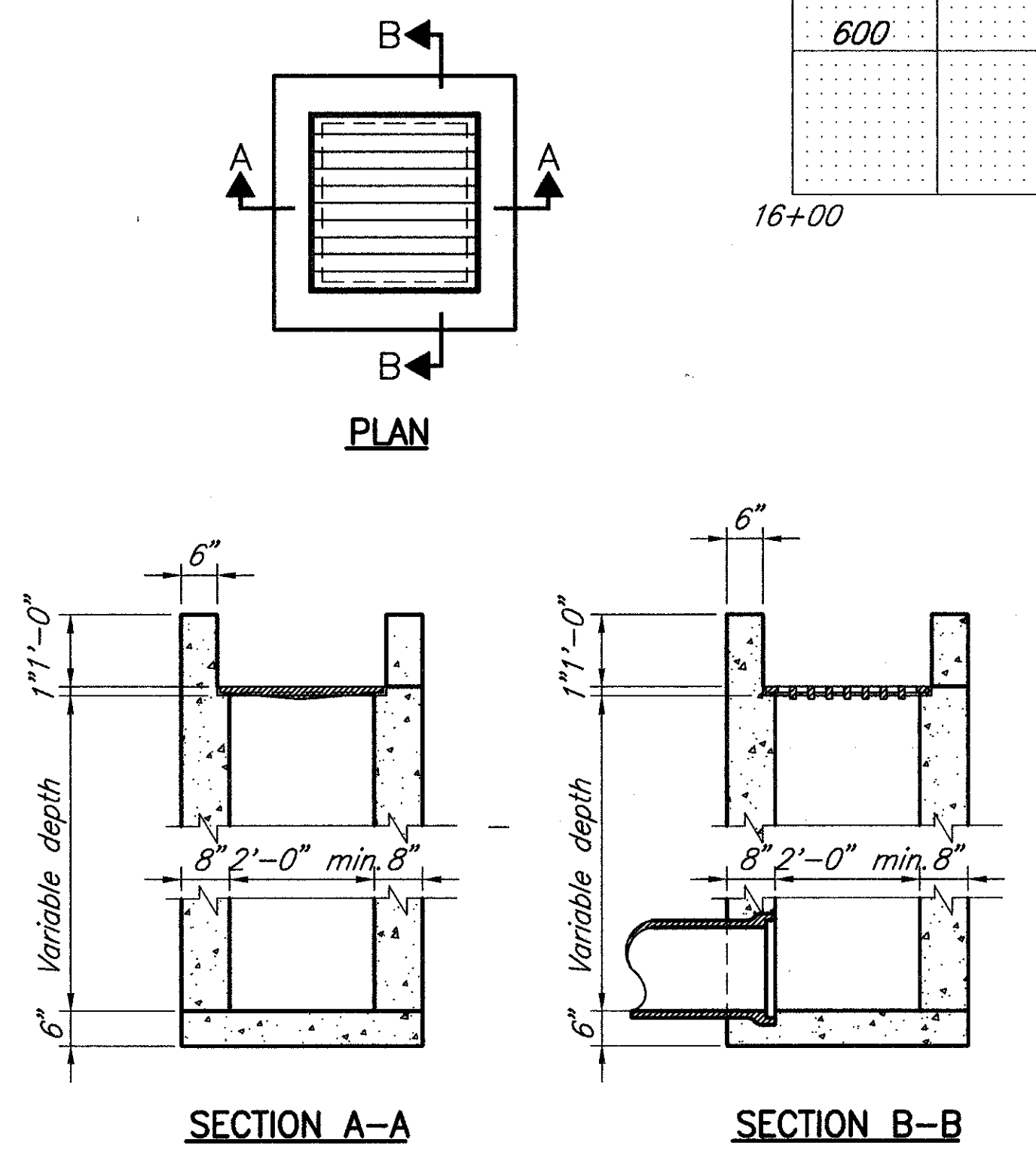
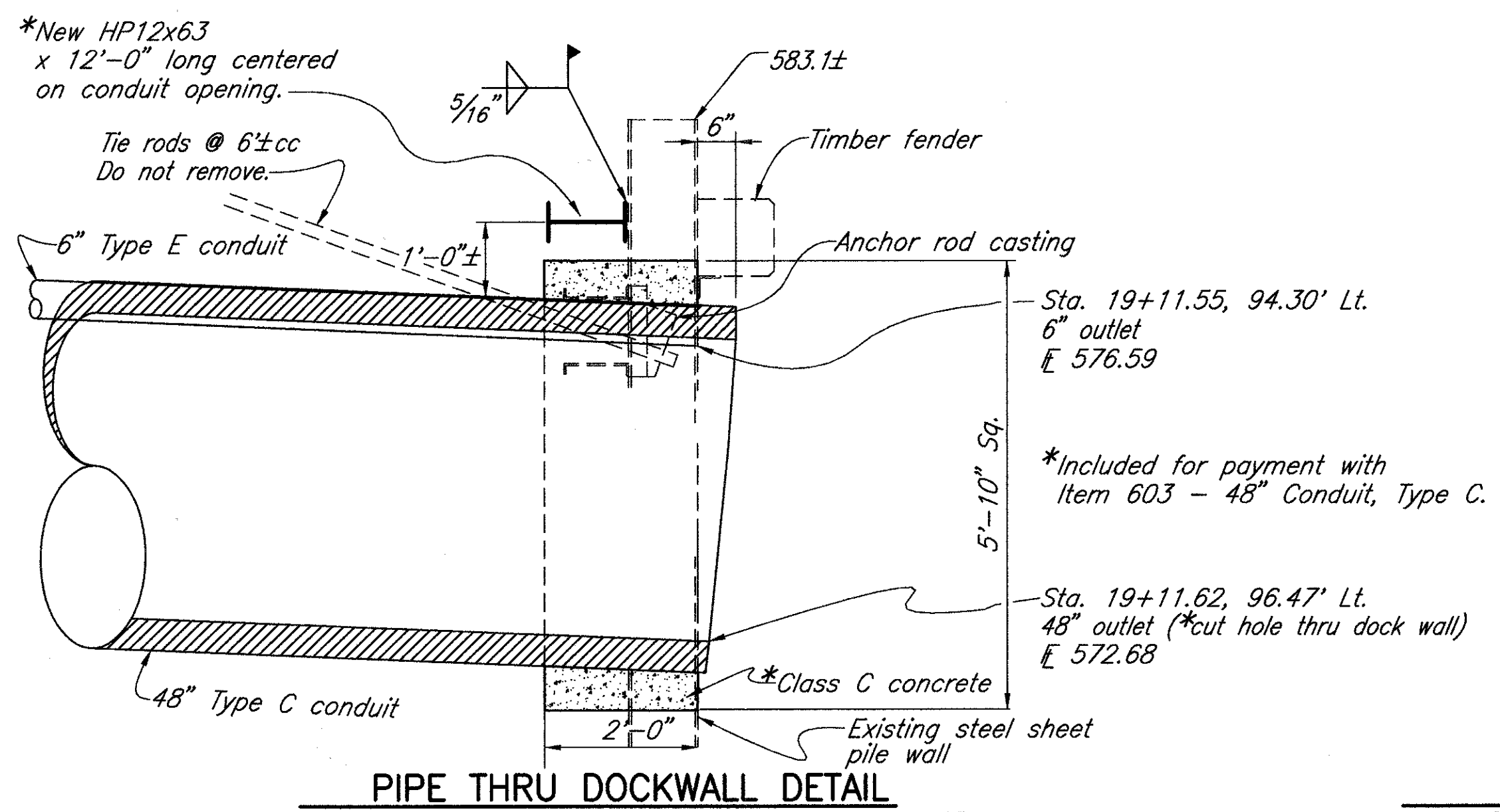
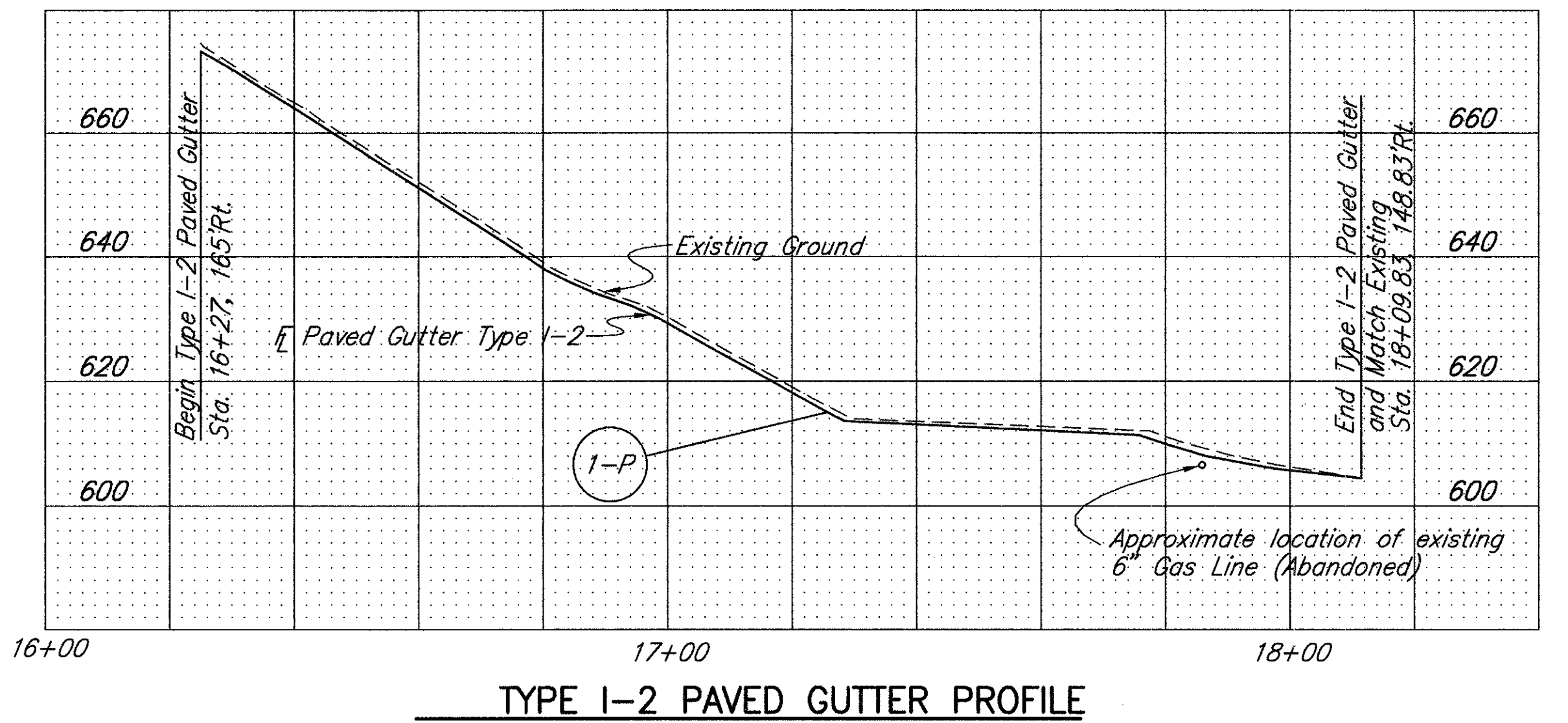
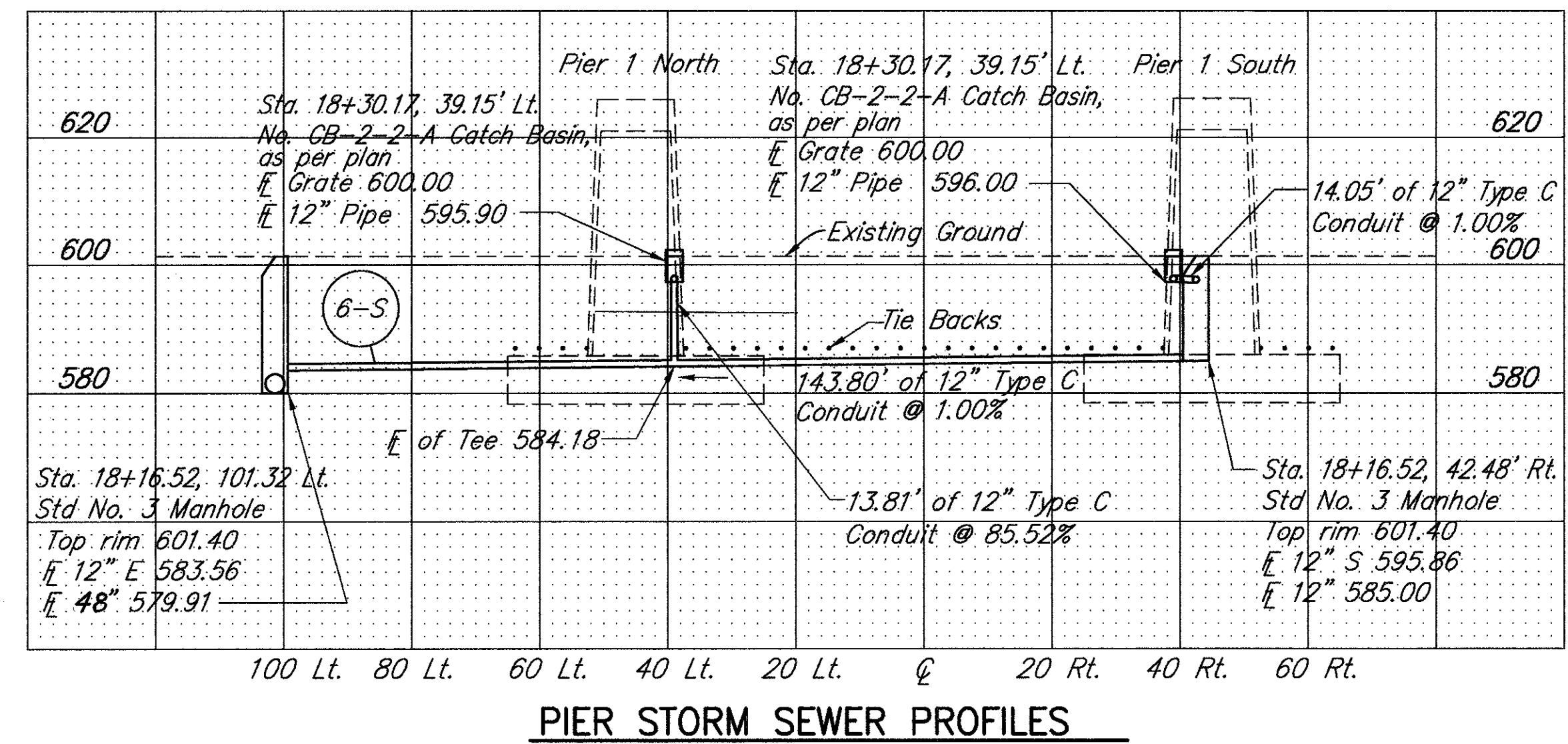
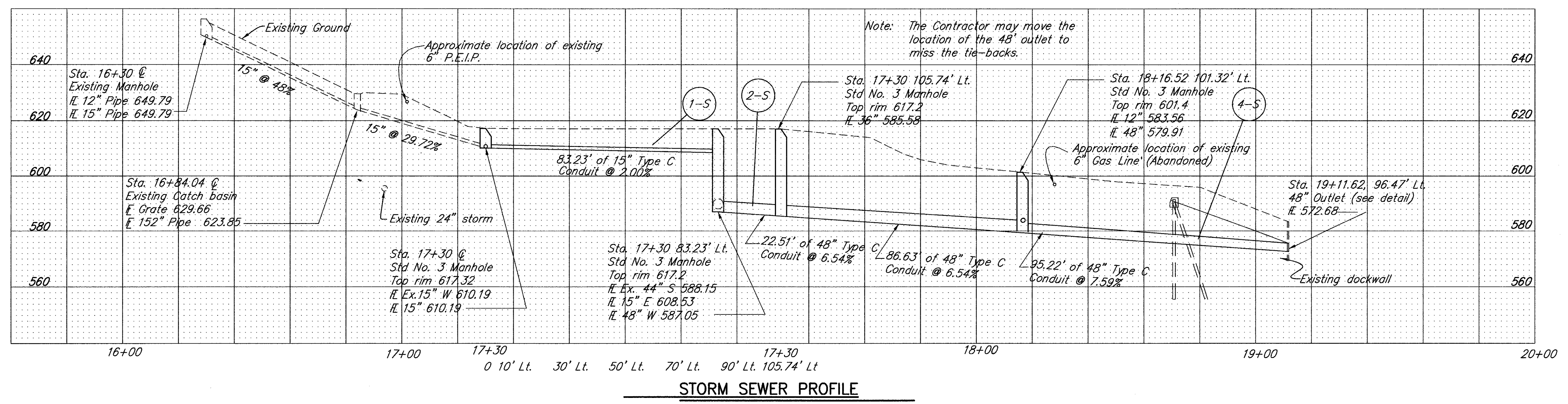
**NOTES**

**MATERIALS** shown are existing unless otherwise noted.

DRAINAGE AND GRADING PLAN

CUY-90-15.24





Job No. 83111SP Date 12/23/96 Drawn By: SB

Note: The Contractor may move the location of the 48\"/>

\*Included for payment with Item 603 - 48\"/>

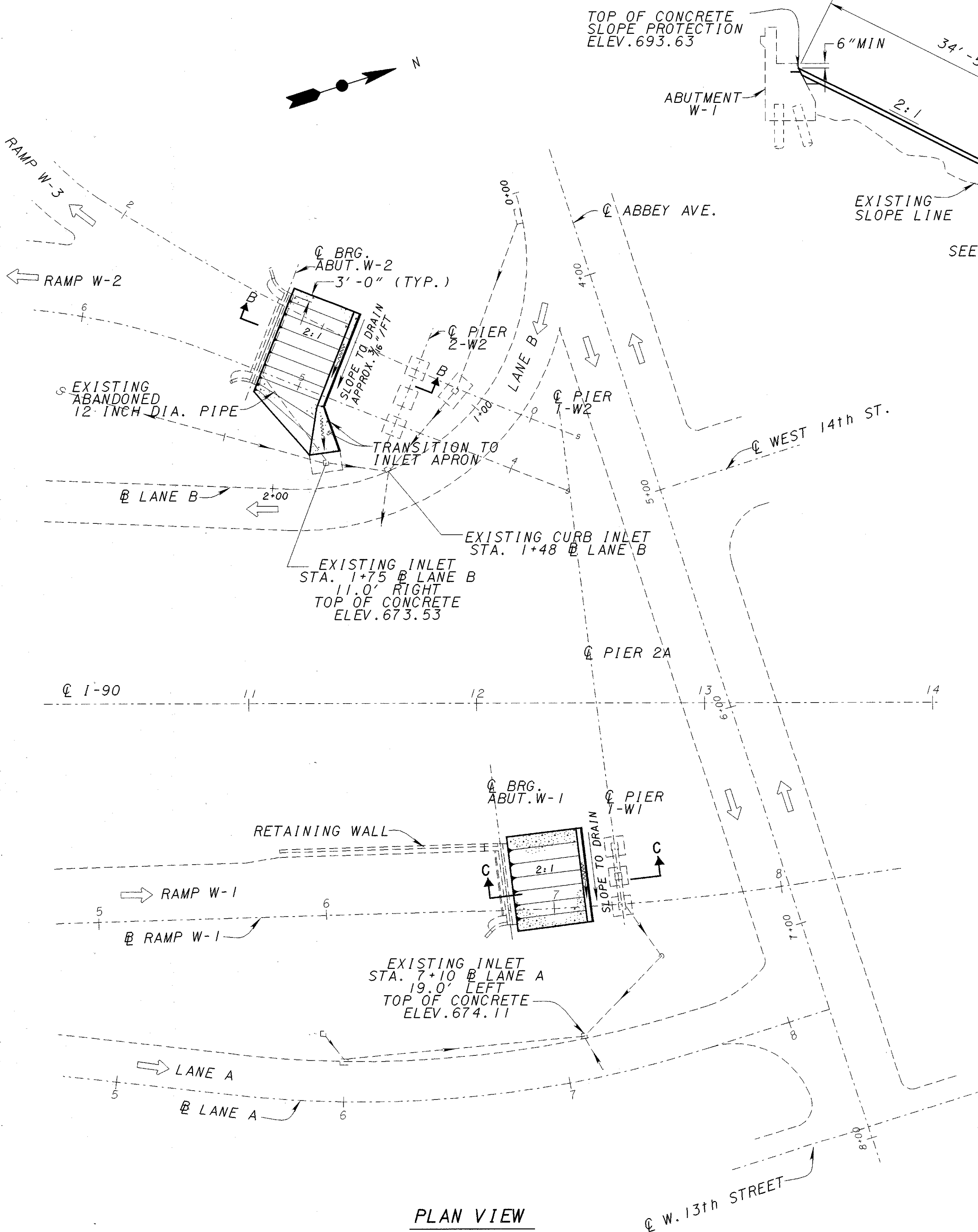




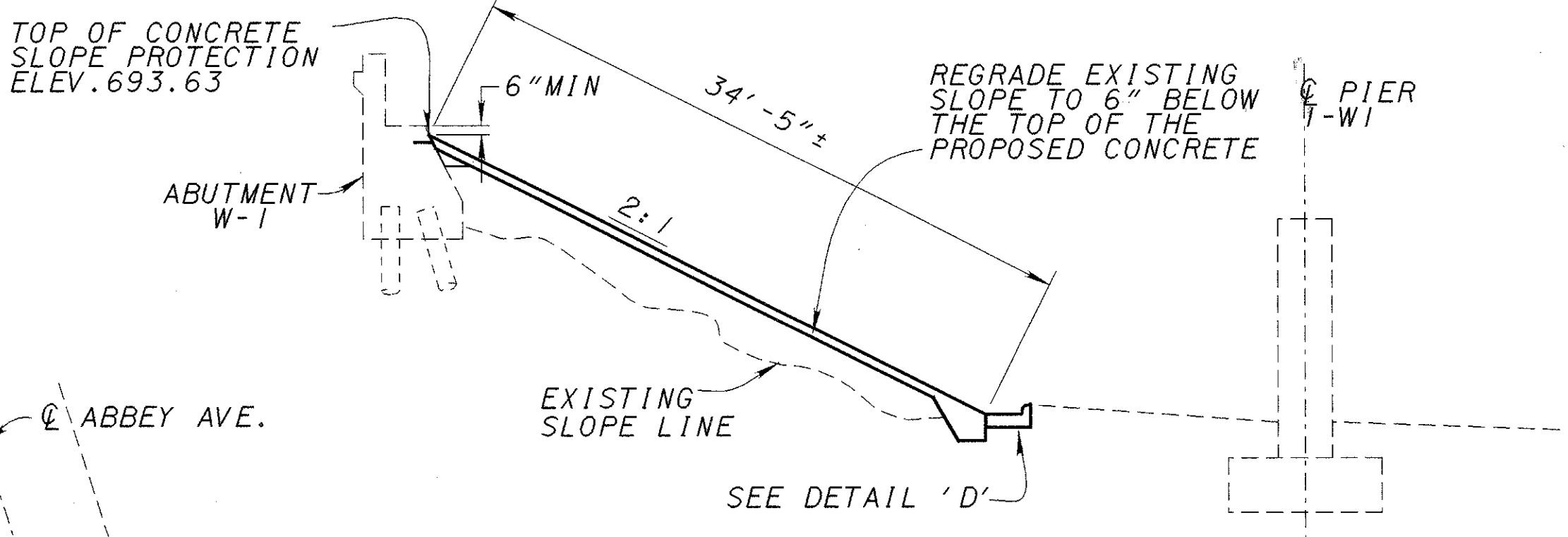
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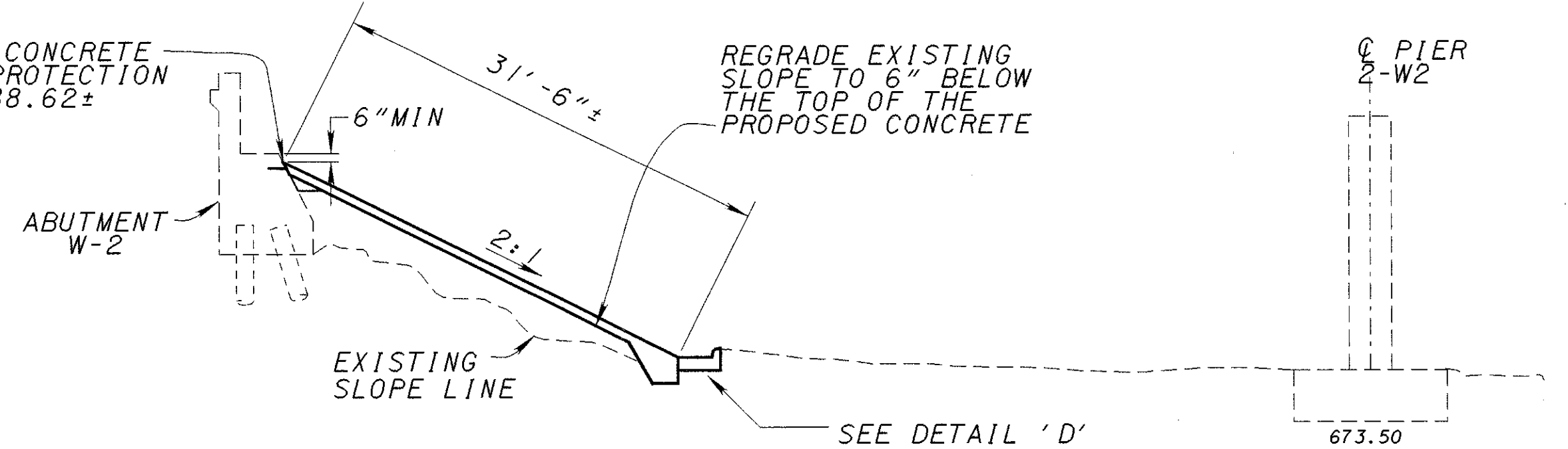
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PLOTTED FROM: j:\br\gcox\csp.dgn



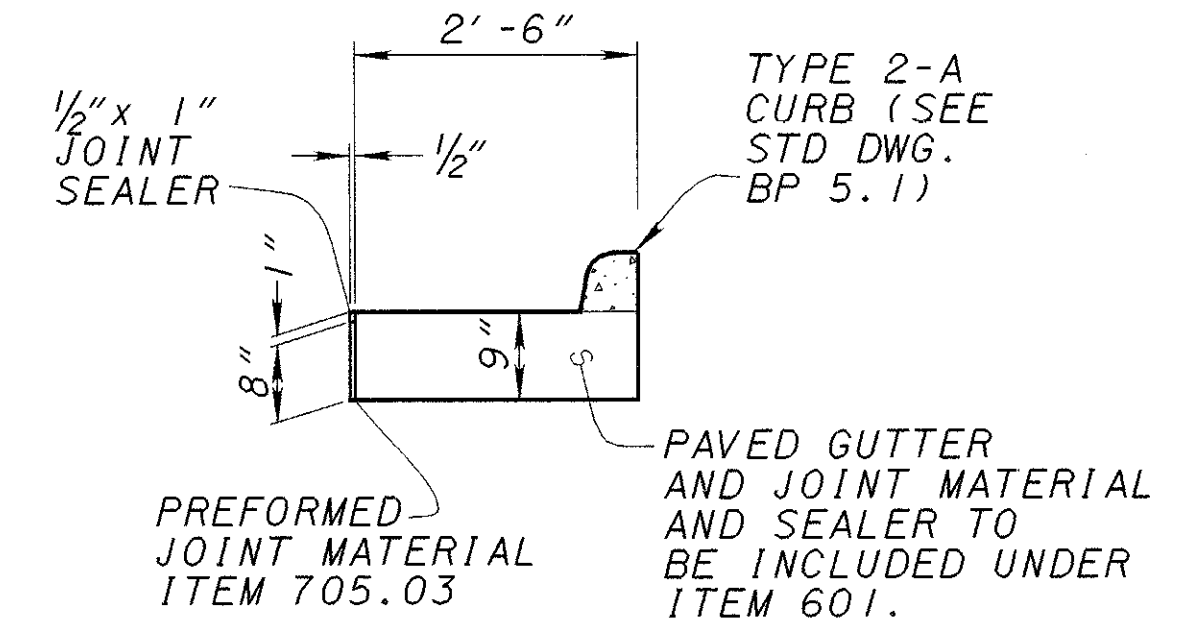
PLAN VIEW



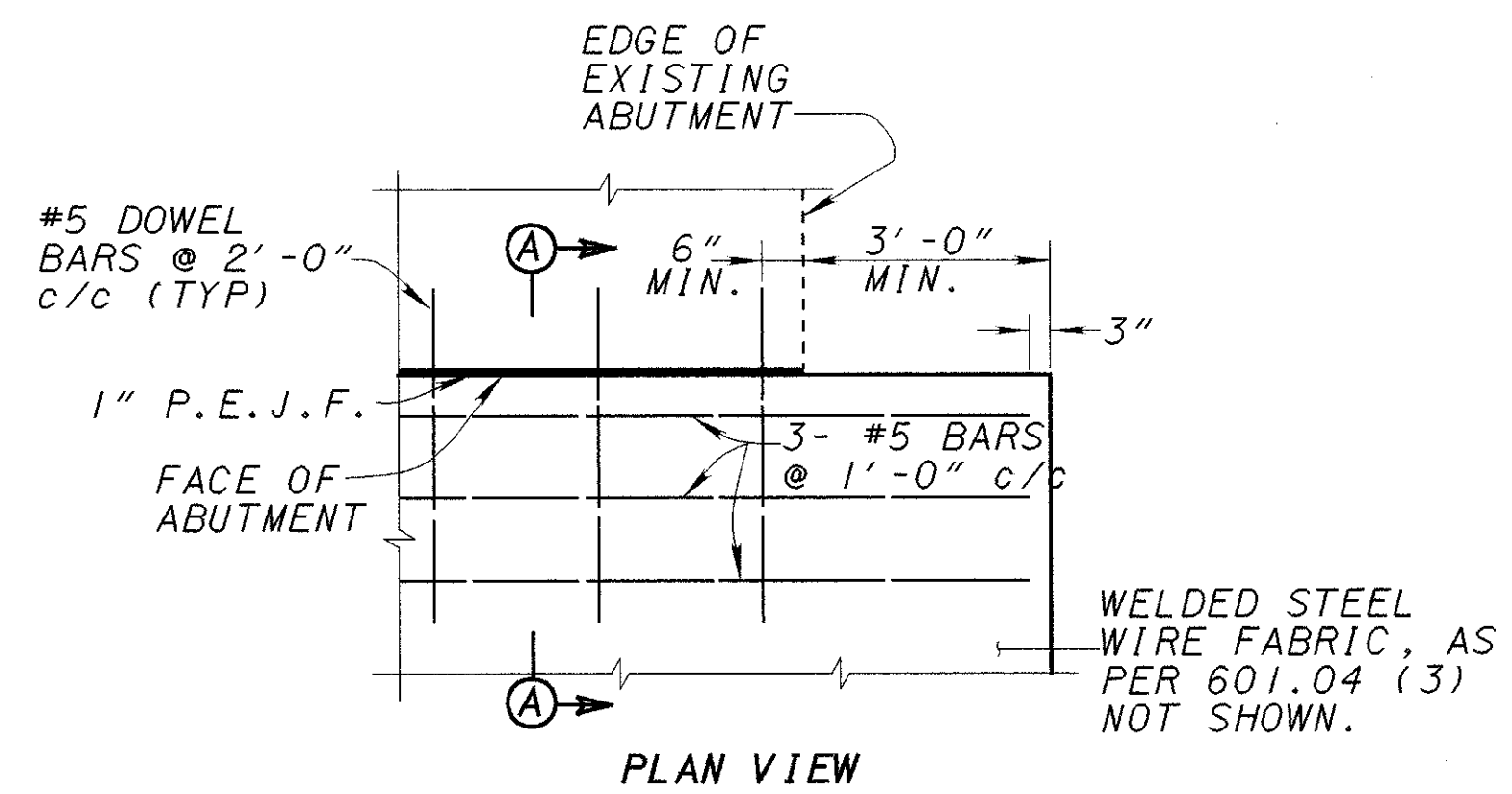
SECTION C-C



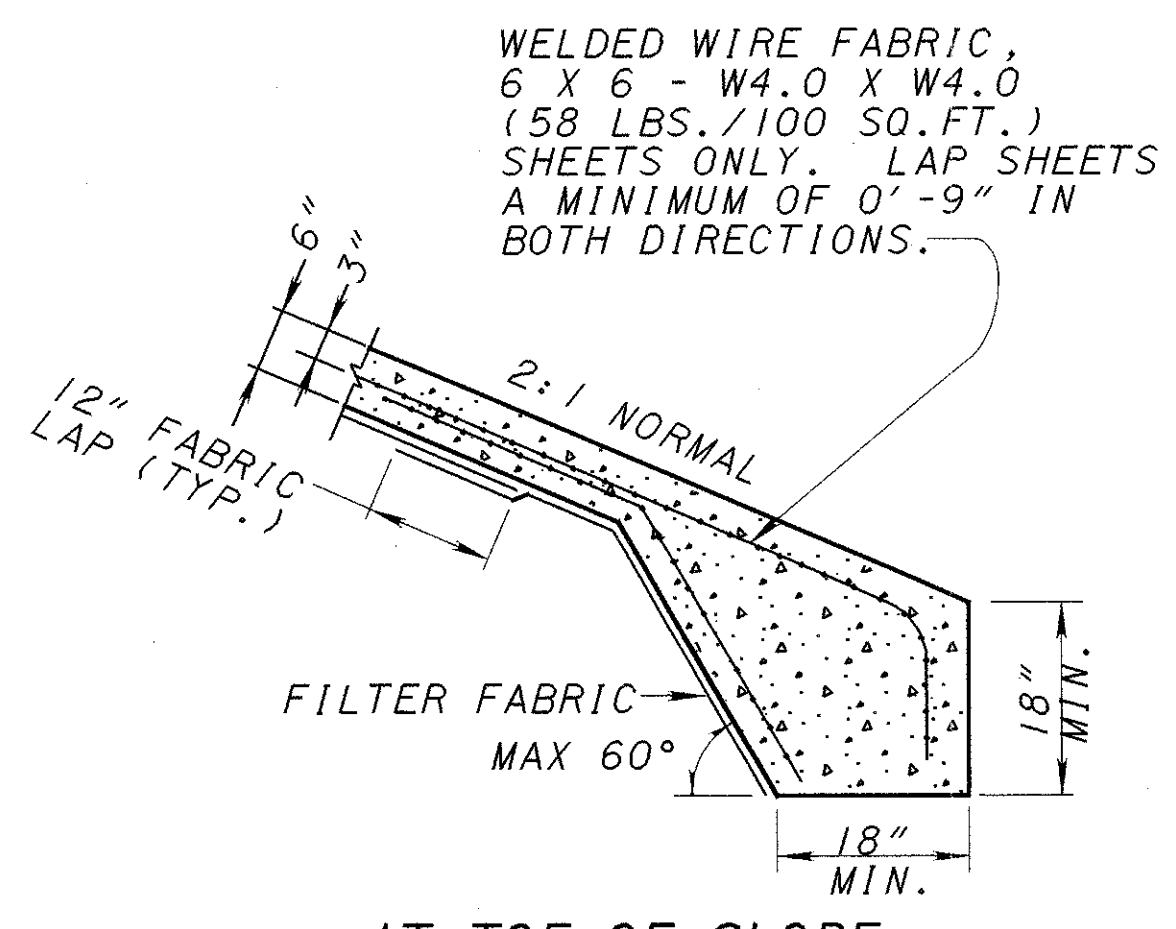
SECTION B-B



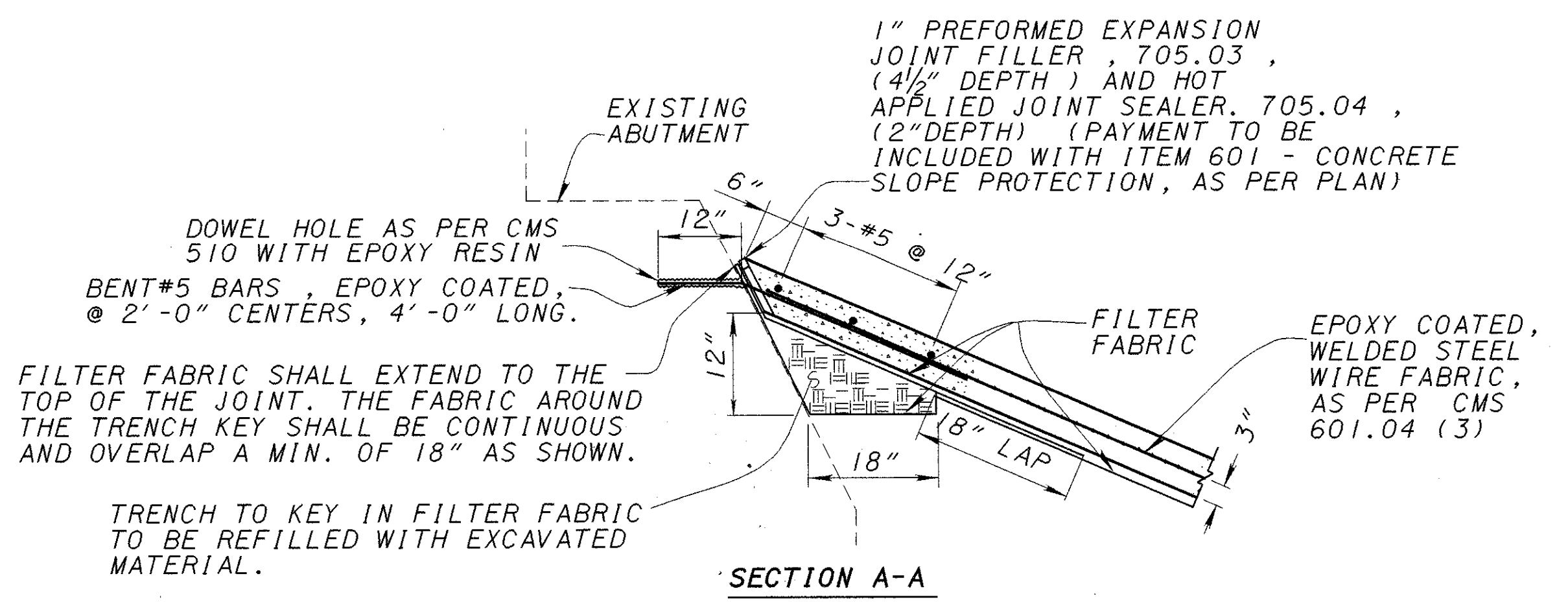
DETAIL D



SLOPE PROTECTION REINFORCING DETAIL



AT TOE OF SLOPE

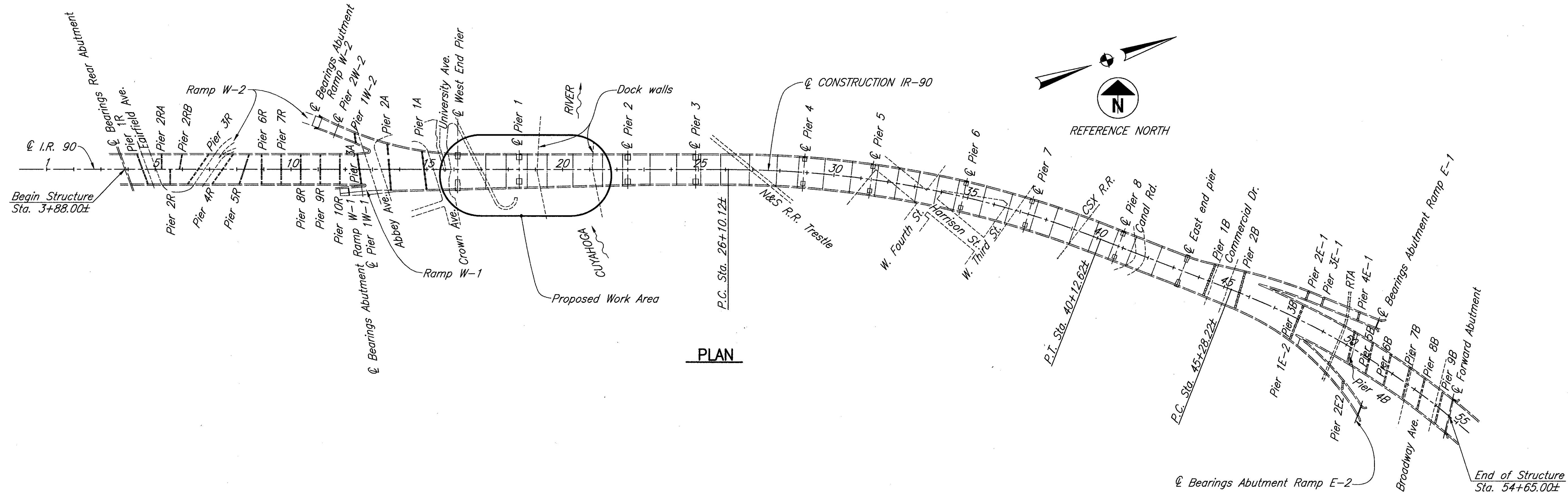


CONCRETE SLOPE ANCHORING DETAIL

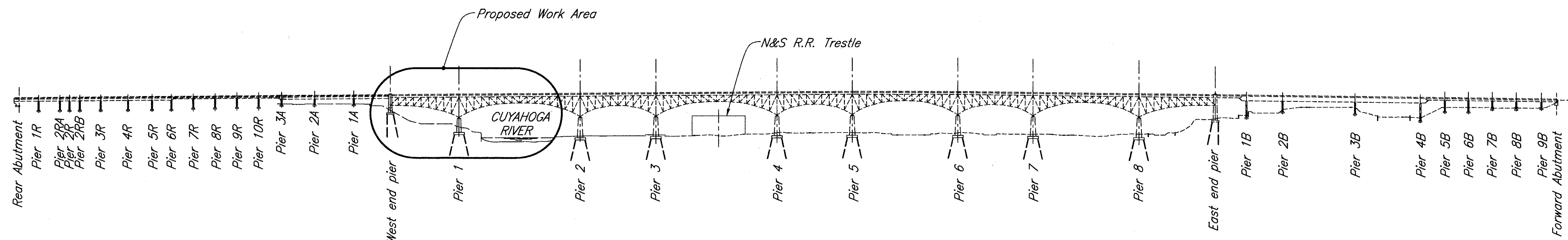
SEE GENERAL NOTES, SHEET 2A OF 61 FOR ADDITIONAL INFORMATION.



Job No. 9311GP1 Date 12/23/96 Drawn By JLS,JFS,RB



PLAN



ELEVATION

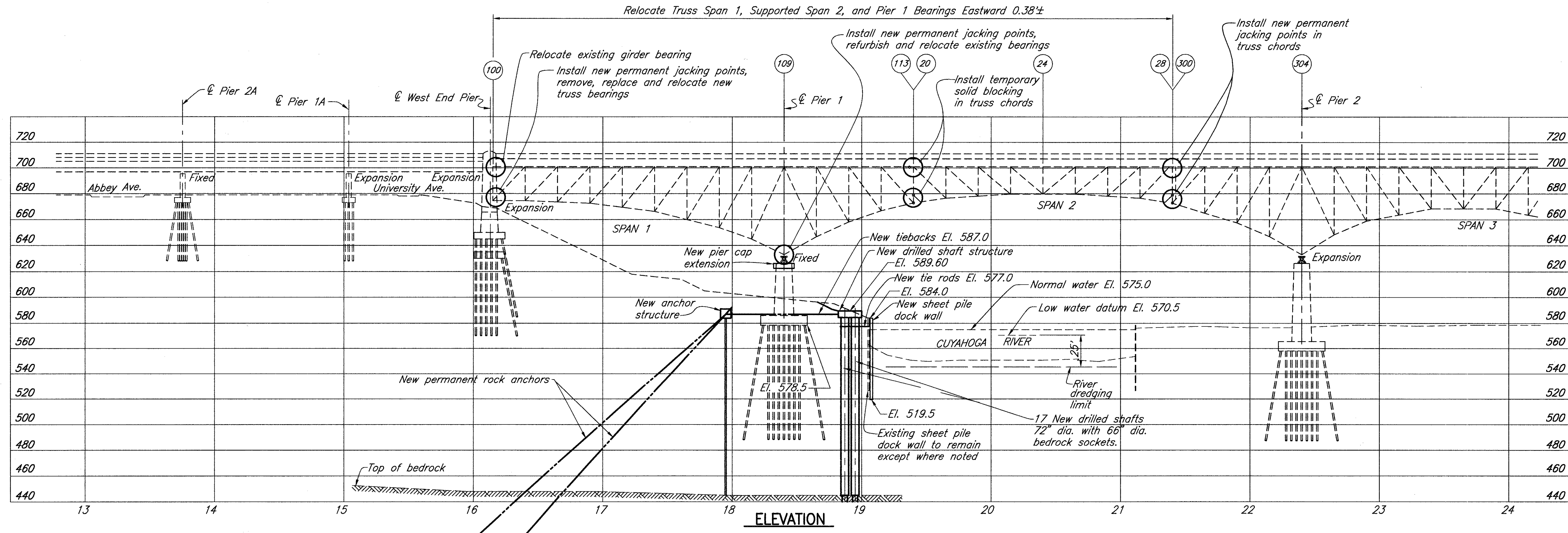
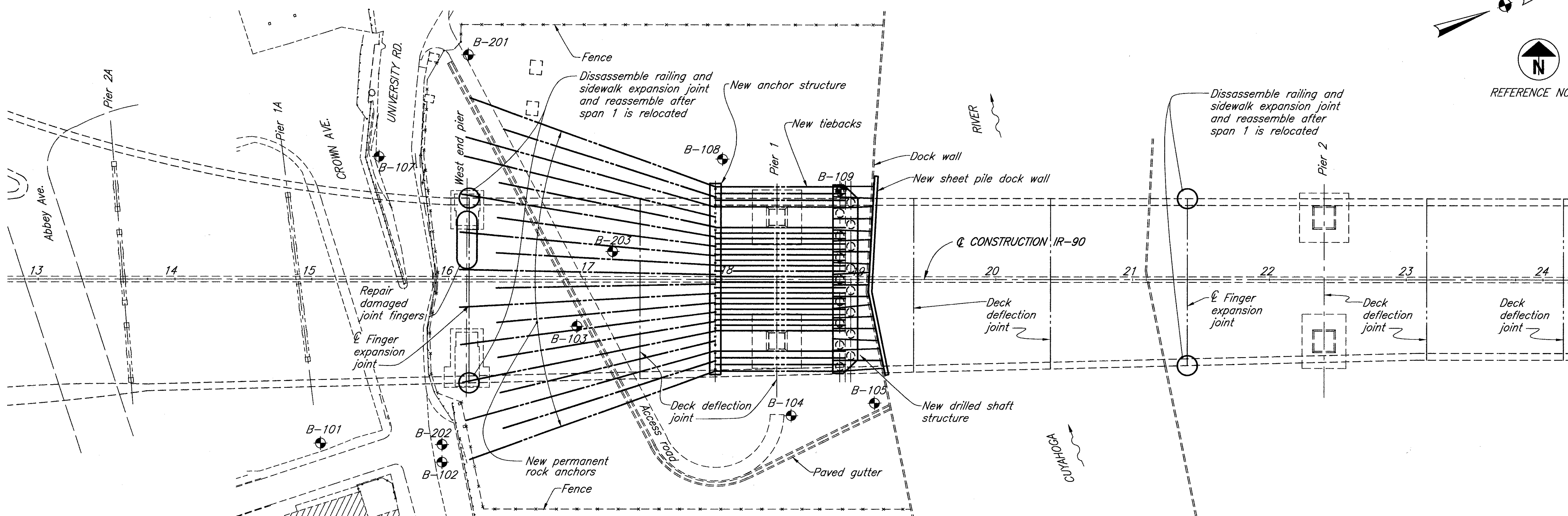
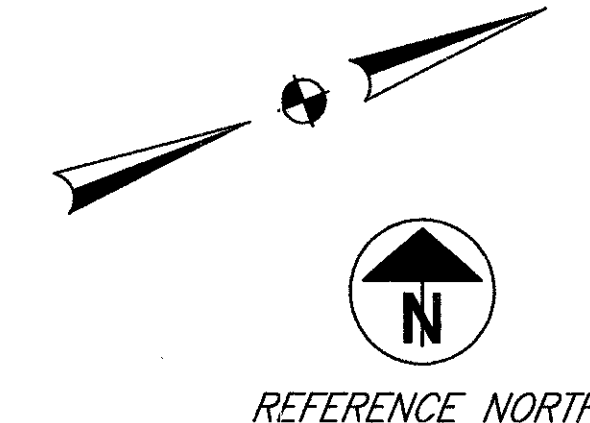
**EXISTING STRUCTURE - REAR APPROACH SPANS**  
 TYPE: Continuous steel beams and girders with concrete deck and substructure.  
 SPANS: Westbound: 64±, 71±, 65±, 69±, 90±, 80±, 64±, 5 @ 72±, 109±, 129± and 120±.  
 Eastbound: 64±, 102±, 103±, 90±, 80±, 64±, 5 @ 72±, 109±, 129± and 120±.  
 ROADWAY: 2 @ 53'-9"± curb to curb with (2) 2'-2"± safety curbs and 2'-6"± median barrier.  
 LOADING: CF2000  
 SKEW: Varies  
 WEARING SURFACE: 2½"± Latex modified concrete  
 ALIGNMENT: Tangent  
 CONDITION: Fair  
 YEAR BUILT: 1959 with minor rehabilitation in 1973, 1979, 1984 and 1988.

**EXISTING STRUCTURE - MAIN TRUSS SPANS**  
 TYPE: Steel deck trusses with reinforced concrete deck and substructure.  
 SPANS: 227±, 400±, 250±, 400±, 248±, 348±, 248±, 349± and 251±.  
 ROADWAYS: 2 @ 52'-9"± curb to curb with (2) 3'-2"± safety curbs and 2'-6"± median barrier  
 LOADING: CF2000  
 SKEW: Varies  
 WEARING SURFACE: 2½"± Latex modified concrete  
 ALIGNMENT: Tangent, 1°30'± curve right, Tangent  
 CONDITION: Serious  
 YEAR BUILT: 1959 with minor rehabilitation in 1973, 1984 and 1988.

**EXISTING STRUCTURE - FORWARD APPROACH SPANS**  
 TYPE: Continuous steel beams and girders with concrete deck and substructure.  
 SPANS: 103±, 119±, 239±, 216±, 81±, 78±, 78±, 79±, 83± and 50±.  
 ROADWAYS: 2 @ 52'-9"± curb to curb with (2) 3'-2"± safety curbs and 2'-6"± median barrier  
 LOADING: CF2000  
 SKEW: Varies  
 WEARING SURFACE: 2½"± Latex modified concrete  
 ALIGNMENT: 2± Curve right  
 CONDITION: Serious  
 YEAR BUILT: 1959 with minor rehabilitation in 1973, 1979 and 1988.

**EXISTING STRUCTURE**  
 STRUCTURE FILE NUMBER: 1809393  
 AVERAGE DAILY TRAFFIC: 134,660 ( 1992)  
 AVERAGE DAILY TRUCK TRAFFIC: 8010 ( 1992)

- PROPOSED WORK**
1. Replace a portion of dock wall along Cuyahoga River.
  2. Construct a drilled shaft structure with rock anchors to stabilize slope beneath truss span 1 and pier 1.
  3. Install permanent jacking points in the truss superstructure at the west end pier, pier 1 and span 2.
  4. Repair damaged joint fingers at the west end pier westbound lanes.
  5. Relocate truss span 1, supported span 2, and pier 1 bearings westward.
  6. Replace and Relocate bearings at the west end pier.



Job No. 93111AL1 Date 12/24/96 Drawn By RB/JPS

RICHLAND ENGINEERING LIMITED  
 29 NORTH PARK STREET  
 MANSFIELD, OHIO 44902

DATE	12/20/96
REVIEWED	BLW
DESIGNED	DAP
CHECKED	MSL
DRAWN	RRB
REVISION	
STRUCTURE FILE NO.	1809333

**PARTIAL GENERAL PLAN**

**BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER**

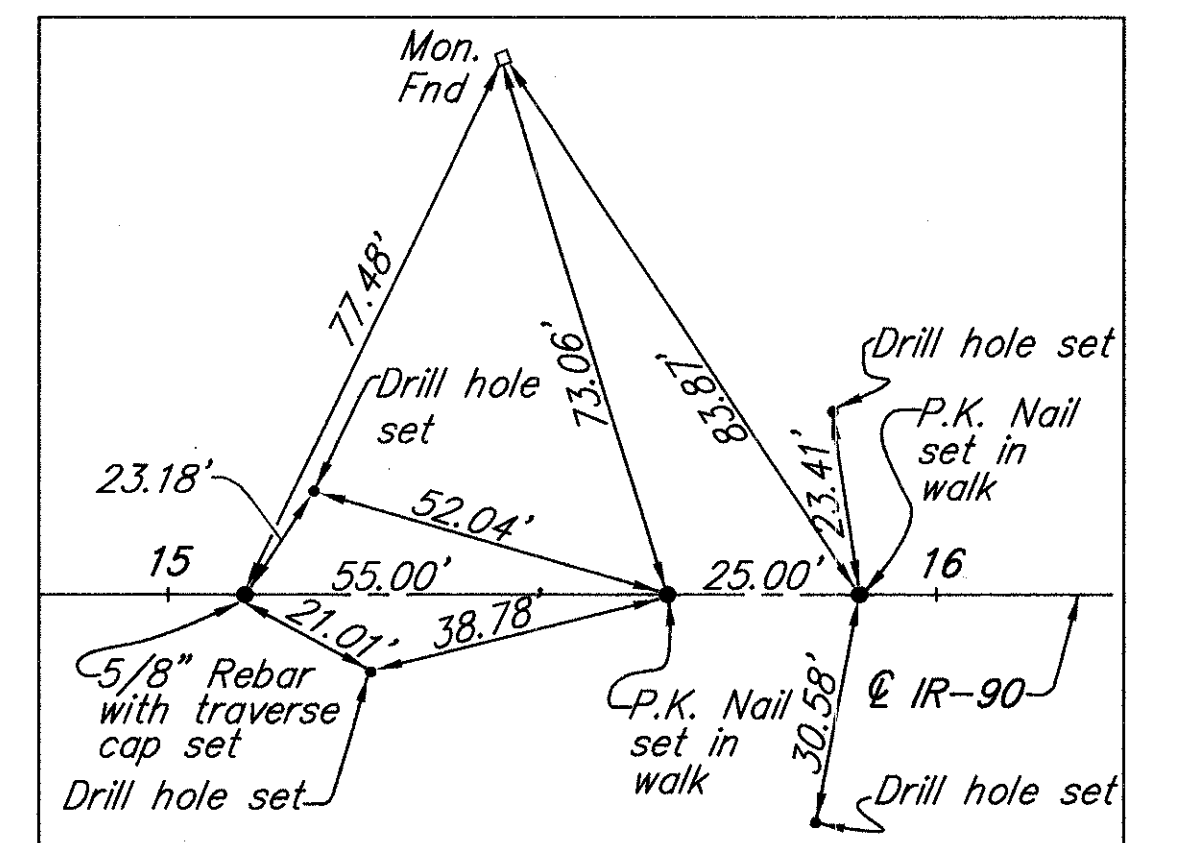
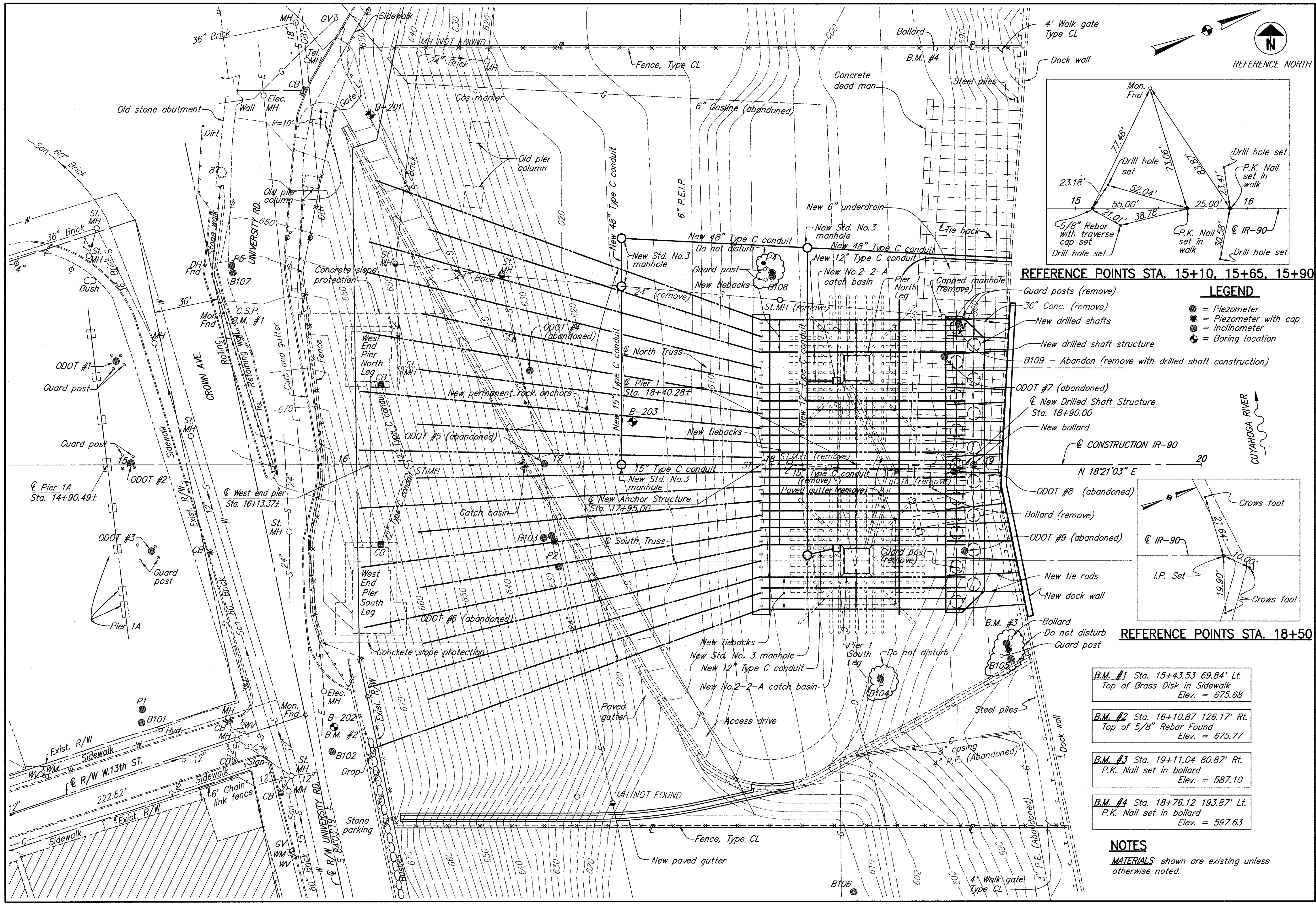
**CUY-90-1524**

2 / 48

15  
61



Job No. 93111SP1 Date 12/23/96 Drawn By RB/JPS



REFERENCE POINTS STA. 15+10, 15+65, 15+90

**LEGEND**

- = Piezometer
- = Piezometer with cap
- = Inclinometer
- ⊕ = Boring location

- = New drilled shaft structure
- B109 - Abandon (remove with drilled shaft construction)
- = ODOT #7 (abandoned)
- = New Drilled Shaft Structure Sta. 18+90.00
- = New bollard
- = CONSTRUCTION IR-90
- = ODOT #8 (abandoned)
- = Bollard (remove)
- = ODOT #9 (abandoned)
- = New tie rods
- = New dock wall
- = B.M. #3
- = Bollard
- = Do not disturb
- = Guard post
- = Steel piles
- = 8\"/>

REFERENCE POINTS STA. 18+50

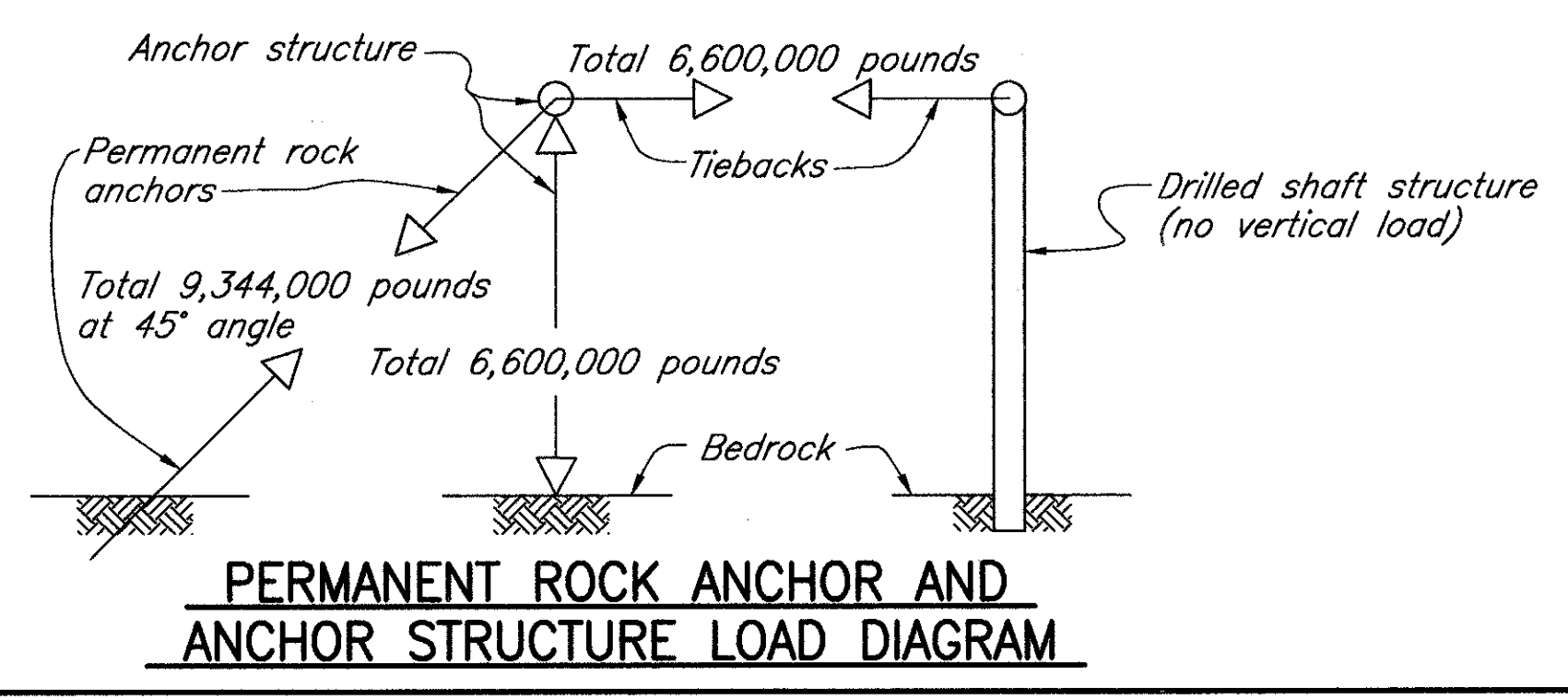
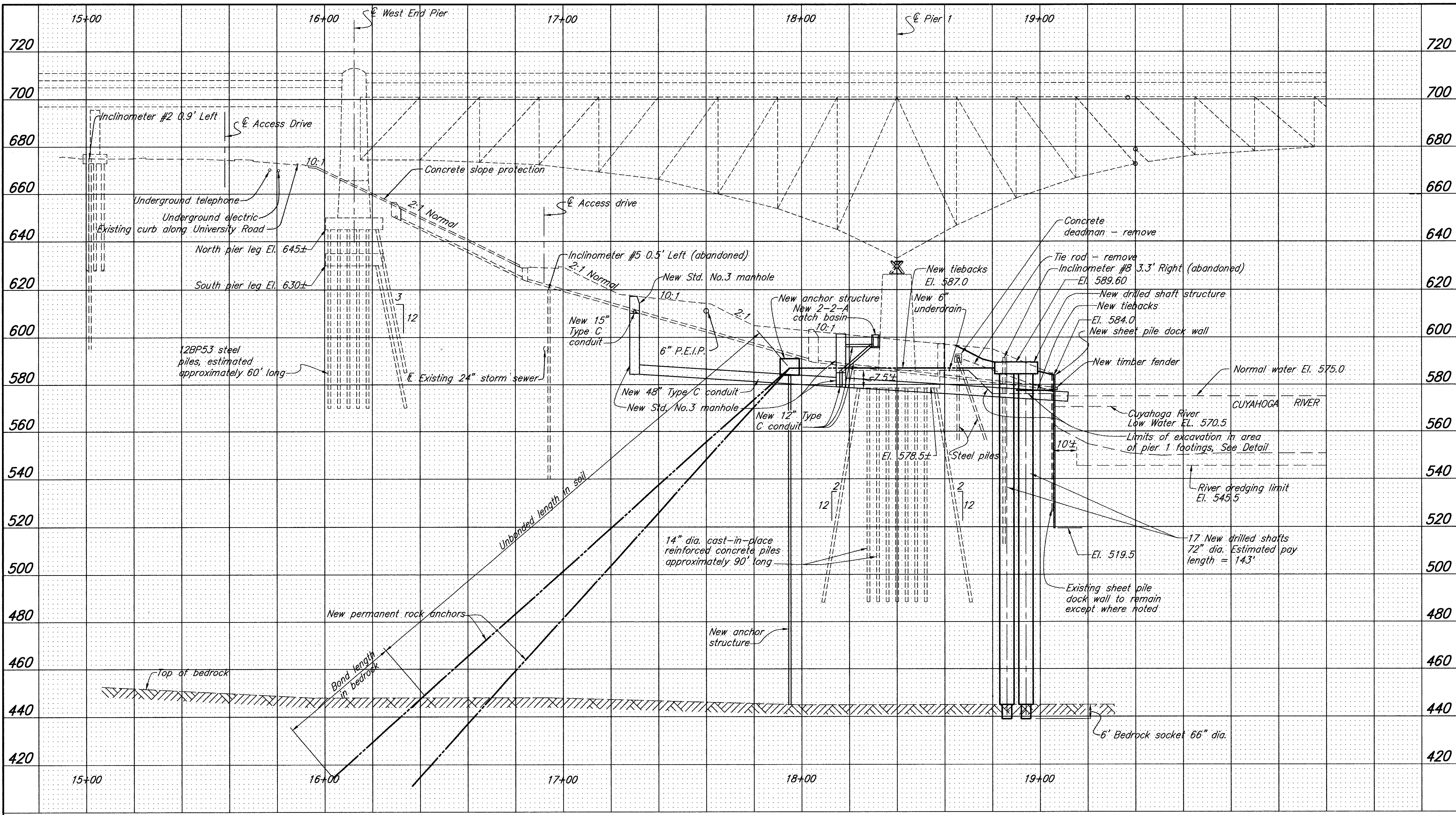
- B.M. #1** Sta. 15+43.53 69.84' Lt.  
Top of Brass Disk in Sidewalk  
Elev. = 675.68
- B.M. #2** Sta. 16+10.87 126.17' Rt.  
Top of 5/8\"/>

**NOTES**

MATERIALS shown are existing unless otherwise noted.



Job No. 93111CP1 Date 12/24/96 Drawn By RB,JPS



**NOTES**  
**LIMITS OF EXCAVATION:** See Section C-C on sheet 21/48  
**VERIFICATION OF PIER TOP OF FOOTING:**  
 The Contractor shall excavate to the top of the pier 1 footings and determine the top of footing elevations prior to beginning design and construction work. Payment shall be included as incidental to Item 530-Structure, misc.: Tiebacks, anchor structure, and permanent rock anchors.

RICHLAND ENGINEERING LIMITED  
 29 NORTH PARK STREET  
 MANSFIELD, OHIO 44902  
 DATE: 12/20/96  
 STRUCTURE FILE NO.: 1809393  
 REVIEWED: BLN  
 DRAWN: ARB  
 DESIGNED: DAP  
 CHECKED: MSJ  
 CENTERLINE PROFILE  
 BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER  
 CUY-90-15.24  
 4 / 48  
 17  
 61

PLOT SUBMITTED: 9-JAN-1997 12:39

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# ESTIMATED QUANTITIES

CALCULATED MSL DATE 12/96  
 CHECKED KAK DATE 12/96

ITEM	ITEM EXT.	TOTAL	UNIT	DESCRIPTION	SUPER.	SUBSTR.	GENERAL	AS PER PLAN, OR MISC. SHEET NO.	SPECIAL
202	11201	Lump		Portions of structure removed, as per plan	Lump	Lump		6	
202	98100	950	Each	Removal misc.: Existing rivet or bolt	898		52	6	
503	11100	Lump		Cofferdams, cribs and sheeting			Lump		
503	21100	400	Cu.Yd.	Unclassified excavation		400			
504	11101	9095	Sq.Ft.	Steel sheet piling left in place (min.section modulus = 71.7 in. <sup>3</sup> /ft), as per plan			9095	21	
505	11100	Lump		Pile driving equipment mobilization			Lump		
511	51100	52	Cu.Yd.	Class C concrete, misc.: Pier 1 cap		52			
511	51100	420	Cu.Yd.	Class C concrete, misc.: Drilled shaft cap		420			
Special	51267502	435	Sq.Yd.	Sealing of concrete surfaces, epoxy (See Proposal Note)		435		7	
513	16590	28700	Pound	Structural steel, misc.: Permanent jacking supports	28700				
513	16600	Lump		Structural steel, misc.: Dock wall walers, tie rods, fender connectors and hardware			Lump	21,22	
513	16600	Lump		Structural steel, misc.: Removal of crack by grinding	Lump			24A	
513	16600	Lump		Structural steel, misc.: Replacement of bearing stiffener	Lump			24A	
513	16800	20	Each	Structural steel, misc.: Swedge anchor bolts (2 1/2" dia x 4'-8") with nut and washer	20			31	
513	16800	1	Each	Structural steel, misc.: Bollard, anchor bolts and anchor plate			1	15	
513	16800	8	Each	Structural steel, misc.: Pencil abrasive blasting, grinding and NDT	8			24A	
513	16800	11	Each	Structural steel, misc.: Drilling structural steel, grinding, and NDT	11			24A	
514	01500	52700	Pound	Field painting of new structural steel, System A	52700				
514	27700	6000	Sq.Ft.	Field painting, misc.: Surface preparation of existing steel	6000				
514	27700	6000	Sq.Ft.	Field painting, misc.: Existing structural steel, prime coat, System A	6000				
514	27700	6000	Sq.Ft.	Field painting, misc.: Existing structural steel, finish coat, System A	6000				
514	27704	Lump		Field painting, misc.: Field painting of tested and/or/ retrofitted areas	Lump			24A	
516	15000	16	Each	Structural joint or joint sealer, misc.: Expansion joint finger repair by welding	8		8	7,45	
516	15000	45	Each	Structural joint or joint sealer, misc.: Expansion joint finger repair by heat straightening	30		15	7,45	
516	46900	1	Each	Bearing device, misc.: Refurbish and reset bearing, west end pier girder	1			7,28	
516	46900	2	Each	Bearing device, misc.: Refurbish and reset bearing, pier 1 truss	2			7,34	
516	46910	24000	Pound	Bearing device, misc.: Replace bearing, west end pier truss	24000			7,27	
516	47001	Lump		Jacking and temporary support of superstructure, as per plan	Lump			7,24	
518	51200	100	Lin.Ft.	10 inch pipe downspout, including specials		100		8	
518	62200	2	Each	Structure drainage, misc.: Relocate pier 1 drainage hopper		2			
521	15630	1.7	MFBM	Bridge Timber, misc.: Dock wall fender and bolts			1.7		
524	94934	102	Lin.Ft.	Drilled Shafts, 66" diameter, into bedrock		102			
524	94947	2431	Lin.Ft.	Drilled Shafts, 72" diameter, above bedrock, as per plan		2431		13	
Special	53000200	Lump		Structure, misc.: Tiebacks, anchor structure, and permanent rock anchors		Lump		8	
Special	53000200	Lump		Structure, misc.: Drilled shaft and rock anchor instrumentation		Lump		11,18	
Special	53000400	20	Each	Structure, misc.: Dowel holes wth non-shrink, non-metallic epoxy grout		20		31	

## INDEX OF SHEETS

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DESIGN AGENCY: RICHLAND ENGINEERING LTD  
 29 NORTH PARK STREET  
 MANSFIELD, OHIO 44902  
 DATE: 12/20/96  
 BLN 12/20/96  
 STRUCTURE FILE NUMBER: 1809393  
 REVIEWED: JPS  
 DRAWN: JPS  
 CHECKED: MSL  
 DESIGNED: DAP  
 ESTIMATED QUANTITIES  
 BRIDGE NO. CUY-90-1524  
 CENTRAL VIADUCT OVER CUYAHOGA RIVER  
 CUYAHOGA COUNTY  
 CUY-90-15.24  
 5/48  
 18  
 61



REFERENCE: shall be made to Standard Drawing:

None

And to Supplemental Specifications:  
852 dated 7-30-93

DESIGN SPECIFICATIONS: This structure conforms to "Standard Specifications for Highway Bridges" adopted by the American Association of State Highway and Transportation Officials, 1992, including the 1993, 1994, and 1995 Interim Specifications and the ODOT Bridge Design Manual.

DESIGN DATA: New materials incorporated in the structure (except for tiebacks, anchor structure, and rock anchors) conform to the following:

Design Loading - HS20-44 Case II and the Alternate Military Loading.  
Concrete Class C - Unit Stress 1333 P.S.I.  
Reinforcing Steel - Epoxy Coated - ASTM A615, A616, or A617 - Grade 60 - Unit Stress 24,000 P.S.I.  
Spiral Reinforcement May be Plain Bars, ASTM A82 or A615  
Structural Steel ASTM A36 - Unit Stress 20,000 P.S.I.  
Sheet Piling Steel ASTM A572, Grade 50 - Unit Stress 32,000 P.S.I.  
High Strength Steel Bar ASTM A722 - Unit Stress 66,000 P.S.I.  
Steel Castings ASTM A27, Grade 65-35 or Grade 70-36

Additional design data is included in the general note "Structure Misc.: Tiebacks, Anchor Structure, and Permanent Rock Anchors".

EXISTING STRUCTURE PLANS: Including design plans, shop drawings, and reconstruction plans are available for review at the ODOT District 12 Office, 5500 Transportation Blvd., Garfield Heights, Ohio.

EXISTING STRUCTURE VERIFICATION: Details and dimensions shown on these plans pertaining to the existing structure have been obtained from plans of the existing structure and from field observations and measurements. Consequently, they are indicative of the existing structure and the proposed work but they shall be considered tentative and approximate. The Contractor is referred to CMS Sections 102.05, 105.02 and 513.02.

Contract bid prices shall be based upon a recognition of the uncertainties described above and upon a prebid examination of the existing structure by the Contractor. However, all project work shall be based upon actual details and dimensions which have been verified by the Contractor in the field.

UTILITY LINES: All expenses involved in permanent relocation of the affected utility lines shall be borne by the Owners. The Contractor and Owners are requested to cooperate by arranging their work in such a manner that inconvenience to either will be held to a minimum.

CUYAHOGA RIVER TRAFFIC: The Cuyahoga River under truss span 2 is navigable and is used by large ships, work boats, and pleasure boats. The horizontal and vertical clearances for navigation shall be maintained at all times. River traffic shall not be interrupted.

The Contractor shall not drop materials or debris in the river. The Contractor shall notify the U. S. Coast Guard and City of Cleveland Department of Ports and Harbors of any major work being performed over or along the river.

I-90 MAINTENANCE OF TRAFFIC: Interstate 90 vehicular traffic and pedestrian traffic shall be maintained at all times except as provided in the maintenance of traffic plan sheets 6 and 7 of 61.

Temporary lane closures are required for repair of the damaged joint fingers in the westbound lanes at the west end pier.

The bridge will be closed to all traffic in the area of the west end pier and pier 1 to remove and reinstall bearings. The vertical jacking work will raise one side of the west end pier roadway joint.

SEQUENCE OF CONSTRUCTION: The following sequence of construction is required to be performed in the listed order to provide for proper stabilizing and relocation of the existing structure.

1. Install new sheet piling dock wall.
2. Construct drilled shaft structure, tiebacks and anchor structure. Preparation work for relocating span 1 shall be performed at the same time.
3. Install and tension rock anchors.
4. Relocate span 1 and supported span 2.
5. Complete all items of work.

The procedure for constructing the new sheet piling dock wall and working in the area of the dock wall shall be as follows:

1. Install new sheet piling and fill void areas between new and existing sheet piling.
2. As the drilled shafts are constructed excavate and remove material behind the existing sheet piling to elevation 576 and remove the existing dock wall tieback system.
3. It is anticipated that the Contractor will perform the construction work with equipment on land. However, the Contractor shall take precautions to prevent overloading and damaging the dock wall. The Contractor may add additional support at his expense. No equipment heavier than 8,000 pounds shall be allowed within 20 feet of the sheet piling dock wall that is not supported by tie rods. No equipment heavier than 40,000 pounds shall be allowed within 20 feet of the sheet piling dock wall that is supported by tie rods unless a structural analysis is performed per CMS 501.09.
4. New tie rods to the dock wall shall be installed as the drilled shaft construction proceeds and each shaft is completed.

The procedure for relocating span 1 and supported span 2 shall be as follows:

1. Install permanent jacking point reinforcement in the superstructure for vertical jacking at the west end pier truss and girder bearings, and pier 1 truss bearings. Enlarge the pier 1 concrete caps. Remove portions of drainage system and miscellaneous steel.
2. Install permanent jacking point reinforcement in the north and south upper and lower truss chords, and the wind shear key for horizontal jacking at the span 2 expansion joints.
3. Repair or replace the misaligned, damaged and bent fingers in the west end pier expansion joint. This work is necessary to allow the joint to close when span 1 is relocated. Finger repair work shall be performed with temporary lane closures subject to time limitations.
4. Disassemble railing and sidewalk expansion joints at the west end pier and span 2 to eliminate possible binding when span 1 is relocated. No gaps shall be left in the sidewalk or railing that could endanger pedestrian or vehicular traffic.
5. Raise the trusses and girder at the west end pier about 3 inches, remove the existing bearings and install temporary rollers or sliders. Lower the trusses and girder down to their original height. Vertical jacking work shall be performed while the bridge is closed to vehicular traffic. This work is subject to detour limitations.
6. Raise the trusses at pier 1 about 3 inches, cut the existing anchor bolts, remove the existing bearings and install temporary rollers or sliders. Lower the trusses down to their original height. The jacking and temporary support systems must ensure that the truss is restrained from uncontrolled movement when Pier 1 is released and at all other times. Vertical jacking work shall be performed while the bridge is closed to vehicular traffic. This work is subject to detour limitations.
7. Install temporary blocking in the north and south upper and lower truss chords at the span 2 deflection joints.
8. Relocate span 1 and supported span 2 westward toward the west end pier. Horizontal movement shall be accomplished by horizontal jacking at each west end pier bearing location, pier 1 bearing location, upper wind shear key at the span 2 expansion joint, and north and south upper and lower truss chords at the span 2 expansion joint. The primary forces for moving the structure shall be applied at pier 1 and the west end pier. Jacking at the span 2 expansion joint shall be used to overcome the resistance of opening the joint. The Contractor will be responsible for design and installation of the horizontal jacking system and temporary rollers and sliders.  
  
The distance recommended to move span 1 is determined by several factors including: the relative difference in the positions of the west end pier and pier 1; the distance required to close the west end pier expansion joint to a normal opening; and the distance required to open the span 2 expansion joint to a normal opening. An extra amount of relocation is recommended to account for relaxation of the structure after relocation.
9. Reused, refurbished existing pier 1 bearings are to be installed at the new locations with new anchor rods. Reused, refurbished existing west end pier bearings are to be reinstalled at their original locations. Reused, refurbished existing west end pier girder bearing is to be installed at a new location. Vertical jacking work shall be performed while the bridge is closed to vehicular traffic. This work is subject to detour limitations.
10. Reassemble railing and sidewalk expansion joints at the west end pier and span 2. Remove temporary blocking at the span 2 deflection joint.
11. Remove jacks, temporary connections, and temporary supports. Reinstall portions of drainage system and miscellaneous steel.

PORTIONS OF STRUCTURE REMOVED, AS PER PLAN: Shall include the elements indicated in the plans and general notes and are not separately listed for payment. Items to be removed include all existing materials being replaced by new construction, and miscellaneous items that are not shown incorporated in the final construction and are directed to be removed by the Engineer. Some of the major items to be removed are listed below.

Dock wall, walers, tiebacks, piles, anchors and deadmen

Pier 1 concrete

Structural steel incidental to new jacking support installation

Damaged expansion joint fingers

Drainage downspouts, supports and incidentals

Pier 1 concrete shall be removed by means of approved pneumatic hammers employing pointed and blunt chisel tools. Hydraulic hoe-rams will not be permitted. The weight of hammer shall be approved by the Engineer. The weight of the hammer shall not be more than 35 pounds for removal within 18-in. of portions to be preserved. Outside the 18-in. limit, a hammer heavier than 35 pounds, but not to exceed 85 pounds, may be used at the approval of the Engineer. Pneumatic hammers shall not be placed in direct contact with reinforcing steel that is to be retained in the rebuilt structure.

Exposed reinforcing steel shall be cleaned by sandblasting to Grade SA-1 to remove all loose particles of concrete or rust. Existing reinforcing steel shall be cut and/or maintained as indicated in the plans, or as directed by the Engineer, to serve as dowels or principal reinforcement in the re-built structure. These bars shall be cleaned to remove concrete fragments and foreign matter. Care shall be taken to preserve the bond of such dowels or principal reinforcement to the existing concrete. Where bond between existing concrete and reinforcing steel that is to be retained has been destroyed, the unbonded concrete adjacent to the bar shall be removed to a depth which will permit new concrete to bond to the entire periphery of the bar so debonded. A minimum of 1 1/2 inch clearance around the perimeter of the steel shall be provided. Damaged areas of reinforcement that are to remain shall be cut and stress transfer shall be accomplished by either a lapped or mechanical splice as approved by the Engineer. Other existing reinforcement within the removal limits shall be removed and disposed of. All necessary labor, equipment and material required to cut and clean existing reinforcing steel shall be provided by the Contractor and included with Item 202-Portions of structure removed, as per plan, for payment. Lapped or mechanical splices required for stress transfer where existing reinforcement is damaged by the Contractor shall be provided by the Contractor at his expense.

EXISTING RIVET AND STRUCTURAL STEEL REMOVAL: Existing rivets that are in holes used to connect new material to existing material, existing rivets that must be removed to remove existing steel, and rivets directed to be removed by the Engineer shall be removed with care in accordance with CMS Section 202.03.

No more rivets shall be removed from an area than are necessary for connecting each new material piece. Rivets shall be removed from only one side of a truss member at a time.

All existing rivets to be removed shall first have the heads cut off and then the remainder of the rivet removed by drilling or burning. Some rivets to be removed may have countersunk heads on one or both ends. Rivets that are countersunk both ends shall be removed by drilling or burning. Punching may be used to remove loose fitting shanks. Rivet removal methods shall not damage base material that is to remain in place. The Contractor shall submit details of the proposed rivet removal method for approval by the Engineer prior to beginning work. Any damage to existing material to remain in place due to the Contractor's removal operation shall be repaired to the satisfaction of the Engineer at the cost of the Contractor.

Existing structural steel which is indicated to be removed by cutting may be flame cut to straight lines. All flame cut edges shall be ground smooth. All other structural steel shall be removed by removal of existing rivets.

Payment for careful structural steel removal shall be included with Item 202-Portions of structure removed, as per plan. Payment for special rivet removal procedures shall be included per each rivet, with Item 202-Removal misc.: Existing rivet or bolt.

GENERAL NOTES CONTINUED: See sheet 7 / 48



**SEALING OF CONCRETE SURFACES (EPOXY):** A concrete sealer shall be applied to the concrete surfaces of pier 1. See proposal for surface preparation requirements, application rates, material requirements and application procedures.

**CONNECTION BOLTS:** 5/8 inch diameter and larger shall be hex head, galvanized ASTM A325 high strength steel bolts, unless otherwise noted. ASTM A490 high strength steel bolts shall not be galvanized. Bolts 1/2 inch diameter and smaller shall be galvanized ASTM A449. Stainless steel bolts shall be Type 304. Countersunk bolts shall be galvanized SAE J429 Grade 5. New connection bolts shall be included for payment with the pertinent new material pay item.

**WELDING TO EXISTING STEEL:** The original design plans and shop drawings for CUY-90-1524 indicate that copper-bearing carbon structural steel was used for most of the structure and that manganese structural steel was used in some areas. Finger expansion joints and truss bearings are steel castings. Welding to the existing steel shall not be permitted without the approval of the Director, except where detailed in the plans.

**SHOP PAINTING NEW STRUCTURAL STEEL:** All new steel that is not galvanized, and is to be finished per Item 514-Field painting of new structural steel, System A shall be shop painted per 514.03 and 514.04.

**NEW GALVANIZED STEEL:** Shall be galvanized after fabrication per 711.02. The Contractor shall be very careful in handling the galvanized steel to minimize scratches and abrasion of the finish. Wire rope slings and metal hooks shall be padded with wood, or reinforced fabric webbing shall be used for material handling. Scratches and abrasions of the galvanized finish shall be touched up in the field by "cold applied galvanizing" as directed by the Engineer. Connection bolts for galvanized steel members shall be mechanically galvanized.

**BOLTED CONNECTION TO EXISTING STEEL:** At locations shown on the plans and as directed by the Engineer, new structural steel shall be connected to existing structural steel using existing rivet or bolt holes and new bolts. Rivet removal procedures are described in the General Notes. Payment for rivet or bolt removal is included with Item 202- Removal misc.: Existing rivet or bolt.

Holes in new material shall be made by any of the following methods (to be selected by the Contractor):

- Careful field measurement by the Contractor shall be used for locating holes in new material to be subpunched or drilled undersize in the shop. The hole shall be 3/16 inch less in diameter than the nominal diameter of the new bolt. The holes shall be reamed to proper size in the field after fit-up to the existing rivet or bolt holes.
- Make templates in the field of hole patterns and locations after removal of rivets or bolts. Use the field templates in the shop to subpunch or drill undersize holes. The holes shall be reamed in the field after fit-up to the existing rivet or bolt holes.
- Furnish new structural steel without shop holes for reconnection to existing rivet or bolt holes. Holes in new material to be field drilled and reamed to match existing rivet or bolt location.

Rivet holes not used for bolted connections of new structural steel shall be filled with a bolt unless otherwise noted.

Existing material without holes for connection to new material shall be field drilled.

All holes through new and existing material shall be reamed after assembly. The final holes shall be standard size, 1/16 inch larger in diameter than the nominal bolt diameter, unless otherwise noted.

Additional requirements for holes shall be per 513.14. Shop holes that do not match existing rivet holes shall be field drilled.

Existing material shall be cleaned and prime painted before connecting new material.

The cost of all material, equipment and labor for connecting new material to existing material including reaming new or existing holes, and drilling new holes, shall be included as incidental to the pertinent new material pay item.

**STRUCTURAL JOINT OR JOINT SEALER MISC.: EXPANSION JOINT FINGER REPAIR:** Damaged and bent fingers in the deck expansion joint at the west end pier shall be repaired by removing the cracked or broken fingers and installing new fingers by welding; or by heat straightening bent fingers.

Heat straightening work shall be performed under the direct supervision of a person who shall present written documentation prior to beginning work of his successful heat straightening experience with comparable members. He shall possess the knowledge and experience to apply the heat in such a manner, sequence and amount that the final straightened member retains as little residual stress as possible. Heat shall be applied at or below 650 C (1200 F) and monitored with contact thermometers, pyrometric sticks, or other heat indicating devices. These heat indicating devices shall be supplied by the Contractor and made available to the inspector at all times. Torch tip sizes shall be limited to 1 inch diameter maximum. The heat straightening shall be accomplished with the use of "V" heats or triangular heats. The "V" is heated from the apex to the base in a manner such that the only place showing color is directly under the torch. The entire "V" shall not be heated simultaneously nor shall it be reheated until after it has cooled to the touch. Forced cooling is not permitted. The straightening shall be accomplished with little mechanical force as possible.

Payment for all labor, materials and equipment required, per each finger, shall be included with Item 516-Structural joint or joint sealer, misc.: Expansion joint finger repair by welding or Item 516 - Structural joint or joint sealer, misc.: Expansion joint finger repair by heat straightening.

**BEARING DEVICE MISC.: REPLACE BEARING, WEST END PIER TRUSS:** West end pier north and south expansion rockers and lower seats shall be completely removed and replaced with new material. New bearings shall be shop painted per 514.03 and 514.04 for System A. The new bearings shall be the same size and configuration as the existing bearings. Materials and fabrication shall be in accordance with 513 and 516. Existing steel castings may be replaced with weldments.

Shop drawings shall be furnished per 501.05.

Payment for all labor, materials and equipment required per pound, shall be included for payment with Item 516 - Bearing device, misc.: Replace bearing, west end pier truss.

**BEARING DEVICE MISC.: REFURBISH AND RESET BEARING:** Pier 1 bearings and west end pier girder expansion rocker shall be completely removed and cleaned and painted per the field painting items of work prior to placing in their final position. The Contractor may, at his option, furnish all new material in addition to new material specified in the plans, in lieu of reusing existing material. If the Contractor chooses to furnish new material, it shall be of equivalent size and configuration in accordance with Items 513 and 516, at no additional cost. Existing steel castings may be replaced with weldments.

Shop drawings shall be furnished per 501.05 for all new material.

Payment for all labor, materials and equipment required, per each bearing, shall be included with the following items:

- Item 516 - Bearing device, misc.: Refurbish and reset bearing, west end pier girder
- Item 516 - Bearing device, misc.: Refurbish and reset bearing, pier 1 truss

**JACKING AND TEMPORARY SUPPORT OF THE SUPERSTRUCTURE AS PER PLAN:** Previous inspections, measurements and studies of Bridge CUY-90-1524 have identified movement of the substructure from its original position. Substructure stabilization work including construction of the drilled shaft structure and rock anchors shall be completed before span 1 and supported span 2 are relocated.

The work includes repositioning fixed and expansion bearings longitudinally to properly align the superstructure joints. Repositioning the fixed bearings requires moving the connected superstructure span.

The estimated distances for relocating the bearings are:

	Longitudinal
Pier 1 north fixed bearing	4 1/2" East
Pier 1 south fixed bearing	4 1/2" East
West end pier girder bearing	3" East (Lower shoe only)

The actual dimensions for relocating bearings shall be as directed by the Engineer based on the latest available studies and measurements.

See "Sequence of Construction" General Note sheet 6/48 for limitations on relocation work.

The Contractor shall be responsible for the design and installation of an adequate support and jacking system capable of raising and moving the spans and bearings as indicated. The Contractor shall be responsible for properly arranging all temporary supports so as not to damage or induce overstress in any existing bridge members. The temporary support and jacking systems shall restrain uncontrolled movement of the bearings when pier 1 anchor rods are cut. A sufficient number of jacks of adequate capacity shall be used to offset the dead load reaction of the structure for vertical lift, and offset frictional forces and binding which resist longitudinal movements. Temporary bearings, supports and blocking shall be adequate to carry the live load in addition to the dead load. The estimated existing dead load and live load reactions at the substructure units are tabulated in the drawings, sheets 25/48, 28/48 and 32/48. Minimum horizontal jacking loads are shown on Span 1 and 2 Framing Plan and Elevation sheet 24/48.

Materials for temporary supports shall be as specified in CMS 513. Allowable unit stresses may be increased by 33 percent for temporary erection loading conditions.

The Contractor shall furnish jacks with a total minimum capacity of 150% of the estimated existing dead load, or the sum of the existing dead load and live load, whichever is greater. The structure shall not be raised more than 4 inches to remove and/or relocate a bearing. Jacks under hydraulic pressure shall not be used to support live loads. Jacks shall be shimmed tight or otherwise blocked when under live load. Provision for expansion and contraction movement of the structure with temperature change shall be made at all times. The structure shall not be supported on vertical jacks at the west end pier without expansion and contraction provisions during non-working hours or while unattended by contractor's personnel.

Temporary jacks, blocking, and roller devices or low friction sliders shall be used for support on top of the substructure units. The existing structure members may be reinforced with material added only with the approval of the Director.

Jacks for lifting and moving the structure shall be hydraulic ram type with electric power pumps. Multiple jacks at a single bearing location shall be connected to a hydraulic manifold and operated by a single pump to provide equal lifting pressure. The Contractor shall furnish personnel to operate and/or observe jacks at each bearing or truss chord location. The personnel shall be equipped with radios for communication with each jacking location during the longitudinal jacking operation.

The Contractor shall submit details of the proposed temporary support system and methods and procedures for moving the spans and bearings to the Director for approval prior to beginning work. The submittal shall indicate materials, member sizes, spacings, jack point locations, jacking loads, method of horizontal movement, and installation and removal procedures. Detailed plans of the temporary support shall be prepared by a Registered Professional Engineer and shall bear his signature and number of professional engineering seal. The Contractor shall submit three (3) copies of the plans and two (2) copies of the design calculations to the Director, at least fifteen (15) days prior to beginning work, and shall receive approval before starting. Attachments made by welding to any structural member shall be approved by the Director before such attachments are made. Details of the attachments shall be submitted as part of the support plans, or independently by a similar submission. Approval of the plans shall not relieve the Contractor of responsibility for the behavior of the supports or the work necessary to move the spans and bearings.

Prior to relocating span 1 and supported span 2 the railing, sidewalk, roadway and truss expansion joints at span 2 panel 28/300 shall be "freed-up" by cutting, cleaning and lubricating parts in contact. No gaps shall be left in the railing or sidewalk surfaces. Temporary covers shall be installed.

Existing bridge seats shall be prepared per 516.05 as necessary to provide a smooth and level seat for the bearings in the new positions.

After all relocation and bearing work is complete all jacks and temporary support material shall be removed.

Payment for all labor, materials, and equipment required for relocating spans and bearings, including all temporary supports, jacking, bearing removal, bearing installation, and submittals shall be included in the price bid as follows:

Item 516 - Jacking and temporary support of superstructure, as per plan.

**GENERAL NOTES CONTINUED:** See sheet 8/48



PIPE DOWNSPOUT: shall be standard weight, schedule 40 steel pipe. Elbows shall be schedule 40 welded fittings with full penetration butt welds. Elbows and downspout inlets shall be shop fabricated with the downspouts. Field splices in the downspouts shall be Victaulic coupling Style 99, Dresser coupling Style 38, or equal.

10" Pipe downspout shall have a wall thickness of 0.365 inches.

Elbows and bends shall be smooth radius or fabricated with a single miter not to exceed a 22.5 degree bend. The centerline radius shall be 18 inches.

Steel materials for downspouts, including elbows and reducers, mounting brackets, couplings and all hardware shall be galvanized per 711.02 after fabrication.

Downspouts shall be supported by brackets at a maximum spacing of 5'-0" c/c unless otherwise noted. The downspout brackets shall be anchored to the wall using 3/4" diameter bolts drilled and anchored into the pier leg using methods and materials outlined in Supplemental Specification 852. These anchors are to be considered incidental to the downspout pipe and no extra payment shall be made.

Downspout inlets shall be included in the measured length of pipe downspout.

Shop drawings shall be furnished per 501.05 for all 518 items.

STRUCTURE, MISC.: TIEBACKS, ANCHOR STRUCTURE, AND PERMANENT ROCK ANCHORS:

1.0 Description

This work consists of furnishing, installing and testing permanent cement grouted rock anchors, tiebacks, and anchor structure, to be constructed in accordance with this specification and in reasonably close conformity with the lines, grades, design, and dimensions shown on the plans or established by the Engineer.

The rock anchors to be installed shall comply with the contents of the latest edition of "Recommendations for Prestressed Rock and Soil Anchors", published by the Post Tensioning Institute located at 1717 West Northern Ave., Phoenix, Arizona, 85021 (telephone 602-870-7540) except as modified herein.

The required tieback elevations and the total horizontal design load are shown on the plans. The Contractor shall excavate to the top of the pier 1 footings and determine the top of footing elevations prior to beginning design work. The final design elevations shall be adjusted to clear the actual footing elevation if necessary. The actual size and spacing of the tiebacks is to be determined by the Contractor. The complete anchor structure including reinforced concrete cap and steel bearing piles is to be designed by the Contractor. The actual spacing and inclination of the rock anchors is to be determined by the Contractor after reviewing the results of the first performance test. The rock anchor spacing at the anchor structure shall not be more than 10 feet. Rock anchors in bedrock shall be at least 10 feet apart. The inclinations of the rock anchors shall be such that the total vertical rock anchor load does not exceed the total horizontal rock anchor load.

The tieback, anchor structure, and rock anchor system shall be designed for a Load Factor of 1.4 unless otherwise noted.

1.1 Design Requirements

The Contractor shall be responsible for preparing and submitting a design proposal describing the tieback, anchor structure, and rock anchor system intended for the project. The design proposal shall include:

- Description of the rock anchor installation (including drilling, grouting and stressing information).
- Estimated rock anchor capacity.
- Rock anchor tendon type and capacity.
- Rock anchor anchorage type.
- Rock anchor minimum bonded lengths, minimum unbonded lengths, total rock anchor lengths, angles of installation and locations.
- Corrosion protection details for rock anchors and hardware.
- Detailed plans for proof, creep, performance and lift-off testing of rock anchors showing loading and measuring devices to be used, test locations, and testing procedures to be followed.
- Detailed plans for tiebacks and embedment anchorage.
- Detailed plans for anchor structure concrete cap and steel bearing piles.
- Calculations and construction drawings prepared, stamped and signed by a civil or structural engineer registered as a Professional Engineer in the State of Ohio. These drawings must show explicit details to allow expeditious review of the proposed design and construction procedure. The Contractor shall submit three (3) copies of the plans and two (2) copies of the design calculations to the Director, at least fifteen (15) days prior to beginning work, and shall receive approval before starting.

2.0 Qualifications of Rock Anchor Contractor

2.1 Qualifications.

The rock anchor work shall be performed by a Contractor or Subcontractor (1) who has been prequalified by the Ohio Department of Transportation as per the Ohio Revised Code 5525.02 thru 5525.09 and (2) who can provide the level of expertise as specified below:

- A Registered Professional Engineer having at least one year of experience in the construction of permanent rock anchors using multi-strand tendons with unbonded length, shall be in charge of overseeing the construction of the rock anchor work. The Registered Professional Engineer shall be responsible for certifying the results of the rock anchor testing.
- A full-time foreman having completed the general supervision of at least two permanent rock anchor tendon projects (including significant unbonded length) which were successfully completed within the past three years shall be in charge of supervising the construction.
- Each drilling operator shall have successfully installed at least 50 permanent tendon type rock anchors within the past two years.

2.2 Work Experience

The following information shall be furnished by the Contractor when requesting approval of the personnel he proposed to utilize to perform the rock anchor work:

- Resumes for the required personnel defined in Section 2.1 Qualifications.
- The project locations and the number of tendon type rock anchors which have been completed during the past four years along with the names and addresses of the owners, contractors, or architect - engineers for which the rock anchor services were provided.
- A detailed description of all types of rock anchors which have been installed during the past four years.
- A description of the type of rock anchor equipment that has been used on previous projects and of the rock anchor equipment that is to be used on this project.

The information requested in Section 2.2 shall be furnished to the Engineer prior to beginning the tieback work. Non compliance by the Contractor must be rectified prior to beginning the rock anchor work.

3.0 Definitions

3.1 Alignment Load:

The nominal load maintained on the rock anchor during testing to assure that the testing equipment remains in proper position.

3.2 Anchor Grout (Primary Grout):

Material that is injected into the rock anchor hole to cover the bond length of the tendon and provide the medium for transmitting the tendon tensile force to the bedrock along the bond length.

3.3 Anchor Length (Tendon Bond Length):

The length of the rock anchor system where the tensile force in the tendon is transferred to the ground.

3.4 Anchor Structure:

The reinforced concrete cap and vertical steel piles that connect the rock anchors to the tiebacks and support the vertical load component of the rock anchors.

3.5 Anchorage:

The rock anchor head and bearing plate which transfer the tensile force in the tendon from the bond length to the anchor structure.

3.6 Capsule:

Plastic tube into which the rock anchor grout, tendon, spacers and centralizers are positioned and then grouted into place.

3.7 Creep Curve:

A semi logarithmic plot of the creep movement vs time, with the units of time plotted on the logarithmic axis.

3.8 Creep Movement:

The time-dependent movements of the rock anchor at a constant load.

3.9 Creep Rate:

The slope of the creep curve per log cycle of time.

3.10 Creep Test:

The loading and unloading increments for this test are the same as used for a performance test. The movement of the tendon is recorded at each loading and unloading increment and the movement of the tendon is also recorded for a defined extended time period while maintaining certain load increments.

3.11 Jacking Length:

The length of the prestressing tendon which is located on the jacking side of the final anchorage position and tensioned during the stressing of the tendon.

3.12 Performance Test:

This load test requires the application of defined incremental loading and unloading of the rock anchor tendon. The movement of the tendon is recorded at each loading and unloading increment. The maximum load applied during this test is maintained constant for a defined time period while movements are recorded.

3.13 Proof Load (Test Load):

The largest load applied to a rock anchor when post-tensioning a rock anchor during a load test. This load is generally a defined percentage increase in the rock anchor design load.

3.14 Proof Test:

A rock anchor load test that requires the application of defined incremental loads to the anchor tendon. The movement of the tendon is recorded at each load increment.

3.15 Rock Anchor:

A structural system which consists of cement grouted steel strand tendons embedded into bedrock thereby developing resistance to an applied tensile force.

The rock anchor is composed of a multiple strand type tendon, grout, anchor head, bearing plate, trumpet, spacers, centralizers, and corrosion protection system.

3.16 Rock Anchor Design Load:

The design load (DL) is equal to the total horizontal load divided by the number of rock anchors and then increased to correspond with the actual tensile force component as installed by the contractor. For example, 6,600 kips (the horizontal load) divided by 20 (anchors) times the secant of 45 degrees (installed angle) = DL.

3.17 Secondary Grout:

Material that is injected into the rock anchor hole to cover the unbonded length of the tendon to provide corrosion protection. Generally the same material as used for the primary grout.

3.18 Tendon:

The prestressing steel strands and anchorage and also the sheathing.

3.19 Tiebacks:

The steel members connecting the anchor structure to the drilled shaft structure cap.

STRUCTURE, MISC.: TIEBACKS, ANCHOR STRUCTURE, AND PERMANENT ROCK ANCHORS CONTINUED: See sheet 9 / 48



STRUCTURE, MISC.: TIEBACKS, ANCHOR STRUCTURE, AND PERMANENT ROCK ANCHORS (CONTINUED):

3.20 Transfer Load (Lock-Off Reading):

The load carried by the tendon after completion of testing and/or stressing of the rock anchor.

3.21 Unbonded Length:

The length of the rock anchor system which is free to elongate and is located between the rock anchor head and tendon bond length.

3.22 Unbonded Testing Length (Stressing Length):

The sum of the unbonded length and the jacking length which is equal to the length of the tendon that is free to elongate elastically during stressing.

4.0 Rock Anchor Materials

The contractor shall make arrangements to acquire the rock anchor system, steel tendons, and all necessary incidentals for construction of the proposed rock anchors. (Refer to the section of the proposal concerning steel produced in the United States.)

4.1 Steel

Prestressing steel for tendons shall be 7-wire strand, Grade 270, stress relieved or low relaxation steel, ASTM A416.

All anchorages shall develop at least 95 percent of the minimum specified ultimate strength of the prestressing steel, when tested in an unbonded state, without exceeding anticipated set. Tendons shall be prefabricated for the total length required without the use of couplers.

The steel used for construction of the anchorage system shall conform to the requirements of Item 711.

Bearing plates shall be fabricated from steel conforming to AASHTO M270 (ASTM A709) Grade 36, or be a ductile iron casting conforming to ASTM A536.

Trumpets used to provide a transition from the anchorage to the unbonded length corrosion protection shall be fabricated from a steel pipe or tube conforming to the requirements of ASTM A53 for pipe or ASTM A-500 for tubing. Minimum wall thickness shall be 0.20 inches.

Anchorage covers used to enclose exposed anchorages shall be fabricated from steel, steel pipe, steel tube, or ductile cast iron conforming to the requirements of AASHTO M270 (ASTM A709) Grade 36 for Steel, ASTM A53 for pipe, ASTM A500 for tubing, and ASTM A536 for ductile cast iron. Minimum thickness shall be 0.10 inches.

4.2 Grout

Cement shall be Type I, II, or III Portland Cement conforming to AASHTO M85. Cement used for grouting shall be fresh and shall not contain any lumps or other indications of hydration or "pack set."

Aggregate shall conform to the requirements for fine aggregate described AASHTO M6.

The grout shall conform to all applicable requirements of 499. Water for mixing grout shall be potable, clean and free of injurious quantities of substances known to be harmful to Portland cement or prestressing steel.

Admixtures can be used in the grout only when approved by the Engineer. Preference shall be given to not using any admixtures in the grout. Expansive admixtures may only be added to grout which is used for filling sealed encapsulations, trumpets and anchorage covers. Accelerators shall not be used. Chemical additives which can control bleed and/or retard set may be used in the anchor grout.

4.3 Centralizers

Centralizers shall be fabricated from a steel or plastic material that is nondetrimental to the prestressing steel.

4.4 Spacers

Spacers shall be fabricated from a steel or plastic material that is nondetrimental to the prestressing steel.

4.5 Capsule

The encapsulation material shall be corrugated plastic tube. The capsule shall be:

- Resistant to chemical attack from aggressive environments, grout, or grease.
- Fabricated from materials nondetrimental to the tendon.
- Capable of withstanding abrasion, impact, and bending during handling and installation.
- Free of flaws which would permit water to enter into the tieback system.
- Capable of transferring stresses from the grout inside the capsule to the grout outside the capsule.

4.6 Corrosion Protection Elements

Corrosion inhibiting grease inside the sheath for the unbonded length shall conform to the requirements of the Post Tensioning Institute's "Specifications for Unbonded Single Strand Tendons," Section 3.2.5. The corrosion inhibitor shall fill all space between the strand wires and between the strand and the sheath.

Sheath for the unbonded length of the tendon shall consist of one of the following:

- Seamless polyethylene (PE) tube having a minimum wall thickness of 60 mils plus or minus 10 mils. The polyethylene shall be cell classification J34413 by ASTM D3350.
- Seamless polypropylene tube having a minimum wall thickness of 60 mils plus or minus 10 mils. The polypropylene shall be cell classification PP210B5542-11 by ASTM D4101.
- Heat shrinkable tube consisting of a radiation cross linked polyolefin tube internally coated with an adhesive sealant. The minimum type wall thickness before shrinking shall be 24 mils. The minimum adhesive sealant thickness shall be 20 mils.
- Corrugated polyvinyl chloride (PVC) tube having a minimum wall thickness of 30 mils.

Encapsulation for the tendon unbonded and bond length shall consist of one of the following:

- Corrugated high density polyethylene (HDPE) tube having a minimum wall thickness of 30 mils and conforming to AASHTO M252 requirements.
- Corrugated polyvinyl chloride (PVC) tube having a minimum wall thickness of 30 mils.

