CUY-90-14.90

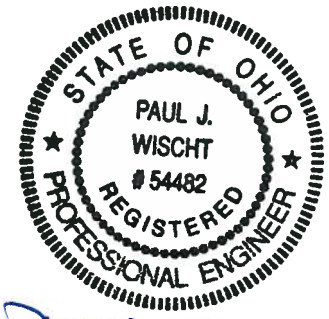
Project Number 133000

PID 82119

Bridge #34 – Removal Plan

Prepared by:

Trumbull-Great Lakes-Ruhlin
a joint venture



Plan checked by:

Paul J. Wischt, P.E.
URS Corporation
564 White Pond Drive
Akron, Ohio 44320

Paul J. Wischt, P.E. Date 3/26/14

Plan Reviewed by:

Tom E. Stora, P.E.
URS Corporation
564 White Pond Drive
Akron, Ohio 44320

Tom E. Stora, P.E. Date 3/26/14

Reviewed: COMPLIES WITH PROJECT DOCUMENTS
Independent Quality Construction Manager
Michael D Lee
Name

Date: 2014.04.02 16:31:16 -04'00'

SUC.140327.TGR.BU24_Brg34_DemoPlan

Trumbull-Great Lakes-Ruhlin
a joint venture

Demolition Plan for Br. 34 CUY-77-1575 On Ramp to I-77 SB over E. 14th St.

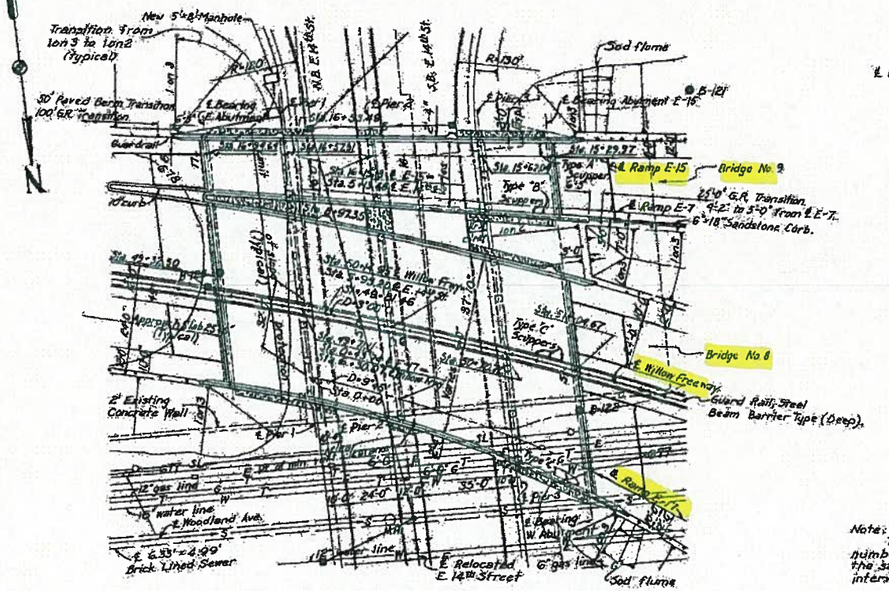
Use ODOT approved overnight closures of E. 14th St., with detours.
All work at night, or during daytime short term single lane closure times.
No traffic adjacent to or under the bridge during demolition.

Use Komatsu 360 size excavator with hoe ram or UP30 universal processor to remove deck and parapets.
Cross braces will be removed from the top, as deck removal progresses, by laborers using torches or by processor.
One set of cross braces near each abutment and pier will be left in place for stability. Also, the maximum spacing between x-frames removed will be 40-feet.
Hoe ram approach slabs and remove. Hoe ram abutment back walls and excavate to seat elevations.

All concrete debris will be loaded out to a recycling center off site.

Structural Steel removal:
A hydraulic excavator will be attached to the abutment ends of each successive beam line using shackles. The remaining cross braces will be cut using torches, and then the beam line will be cut at the rear side of Pier 2 bearing point. Connection to the P2 bearing will be removed.
The beams will be pulled by the excavators away from mid-span, onto the remaining ramp pavement. There they will be processed and hauled to an off-site recycling center. The process will be repeated for each beam line.

Concrete abutments, piers, and slope protection will be removed using hoe rams or processor.
All concrete debris will be hauled to a recycling center off site.
All resteel will be hauled to a steel recycling center off site.



U-O

PLAN

CURVE DATA

℄ Willow Freeway
Δ= 23°06'48"
D= 3°00'00"
R= 1909.86'
T= 390.54'
L= 770.50'

℄ Ramp E-17
Δ= 60°33'40"
D= 9°45'00"
R= 587.65
T= 343.13'
L= 621.14'

LEGEND

Existing R/W
Existing Edge of Pavement
Existing Sewer
OBT Line
Water Line
Gas Line
Street Lights
CEI Line
Existing Manhole
Existing Catch Basin
*Sewers
*Inlets
*Manholes
*2" Duct
*4" Duct
* Built under previous contract.

BORING 121
Vertical Scale: 1"=20'
Sta. 14+63 ℄ Ramp E-15 33' Rt.

Note:
The figures to the left indicate the number of hammer blows required to drive the sampling spoon 1 ft. They are given at 5' intervals starting at elev. 678.1.

LAYOUT DIAGRAM BRIDGES NO. 8 & 9.
No Scale
*Offsets measured from reference line to ℄ Willow Freeway along ℄ bearings.

PROPOSED STRUCTURE BR. NO. 8

Type: Continuous steel beam with reinforced concrete deck and substructure.
Spans: 36'-7½", 43'-0¼", 55'-9⅜", 35'-11⅛" along ℄ Willow Frwy.
Roadway: 64'-0" (nominal) face to face parapets
Loading: CF-2000-Adequate for A.A.H.S.O. alternate loading.
Skew: Varies
Surface Course: 1" Monolithic Concrete
Alignment: 3°00'00" Rt.
Approach Slabs: AS-1-54 (25' Long)
Superelevation: .05 ft/ft.

PROPOSED STRUCTURE BR. NO. 9

Type: Continuous steel beam with reinforced concrete deck and substructure.
Spans: 37'-4⅝", 42'-1⅝", 53'-1⅝", & 32'-0⅝" along ℄ E-15.
Roadway: Varies
Loading: CF-2000-Adequate for A.A.H.S.O. alternate loading.
Skew: 6°43'20"
Surface Course: 1" Monolithic Concrete.
Alignment: Tangent.
Approach Slabs: AS-1-54 (25' Long)
Superelevation: Varies.

PROFILE BRIDGE NO. 8

PROFILE BRIDGE NO. 9

ELEVATION BRIDGE NO. 8

*15'-0" required minimum vertical clearance. Point of actual minimum vertical clearance occurs at the median curb of Southbound E. 14th St. and the north exterior beam.

Slopes shown in Elevation are normal to E. 14th St.

ELEVATION BRIDGE NO. 9

*15'-0" required minimum vertical clearance. Point of actual minimum vertical clearance occurs at the west curb of Southbound E. 14th St. and the north exterior beam.

RAMP E-15 OVER EAST 14th ST.

15 C.I.P. REINFORCED CONCRETE PILES

PILE INFORMATION			
Location	Diameter	Number	Estimated ave. length
Bridge 8			
West Abutment	12"	36	35 ft
Piers 1, 2, & 3.	14"	75	27 ft.
Bridge No. 9			
Abutment E-15	12"	14	35 ft.
Piers 1, 2, & 3.	14"	36	27 ft.
Bridge No. 8 & No. 9			
East Abutment	12"	40	37 ft.

NOTES:

Rod soundings only were taken at location B-122 and B-123. The core drilling made at B-121 is plotted.

Pile lengths are based on boring data and are approximate only. The Contractor shall assume full responsibility for length of piling selected for driving.

The following items are not included in the bridge plans (See Roadway Plans for details).
Approach grading, pavements, and slabs.
Roadway, Guard Rail, Sod Flumes.
For details of slope protection see Sh. 174-7A
For details of pier plans & drain pipe locations at piers see Sh. 171-7A & 174-7A.

Note:
Piers for Bridges 8 & 9 are included in Part 6.

