

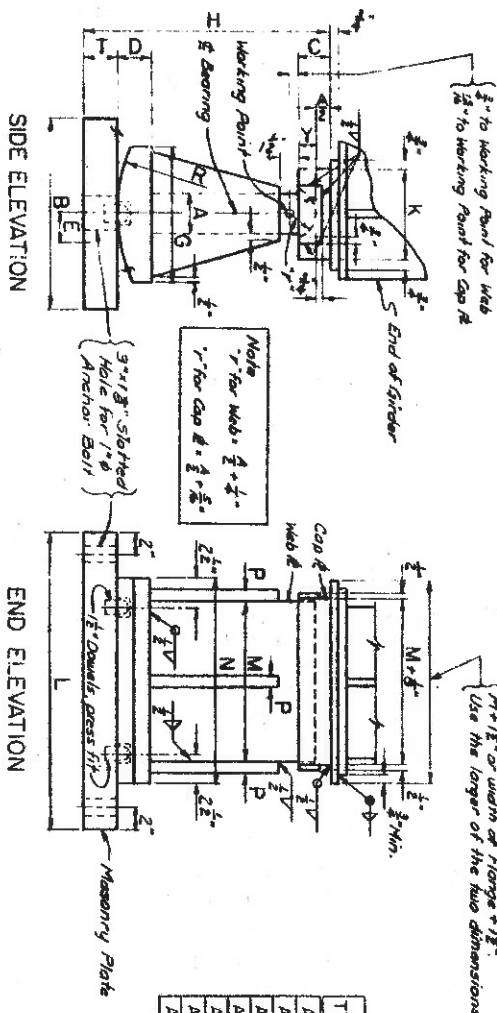
TO:  MAIN OFFICE REGIONAL OFFICE  <b>SUPERSEDED BY EI 80-015</b> <b>EFFECTIVE 3/12/1980</b>	<h1>ENGINEERING INSTRUCTION</h1> <p>NEW YORK STATE DEPARTMENT OF TRANSPORTATION</p> <p>SUBJECT: BDD 77-35 HIGH STEEL BEARINGS BDD 77-36          LOW STEEL BEARINGS AND BDD 77-37 STEEL          LAMINATED BEARINGS FOR PRESTRESSED UNITS</p> <p>Subject Code: 7.35-2</p>
Distribution: <input checked="" type="checkbox"/> Main Office <input checked="" type="checkbox"/> Regions <input type="checkbox"/> Special	Code: <u>EI 77-53</u> Date: <u>11/28/77</u>
APPROVED: <u><i>J. H. Laurigan</i></u> Deputy Chief Engineer (Structures)	Supersedes: Portions of BDD 72-35

Attached are copies of the subject sheets for distribution to your personnel.

The principal changes are:

- BDD 77-35 Types BE, BF, CE, and CF bearings have been deleted.
- BDD 77-36 A new sheet for Low Steel Bearings, types BE and BF.
- BDD 77-37 A new sheet for Steel Laminated Elastomeric Bearings for prestressed units.

Plain Elastomeric Bearings may be used for fixed and expansion when permitted by design.



NOTE: Machine-finished sliding surfaces in contact shall receive one coat of any common fibrous anti-rust grease soon after the sliding is complete. The contractor shall instruct all protective coatings to prevent assembly of the bearings. The bearings shall be thoroughly cleaned and then coated with protective grease before assembly.

NOTE: Use the larger of the two dimensions.

NOTE: 1/4" roughened or sawtooth anchor bolt 1/2" dia. Thread top & Regular Hex Nut. This portion of bolt shall be removed after nut has been tightened to the satisfaction of the engineer.

NOTE: Rubber impregnated woven carbon fabric, 725-01 or Rubber Impregnated Random Fiber, 725-02, Galvanneal or Galvalume Steel.

NOTE: Anchor bolts, nuts and washers shall be galvanized in accordance with the requirements of National Specification 719-01, Galvanized Coatings and Repair Methods.

NOTE TO DESIGNER: The moment for temperature is limited to the maximum eccentricity minus the permissible erection tolerance. Refer to page 67, Article 207, Expansion Bearings of the Steel Construction Manual for tolerance, which is a function of span. If the movement for temperature exceeds maximum E minus tolerance, the bearings shall be redesigned.

