CONDITION ASSESSMENT REPORT

of the

Boathouse at the Huron Islands Light Station
Huron National Wildlife Refuge

Marquette County, Michigan

View of the Huron Islands Light Station Boathouse and Pier, August 2020

PREPARED FOR THE

U.S. Fish & Wildlife Service
Huron National Wildlife Refuge
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Introduction

The Huron Islands are a remote chain of eight islands located in southern Lake Superior along the north shore of Michigan's upper peninsula. Known as the Huron National Wildlife Refuge, the site is under the jurisdiction of the U.S. Fish & Wildlife Service (USFWS). Located approximately three miles from shore, the Huron Islands are isolated and difficult to reach, but are open to the public for day use.

In the mid-1800s maritime traffic from Michigan's Keweenaw Peninsula increased significantly with the mining industry shipping copper and iron ore to the industrial cities located on the southern lakes and returning with miners and supplies. The area around the Huron Islands became known as a great hazard for ships following the rugged coast and was the site of numerous shipwrecks. After numerous requests for navigation aids in this area, the United States Congress appropriated funds in 1866 for the establishment of a lighthouse on West Huron Island, the tallest of the eight islands. Construction on the light station began in 1866 and the navigation light became operational in the fall of 1868.

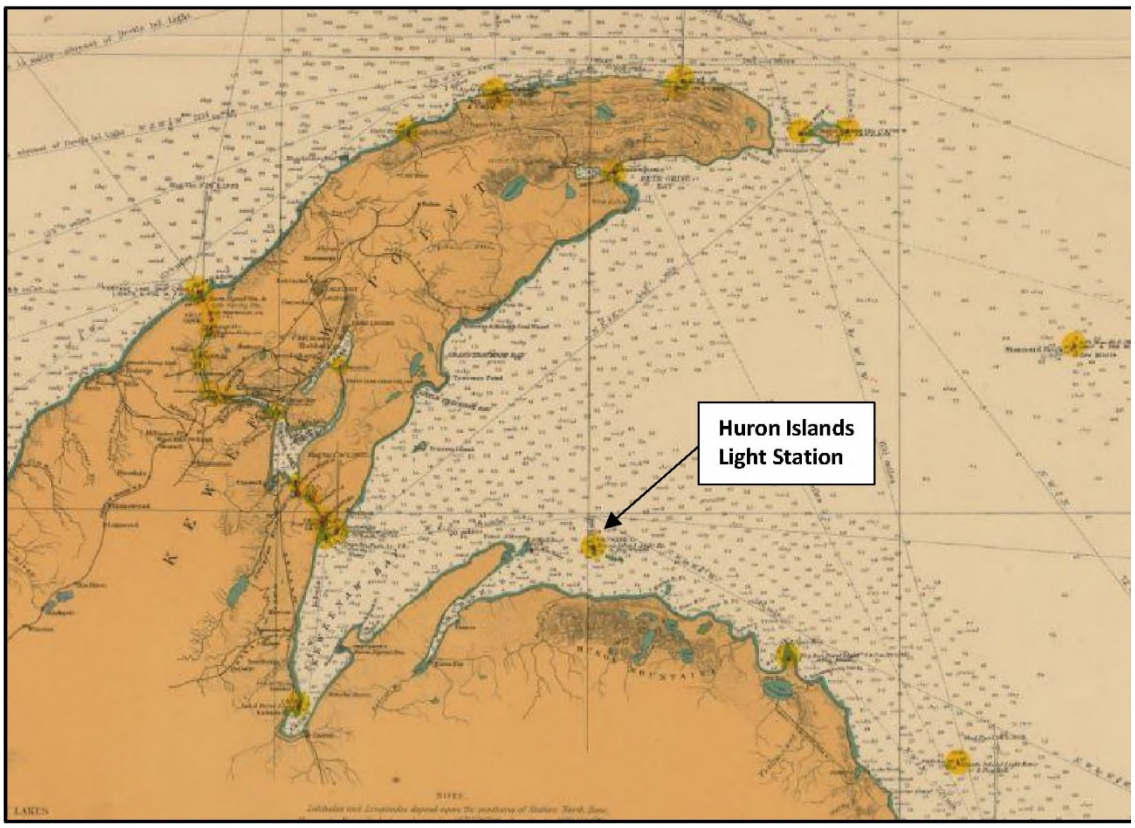


Figure 1: Part of a 1905 nautical map of Lake Superior showing the Huron Islands Light Station.

In the late 1800s and early to mid-1900s activity at the site was great and many other buildings and structures were constructed. The light station was manned

until 1972 when it was fully automated. Buildings were then shuttered and the site is occasionally visited by the U.S. Coast Guard to maintain the light which continues in use as an active navigation aid. Today the islands are managed by the U.S. Fish & Wildlife Service as a wilderness area with limited public use, primarily due to its remoteness. The Huron Islands Lighthouse was listed on the National Register of Historic Places in September 1975 (Reference #75000955). In 1999 the non-profit Huron Island Lighthouse Preservation Association (HILPA) was formed with its mission being the preservation of the light station for future generations.

Photo 1: Light Tower/Keeper's Dwelling.

Photo 2: Assistant Keeper's Dwelling.

Photo 3: Fog Signal Building

Photo 4: Barracks Building.

A number of buildings and structures at the site remain, including the main Lighthouse/Dwelling, Assistant Keeper's Dwelling, Oilhouse, Privy, Fog Signal Building, and Barracks, however the focus of this report is the Boathouse. The Boathouse is a small, simple structure constructed of reinforced concrete on a structural steel frame that was built in 1912. It is a rare surviving example of this

type of construction rarely seen at a maritime site. It is located at the only landing point on the island and is the first structure seen by visitors.

Photo 5: View of the Boathouse and pier as approached by boat

Photo 6: Front (South) face of the Boathouse.

The architectural firm of Sanders & Czapski Associates, PLLC was retained by the U.S. Fish & Wildlife Service to conduct a site inspection and evaluation of the Boathouse. Certified historic architect Ken Czapski, AIA, and structural engineer Robert Cambensy, PE, performed a site visit on August 27, 2020. Jeffery Loman and Burt Mason, volunteers from the Huron Island Lighthouse Preservation Association (HILPA) accompanied the inspection team to the island and provided assistance as well as knowledge of the historic site. A special thank you is also extended to Jeffery Loman for providing boat transport to Huron Islands on his private boat.

Observations

The Boathouse was originally constructed in 1912 as a 30'-5" x 15'-5" structure to provide safe housing for the boat used by the light keeper and crew. In 1951 an addition was constructed to enlarge the building to its present-day size of 40'-5" x 15'-5". It is a single-story building with a structural steel frame on poured, reinforced concrete floor and piers. The walls and roof are 2 ½" thick poured concrete on a metal lath framework, identified as "Corr-Mesh" on the original 1912 drawings. Drawings of the existing, present day conditions are included in Appendix A and the original drawing from 1912 is included in Appendix B.

Photo 7: Interior view of the Boathouse looking north, showing the exposed structural steel frame.

The structural steel frame of the Boathouse consists of five trusses and supporting columns that are connected by six C-channel roof purlins. These steel trusses, and general interior views of the Boathouse are seen in Photos 7 and 8.

Photo 8: Interior view of the Boathouse looking south, showing the exposed structural steel frame and large boat door opening.

The steel trusses, which have an 8/12 slope, are constructed of a single steel angle. Angle sizes are 2"x 2" x ¼" at the bottom chord and diagonals and 2 ½" x 2 ½" x ¼" at the top chord. Truss members are connected with steel plates and bolted connections. Roof purlins are 6" deep C-channels.

Photo 9: Detail view of roof truss and roof purlins.

Photo 10: Detail view of roof truss to column connection at Column C-1.

Steel C-channel columns measured 4" deep with x 5/8" legs. The outermost flange of each column is concealed in the concrete walls.

The steel columns, trusses and purlins are rust coated, however the cross-sectional area of most members above the floor line appears to be close to original. There is severe deterioration of the columns at the base, or just above the floor line, at columns A-1, B-1, C-1 and C-2. (Refer to the column grid shown on the drawings in Appendix A). At column C-1, the column is completely rusted and separated from its base, transferring all loads into the concrete walls at this corner. See Photos 11 and 12.

Photo 11: Completely rusted base of steel C-channel column at location C-1.

Photo 12: Rusted base of steel C-channel column at location A-1

Photo 13: Rusted base of steel C-channel column at location C-2.

A 4" x 4" x ½" steel angle forms the frame for the large doors on the south wall of the Boathouse. A section of concrete floor is missing at the base on the west side,

leaving this column unsupported, as seen in Photo 14.

Photo 14: Missing concrete and unsupported steel angle column at door opening.

Photo 15 and 16: Embedded flange of C-channel column exposed where concrete wall surface is missing.

The flange of the steel (-channel column is exposed at the corner of the Boathouse at location C-1, as seen in Photos 15 and 16.

In general, the steel columns are in poor condition; the roof trusses and the roof purlins are in fair condition.

The walls and roof of the Boathouse are concrete panels identified as "Corr-Mesh" on the original drawings. A 1915 "Corr-Mesh" product brochure is included in Appendix C to offer greater insight into this product. "Corr-Mesh" is a heavy duty expanded metal lathe product with intermediate ribs for added strength, produced

by the Corrugated Bar Company, Buffalo, New York. The product was clipped and wired to the structural steel frame and then field coated with cement mortar on both sides, offering a " ...quick, economical and fireproof construction", as stated in the brochure. Wall panels measured 2 ½" thick.

Photo 17: Exterior view of the Boathouse concrete walls and roof.

Photo 18: Close-up view of the interior wall surface at the north wall.

The walls are in poor condition, with numerous horizontal and vertical cracks and missing sections. As seen in Photo 17, the section of wall between the man-door and building corner is bowing outwards with horizontal cracks. This is the corner of the building where the base of the corner column is rusted away, resulting in vertical load being transferred to the walls.

On the south wall of the Boathouse, adjacent to the large boat doors, a large section of concrete wall is missing, as seen in Photo 19. Other damaged wall areas are seen in Photos 20 and 21. Where visible at exposed edges, the metal lath is very rusted.

Photo 19: Missing section of concrete wall on the south wall of the Boathouse.

Photo 20: Horizontal and vertical cracking on the exterior wall surface on the east wall.

Photo 21: Damaged concrete wall panels and floor slab at the northwest corner. Exposed reinforcing bars can be seen in the concrete floor slab and the exposed "Corr-Mesh" metal lath can be seen in the wall.

The concrete roof panels of the Boathouse are mostly intact, however there is a damaged area at the overhang at column location A-4. The west side of the roof can be seen in Photo 17, and the east roof partially seen in Photo 22. Cracking is also visible.

Photo 22: View of east side of roof where remnants of an asphalt sheet roofing product remains.

Photo 23: Damaged concrete roof and wall panels at location C-4.

The original roofing material is identified as " 'Security' prepared roofing" on the original drawings. There are remnants of an asphalt sheet roofing material on the east side, which would have been mopped on, but otherwise the concrete roof panels are exposed. Extensive areas of moss are growing on the roof.

The foundation of the Boathouse is a poured concrete slab supported by poured concrete beams, piers and walls. The presence of footings is not known and it is probable that the concrete was poured directly on the exposed rock. The floor slab measured approximately nine inches thick.

Photo 24: View of perimeter concrete beam along the west side and underside of the concrete floor slab. This area is part of the 1951 addition and in better condition.

Photo 25: View of the two concrete piers supporting the floor slab at the southwest corner, location C-5. These piers are part of the 1951 addition.

Much of the concrete foundation is severely deteriorated with cracked and missing concrete, and exposed reinforcing bars, particularly in the original 1912 portion of the structure. Concrete components in the 1951 addition are in much better condition.

Photo 26: Damaged perimeter concrete beam on west wall near south corner, original 1912 construction.

Photo 27: Damaged perimeter concrete beam on west wall with exposed reinforcing bar, 1912 construction.

Photo 28: Damaged concrete beam and pier along column line 4, original 1912 construction.

Photo 29: Damaged concrete pier along west side, mid-point between column lines 2 and 3.

The upper surface of the concrete floor slab in the building is in fair condition, as seen in previous Photos 7 and 8, however there is some significant cracking and deterioration along Column Line 4, which is the transition between the 1912 and 1951 construction. This condition is seen in Photo 30.

Photo 30: Concrete floor slab and boat well wall deterioration along column line 4.

Other features and architectural elements of the Boathouse include a pedestrian door and fixed steel sash windows on the west wall. The door opening measures 2'-

8" x 6'-8"; the door is missing. The fixed steel sash window measures 6'-3" wide x 1'-11" high; all glass is missing from the six individual openings.

Photo 31: Interior view of the fixed steel sash windows and adjacent pedestrian door on the west wall.

Photo 32: Exterior view of the fixed steel sash windows. All glass is missing. The deteriorated concrete wall surface is also seen in this photo.

On the south wall of the Boathouse there are two large doors, with each leaf measuring 4'- 9" wide x 11'-0" high. The doors are corrugated metal panels set in a 2" x 2" steel angle frame. The east door leaf remains in place; the west door leaf has been removed and is setting inside the building. The intact door is seen in Photos 6 and 19; the other leaf is seen in Photo 33.

Photo 33: Large Boathouse door stored inside.

A pair of steel boat rails remain intact and run from the water into the Boathouse. There is a wood walkway within the rails that is in fair condition inside the structure. A large winch is present at the rear of the Boathouse.

Photo 34: View of the boat rails and winch.

Photo 35: View of boat rails at the south end of the Boathouse.

Other features immediately adjacent to the Boathouse are the eight foot wide concrete pier and four foot wide wood boardwalk that provide access to the pathway that leads to the other buildings on the island. As the only boat landing point, all visitors to the island pass within a very close distance of the Boathouse.

Photo 36: View of concrete and steel sheet piling pier.

Photo 37: View of wood boardwalk connecting the pier to the pathway.

Recommendations

Due to a variety of factors including lack of maintenance, extreme weather conditions, and vandalism, the Boathouse is presently in very poor condition. It is the opinion of Sanders & Czapski Associates that in its present condition the Boathouse is an unsafe structure and that public access should be prohibited. All openings should be secured to prevent entry.

A number of options for this unique building exist, including rehabilitation, stabilization and, lastly, demolition. Costs for these options will vary considerably and are greatly affected by the remote island location. A discussion of these different options follows.

A. Stablization

Under this treatment option, temporary measures should be taken to stabilize and secure the Boathouse until future rehabilitation efforts are feasible. Stabilization efforts would include:

- Install temporary columns to support the roof structure where steel columns are significantly deteriorated. Temporary supports may extend past the deteriorated concrete foundation to the surface of the exposed rock.
- Remove deteriorated sections of the concrete wall and roof panels.
- Install temporary lateral bracing to withstand horizontal loads.
- Install temporary roofing material, such as a single-ply sheet membrane product, to protect the structure.
- Install security panels over door, window and wall openings to prevent public access.

B. Rehabilitation

Under this treatment option, deteriorated elements of the Boathouse would be repaired or replaced, missing elements replaced, and the structure restored with the intent of re-use for another purpose. As the initial landing and gathering point on the island, a restored Boathouse could be used as a weather shelter and/or a visitor orientation center. Rehabilitation work would include:

- Repair the concrete foundation and floor.
- Install wood decking over the boat well to add usable floor space.
- Repair the structural steel frame.
- Repair/replace damaged concrete wall and roof panels.
- Install new pedestrian door and windows.

- Install the one boat door that has been removed and is presently stored inside.
- Install new roofing material.

C. Modified Rehabilitation

Because the "Corr-Mesh" concrete wall and roof will be costly to repair and replicate, this approach would be to remove the majority of the concrete wall and roof panels, repair and restore the structural steel frame and concrete foundation, and add a new type of wall and roof cladding material. Under this approach the size of the building would remain the same, and the structural steel frame would remain, preserving some original material. As with Option B, the building could be used as a shelter and/or a visitor orientation center for visitors arriving at the island. Rehabilitation work would include:

- Repair the concrete foundation and floor.
- Install wood decking over the boat well to add usable floor space.
- Remove most of the deteriorated concrete wall and roof panels; retain some original wall material on the east wall.
- Repair the structural steel frame and add lateral bracing.
- Install new metal wall and roof panels, possibly corrugated steel panels.
- Install new pedestrian door and windows.
- Install the one boat door that has been removed and is presently stored inside.

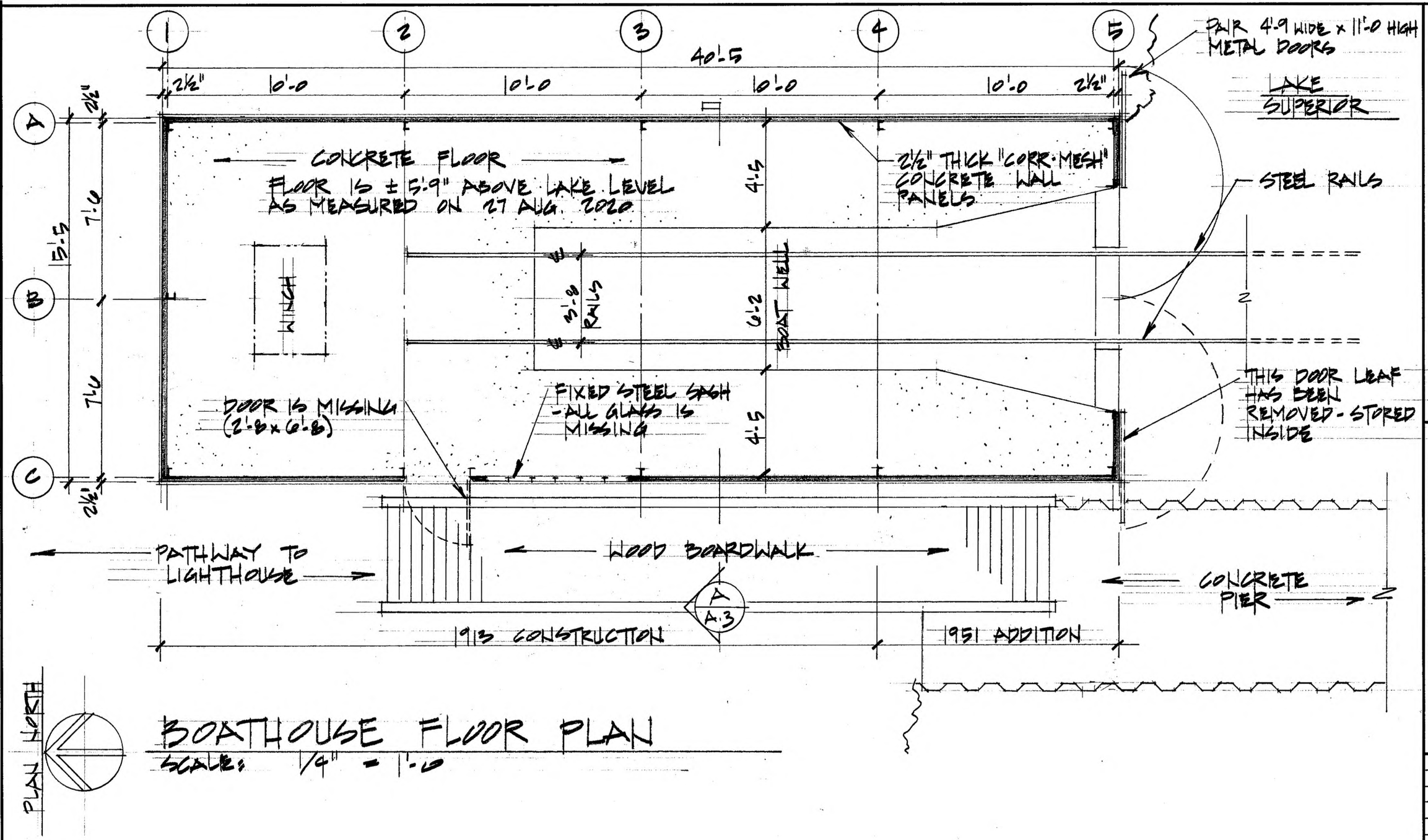
D. Demolition

A last course of action would be to demolish the Boathouse, resulting in the permanent loss of a significant historic structure. This option is not recommended.

Based on our site investigation and analysis, and discussions with U.S. Fish & Wildlife Service, our recommended course of treatment is the "Modified Rehabilitation". Retaining the structural steel frame of the building and some of the concrete "Corr-Mesh" wall panels, along with interpretive signage, would provide an opportunity to interpret the original building in its original location. Rehabilitating the building for use as a visitor shelter and interpretive center would provide a new use for the Boathouse at this important historic maritime site.

