

RELIANCE STEEL PRODUCTS COMPANY

Reliance Steel Products Company fabricated its first STEEL BRIDGE FLOOR approximately 40 years ago. Since then the company has furnished grid floors on well over 3,000 projects. The floors currently being manufactured have been field tested and can be used with the assurance that the floor will perform satisfactorily. This experience has been gained on such prestigious projects as the:

George Washington Bridge Benjamin Franklin Bridge Walt Whitman Bridge Koskiosko Bridge 59th St. Bridge Patapsco Tunnel Expressway Sunshine Bridge and many bascule bridges throughout the United States.

ADVANTAGES

- 1. Maintenance free
- 2. Lightweight construction
- 3. Speedy installation
- 4. Factory controlled quality
- Composite action with supporting steel
- Minimal traffic disruption when used to repair an existing structure
- 7. Eliminates problem areas at construction joints, expansion dams and scuppers.

COMPOSITE ACTION

Substantial savings can be realized by utilizing the composite action between grid floors and supporting members to reduce the amount of steel required in the superstructure. Grid floors are either welded or bolted to the supporting members, causing the floor and supporting member to act integrally. This composite action can be taken advantage of in the design of new structures or in the rehabilitiation of old structures.

PRECAST PANELS

To minimize traffic disruption, bridge decks can be filled with concrete and cured before erection on the bridge. This procedure will speed erection time, which is highly advantageous in congested metropolitan areas.

TEST DATA

For further information please contact our engineering department.



A modified 5" Weldlock Type C was chosen for the redecking operation on the Tobin Memorial Bridge over the Mystic River in Boston, Massachusettes.



Owing to its light weight and superior design, Reliance 5" Weldlock Type H was selected for the deck on this bascule span in Florida.



Workmen placing Reliance Orthotropic sidewalk in place without need for special equipment. Reliance can furnish, to your specifications, sidewalk panels fabricated for ease of installation and reduced erection costs.



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ENGINEERING ASSISTANCE

With over 40 years experience, Reliance engineers can design and engineer any feasible installation. No job is too big, too small or too complicated. We appreciate the opportunity to work with the engineer in the early planning stages; at which time we can, if requested, furnish estimates for budget purposes. To serve you more quickly and efficiently, Reliance maintains engineering staffs in both Pennsylvania and Alabama.

FOR OPEN GRATINGS REFER RELIANCE CATALOG RSL-18 SWEETS 5.6/Re

RELIANCE CONCRETE-FILLED FLOORS

Concrete-filled grid floors have been used on bridges for over 40 years. The performance of these floors has been far superior to the standard reinforced concrete deck. The combined action of tire studs, salt and high traffic density has caused the standard reinforced concrete deck to erode rapidly, spawl and crack. Disruption in traffic and the actual cost of replacement of the floor are so high that it is often impossible to calculate the true cost of maintenance. It is for this reason that engineers should always consider the use of grid floors on new bridges and in the replacement of an existing floor slab.

Grid floors are shop fabricated in large panels including form pans and all necessary longitudinal and transverse reinforcement. Panels are set on the bridge stringers and welded in place. Shear studs are not necessary. The grid is filled with concrete and screeded flush to the top of the steel grid. A wearing surface of asphaltic concrete can then be applied or traffic can ride on the armoured grid surface. Over the last forty years, many floors of this design have been in use. During this period, the only significant maintenance requirement has been the painting of the underneath surface of the roadway at the same time as the rest of the structure was painted. The properly designed floors do not exhibit longitudinal, transverse or diagonal cracks. Because of the cellular structure, it resists water leakage through the floor. When an asphalt riding surface is not applied, the only deterioration of the floor is caused by normal wear of the top surface. This is an exceedingly slow process and is limited to cupping of the concrete.

When the amount of traffic has exceeded the design capacity of a bridge, rather than build a new and expensive structure, it is frequently possible to widen the existing roadway with the use of a lightweight concretefilled grid. This can be accomplished without stopping the existing traffic. Reliance Steel Products Company has had a wide range of experience in widening of existing structures and the information in our files is available on request.

PRECAST PANELS

To minimize traffic disruption, bridge decks can be filled with concrete and cured before erection on the bridge.

ENGINEERING ANALYSIS

LOAD:

The traffic loads are as defined by ASSHO Specs. 1973, Art. 1.2.5. The spans on which the grid flooring is placed are in most cases smaller than the center-to-center distance of 14'0 between axles. Therefore, the heaviest axle governs the design.

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Proper live-load impact factor is considered in all the designs as per Art. 1.2.12, where the maximum impact factor is 30% of the live load.

The distribution of wheel load and bending moments are calculated in accordance with Art. 1.3.6 and Art. 1.3.2.

STRENGTH OF SECTION:

The strength of composite steel and concrete flooring is determined by means of the "Transformed area" method with appropriate N value.

The allowable stresses in steel and concrete conform to the limits set forth in Art. 1.5.1 and Art. 1.7.1.