UNIT STRESSES - ALL STRESSSES

1. Tension & Compression due to bending - 20,000 p. s. i. Bearing on Steel parts in contact - 20,000 p. s. i. Bearing on Masonry - 1,000 p. s. i. Bearing on Decking - Pounds per 100 sq. inch Diameter up to 25" - 650 Diameter over 25" - 3,500 / ft

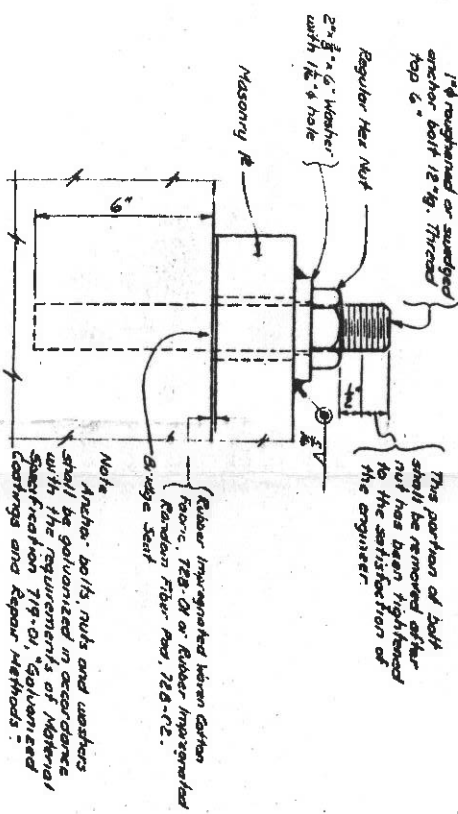
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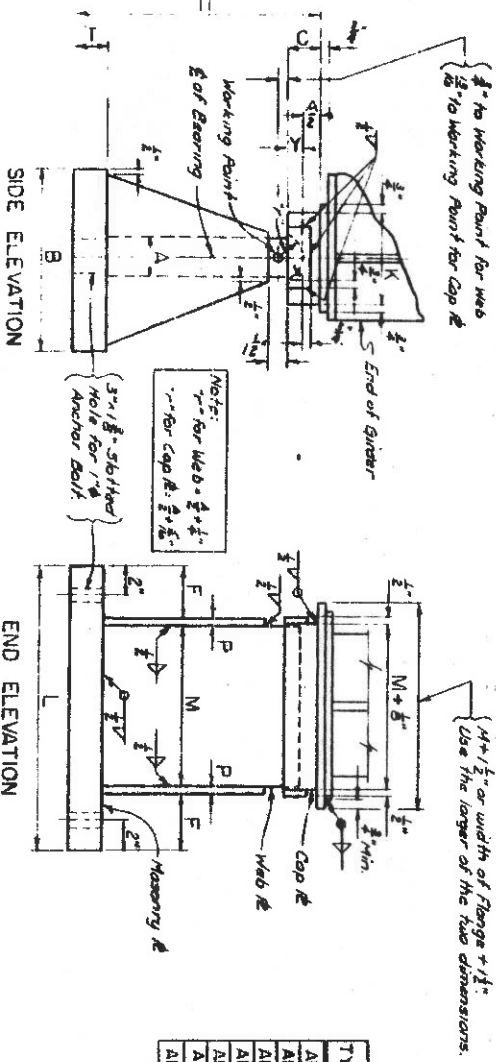
Dimensions shown below are in inches

TYPE	MAX. LOAD IN KIPS	E	B	L	T	H	R	N	M	A	D	G	P	K	Y	C
AE1	150	2 1/2	2	23	2	14 1/4	9	15	11	3	2 1/4	8	1	2 1/2		
AE2	200	2 1/2	2	23	2	14 1/4	9	15	11	3	2 1/4	8	1	2 1/2		
AE3	250	3 1/4	17	26	3	19 3/4	13	18	14	3 1/2	3	12	3 1/4	1 1/4	3	
AE4	300															
AE5	400															
AE6	500	4	23	35	4	26 1/4	18	27	19	4	4	16	1	1 1/2	3 1/2	
AE7	600															

ANCHOR BOLT DETAIL FOR ALL BEARINGS



EXPANSION BEARINGS TYPE "AE"