Appendix A

Existing conditions drawings



BOATHOUSE FLOOR PLAN

SCALE: 1/4" = 1'-0

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architecture / landscape architecture / historic preservation
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U.S. FISH & WILDLIFE SERVICE
BOATHOUSE AT THE
HURON ISLANDS LIGHT STATION
Huron National Wildlife Refuge
Marquette County, Michigan

25 SEP 2020

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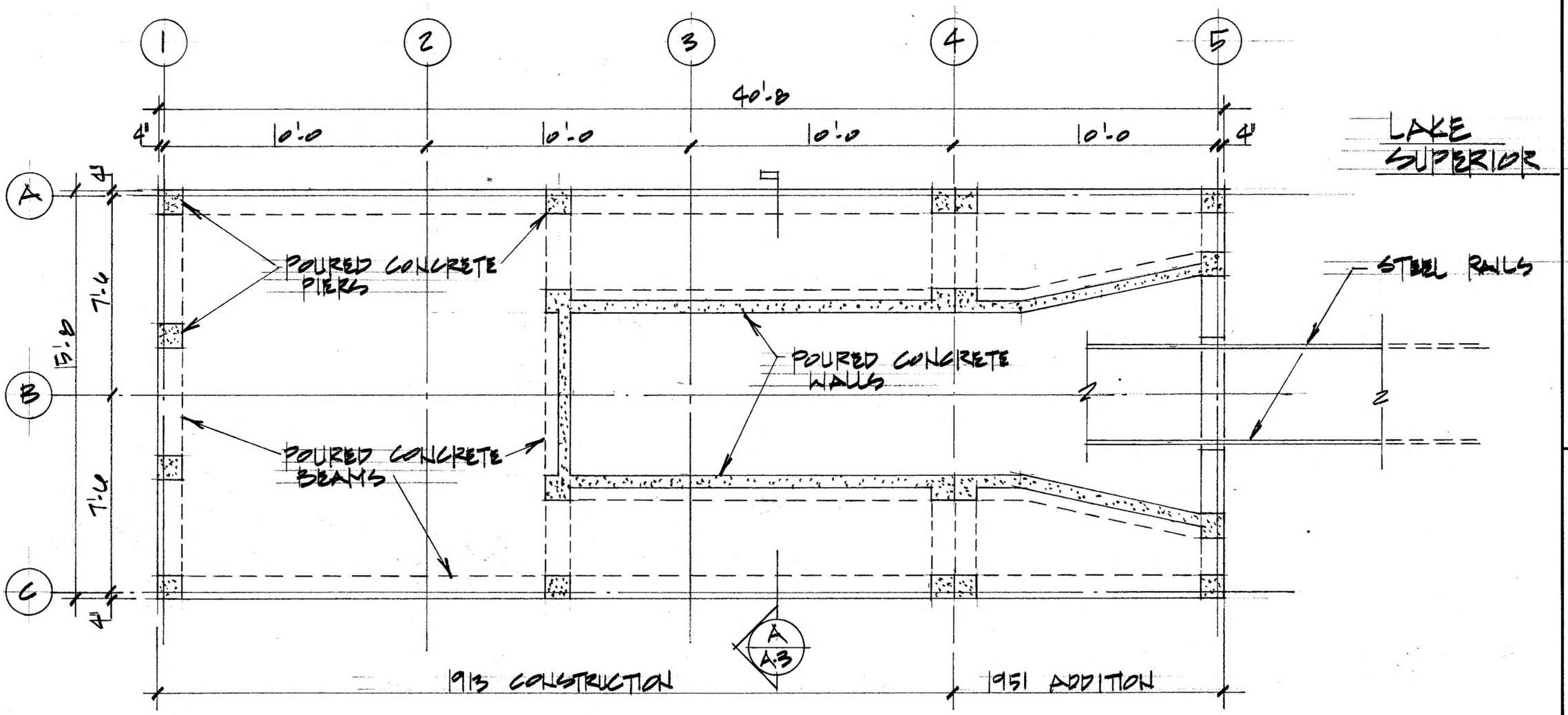

PLAN NORTH

BOATHOUSE FOUNDATION PLAN

SCALE: 1/4" = 1'-0

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2 SEP. 2020

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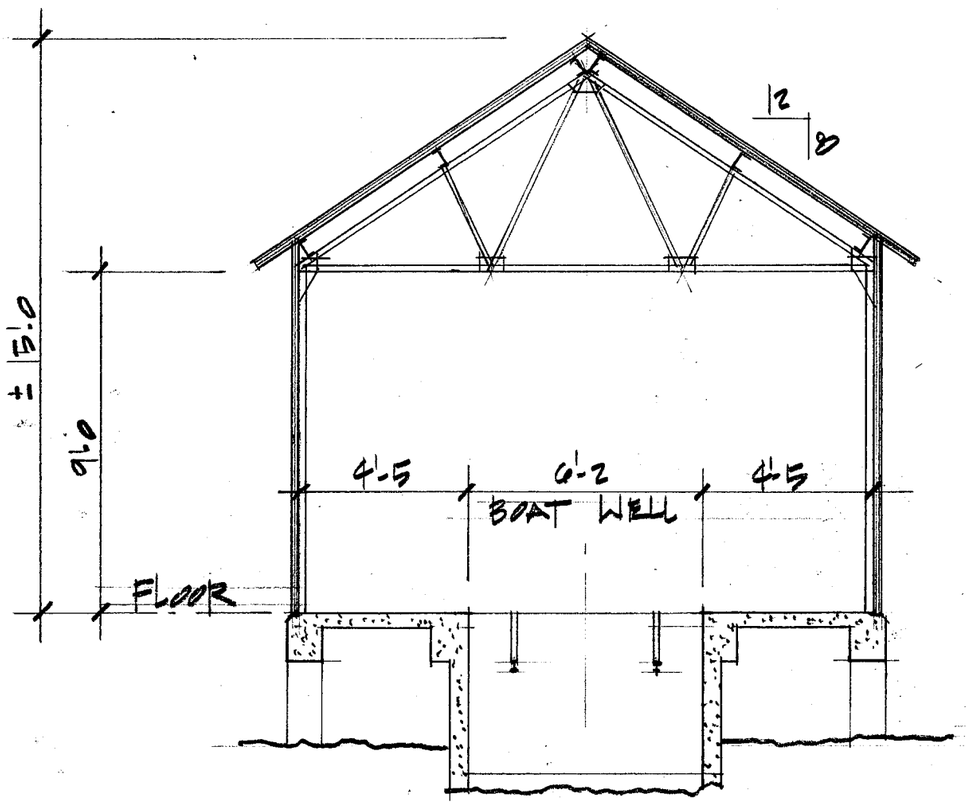

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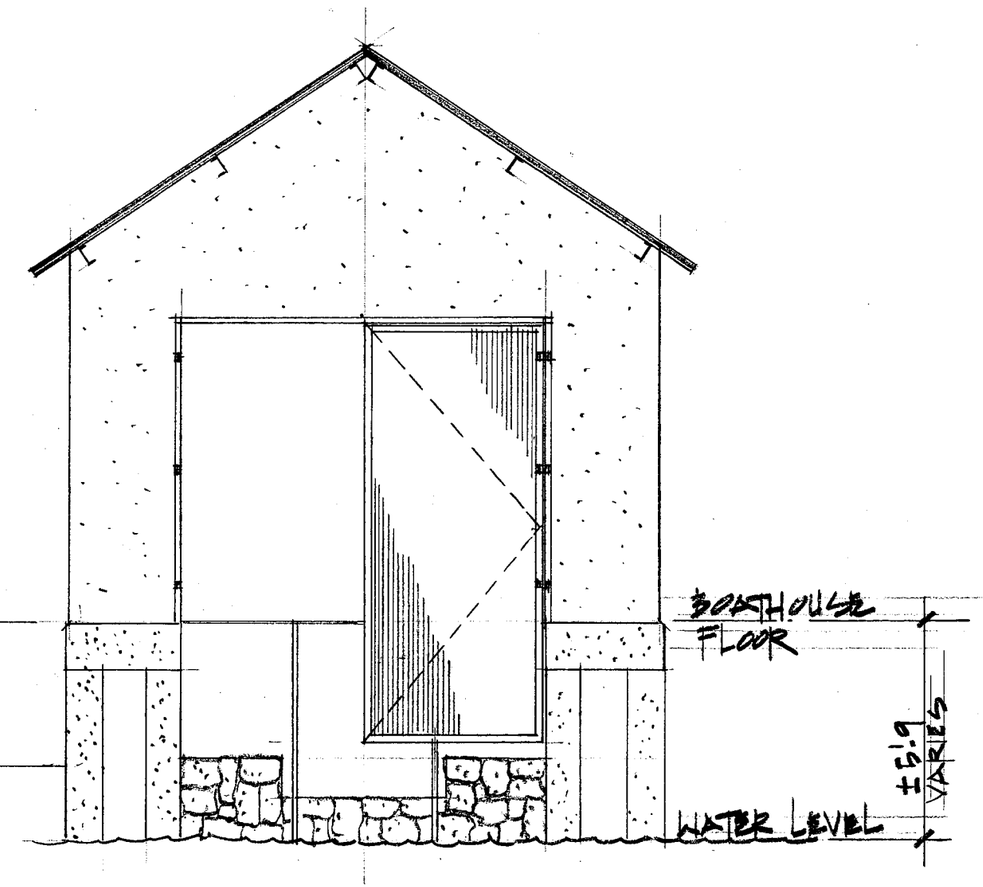
BUILDING SECTION
SCALE: 1/4" = 1'-0



FRONT (SOUTH) ELEVATION
SCALE: 1/4" = 1'-0

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Appendix B

Boathouse 1912 Drawing

RHL 1023850

HALF TRUSS
4 REQD COMPLETE
HALF SECTION OF BOAT HOUSE
SIDE ELEVATION
FRONT ELEVATION
PLAN OF ROOF FRAMING
ROOF PLAN
TYPICAL BEAM REINFORCEMENT
DETAILS OF STEEL POST WINDOW FRAME
ELEVENTH LIGHT-HOUSE DISTRICT
OFFICE OF COMMANDER, 6TH CHICAGO, U.S.N.C.
LIGHT-HOUSE INSPECTOR
FOR HURON ISLAND
15'-0" X 30'-0" FIRE PROOF BOATHOUSE

Appendix C

1915 “Corr-Mesh” Product Brochure

102-15.

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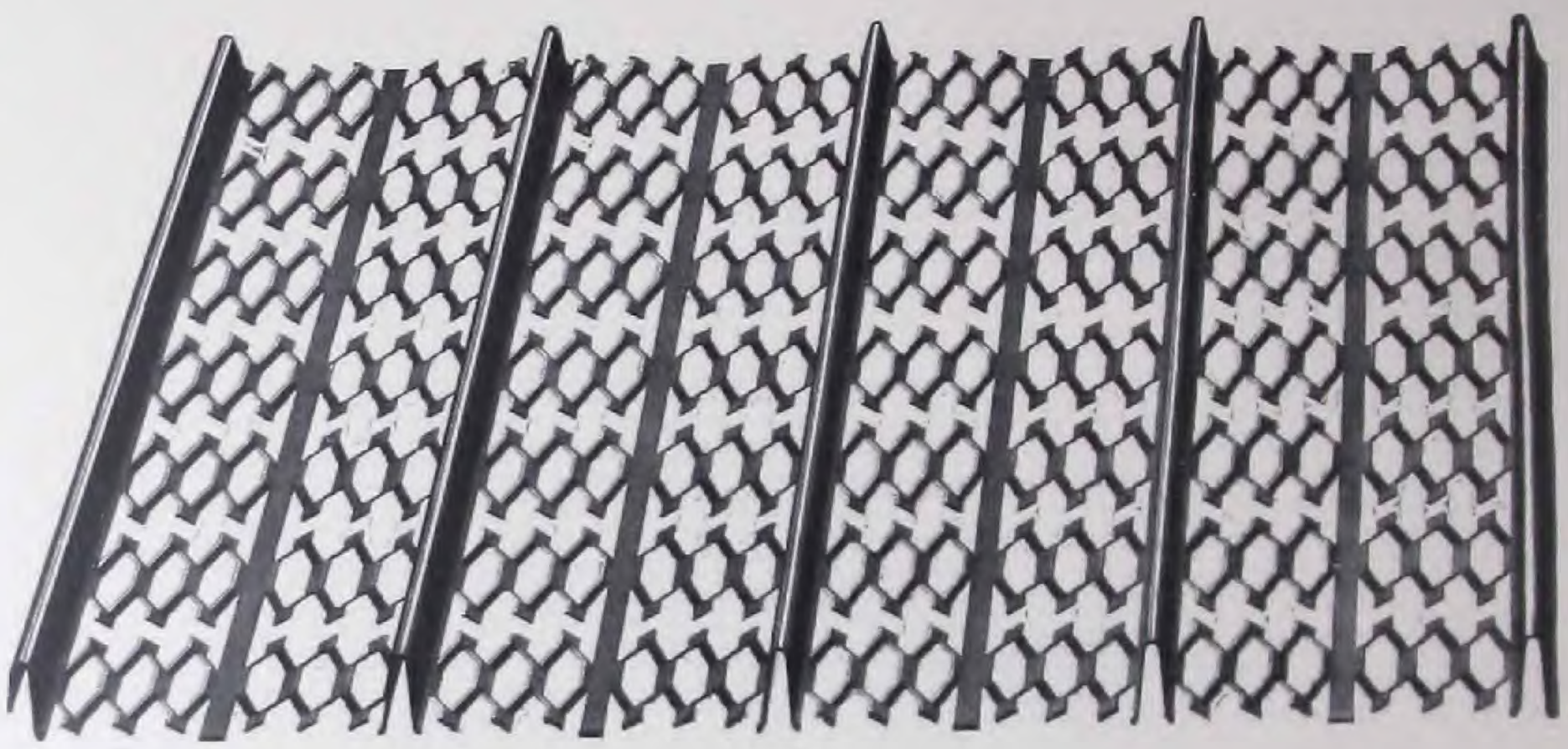
CORR-MESH

metal lath.

1915

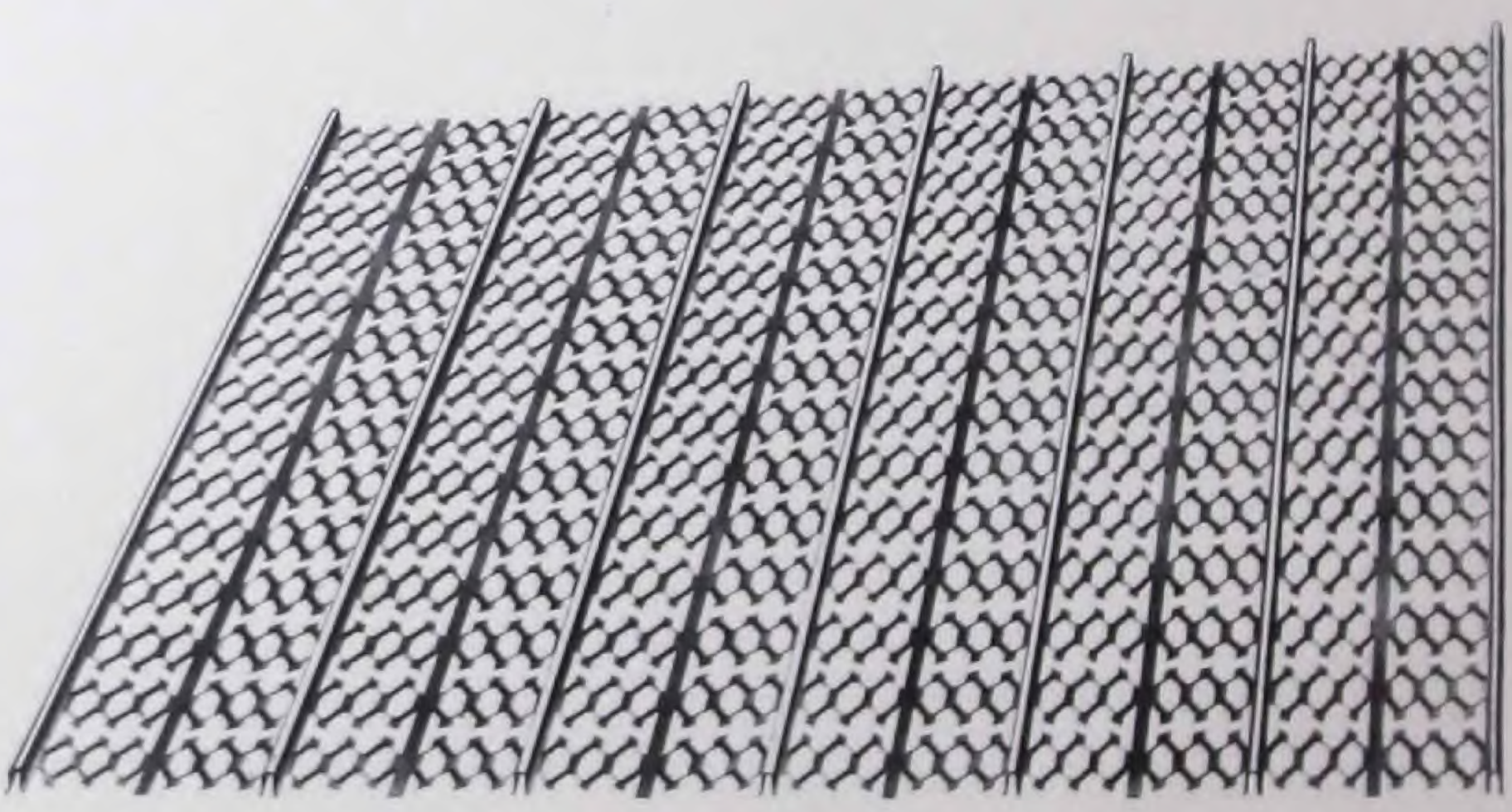
CORRUGATED BAR CO.

BUFFALO N·Y·



Corr-Mesh

Corr-Mesh is expanded metal with very stiff ribs ¾-inch high spaced 3¼ inches center to center. These ribs are an integral part of the sheet and make an effective reinforcement.



Corr-Mesh Lath

Corr-Mesh Lath is made from the same metal as Corr-Mesh—the toughest and strongest sheet metal known. The ribs are $\frac{5}{16}$-inch high spaced 3 inches apart. Corr-Mesh Lath is not as stiff as Corr-Mesh.

Corr-Mesh
and
Corr-Mesh Lath

for quick, economical
fireproof construction
as adapted to

Factories	Silos
Garages	Tanks
Residences	Conduits
Outbuildings	Sewers
Fences	Culverts

of Concrete or Stucco

Corr-Bar-O
Waterproofing Products

CORRUGATED BAR CO.

BUFFALO N Y

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Corrugated Bar Company,
Buffalo, N. Y.

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Corr Products

The products of the Corrugated Bar Company are not mere materials manufactured for a market. They are the result of engineering knowledge and experience as applied to the proper adaptation and use of materials for different forms of building construction.

The basis of CORR products is the building itself—the best kind of reinforcement or support for concrete, cement, mortar or plaster required for each individual purpose, consistent with economy, speed of construction, strength and permanence.

Each one of these products has been designed by engineers and represents an experience of some twenty-four years in expanded metal and reinforced concrete construction in which several hundred million dollars worth of buildings have been erected.

Corr-Mesh and Corr-Mesh Lath

CORR-MESH and CORR-MESH LATH are very stiff-ribbed expanded metal—one-piece products, made from the toughest and strongest sheet metal that can be produced. The ribs are ¾-inch high in CORR-MESH and $\frac{5}{16}$-inch high in CORR-MESH LATH. The metal between is expanded into a diamond mesh with a piece of plain metal left in the middle for further strengthening.

These two products are very much the same except that CORR-MESH having the higher rib is considerably heavier and stiffer.

Corr-Mesh

(See pp. 53-54 for detailed information as to sizes, gauges, etc.)

The ribs, ¾-inch high, give great strength and stiffness. CORR-MESH gives firm support to concrete and plaster both during construction and after.

For walls and partitions, CORR-MESH is plastered both sides with cement mortar, forming a smooth, solid monolithic wall of great strength. The ribs do away with extra studding—a saving in material and labor cost.

For roofs and floors, CORR-MESH acts as form-work and concrete is merely spread and smoothed down. CORR-MESH supports the wet concrete; no deck centering is required. This saves approximately 3½ cents per square foot.

Uses of Corr-Mesh

Foundries and light manufacturing plants: Replaces corrugated iron and mill construction. CORR-MESH is the ideal method of construction for roofs, floors, partitions and exterior walls.

Railroads: Handsome, permanent, fireproof stations, sheds and wayside buildings in stucco at low cost.

Amusement Park Buildings: CORR-MESH makes possible the only low cost construction on which insurance can be obtained.