MICROFILMED
JUL 2 1965

FED. ROADS DIV. NO.	STATE	FED. AID PROJ. NO.	
2	OHIO		

145
181

CUYAHOGA COUNTY
CITY OF CLEVELAND
CUY-21-15.32
CUY-42-18.42

H.N.T.B. BRS. NO. 8 AND 9 PART 7A

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
KANSAS CITY CLEVELAND NEW YORK

SITE PLAN

WILLOW FREEWAY & RAMP E-15 OVER E. 14TH STREET
STA. 49+30.16 STA. 51+07.08 (WILLOW FREEWAY)
STA. 15+27.70 STA. 16+96.91 (RAMP E-15)
BR. NO. CUY-21-1573 A & B Scale: 1" = 30'

WILLOW-INNER BELT FREEWAY

CLEVELAND CUYAHOGA COUNTY OHIO

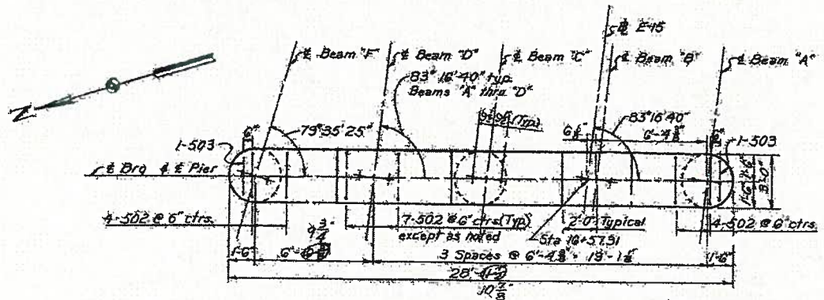
DRAWN AJS	TRACED DLY	CHECKED DRK	REVIEWED JCT	REVISED
DATE 6-26-58	DATE 7-29-58	DATE 7-14-58	DATE 8-15-58	SHEET 145

Bridge #9

FED. ROADS DIV. NO.	STATE	FED. AID PROJ. NO.		
2	OHIO			

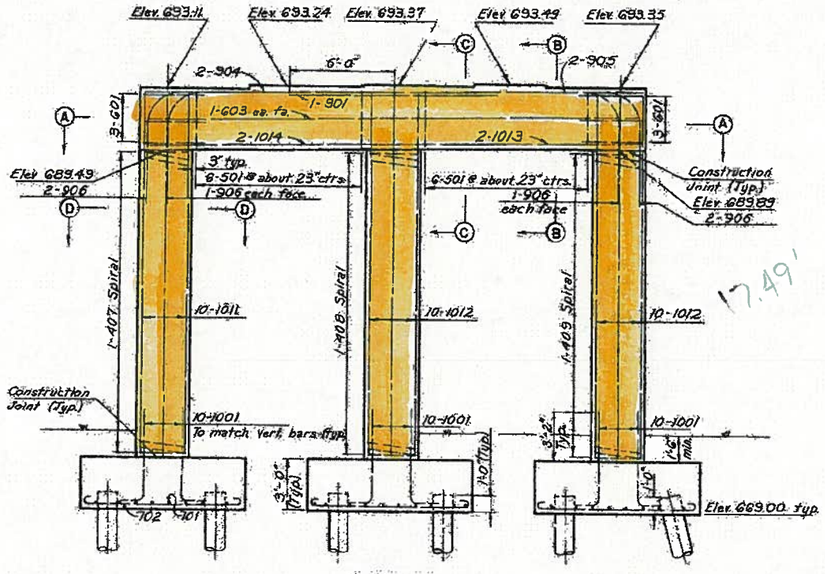
148
175

CUYAHOGA COUNTY
CITY OF CLEVELAND
CUY-42-18.29

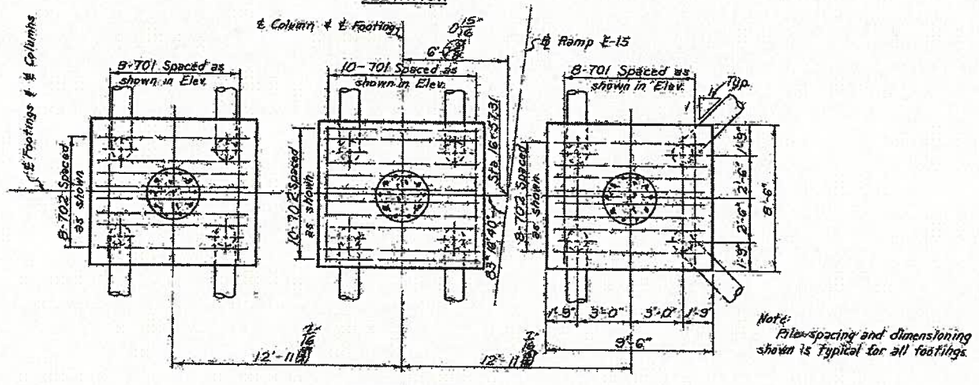


PLAN

Note:
Special care shall be taken when placing reinforcing steel so as not to interfere with anchor bar setting.
Anchor bars to be furnished and set under ~~typical~~ contract.

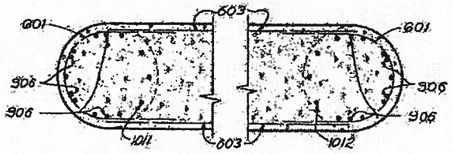


ELEVATION

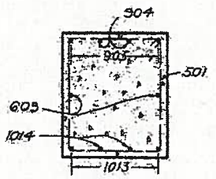


FOOTING PLAN

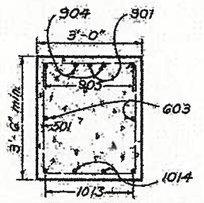
PIER 1



SECTION AA



SECTION BB

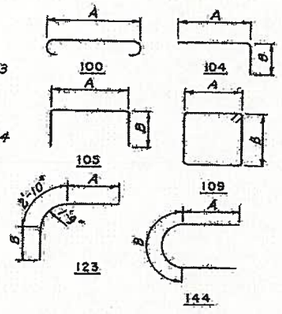


SECTION CC

SECTION DD

Typ. for all columns except for bar marks.

Scale for sections: ½"=1'-0"



BAR BENDING DIAGRAMS

NOTE:
Sections shown for Pier 1. Sections for Piers 2 and 3 are similar except for bar marks.

Note: Prefix "D" shall be assigned to all bar marks.

REINFORCEMENT SCHEDULE FOR PIERS 1, 2 & 3

MARK	NO.	LENGTH	TYPE	DIMENSIONS A	B	C	D	SERIES INCREMENT	WEIGHT (POUNDS)
501	42	12'-1"	109	2'-8"	3'-2"				530
502	101	3'-3"	105	2'-8"	0'-8"				596
503	6	3'-7"	105	2'-6"	0'-8"				22
601	18	6'-9"	144	1'-4"	4'-1"				183
602	4	15'-6"	Str.						33
603	2	14'-0"	Str.						42
604	4	17'-0"	Str.						102
701	52	3'-10"	100	8'-2"					1045
702	108	10'-10"	100	3'-2"					2391
901	2	12'-0"	Str.						82
902	2	31'-3"	Str.						213
903	2	28'-9"	Str.						195
904	2	28'-6"	Str.						194
905	2	26'-0"	Str.						177
906	16	11'-8"	123	4'-5	4'-5				635
1001	90	6'-11"	104	5'-9"	1'-5"				2680
1002	10	18'-0"	Str.						775
1003	10	18'-3"	Str.						785
1004	10	18'-6"	Str.						796
1005	2	34'-6"	Str.						298
1006	2	32'-0"	Str.						275
1007	10	19'-9"	Str.						850
1008	10	20'-0"	Str.						861
1009	10	20'-3"	Str.						871
1010	8	17'-2"	Str.						591
1011	10	20'-9"	Str.						893
1012	20	21'-0"	Str.						1807
1013	2	26'-0"	Str.						224
1014	2	28'-4"	Str.						244
1015	8	12'-4"	123	4'-9"	4'-9"				425
1101	8	17'-9"	Str.						754
								Total	19,428

SPIRAL REINFORCEMENT SCHEDULE

MARK	NO.	CORE DIA. % SPIRAL	LENGTH	PITCH	NO. OF TURNS	WEIGHT (POUNDS)
401	1	2'-8"	15'-0"	4½"	43	237
402	1	2'-8"	13'-2"	4½"	43	237
403	1	2'-8"	15'-5"	4½"	44	243
404	1	2'-8"	16'-7"	4½"	47	259
405	1	2'-8"	16'-9"	4½"	48	265
406	1	2'-8"	16'-11"	4½"	48	265
407	1	2'-8"	17'-6"	4½"	50	276
408	1	2'-8"	17'-8"	4½"	50	276
409	1	2'-8"	17'-10"	4½"	51	282
					Total	2340

NOTES:
Reinforcement bars shall be 3" clear from face of concrete at bottom of footings and 2" elsewhere.
Pile spacings are given along bottom of footings.
All piles shall be 14"ϕ C.I.P. reinforced concrete.
All battered piles to be battered 3 in 12 in direction shown.
All bar dimensions are given out to out.
For masonry plate details, see sh. 156-G
For replacement steel schedule, see sh. 97-G

NOTES FOR SPIRAL REINFORCING BARS:
The "Length" shown in the reinforcement schedule for the spiral bars is the distance from the top of the footing to the bottom of the pier cap.
The "No. of Turns" shown in the reinforcement schedule for the spiral bars is the "Length" divided by the pitch, plus 3 turns (total number of closed coils), expressed as the nearest whole number. 1½ closed coils shall be provided at the ends of each spiral unit.
Four steel channel, tie triangle spacers, weighing approximately 0.68 lb. per lin. ft. of spacer, shall be provided for each spiral unit. They shall be equally spaced along the periphery of the coil. The number of pounds of these spacers, based on 0.68 lb. per lin. ft. will be paid for as reinforcing steel and is included in the tabulated quantity of spiral bars.
Spiral reinforcing bars shall not have deformations but shall in other respects conform to Item 5-4.

