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ADVANCE PROOF—*(Subject to revision).*

NEW SHOPS OF INTERCOLONIAL RAILWAY OF CANADA, MONCTON, N. B.

By C. F. Bristol, Stud. Can. Soc. C. E.

(To be read before General Section, April 16th, 1908.)

The new shops of the Intercolonial Railway are located about a mile from Moncton Station, on the main line to Montreal. The site is on a plateau, about sixty feet above sea level, and although nearly flat, slopes gently to the southward in the direction of a small creek.

General Layout.

As shown on plan (Fig. 1), two main sidings, with numerous branches and spurs, facilitate shunting and render ready access to all buildings and yards.

The two Passenger Car Shops are long and narrow, and so designed that cars may be placed transversely in each shop. These two buildings are parallel to each other and at right angles to the main line, with eighteen tracks in each. Cars may be readily transferred from any track in one shop to any track in the other by means of the electric transfer table between the two shops.

The Stores and Office Building, Power House, Producer Gas House, Freight Car Shop, Planing Mill, Lumber Shed, and Dry Kiln are all laid out parallel to the main line of the railway, and are all served by side tracks. The Planing Mill is situated convenient to the Passenger Car Shop and Freight Car Shop.

The Locomotive Shops comprise the Machine Shop and Annex, Boiler Shop, Boiler Erecting Shop, Engine Erecting Shop, and

Smith Shop, all under one roof. The four latter shops are parallel to the main line, but at right angles to the Machine Shop.

A notable feature in connection with the Engine Erecting Shop is the arrangement of the pits. The main pit runs almost the entire length of the shop, while the track is continued across the Machine and Passenger Car Shops into the Paint Shop, where locomotives may be painted should the Erecting Shop be crowded. The side pits are all laid at an oblique angle to the main pit, and this arrangement provides greater facilities for stripping and repairing engines.

Foundations.

The foundations rest on firm, dry, red clay. The pressure on the clay under the column footings and foundations was not allowed to exceed three tons per square foot.

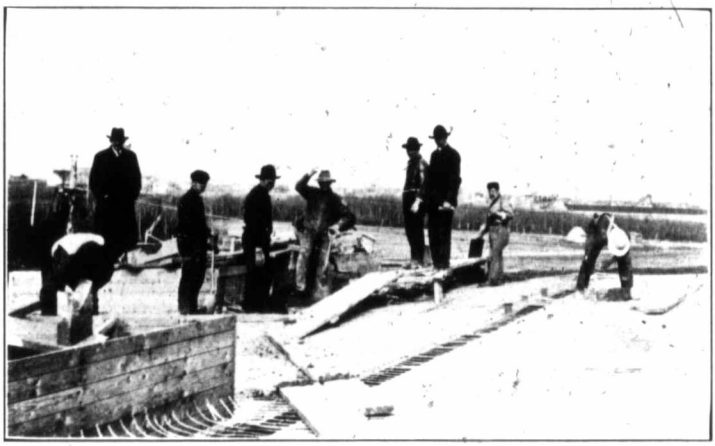
The foundations are of 1-3-5 concrete, with a six-inch batter on each face, and wherever the load is concentrated, as in the case of side columns, the width of the foundation is increased proportionately. The column footings are in the form of truncated pyramids.

Freight Car Shop.

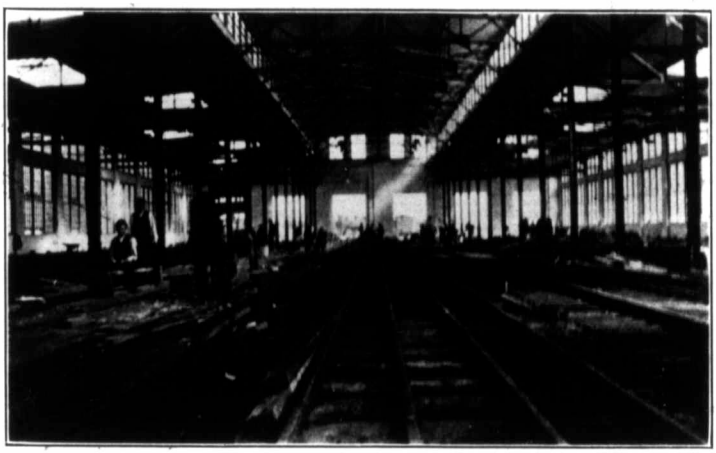
This building is 134′ 8″ by 362′. Two rows of columns divide the shop into three bays, each 44′ wide, and each containing two tracks through the entire length of the shop. In addition to these there are several narrow gauge tracks for small trucks.

The first wall course is 4′ high by 24″ thick on the ends, and 12″ on the sides, this being increased to 20″ at the side columns or pilasters. The upper outside edge of this first course has a 4″ bevel running completely around the building. Expansion joints divide the wall into sections of 40′. On the sides, with 20′ centres, extending from the first wall course to the roof, are the concrete pilasters, 4′ 8″ wide and 16″ thick, with a small projection on each side which serves as a casing for the window frames. The space between the pilasters is entirely glass, except a strip 2′ 3″ wide, which is made up of 2″ x 4″ spruce studding, covered on both sides with expanded metal lath and plastered with Portland cement mortar.

In each end are six doors, 12′ wide by 16′ high, and above the doors the walls are only 12″ thick, with the exception of the lintels, which are 6″ thick and 8′ high. The reinforcement in the lintels consists of horizontal steel rods laid 18″ centre to centre, and vertical rods, with 2′ centres, extending into the cornice. Each alternate row of horizontal rods through the lintels is carried completely across the building. A number of vertical rods are also run up in the concrete about 2″ from the sides of the windows, in



Roof, Freight Car Shop.



Interior of Freight Car Shop.

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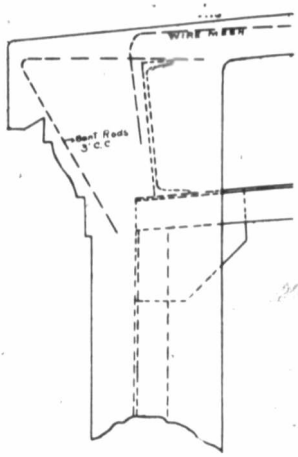
the ends of the monitor, and also in the thin portion of the wall at each side of the doors, where recesses are left for the door frames. (Fig. 2.)

The centre columns are made up of two 8" channels held together by rivetted lattice work, while steel trusses support the roof and form the monitor. The ends of each row of purlins are firmly imbedded in the end walls, while the two outside rows are completely imbedded in the concrete cornice. The outside vertical members of the trusses and monitor are imbedded in the concrete pilaster.

The concrete cornice is in the form shown in sketch.



The outside purlins surrounded by this concrete cornice serve as a very efficient reinforcement, but small bent rods of steel were also placed near the face of the cornice three feet apart.

The roof slab consists of cinder concrete, 1-2-4 mix. The slab forms a knee on each side of the "I" beam purlins, and completely covers the upper flange and half of the web, thus giving them lateral support. (Fig. 2A.)