Solid Stucco Residences: Beautiful effect obtained at comparatively low cost. Fireproof as far as the walls of the building are concerned.

CORR-MESH is also effectively used for

Farm buildings	Culverts	Sewers
Fences	Tanks	Conduits

and similar construction. The fireproofing advantage is obvious.

CORR-MESH is instantly available for repair work, whether on steel, concrete or wooden frames. Many railways and industrial corporations carry CORR-MESH in stock.

Many Advantages

CORR-MESH greatly reduces the amount of labor. It does away with the old methods of deck centering in roof and floor work, and the extra studding and labor of wiring in partitions. CORR-MESH increases the speed of erection. Special labor-saving tools and devices for attaching CORR-MESH to all kinds of framework (see page 57–59).

CORR-MESH constructions are light in weight, saving in the cost of supporting framework.

CORR-MESH construction costs less than any other construction giving equal permanence and general utility.

Corr-Mesh Lath

(See pages 55–56 for detailed information as to sizes, gauges, etc.)

Lighter than CORR-MESH but made on the same principle. The ribs are $\frac{5}{16}$-inch high.

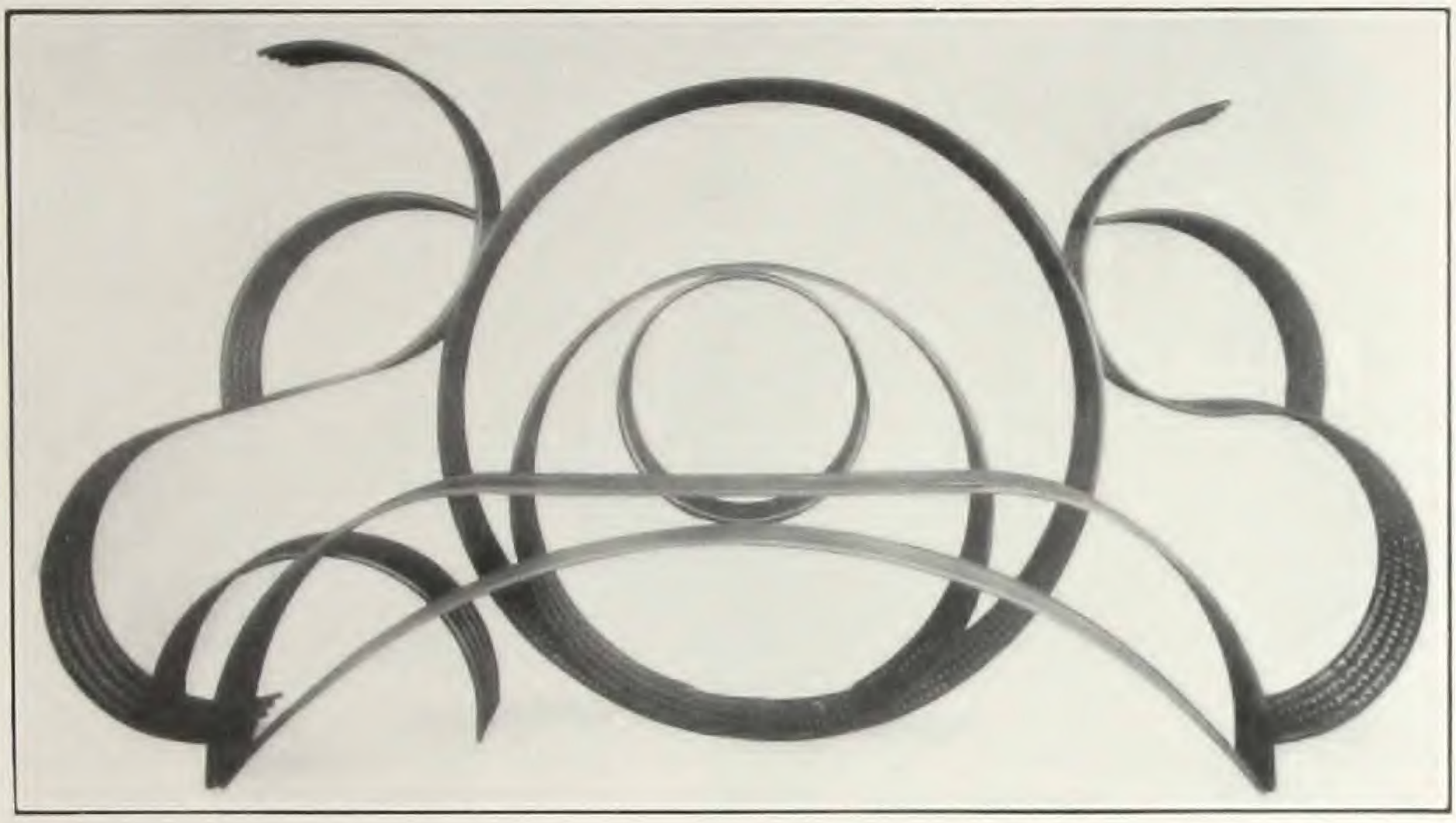
CORR-MESH LATH is used extensively for ceilings, where it greatly reduces the material required in the supporting framework, and cuts down the cost of erection. In stucco construction it eliminates furring strips and makes a strong and permanent reinforcement for the plaster covering.

Uses of Corr-Mesh Lath

Besides the above named applications, CORR-MESH LATH is used in

Stucco Veneer residences	Culverts	Conduits
Farm buildings	Tanks	and similar construction.
Fences	Sewers	

In the following pages are descriptions and illustrations of the applications of CORR-MESH and CORR-MESH LATH to various uses, also a supplement on labor-saving tools and fittings and CORR-BAR-O Water-Proofing products.



Curved Corr-Mesh

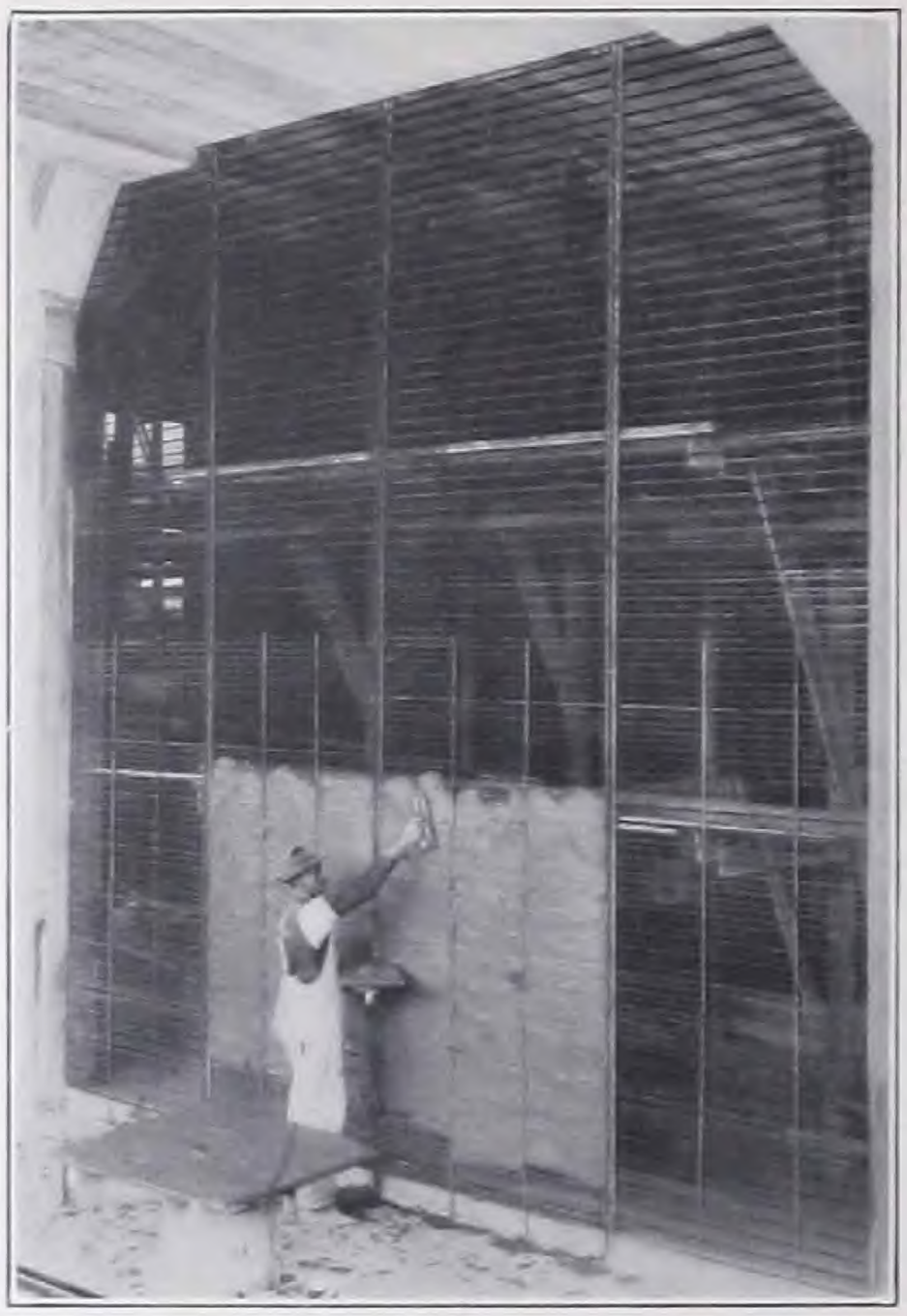
Corr-Mesh can be curved at the factory to any radius over 12 inches.

The above illustration shows a few samples of curved Corr-Mesh. The curvature is uniform and the ribs may be on either the inside or the outside.

Curved Corr-Mesh is especially adapted for any construction where it is necessary to concrete or plaster a curved surface. In reinforced concrete sewers, conduits, arched floors and similar construction, the Corr-Mesh acts both as reinforcing material and form work, eliminating the expensive curved centering usually required for such work. It is also extensively used for curved roofs, domes, alcoves, and other constructions which require simple or groined arches, and other curves for walls and ceilings.

The cost of curving the Corr-Mesh sheets is low. Curved Corr-Mesh is crated for shipment, and arrives in perfect condition.

Solid Partitions



HIGH CORR-MESH PARTITIONS
Atlanta Joint Terminals Building, Atlanta, Ga.

CORR-MESH, with ribs ¾ inch high, plastered on both sides, forms solid two-inch partitions of great strength and economy.

Their light weight (20 pounds per square foot) cuts down the total weight of building.

They save in floor area (2% in office buildings and 4% in hotels and apartment houses). They are absolutely fireproof, and the strongest of all the standard fireproof partitions used in Class A buildings. They are more nearly sound proof than any other kind of partition except hollow-tile. This was shown by a series of tests made on 2-inch solid partitions at the Chicago Music Building.

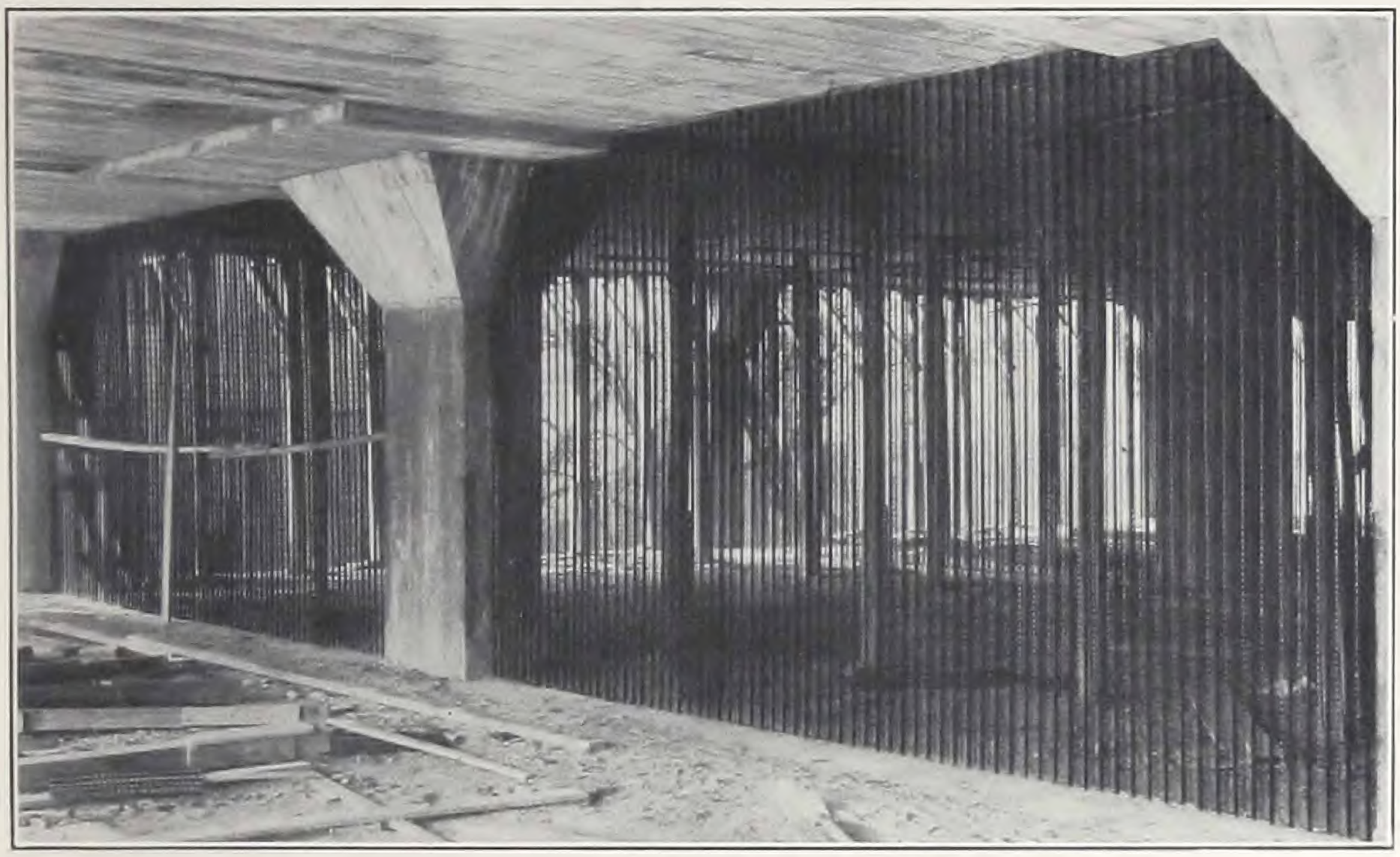
Easy to Build

CORR-MESH is stud and lath in one piece. The ¾-inch ribs act as studding. The end ribs of adjacent sheets interlock, forming a continuous sheet which is "up-ended" as a unit and secured top and bottom. Special fastenings make this quick and easy. Any standard lime or patent plaster is easily applied with no waste of material.

Lime plaster has a much greater sound-proofing efficiency than the patent plasters but, if used, it should be gauged with 10% Portland cement.

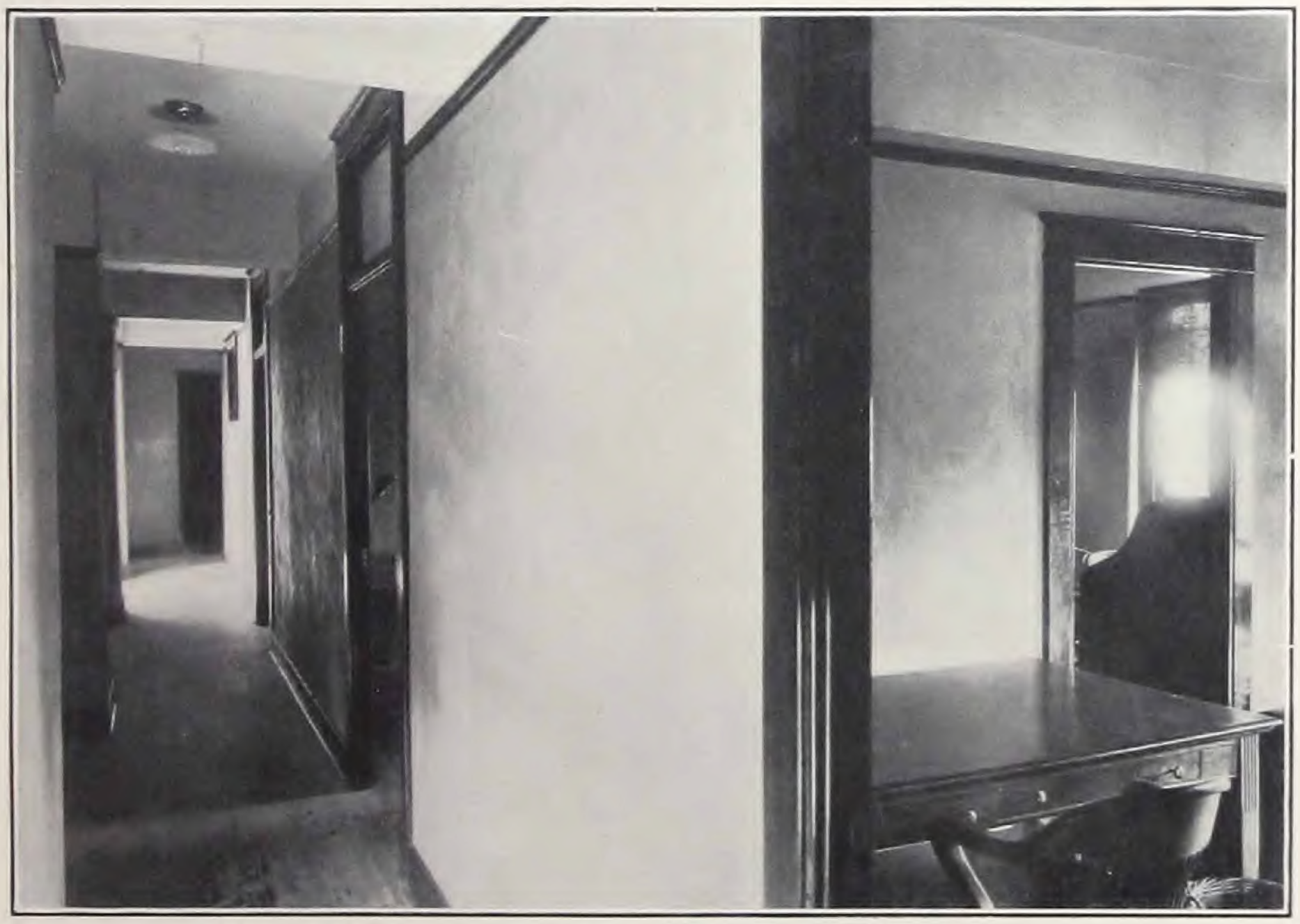
CORR-MESH partitions are like a solid slab of stone with the added strength and toughness of steel reinforcement. They have come into wide use in apartment houses, hotels, warehouses, factories and all classes of industrial buildings.

For designing details and specifications, see pages 12–14.