H.N.T.B BR. NO. 9 PART 6

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
KANSAS CITY CLEVELAND NEW YORK

PIER 1

RAMP E-15 OVER EAST 14th ST.
BR. NO. CUY-21-1573B STA. 15+27.70
Scale: 1/4"=1'-0" Except as noted. STA. 16+96.91
WILLOW-INNER BELT FREEWAY
CLEVELAND CUYAHOGA COUNTY OHIO

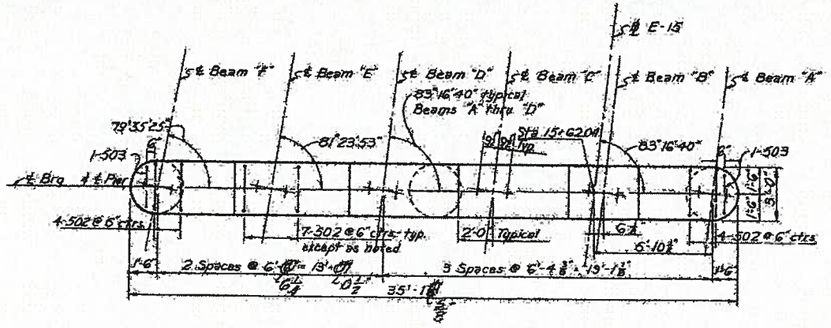
DRAWN CAC	TRACED	CHECKED J.T.	REVIEWED JCT	REVISED 9-21-60
DATE 7-4-59	DATE	DATE 6-18-59	DATE 11-12-59	SHEET 148

Bridge #9

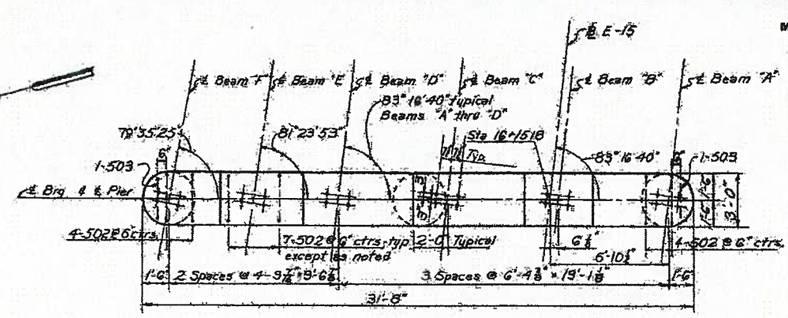
FED. ROADS DIV. NO.	STATE	FED. AID PROJ. NO.	
2	OHIO		

149
175

CUYAHOGA COUNTY
CITY OF CLEVELAND
CUY-42-18.29



PLAN

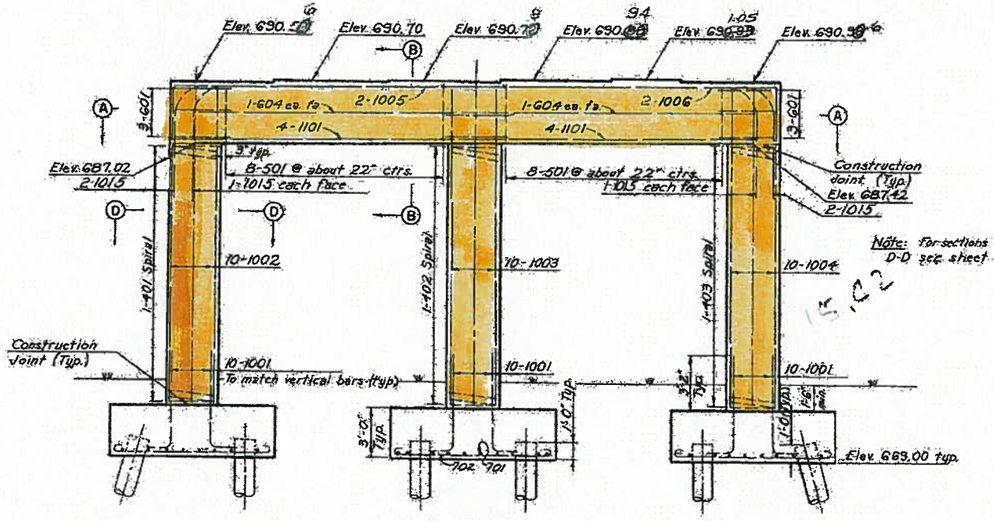


PLAN

Note: Special care shall be taken when placing reinforcing steel so as not to interfere with anchor bar setting. Anchor bars to be furnished and set under ~~X~~ separate contract.

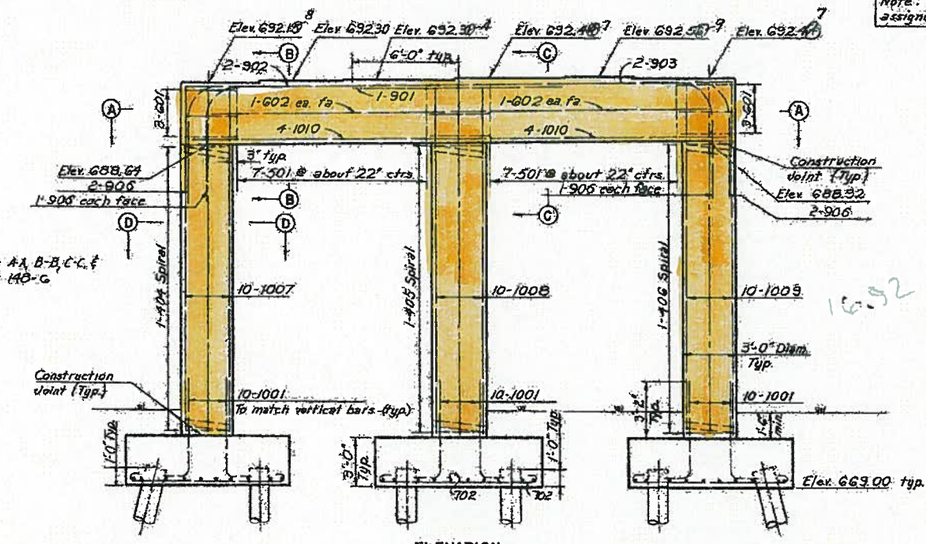
Note: Provide electrical ground wire in outside columns of Pier 2. See notes on Sh 13A; C.
Special care shall be taken in placing of electrical ground so as not to interfere with shoe base plate.

Note: Prefix "P" shall be assigned to all bar marks.

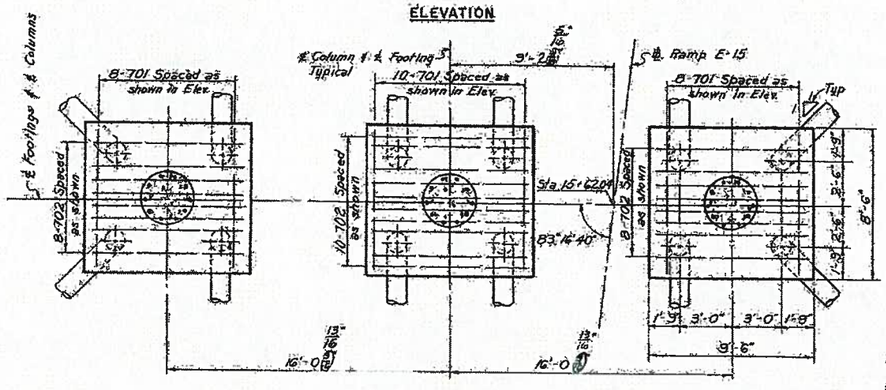


ELEVATION

Note: For sections A-A, B-B, C-C, & D-D see sheet 14B-G.



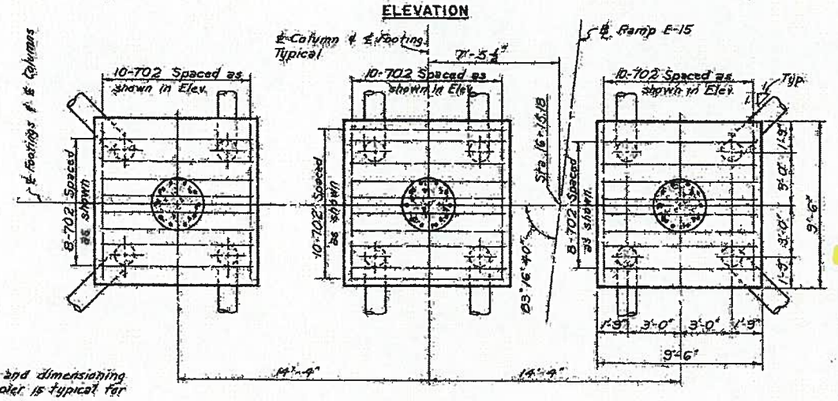
ELEVATION



FOOTING PLAN

PIER 3

Note: Pile spacing and dimensioning shown for each pier is typical for all footings.