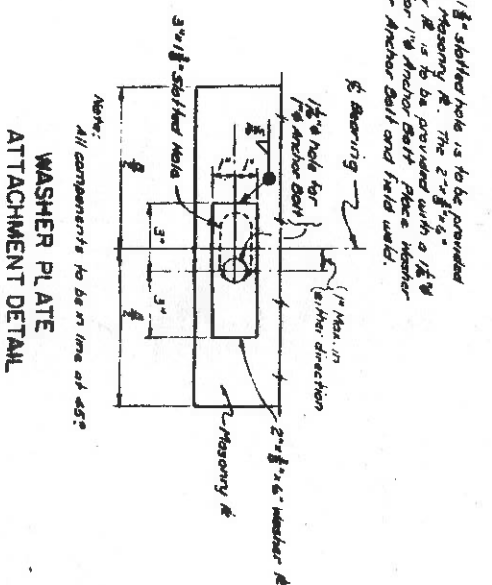
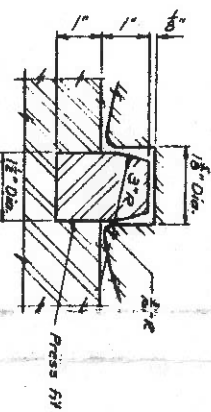


FIXED BEARINGS TYPE "AF"

Dimensions shown below are in inches.

TYPE	MAX. LOAD IN KIPS	B	L	T	H	F	M	A	P	K	Y	C
AF1	150	12	23	2	14 1/4	9	15	11	3	1	2 1/2	
AF2	200	12	23	2	14 1/4	9	15	11	3	1	2 1/2	
AF3	250	16	26	3	19 3/4	13	18	14	3 1/2	1 1/4	3	
AF4	300											
AF5	400											
AF6	500	24	30	4	26 1/4	18	27	19	4	1	1 1/2	3 1/2
AF7	600	25	34									

TYPICAL SECTION THRU DOWEL



WASHER PLATE ATTACHMENT DETAIL

NOTE TO DESIGNER: The field welding of the flange to the bearing shall be accomplished with a shielded metal arc process. The minimum size weld shall be 5/16". The actual weld size shall be determined by design.

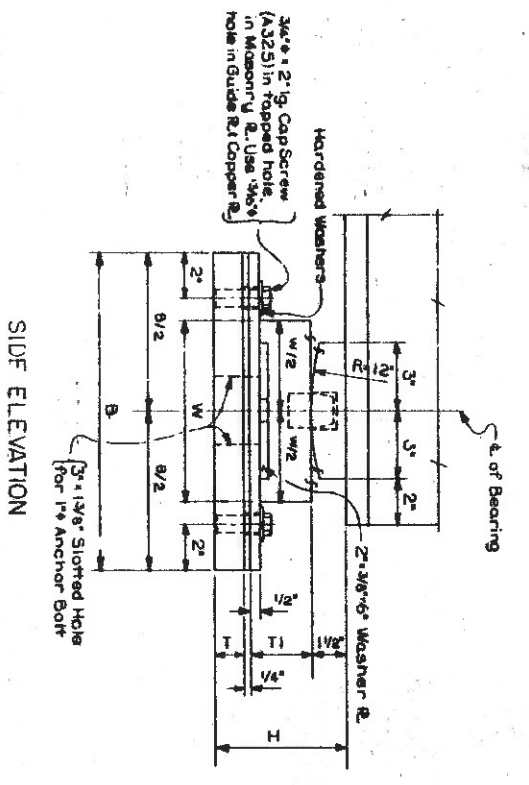
NOTE: All material, including anchor bolts, nuts and washers shall be ASTM A36. When the structural steel is the ungalvanized weathering steel, the material for the bearing, anchor bolts, nuts and washers shall be ASTM A508.