The reinforcement in the roof slab is electrically-welded wire cloth, 10" x 4" mesh. The transverse wires are about $\frac{3}{8}$" diameter, and the longitudinal wires about $\frac{1}{4}$" diameter. This reinforcement is arranged so as to come $\frac{1}{2}$" from the bottom of the slab at the centre of the span between the purlins, and $\frac{1}{2}$" from the top of the slab at a point over the purlins. The bottom plane of the concrete slab is $\frac{1}{2}$" below the plane of the top flanges of the purlins.

A thin layer of cement mortar is spread over the cinder slab to cover up the sharp projections, and over this a thin layer of pitch. Three plys of roofing felt are laid longitudinally, then hot pitch poured thereon, and the whole covered with a layer of gravel. At the edge of the roof the felt is well nailed to wooden strips imbedded in the cornice. The weight of the gravel and the adhesion of the pitch securely hold the felt to the roof, and obviate the use of transverse nailing strips.

The monitor, 44′ wide and 8′ high, with continuous side lights, pivoted, extends the full length of the shop. The vertical members of the monitor truss are imbedded in small concrete columns similar in shape to the large side columns.

Two rows of skylights on each side of the roof, with galvanized iron frame, on a 6″ concrete wall 2′ high, furnish additional light.

The Planing Mill is 81′ 10″ x 202′ 8″, and is constructed practically the same as the Freight Car Repair Shop, except that outside steel columns are imbedded in concrete side columns, and that the monitor only comes within twenty feet of the ends of the building. Hence, the trusses at these points were designed to carry the monitor end walls. The steel columns were set up first and well guyed, then the trusses were rivetted in position and the purlins laid. No anchor bolts were used to hold the columns, as the forms were built around them to form the concrete pilaster. The cornice forms were next placed, and the column and cornice forms were filled with concrete in one operation.

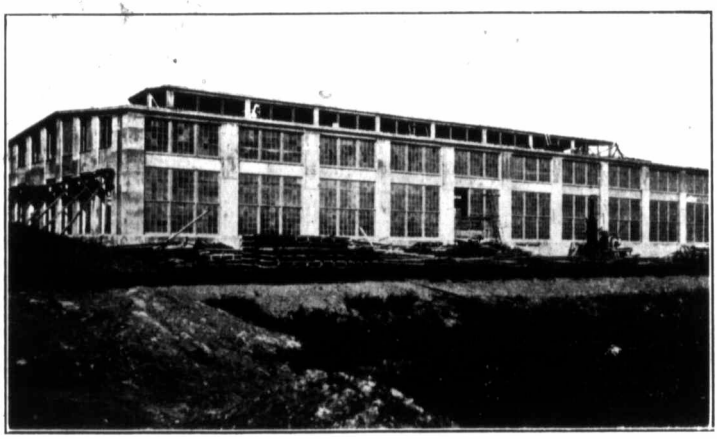
Passenger Car and Paint Shops.

Each of these shops is 361′ 8″ x 100′. The Cabinet Shop is elevated half a story in one end of the Passenger Car Shop, on what is termed the mezzanine floor. In the Car Paint Shop, on a similar floor, are the upholstery and varnish rooms.

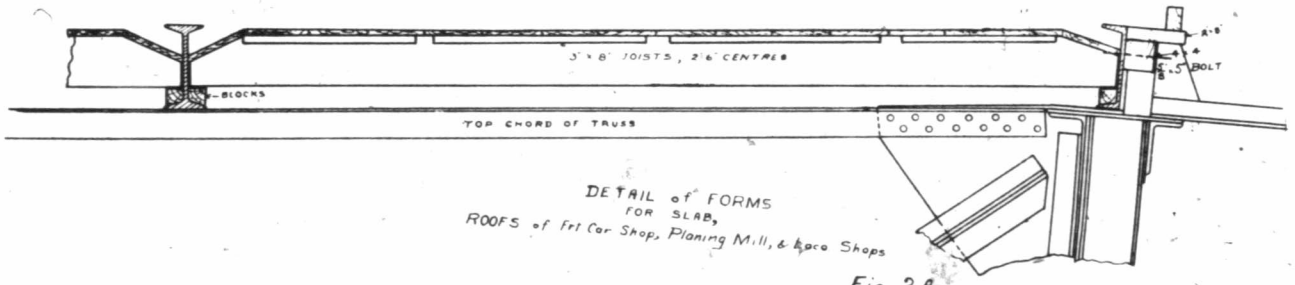
These buildings are constructed entirely of reinforced concrete, and being exactly similar, the same forms were used for both.

The column footings are built independently of the columns, and have $\frac{3}{8}$″ square steel rods, 3′ long, projecting about 18″ above the top, thus giving a firm bond between the footings and the columns. The columns are 14″ square, with chamfered corners and knee braced at the girder connections. Eight twisted steel bars, four of which are $\frac{5}{8}$″ square, and four $\frac{3}{4}$″ square, arranged alternately and spaced equidistant in a circle, are enclosed in a helix of 4″ pitch and 10″ diameter, formed by a $\frac{1}{2}$″ x $\frac{1}{8}$″ steel band, the whole reinforcement extending from end to end of the column. The bars and helix are wired together at the intersections, resulting in a very strong and neat reinforcement.

Interior of Passenger Car Shop.



Exterior of Planing Mill.



DETAIL of FORMS
FOR SLAB,
ROOFS of Frt Car Shop, Planing Mill, & Loco Shops

Fig 2A

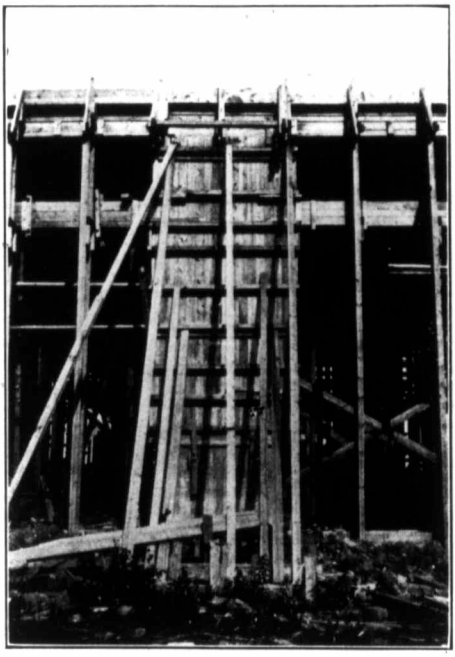
In the first wall course, which is 16" thick, with the upper outside edge bevelled, both horizontal and vertical reinforcement is used, consisting of ⅜" square steel rods. The vertical rods project about 6", ensuring a firm bond with the next course. The balance of the wall is 12" thick, and is almost all in the form of wall columns, with interstices for windows and doors, 60% of the wall area being of glass. The reinforcement in these wall columns consists of ⅜" round and ½" square bars, placed horizontally and vertically, and all wired together to form a coarse mesh.

