STATE OF IOWA

# STATE HIGHWAY COMMISSION

DESIGNS FOR

# BRIDGES AND CULVERTS

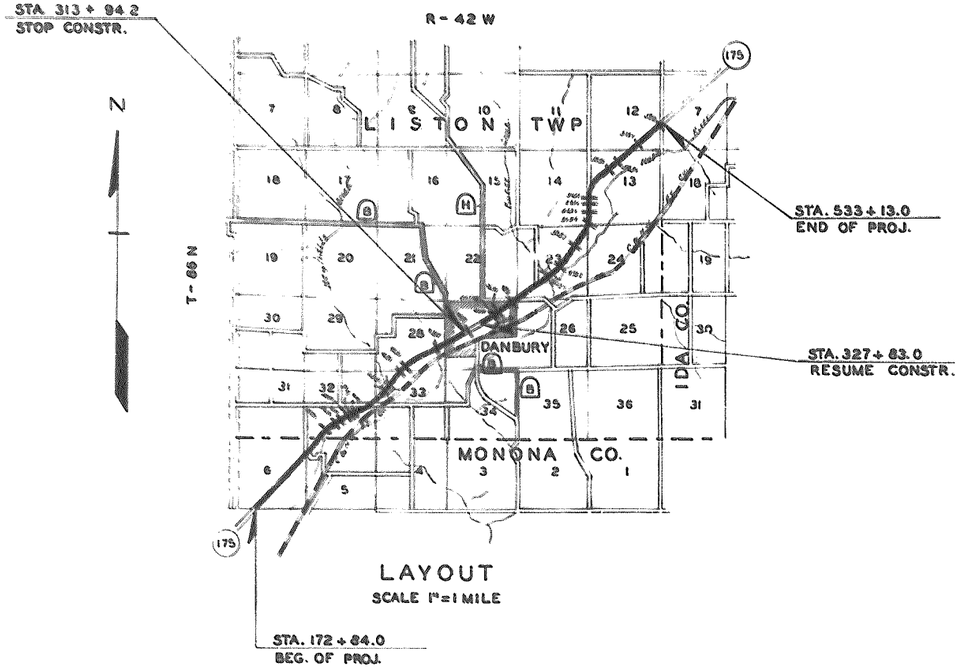
PRIMARY ROAD SYSTEM F. N. PROJECT NO. 245

## WOODBURY COUNTY

NOVEMBER 1951

| DESIGN | LOCATION SECTION | STATION | TOWNSHIP | DESCRIPTION SIZE AND TYPE | ESTIMATE OF QUANTITIES CONCRETE CU. YD. | REINF. STEEL LB. | STRUCT STEEL LB. | EXCAVATION C.Y. CL. 10 CHANNEL | CL. 20 | CL. 31 | PILING STEEL SHEET & | TREATED | UNTREATED | RAISING OLD BRIDGE | CLEAN AND PAINTING | REMOVALS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| In letting Nov 27, 1951 6451 | 33 | 223+42 | Liston | 180'-4½" Continuous Slab &c | 380.0 | 32,445 | | 1175 | 150 | 102 | | 12"-30' 180 12"-40' 200 | 8"-30' 180 | | | [illegible] |
| 6551 | 33 | 332+93.1 | Liston | Three 8' Units @ 63.22' Ea. | 179.6 | 7,718 | 5978 | | 287 | 38 | 1966 | | 200 | Lump Sum | Lump Sum | |
| | | | | | 5806 | 66,924 | 5978 | 1175 | 437 | 135 | 1966 | 12-12 | 1280 | | | |