ANALYSIS:

As an example, let us check the stresses on a given span for $4\frac{1}{4}$ " I-beam Interlock flooring with traffic transverse to the main members. The net section properties of I-beam alone in (in.)³ per ft. are:

Positive: St = 3.285 Sb = 3.348Negative: St = 2.977 Sb = 3.680

The composite section properties with N=10, in $(in.)^3$ per ft. of slab are:

Positive: Sc = 57.82 Sst = 3.53

Negative: Sc = 58.34 Sst = 3.10

The theoretical dead weight of steel and concrete is 61.5 psf. The maximum center-to-center between supports, as given in the table on page 6, is 7'7", continuous on three or more supports. Assuming a flange width of 7" for the support stringer, the effective span will be $7'3\frac{1}{2}$ ".

The live-load bending moment for H-20 wheel load as per Art. 1.3.2 is therefore:

 $M^{LL} = \frac{0.8 (7.29+2) \times 16,000}{32} = 3716.0 \text{ lbs. ft./ft.},$

where 0.8 is the continuity factor. The impact factor is 30%, therefore: $M^{LL} + I = 3716.0 \times 1.3 = 4830.8$ lbs. ft./ft. For dead load, the bending moment is: $M^{DL} = \frac{61.5 \times (7.29)^2}{10} = 326.8$ lbs. ft./ft.

MAXIMUM STRESSES:

Positive

Steel: $f \perp + I = (4830.8 \times 12)/3.53 = 16,521.98$ $f \square = (326.8 \times 12)/3.348 = 1,171.45$ Total fs = 17,593.43 psi Concrete fc = (4830.8 x 12)/57.82 = 1,002.6 psi Negative Steel: $f \perp + I = (4830.8 \times 12)/3.10 = 18,699.87$ $f \square = (326.8 \times 12)/2.997 = 1,308.65$ Total fs = 20,008.52 psi Concrete: fc = (4830.8 x 12)/58.34 = 993.65 psi

All stresses meet the allowable limits of 1200 psi for concrete and 20,000 psi for A36 steel. The design is, therefore, satisfactory.

3" I-BEAM WELD

This design was developed for use where the flooring is placed without an overfill. The surface wear of several years of traffic is uniform and excellent riding qualities are maintained. 3" I-Beam Weld is available in panels up to 6' wide and 48' long.

SUGGESTED SPECIFICATIONS:

The bridge flooring shall be 3" I-Beam Weld as manufactured by Reliance Steel Products Company or equal. The flooring shall consist of special I-Beams 3" x 4.5 lbs., at 4" on centers inter-sected at right angles with 1/2" x 3/16" cross bars spaced at 4" on centers. The beams and the cross bars shall be pressure welded at intersecting points. Bottom cross bars 5/8" diameter shall be provided at 8" on centers in the middle half of every span. A dished No. 20 gauge form pan shall rest between the 3" I-Beams on their bottom flanges and tack welded in shop. When filled flush with concrete. the bridge flooring shall be capable of carrying an AASHO H-20 load on the design span. One shop coat of T-779 Red Lead Primer shall be provided on the exposed surfaces only. The surfaces in contact with concrete shall not be painted. The theoretical weight of steel in the floor shall be 16.17 lbs. per sq. ft. FINISH:

Any approved shop coat of paint can be applied. Manufacturer's standard shop paint T-779 Red Lead Primer is recommended.







CONCRETE REQUIREMENT: 0.00853 CU. YDS. PER SQ. FT.

DESIGN PROPERTIES	MAXIMUM SAFE SPANS (CONTINUOUS) FOR ALLOWABLE STRESSES AASHO H-20 LOADING							
WEIGHT WITH CONC. = 49.3 PSF WEIGHT STEEL ONLY -	BEAMS TRANSVERSE TO TRAFFIC TO TRAFFIC							
16.17 PSF	A36	A588	A36 A588					
N = 10 Sc = 37.26 Sst = 2.57 in. ³ /ft.	5'2¾″	5′2¾′′	4′2¼″	4′2¼″				
N = 8 Sc = 32.00 Sst = 2.62 in. ³ /ft.	6′3½″	7′1″	4′9¾′′	5'3½"				

STANDARD 41/4" & 5" I-BEAM INTERLOCK

The 4¼" and 5" I-Beam Interlock are the most widely used of the concrete grid floors. When used in areas of intense traffic on major highways, the surface does not show any significant cracks and the effect of wearing is limited to a moderate amount of cupping in the exposed concrete. It is an ideal floor to use for replacing existing concrete slabs or widening existing bridge. 4¼" and 5" are generally available in panels up to 8' wide and 48' long.