4.7 Miscellaneous Elements

Bondbreaker for a tendon shall consist of a smooth plastic tube or pipe that is resistant to aging by ultra-violet light and that is capable of withstanding abrasion, impact and bending during handling and installation.

Spacers for separation of elements of multi-element tendon shall permit the free flow of grout. They shall be fabricated from plastic, steel or material which is not detrimental to the prestressing steel. Wood shall not be used.

Centralizers shall be fabricated from plastic, steel or material which is not detrimental to either the prestressing steel or any element of the tendon corrosion protection. Wood shall not be used. The centralizer shall be able to maintain the position of the tendon so that a minimum of 0.5 inches of grout cover is obtained on the tendons.

5.0 Rock Anchor Fabrication

Tendons for rock anchors may be either shop or field fabricated from materials conforming to the requirements of Section 4.1. Tendons shall be fabricated as shown on the plans. The tendon shall be sized so that the maximum test load does not exceed 80 percent of the minimum guaranteed ultimate strength of the tendon.

5.1 Bond Length and Tendon Bond Length

The bond length shall be sufficiently long that the stress at the rock-grout interface in the bonded zone does not exceed an average of 50 psi at 100 percent of the guaranteed ultimate tensile strength of the anchor.

Centralizers shall be placed along the bond length. They shall be located at 10 foot maximum centers with the upper one located a maximum of 5 feet from the top of the bond length and the lower one located one foot from the bottom of the bond length. Centralizers are not required on tendons installed utilizing a hollow-stem auger if it is grouted through the auger and the drill hole is maintained full of a stiff grout (9 inch slump or less) during extraction of the auger.

5.2 Tendon

The size of the tendon shall be designed so that (1) when tensioned to the Rock Anchor Design Load, the loading does not tension the tendon beyond 60 percent of the guaranteed ultimate tensile strength (GUTS) of the tendon and (2) when tensioned to the maximum test load (1.33 times the Tieback Design Load), the loading does not tension the tendon beyond 80 percent of GUTS.

5.3 Encapsulation Protected Anchor Tendon

The tendon bond length shall be encapsulated by a grout-filled corrugated plastic tube. The tendon can be grouted inside the encapsulation prior to inserting the tendon in the drill hole or after the tendon has been placed in the drill hole. The tendon shall be centralized within the encapsulation and the tube sized to provide an average of 0.50 inches of grout cover for the prestressing steel.

5.4 Corrosion Protection

Continuity of corrosion protection shall be provided at the transition from the bonded length to unbonded length of the tendon.

5.5 Anchorage and Trumpet

The trumpet shall be welded to the bearing plate. The trumpet shall have an inside diameter equal to or larger than the hole in the bearing plate. The trumpet shall be long enough to accommodate movements of the structure during testing and stressing.

Trumpets filled with corrosion-inhibiting grease shall have a permanent Buna-N rubber or approved equal seal provided between the trumpet and the unbonded length corrosion protection. Trumpets filled with grout shall have a temporary seal provided between the trumpet and the unbonded length corrosion protection.

5.6 Tendon Storage and Handling

Tendons shall be stored and handled in such a manner as to avoid damage or corrosion. Damage to tendon prestressing steel as a result of abrasion, cuts, nicks, welds and weld splatter will be cause for rejection by the Engineer. Grounding of welding leads to the prestressing steel is not permitted. Prior to inserting a tendon into the drilled hole, its corrosion protection elements shall be examined for damage. Any damage found shall be repaired in a manner approved by the Engineer.

5.7 Installation

The Contractor shall select a drilling method, a grouting procedure and a grouting pressure that is expected to provide the best rock anchor capacity for the subsurface conditions at this project site.

5.8 Drilling

Excessive amounts of water shall not be used in the drilling operation. Drilling shall be performed by the duplex drilling method with a casing and drill rod using an internal flush of drilling waste. The location, inclination, and alignment of the drilled hole shall be as shown on the plans. The inclination of the rock anchors shall alternate to spread the anchors in the bedrock. Inclination and alignment shall be within plus or minus 3 degrees of the plan angle at the bearing plate.

STRUCTURE, MISC.: TIEBACKS, ANCHOR STRUCTURE, AND PERMANENT ROCK ANCHORS CONTINUED: See sheet 10/48

RICHLAND ENGINEERING LIMITED		29 NORTH PARK STREET MANSFIELD, OHIO 44902	
DATE	12/20/96	REVIEWED	BLN
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STRUCTURE, MISC.: TIEBACKS, ANCHOR STRUCTURE, AND PERMANENT ROCK ANCHORS CONTINUED:

5.9 Tendon Insertion

The tendon shall be inserted into the drilled hole to the desired depth without difficulty. When the tendon cannot be completely inserted it shall be removed and the drill hole cleaned or redrilled to permit insertion. Partially inserted tendons shall not be driven or forced into the hole.

5.10 Rock Anchor Angle

The rock anchor tendons shall be installed at an angle of  $45 \pm 5$  degrees down from horizontal. The rock anchor angle used will require adjustment of the design load such that the horizontal component satisfies the design requirements for the structure loading at that location.

5.11 Grouting

A neat cement grout or sand cement grout conforming to Section 4.2 shall be used.

The grouting equipment shall produce a grout free of lumps and undispersed cement. A positive displacement grout pump shall be used. The pump shall be equipped with a pressure gauge to monitor grout pressures. The pressure gauge shall be capable of measuring pressures of at least 150 psi or twice the actual grout pressures used, whichever is greater. The grouting equipment shall be sized to enable the grout to be pumped in one continuous operation. The mixer shall be capable of continuously agitating the grout.

The grout shall be injected from the lowest point of the drill hole. The grout may be pumped through grout tubes, casing, hollow-stem augers or drill rods. The grout may be placed before or after insertion of the tendon. The quantity of the grout and the grout pressures shall be recorded. The grout pressures and grout takes shall be controlled to prevent excessive heave of the ground or fracturing of rock formations.

Except where indicated below, the grout above the top of the bond length may be placed at the same time as the bond length grout, but it shall not be placed under pressure.

The grout at the top of the drill hole shall stop six inches from the back of the structure or from the bottom of the trumpet, whichever is lowest.

Pressure grouting techniques shall be utilized. Pressure grouting requires that the drill hole be sealed and that the grout be injected until a 50 psi grout pressure can be maintained on the grout within the bond length for a period of five minutes.

Upon completion of grouting, the grout tube may remain in the drill hole provided it is filled with grout.

After grouting, the tendon shall not be loaded for a minimum of three days.

5.12 Trumpet and Anchorage

The corrosion protection surrounding the unbonded length of the tendon shall be extended into the trumpet a minimum of six inches beyond the bottom watertight seal in the trumpet.

The corrosion protection surrounding the unbonded length of the tendon shall not contact the bearing plate or the anchorage during the load testing or stressing.

The bearing plate and anchorage shall be placed perpendicular to the axis of the tendon.

The trumpet shall be completely filled with corrosion inhibiting grease or grout. The grease may be placed any time during construction. The grout shall be placed after the rock anchor has been load tested and accepted. The Contractor shall demonstrate that the procedures selected for placement of either grease or grout will produce a completely filled trumpet.

Anchorage shall be covered with a corrosion inhibiting grease.

6.0 Rock Anchor Testing and Stressing

Each rock anchor shall be load tested by the Contractor. A load greater than 10 percent of the design load shall not be applied to the rock anchor prior to load testing. The test load shall be simultaneously applied to the entire tendon. Rock anchors shall be loaded in a sequence that begins nearest the centerline of construction and proceeds alternately to the north side and the south side. Accepted rock anchors will not require further testing or loading.

6.1 Testing Equipment

A dial gauge or vernier scale capable of measuring displacements to 0.001 inches shall be used to measure rock anchor movement. It shall have adequate travel so total rock anchor movement can be measured without resetting the device.

A hydraulic jack and pump shall be used to apply the test load. The jack and calibrated pressure gauge shall be used to monitor the applied load. The applied load shall be measured by an electrical resistance load cell and readout instrument. The pressure gauge shall be graduated in 100 psi increments or less. When the theoretical elastic elongation of the total rock anchor length at the maximum test load exceeds the ram travel of the jack, the procedure for recycling the jack ram shall be provided. Each increment of test load shall be applied in one minute or less.

A calibrated reference pressure gauge shall be available at the site. The reference gauge shall be calibrated with the test jack and pressure gauge.

The stressing equipment shall be placed over the ground anchor tendon in such a manner that the jack, bearing plates, load cell and stressing anchorage are axially aligned with the tendon and the tendon is centered with the equipment.

6.2 Performance Test

The first four rock anchors installed shall be performance tested in accordance with the following procedures. The remaining rock anchors shall be tested in accordance with the proof test procedures.

The performance test shall be made by incrementally loading and unloading the rock anchor in accordance with the following schedule unless a different maximum test load and schedule are indicated on the plans. The load shall be raised from one increment to another immediately after recording the rock anchor movement. The rock anchor movement shall be measured and recorded to the nearest 0.001 inches with respect to an independent fixed reference point at the alignment load and at each increment of load. The load shall be monitored with a pressure gauge. A reference pressure gauge shall be placed in series with the pressure gauge during each performance test. If the load determined by the reference pressure gauge and the load determined by the pressure gauge differ by more than 10 percent, the jack, pressure gauge and reference pressure gauge shall be recalibrated. At load increments other than the maximum test load, the load shall be held just long enough to obtain the movement reading.

Performance Test Schedule

Step	Load	Step	Load
1	AL	15	AL
2	0.25DL*	16	0.25DL
3	AL	17	0.50DL
4	0.25DL	18	0.75DL
5	0.50DL*	19	1.00DL
6	AL	20	1.20DL*
7	0.25DL	21	AL
8	0.50DL	22	0.25DL
9	0.75DL*	23	0.50DL
10	AL	24	0.75DL
11	0.25DL	25	1.00DL
12	0.50DL	26	1.20DL
13	0.75DL	27	1.33DL* (Max. test load)
14	1.00DL*	28	Reduce to lock-off load (Section 6.5)

Where: AL = Alignment Load  
DL = Design load for rock anchor  
\* = Graph required. See last paragraph in this Section 6.2

The maximum test load in a performance test shall be held for a minimum of one hour. The jack shall be repumped as necessary in order to maintain a constant load. The load-hold period shall start as soon as the maximum test load is applied and the rock anchor movement shall be measured and recorded at 1 minute, 2, 3, 4, 5, 6, 10, 15, 20, 25, 30, 45 and 60 minutes.

A graph shall be constructed showing a plot of rock anchor movement versus load for each load increment marked with an asterisk (\*) in the performance test schedule and a plot of the residual rock anchor movement of the tendon at each alignment load versus the highest previously applied load. Graph format shall be approved by the Engineer prior to use.

6.3 Proof Test

The proof test shall be performed by incrementally loading the rock anchor in accordance with the following schedule unless a different maximum test load and schedule are indicated on the plans. The load shall be raised from one increment to another immediately after recording the rock anchor movement. The rock anchor movement shall be measured and recorded to the nearest 0.001 inches with respect to an independent fixed reference point at the alignment load and at each increment of load. The load shall be monitored with a pressure gauge. At load increments other than the maximum test load, the load shall be held just long enough to obtain the movement reading.

Proof Test Schedule

Step	Load	Step	Load
1	AL	5	1.00DL
2	0.25DL	6	1.20DL (Max. test load)
3	0.50DL	7	Reduce to lock-off load (Section 6.5)
4	0.75DL		

Where: AL = Alignment Load  
DL = Design load for rock anchor

The maximum test load in a proof test shall be held for 10 minutes. The jack shall be repumped as necessary in order to maintain a constant load. The load-hold period shall start as soon as the maximum test load is applied and the rock anchor movement shall be measured and recorded at 1 minute, 2, 3, 4, 5, 6 and 10 minutes. If the rock anchor movement between 1 minute and 10 minutes exceeds 0.04 inches, the maximum test load shall be held for an additional 50 minutes. If the load hold is extended, the rock anchor movement shall be recorded at 15 minutes, 20, 30, 45 and 60 minutes. A graph shall be constructed showing a plot of rock anchor movement versus load for each load increment in the proof test. Graph format shall be approved by the Engineer prior to use.

6.4 Rock Anchor Load Test Acceptance Criteria

A performance-tested or proof-tested rock anchor with a 10 minute load hold is acceptable if the:

- (1) Rock anchor resists the maximum test load with less than 0.04 inches movement between 1 minute and 10 minutes; and
- (2) Elastic movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the unbonded length.
- (3) Total elastic movement from a performance test at the maximum test load may not exceed the theoretical elastic elongation of the unbonded length plus 50 percent of the theoretical elastic elongation of the bonded length.

A performance-tested or proof-tested rock anchor with a 60 minute hold is acceptable if the:

- (1) Rock anchor resists the maximum test load with a creep rate that does not exceed 0.08 inches in the last log cycle of time; and
- (2) Elastic movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the unbonded length.
- (3) Total elastic movement from a performance test at the maximum test load may not exceed the theoretical elastic elongation of the unbonded length plus 50 percent of the theoretical elastic elongation of the bonded length.

6.5 Lock Off

Upon successful completion of the load testing, the rock anchor load shall be reduced to the lock-off load which is equal to 1.00 DL. The rock anchor load should be reduced to the AL just prior to applying the lock-off load. After transferring the load and prior to removing the jack, a lift-off load reading shall be made. The lift-off load shall be within 10 percent of the specified lock-off load. If the load is not within 10 percent of the specified lock-off load, the anchorage shall be reset and another lift-off load reading shall be made. This process shall be repeated until the desired lock-off load is obtained.

STRUCTURE, MISC.: TIEBACKS, ANCHOR STRUCTURE, AND PERMANENT ROCK ANCHORS CONTINUED: See sheet 11/48

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29 NORTH PARK STREET  
MANSFIELD, OHIO 44902

DATE 12/20/96  
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STRUCTURE FILE NO. 1809393

GENERAL NOTES  
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STRUCTURE, MISC.: TIEBACKS, ANCHOR STRUCTURE, AND PERMANENT ROCK ANCHORS (CONTINUED):

7.0 Anchor Structure

The anchor structure includes the reinforced concrete cap that connects the anchorage for the rock anchors and the tiebacks from the drilled shaft structure. The reinforced concrete cap is to be supported by steel bearing piles.

7.1 Design Data

Concrete Class C - Compressive Strength 4,000 P.S.I.  
Reinforcing Steel ASTM A615, A616, or A617 - Grade 60 - Yield Strength 60,000 P.S.I.  
Steel Piling ASTM A36, A572 Grades 42 through 50, or A709 Grades 36 or 50 - Unit Stress 11,700 P.S.I.

7.2 Materials and Installation

Concrete shall be Class C in accordance with CMS 511. Reinforcing steel shall be in accordance with CMS 509.

Piling shall be vertical steel piles driven to refusal on bedrock. Concrete piles or drilled shafts shall not be used. The steel piles shall have steel points or shoes. Prebored holes may be used to install the first 50 percent of the total pile length. Bearing piles shall be in accordance with CMS 505 and 507.

Excavation and backfill to proposed grade shall be in accordance with CMS 503.

8.0 Tiebacks

The tiebacks include the steel members and protection that connect the anchor structure to the drilled shaft structure cap. The tieback ends shall be embedded in the reinforced concrete and anchored by mechanical shear connectors. The embedment length shall be long enough to prevent cracking of the reinforced concrete and adequately transfer connected loads within allowable stresses.

8.1 Design Data

Structural Steel ASTM A36 - Yield Strength 36,000 P.S.I.

8.2 Materials and Installation

Structural steel for the tieback members shall be ASTM A36 in accordance with CMS 513. Tieback members shall be rolled steel wide flange or H-pile sections.

The tieback shall be encased in a continuous corrugated polyethylene or PVC pipe sleeve with smooth interior wall, CMS 707.33 or 707.42, for corrosion protection. The pipe sleeve shall be keyed into the anchor structure and the drilled shaft cap.

The pipe sleeve shall be filled with grout after all of the rock anchors are loaded to the lock-off load. The grout shall be as described in Section 4.2.

Excavation and backfill to proposed grade shall be in accordance with CMS 503. The pipe sleeve shall be backfilled with a minimum of 6 inches of granular material, No. 8 (1/2") or smaller in accordance with CMS 203.

9.0 Final Report of Rock Anchor Installations

The Contractor shall furnish to the Director three copies of a bound and typed report containing the following information:

1. A tabulation of data from all rock anchor testing
2. Type of instrumentation used for conducting testing
3. Testing procedures
4. Plates of all graphical test data
5. Contractor's general opinion of plans and specifications
6. Construction procedures
7. Grouting records
8. Construction difficulties and/or special techniques.

The preparation of this report is considered incidental to the installation of the rock anchors and therefore does not have a separate payment item.

10.0 Measurement and Payment

The contract unit price paid for the tiebacks, anchor structure, and rock anchors shall include full compensation for furnishing all labor, materials, tools, mobilization, equipment, excavation, backfill, and incidentals, and for doing all the work involved in installing the tiebacks, anchor structure, and rock anchors (including testing), complete in place, as shown on the plans and as specified in these specifications and the special provisions, and as directed by the Engineer.

Item	Unit	Description
Special Lump		Structure, misc.: Tiebacks, anchor structure, and permanent rock anchors

STRUCTURE MISC.: DRILLED SHAFT AND ROCK ANCHOR INSTRUMENTATION:

The University of Akron Civil Engineering Department will test portions of the subsurface stabilization structure during and after construction under a separate contract with the Ohio Department of Transportation. The Contractor shall furnish and install the test instruments and equipment. The Contractor shall also furnish, install and operate a hydraulic jack and jacking frame to perform a lateral load test on the drilled shafts. The lateral load test will be conducted in conformance with ASTM D3966-90 Standard Test Method for Piles Under Lateral Loads (Cyclic Loading option). University of Akron personnel will supervise installation of the equipment, collect data from the instruments, and conduct the load tests.

Elements of the work and material requirements are shown on sheet **18/48**

Materials specified are as manufactured by Applied Geomechanics, 1336 Brommer Street, Santa Cruz, California 95062, Telephone (408) 462-2801, FAX (408) 462-4418; or Geokon, Inc. 48 Spencer Street, Lebanon, New Hampshire 03766, Telephone (603) 448-1562, FAX (603) 448-3216.

All of the instruments and accessories shall be installed according to manufacturer's recommendations and as directed by the Engineer. Cables for all strain gages shall be continuous from the gage to a common terminal box.

Payment for all materials, labor and equipment necessary to install the instruments and accessories; and to perform the lateral load test shall be included in the lump sum price bid for Item 530 - Structure, misc.: Drilled shaft and rock anchor instrumentation.

DOWEL HOLES

DOWEL HOLES ADJACENT TO NEW 511 CONCRETE

Dowel holes which are required to anchor reinforcing steel shall be as per item 510 using 705.20, epoxy grout. Payment for all costs of materials and construction is included under Item 511.

DOWEL HOLES NOT ADJACENT TO NEW 511 CONCRETE

Dowel holes shall be as per Item 510 and anchored using 705.20 grout. Payment for drilling and furnishing and placing materials shall be made at the contract price per each for Item Special - Structure Misc: Dowel Hole with Nonshrink, Nonmetallic Epoxy Grout.

If dowel holes are to be used in non-511 locations then the second note above should be used or the item which requires the dowel holes can be made "as per plan".

 RICHLAND ENGINEERING LIMITED 29 NORTH PARK STREET MANSFIELD, OHIO 44902	DATE 12/20/96 REVISIONS BLN DRAWN JPS DESIGNED DAP CHECKED MSL	STRUCTURE FILE NO. 1809393	GENERAL NOTES BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER
			CUY-90-15.24 11/48 24/61



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ITEM 513 - STRUCTURAL STEEL MISC.: PENCIL ABRASIVE BLASTING, GRINDING, AND NDT

THIS WORK CONSISTS OF THE FOLLOWING SEQUENCE OF OPERATIONS PERFORMED AT THE AREAS AS DESIGNATED IN THE PLANS AND AS DIRECTED BY THE ENGINEER.

- 1. CLEAN THE DESIGNATED AREA BY PENCIL ABRASIVE BLASTING THE PAINT AND/OR RUST FROM THE STEEL SURFACE.
2. THE ENGINEER, ACCOMPANIED BY THE CONTRACTOR, SHALL CAREFULLY VISUALLY INSPECT THE CLEANED AREA.
3. NON-DESTRUCTIVELY TEST (NDT) THE AREA USING MAGNETIC PARTICLE EXAMINATION AND/OR DYE PENETRATION SO THAT THE ENGINEER MAY FURTHER INSPECT FOR CRACKS.
4. ALL CRACKS AND/OR CRACK TIPS THAT ARE ACCESSIBLE ARE TO BE REMOVED AS SHOWN IN THE PLANS AND PAID FOR AS ITEM 513 - STRUCTURAL STEEL MISC.: DRILLING STRUCTURAL STEEL, GRINDING AND NDT.
5. PERFORM STEPS 1 THRU 4 ON THE OTHER SIDE OF THIS LOCATION.

THE ACCEPTED NUMBER OF LOCATIONS OF WORK AS DESCRIBED IN THIS NOTE WILL BE PAID FOR AT THE CONTRACT UNIT PRICE PER LOCATION. THIS PRICE AND PAYMENT SHALL BE FULL COMPENSATION FOR FURNISHING ALL MATERIAL, LABOR, AND EQUIPMENT NECESSARY TO CLEAN, GRIND, AND PERFORM NDT ON ALL SURFACES AT EACH LOCATION.

PAYMENT WILL BE MADE AT THE CONTRACT PRICE BID UNDER:

Table with 3 columns: ITEM, UNIT, DESCRIPTION. Row 1: 513, EACH, STRUCTURAL STEEL MISC.: PENCIL ABRASIVE BLASTING, GRINDING, AND NDT

ITEM 513 - STRUCTURAL STEEL MISC.: REMOVAL OF CRACK BY GRINDING

THIS WORK SHALL BE PERFORMED AFTER PENCIL ABRASIVE BLASTING, GRINDING, AND NDT HAVE BEEN PERFORMED ON THE DESIGNATED AREA. ONCE THE CRACK HAS BEEN LOCATED AND EXPOSED, THE CONTRACTOR SHALL REMOVE THE CRACK IN THE WELD BY CAREFUL GRINDING. GRINDING SHALL BE PERFORMED WITH A BURR GRINDER SUCH THAT A 1/2-INCH SMOOTH RADIUS IS MAINTAINED.

THE COST FOR FURNISHING ALL MATERIALS, LABOR AND EQUIPMENT NECESSARY FOR REMOVAL OF THE CRACK AND SUBSEQUENT NDT SHALL BE INCLUDED IN THE CONTRACT BID PRICE FOR:

Table with 3 columns: ITEM, UNIT, DESCRIPTION. Row 1: 513, LUMP, STRUCTURAL STEEL MISC.: REMOVAL OF CRACK BY GRINDING

ITEM 513 - STRUCTURAL STEEL MISC.: DRILLING STRUCTURAL STEEL, GRINDING, AND NDT

THIS WORK CONSISTS OF DRILLING CRACKS AND ENDS OF CRACKS, GRINDING TO ENLARGE DRILLED HOLES, AND NON DESTRUCTIVE TESTING AS SHOWN IN THE PLANS AND AS DIRECTED BY THE ENGINEER. DISTRICT PRODUCTION DEPARTMENT (BRIDGE SECTION) APPROVAL MUST BE OBTAINED BEFORE DRILLING ANY HOLES IN THE FLANGES UNDER THIS PAY ITEM.

DRILL HOLES TO REMOVE ENTIRE CRACKS OR THE APPARENT ENDS OF THE CRACKS REVEALED BY THE INITIAL NDT AND/OR VISUAL INSPECTION. GRIND SMOOTH THE EXPOSED CIRCUMFERENCE OF EACH DRILLED HOLE AND CAREFULLY INSPECT FOR CRACKS USING MAGNETIC PARTICLE EXAMINATION AND/OR DYE PENETRATION.

SINCE ANY OF THESE CRACKS COULD PROPAGATE INTO A TENSION ZONE, REMOVING THEIR ENDS IS IMPERATIVE. CRACKS LESS THAN 1 1/2 INCHES LONG, AND CRACKED AREAS OR DEFECTS LESS THAN 1 1/2 INCHES IN DIAMETER SHALL BE REMOVED BY A SINGLE HOLE WHEN PRACTICAL.

THE LOCATION OF ALL HOLES SHALL BE DETERMINED BY AND DRILLED UNDER THE DIRECTION OF THE ENGINEER.

THE ACCEPTED NUMBER OF HOLES DRILLED IN THE STRUCTURAL STEEL AS DETAILED ABOVE WILL BE PAID FOR AT THE CONTRACT PRICE PER EACH HOLE. PRICE AND PAYMENT SHALL BE FULL COMPENSATION FOR FURNISHING ALL MATERIAL, LABOR, AND EQUIPMENT NECESSARY FOR DRILLING THE HOLES, GRINDING TO ENLARGE DRILLED HOLES, AND NDT.

PAYMENTS WILL BE MADE UNDER:

Table with 3 columns: ITEM, UNIT, DESCRIPTION. Row 1: 513, EACH, STRUCTURAL STEEL MISC.: DRILLING STRUCTURAL STEEL, GRINDING, AND NDT

ITEM 513 - STRUCTURAL STEEL, MISC.: REPLACEMENT OF BEARING STIFFENER

THIS ITEM SHALL CONSIST OF FURNISHING ALL MATERIAL, LABOR AND EQUIPMENT NECESSARY TO INSTALL THE BEARING STIFFENER AS SHOWN IN THE PLANS.

THE CONTRACTOR SHALL CLEAN THE BEAM WEB IN THE AREA WHERE THE STIFFENER IS TO PLACED BY ABRASIVE BLASTING AND SHALL REMOVE ANY EXISTING WELD MATERIAL BY CAREFUL GRINDING, PRIOR TO WELDING THE NEW BEARING STIFFENER INTO PLACE.

STRUCTURAL STEEL FOR THIS ITEM SHALL BE ASTM A36. STRUCTURAL STEEL UNDER THIS ITEM WILL NOT REQUIRE SHOP DRAWINGS TO BE APPROVED PRIOR TO FABRICATION. THE CONTRACTOR SHALL MAKE THE NECESSARY MEASUREMENTS AND PREPARE SKETCHES, DRAWINGS, TABLES, ETC. THE ENGINEER SHALL HAVE THE AUTHORITY AND RESPONSIBILITY FOR ENSURING THAT THE FABRICATED STEEL IS ACCEPTABLE.

THE FABRICATOR SHALL FURNISH THE OFFICE OF STRUCTURAL ENGINEERING A 35 MILLIMETER MICROFILM COPY OF EACH APPROVED SHOP DRAWING. THE MICROFILM SHALL BE MOUNTED ON AN APERTURE CARD AS SPECIFIED IN 501.05.

AFTER INSTALLATION, THE BEARING STIFFENER SHALL BE FIELD PAINTED AS PER ITEM 514- FIELD PAINTING MISC.: FIELD PAINTING OF TESTED AND/OR RETROFITTED AREAS.

THE COST FOR FURNISHING ALL MATERIALS, LABOR AND EQUIPMENT NECESSARY TO INSTALL THE BEARING STIFFENER AS PER THIS NOTE AND AS SHOWN IN THE PLANS SHALL BE INCLUDED IN THE CONTRACT PRICE BID FOR:

Table with 3 columns: ITEM, UNIT, DESCRIPTION. Row 1: 513, LUMP, STRUCTURAL STEEL MISC.: REPLACEMENT OF BEARING STIFFENER.

ITEM 514 - FIELD PAINTING MISC.: FIELD PAINTING OF TESTED AND/OR RETROFITTED AREAS

THIS ITEM SHALL CONSIST OF PREPARING AND COATING (1) ALL AREAS WHERE PENCIL ABRASIVE BLASTING, GRINDING AND NDT OCCURED, (2) THE EXPOSED EDGES WHERE DRILLING OCCURED, AND (3) THE REPLACED BEARING STIFFENER, AND (4) ANY OTHER AREAS AFFECTED BY THE CONTRACTOR'S WORK.

SURFACE PREPARATION SHALL CONSIST OF ABRASIVE BLASTING THE STEEL TO BE COATED TO AN SA 2 1/2 NEAR-WHITE CONDITION. BLASTING ABRASIVES CONTAINING MORE THAN 1% FREE SILICA SHALL NOT BE ALLOWED. THESE AREAS SHALL BE COATED THE SAME DAY THAT THEY ARE BLASTED.

THE PREPARED AREAS SHALL BE COATED WITH ONE COAT OF A HIGH SOLIDS EPOXY AT LEAST 5 MILS THICK. THE HIGH SOLIDS EPOXY SHALL BE APPLIED BY BRUSH. THE COLOR OF THE HIGH SOLIDS EPOXY SHALL CLOSELY MATCH THE COLOR OF THE EXISTING COATING.

THE HIGH SOLIDS EPOXY SHALL BE ONE OF THE FOLLOWING PRODUCTS:

- 1) AMERON AMERLOCK 400
2) VALSPAR HIGH SOLIDS EPOXY 76 SERIES
3) TNEMEC CHEMBUILD SERIES 135
4) SHERWIN WILLIAMS - EPOXY-MASTIC COATING

COST FOR FURNISHING ALL MATERIALS, LABOR, AND EQUIPMENT NECESSARY TO COMPLETE THIS ITEM SHALL BE INCLUDED IN THE LUMP SUM BID PRICE FOR THIS ITEM:

Table with 3 columns: ITEM, UNIT, DESCRIPTION. Row 1: 514, LUMP, FIELD PAINTING MISC.: FIELD PAINTING OF TESTED AND/OR RETROFITTED AREAS

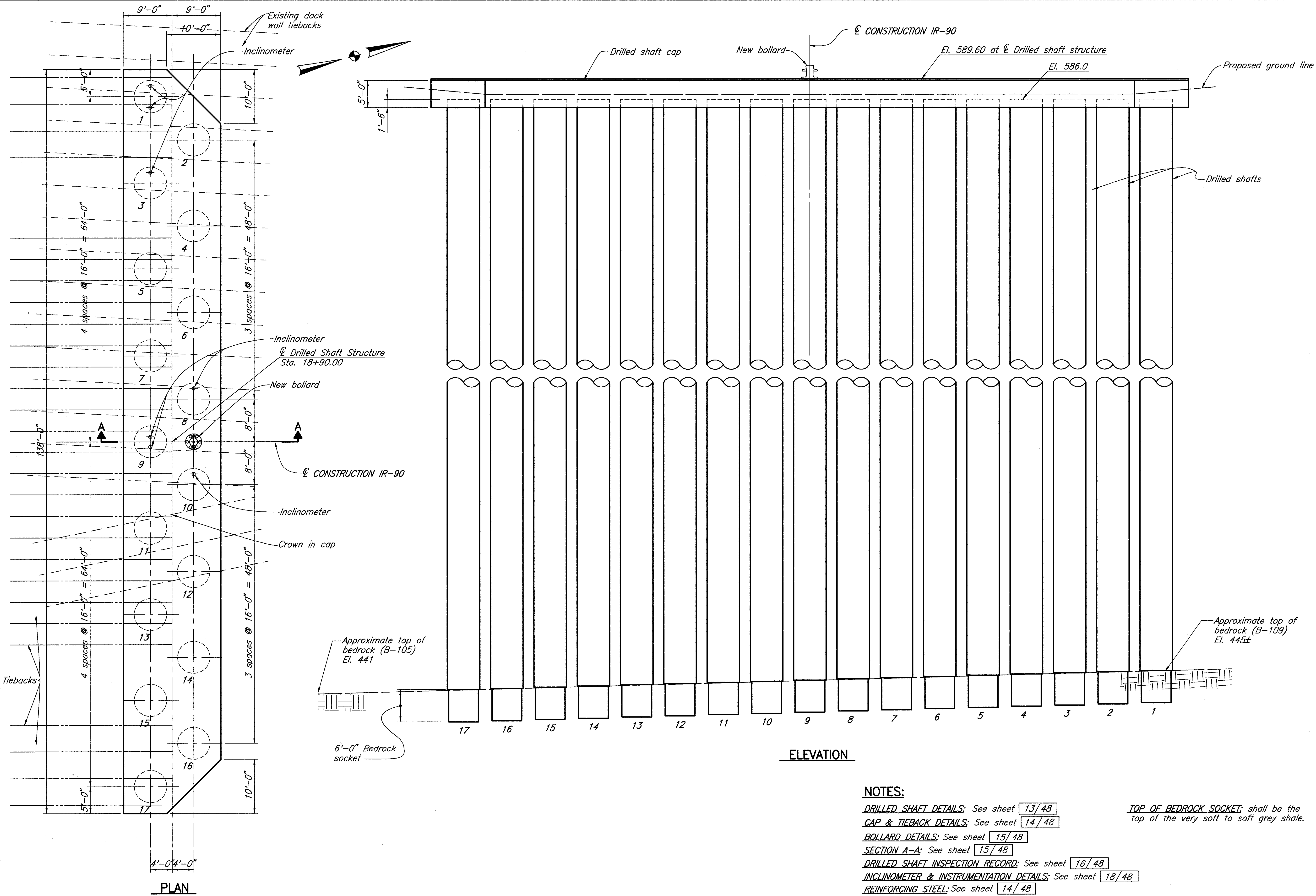
PENCIL ABRASIVE BLASTING THE PENCIL ABRASIVE BLASTING REFERRED TO IN THE VARIOUS NOTES AND REPAIR ITEMS IN THESE PLANS SHALL CONFORM TO THE FOLLOWING:

CLEAN THE DESIGNATED NON-DESTRUCTIVE TESTING (NDT) AREAS OF ALL PAINT, RUST, AND FOREIGN MATERIAL BY ABRASIVE BLASTING TO A SURFACE QUALITY EQUAL TO SSPC-SP10 PREPARATION GRADE SA 2 ACCORDING TO AND AS SHOWN IN SSPC-VIS 1-89. SINCE THE INTENT OF THE PENCIL ABRASIVE BLASTING IS TO ENHANCE THE VISUAL AND NDT CRACK DETECTION TECHNIQUES, A GENTLE ABRASIVE BLAST SHALL BE USED SUCH THAT THE SURFACE IS NOT PEENED OR OTHERWISE COLD WORKED.

THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER THAT PENCIL ABRASIVE BLASTING CAN SATISFACTORILY BE PERFORMED ACCORDING TO THESE SPECIFICATIONS PRIOR TO THE START OF THE WORK. THE COST OF THE PENCIL ABRASIVE BLASTING HAS BEEN INCLUDED FOR PAYMENT IN THE APPROPRIATE REPAIR ITEMS.

Vertical sidebar containing: DESIGN AGENCY: O.D.O.T., DISTRICT TWELVE, PRODUCTION DEPARTMENT, DATE: 01/97, REVISED: DWL, STRUCTURE FILE NUMBER: 1809393, DRAWN: GLC, CHECKED: BGT, REVISIONS, STRUCTURE NOTES, BRIDGE NO. CUY-90-1524, CENTRAL VIADUCT OVER CUYAHOGA RIVER, CUYAHOGA COUNTY, CUY-90-15.24, 11A/48, 24A, 61

Job No. 93111DS1 Date 12/23/96 Drawn By JLS, RB, JLS, JPS



<b>RICHLAND ENGINEERING LIMITED</b> 29 NORTH PARK STREET MANSFIELD, OHIO 44902	
DATE 12/20/96	STRUCTURE FILE NO. 1809393
REVIEWED BLN	CHECKED MSL
DRAWN JLS	REVISIONS
DESIGNED DAP	FILE NO.

**DRILLED SHAFT STRUCTURE PLAN AND ELEVATION**

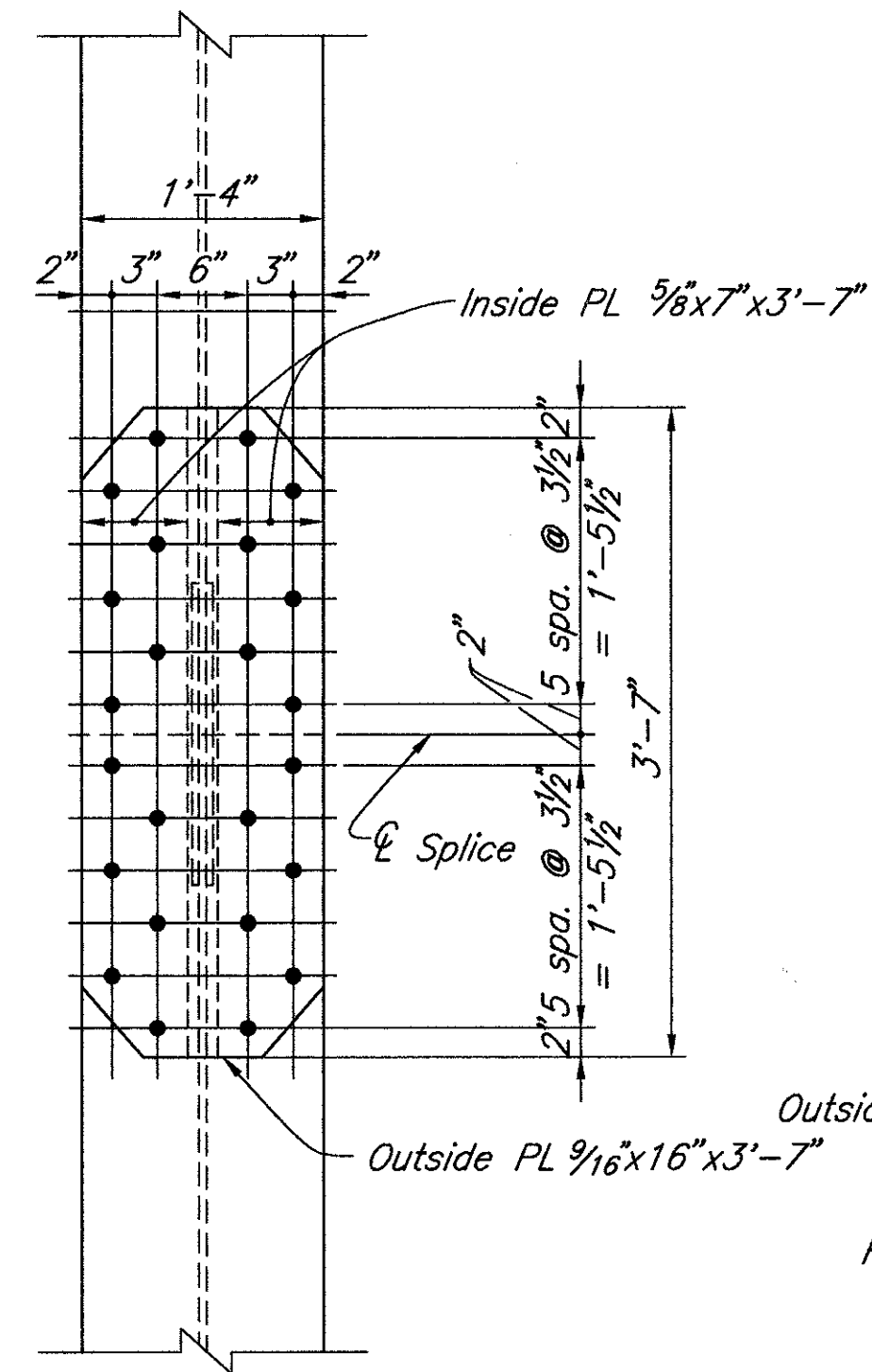
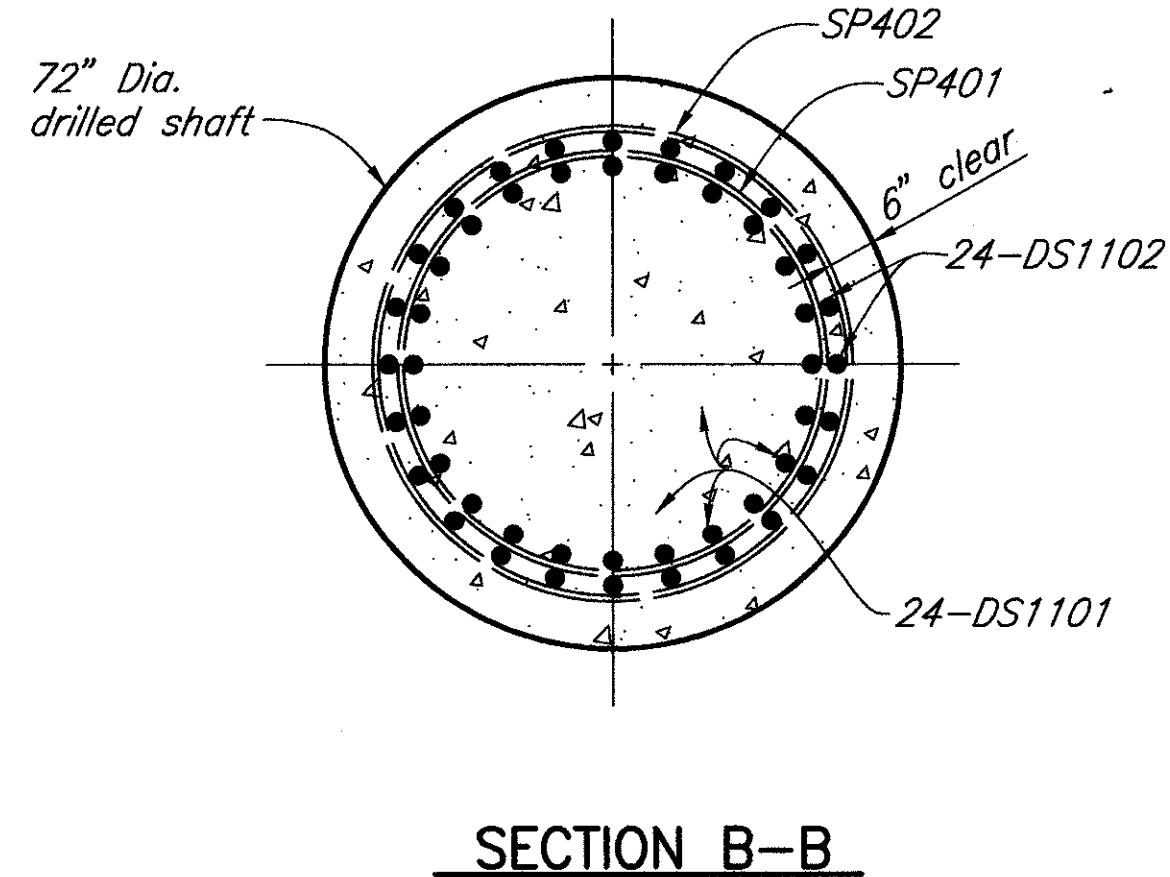
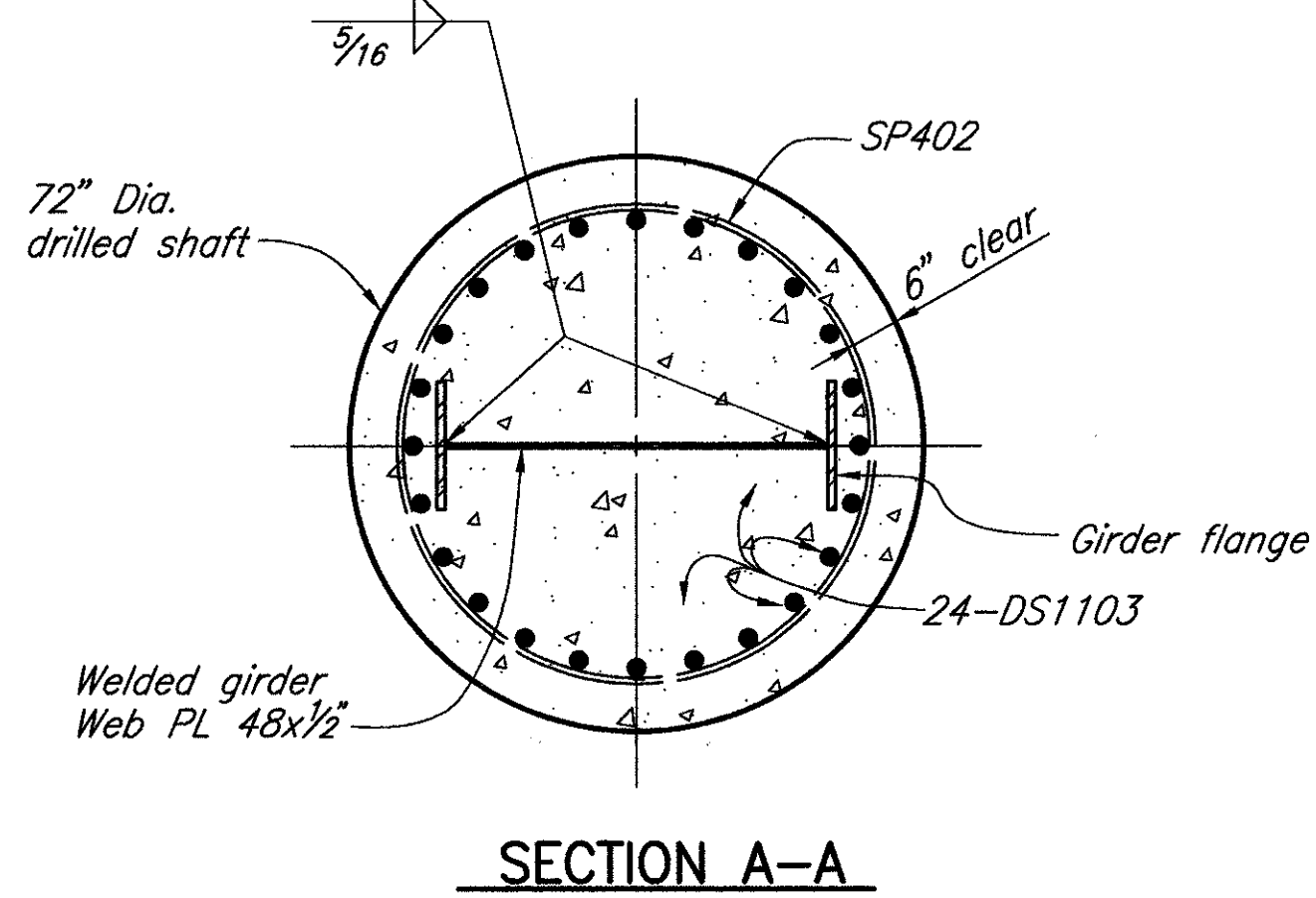
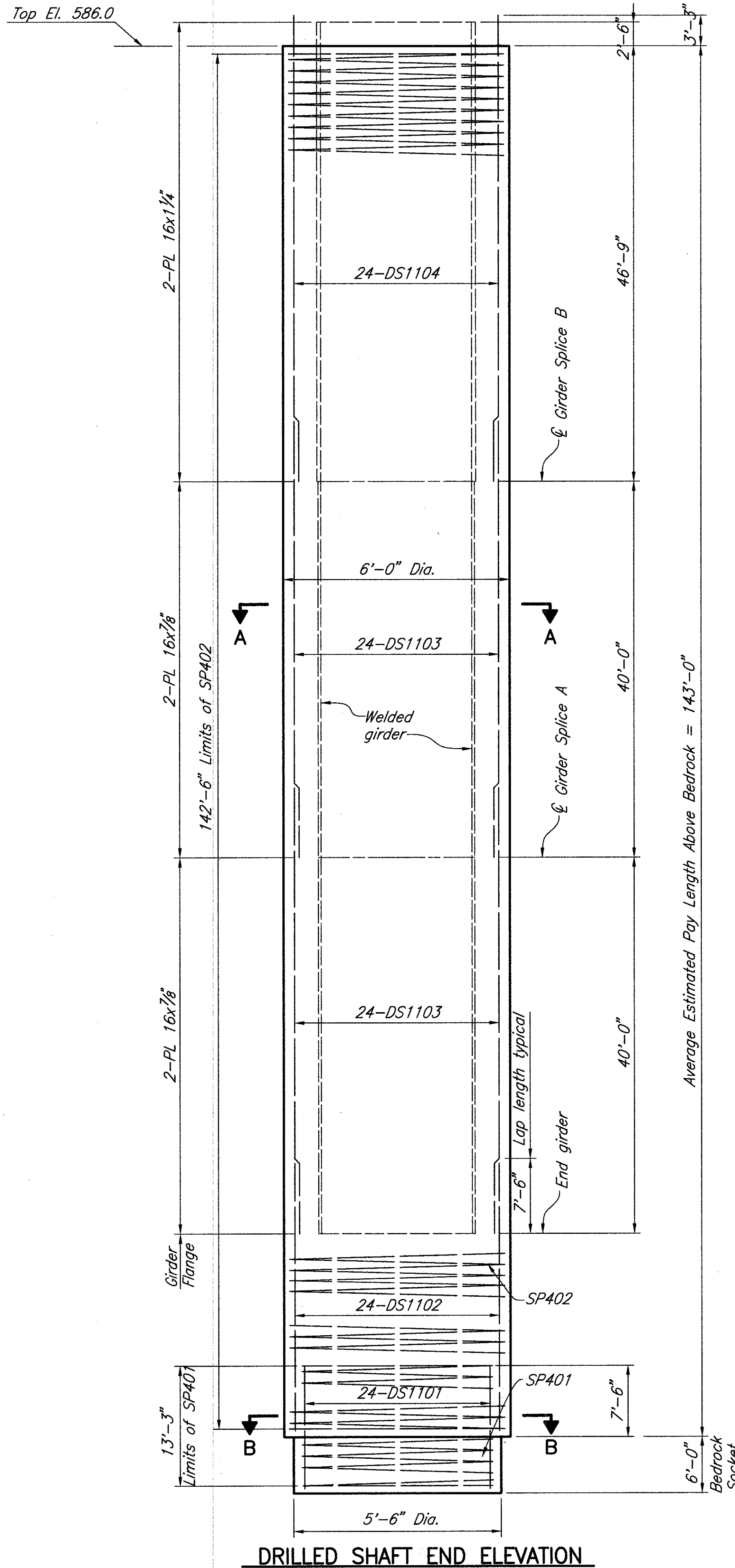
BRIDGE NO. CUY-90-1524 OVER THE CUYAHOGA RIVER

**CUY-90-15.24**

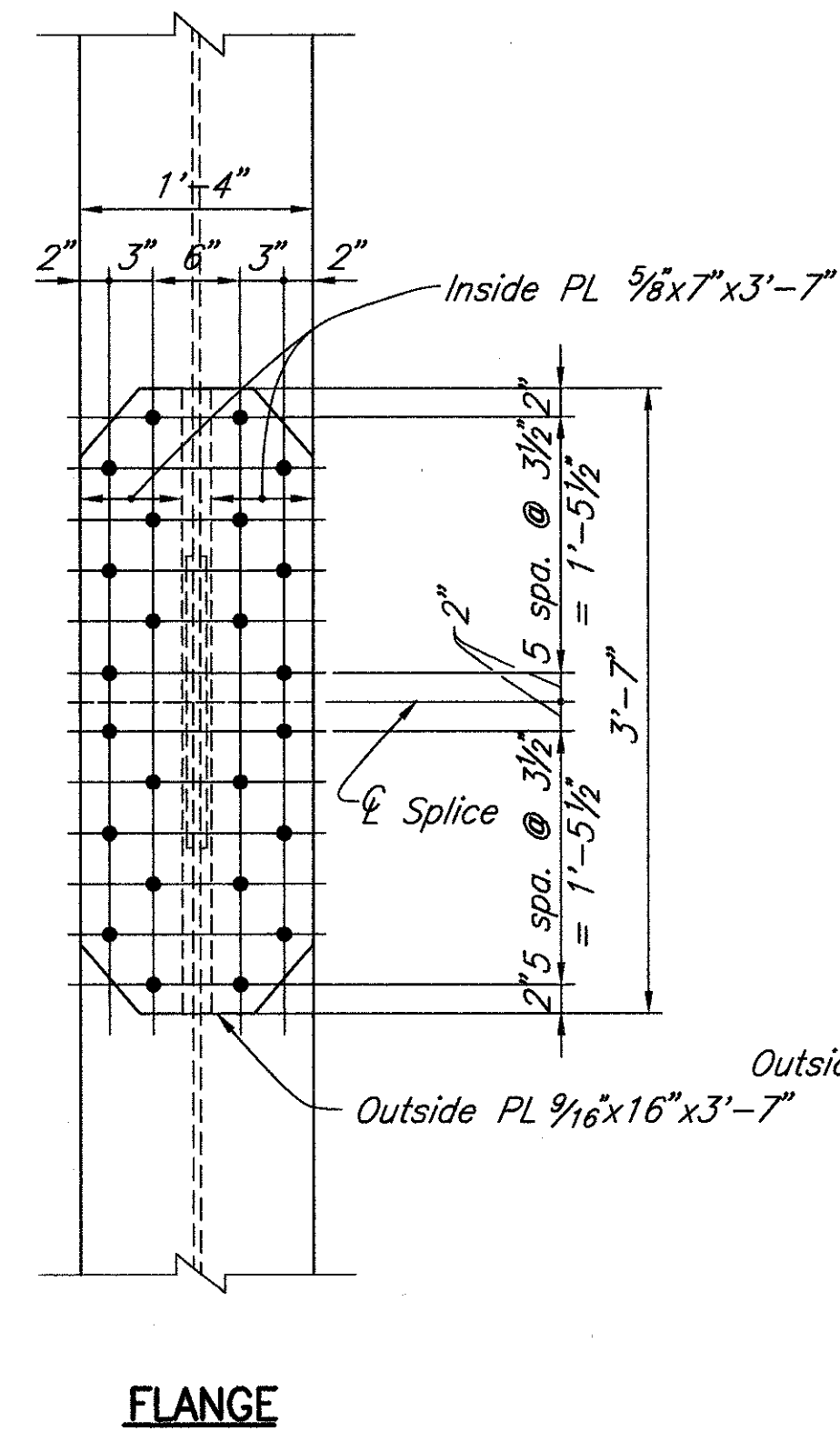
12 / 48

25 / 61

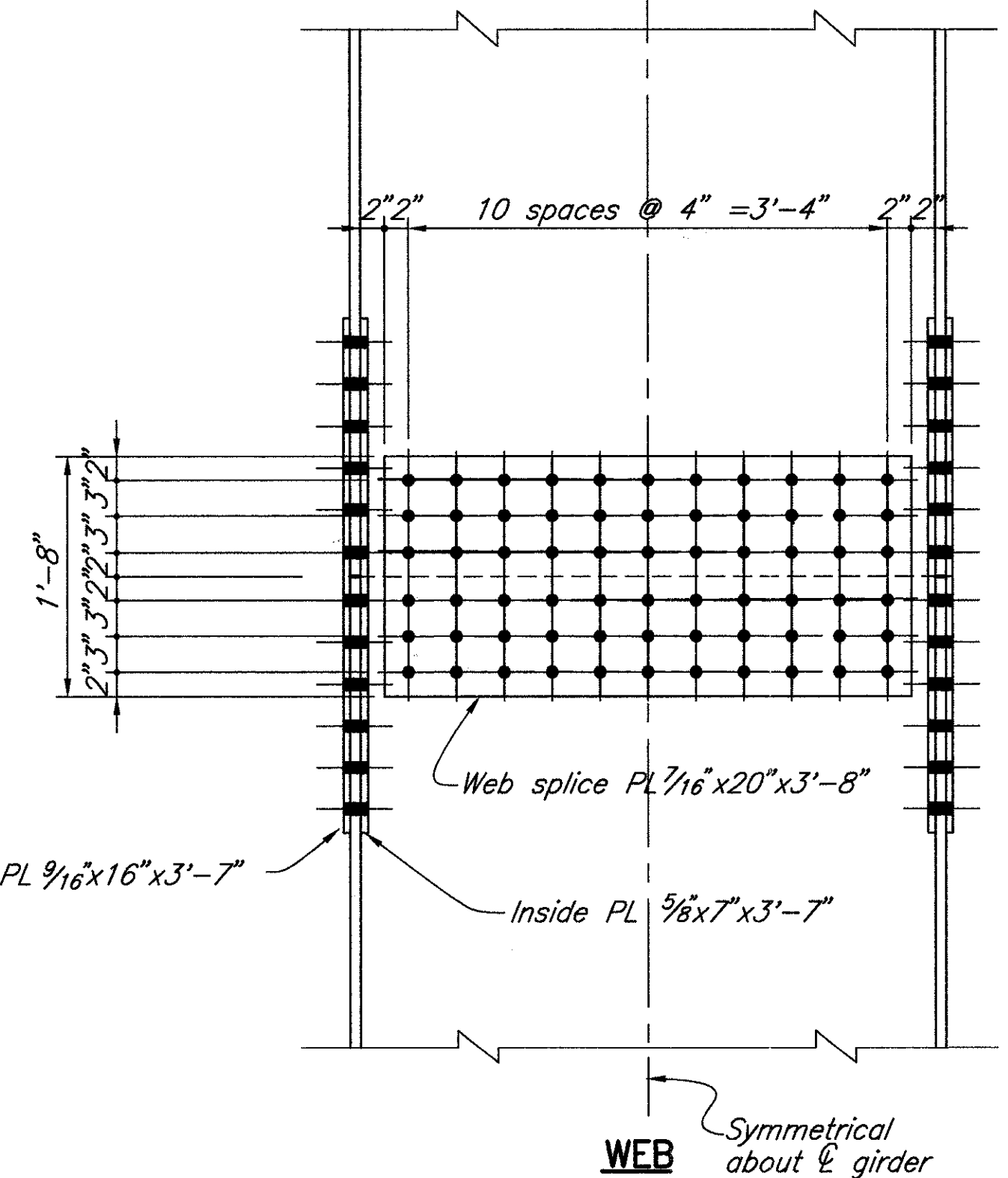
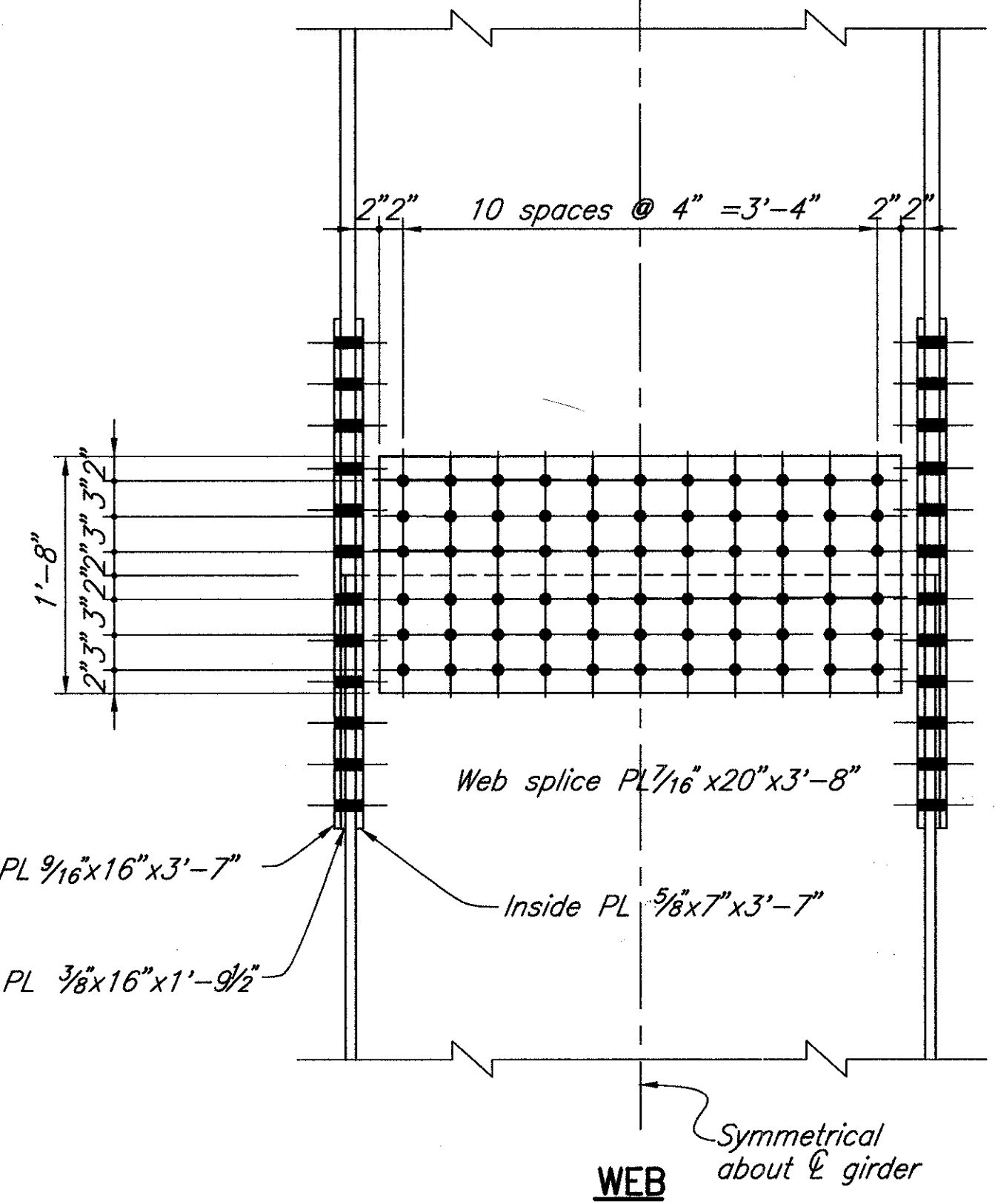




GIRDER SPLICE B DETAIL

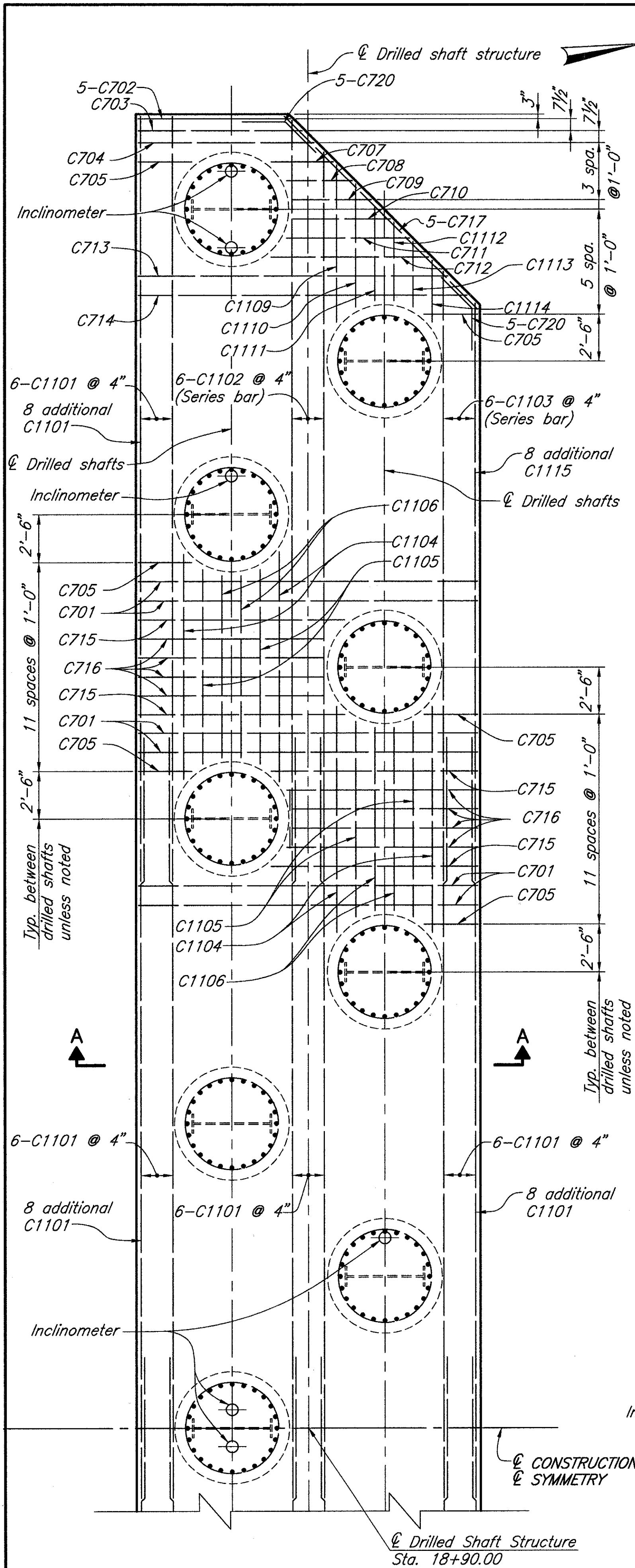


GIRDER SPLICE A DETAIL

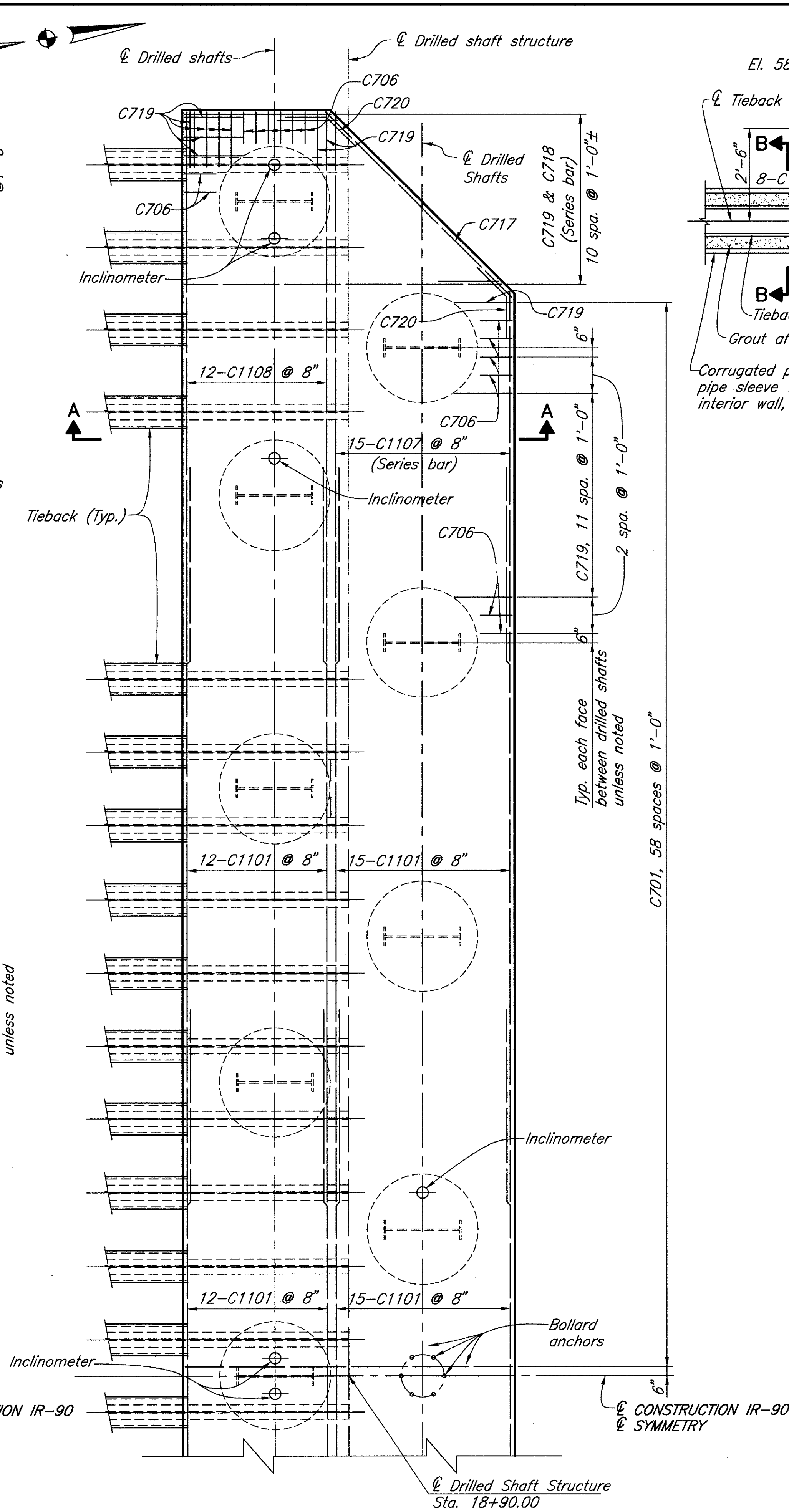


**NOTES:**  
**CONNECTION BOLTS:** Shall be 7/8 dia. A325  
**BOLT LEGEND:** See sheet 25/48  
**REINFORCING SCHEDULE:** See sheet 15/48  
**STEEL GIRDER** splice plates and connection bolts shall be included for payment with Item 524-Drilled shafts, 72" diameter, above bedrock.

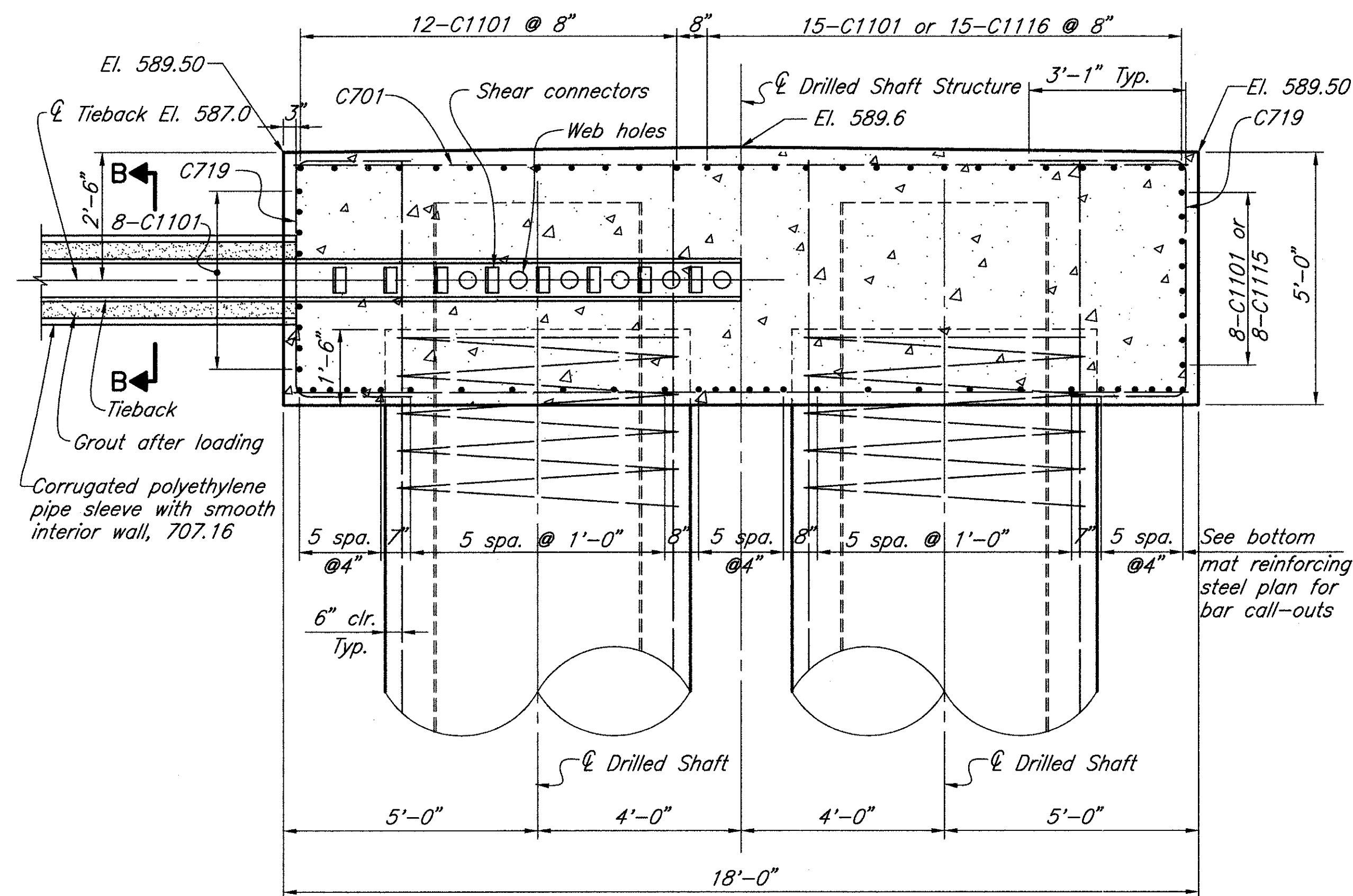
Job No. 93111DS4 Date 12/23/96 Drawn By JLS,TWH,JPS,JLS



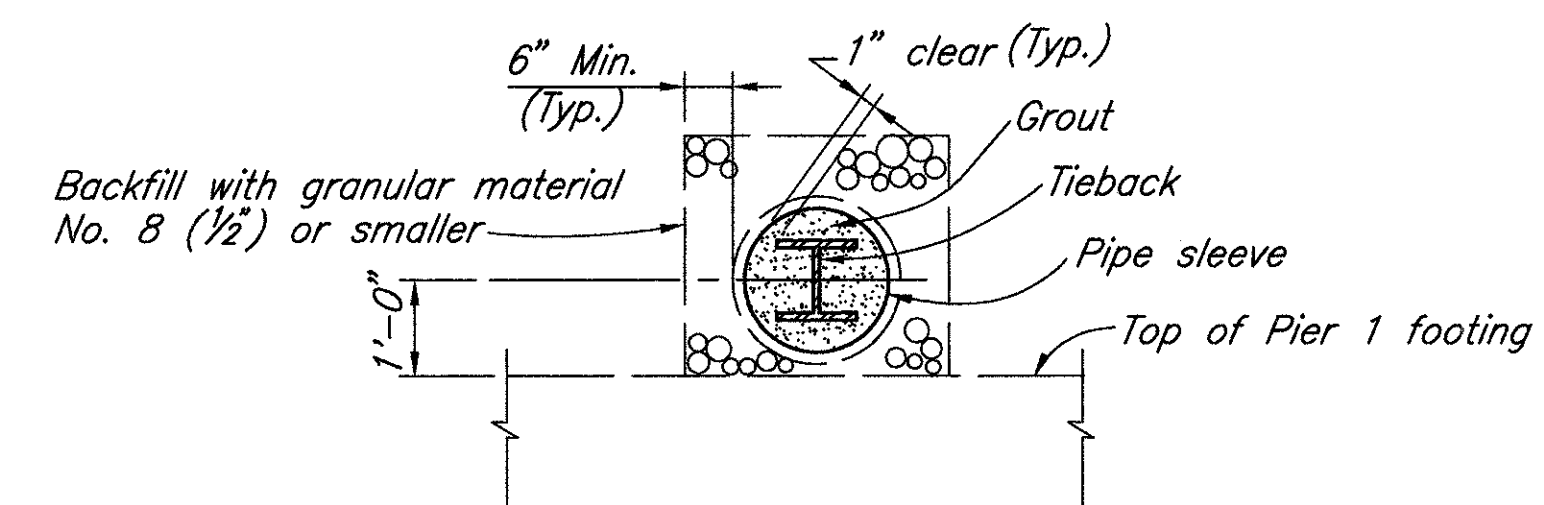
BOTTOM MAT REINFORCING STEEL PLAN



TOP MAT REINFORCING STEEL PLAN



SECTION A-A



SECTION B-B

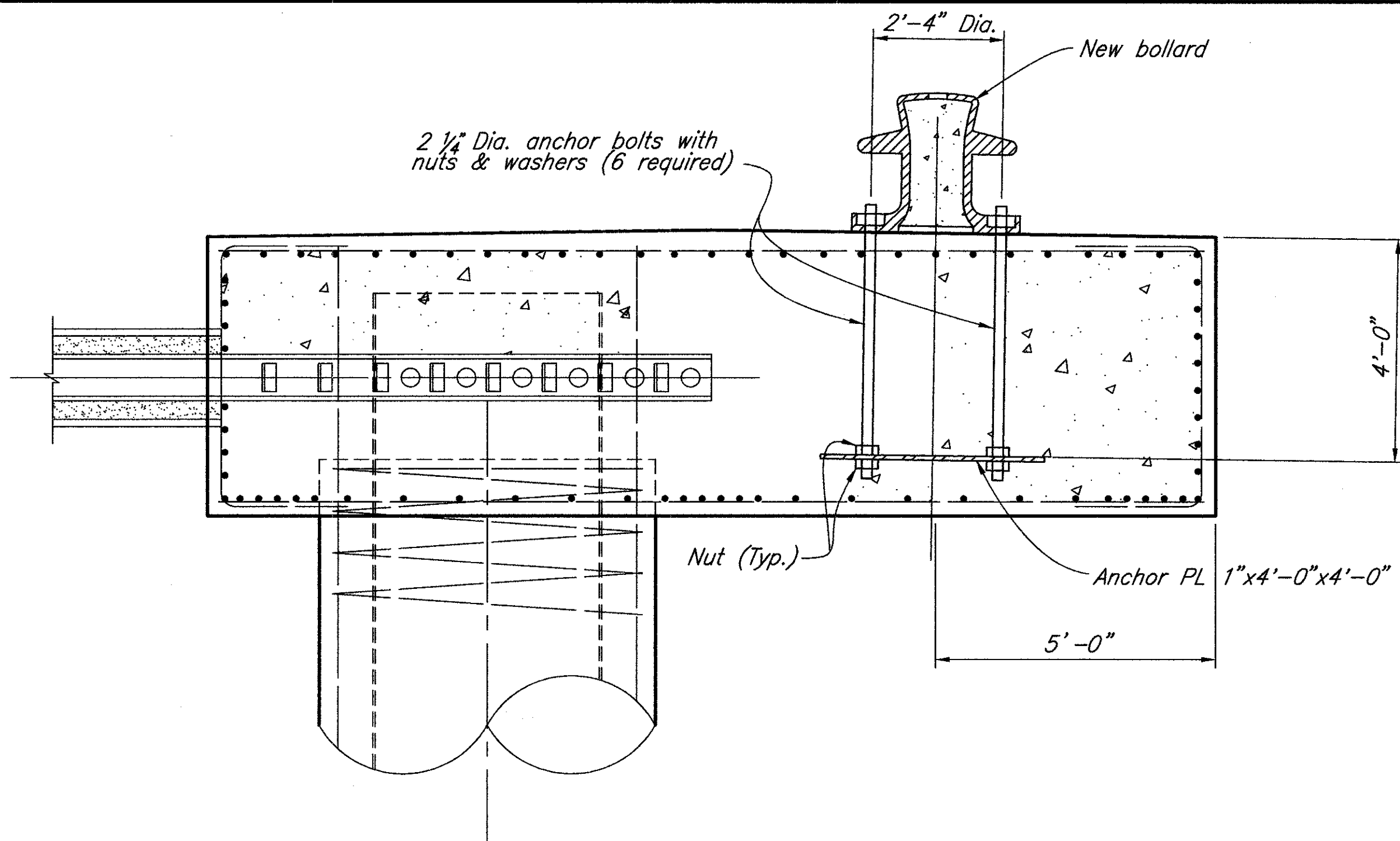
**NOTES:**

REINFORCING SCHEDULE: See sheet 15/48

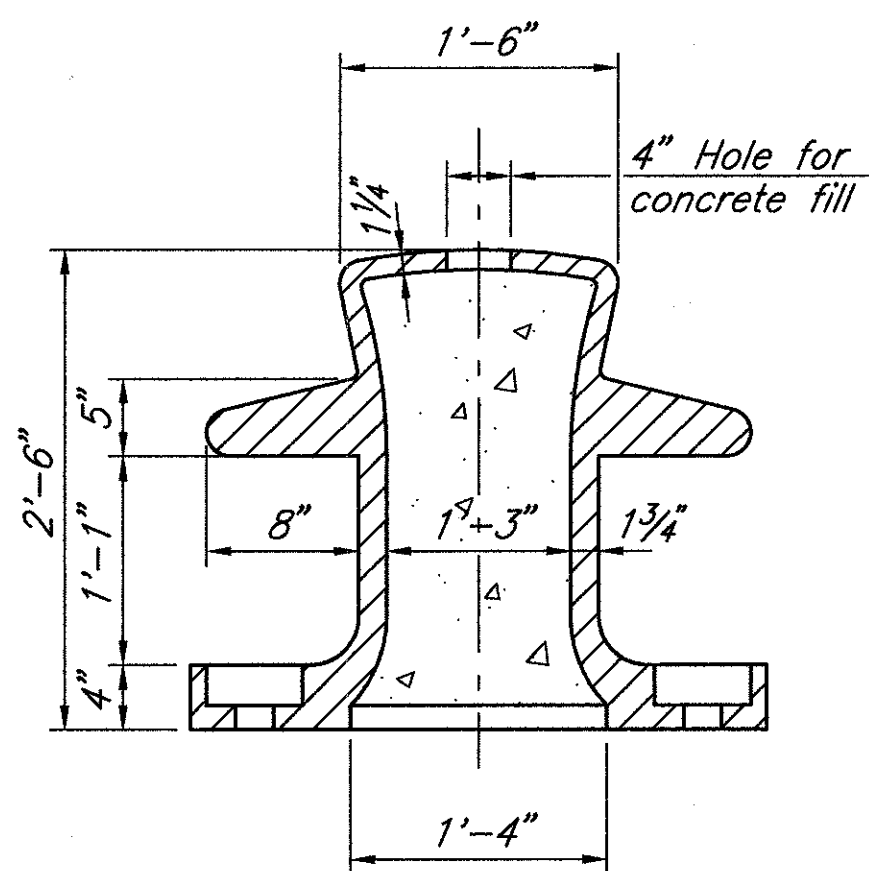
REINFORCING STEEL SPLICE LENGTHS shall be 7'-6" for #11 bars in the bottom mat and 10'-6" for #11 bars in the top mat.

<p><b>RICHLAND ENGINEERING LIMITED</b> 29 NORTH PARK STREET MANSFIELD, OHIO 44902</p>	
<p>DATE: 12/20/96 REVIEWED: BLN DRAWN: JLS DESIGNED: DAP CHECKED: MSL</p>	<p>STRUCTURE FILE NO.: 1809393 REVISED:</p>
<p><b>DRILLED SHAFT STRUCTURE CAP DETAILS</b> BRIDGE NO. CUY-90-1524 OVER CUYAHOCA RIVER</p>	
<p>CUY-90-15.24</p>	
<p>14 / 48</p>	
<p>27 / 61</p>	

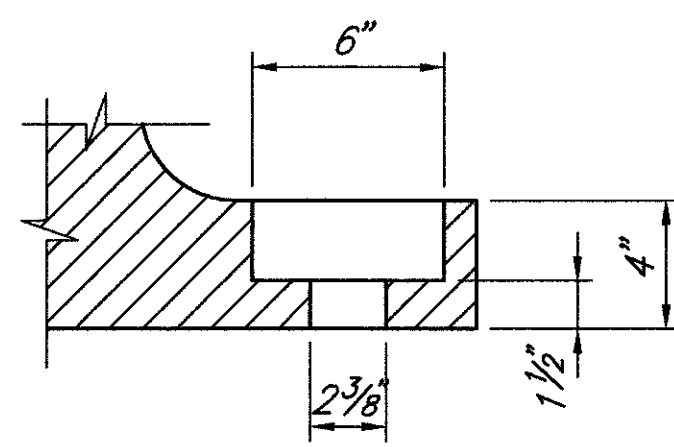




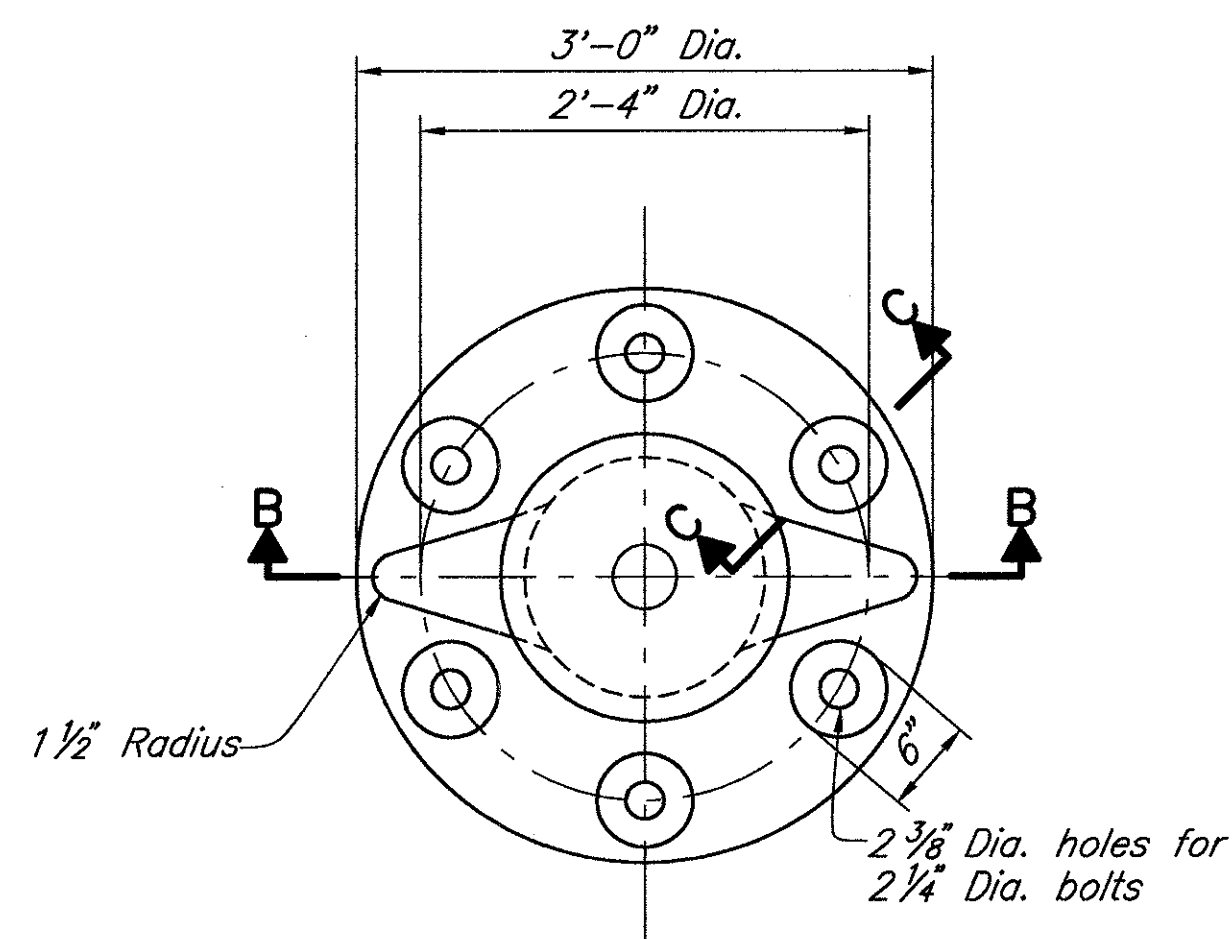
SECTION A-A



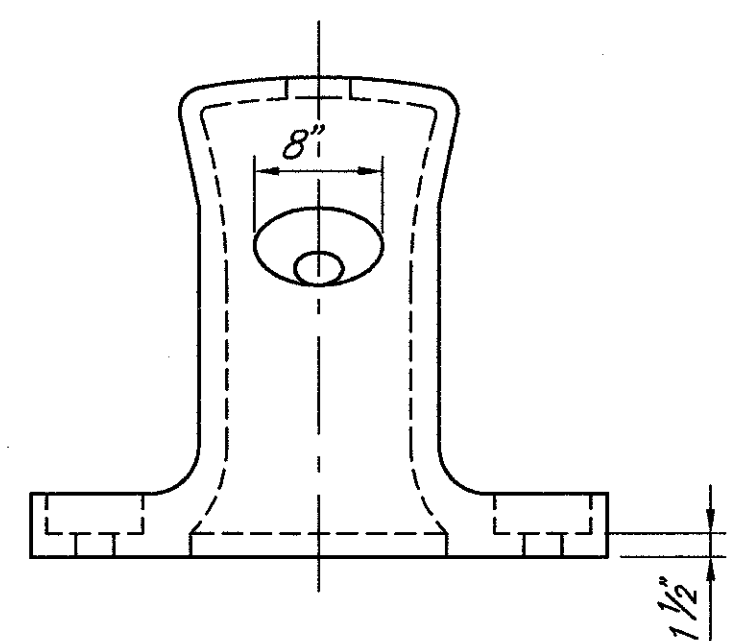
SECTION B-B



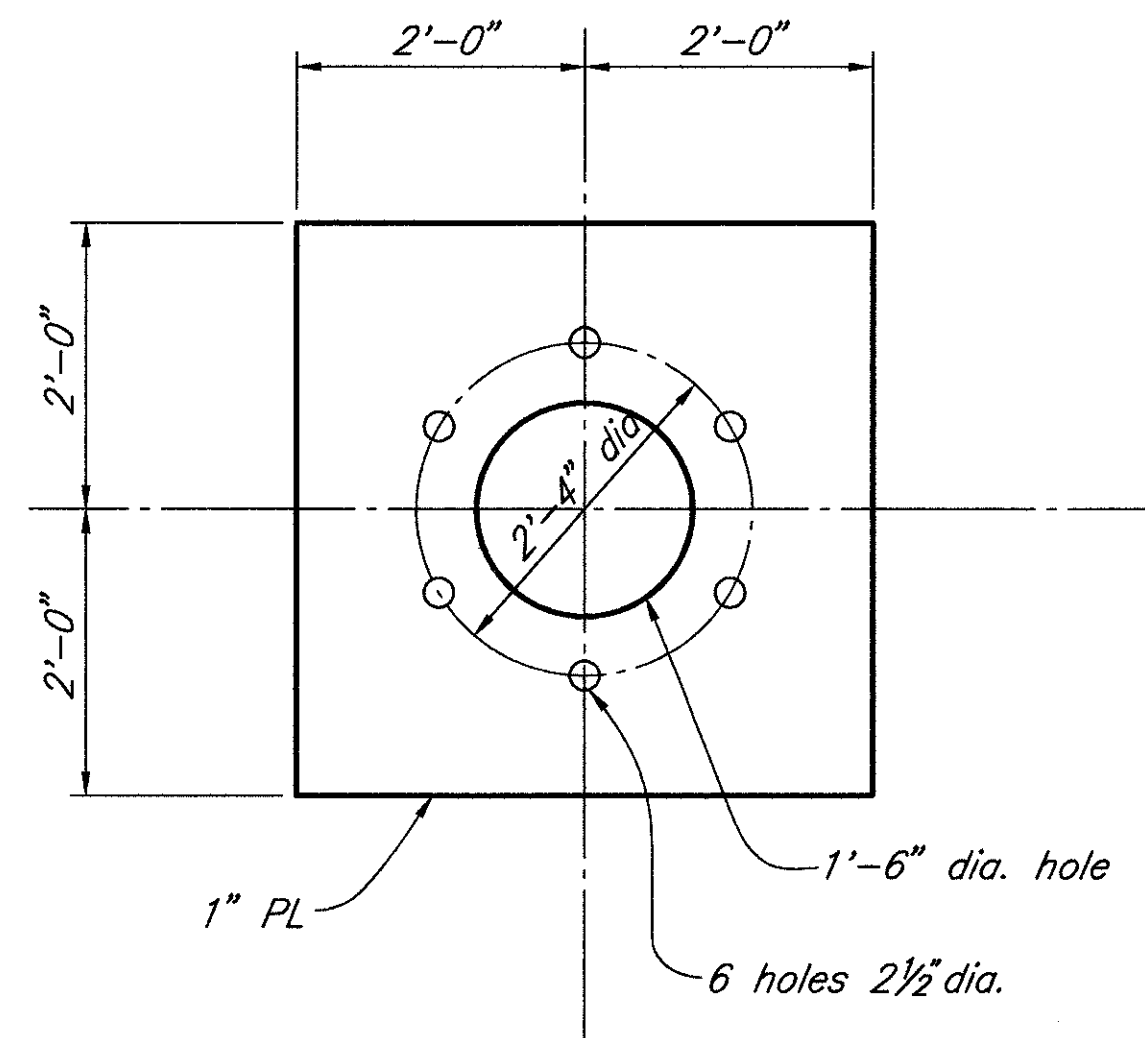
SECTION C-C



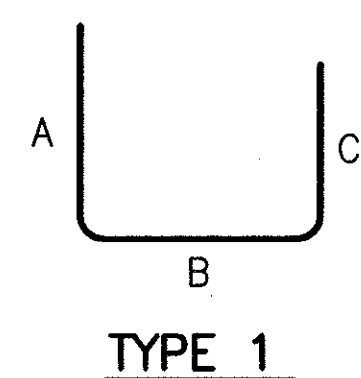
CITY OF CLEVELAND STANDARD  
BOLLARD-CAST STEEL PLAN



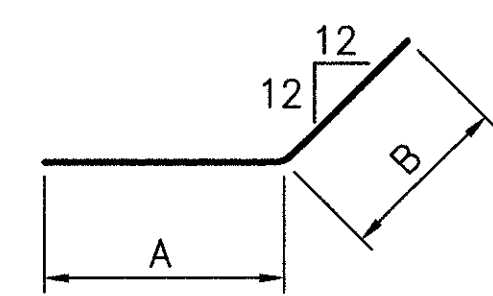
CITY OF CLEVELAND STANDARD  
BOLLARD-CAST STEEL ELEVATION



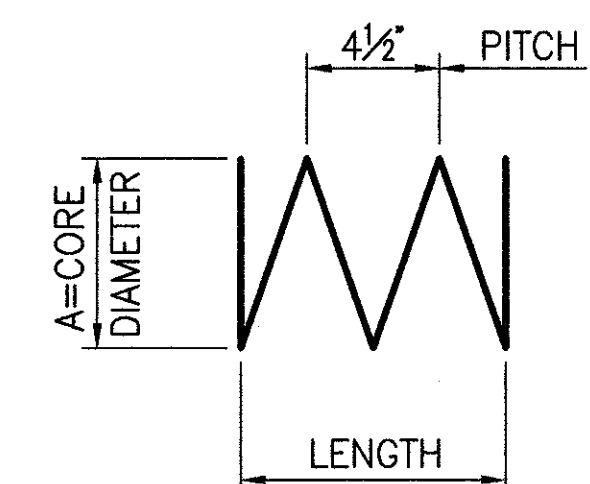
ANCHOR PLATE DETAIL



TYPE 1



TYPE 2



TYPE 3

DRILLED SHAFT				CALCULATED JPS DATE 12/96		CHECKED MSL DATE 12/96	
STRUCTURE REINFORCING STEEL LIST (EPOXY COATED)							
MARK	NO.	LENGTH	TYPE	A	B	C	INC.
C701	146	17'-6"	Str.				
C702	10	7'-7"	Str.				
C703	2	8'-3"	Str.				
C704	2	8'-10"	Str.				
C705	34	2'-8"	Str.				
C706	80	8'-10"	1	1'-7"	4'-6"	3'-1"	
C707	2	3'-0"	Str.				
C708	2	3'-3"	Str.				
C709	2	3'-10"	Str.				
C710	2	4'-11"	Str.				
C711	2	6'-3"	Str.				
C712	2	8'-0"	Str.				
C713	2	15'-10"	Str.				
C714	2	16'-10"	Str.				
C715	30	10'-8"	Str.				
C716	60	9'-6"	Str.				
C717	12	13'-11"	Str.				
C718	Series of 2 to 11	7'-7" to 16'-9"	Str.				11"
C719	224	10'-4"	1	3'-1"	4'-6"	3'-1"	
C720	24	6'-1"	2	3'-1"	3'-1"		
C1101	177	40'-0"	Str.				
C1102	Series of 2 to 6	38'-1" to 39'-9"	Str.				4"
C1103	Series of 2 to 6	30'-2" to 31'-10"	Str.				4"
C1104	30	11'-10"	Str.				
C1105	30	10'-2"	Str.				
C1106	30	9'-6"	Str.				
C1107	Series of 2 to 15	21'-2" to 30'-6"	Str.				8"
C1108	24	30'-6"	Str.				
C1109	2	8'-0"	Str.				
C1110	2	6'-3"	Str.				
C1111	2	4'-11"	Str.				
C1112	2	3'-11"	Str.				
C1113	2	3'-3"	Str.				
C1114	2	3'-0"	Str.				
C1115	16	30'-2"	Str.				
SP401	17	13'-3"	3	4'-5"			
SP402	17	142'-6"	3	4'-11"			
DS1101	408	13'-3"	Str.				
DS1102	408	*	Str.				
DS1103	816	47'-6"	Str.				
DS1104	408	50'-0"	Str.				

\* - Length varies with actual length of drilled shaft.

NOTES:

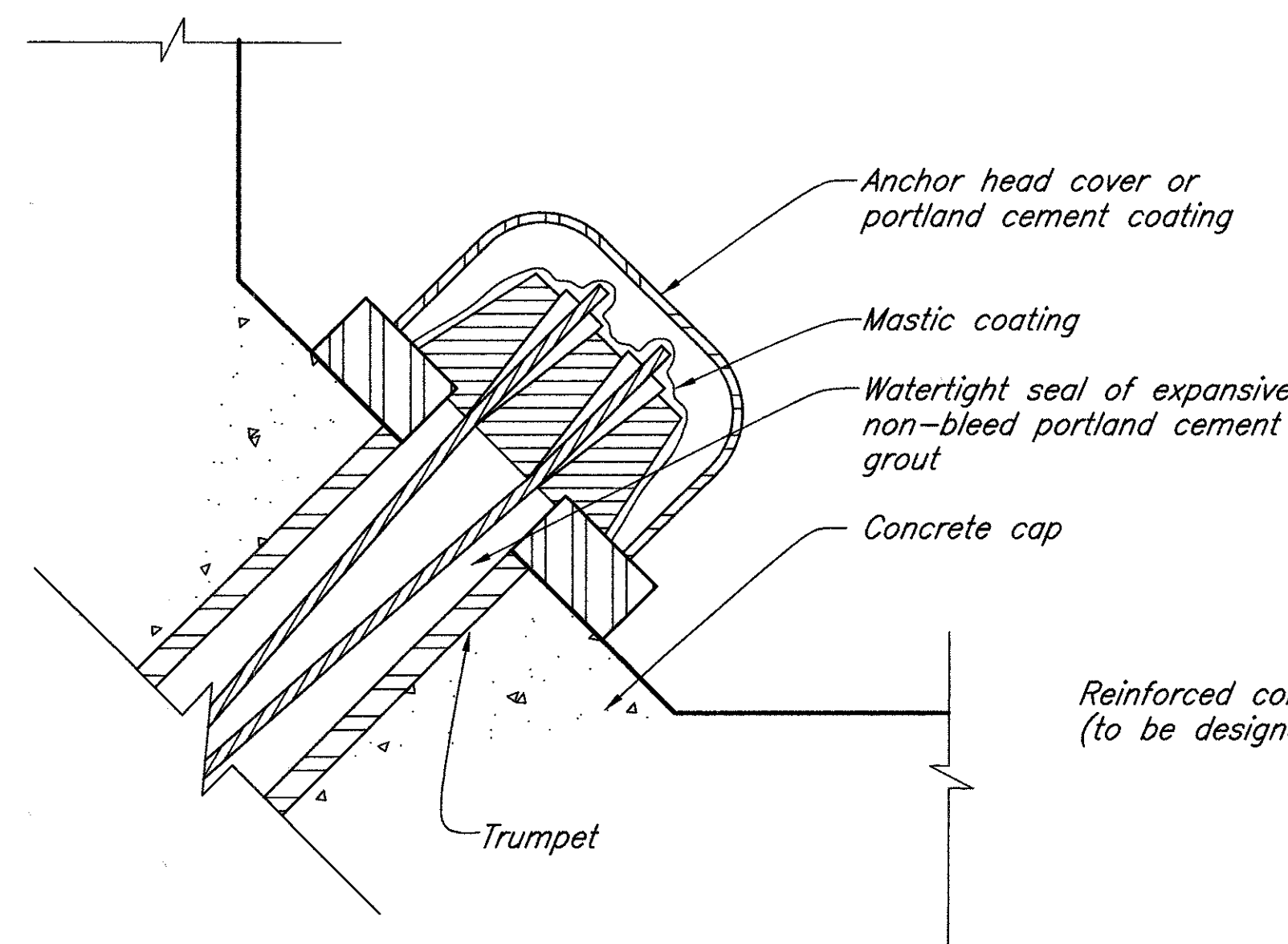
BOLLARD steel casting material shall be per 711.07. Anchor bolts shall be per 711.10. Anchor plates shall be ASTM A36. Concrete fill shall be Class C per 511. Payment for the concrete fill shall be incidental to Item 513 - Structural steel, misc.: Bollard and anchor bolts.

SECTION A-A: See sheet 12/48 for location.