The window lintels, 6" thick by 2' high and 12' long, have two ⅝" square twisted steel bars 20' long laid near the bottom, and two ⅜" round bars each 20' long, one in the centre and the other near the top. These bars extend 4' each way into the side wall columns so that they are securely fixed. The door lintels are smaller but of practically the same construction.

The mezzanine floor in the south end of each building is supported by a transverse girder resting on four columns, and a number of secondary beams at right angles to the girder. The secondary beams are carried by the transverse girder and the end wall columns, while the 4" floor slab is taken as the flange of the beams. ⅝" square twisted steel bars, 20' long, and laid with 12" centres, constitute the slab reinforcement, and are placed about ½" above the bottom of the slab. The reinforcement in the beams and girder is similar to that used in the roof girders and beams described below.

The roof is carried by six longitudinal rows of columns, including the side wall columns. The rows of columns are 20' between centres, while the columns in each row are 18' apart, centre to centre. Each transverse row of columns carries a continuous roof girder, and the girders carry secondary beams spaced 6' 4" apart and at right angles to the girders. (Fig. 3). The 3" roof slab rests on the top of the beams and girders, and is figured as one piece with them, serving as the flange. Where the continuity of the secondary beams running longitudinally is broken by openings for the skylights, the beams project about 2' 6" from the girder in the form of short cantilevers, which support the skylight walls.

The concrete for the foundation, column footings and lower portions of the wall was mixed in the proportion of one part of cement, two of sand, and six of gravel; for the interior columns, there was used one part cement, one part sand, and four parts gravel, which had to pass a ¾" screen, but five parts of gravel were used for the wall columns, beams, girders, and roof slab. A richer concrete was used in the centre columns in order to give the greater strength necessary. All the concrete was "Wet Mix" and



Side Columns, Passenger Car Shop.

Columns for Mezzanine Floor, Passenger Car Shop.

Forms for Beams, etc.

thoroughly tamped. The tamping rod consisted of a piece of gas pipe, in one end of which a thin steel blade about five inches wide was welded. This blade was always shoved down into the concrete, close to the form. By this means all the stones in the concrete were pushed back from the faces of the forms, permitting the fine sand, etc., to form the outside surface. This tamping always resulted in uniform smooth surfaces when well done. Of course, the 3" roof slab could not be tamped in this way, but it was well stirred by the shovels and straight edges run over the surface and the rough places smoothed off with a float.

The reinforcement in the girders consists of four twisted steel bars ¾" square, as shown on drawing (Fig. 3), extending across the span between each pair of columns and lapping about 1' with the reinforcement in the next span. Six ⅝" square stirrups were wired to the four twisted bars at each end, so that the complete reinforcement for each span could be easily handled and laid in position in one piece. In the secondary beams, the reinforcement is made up of three ⅝" square twisted steel bars and wired together with the stirrups. At an angle of 45° two ⅝" square twisted bars 5' long are thrust down into the knee brace on each side of the column, while three ⅞" square twisted rods are laid in the slab over each column.

The slab reinforcement on the Passenger Car Shop consists of No. 10 gauge 3" mesh expanded metal, while on the Passenger Car Paint Shop ⅜" square twisted rods are laid transversely with 12" centres.

FORMS.

The forms for the walls, side columns, etc., employed in the construction of these buildings consists of 1¾" T. & G. spruce boards, planed on one side, and strongly bound together by means of 3" x 6" cleats spaced about 24" centres. The outside and inside forms are held together by ⅝" bolts and kept equidistant by either wooden or concrete spacers. The wooden spacers were knocked out and thrown aside as the concrete was brought up to their level. Oblique timbers, for additional bracing, were also used.

The centre column forms were constructed on the same principle, *i.e.*, 1¾" T. & G. lumber held together by cleats, and the cleats on each side being bolted to one another. The side pieces were kept apart by long bulkheads, which formed the other two sides. (Fig. 4.)

The moulds for the girders and beams were made up of 1¾" T. & G. boards, as shown on drawing (Fig. 4.). Openings were cut in the sides of the girder forms to receive the secondary beam forms, while cleats "SS" and cross-bar "T" formed a yoke to support the form. The secondary beam forms, in addition to the sides

and bottom pieces, had longitudinal carrying pieces, which were nailed to the vertical cleats to carry the roof panel joists. (Fig. 4.)

The box forming the knee brace was fastened on to the column form at cross pieces "AA" by means of four uprights "DD". Each pair of these uprights were held in position by a bolt running through the column, as shown at "GG". (Fig. 4.)

Two transverse rows of wall and centre column forms were first set up, levelled and braced in position, without lining up. Then the knee brace boxes were dropped into place and fastened to the four uprights "D" with a few nails. The columns and boxes being then in one piece the girder sides were dropped into position, cleats "X" fitting up tight to the sloping bottom of knee brace "F". When the girder bottom was dropped into position it acted as the spacer to the two side forms, while the secondary beam forms, when dropped into place, acted as side braces. The joists for carrying the roof panels were next put in place across the carrying pieces on the secondary beams and nailed. Finally, the roof panels, which were composed of 1" T. & G. stuff, were laid over the joists.

Forms for half of the building, plus one extra panel, were made up, and when completely put together, the whole was lined and levelled. The extra panel was left up when the shift from north half to south half was made, in order to fasten the forms after the first shift.

Stores and Office Building.

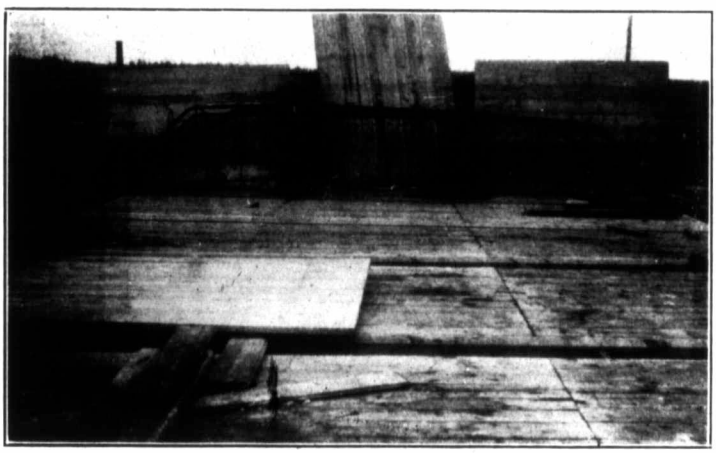
The first floor and basement of the Stores and Office building is intended for the Local and General Stores Department, and the second story, over the western half, will be utilized for the offices of the Stores Department and Superintendent of Motive Power.

An exterior wall, 9 feet from the sides of the building and about 4½ feet above ground, supports a reinforced concrete slab platform along the sides of the building. The platform is also continued out 25 feet on the east end with a ramp for trucks on each side. The reinforcement in this platform slab is made up of ⅜" square twisted bars 9' 5" long and 5" centres, laid transversely, and ⅜" round bars 18" centre to centre, longitudinally. In addition to this the outside edge is protected by a 4" x 6" steel angle.