FOOTING PLAN

PIER 2

NOTE: For Reinforcement Schedule and Notes see sheet 14B-G.

H.N.T.B. BR. NO. 9 PART 6

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
KANSAS CITY CLEVELAND NEW YORK

PIERS 2 & 3

RAMP E-15 OVER EAST 14th ST.
BR. NO. CUY-21-1573B STA. 15+27.70
Scale: 1/4" = 1'-0" STA. 16+98.91

WILLOW-INNER BELT FREEWAY
CLEVELAND CUYAHOGA COUNTY OHIO

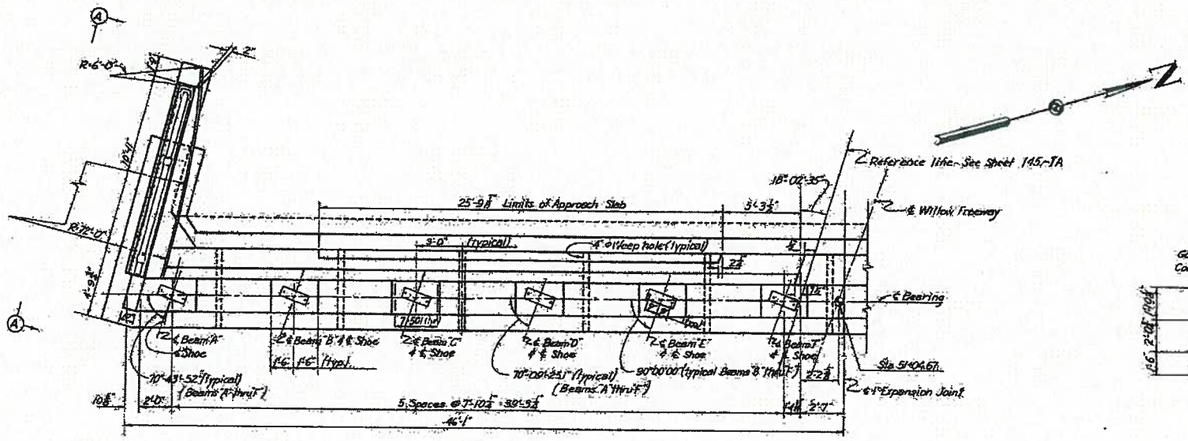
DRAWN C.E.P.	TRACED	CHECKED C.F.	REVIEWED	REVISED 7-22-60
DATE 9-21-59	DATE	DATE 6-19-59	DATE 11-12-59	SHEET 149

Revised 9-21-60.

FED. ROADS DIV. NO.	STATE	FED. AID PROJ. NO.		
2	OHIO			

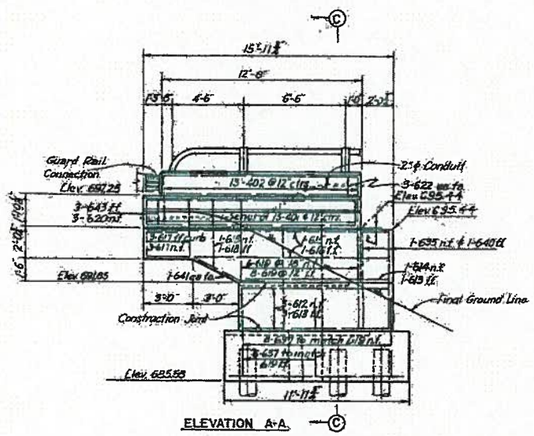
148
181

CUYAHOGA COUNTY
CITY OF CLEVELAND
CUY-21-15.32
CUY-42-18.42

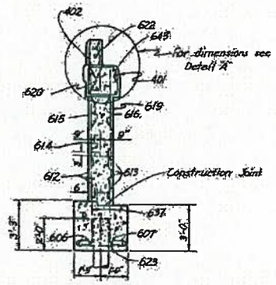


PLAN

Note:
Ends of railing parapet shall be normal to top of safety curb.

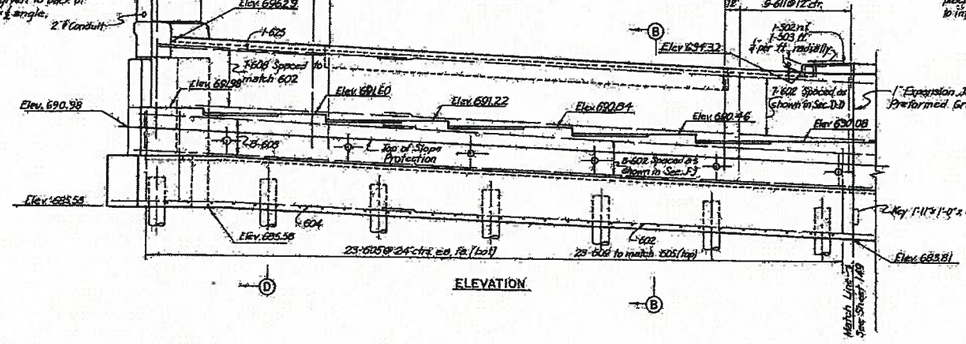


ELEVATION A-A



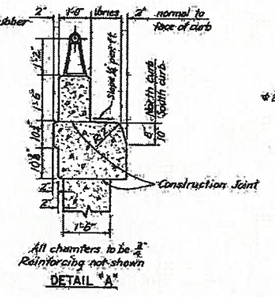
SECTION C-C

Note:
Elevations along backwall are given to back of 6"x6"x⅝" angles.

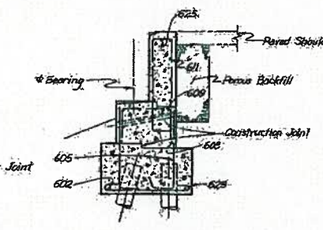


ELEVATION

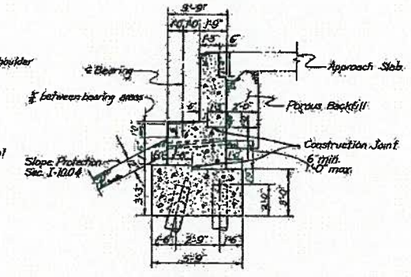
Note:
Special care shall be taken when placing reinforcing steel, so as not to interfere with anchor bar setting.



DETAIL "A"

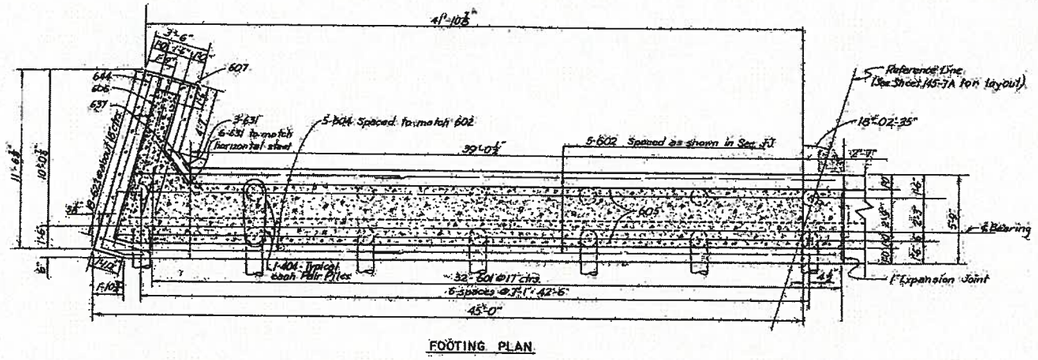


SECTION D-D



SECTION B-B

Reinforcing not shown



FOOTING PLAN

NOTES:
All piles shall be 12" CIP reinforced concrete.
All battered piles shall be battered 3 in 12 in direction shown
Pile spacings are given along bottom of footing
For additional notes see sh. 146-TA