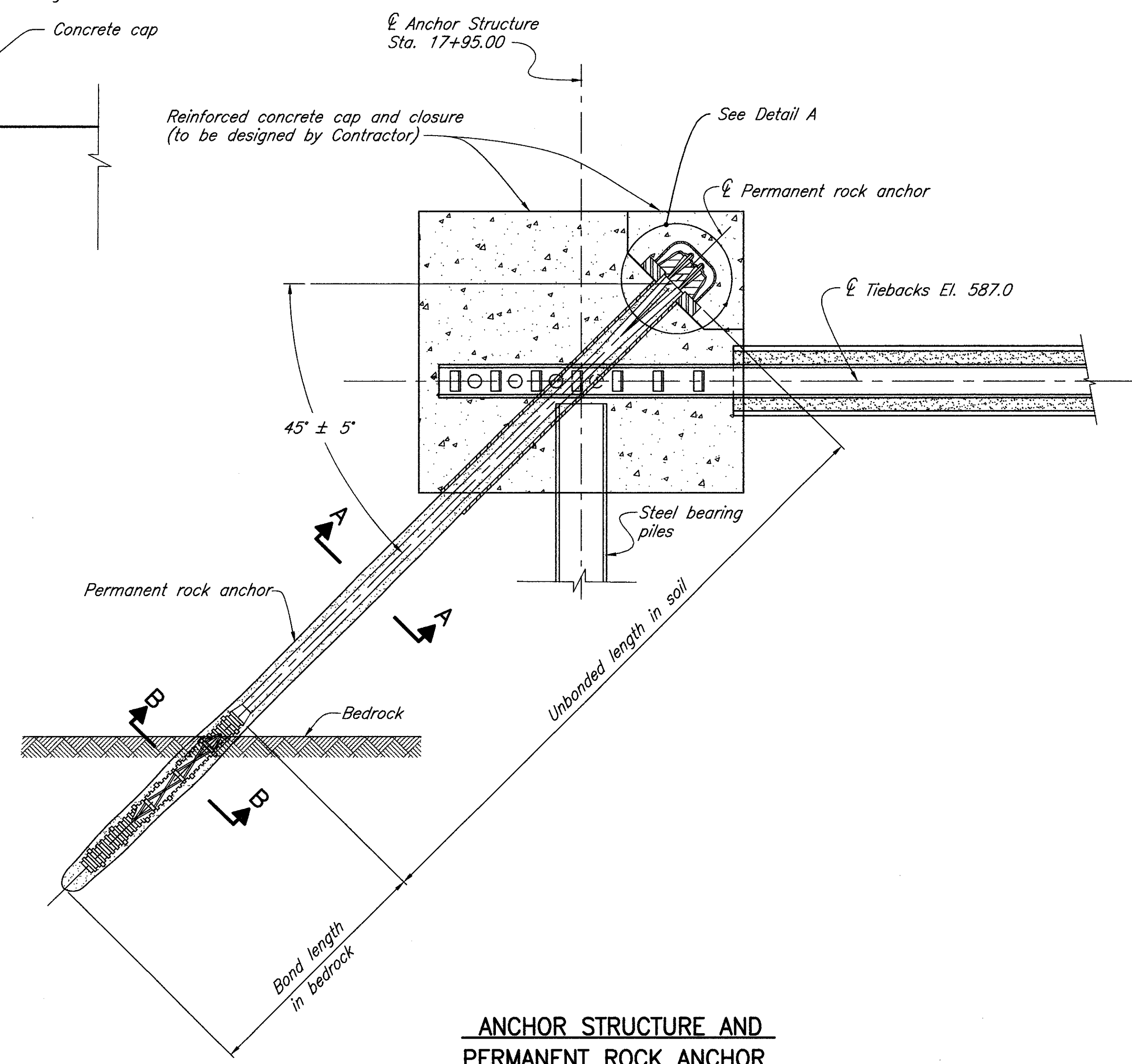




Job No. 93111PRA Date 12/23/96 Drawn By RRB,JPS

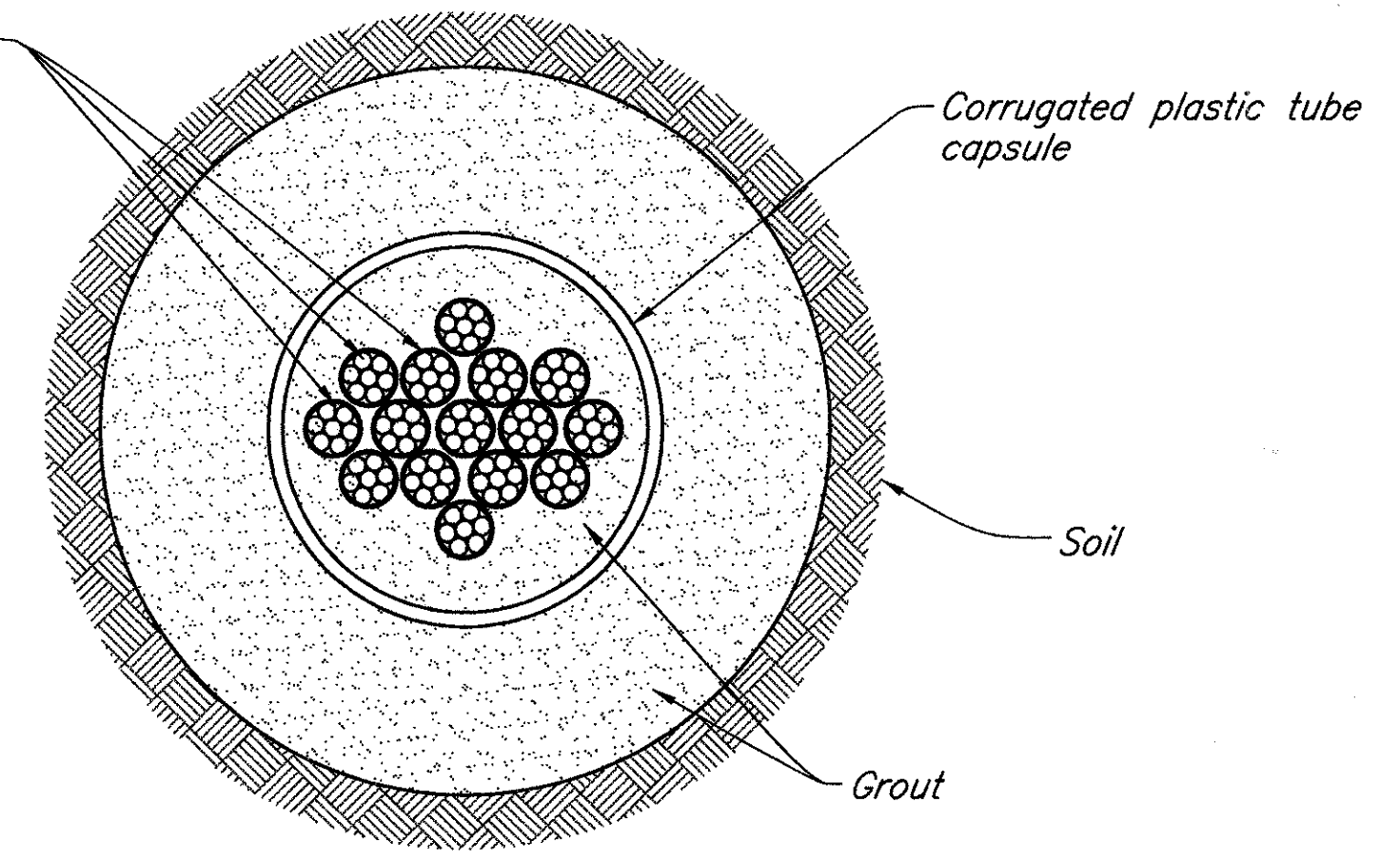


**DETAIL A**

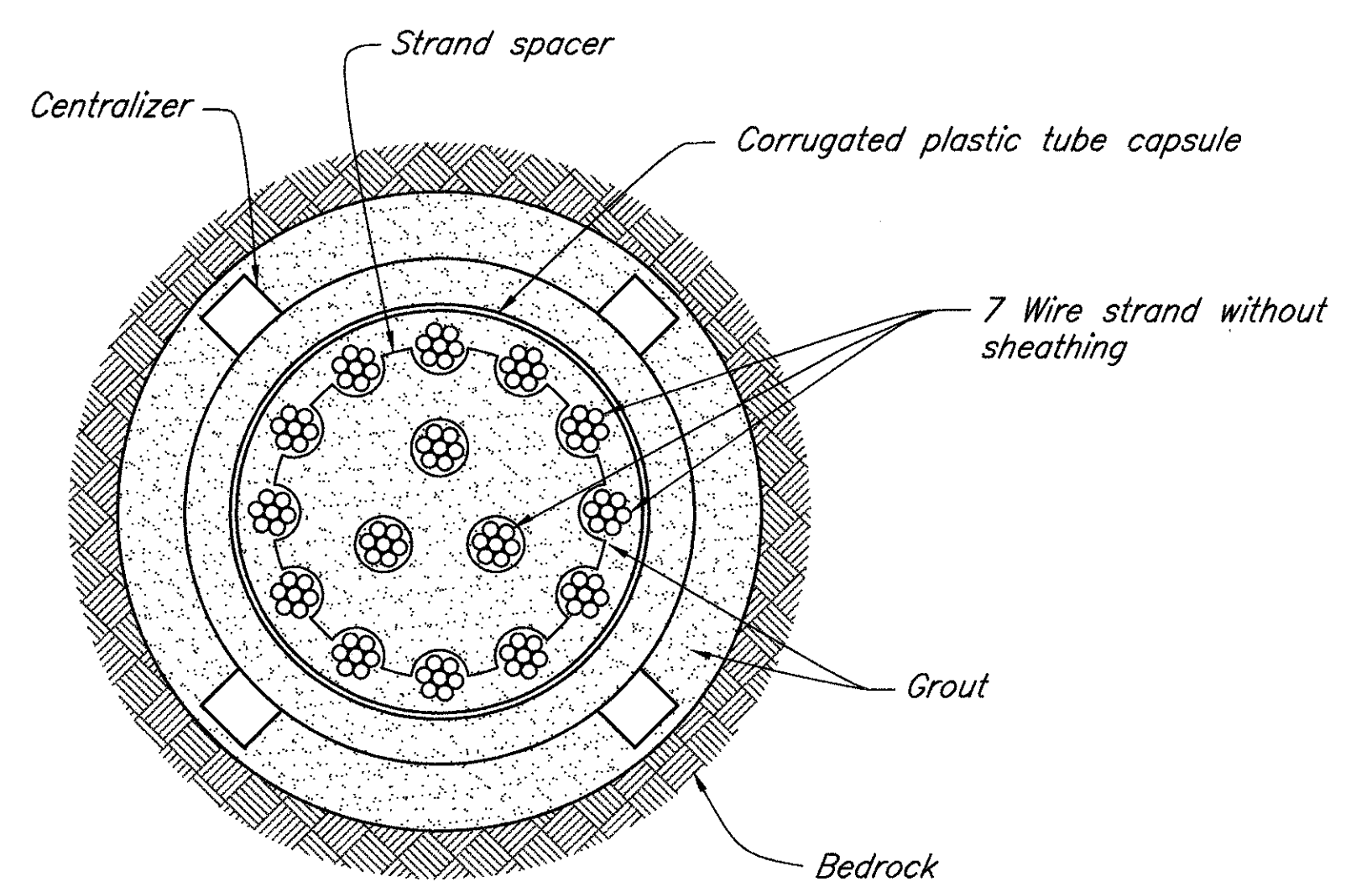


**ANCHOR STRUCTURE AND PERMANENT ROCK ANCHOR**

7 Wire strand with corrosion inhibitor and seamless sheath



**SECTION A-A  
UNBONDED LENGTH**



**SECTION B-B  
BOND LENGTH**

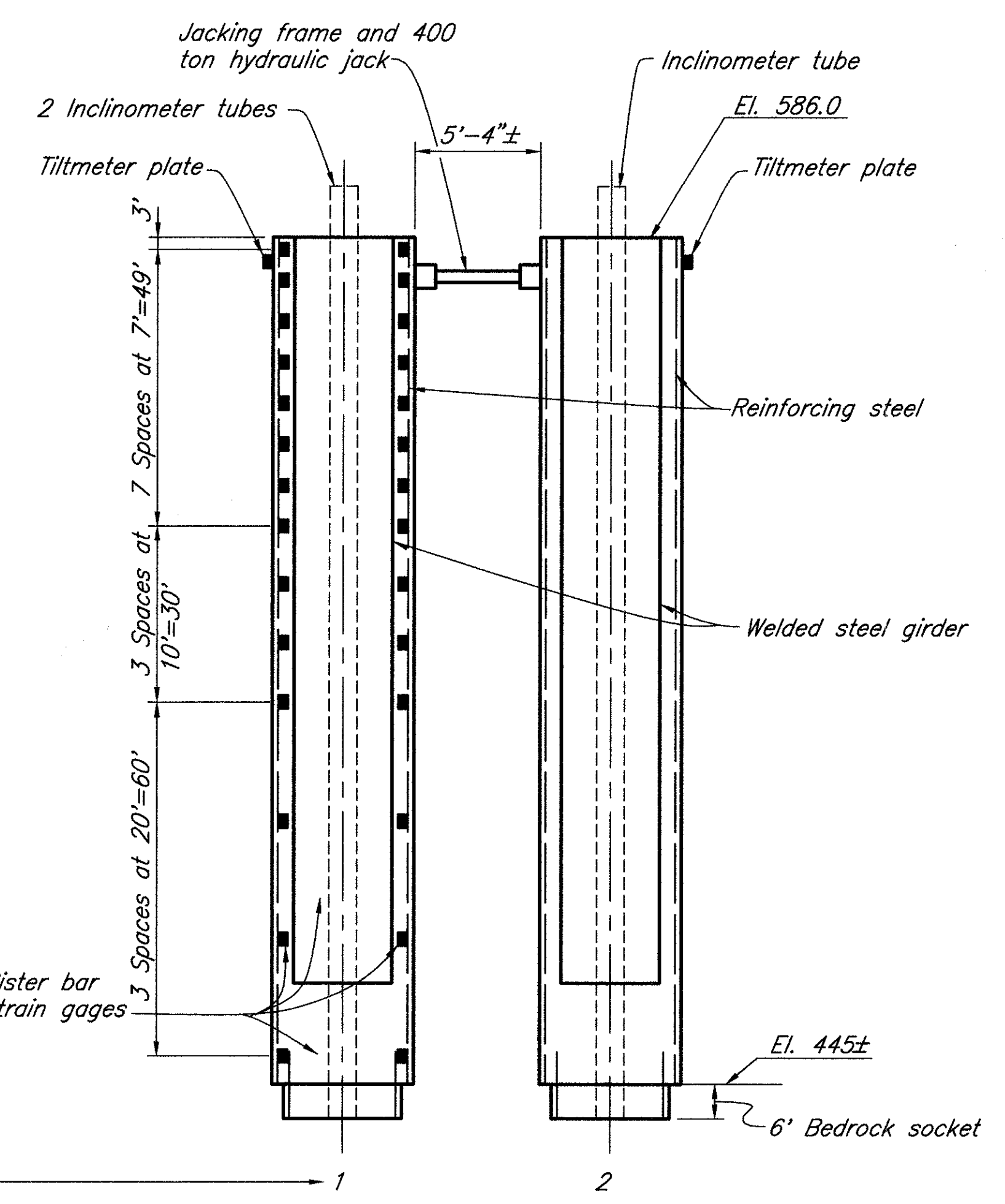
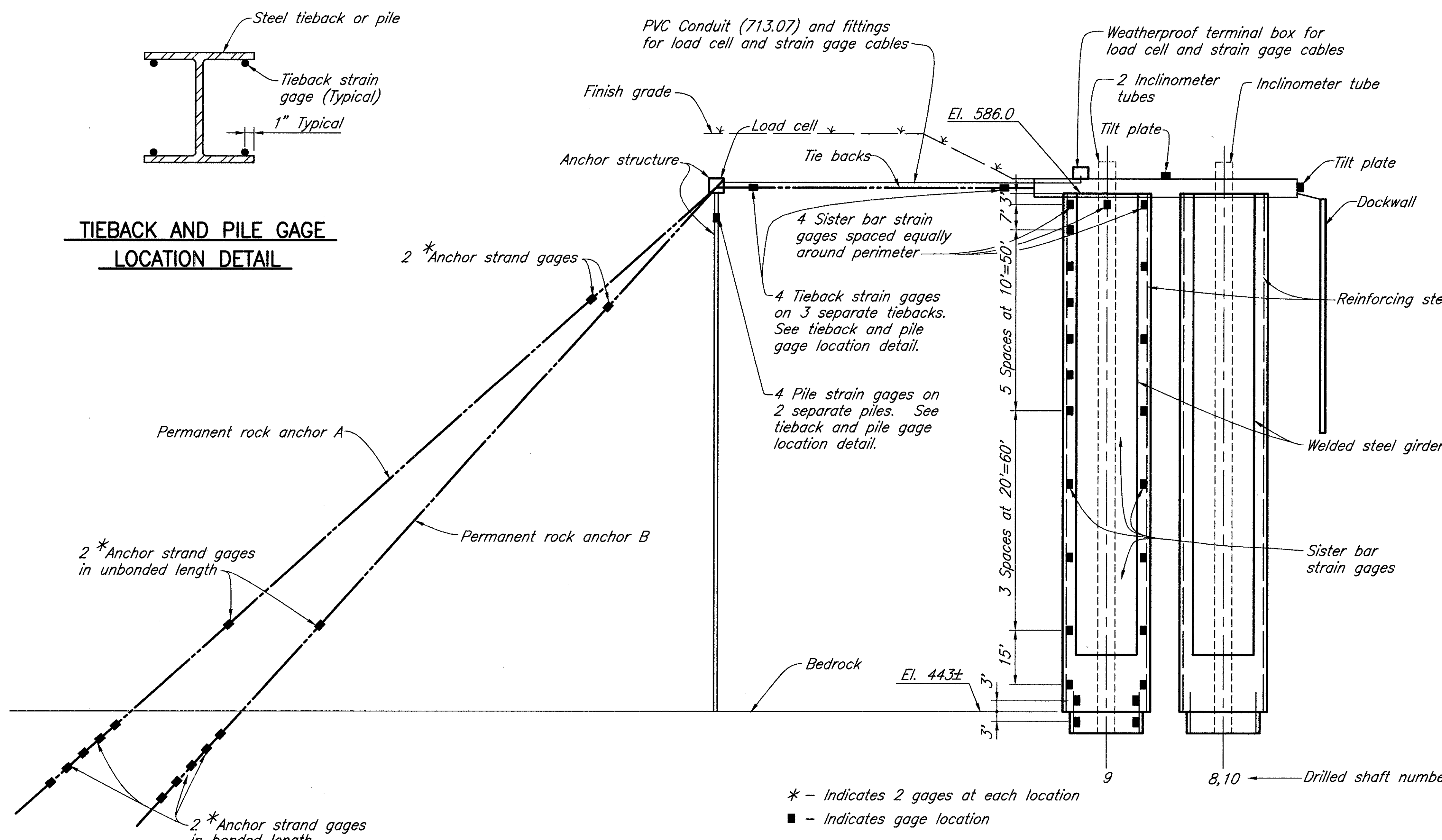
**NOTES:**

STRUCTURE MISC.: TIEBACKS, ANCHOR STRUCTURE AND PERMANENT ROCK ANCHORS: See General Note sheet 8/48

INSTRUMENTATION DETAILS: See sheet 18/48

DATE	12/20/96
REVIEWED	BLN
DESIGNED	DAP
DRAWN	RRB
CHECKED	MSL
STRUCTURE FILE NO.	1809393

**TIEBACK AND PILE GAGE LOCATION DETAIL**



**INSTRUMENTATION FOR ANCHORS & LONG TERM MONITORING**

**INSTRUMENTATION FOR LATERAL LOAD TEST**

**NOTES:**

**INSTRUMENT DESCRIPTIONS:**

**Inclinometer Tubes** - Geokon Model 6501 pultruded fiberglass inclinometer casing (nominal 2 1/2" inside diameter) with protective 4 inch galvanized steel pipe and locking cap top housing, bottom plug and top cap. Inclinometer tubes shall be tied in place prior to placing concrete in the drilled shafts. The inclinometer tubes shall be supported from the reinforcing steel or the steel girder.

**Sister Bar Strain Gages** - Geokon Model 4911VW #4 Rebar Strain Meter with cable and terminal box.

**In-Place Tiltmeter** - Geokon Model 6350 in-place tiltmeter.

**Tilt Plate** - Applied Geomechanics stainless steel tilt plate with protective cover for use with Model 800P portable tiltmeter. Permanently anchored to concrete surface.

**Load Cells For Anchors** - Geokon Model 4900 load cell with cable and terminal box. Load cell capacity shall be higher than the design load of the anchor.

**Anchor Strand Gages** - Geokon Model 4410 vibrating wire strand meter with cable and terminal box.

**Tieback Strain Gages** - Geokon Model 4000 vibrating wire strain gages with cable and terminal box.

**Data Aquisition System** - Geokon Micro 10 Data Logger (1 each) with cellular phone package and solar power supply; and Geokon Model 8032 Multiplexer (6 each).

**ADDITIONAL NOTES:** See General Note "Structure, Misc.: Drilled Shaft and Rock Anchor Instrumentation" sheet 11/48 for additional information.

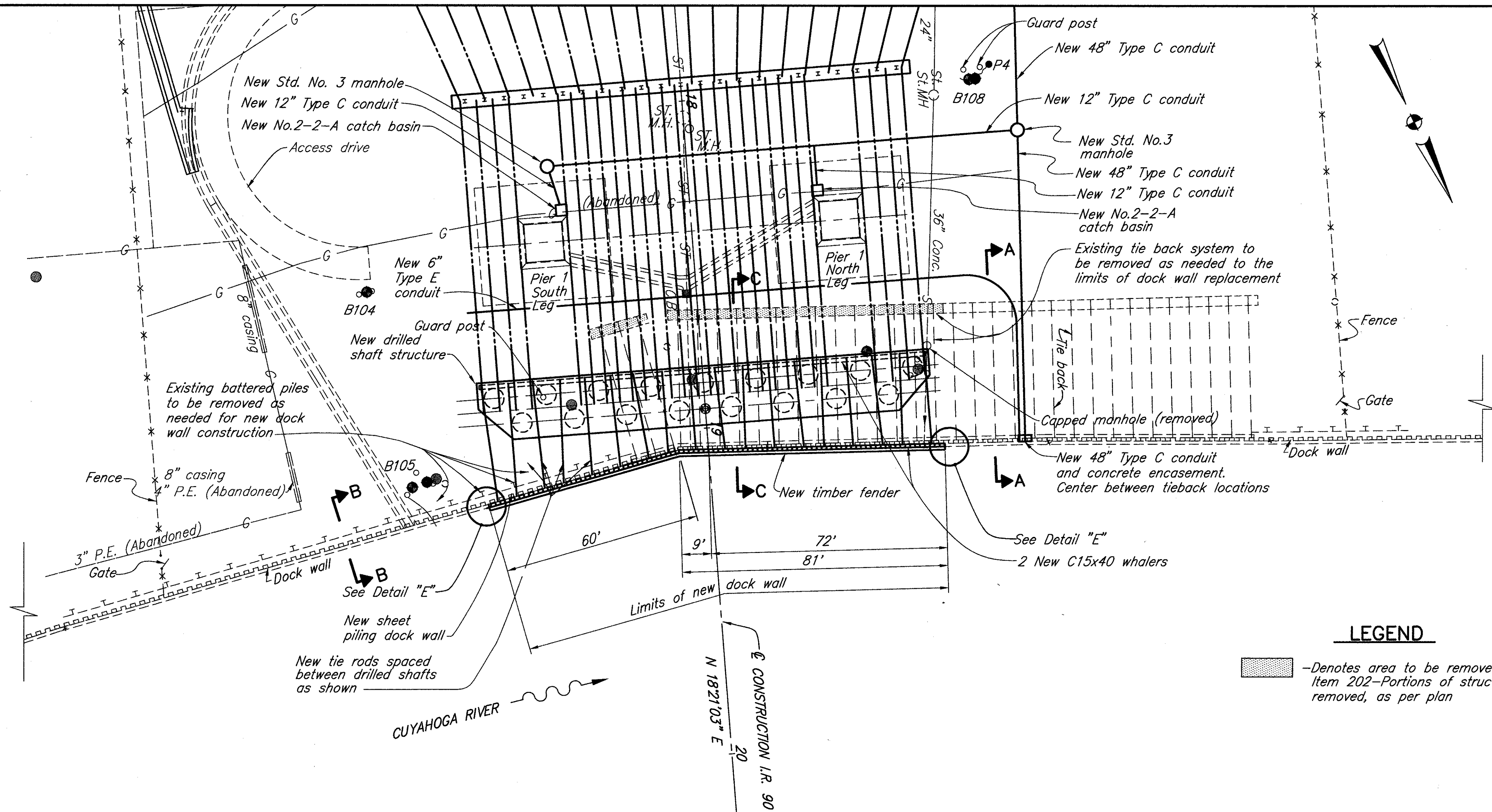
**TABLE OF INSTRUMENTATION**

TYPE OF INSTRUMENT	SISTER BAR (Geokon 4911vw)	LOAD CELL (Geokon 4900)	IN-PLACE TILTMETER (Geokon 6350)	TILT PLATE	STRAND GAGE (Geokon 4410)	INCLINOMETER TUBE (Geokon 6501)	STRAIN GAGE (Geokon 4000)	DATA LOGGER	MULTIPLEXER
Description	EACH	EACH	EACH	EACH	EACH	LIN. FT.	EACH	EACH	EACH
<b>Lateral Load Test</b>									
Drilled shaft No. 1	28		2	2		2 @ 165			
Drilled shaft No. 2			2	2		165			
<b>Long Term Monitoring</b>									
Drilled shaft No. 8						165			
Drilled shaft No. 9	28					2 @ 165		General	General
Drilled shaft No. 10						165			
Tiebacks							24		
Anchor structure piles							12		
Drilled Shaft Cap			4	4					
Permanent Rock Anchor A		1			14				
Permanent Rock Anchor B		1			14				
<b>Total Quantity</b>	<b>56</b>	<b>2</b>	<b>8</b>	<b>8</b>	<b>28</b>	<b>1,155</b>	<b>36</b>	<b>1</b>	<b>6</b>

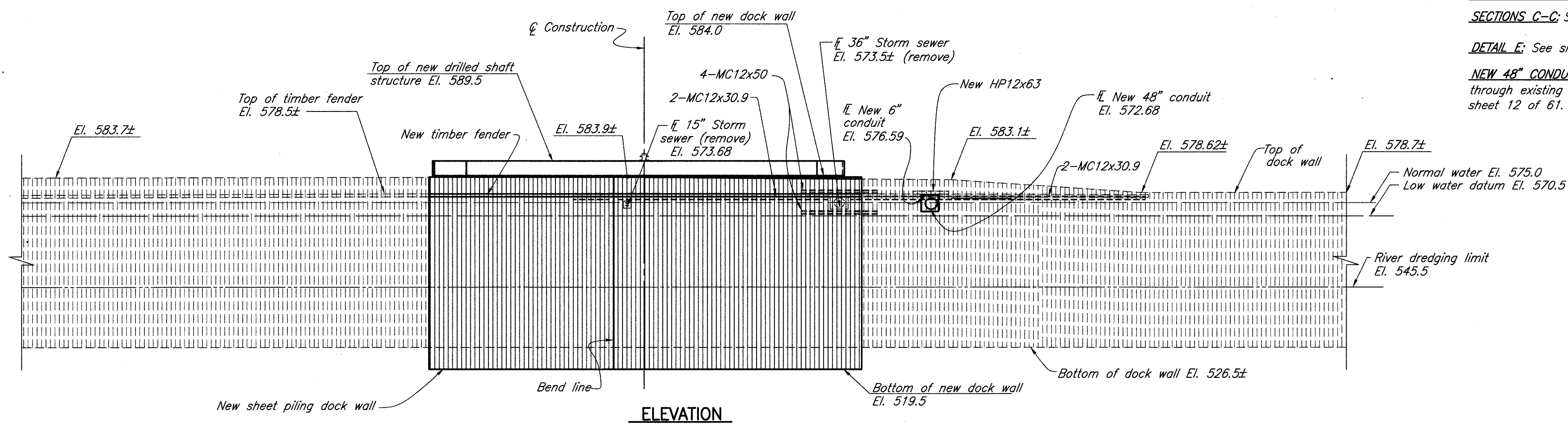
Job No. 93111INS Date 12/23/96 Drawn By RB/JPS



Job No. 93111dw1 Date 12/23/96 Drawn By RB,JFS, JLS



PLAN



ELEVATION

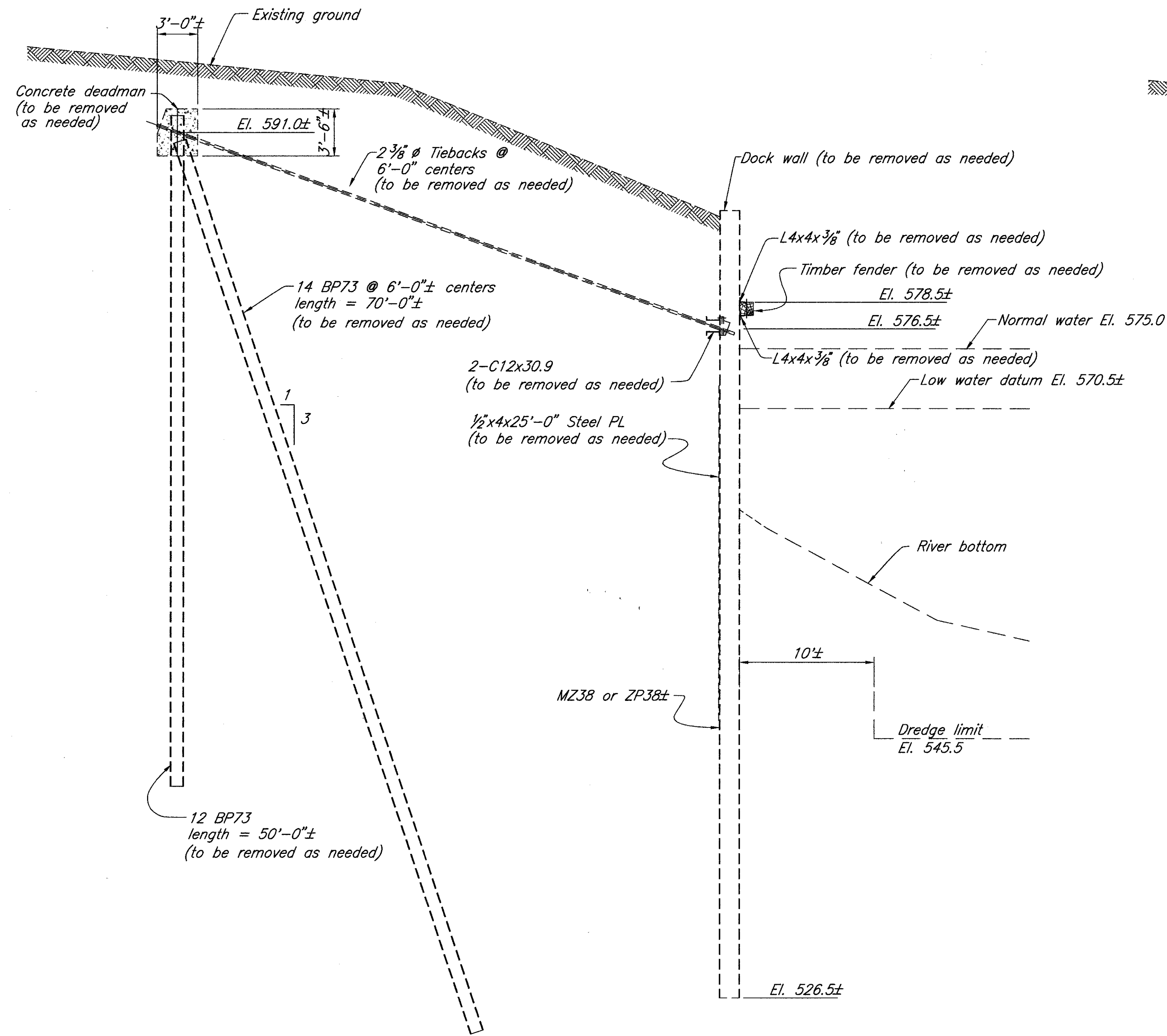
**LEGEND**

-Denotes area to be removed per Item 202-Portions of structure removed, as per plan

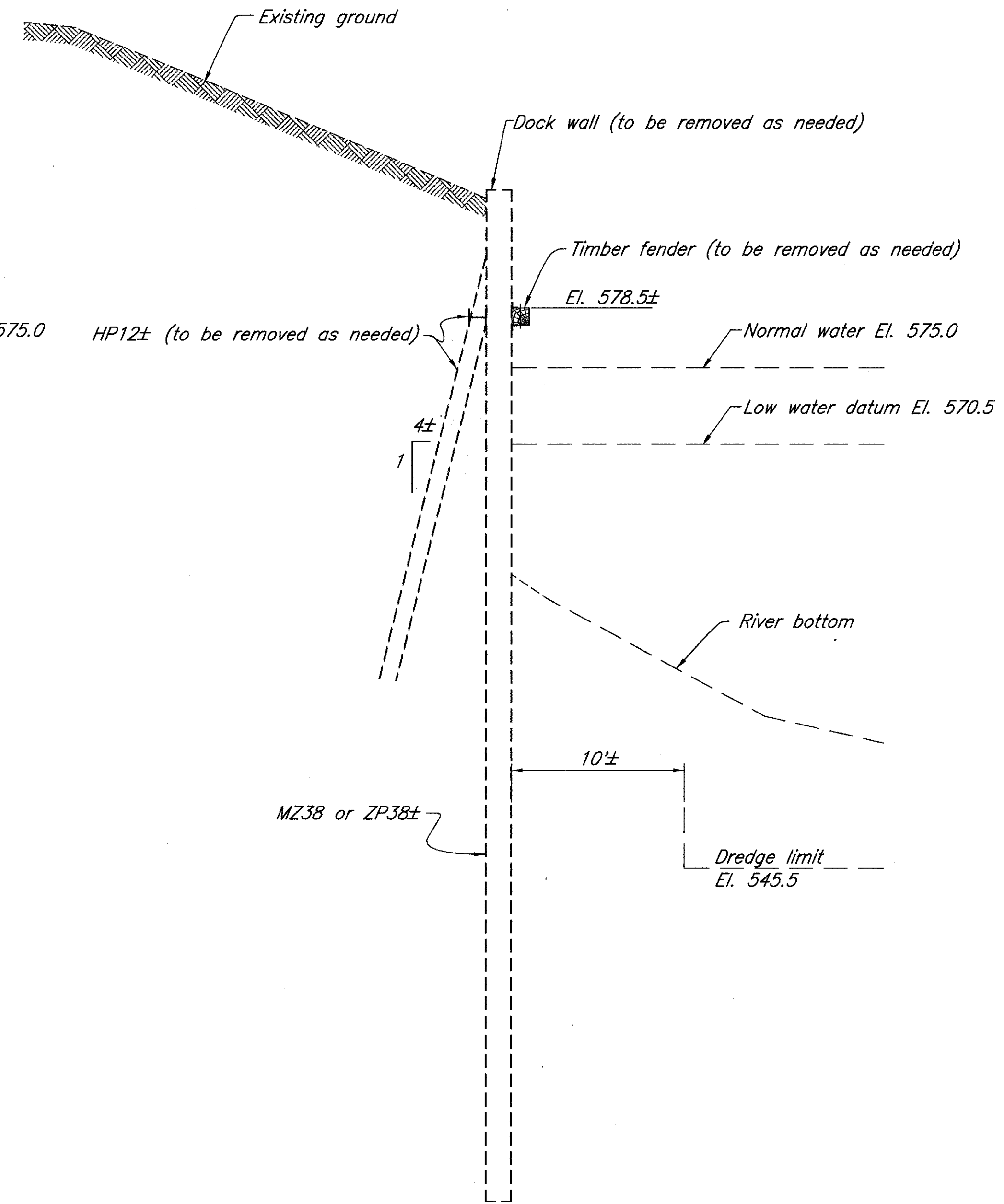
**NOTES:**

- MATERIALS** shown are existing unless otherwise noted.
- NEW SHEET PILING LOCATION:** The new sheet piling shall be driven with the back face in contact with the existing dock wall sheet piling.
- CONSTRUCTION SEQUENCE FOR DOCKWALL:** See sheet 6/48
- SECTIONS A-A & B-B:** See sheet 20/48
- SECTIONS C-C:** See sheet 21/48
- DETAIL E:** See sheet 21/48
- NEW 48" CONDUIT AND NEW 6" CONDUIT** through existing dock wall see details on sheet 12 of 61.

<b>RICHLAND ENGINEERING LIMITED</b> 29 NORTH PARK STREET MANSFIELD, OHIO 44902		DATE	12/20/96
		REVIEWED	DAP
DRAWN	ARRB	STRUCTURE FILE NO.	1809393
DESIGNED	DT	CHECKED	BLV
<b>DOCK WALL PLAN &amp; ELEVATION</b> BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER			
<b>CUY-90-15.24</b>		19 / 48	
32 61			



SECTION A-A



SECTION B-B

**NOTES:**

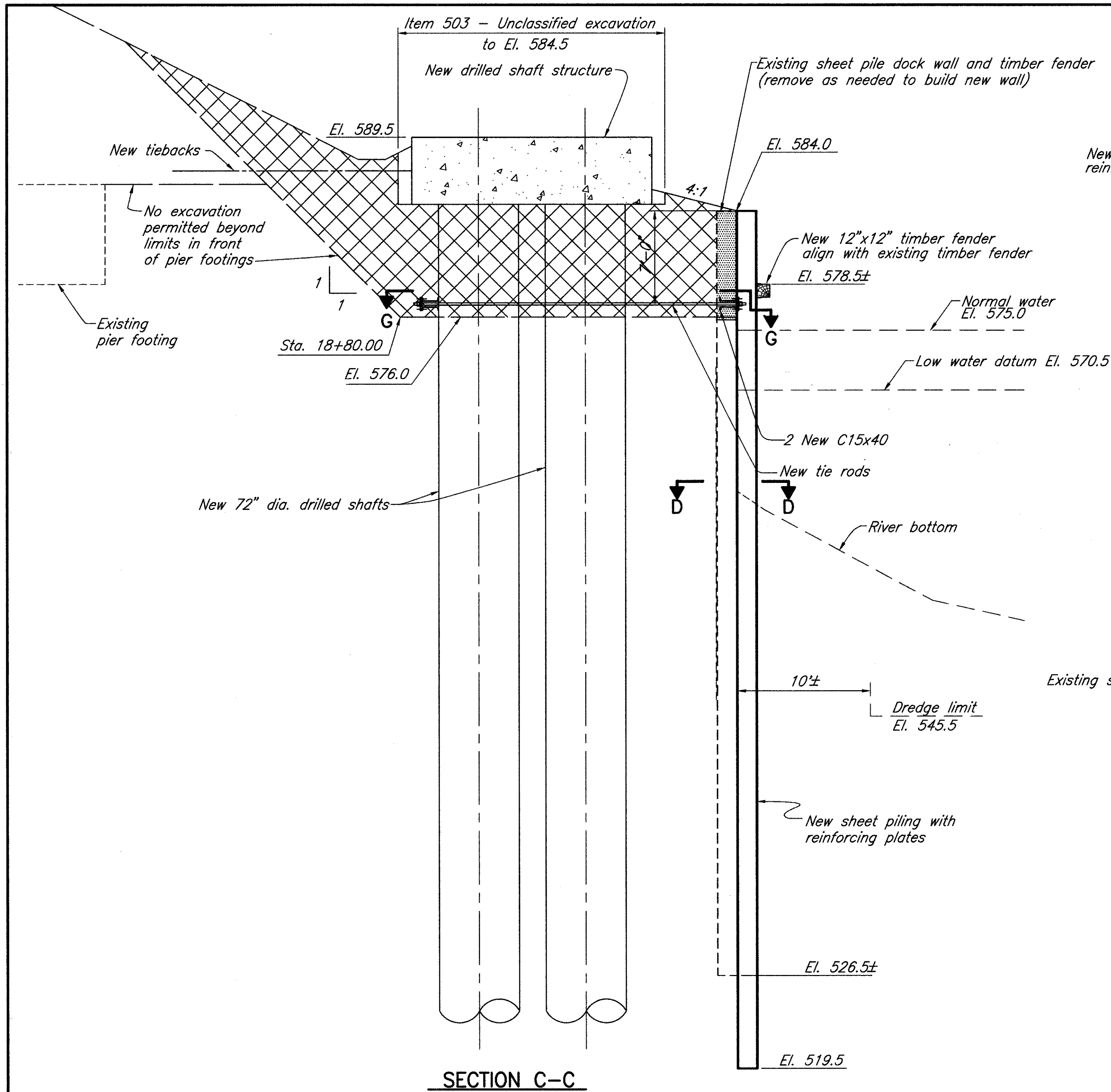
MATERIALS shown are existing unless otherwise noted.  
SECTIONS A-A & B-B show the existing dockwall as indicated on original design drawings. This information is presented as an indication of what may be encountered at the site. See sheet 19/48 location.  
DOCK WALL REMOVAL: Portions of existing dock wall walers, tiebacks, piles, anchors, and deadman shall be removed and included for payment with Item 202-Portions of structure removed, as per plan.

DATE	12/20/96
REVIEWED	DAP
STRUCTURE FILE NO.	1809393
DRAWN	RB
CHECKED	BLN

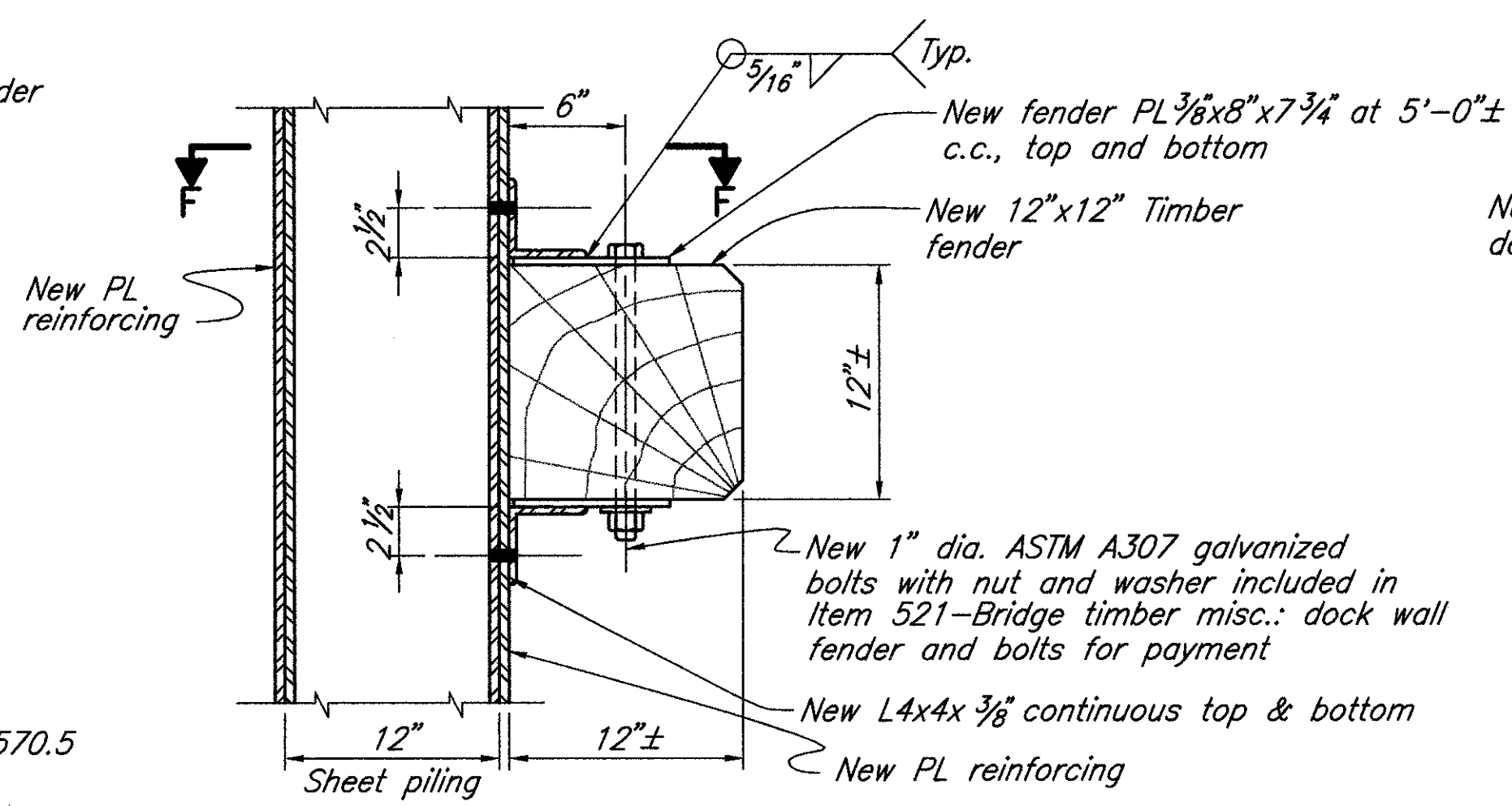
**EXISTING DOCK WALL DETAILS**  
 BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER

CUY-90-15.24

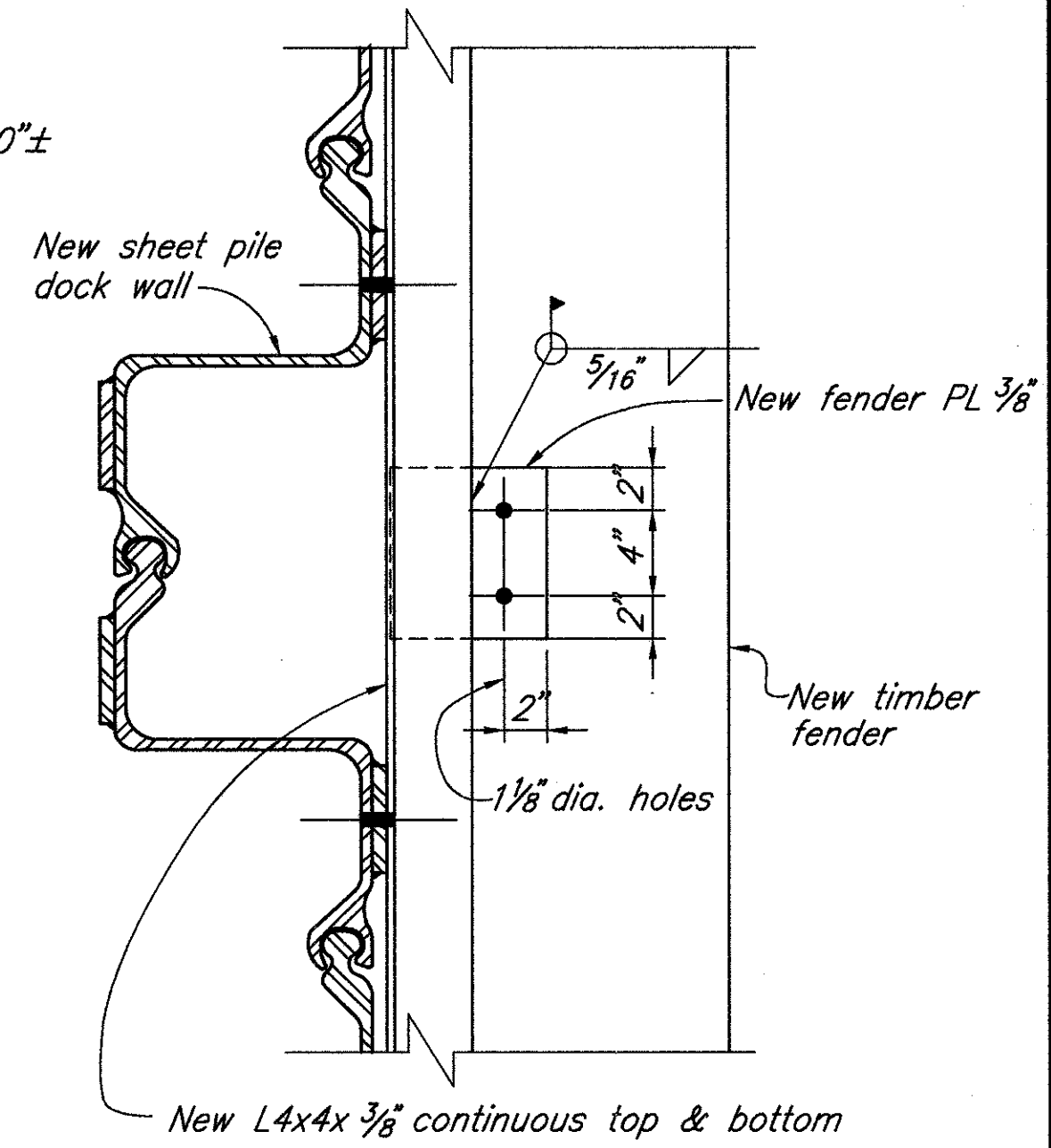




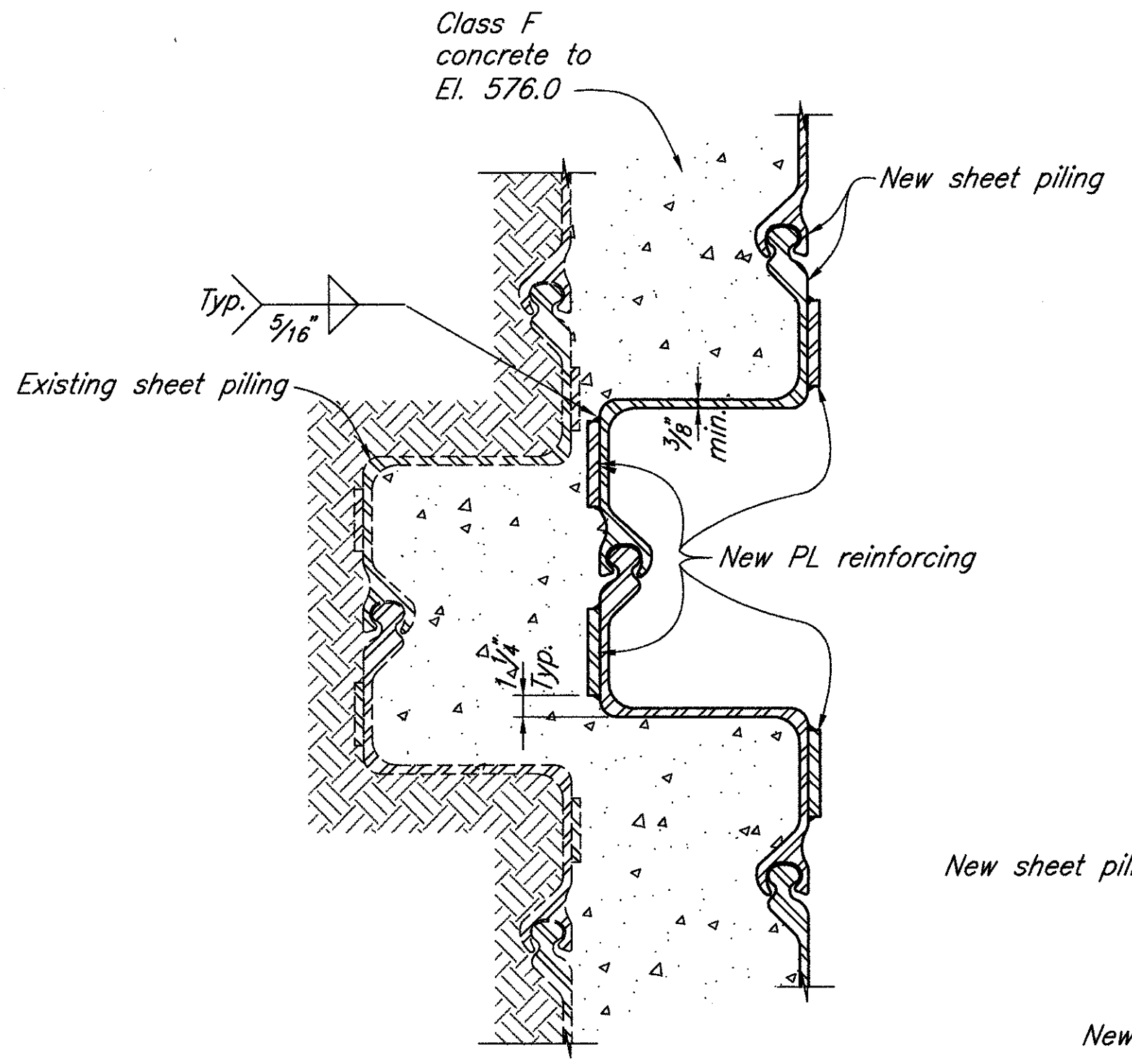
SECTION C-C



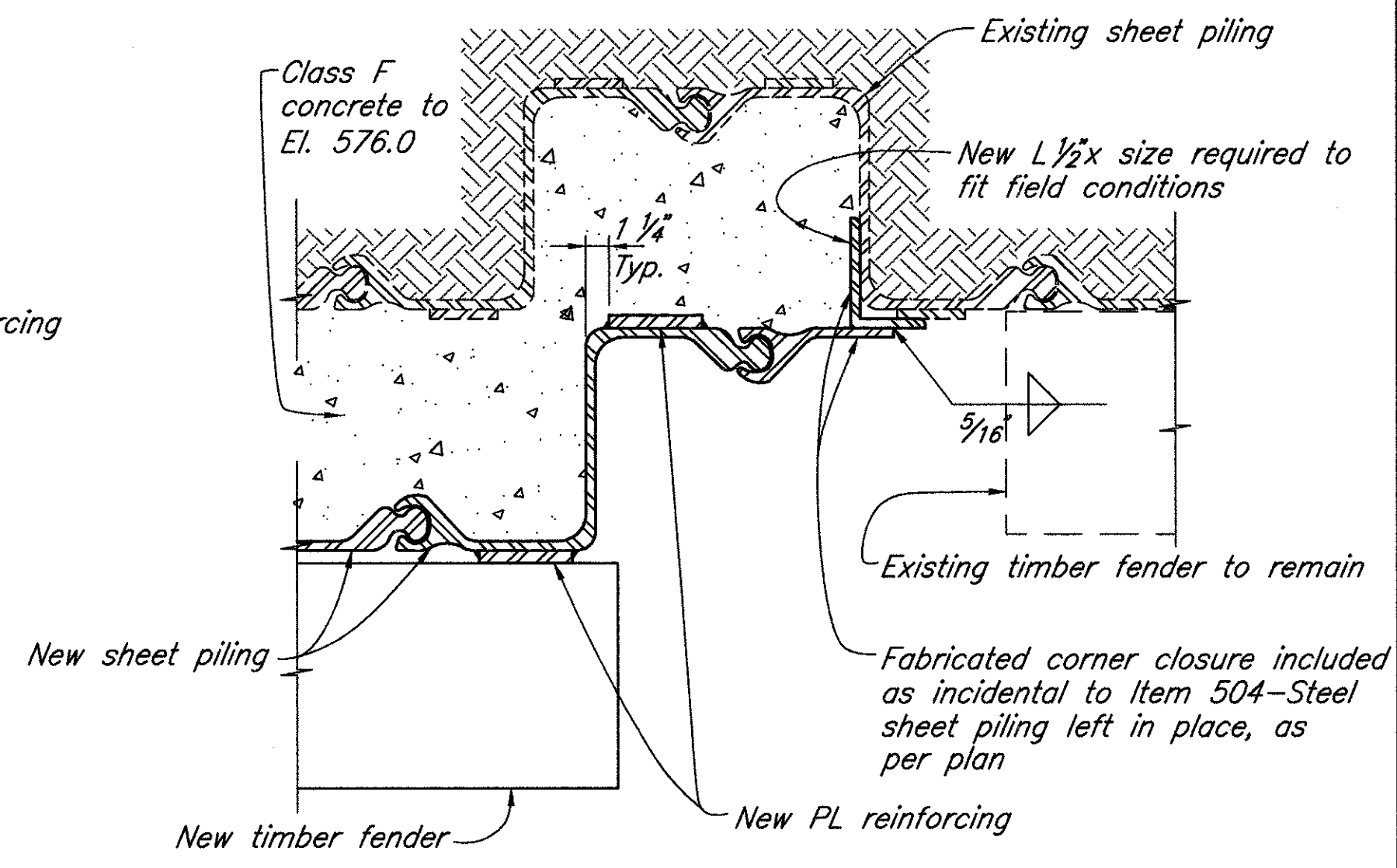
FENDER DETAIL



SECTION F-F



SECTION D-D

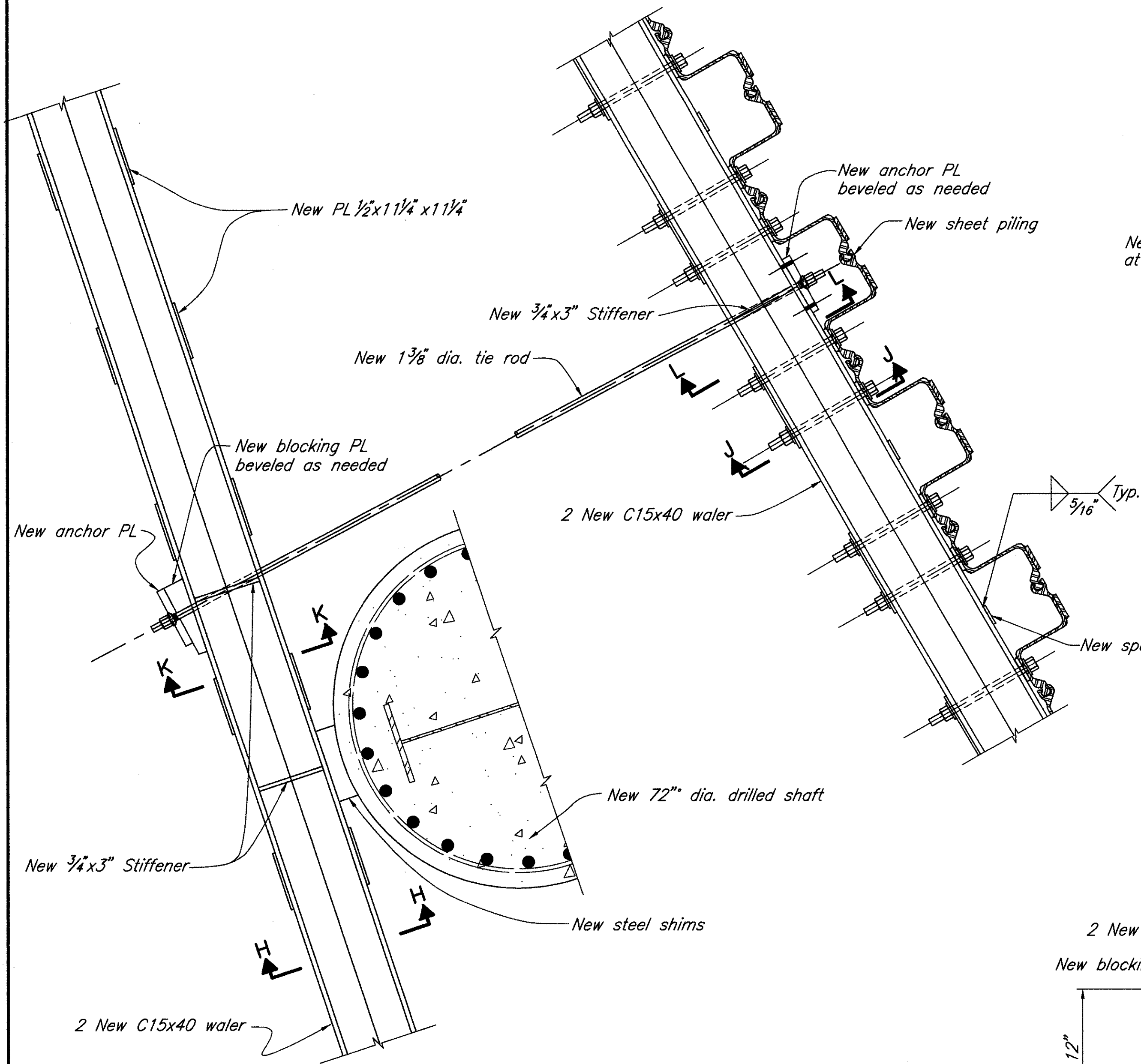


DETAIL E

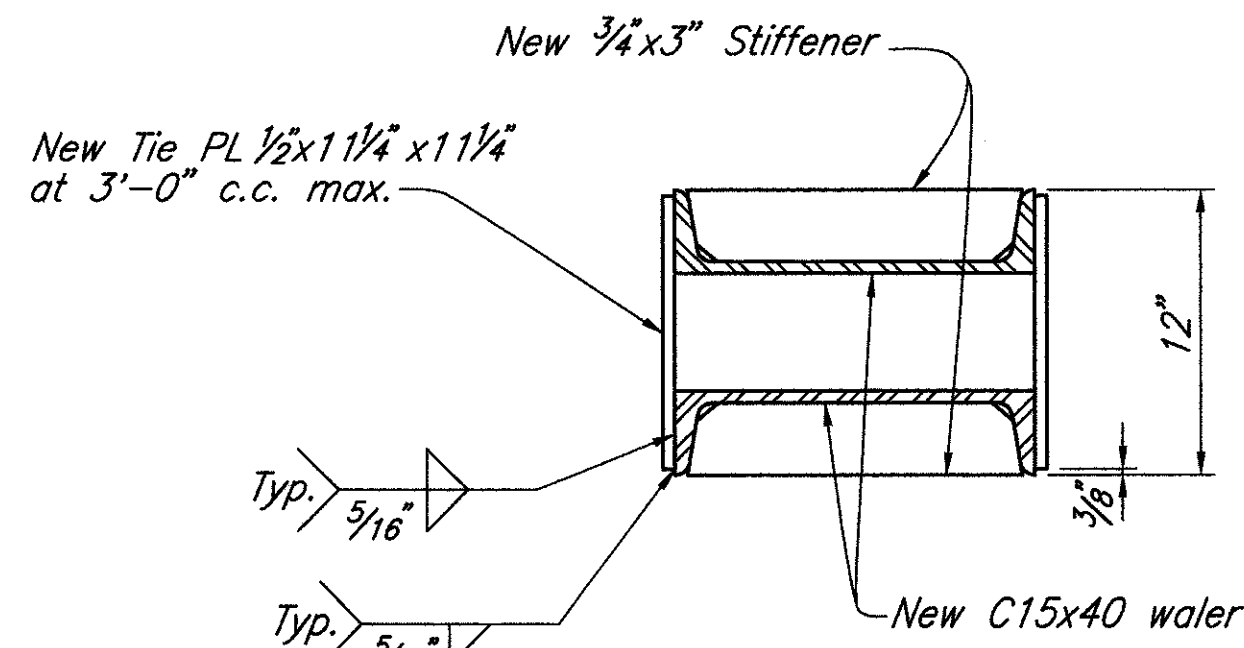
LEGEND

- Denotes area to be removed per Item 202-Portions of structure removed, as per plan
- Denotes area to be excavated and later backfilled as part of the installation of the new tie rods per Item 513 Structural steel, misc.: Dockwall walers, tie rods, fender connectors and hardware.

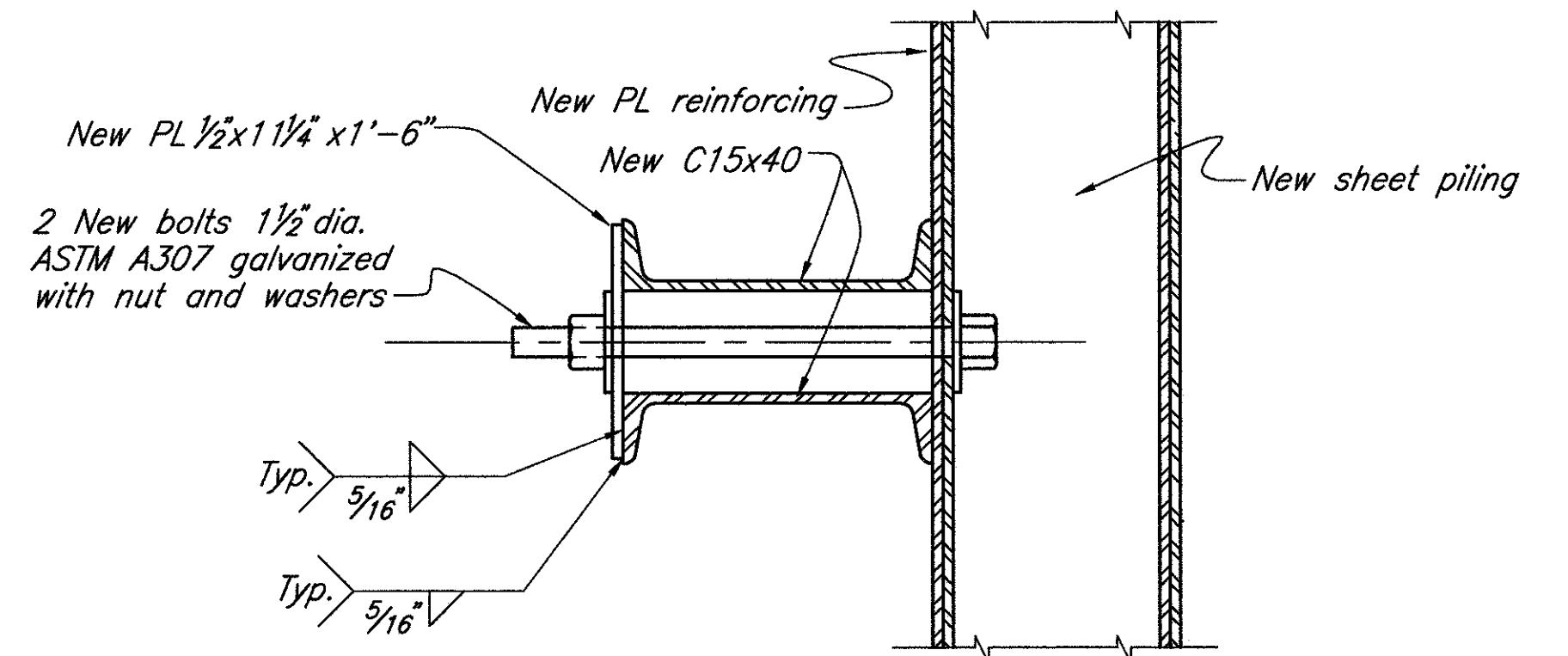
- NOTES:**
- MATERIALS** shown are existing unless otherwise noted.
  - ITEM 504-STEEL SHEET PILING LEFT IN PLACE** shall be ASTM A572, Grade 50 steel with a minimum thickness of 3/8" and a minimum section modulus of 71.7 cubic inches per foot of wall.
  - CONNECTION BOLTS:** Shall be 7/8" dia. A325 unless otherwise noted
  - BOLT LEGEND:** See sheet 25/48
  - EXISTING DOCKWALL DETAILS:** See sheet 20/48
  - DETAIL E:** Location see sheet 19/48
  - CLASS F CONCRETE:** shall be in accordance with Item 511 and included for payment with Item 504-Steel sheet piling left in place, as per plan
  - SECTION G-G:** See sheet 22/48
  - SECTION C-C:** See sheet 19/48 for location.



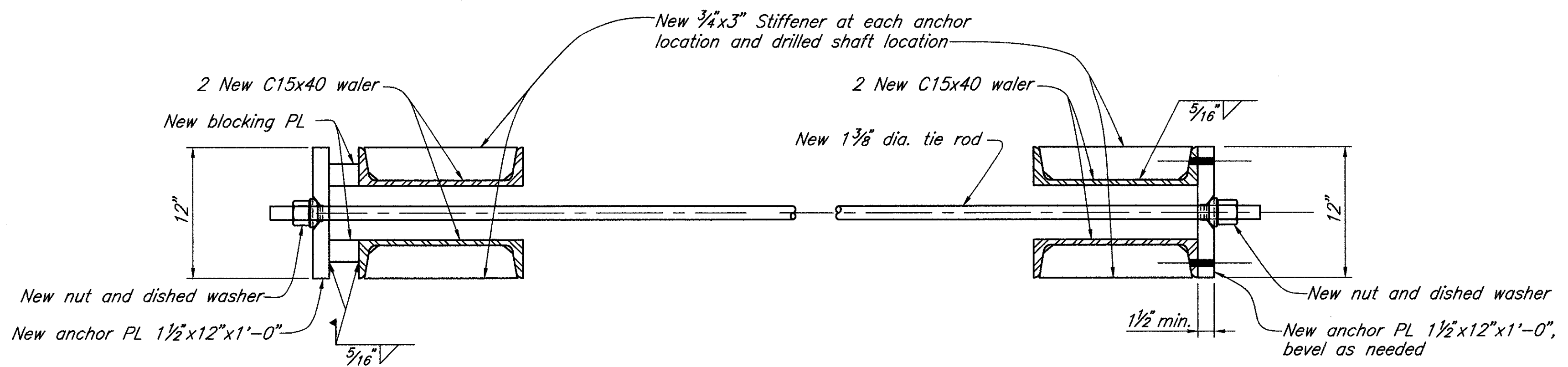
SECTION G-G



SECTION H-H

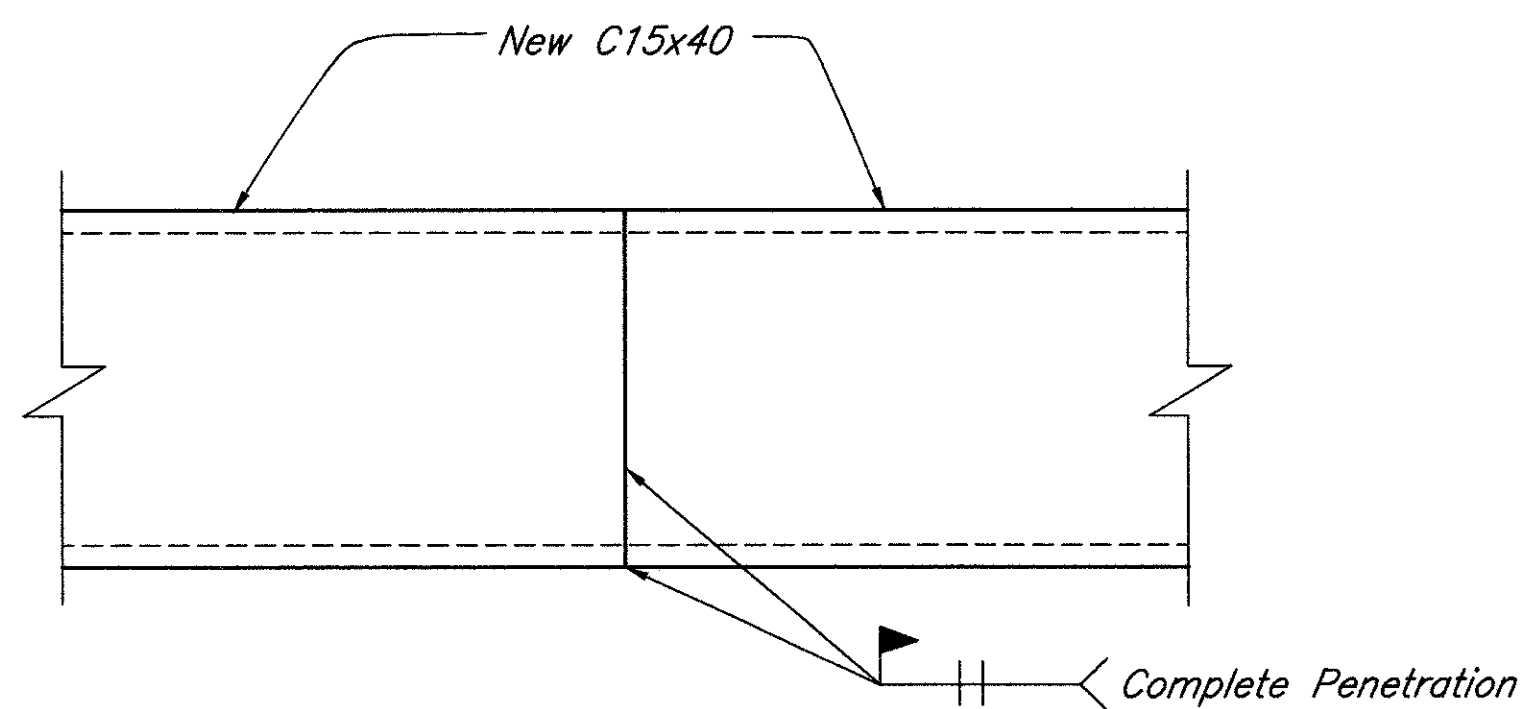


SECTION J-J



SECTION K-K

SECTION L-L



SPLICE DETAIL DOCK WALL WALER

**NOTES:**

**MATERIALS** shown are existing unless otherwise noted.

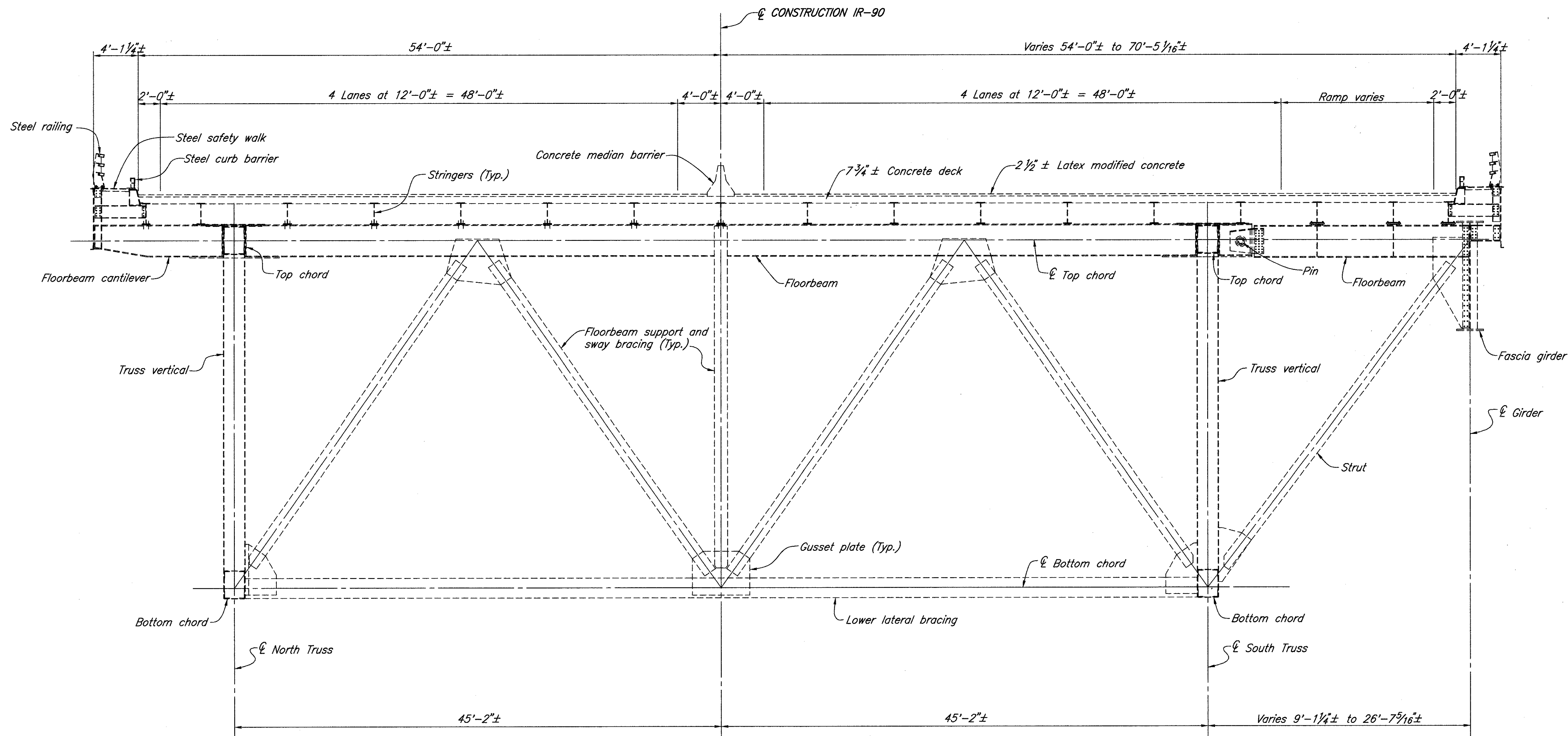
**CONNECTION BOLTS:** Shall be  $\frac{7}{8}$ " dia. A325 unless otherwise noted

**BOLT LEGEND:** See sheet 25/48

**SECTION G-G:** See sheet 21/48 for location.

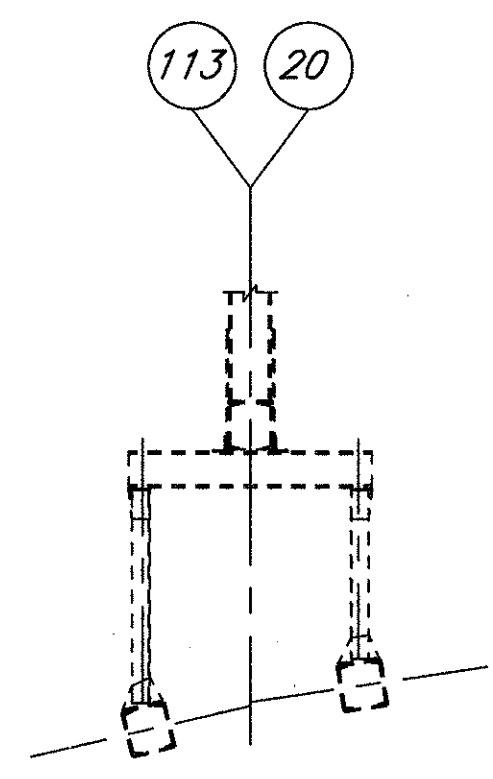
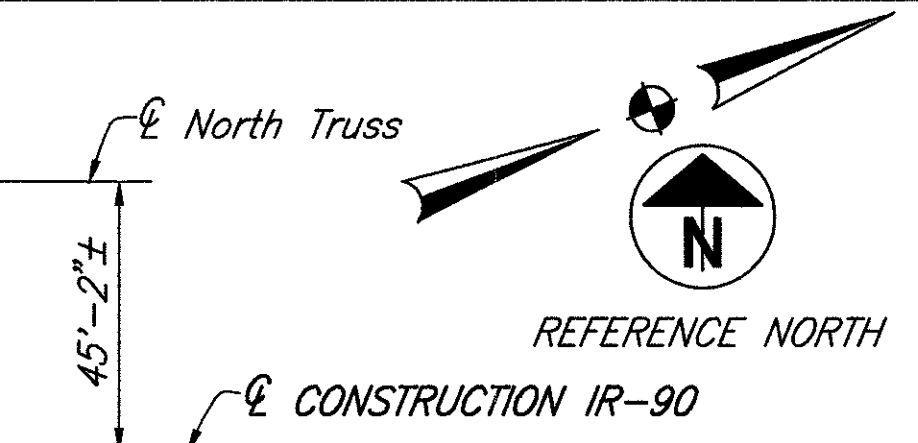
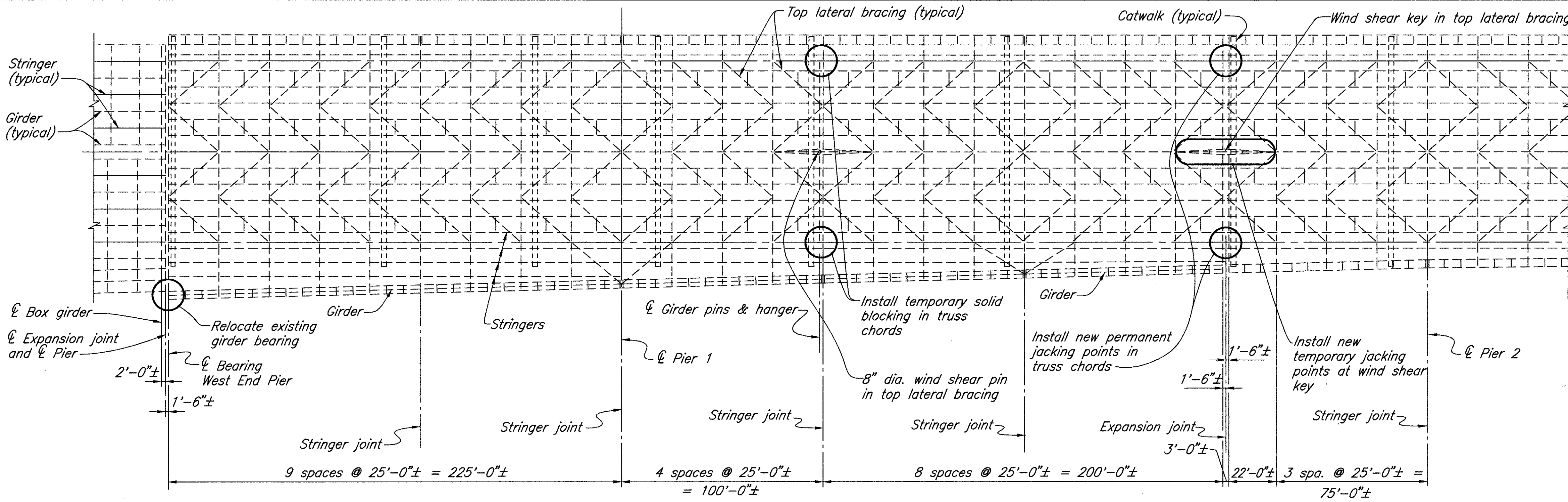
**TIE RODS** shall be  $1\frac{3}{8}$ " dia. high strength steel bar ASTM A722, Grade 150, epoxy coated per CMS 709.00.



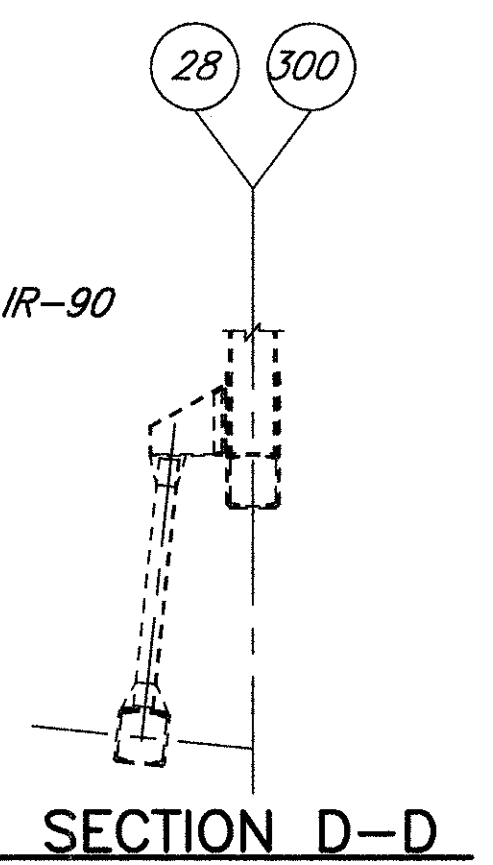
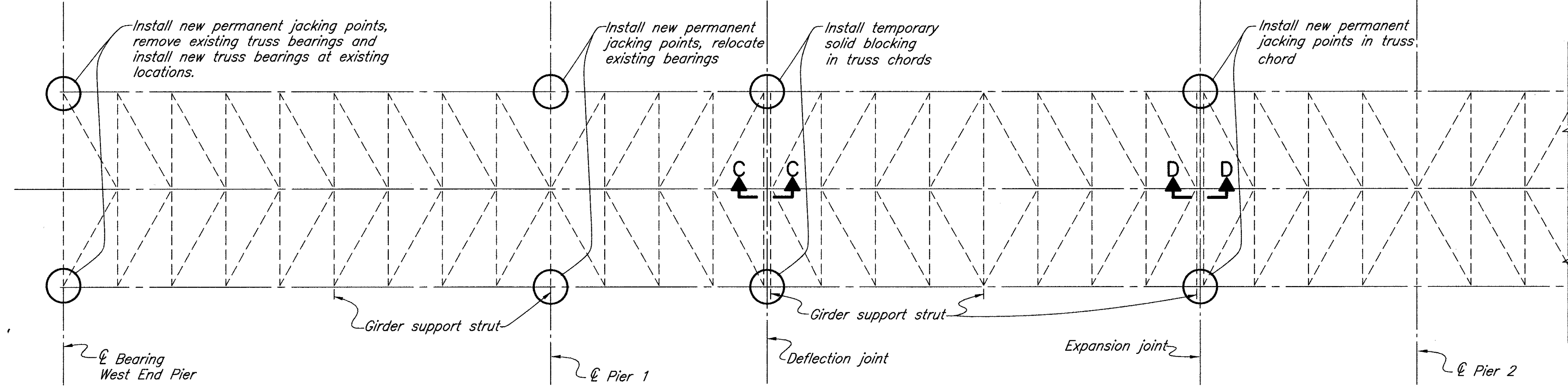


TRANSVERSE SECTION MAIN TRUSS SPAN  
AT FLOORBEAM 105

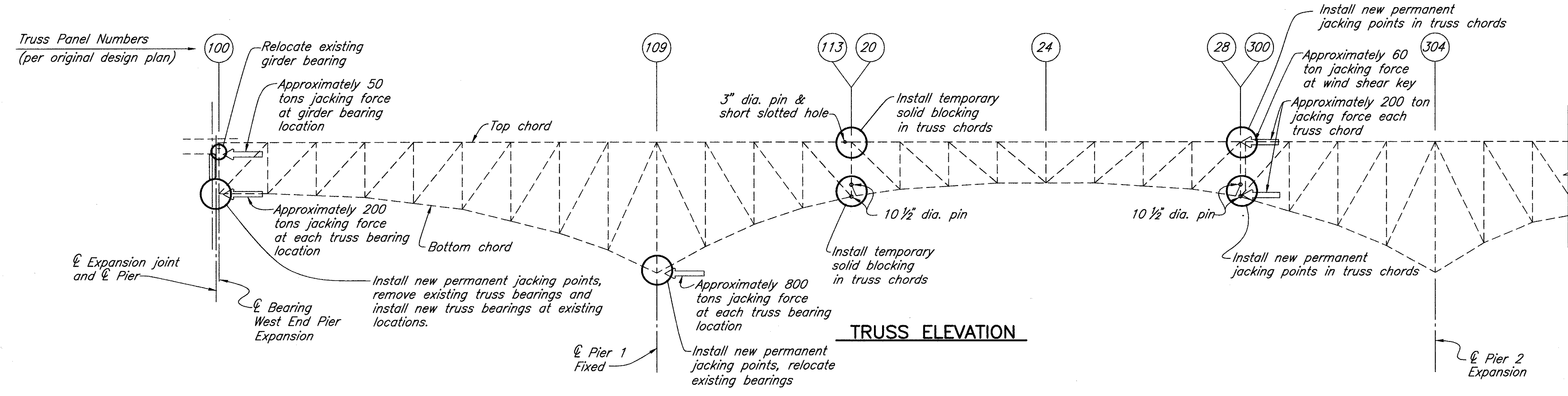
		RICHLAND ENGINEERING LIMITED 29 NORTH PARK STREET MANSFIELD, OHIO 44902
DATE	12/20/96	STRUCTURE FILE NO. 1809393
REVISION	BLN	
DRAWN	RRB	REVISION
DESIGNED	DAP	CHECKED
		RWR
TRANSVERSE SECTION BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER		
CUY-90-15.24		
23 / 48		36 61



**FLOOR SYSTEM FRAMING PLAN & TOP CHORD LATERAL BRACING**



**BOTTOM CHORD LATERAL BRACING**



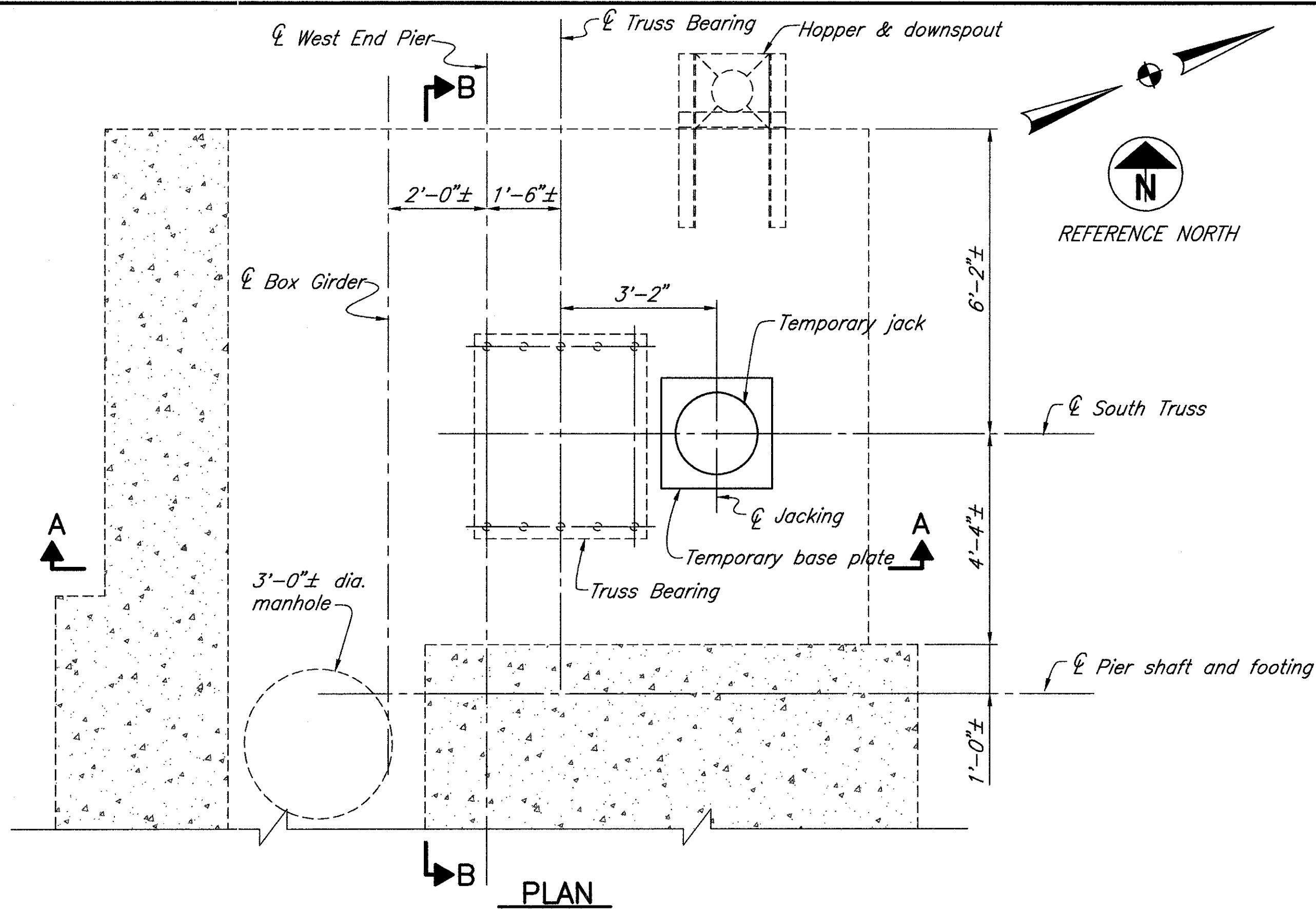
- NOTES:**
- MATERIALS** shown are existing unless otherwise noted.
  - WEST END PIER TRUSS BEARING DETAILS:** See sheet 25/48 thru 27/48
  - WEST END GIRDER BEARINGS:** See sheet 28/48
  - WEST END PIER DRAINAGE DETAILS:** See sheet 29/48 and 30/48
  - PIER 1 CAP EXTENSION DETAILS:** See sheet 31/48
  - PIER 1 TRUSS BEARING DETAILS:** See sheet 32/48 thru 34/48
  - PIER 1 DRAINAGE DETAILS:** See sheet 35/48 and 36/48
  - TRUSS DEFLECTION JOINT DETAILS:** See sheet 37/48 and 38/48
  - TRUSS EXPANSION JOINT DETAILS:** See sheet 39/48 thru 43/48
  - TRUSS WIND SHEAR KEY DETAILS:** See sheet 44/48
  - EXPANSION JOINT DETAILS:** See sheet 45/48 thru 48/48

Job No. 93111FRA Date 12/23/96 Drawn By RB,JPS,TWH

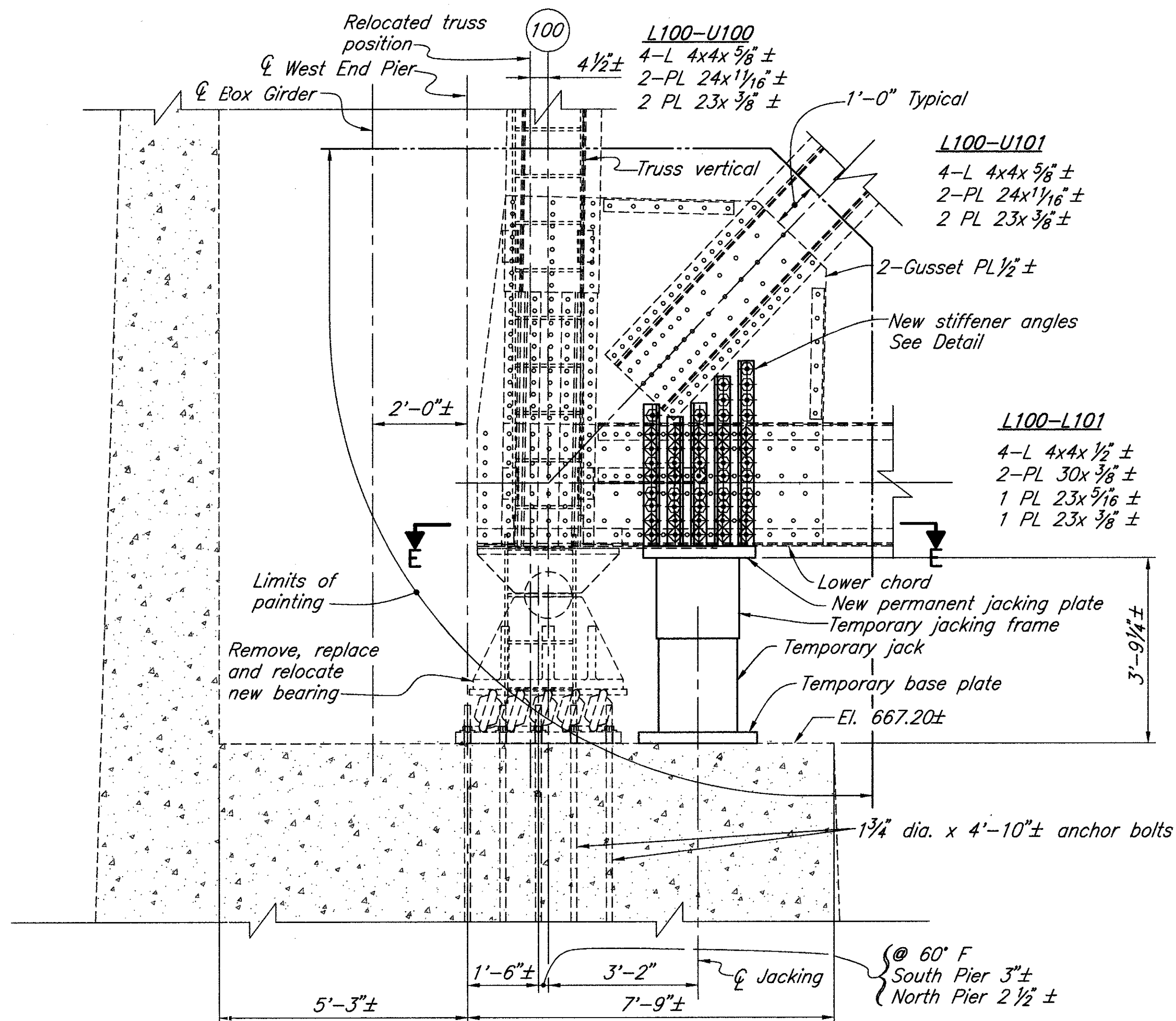
		DATE 12/20/96 REVIEWED BLN DRAWN RRB DESIGNED DAP CHECKED RWR	STRUCTURE FILE NO. 1809393 REVISED
<b>SPAN 1 &amp; 2 FRAMING PLAN AND ELEVATION</b> BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER			
<b>CUY-90-15.24</b>		24 / 48	
37 61			



Job No. 93111WP1 Date 12/24/96 Drawn By TMH/RB/JPS/JLS



PLAN



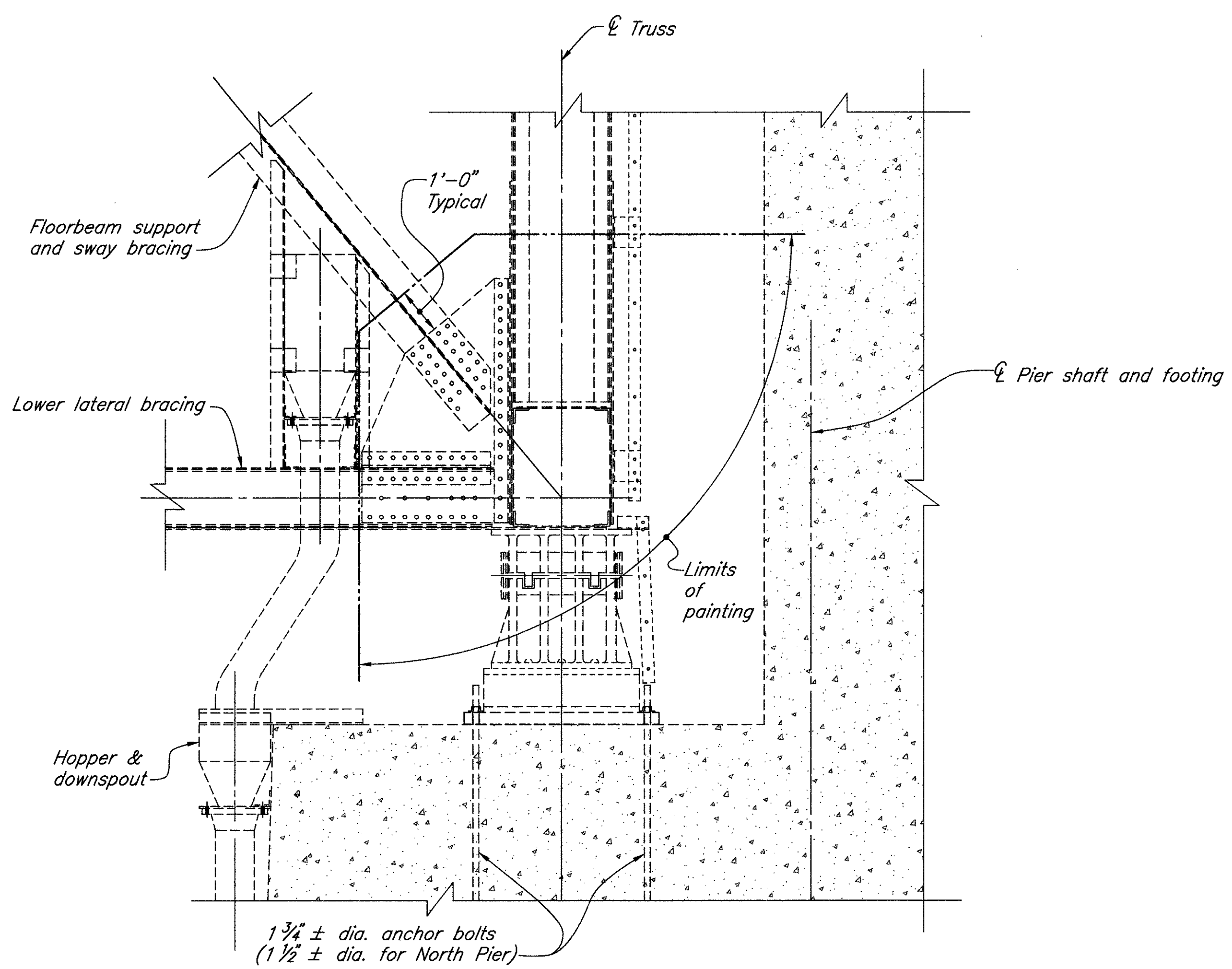
TRUSS BEARING WEST END PIER SOUTH (LOOKING NORTH)  
VIEW A-A

WEST END PIER TRUSS BEARING REACTION

	NORTH	SOUTH
Dead Load	480 kips	740 kips
Live Load	440 kips	550 kips
Total	920 kips	1,290 kips

BOLT LEGEND

- New field bolt and nut.
- New material to new material.
- Remove existing rivet or bolt. Install new field bolt and nut. New material to existing rivet or bolt hole.
- New field bolt and nut. New material to field drilled new or existing steel.
- Existing rivet to remain



TRUSS BEARING WEST END PIER SOUTH (LOOKING EAST)  
VIEW B-B

NOTES:

**MATERIALS** shown are existing unless otherwise noted. All new steel material shall be A36.

**WEST END PIER NORTH** is similar to West End Pier South proposed work.

**TEMPORARY SUPPORT:** The structure shall not be supported on vertical jacks or blocking without provision for expansion and contraction movement during non-working hours or while unattended by contractor's personnel.

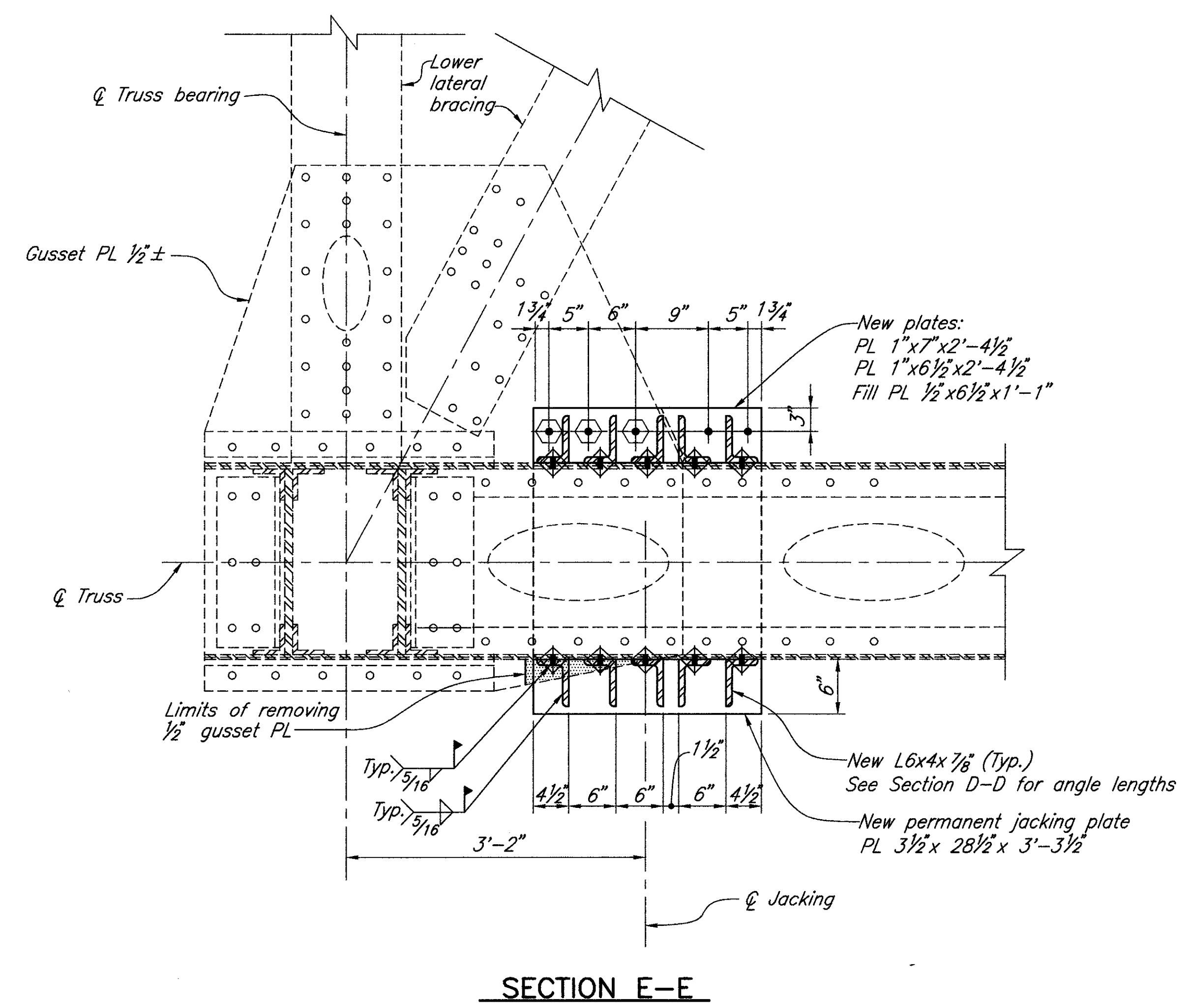
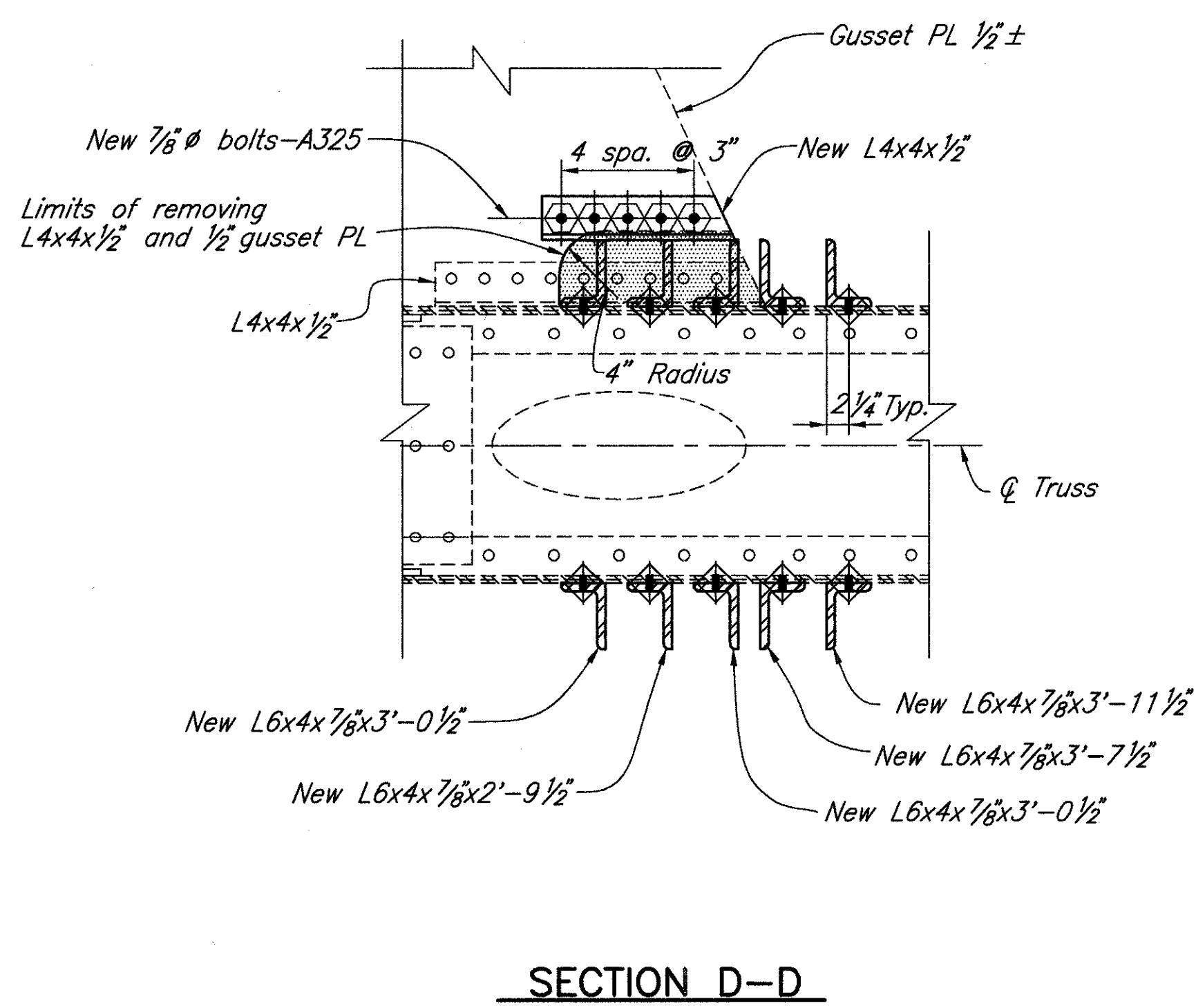
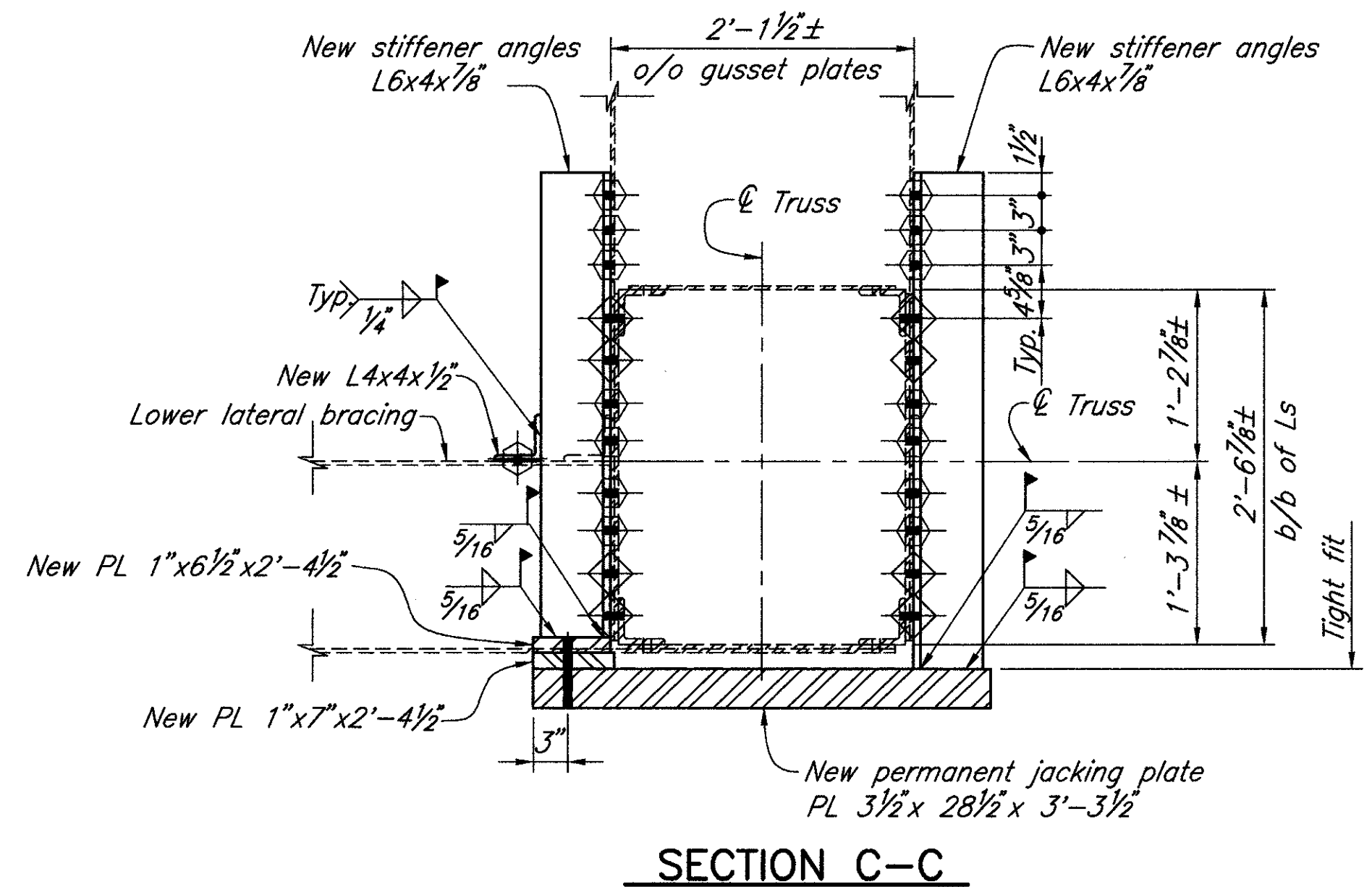
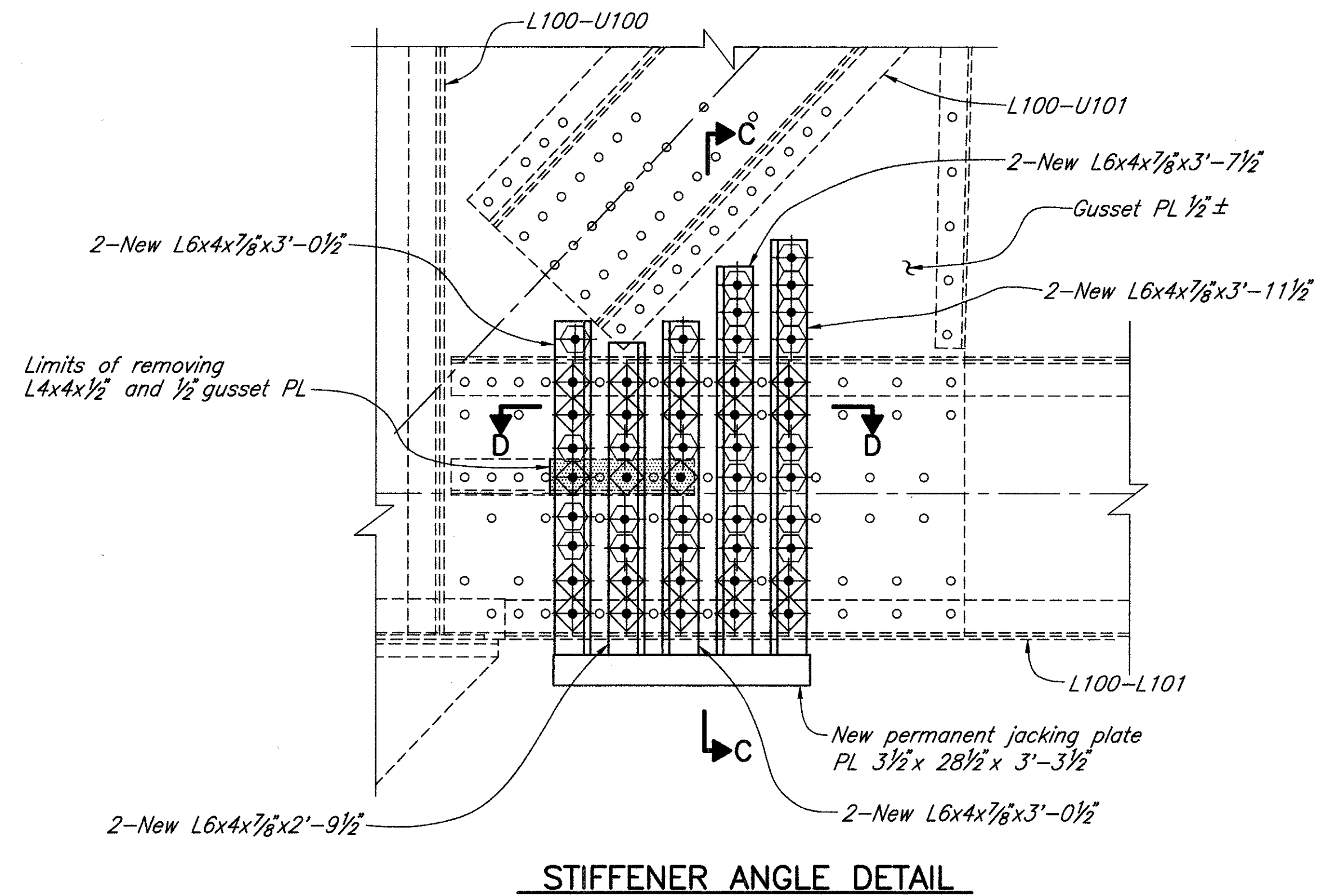
**PAINTING LIMITS:** Extent of work for painting of existing steel for estimated quantities Item 514-Field painting, misc.: Surface preparation of existing steel, Item 514-Field painting, misc.: Existing structural steel, prime coat, System A, and Item 514-Field painting, misc.: Existing structural steel, finish coat, System A.