APPROVED  
[Signature]

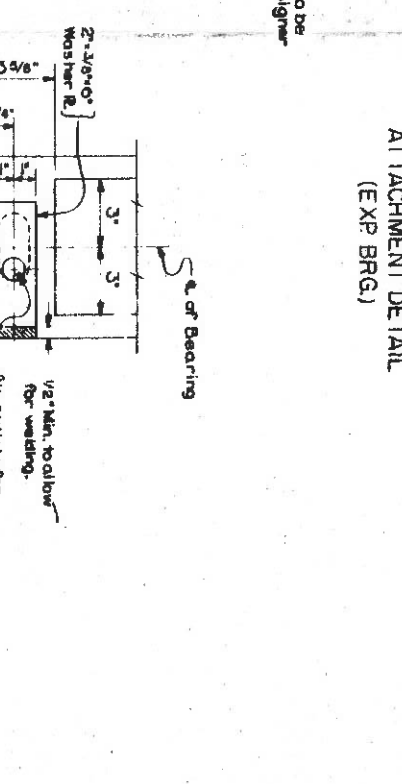
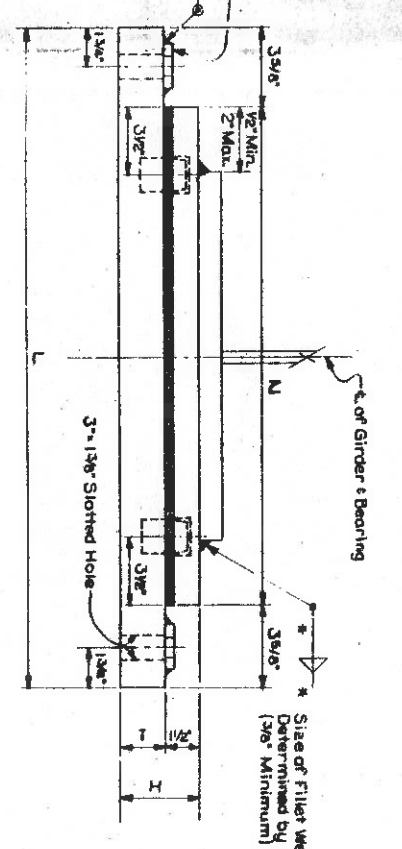
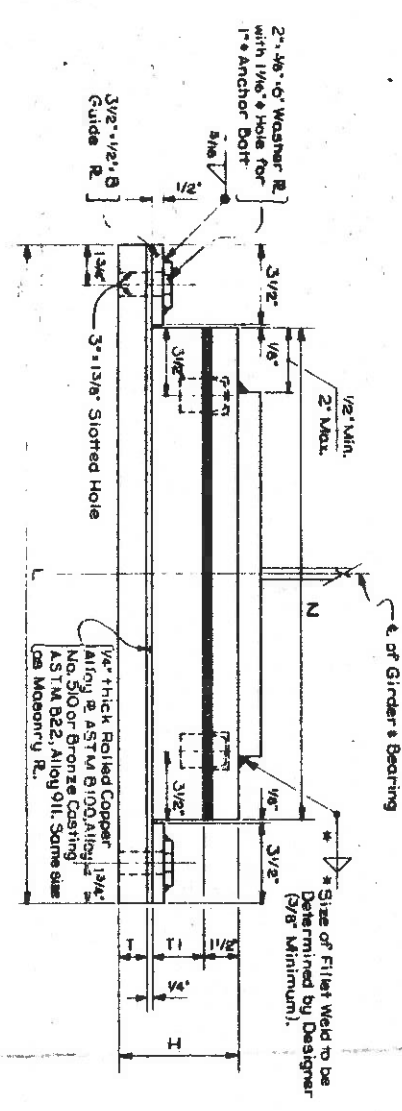
STATE OF NEW YORK  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF CONSTRUCTION

HIGH BRIDGE BEARINGS  
TYPE "AE" & "AF"

PROJECT NO. \_\_\_\_\_ DATE ISSUED \_\_\_\_\_  
DESIGNER NO. \_\_\_\_\_ OF \_\_\_\_\_



**UNIT STRESSES**  
 Tension & compression due to bending: 20,000 PSI  
 Bearing on steel girders in contact: 29,000 PSI  
 Line bearing on rockers:  $P = \frac{F_u - 13,000}{20,000}$  6000  
 (Diameter up to 2.5")  
 Bearing on copper alloy: 2,000 PSI  
 Bearing on concrete:  $f_b = 30 f_c / A_v$   
 Coefficient of friction: 15% Dead Load  
 Minimum distance between edge of masonry plate  
 and face of pedestal shall be 3 inches.