The reinforcement in the exterior and interior walls, forming the first course above the foundation, consists of ⅜" round horizontal rods 12" centres, and ⅜" square vertical rods 3' centre to centre, projecting above the floor level. These rods are all wired together forming a coarse mesh, and are expected to overcome cracking from the expansion and contraction of the concrete.

The pedestals supporting the columns have eighteen ¾" square twisted bars 4' 8" long, laid "cris-cross" nine each way, about 4"

Forms for Second Story, Stores and Office Building.



Reinforcement in Girder, Stores and Office Building.

from the bottom. Also two ½" square bars project about 9" above the basement floor line to ensure a firm bond with the base of the columns. The columns supporting the floors and roof are square with bevelled corners, and the reinforcement consists of eight vertical rods set equidistant in a circle, with ½" x ⅛" flat steel band wired to the vertical bars in the form of a spiral of 3" pitch. (Fig. 5.)

The floors are of all concrete construction, in the form of slabs stiffened by ribs. These ribs are a series of heavy transverse girders resting on the centre and wall columns, and a similar series of secondary beams at right angles to, and supported by the main or transverse girders. The floor slabs, with the girders and beams supporting them, are moulded in place in one piece. (Fig. 5.)

Twisted square bar reinforcement is used altogether for the floors, girders, and beams.

The tension bars in the transverse girders on the first floor consists of six 1" square twisted bars, while in the secondary beams only five ¾" square twisted bars are used. Five 1" square bars in the girders and four ¾" bars in the secondary beams comprise the tension bars for the second floor. In the roof, five ⅝" bars in the girders and four ½" bars in the secondary beams form the reinforcement. All tension bars in the floor and roof ribs are tightly wired to the stirrups, and were generally made up as shown in illustration opposite.

Drawing No. 5 shows the general shape of the wall columns, girders, beams, and centre columns.

The forms for this building were made on the same principle as those described under Passenger Car Shops. Forms were made up for half of the first floor, plus an extra panel. The first floor was moulded in two shifts, and the second floor over half of the building in the third shift. For the roof the same girder and beam forms were used, but tilted up, and the increased length was obtained by increasing the length of the forms by means of wedges, and finished in two shifts in like manner. New column forms, however, had to be made each time, as the columns for the different floors diminished in size and increased in length for the upper portions of the building. The same panels were used each shift for the different floors and roof, although considerable repairing and patching was found necessary, due to shrinkage, rough usage, etc.

Both the store-room and office floors are finished with ⅞" T. & G. hardwood flooring, fastened to 3" x 2" nailing strips spaced 16" centres, and laid transversely to the building, the intervening space between the floor slab and hardwood flooring being filled with fine dry ashes.

A slag cement was used in all the concrete below the ground line. The important factor in favor of this cement, from a contractor's standpoint, was that it cost about $1.00 per barrel less than the Portland cement, f.o.b. cars Moncton.

An average taken from a month's tests is as follows: Assuming 500 lbs. per square inch as the standard tensile strength of a good Portland cement, this slag cement gave an average result of about 58 per cent. at 7 days and at 28 days about 85 per cent. of the standard, although some individual tests ran very close to the 500 lbs. per square inch. When given a longer period than 28 days in which to set the tensile strength indicates a still greater increase, but for want of time very few tests were made on briquettes over 28 days old.

Where a large amount of concrete work is being carried on it is a question whether the use of this cement is economical, as it is slow in setting, thereby retarding the progress of taking down and setting up forms. In several instances, during cold, damp weather, this cement took six days to set.

In the floors and roofs of these large reinforced concrete buildings, the transverse girders are all continuous. The concrete was deposited transversely to the building, but as strips of only 40 to 50 feet could be laid in a day, numerous joints necessarily occurred in the secondary beams. In making these joints, the system followed was of great importance, as the efficiency of the beam depended on the position of the joint and the care with which it was made. The outer edge of each day's deposit terminated as nearly as possible at the points of counter-flexure in the secondary beams. A "wet mix" was used for this work, and the semi-fluid concrete was allowed to run into the trough or beam form, taking a sloping shape as the cement set. Each morning, before the mixers were started, the face of the joint was prepared, as follows:

The concrete was cut away slightly, and the surface of the joint was swept clean and sprinkled with water;

Finally, just before the first batch was deposited, the joint was coated with a thin grout.

A joint made in the manner described above, will give approximately 88% of the strength of a solid beam.

Locomotive Shops.

The Locomotive Plant includes five shops, viz:

The Machine Shop, 131' 6" x 408' x 36' high, divided into two bays by a centre line of columns, each bay being served with an overhead electric travelling crane of ten tons capacity. This shop has an Annex 44' x 408'.

The Smith Shop, at right angles to the Machine Shop, is 75′ x 375′ x 37′ high. Water gas will be used for the different furnaces. Jib cranes are to be placed conveniently near the several fires and furnaces, while a track through the centre of the shop permits the handling of heavy work by means of trucks.

The Engine Erecting Shop, separated from the Smith Shop by a partition, is 80′ x 375′ x 50′ high. Two 60-ton electric travelling cranes are to be installed for moving and placing locomotives. Through the centre runs a surface track with a shallow concrete pit. On each side of this central track are eight side tracks with pits arranged herring-bone style. These side tracks are designed to accommodate engines requiring heavy repairs, and this form of layout provides ample space for overhauling. This leaves the central track free for light repair work, and obviates the necessity of lifting one engine over another.

Between the Engine Erecting Shop and Boiler Shop walls is a space 25′ wide, which permits of additional side lights. The Boiler Shop is 100′ x 375′, divided into two bays by a row of columns down the centre. The bay intended for boiler erection is 44′ high, and the west end of it contains the rivetting tower, 25′ long by 75′ high. A 35-ton electric travelling crane is to be installed in this bay, and a 30-ton crane in the rivetting tower to serve the bull rivetter. The tool bay is served by means of a 10-ton electric travelling crane, which traverses the entire length of the shop. In addition to this, jib cranes are to be placed convenient to the different tools.

These buildings are of structural steel framing. The columns rest on concrete pedestals spaced 25′ centre to centre throughout. The side walls, for a distance of 5′ above the ground, are of concrete, and at each exterior column, extending up to the cornice, is concrete pilaster. The 6″ partitions between the various shops are of reinforced concrete.

In the Smith Shop the ground is brought to grade and filled with selected filling, rolled, and rammed. The floor in the Engine Erecting Shop consists of 3″ hemlock plank spiked to 4″ x 6″ sills, spaced 2′ 9″ centres, and resting upon a 4″ layer of concrete. The Boiler Shop has 3″ hemlock plank on 6″ x 6″ cedar sills laid 3′ apart, while in the Machine Shop 2″ hemlock plank are nailed to 3″ x 3″ nailing strips resting upon a 3½″ layer of concrete.