**NEW STIFFENER ANGLE DETAIL:** See sheet 26/48

**SECTIONS E-E:** See sheet 26/48

**NEW BEARINGS:** See sheet 27/48

**DRAINAGE DETAILS:** See sheet 29/48 and 30/48



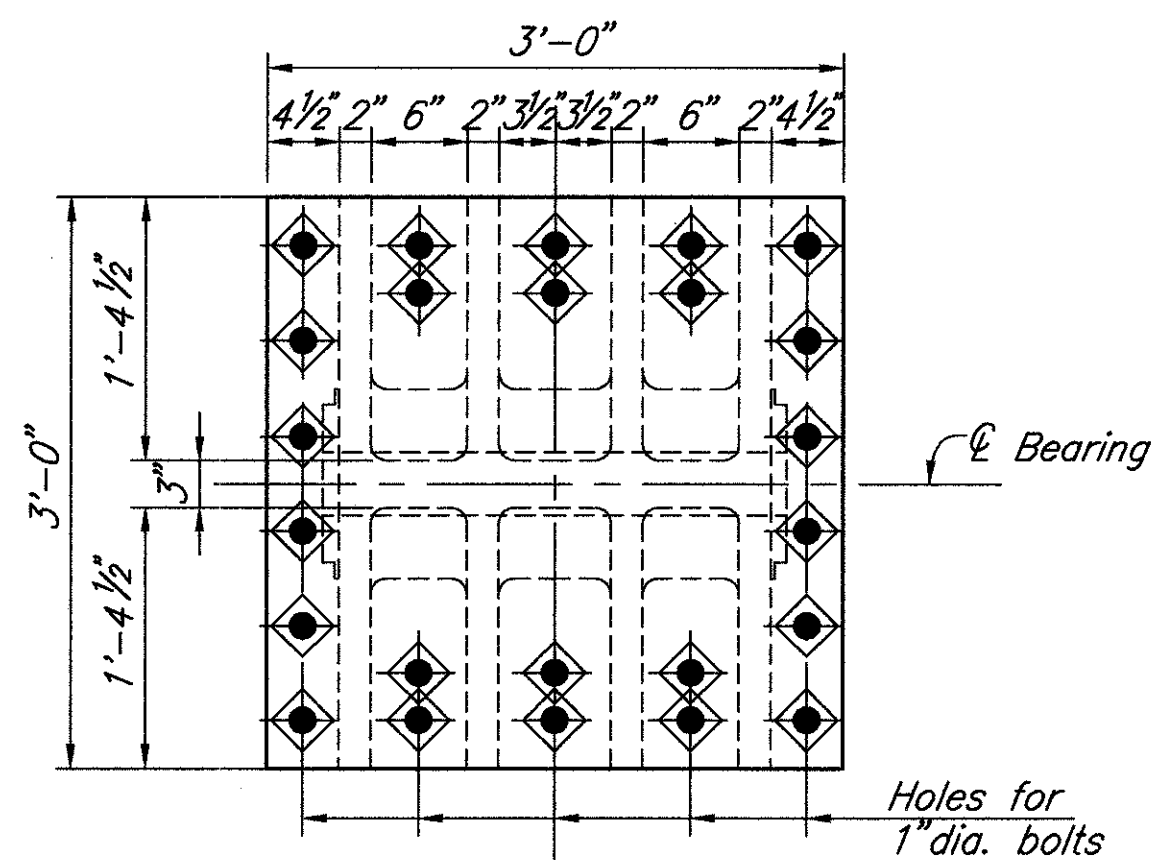
**LEGEND**

-Denotes area to be removed per Item 202-Portions of structure removed, as per plan

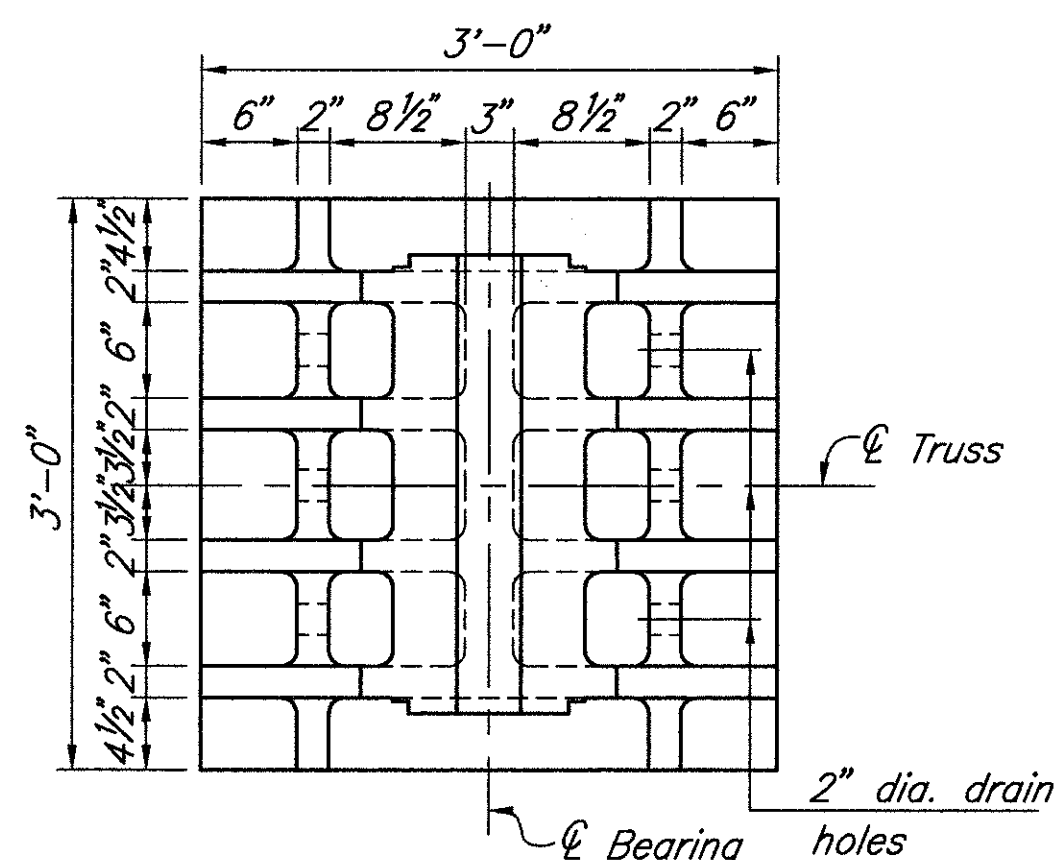
**NOTES:**

- MATERIALS** shown are existing unless otherwise noted. All new steel material shall be A36.
- WEST END PIER NORTH** is similar to West End Pier South proposed work.
- CONNECTION BOLTS** shall all be 1" dia. A490 unless noted.
- BOLT LEGEND:** See sheet 25/48
- SECTION E-E:** See sheet 25/48 for location.

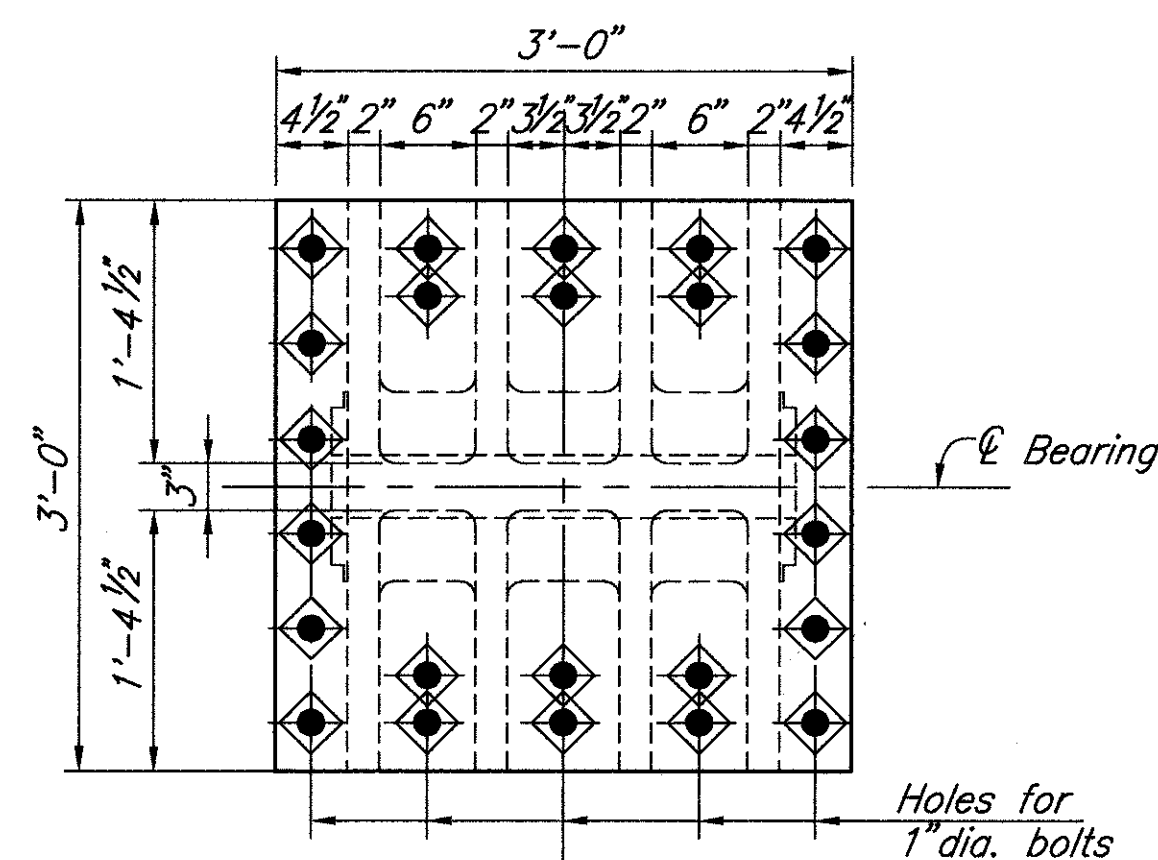




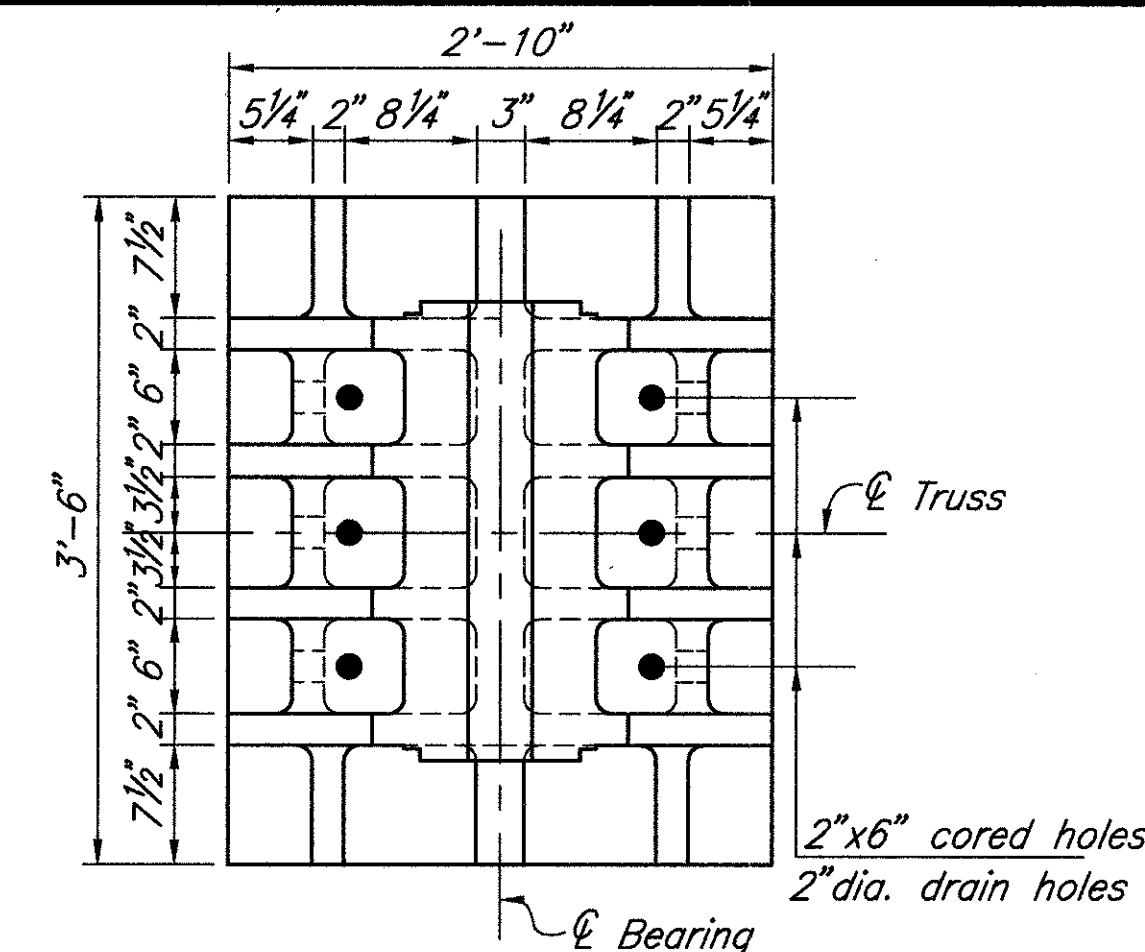
TOP CASTING



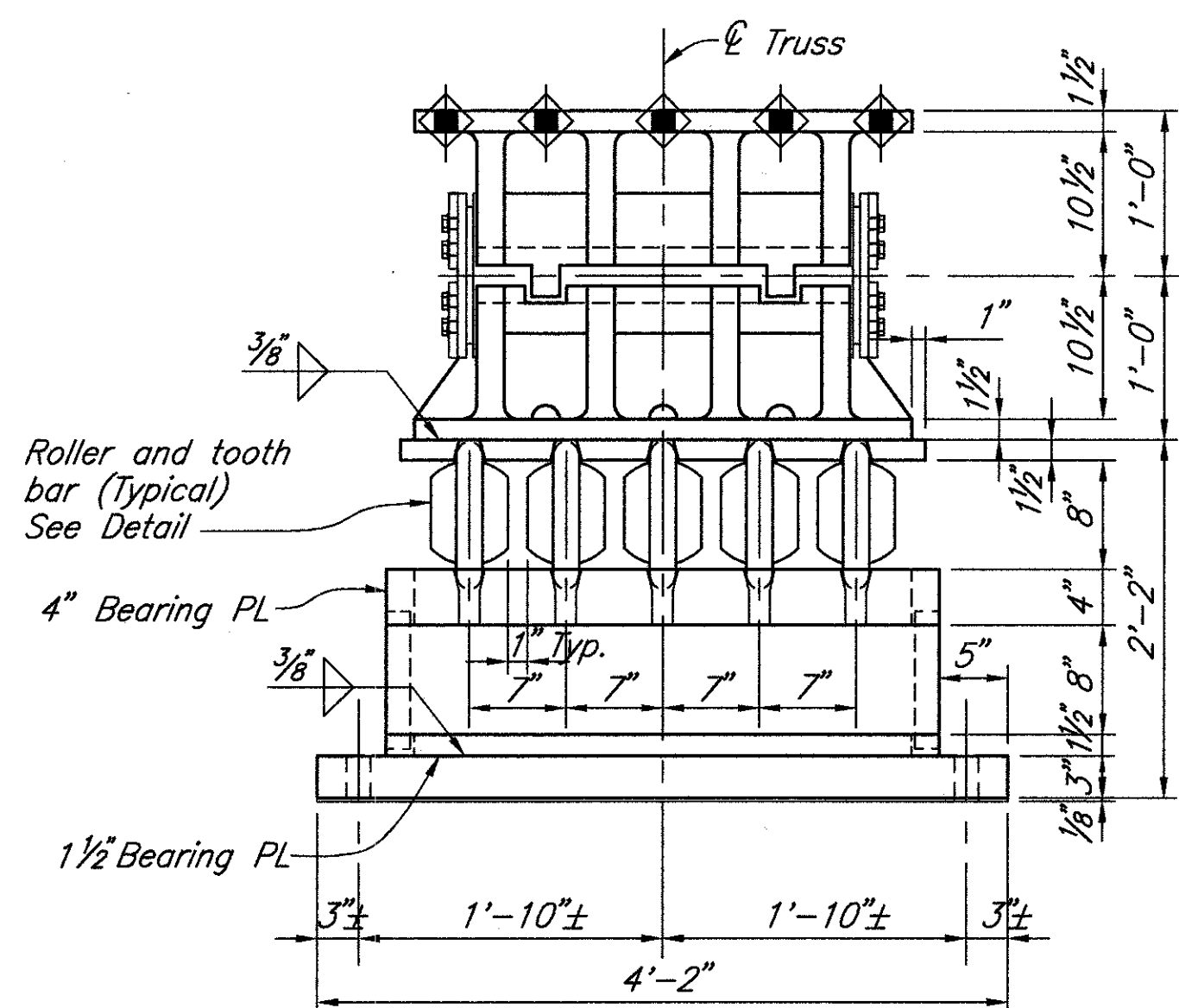
BOTTOM CASTING



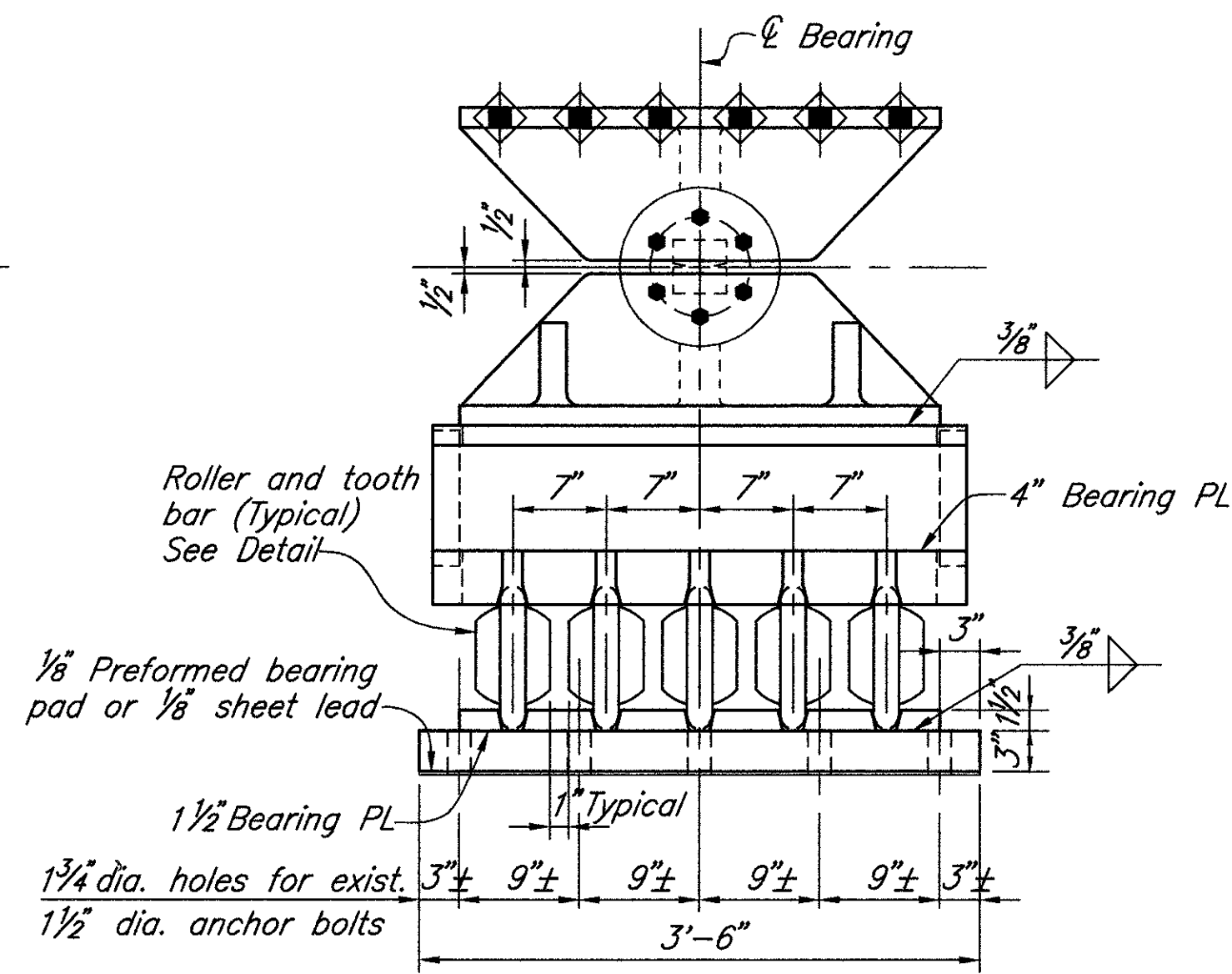
TOP CASTING



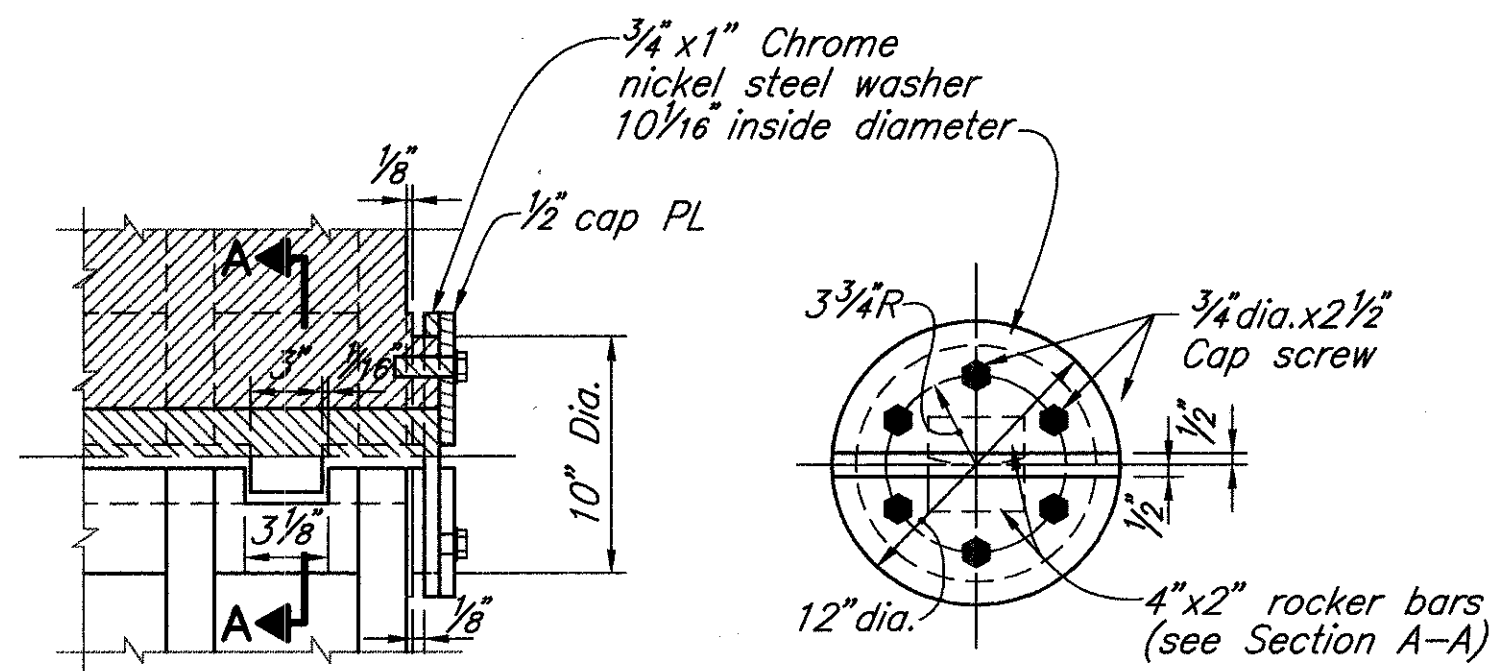
BOTTOM CASTING



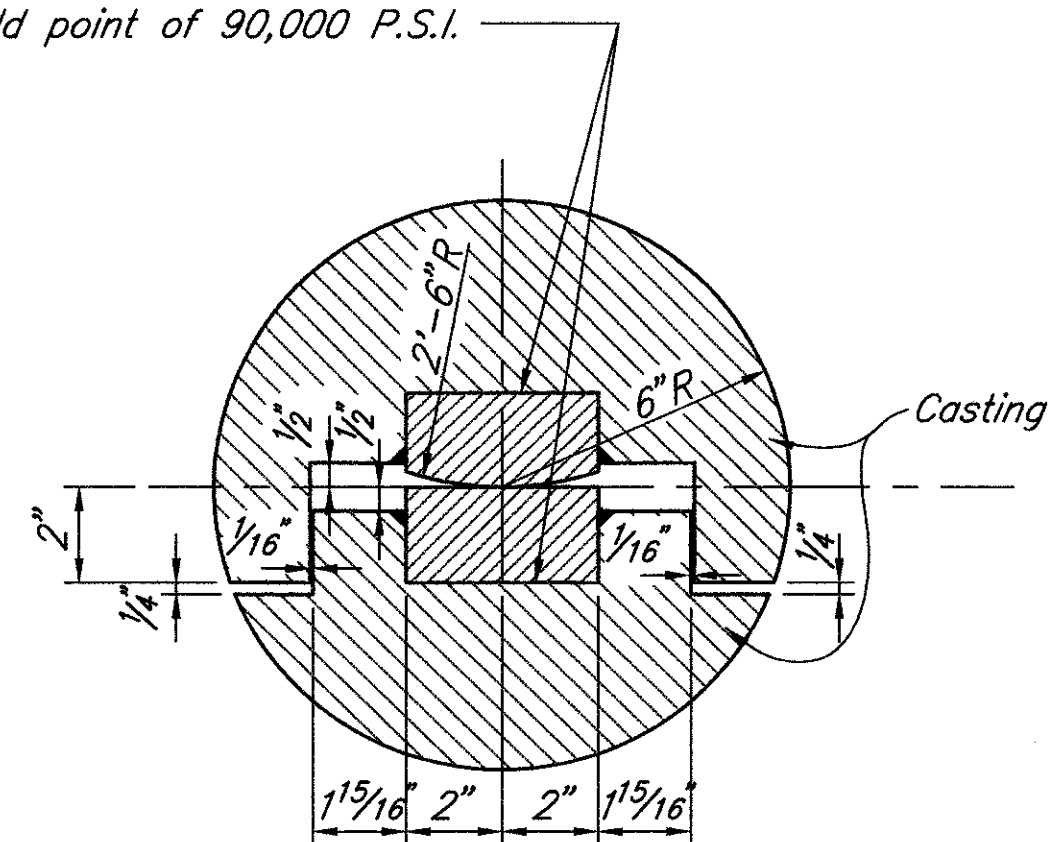
WEST END PIER (NORTH)



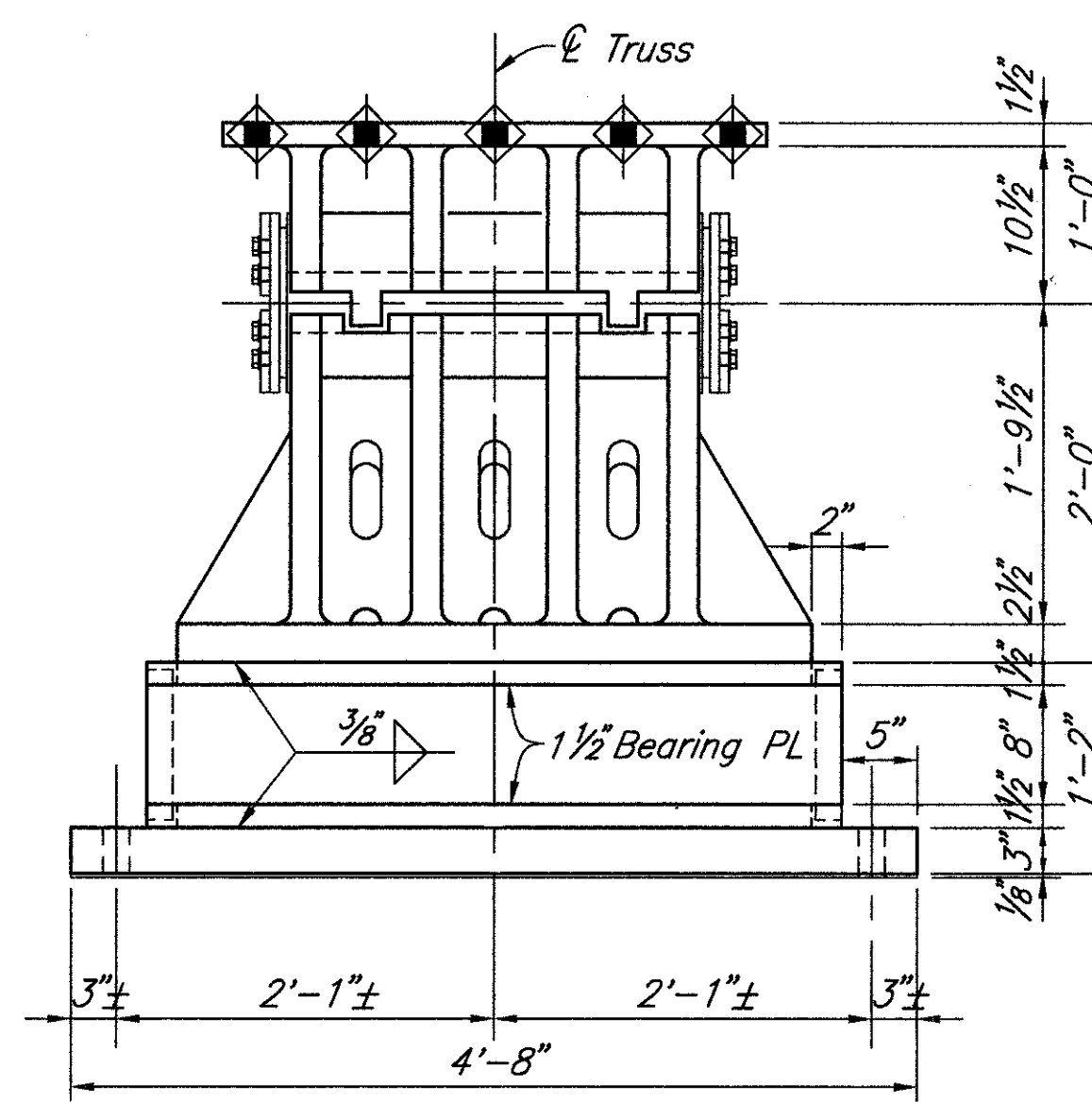
Press fit 4"x2" steel rocker bars into new castings. Finish bars on all sides. Bevel edges of notch 3/8" and weld. Grind weld smooth and flush with casting. Rocker bars shall meet ASTM A514 with a minimum yield point of 90,000 P.S.I.



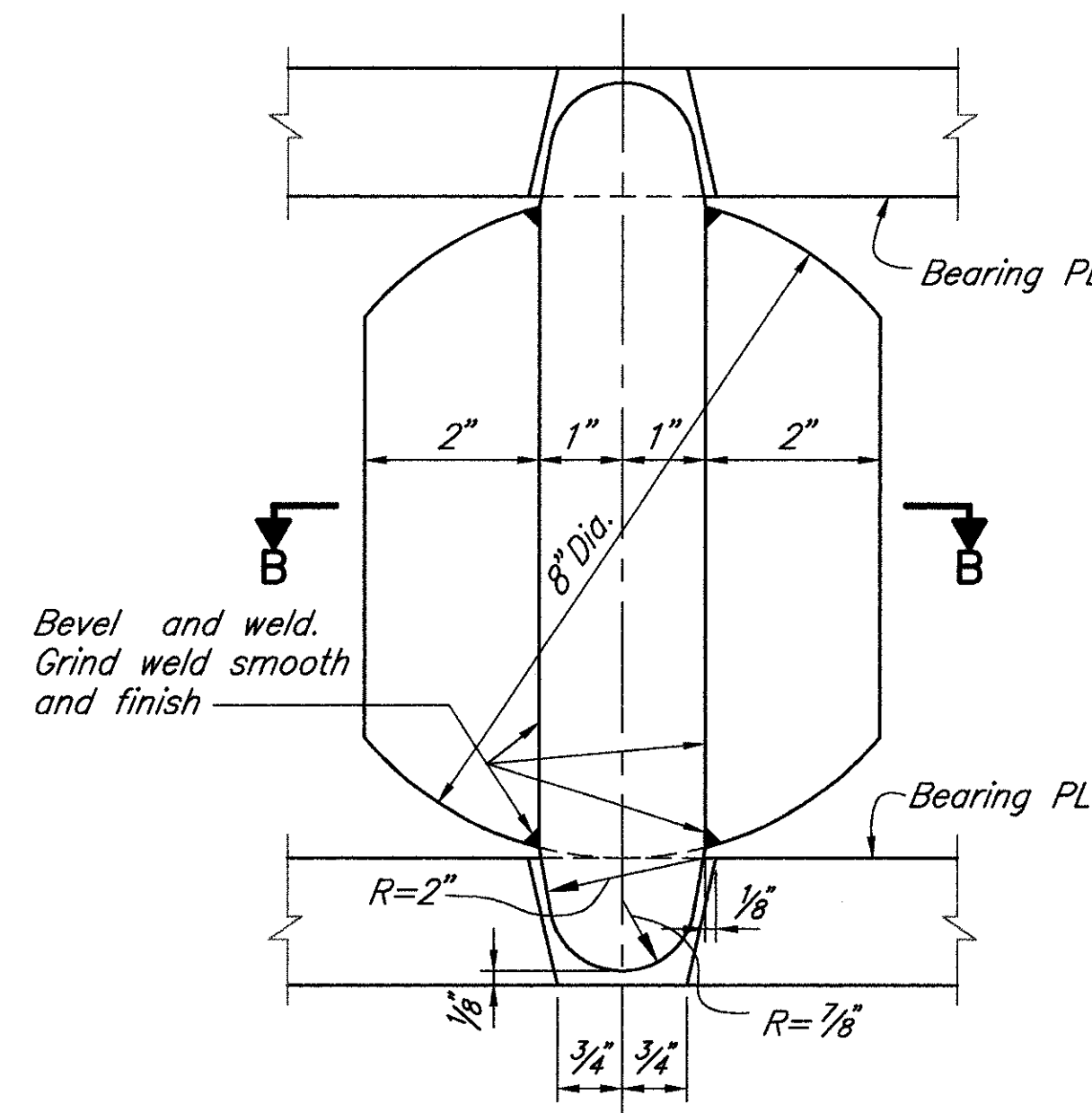
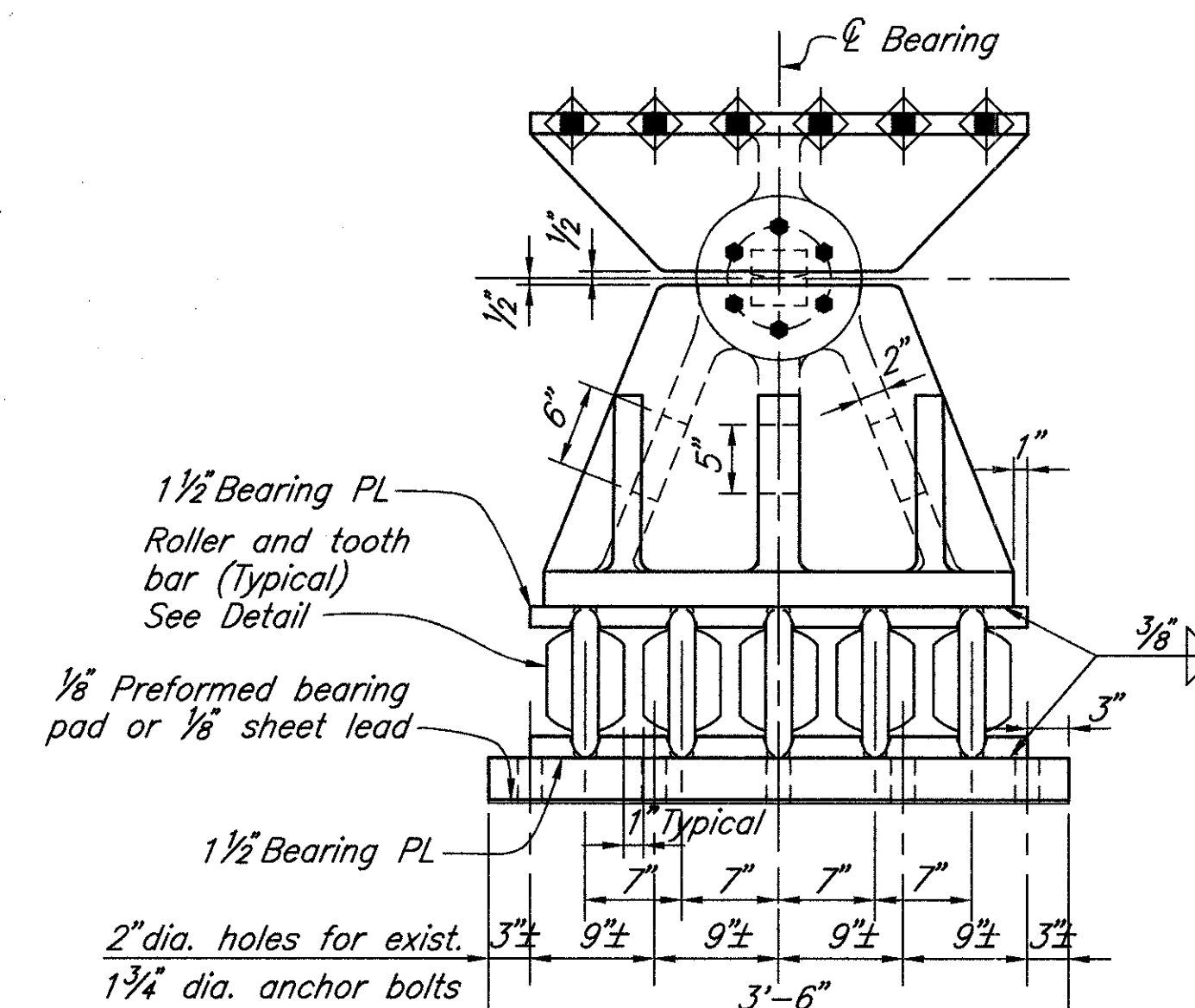
CASTING DETAILS



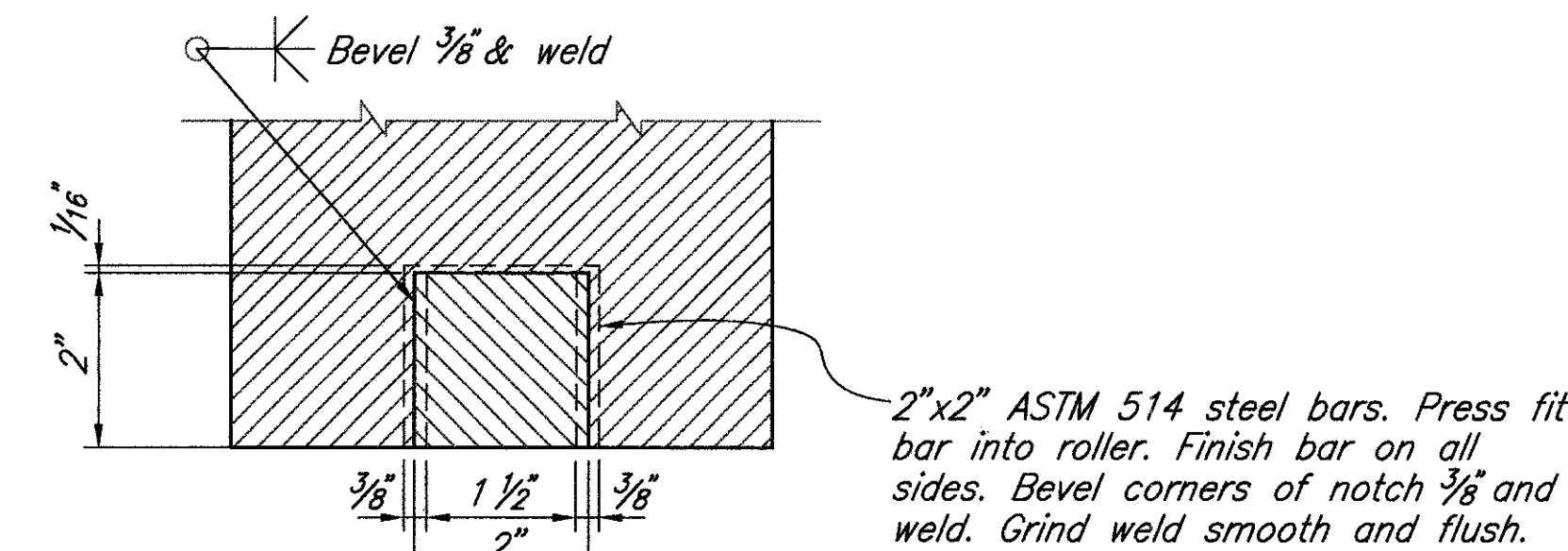
SECTION A-A



WEST END PIER (SOUTH)



ROLLER AND TOOTH BAR DETAIL



SECTION B-B

NOTES

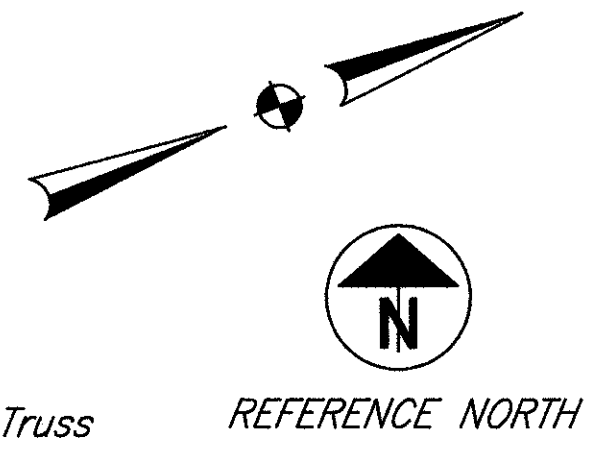
**MATERIALS:** All materials shown shall be new:  
Steel castings ASTM A27, Grade 65-35 or Grade 70-36  
Rolled steel ASTM A36

**REPLACE BEARING:** See General Note sheet 7/48

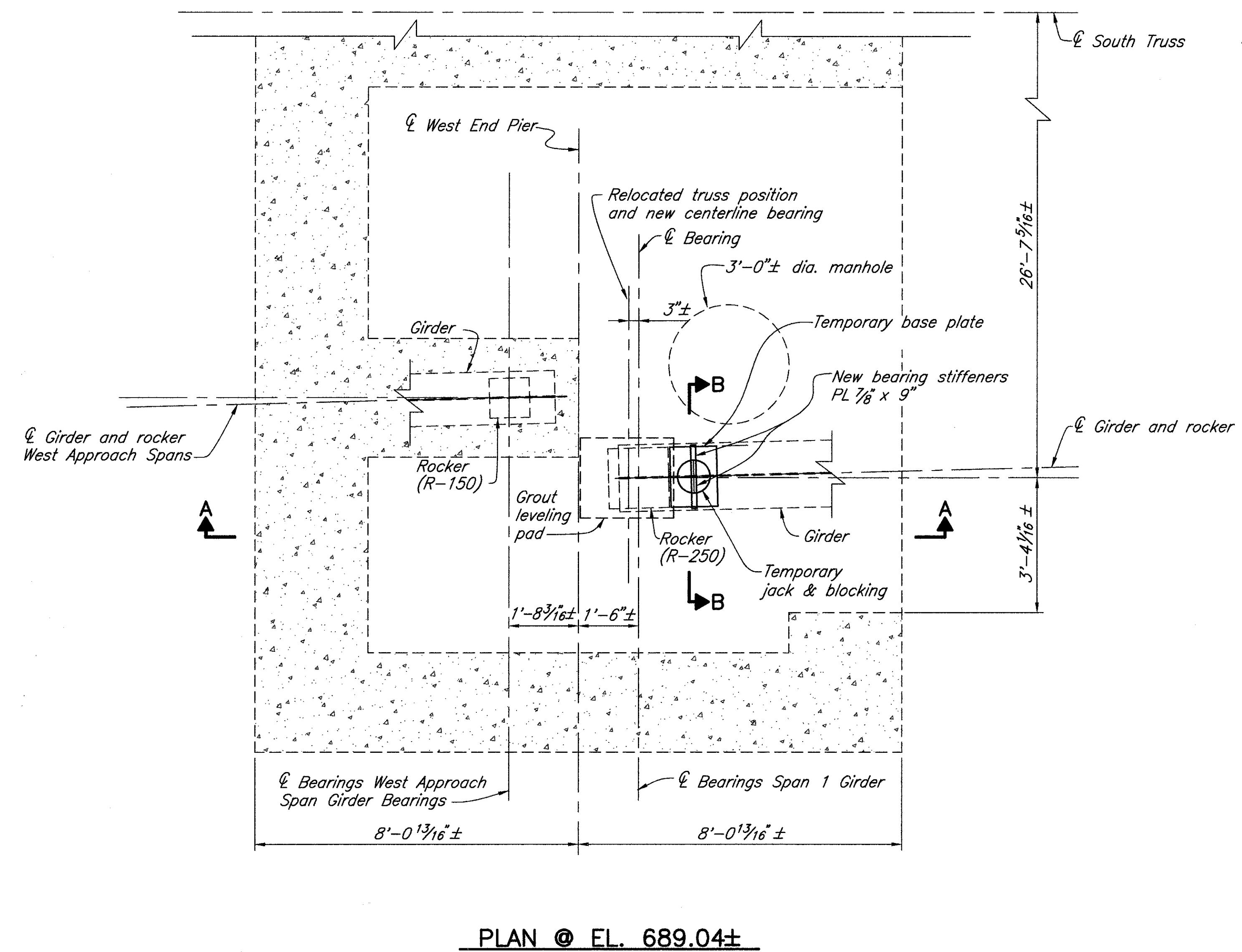
**FINISH:** Material shall be surface finished according to CMS 513.07.

**CONNECTION BOLTS** shall be 1" dia. A325 galvanized.

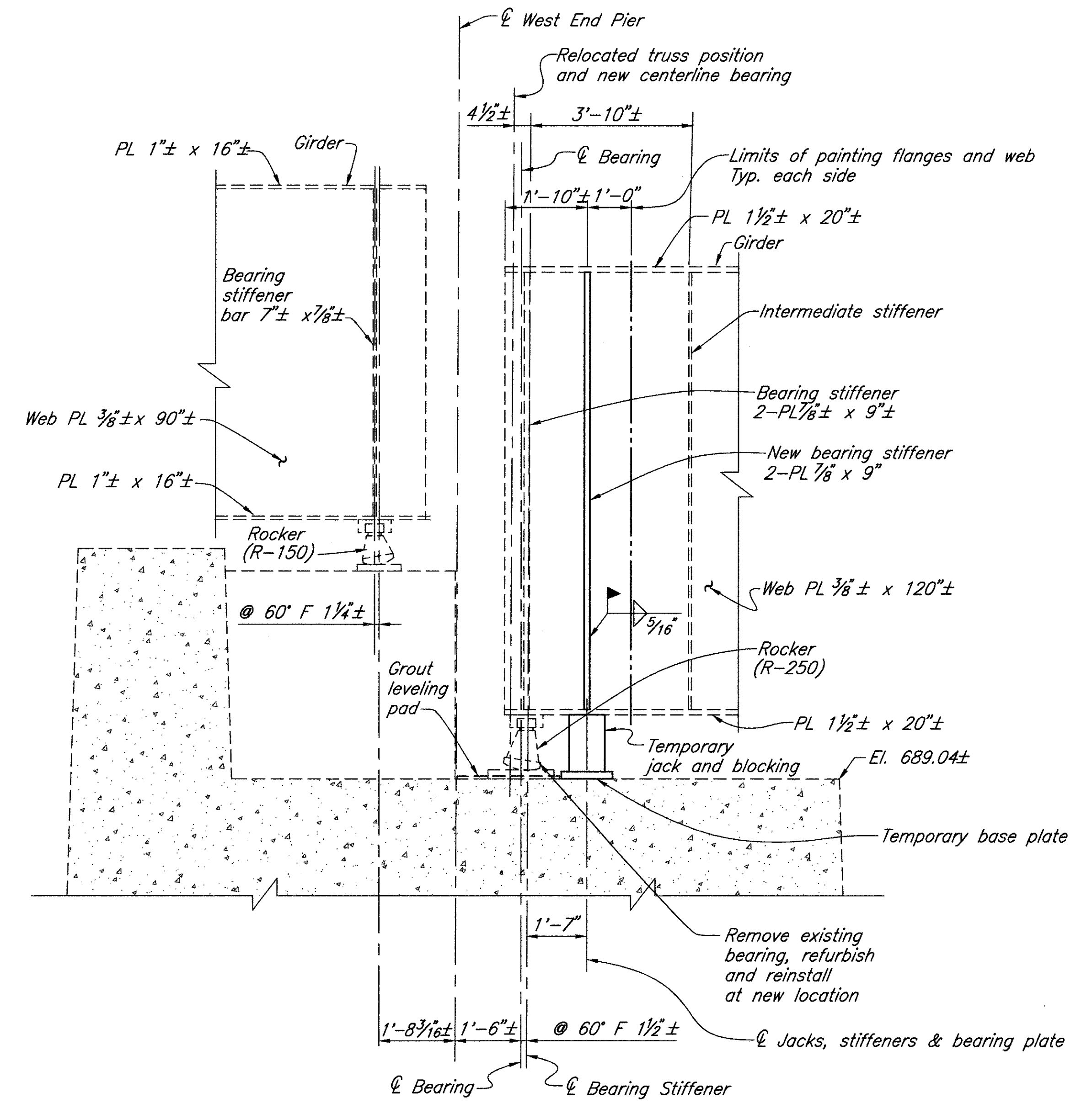
**BOLT LEGEND:** See sheet 25/48



NOTE: Floorbeams, stringers, deck and joint not shown.



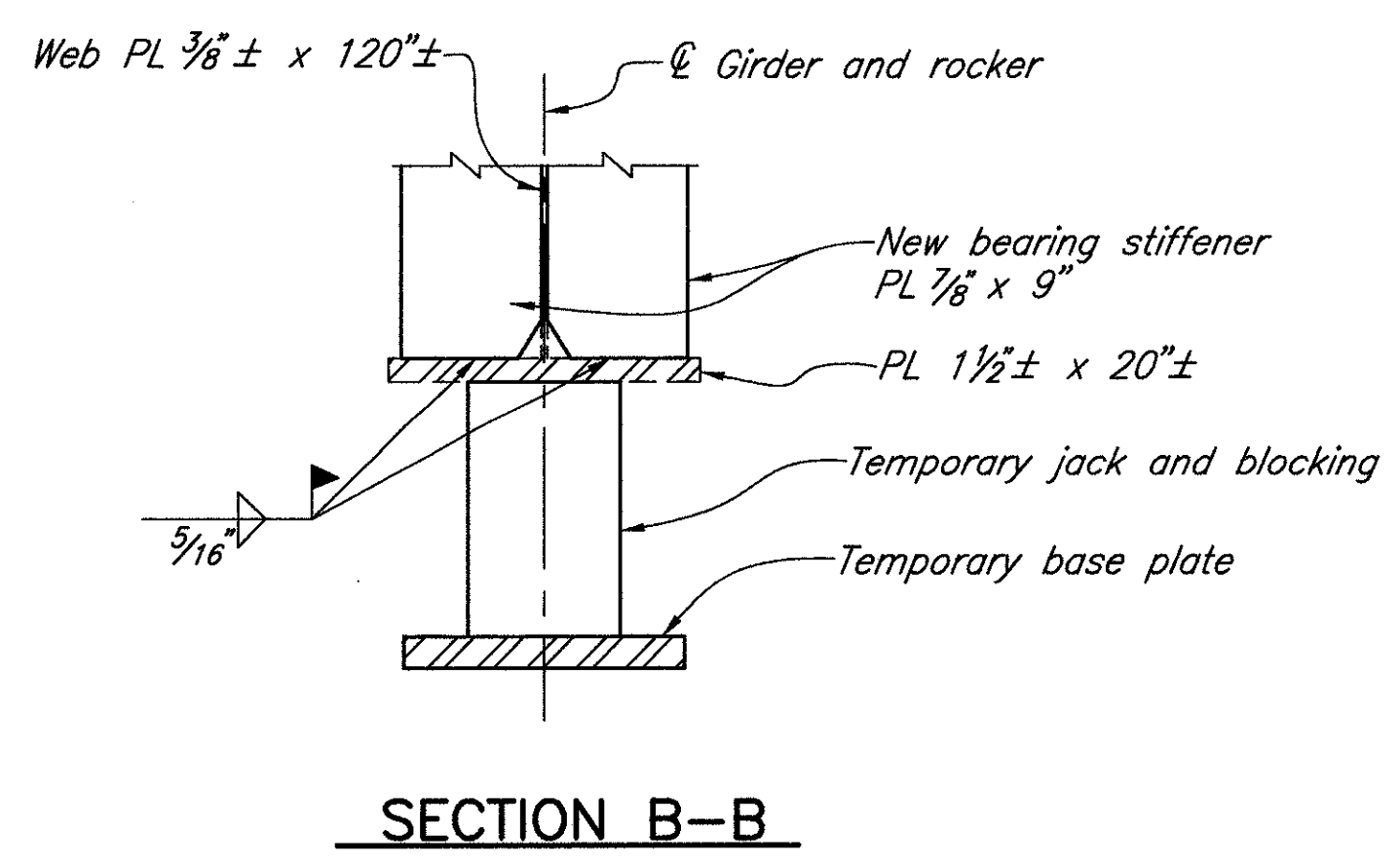
PLAN @ EL. 689.04±



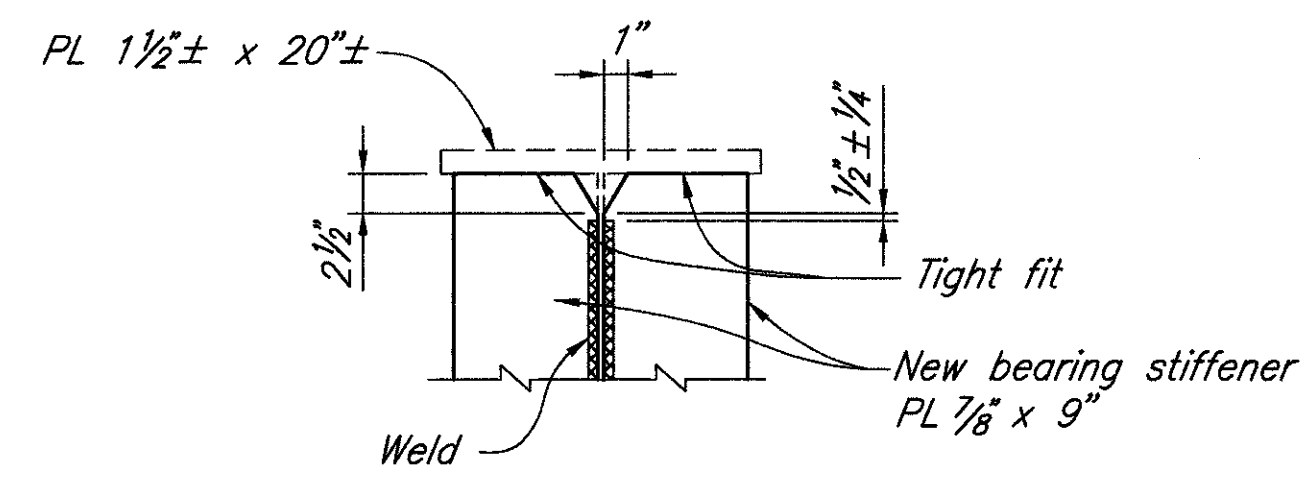
GIRDER BEARING WEST END PIER (LOOKING NORTH)  
SECTION A-A

**WEST END PIER  
GIRDER BEARING REACTION**

Dead Load	182 kips
Live Load	50 kips
	232 kips



SECTION B-B



TYPICAL CORNER CLIPPING AND  
WELD TERMINATION DETAIL

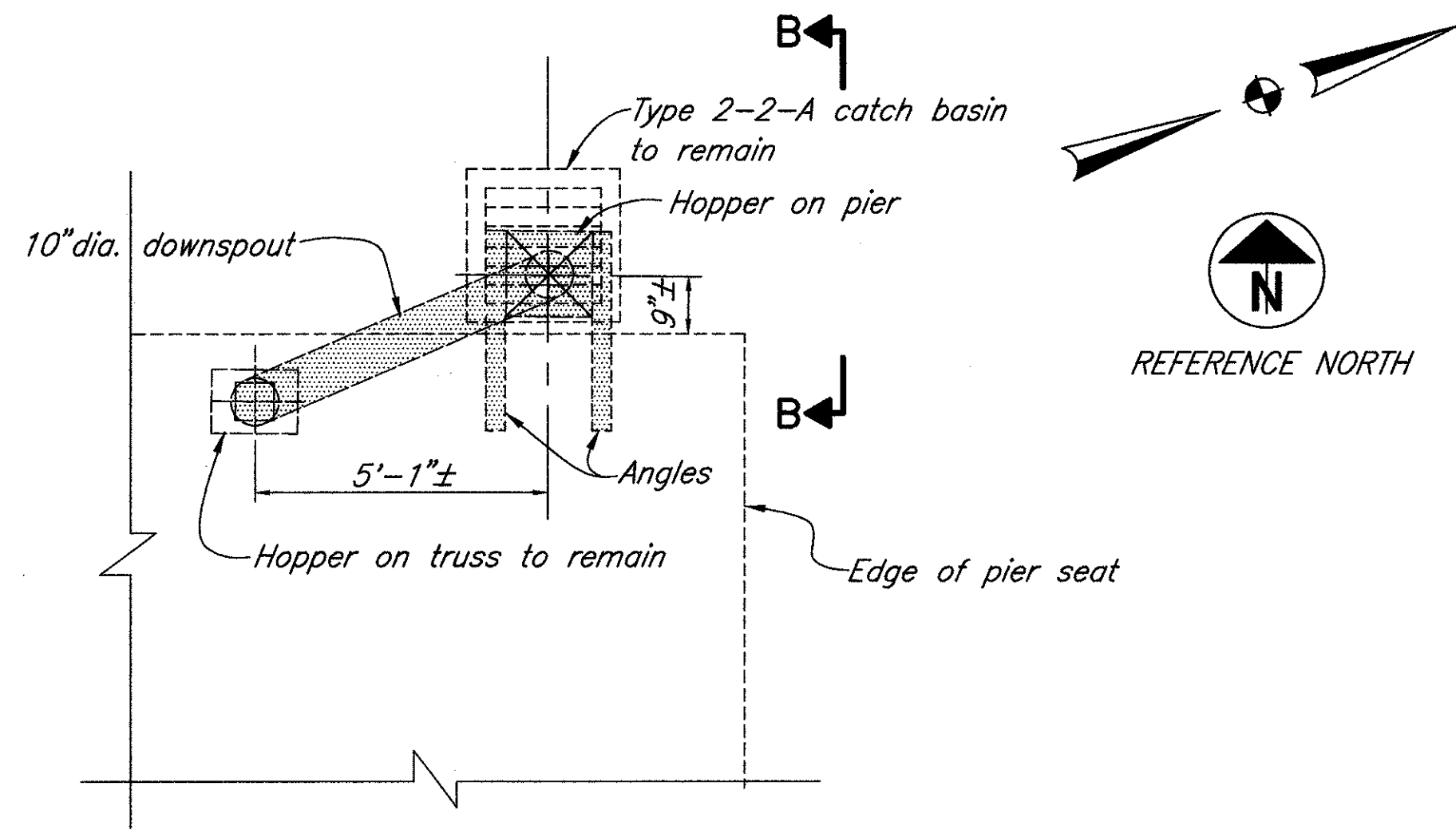
**NOTES**

- MATERIALS:** shown are existing unless otherwise noted.
- PAINTING LIMITS:** Extent of work for painting of existing steel for estimated quantities Item 514-Field painting, misc.: Surface preparation of existing steel, Item 514-Field painting, misc.: Existing structural steel, prime coat, System A, and Item 514-Field painting, misc.: Existing structural steel, finish coat, System A.
- REFURBISH BEARING:** See General Note sheet 7/48
- TEMPORARY SUPPORT:** See sheet 25/48

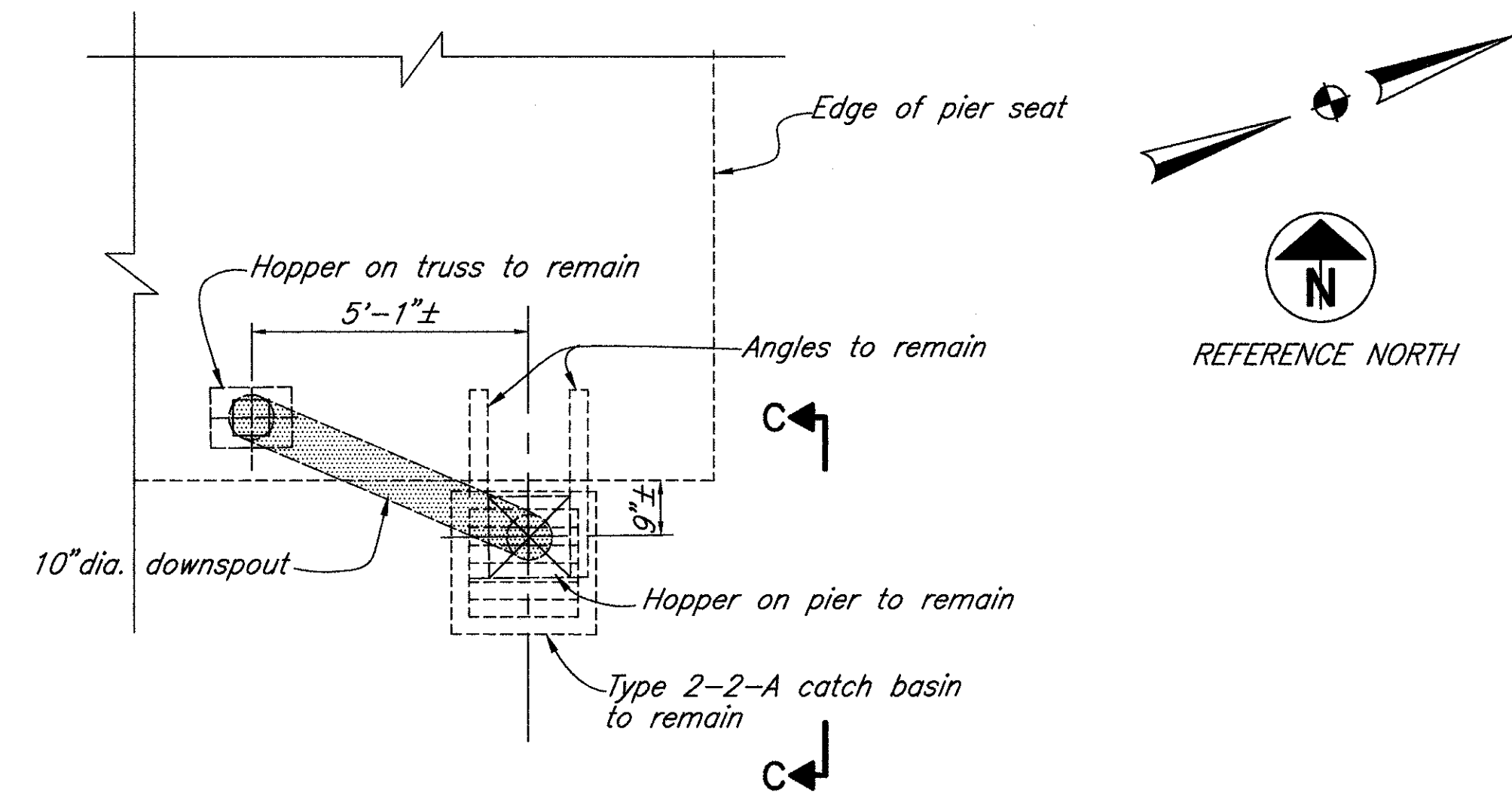
Job No. 93111WP4 Date 12/24/96 Drawn By RB, JLS, JPS, JLS

RICHLAND ENGINEERING LIMITED  
 29 NORTH PARK STREET  
 MANSFIELD, OHIO 44902  
 DATE 12/20/96  
 REVIEWED DAP  
 STRUCTURE FILE NO. 1809393  
 DRAWN RRB  
 DESIGNED KAK  
 CHECKED RWR  
 WEST END PIER GIRDER BEARINGS  
 BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER  
 CUY-90-15.24  
 28 / 48  
 41  
 61

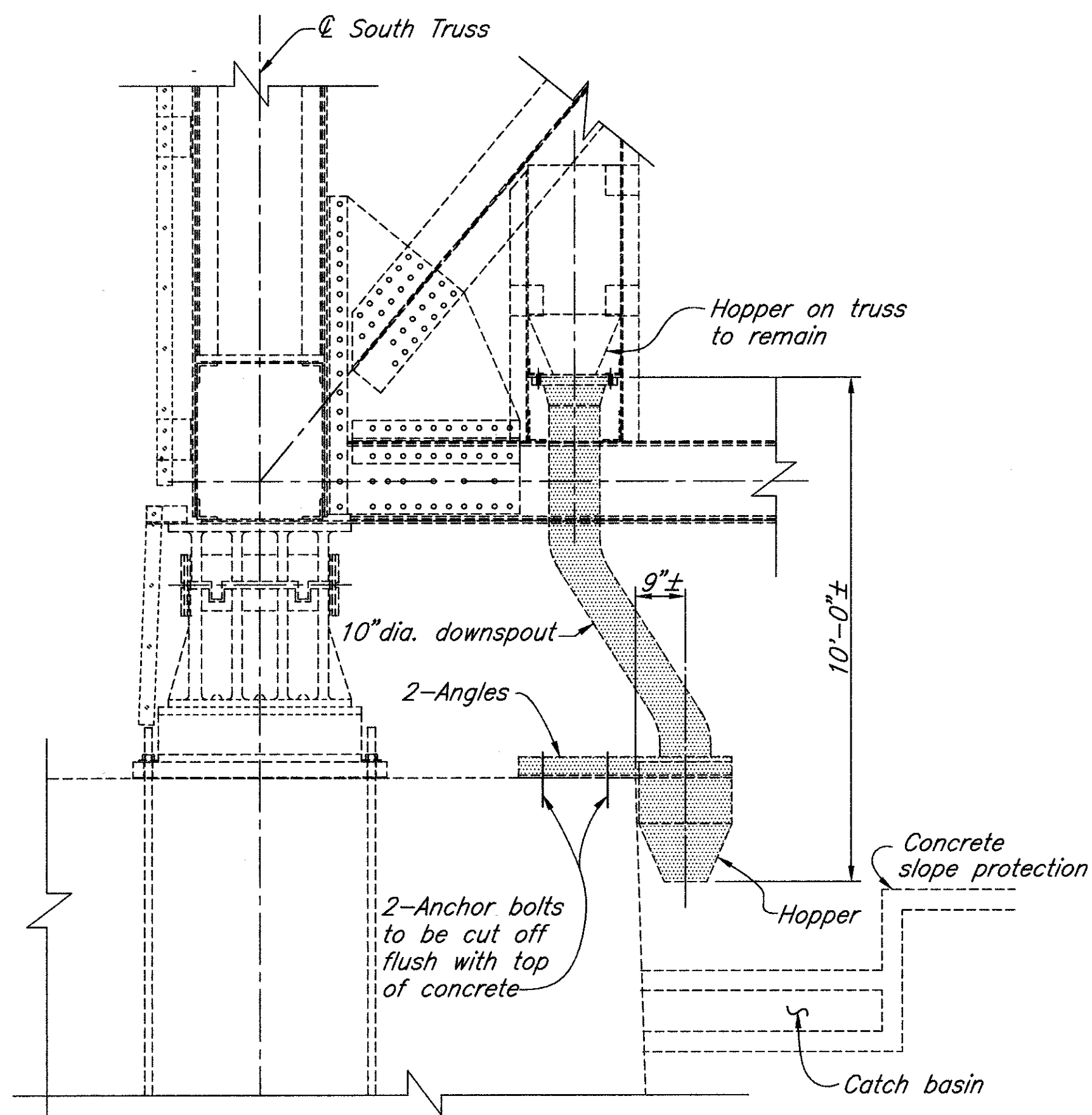




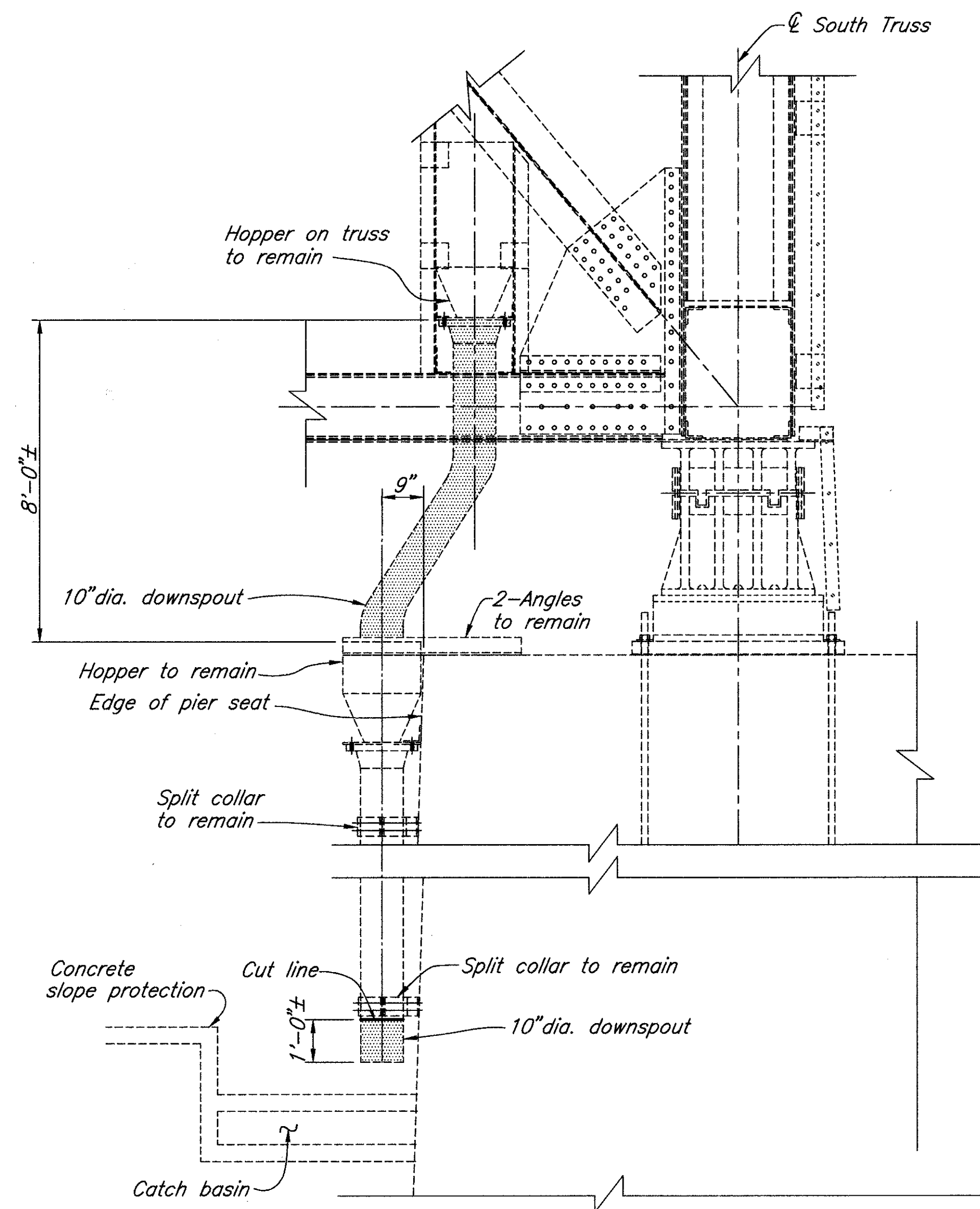
WEST END PIER, RIGHT LEG PLAN



WEST END PIER, LEFT LEG PLAN

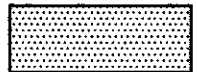


WEST END PIER RIGHT LEG ELEVATION  
VIEW B-B



WEST END PIER LEFT LEG ELEVATION  
VIEW C-C

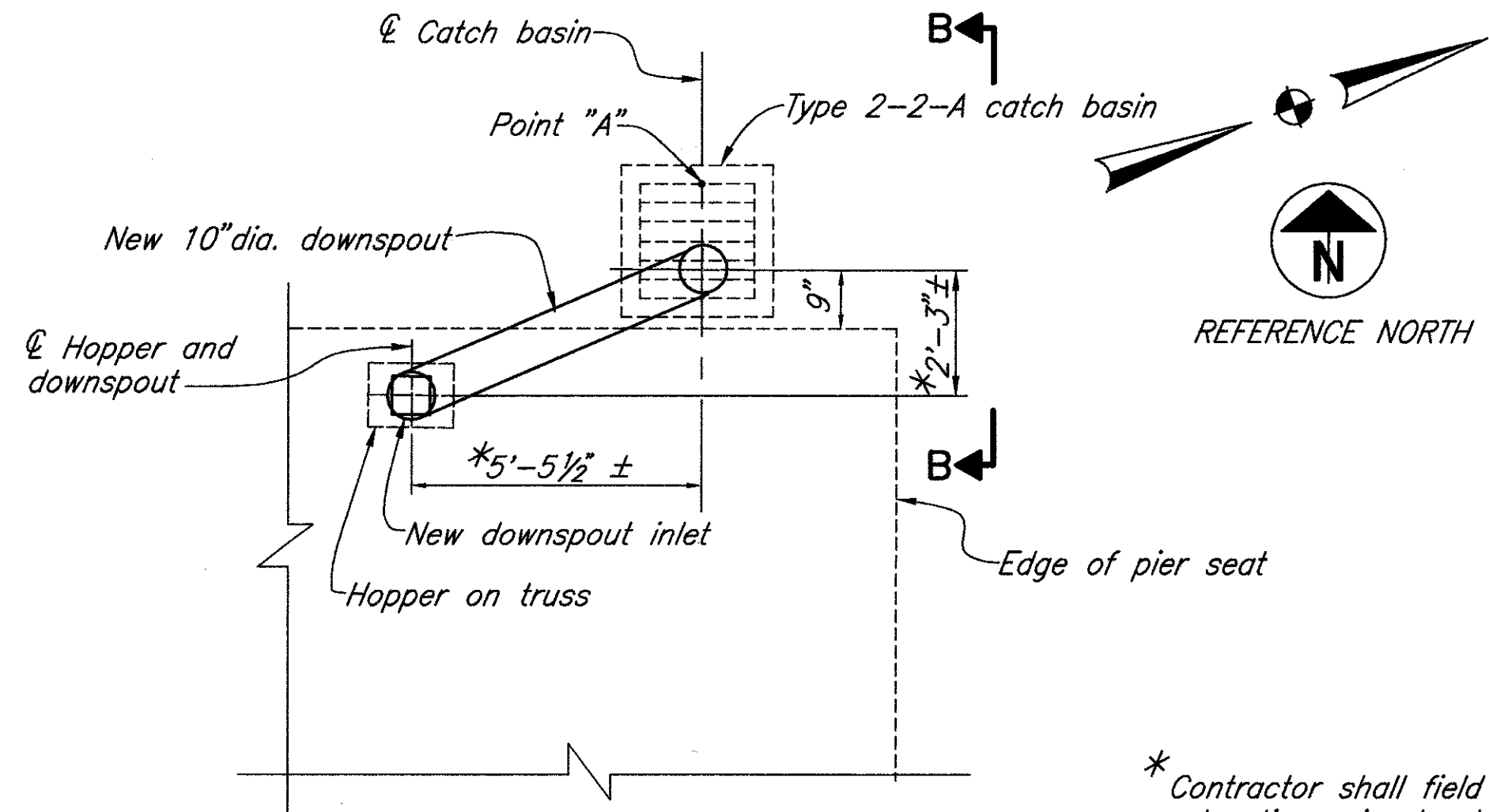
**LEGEND**

 -Denotes area to be removed per Item 202-Portions of structure removed, as per plan

**NOTES**

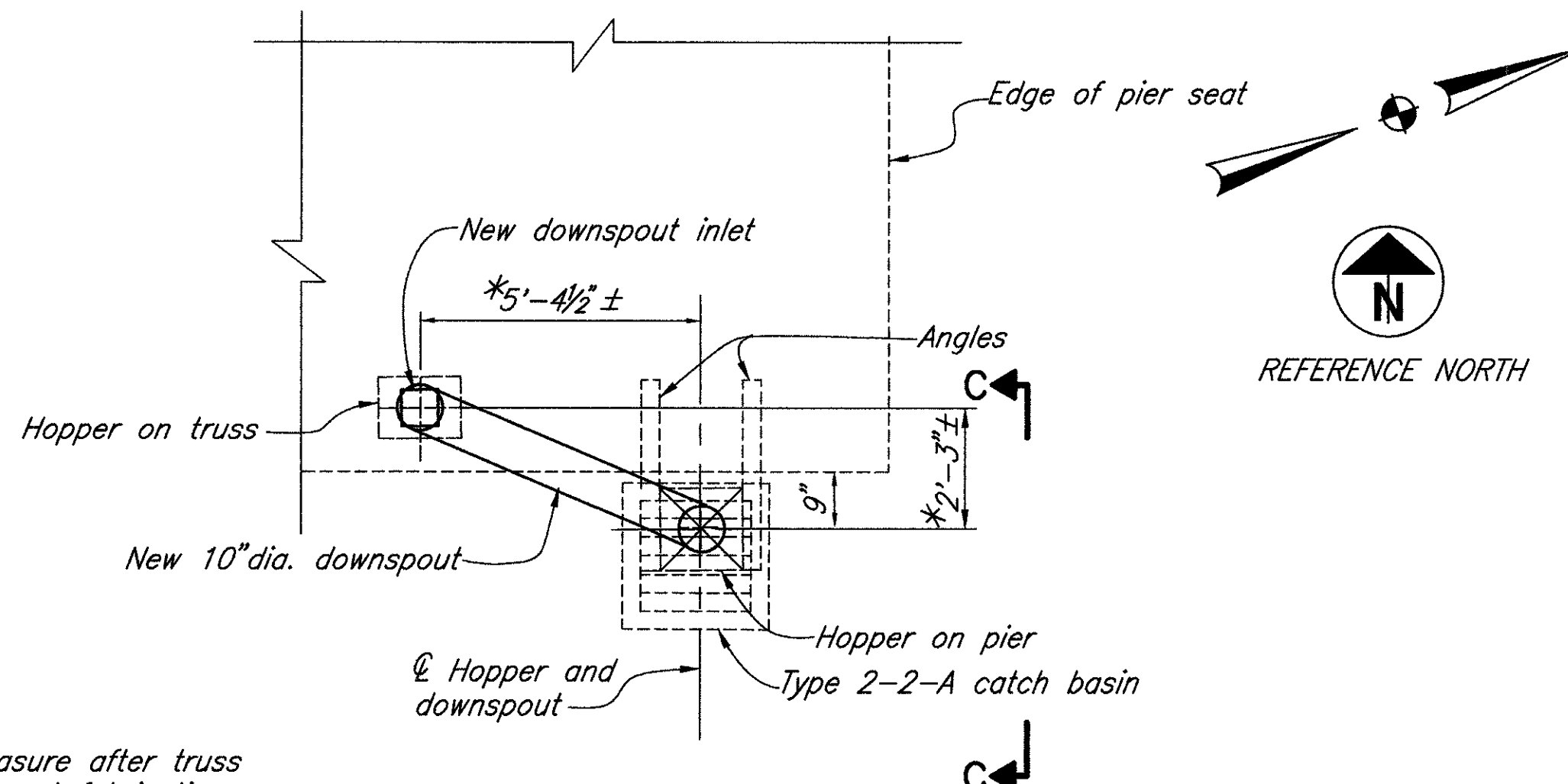
MATERIALS shown are existing unless otherwise noted.

Job No. 93111WP6 Date 12/26/96 Drawn By TMH-JLS,JPS,JLS

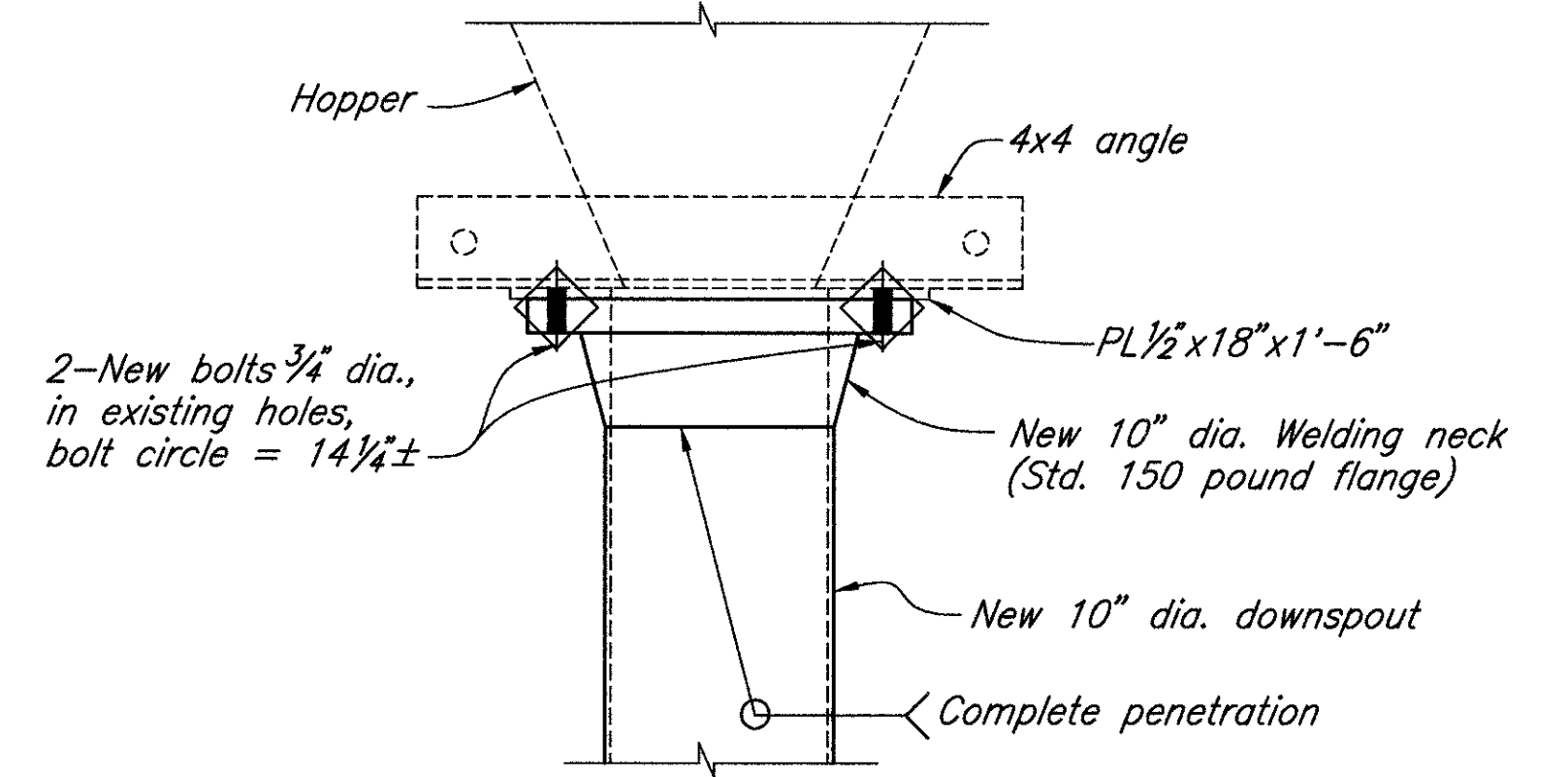


WEST END PIER, RIGHT LEG PLAN

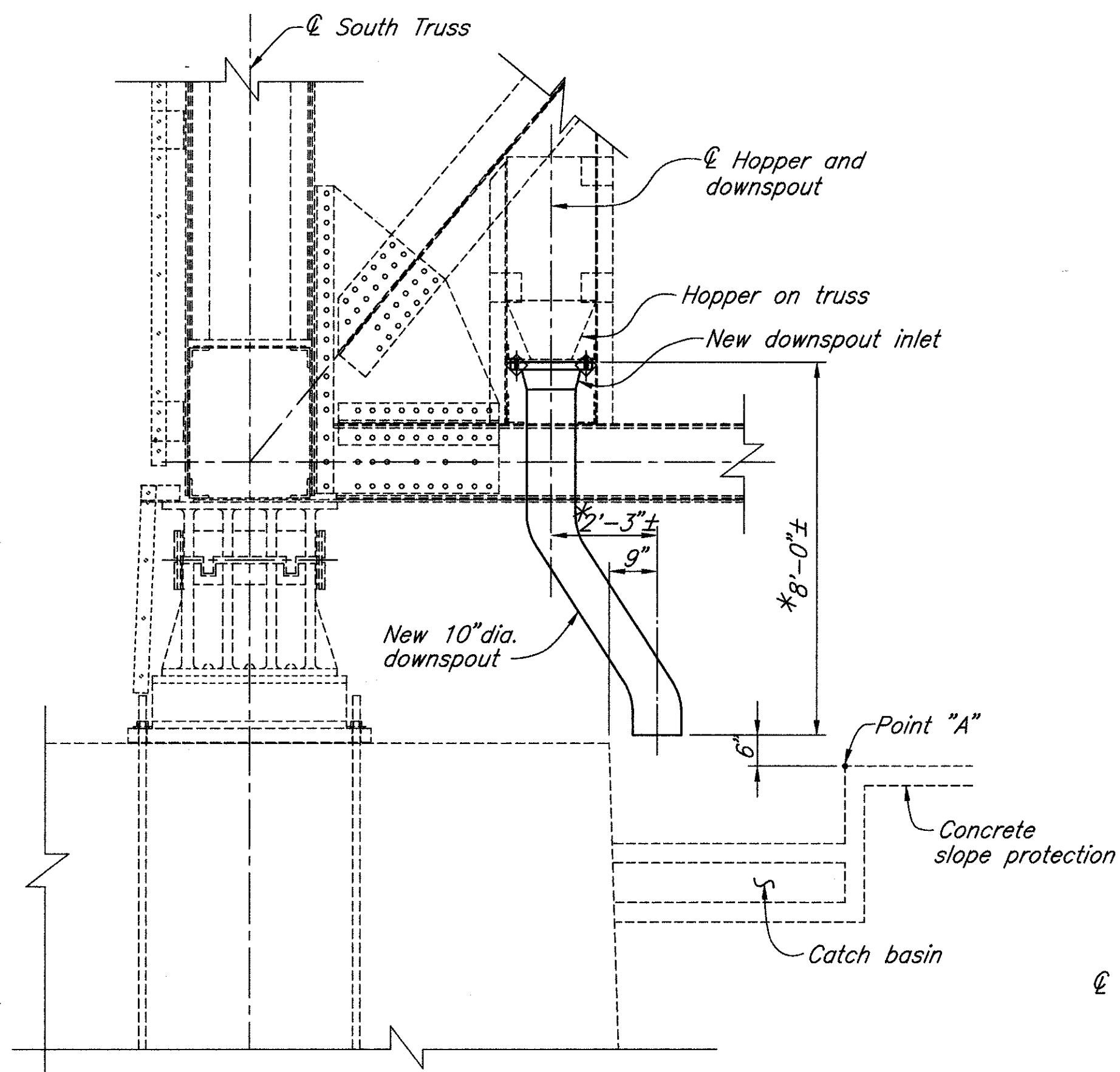
\* Contractor shall field measure after truss relocation prior to downspout fabrication



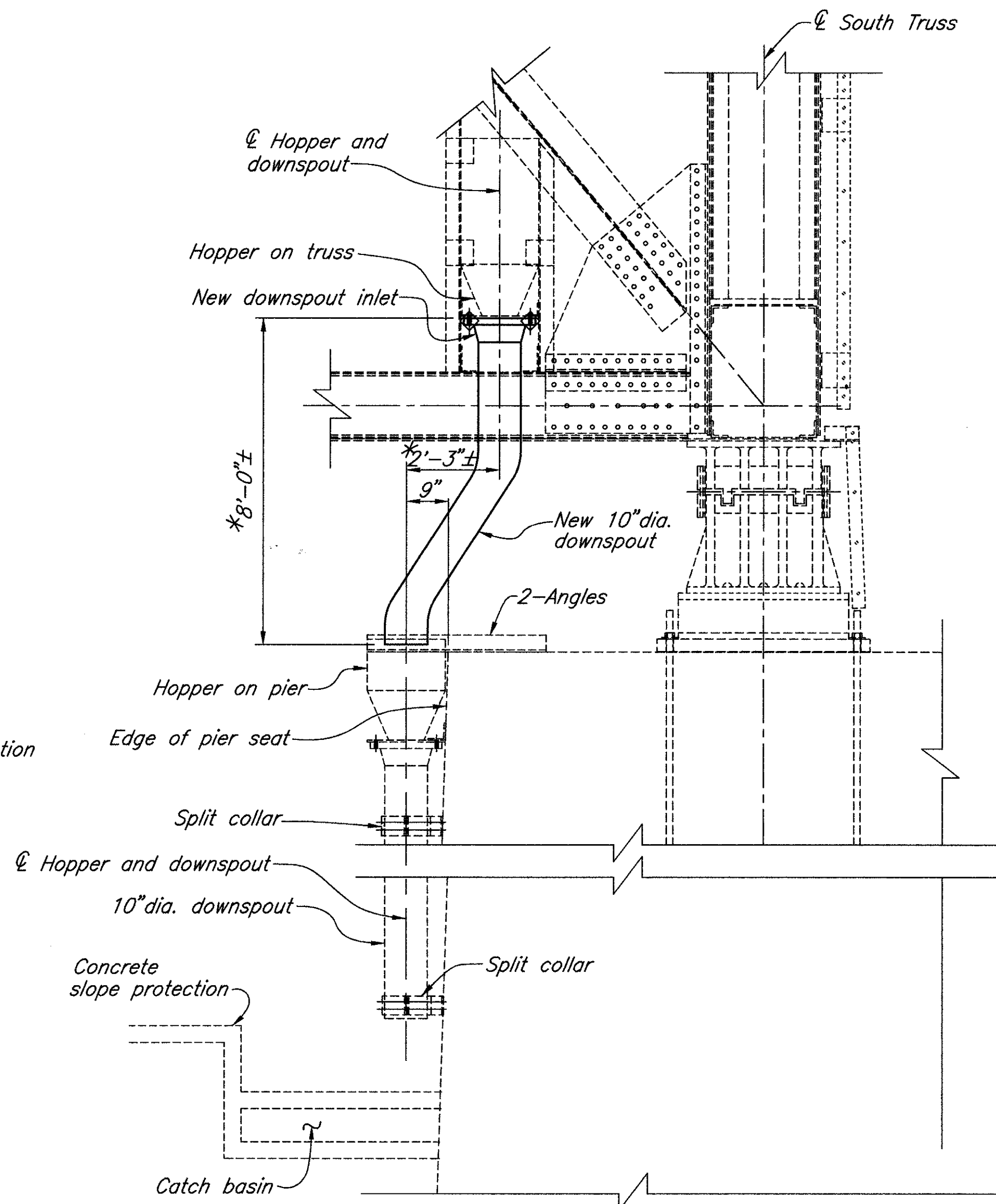
WEST END PIER, LEFT LEG PLAN



DOWNSPOUT INLET DETAIL



WEST END PIER RIGHT LEG ELEVATION  
VIEW B-B



WEST END PIER LEFT LEG ELEVATION  
VIEW C-C

**NOTES**

**MATERIALS** shown are existing unless otherwise noted.

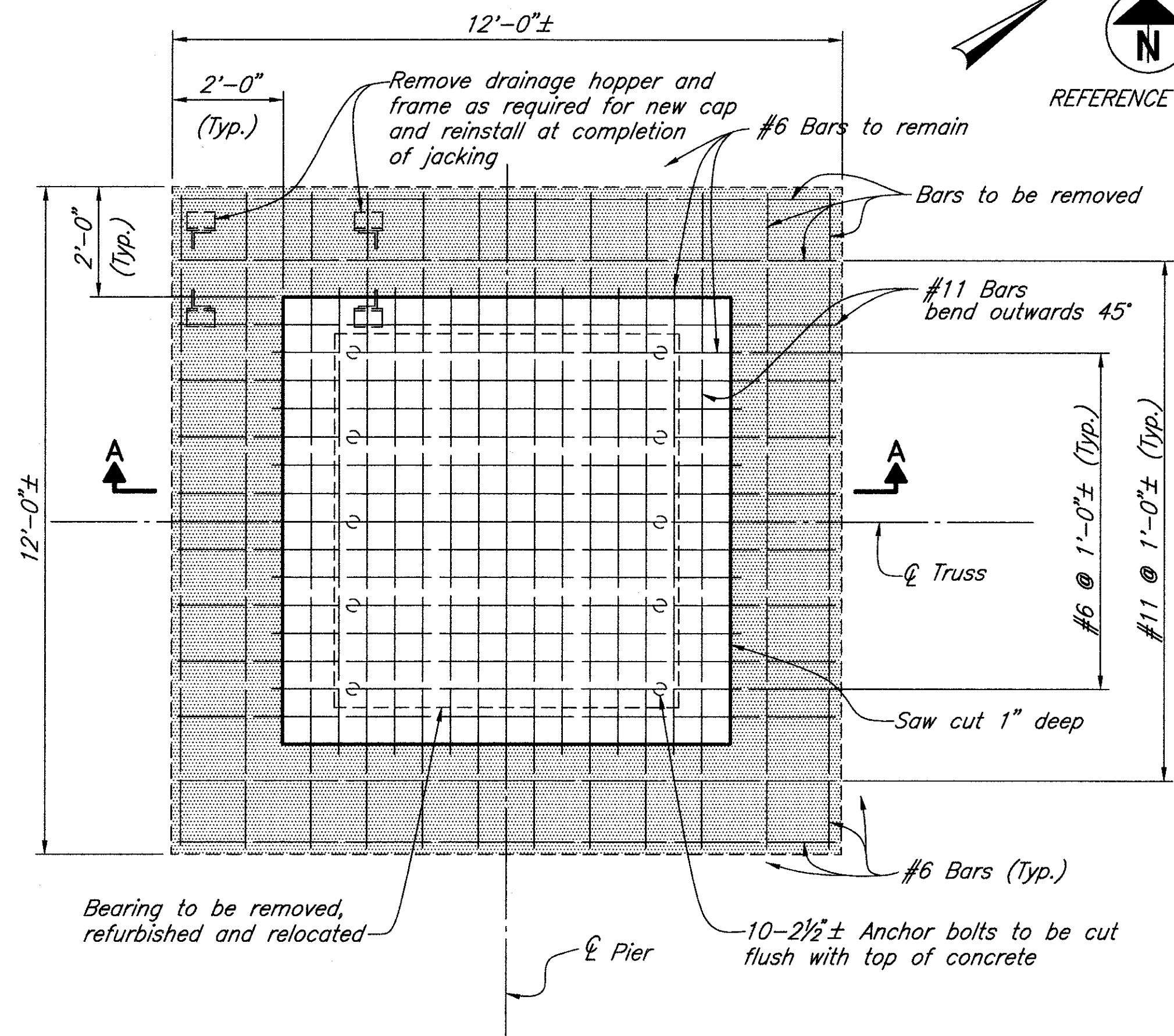
**PIPE DOWNSPOUT:** See General Note sheet 8/48

**CONNECTION BOLT** shall be 3/4" dia. A325 galvanized.

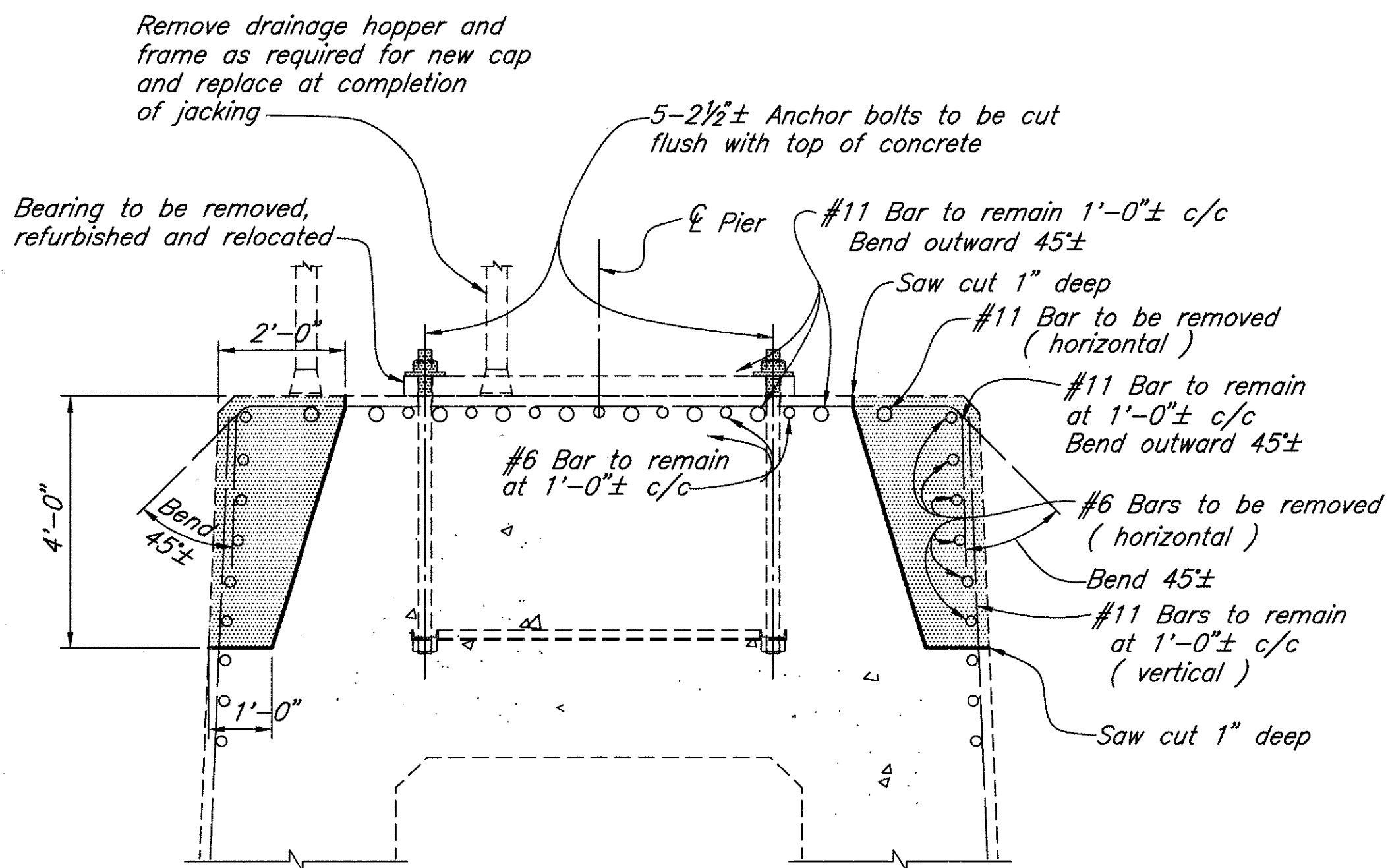
**BOLT LEGEND:** See sheet 25/48

DATE	12/20/96
REVIEWED	DAP
STRUCTURE FILE NO.	1809393
DRAWN	TMH
CHECKED	RWP



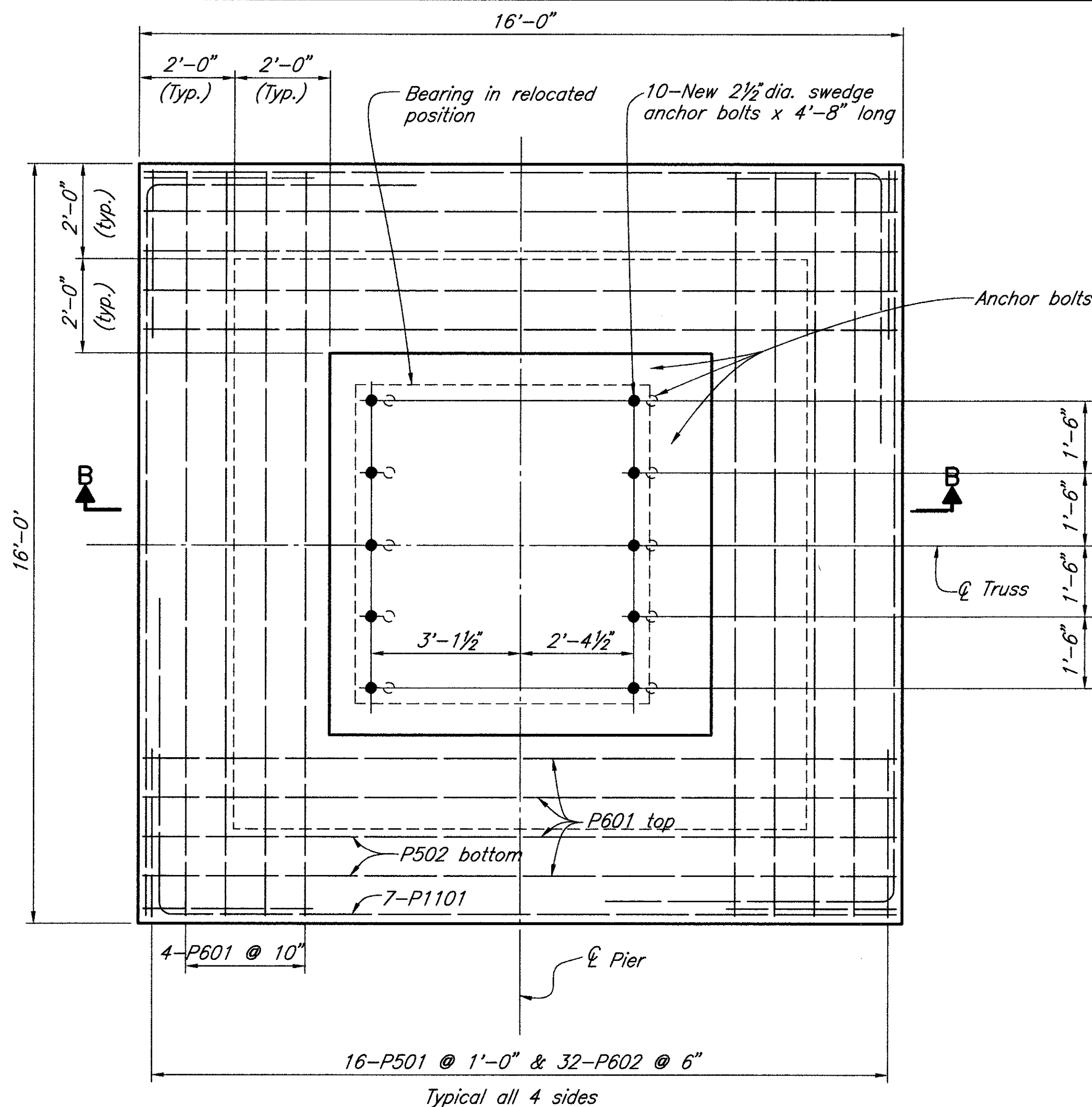


PIER 1 REMOVAL PLAN

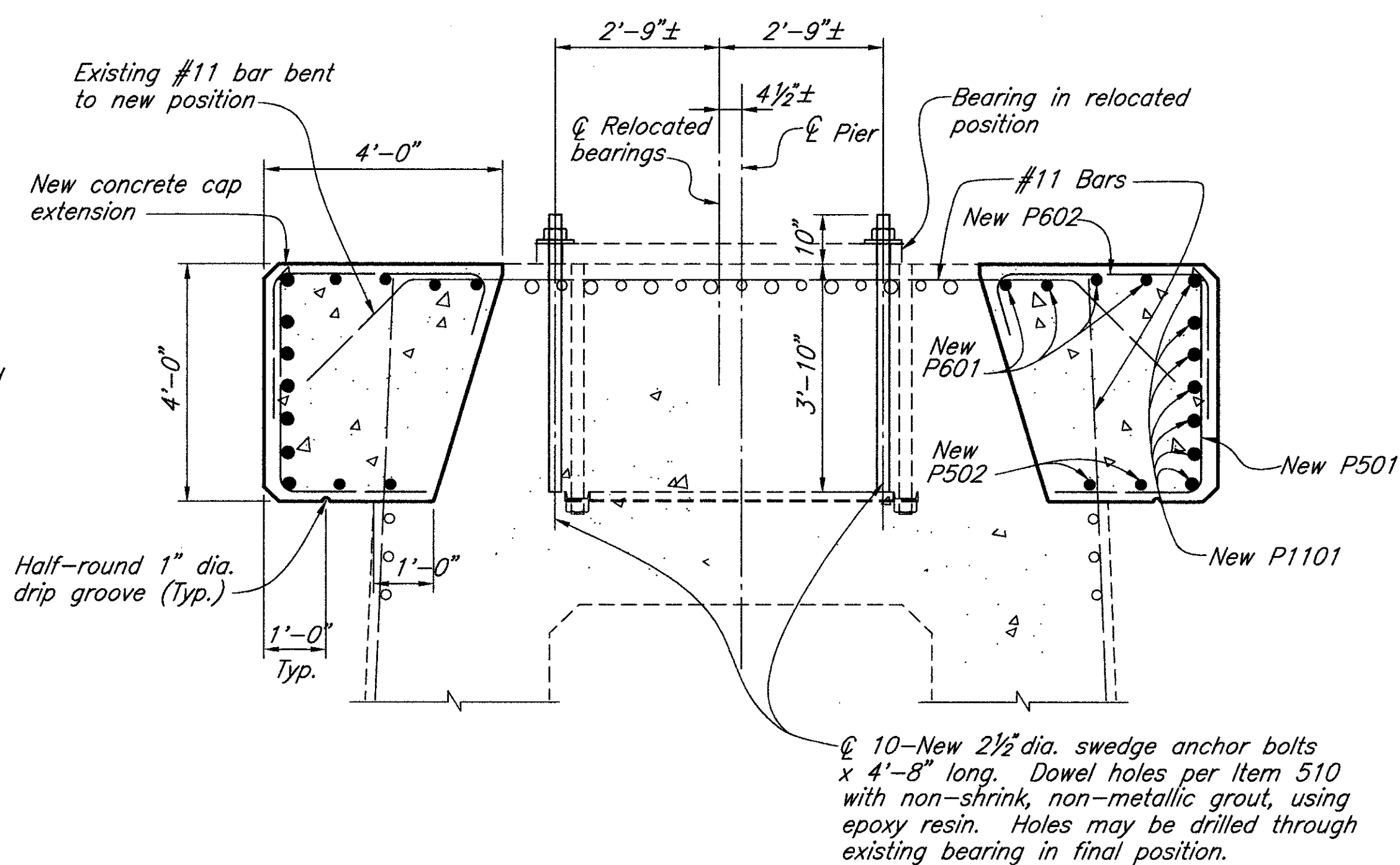


NOTE: Reinforcing steel designated to remain shall not be cut.