CORR-MESH PARTITIONS

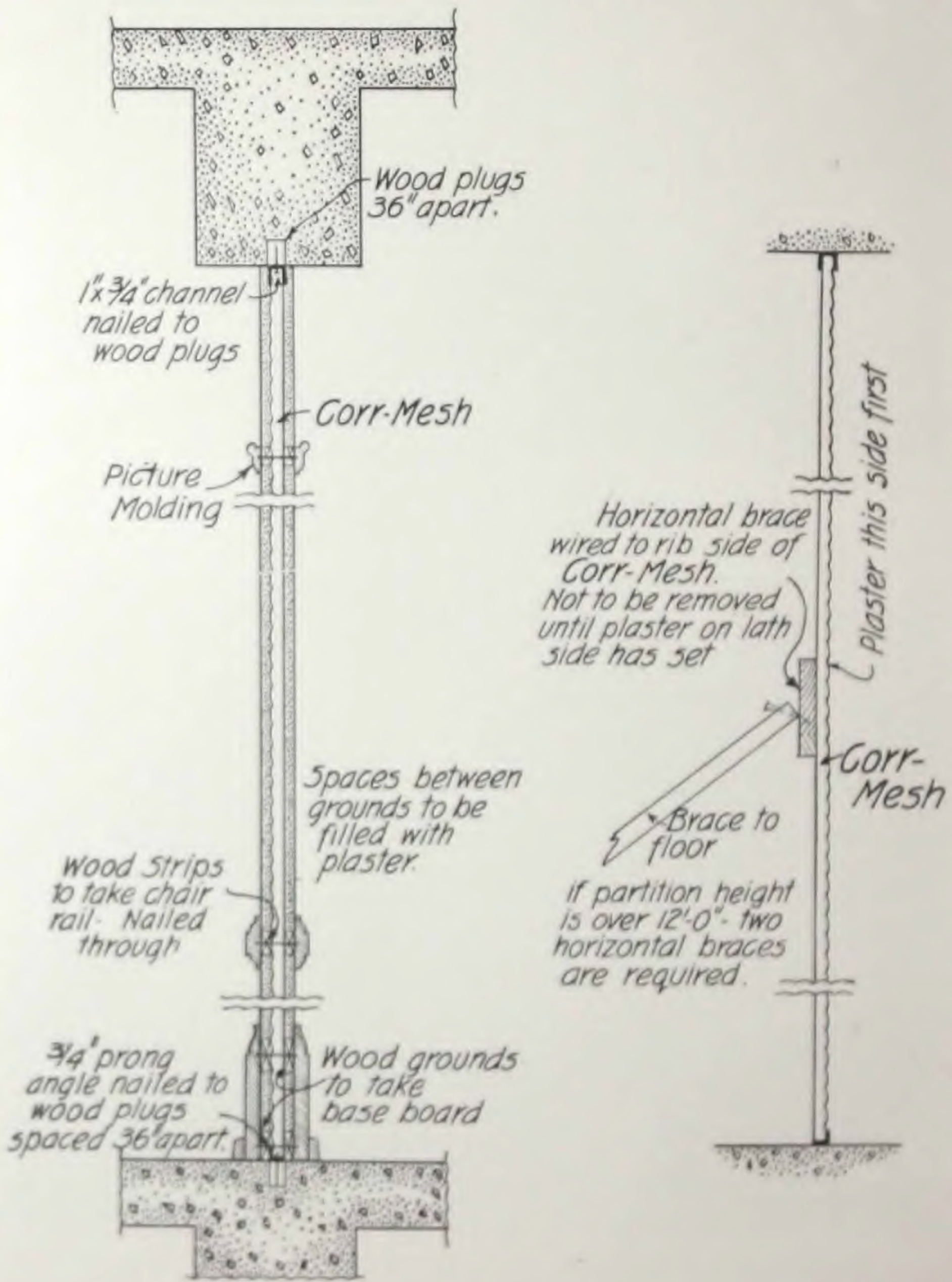
Atlanta Joint Terminals Building, Atlanta, Ga.



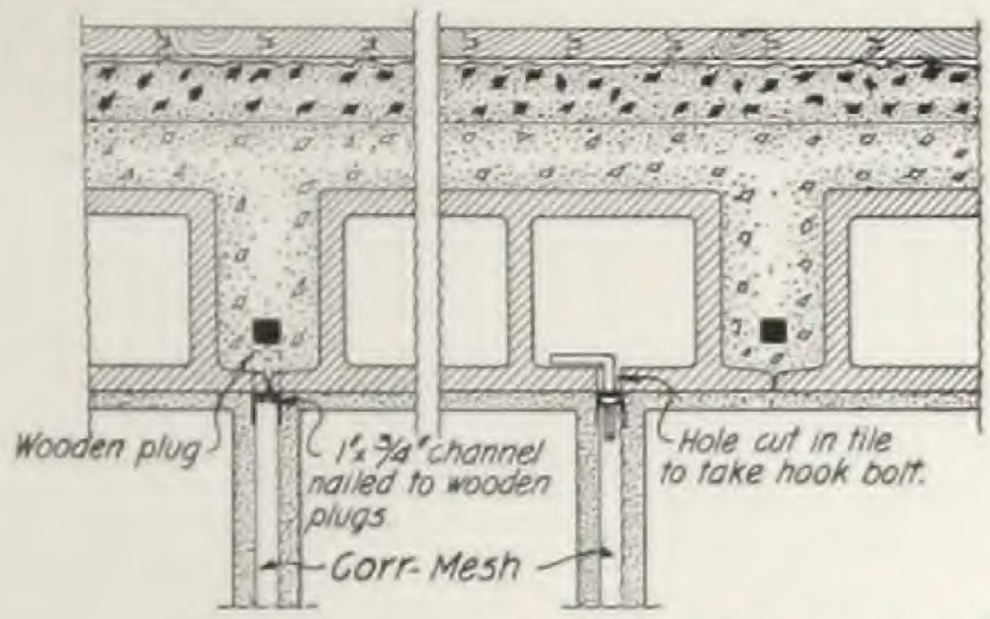
CORR-MESH PARTITIONS, WALDORF BUILDING, ALBANY, N. Y.

W. H. Van Guysling, Architect — Morris Kantrowitz, Contractor

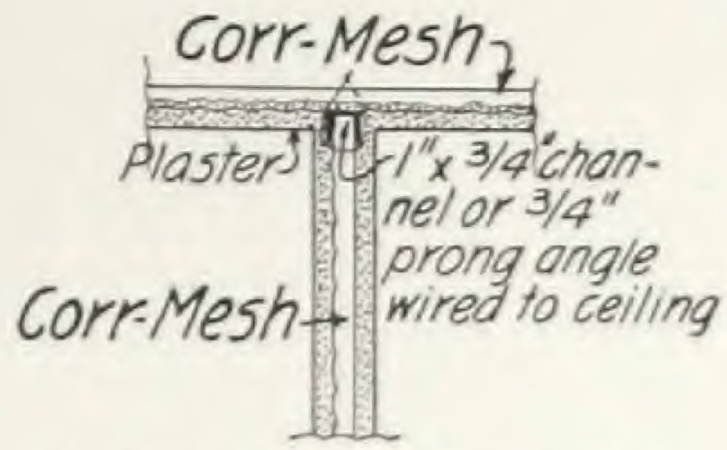
Designing Details



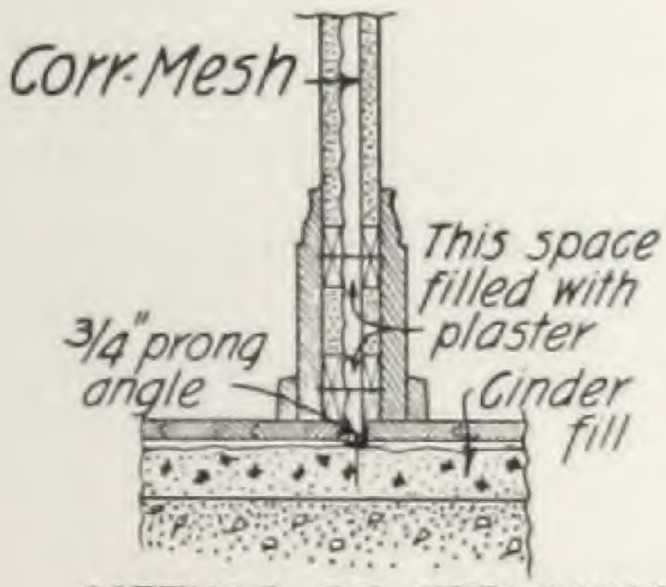
Designing Details



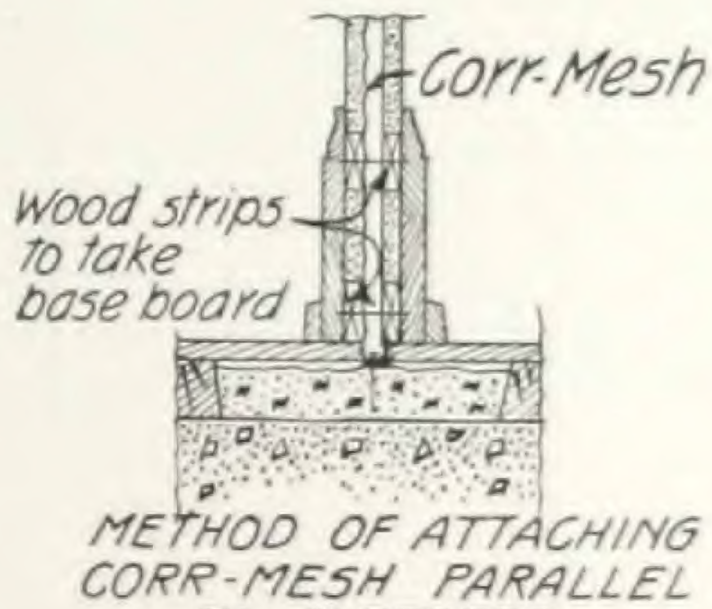
Two Methods for attaching Corr-Mesh Partitions to Hollow Tile Ceiling.



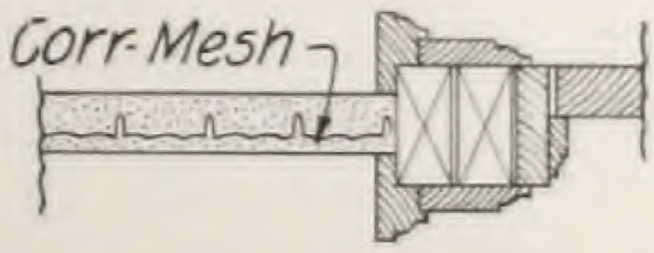
METHOD OF ATTACHING CORR-MESH PARTITIONS TO SUSPENDED CEILING



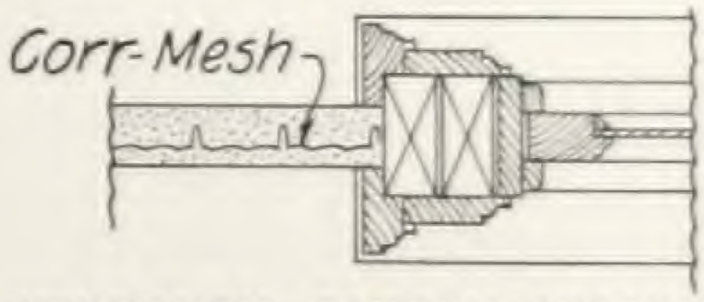
METHOD OF ATTACHING CORR-MESH CROSSWISE OF SLEEPERS



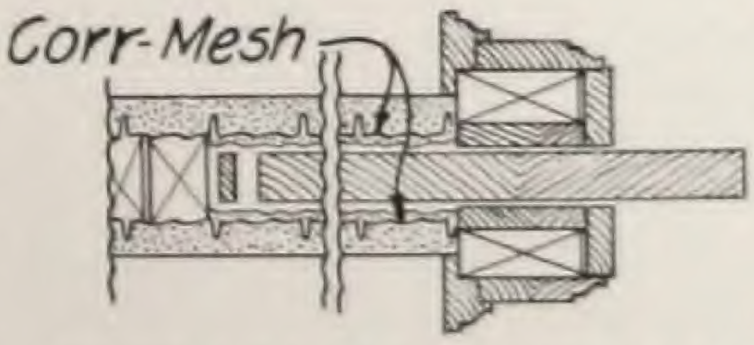
METHOD OF ATTACHING CORR-MESH PARALLEL TO SLEEPERS



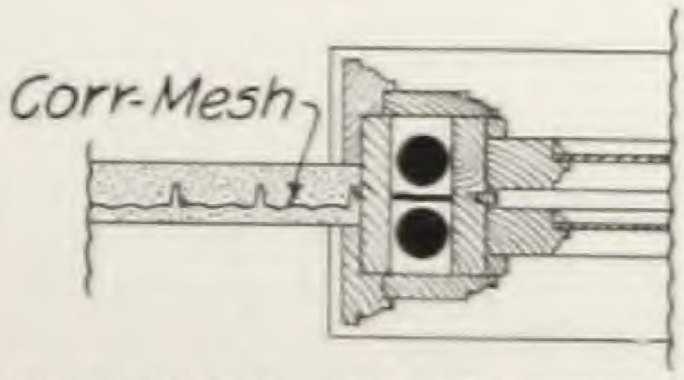
HORIZONTAL SECTION THROUGH DOOR JAMB



HORIZONTAL SECTION THROUGH FIXED SASH



HORIZONTAL SECTION THROUGH SLIDING DOOR JAMB.



HORIZONTAL SECTION THROUGH SLIDING SASH

Specifications

Corr-Mesh

CORR-MESH of.....gauge (for proper gauge, see table below), with ribs ¾-inch high spaced not more than 3¼ inches center to center, shall be used for partitions. Outside ribs of adjacent sheets shall be interlocked and, every 24 inches, pinched together by special punch or wired tightly with No. 16 galvanized wire.

Fastening Partitions

Details of attachment to floor and ceiling are shown on pages 12 and 13.

Splicing Corr-Mesh

Where partitions are of such a height that it is necessary to make end splices, sheets shall lap 2 inches where the laps come directly over a permanent supporting framework. If laps do not come at the permanent support, each rib shall be punched or wired tightly at both ends of all laps, which shall be at least 4 inches if they break joints, or not less than 8 inches if they do not break joints.

High Partitions

If partitions are more than 18 feet high, some standard framing shall be provided. This framing is usually of light structural steel angles, tees or channels. When a framing is required, it may be advisable to run the ribs horizontally instead of vertically.

Plastering

Before plastering, place temporary horizontal shoring on rib side at middle of height of partition; plaster on lath side first, then, after first coat has set, remove shoring and plaster on rib side.

Plaster

Use any standard lime or patent wall plaster prepared for use on metal lath. If lime plaster is used, 10 per cent. Portland cement shall be added for strength, and long cow hair, of good quality, shall be mixed in the plaster for the first coat on each side, in the proportion of 1 pound of hair for each sack of cement.

Table III—Corr-Mesh Partitions

HEIGHT	GAUGE CORR-MESH ¾-INCH RIBS	THICKNESS OF PARTITION
Up to 8′–0″	28	1¾″
8′–0″ to 12′–0″	28	2″
12′–0″ to 13′–0″	26	2″
13′–0″ to 14′–0″	26	2¼″
14′–0″ to 15′–0″	26	2½″
15′–0″ to 16′–0″	24	2½″
16′–0″ to 17′–0″	24	2¾″
17′–0″ to 18′–0″	24	3″

Corr-Mesh Lath Partitions

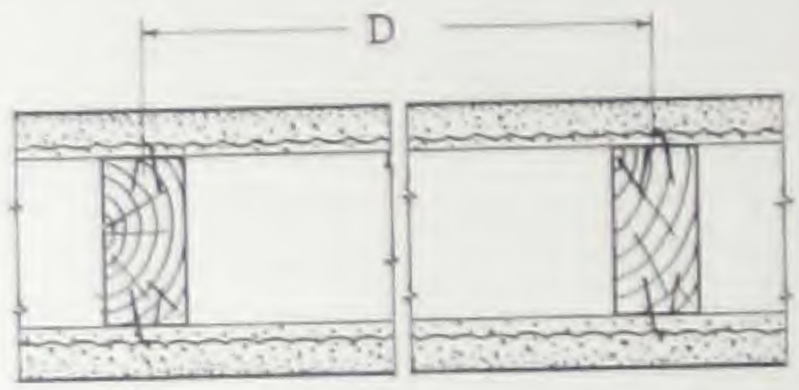
Corr-Mesh Lath (with ribs $\frac{5}{16}$-inch high) is especially adapted for the construction of double partitions and solid partitions over eighteen feet high.

The stiffness and close spacing of the ribs permit the supports to be placed from 26 inches to 40 inches center to center (see Table IV on next page). This makes a great saving in the cost of both the material and the erection of the studs.

The Corr-Mesh Lath forms a good, stiff, smooth surface, which has no tendency to wave while being plastered, and permits the plasterers to work with maximum speed, using a minimum quantity of material.

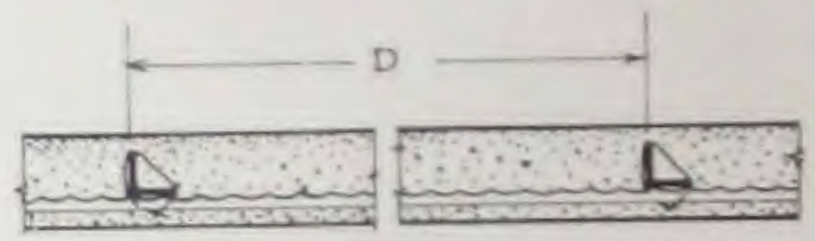
For fireproof construction, small steel or sheet metal channels or rolled angles can be substituted for the wood studs shown in Fig. 7 on the next page.

Designing Details



CORR·MESH·LATH
WITH·LATH·SIDE·OUT
STAPLED·TO·WOOD·STUDS

Fig. 7



CORR·MESH·LATH
WITH·LATH·SIDE·IN
WIRED TO METAL STUDS

Fig. 8

Specifications

Corr-Mesh Lath

CORR-MESH LATH of.....gauge (for proper gauge, see Table IV below), with ribs $\frac{5}{16}$-inch high spaced not more than 3 inches center to center, shall be used for double partitions and solid partitions over .....feet in height. Outside ribs of adjacent sheets shall be interlocked and wired tightly every 24 inches with No. 16 galvanized wire.

Splicing Corr-Mesh Lath

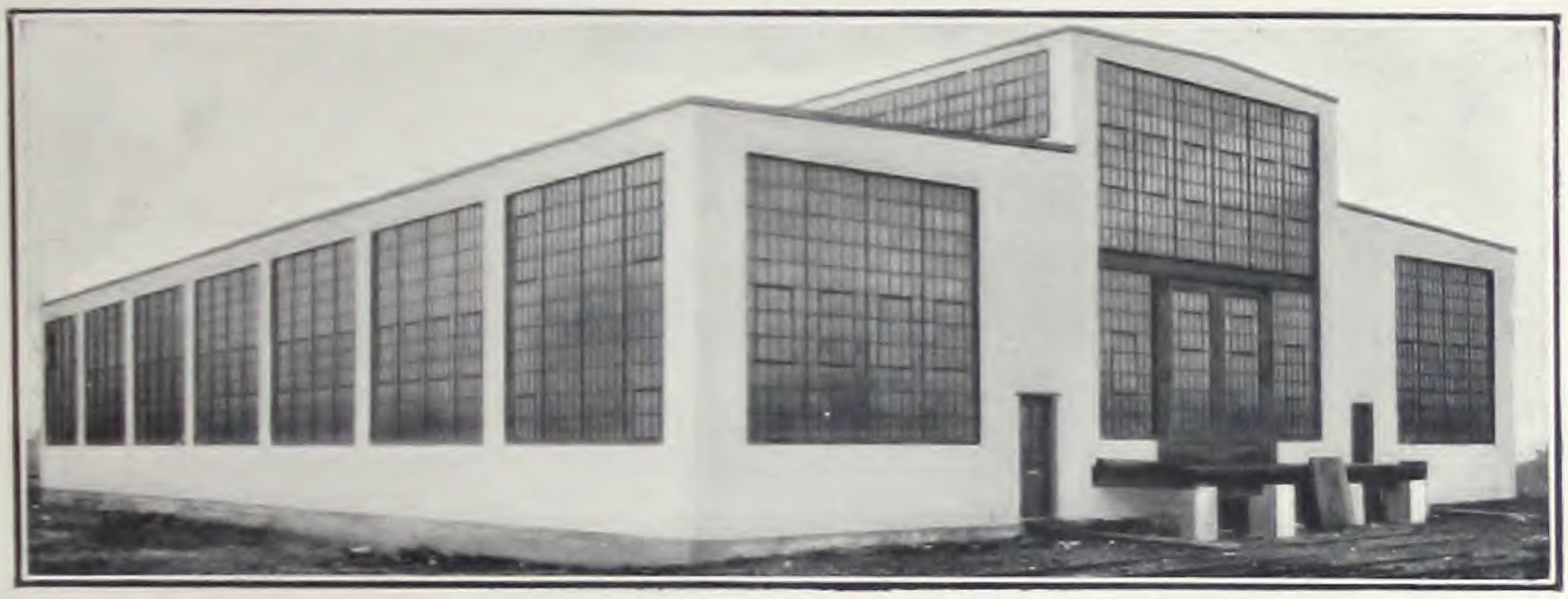
End splices shall not be less than 2 inches where the laps come directly over a permanent supporting framework. If laps do not come at the permanent support, laps shall be not less than 4 inches, and every second rib shall be wired tightly at both ends of all laps, and laps shall break joints.

Plaster

See plaster specifications for CORR-MESH Partitions, page 14.