Note: Prefix 'AB' shall be assigned to all bar marks

H.N.T.B. BR. NO. 8 PART TA

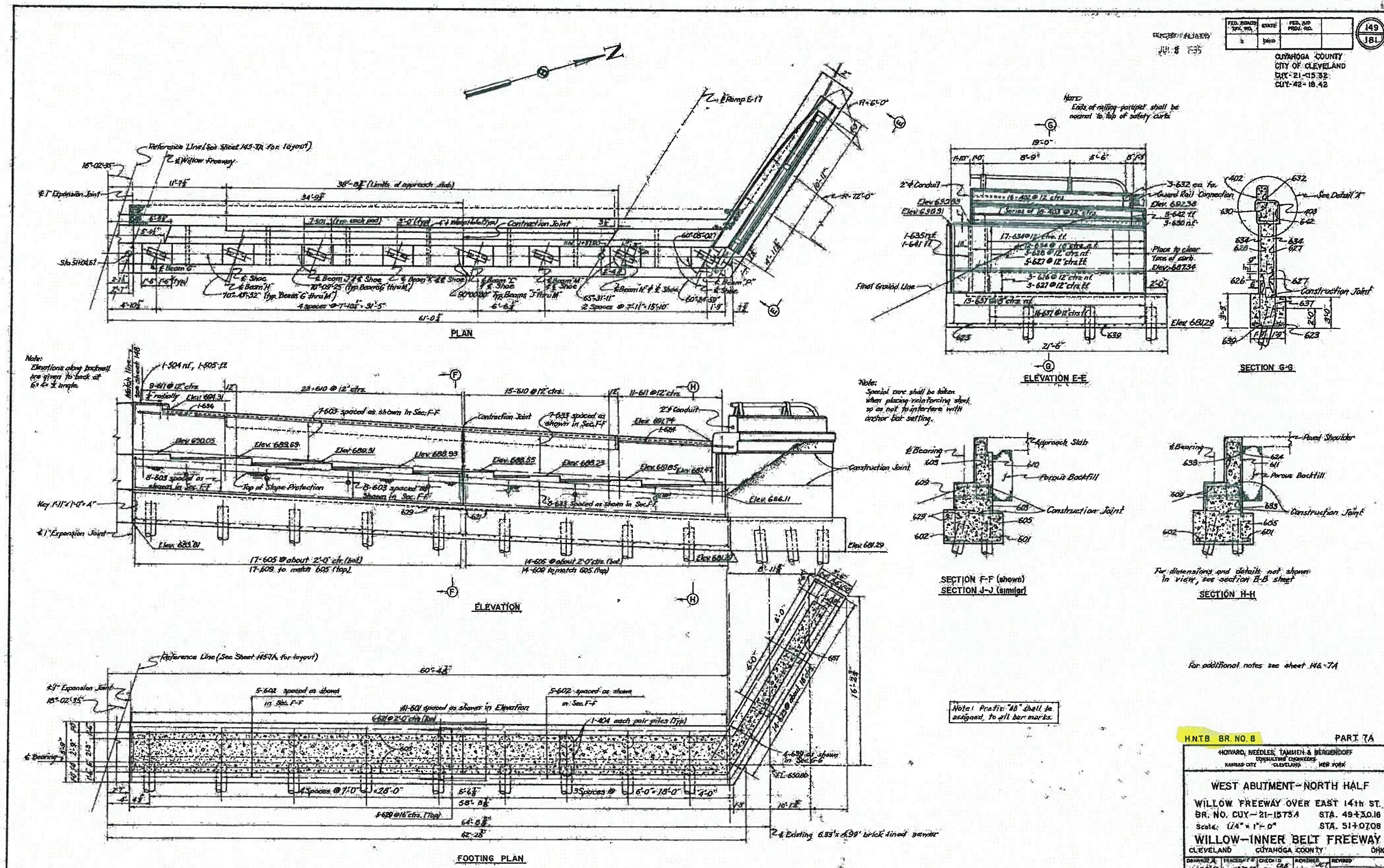
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
KANSAS CITY CLEVELAND NEW YORK

WEST ABUTMENT-SOUTH HALF

WILLOW FREEWAY OVER EAST 14th ST.
BR. NO. CUY-2I-1573 A STA. 49+30.16
Scale: 1/4"=1'-0" Except as noted STA. 51+07.08

WILLOW-INNER BELT FREEWAY
CLEVELAND CUYAHOGA COUNTY OHIO

DRAWN	TRACED	CHECKED	REVIEWED	REVISED
DATE 7/15/57	DATE 9-9-58	DATE 9-9-58	DATE 11-13-57	SHEET 148



CUYAHOGA COUNTY
CITY OF CLEVELAND
CUY-21-15.32
CUY-42-18.42
149
181
PLAN
ELEVATION
FOOTING PLAN
ELEVATION E-E
SECTION G-G
SECTION F-F (shown)
SECTION J-J (similar)
SECTION H-H
Note: Ends of railing parapet shall be normal to top of safety curb.
Note: Elevations along backwall are given to back of 6" × 4" × ½" angle.
Note: Special care shall be taken when placing reinforcing steel so as not to interfere with anchor bar setting.
For dimensions and details not shown in view, see section B-B sheet
For additional notes see sheet 146-7A
Note: Prefix "AB" shall be assigned to all bar marks.

H.N.T.B. BR. NO. 8

PART 7A

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
KANSAS CITY CLEVELAND NEW YORK

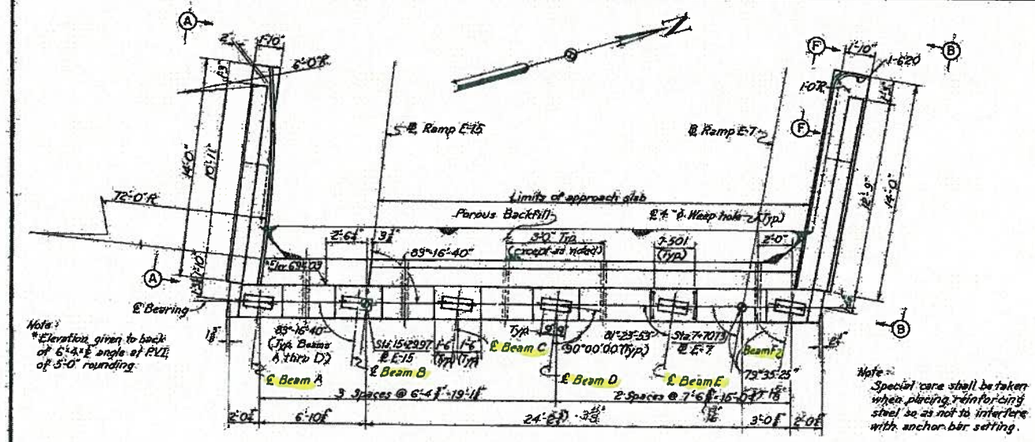
WEST ABUTMENT–NORTH HALF

WILLOW FREEWAY OVER EAST 14th ST.
BR. NO. CUY–21–1573A STA. 49+30.16
Scale 1/4" = 1'-0" STA. 51+07.08

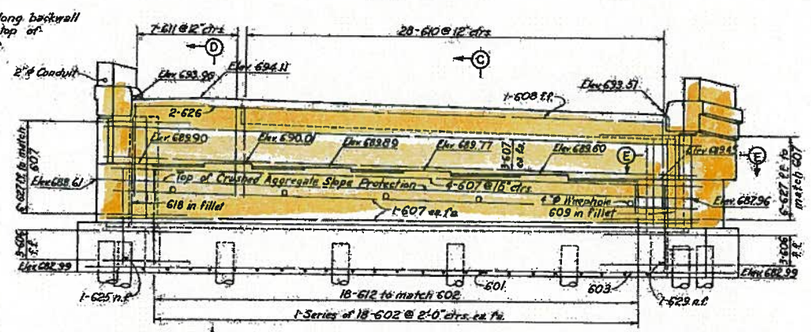
WILLOW–INNER BELT FREEWAY
CLEVELAND CUYAHOGA COUNTY OHIO

SHEET 149

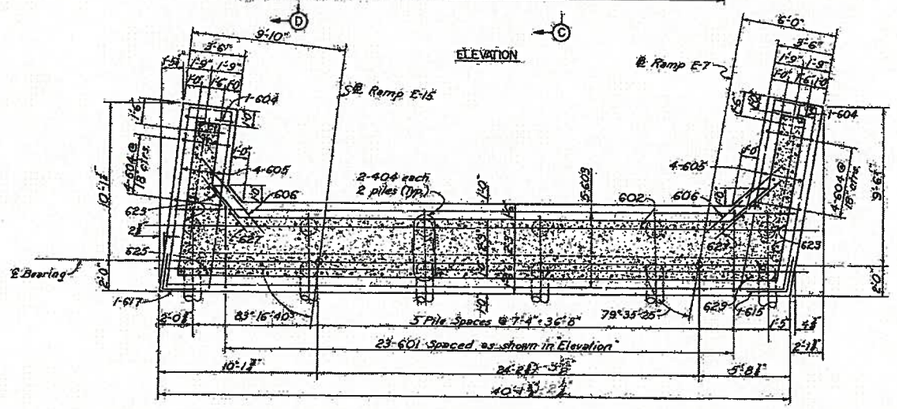
SUC.140327.TGR.BU24_Brg34_DemoPlan



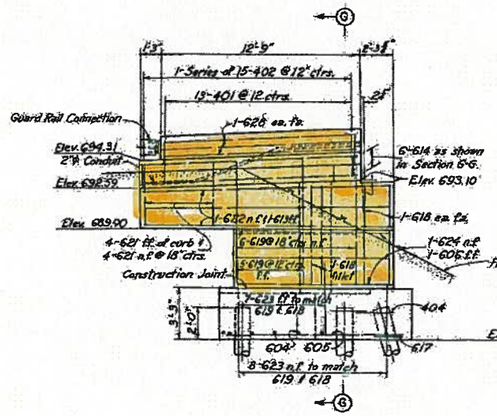
PLAN
Top of backwall to follow crown of roadway.