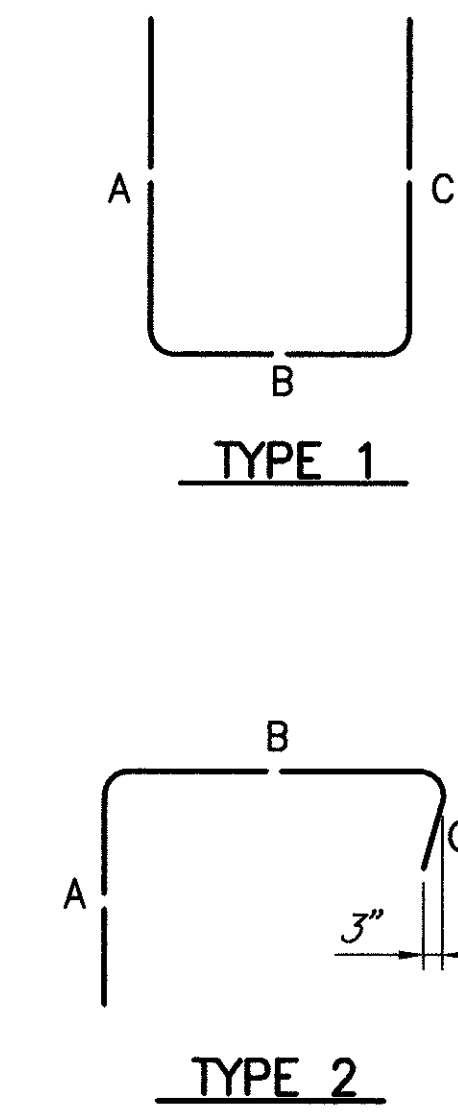
SECTION A-A



PIER 1 NEW PLAN



SECTION B-B



MARK	NO.	LENGTH	TYPE	A	B	C
P501	128	5'-9"	1	3'-6"	2'-6"	0
P502	16	22'-5"	1	3'-6"	15'-8"	3'-6"
P601	32	20'-8"	1	2'-9"	15'-6"	2'-9"
P602	256	7'-1"	2	2'-9"	3'-8"	1'-0"
P1101	56	20'-9"	1	5'-7"	15'-6"	0

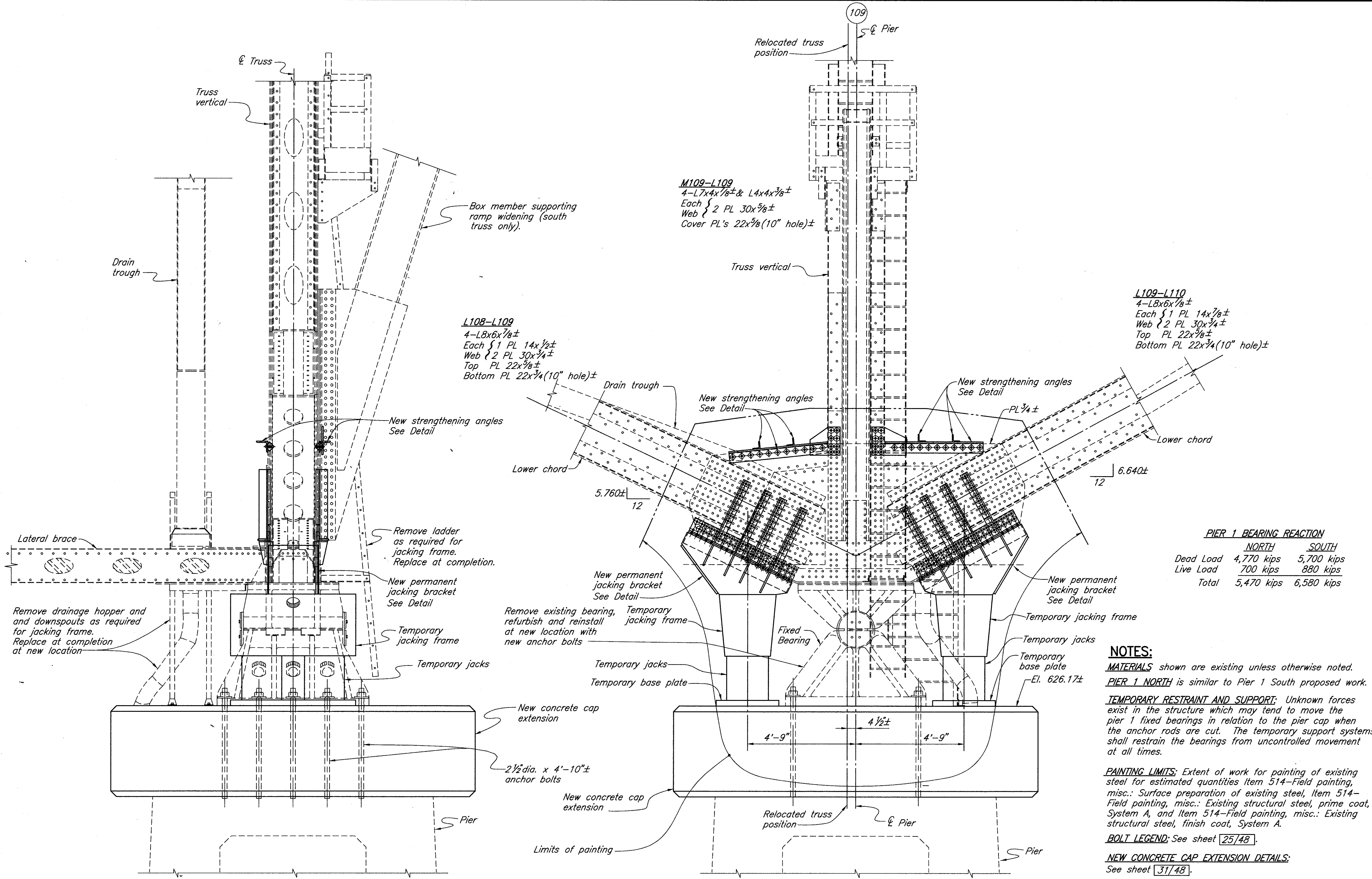
LEGEND

-Denotes area to be removed per Item 202-Portions of structure removed, as per plan

NOTES:

- MATERIALS shown are existing unless otherwise noted.
- REINFORCING STEEL: All reinforcing steel shall be epoxy coated.
- PIER 1 NORTH is similar to Pier 1 South proposed work.
- REFURBISH BEARING DETAILS: See sheet 34/48
- DRAINAGE COLLECTION HOPPERS shall be removed while concrete cap is rebuilt, and structure jacked. Temporary drains will be connected to the longitudinal conductor troughs to prevent the bridge drainage from interrupting the work on the pier cap. After the structure is reset, the hoppers and frame are to be reinstalled and connected to the downspout as shown on sheet 36/48. Payment for removal of existing drainage collection hoppers; temporary drains installation and removal; and installation of reused existing drainage collection hoppers shall be included with Item 518 - Structure drainage, misc.: Relocate Pier 1 drainage hopper.

Job No. 9311PR2 Date 12/24/96 Drawn By KAK,JPS,RB,TWH,LS



PIER 1 SOUTH (LOOKING EAST)

PIER 1 SOUTH (LOOKING NORTH)

**L108-L109**  
 4-L8x6x7/8±  
 Each { 1 PL 14x1/2±  
 Web { 2 PL 30x3/4±  
 Top PL 22x3/8±  
 Bottom PL 22x3/4(10" hole)±

**M109-L109**  
 4-L7x4x1/8± & L4x4x3/8±  
 Each { 2 PL 30x5/8±  
 Web { 2 PL 30x5/8±  
 Cover PL's 22x3/8(10" hole)±

**L109-L110**  
 4-L8x6x7/8±  
 Each { 1 PL 14x7/8±  
 Web { 2 PL 30x3/4±  
 Top PL 22x3/8±  
 Bottom PL 22x3/4(10" hole)±

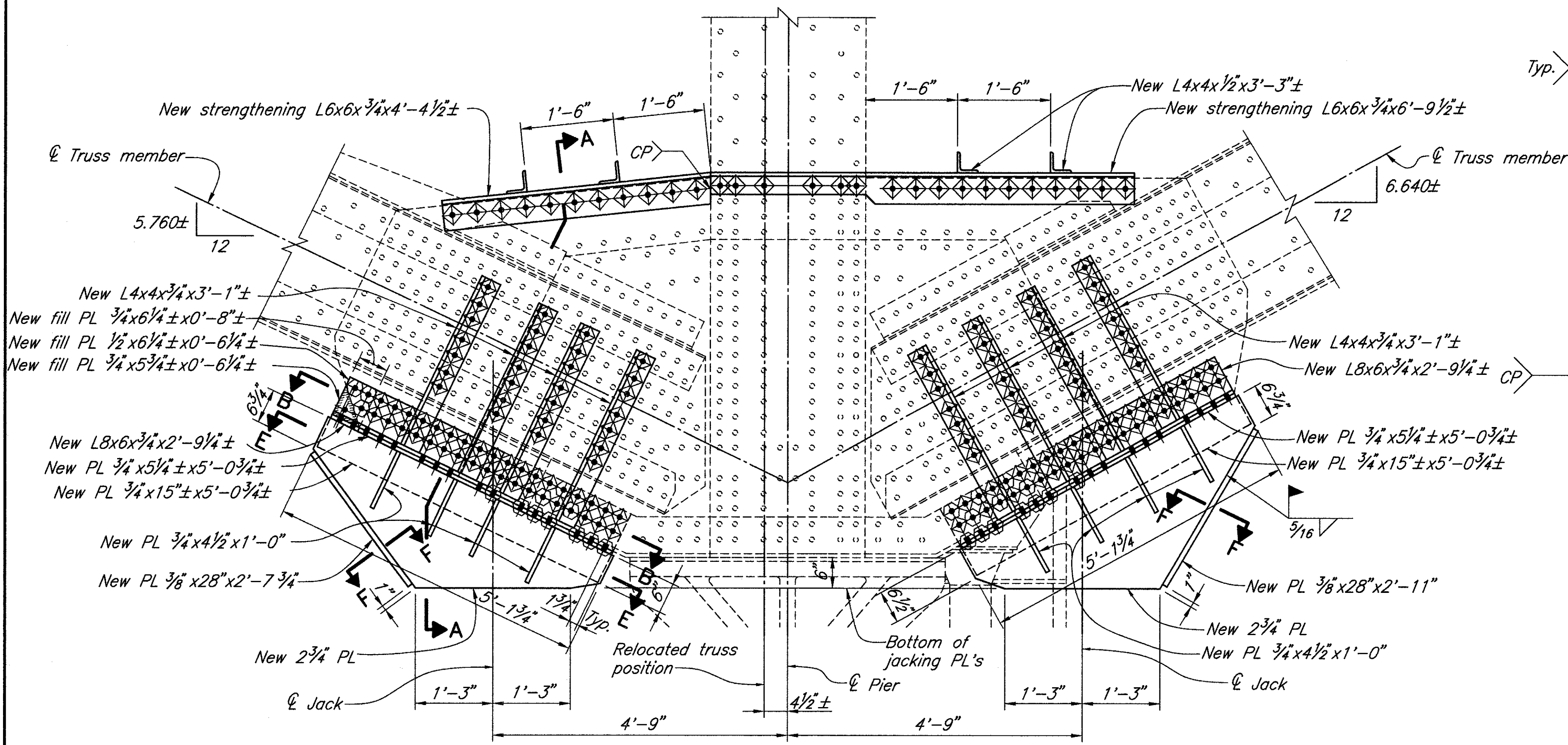
**PIER 1 BEARING REACTION**

	NORTH	SOUTH
Dead Load	4,770 kips	5,700 kips
Live Load	700 kips	880 kips
Total	5,470 kips	6,580 kips

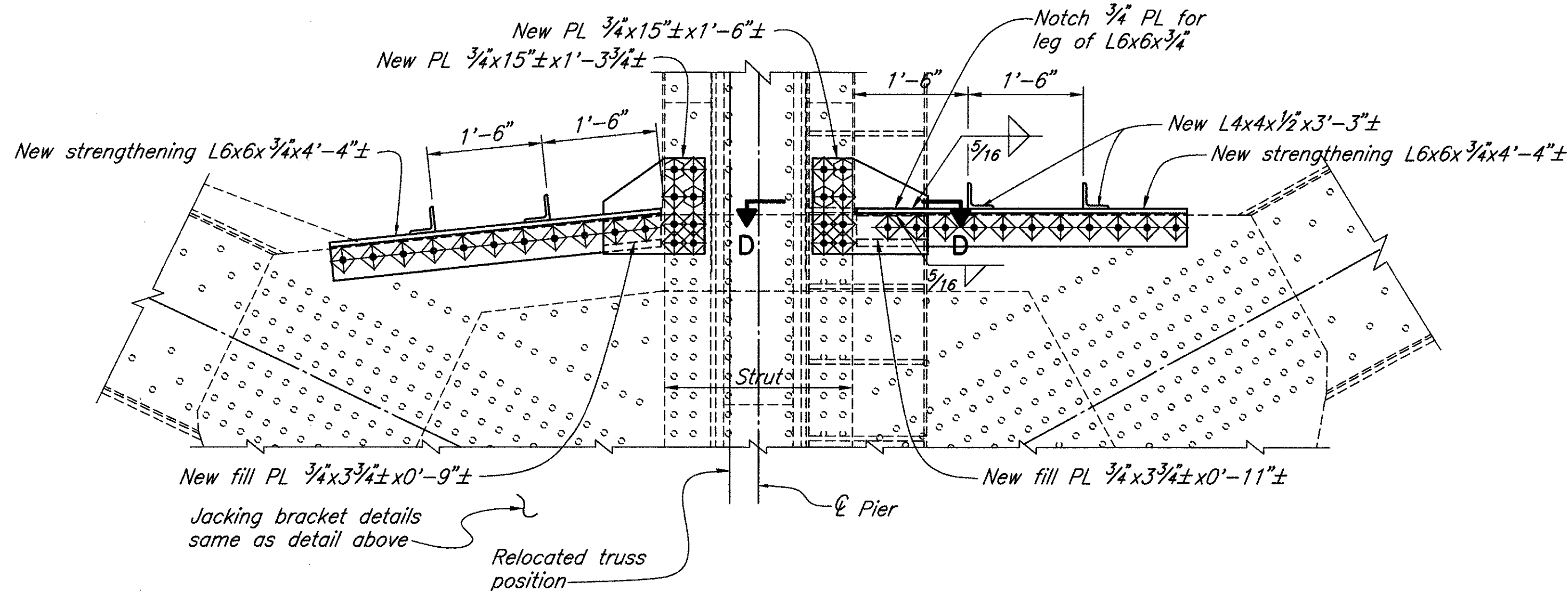
**NOTES:**  
**MATERIALS** shown are existing unless otherwise noted.  
**PIER 1 NORTH** is similar to Pier 1 South proposed work.  
**TEMPORARY RESTRAINT AND SUPPORT:** Unknown forces exist in the structure which may tend to move the pier 1 fixed bearings in relation to the pier cap when the anchor rods are cut. The temporary support systems shall restrain the bearings from uncontrolled movement at all times.  
**PAINTING LIMITS:** Extent of work for painting of existing steel for estimated quantities Item 514-Field painting, misc.: Surface preparation of existing steel, Item 514-Field painting, misc.: Existing structural steel, prime coat, System A, and Item 514-Field painting, misc.: Existing structural steel, finish coat, System A.  
**BOLT LEGEND:** See sheet [25/48].  
**NEW CONCRETE CAP EXTENSION DETAILS:** See sheet [31/48].  
**NEW JACKING BRACKET AND STRENGTHENING ANGLE DETAIL:** See sheet [33/48].  
**REFURBISH BEARING DETAILS:** See sheet [34/48].  
**DRAINAGE DETAILS:** See sheet [35/48] and [36/48].



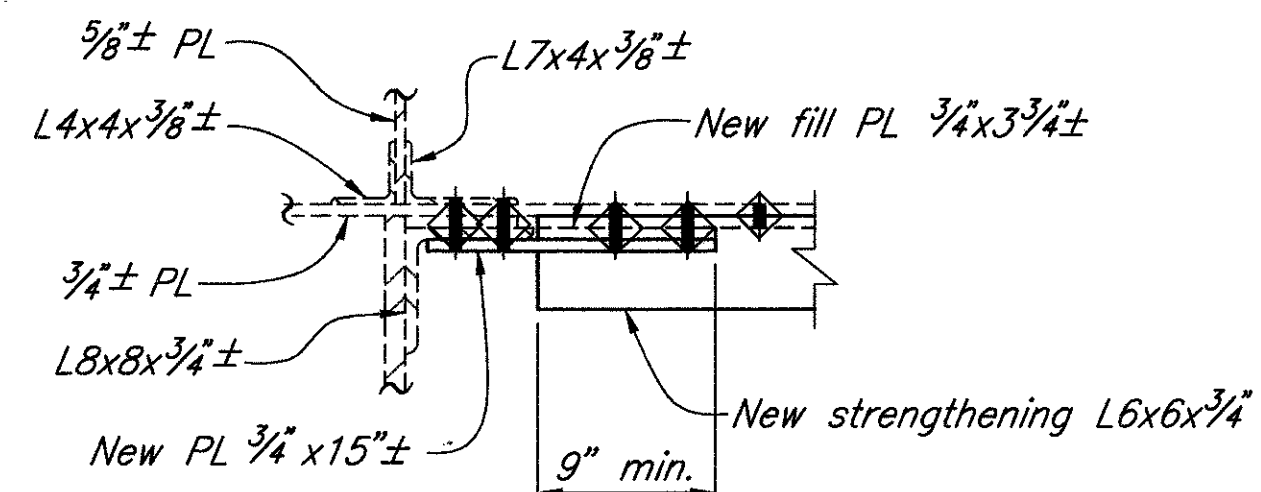
Job No. 93111PR3 Date 12/26/96 Drawn By JLS,TWH,JLS



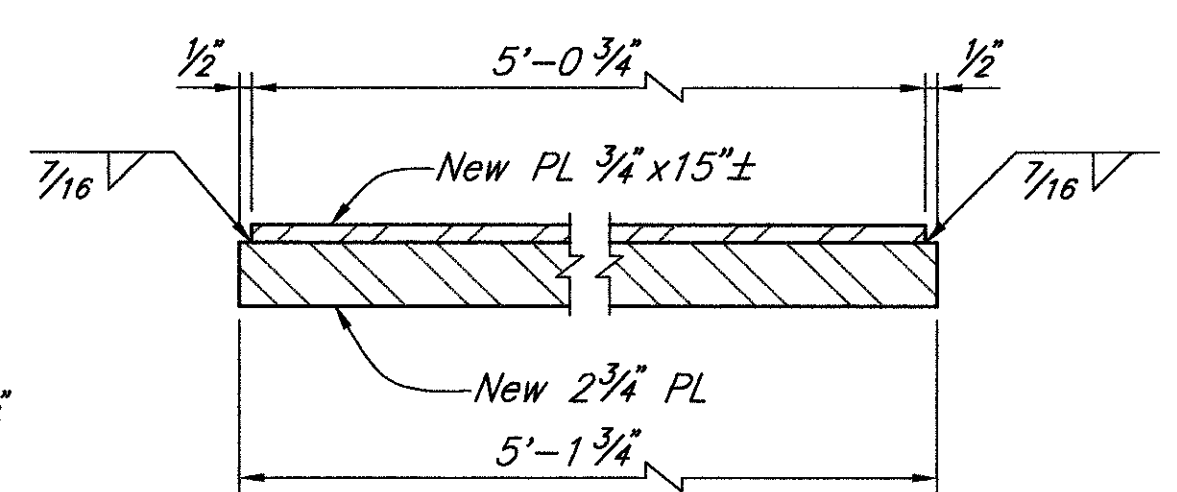
**JACKING BRACKET NORTH & SOUTH TRUSS AND STRENGTHENING ANGLE DETAIL - NORTH TRUSS**  
 (LOOKING NORTH)  
 (NORTH & SOUTH TRUSS LOOKING SOUTH - SIMILAR)  
 (3 Locations)



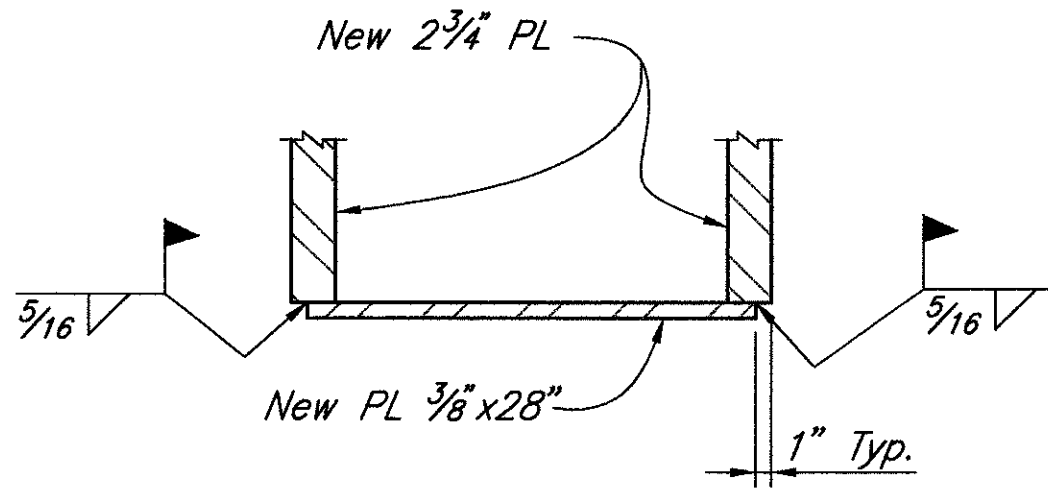
**STRENGTHENING ANGLE DETAIL - SOUTH TRUSS**  
 (LOOKING NORTH)  
 (1 Location)



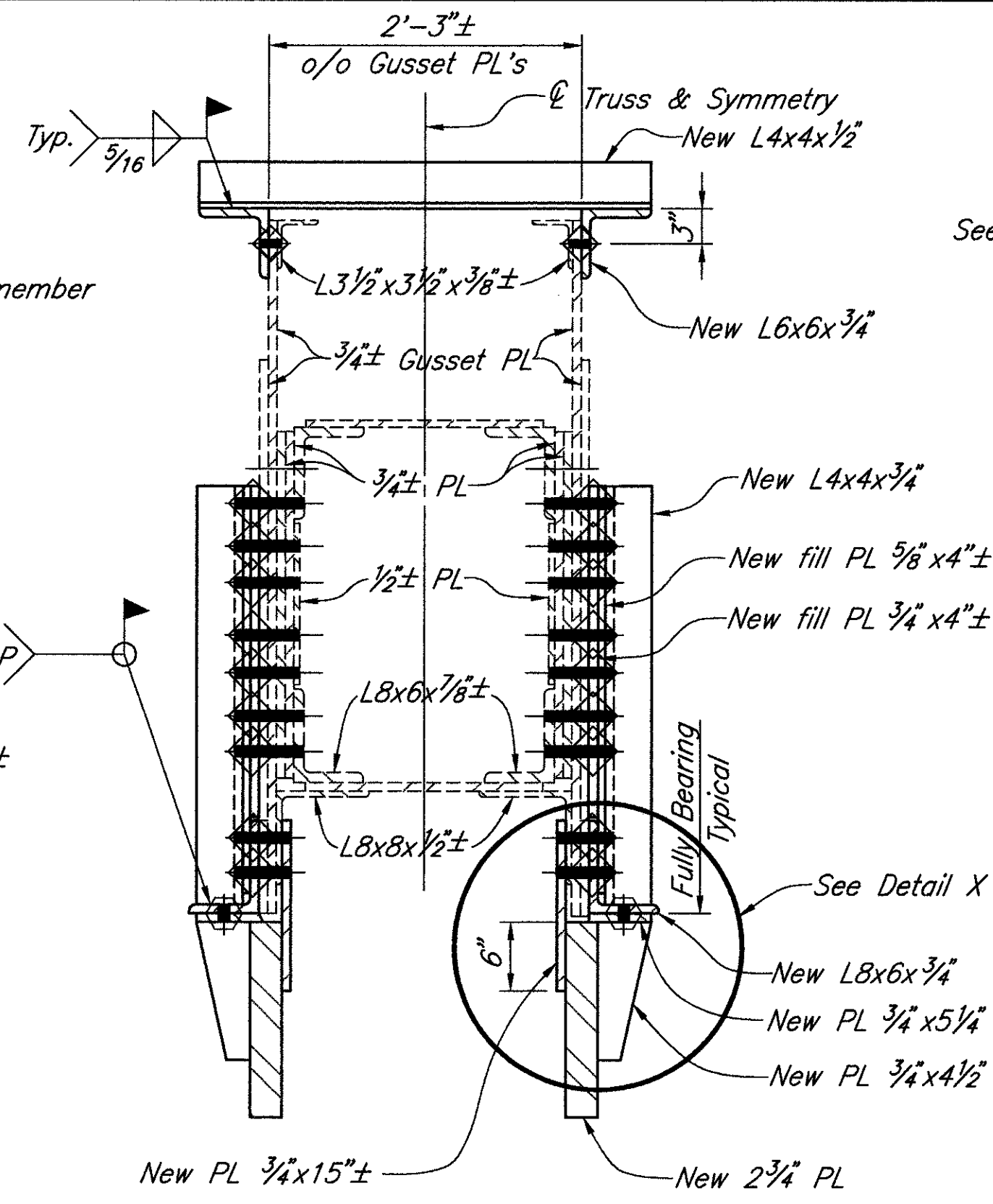
**SECTION D-D**



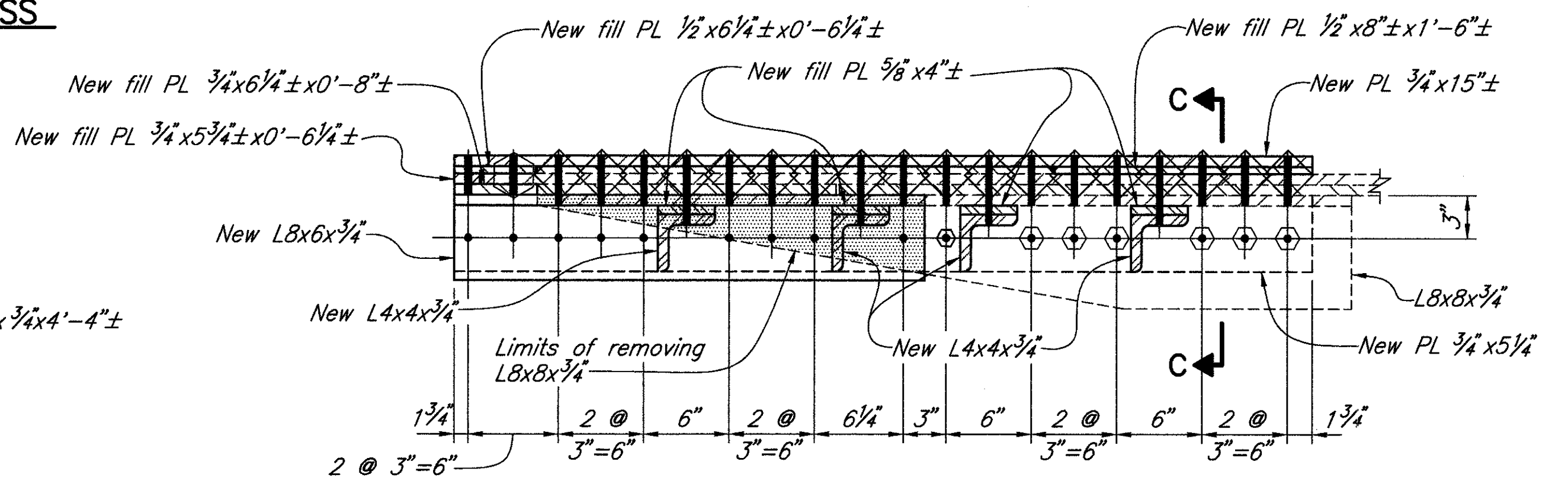
**SECTION E-E**



**SECTION F-F**



**SECTION A-A**

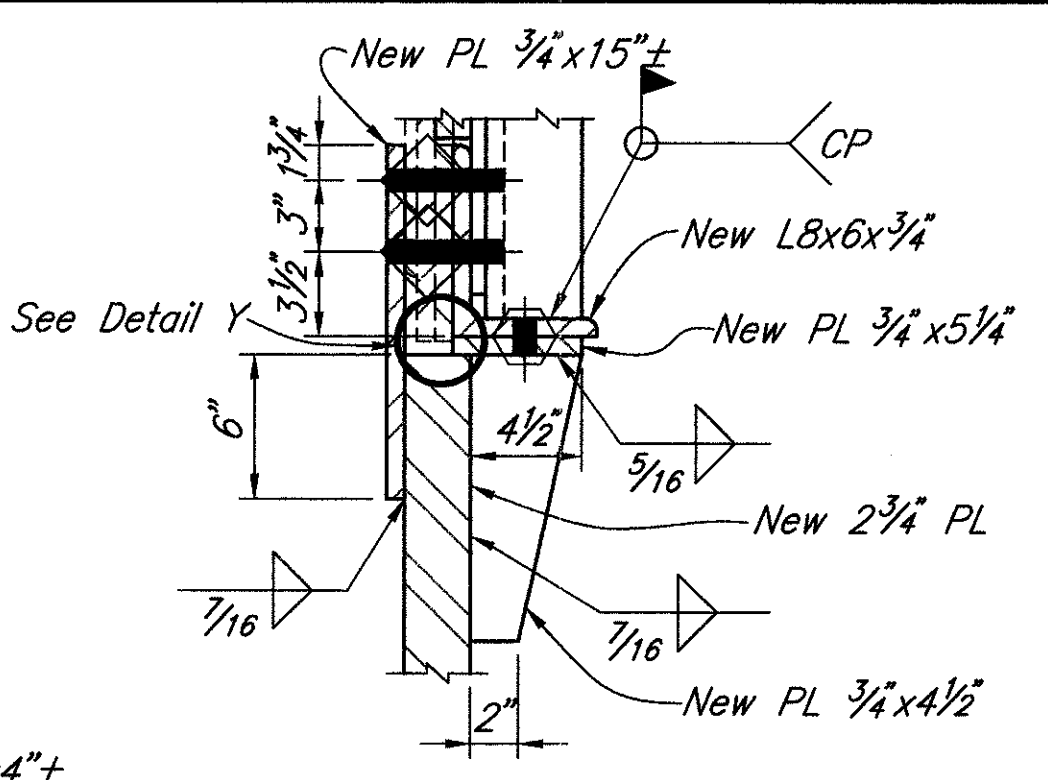


**SECTION B-B**

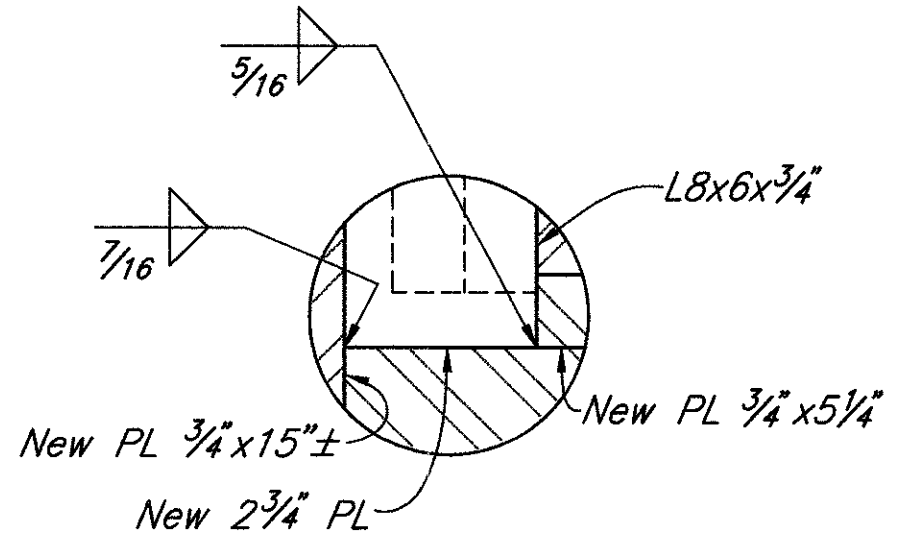
**LEGEND**  
 -Denotes area to be removed per Item 202-Portions of structure removed, as per plan

**NOTES:**  
 MATERIALS shown are existing unless otherwise noted.  
 CP: Indicates complete penetration weld.  
 NEW BOLTS: 1" Dia. A490 unless noted.  
 BOLTING SEQUENCE: Removal of rivets and placement of new bolts shall be done one side of truss member at a time.  
 BOLT LEGEND: See sheet 25 / 48

**SECTION C-C**



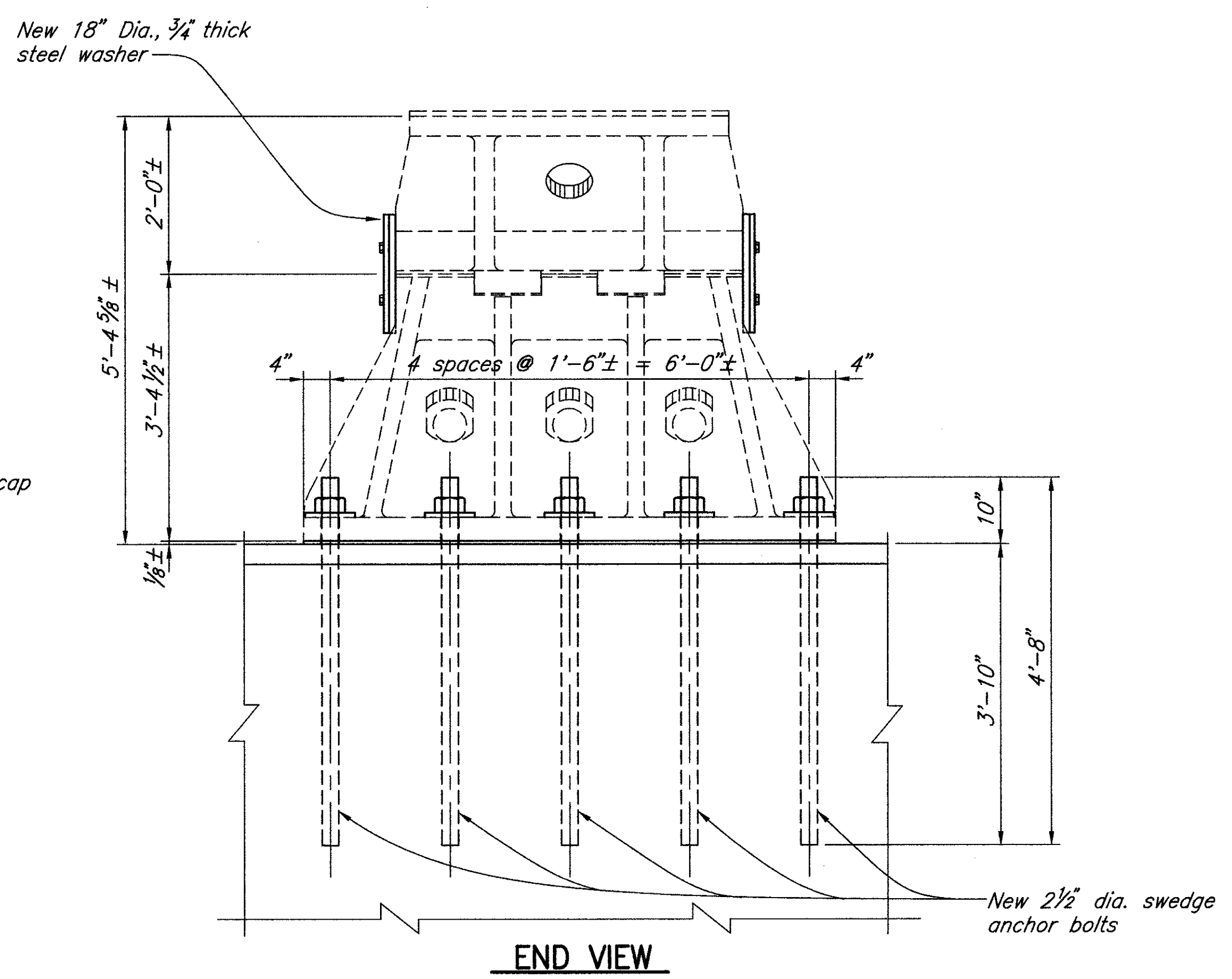
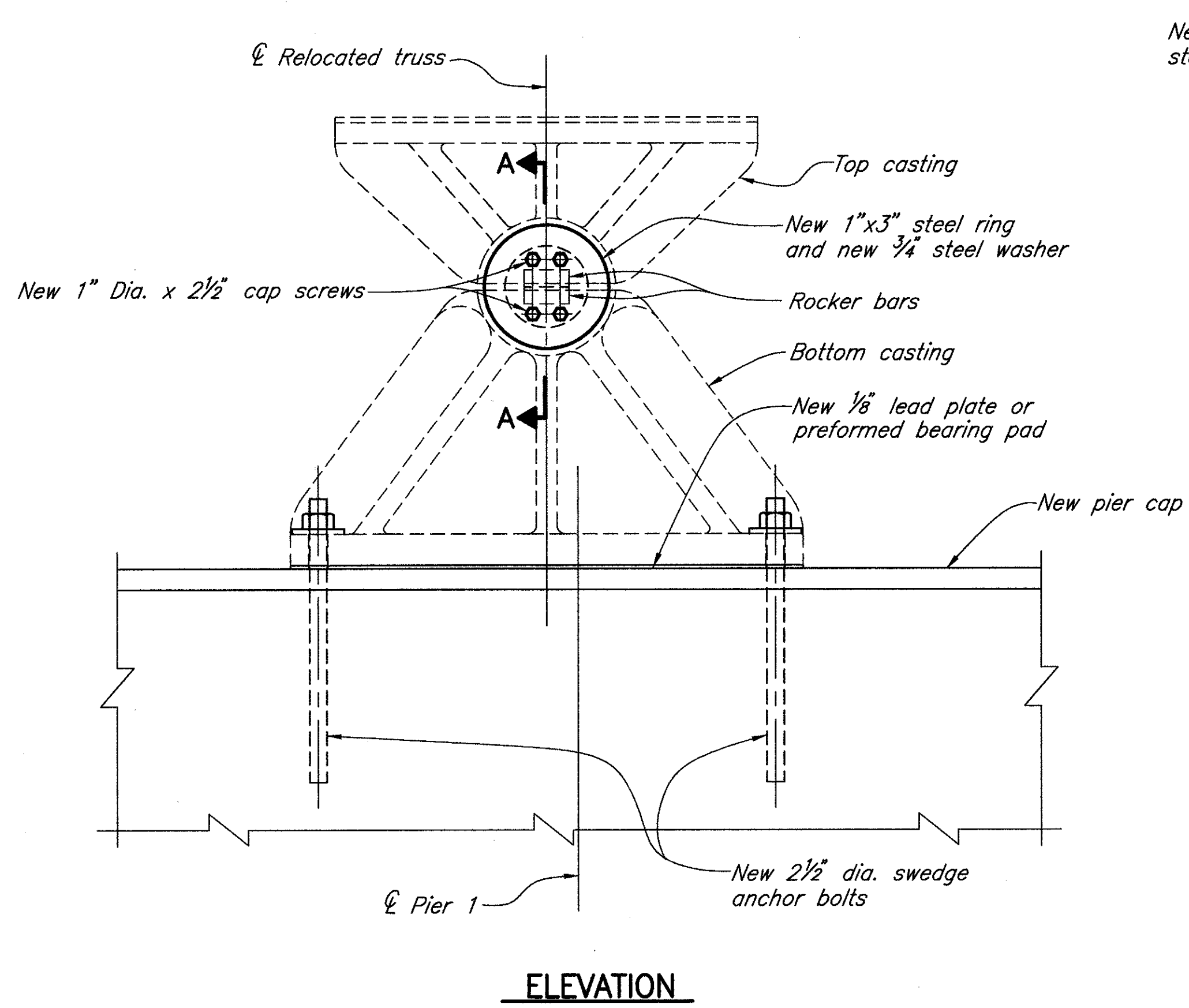
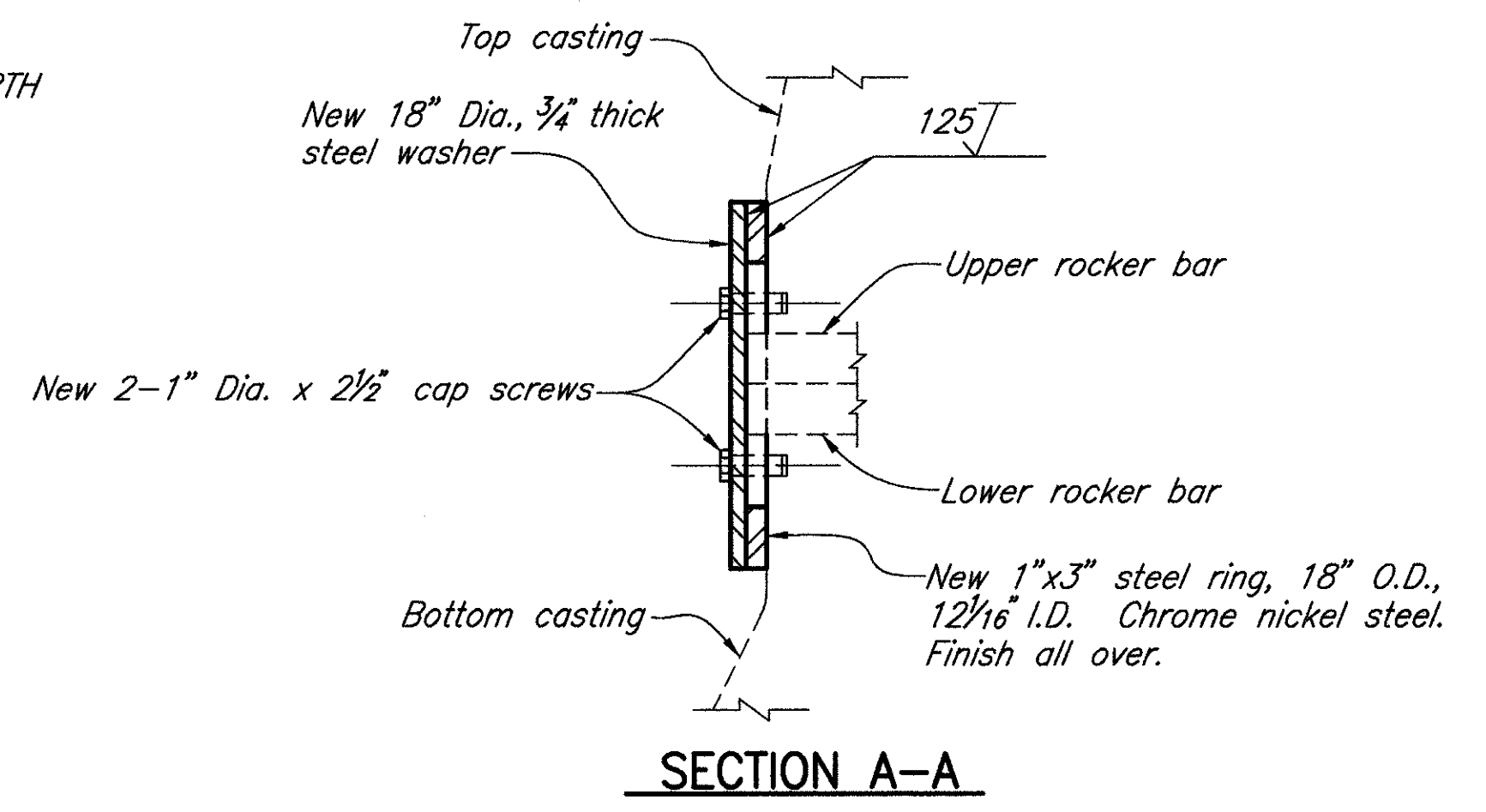
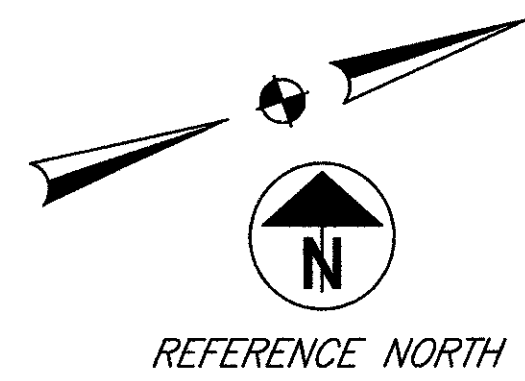
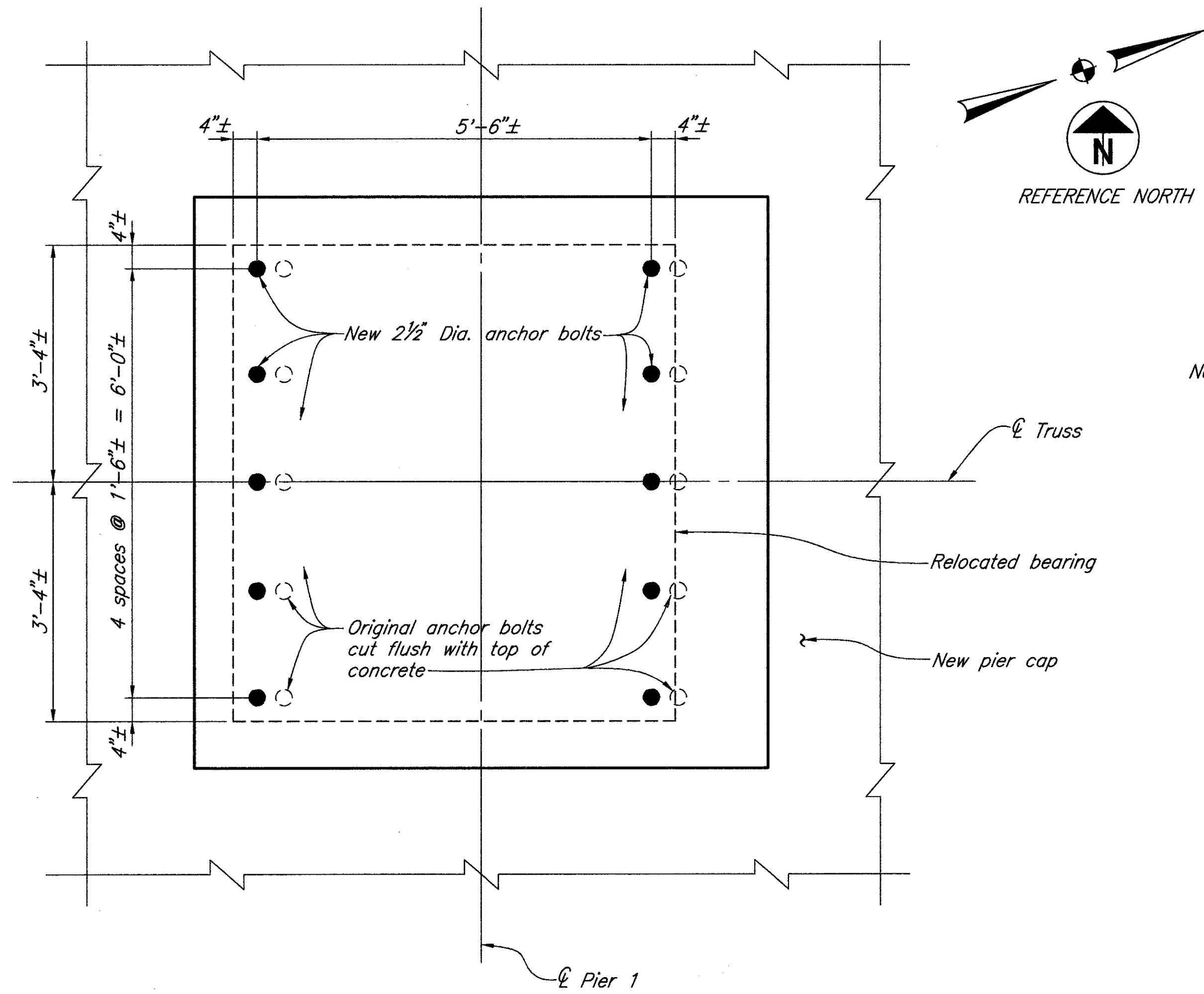
**DETAIL X**



**DETAIL Y**

RICHLAND ENGINEERING LIMITED  
 29 NORTH PARK STREET  
 MANSFIELD, OHIO 44902  
 DATE 12/20/96  
 REVIEWED DAP  
 STRUCTURE FILE NO. 1809393  
 DRAWN JLS  
 DESIGNED KAK  
 CHECKED RWR  
**PIER 1 TRUSS BEARINGS**  
**PERMANENT JACKING BRACKETS**  
**BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER**  
 CUY-90-15.24  
 33 / 48  
 46  
 61

Job No. 93111PR4 Date 12/23/96 Drawn By TMH,JPS,JLS



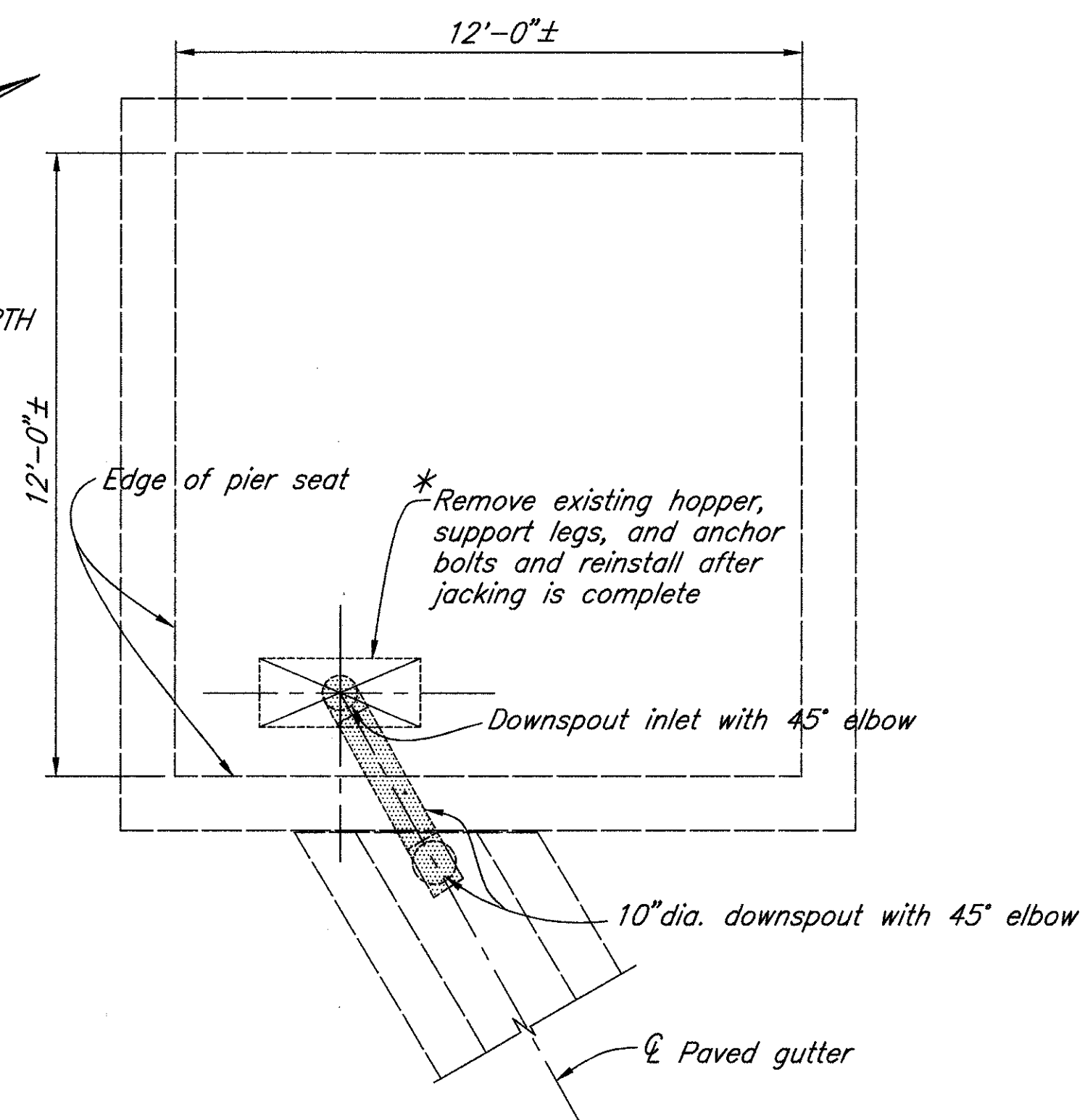
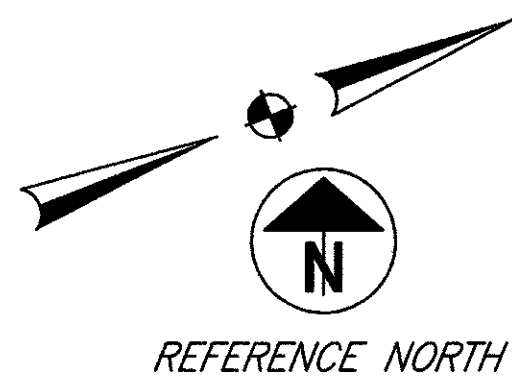
**NOTES:**

*MATERIALS* shown are existing unless otherwise noted.

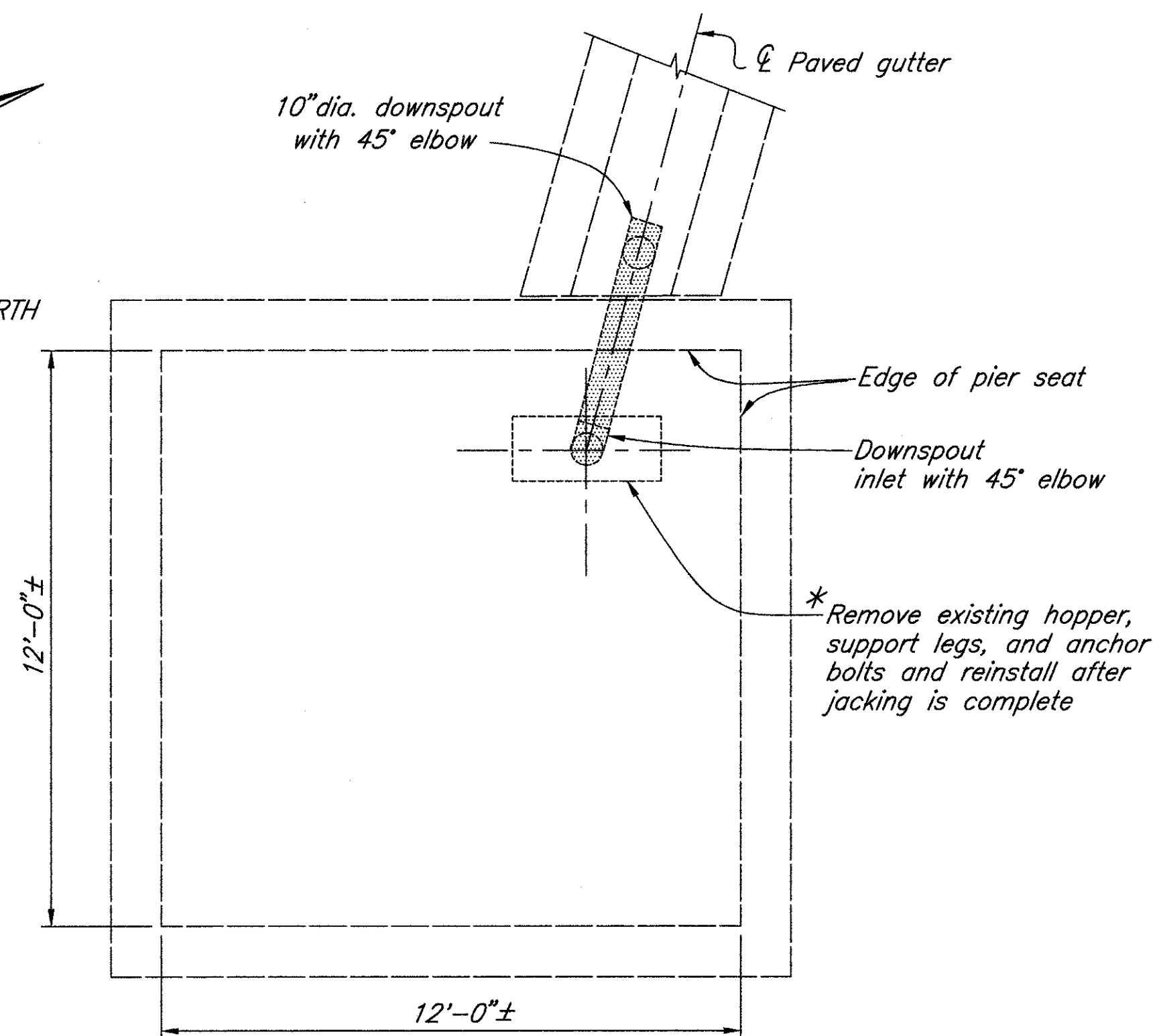
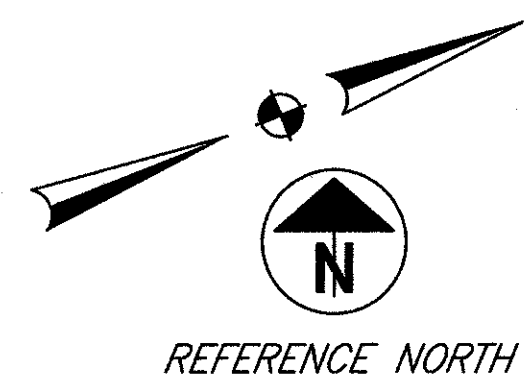
*REFURBISH BEARING:* See General Note sheet 7/48

RICHLAND ENGINEERING LIMITED		29 NORTH PARK STREET MANSFIELD, OHIO 44902	
DATE	12/20/96	DESIGNED	DT
REVIEWED	DAP	CHECKED	RWR
DRAWN	TMH	STRUCTURE FILE NO.	1809393
<b>PIER 1 TRUSS BEARINGS REFURBISH DETAILS</b>			
BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER			
CUY-90-15.24		34 / 48	
47		61	



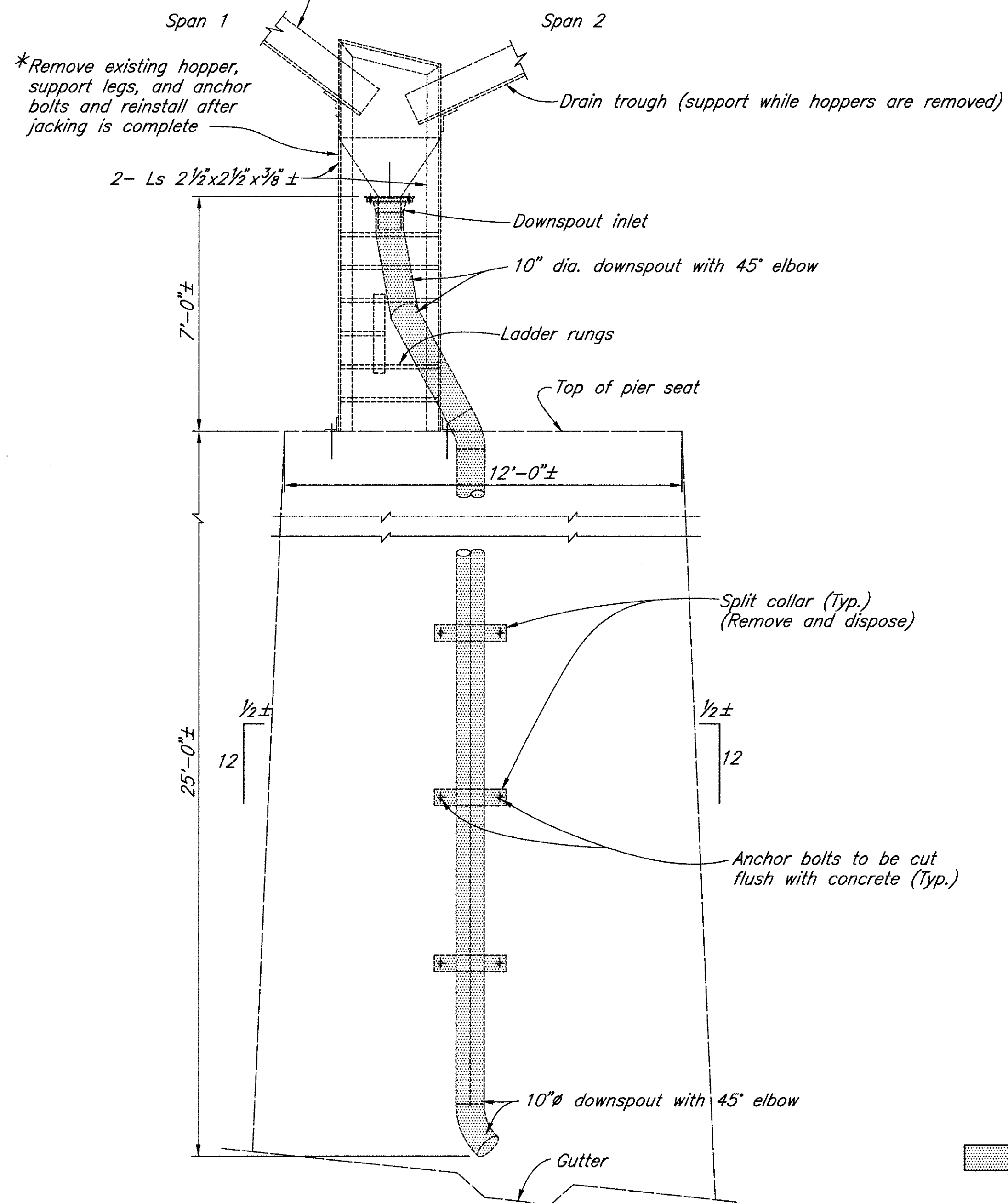


PIER 1, LEFT LEG PLAN



PIER 1, RIGHT LEG PLAN

Drain trough (support while hoppers are removed)



PIER 1, LEFT LEG ELEVATION (LOOKING NORTH)  
AS SHOWN

PIER 1, RIGHT LEG ELEVATION (LOOKING SOUTH)  
SIMILAR

**LEGEND**

-Denotes area to be removed per Item 202-Portions of structure removed, as per plan

**NOTES**

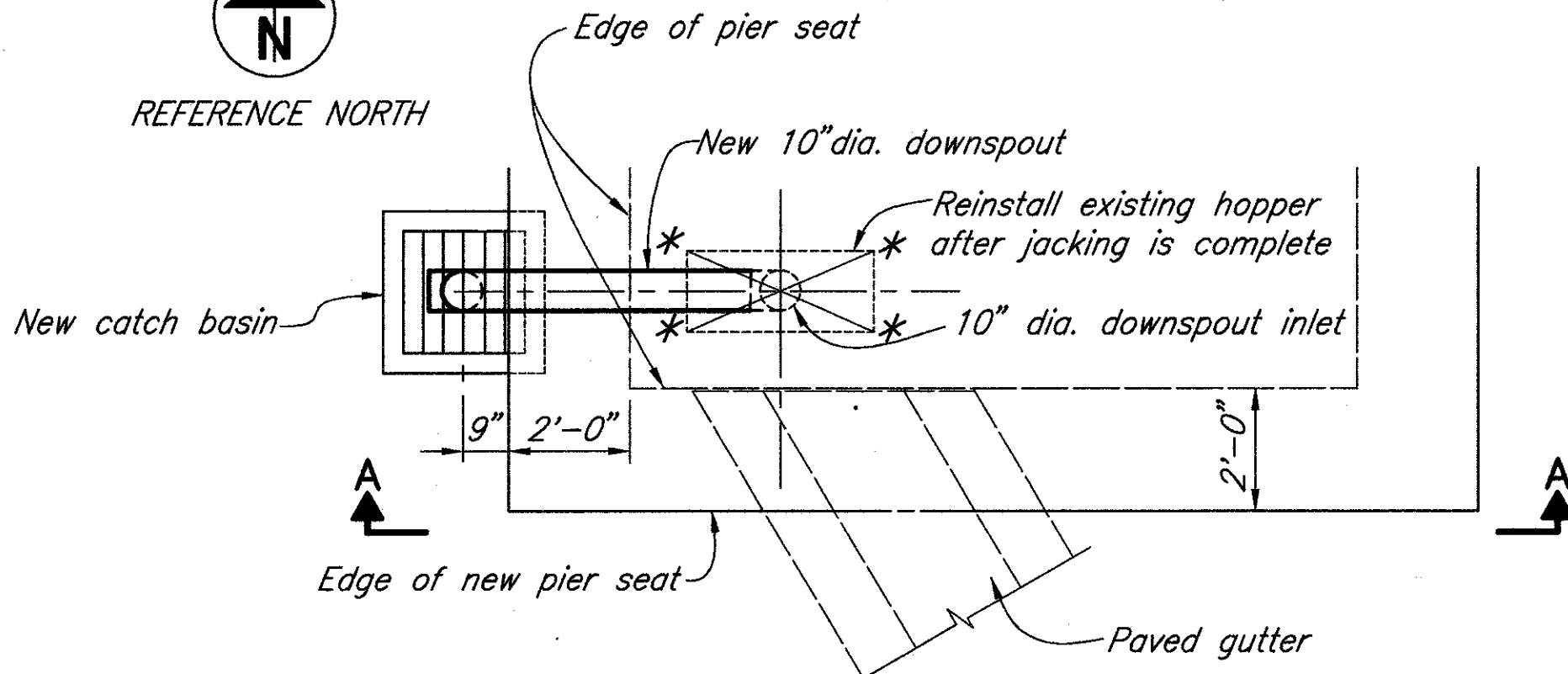
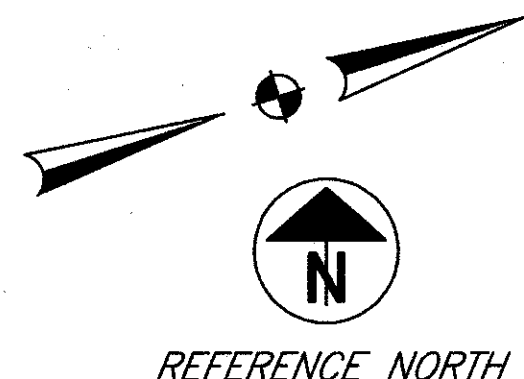
**MATERIALS** shown are existing unless otherwise noted.

**DRAIN TROUGHS:** Prior to and as part of Span 1 & 2 relocation the Contractor shall make sure the drain troughs will move freely within the pier hoppers.\*

**DRAINAGE HOPPERS:** The Contractor shall reinstall the reused drainage hoppers in the same relative position with the existing truss drain trough after the structure has been moved and reset.\*

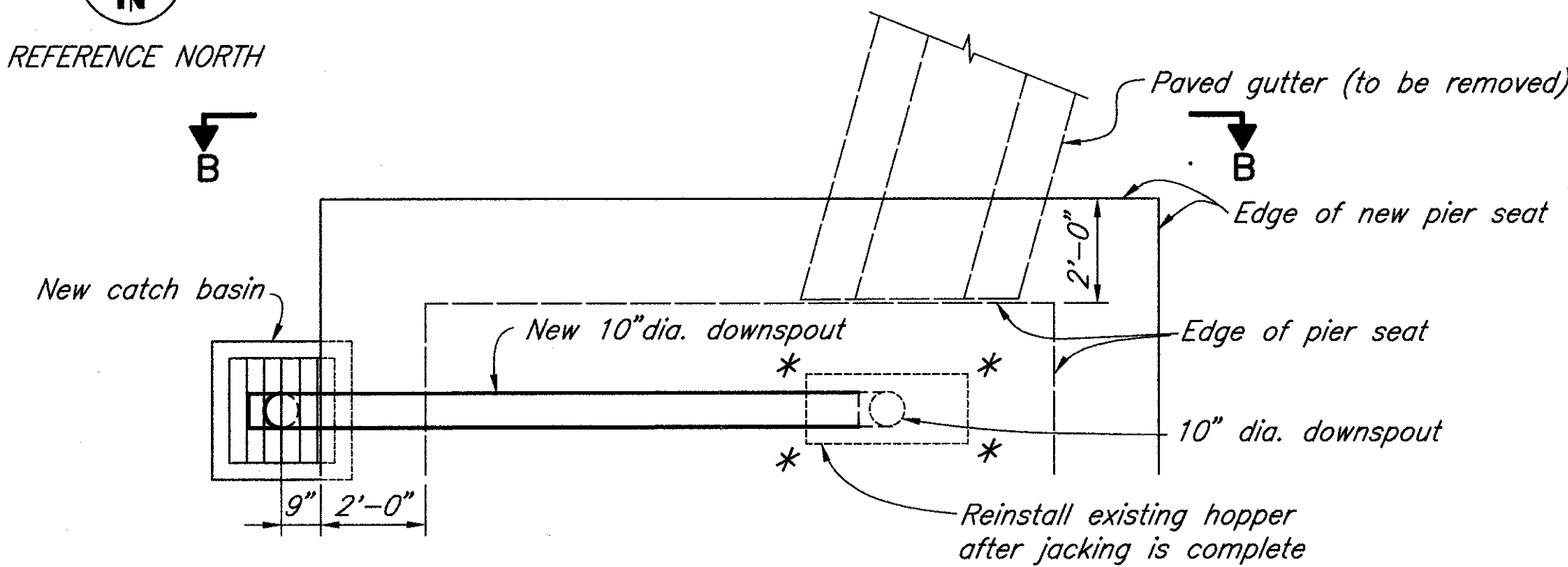
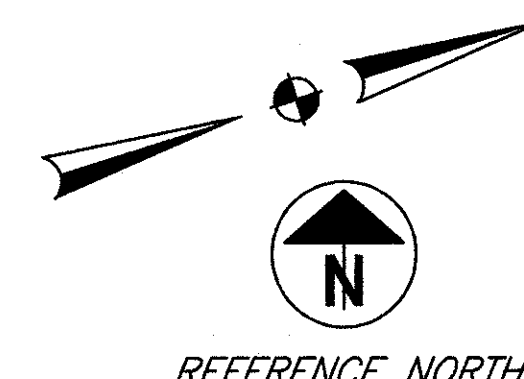
\* Payment included with Item 518 - Structure drainage, misc.:  
Relocate pier 1 drainage hopper.

Job No. 93111PR Date 12/23/96 Drawn By TWH/JLS

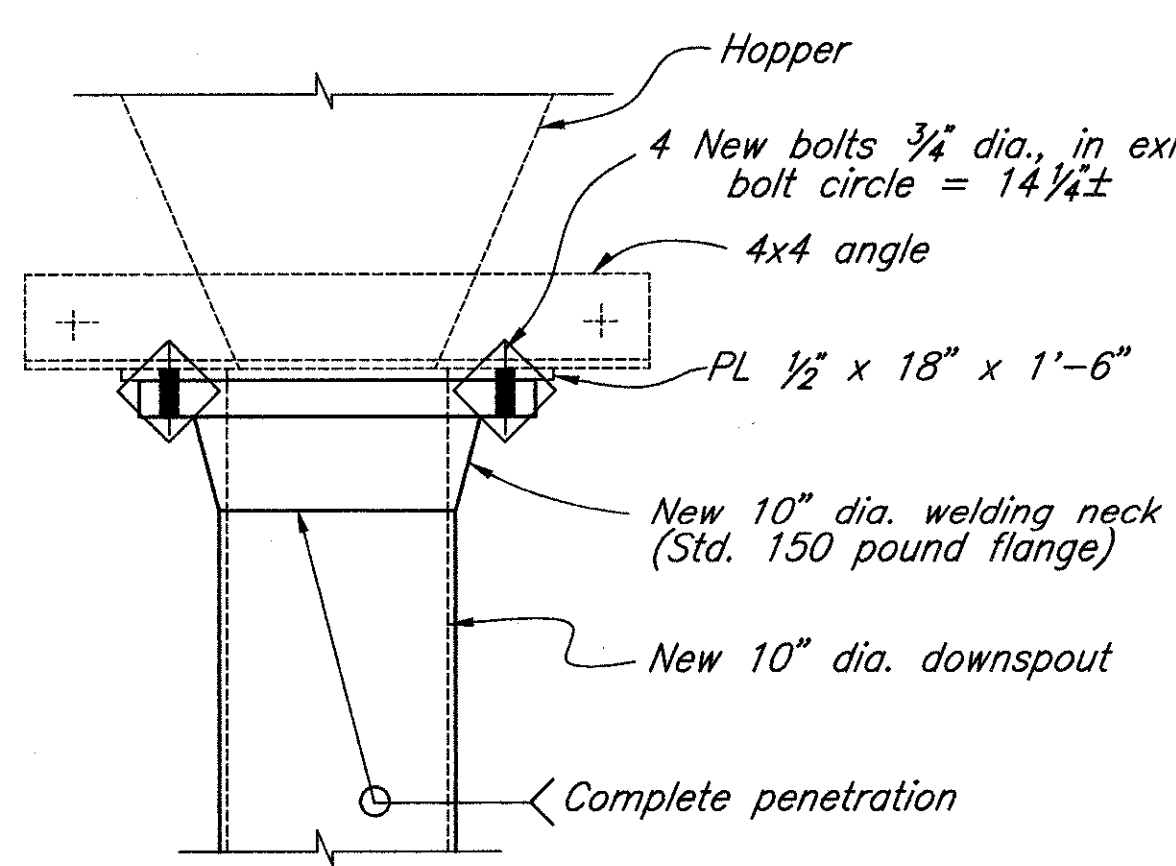


**PIER 1, LEFT LEG PLAN**

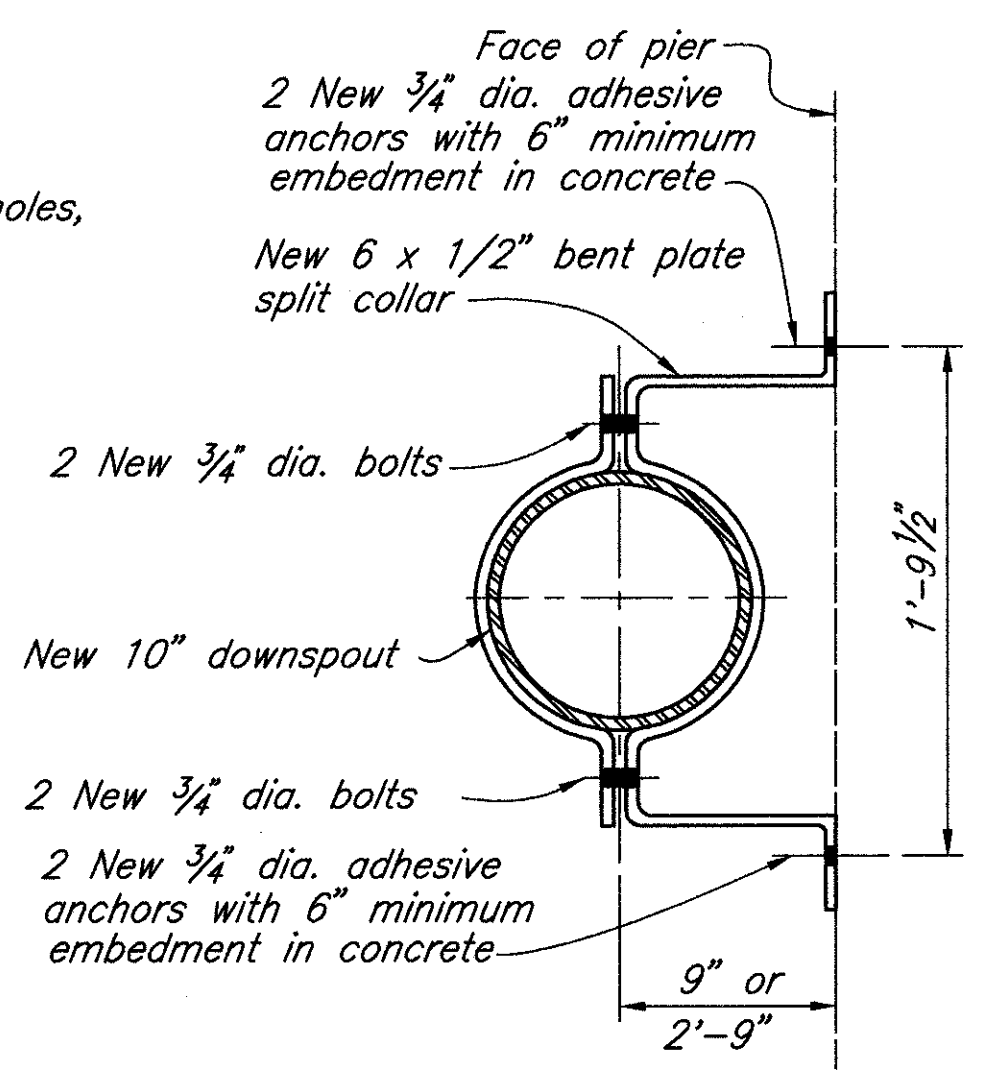
\* - Location of new 3/4" dia. adhesive anchors to be established when hopper is reinstalled. Included for payment with Item 518 - Structure drainage, misc.; Relocate pier 1 drainage hopper.



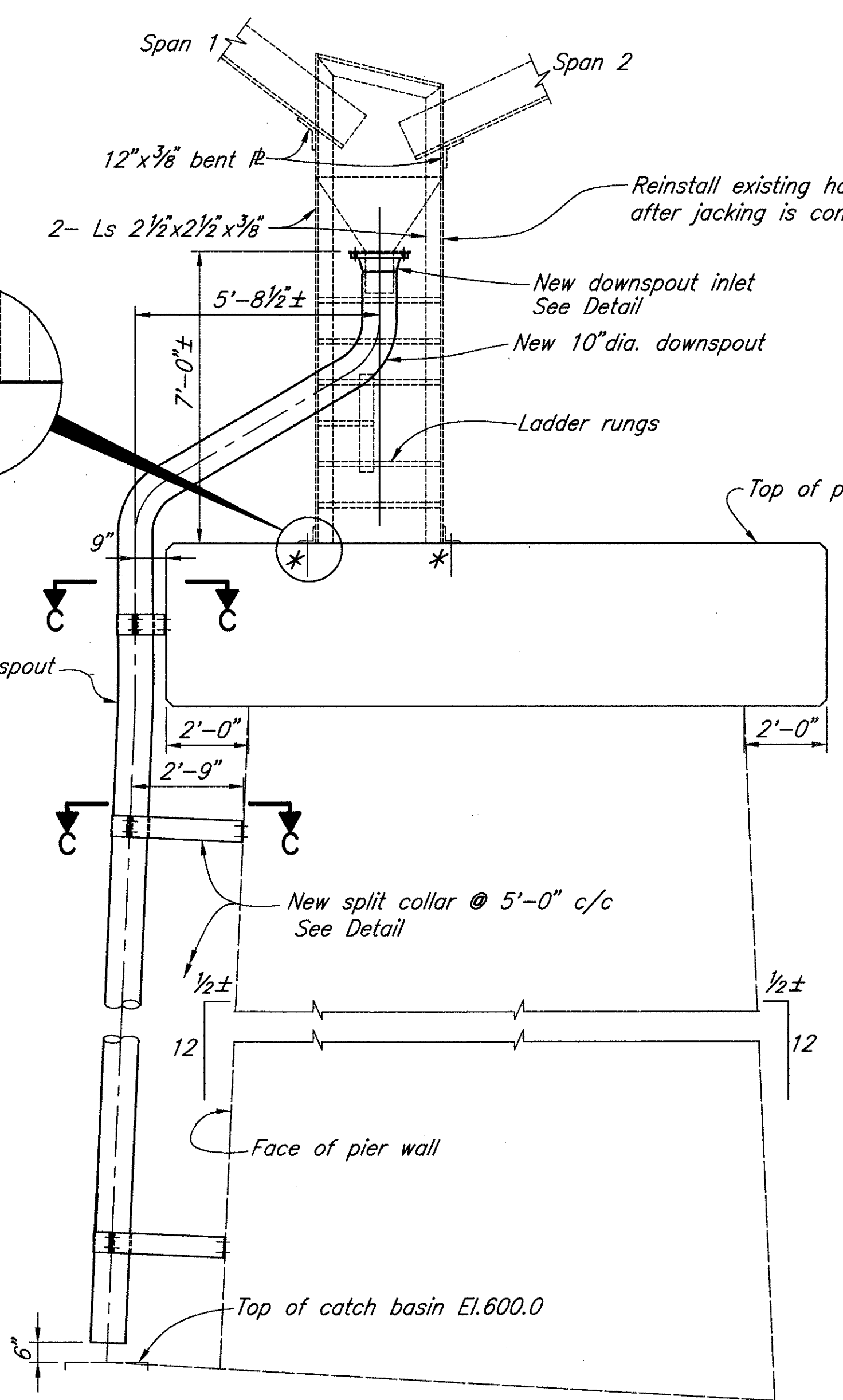
**PIER 1, RIGHT LEG PLAN**



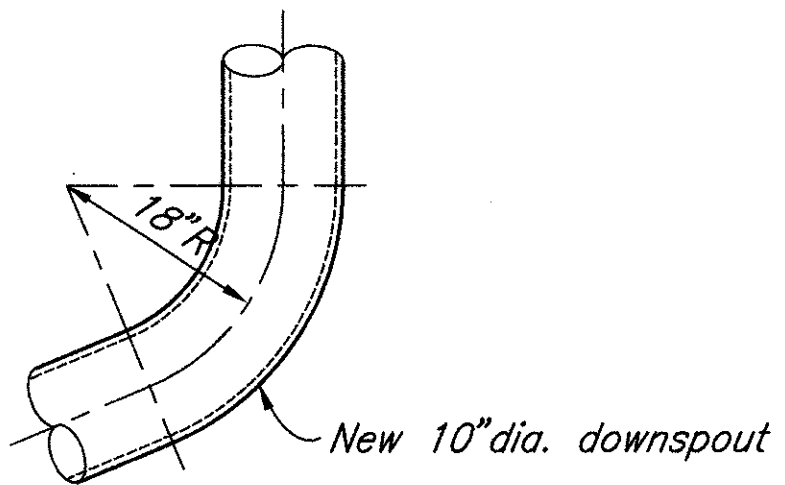
**DOWNSPOUT INLET DETAIL**



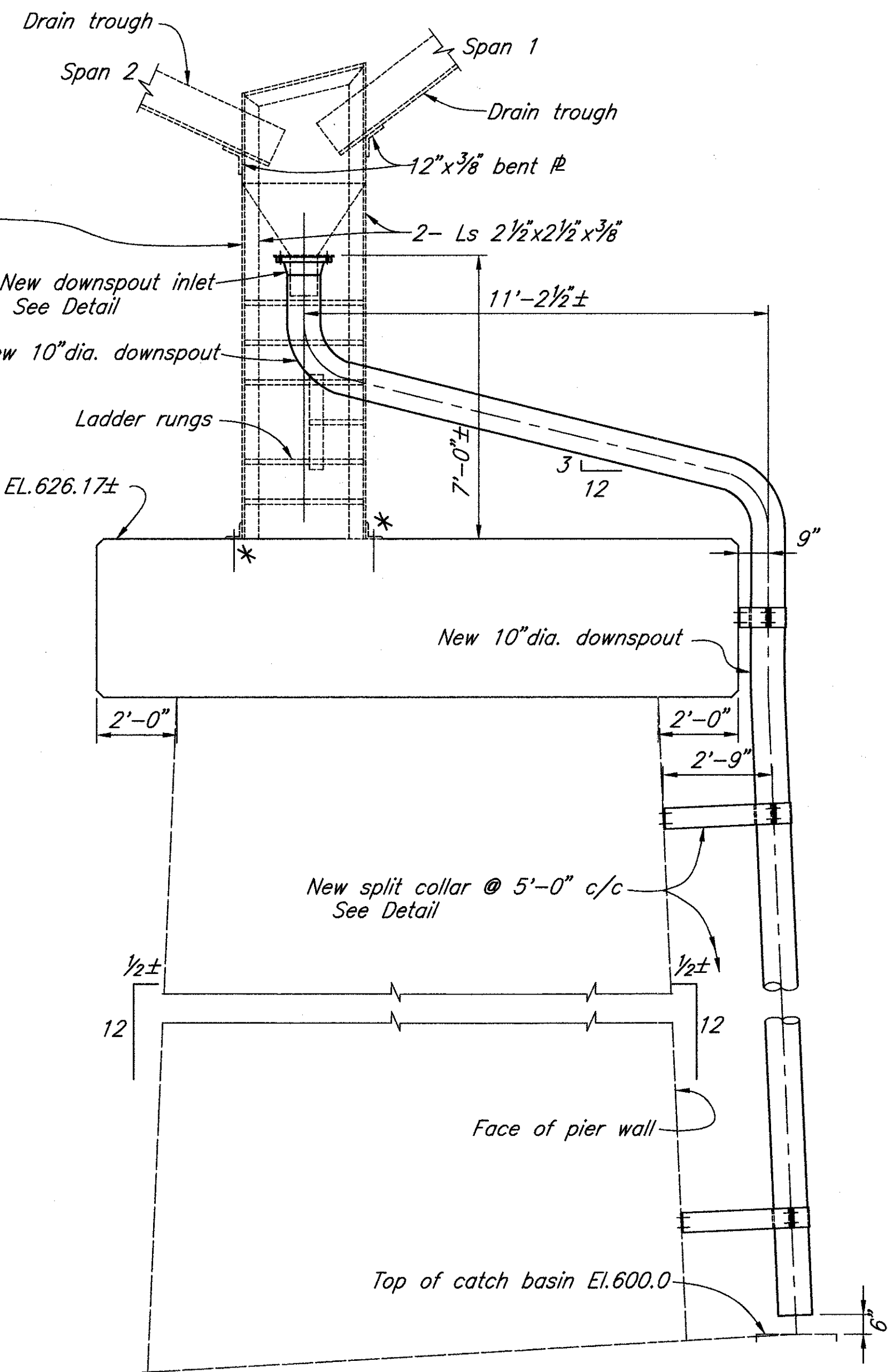
**SECTION C-C SPLIT COLLAR PLAN DETAIL**



**PIER 1, LEFT LEG ELEVATION (LOOKING NORTH) VIEW A-A**



**DOWNSPOUT BEND DETAIL**



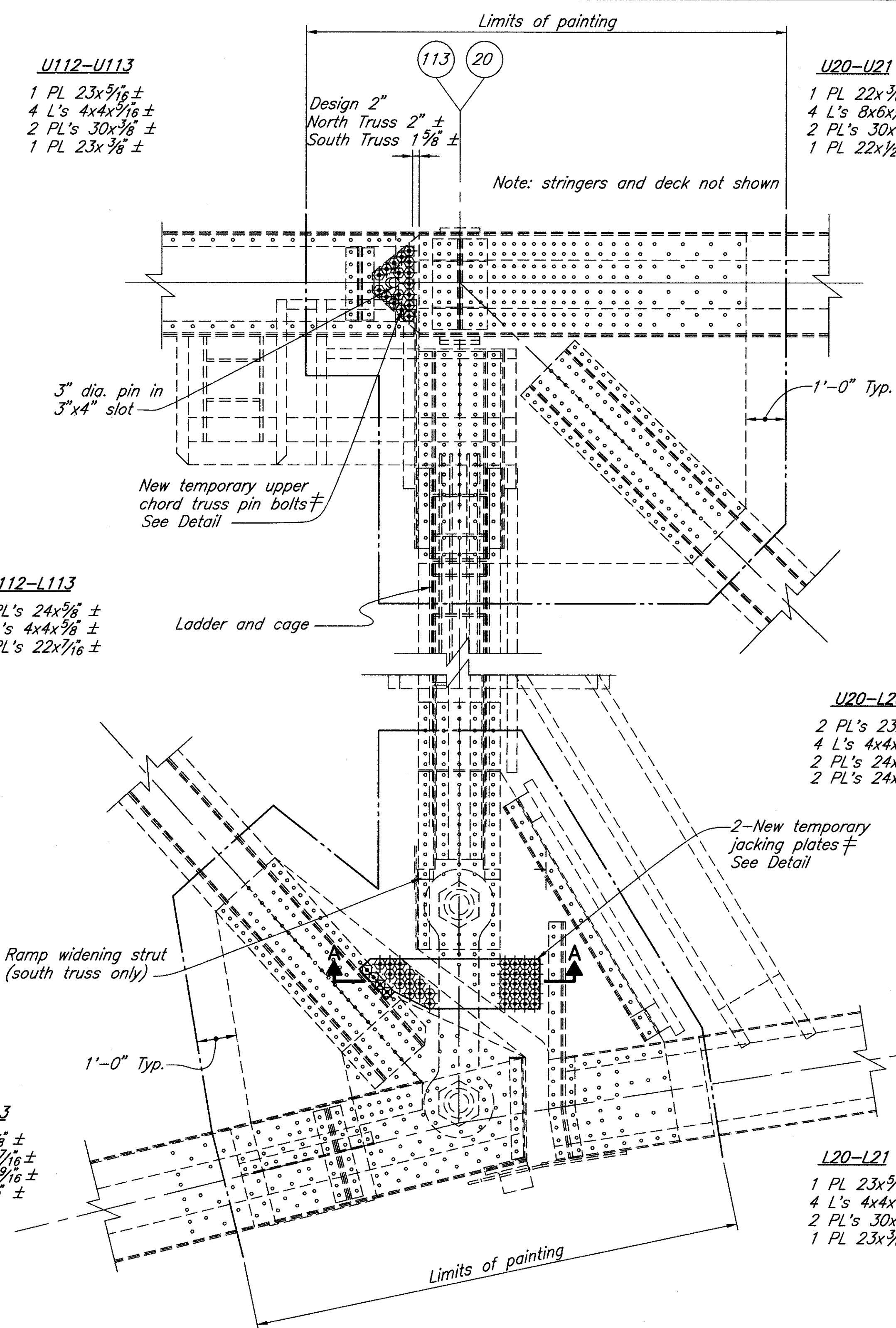
**PIER 1, RIGHT LEG ELEVATION (LOOKING SOUTH) VIEW B-B**

**NOTES**

- MATERIALS** shown are existing unless otherwise noted.
- PIPE DOWNSPOUT:** See General Note sheet 8/48.
- ADHESIVE FOR ANCHORS** in concrete shall be 705.20 non-shrink, non-metallic grout using epoxy resin.
- DRAIN TROUGHS:** Prior to and as part of Span 1 & 2 relocation the Contractor shall make sure the drain troughs will move freely within the pier hoppers.
- DIMENSIONS** are to be field measured by the Contractor as the existing dimensions will be adjusted by the relocation of span 1 & 2.
- BOLT LEGEND:** See sheet 25/48.

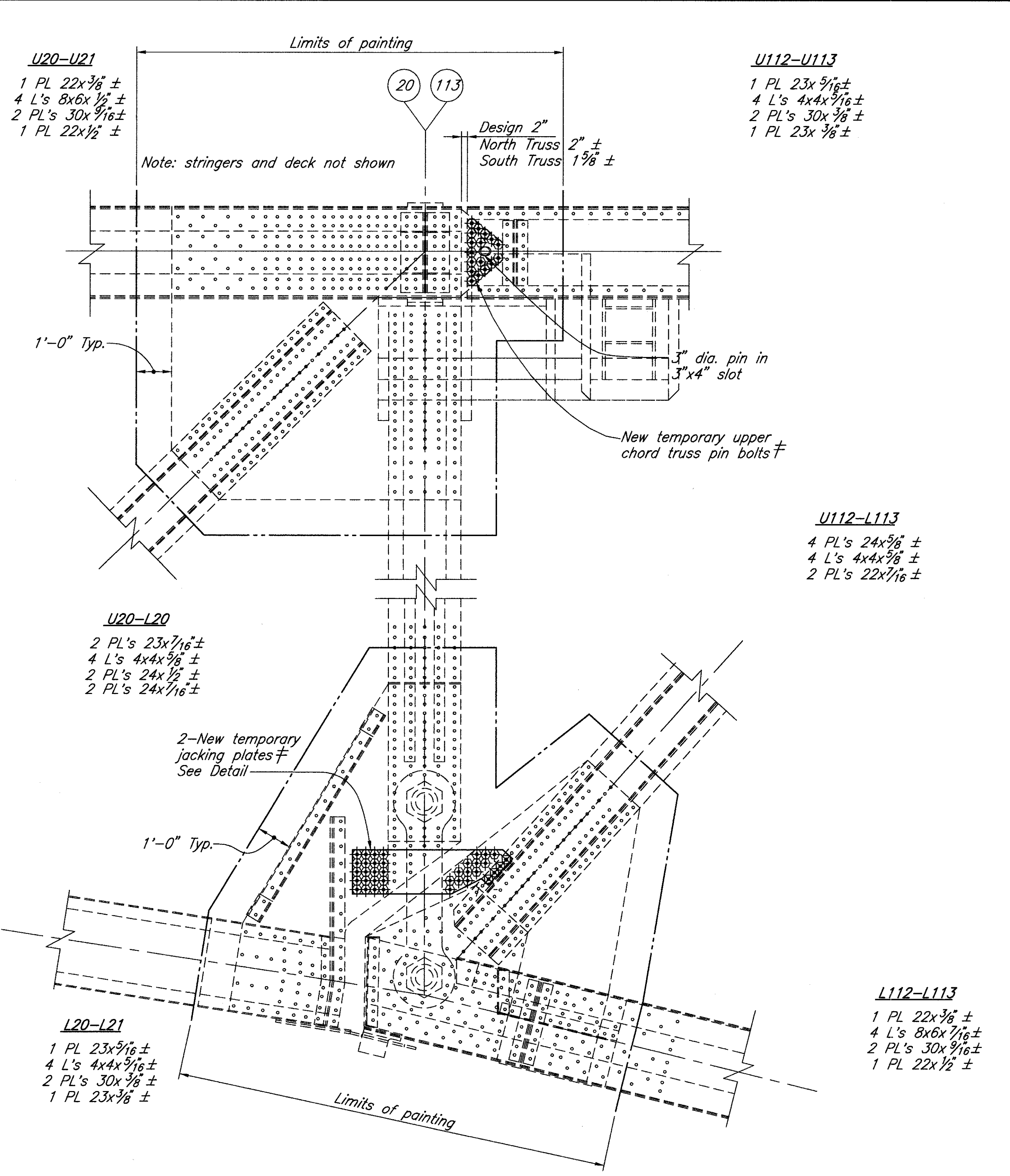
Job No. 93111PR6 Date 12/23/96 Drawn By TWH/JLS





**TRUSS DEFLECTION JOINT SOUTH TRUSS SPAN 2 (LOOKING NORTH)**

† - Indicates included for payment with Item 516 - Jacking and temporary support of superstructure, as per plan



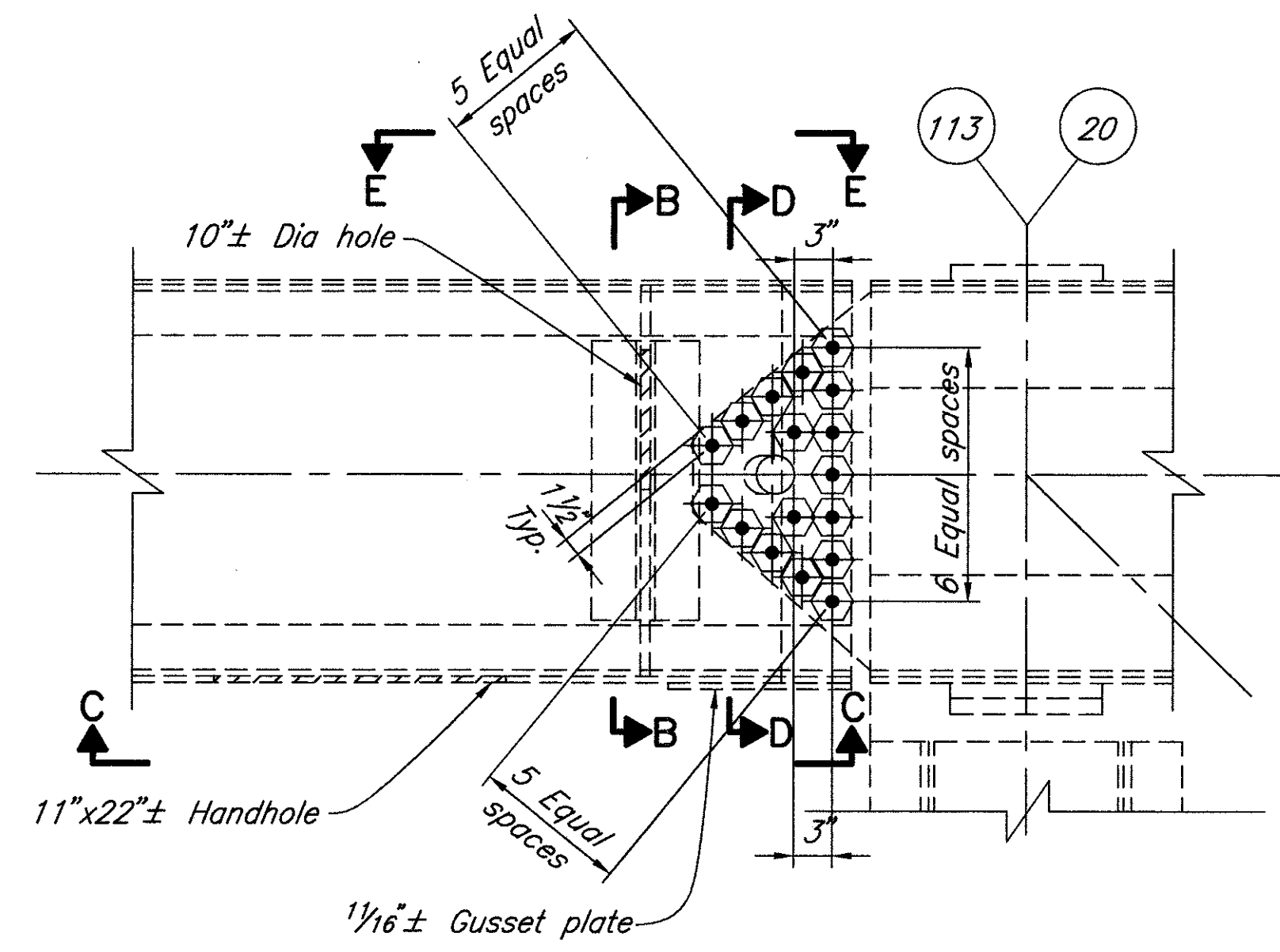
**TRUSS DEFLECTION JOINT SOUTH TRUSS SPAN 2 (LOOKING SOUTH)**

**NOTES:**

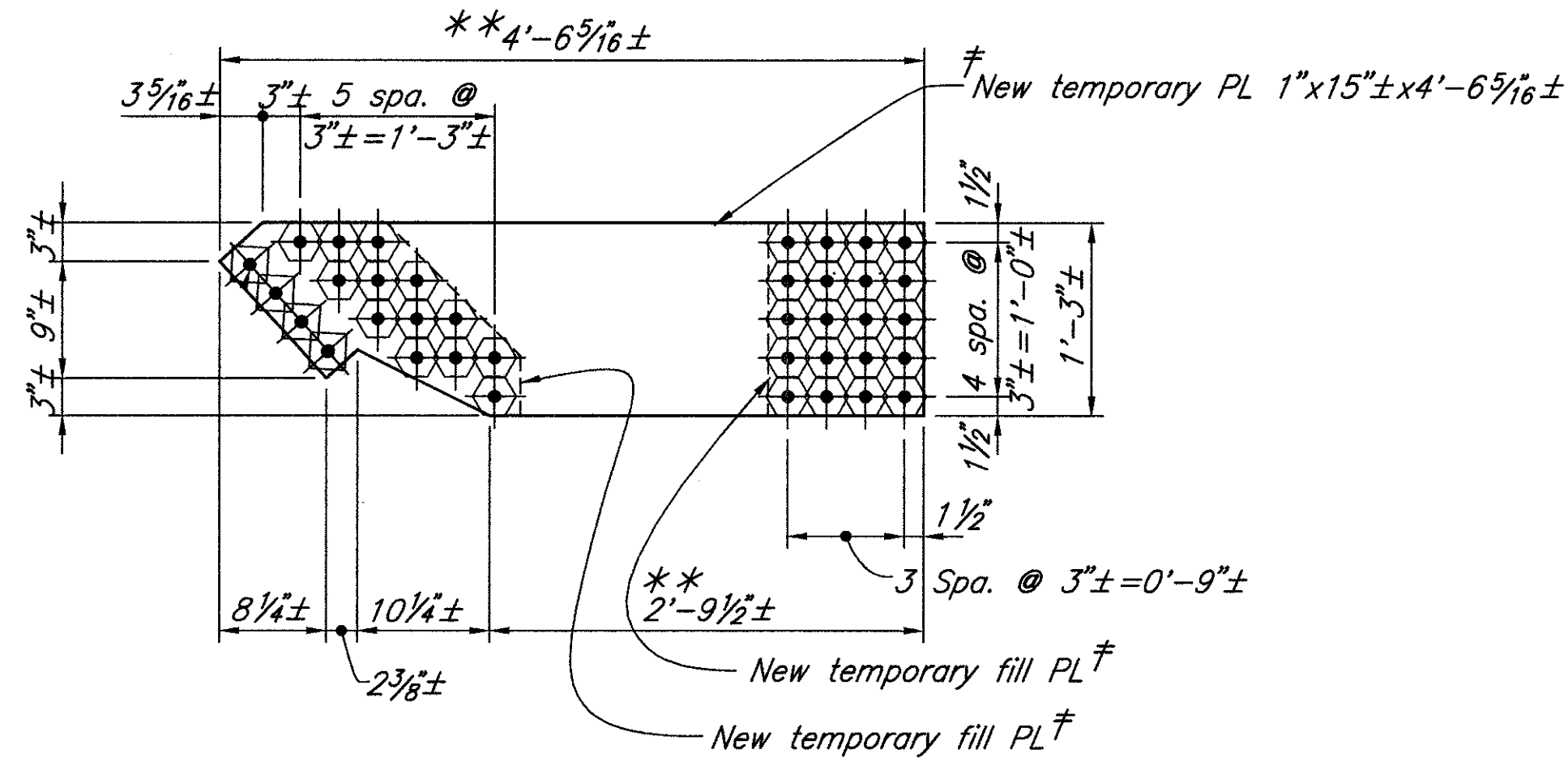
**MATERIALS** shown are existing unless otherwise noted. All new steel material shall be A36.  
**NORTH TRUSS** is similar to South Truss proposed work.  
**PAINTING LIMITS:** Extent of work for painting of existing steel for estimated quantities Item 514-Field painting, misc.: Surface preparation of existing steel, Item 514-Field painting, misc.: Existing structural steel, prime coat, System A, and Item 514-Field painting, misc.: Existing structural steel, finish coat, System A.