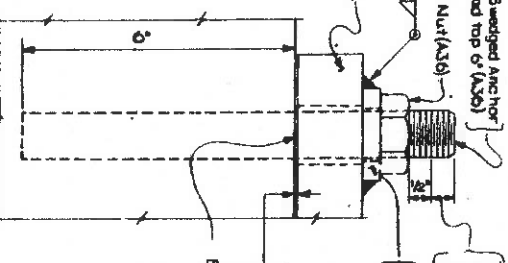
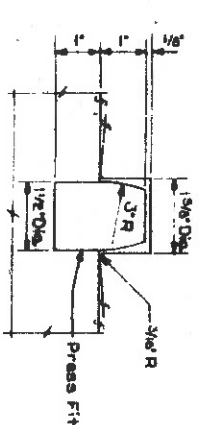


**EXPANSION BEARING (Maximum Eccentricity)**

Type	Item No.	Max. Load (Kilbs)	B	L	T	W	N	TI	H
BE1	105	12	21	1/4"	6	13/16"	2	5	
BE2	200	12	23	1/4"	8	15/16"	2	5	
BE3	250	12	26	1/4"	8	18/16"	2 1/4"	5 1/4"	
BE4	300	14	29	1/4"	8	21/16"	2 1/4"	5 1/4"	

**FIXED BEARING**

Max. Load (Kilbs)	B	L	T	W	N	TI	H	Item No.
105	6	21	1/4"	13/16"	3			BE1
200	8	23	1/4"	15/16"	3 1/2"			BE2
250	8	26	2	18/16"	3 1/2"			BE3
300	10	29	2	21/16"	3 1/2"			BE4



This portion of bolt shall be removed other than has been highlighted to the satisfaction of the Engineer.  
 2" x 3/8" x 6" Washer R (A306) with 1 1/8" Hole  
 Layers of canvas and dull orange primer, a 1/8" thick lead sheet for a bearing pad in accordance with Subsection 72B Vertical Load Transmitting Devices:  
 Bridge Seat  
 Note: Anchor Bolts and Nuts shall be galvanized in accordance with the requirements of Material Specification 710-01 Galvanized Coatings and Repair Methods.  
 Note to Designer:  
 There may be instances when the designer will have to modify the size of the bearing components in order to accommodate heavier loads or larger eccentricities. If this is done, the modified bearing shall be paid for under the same item number as the standard bearing which is most similar in size.

DATE MADE: 4/24/77  
 PROJECT ENGINEER: R.K. Sirocki  
 IN CHARGE OF: J.F. Dargatzis  
 DESIGNED BY: J.F. Dargatzis  
 CHECKED BY: J.F. Dargatzis  
 APPROVED BY: J.F. Dargatzis

APPROVED  
 4/24/77  
 J.F. Dargatzis

STATE OF NEW YORK  
 DEPARTMENT OF TRANSPORTATION  
 DIVISION OF CONSTRUCTION  
 LOW STEEL BEARING

MAX. TOTAL LOAD (K)			
L/W	18"	24"	30"
6"	75	100	125
8"	100	135	170
9"	115	155	195
10"	125	170	215
12"	—	205	260

MAX. DEAD LOAD (K)			
L/W	18"	24"	30"
6"	50	65	80
8"	70	90	110
9"	75	100	125
10"	85	115	145
12"	—	140	175

BEARINGS WITH ONE 2" HOLE			
PLATE THICKNESS (GA.)			
L/W	18"	24"	30"
6"	1/2	1/2	1/2
8"	1/2	1/2	1/2
9"	1/2	1/2	1/2
10"	1/2	1/2	1/2
12"	—	1/2	1/2