The roof slab is composed of four inches of cinder concrete, reinforced by ⅜″ square twisted steel rods 12″ centre to centre. On the upper sides of all skylights situated on the slope of the roof, the slab is raised to form a cricket to shed water freely.

Side lights comprise a large percentage of the outer wall area, while numerous skylights supply additional light.

The Machine Shop is well under way, but beyond the foundations, nothing has been done to the balance of the locomotive shops, which will not be completed for some months.

Power House.

The Power House is built on the same principle as the Planing Mill, viz.: Steel columns imbedded in concrete pilaster, and steel trusses to support the roof. The engine room and boiler room are each 69′ x 100′, and separated by a reinforced concrete wall.

The floor in the engine room consists of ⅞″ maple flooring, overlying 2″ hemlock planks spiked to 3″ x 3″ nailing strips imbedded in a 3½″ layer of concrete.

In the boiler room the floor is of tar macadam, laid on a 6″ course of gravel, well rammed and rolled.

The boiler equipment consists of four Babcock & Wilcox water tube boilers of 250 H. P. each, arranged in two batteries, while the necessary space is reserved for a third battery. Fuel economizers, and a feed water heater and pump, are installed to take care of the feed water. An induced draft plant forms part of the equipment, also a 1000-gallon U. W. pump. In this room, a fan, direct connected to an auxiliary engine, supplied the heat required in the Freight Car Shop.

The coal bins are arranged along the side of the building in front of the boilers.

The engine and generator equipment is as follows: Two horizontal double-acting gas engines, normal rating 500 B. H. P. each, adapted to drive two 300 K. W. direct-connected, sixty-cycle A. C. generators. These generators are three-phase, 1500 R. P. M., and 220 volts. In addition to these machines there will be two 70 K. W. D. C. belt-driven generators of 250 volts and 875 R. P. M.

The gas engines are driven by producer gas, which is to be manufactured in the Producer Gas House, situated near the Power House. The gas for the furnaces in the Smith Shop will be water gas, also manufactured in the gas house. The gas generators will convert continuously about 1000 pounds of coal per hour, generating therefrom about 18 cubic feet of water gas for the furnaces, and about 55 cubic feet of producer gas for the engines.

The shops are heated by the hot blast system, using exhaust steam from the auxiliary engines and pumps, supplemented by live steam from the boilers. Fans, direct connected with engines, force the hot air through concrete conduits, furnished with risers in the walls. These risers discharge close to the floor near the windows.

The sewerage system is extensive, consisting of one main 2800 feet long, emptying into a small creek which flows to the Petitcodiac River. This is a concrete pipe, egg section, 3½ feet high by 3 feet wide, with an 8″ wall.

From the main sewer, branches, varying from 20″ to 6″ diameter, extend past the various shops to receive the drainage from the down pipes, porous tiles along the foundations, shop drains, etc. The two mains branches consist of 20″ concrete pipe, while 12″ and 6″ vitrified clay pipes are used for the others. Wherever a line of pipe discharges into a branch or main sewer, concrete catch basins are provided.

The interior surface of the walls, concrete columns, and ceilings are painted with cold water paint, applied with a spraying machine, giving a very white finish, and increasing materially the brightness and lighting effect of the buildings.

The steel columns and trusses are painted a dark red, while the window frames and doors are covered with a light drab paint.

For each roof the snow and wind load was estimated at the minimum of twenty pounds per square foot, vertical load. The design is intended to facilitate the removal of snow by the wind, but in event of the snow load becoming twice as great as assumed, the increased unit stress in the steel would not be great. However, all of the roofs during construction were loaded beyond this minimum, showing no signs of injury to them.

Construction Plant.

The machinery or plant consists of eight mixers, both yard and half-yard sizes, located convenient to the various buildings. Where the concrete had to be elevated, the mixer discharged into a bucket which was hoisted up an elevator and dumped automatically into a hopper, from which the mix could be taken by barrows. Both the mixers and hoisting machinery were driven by small donkey engines. Two gas engines were also used, one for twisting the steel and the other for pumping.

Two derricks, with 60′ booms, and one with a 90′ boom, were used for steel erection, while a travelling yard crane, with a 40′ boom, was used for unloading and other purposes.

Mr. W. A. Bowden, of the Department of Railways and Canals, is the Designing Engineer of all these buildings.

The economic handling of material between the various shops was the prime factor in determining their location in relation to each other, and they are so placed as to enable any shop to be enlarged without interfering with the future extension of any of the others.