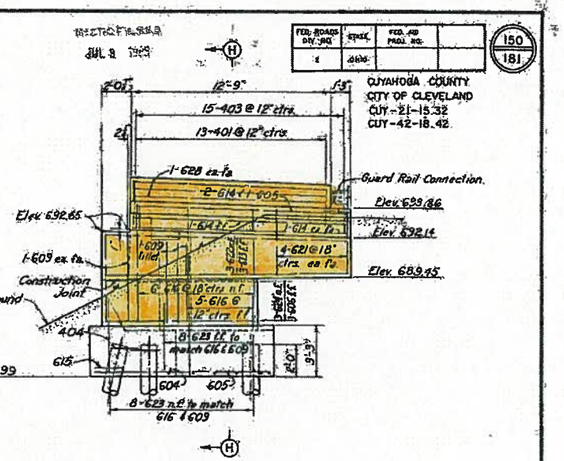
ELEVATION



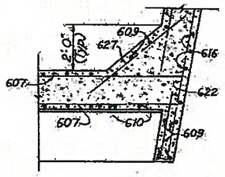
FOOTING PLAN



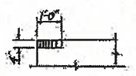
ELEVATION A-A



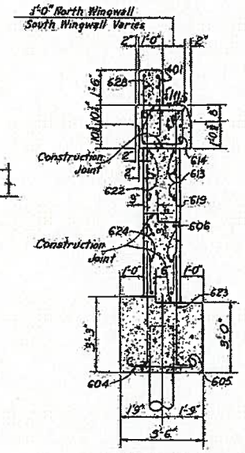
ELEVATION B-B



SECTION E-E

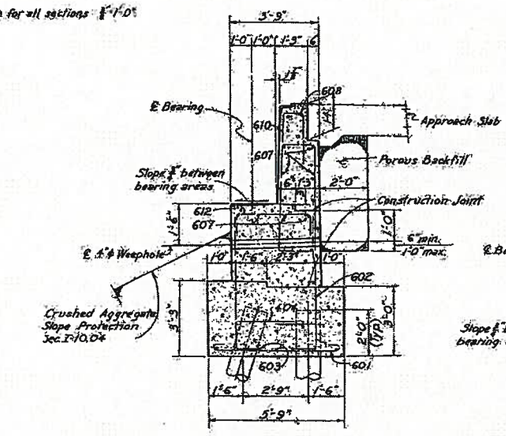


VIEW F-F

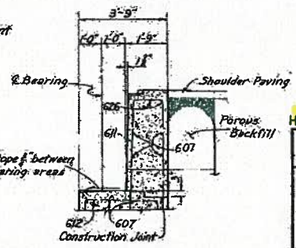


SECTION G-G (Shown)
SECTION H-H (Similar)

Note: Scale for all sections 1"=1'-0"



SECTION C-C



PARTIAL SECTION D-D

NOTES :
All piles shall be 12" cast in place reinforced concrete.
All battered piles shall be battered 3 in 12 in direction shown.
Pile spacing given along bottom of footing.
For details of end dam see sheet 173-7A
For masonry plate details, see sheet 173-7A
For Railing Post spacing, details of Railing and Guard Rail Connection, see sheet 175-7A
Reinforcement bars shall be 3 inches clear from bottom of footing and 2 inches elsewhere.
1'-0" near sheet f.f. for type 1 ga. ft. = 4 each face.
For Reinforcement Schedule, see sheet 131-7A
For location of lighting conduit, see sheet 176-7A
Ends of railing parapet to be normal to top of safety curb.
For slope protection details, see sheet 174-7A
Backfill shall be placed prior to placing of curb.

Note: Prefix "A" shall be assigned to all bar marks.

H.N.T.B. BR. NO. 9 PART 7A

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
KANSAS CITY CLEVELAND NEW YORK

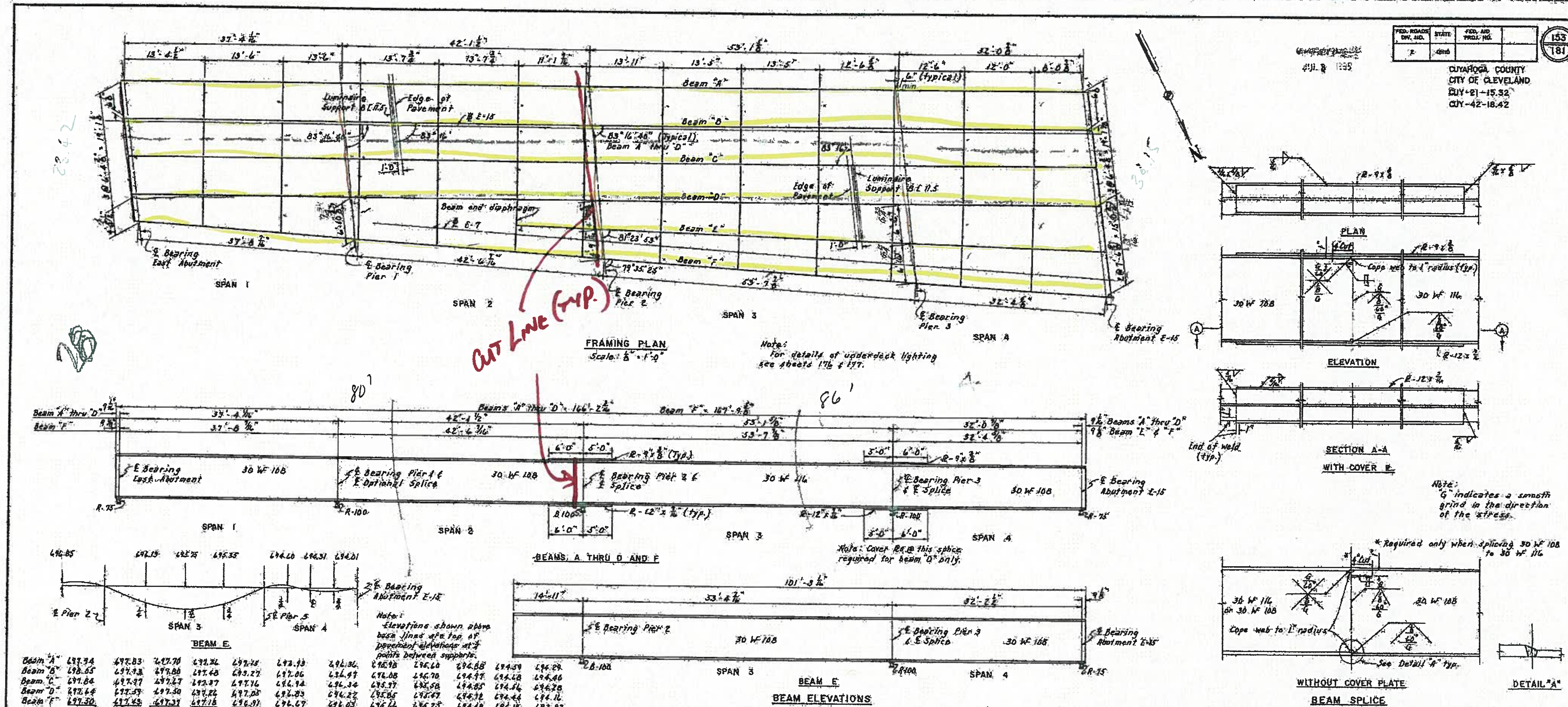
ABUTMENT E-15
RAMP E-15 OVER EAST 14th. ST.
BR. NO. CUY-2)-1573 B STA. 15+22.70
Scale: (1/4"=1'-0" Except as noted. STA. 16+96.9)
WILLOW - INNER BELT FREEWAY
CLEVELAND CUYAHOGA COUNTY OHIO

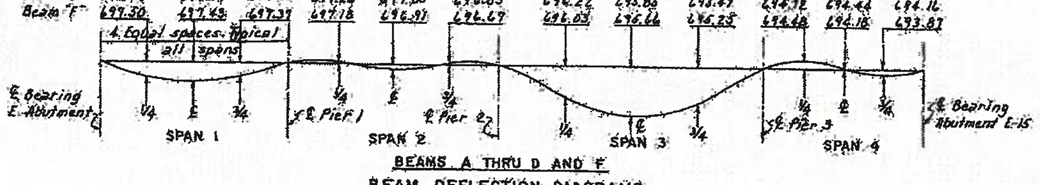
DRAWN C.C.D.	TRACED R.J.K.	CHECKED C.A.B.	REVIEWED J.C.T.	REVISED 7-24-60
DATE 5-20-59	DATE 5-25-59	DATE 5-26-59	DATE 6-15-59	SHEET 150

FED. ROADS DIV. NO. 1 | STATE | FED. AID PROJ. NO.
OHIO

150
181

CUYAHOGA COUNTY
CITY OF CLEVELAND
CUY-2)-15.32
CUY-42-18.42





NOTES:

Top of beam elevations are exclusive of cover plates.
For details of end dams, see sheet 173-7A
For crossframe details, see sheet 158-7A
For Drainage Details, see sheet 174-7A
For details of rocker masonry plates, see sheet 173-7A
For other rocker and bolster details, see Ohio Standard Drawing RB-1-56.
Elevations shown in table are located at intersections of ℄ bearing and ℄ beams.