SUGGESTED SPECIFICATIONS: (Example)

The bridge flooring shall be standard 41/4" I-Beam Interlock as manufactured by Reliance Steel Products Company or equal. The flooring shall consist of special I-Beams 41/4" x 5.0 lbs., placed at 6" on centers, intersected at right angles with 11/4" x 3/16" cross bars spaced at 4" on centers. The beams and the cross bars shall be securely interlocked. Bottom cross bars, 5/8" diameter, shall be provided at 8" on centers, in the middle half of every span. A dished No. 20 gauge form pan shall rest between the 41/4" 1-Beams on their bottom flanges and tack welded in shop. When filled flush with concrete, the bridge flooring shall be capable of carrying an AASHO H-20 load on the design span. One shop coat of T-779 Red Lead Primer shall be provided on the exposed surfaces only. The surfaces in contact with concrete shall not be painted. The theoretical weight of steel in the floor shall be 15.46 lbs. per sq. ft. FINISH:

Any approved shop coat of paint can be applied. Manufacturer's standard shop paint, T-779 Red Lead Primer is recommended.

COMPOSITE ACTION

Substantial savings can be realized by utilizing the composite action between grid floors and supporting members to reduce the amount of steel required in the superstructure. This action can be taken advantage of in the design of new structures or in the rehabilitiation of old structures.

CONCRETE REQUIREMENTS PER SQ. FT.							
4¼" Standard	0.0119 Cu. Yds.						
5" Standard	0.0143 Cu. Yds.						



4¹/₄" I-BEAM INTERLOCK

DESIGN PROPERTIES	MAXIMUM SAFE SPANS (CONTINUOUS) FOR ALLOWABLE STRESSES AASHO H-20 LOADING							
WEIGHT WITH CONC. = 61.5 PSF	TRANS	VERSE	PARALLEL					
WEIGHT STEEL ONLY = 15.46 PSF	A36	A588	A36	A588				
N = 10 Sc = 57.82 Sst = 3.10 in ³ /ft.	7'7''	8'7"	5'7½″	6′2¾″				
N = 8 Sc = 50.18 Sst = 3.12 in ³ /ft.	7'7½″	10′6¼″	5'7¾''	7′5¼″				

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5" I-BEAM INTERLOCK

DESIGN PROPERTIES	MAXIMUM SAFE SPANS (CONTINUOUS) FOR ALLOWABLE STRESSES AASHO H-20 LOADING							
WEIGHT WITH CONC. = 73.34 PSF	TRANS	VERSE	PARALLEL					
WEIGHT STEEL ONLY = 18.21 PSF	A36	A588	A36 A588					
N = 10 Sc = 85.12 Sst = 4.377	10′5½″	12′2 ½″	7'7½''	8′9%″				
N = 8 Sc = 73.88 Sst = 4.40	10'6"	14'1"	7'8''	10′1¼″				

4¼" AND 5" I-BEAM INTERLOCK

For the most economical design it is recommended that the spacing of the I-Beams be determined by the span and loading conditions. The use of special spacings should be limited to large projects. For major highways it is recommended that a minimum of 1¾" black top or contrete overfill be used as a wearing surface.

SUGGESTED SPECIFCATIONS: (Example)

The bridge flooring shall be 5" I-Beam Interlock as manufactured by Reliance Steel Porducts Company or equal. The flooring shall consist of special I-Beams 5" x 6.38 lbs., placed at 9" on centers, intersected at right angles with 11/4" x 3/16" top cross bars spaced at 16" on centers. The beams and cross bars shall be securely interlocked. Bottom cross bars, %" diameter, shall be provided at 8" on centers in the middle half of every span. A dished No. 20 gauge form pan shall rest between 5" I-Beams on their bottom flanges and tack welded in shop. When filled with concrete, the bridge flooring shall be capable of carrying an AASHO H-20 load on the design span. One shop coat of T-779 Red Lead Primer shall be provided on the exposed surfaces only. The surfaces in contact with concrete shall not be painted. The theoretical weight of steel in the floor shall be 12.2 lbs. per sq. ft. (not including concrete). FINISH:

Any approved shop coat of paint can be applied. Manufacturer's standard shop paint, T-779 Red Lead Primer, is recommended.

PRECAST PANELS:

4¹/₄" and 5" I-Beam Interlock decks can be filled with concrete and cured before erection on the bridge. This procedure is invaluable for speedy erection in congested areas and on bridges carrying high volumes of traffic. The attachment to bridge stringers, either by bolting or welding, is determined by the individual project.

COMPOSITE ACTION

Grid floors are either welded or bolted to the supporting members, causing the floor and supporting member to act integrally. This composite action can be taken advantage of in the design of new structures or in the rehabilitiation of old structures.

Substantial savings can be realized by utilizing the composite action between grid floors and supporting members to reduce the amount of steel required in the superstructure.