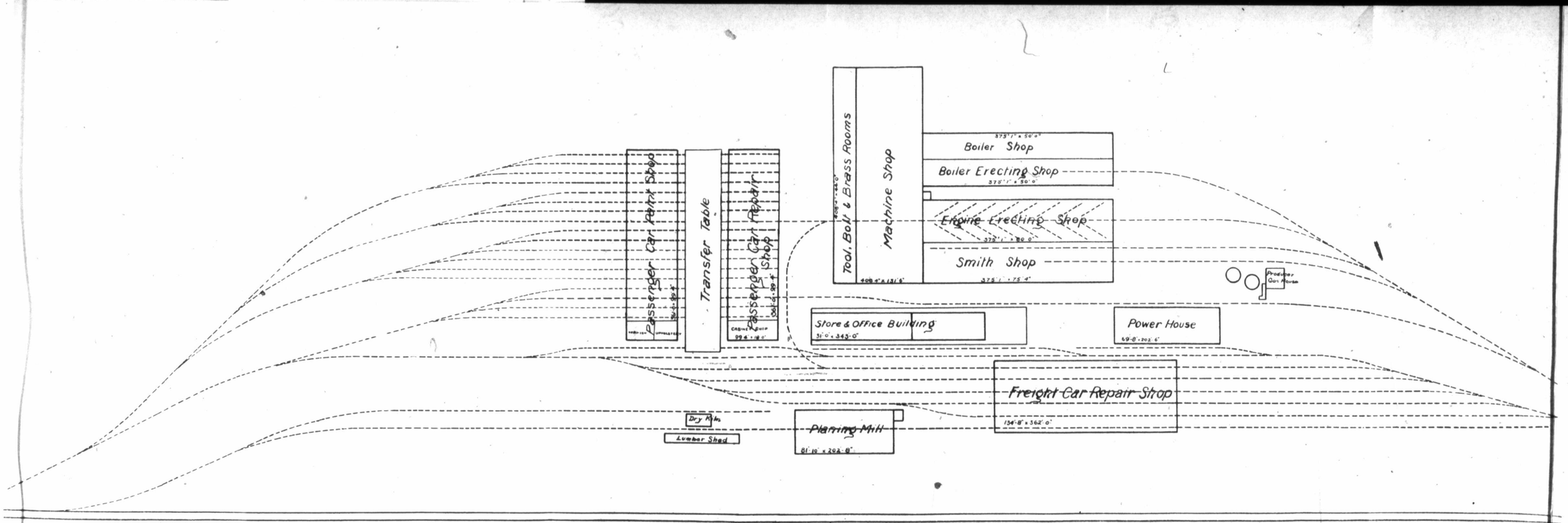
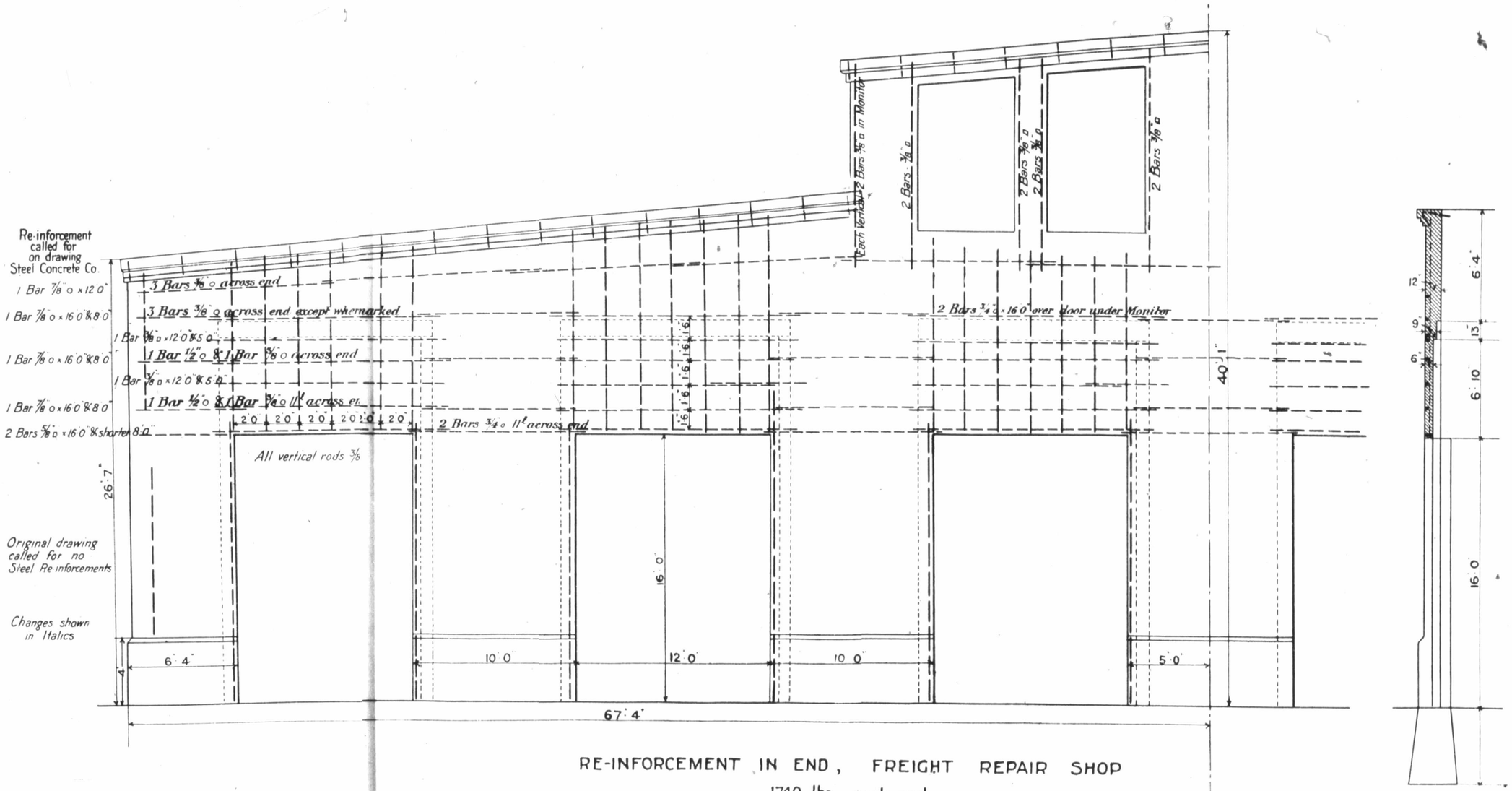

Passenger Car Paint Shop
Transfer Table
Passenger Car Repair Shop
Tool, Bolt & Brass Rooms
Machine Shop
Boiler Shop
Boiler Erecting Shop
Engine Erecting Shop
Smith Shop
Producer Gas House
Store & Office Building
Power House
Freight Car Repair Shop
Dry Kiln
Lumber Shed
Planing Mill

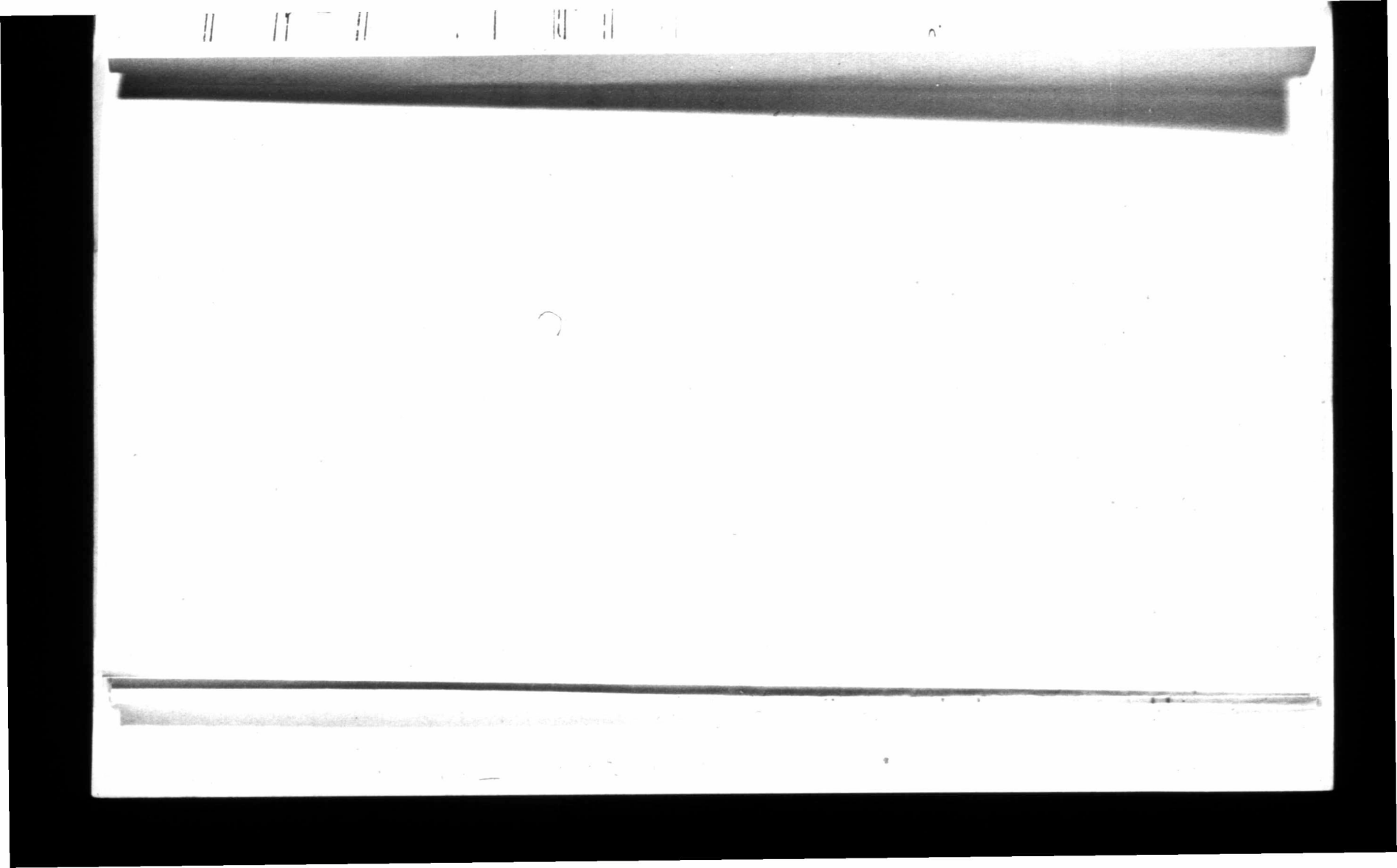
Fig. 1.