| DESIGN | LOCATION SECTION | TOWNSHIP | STATION | DESCRIPTION SIZE AND TYPE | ESTIMATE OF QUANTITIES CONCRETE C.Y. YDS | REINF. STEEL LBS | EXCAVATION C.Y. 23 | 24 | | REMOVE |
|---|---|---|---|---|---|---|---|---|---|---|
| 3551 | 32 | Liston | 179+63 | 8'-2"x6'-3" RCB 15° Skew | 98.4 | 11493 | 323 | | | 8'-2" x 11'-3" RCB |
| 3651 | 32 | " | 190+58.2 | 12'-3" RCBox 3° Skew | 13.3 | 723 | 1 | 7 | | |
| 3751 | 32 | " | 196+83 | 2-2'-9" x 2'-3" Tunnel RCB 22° Skew 2'-2" | 3.3 | 742 | 10 | | | |
| 3851 | 32 | " | 201+75 | 10'-5" x 5'-0" RCBox | 16.3 | 5445 | 32 | | | |
| 3951 | 32 | " | 217+65 | 2-12'-0" x 8'-0" RCBox | 146 | 766 | 9 | 6 | | |
| 4051 | 32 | " | 222+70 | Quadruple 10'-5" x 6'-2" RCB | 336.7 | 45896 | 633 | | | 34'-2" x 36'-0" RCB |
| 4151 | 33 | " | 259+83.1 | 8'-4" RCB 60° Skew | 64.2 | 6756 | 41 | | | Break back 661 17-6" |
| 4251 | 28 | " | 266+63.93 | Two 6'-4" x 4'-0" RCB 35° Skew | 83.7 | 10617 | 71 | | | Break back 661 11-6" |
| 4351 | 28 | " | 287+95 | Triple 12'-6" x 8'-0" RCB 30° Skew | 382.4 | 48189 | 1000 | | | Two 12'-6" x 39'-0" 30° Skew RCB |
| 4451 | 27 | " | 328+00 | 4'-2" x 6'-4" RCB | 210 | 17681 | 66 | | | 6'-2" x 8'-0" RCB Wing [illegible] |
| *4551 | 27 | " | 342+23.5 | 4'-4" RCB 22° Skew & 45°-0"-45° | 47.2 | 3786 | 93 | | | 92 x 18'-0" RCB |
| 4651 | 27 | " | 342+22 Rev | 5'-2" x 2'-0" RC Flume | 22.4 | 1220 | 63 | | | |
| 4751 | 27 | " | 343+70 | 5'-2" x 2'-6" RCBox 5° Skew | 31.6 | 3493 | 133 | | | Flume 5'-0" x 2'-6" |
| 4851 | 26 | " | 366+17 | 4'-3" x 3'-0" RCBox 30° Skew | 136 | 1091 | 8 | | | |
| 4951 | 23 | " | 405+95 | 3'-3" x 2'-1" RCBox 17°-7" Skew | 65.1 | 4911 | 77 | 255 | | 10'-6" x 5'-4" RCB |
| 5051 | 23 | " | 423+81 | Two 2'-3" x 2'-3" RCBox | 62.6 | 6269 | 62 | 67 | | |
| 5151 | 14 | " | 436+55 | 3'-3" x 3'-3" RCBox | 22.1 | 1216 | 55 | | | |
| 5251 | 14 | " | 442+61 | 2'-2" x 2'-0" RCB | 17.5 | 929 | 28 | | | |
| 5351 | 14 | " | 448+96 | 3'-3" x 3'-3" RCBox | 19.9 | 1175 | 14 | | | |
| 5451 | 14 | " | 455+46 | 3'-2" x 3'-0" RCBox | 19.4 | 1133 | 24 | | | |
| 5551 | 13 | " | 462+68 | 4'-4" x 3'-0" RCBox | 26.2 | 1938 | 46 | 151 | | |
| 5651 | 13 | " | 488+43 | 3'-4" x 3'-0" RCBox | 18.0 | 816 | 16 | | | |
| 5751 | 12 | " | 509+90 | 5'-4" x 4'-0" RCBox | 21.6 | 1923 | 17 | | | |
| 5851 | 12 | " | 532+40 | 6'-4" x 6'-6" RCB 15° Skew | 58.0 | 5061 | 12.0 | | | Skew Ends of Box RCB |
| | | | | Total | 1523.6 | 167457 | 2280 | 511 | | |
| *4551a | 27 | Liston | 341+60 | 5'-2" x 32'-0" RCB & Flume | 45.0 | 3775 | 155 | | | Break down to Size 6'-6" x 18'-0" |




Specifications

All material and construction to be in accordance with Iowa State Highway Commission Standard Specifications Series of 1948. For culverts 1952 for bridges.

APPROVED

CHIEF ENGINEER IOWA HIGHWAY COMMISSION DATE

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

RECOMMENDED FOR APPROVAL

DISTRICT ENGINEER DATE

APPROVED

DIVISION ENGINEER DATE

Revised 2-26-52 Designs 6451 and 6551 added

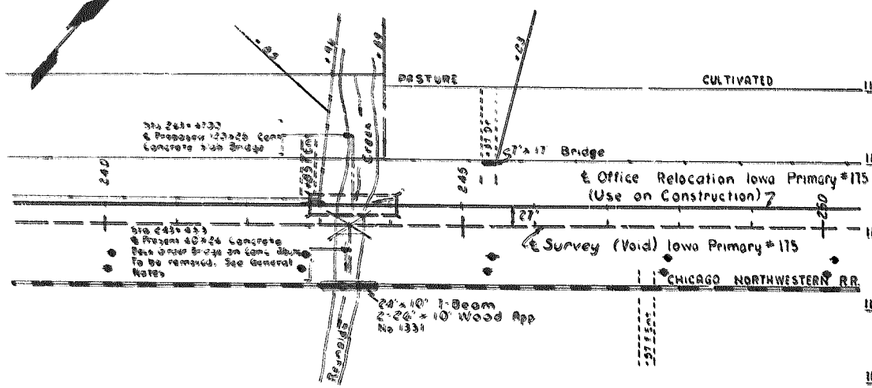
* Revised 2-12-52 Design 4551a Supersedes design 4551

2-11

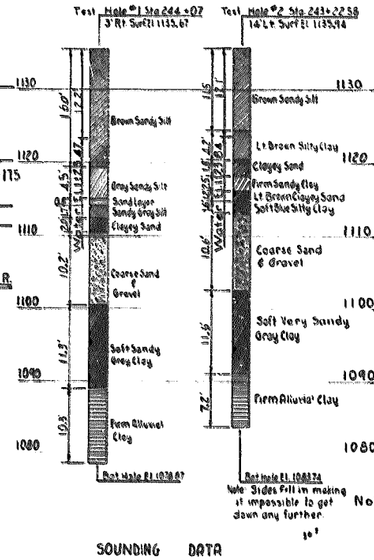
Woodbury Co. Proj. FN 245 File 13949 B.T.L. DIC