H-20 LOAD MAXIMUM SAFE SPAN (CONTINUOUS) FOR ALLOWABLE STRESSES

'A'	DE	SIGN PROP	PERTIES	6	N	= 10 fo	c = 1200	psi
4¼″	WT.	WT.	Scon	Sst	TRANS	VERSE	PARA	LLEL
Spacing	only)	concrete)	In.³/ft.	in.³/ft.	A-36	A-588	A-36	A-588
7	12.2	59.6	51.6	2.68	6′4½″	7'7"	4'11"	7'¼″′
8	11.1	58.8	47.7	2.36	5′5½″	6′11½″	4'4½″	5′2¾″
9	10.3	58.2	44.6	2.11	4′8½″	6'5¼″	3′11½″	4'11"
'A'	DE	SIGN PRO	PERTIES	S	N = 10 fc = 1200 psi			
5″	WT.	WT.	T. TRANSVERSE PARALLEL			LLEL		
I-BEAM Spacing	(Steel only)	(With concrete)	Scon in.³/ft.	Sst in.³/ft.	A-36	A-588	A-36	A-588
7	14.6	70.2	77.7	3.77	9′2½″	11′6¼″	6′8¼″	8′1½″
8	13.2	69.3	71.6	3.32	8′0½″	10′7 ½″	5′11½″	7′6½″
9	12.2	68.5	66.4	2.96	7′0½″	9′10″	5′4½″	7′0½″
10	11.3	67.9	62.2	2.68	6′3½″	8′10½″	4′10½′′	6′5¼″

NOTE: Weight of wearing surface not included.

NOTE: For additional information contact our engineering department.

5" WELDLOCK TYPE "C"

Reliance Type C Weldlock combines maximum carrying capacity and rigidity with economy. The floor can be used in conjunction with open grid flooring, Reliance Type H. Since 2¾" of concrete is encompassed within the grid structure, it is recommended that 1¾" to 2½" of overfill be used. Panels can be furnished 48' long and 8' wide.

SUGGESTED SPECIFICATION: The bridge flooring shall be Type 'C' Weldlock as manufactured by **Reliance Steel Products Company or** equal. The flooring shall consist of special I-Beams 5" 5.54 lbs. spaced at 8" on centers. Two supplementary bars 1" x 5/16" shall be spaced equally between the I-Beams. The cross bars shall be 2" x 3/16" spaced at 4" on centers intersecting the I-Beams and supplementary bars at right angles and securely interlocked. A dished No. 20 gauge form pan shall be provided between the beams resting on the middle flanges of the I-Beams and tack welded in shop. When filled with concrete, the bridge flooring shall be capable of carrying an AASHO H-20 load on the design span. Areas of grid flooring not in contact with concrete shall be painted with one shop coat of T-779 Red Lead Primer after fabrication. The weight of steel in the floor shall be 17.40 per sq. ft. (without concrete). FINISH:

Any approved shop coat of paint can be applied. Manufacturer's standard shop paint, T-779 Red Lead Primer, is recommended.

5" TYPE C CONCRETE REQUIREMENT: 0.00823 CU. YDS. PER SQ. FT.

PRECAST PANELS:

5" Weldlock Type C decks can be filled with concrete and cured before erection on the bridge. This procedure is invaluable for speedy erection in congested areas and on bridges carrying high volumes of traffic.

COMPOSITE ACTION

Substantial savings can be realized by utilizing the composite action between grid floors and supporting members to reduce the amount of steel required in the superstructure. Grid floors are either welded or bolted to the supporting members, causing the floor and supporting member to act integrally. This composite action can be taken advantage of in the design of new structures or in the rehabilitiation of old structures.





AVG. WT. OF STEEL ONLY = 17.4 PSF

TYPE OF STEEL	WEIGHT	SECTI PROPE POSITIVE in. ³ /ft.		ONAL RTIES NEGA in.3	TIVE /ft.	*MAXIMUM SPAN FOR ALLOWABLE STRESSES H-20 LOAD		N = 8 fc = 1,800 psi
SIEEL	n	Sc	Sst	Sc	Sst	SIMPLE	CONT.	fs = 20,000 psi (A-36)
A-36	50.65	70.8	4.47	4.86	4.22	6′-5″	7'-4''	fs = 27,000 psi (Low Alloy)
A-588	50.65	70.8	4.47	4.86	4.22	7'-10″	9'-6"	

NOTE: For additional information contact our engineering department.

TYPICAL CONSTRUCTION DETAILS



RELIANCE OPEN GRID BRIDGE FLOORS

The design of steel grid floors is guided by current AASHO standards. They are skid-resistant, permanent, and practically eliminate maintenance. All Reliance open steel grid floors are serrated to make them non-skid.

Old bridges that would otherwise have to be dismantled or abandoned, or have their load-carrying capacity seriously impaired, may have many years of usefulness added to them by replacement of their present floors with the lightweight flooring. Welded reinforcing provided by the floor panels adds rigidity and raises the carrying capacity of the bridge to modern traffic load demands.

In areas where floods are a problem, experience has shown the open steel grid to be most satisfactory. The complete lack of buoyancy and the weight of the steel bridge hold the structure in position with the least amount of damage and replacement cost.

The use of the open grid floor has found wide acceptance for roadways on bascule and lift bridges. Owing to the lightness of the flooring, the load handled by the machinery is considerably reduced. The cost of the original structure and subsequent maintenance costs make the grid floor the most logical choice for use on movable bridge spans.