**TEMPORARY JACKING PLATE DETAIL:** See sheet 38/48  
**BOLT LEGEND:** See sheet 25/48  
**SECTION A-A:** See sheet 38/48  
**TEMPORARY UPPER CHORD TRUSS PIN BOLTS DETAIL:** See sheet 38/48

Job No. 93111TD2 Date 12/26/96 Drawn By TWH/RB/LS/JPS

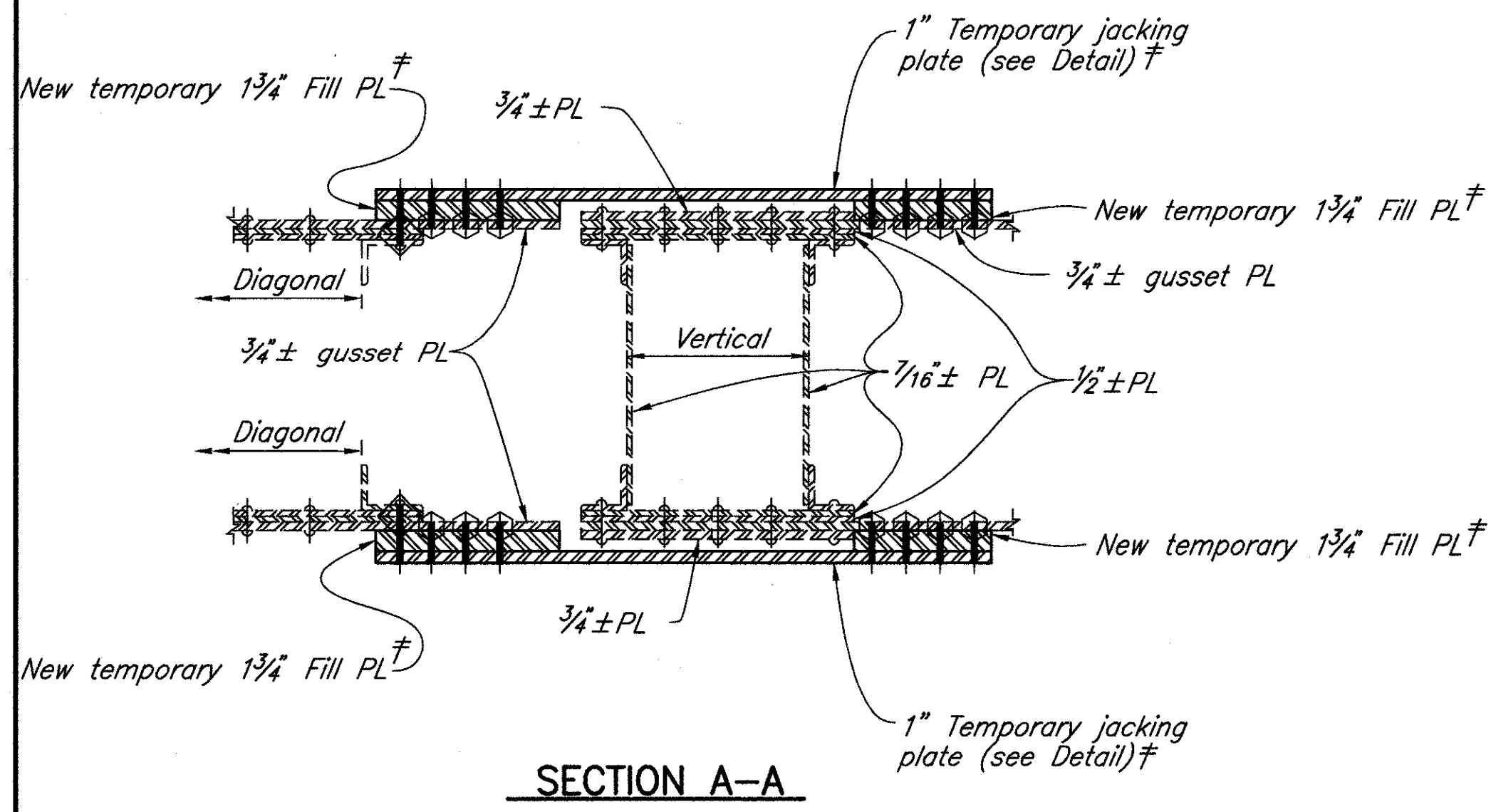


**TEMPORARY UPPER CHORD TRUSS PIN BOLTING**  
(17 bolts per location, 4 locations required)

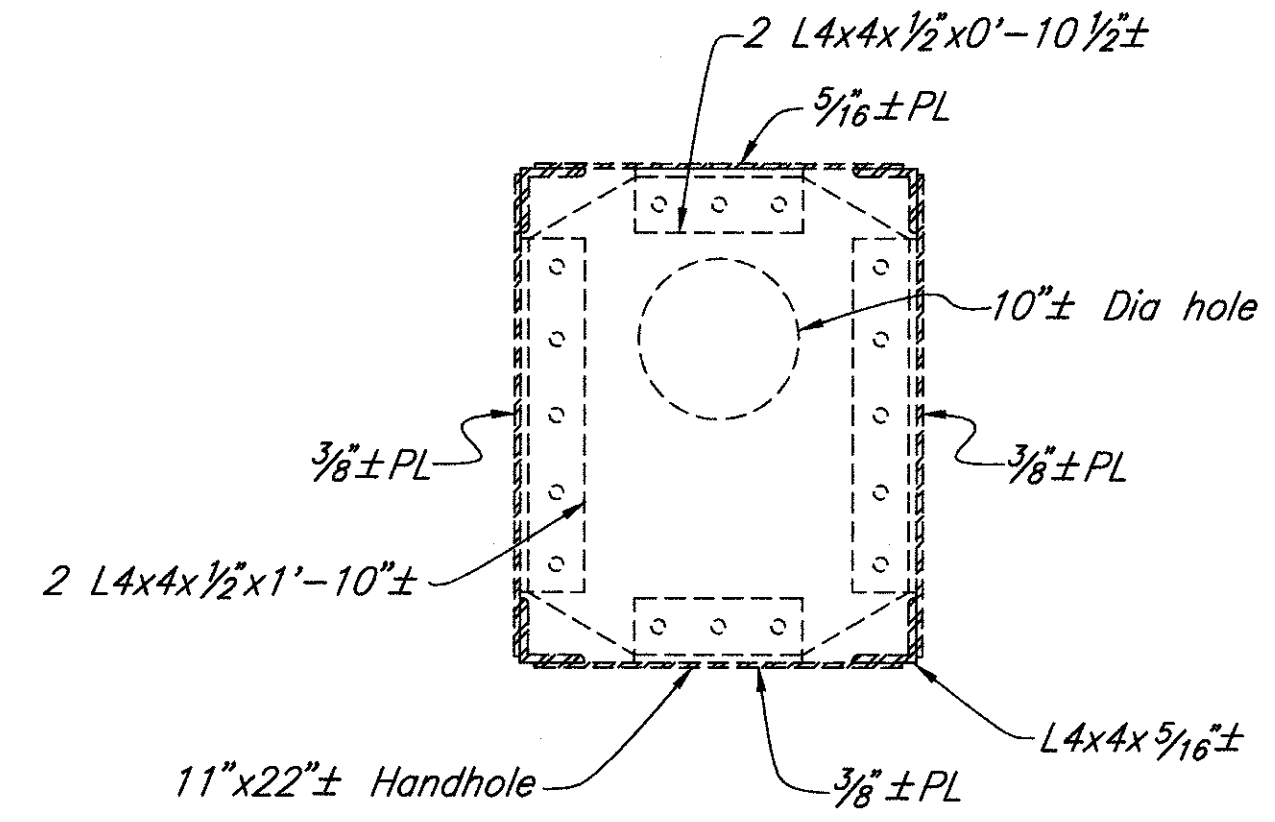


**TEMPORARY JACKING PLATE DETAIL**  
(4 Required)

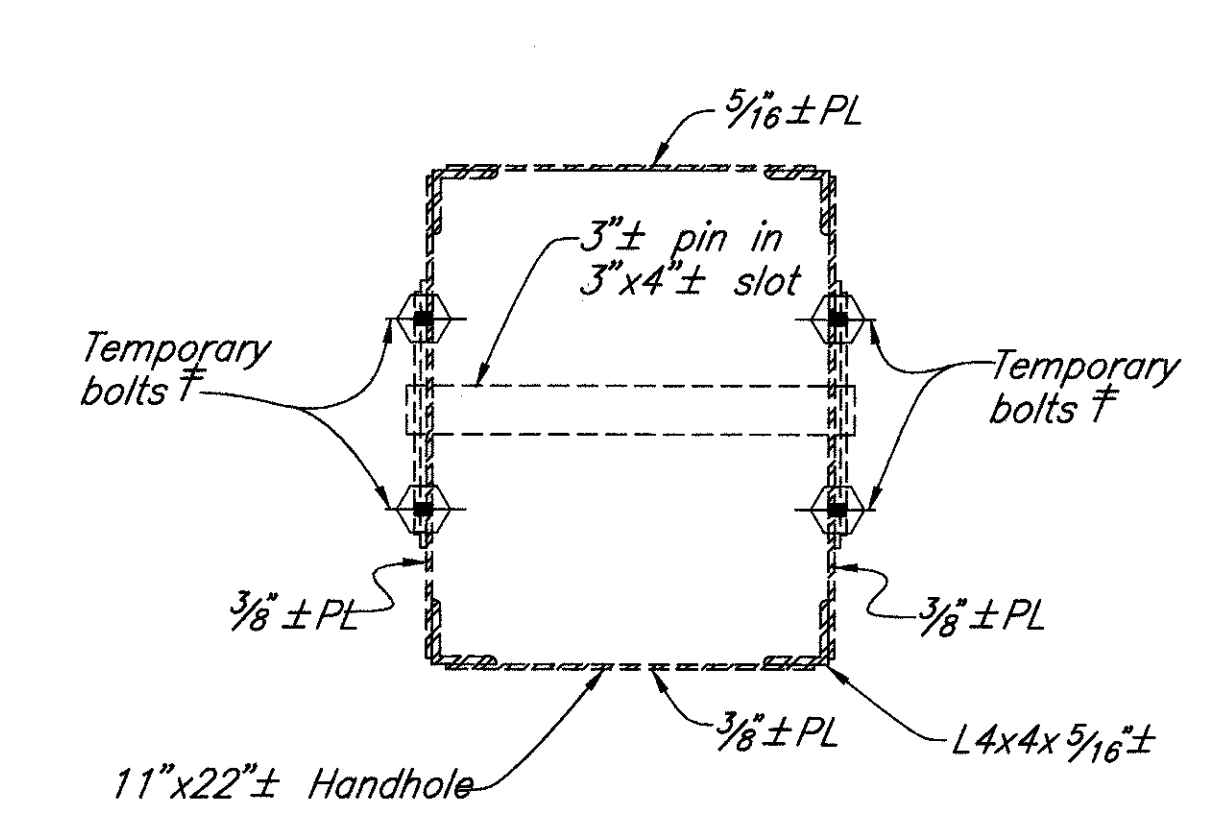
\*\* - These dimensions are approximate. Actual dimensions may vary depending upon location of the truss after vertical jacking.



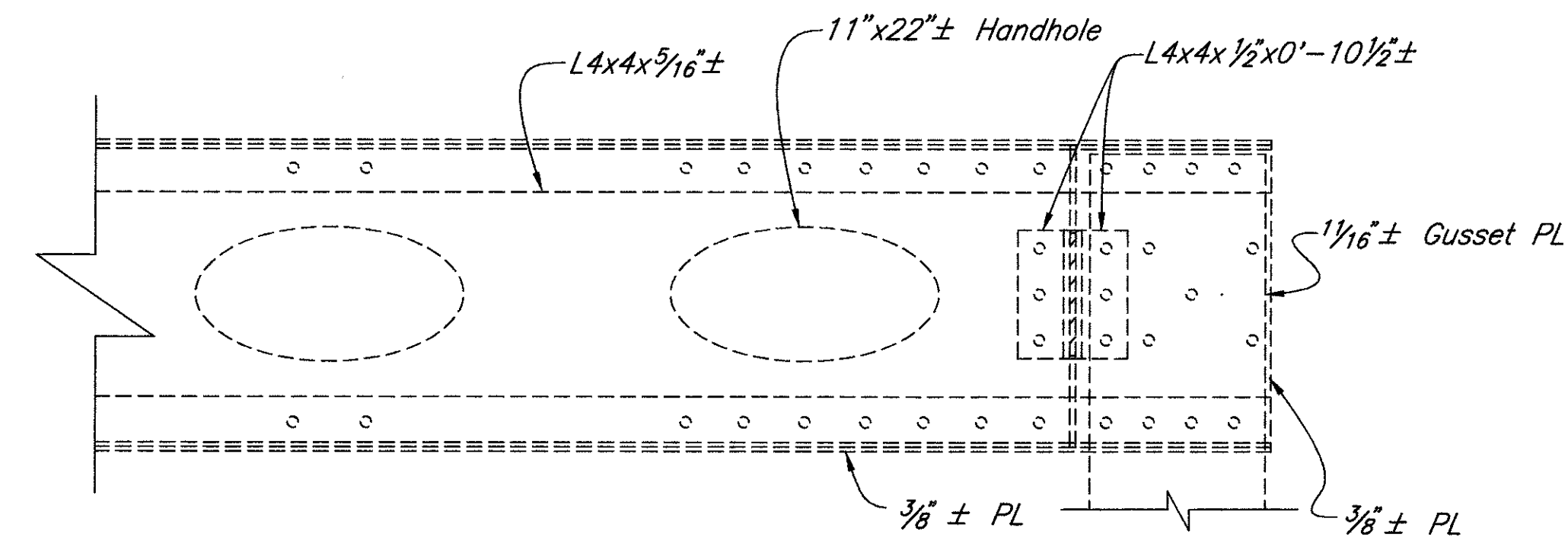
**SECTION A-A**



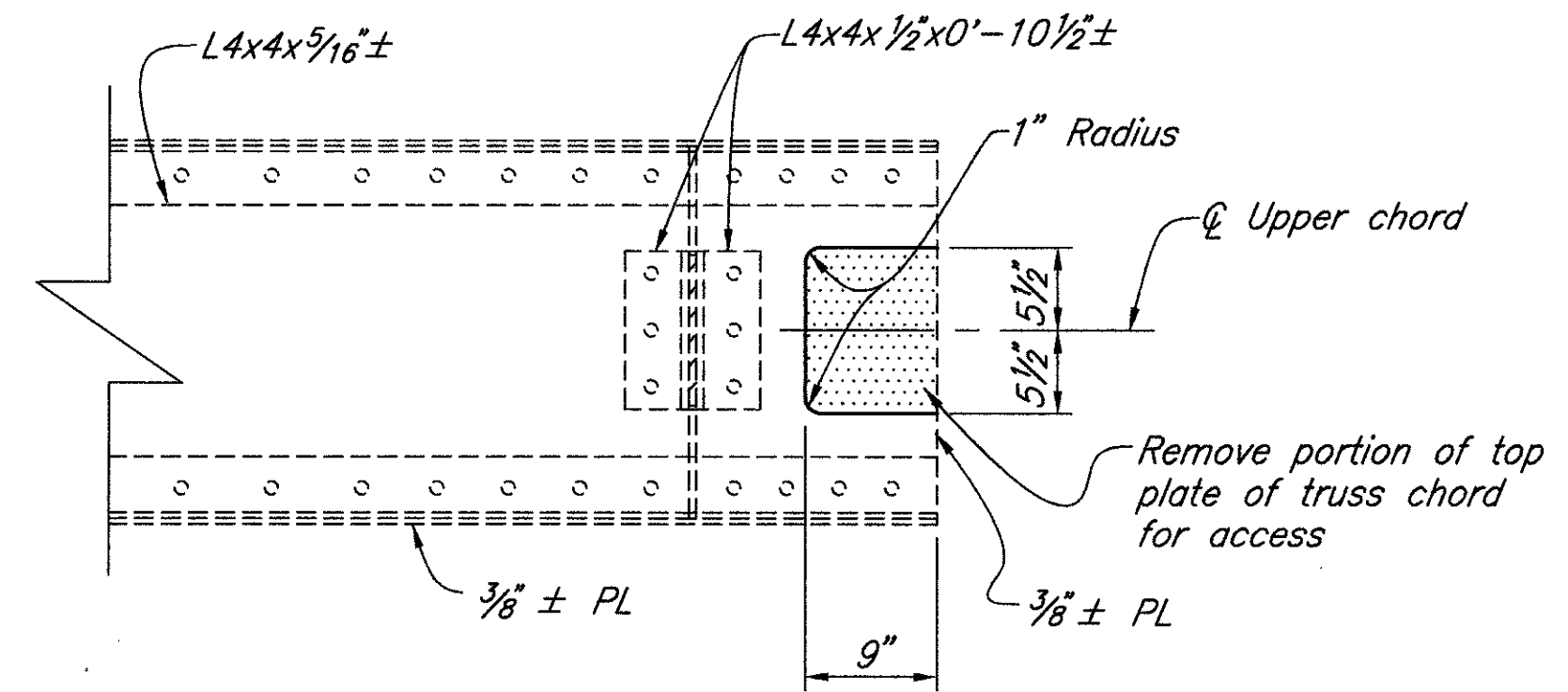
**SECTION B-B**



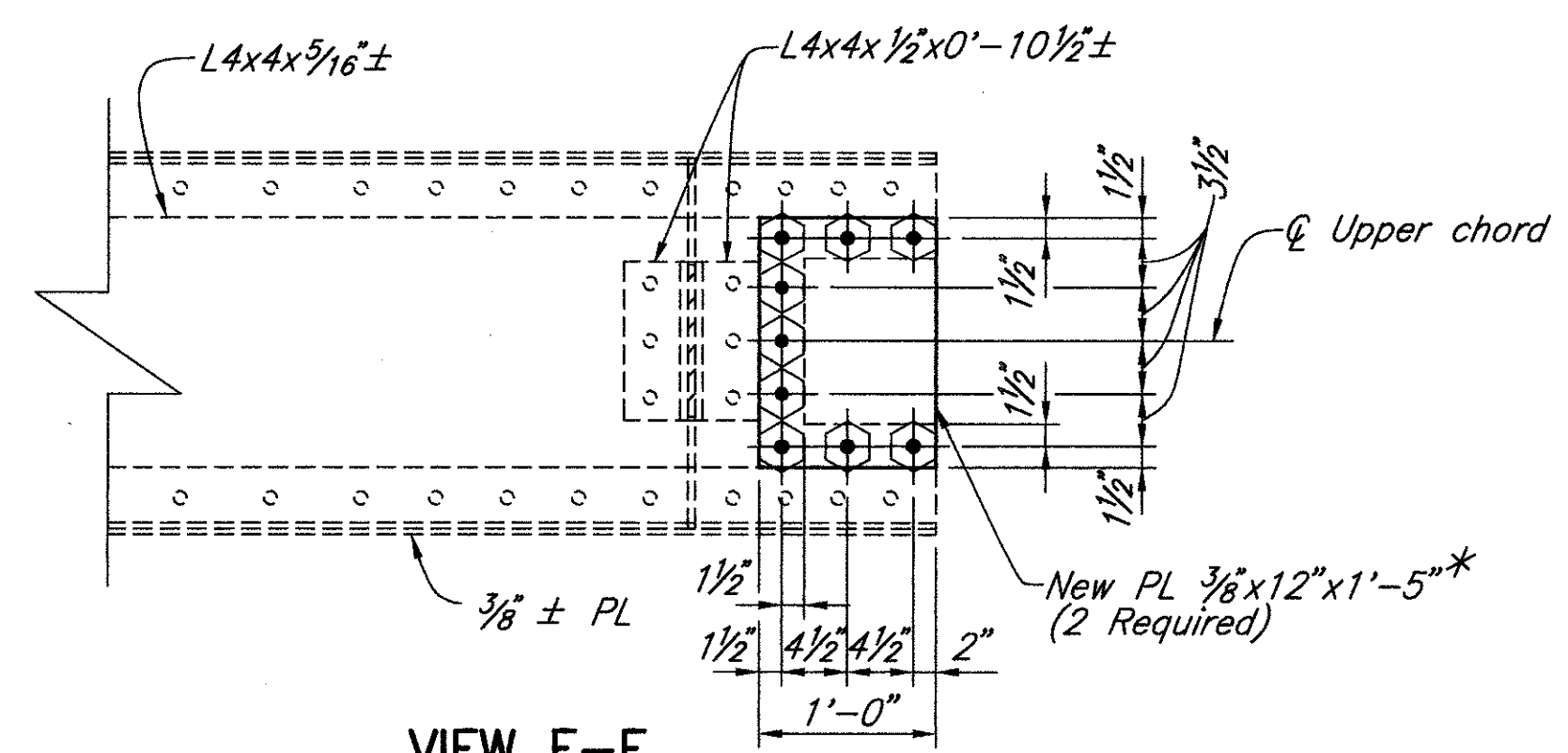
**SECTION D-D**



**VIEW C-C**



**VIEW E-E  
REMOVAL**



**VIEW E-E  
PROPOSED**

**LEGEND**

- Denotes area to be removed per Item 202 - Portions of structure removed, as per plan

\* Indicates included for payment with Item 513 - Structural steel, misc.: Permanent jacking supports.

‡ Indicates included for payment with Item 516 - Jacking and temporary support of superstructure, as per plan.

**NOTES:**

**MATERIALS** shown are existing unless otherwise noted  
**BOLTS:** Shall be 7/8" dia. A325

**TEMPORARY JACKING PLATES AND FILL PLATES:** Shall be removed upon completion of jacking. Remaining holes are to be filled with permanent 7/8" dia. A325 galvanized bolts. Payment for temporary plates, fills and bolts shall be included with Item 516 - Jacking and temporary support of superstructure, as per plan. Permanent bolts are to be included with Item 513 - Structural steel, misc.: Permanent jacking supports.

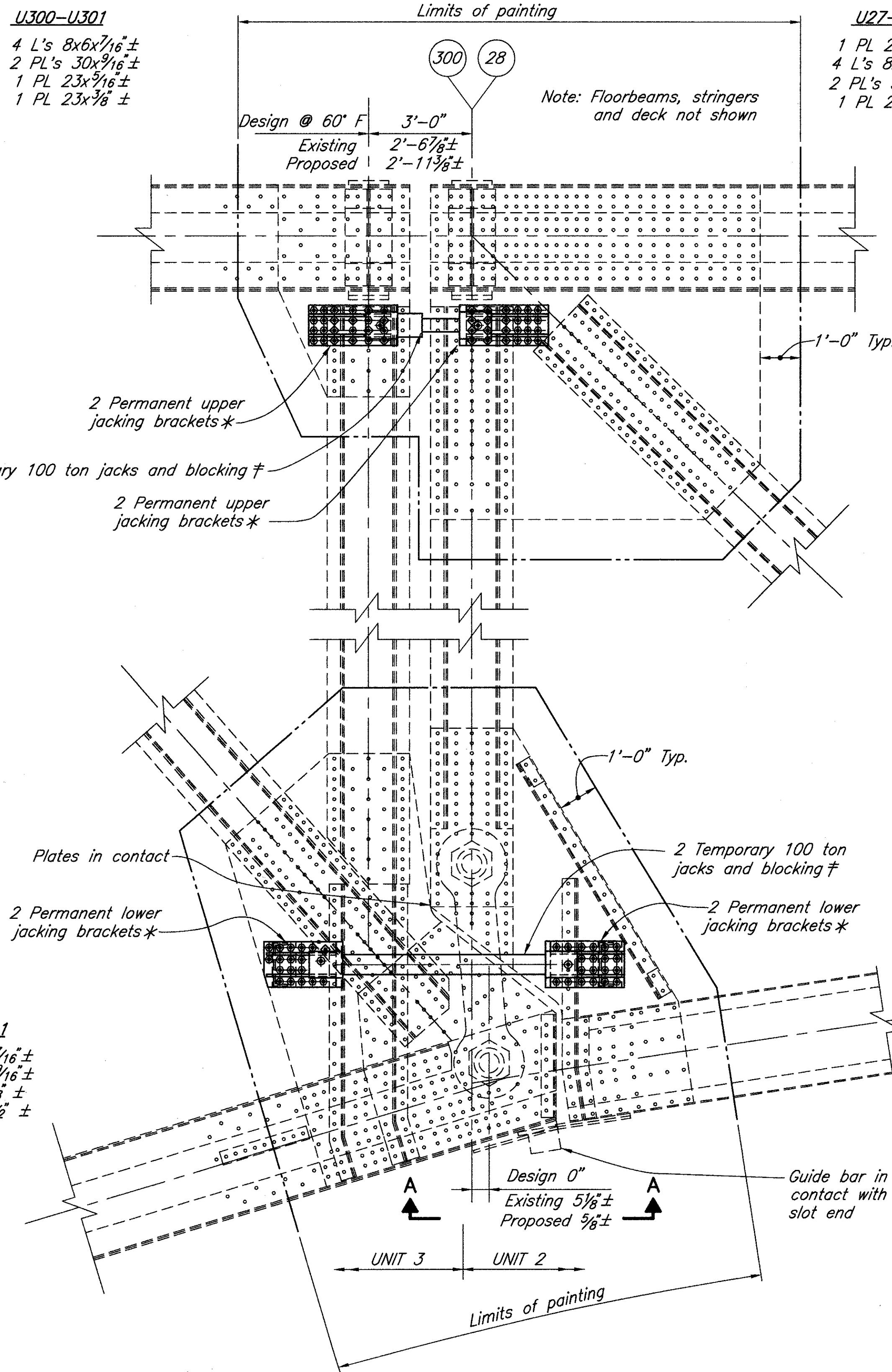
**TEMPORARY UPPER CHORD TRUSS PIN BOLTS:** Shall be removed upon completion of jacking. Payment shall be included with Item 516 - Jacking and temporary support of superstructure, as per plan.

**BOLT LEGEND:** See sheet 25/48

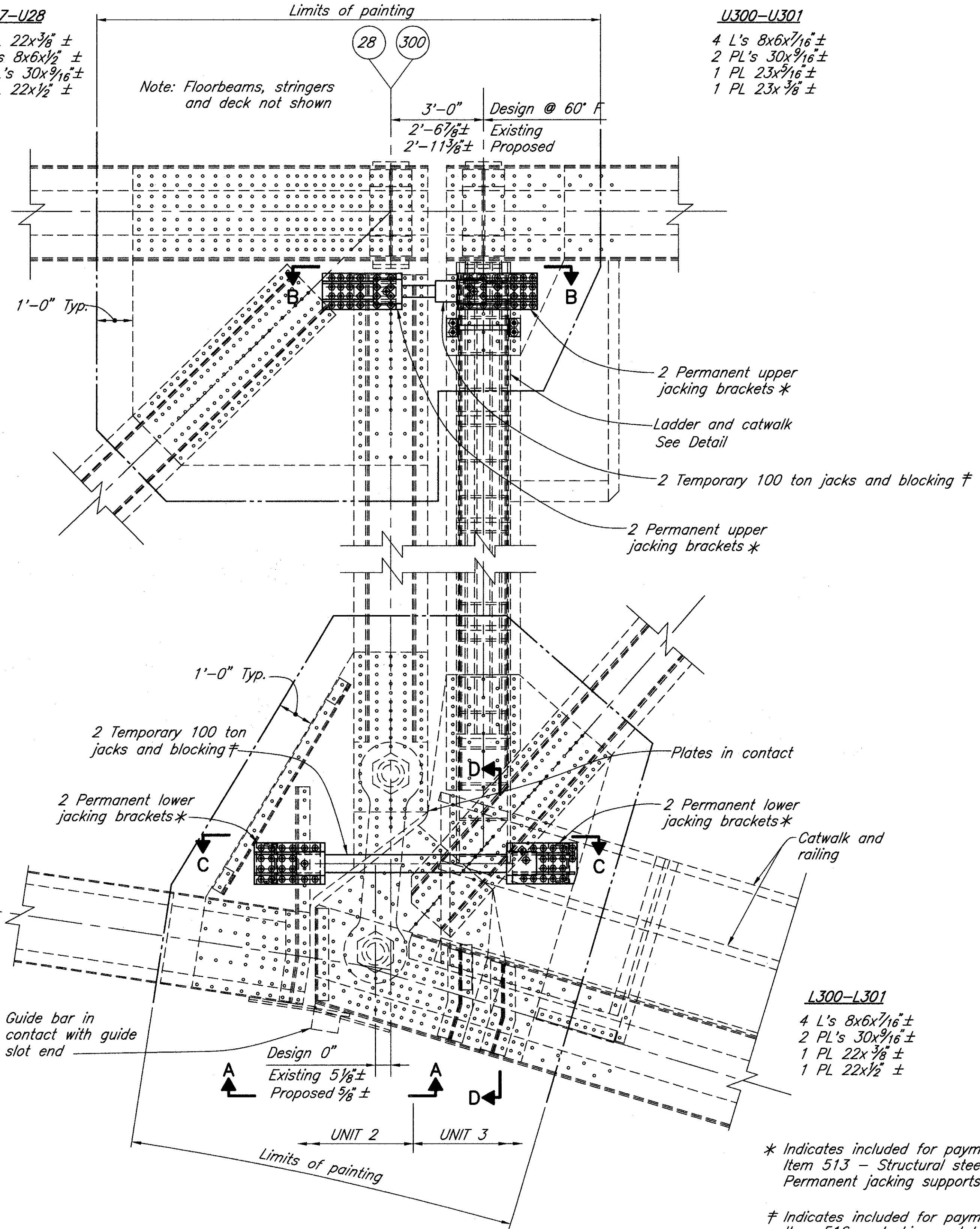
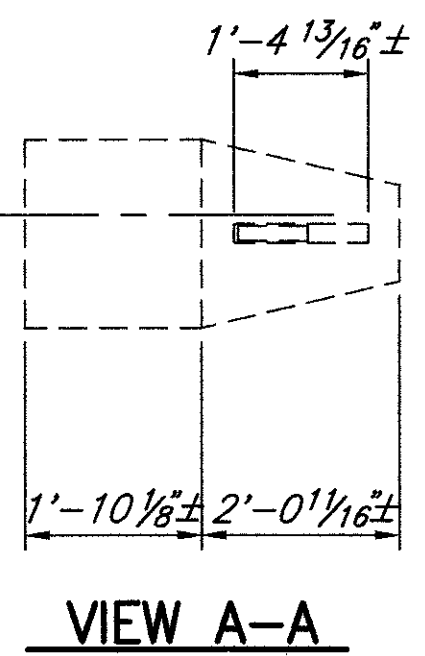
**SECTION A-A:** See sheet 37/48 for location.



Job No. 93111TEL Date 12/24/96 Drawn By RB/KHK/JLS/JPS/JLS



TRUSS EXPANSION JOINT SOUTH TRUSS SPAN 2 (LOOKING SOUTH)



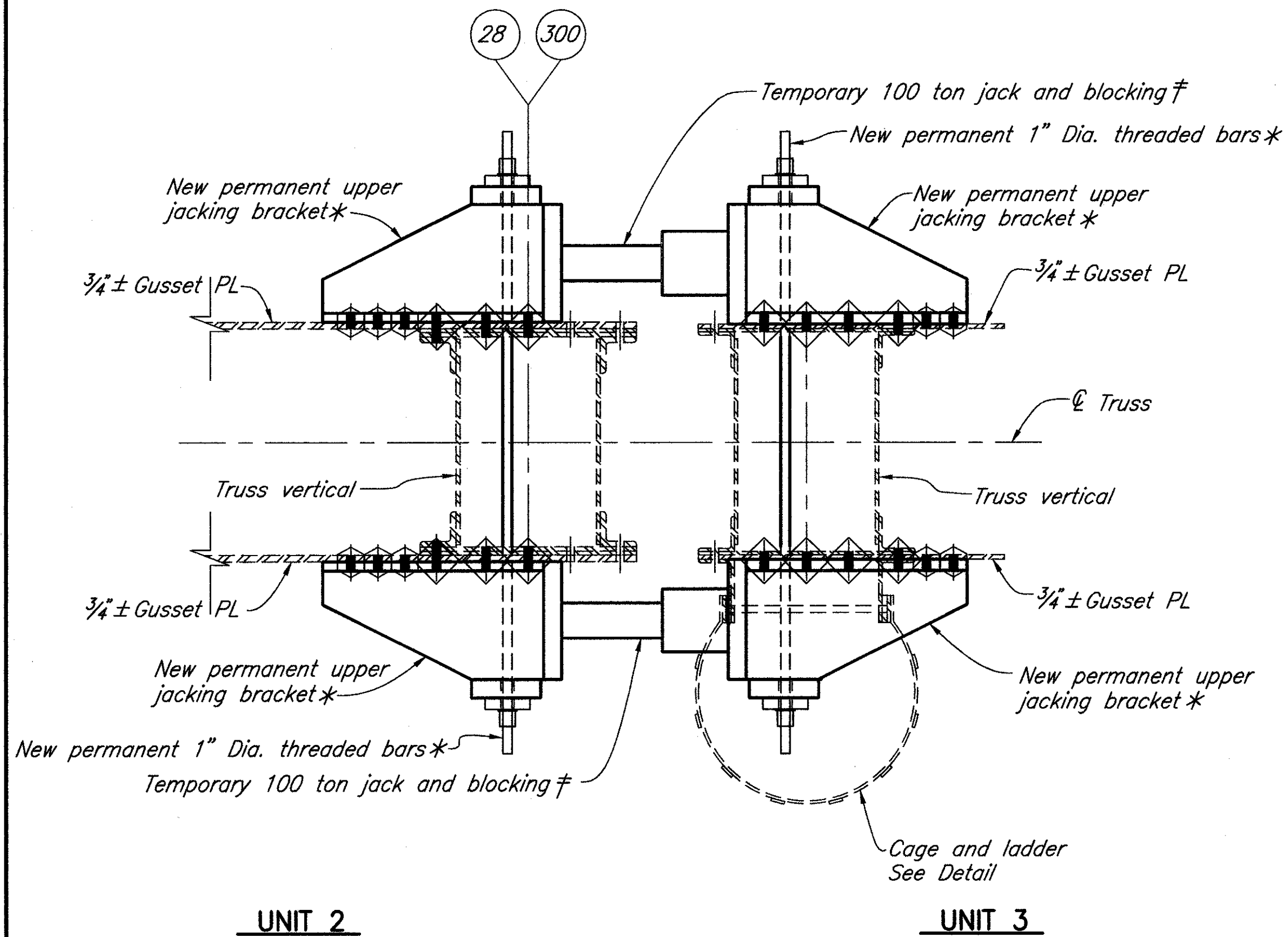
TRUSS EXPANSION JOINT SOUTH TRUSS SPAN 2 (LOOKING NORTH)

**NOTES:**  
**MATERIALS** shown are existing unless otherwise noted.  
**NORTH TRUSS** similar to south truss proposed work.  
**PAINTING LIMITS:** Extent of work for painting of existing steel for estimated quantities Item 514-Field painting, misc.: Surface preparation of existing steel, Item 514-Field painting, misc.: Existing structural steel, prime coat, System A, and Item 514-Field painting, misc.: Existing structural steel, finish coat, System A.

**BOLT LEGEND:** See sheet 25 / 48 .  
**SECTIONS B-B, C-C, & D-D:** See sheet 40 / 48 .  
**PERMANENT UPPER & LOWER JACKING BRACKETS:** See sheets 41 / 48 & 42 / 48 .  
**LADDER & CATWALK DETAILS:** See sheet 43 / 48 .

\* Indicates included for payment with Item 513 - Structural steel, misc.: Permanent jacking supports.  
 † Indicates included for payment with Item 516 - Jacking and temporary support of superstructure, as per plan.

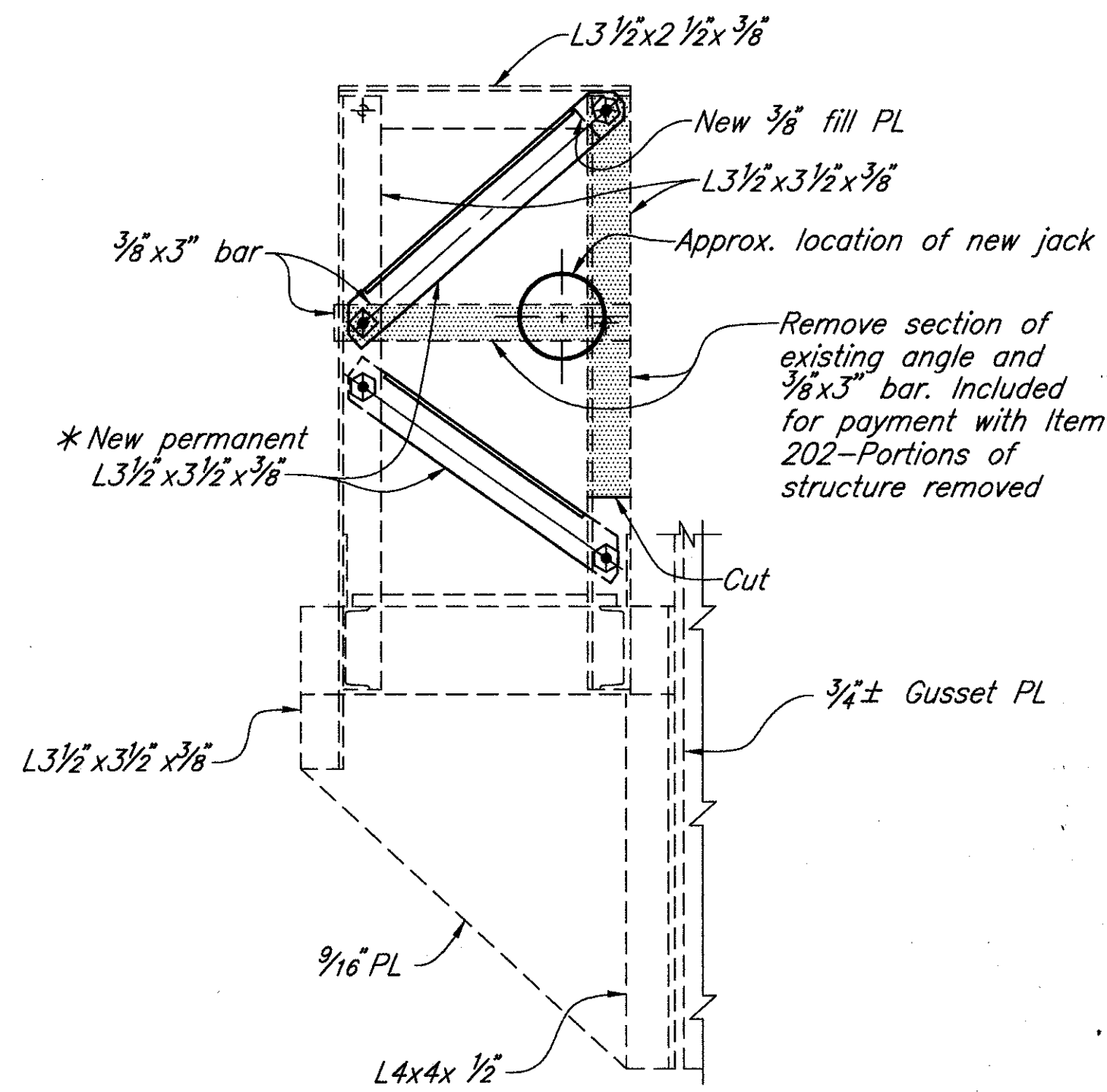
Job No. 93111E4 Date 12/26/96 Drawn By JLS,JPS,JLS



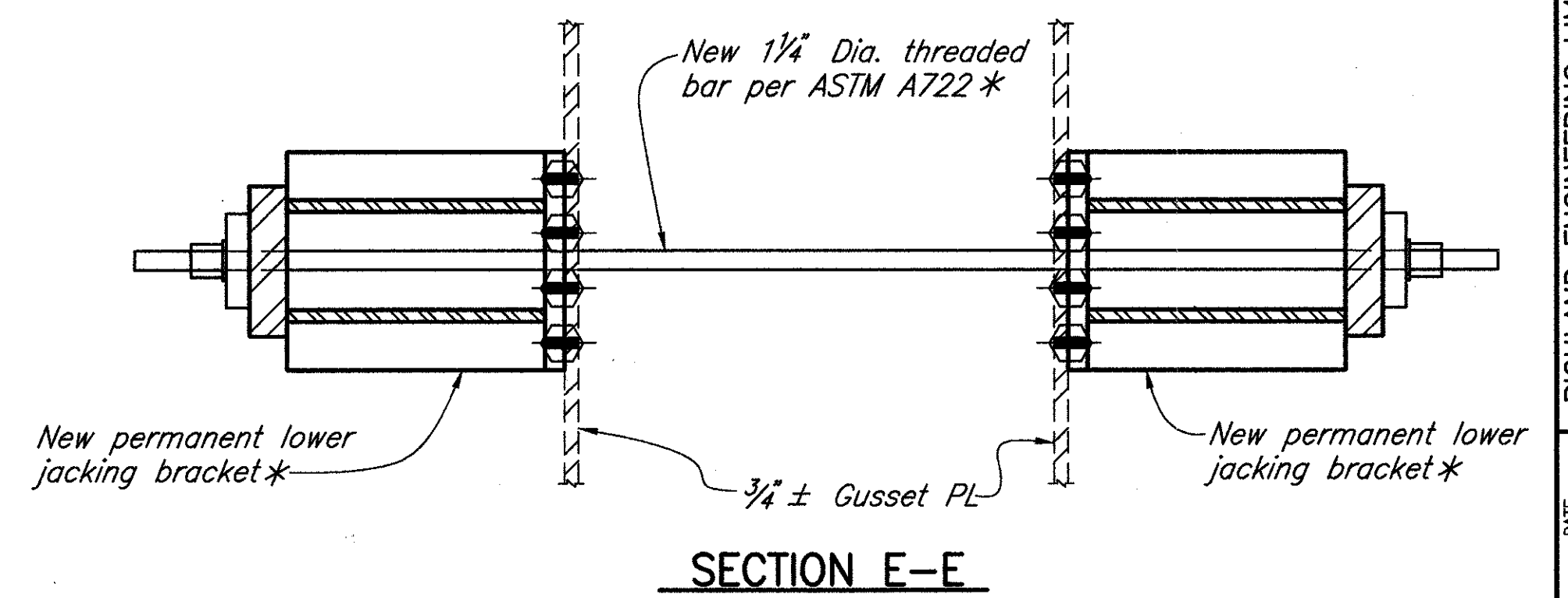
UNIT 2

UNIT 3

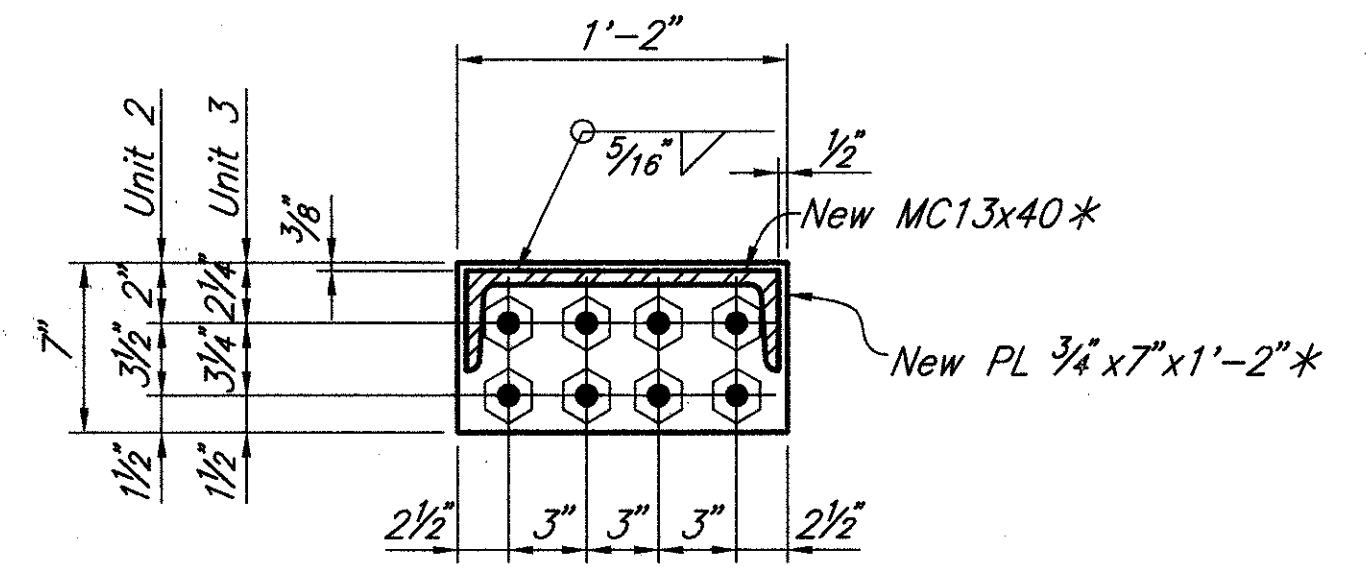
PERMANENT UPPER JACKING BRACKET  
SECTION B-B



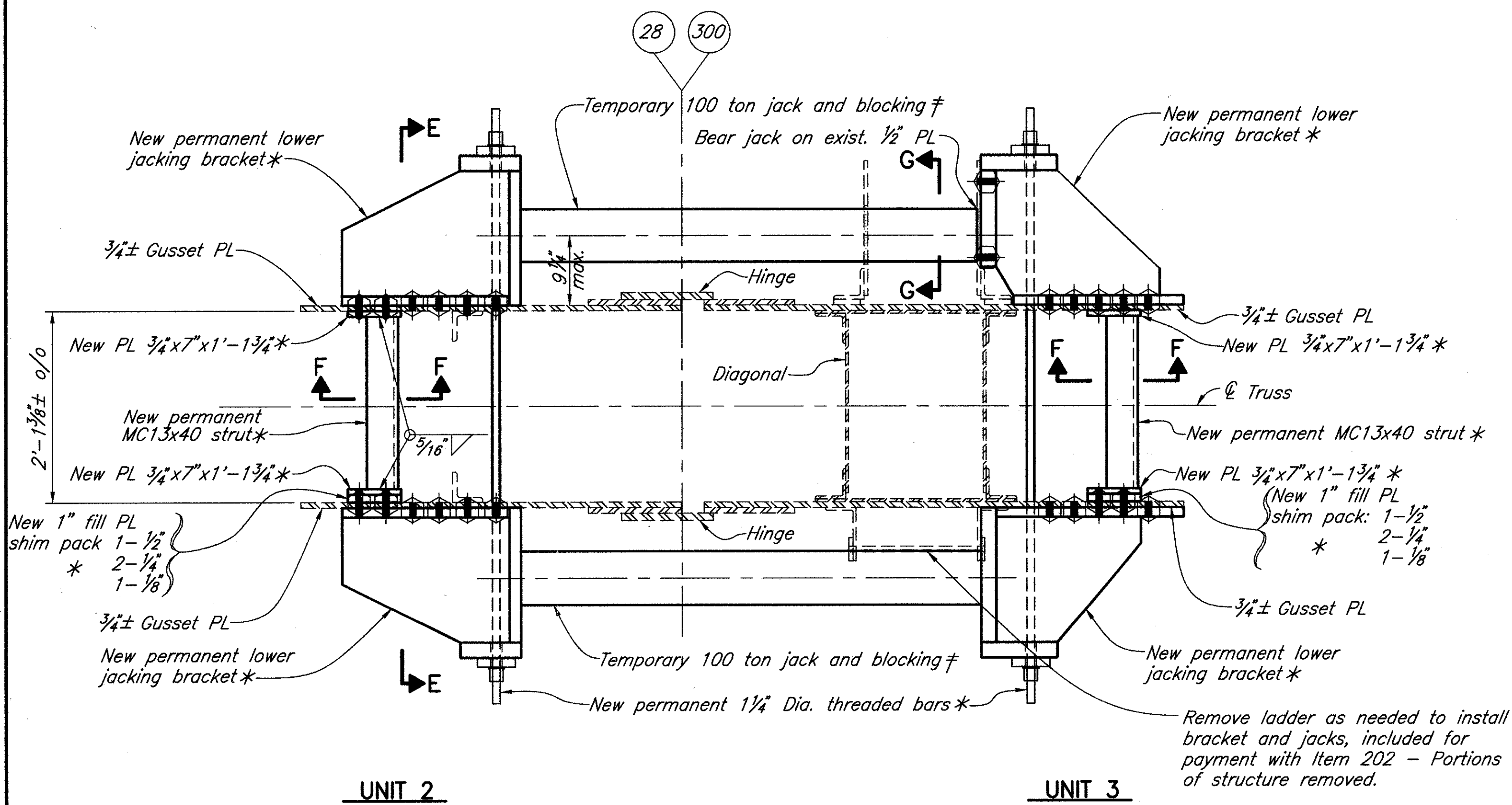
SECTION D-D  
SOUTH TRUSS ONLY



SECTION E-E



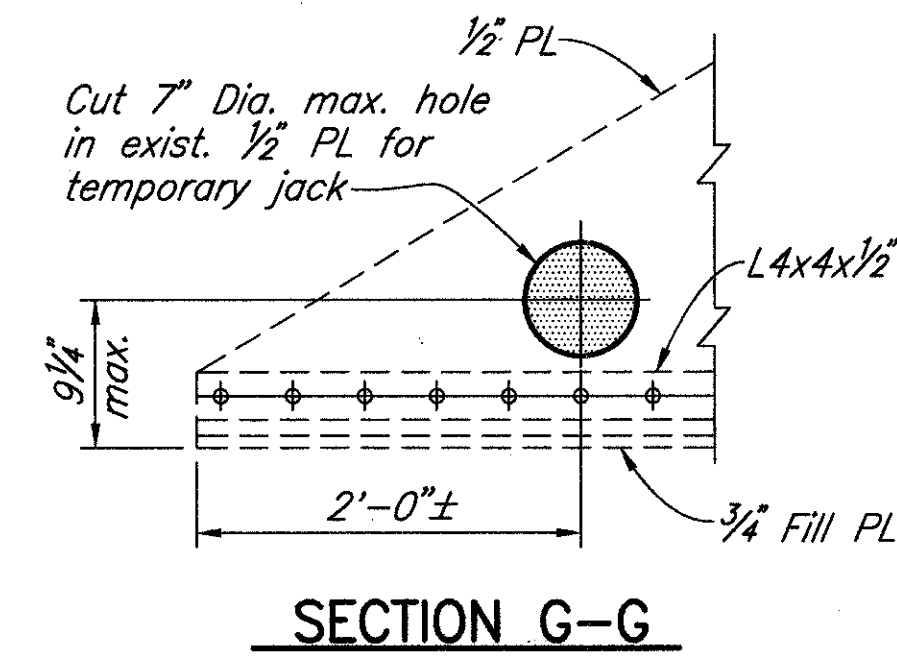
SECTION F-F



UNIT 2

UNIT 3

PERMANENT LOWER JACKING BRACKET  
SECTION C-C



SECTION G-G

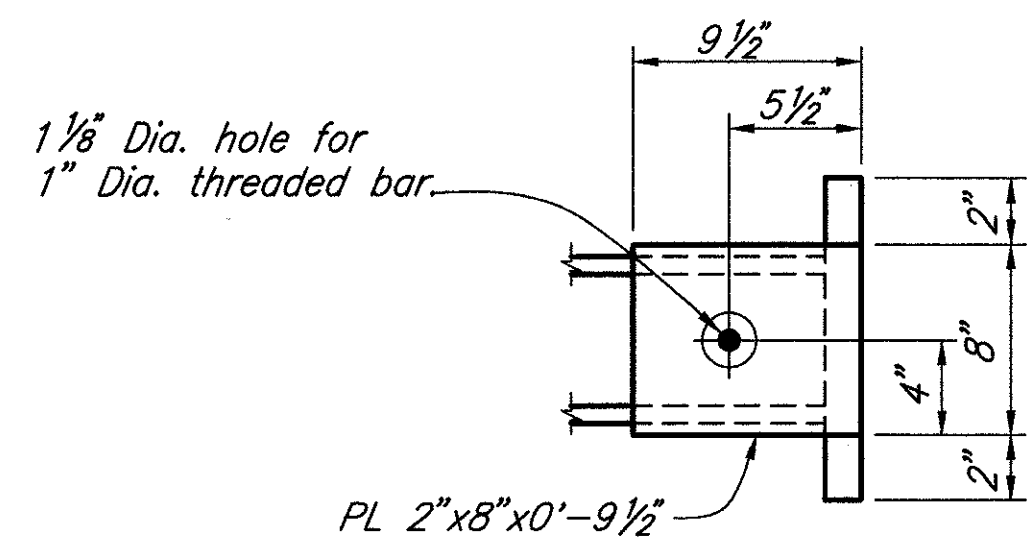
LEGEND

- Denotes area to be removed per Item 202 - Portions of structure removed, as per plan.
- \* Indicates included for payment with Item 513 - Structural steel, misc.: Permanent jacking supports.
- † Indicates included for payment with Item 516 - Jacking and temporary support of superstructure, as per plan.

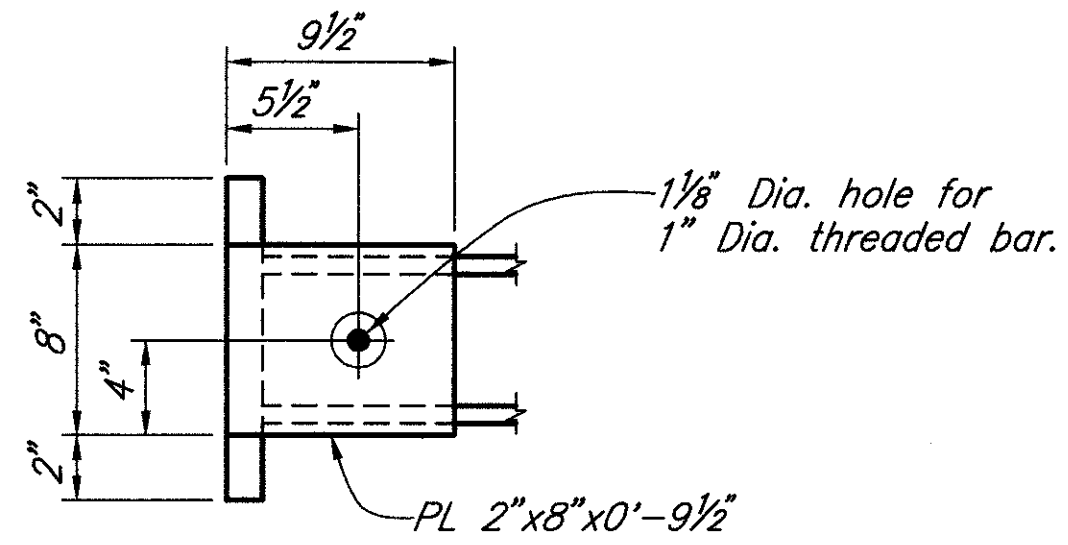
NOTES

- MATERIALS** shown are existing unless otherwise noted.
- CONNECTION BOLTS** shall be 7/8" Dia. A325 galvanized unless noted.
- BOLT LEGEND:** See sheet 25/48.
- SECTIONS B-B, C-C & D-D:** See sheet 39/48 for location.
- PERMANENT UPPER & LOWER JACKING BRACKET DETAILS:** See sheet 41/48.
- FILL PLATE DETAILS:** See sheet 41/48.
- CAGE AND LADDER DETAILS:** See sheet 43/48.

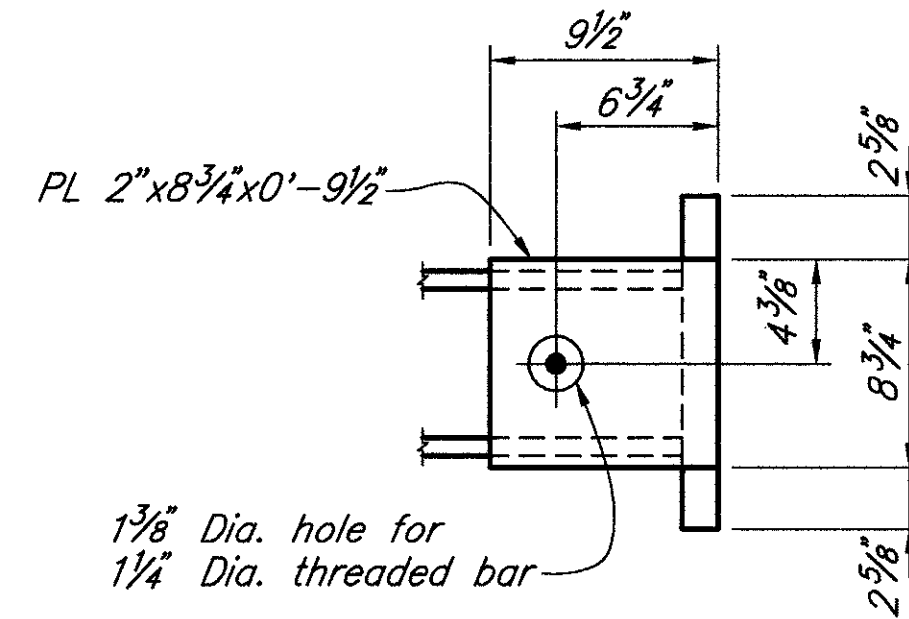




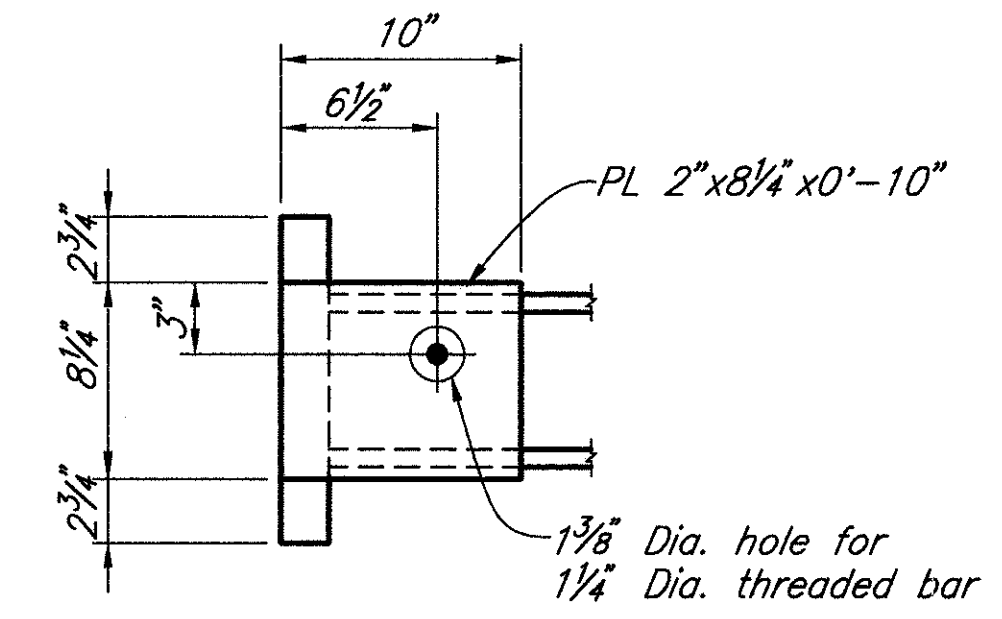
TOP PLATE



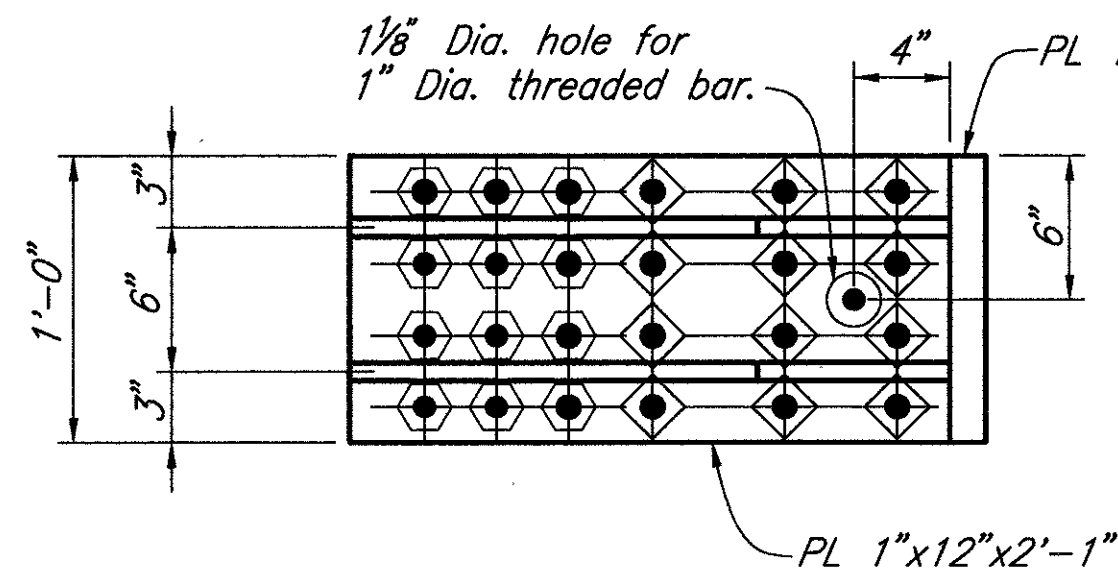
TOP PLATE



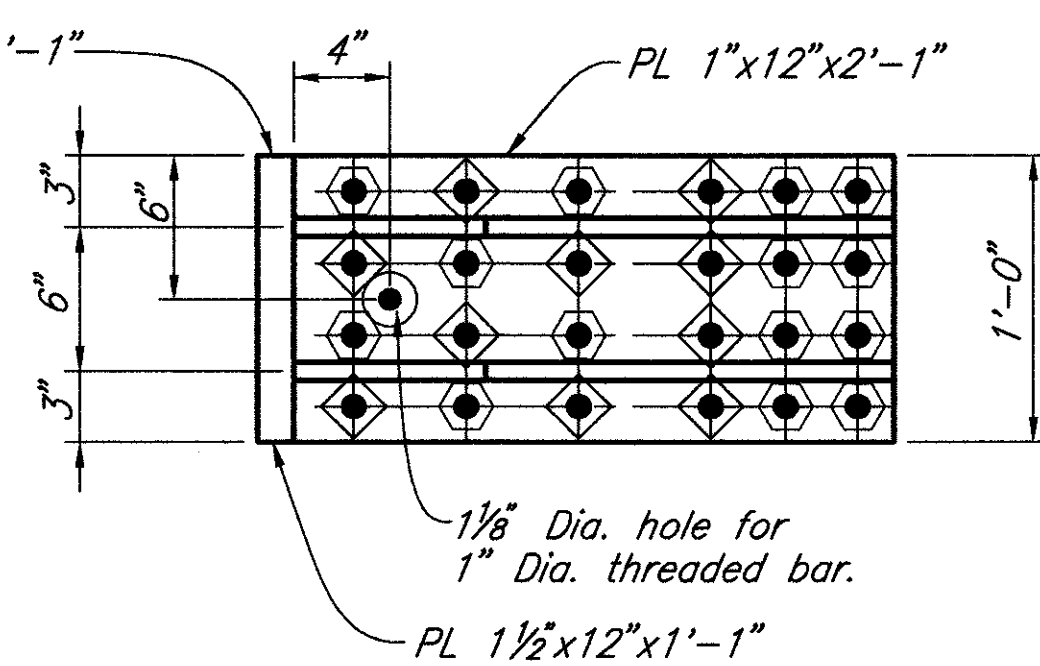
TOP PLATE



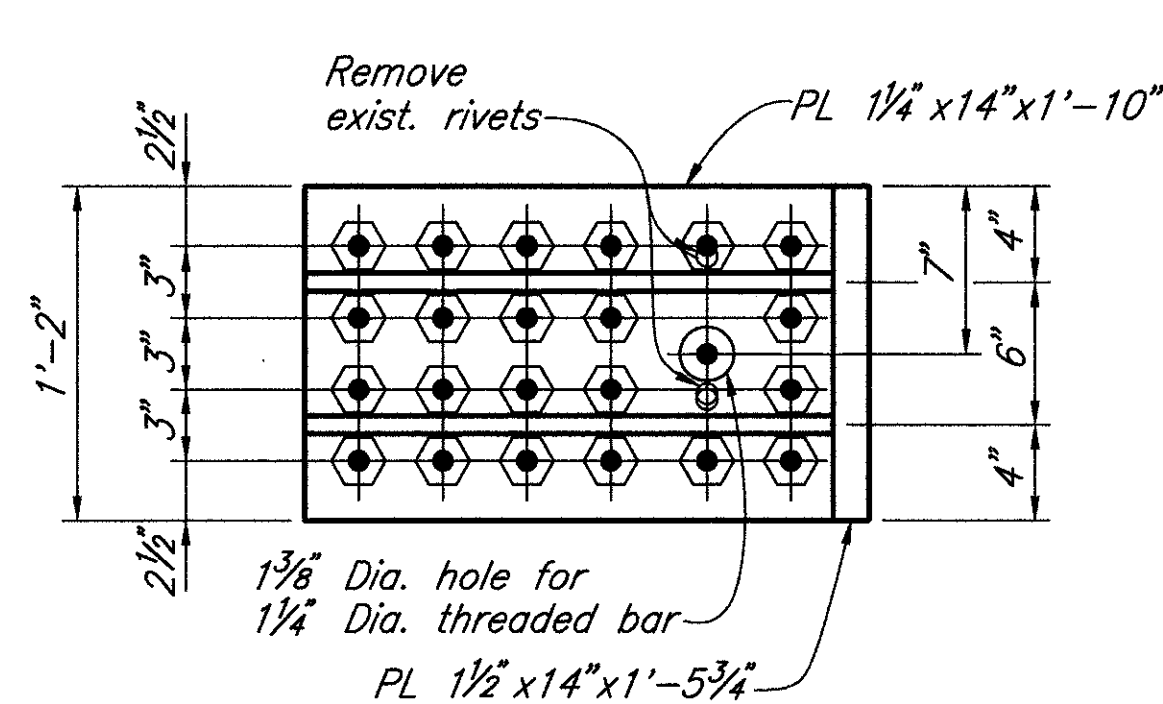
TOP PLATE



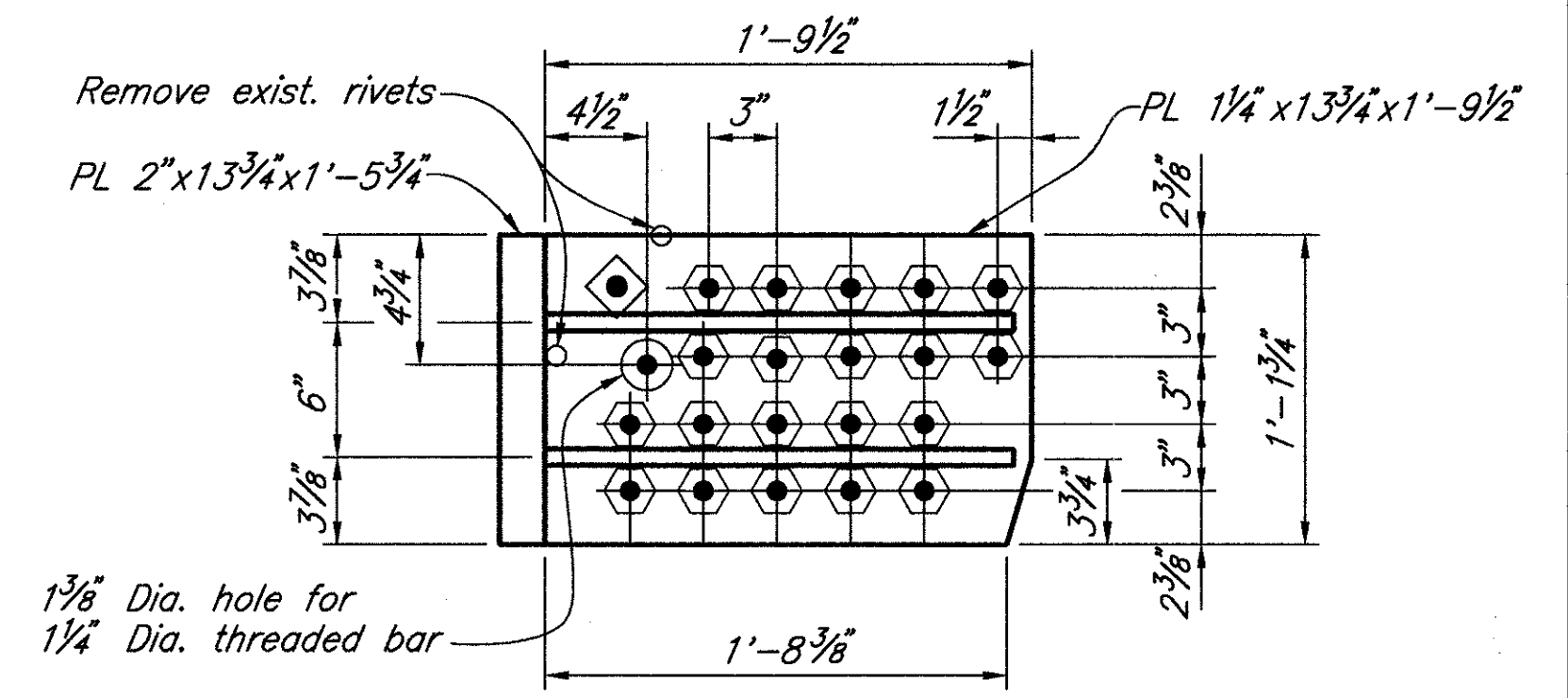
BOTTOM PLATE



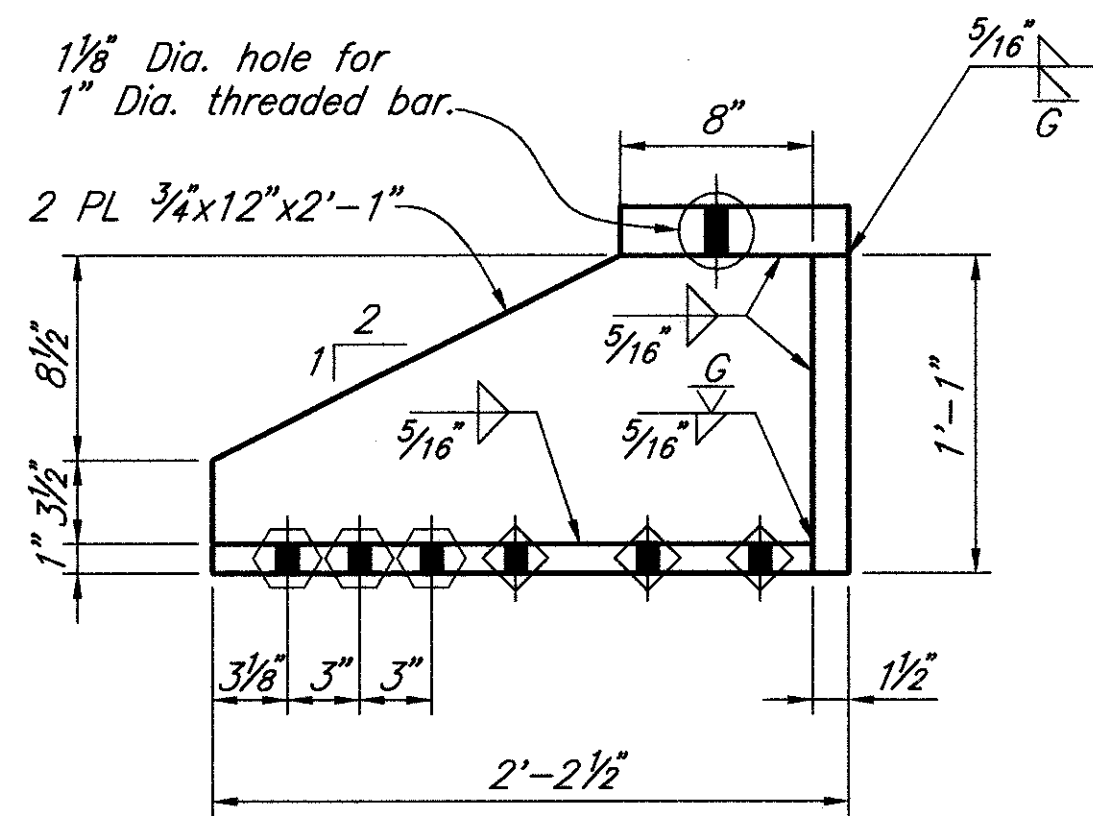
BOTTOM PLATE



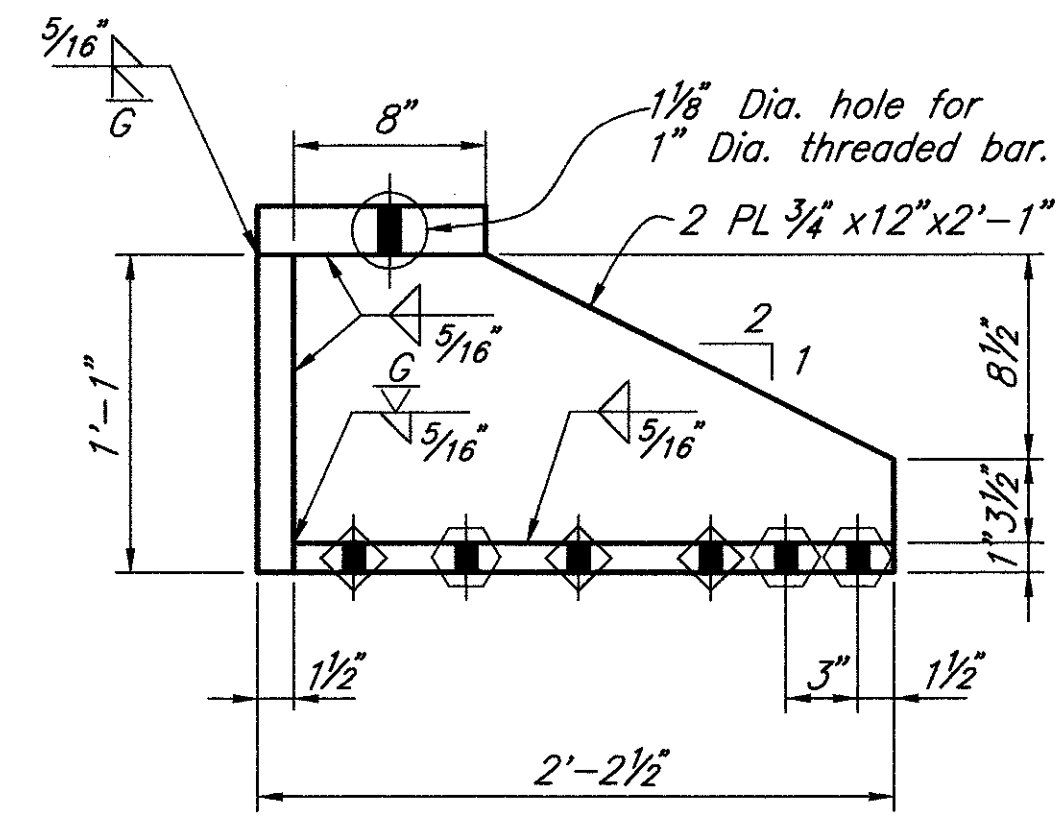
BOTTOM PLATE



BOTTOM PLATE

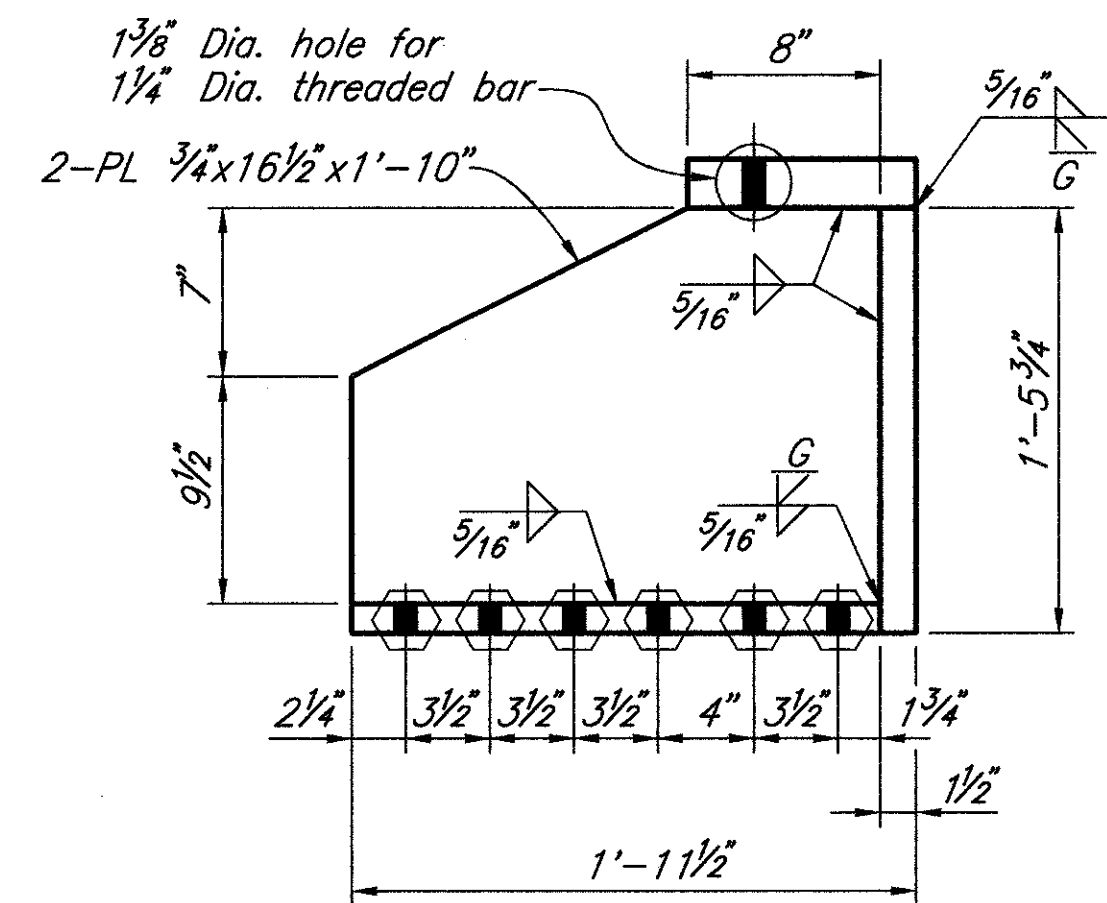


UNIT 2  
(4 Required)

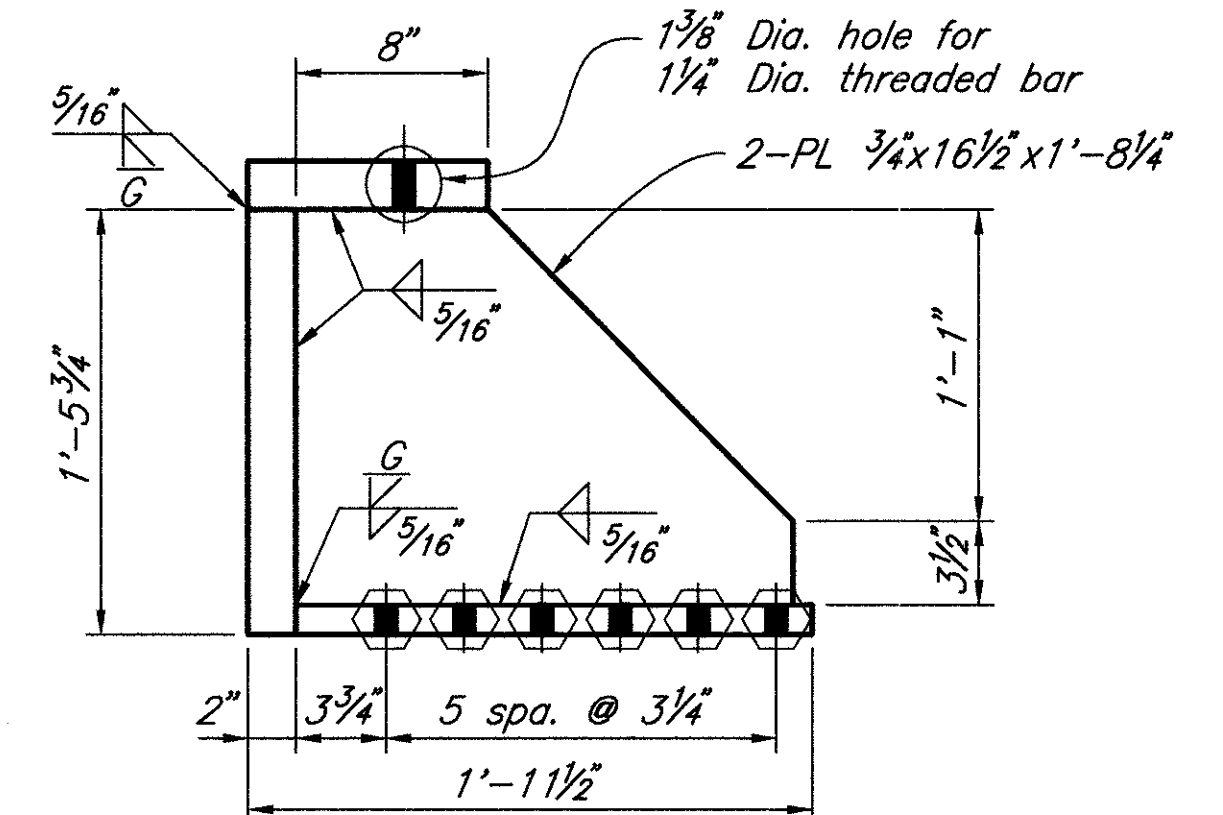


UNIT 3  
(4 Required)

PERMANENT UPPER JACKING BRACKETS FOR TRUSS NO. 28 & TRUSS NO. 300



UNIT 2  
(4 Required)



UNIT 3 EXTERIOR  
(1 Required South truss, South face, as shown)  
(1 Required North truss, North face, opposite hand)

PERMANENT LOWER JACKING BRACKETS FOR TRUSS NO. 28 & TRUSS NO. 300

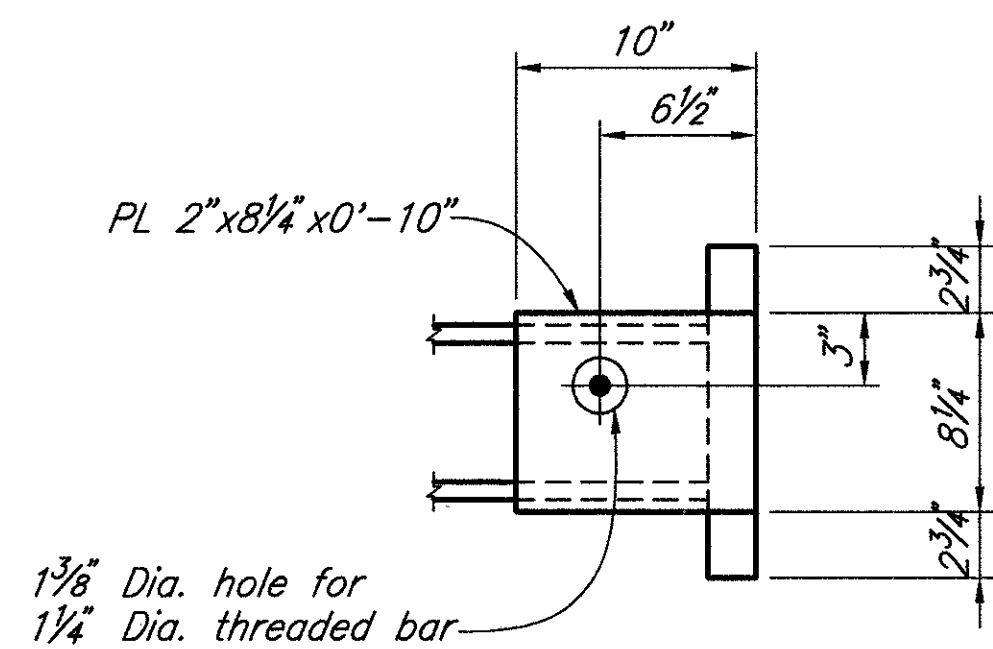
NOTES

MATERIALS shown are new unless otherwise noted.

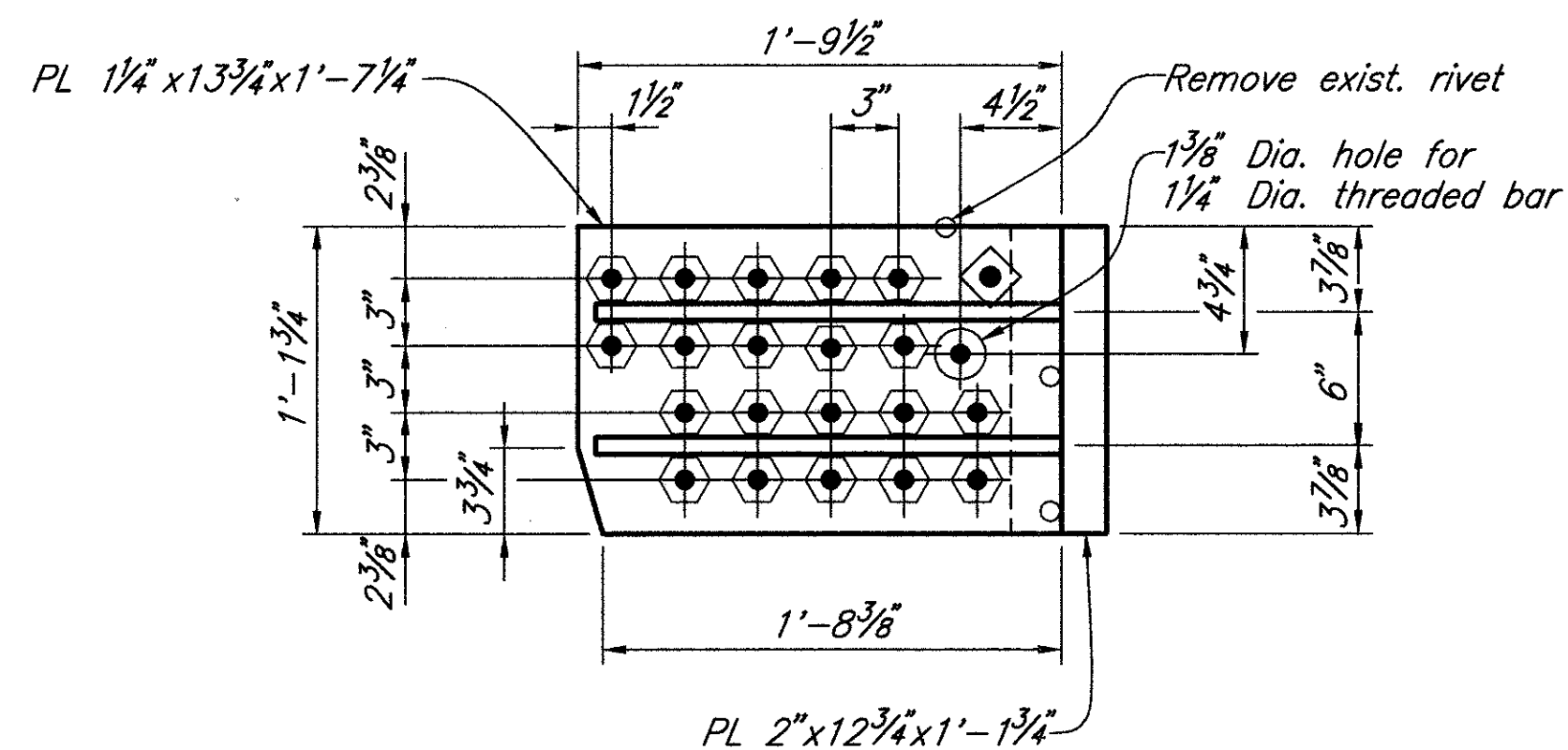
BOLT LEGEND: See sheet 25/48.

PERMANENT UPPER & LOWER JACKING BRACKETS: See sheet 39/48 for locations.

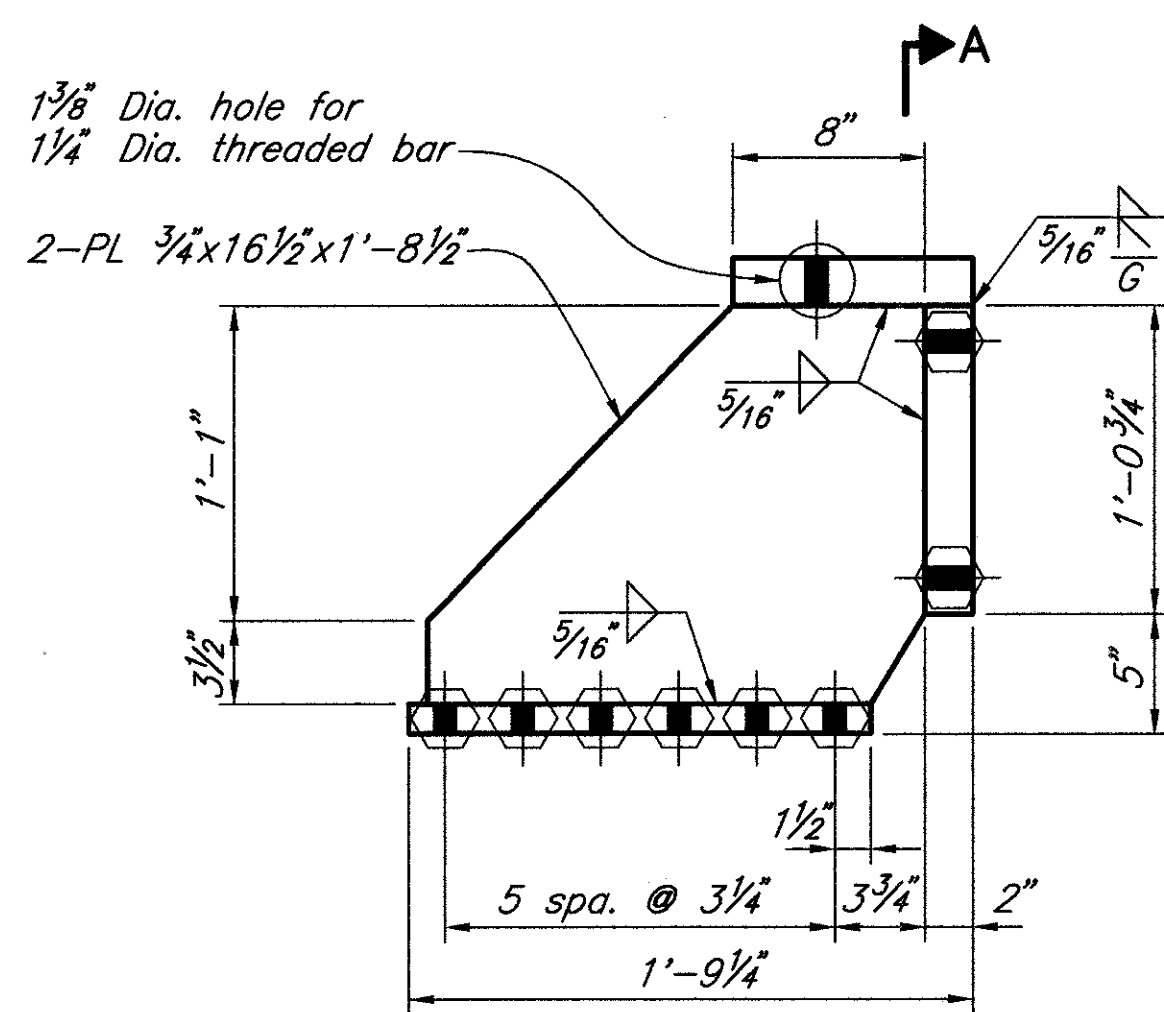
UNIT 3 INTERIOR LOWER JACKING BRACKET: See sheet 42/48.



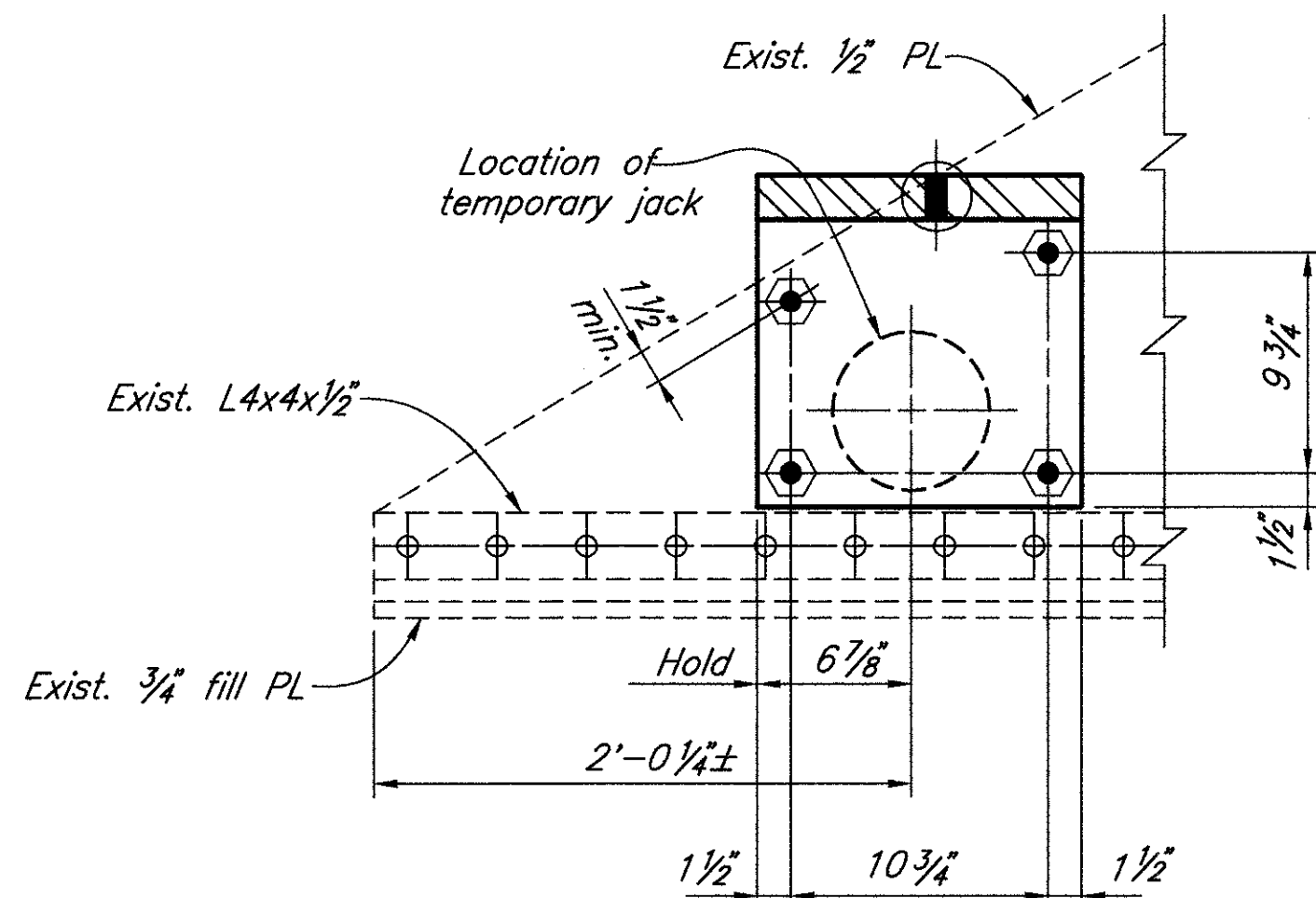
TOP PLATE



BOTTOM PLATE



UNIT 3 INTERIOR



SECTION A-A

**PERMANENT LOWER JACKING BRACKETS FOR TRUSS NO. 300**

(1 Required; South Truss, North Face, as shown)  
 (1 Required; North Truss, South Face, opposite hand)

**NOTES**

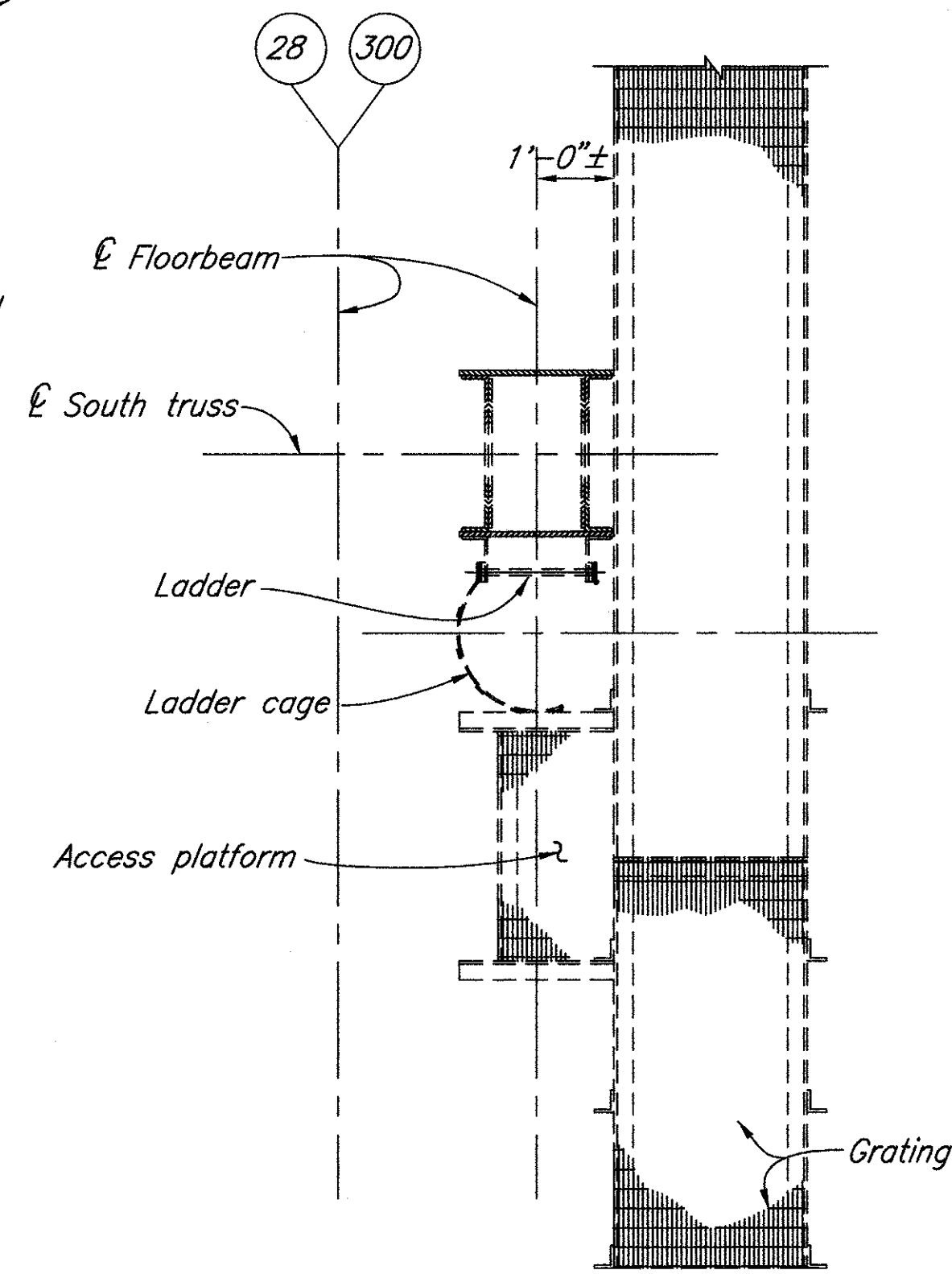
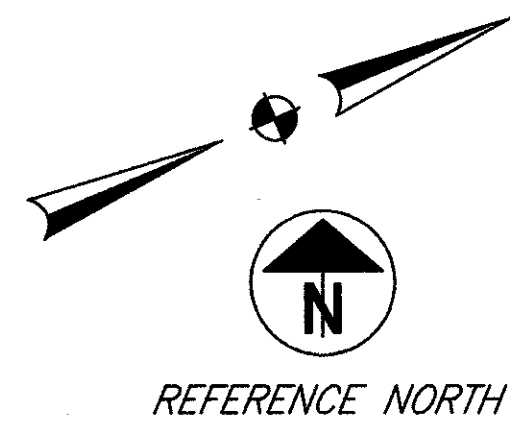
MATERIALS shown are new unless otherwise noted.

BOLT LEGEND: See sheet 25/48.

PERMANENT LOWER JACKING BRACKETS:  
 See sheet 39/48 for locations.

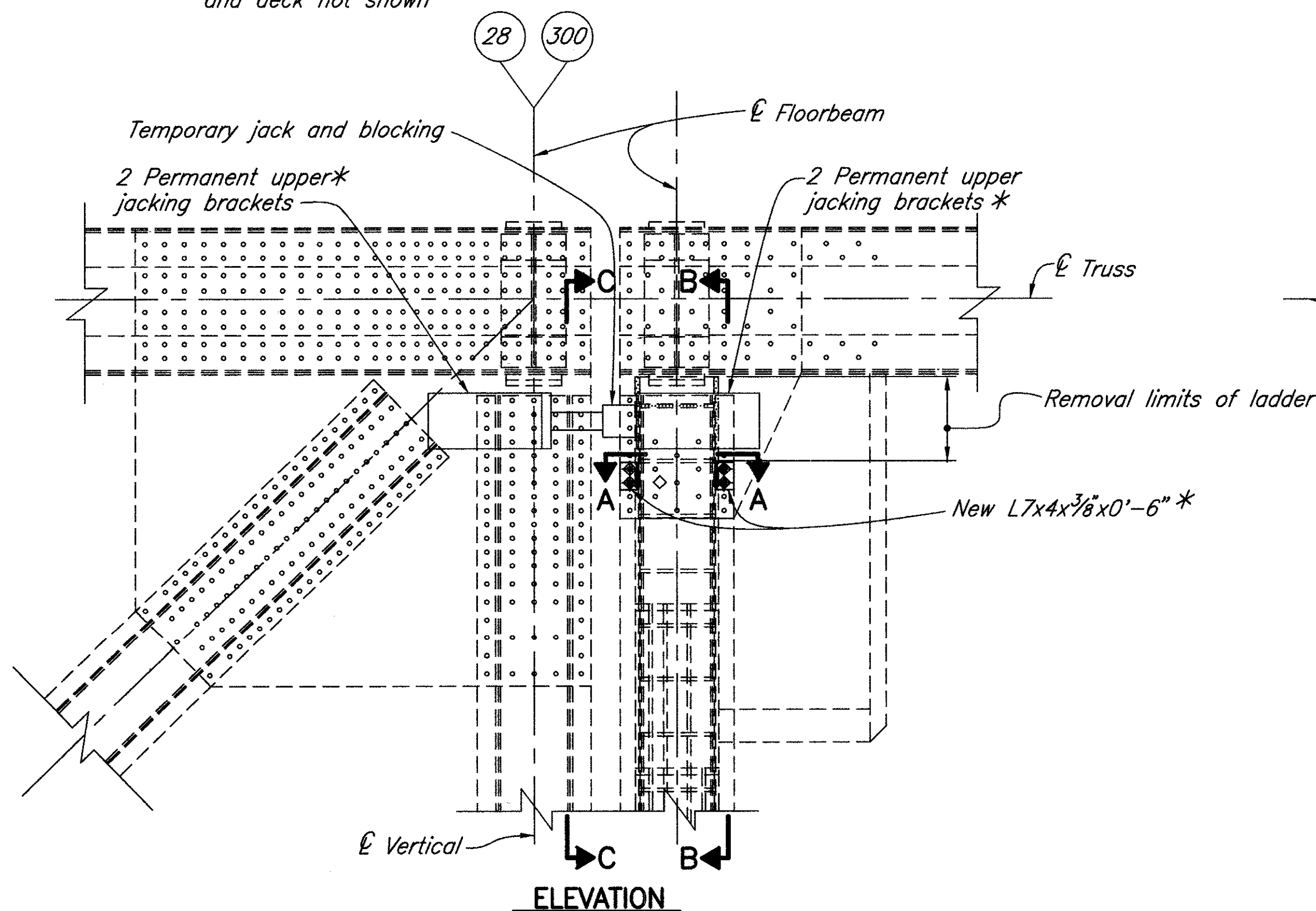
ADDITIONAL JACKING BRACKETS:  
 See sheet 41/48.