7,411 6,411

LISTON TWP
T.86N R.42W.
SECTION 33




GENERAL PLAN
Scale: 1" = 100'
D.A. = 2.5 sq miles
Rolling to Hilly

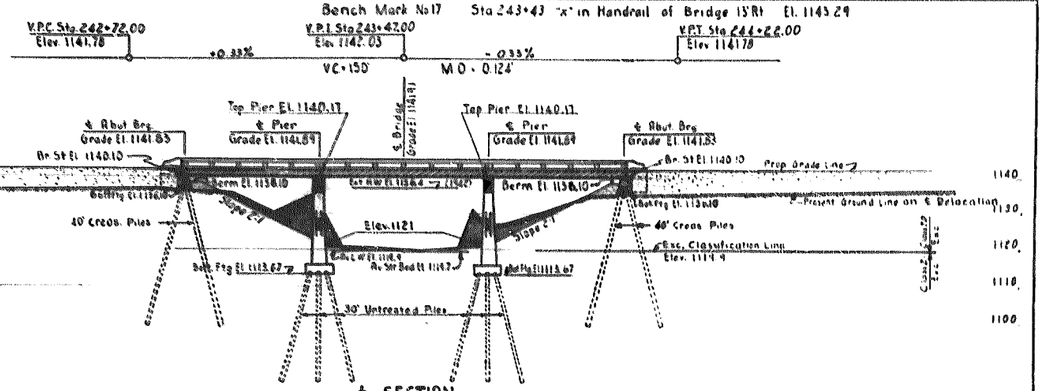



Note: Sides fell in making it impossible to get down any further.

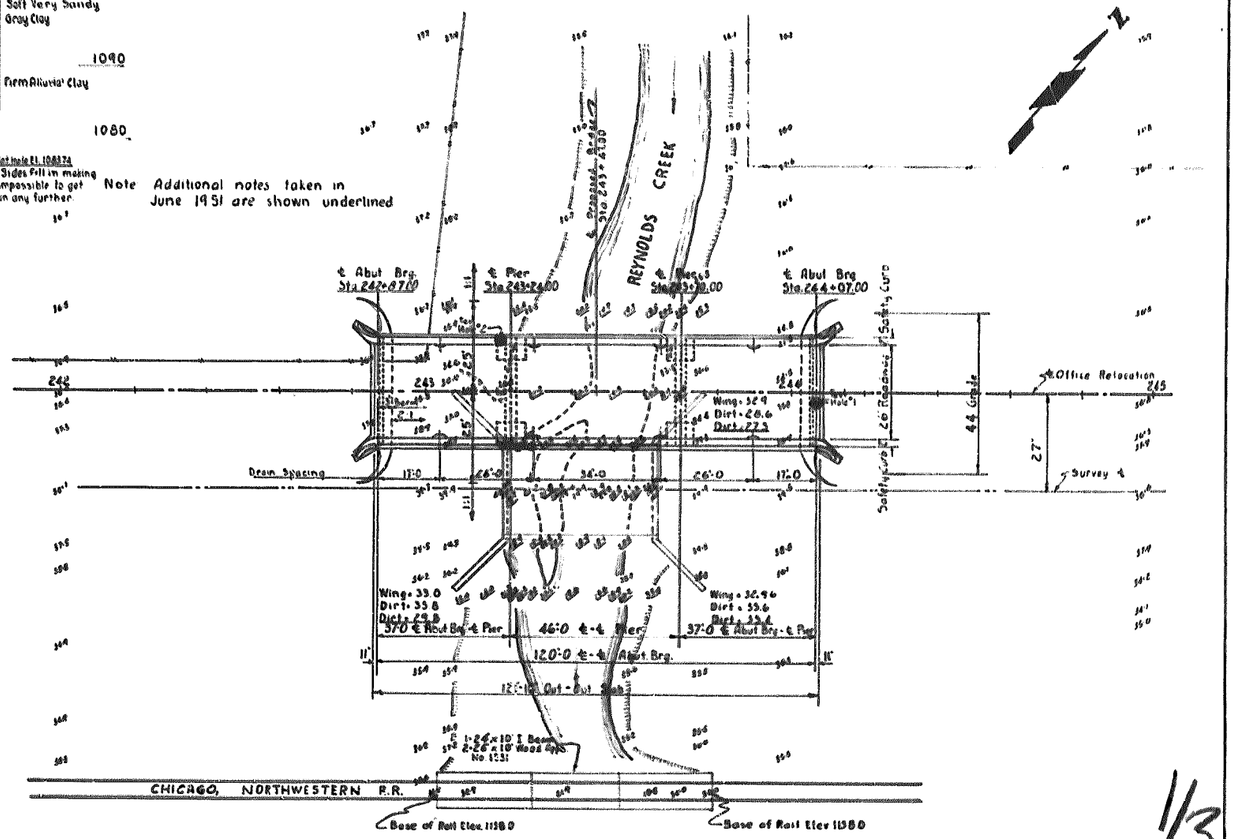
SOUNDING DATA
Scale, 1" = 10'

Note Additional notes taken in June 1951 are shown underlined

Bench Mark No 17 Sta 243+43 "x" in Handrail of Bridge 15' Rt El. 1145.29




℄ SECTION




SITUATION PLAN
Scale: 1"=20'

GENERAL NOTES:

This bridge is designed for H-20 Loading plus an allowance of 14%/ft² of roadway for future wearing surface. Slab as shown includes 2" future wearing surface.

Approach fills are not a part of this estimate but are to be in place before abutment piles are driven. Bridge Contractor is to level off and shape berms as shown.

Bridge Contractor is to remove the present structure. Substructure is to be removed entirely where interfering w/in new construction. The remainder of the substructure is to be removed to low water or to at least one foot below finished ground line. Broken concrete to be placed as directed by engineer.

Bridge Contractor is to clear channel under bridge for a distance of 25' each side of ℄ Roadway as shown in Situation Plan and by shaded areas in ℄ Section.

Red lines on tracing or faint lines on print indicate present construction.

SPECIFICATIONS:

Design: A.A.S.H.O. Series 1949, for H-20-44 Loading with modifications as noted on Sheet 3 of 3.