The floor provides approximately 80% open area. This open area results in a low wind resistance which is particularly important for bascule spans and the solution of aerodynamic problems on long span bridges.



ENGINEERING ANALYSIS

I OAD.

The traffic loads H-10, H-15, and H-20 are as defined by AASHO Specs. 1973, Art. 1.2.5. The axle loads for H-20, H-15 and H-10 trucks are respectively 32,000 lbs., 24,000 lbs. and 16,000 lbs. Because the spans on which the grid flooring is used are small, only the heaviest axle governs the design. Therefore, for HS-20 and HS-15 trucks, the loads are the same as for H-20 and H-15 trucks respectively.

Proper live-load impact factor is considered in all the designs as per Art. 1.2.12., the maximum impact factor being 30% of the live load.

The distribution of load on the grid floors is in accordance with Art. 1.3.6, which states that "A wheel load shall be distributed, normal to the main bars, over a width equal to 11/4 inches per ton of axle load plus twice the distance center-to-center of main bars. The portion of the load assigned to each main bar shall be applied to the bar uniformly over a length equal to the rear tire width (20 inches for H-20, 15 inches for H-15)."

STRENGTH OF SECTION:

The strength of section is determined by moment of inertia method. Serrations and punched holes for various members are taken into consideration and the design is based on the net section properties.

Allowable stresses in tension and in compression conform to the limits set forth in Art. 1.7.1 and depend on the type of material used.

ANALYSIS:

For example, let us check the stresses on a specified span for 20R5, Type 'R' Rectagrid for H-20 loading, A36 steel. The section properties of which are:

Stop = 1.5563

Sbot = 1.4280 in³ / 6" element

The allowable compressive stress in the 1 x 5/16 supplementary bar is obtained by AASHO formula:

fc = 20,000 - 7.5 (4/.3125)² = 18771.2 PSI

The allowable tensile stress fs = 20,000 psi.

The maximum center-to-center distance between supports is 3'11¾" in the table.

Assuming the flange width is 7" for the supporting stringers, the effective clear span is: (3'11%'' - %'') - %(7'') = 3'8%'' or 44.25"

The load is H-20 with maximum wheel load of 16,000 lbs. For a span of 3'81/4", the impact factor is 30% and, therefore, the live load plus impact load is $16,000 \times 1.3 = 20,800$ lbs.

The distribution of the load is: 11/4 x 16T + 2 x 6" = 32" normal to the main bars and 20" parallel to the main bars. This, the effective load including impact on a 6" element is:

(20,800)/(32/6) = 3,900 lbs.

The design moment on continuous span is:

 $M_{LL} + I = P/2 (L/2 - d/4) \times 0.8$

= 3900/2 (44.25/2 - 20/4) x 0.8 = 26,715 lbs.-in.

Therefore, the maximum stresses are:

ft = M/1.5563 = 17,165.7 psi.

fb = M/1.4280 = 18,707.9 psi.

Both the stresses are within allowable limits. Hence the design is satisfactory.

The dead weight of grid flooring is not significant compared to the live load, therefore, it is ignored in the design calculations.

5" WELDLOCK TYPE "H"

Reliance Type H Weldlock bridge flooring is constructed of specially designed I-Beams. Federal, state, county, and municipal governing bodies accept this floor as a standard in their specifications. This well designed floor is widely used and when properly installed will be maintenance free for an extended period after installation. Should a weld be damaged under unusual traffic abuse, the floor can be repaired easily.

SUGGESTED SPECIFICATION:

The bridge flooring shall be Type 'H' Weldlock as manufactured by Reliance Steel Products Company or equal. The flooring shall consist of special I-Beams 5" x 5.54 lbs. spaced at 8" on centers. Two supplementary bars equally spaced between I-Beams shall be 1" x 5/16". The I-Beams and the supplementary bars shall be intersected at right angles by cross bars 2" x 1/4" spaced at 4" on centers. The floor shall weigh approximately 17.33 PSF. The cross bars shall be securely interlocked with I-Beams. The top edges of all members shall be serrated and their top surface shall be in the same plane. The bridge flooring shall be painted with one shop coat of T-779 Red Lead Primer after fabrication. FINISH:

Any approved shop coat of paint can be applied. Manufacturer's standard shop paint, T-779 Red Lead Primer, is recommended.



Reliance flooring undergoing testing to determine stress distribution.





AVERAGE WEIGHT = 17.33 PSF

SECTIONAL PROPERTIES PER FOOT AVERAGE			*MAXIMU STR	JM SPAN I ESSES FC	FOR ALLO	WABLE AD
	C 11	.	A36 S	TEEL	A588 S	TEEL
M-I	5.м. Тор	BOTTOM	SIMPLE	CONT.	SIMPLE	CONT.
10.818 in.⁴	4.277 in. ³	4.070 in. ³	4′-11½″	5′-11 ½″	6′ -1 ½″	7′-4½″

*For spans over 6'-0 contact our engineering dept.