Table IV—Distance Between Supports for Corr-Mesh Lath Partitions and Walls

GAUGE CORR-MESH LATH $\frac{5}{16}$-INCH RIBS	DISTANCE "D" CENTER TO CENTER OF SUPPORTS FIGURES 7 AND 8
24	40 inches
26	32 "
28	26 "



Exterior Walls

*Steel and Reinforced Concrete Framing

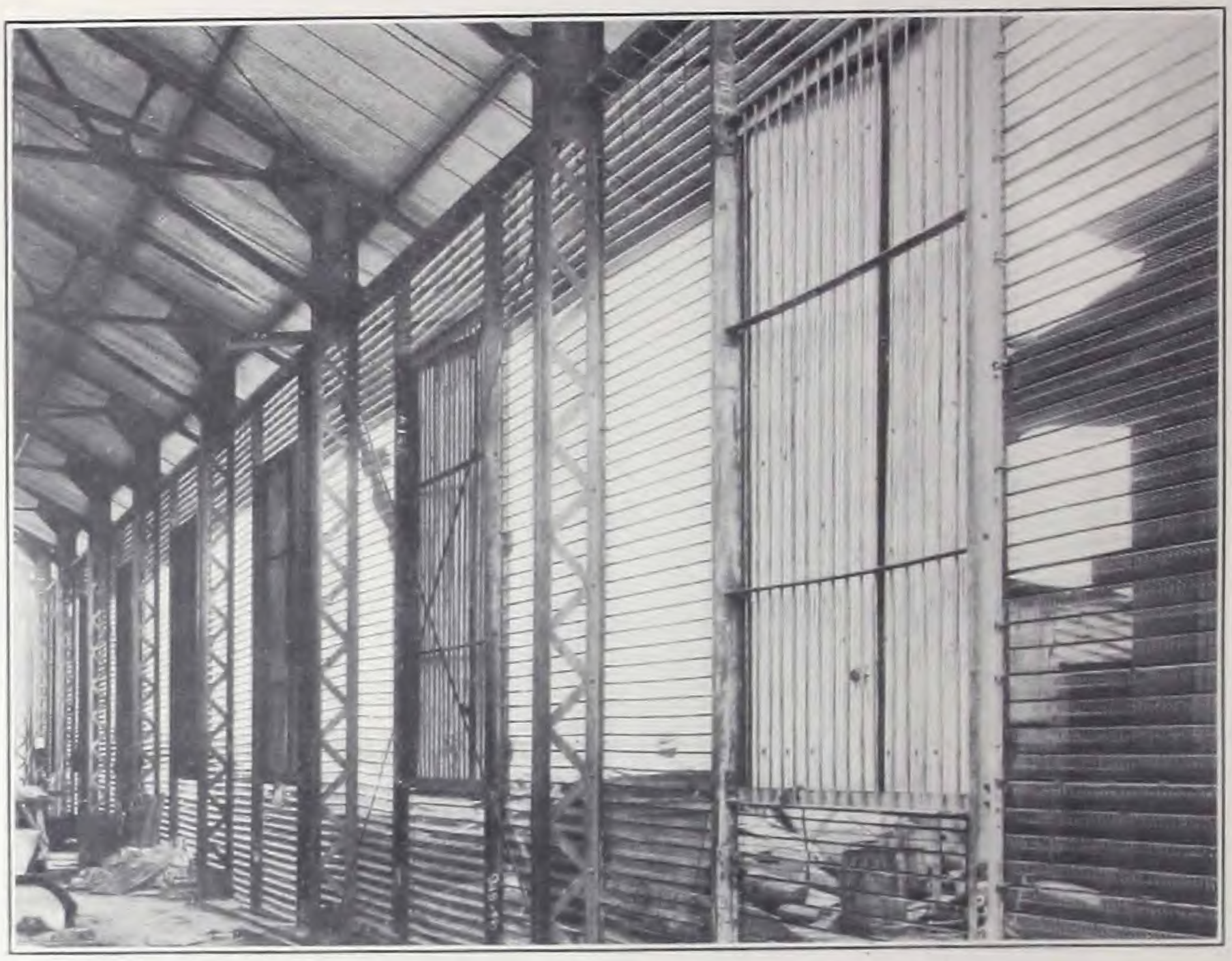
For foundries and industrial buildings, CORR-MESH walls are much better than corrugated iron because there are no maintenance and renewal costs. They cost about two-thirds as much as 9-inch brick curtain walls or porous non-waterproof concrete block walls, and considerably less than 4-inch poured reinforced concrete walls without waterproofing.

CORR-MESH is rigidly attached to the outside of the frame and plastered inside and out to a total thickness of two inches with Portland cement, gauged with lime. The ribs do away with extra studding—a saving in material and labor cost.

CORR-MESH gives, for a very low cost, an exterior which, for beauty and solidity and permanence is much better than any other type of construction.

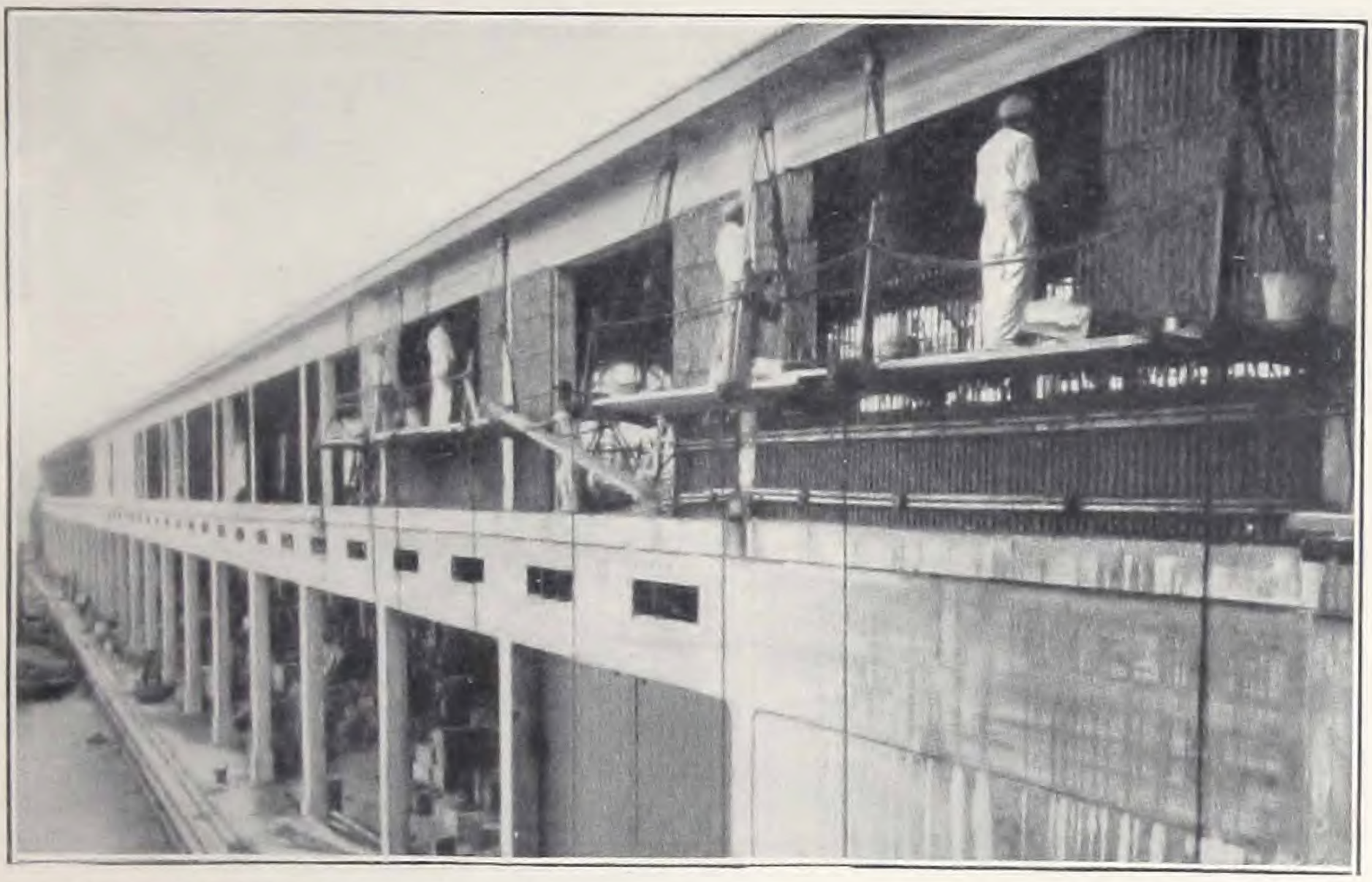
For designing details see pages 20 and 21. For complete specifications see pages 22 and 23.

*NOTE.—For exterior walls on wood framing, see Stucco Residences, pages 39 to 42.