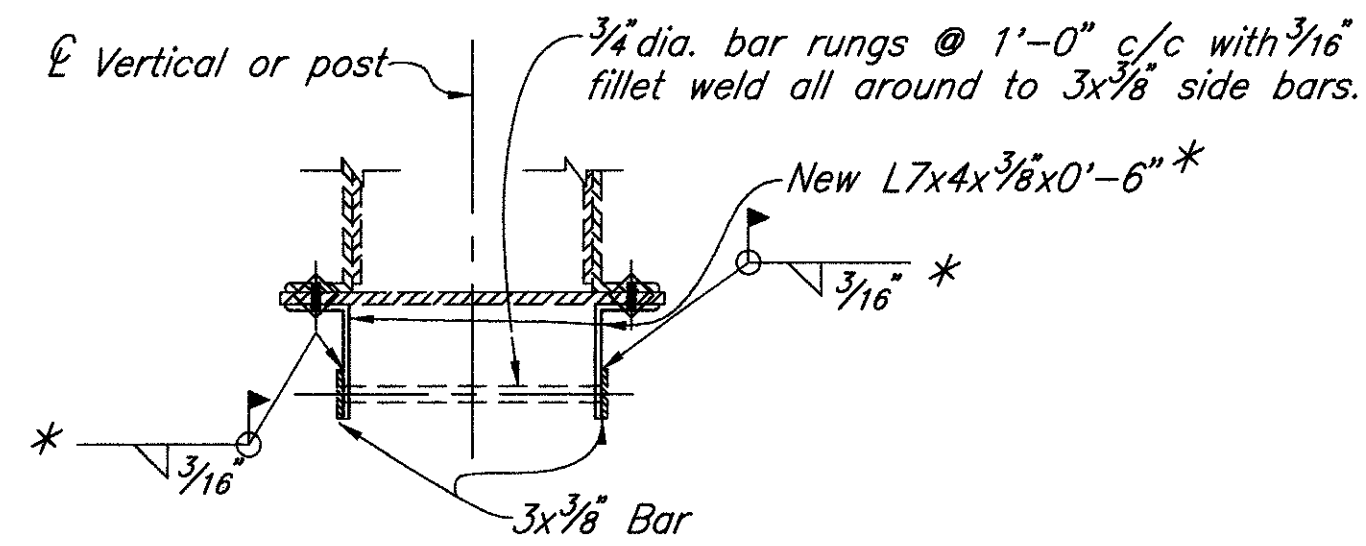
**PLAN**  
(South side shown)  
(North side similar)

Note: Floorbeams, stringers  
and deck not shown

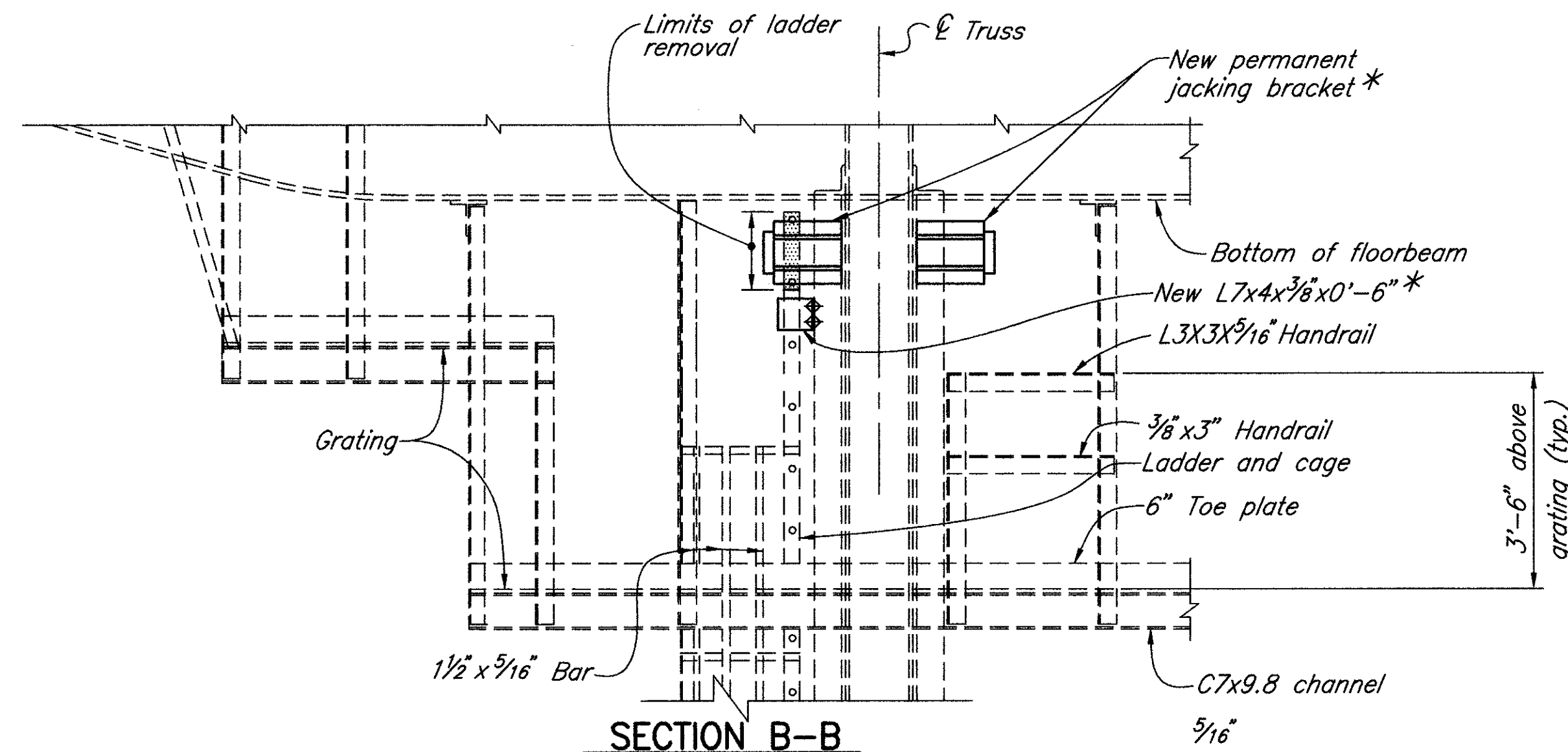


**TRUSS EXPANSION JOINT, SPAN 2 (SHOWN)**  
(South Truss looking North)

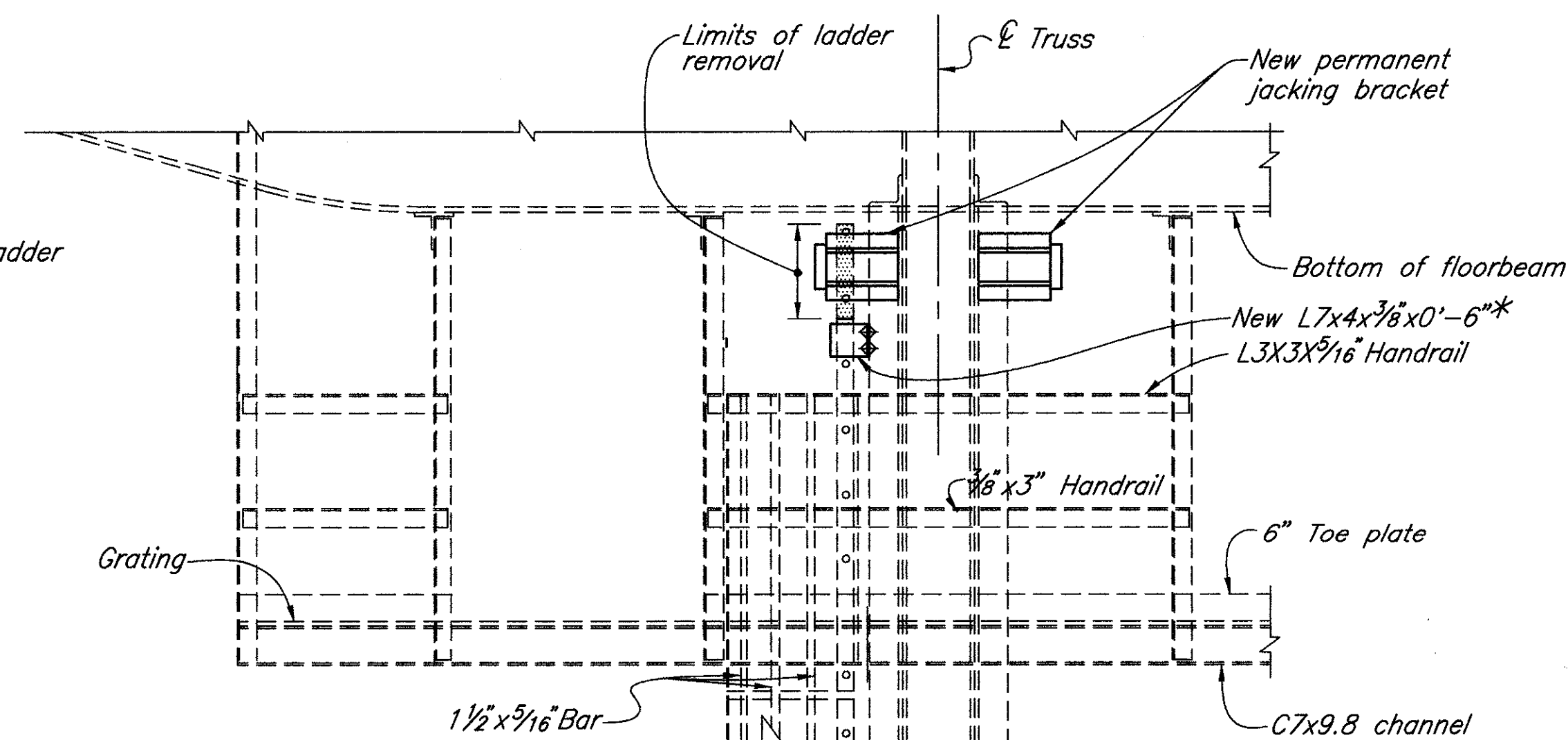
**TRUSS EXPANSION JOINT, SPAN 2 (OPPOSITE HAND)**  
(North Truss looking North)



**SECTION A-A**



**SECTION B-B**  
(South Truss looking West)



**SECTION C-C**  
(North Truss looking East)

**LEGEND**

-Denotes area to be removed per Item 202-Portions of structure removed, as per plan

\* -Indicates included for payment with Item 513 - Structural steel misc.; Permanent jacking supports.

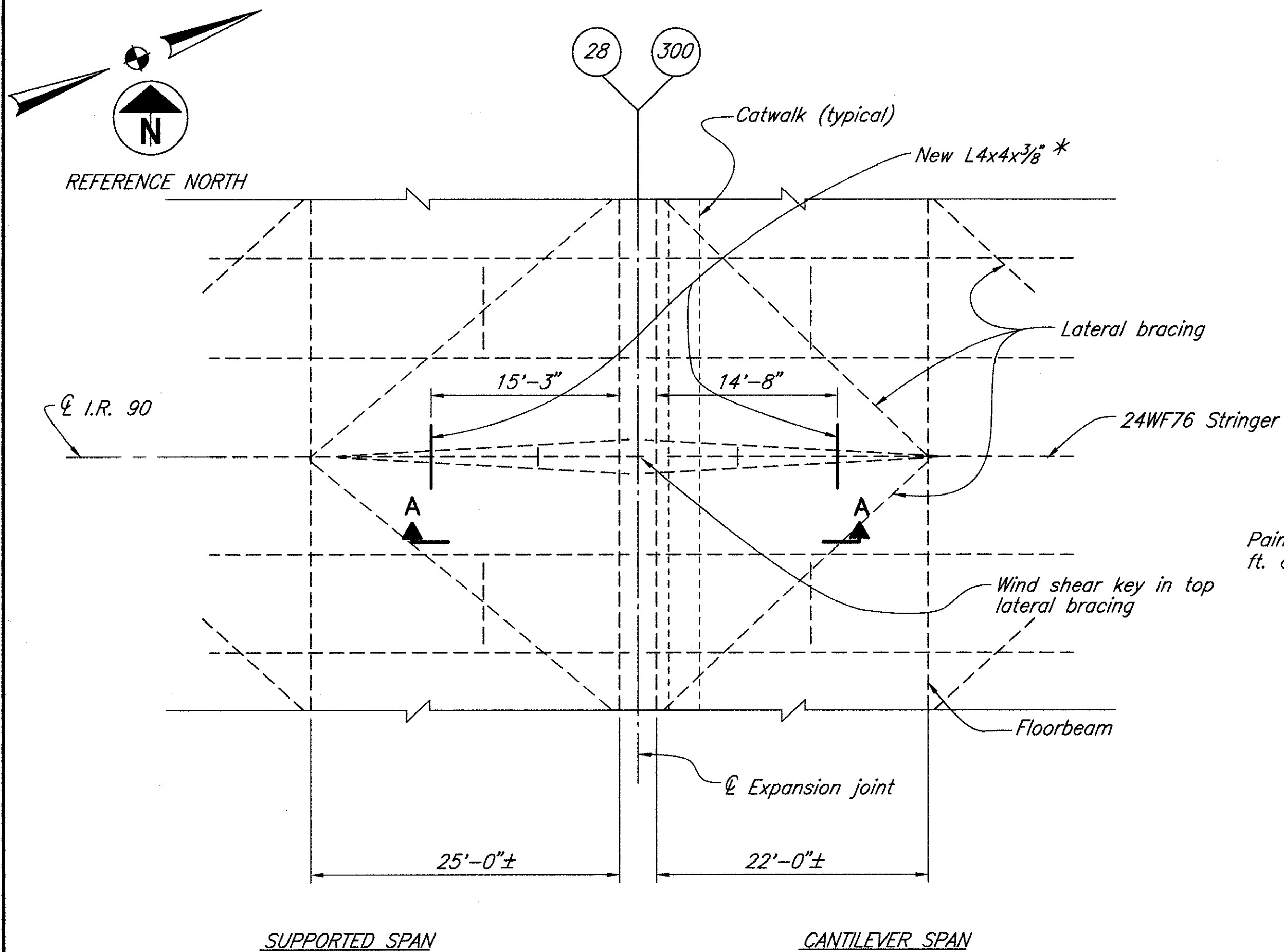
**NOTES:**

**MATERIALS** shown are existing unless otherwise noted.

**CONNECTION BOLTS** shall be 7/8" dia. A325 galvanized, unless noted.

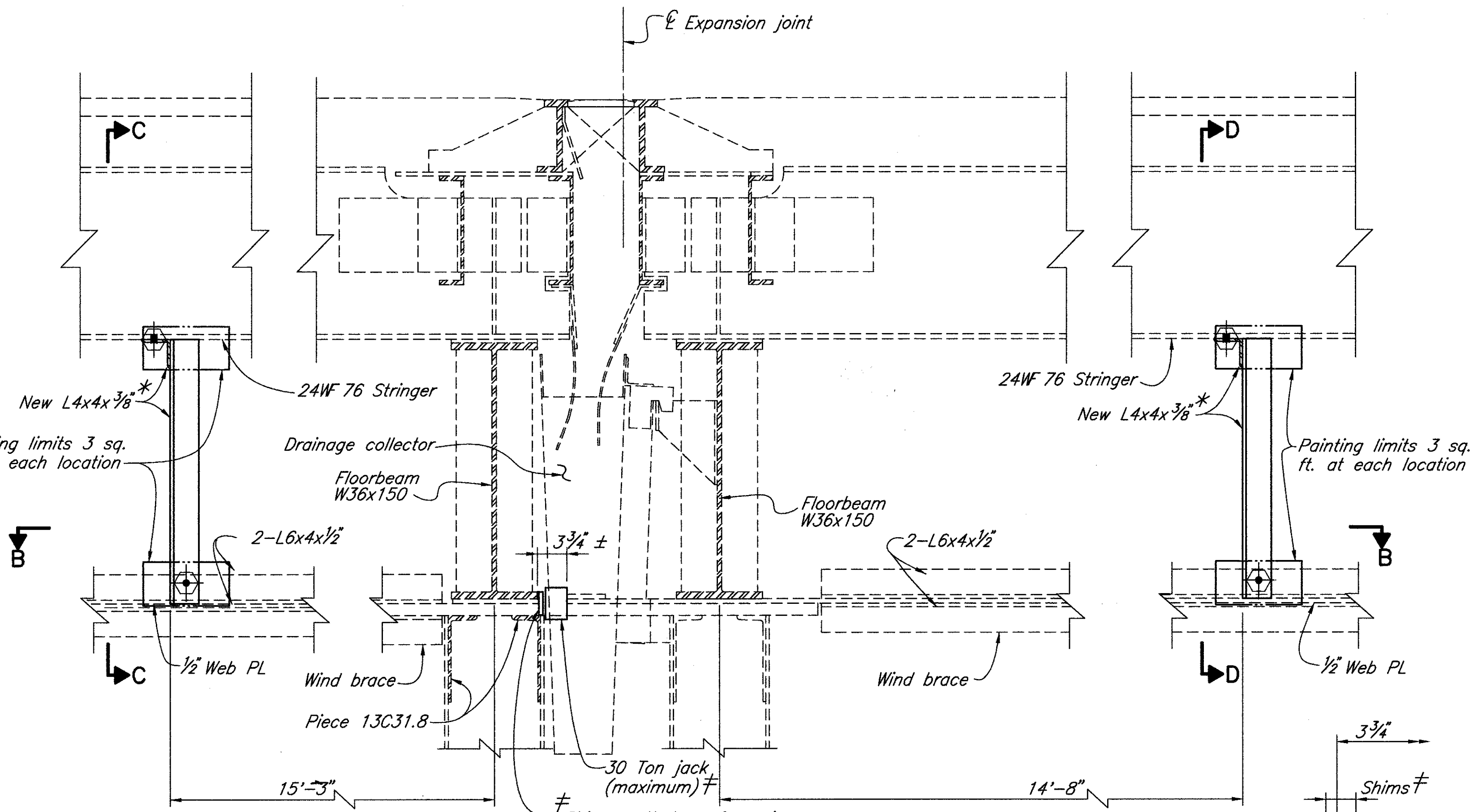
**BOLT LEGEND:** See sheet 25/48.

Job No. 931117E3 Date 12/26/96 Drawn By TWH/RB

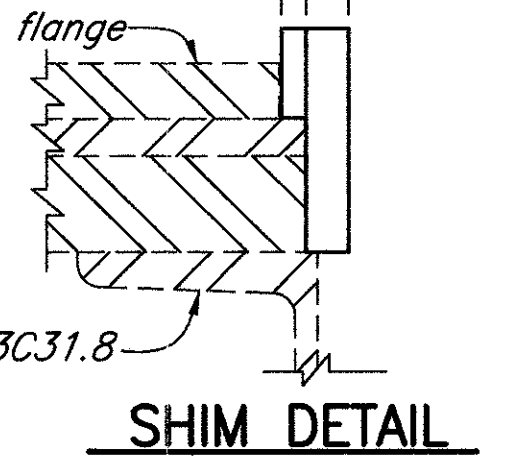


**PARTIAL FLOOR SYSTEM FRAMING PLAN & TOP CHORD LATERAL BRACING**

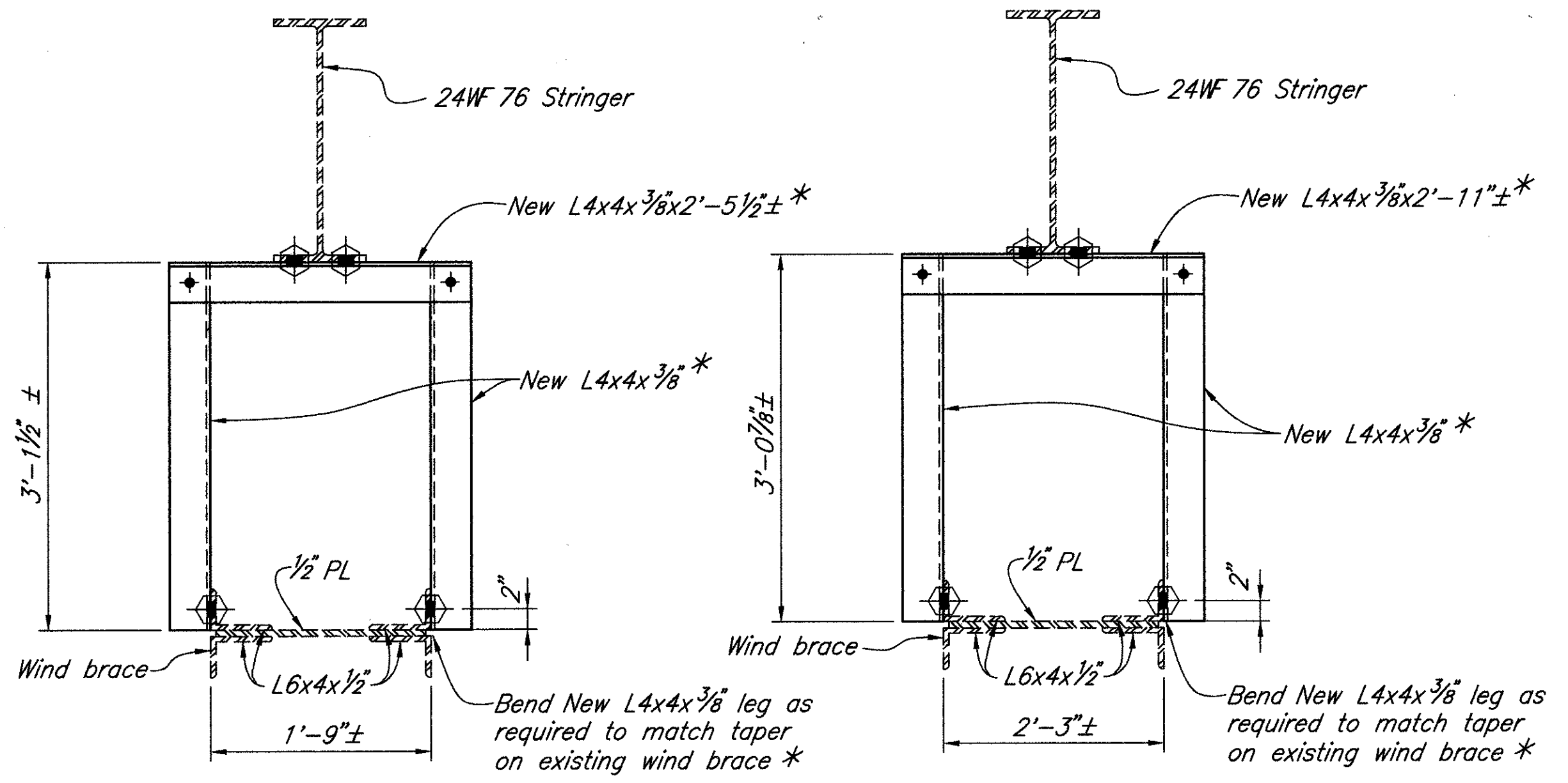
\* - Indicates included for payment with Item 513 - Structural steel, misc.; Permanent jacking supports.  
 ‡ - Indicates included for payment with Item 516 - Jacking and temporary support of superstructure, as per plan



**SECTION A-A ELEVATION**

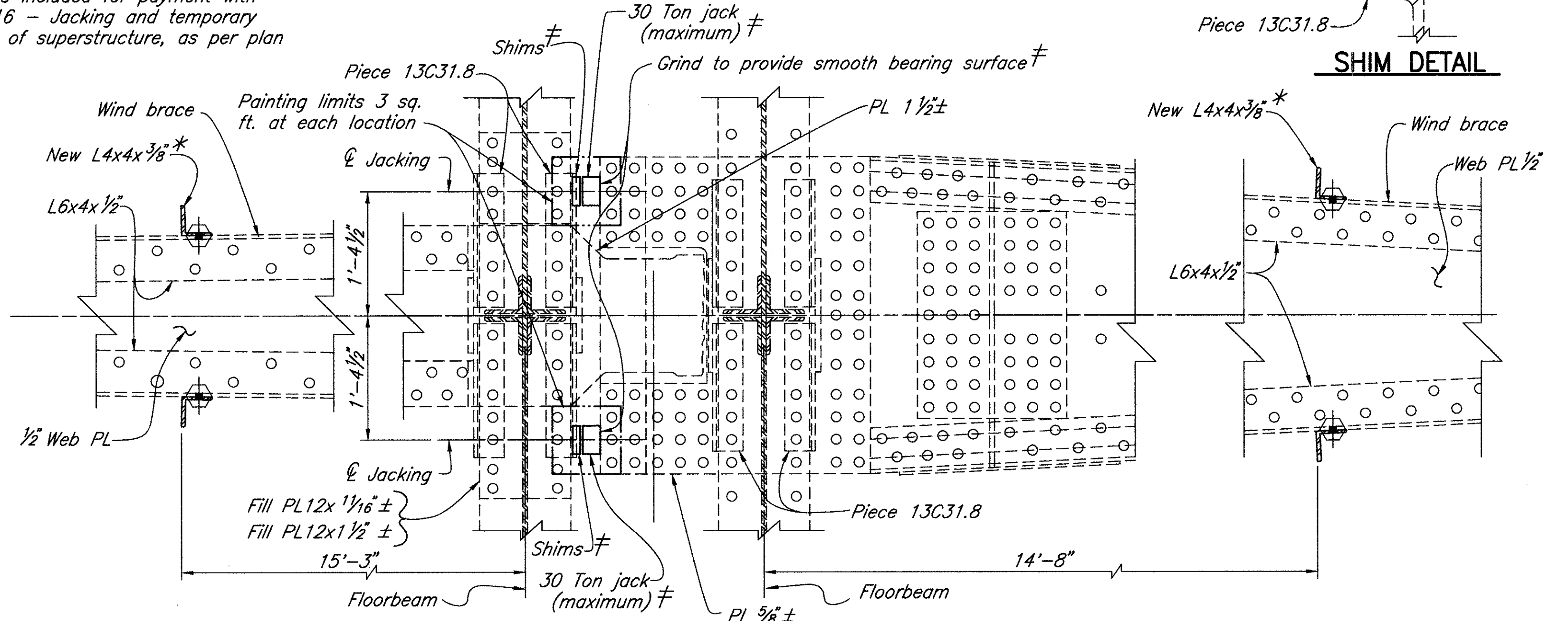


**SHIM DETAIL**



**SECTION C-C**

**SECTION D-D**



**SECTION B-B ELEVATION**

**NOTES:**

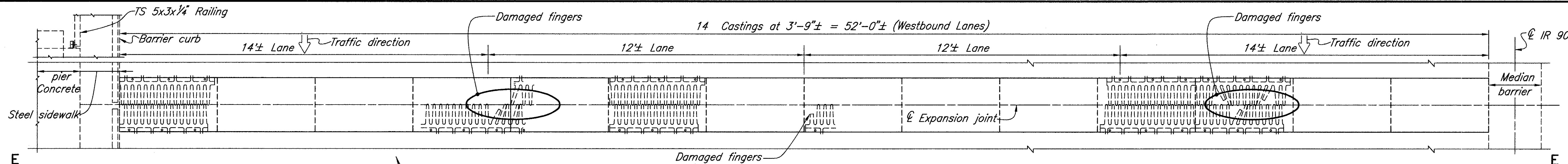
**MATERIALS** shown are existing unless otherwise noted  
**BOLT LEGEND:** See sheet 25/48  
**NEW BOLTS** 7/8 dia. A325 Galvanized

**PAINTING LIMITS:** Extent of work for painting of existing steel for estimated quantities Item 514- Field painting, misc.: Surface preparation of existing steel, Item 514-Field painting, misc.: Existing structural steel, prime coat, System A, and Item 514-Field painting, misc.: Existing structural steel, finish coat, System A.

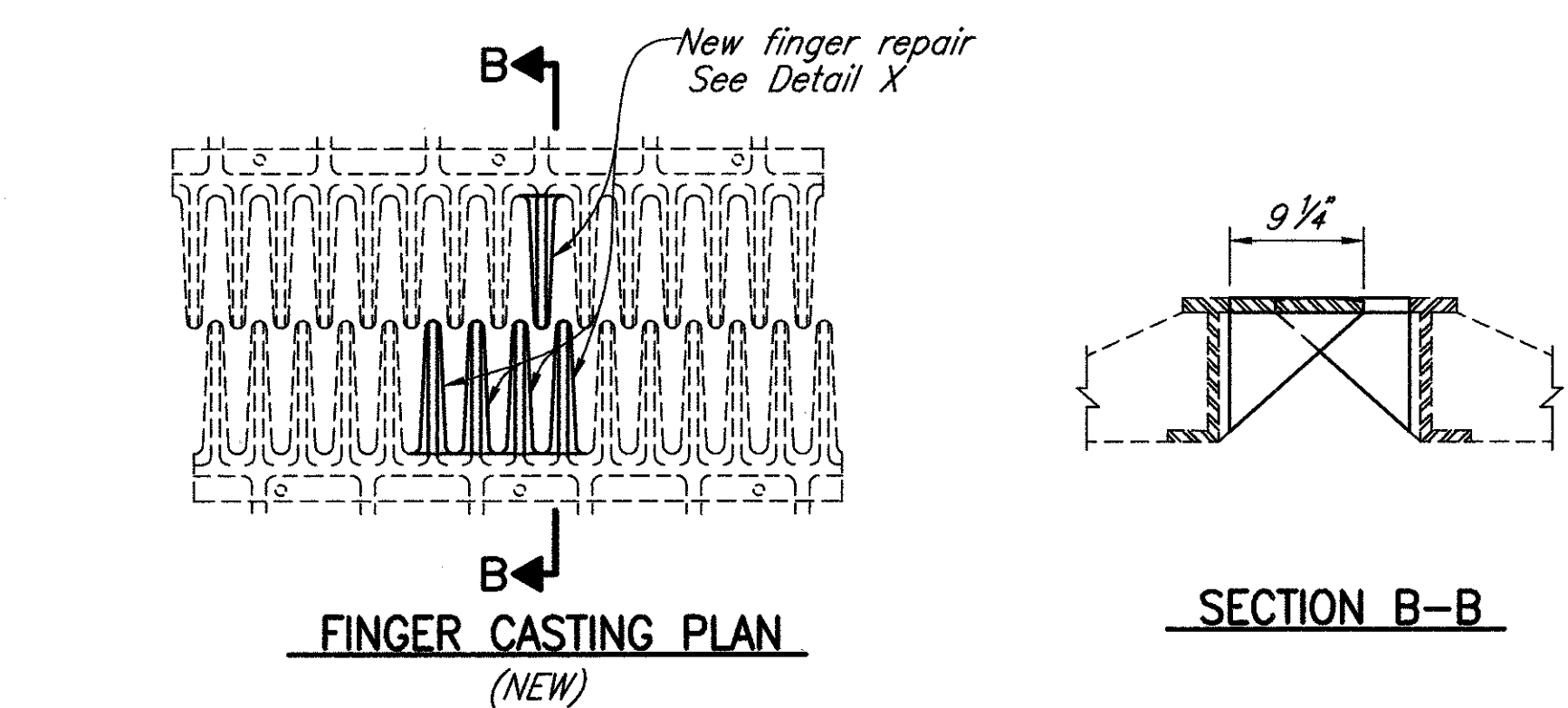
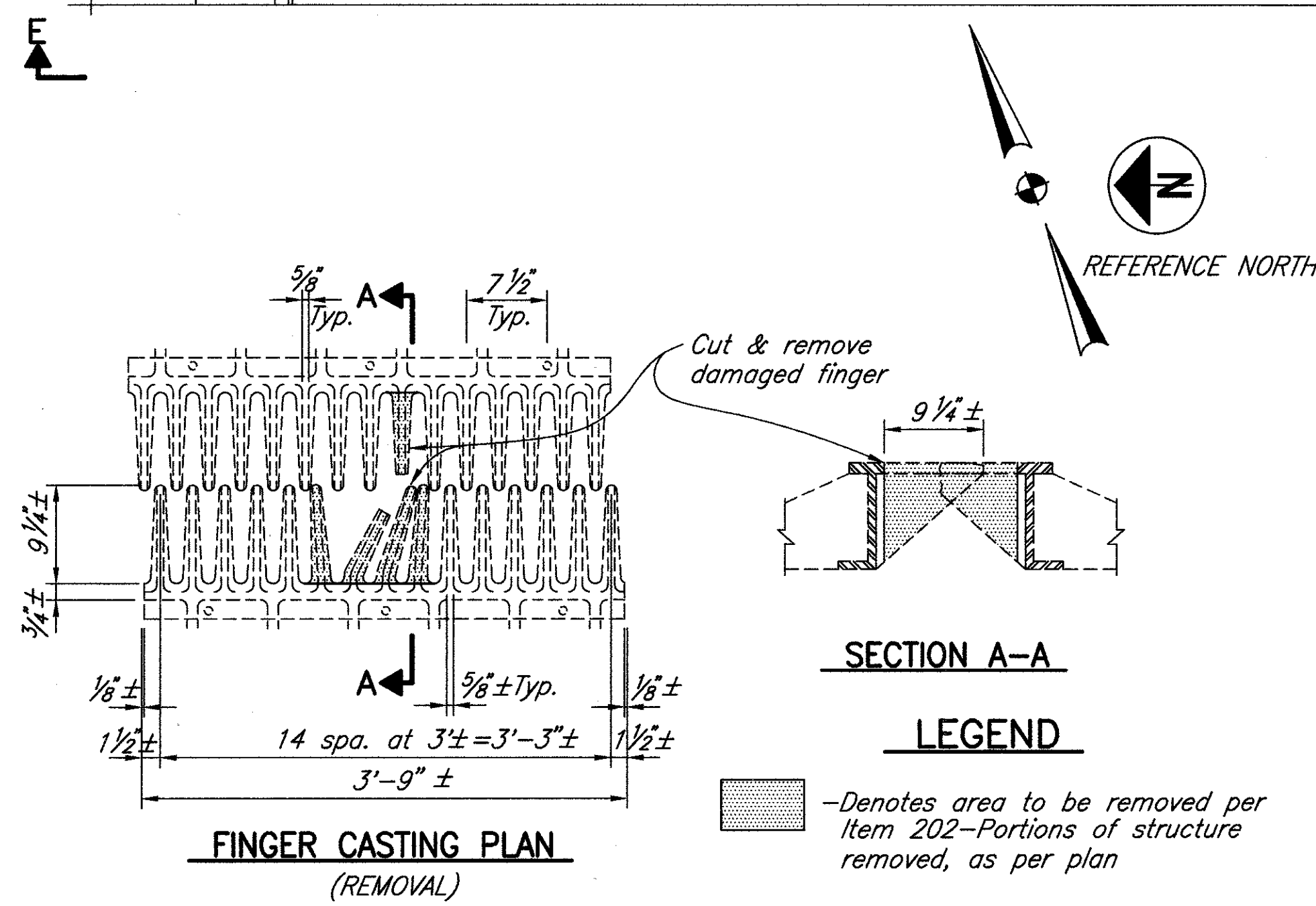
Job No. 93111TW1 Date 12/23/96 Drawn By TWH/RB



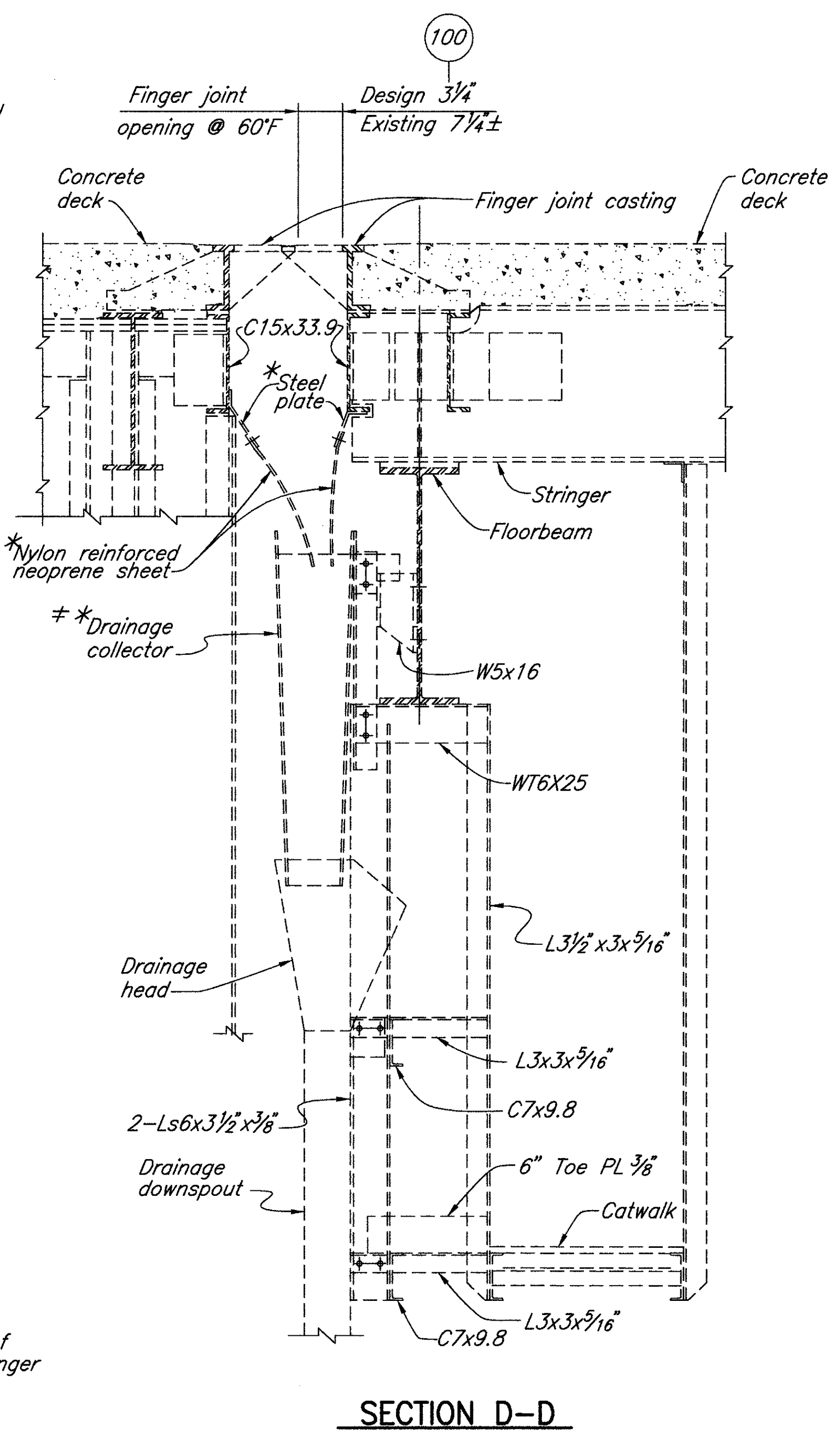
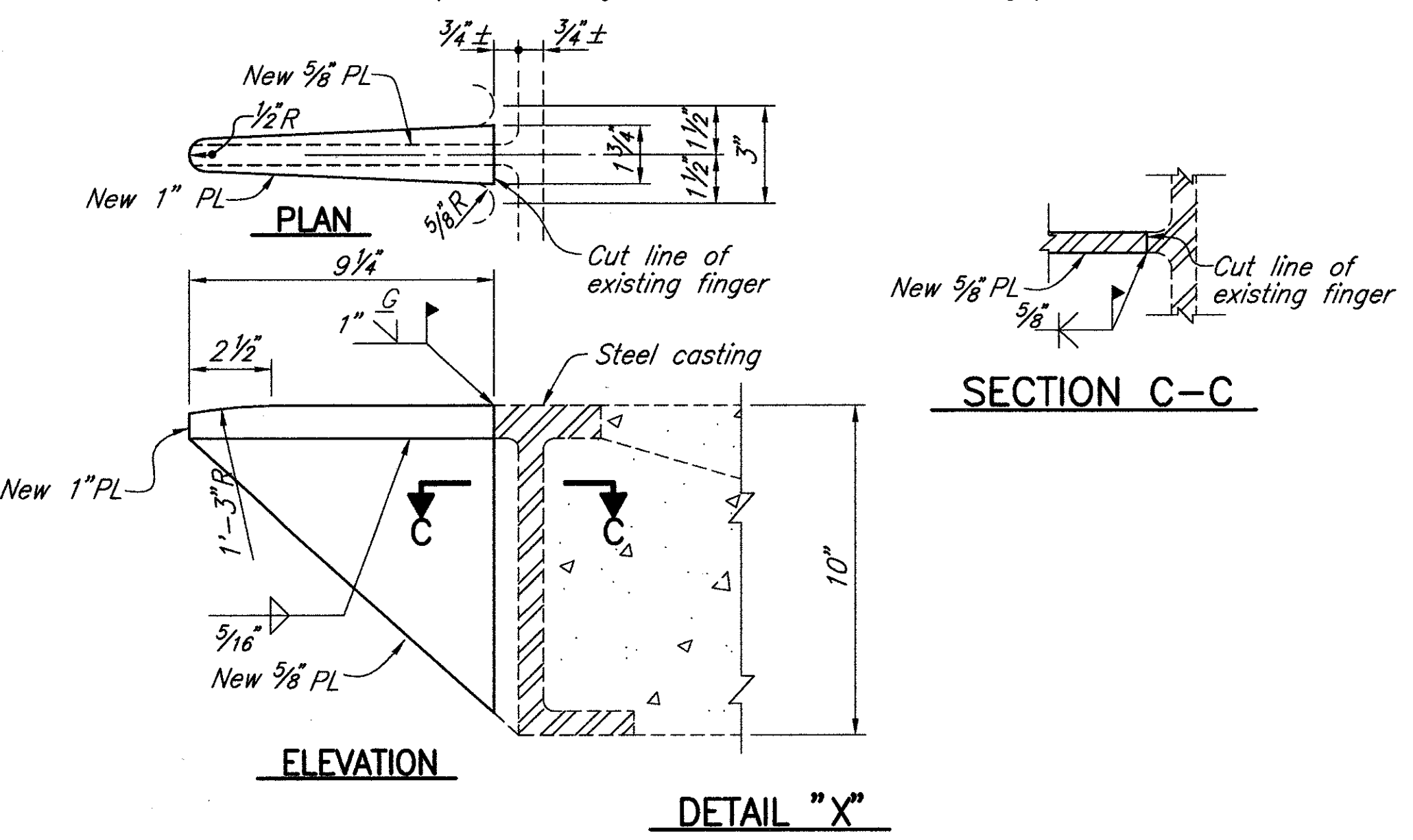
Job No. 9311DE2 Date 12/26/96 Drawn By TWH:RB



HALF PLAN OF EXPANSION JOINT AT WEST END PIER

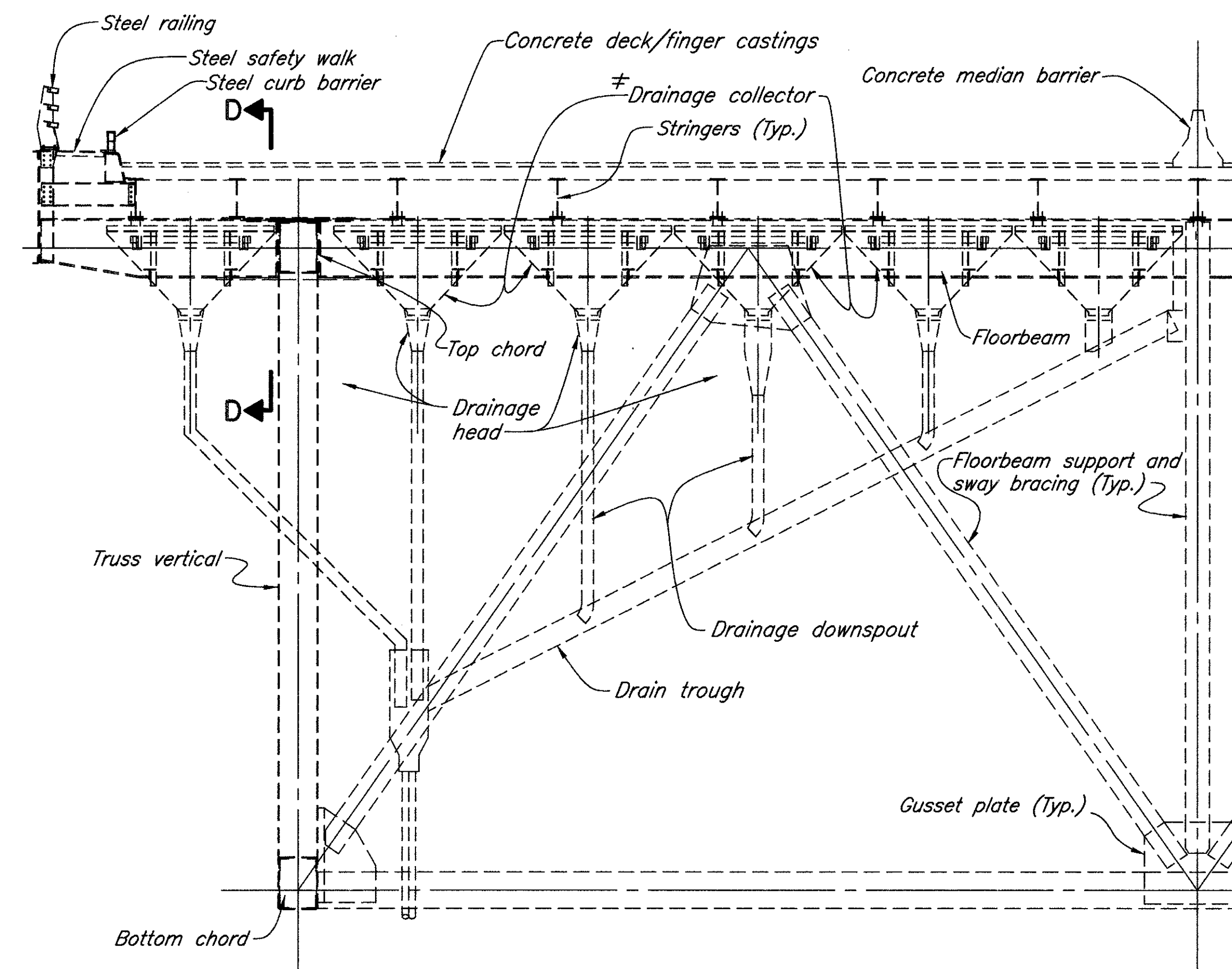


WEST END PIER JOINT REPAIR  
(New castings same dimensions as existing)



SECTION D-D

- \* - Contractor shall remove and reinstall this material as needed for finger repairs. Payment shall be included as incidental to Item 516-Structural joint or joint seal misc.: Expansion joint finger repair by welding, or by heat straightening.
- ± - Contractor shall remove and reinstall drainage collectors as needed for vertical and horizontal jacking of structure. Payment shall be included as incidental to Item 516- Jacking and temporary support of superstructure, as per plan.

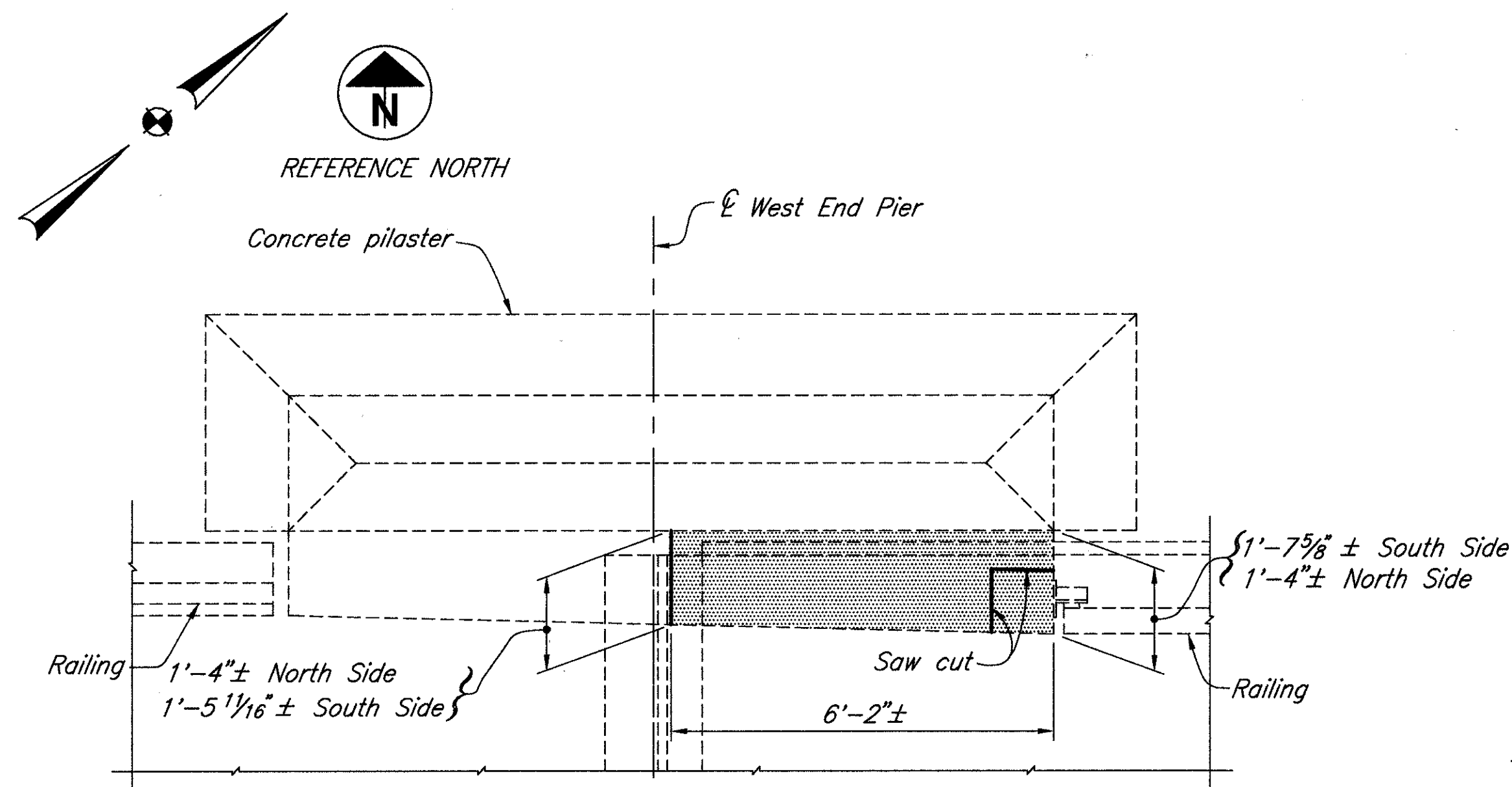


HALF TYPICAL SECTION AT WEST END PIER  
SECTION E-E

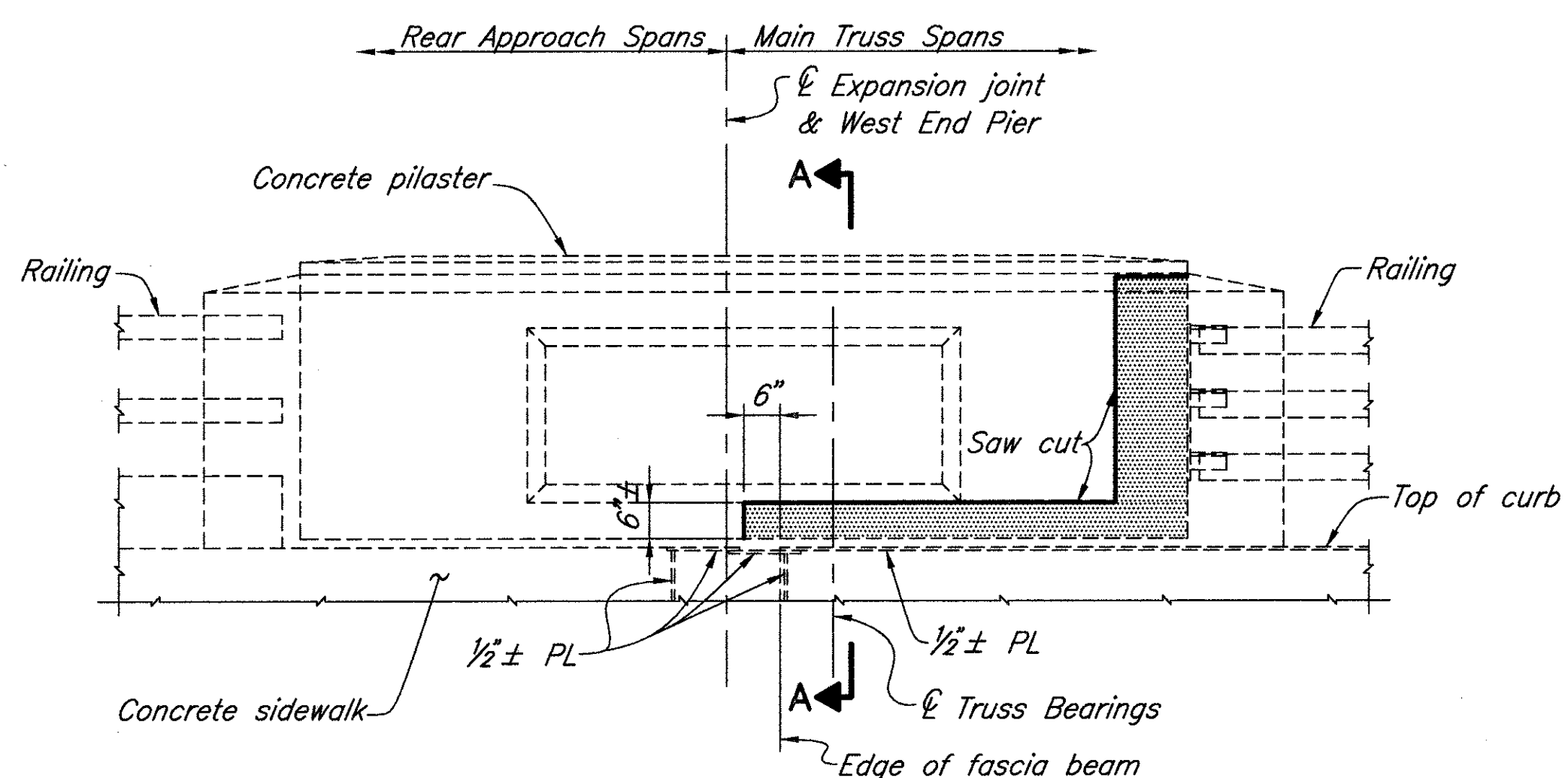
**NOTES:**  
**MATERIALS** shown are existing unless otherwise noted.  
**FINGER REPAIR:** The Contractor shall heat straighten or replace a damaged finger on the expansion joint steel casting as directed by the Engineer. As of September 1996 a total of 30 fingers were damaged requiring repair by heat straightening and 8 fingers were broken requiring repair by welding. A contingency quantity for additional damage repair has been included in the estimated quantities to be used at the direction of the Engineer.  
**STRUCTURAL JOINT OR JOINT SEAL MISC.: EXPANSION JOINT FINGER REPAIR:** See General Notes sheet 7 / 48.

RICHLAND ENGINEERING LIMITED  
 29 NORTH PARK STREET  
 MANSFIELD, OHIO 44902  
 DATE 12/20/96  
 REVIEWED DAP  
 DRAWN TWH  
 DESIGNED DT  
 CHECKED RWR  
 STRUCTURE FILE NO. 1809393  
 DECK EXPANSION JOINT  
 FINGER REPAIR WEST END PIER  
 BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER  
 CUY-90-15.24  
 45 / 48  
 58  
 61

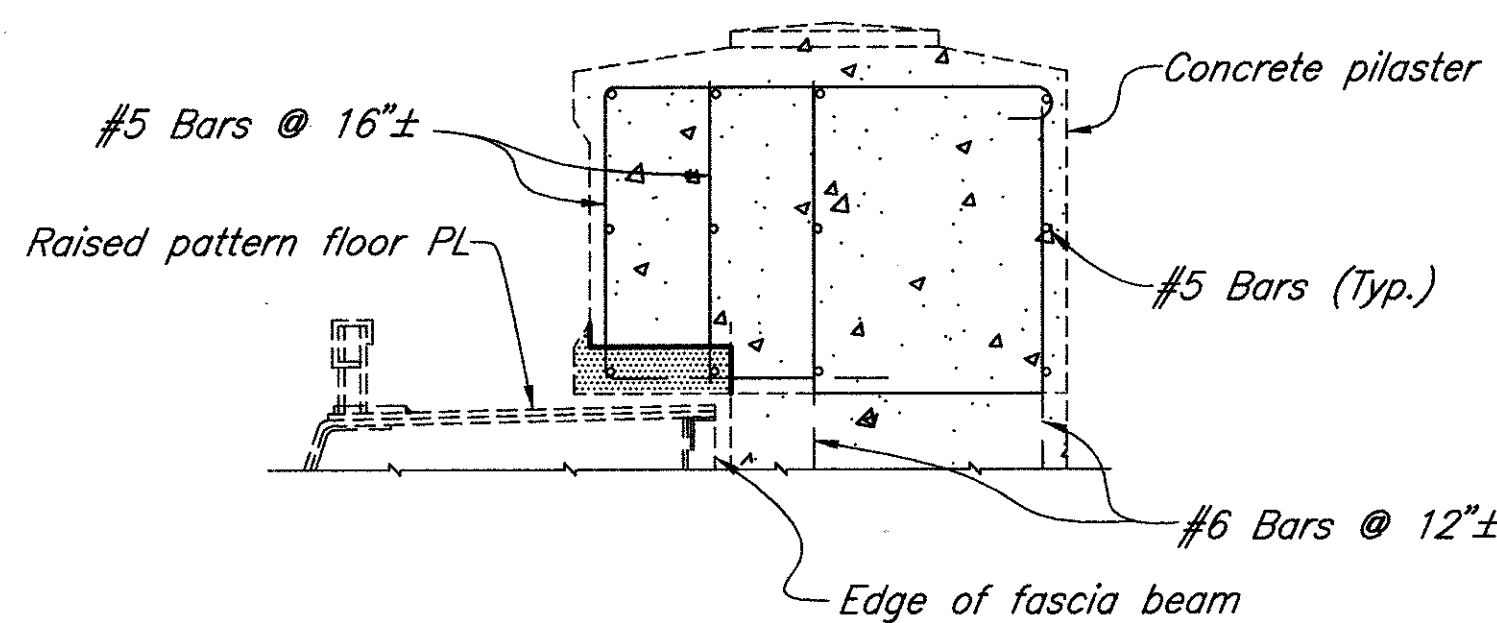
Job No. 93111WPD Date 12/26/96 Drawn By JFS



PLAN

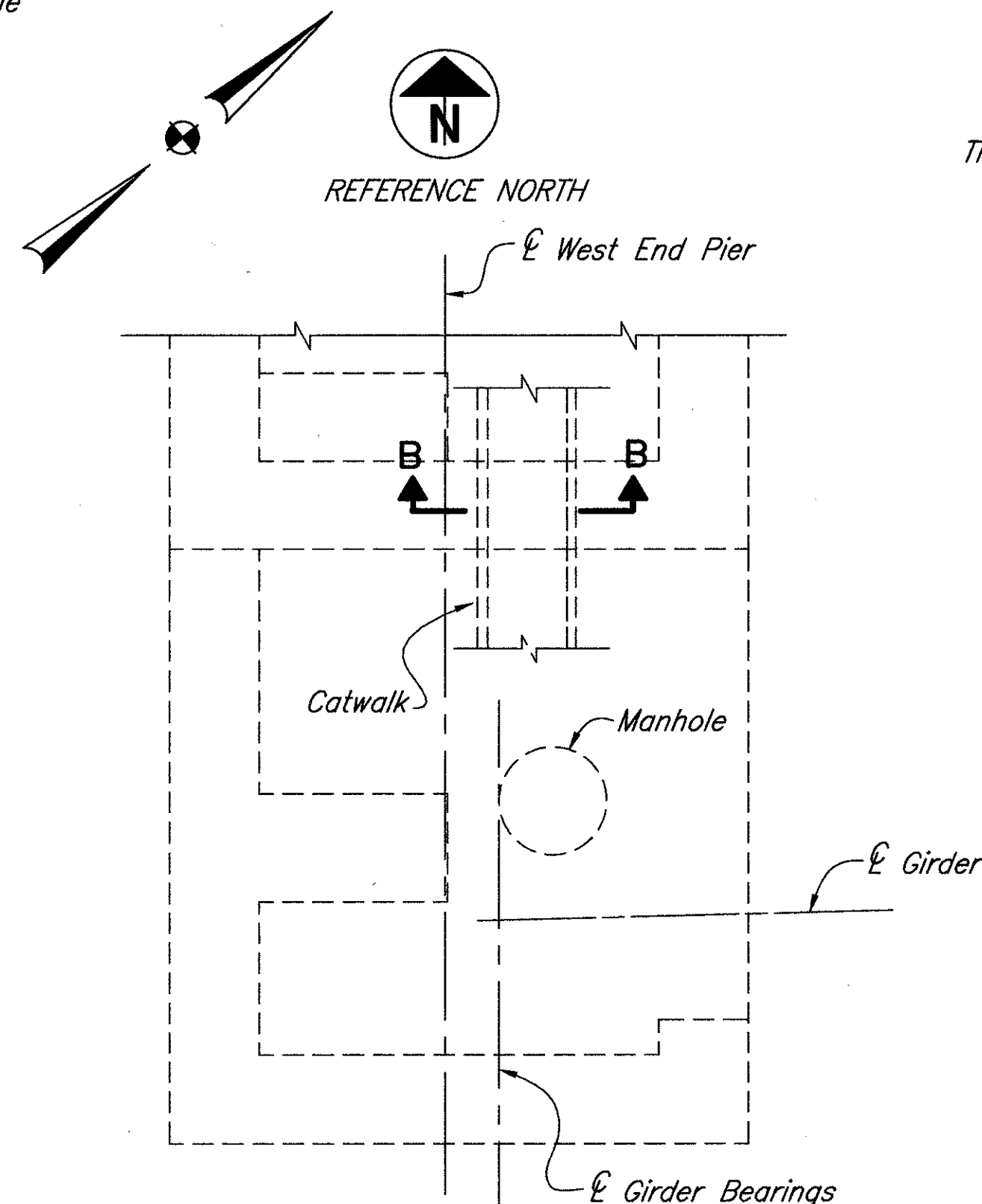


ELEVATION  
WEST END PIER PILASTER  
( NORTH SIDE SHOWN, SOUTH SIDE SIMILAR )

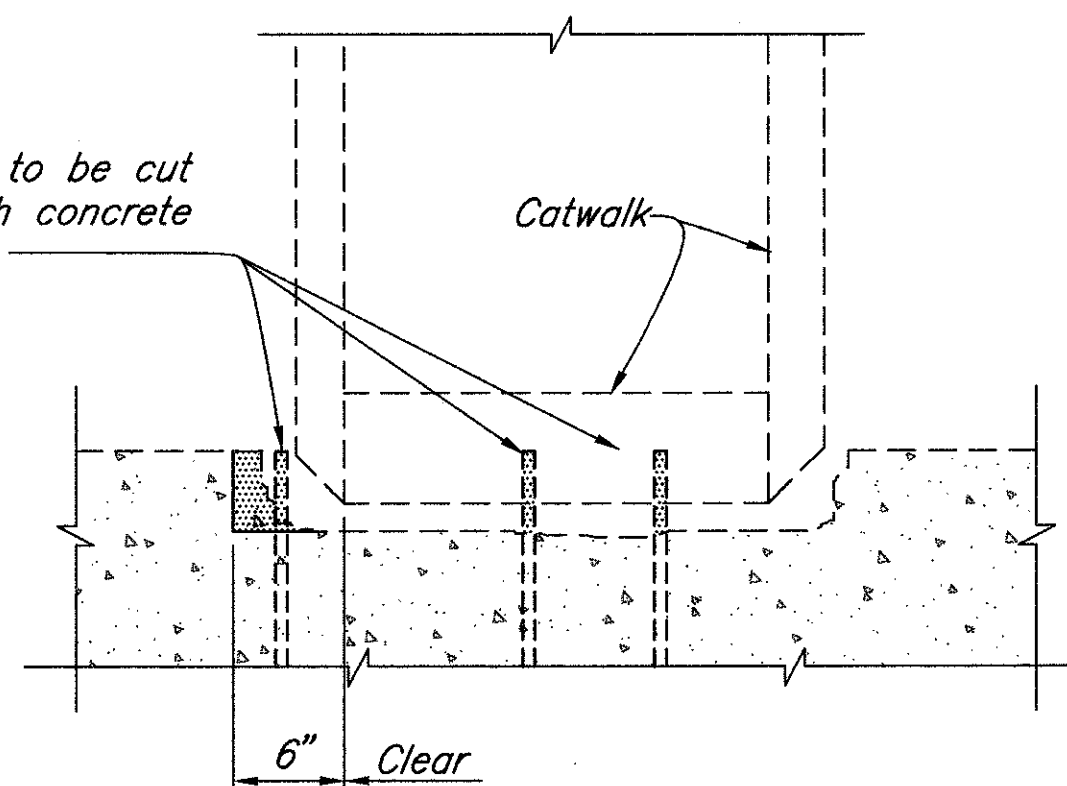


SECTION A-A

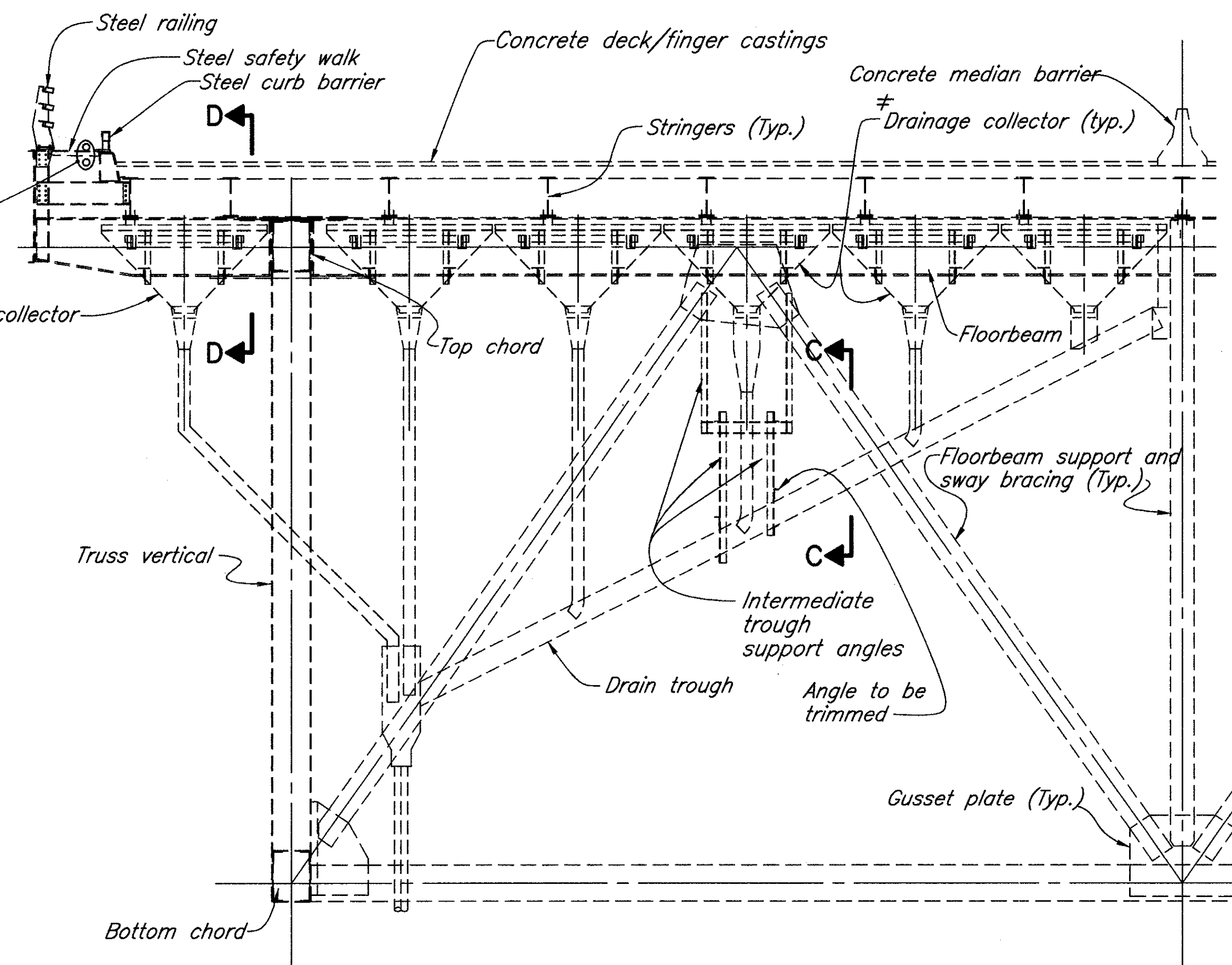
Lighting power cables shall be temporarily supported and/or disconnected to provide enough slack in the cable to accommodate vertical jacking of the structure. Payment shall be included as incidental to Item 516- Jacking and temporary support of superstructure, as per plan.



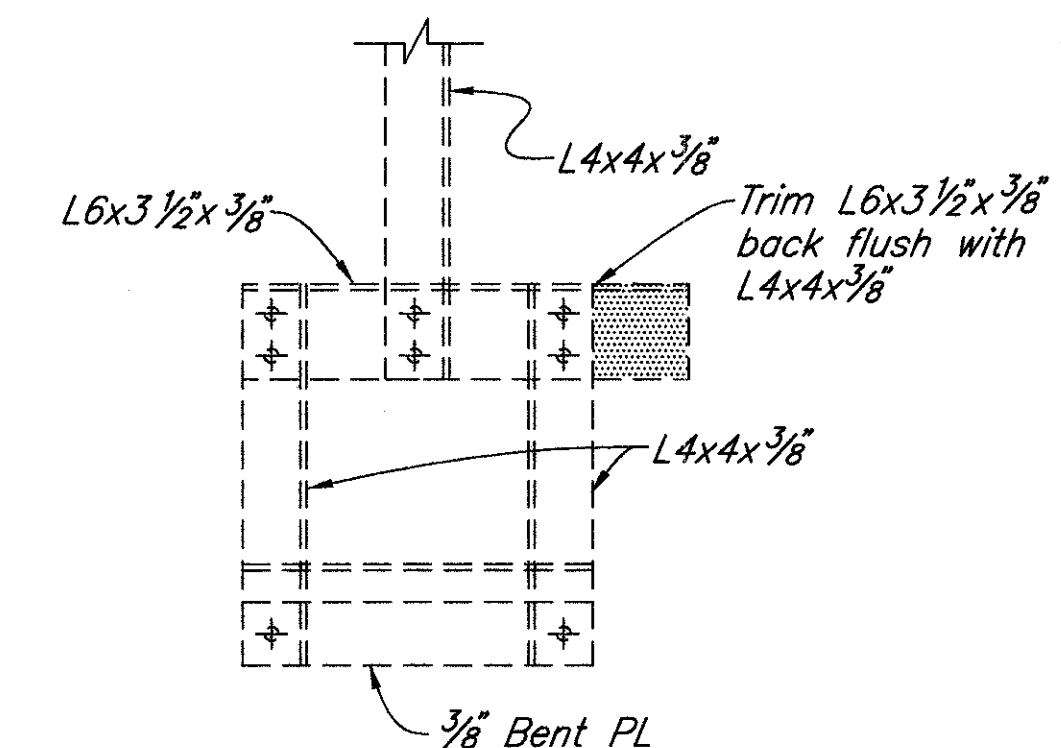
PLAN AT WEST END PIER



SECTION B-B



HALF TYPICAL SECTION AT WEST END PIER



SECTION C-C  
( ONE LOCATION )

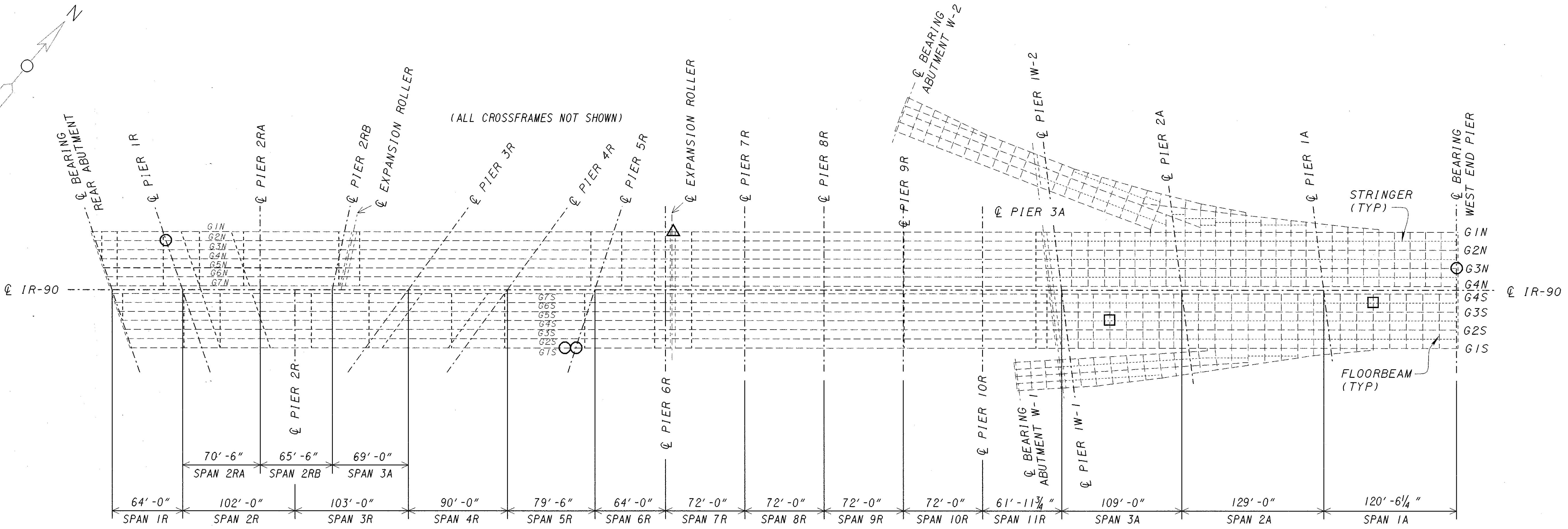
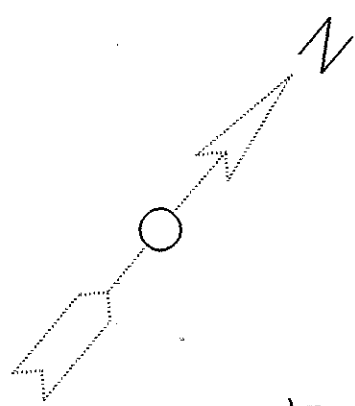
LEGEND

- Indicates area to be removed per Item 202-Portions of structure removed, as per plan.
- Contractor shall remove and reinstall drainage collectors as needed for vertical and horizontal jacking of structure. Payment shall be included as incidental to Item 516 - Jacking and temporary support of superstructure, as per plan.

NOTES:

- MATERIALS shown are existing unless otherwise noted.
- SECTION D-D: See sheet 45/48





- - CRACK REPAIR
- △ - REPLACE MISSING BEARING STIFFENER
- - FLOORBEAM/STRINGER RETROFIT

**FRAMING PLAN: WEST APPROACH AND INNERBELT EXTENSION**

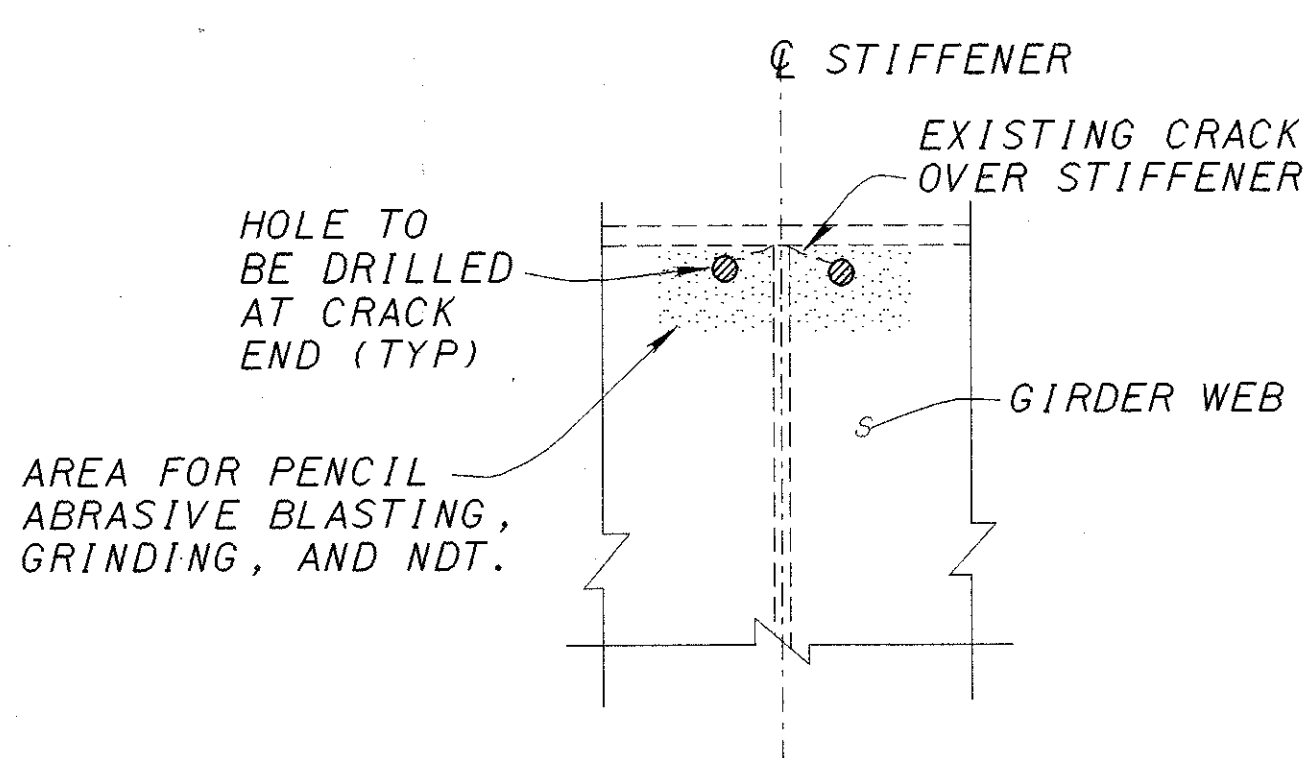
DESIGNED GLC	CHECKED BGT	DRAWN FLK	REVIEWED DWL	DATE 01/97	DESIGN AGENCY O.D.O.T. DISTRICT 12
STRUCTURAL STEEL RETROFIT LOCATIONS BR. NO. CUY-90-1524 CENTRAL VIADUCT OVER CUYAHOGA RIVER		STRUCTURE FILE NUMBER 1809393		PRODUCTION DEPARTMENT	
CUYAHOGA COUNTY CUY-90-1524		46A/48		59A 61	

SEE RETROFIT DETAILS SHEET 46B OF 48, AND STRUCTURE NOTES SHEET 11A OF 48.

PLOT SUBMITTED: 9-JAN-1997 10:08

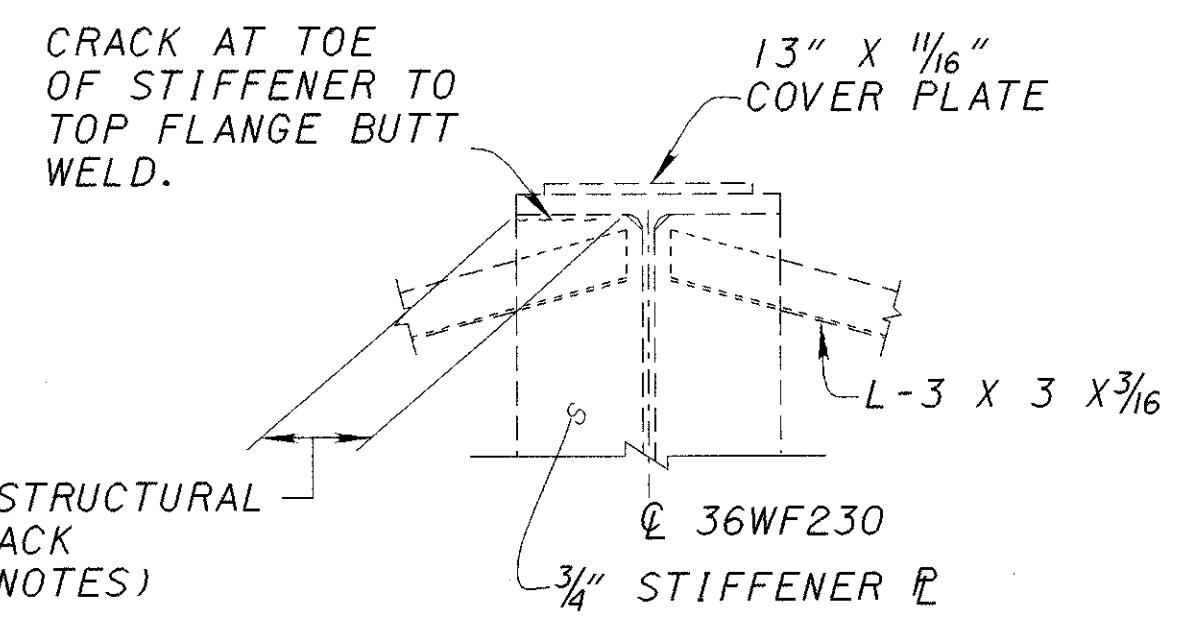
filename.dgn

PLOTTED BY: fkonopka  
 PLOTTED FROM: j:\br\gcox\stret.dgn

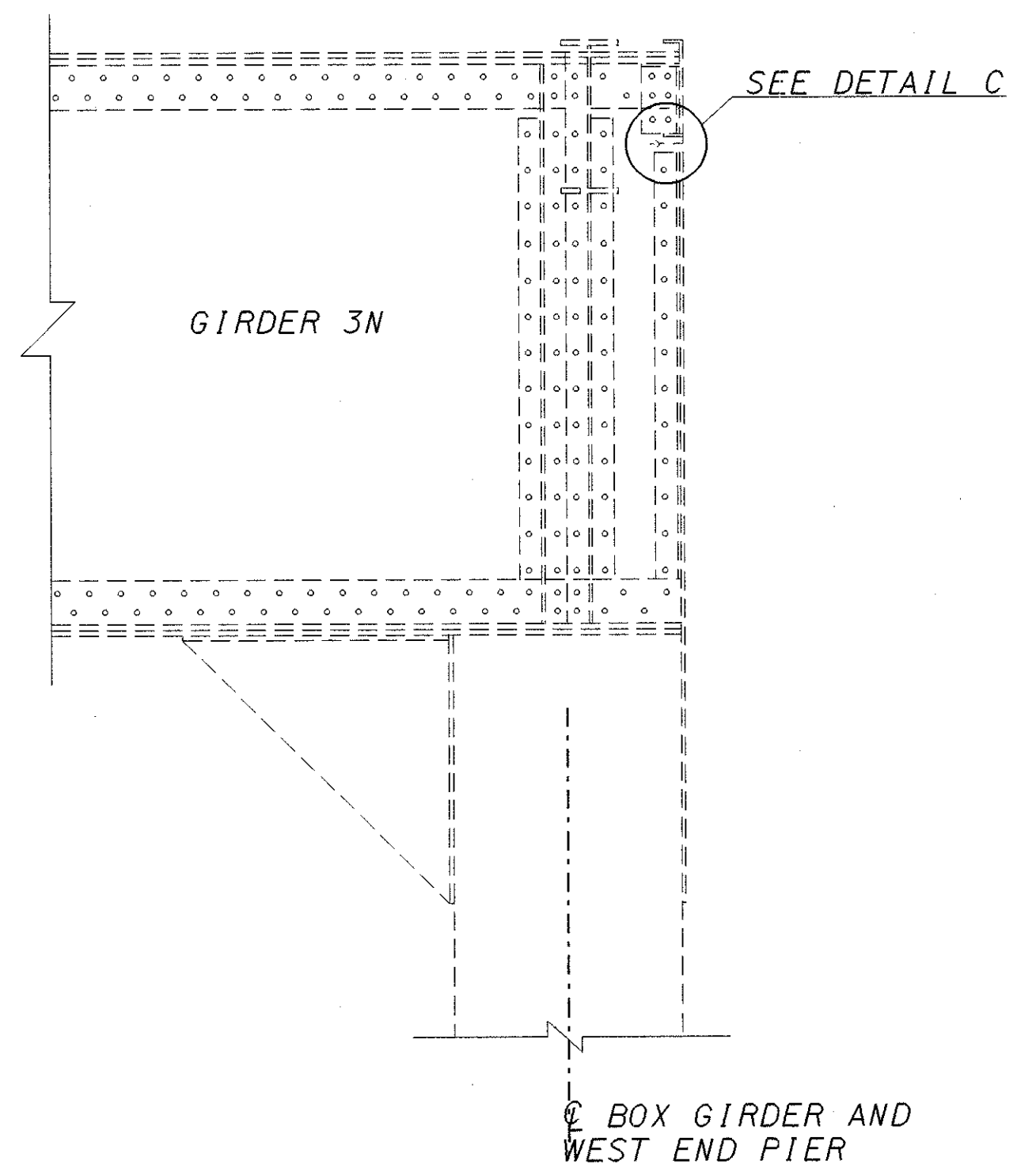


CRACK REPAIR AT GIRDER '2N' OVER PIER 1R AND GIRDER '1S' OVER PIER 5R

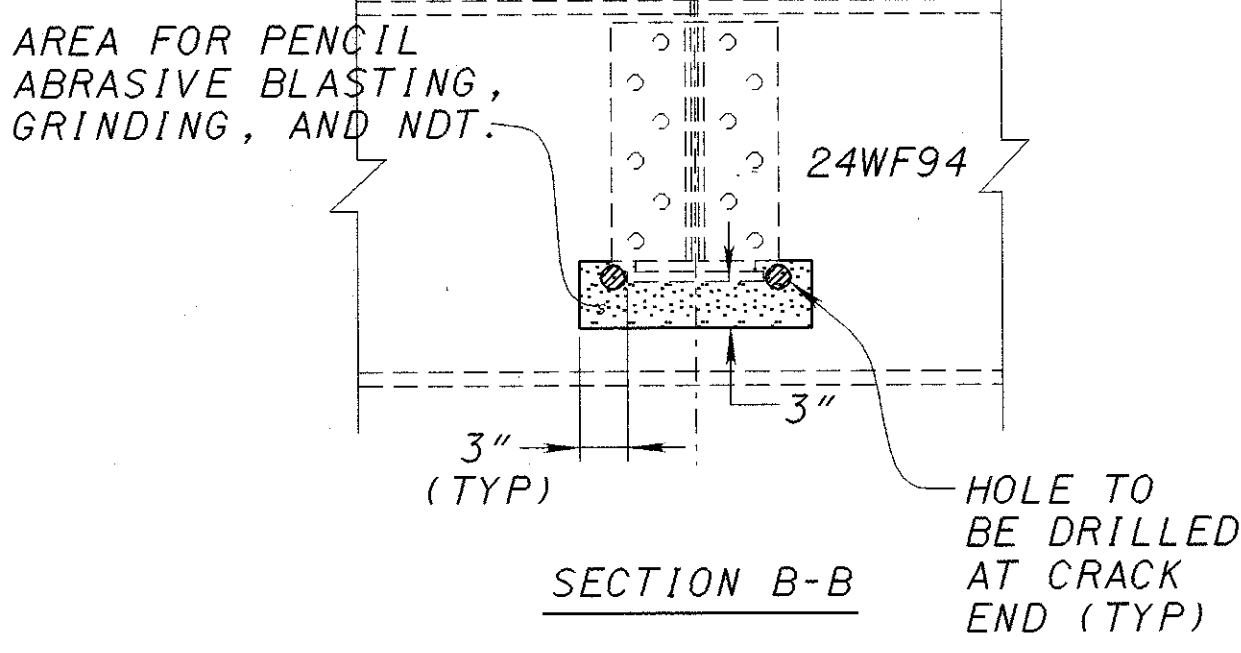
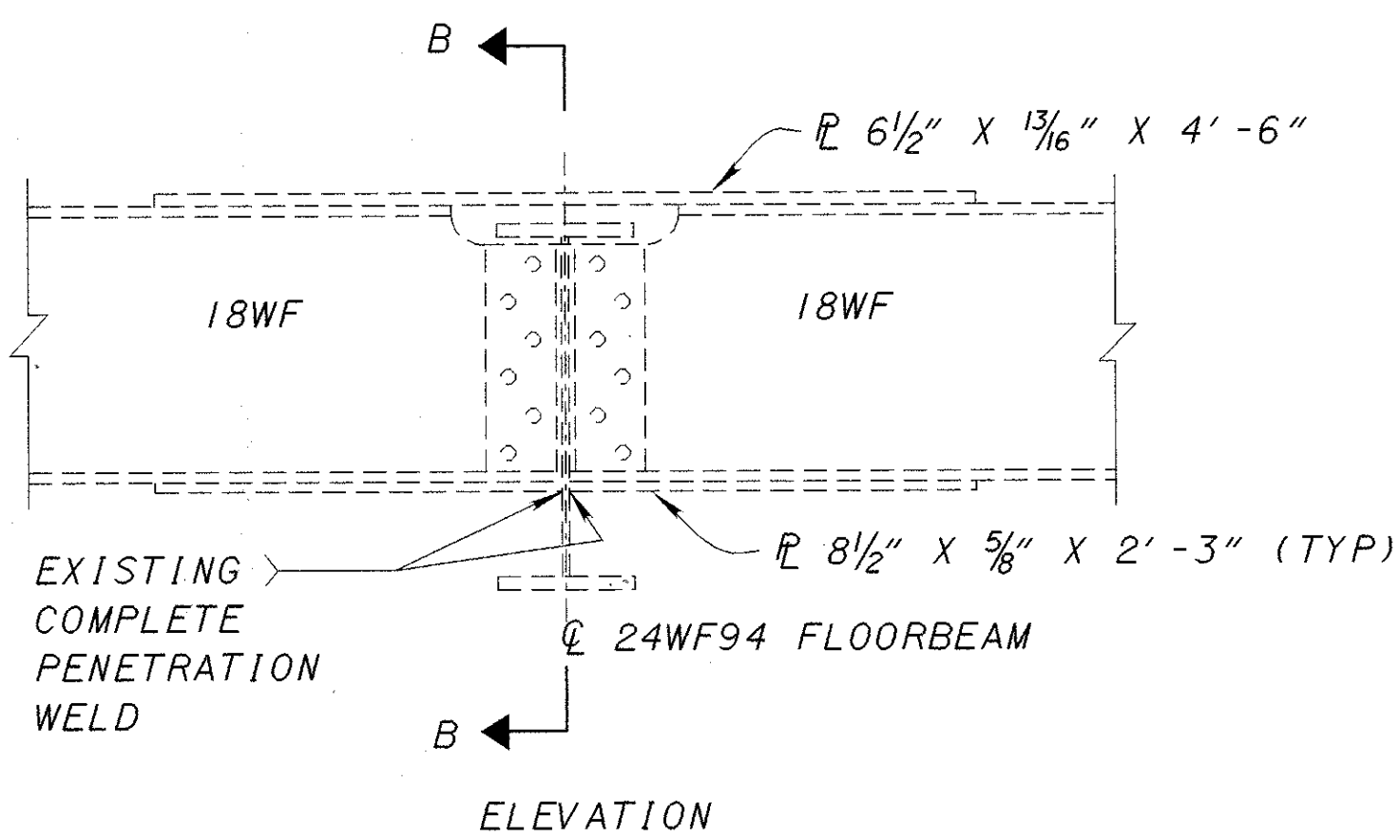
REMOVE EXISTING CRACK BY CAREFUL GRINDING. TO BE PAID FOR UNDER ITEM 513 - STRUCTURAL STEEL MISC.: REMOVAL OF CRACK BY GRINDING. (SEE GENERAL NOTES)



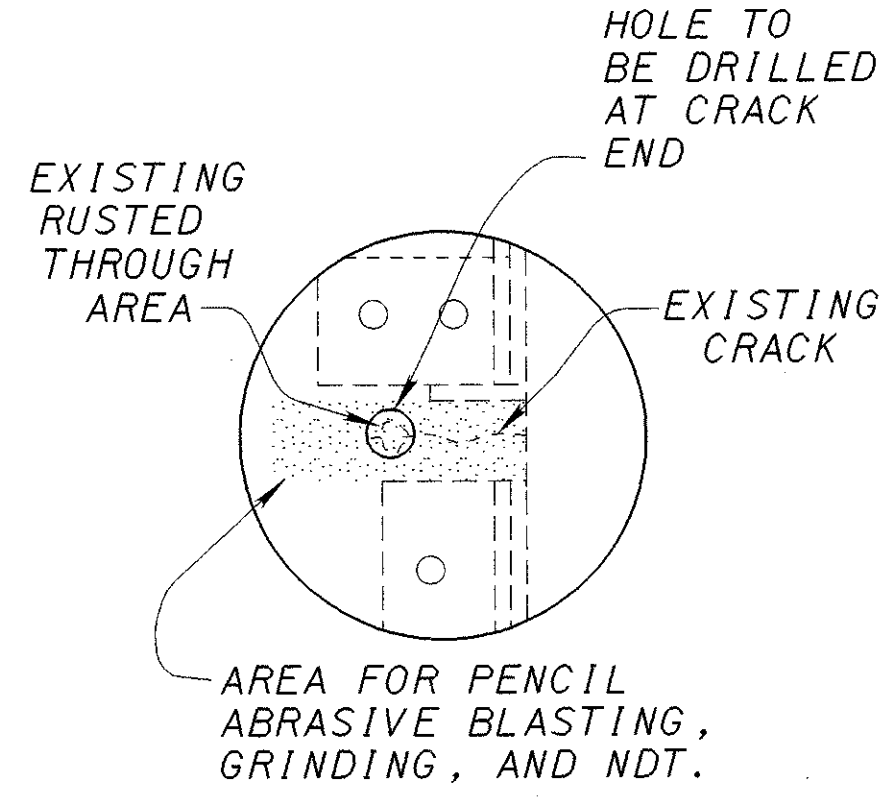
CRACK REPAIR AT BEAM 4N OVER PIER 7B



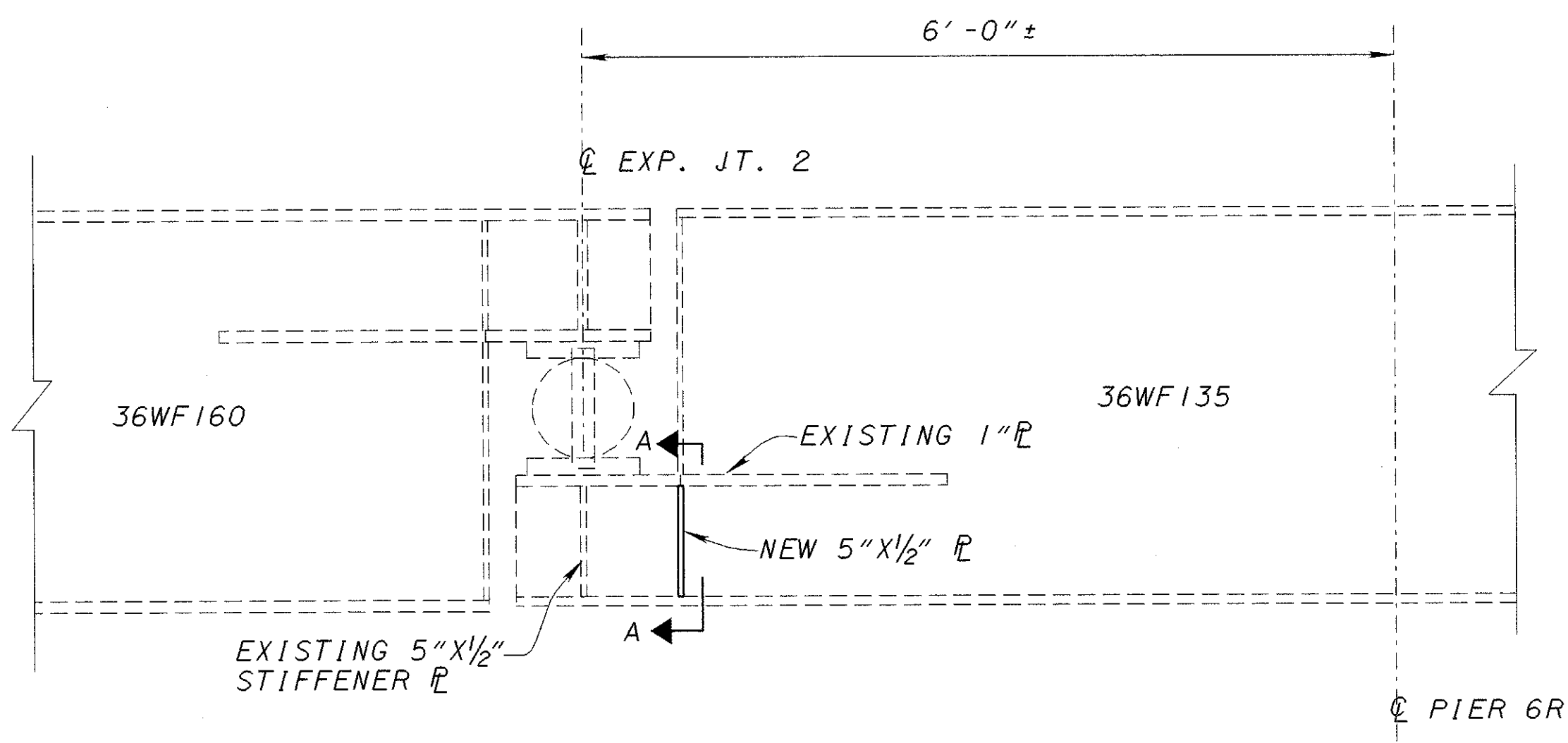
CRACK REPAIR OVER BEARING STIFFENER AT GIRDER NO. 3N



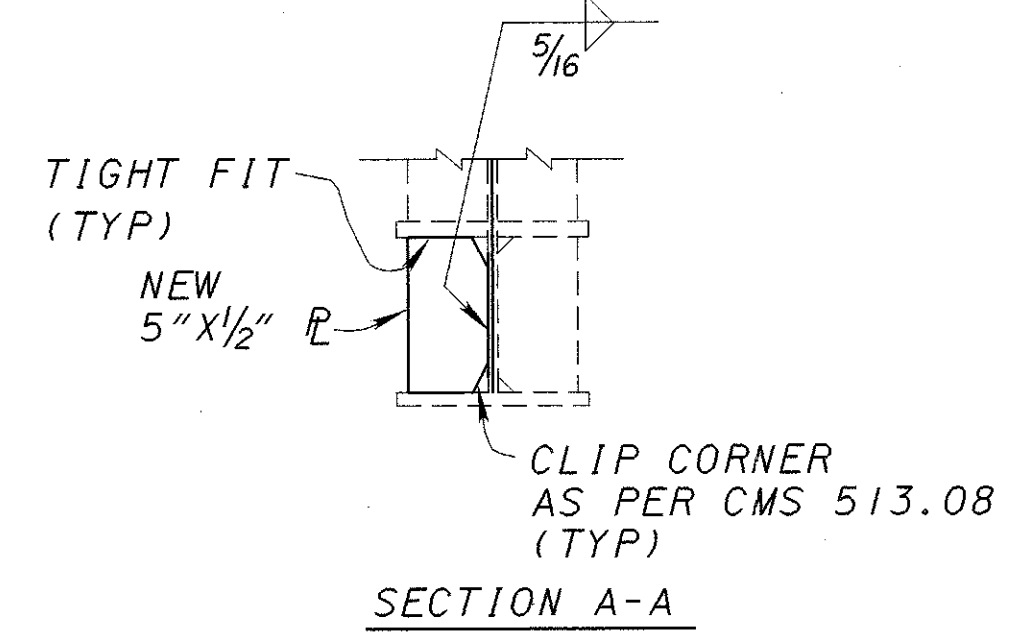
FLOORBEAM / STRINGER CRACK REPAIR



DETAIL C



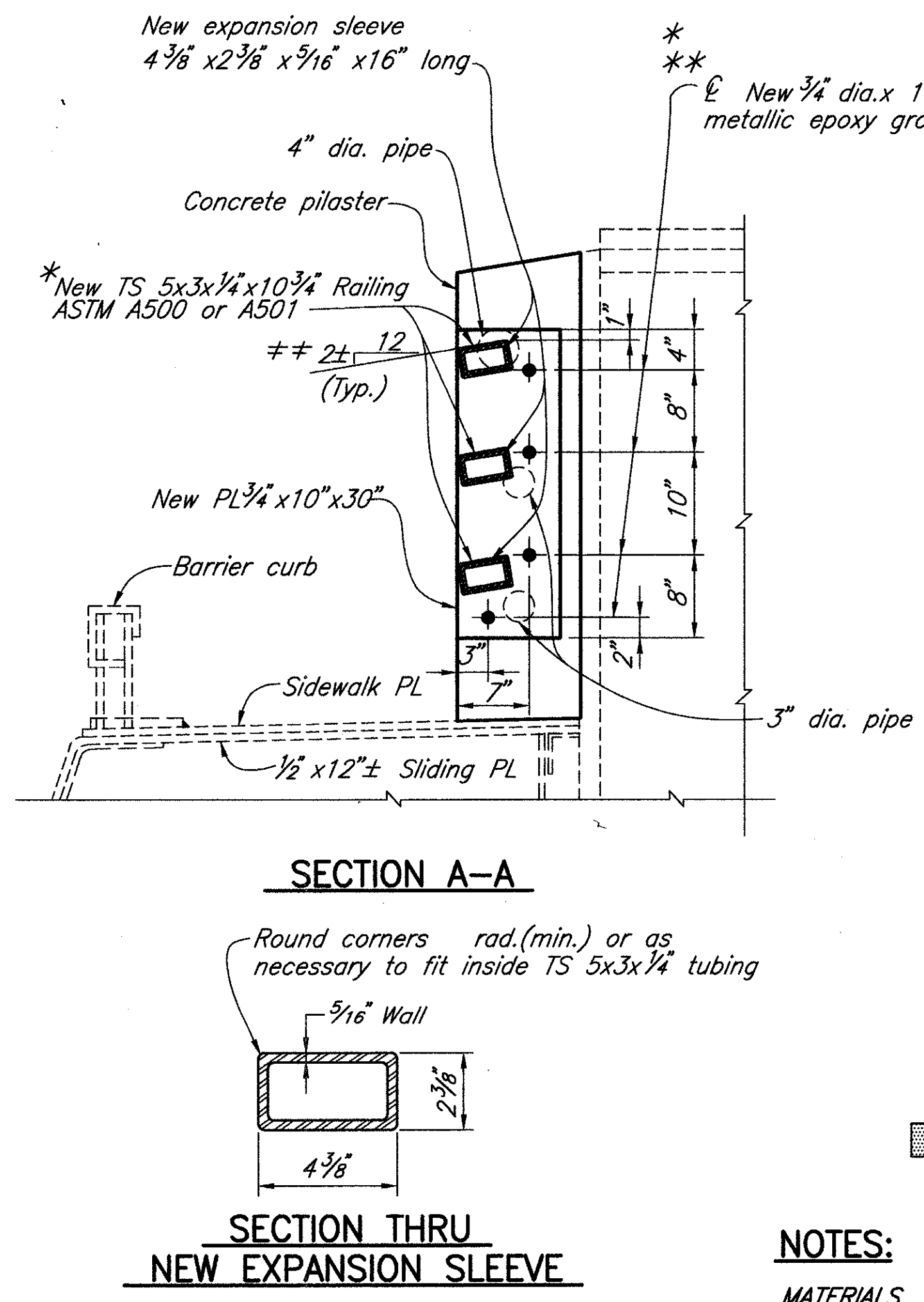
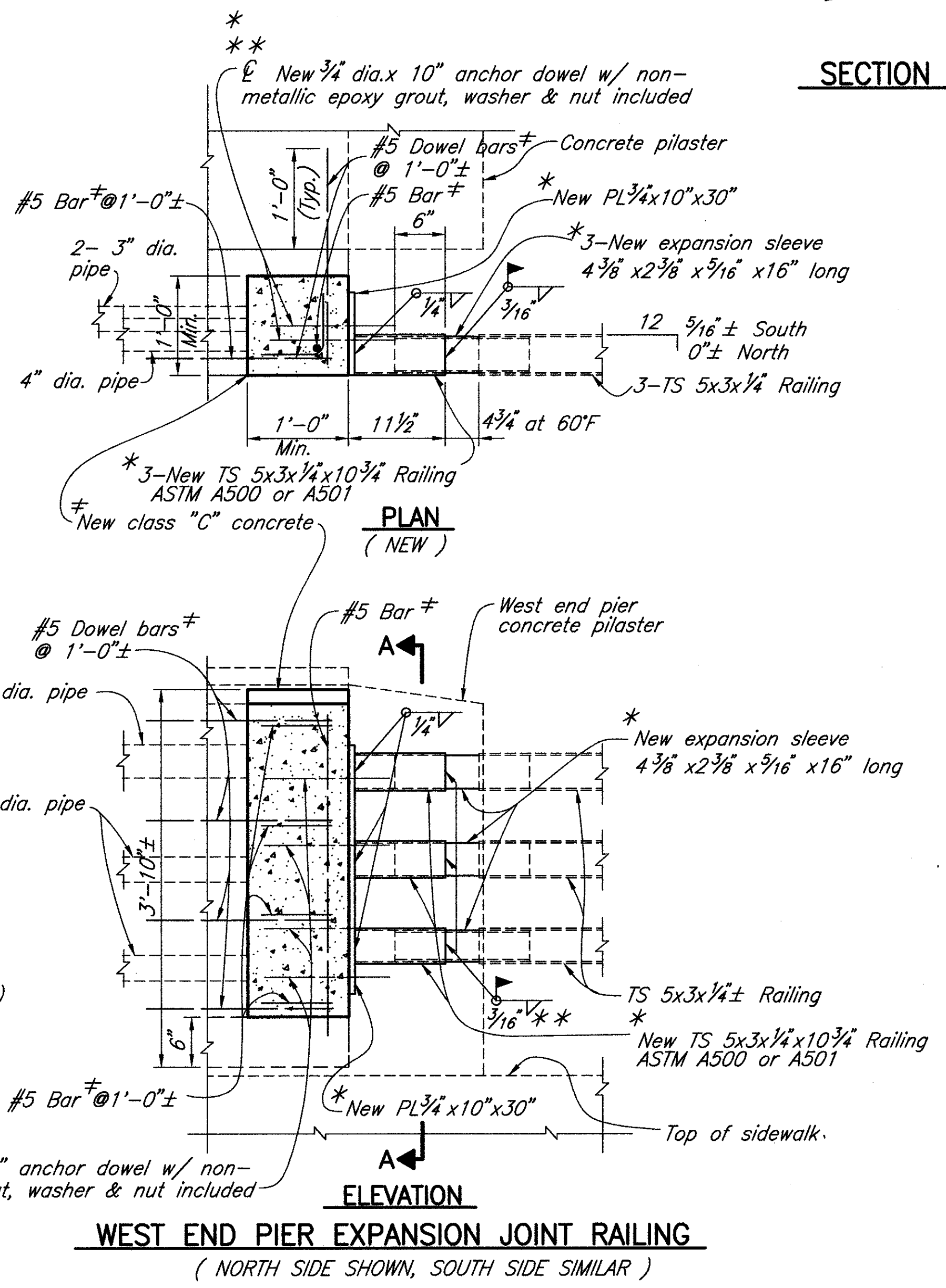
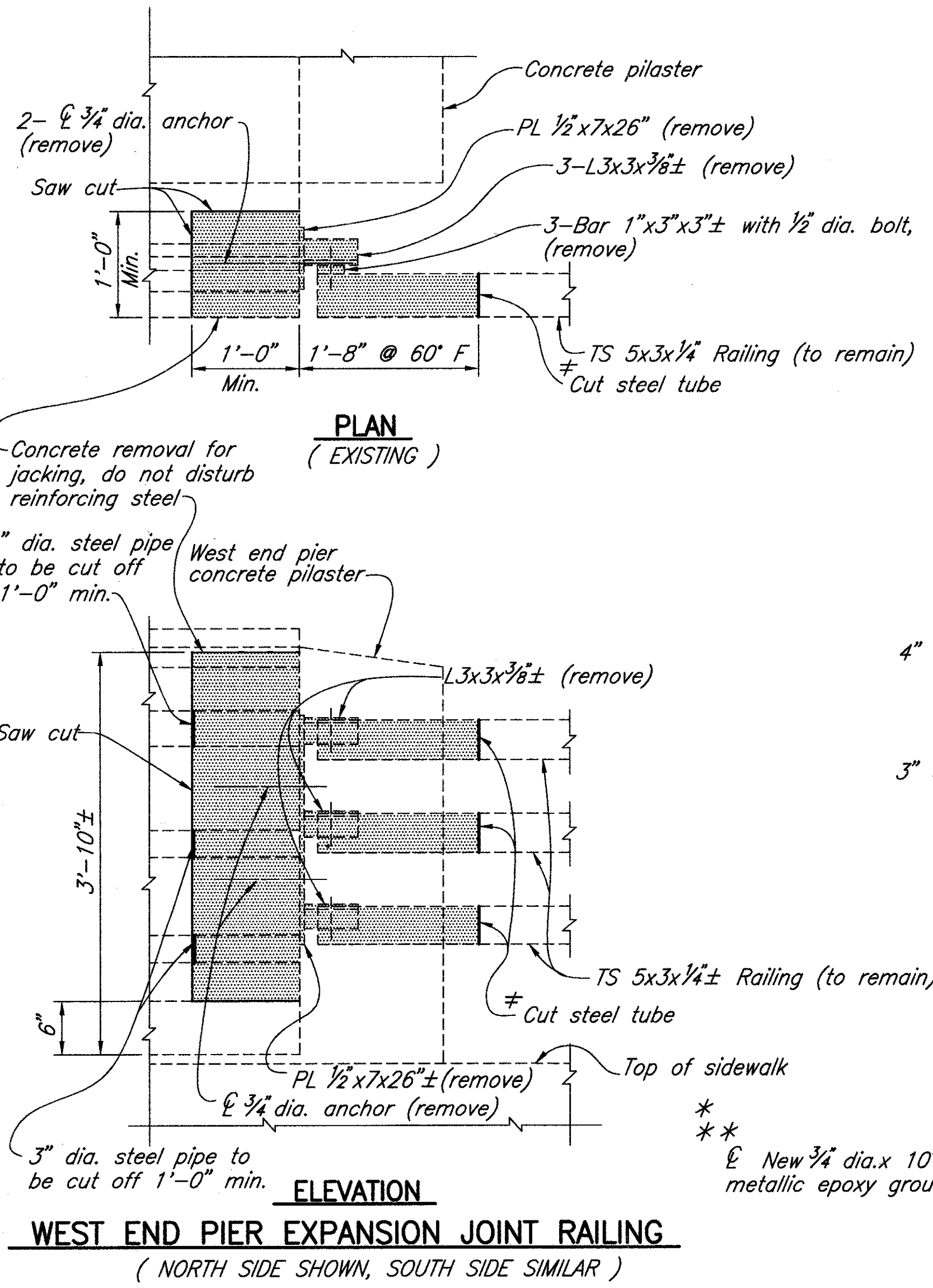
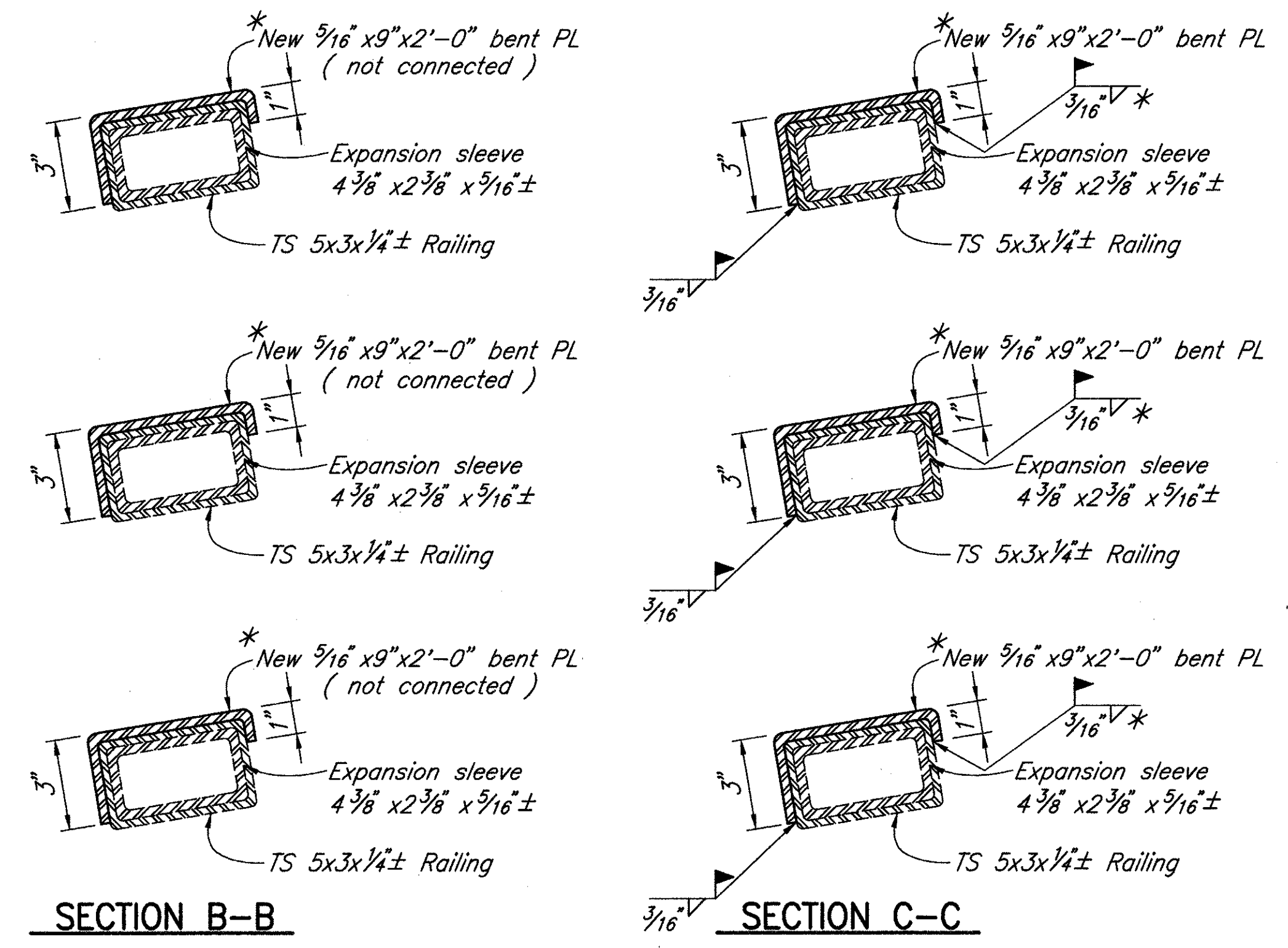
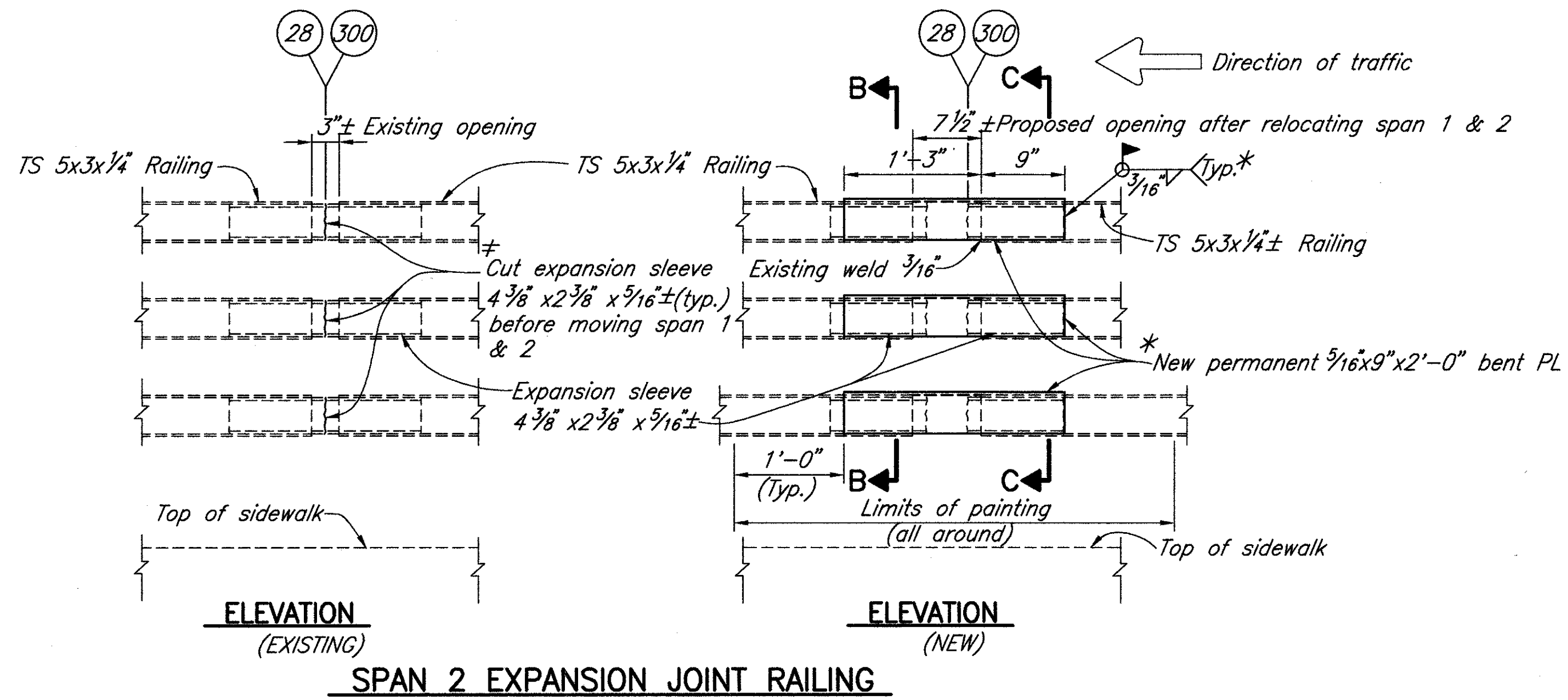
ELEVATION BEAM NO. "IN" AT EXPANSION JOINT 2 (LOOKING SOUTH)



REPLACEMENT OF MISSING BEARING STIFFENER AT EXPANSION ROLLER

DESIGNED	GLC	CHECKED	BGT
DRAWN	GLC	REVISED	
REVISED	DWL	DATE	01/97
STRUCTURE FILE NUMBER	1809393		
DESIGN AGENCY	O.D.O.T.		
DISTRICT	TWELVE		
DEPARTMENT	PRODUCTION		
STRUCTURAL STEEL RETROFIT DETAILS			
BRIDGE NO. CUY-90-1524			
CENTRAL VIADUCT OVER CUYAHOGA RIVER			
CUYAHOGA COUNTY			
CUY-90-15.24			
46B/48			
59B 61			





- LEGEND**
- \* Included for payment with Item 513- structural steel misc.: Permanent jacking supports.
  - \*\* Install after structure relocation.
  - ± Included for payment with Item 516- jacking and temporary support of superstructure, as per plan.
  - ±± Prior to fabrication, contractor shall measure and match angle of existing railing tubes.
  - Indicates area to be removed per Item 202-Portions of structure removed, as per plan.