TYPE "R" RECTAGRID

The selection of the proper Type "R" floor is determined by the stringers or floor beam spacing on the bridge. Since the floor consists of standard bars, small jobs can be purchased from warehouse stocks. A stiff cross bar provides lateral distribution of loads. The top and bottom areas of main and supplementary bars are continuous. All joints are arc welded. This floor is recommended when the Type H cannot be used economically.

SUGGESTED SPECIFICATIONS: (Example)

The bridge flooring shall be Type 'R' Rectagrid as manufactured by Reliance Steel Products Company, No. 16R4, with 4" x 1/4" main bearing bars and 1" x 5/16" supplementary bars alternately spaced on 6" centers. The cross bar shall be 2" x 1/4" spaced on 4" centers intersecting main bars at right angles and securely interlocked. The holes punched in the main bearing bars shall be such that at least 3/4" material is available on top flange above the slots. All cross bars, bearing bars and supplementary bars shall be welded at their intersections. The bridge flooring shall be capable of carrying an AASHO H-20 load on a 2'-8" span. The flooring units shall be painted with one shop coat of T-779 Red Lead Primer after fabrication. The weight of the flooring is 14.24 lbs. per sq. ft.

FINISH:

Any approved shop coat of paint can be applied. Manufacturer's standard shop paint, T-779 Red Lead Primer, is recommended.







	PHYSICA	L PROP	ERTIES		MAXIMUM SAFE SPAN (CONTINUOUS)					
Peering	Cross		Min.	Туре	H-10	Loading	H-15 L	.oading	H-20 L	oading
Bearing Bar Size	Bar Size (in.)	Avg. WT. Sq. Ft.	Sec. Mod.in.3 per Element	ber	A-36 Steel	Low Alloy Steel	A-36 Steel	Low Alloy Steel	A-36 Steel	Low Alloy Steel
13/64	2 x 1/4	12.18	0.4658	14R3	2′0″	2′2″	2′0″	2'1½"	2′0″	2'1½"
1/4		13.35	0.5631	14R4	2′2½″	2′7¾″	2′2½″	2'6"	2′2½″	2'6"
3-1/2 x 5/16		14.91	0.6907	14R5	2′7¼″	3′2½″	2′6″	2'11½"	2′6″	2'11¼"
3/8		16.47	0.8165	14R6	3′0″	3′9″	2′9½″	3'4¾"	2′9½″	3'4"
13/64	2 x 1/4	12.90	0.6279	16R3	2′3½″	2'8¼"	2′3¼″	2′6½″	2'3¼"	2′6½″
1/4		14.24	0.8147	16R4	2′10½″	3'6"	2′8½″	3′2½″	2'8½"	3′1¾″
4 x 5/16		16.02	0.9971	16R5	3′5½″	4'3¾"	3′2″	3′10½″	3'1½"	3′9″
3/8		17.80	1.1767	16R6	4′0¼″	* 4'11½"	3′7½″	4′6″	3'6½"	4′3¾″
1/4	2 x 1/4	15.13	0.9596	18R4	3′3″	4′0″	3′0″	3'7¼"	2′11¾″	3'6¼"
4-1/2 x 5/16		17.13	1.1666	18R5	3′11¼″	4′11¼″	3′6½″	4'4½"	3′5½″	4'2¼"
3/8		19.14	1.3675	18R6	4′6¾″	* 5′6¾″	4′6¾″	5'0¾"	3′11″	4'9¾"
5 x 5/16 3/8	2 x 1/4	16.02 18.25 20.48	1.1779 1.4280 1.6731	20R4 20R5 20R6	3′10″ 4′7¾″ 5′5″	4′9″ 5′10½″ 6′4¼″	3′5¾″ 4′1¾″ 4′9½″	4′2½″ 5′1¾″ *5′9½″	3′4¾″ 3′11¾″ 4′6½″	4′0″3⁄4″ 4′10½″ *5′53⁄4″
5/16	2 x 1/4	19.36	1.7888	22R5	5′5″	6′10¾″	4′9¼″	5′11¾″	4′6½″	5′7½″
5-1/2 x 3/8		21.81	1.9996	22R6	6′4″	* 7′2¼″	5′6¼″	*6′6½″	5′2½″	*6′2¼″
7/16		24.27	2.2379	22R7	7′2″	* 7′7″	6′1½″	*6′10¾″	5′9″	*6′6½″
5/16	2 x 1/4	20.48	2.0105	24R5	6′3″	* 7′6¾″	5′5½″	*6′10½″	5′2″	6′5″
6 x 3/8		23.15	2.3498	24R6	7′3¾″	* 8′0¾″	6′4″	*7′3¾″	5′11¼″	*6′11¼″
7/16		25.83	2.5986	24R7	8′1½″	* 8′6″	6′11½″	*7′8¾″	6′6″	*7′3¾″
5/16	2 x 1/4	21.59	2.3346	26R5	7′1¾″	* 8'4¾"	6'2¼"	*7′7¾″	5′9¾″	*7′2¾″
6-1/2 x 3/3		24.49	2.7000	26R6	8′3¾″	* 8'11½"	7'1½"	*8′1¾″	6′7¾″	*7′8½″
7/16		27.38	2.9924	26R7	9′2¾″	* 9'5¾"	7'1½"	*8′7¼″	7′3¾″	*8′1¾″
5/16	2 x 1/4	22.71	2.6817	28R5	8'1½"	* 9'3¼″	6'11½"	*8′5″	6′6″	*7′11¾″
7 x 3/8		25.83	3.0791	28R6	9'4½"	* 9'8″	8'0"	*9′0″	7′5″	*8′6″
7/16		28.94	3.4200	28R7	* 9'11¾"	* 9'11¾″	8'10½"	*9′5½″	8′2½″	*9′0″
5/16	2 x 1/4	23.82	3.0526	30R5	9′1½″	* 9'9¾"	7′9¾″	*9'3″	7′3″	*8'4″
7-1/2 x 3/8		27.16	3.4877	30R6	*10′2½″	*10'2½"	8′11¼″	*9'8″	8′3″	*9'4″
7/16		30.50	3.8818	30R7	*10′7″	*10'7"	9′11½″	*9'11¾″	9′2″	*9'8″