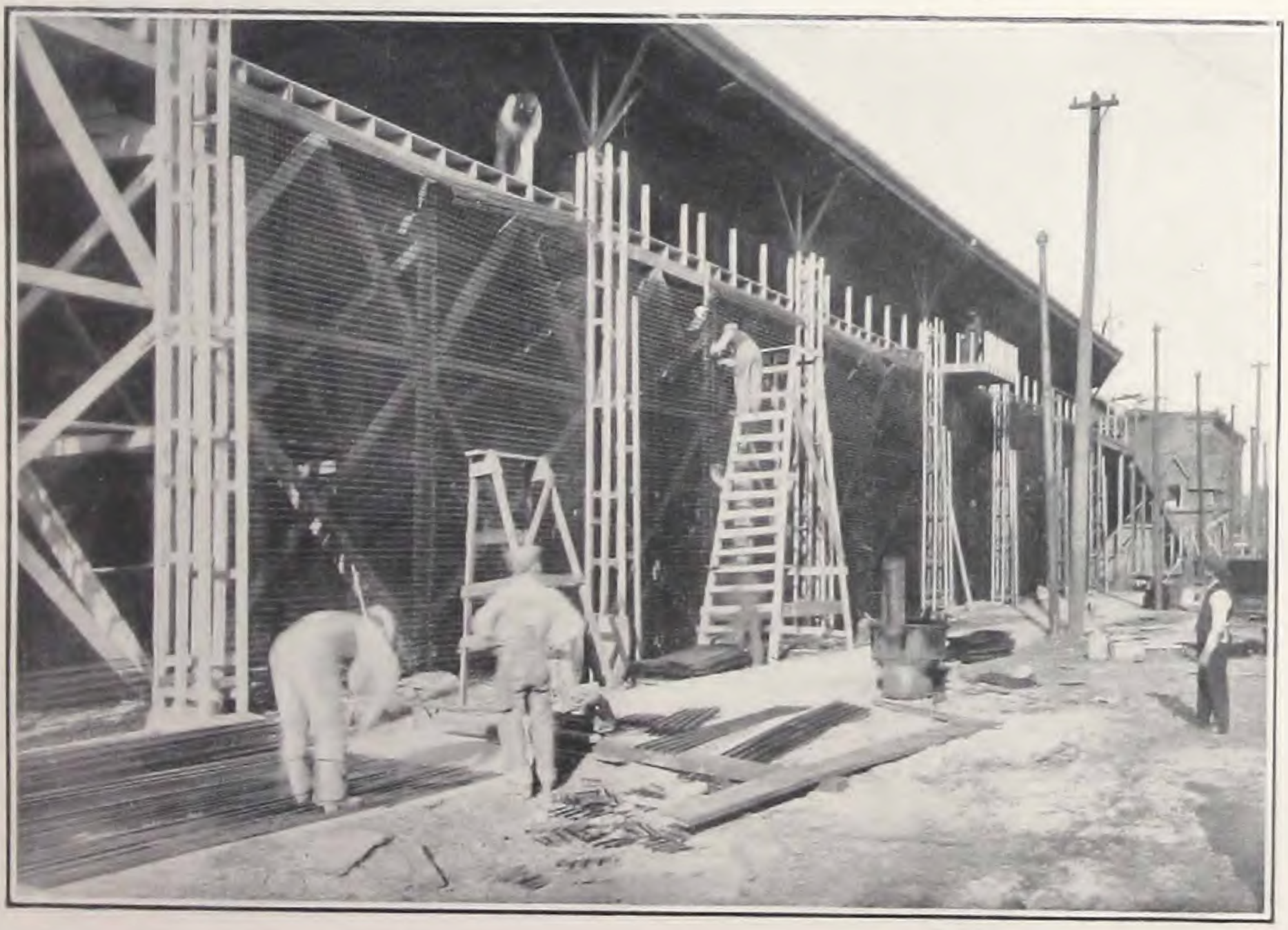
CORR-MESH WALL BEFORE PLASTERING

PLASTERING CORR-MESH WALLS, PANAMA



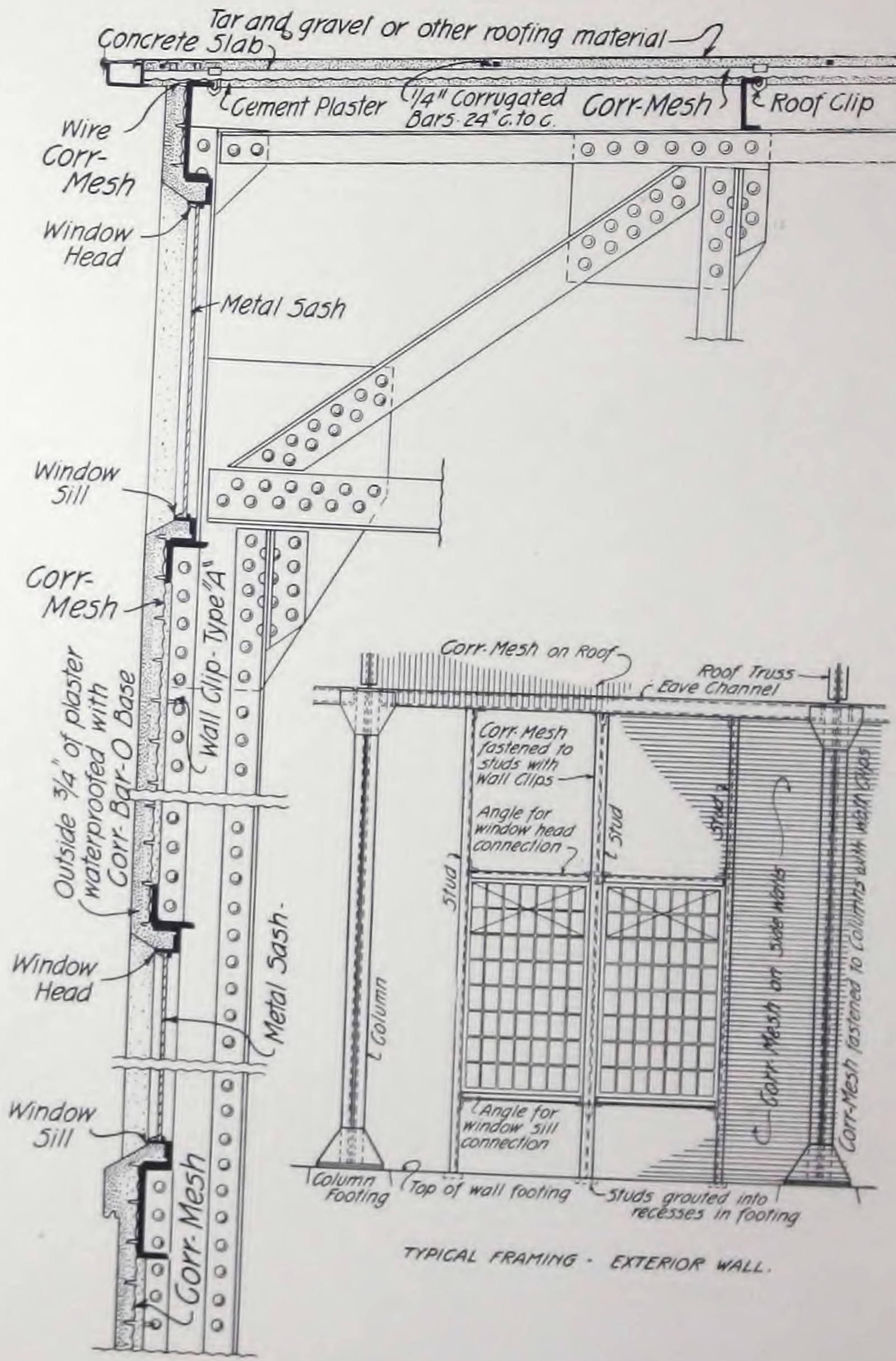
CORR-MESH WALLS ON CONCRETE FRAME, PIER SHEDS, HAVANA, CUBA

Barclay, Parsons & Clapp, Engineers — MacArthur, Perks & Co., Ltd., Contractors



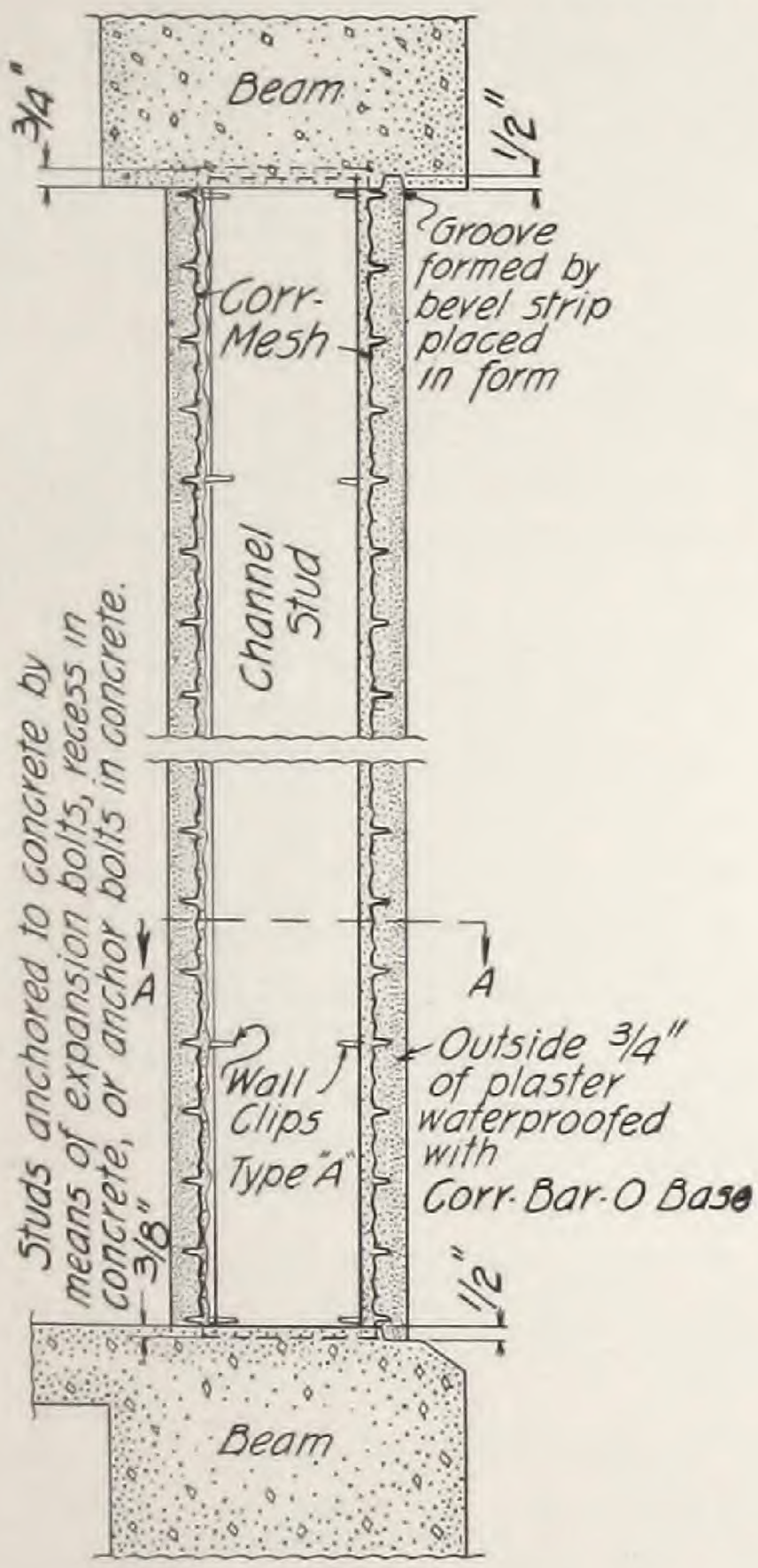
CORR-MESH FENCE, ST. PAUL, MINNESOTA

Designing Details

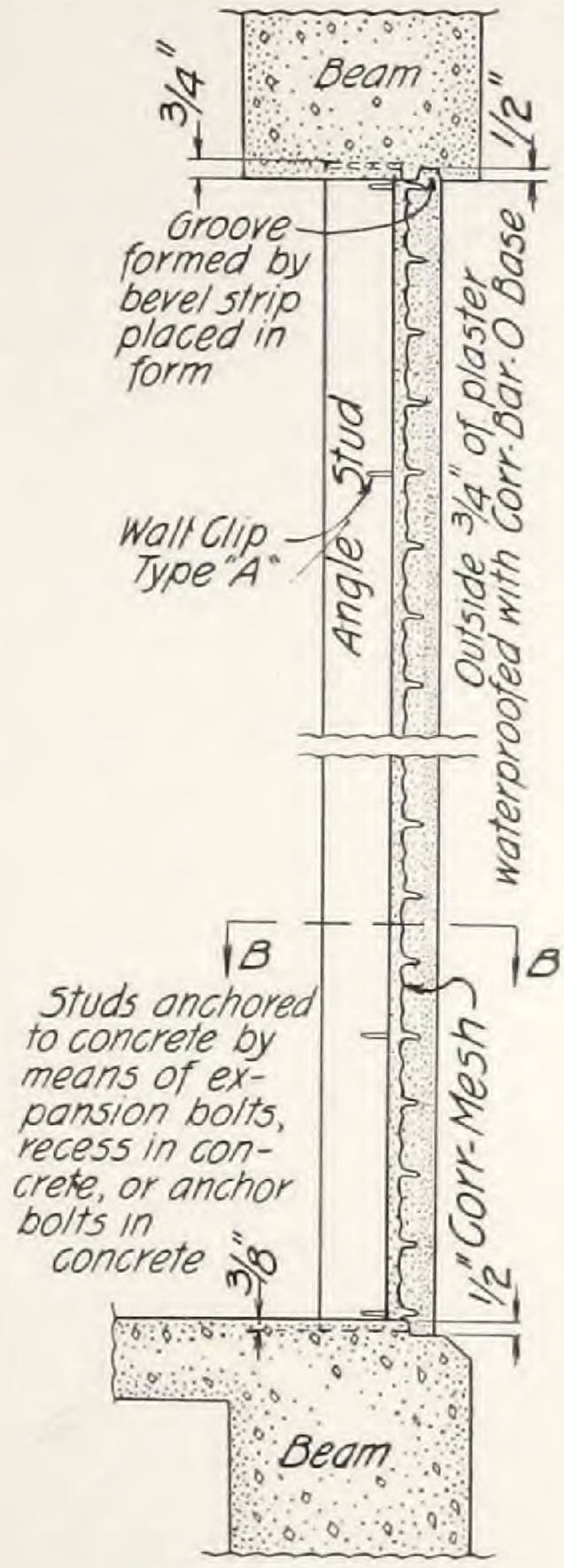


Mill Building with a Structural Steel Frame

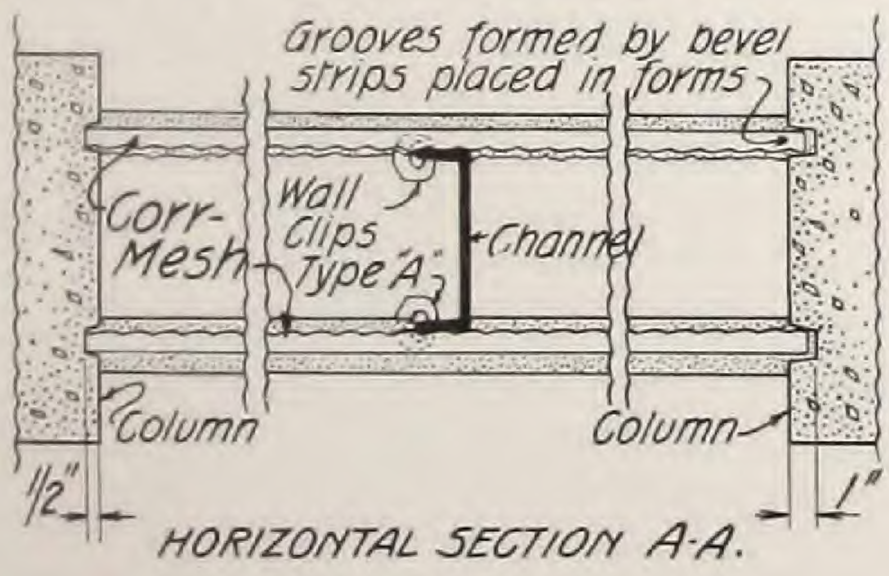
Designing Details



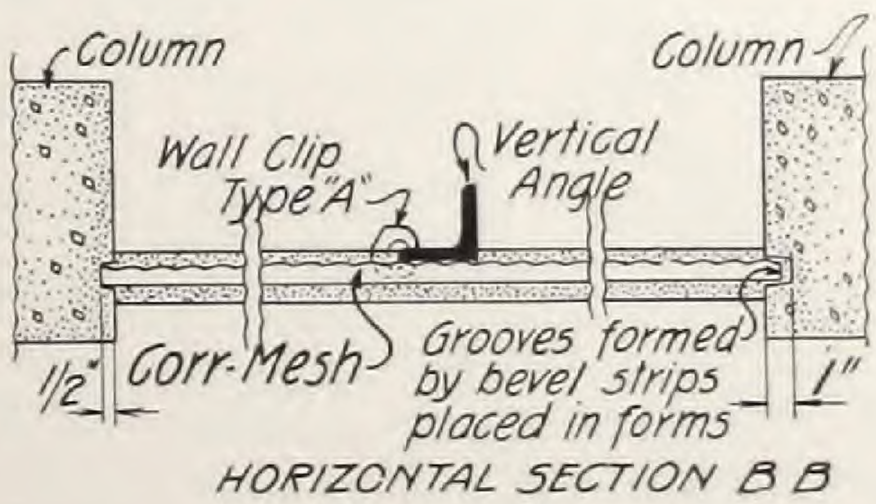
VERTICAL SECTION



VERTICAL SECTION



Double Wall



Single Wall

CORR-MESH Wall Construction with Reinforced Concrete Frame

Specifications

Reinforcing Material

CORR-MESH of . . . . . gauge, with ribs ¾-inch high spaced not more than 3¼ inches center to center, shall be used for walls. (For gauge of CORR-MESH, see Table V on next page.)

Erection of Corr-Mesh

The CORR-MESH shall be erected with the rib side outward.

The outside ribs of adjacent sheets shall be interlocked and, every 24 inches, pinched together by the special punch or wired tightly with No. 16 galvanized wire.

End laps shall be not less than 6 inches. When laps do not come directly over the permanent supports, each rib shall be punched or wired tightly at both ends of all laps, and laps shall be not less than 8 inches if they do not break joints.

The CORR-MESH shall be fastened to the supporting framework as shown by the details on pages 20 and 21, or by other methods that meet the approval of the engineer. Where the building has a structural steel framework, the CORR-MESH shall be fastened to this frame by special Wall Clips, Type "A" or Type "B," spaced 13 inches apart and located at the double or lapped ribs. Where a timber framing is used, the CORR-MESH shall be attached by staples over the ribs.

The CORR-MESH sheets shall, where possible, be run horizontally. If this is impracticable and the sheets run vertically, ¼-inch round temperature rods, spaced 24 inches apart, shall be run horizontally.

Cement Plaster

The cement plaster shall consist of the following materials:

Portland cement which meets the standard specifications of the American Society for Testing Materials.

Sand of good quality and free from dirt.

Lime of best quality and uniformly hydrated.

Corr-Bar-O Waterproofing Base as manufactured by the Corrugated Bar Company.

The cement plaster shall be mixed as follows:

10 parts Portland cement and 1 part hydrated lime, measured by volume, shall be thoroughly mixed dry; 1 part of this cement-lime mixture and 2 parts sand, measured by volume, shall be thoroughly mixed dry, and sufficient water then added to make a stiff plaster.

The plaster shall be mixed in such quantities that it can be applied immediately after the water has been added. No plaster shall be used that has been mixed with the water for longer than 30 minutes.

The plaster for the first coat shall contain a thorough intermixture of long cow hair of good quality, in the proportions of 1 pound of hair for each sack of cement used.

The plaster for the ¾-inch finish coat on exterior walls shall contain Corr-Bar-O Waterproofing Base, in the proportion of 1 gallon of Base to 18 gallons of water used for mixing the mortar. The Base shall be thoroughly mixed into all water for preparing the plaster.

Application of Cement Plaster

Before CORR-MESH is plastered, temporary wooden bracing shall be placed against the lath side so that the material shall not span more than 6 feet in the clear.

The first coat of plaster shall be applied on the outer side of the CORR-MESH and, while still wet, the surface shall be scratched over to form a key for the finishing coat, which shall be put on as soon as possible after the first coat has set.

As soon as the cement plaster on the rib side has set, remove the temporary bracing and proceed with the plastering on the lath side, using the same mixture as for the first coat on the other side.

The total thickness of the wall shall not be less than 2 inches.

Protection

Plastering shall not be undertaken when the temperature is below 32° Fahrenheit without taking proper precautions to prevent the plaster from freezing.

The plaster shall not be allowed to dry out too rapidly, and where exposed to sun or wind, the surface shall be either frequently sprayed for at least 48 hours after the initial set has taken place or protected by hanging wet curtains in front.

Table V—Corr-Mesh Exterior Walls

CLEAR SPANS	GAUGE CORR-MESH ¾-INCH RIBS	THICKNESS OF WALL
7′–0″ or Less	28	2″
7′–0″ to 8′–0″	26	2″
8′–0″ to 9′–0″	26	2¼″
9′–0″ to 10′–0″	24	2½″
10′–0″ to 12′–0″	24	2¾″

CORR-MESH FLOOR, BALCONY, CENTRAL PARK THEATRE, BUFFALO, N. Y.

H. P. Kehr, Architect and Contractor

Floors

CORR-MESH (with ribs ¾-inch high) is very effective in the construction of short floor spans between beams of either steel or concrete.

No centering is required as CORR-MESH supports the wet concrete, which is merely spread and smoothed down. This not only saves in cost, (about 3½ cents per square foot) but also greatly increases the speed of construction.

For Light Loads

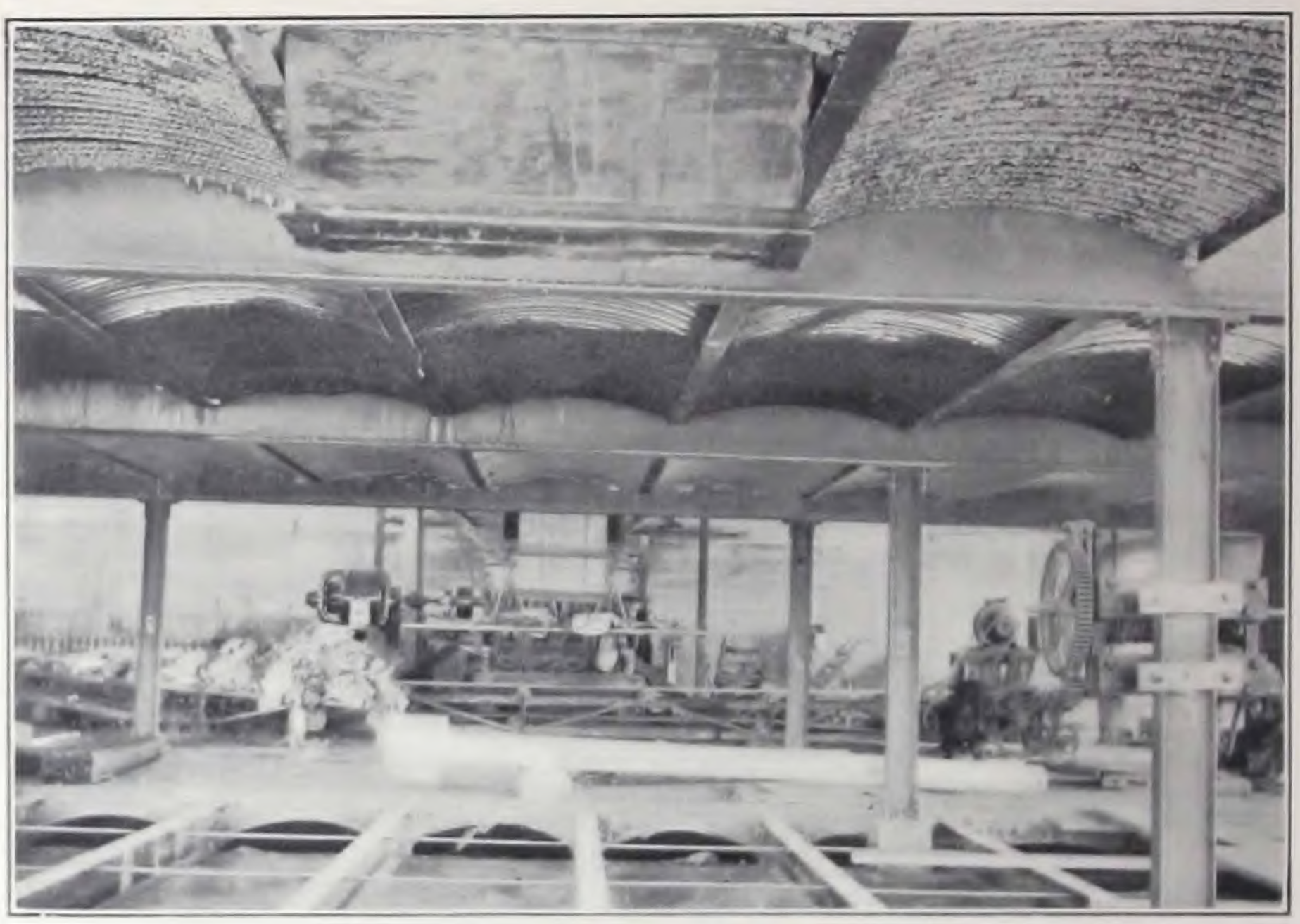
In hotels, apartment houses, etc., the more economical constructions are shown by systems 1, 2 and 3 on page 27. With these systems a suspended ceiling is generally used (see Fig. 12, page 37).

CORR-MESH FLOOR

Grandstand, Federal League Ball Park, Chicago, Ill.

CORR-MESH ARCHED FLOOR CONSTRUCTION

Dexter Portland Cement Company, Nazareth, Pennsylvania



CORR-MESH FLOOR, WOLVERINE PORTLAND CEMENT COMPANY,
COLDWATER, MICHIGAN

Arched Floors for Heavy Loads

In warehouses, factories, etc., curved CORR-MESH, with ribs ¾-inch high, permits a very economical arched concrete slab construction. (See Systems 4 and 5 on page 27.)

CORR-MESH is curved at the factory to any radius required, and carefully crated to prevent damage during shipment.

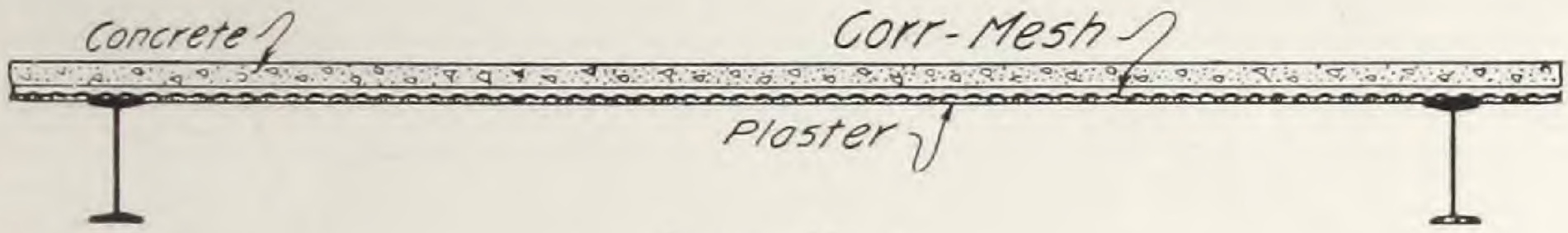
The curved sheets can be rapidly placed in position. No centering is required.

Where structural steel floor beams are used the CORR-MESH rests on the bottom flanges, as shown by systems Nos. 3 and 4 on page 27. Where reinforced concrete beams are used the CORR-MESH rests on the forms for the bottom of the beams; the mesh is stripped back from the ribs a distance sufficient to allow the concrete to completely enclose the outside reinforcing rods in the beams. This eliminates the expensive formwork for the beam boxes. (See system No. 5 on page 27.)

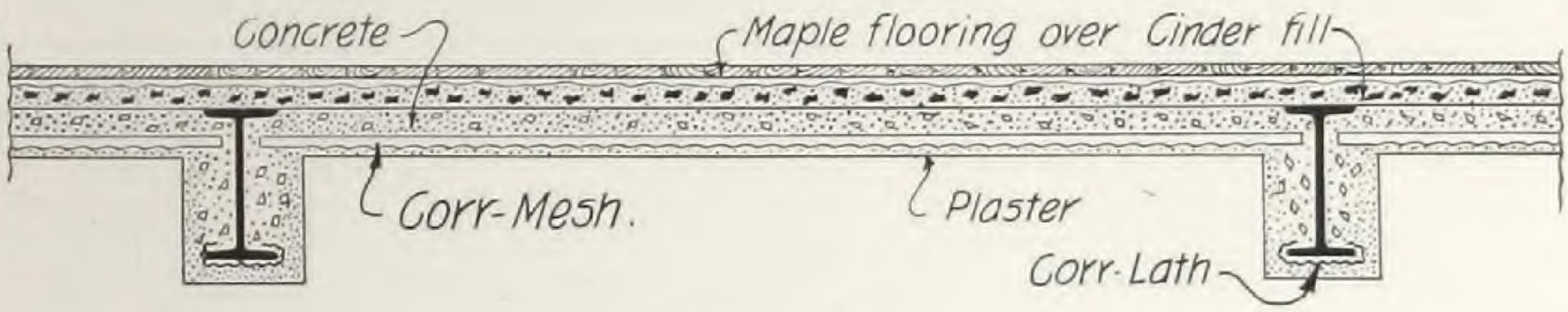
If you will send us loads and sketches showing floor layout we will gladly prepare sections showing suitable and economical design.

For information giving carrying capacity and complete specifications of CORR-MESH Floors, see pages 32, 33 and 34.