Construction: Iowa State Highway Commission Series 1952.

| TOTAL ESTIMATED QUANTITIES | | | | |
|---|---|---|---|---|
| Part | Superstruc. | 2 Abuts. | 2 Piers | Total |
| Concrete | 253.1 | 50.7 | 74.2 | 380.0 cuyd. |
| Reinf. Steel | 47,915 | 2020 | 6870 | 57,205 lbs. |
| Creo. Piles | | 26@40' | | 1040 lin. ft. |
| Untreated Piles | | | 36@30' | 1080 " " |
| Cl. 10 Channel Exc | | | | 1175 cuyd. |
| Cl. 20 Excavation | | | | 150 " " |
| Cl. 21 Excavation | | | | 102 " " |
| Removal of old bridge | | | | Lump Sum |
| | | | | |

Location:
Over Reynolds Creek
On Relocation Iowa Primary # 175
Section 33
Liston Township
Woodbury County

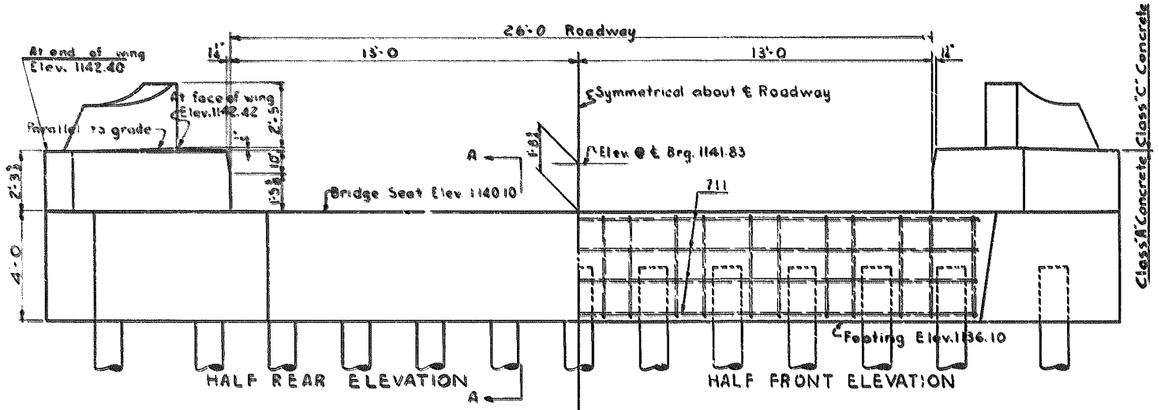
Design for
120'x 26' CONT. CONCRETE SLAB BRIDGE
37'-0 End Spans 46'-0 Center Span
Concrete Rail & Substructure 2'-0 Safety Curb

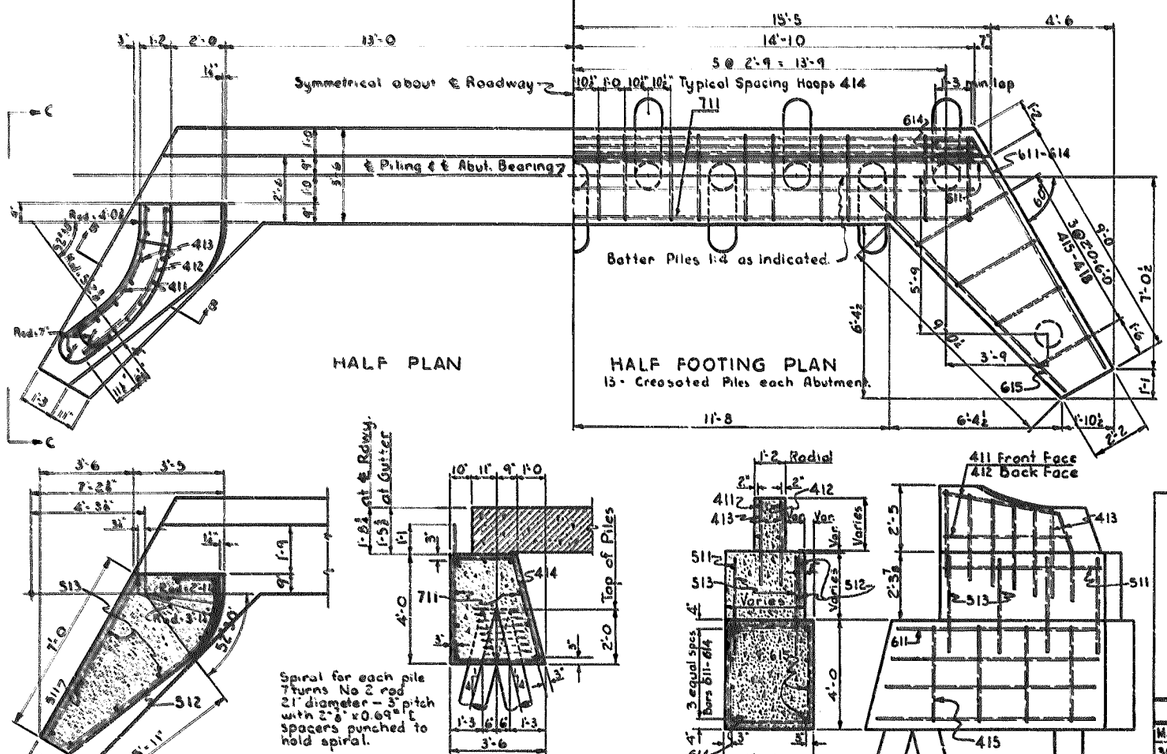
SITUATION & GENERAL PLANS
Sta. 243+47.00 Project F-245
WOODBURY COUNTY
Iowa State Highway Commission
February 1952 Sheet 1 of 3