*Adjusted to come within the limits of maximum allowable deflection.

STANDARD RECTAGRID

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This floor can take severe impact and occasional overloads without damage and is the most economical for short spans.

SUGGESTED SPECIFICATIONS (EXAMPLE)

The bridge flooring shall be Type 'S' standard Rectagrid as manufactured by Reliance Steel Products Company, No. 16S5 with 4" x 5/16" bearing bars spaced on 2%'' centers. The cross bars shall be 1" x 5/16" space on 4" centers. The bearing bars and cross bars shall be serrated and assembled such that all top surfaces shall be in the same plane. The cross bars shall be pressure welded to bearing bars forming an electroforged joint at the base of each intersection and to securely interlock the bars an arc weld shall be provided at the top of each intersection. The bridge flooring shall be capable of carrying an AASHO H-20 load on the design span. The flooring units shall be painted with one shop coat of T-779 Red Lead primer after fabrication. The weight of the flooring shall be 24.68 lbs. per sq. ft.







	PHYSICA	L PROP	ERTIES		MAXIMUM SAFE SPAN (CONTINUOUS)					
Dessine	Cross		Min.	Туре	H-10 I	oading	H-15 L	.oading	H-20 L	oading
Bearing Bar Size	Bar Size (in.)	Avg. WT. Sq. Ft.	Sec. Mod.in. ³ per Element	ber	A-36 Steel	Low Alloy Steel	A-36 Steel	Low Alloy Steel	A-36 Steel	Low Alloy Steel
2-1/2 x 13/64 1/4	3/4 x 5/16	11.12 13.14	0.2115 0.2604	10S3 10S4	1′11½″ 2′2″	2′2½″ 2′6″	1′11½″ 2′2″	2′2½″ 2′6″	1′11½″ 2′2″	2′2½″ 2′6″
2-3/4 x 13/64 1/4	3/4 x 5/16	12.00 14.24	0.2560 0.3150	11S3 11S4	2′1½″ 2′4½″	2′5″ 2′9½″	2′1½″ 2′4½″	2′5″ 2′9½″	2′1½″ 2′4½″	2′5″ 2′9½″
1/4 3 x 5/16 3/8	3/4 x 5/16	15.28 18.51 21.73	0.3750 0.4687 0.5624	12S4 12S5 12S6	2′7½″ 3′0½″ 3′5½″	3′1½″ 3′8″ 3′11½″	2′7½″ 3′0½″ 3′5″	3′1½″ 3′6″ 3′9″	2′7½″ 3′0½″ 3′5″	3′1½″ 3′5″ 3′8″
3-1/4 x 1/4	1 x 5/16	17.16	0.4400	1354	2′10½″	3′6″	2′10½″	3′5″	2'10½″	3′5″
1/4 3-1/2 x 5/16 3/8	1 x 5/16	18.23 22.00 25.75	0.5104 0.6379 0.7656	14S4 14S5 14S6	3′2″ 3′9½″ 4′5½″	3'11½" 4'5½" *5'6½"	3′2″ 3′8½″ 4′3″	3'10" 4'3" 4'7"	3′2″ 3′8½″ 4′3″	3′9″ 4′1½″ 4′5½″
3-3/4 x 1/4	1 x 5/16	19.31	0.5859	1554	3′6″	4′5″	3′5½″	4'2½"	3'51/2"	4'1"
1/4 4 x 5/16 3/8	1 x 5/16	20.38 24.68 29.00	0.666 0.8333 1.000	16S4 16S5 16S6	3′11″ 4′9″ 5′7″	4′11½″ *5′9½″ 6′0½″	3′9½″ 4′6½″ 5′3½″	4′7″ *5′8″ 5′10½″	3′9½″ 4′6″ 5′2½″	4′5½″ 4′11″ *5′9½″
4-1/4 x 1/4	1 x 5/16	21.45	0.7526	1754	4'3½″	5′6″	4'1½"	4′11½″	4'1½"	4'10"
1/4 4-1/2 x 5/16 3/8	1 x 5/16	22.53 27.37 32.20	0.8437 1.0546 1.2656	18S4 18S5 18S6	4′9″ 5′10″ *6′7″	*5′11½″ *6′3½″ *6′7″	4′6½″ 5′5½″ *6′4½″	5′8½″ *6′1″ *6′4½″	4′6″ 5′5″ *6′3½″	5′2½″ 5′8″ *6′3½″
1/4 5 x 5/16 3/8	1 x 5/16	24.68 30.05 35.42	1.0416 1.3020 1.5624	20S4 20S5 20S6	5′8½″ *6′10″ *7′2″	*6′5″ *6′10″ *7′2″	5'4½" 6'6½" *6'11½"	*6'3" *6'7½" *6'11½"	5′3½″ 6′5″ *6′10″	*6'1½″ *6'6″ *6'10″
5-1/2 x 5/16	1 x 5/16	32.74	1.5755	22S5	*7′5″	*7′5″	*7'2"	*7'2"	*7′0½″	*7′0½″
6 x 5/16	1 x 5/16	35.42	1.8750	2455	*8'1″	*8′1″	*7′9″	*7′9″	*7′7½″	7′7½″
*Live load deflec	tion governe									