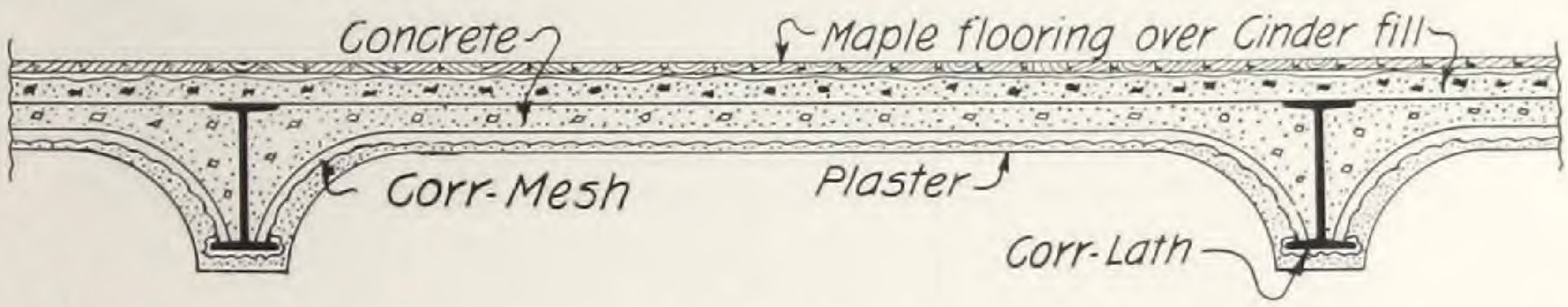
Designing Details



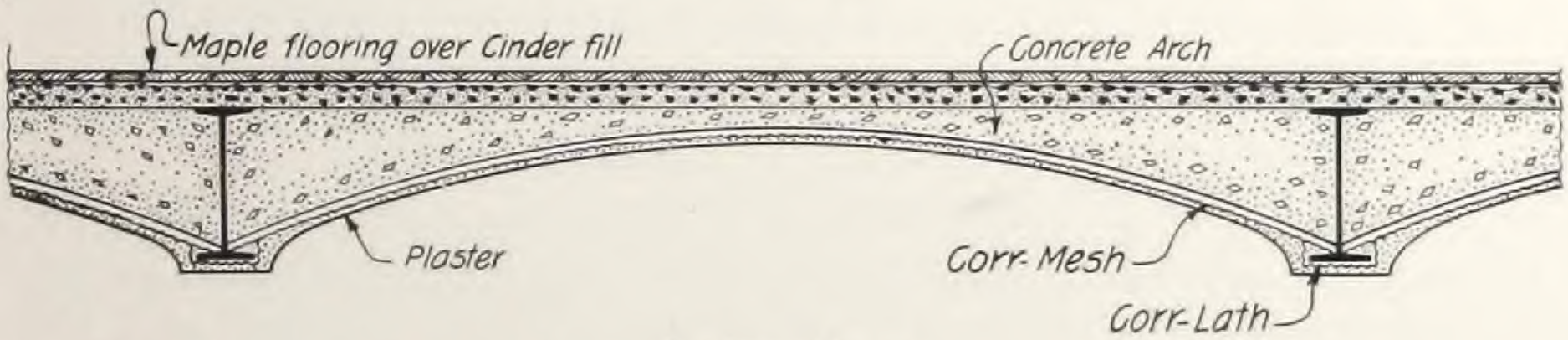
System No. 1



System No. 2



System No. 3



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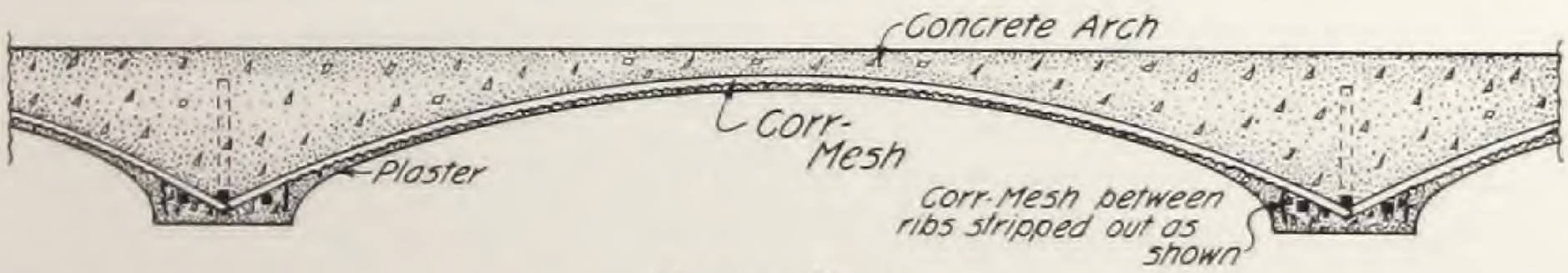

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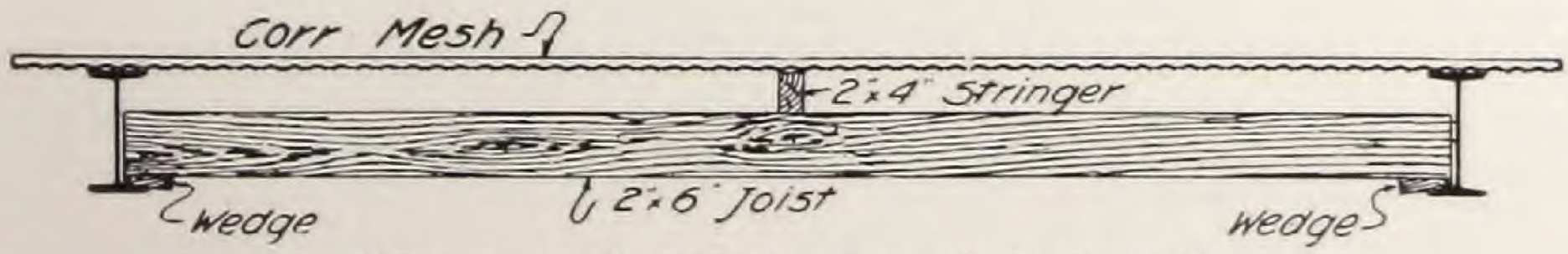


METHOD OF SUPPORTING CORR-MESH LONG SPANS

Figure 9

CORR-MESH ROOF, CANADIAN STEEL FOUNDRIES, LTD., WELLAND, ONT.

Roofs

For roof construction of industrial buildings CORR-MESH (with ribs ¾-inch high) is economical of material and labor, is permanent and fireproof. It permits the use of thin slabs, thus reducing the weight of the supporting steel frame. Saves nearly all the cost of centering.

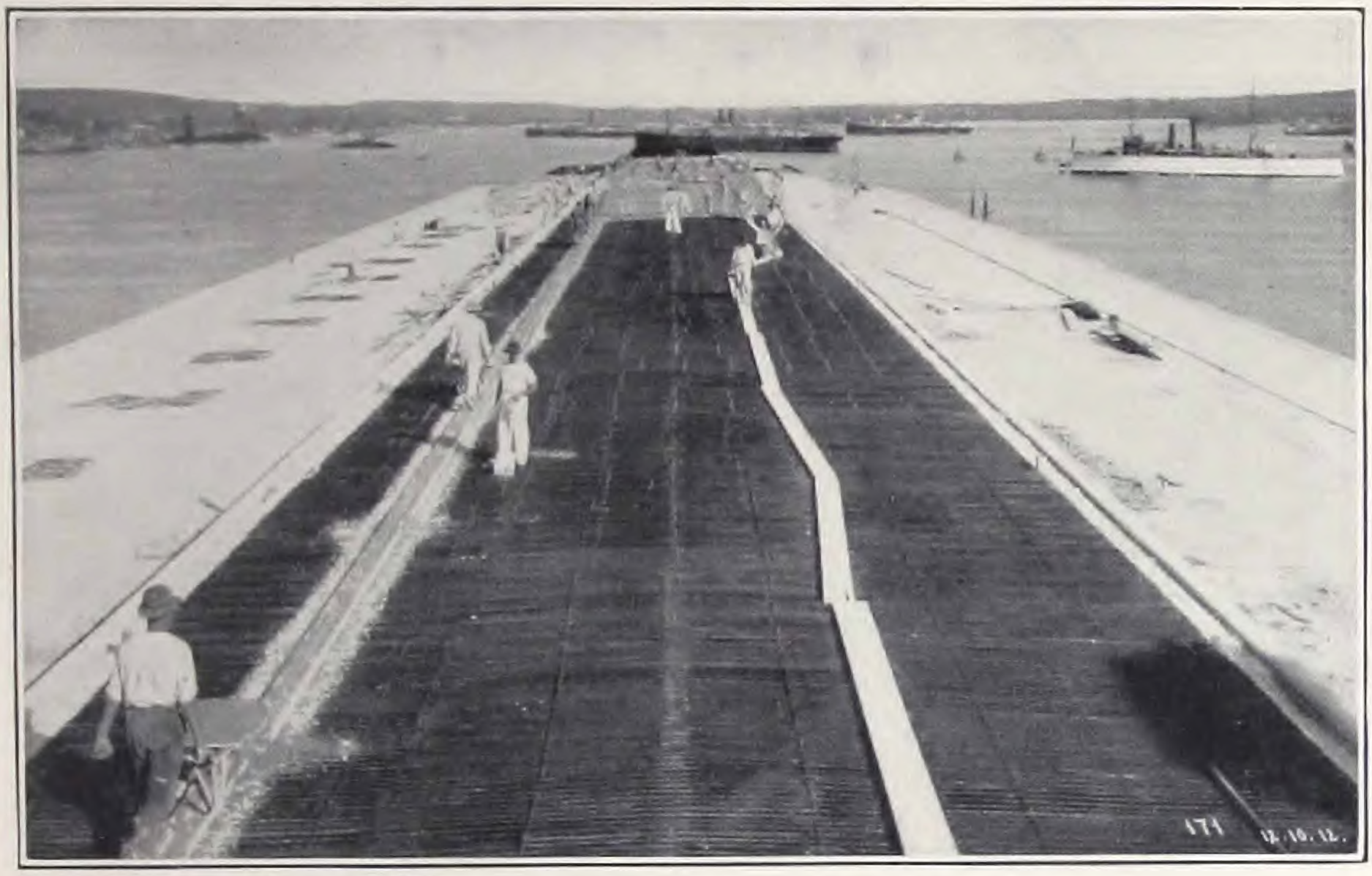
The ¾-inch ribs of CORR-MESH give it great strength and enable it to support the wet concrete. This saves 3½ cents per square foot in centering.

Gives a fireproof, permanent roof, repair-free for all time.

The cost is less than for the older types of reinforced concrete roof. Though somewhat more expensive than corrugated iron sheets in first cost, it is far more economical in the long run, and is better looking, besides being fireproof.

CORR-MESH roofs are easily, quickly and economically constructed. CORR-MESH spans the framework and the concrete is merely poured and smoothed down.

For designing details, carrying capacity, and complete specifications, see pages 31, 32, 33 and 34.



CORR-MESH ROOF, PIER SHEDS, HAVANA, CUBA

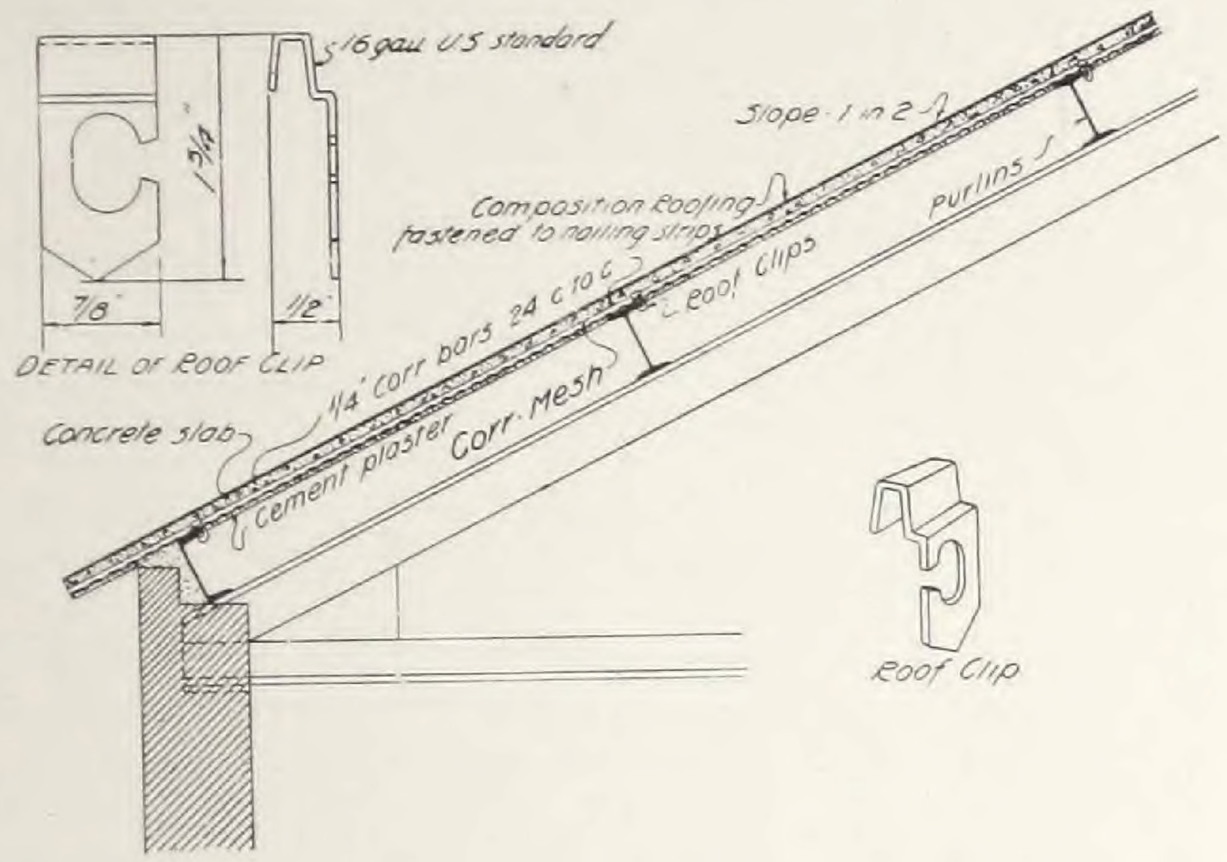
SAW-TOOTH ROOF OF CORR-MESH CONSTRUCTION

Mack Motor Truck Garage, Cambridge, Mass.

CORR-MESH ROOFS, CANADIAN STEEL FOUNDRIES, LTD., WELLAND, ONTARIO

National Sand and Material Company, Contractors

Designing Details



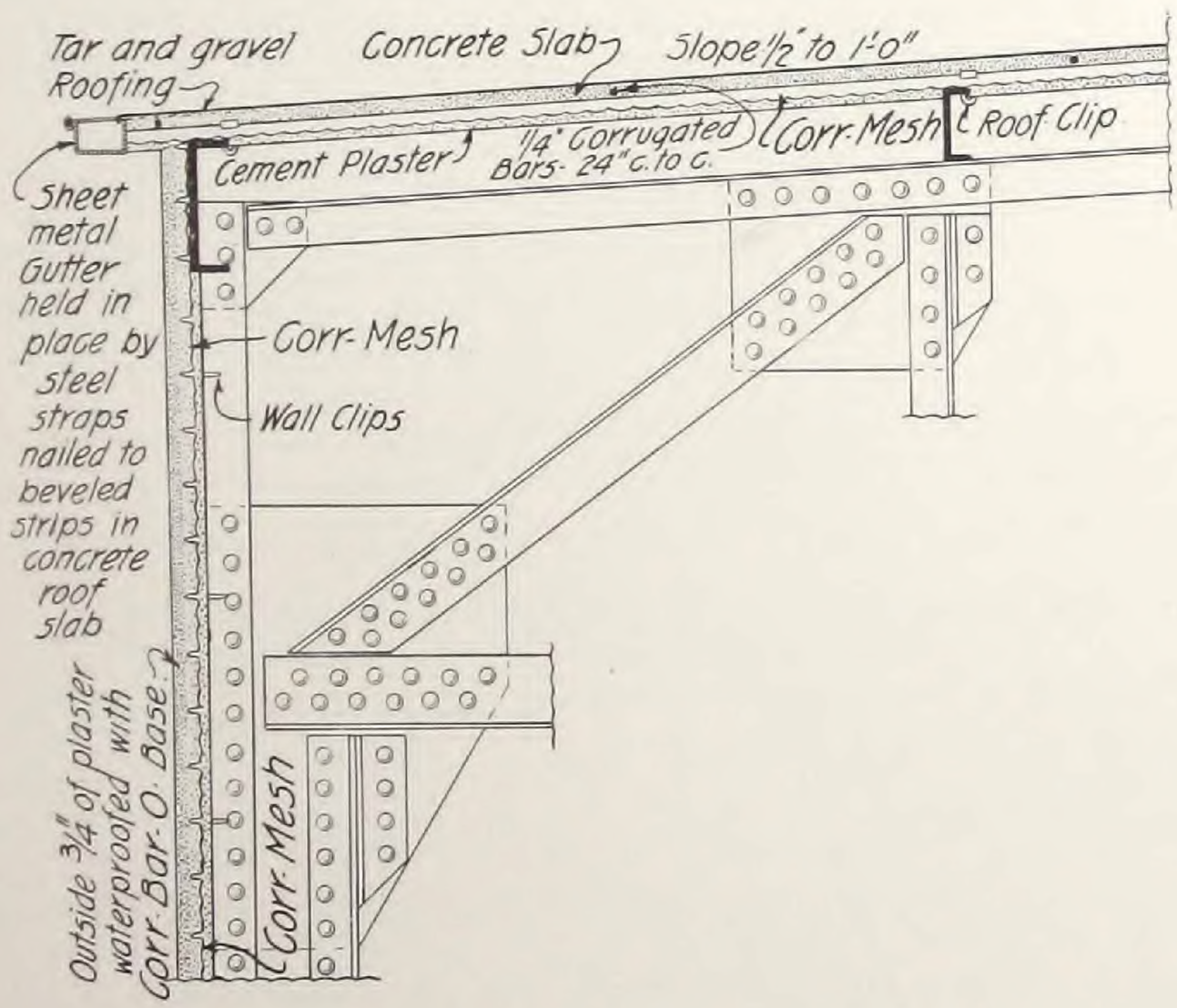
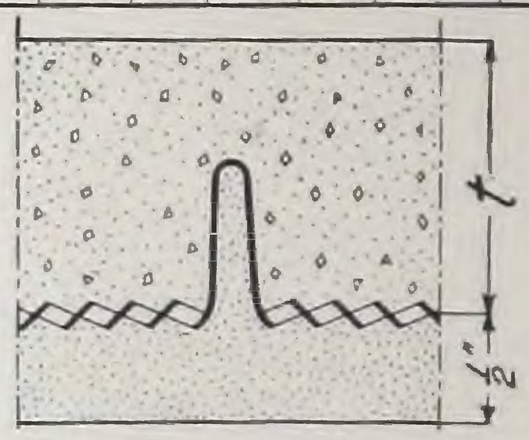


Table VI—Carrying Capacity of Floor and Roof Slabs

(Corr-Mesh with ribs ¾-inch high)

t See Sketch	Weight of Slab per Square Foot with Plaster	Gauge of Corr. Mesh U.S. Std.	Span in Feet 2'-0" Total Load	2'-0" Live Load	3'-0" Total Load	3'-0" Live Load	4'-0" Total Load	4'-0" Live Load	5'-0" Total Load	5'-0" Live Load	6'-0" Total Load	6'-0" Live Load	7'-0" Total Load	7'-0" Live Load	8'-0" Total Load	8'-0" Live Load	9'-0" Total Load	9'-0" Live L'd	10'-0" Tot. L'd	10'-0" Live L'd
1"	19#	28	261	242	115	96	64	45												
		26	307	288	135	116	75	56												
		24	335	316	147	128	82	63	52	33										
1¼"	22#	28	371	349	162	140	90	68	56	34										
		26	436	414	191	169	105	83	66	44										
		24	539	517	236	214	131	109	83	61	60	38								
1½"	25#	28	482	457	210	185	117	92	74	49										
		26	565	540	247	222	136	111	87	62	61	36								
		24	744	719	325	300	181	156	115	90	79	54								
1¾"	28#	28	597	569	260	232	144	116	92	64	63	35								
		26	707	679	308	280	170	142	108	80	75	47								
		24	927	899	404	376	224	196	142	114	98	70	72	44						
2"	31#	28	712	681	311	280	172	141	110	79	76	45								
		26	850	819	370	339	205	174	130	99	90	59	66	35						
		24	1110	1079	483	452	267	236	170	139	117	86	86	55	65	34				
2¼"	34#	28	838	804	364	330	201	167	128	94	89	55								
		26	998	964	433	399	239	205	152	118	104	70	76	42						
		24	1305	1271	564	530	313	279	199	165	137	103	100	66	76	42				
2½"	37#	28	965	928	417	380	231	194	147	110	102	65	74	37						
		26	1146	1109	496	459	274	237	174	137	119	82	87	50						
		24	1500	1463	646	609	359	322	228	191	157	120	114	77	87	50	69	32		
2¾"	40#	28	1097	1057	470	430	260	220	165	125	114	74	83	43						
		26	1308	1268	559	519	310	270	196	156	135	95	98	58	76	36				
		24	1700	1660	727	687	402	362	255	215	176	136	128	88	98	58	77	37		
3"	43#	28	1230	1187	524	481	290	247	183	140	126	83	92	49						
		26	1470	1427	623	580	346	303	219	176	151	108	110	67	84	41				
		24	1900	1857	808	765	446	403	282	239	195	152	142	99	109	66	85	42		
3¼"	46#	28	1375	1329	586	540	324	278	204	158	140	94	102	56	78	32				
		26	1621	1575	690	644	381	335	241	195	166	120	121	75	92	46				
		24	2117	2071	903	857	497	451	315	269	217	171	158	112	120	74	95	49		
3½"	49#	28	1520	1471	648	599	358	309	226	177	155	106	113	64	86	37				
		26	1773	1724	758	709	416	367	264	215	181	132	132	83	100	51				
		24	2335	2286	999	950	549	500	349	300	240	191	174	125	132	83	105	56	84	35



The left-hand column, marked "total load," gives for each span the total safe load capacity in pounds per square foot. This load is the sum of the dead and live loads.

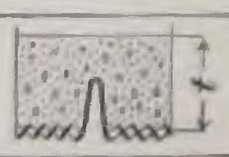
The "dead load" is the weight in pounds per square foot of floor of the materials shown in the sketch.

The right-hand column, marked "live load," gives for each span the safe load capacity in pounds per square foot in excess of the dead load as above defined.

Table VII—Maximum Clear Spans in Feet

On Which Corr-Mesh of Standard Gauges, with ribs ¾-inch high, will Carry Varying Thicknesses of Wet Concrete Slabs

Gauge of Corr-Mesh U.S. Standard	Thickness of Slab = t 1"	1¼"	1½"	1¾"	2"	2¼"	2½"	2¾"	3"	3¼"	3½"	3¾"	4"
24	5'-7"	5'-1"	4'-8"	4'-4"	4'-0"	3'-10"	3'-8"	3'-6"	3'-4"	3'-2"	3'-1"	3'-0"	2'-11"
26	4'-7"	4'-2"	3'-10"	3'-7"	3'-4"	3'-2"	3'-0"	2'-10"	2'-9"	2'-8"	2'-7"	2'-6"	2'-5"
28	4'-0"	3'-7"	3'-3"	3'-1"	2'-10"	2'-8"	2'-7"	2'-6"	2'-5"	2'-4"	2'-3"	2'-2"	2'-1"



For greater spans use temporary supports as shown at the bottom of page 27

Specifications

Reinforcing Material

CORR-MESH of.....(for proper gauge, see Table VI on page 32), with ribs ¾-inch high spaced not more than 3¼ inches center to center, shall be used for floors and roofs. Outside ribs of adjacent sheets shall be interlocked and, every two feet, pinched together by special punch or fastened tightly with No. 16 galvanized wire. Ends of sheets shall always come over the supporting beams and shall be lapped at least two inches. The interlocked ends of the middle ribs of lapped sheets shall be wired together or pinched with the punch.