Design No. 6451 Woodbury Co. File No. 13949
Designed by: E-JBD Traced by: DPP Checked by: JBD-E

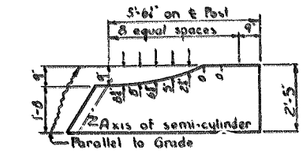
1/3

Bench Mark No. 17 Sta. 243+43 "X" in Handrail of Bridge 13' Rt El 1143.29




ABUTMENT DETAILS
Scale: ⅜"=1'-0




WING POST DEVELOPED

**SUBSTRUCTURE NOTES.**

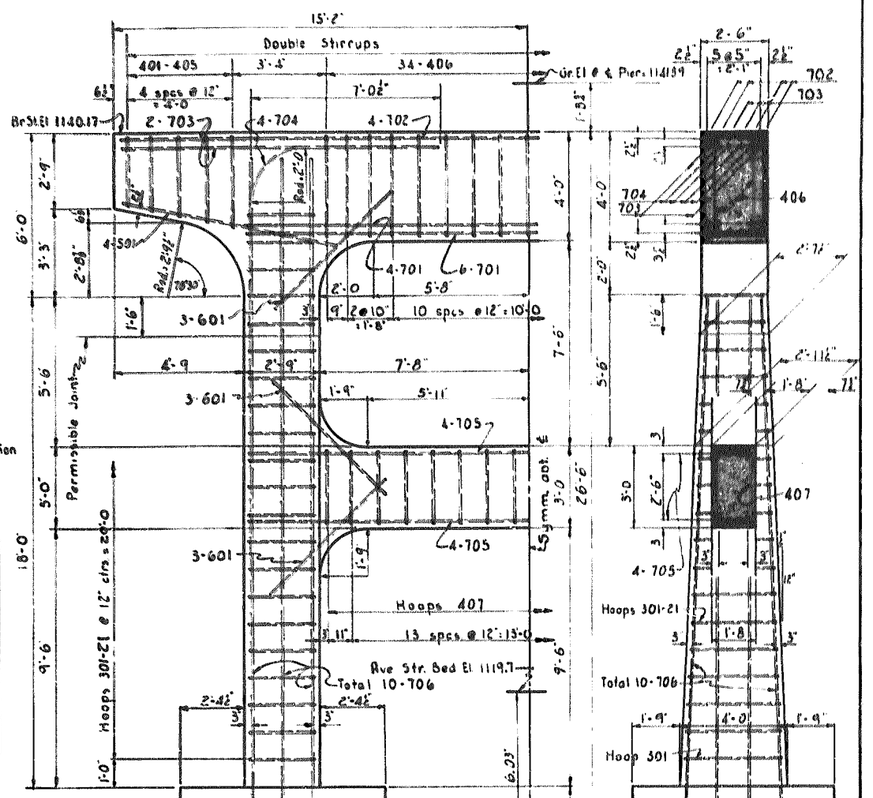
All exposed corners of 90° or sharper, except vertical corners of rail posts, to be filleted with a 2" dressed, beveled strip.

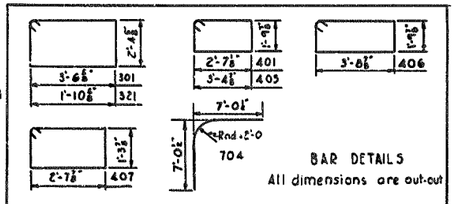
Edge distance front face of concrete to ℄ of near bar to be 2" unless noted otherwise

Pier piles to be driven to full penetration if practicable but at least to 20 Ton bearing value.

**Specifications:**
Construction: Iowa State Highway Commission Specifications Series 1932

| CONCRETE PLACEMENT QUANTITIES | |
|---|---|
| ONE ABUTMENT | |
| Footing | 20.4 cu.yd |
| Wingwalls | 3.7 cu.yd |
| Wing Posts, Class 'C' | 1.25 cu.yd |
| ONE PIER | |
| Footing | 10.2 cu.yd |
| Shaft (below joint) | 14.1 cu.yd |
| Cap (above joint) | 12.8 cu.yd |



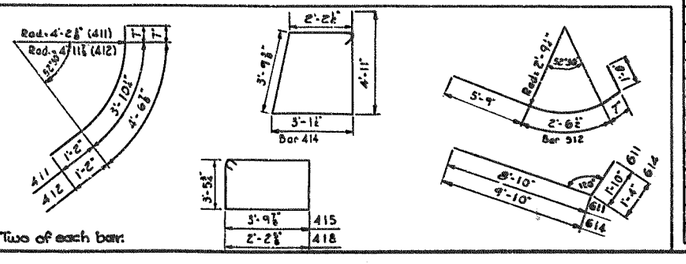

| BILL OF REINFORCING - ONE PIER | | | | | | |
|---|---|---|---|---|---|---|
| Mark | Location | Shape | No | Size | Length | Weight |
| 301-21 | Column Hoops * | | 42 | 3 | varies | 168 |
| 401-5 | Cantilever Beam Hoops * | | 20 | 4 | varies | 136 |
| 405 | Beam Hoops | | 34 | 4 | 11'-7" | 263 |
| 407 | Strut Hoops | | 16 | 4 | 8'-5" | 90 |
| 408 | Footings Horizontal | —— | 26 | 4 | 7'-0" | 122 |
| 501 | Batt. Cantilever Beam | —— | 8 | 5 | 8'-0" | 67 |
| 601 | Beam & Strut Fillets | —— | 18 | 6 | 6'-0" | 162 |
| 701 | Beam, Batt. Longit. | —— | 10 | 7 | 20'-6" | 419 |
| 702 | " Top " | —— | 4 | 7 | 29'-10" | 244 |
| 703 | " " " | —— | 8 | 7 | 11'-9" | 192 |
| 704 | Column & Beam | —— | 8 | 7 | 13'-2" | 215 |
| 705 | Strut Longit. | —— | 8 | 7 | 20'-6" | 355 |
| 706 | Column Vertical | —— | 20 | 7 | 25'-0" | 1022 |
| | | | | | Total | 3435 |