load deflection governs.

TYPICAL CONSTRUCTION DETAILS



RELCRETE PRECAST PANELS

In the Relcrete slab, concrete is pre-cast in the factory and may be furnished with a non-slip abrasive surface. Panels can be furnished in widths up to 4 ft. and in lengths determined by tee size and span. The lightweight panels are readily removable to provide access to valves, pipes, conduits and transformers.

LIVE LOAD = 85 PSF

Design	Type	Тее	Avg. Wt. Lbs. Sq. Ft.	Max.
Allowables	Type	Size	Ordinary Concrete	Clear Span
	1-T	1 x 1 x 3/16	14.1	4′11½″
Relcrete	2-T	1¼ x 1¼ x 3/16	17.6	6'2"
f′c = 3500 psi	3-Т	1½ x 1½ x 3/16	21.1	7'2"
	4-T	1¾ x 1¾ x 3/16	24.6	8'9"
	5-T	2 x 2 x 1/4	29.5	10'2½″
T-Weld	STD	2 x 2 x 1/4	30.6	9′7″
f'c = 3000 psi	heavy duty	2 x 2 x 1/4	33.1	10′5″





ORTHOTROPIC SIDEWALKS

Reliance Orthotropic Relgrit floor is an ideal sidewalk for new bridges or replacement for old floors. It is light and does not burden the bridge with excessive dead load. Erection is straightforward, quiet and inexpensive. Maintenance costs are negligible.

LIVE LOAD = 100 PSF

Span	Recommended		Avg.	Properties Of Section			Max. Stress (PSI)	
	Deck Plate	Bearing Bar @12" c/c	Wt. PSF	l in.⁴/ft.	Sp in.³/ft.	Sb in.³/ft.	Deck Plate	Bearing Bar
4'0"	3/16	1¼ x 1/4	10.9	0.1890	1.0420	0.1505	2554.	17687.
5′0″	3/16	1½ x 5/16	11.4	0.3707	1.5494	0.2559	2697.	16331.
6′0″	3/16	1¾ x 5/16	11.7	0.5590	1.9742	0.3379	3055.	17852.
7'0"	3/16	2 x 5/16	12.0	0.8001	2.4311	0.4311	3410.	19091.
8'0"	3/16	2¼ x 3/8	12.7	1.2740	2.9897	0.6334	3619.	17084.
9'0"	3/16	2¼ x 3/8	13.4	2.1820	3.9289	0.9160	3505.	15035.

T-WELD CAST IN FIELD

T-Weld Sidewalk is a lightweight, economical, permanent and fireproof floor. Specially designed for bridge sidewalks, it also is excellent for installations in garages, warehouses and industrial plants. When filled with concrete it weighs much less than reinforced concrete floors of equal strength. T-Weld is furnished in 4 to 6 ft. wide units; can be either welded or bolted to supporting members.

LIVE LOAD = 100 PSF

Туре	Tee Size	WT. PSF STEEL ONLY	Max. Clear Span
standard	2 x 2 x 1/4	9.4 lbs.	9'0''
heavy duty	2 x 2 x 1/4	12.8 lbs.	9'10"









RELIANCE STEEL PRODUCTS COMPANY

TUSCALOOSA PLANT

Cottondale, Alabama Zip No. 35453 Phone: (205) 553-3111 **PITTSBURGH GENERAL SALES OFFICE & PLANT**

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