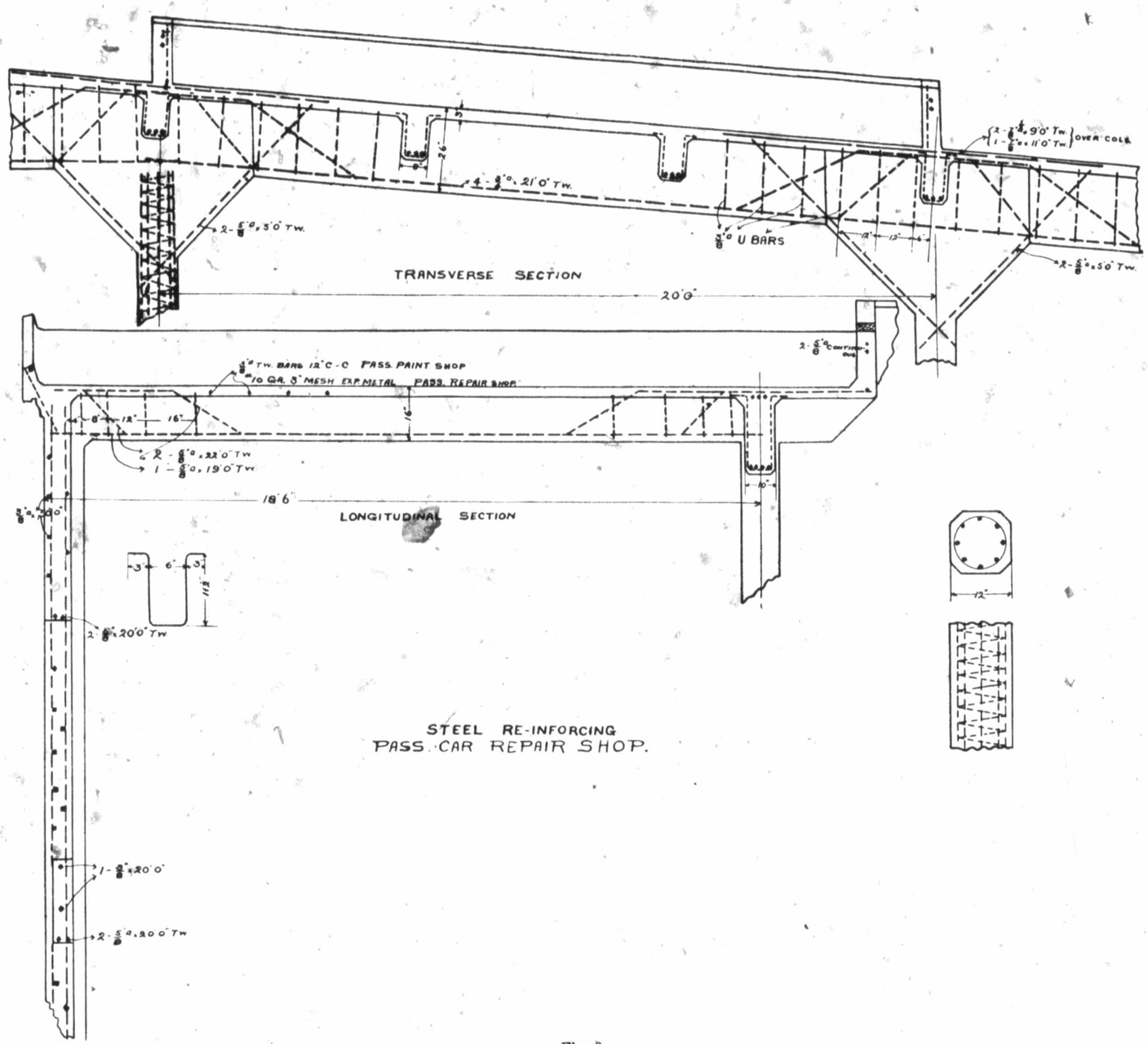


RE-INFORCEMENT IN END, FREIGHT REPAIR SHOP

1740 lbs. each end

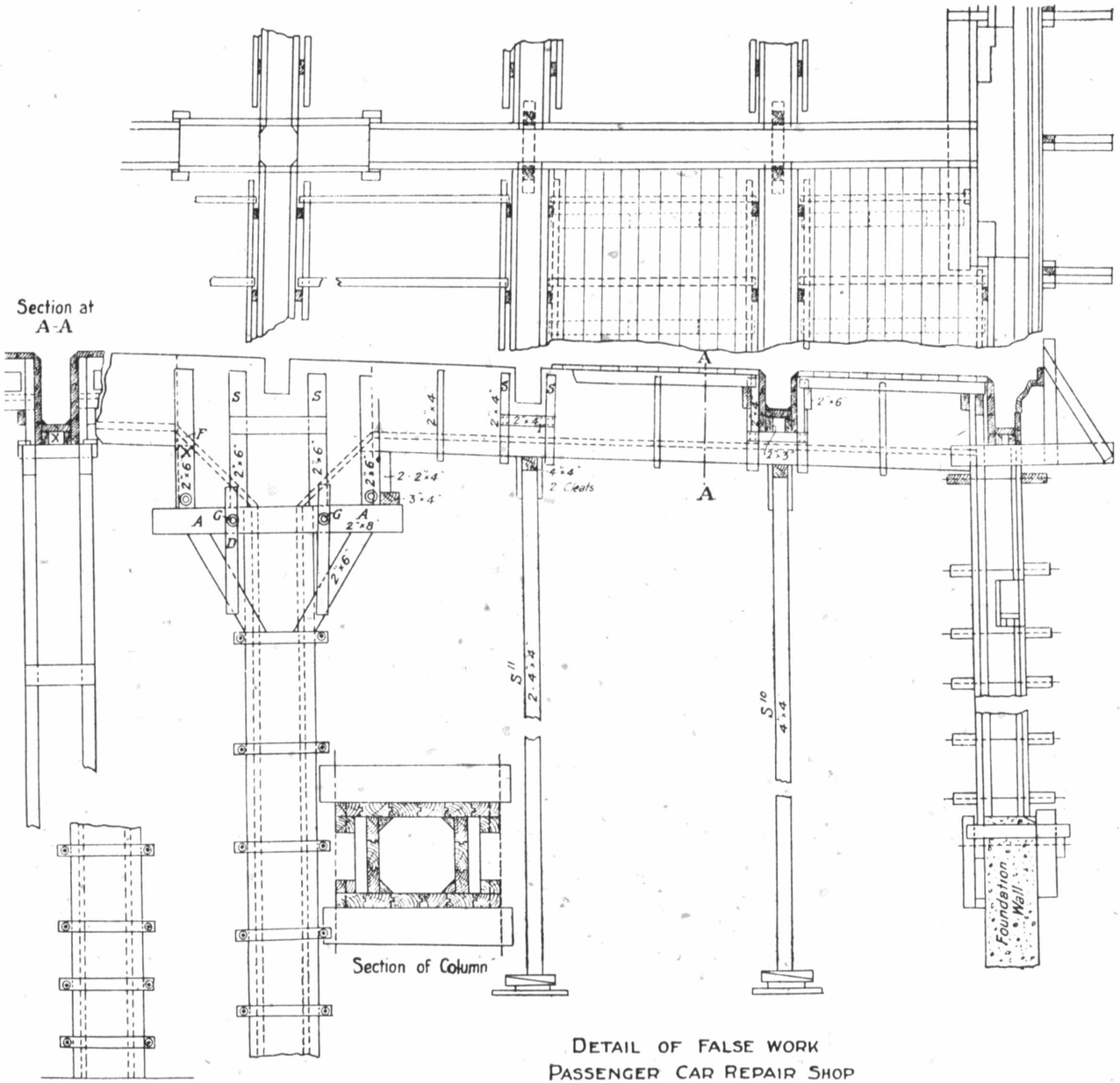
Fig. 2.





STEEL RE-INFORCING
PASS. CAR REPAIR SHOP.

Fig. 3.



DETAIL OF FALSE WORK
PASSENGER CAR REPAIR SHOP