*Two of each bar.

| ESTIMATED QUANTITIES | | |
|---|---|---|
| Part | 2 Abuts. | 2 Piers |
| Concrete, Class 'A' | 48.2 cu.yd | 74.2 cu.yd |
| " , Class 'C' | 2.5 cu.yd | |
| Reinforcing Steel | 2820 lbs. | 6870 lbs. |
| Creosoted Piles | 26 @ 40' | |
| Untreated Piles | | 36 @ 30' |
| Class '20' Exc. | 107 cu.yd | 43 cu.yd. |
| Class '21' Exc. | | 102 cu.yd. |

| BILL OF REINFORCING - ONE ABUTMENT | | | | | | |
|---|---|---|---|---|---|---|
| Mark | Location | Shape | No | Size | Length | Weight |
| 411 | Wing Post FFH | | 4 | 4 | 5'-7" | 15 |
| 412 | Wing " BFH | | 4 | 4 | 6'-4" | 17 |
| 413 | " " Vertical | | 26 | 4 | 3'-2" | 55 |
| 414 | Bridge Seat Hoops | | 22 | 4 | 14'-2" | 208 |
| 415-8 | Wing Footing Hoops * | | 8 | 4 | varies | 72 |
| 511 | Wing Wall FFH | | 2 | 5 | 6'-8" | 14 |
| 512 | " " BFH | | 4 | 5 | 10'-6" | 44 |
| 513 | Wing Wall Both Faces V. | | 20 | 5 | 3'-3" | 68 |
| 611-14 | Wing Footing FFH * | | 9 | 6 | varies | 132 |
| 615 | " " BFH | | 6 | 6 | 10'-3" | 123 |
| 711 | Bridge Seat Longit. | | 9 | 7 | 29'-6" | 545 |
| | Spirals Complete | Wire | 13 | | | 117 |
| | | | | | Total | 1410 |

*Two of each bar.



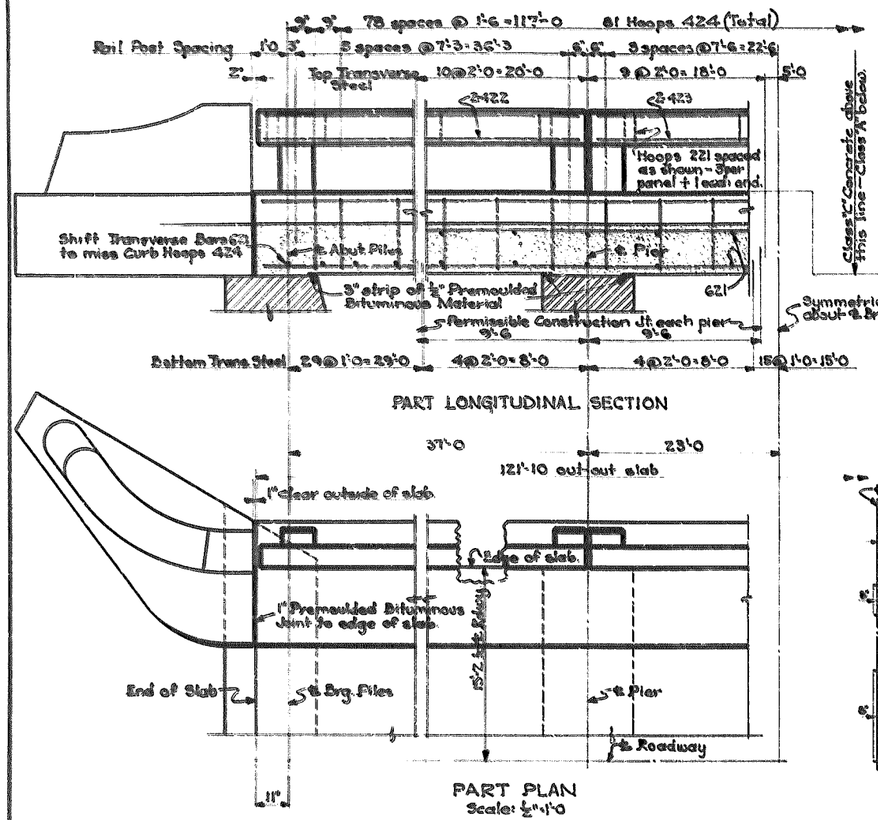

Design for
120' x 26' CONT. CONCRETE SLAB BRIDGE
End Spans 37'-0 Center Span 46'-0
Concrete Rail & Substructure. 2'-0 Safety Curbs.
ABUTMENT & PIER DETAILS
Sta. 243+47.00 Proj. F-245
WOODBURY COUNTY
Iowa State Highway Commission.
February 1952. Sheet 2 of 3

Location:
Over Reynolds Creek
On Relocation Iowa Primary #175
Section 33
Liston Township
Woodbury County

2/3

Design No. 6451 Woodbury Co. File No. 13949 C&D
Designed by: [illegible] Traced by: [illegible] Checked by: [illegible]