BEAM SPLICE WELDING PROCEDURE

1. Raise ends of beams "A" thru "D" and "E" 1/8" at Pier 3.
2. Butt-weld the beam flanges and web at Pier 2 using the following sequence: make two passes on each flange then two on the web; repeat, using one pass at each location, until welds are completed.
3. Weld the top and bottom cover plates.
4. Lower the beam ends at Pier 3 to final position.
5. Repeat step 2 and, in the case of beam "D", also step 3 at Pier 3. No raising of beam ends @ Abutment E-15 required. (The above procedure assumes that no splice is made at Pier 1. If the beams are spliced at Pier 1, only step 2 is required.)

ELEVATIONS AND DEFLECTIONS

BEAM	EAST ABUTMENT TOP OF BEAM ELEVATION	EAST ABUTMENT TOP OF PVMT. ELEVATION	SPAN 1 1/4 D.L. DEFL. CON	SPAN 1 1/4 D.L. DEFL. TOT	SPAN 1 ℄ D.L. DEFL. CON	SPAN 1 ℄ D.L. DEFL. TOT	SPAN 1 3/4 D.L. DEFL. CON	SPAN 1 3/4 D.L. DEFL. TOT	PIER NO. 1 TOP OF BEAM ELEVATION	PIER NO. 1 TOP OF PVMT. ELEVATION	SPAN 2 1/4 D.L. DEFL. CON	SPAN 2 1/4 D.L. DEFL. TOT	SPAN 2 ℄ D.L. DEFL. CON	SPAN 2 ℄ D.L. DEFL. TOT	SPAN 2 3/4 D.L. DEFL. CON	SPAN 2 3/4 D.L. DEFL. TOT
A	697.25	698.05	3/16	3/16	1/4	1/4	1/8	1/8	696.93	697.63	0	0	1/16	1/16	0	0
B	697.345	698.15	1/8	1/8	3/16	3/16	1/16	1/16	696.87	697.67	0	0	0	0	0	0
C	697.10	697.90	1/8	1/8	3/16	3/16	1/16	1/16	696.765	697.56	0	0	0	0	0	0
D	696.88	697.68	1/8	1/8	1/8	1/8	1/16	1/16	696.62	697.42	0	0	0	0	0	0
E											End of beam				-1/16	-1/16
F	696.74	697.64	1/4	1/4	5/16	5/16	3/16	3/16	696.49	697.29	0	0	0	0	-1/16	-1/16

BEAM	PIER NO. 2 TOP OF BEAM ELEVATION	PIER NO. 2 TOP OF PVMT. ELEVATION	SPAN 3 1/4 D.L. DEFL. CON	SPAN 3 1/4 D.L. DEFL. TOT	SPAN 3 1/4 CONVEXITY	SPAN 3 ℄ D.L. DEFL. CON	SPAN 3 ℄ D.L. DEFL. TOT	SPAN 3 ℄ CONVEXITY	SPAN 3 3/4 D.L. DEFL. CON	SPAN 3 3/4 D.L. DEFL. TOT	SPAN 3 3/4 CONVEXITY	PIER NO. 3 TOP OF BEAM ELEVATION	PIER NO. 3 TOP OF PVMT. ELEVATION	SPAN 4 1/4 D.L. DEFL. CON	SPAN 4 1/4 D.L. DEFL. TOT	SPAN 4 ℄ D.L. DEFL. CON	SPAN 4 ℄ D.L. DEFL. TOT	SPAN 4 3/4 D.L. DEFL. CON	SPAN 4 3/4 D.L. DEFL. TOT	ABUTMENT E-15 TOP OF BEAM ELEVATION	ABUTMENT E-15 TOP OF PVMT. ELEVATION
A	695.90	696.70	3/8	3/8	1/2	9/16	5/8	3/4	3/8	3/8	5/8	694.360	695.16	-1/16	-1/16	0	0	0	0	693.20	694.00
B	696.02	696.82	1/4	1/4	1/2	5/16	3/8	5/8	1/4	1/4	3/4	694.485	695.25	0	0	0	0	0	0	693.381	694.11
C	695.90	696.70	3/16	1/4	3/8	7/16	1/2	5/8	1/4	1/4	5/8	694.34	695.14	0	0	0	0	0	0	693.019	693.99
D	695.77	696.57	1/4	1/4	1/2	7/16	1/2	3/4	3/16	3/16	3/4	694.22	695.02	0	0	0	0	0	0	693.087	693.87
E	695.68	696.48	1/4	1/4	5/8	5/16	3/8	7/8	1/4	1/4	7/8	694.08	694.88	0	0	0	0	1/16	1/16	692.90	693.70
F	695.61	696.41	3/8	3/8	3/8	9/16	5/8	1	3/8	3/8	1	693.973	694.76	-1/16	-1/16	0	0	0	0	692.95	693.55

NOTES:

The beams in Span 3 shall be cambered as follows:
Where the sum of the deflections and convexity is 3/4" to 1" the required camber will be 1", and if greater than 1", the required camber will be the same as the sum.
Beams in Span 1, 2 & 4 do not require camber, but shall be fabricated so that any curved beam will be placed with the convex flange up.
Deflections are given at the quarter points and are measured to the nearest 1/16 inch.
In Elevation and Deflection Table the following abbreviations are used:
(D.L. Defl.) denotes dead load deflections. (Tot.) refers to total deflections from dead load of steel and concrete.
(Con.) denotes deflections for concrete.
Convexity denotes corrections required for vertical curvature of the roadway gradient.
(PVMT.) denotes pavement.

Revision 9-21-60.

H.N.T.B. BR. NO. 9

PART 7A

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
KANSAS CITY CLEVELAND NEW YORK

FRAMING PLAN

RAMP E-15 OVER EAST 14th ST.
BR. NO. CUY-21-1573 B STA. 15+27.70
Scale: As noted STA. 16+96.91

WILLOW - INNER BELT FREEWAY

CLEVELAND CUYAHOGA COUNTY OHIO

DRAWN R.A. DATE 6-8-58	TRACED DATE 5-18-59	CHECKED AL DATE 8-15-58	REVIEWED JCT DATE 2-18-59	REVISED 7-22-60 SHEET 153

SPECIFICATIONS

ENGINE

Model ..... Komatsu SAA6D114E-5*
Type ..... Water-cooled, 4-cycle, direct injection
Aspiration ..... Turbocharged, aftercooled, cooled EGR
Number of cylinders 6
Bore ..... 114 mm **4.49"**
Stroke ..... 144.5 mm **5.69"**
Piston displacement ..... 8.85 ltr **540 in³**
Horsepower:
SAE J1995 ..... Gross 202 kW **271 HP**
ISO 9249 / SAE J1349 ..... Net 192 kW **257 HP**
Rated rpm 1950
Fan drive method for radiator cooling ..... Mechanical
Governor ..... All-speed control, electronic

*EPA Tier 4 Interim and EU stage 3B emissions certified

HYDRAULICS

Type ..... HydrauMind (Hydraulic Mechanical Intelligence New Design) system, closed-center system with load sensing valves and pressure compensated valves
Number of selectable working modes 6
Main pump:
Type ..... Variable displacement piston type
Pumps for ..... Boom, arm, bucket, swing, and travel circuits
Maximum flow ..... 535 ltr/min **141.3 gal/min**
Supply for control circuit ..... Self-reducing valve
Hydraulic motors:
Travel ..... 2 x axial piston motors with parking brake
Swing ..... 1 x axial piston motor with swing holding brake
Relief valve setting:
Implement circuits ..... 37.3 MPa 380 kg/cm² **5,400 psi**
Travel circuit ..... 37.3 MPa 380 kg/cm² **5,400 psi**
Swing circuit ..... 27.9 MPa 285 kg/cm² **4,050 psi**
Pilot circuit ..... 3.2 MPa 33 kg/cm² **470 psi**
Hydraulic cylinders:
(Number of cylinders – bore x stroke x rod diameter)
Boom 2–140 mm x 1480 mm x 100 mm **5.5" x 58.3" x 3.9"**
Arm .... 1–160 mm x 1825 mm x 110 mm **6.3" x 71.9" x 4.3"**
Bucket ..... for 3.2 m **10'5"** and 4.0 m **13'2"** Arms
1–140 mm x 1285 mm x 100 mm **5.5" x 50.6" x 3.9"**
for 2.54 m **8'4"** Arm
1–150 mm x 1285 mm x 110 mm **5.9" x 50.6" x 4.3"**