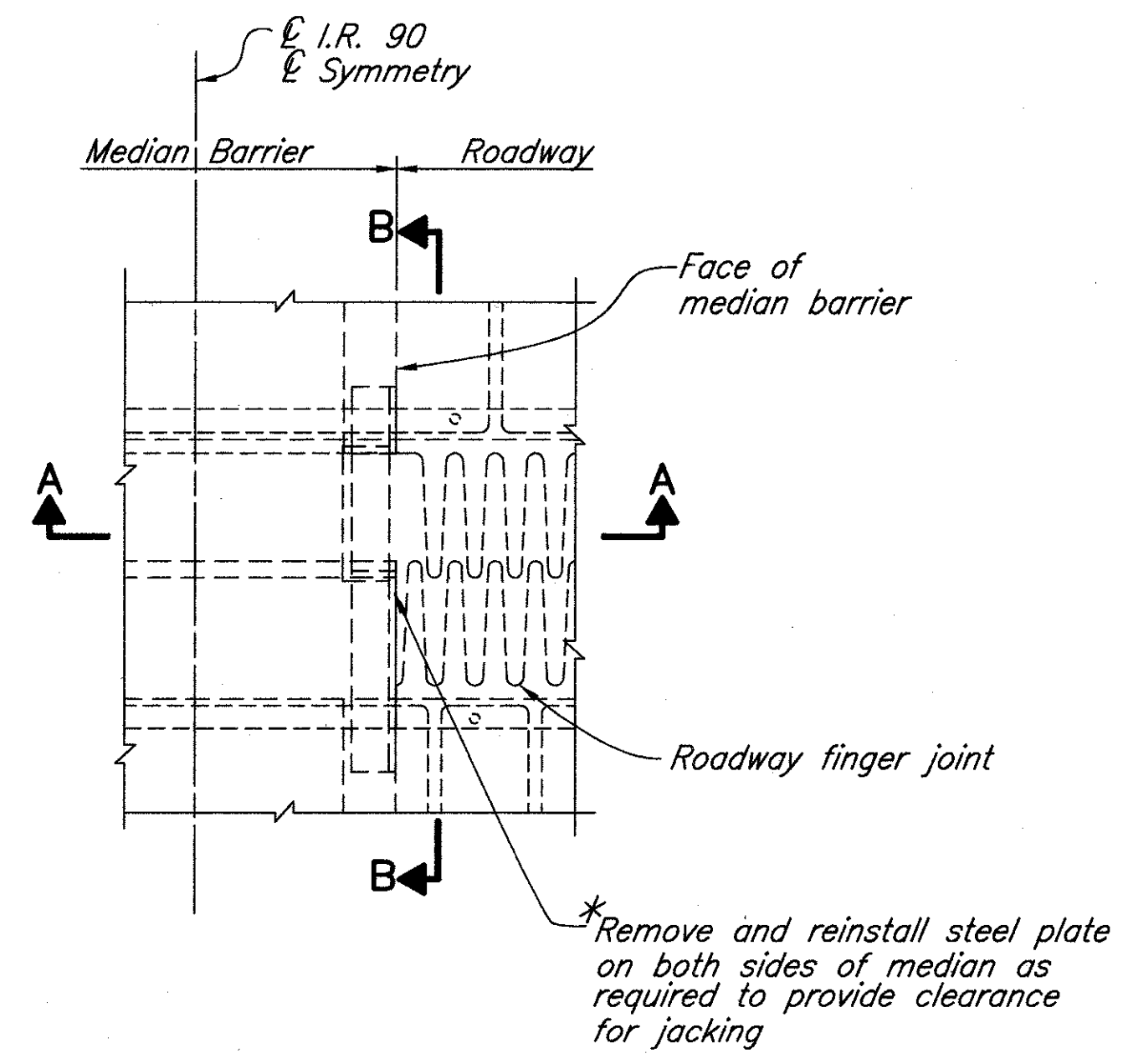
**NOTES:**

**MATERIALS** shown are existing unless otherwise noted.

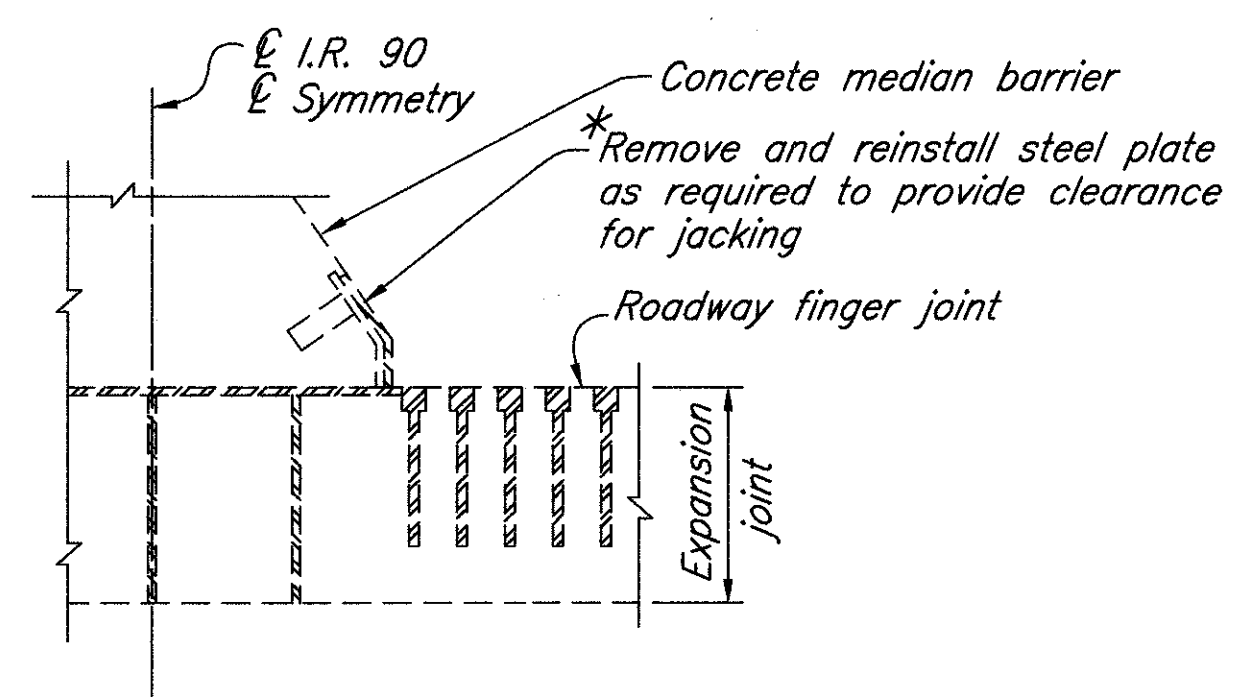
**JACKING AND TEMPORARY SUPPORT OF SUPERSTRUCTURE:** See General Note sheet 7/48.

The expansion sleeve may be fabricated from a single sheet of stock, formed and seam welded or may be fabricated from plate stock welded at the corners. If heat bending methods are used the sleeve shall be annealed for stress relief after bending. Material shall meet ASTM A36.

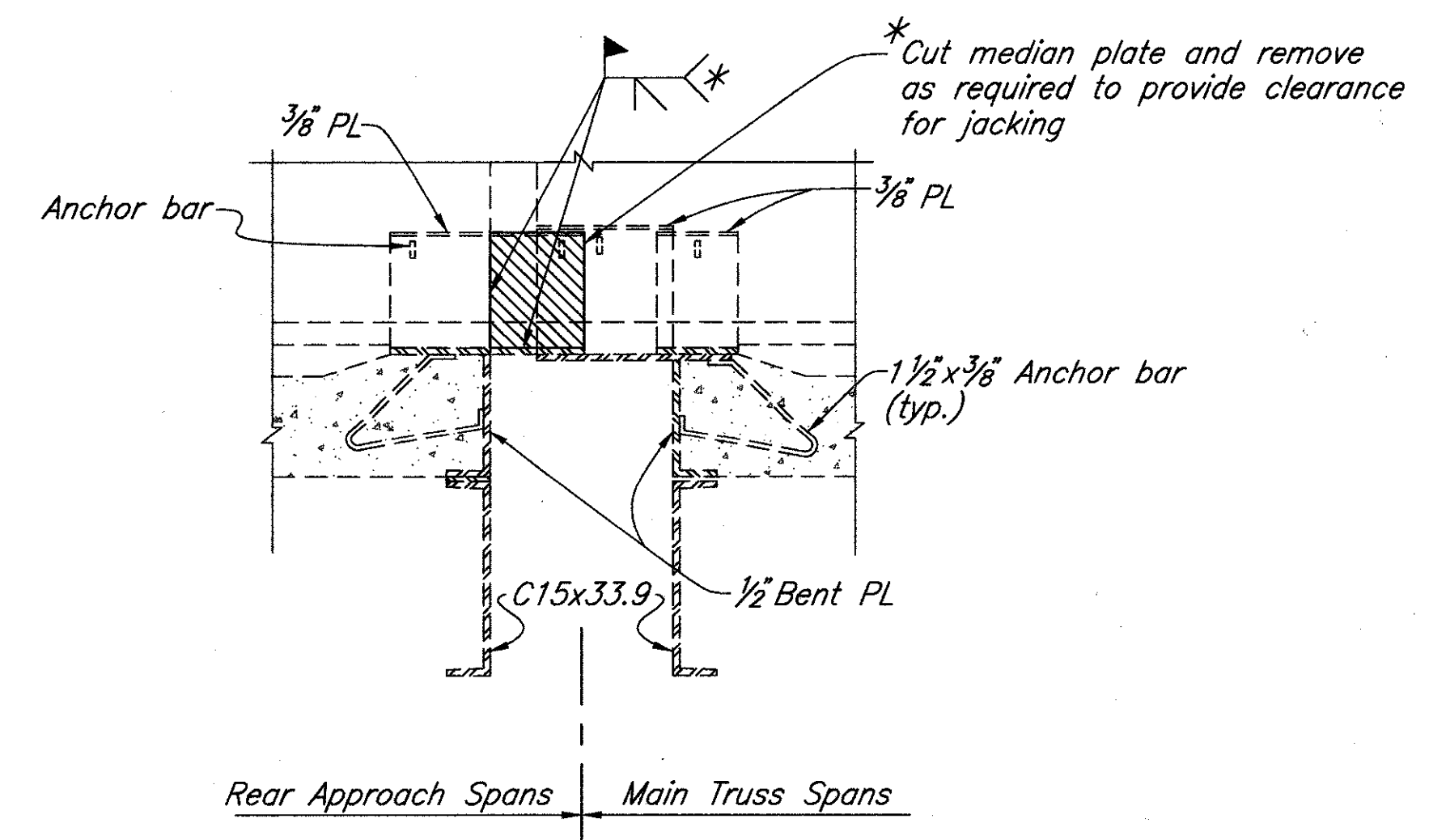
Job No. 9311RD1 Date 12/26/96 Drawn By TWH:RB



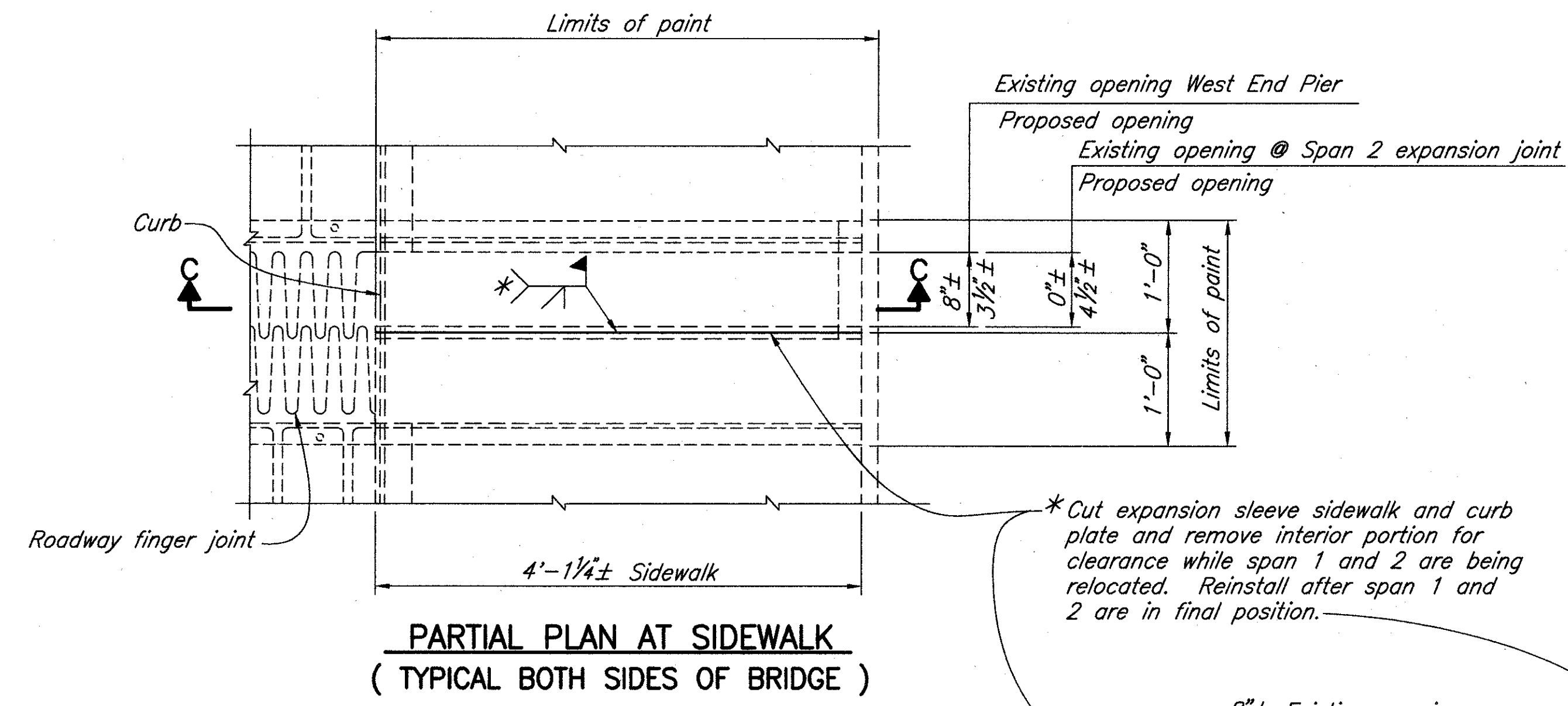
**PARTIAL PLAN AT MEDIAN  
(WEST END PIER)**



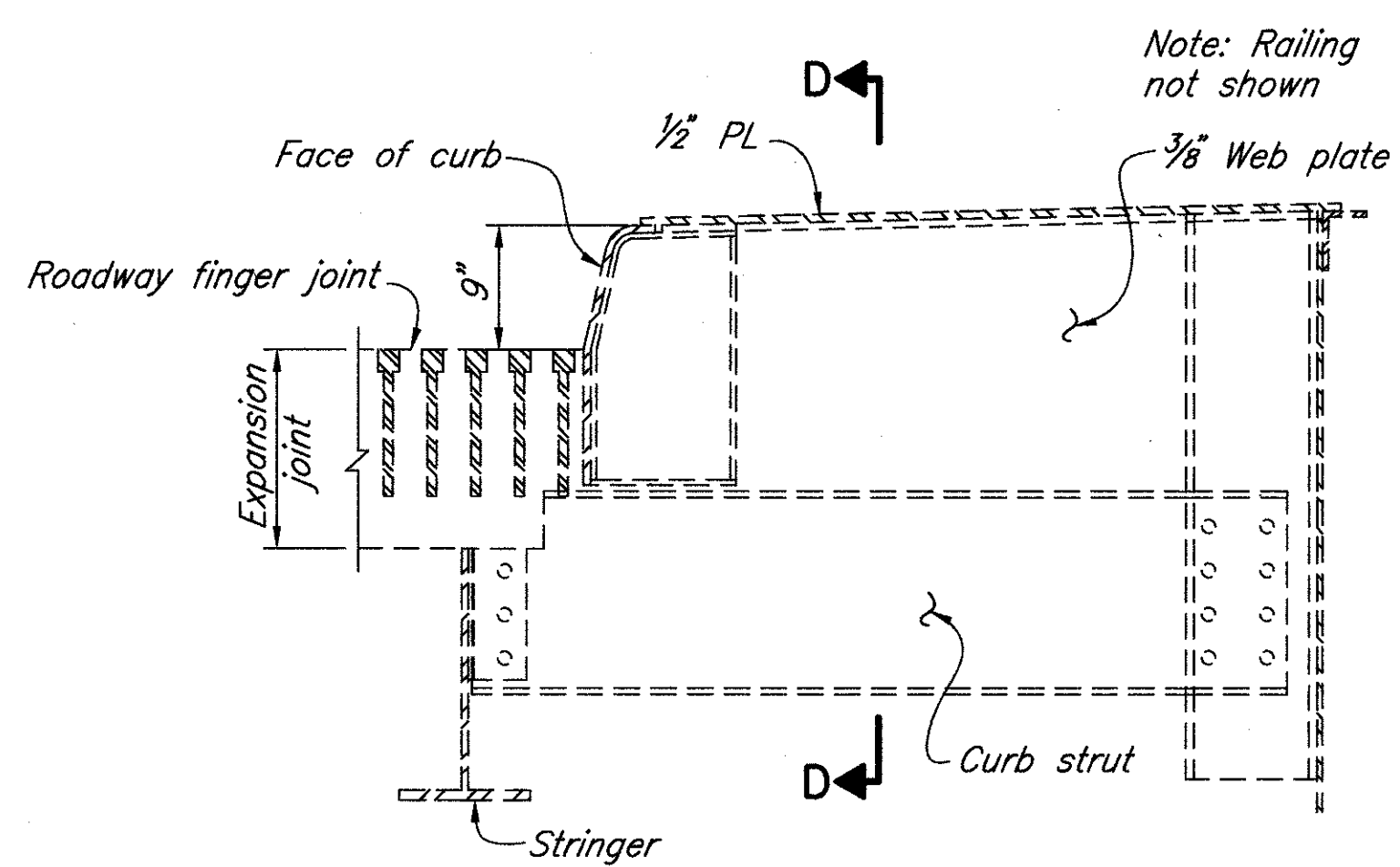
**SECTION A-A**



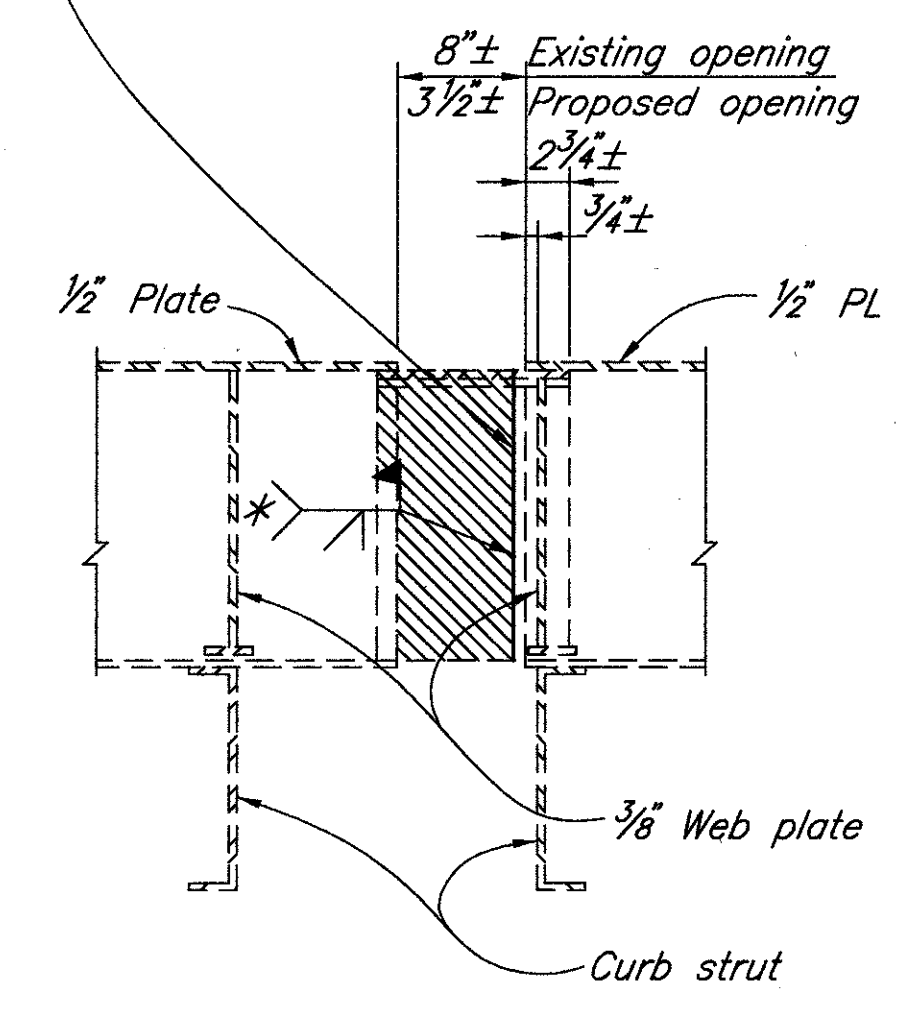
**SECTION B-B  
(AT WEST END PIER)**



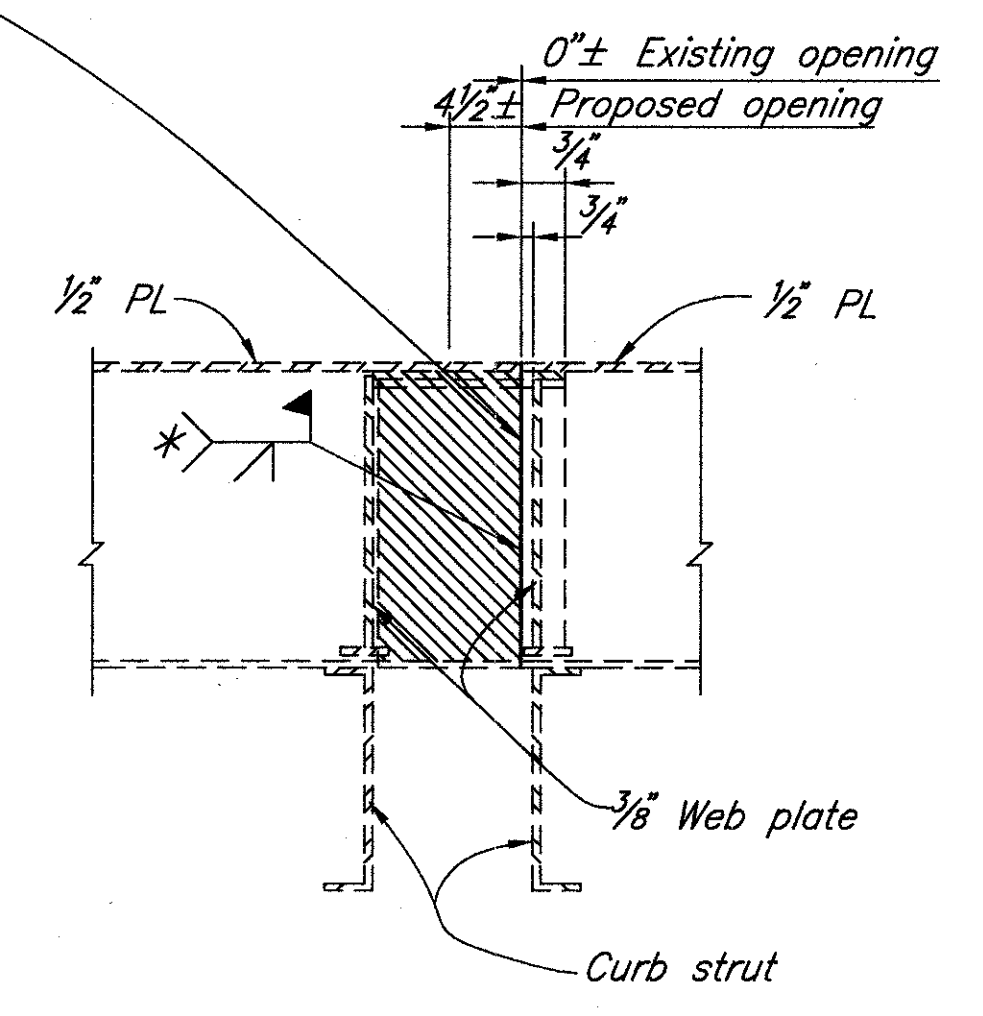
**PARTIAL PLAN AT SIDEWALK  
(TYPICAL BOTH SIDES OF BRIDGE)**



**SECTION C-C**



**SECTION D-D  
(AT WEST END PIER)**



**SECTION D-D  
(AT SPAN 2 EXPANSION JOINT)**

\* Included for payment with Item 516 - Jacking and temporary support of superstructure, as per plan.

**LEGEND**

Indicates material to be removed and reinstalled. Included for payment with Item 516 - Jacking and temporary support of superstructure, as per plan.

**NOTES:**

**MATERIALS** shown are existing unless otherwise noted.

**JACKING AND TEMPORARY SUPPORT OF SUPERSTRUCTURE:** Contractor is to carefully disassemble as much of the curb and sidewalk joints as needed to allow the structure to move prior to the relocation of the bridge. After the bridge is moved the joints will be rebuilt using the original materials unless damaged by the Contractors disassembly. Damaged plates will be replaced at the Contractors cost. See General Note sheet 7/48 for additional information.

**TEMPORARY COVER PLATES** are to be provided as needed to protect pedestrian traffic during jacking operation. A minimum 3/8 plate shall be temporarily welded to one side of the joint to cover the opening.

Job No. 9311SD1 Date 12/27/96 Drawn By TWH, RB, JLS

<p><b>RICHLAND ENGINEERING LIMITED</b> 29 NORTH PARK STREET MANSFIELD, OHIO 44902</p>	
<p>DATE 12/23/96</p>	<p>STRUCTURE FILE NO. 1809393</p>
<p>REVIEWED DAP</p>	<p>CHECKED RWR</p>
<p>DRAWN TWH</p>	<p>DESIGNED DT</p>
<p><b>SIDEWALK EXPANSION JOINT DETAILS PLAN AND ELEVATIONS BRIDGE NO. CUY-90-1524 OVER CUYAHOGA RIVER</b></p>	
<p><b>CUY-90-15.24</b></p>	
<p>48 / 48</p>	<p>61 / 61</p>



**SITE GEOLOGY**

THE PROJECT LIES WITHIN THE PRESENT CUYAHOGA RIVER VALLEY. THE CUYAHOGA RIVER AT THE PROJECT LOCATIONS FLOWS ABOVE THE WESTERN SLOPE OF A PREGLACIAL BURIED BEDROCK VALLEY. THE ROCK SURFACE IS NEARLY LEVEL AT AN ELEVATION OF 450. THE BEDROCK CONSISTS OF SHALE WHICH BELONGS TO CHAGRIN FORMATION OF THE DEVONIAN ROCK SYSTEM.

THE PREGLACIAL VALLEY IS FILLED WITH SAND, GRAVEL AND SILT CARRIED IN BY THE RIVER AND WITH LACUSTRINE SILTS AND CLAYS DEPOSITED DURING THE TIMES WHEN THE AREA WAS COVERED BY LAKES.

**GENERAL SUBSURFACE CONDITIONS**

THE SUBSURFACE INVESTIGATION - PROFILE SHOWS SEVEN OF THE EIGHTEEN BORINGS WHICH ARE GENERALLY REPRESENTATIVE OF THE SOIL SUBSURFACE CONDITIONS.

IN GENERAL THE SOILS ENCOUNTERED DURING THE BORING PROGRAM VERIFY THE GEOLOGIC LITERATURE. IN ORDER TO SIMPLIFY THE SECTION, THE SOIL DESCRIPTIONS HAVE BEEN PRESENTED IN A SHORTENED OR ABBREVIATED FORM. IF MORE DETAILED DESCRIPTIONS OF THE SOILS ARE DESIRED, IN GENERAL OR AT A PARTICULAR LOCATION, THE LOGS OF THE INDIVIDUAL BORINGS SHOULD BE EXAMINED IN CONJUNCTION WITH THE FOLLOWING OUTLINE.

THE FOLLOWING IS A BRIEF OUTLINE OF THE GENERAL CONDITIONS ENCOUNTERED. FOR CLARITY, THE CONDITIONS ARE DESCRIBED SEPARATELY FOR THE UPPER, MIDDLE AND LOWER SLOPE AREAS.

**UPPER SLOPE**

BORINGS B-101, B-102, B-107, P-1 AND P-5

1) 2.0 TO 8.2 FEET OF FILL RANGING FROM LOOSE TO MEDIUM-DENSE FINE TO COARSE SAND (A-3a) TO FINE TO COARSE GRAVEL (A-1-a, A-1-b).

2) BORINGS B-107 AND P-5 ENCOUNTERED 13 INCHES OF ASPHALT PAVING ABOVE ABOUT 4 FEET OF FILL CONSISTING OF LOOSE FINE TO COARSE SAND (A-3a).

3) BELOW THE FILL, BORINGS ENCOUNTERED, FOR THE MOST PART, 45 TO 60 FEET OF LOOSE TO MEDIUM-DENSE FINE TO COARSE SAND (A-1-b, A-3a) WITH SOME LAYERS OR POCKETS OF SILT (A-4b) AND SILTY CLAY (A-6b).

4) APPROXIMATELY 120 FEET OF STIFF TO HARD WITH ZONES OF MEDIUM-STIFF GRAY SILTY CLAY (A-6a, A-6b) WITH MANY TO FEW THIN SILT (A-4a, A-4b) SEAMS AND LENSES.

5) ABOUT 5 TO 10 FEET OF DENSE SILT (A-4a, A-4b).

6) 25 TO 35 FEET OF VERY-STIFF TO HARD GRAY SILTY CLAY (A-6a, A-6b) WITH MANY TO FEW THIN SILT (A-4a, A-4b) SEAMS AND LENSES.

**MIDDLE SLOPE**

BORINGS B-103, B-106, B-108, P-2 AND P-4

1) 10 TO 18 FEET OF LOOSE TO MEDIUM-DENSE FILL AND POSSIBLE FILL RANGING FROM FINE TO COARSE SAND (A-3a) TO FINE TO COARSE GRAVEL (A-1-a, A-1-b).

3) BELOW THE FILL, 4 TO 11 FEET OF LOOSE TO MEDIUM-DENSE FINE TO COARSE SAND (A-1-b, A-3a) WITH SOME LAYERS OR POCKETS OF SILT (A-4b).

4) APPROXIMATELY 95 TO 110 FEET OF STIFF TO HARD WITH ZONES OF MEDIUM-STIFF GRAY SILTY CLAY (A-6a, A-6b) WITH MANY TO FEW THIN SILT (A-4a, A-4b) SEAMS AND LENSES.

5) ABOUT 5 TO 10 FEET OF DENSE SILT (A-4a, A-4b).

6) 25 TO 35 FEET OF VERY-STIFF TO HARD GRAY SILTY CLAY (A-6a, A-6b) WITH MANY TO FEW THIN SILT (A-4a, A-4b) SEAMS AND LENSES.

**LOWER SLOPE**

BORINGS B-104, B-105, B-109, B-110 AND P-3

1) 11 TO 25 FEET OF FILL RANGING FROM LOOSE TO MEDIUM-DENSE FINE TO COARSE SAND (A-3a) TO FINE TO COARSE GRAVEL (A-1-a, A-1-b).

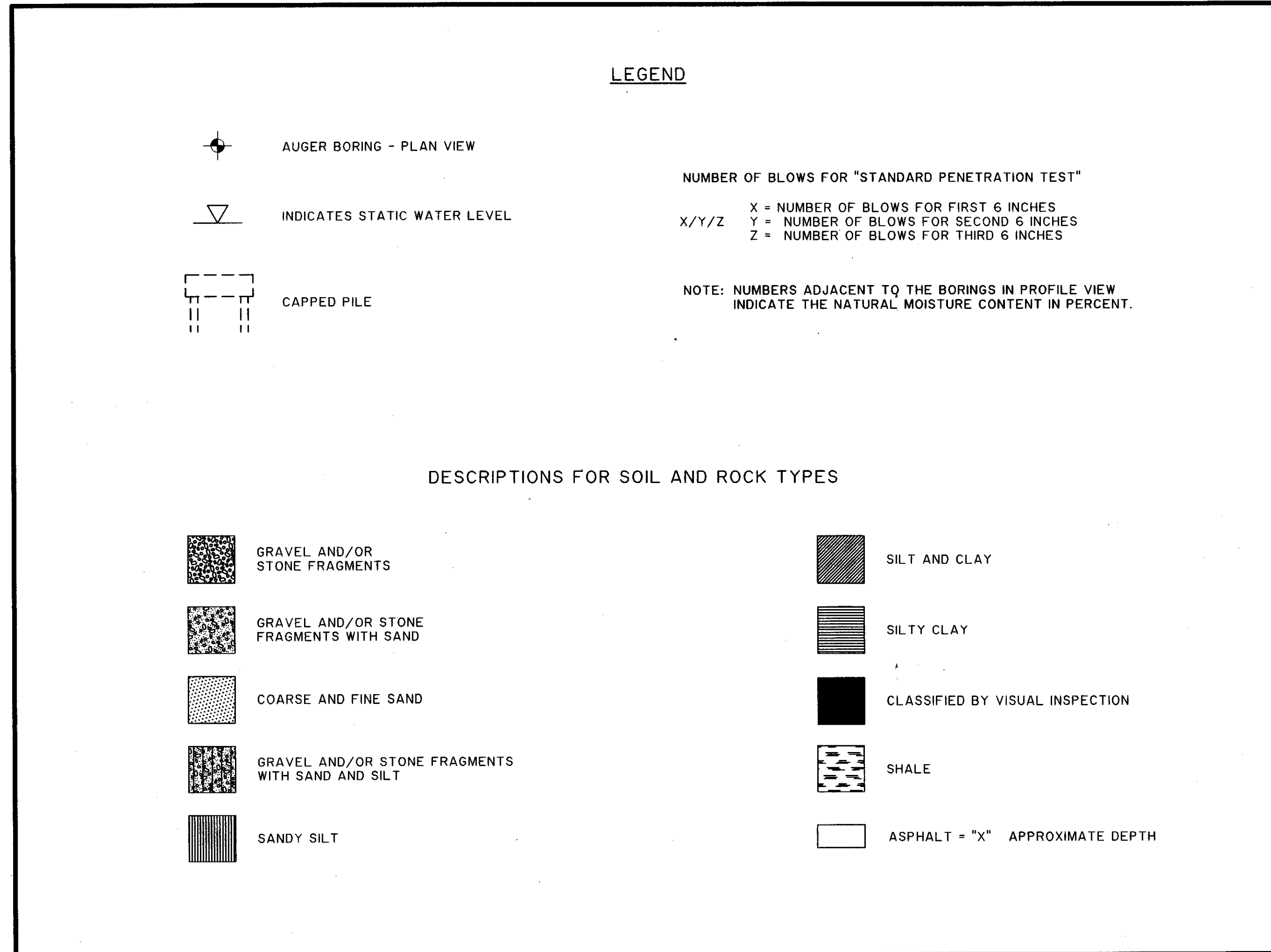
2) 5 TO 9 FEET OF LOOSE TO MEDIUM-DENSE FINE TO COARSE SAND (A-3a) WITH SOME LAYERS OR POCKETS OF SILT (A-4a, A-4b) WAS ENCOUNTERED BELOW THE FILL IN BORINGS B-104, B-105 AND B-110.

3) APPROXIMATELY 85 TO 95 FEET OF STIFF TO HARD WITH ZONES OF MEDIUM-STIFF GRAY SILTY CLAY (A-6a, A-6b) WITH MANY TO FEW THIN SILT (A-4a, A-4b) SEAMS AND LENSES.

4) ABOUT 5 FEET OF DENSE SILT (A-4a, A-4b).

5) 25 TO 35 FEET OF VERY-STIFF TO HARD GRAY SILTY CLAY (A-6a, A-6b) WITH MANY TO FEW THIN SILT (A-4a, A-4b) SEAMS AND LENSES.

BEDROCK CONSISTING OF SOFT TO MEDIUM-HARD SHALE WAS ENCOUNTERED IN BORINGS B-101 THROUGH B-110 AND B-201 THROUGH B-203 AT ABOUT ELEVATION 450. THE DRY DENSITY OF BEDROCK RANGES FROM 155.9 TO 161.9 pcf. THREE UNCONFINED COMPRESSION TEST WERE CONDUCTED. THE ULTIMATE STRENGTH OF BEDROCK RANGES FROM 2610 TO 6817 psi.



**MODIFIED SLAKE DURABILITY TEST**

FOUR INCH SAMPLES OF SHALE FROM BORING B-201, B-202 AND B-203 FROM ELEVATIONS OF 411, 425, AND 424.6 RESPECTIVELY, WERE EMERSED IN WATER AND OBSERVED. WITHIN ONE HOUR, ALL THREE SAMPLES DEVELOPED CLOSELY SPACED HORIZONTAL CRACKS. OBSERVED OVER A FIVE DAY PERIOD, CRACKS WIDENED AND INCREASED IN NUMBER, HOWEVER THE SAMPLE REMAINED INTACT UNLESS HANDLED, IN WHICH CASE THE SAMPLE EASILY SEPARATED AT THE CRACKS. BASED UPON THESE OBSERVATIONS, WE WOULD DESCRIBE THE SLAKING AS MODERATE.

**INTRODUCTION**

IN 1994, FIFTEEN BORINGS WERE DRILLED TO DEPTHS THAT RANGE FROM 140 TO 232 FEET. FIVE FEET OF ROCK WAS CORED IN 10 OF THE 15 BORINGS. THE BORINGS WERE PERFORMED WITH A TRUCK-MOUNTED DRILL RIG AND ADVANCED THROUGH THE TOP 30 TO 60 FEET OF SOIL USING A 3/4-INCH I.D. HOLLOW-STEM AUGER. AT REGULAR INTERVALS, DISTURBED, BUT REPRESENTATIVE, SOIL SAMPLES WERE OBTAINED BY LOWERING A 2-INCH O.D. SPLIT-BARREL SAMPLER TO THE DESIRED SAMPLING DEPTH, AND THEN DRIVING THE SAMPLER INTO THE SOIL AT DEPTH WITH BLOWS FROM A 140-POUND HAMMER FREELY FALLING 30 INCHES.

AT A DEPTH WHERE CONSISTENT COHESIVE SOIL WAS ENCOUNTERED THE HOLLOW-STEM AUGERS WERE REMOVED AND REPLACED WITH SMOOTH SIDED 4-INCH I.D. CASING THAT REMAINED IN PLACE UNTIL THE BORING AND INSTRUMENT INSTALLATION WAS COMPLETE. THE BORING WAS THEN ADVANCED THROUGH THE CASING USING A 3 -INCH ROTARY BIT THAT USED RECIRCULATED WATER AS DRILLING FLUID. AT DESIRED DEPTHS THE SOIL SAMPLES WERE OBTAINED BY REMOVING THE ROTARY BIT AND LOWERING THE 2-INCH O.D. SPLIT-BARREL SAMPLER TO DEPTH AND OBTAINING A SAMPLE AS STATED ABOVE. SPLIT-BARREL SAMPLES WERE EXAMINED IMMEDIATELY AFTER RECOVERY AND REPRESENTATIVE PORTIONS WERE PRESERVED IN AIRTIGHT JARS.

NUMEROUS UNDISTURBED SOIL SAMPLES WERE OBTAINED BY HYDRAULICALLY PRESSING A THIN-WALLED STEEL SHELBY TUBE INTO THE SOIL AT THE DESIRED DEPTH. THE SOIL SAMPLES WERE PRESERVED BY REMOVING CUTTINGS FROM THE END OF THE TUBES AND SEALING THE SOIL SAMPLE WITH WAX.

ON DESIGNATED BORINGS, A CHANGEOVER TO ROCK CORING TECHNIQUES WAS PERFORMED, AND 5.0 FEET OF BEDROCK WERE CORED, IN BORINGS B-101 THROUGH B-110, WITH AN NXM DOUBLE-TUBE CORE BARREL AND A DIAMOND BIT, USING RECIRCULATED WATER AS A CIRCULATING/COOLING FLUID.

IN 1996, THREE ADDITIONAL BORINGS WERE DRILLED TO DEPTHS THAT RANGE FROM 232.5 TO 292.6 FEET. 60.0 FEET OF BEDROCK WERE CORED IN EACH BORING BY USING AN NXM DOUBLE-TUBE CORE BARREL AND A DIAMOND BIT USING RECIRCULATED WATER AS A CIRCULATING/COOLING FLUID. NO SOIL SAMPLES WERE OBTAINED IN THESE BORINGS.

**EXPLANATION OF SYMBOLS AND TERMS USED ON BORING LOGS**

**SAMPLING DATA**

BLOCKED-IN "SAMPLE" COLUMN INDICATES SAMPLE WAS ATTEMPTED AND RECOVERED WITHIN THIS DEPTH INTERVAL.

SAMPLE WAS ATTEMPTED WITHIN INTERVAL BUT NOT RECOVERED.

2/5/9 THE NUMBER OF BLOWS REQUIRED FOR EACH 6-INCH INCREMENT OF PENETRATION OF A STANDARD 2" O.D. SPLIT-BARREL SAMPLER, DRIVEN A DISTANCE OF 18 INCHES BY A 140 POUND HAMMER FREELY FALLING 30 INCHES. ADDITION OF ONE OF THE FOLLOWING SYMBOLS INDICATES THE USE OF A SPLIT-BARREL OTHER THAN THE 2" O.D. SAMPLER:

[2S] - 2-1/2" O.D. SPLIT-BARREL SAMPLER

[3S] - 3" O.D. SPLIT-BARREL SAMPLER

P SHELBY TUBE SAMPLER, 3" O.D. HYDRAULICALLY PUSHED.

R REFUSAL OF SAMPLER IN VERY-HARD OR DENSE SOIL, OR ON A RESISTANT SURFACE.

50 - 2" NUMBER OF BLOWS (50) TO DRIVE A SPLIT-BARREL SAMPLER A CERTAIN NUMBER OF INCHES (2), OTHER THAN THE NORMAL 6-INCH INCREMENTS.

S/D SAMPLER (SPLIT-BARREL) ADVANCED BY WEIGHT OF DRILL RODS (D), OR COMBINED WEIGHT OF

S/H RODS AND DRIVE HAMMER (H).

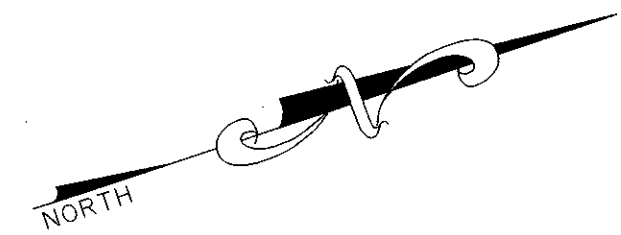
WHEN BEDROCK IS ENCOUNTERED AND ROCK CORE SAMPLES ARE ATTEMPTED, THE "SAMPLING EFFORT" COLUMN IS USED TO RECORD THE TYPE OF CORE BARREL USED (NXM) AND THE PERCENTAGE OF CORE RECOVERED FOR EACH RUN OF SAMPLER. ROCK-CORE BARRELS CAN BE EITHER SINGLE- OR DOUBLE-TUBE CONSTRUCTION, AND A SPECIAL SERIES OF DOUBLE-TUBE BARRELS, DESIGNATED BY THE SUFFIX M, IS COMMONLY USED TO OBTAIN MAXIMUM CORE RECOVERY IN VERY-SOFT OR FRACTURED ROCK. THREE BASIC GROUPS OF BARRELS ARE USED MOST OFTEN IN SUBSURFACE INVESTIGATIONS FOR ENGINEERING PURPOSES, AND THESE GROUPS AND THE DIAMETERS OF THE CORES OBTAINED ARE AS FOLLOWS:

- AX,AW,AXM,AWM - 1-1/8 INCHES
- BX,BW,BXM,BWM - 1-5/8 INCHES
- NX,NW,NXM,NWM - 2-1/8 INCHES

NOTE: ALL AVAILABLE SOIL AND BEDROCK INFORMATION WHICH IS CONVENIENTLY SHOWN ON THE SUBSURFACE INVESTIGATION - PROFILE SHEET. DETAILED SUBSURFACE INFORMATION IS SHOWN ON THE 1994 BORING LOG SHEETS 1 OF 11, THE 1996 BORING LOG SHEET A, PROVIDED BY BBC&M ENGINEERING, INC. AND THE 1990 BORING LOG SHEETS 1 OF 7, PROVIDED BY ODOT.

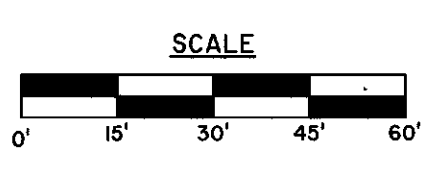
ADDITIONAL SOILS INFORMATION IS AVAILABLE IN AN 8-1/2" X 11" BOUND REPORT ON FILE AT

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**LEGEND**

- B-I SLOPE INCLINOMETER INSTALLED BY BBC&M ENGINEERING, INC. (1994).
- P-I PIEZOMETER INSTALLED BY BBC&M ENGINEERING, INC. (1994).
- I-I SLOPE INCLINOMETER INSTALLED BY ODOT (1990).
- B-201 BORING LOCATION DRILLED IN 1996



B-110

B-106

CUYAHOGA RIVER

CUYAHOGA RIVER

E CONSTRUCTION AND RIGHT OF WAY IR-90

C:\PROJECTS\CUY-90\450002.DWG

TOPOGRAPHIC MAPPING PROVIDED BY RICHLAND ENGINEERING LIMITED

DESIGN AGENCY  
**BBC&M ENGINEERING, INC.**  
 DUBLIN, OHIO

DESIGNED	REVIEWED	DATE
S.P.R./F.X.C.	P.H.A.	11/29/94
CHECKED	REVISION	STRUCTURE FILE NUMBER
P.H.A.	9/25/96	1809393

**SUBSURFACE INVESTIGATION - PLAN OF EXPLORATIONS**  
 BRIDGE NO. CUY-90-15.24  
 WEST BANK STABILITY ANALYSIS

**CUY-90-15.24**



Pier 1A

West End Pier

Pier 1

CUYAHOGA RIVER

700

700

600

600

500

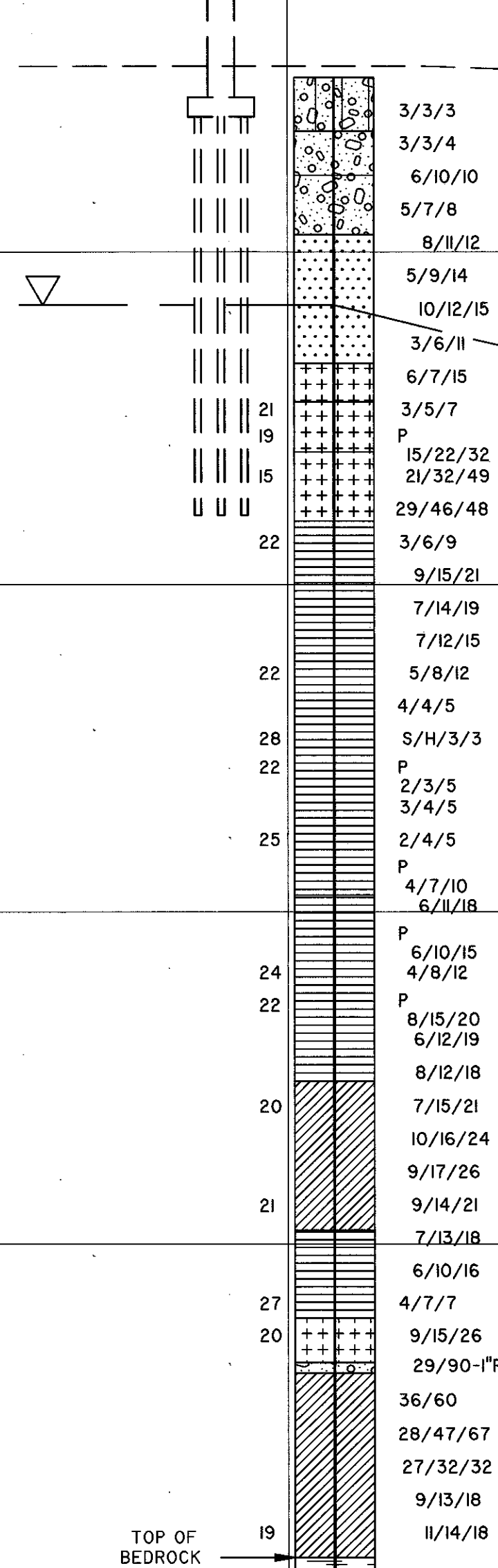
500

400

400

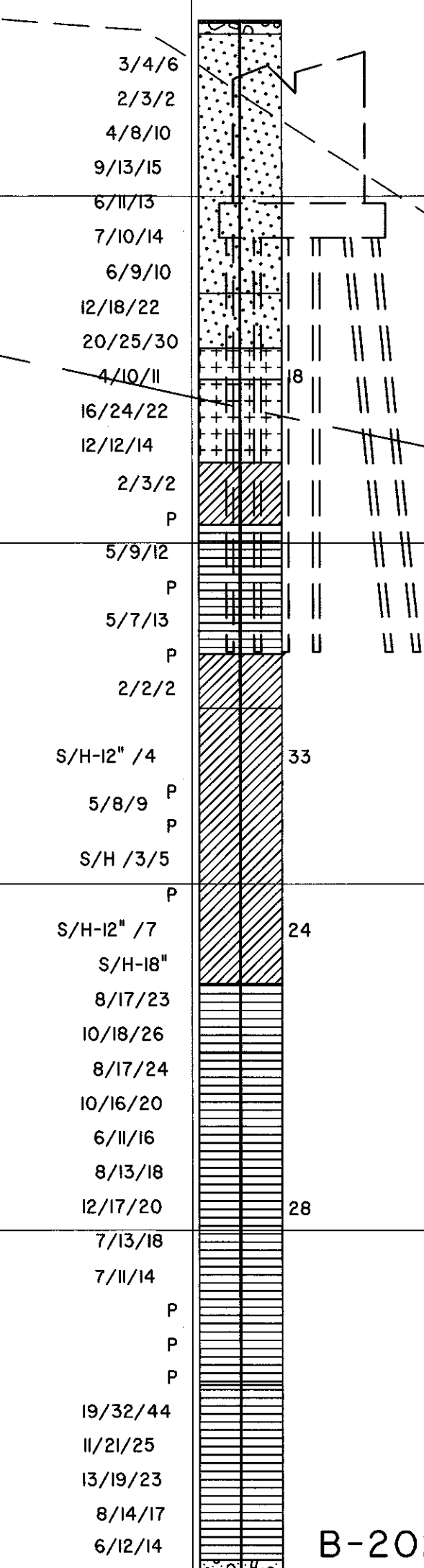
B-101

STA 15+06.50  
20.7'R



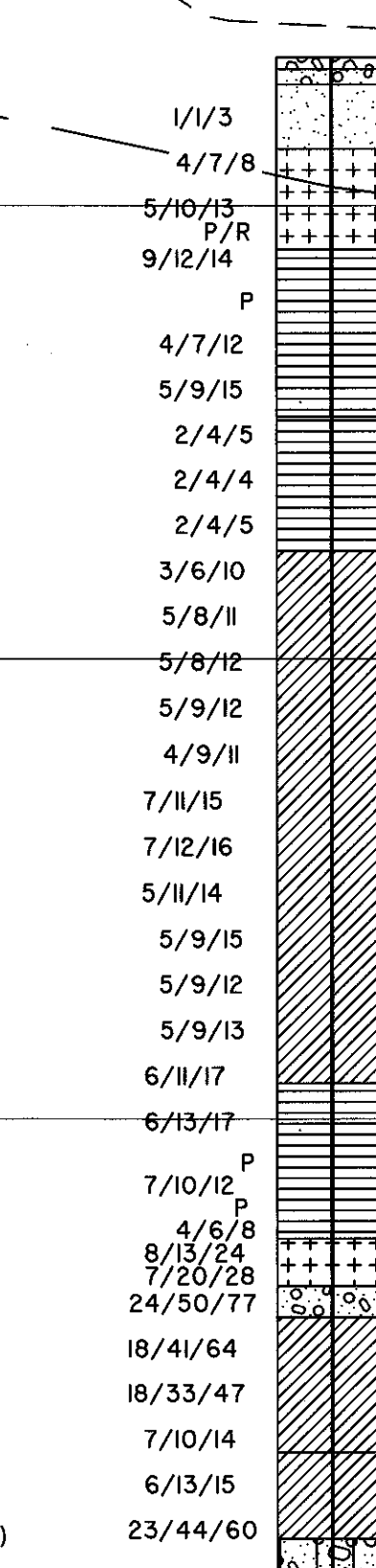
B-102

STA 15+95.34  
134.7'R



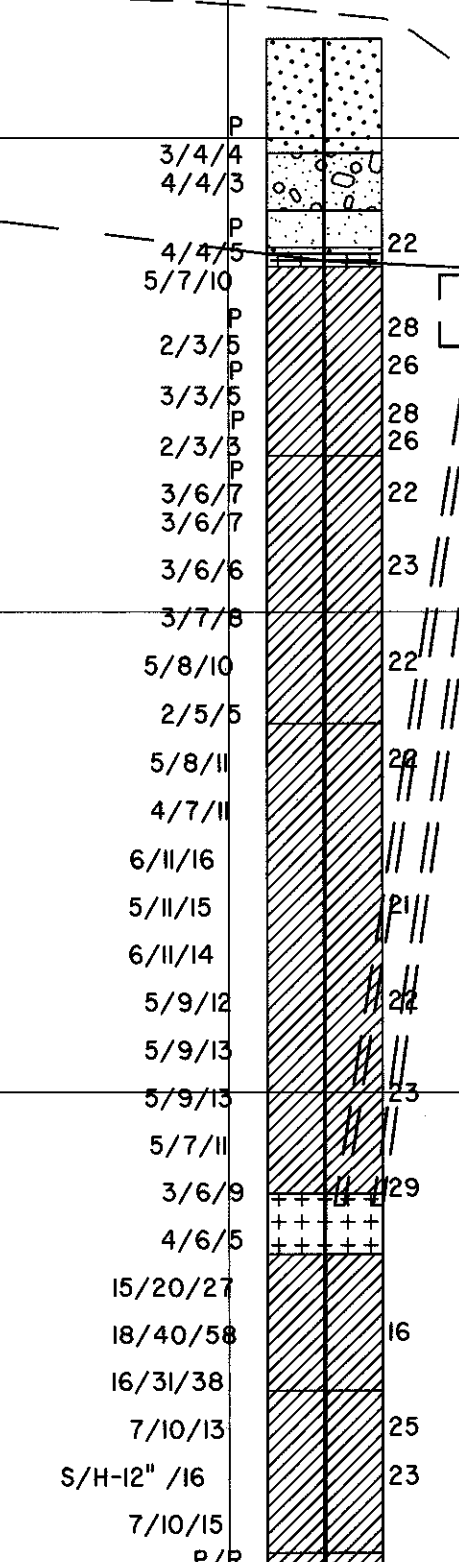
B-103

STA 16+93.83  
34.49'R



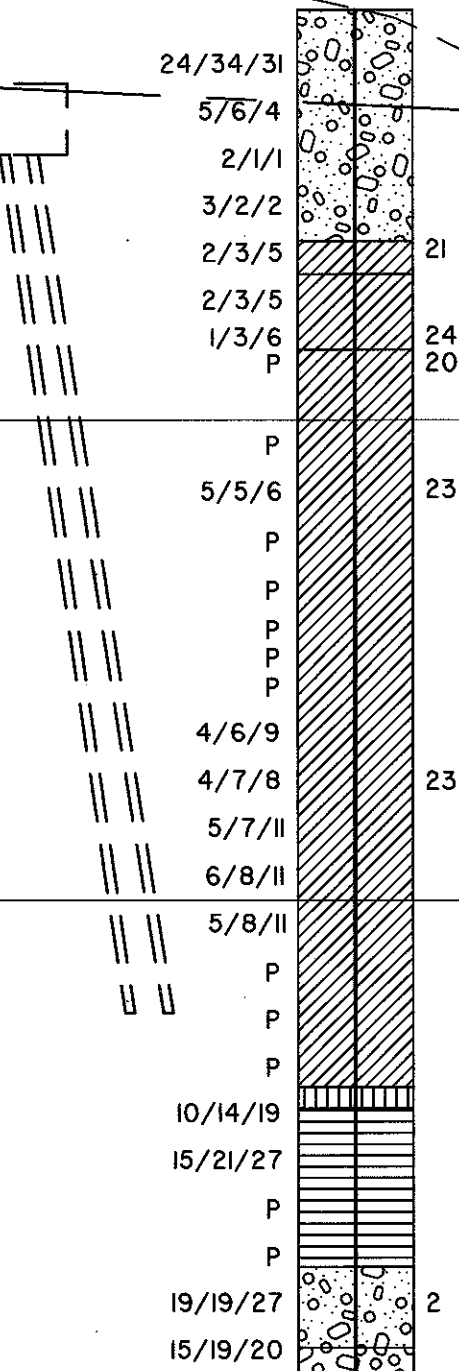
B-108

STA 18+00.15  
87.8'L

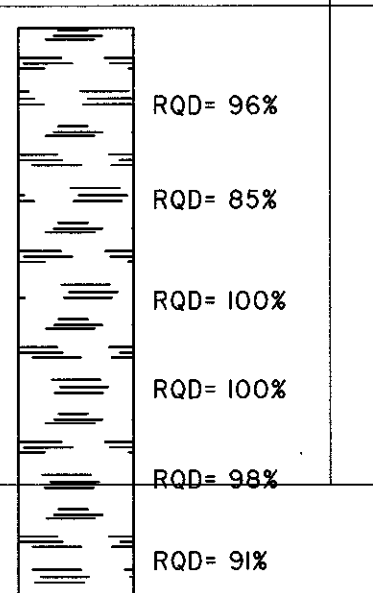


B-109

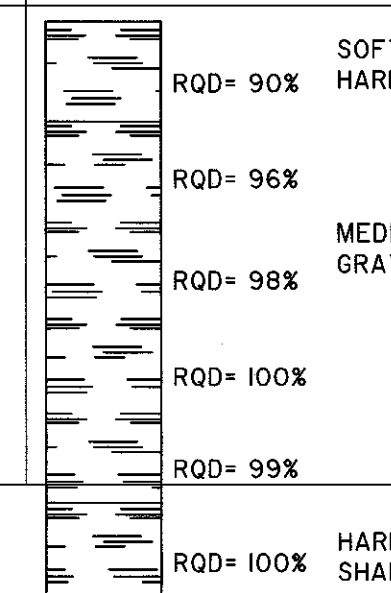
STA 18+86.96  
65.6'L



B-202 (ROCK CORE)



B-203 (ROCK CORE)



15+00

16+00

17+00

18+00

19+00

SOFT TO MEDIUM-HARD GRAY AND DARK-GRAY SHALE

TOP OF BEDROCK  
MEDIUM-HARD GRAY SHALE

TOP OF BEDROCK  
SOFT TO MEDIUM-HARD GRAY SHALE

SOFT TO MEDIUM-HARD GRAY SHALE  
MEDIUM-HARD GRAY SHALE

SOFT TO MEDIUM-HARD BLACK AND GRAY SHALE

SOFT TO MEDIUM-HARD GRAY SHALE

MEDIUM-HARD TO HARD GRAY SHALE

HARD GRAY SHALE







DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE-TROMETER	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler					LOCATION: Sta. 15-95.34											
							3" O.D. Shelby Tube	NXM Rock-core Barrel	134.7" Rl. of Centerline	Agg.	C.S.	F.S.	SILT	CLAY	Agg.	C.S.	F.S.	SILT	CLAY				
0							COMPLETION DEPTH: 232.0' ELEVATION: 675.7 DATE: 9/9/94 - 9/14/94																
							DESCRIPTION																
0-5	1	3/4/6					FILL: Loose gray coarse gravel. Est. A-1-a																
5-10	2	2/3/2					FILL: Medium-dense to dense black fine to medium sand, trace coarse sand, trace fine to coarse gravel. Est. A-3a																
10-15	3	4/8/10					Medium-dense brown fine to coarse sand, trace to little fine gravel, trace silt.																
15-20	4	9/13/15					- At 32.1': Contains seams of fine sand, some to "and" silt.																
20-25	5	6/11/13					Est. A-3a																
25-30	6	7/10/14					Dense brown fine sand, trace to little silt, trace medium to coarse sand, trace fine gravel.																
30-35	7	6/9/10					Est. A-3a																
35-40	8	12/19/22					Dense brown fine sand, trace to little silt, trace medium to coarse sand, trace fine gravel.																
40-45	9A 9B	20/25/30					Est. A-3a																
45-50	10	4/10/11	2.8-3.5	18	23	18	0	0	10	65	25	Very-stiff gray clayey silt interbedded with silt, trace fine to medium sand.											
50-55	11	16/24/22					A-4b(8)																
55-60	12	12/12/14					0	0	5	79	16	Medium-dense to dense gray silt, little to "and" fine sand.											
60-65	13	2/3/2	0.5-0.7				A-4b(8)																
65-70	14	P	0.8-1.0				Interbedded medium-stiff gray silty clay and very-loose to loose silt, some fine sand, horizontal laminated structure.																
70-75	15	5/9/12	1.5-4.5				Est. A-6a																
75-80	16	P	4.5				Stiff to hard gray silty clay, trace fine to medium sand, contains seams of silt, horizontal structure.																
80-85	17	5/7/13	1.5-2.5				Est. A-6a																
85-90	18	P	1.0				Est. A-6b																
90-95	19	2/2/2	0.5-1.0				Medium-stiff to stiff gray silty clay, trace fine to coarse sand, trace fine gravel, few seams of silt.																
95-100							A-6a, A-6b(9,11)																
WATER LEVEL: <input checked="" type="checkbox"/>							WATER NOTE: <input checked="" type="checkbox"/>							DATE: <input checked="" type="checkbox"/>									



DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE-TROMETER	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler					LOCATION: Sta. 15-95.34													
							3" O.D. Shelby Tube	NXM Rock-core Barrel	134.7" Rl. of Centerline	Agg.	C.S.	F.S.	SILT	CLAY	Agg.	C.S.	F.S.	SILT	CLAY						
100							COMPLETION DEPTH: 232.0' ELEVATION: 675.7 DATE: 9/9/94 - 9/14/94																		
							DESCRIPTION																		
100-105	20		0.8-1.2				Medium-stiff to stiff gray silty clay, trace fine to coarse sand, trace fine gravel, few seams of silt.																		
105-110	21	S/H-12/4	0.5-0.8	33	41	22	1	1	1	10	87	- Sample 21: Medium-stiff gray silty clay, trace fine to coarse sand, A-7-6(12).													
110-115	22	5/8/9	0.5				P																		
115-120	23	P	1.0-1.5				38	20	1	1	31	66	P												
120-125	24	S/H-6/35	0.6-0.8				P																		
125-130	25	P	1.5-2.0				29	17	0	0	1	53	46	P											
130-135	26	S/H-12/7	0.5-1.0	24	30	18	0	0	1	49	50	P													
135-140	27	S/H-18	0.7-1.0				P																		
140-145	28	8/17/23	2.5-3.5				A-6a, A-6b(9,11)																		
145-150	29	10/18/26	3.2-3.5				Stiff to very-stiff gray silty clay, trace fine to coarse sand, trace fine gravel, horizontal structure, contains thin seams of clayey silt and silt.																		
150-155	30	8/17/24	3.0-3.5				P																		
155-160	31	10/16/20	2.0-3.0				P																		
160-165	32	6/11/16	1.8-2.4				P																		
165-170	33	8/13/18	2.0-2.5				P																		
170-175	34	2/17/20	1.5-2.0	28	35	19	0	2	2	27	69	P													
175-180	35	7/13/18	2.5-3.0				P																		
180-185	36	7/11/14	2.4-3.0				P																		
185-190	37	P	1.0-1.5				P																		
190-195	38	P	1.5				P																		
195-200	39	P	2.5-3.0				P																		
WATER LEVEL: <input checked="" type="checkbox"/>							WATER NOTE: <input checked="" type="checkbox"/>							DATE: <input checked="" type="checkbox"/>											

DESCRIPTION ON NEXT PAGE



DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE-TROMETER	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler					LOCATION: Sta. 15-95.34								
							3" O.D. Shelby Tube	NXM Rock-core Barrel	134.7" Rl. of Centerline	Agg.	C.S.	F.S.	SILT	CLAY	Agg.	C.S.	F.S.	SILT	CLAY	
200							COMPLETION DEPTH: 232.0' ELEVATION: 675.7 DATE: 9/9/94 - 9/14/94													
							DESCRIPTION													
200-205	40	9/32/44	4.8				Very-stiff gray silty clay, trace fine to coarse sand, trace fine gravel, few lenses of silt.													
205-210	41	11/21/25	4.3-4.5				- From 198.4' to 200.0': Few seams of fine to coarse gravel.													
210-215	42	13/19/23	3.0-3.8				- From 200.1' to 200.4': Cobble.													
215-220	43	8/14/17	2.0-3.0				Est. A-6b													
220-225	44	6/12/14	2.0-2.5				Dense gray fine to coarse gravel, "and" silty clay, some fine to coarse sand.													
225-230	45	NXM REC	100%	50%			Est. A-1-b													
230-235							Medium-hard gray shale, nearly horizontally bedded, slightly fissile.													
235-240							- From 230.7' to 231.2': Several vertical fractures.													
240-245							- From 231.8' to 232.0': Few diagonal fractures.													
245-250							END OF BORING													
250-255							- Encountered water at 39.5'.													
255-260							- 0.0 to 64' 3-1/4" I.D. Hollow-stem Auger with plug replaced with 4" I.D. Flush-coupled casing from 0.0 to 64'.													
260-265							- 65' to 225.5' 3-7/8" Tricone Bit.													
265-270							- 65' to 232.0' recirculated water used as drilling fluid.													
270-275							P													
275-280							P													
280-285							P													
285-290							P													
290-295							P													
295-300							P													
WATER LEVEL: <input checked="" type="checkbox"/>							WATER NOTE: <input checked="" type="checkbox"/>							DATE: <input checked="" type="checkbox"/>						

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DESIGN AGENCY  
 BBC&M ENGINEERING, INC.  
 DUBLIN, OHIO

DATE  
 11/17/94  
 REVIEWED  
 P.H.A.  
 STRUCTURE FILE NUMBER  
 1809393

DRAWN  
 B.R.  
 REVISION  
 CHECKED  
 S.P.R.

SUBSURFACE INVESTIGATION - 1994 BORING LOGS SHEET 2 OF 11  
 BRIDGE NO. CUY-90-15.24  
 WEST BANK STABILITY ANALYSIS

CUY-90-15.24

5  
 22













DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE- TROMETER	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler					LOCATION: Sta. 15-49.05									
							3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	
							COMPLETION DEPTH: 215.0'					ELEVATION: 662.7					DATE: 9/19/94 - 9/22/94				
DESCRIPTION																					
100	20	5/6/8	1.3-1.8														Stiff to very-stiff gray silty clay, trace fine to medium sand, few to many seams and lenses of silt, horizontal structure. A-6b(II)				
105	21	6/10/15	3.3-4.5														Very-stiff to hard gray silty clay, trace fine to medium sand, few to many seams and lenses of silt, horizontal structure.				
110	22	8/12/16	2.7-4.5														Est. A-6b				
115	23	7/12/19	2.9-3.7														Stiff to very-stiff gray silty clay, trace fine to coarse sand, few lenses of silt.				
120	24	P	1.7-2.0														Est. A-6b				
125	25	3/6/12	1.8-2.8	23	31	19	0	1	1	52	46										
130	26	P	3.2-3.3																		
135	27	9/19/21	2.0-2.3																		
140	28	P	2.2-2.7																		
145	29	6/10/14	1.8-2.1														A-6a(9)				
150	30	5/11/19	2.1-2.4	23													Very-stiff to hard gray silty clay, trace fine to coarse sand, trace fine gravel.				
155	31	7/13/18	3.2-3.3																		
160	32	7/12/17	3.0-3.4																		
165	33	7/11/15	2.7-4.2														Est. A-6a				
170	34	5/8/10	1.7-2.8	26	32	18	0	0	1	38	61						Stiff to very-stiff gray silty clay, trace fine to coarse sand, few seams and lenses of silt.				
175	35	6/2/38	4.5														A-6a(10)				
180	36	6/4/30-4"R	4.5														Dense gray fine to medium sand, little silt, trace coarse sand. Est. A-3a				
185	37	8/5/30-5"R	4.5														Hard gray silty clay, trace to little fine to coarse sand, trace fine gravel, few lenses of silt.				
190	38	11/22/30	4.5																		
195																	Est. A-6b				
200																					

WATER LEVEL:  WATER NOTE:  DATE:



DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE- TROMETER	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler					LOCATION: Sta. 15-49.05									
							3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube			
							COMPLETION DEPTH: 215.0'					ELEVATION: 662.7					DATE: 9/19/94 - 9/22/94				
DESCRIPTION																					
200	39	8/2/14	2.3-3.5														Hard gray silty clay, trace to little fine to coarse sand, trace fine gravel, few lenses of silt.				
205	40A	11/20/30	2.4-3.5																		
205	40B	11/20/30	3.4-4.5																		
210	41	25/50-2"R NXM REC	4.2-4.5														Est. A-6b				
210	42	100%	83%																		
215																					
220																					
225																					
230																					
235																					
240																					
245																					
250																					
255																					
260																					
265																					
270																					
275																					
280																					
285																					
290																					
295																					
300																					

WATER LEVEL:  WATER NOTE:  DATE:



DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE- TROMETER	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler					LOCATION: Sta. 18-00.15									
							3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube			
							COMPLETION DEPTH: 170.2'					ELEVATION: 610.40					DATE: 8/8/94 - 8/10/94				
DESCRIPTION																					
0																	FILL: Loose black cinders and slag, contains seams or lenses of: Silt; clayey silt; fine to coarse gravel; and brown fine to medium sand, trace brick or tile fragments.				
5																					
10	1	P															Est. A-3a				
10	2	3/4/4															POSSIBLE FILL: Loose brown fine to coarse sand, little fine to coarse gravel, trace to little silt.				
15	3	4/4/3								32	40	17					A-1-b(0)				
20	4	P															Loose brown fine to medium sand, trace silt. Est. A-3				
20	5A	4/4/5	1.8-2.0	22	26	19	0	0	2	74	24						Loose brown fine to medium sand, little silt, trace coarse sand. Est. A-3a				
25	6	5/7/10	2.0-4.5														Stiff gray silty clay interbedded with clayey silt, "and" silt, few thin seams of fine sand. A-4b(8)				
30	7	P	1.0-1.8	28	39	22	1	3	4	18	74						Medium-stiff to stiff gray silty clay, little fine to coarse sand, few lenses of silt and fine sand.				
35	8	P	1.3-1.5	26	36	21	0	0	1	33	66						- From 25.0' to 26.5': Hard.				
40	9	3/3/5	1.0	26	38	20	0	1	2	32	66										
45	10	P	0.7-1.0	28	39	22	0	1	1	32	66										
45	11	2/3/3	0.7-1.0	26	38	20	0	1	2	35	62						A-6a, A-6b(10,11)				
50	12	P	2.5	22	30	18	0	0	1	55	44						Stiff to very-stiff gray silty clay, trace to little fine to medium sand, contains many seams and lenses of silt.				
55	13	3/6/7	1.8-2.0	22	30	18	0	0	1	55	44						- From 44.0' to 49.0': Irregular "disturbed" structure.				
60	14	3/6/7	1.5-1.8																		
65	15	3/6/6	1.3-1.8	23	30	17	0	0	1	56	43										
70	16	3/7/8	2.0-3.0																		
75	17	5/8/10	2.0-4.0	22	29	18	1	1	2	62	34										
80	18	2/5/5	1.0-1.5	22	33	18	1	2	6	31	60						A-6a(8,9)				
85	19	5/8/11	1.5-1.7	22	33	18	1	2	6	31	60						Stiff to very-stiff gray silty clay, trace to little fine to coarse sand, trace fine gravel, few lenses of silt.				
90	20	4/7/11	1.8-2.0																		
95	21	6/11/16	2.0-2.3																		
100	22	5/11/15	2.0-2.3	21	33	18	2	3	4	33	58										
105	23	6/11/14	2.0-2.3																		
110																					

WATER LEVEL:  WATER NOTE: None to 48.5' DATE: 08/10/94

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DESIGN AGENCY  
**BBC&M ENGINEERING, INC.**  
 DUBLIN, OHIO

DATE  
 11/17/94

REVIEWED  
 P.H.A.

DRAWN  
 B.R.

DESIGNED  
 S.P.R.

CHECKED

STRUCTURE FILE NUMBER  
 1809393

WEST BANK STABILITY ANALYSIS

SUBSURFACE INVESTIGATION - 1994 BORING LOGS SHEET 6 OF 11  
 BRIDGE NO. CUY-90-15.24

CUY-90-15.24

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DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE-TROMETER	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler				LOCATION: Sta. 18-00.15				
							1st	%	%	%	AGG.	C.S.	F.S.	SILT	CLAY
100	24	5/9/12	16-19	22	33	20	4	3	3	30	60	Stiff to very-stiff gray silty clay, trace to little fine to coarse sand, trace fine gravel, few lenses of silt.			
105	25	5/9/13	19-23												
110	26	5/9/13	2.0-2.5	23	34	19	0	0	1	37	62				
115	27	5/7/11	1.7-2.3												
120	28A 28B	3/6/9	1.0-1.3 2.0-2.5	29	38	20	0	1	3	22	74	A-6a, A-6b(10,11) Interbedded: Medium-dense gray silt, stiff gray silty clay; and fine sand.			
125	29A 29B	4/6/5	1.0									Est. A-4b Very-stiff to hard gray silty clay, trace to little fine to coarse sand, trace fine gravel.			
130	30	5/20/27										- From 129.8' to 131.8': Seam of dense gray fine to coarse sand, "and" fine gravel, little silt. - From 135.0' to 135.7': Contains many slickensided partings.			
135	31	8/4/58	4.5	16	32	18	5	3	6	29	57	A-6a(10) Stiff to very-stiff gray silty clay, trace fine to coarse sand, trace fine to coarse gravel, many lenses of silt.			
140	32	6/3/58	3.5-4.5												
145	33	7/10/13	2.0-2.6	25	32	20	0	0	0	95	5				
150	34	SH-12" 16	1.0-2.0	23	31	20	13	0	1	33	53				
155	35	7/10/15	2.0-2.5									A-6a(8,9)			
160	36	P/R	4.5									Hard gray silty clay, little to some fine to coarse sand, trace to little fine to coarse gravel. A-6a(8)			
165	37	20-28 32	4.5							43	11	Dense gray fine to coarse gravel, some fine to coarse sand, "and" clayey silt. A-4a(11)			
170	38	100-2" NXM REC	100%	64%								Soft to medium-hard black and gray shale. Very-soft to soft gray shale, nearly horizontally bedded, partly similar to hard soil.			
175	39											Soft to medium-hard black and gray shale, nearly horizontally bedded, fissile. - From 165.9' to 166.2': Iron carbonate seams. - From 169.3' to 170.2': Near-vertical fracture, filled with broken shale fragments and soft clay.			
180												END OF BORING			
185												- 0.0 to 45' 3-1/4" I.D. Hollow-stem Auger with plug replaced with 4" I.D. Flush-coupled casing from 0.0 to 45'.			
190												- 45' to 165.2' 3-7/8" Tricone Bit.			
195												- 45 to 170.2' recirculated water used as drilling fluid.			
200												WATER LEVEL: None to 48.5' WATER NOTE: DATE: 08/10/94			



DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE-TROMETER	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler				LOCATION: Sta. 18-86.96				
							1st	%	%	%	AGG.	C.S.	F.S.	SILT	CLAY
0												FILL: Dense black fine to coarse sand, little fine to coarse gravel, trace silt, (cinders, slag, and foundry sand).			
5	1	2/4/3/3													
10	2	5/6/4													
15	3	2/1/1													
20	4	3/2/2										Est. A-1-b			
25	5	2/3/5	1.5-3.5	21	34	19	0	0	1	66	33	Stiff to very-stiff gray silty clay, trace fine to medium sand, horizontal structure. A-6a(10)			
30	6	2/3/5	0.3-0.5									Medium-stiff to stiff gray silty clay, trace fine to medium sand, trace fine gravel, few lenses of silt.			
35	7	1/3/6	0.5-1.5	24	32	19	0	1	1	64	34	A-6a(9)			
40	8	P	2.0	32	18	0	1	1	1	55	43	Stiff to very-stiff gray silty clay, trace fine to coarse sand, few seams and lenses of silt.			
45	9	P	3.0-3.5												
50	10	5/5/6	2.0-3.0	23	31	19	0	1	4	44	51	- At 60.0': Very-stiff to hard.			
55	11	P													
60	12	P	3.0-4.5												
65	P														
70	13	P	1.5-2.0	37	21	2	1	2	32	63					
75	14	4/6/9	1.5-2.5												
80	15	4/7/8	1.0-2.0	23	35	19	1	2	4	36	57				
85	16	5/7/11	1.5-2.5												
90	17	6/8/11	1.5-2.0												
95	18	5/8/11										A-6a, A-6b(9,10)			
100												WATER LEVEL: None to 48.5' WATER NOTE: DATE:			



DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE-TROMETER	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler				LOCATION: Sta. 18-86.96				
							1st	%	%	%	AGG.	C.S.	F.S.	SILT	CLAY
100	19	P	2.0-3.0									Stiff to very-stiff gray silty clay, trace fine to coarse sand, few seams and lenses of silt.			
105	20	P	2.0-2.5									- From 110.0' to 113.0': Very-stiff to hard.			
110	21	P	2.5									A-6a, A-6b(9,10)			
115	22A 22B	0/14/19	2.5-4.5	9	9	33	49					[Estimated] Medium-dense fine to medium sand intermixed with clayey silt, trace coarse sand, trace fine gravel. Est. A-4a			
120	23	5/2/27	4.5									Very-stiff to hard gray silty clay, little fine to coarse sand, trace fine gravel.			
125	24	P	4.5									Est. A-1-b			
130	P											Est. A-6b			
135	25	9/19/27	2	16	35	31	15	3				Dense gray fine to medium sand, little clayey silt, trace coarse sand, trace fine gravel.			
140	26	5/19/20										A-1-b(0)			
145	27	2/3/4/38										Est. A-1-a			
150	28	52-4" R	4.5									Very-soft to soft gray shale, nearly horizontally bedded, partly similar to hard soil.			
155	29	36 50-1" R	4.5												
160	30	100-2" NXM REC	84%	27%								Soft to medium-hard gray shale, nearly horizontally bedded, fissile. - From 161.5' to 162.1': Diagonal fractures, partly clay filled.			
165	31											END OF BORING			
170												- Encountered slight seepage at 19.7'.			
175												- 0.0 to 35' 3-1/4" I.D. Hollow-stem Auger with plug replaced with 4" I.D. Flush-coupled casing from 0.0 to 35'.			
180												- 35' to 158.7' 3-7/8" Tricone Bit.			
185												- 35' to 163.2' recirculated water used as drilling fluid.			
190												WATER LEVEL: None to 48.5' WATER NOTE: DATE:			
195															
200												WATER LEVEL: None to 48.5' WATER NOTE: DATE:			

SUBSURFACE INVESTIGATION - 1994 BORING LOGS SHEET 7 OF 11  
 BRIDGE NO. CUY-90-15.24  
 WEST BANK STABILITY ANALYSIS  
 DESIGN AGENCY: BBC&M ENGINEERING, INC. DUBLIN, OHIO  
 DATE: 11/17/94  
 REVIEWED: P.H.A.  
 DRAWN: B.R.  
 CHECKED: S.P.R.  
 STRUCTURE FILE NUMBER: 1809393





DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE. FROMETER	MOISTURE CONTENT LIQUID	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler					LOCATION: Sta. 18-43.85				
						1st	%	%	Agg.	C.S.	F.S.	SILT	CLAY	3" O.D. Shelby Tube	243.9' Lt of Centerline
0						FILL: Loose brown and black fine to coarse gravel, some to "and" fine to coarse sand, trace to little clayey silt, (cinders and slag).									
5	1	3/3/3				Est. A-1-b									
10	2	2/1/2				Very-loose brown and gray silt, "and" fine sand, trace medium to coarse sand.									
15	3A 3B	1/3/2				0	1	43	56	Est. A-4a					
20	4	1/3/5	0.8-2.0	22	31	19	0	0	1	57	43	Medium-stiff to stiff gray silty clay, trace fine to medium sand, few lenses of silt.			
25	5	3/4/5	0.8-1.8			A-6a(9)									
30	6	P	2.0			Stiff to very-stiff gray silty clay, trace fine to medium sand, many lenses of silt and fine sand.									
35	7	3/6/8	1.3-2.0	24	31	18	0	0	2	52	46	A-6a(9)			
40	8	P	2.0-3.0			Stiff to hard gray silty clay interbedded with silt, trace fine to medium sand, horizontal structure.									
45	9	5/9/13	3.5-4.5			A-6a(9)									
50	10	P	2.0-2.5			A-6a(8)									
55	11	4/5/7	1.0-1.5	25	29	18	0	0	1	55	44	A-6a(8)			
60	12	P	1.5-1.8			Stiff to very-stiff gray silty clay, trace fine to coarse sand, trace fine gravel.									
65	13	5/8/13	2.0-2.4			A-6a, A-6b(10)									
70	14	4/8/12	1.5-2.3	21	33	19	7	3	5	29	56	A-6a, A-6b(10)			
75	15	4/7/12	1.8-2.4			A-6a, A-6b(10)									
80	16	4/10/11	1.2-1.5	24	34	20	1	2	2	32	63	A-6a, A-6b(10)			
85	17	4/8/12	1.5-2.0			A-6a, A-6b(10)									
90	18	5/8/13	1.5-1.8	23	34	20	2	2	2	32	62	A-6a, A-6b(10)			
95	19	5/9/13	1.8-2.0			A-6a, A-6b(10)									
100						A-6a, A-6b(10)									

WATER LEVEL:  WATER NOTE:  DATE:



DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE. FROMETER	MOISTURE CONTENT LIQUID	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler					LOCATION: Sta. 18-43.85				
						1st	%	%	Agg.	C.S.	F.S.	SILT	CLAY	3" O.D. Shelby Tube	243.9' Lt of Centerline
100	20	5/8/11	1.5-2.0	25	37	21	0	1	1	29	69	Stiff to very-stiff gray silty clay, trace fine to coarse sand, trace fine gravel.			
105	21	5/9/11	1.0-2.0			A-6a, A-6b(10)									
110	22	P				Medium-dense gray silt, little to some fine sand.									
115	23	11/4/19				13	28	39	20	Dense gray fine to coarse sand, trace silt, trace fine gravel.					
120	24A 24B	5/3/5/8	4.5			A-3a(0)									
125	25	4/3/6/2	4.5	18	35	18	2	3	5	27	63	Hard gray silty clay, trace to little fine to coarse sand, trace fine gravel, contains sickensided surfaces.			
130	26	7/12/14	1.3-2.0			A-6b(11)									
135	27	P-R	0.8-1.0			Medium-stiff to stiff gray silty clay, trace fine to coarse sand, trace fine to coarse gravel.									
140	28	80-4" R	2.0			- From 140.1' to 140.8': fine sandstone boulder.									
145	29	20/4/6/7	4.5			Est. A-6a									
150	30	NXM REC 100%	RQD 92%			Soft to medium-hard dark-gray to light-gray shale, nearly horizontally bedded, 2" to 9" core pieces, few cemented vertical fractures, contains few thin seams of hard siltstone.									
155						END OF BORING									
160						- Encountered water at 11.0'.									
165						- 0.0 to 29.5' 3-1/4" I.D. Hollow-stem Auger with plug replaced with 4" I.D. Flush-coupled casing from 0.0 to 34'.									
170						- 29.5' to 150' 3-7/8" Tricone Bit.									
175						- 29.5' to 155.0' recirculated water used as drilling fluid.									
180						- 120' to 155' Bentonite drilling mud used.									
185						A-6a(9)									
190						A-6a(9)									
195						A-6a(9)									
200						A-6a(9)									

WATER LEVEL:  WATER NOTE:  DATE:



DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENE. FROMETER	MOISTURE CONTENT LIQUID	PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler					LOCATION: Sta. 15-06.89				
						1st	%	%	Agg.	C.S.	F.S.	SILT	CLAY	3" O.D. Shelby Tube	114.5' Rt of Centerline
0						FILL: Loose black and brown fine to coarse sand and cinders, little to some fine to coarse gravel.									
5						- At 4.5': Brick fragments. Est. A-2-4									
10	1	6/8/10				Medium-dense brown fine to medium sand, trace coarse sand, trace to little fine to coarse gravel, contains occasional thin seam of silt or clayey silt.									
15	2	5/5/6				Est. A-1-b									
20	3	11/12/4				Medium-dense brown fine to coarse sand, little fine to coarse gravel, trace silt.									
25	4	4/9/12				Est. A-1-b									
30	5	6/9/7				1	9	59	31	Medium-dense to dense brown fine to medium sand, trace to little silt, trace coarse sand, trace fine gravel, contains seams (1 to 6 inches) of silt, fine sand, and silty clay.					
35	6A 6B	5/8/12				A-3a(0)									
40	7A 7B	3/6/8				Est. A-4b									
45	8	4/5/2/8				8	9	69	14	Dense gray silt, little fine sand, trace clay.					
50	9	15/4/19				Est. A-4b									
55	10	3/7/9	2.0-2.7			Medium-dense gray silt interbedded with silty clay, trace fine to medium sand.									
60	11	20/2/3/3				0	0	10	78	12	Dense gray silt, little to "and" fine sand, little clay, interbedded with fine sand, some to "and" silt.				
65	12	2/5/3/0				A-4b(8)									
70	13	4/5/5	0.5-0.7	26	30	19	0	0	1	62	37	Medium-stiff gray silty clay interbedded with silt, trace fine to medium sand.			
75	14	P	1.5-2.5			A-6a(8)									
80	15	6/3/19	4.5			Stiff to hard gray silty clay, trace fine sand, few thin seams of clayey silt and silt.									
85	16	6/10/18	2.5-3.5	21	32	19	0	0	0	51	49	A-6a(9)			
90	17	5/10/15	2.7-4.3			A-6a(9)									
95	18	3/5/8	1.0-2.0			A-6a(9)									
100	19	P	0.8-1.0			A-6a(9)									

WATER LEVEL:  WATER NOTE:  DATE:

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DESIGN AGENCY: BBC&M ENGINEERING, INC. DUBLIN, OHIO

DATE: 11/17/94

REVIEWED: P.H.A.

DRAWN: B.R.

DESIGNED: S.P.R.

STRUCTURE FILE NUMBER: 1809393

SUBSURFACE INVESTIGATION - 1994 BORING LOGS SHEET 8 OF 11

BRIDGE NO. CUY-90-15.24

WEST BANK STABILITY ANALYSIS

CUY-90-15.24







DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENETROMETER MOISTURE CONTENT LIQUID LIMIT PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler				LOCATION: Sta. 19+10.11				COMPLETION DEPTH: 140.0'	ELEVATION: 585.6	DATE: 8/22/94	
				3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	86.4' RI of Centerline	86.4' RI of Centerline	86.4' RI of Centerline	86.4' RI of Centerline				
DESCRIPTION															
0															FILL: Loose dark-brown fine to coarse sand some to "and" fine to coarse gravel (cinders and slag).
1	2/3/3														
2	3/3/1														
3	3/2/1														
4A	4/1/1		1.5												Stiff gray silty clay, trace fine sand, few very-thin silt seams.
4B	5-1" R														Est. A-2-4
5	4/1/7	10-12	25	41	18	1	0	1	65	33					- At 24.0': Encountered cobble.
6	4/6/8	1.8-2.5	21	31	19	0	0	1	57	42					Stiff to very-stiff gray silty clay, trace fine to coarse sand, few to many seams and lenses of silt.
7	5/7/9	2.0-3.5													A-7-6(13)
8	P	1.8-2.0													A-6a(9)
9	3/4/6	1.2-2.2	25	35	20	0	0	0	39	61					Stiff to very-stiff gray silty clay, trace fine to coarse sand, trace fine gravel, few lenses of silt.
10	3/4/4	1.2-1.8													
11	P	1.8-2.2													
12	P	1.5													
13	5/7/10	1.5-2.0	22	36	20	1	2	4	34	59					
14	5/7/10	1.5-2.0													
15	5/9/14	2.5-2.8													
16	6/8/11	1.5-2.2	27	44	22	1	0	1	17	81					- Sample 16: Stiff to very-stiff silty clay, A-7-6(14).
17	5/8/11	2.2-2.5													
18	P	2.2													A-6a, A-6b(10)
19	3/3/4	0.5-1.0	29	39	20	0	0	1	22	77					Medium-stiff to stiff gray silty clay, trace fine to coarse sand, few seams of silt.
100															A-6b(12)

WATER LEVEL:  WATER NOTE:  DATE:



DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENETROMETER MOISTURE CONTENT LIQUID LIMIT PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler				LOCATION: Sta. 19+10.11				COMPLETION DEPTH: 140.0'	ELEVATION: 585.6	DATE: 8/22/94	
				3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	86.4' RI of Centerline	86.4' RI of Centerline	86.4' RI of Centerline	86.4' RI of Centerline				
DESCRIPTION															
100															Medium-stiff to stiff gray silty clay, trace fine to coarse sand, few seams of silt.
20	P	1.25													A-6b(12)
21A	2/4/7	0.8	24	NP	NP	0	0	2	79	19					Medium-dense gray silt, trace clay.
21B															A-4b(8)
22	P	3.5													
23	10/13/13	2.5-3.5	28	42	21	0	0	1	16	83					Stiff to very-stiff gray silty clay, trace fine to coarse sand, few seams and lenses of silt.
24	7/11/13	1.5-2.0													- Sample 23: Stiff to very-stiff silty clay, A-7-6(13).
25	6/7/9	2.0-2.2													
26	12/11/13	2.1	34	19	1	6	7	28	58						Medium-dense gray fine to coarse sand, trace silt, trace fine to coarse gravel.
27A	10/4/19	2.2													Est. A-3a
27B															Very-stiff gray silty clay, some fine to coarse sand, trace fine gravel.
															Est. A-6b
															END OF BORING
															- Encountered slight seepage at 13.0'.
															- Encountered water at 17.0'.
															- 0.0 to 27.5' 3-1/4" I.D. Hollow-stem Auger with plug replaced with 4" I.D. Flush-coupled casing from 0.0 to 30'.
															- 27.5' to 140' 3-7/8" Tricone Bit.
															- 30.2' to 149.5' recirculated water used as drilling fluid.

WATER LEVEL:  WATER NOTE:  DATE:



DEPTH, FEET	SAMPLE NO.	SAMPLES SAMPLING EFFORT	HAND PENETROMETER MOISTURE CONTENT LIQUID LIMIT PLASTIC LIMIT	TYPE: 2" O.D. Split-barrel Sampler				LOCATION: Sta. 18+00.08				COMPLETION DEPTH: 200.0'	ELEVATION: 610.1	DATE: 8/11/94 - 8/12/94	
				3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	3" O.D. Shelby Tube	89.7' LI of Centerline	89.7' LI of Centerline	89.7' LI of Centerline	89.7' LI of Centerline				
DESCRIPTION															
0															FILL: Loose to medium-dense black cinders and slag, contains seams or lenses of silt; clayey silt; fine to coarse gravel; brown fine to medium sand, trace brick or tile fragments.
1	6/6/4														
2	3/4/3														- From 10.0' to 10.9': Boulder. Est. A-3a
3	6/6/6										7	15	44	34	POSSIBLE FILL: Medium-dense brown fine to coarse sand, little fine to coarse gravel, contains few thin lenses of clayey silt, trace silt.
4	3/3/4														- From 21.0' to 22.0': Interbedded with brown silty clay. A-3a(0)
5	3/5/6	1.8-3.0	21	30	18	0	0	0	58	42					Stiff to very-stiff gray silty clay interbedded with clayey silt and silt, trace fine to medium sand. A-6a(9)
6	3/4/5	1.3-2.0													Medium-stiff to stiff gray silty clay, little fine to coarse sand, few lenses of silt and fine sand.
7	5/7/7	0.5-1.7	29	36	19	1	1	2	29	67					
8	P	1.0-1.5													
9	3/4/5	0.8	32	42	21	0	1	1	22	76					- Sample 9: Medium-stiff silty clay, A-6-7(13)
10	P	2.2-3.0													Stiff to very-stiff gray silty clay, trace to little fine to medium sand, contains many seams and lenses of silt.
11	4/7/10	1.5-2.0	24	31	18	0	0	1	52	47					
12	P	1.3-2.0													
13	4/6/8	1.2-2.0													
14	4/8/9	1.0-2.0	17	29	17	0	0	1	57	42					
15	4/6/10	1.2-1.9													
16	4/5/10	1.8-3.0													
17	4/6/9	1.9-2.5													- From 69.0' to 75.0': With horizontal structure.
18	2/2/4	0.8-1.2	26	31	18	0	0	0	50	50					- From 72.5' to 74.0': Medium-stiff to stiff. A-6a(9)
19	P	1.3-1.8													
20	5/8/14	1.5-2.2													Stiff to very-stiff gray silty clay, trace to little fine to coarse sand, trace fine gravel, few lenses of silt.
21	8/9/13	1.7-2.0	22	33	17	0	2	4	32	62					
22	7/11/15	1.8-2.1													
23	6/11/17	2.2-2.8	22	33	19	1	2	3	30	64					
24	6/10/14	1.8-2.2	22	33	18	1	2	3	34	60					A-6a, A-6b(10)

WATER LEVEL:  WATER NOTE:  DATE:

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DESIGN AGENCY: BBC&M ENGINEERING, INC. DUBLIN, OHIO  
 DATE: 11/17/94  
 REVIEWED: P.H.A. 11/17/94  
 DRAWN: B.R.  
 CHECKED: S.P.R.  
 STRUCTURE FILE NUMBER: 1809393  
 SUBSURFACE INVESTIGATION - 1994 BORING LOGS SHEET 10 OF 11  
 BRIDGE NO. CUY-90-15.24  
 WEST BANK STABILITY ANALYSIS  
 CUY-90-15.24  
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LOG OF BORING

PAGE 2 OF 2

Date Started 5/22/90 Sampler Type SS Dia. 1 3/8" Water Elev. 501.3' Project Identification: CUYAHOGA  
 Date Completed 5/2/90 Casing Length Dia. CUY-90-15.24  
 STABILITY ANALYSIS  
 SUBSURFACE INVESTIGATION

Boring No. B-8 Station & Offset Surface Elev. 591.3'

ELEV.	Depth	Std. Pen.	Rec. Loss	Description	Field No.	Lab. Nos. Sq.	Physical Characteristics										SHTL Class
							% Agg.	% S.S.	% F.S.	% S.L.T.	% C.L.V.	L.L.	P.I.	W.C.			
491.3	100	3/9/15		GRAY SILT	10	63030	0	1	2	31	66	NP	NP	NP	28	A-4A	
481.3	110	21/27/33		GRAY SANDY SILT	11	63031	7	7	11	35	40	NP	NP	NP	12	A-4A	
471.3	120	36/52/58		GRAY GRAVELLY SILT	12	63032	13	5	8	33	41	NP	NP	NP	12	A-4A	
461.3	130	25/26/33		GRAY GRAVELLY SILT	13	63033	13	4	6	29	48	NP	NP	NP	16	A-4A	
459.8	132			BOTTOM OF BORING													
	134			NOTE: SLOPE INDICATOR PIPE INSTALLED AT 130.0'													
	142			NOTE: BORING LOGS PROVIDED BY ODOT.													
	150																
	158																
	166																
	174																
	182																
	190																
	198																
	200																

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LOG OF BORING

PAGE 1 OF 2

Date Started 5/17/90 Sampler Type SS Dia. 1 3/8" Water Elev. 481.2' Project Identification: CUYAHOGA  
 Date Completed 5/19/90 Casing Length Dia. CUY-90-15.24  
 STABILITY ANALYSIS  
 SUBSURFACE INVESTIGATION

Boring No. B-9 Station & Offset Surface Elev. 586.2'

ELEV.	Depth	Std. Pen.	Rec. Loss	Description	Field No.	Lab. Nos. Sq.	Physical Characteristics										SHTL Class
							% Agg.	% S.S.	% F.S.	% S.L.T.	% C.L.V.	L.L.	P.I.	W.C.			
586.2	0																
581.2	6	8/14/7		DARK GRAY SILTY GRAVELLY SAND	14	62978	19	35	27	17	2	NP	NP	NP	21	A-1-B	
571.2	16	5/7/12		DARK GRAY SILTY SAND	15	62979	0	40	33	26	1	NP	NP	NP	46	A-3A	
561.2	26	4/7/12		GRAY SILTY CLAY	16	62980	0	1	3	27	69	41	16	31	A-7-6		
551.2	36	7/11/13		GRAY CLAYEY SILT	17	62981	0	0	2	61	37	29	9	21	A-4B		
541.2	46	7/18/20		GRAY CLAYEY SILT	18	62982	0	0	1	63	36	26	7	21	A-4B		
531.2	56	7/16/14		GRAY CLAYEY SILT	19	62983	0	0	1	55	44	29	9	22	A-4B		
521.2	66	9/15/17		GRAY CLAYEY SILT	20	62984	0	1	2	51	46	29	9	21	A-4B		
511.2	76	11/12/16		GRAY SILT AND CLAY	21	62985	0	2	3	40	55	35	13	22	A-6A		
501.2	86	8/15/19		GRAY GRAVELLY CLAY	22	62986	18	1	2	29	50	36	14	21	A-6A		
491.2	96	13/19/21		GRAY SILT AND CLAY	23	62987	0	1	2	31	66	35	11	25	A-6A		
	100																

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State of Ohio  
Department of Transportation  
Division of Highways  
Testing Laboratory  
LOG OF BORING

PAGE 2 OF 2

Date Started 5/17/90 Sampler Type SS Dia. 1 3/8" Water Elev. 481.2' Project Identification: CUYAHOGA  
 Date Completed 5/19/90 Casing Length Dia. CUY-90-15.24  
 STABILITY ANALYSIS  
 SUBSURFACE INVESTIGATION

Boring No. B-9 Station & Offset Surface Elev. 586.2'

ELEV.	Depth	Std. Pen.	Rec. Loss	Description	Field No.	Lab. Nos. Sq.	Physical Characteristics										SHTL Class
							% Agg.	% S.S.	% F.S.	% S.L.T.	% C.L.V.	L.L.	P.I.	W.C.			
481.2	106	7/8/13		GRAY CLAYEY SILT	24	62988	0	0	1	53	46	33	10	36	A-4B		
471.2	114	75(0.2)		BOULDER (113.5' - 114.0') GRAY CLAYEY SILT	25	62989	-	-	-	-	-	-	-	14	VISUAL		
461.2	126	22/32/46		GRAY SILTY CLAY	26	62990	0	2	7	32	59	38	16	17	A-6B		
456.2	130	17/21/27		GRAY CLAYEY SILT	27	62991	0	1	1	29	69	35	10	23	A-4A		
454.7	132			BOTTOM OF BORING													
	140			NOTE: SLOPE INDICATOR PIPE INSTALLED AT 130.0'													
	150			NOTE: BORING LOGS PROVIDED BY ODOT.													
	160																
	170																
	180																
	190																
	200																

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SUBSURFACE INVESTIGATION - 1990 BORING LOGS SHEET 6 OF 7  
 BRIDGE NO. CUY-90-15.24  
 WEST BANK STABILITY ANALYSIS

DESIGN AGENCY: **BBC&M ENGINEERING, INC.**  
 DUBLIN, OHIO

DATE: 12/14/94  
 P.H.A. FILE NUMBER: 1803393  
 STRUCTURE FILE NUMBER: 0

DRAWN: R.J.K.  
 CHECKED: S.P.R.  
 REVISIONS: 0

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