Fig. 4.

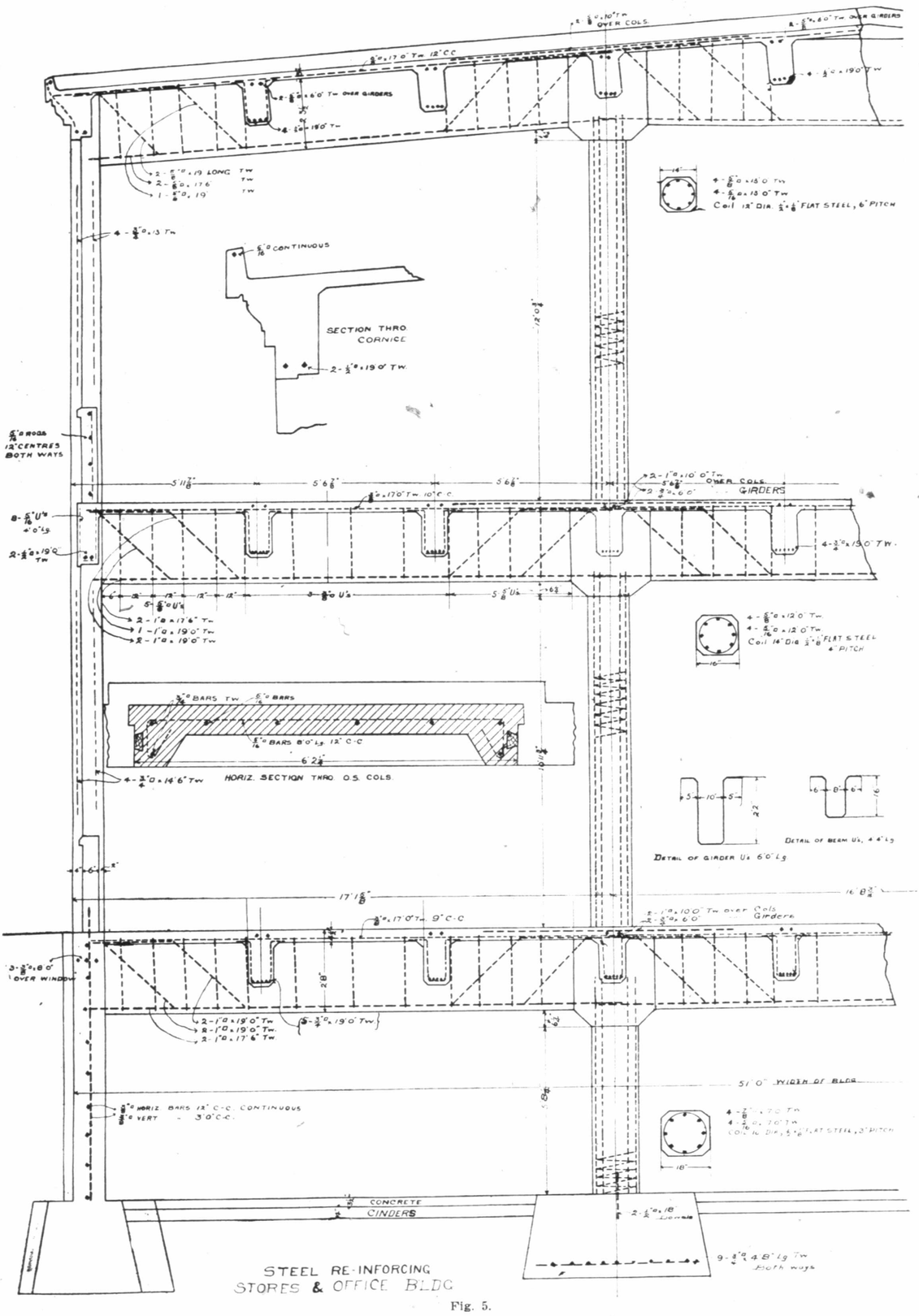

SECTION THRO. CORNICE
HORIZ. SECTION THRO. O.S. COLS.
DETAIL OF GIRDER U2 6'0" Lg.
DETAIL OF BEAM U1, 4'4" Lg
GIRDERS
CONCRETE
CINDERS
51'0" WIDTH OF BLDG.
STEEL RE-INFORCING
STORES & OFFICE BLDG.

Fig. 5.