DRIVES AND BRAKES

Steering control ..... Two levers with pedals
Drive method ..... Hydrostatic
Maximum drawbar pull ..... 290 kN 29570 kg **65,191 lb**
Gradeability ..... 70%, 35°
Maximum travel speed: High ..... 5.5 km/h **3.4 mph**
(Auto-Shift) Mid ..... 4.5 km/h **2.8 mph**
(Auto-Shift) Low ..... 3.2 km/h **2.0 mph**
Service brake ..... Hydraulic lock
Parking brake ..... Mechanical disc brake

SWING SYSTEM

Drive method ..... Hydrostatic
Swing reduction ..... Planetary gear
Swing circle lubrication ..... Grease-bathed
Service brake ..... Hydraulic lock
Holding brake/Swing lock ..... Mechanical disc brake
Swing speed ..... 9.5 rpm
Swing torque ..... 11386 kg•m **82,313 ft lbs**

UNDERCARRIAGE

Center frame ..... X-frame
Track frame ..... Box-section
Seal of track ..... Sealed track
Track adjuster ..... Hydraulic
Number of shoes (each side) 48
Number of carrier rollers (each side) 2
Number of track rollers (each side) 8

COOLANT & LUBRICANT CAPACITY (REFILLING)

Fuel tank ..... 605 ltr **159.8 U.S. gal**
Coolant ..... 37 ltr **9.7 U.S. gal**
Engine ..... 35 ltr **9.2 U.S. gal**
Final drive, each side ..... 9.0 ltr **2.4 U.S. gal**
Swing drive ..... 13.7 ltr **3.6 U.S. gal**
Hydraulic tank ..... 188 ltr **49.7 U.S. gal**
Hydraulic system ..... 365 ltr **96.4 U.S. gal**

OPERATING WEIGHT (APPROXIMATE)

Operating weight includes 6500 mm **21'3"** one-piece HD boom, 3185 mm **10'5"** arm, SAE heaped 1.96 m³ **2.56 yd³** bucket, rated capacity of lubricants, coolant, full fuel tank, operator, and standard equipment.

Triple-Grouser Shoes	Operating Weight	Ground Pressure
700 mm	35,496 kg	0.59 kg/cm²
28"	**78,255 lb**	**8.31 psi**
800 mm	35876 kg	0.52 kg/cm²
31.5"	**79,093 lb**	**7.40 psi**
850 mm	36255 kg	0.50 kg/cm²
33.5"	**79,930 lb**	**7.00 psi**

Component Weights

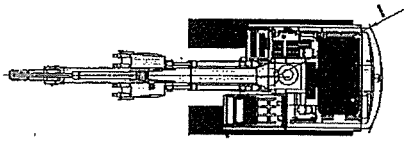
Arm including bucket cylinder and linkage
3185 mm **10'5"** arm assembly ..... 1761 kg **3,882 lb**
4020 mm **13'2"** arm assembly ..... 1988 kg **4,383 lb**
One piece HD boom including arm cylinder
6500 mm **21'3"** boom assembly ..... 3135 kg **6,912 lb**
Boom cylinders x 2 ..... 259 kg **571 lb**
Counterweight ..... 7090 kg **15,631 lb**
1.96 m³ **2.56 yd³** bucket - 54" width ..... 1554 kg **3,425 lb**

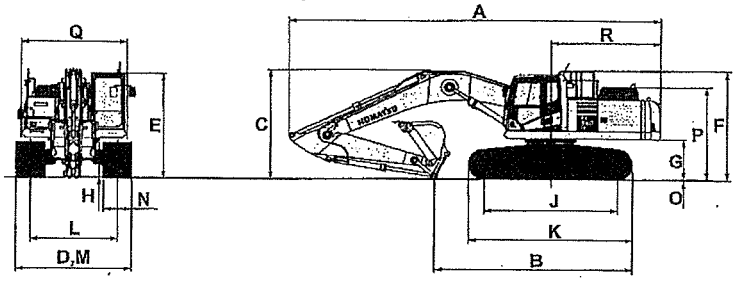
SPECIFICATIONS

DIMENSIONS

	Arm Length	2540 mm	8'4"	3185 mm	10'5"	4020 mm	13'2"
A	Overall length	11180 mm	36'8"	11145 mm	36'7"	11170 mm	36'8"
B	Length on ground (transport)	6760 mm	22'2"	5935 mm	19'6"	5475 mm	18'0"
C	Overall height (to top of boom)*	3410 mm	11'2"	3285 mm	10'9"	3760 mm	12'4"
D	Overall width	3440 mm	11'3"				
E	Overall height (to top of cab)*	3160 mm	10'4"				
F	Overall height (to top of handrail)*	3255 mm	10'8"				
G	Ground clearance, counterweight	1185 mm	3'11"				
H	Ground clearance, minimum	498 mm	1'8"				
I	Tail swing radius	3445 mm	11'4"				
J	Track length on ground	4030 mm	13'3"				
K	Track length	4955 mm	16'3"				
L	Track gauge	2590 mm	8'6"				
M	Width of crawler	3440 mm	11'3"				
N	Shoe width	850 mm	33.5"				
O	Grouser height	36 mm	1.4"				
P	Machine cab height	2750 mm	9'0"				
Q	Machine cab width **	3145 mm	10'4"				
R	Distance, swing center to rear end	3405 mm	11'2"				

*: Including grouser height **: Including handrail





BACKHOE BUCKET, ARM AND BOOM COMBINATION

Bucket Type	Bucket Capacity		Bucket Width		Bucket Weight		6.5 m (21'3") Boom 2.6 m (8'4")	3.2 m (10'5")	4.0 m (13'2")
Komatsu TL	0.93 m³	1.21 yd³	762 mm	30"	1097 kg	2418 lb	V	V	V
	1.18 m³	1.54 yd³	914 mm	36"	1198 kg	2641 lb	V	V	V
	1.44 m³	1.88 yd³	1067 mm	42"	1325 kg	2921 lb	V	V	V
	1.70 m³	2.22 yd³	1219 mm	48"	1426 kg	3144 lb	V	V	W
	1.96 m³	2.56 yd³	1372 mm	54"	1554 kg	3425 lb	W	W	X
Komatsu HP	0.68 m³	0.89 yd³	610 mm	24"	1022 kg	2254 lb	V	V	V
	0.93 m³	1.21 yd³	762 mm	30"	1178 kg	2598 lb	V	V	V
	1.18 m³	1.54 yd³	914 mm	36"	1358 kg	2993 lb	V	V	V
	1.44 m³	1.88 yd³	1067 mm	42"	1439 kg	3173 lb	V	V	V
	1.70 m³	2.22 yd³	1219 mm	48"	1555 kg	3429 lb	V	V	X
	1.96 m³	2.56 yd³	1372 mm	54"	1701 kg	3750 lb	W	X	Y
Komatsu HPS	0.68 m³	0.89 yd³	610 mm	24"	1112 kg	2451 lb	V	V	V
	0.93 m³	1.21 yd³	762 mm	30"	1294 kg	2853 lb	V	V	V
	1.18 m³	1.54 yd³	914 mm	36"	1437 kg	3167 lb	V	V	V
	1.44 m³	1.88 yd³	1067 mm	42"	1607 kg	3543 lb	V	V	W
	1.70 m³	2.22 yd³	1219 mm	48"	1750 kg	3857 lb	V	W	X
	1.96 m³	2.56 yd³	1372 mm	54"	1921 kg	4236 lb	W	X	Y
Komatsu HPX	0.68 m³	0.89 yd³	610 mm	24"	1239 kg	2731 lb	V	V	V
	0.93 m³	1.21 yd³	762 mm	30"	1421 kg	3133 lb	V	V	V
	1.18 m³	1.54 yd³	914 mm	36"	1564 kg	3447 lb	V	V	V
	1.44 m³	1.88 yd³	1067 mm	42"	1734 kg	3823 lb	V	V	W
	1.70 m³	2.22 yd³	1219 mm	48"	1877 kg	4137 lb	V	W	X
	1.96 m³	2.56 yd³	1372 mm	54"	2048 kg	4516 lb	X	X	Y

V - Used with material weights up to 3,500 lb/yd³
W - Used with material weights up to 3,000 lb/yd³
X - Used with material weights up to 2,500 lb/yd³
Y - Used with material weights up to 2,000 lb/yd³
Z - Not useable