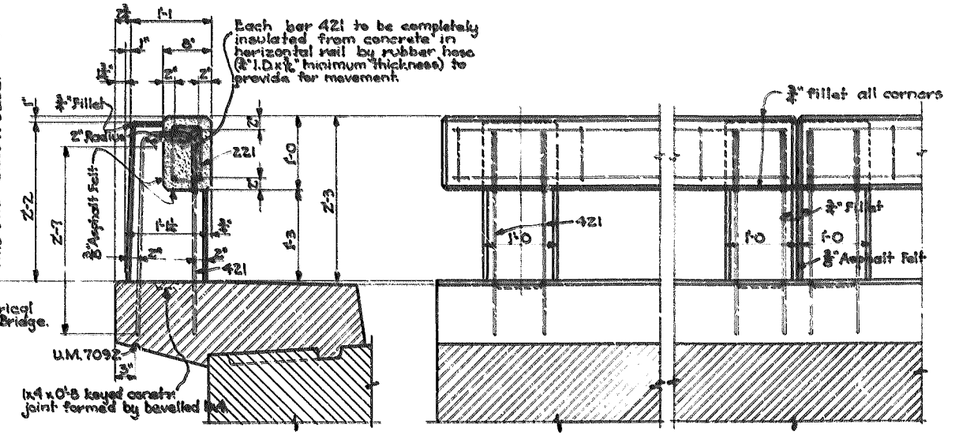
Des. 6451 Woodbury Sheet 2 of 3



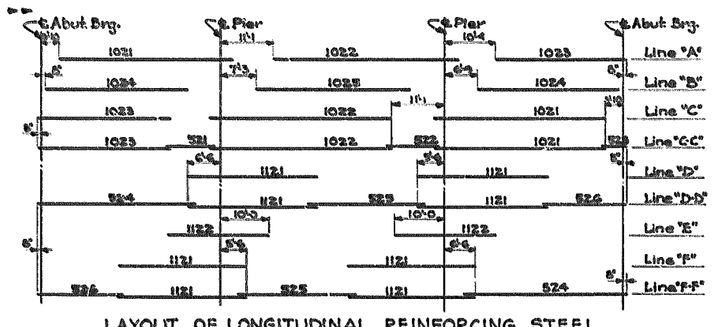

PART LONGITUDINAL SECTION



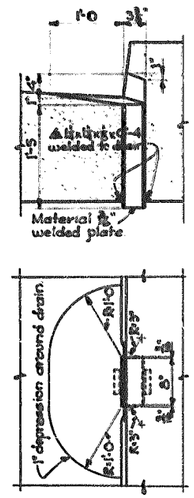

PART PLAN
Scale: ½"=1'-0




RAIL DETAILS
Scale: 1"=1'-0



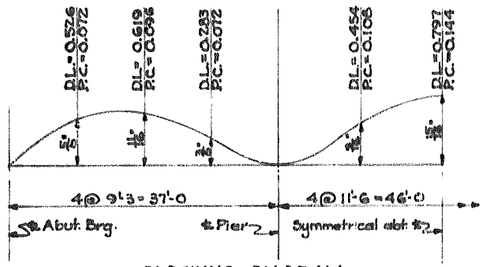

LAYOUT OF LONGITUDINAL REINFORCING STEEL
Note: Bar laps in Line "C-C" are 1'-1; those in Lines "D-D" & "F-F" are 1'-10.




DRAIN DETAILS
Scale: 1"=1'-0

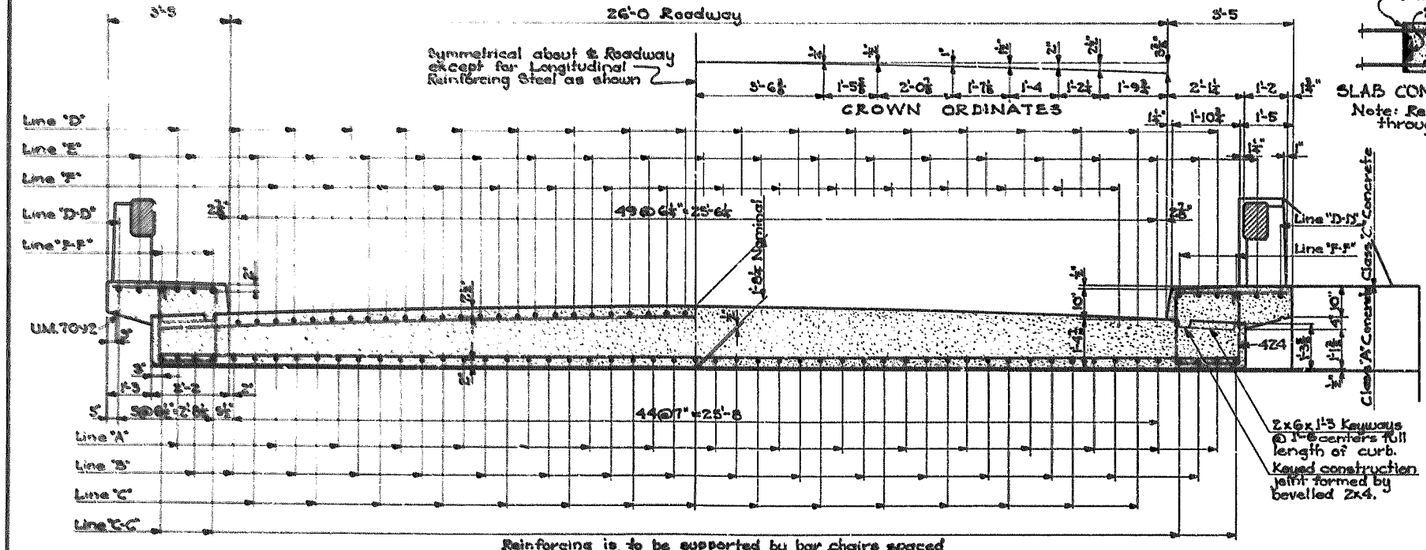
8 Drains Required
Weight: 21.2 lbs. each
See "Situation Plan on Sheet 1 for location.