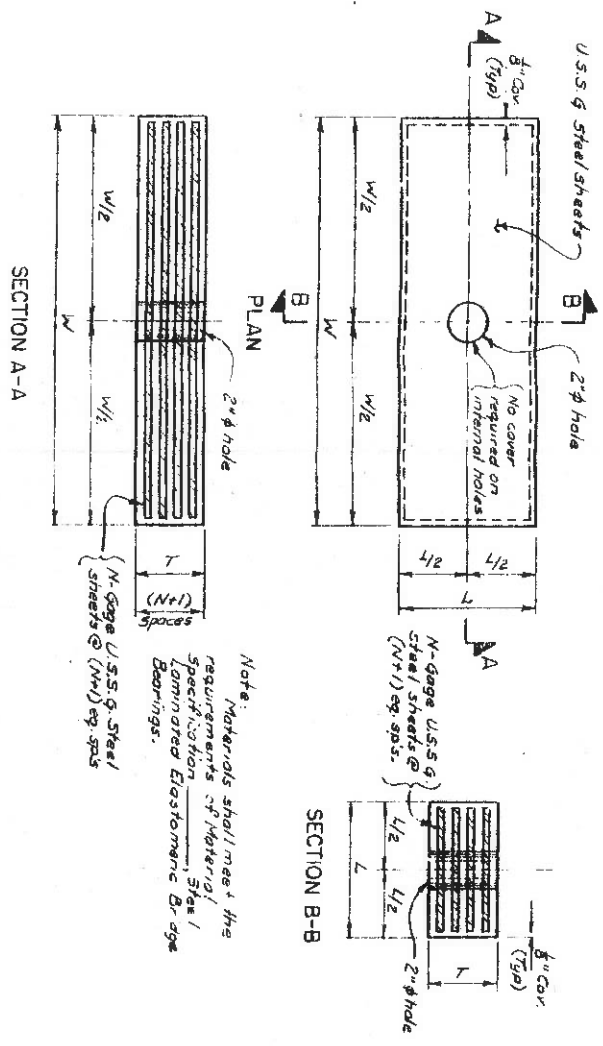
NO. OF PLATES (N)			
L/W	18"	24"	30"
6"	5	5	4
8"	5	5	4
9"	5	5	4
10"	6	5	5
12"	—	5	5

M.A.D. = Maximum Anticipated Distortion  
E.R.T. = Effective Ribbed Thickness

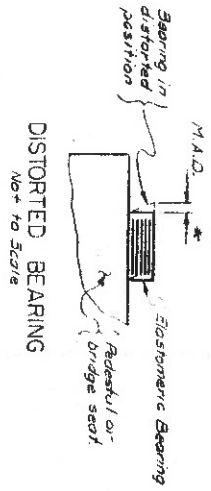
CONVERSION TABLE			
GAGE THICKNESS			
GAGE	THICKNESS	STEEL LAMINATED BEARINGS	
L/W	18"	24"	30"
6	0.1943"	0.364204	0.364207
8	0.1644"	0.364214	0.364217
10	0.1345"	0.364224	0.364227
12	0.1046"	0.364234	0.364237
14	0.0747"	0.364244	0.364247

ITEM NUMBERS			
L/W	18"	24"	30"
6"	636.4204	636.4207	636.4211
8"	636.4214	636.4217	636.4221
9"	636.4224	636.4227	636.4231
10"	636.4234	636.4237	636.4241
12"	—	636.4247	636.4251

Gage = U.S. Standard Gage



ELASTOMERIC BEARING DETAILS  
Not to scale



DISTORTED BEARING  
Not to scale

\* Bearing distortion due to stress of Dead Load Cambs should be considered in addition to temperature change etc.

ELASTOMERIC BEARING SELECTION PROCEDURE

- Expansion Bearings:**
- Using maximum total load, maximum dead load and required amount of travel, select trial bearing.
  - Check shape factor and check for overstressing due to rotation.
  - Bearing must be set level longitudinally between two parallel surfaces. Use dapping to achieve this if necessary.
- Fixed Bearings:**
- Use bearings with same plan dimensions as expansion bearings.
  - Use thinnest bearing possible. This, in many cases, could be plain. Design for shape factor and overstressing due to rotation only.
  - Bearing must be set level longitudinally between two parallel surfaces. Use dapping to achieve this if necessary.

Notes to the Designer:

- When Box Beams or Slab Units are used, bridge seats shall not be sloped in a longitudinal direction.
- When I-beams are used, the pedestals shall not be sloped in any plane.

Notes to be placed on the Plans:

- (Designer: The following note is the usual temperature range):
- The bearings are designed so that the concrete superstructure may be erected when the ambient air temperature is between 40° to 90°.
  - Concrete surfaces under the bearings shall conform to Section 601-308, Section 8, "Finishing Bearing Surfaces" of the New York State Standard Specifications.

APPROVED  
11/15/77  
[Signature]

STATE OF NEW YORK  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF CONSTRUCTION

STEEL LAMINATED  
ELASTOMERIC BEARINGS  
FOR PRESTRESSED UNITS

PROJ. ENG. GILROY  
DATE MADE 9/76  
DRAWING NO. 02