| BILL OF REINFORCING - SUPERSTRUCTURE. | | | | | | |
|---|---|---|---|---|---|---|
| Mark | Location | Shape | No. | Size | Length | Weight |
| 221 | Rail Hoops | □ | 100 | 2 | 2'-10 | 47 |
| 421 | Rail Post, Vertical | ▭ | 76 | 4 | 6'-2 | 313 |
| 422 | Rail, Horiz., End Span | —— | 16 | 4 | 37'-4 | 399 |
| 423 | " " Center Span | —— | 16 | 4 | 23'-3 | 248 |
| 424 | Curb Hoops | □ | 162 | 4 | 9'-3 | 1001 |
| 521 | Curb, longit., bottom | —— | 4 | 5 | 3'-11 | 42 |
| 522 | " " " | —— | 4 | 5 | 16'-8 | 45 |
| 523 | " " " | —— | 4 | 5 | 5'-7 | 23 |
| 524 | " " top | —— | 6 | 5 | 33'-0 | 207 |
| 525 | " " " | —— | 6 | 5 | 24'-2 | 152 |
| 526 | " " " | —— | 6 | 5 | 18'-6 | 116 |
| 621 | Slab, transv., top & bott. | —— | 145 | 6 | 30'-0 | 6534 |
| 1021 | Slab & curb, longit., bott. | —— | 36 | 10 | 36'-9 | 5538 |
| 1022 | " " " " | —— | 36 | 10 | 37'-6 | 5809 |
| 1023 | " " " " | —— | 36 | 10 | 27'-4 | 4234 |
| 1024 | Slab, longit., bottom | —— | 34 | 10 | 29'-7 | 4328 |
| 1025 | " " " | —— | 17 | 10 | 31'-6 | 2304 |
| 1121 | Slab & curb, longit., top | —— | 82 | 11 | 26'-6 | 11,545 |
| 1122 | Slab, longit., top | —— | 42 | 11 | 20'-9 | 4680 |
| | | | | Total | | 47515 # |




BLOCKING DIAGRAM

Note: This diagram shows permanent camber (P.C.) and total anticipated dead load deflection (D.L.), including plastic flow. These figures do not include any allowance for form settlement. Total anticipated dead load deflection based on n=30.




Reinforcing is to be supported by bar chairs spaced at not more than 3'-0 c-c longitudinally & transversely.

HALF SECTION NEAR PIER
Scale: ½"=1'-0

HALF SECTION NEAR ABUTMENT
Scale: ½"=1'-0




SLAB CONSTR. JOINT
Note: Reinforcing runs through joint.

| PLACEMENT QUANTITIES | |
|---|---|
| Slab | 217.3 c.y. |
| Curbs | 29.3 c.y. |
| Rail Posts Class "C" | 2.5 c.y. |
| Rails Class "C" | 6.0 c.y. |
| | |

| ESTIMATED QUANTITIES | |
|---|---|
| Concrete, Class "A" | 246.6 c.y. |
| Concrete, Class "C" | 8.5 c.y. |
| Reinforcing Steel | 47,515 lbs. |
| | |

Location:
Over Reynolds Creek
On Relocation Iowa Primary #175
Section 33
Liston Township
Woodbury County

SUPERSTRUCTURE NOTES:

This bridge is designed for H 20-44 Loading plus 19 lbs/ft² of roadway for future wearing surface. The slab as shown includes ¾" wearing surface.

Allowable $f_s$ for steel = 20,000 psi.

Allowable $f_c$ for concrete = 1200 psi.

All exposed corners of 90° or sharper are to be filleted with ¾" dressed and bevelled strips.

This bridge is designed so that an increase in the live load and impact of 100% will not increase the total stress to more than 150% of specification stresses.

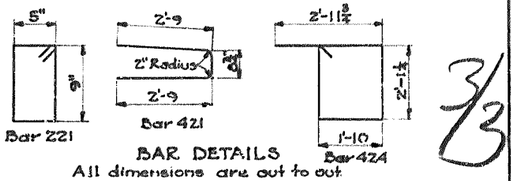
Concrete slab is to be placed with a minimum of construction joints. Locations of permissible construction joints are shown on Part Longitudinal Section. Each curb may be placed in one continuous run from end to end of bridge.

Cost of steel drains to be included in price bid for Class "A" concrete.

SPECIFICATIONS:

Design: AASHO Series of 1949 modified as above.

Construction: Iowa State Highway Commission Specifications, Series of 1952.




BAR DETAILS
All dimensions are out to out

3/3

Design for
120'x 26' CONTINUOUS CONCRETE SLAB BRIDGE
37'-0 End Spans — 46'-0 Center Span
Concrete Rail & Substructure — 2'-0 Safety Curbs
SUPERSTRUCTURE DETAILS
Sta. 243 + 47.00 Project F-245
WOODBURY COUNTY
Iowa State Highway Commission
February 1952 Sheet 3 of 3

Design 6451 Woodbury County File No. 13949

Quantities by [illegible] & [illegible]. Designed by [illegible] Traced by [illegible] Checked by: E. [illegible]