The attachment of the sheets to the supporting members shall be made with standard CORR-MESH Roof Clips or with galvanized wire. This attachment shall be made every 13 inches along each supporting member and shall be located at every lapped rib.

Place CORR-MESH with the rib side upward.

Provide ¼-inch round rods for expansion. These rods shall be 24 inches apart and shall run at right angles to the ribs of the CORR-MESH. They shall be secured in place.

Concrete

Planking shall be laid across the CORR-MESH for runways and for supporting the weight of the workmen. The runways shall be so placed as to come over the supports.

The slab shall consist of a layer of concrete placed on top of the CORR-MESH and a ½-inch coat of Portland cement mortar plastered on the underneath side after the concrete slab has set.

While the top layer of concrete is being poured, the CORR-MESH shall have temporary supports,.....apart, placed between the permanent supports. (See Table VII on page 32, and Fig. 9 on page 27.) These temporary supports shall remain in place until the concrete has thoroughly set.

The materials composing the concrete shall be as follows:

Portland cement which meets the standard specifications of the American Society for Testing Materials.

Sand of good quality and free from dirt.

Gravel, well washed, capable of passing a ½-inch ring, or

Broken Stone of good quality, from which the crusher dust has been removed and capable of passing a ½-inch ring.

The concrete shall consist of 1 part Portland cement, 2 parts sand, and 4 parts broken stone or gravel.

When concrete is used for roofs, surface shall be troweled to a smooth finish.

The completed concrete work shall be made to dry slowly by protecting from the sun by means of canvas, burlap, etc., and by keeping the work well wet down for at least 48 hours.

Plastering Underneath Side

After the concrete has set, and the temporary supports have been removed, the underside shall be plastered to a thickness of ½-inch with a cement plaster, composed of Portland cement, sand, hydrated lime and cow hair—all thoroughly mixed as specified on pages 22 and 23 for cement plaster.

The materials composing this cement plaster shall be as follows:

Portland cement as specified for the concrete.

Sand as specified for the concrete.

Lime of best quality and uniformly hydrated.

Long cow hair of good quality.

Waterproofing

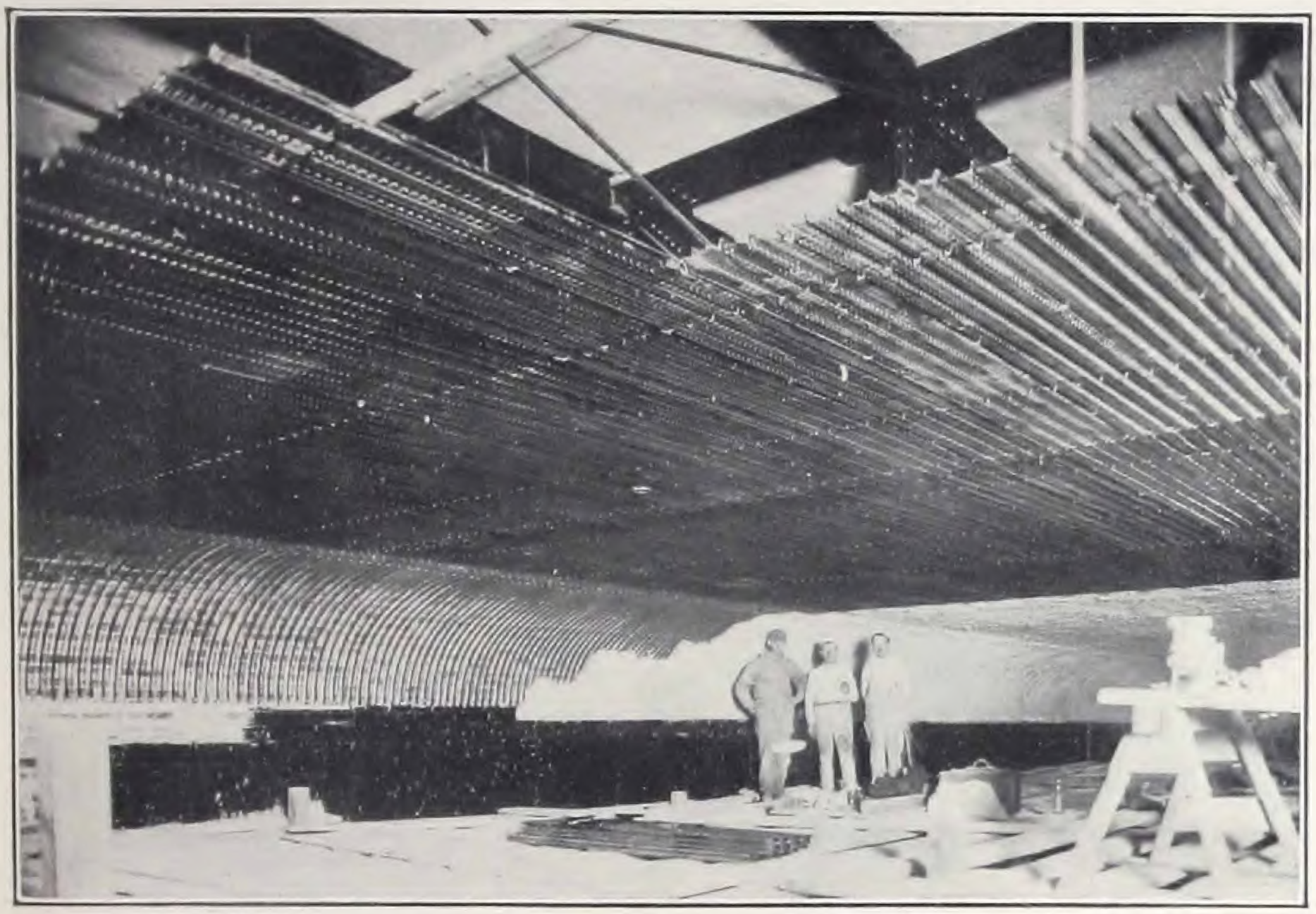
A standard waterproof roofing shall be laid over all CORR-MESH roofs.

Concrete Beams

When concrete beams are used to support the slab, the ends of the CORR-MESH shall rest on the beam boxes. The ends of the sheets shall extend not less than one inch into the beam, and the CORR-MESH shall be in position when placing the concrete in the beams. The concrete in the slab shall be thoroughly bonded to the concrete in the beams.

Timber Beams

When wooden beams are used to support the slab, the CORR-MESH shall be secured to the beams by wire staples not less than 2½ inches in length. The staples shall straddle the ribs, shall be placed along each supporting member, and shall be located at every lapped rib.



CORR-MESH CEILING, MARLOW THEATRE, BUFFALO, N. Y.

Ceilings

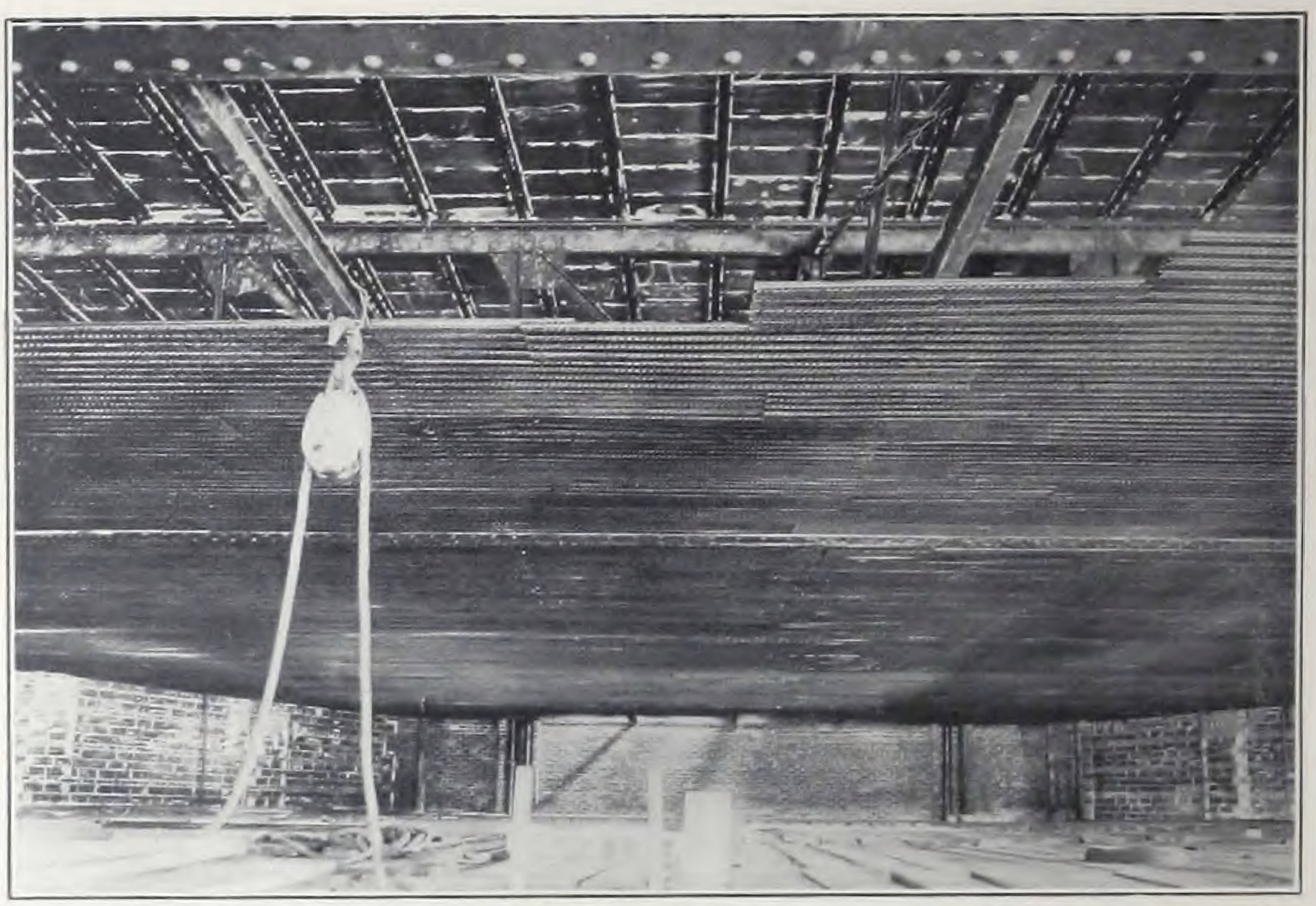
Suspended ceilings are artificial ceilings, made to produce a flat ceiling effect by the hiding of beams and girders. For this purpose CORR-MESH is thoroughly satisfactory and very economical. It is lath and furring in one piece. The minimum of labor is required and labor cost is therefore low. CORR-MESH ceilings are substantial and permanent. The strands are entirely covered by plaster and thus thoroughly protected.

Method of Support

CORR-MESH is placed with the mesh down, cross supports for the ribs being placed every two to six feet, depending on the gauge used.

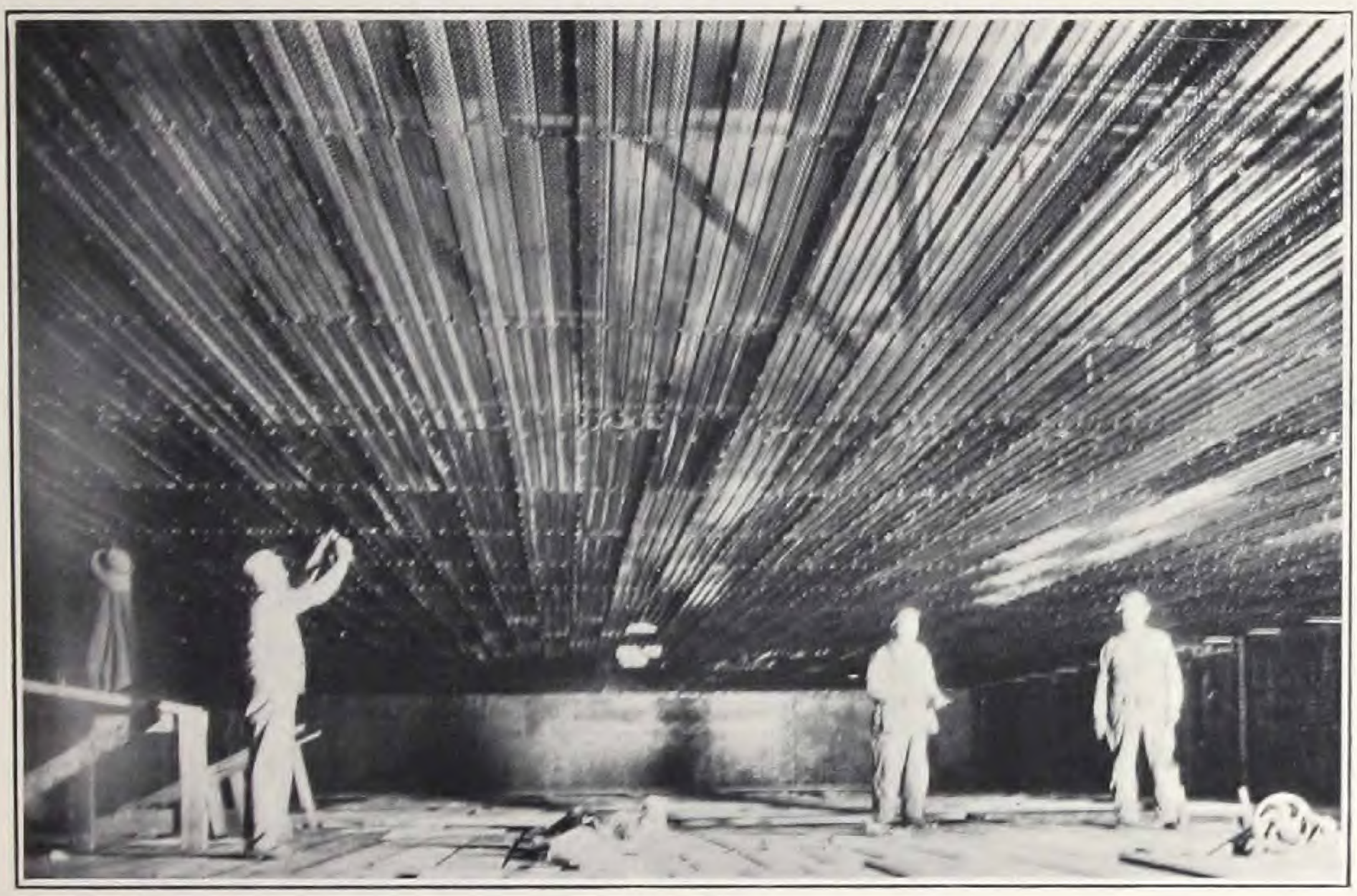
These supports are attached directly to the floor beams or are held by hangers, which should be stiff to resist upward pressure in plastering and adjustable to bring the ceiling to a true plane surface.

For designing details and specifications see pages 37 and 38.



CORR-MESH CEILING, SHOWING CHANNELS SUPPORTING THE CORR-MESH

CORR-MESH CEILING, GROINED ARCH CONSTRUCTION
St. Gerhart's Chapel, Buffalo, N. Y.



CORR-MESH CEILING

Designing Details

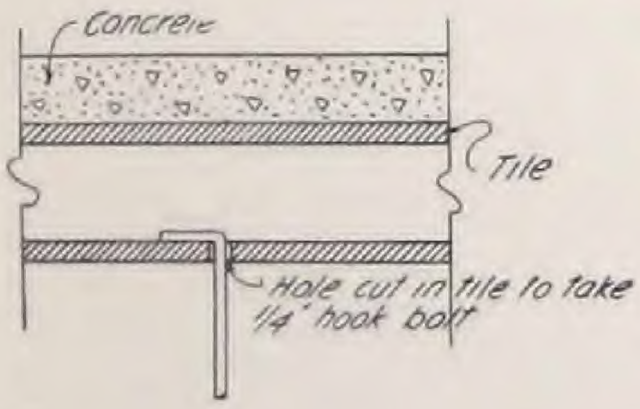


FIG. 10

Channel Hanger Attached to Hollow Tile Floor

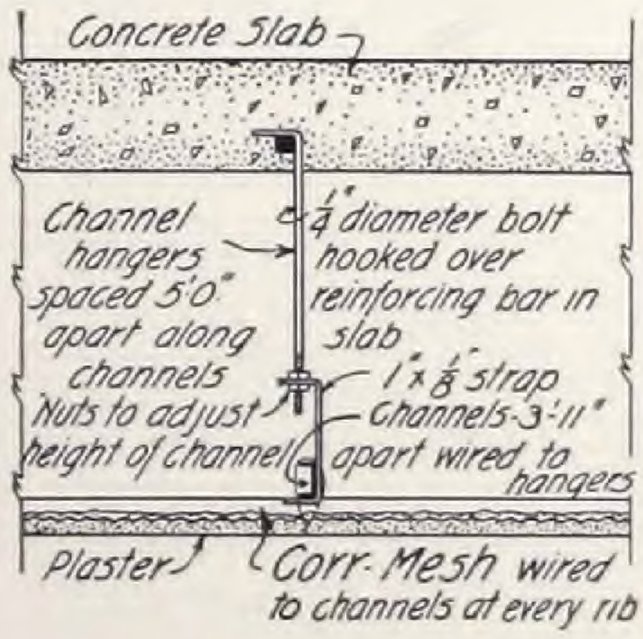


FIG. 11

Suspended Ceiling Beneath Reinforced Concrete Slab

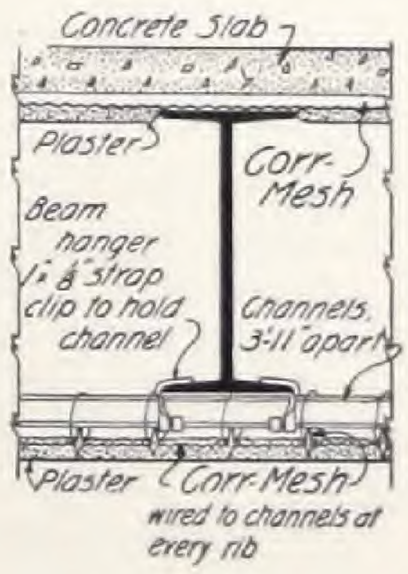


FIG. 12

Suspended Ceiling Attached to I-Beam

Specifications

Details

CORR-MESH of.....gauge, with ribs.....inch high (for proper gauge and height of ribs see Table VIII), shall be used for all suspended ceilings, in accordance with details shown, or other standard details for this type of construction, which shall be approved by the architect.

Fastening Sheets Together

Outside ribs of adjacent sheets shall be securely interlocked and fastened at intervals of 24 inches, by wiring tightly with No. 16 galvanized wire. (The ¾-inch ribs may be fastened by punching with special CORR-MESH punch.)

End laps shall be 2 inches, and shall come directly under the lines of support. If this is impracticable, end laps shall be at least 4 inches where joints are broken, or 6 inches if they do not break joints. In all end laps not directly under the support, each rib shall be punched or wired tightly at both ends of the lap.

Fastening Corr-Mesh to Supports

Each rib shall be securely fastened to every support by No. 14 galvanized wire.

Table VIII—Maximum and Economical Spans of Corr-Mesh and Corr-Mesh Lath for Ceilings

MATERIAL	GAUGE	MAXIMUM DISTANCE BETWEEN SUPPORTS
CORR-MESH Lath (Ribs $\frac{5}{16}$-inch high)	28	2′–2″
	26	2′–8″
	24	3′–0″
CORR-MESH (Ribs ¾-inch high)	28	3′–11″
	26	4′–11″
	24	5′–11″

Solid Stucco Residences

Residences with walls of cement mortar reinforced by CORR-MESH (ribs ¾-inch high) are capable of very beautiful architectural treatment. They are fire-resisting; will stand more wind-pressure than any other type of dwelling house construction except solid stone and cost less than any other type except wood or veneer stucco. Solid stucco is better than veneer stucco because it produces a two-inch solid monolithic wall, into which the studs are imbedded. Sheathing is eliminated, the CORR-MESH being fastened directly to the studs and plastered inside and out.

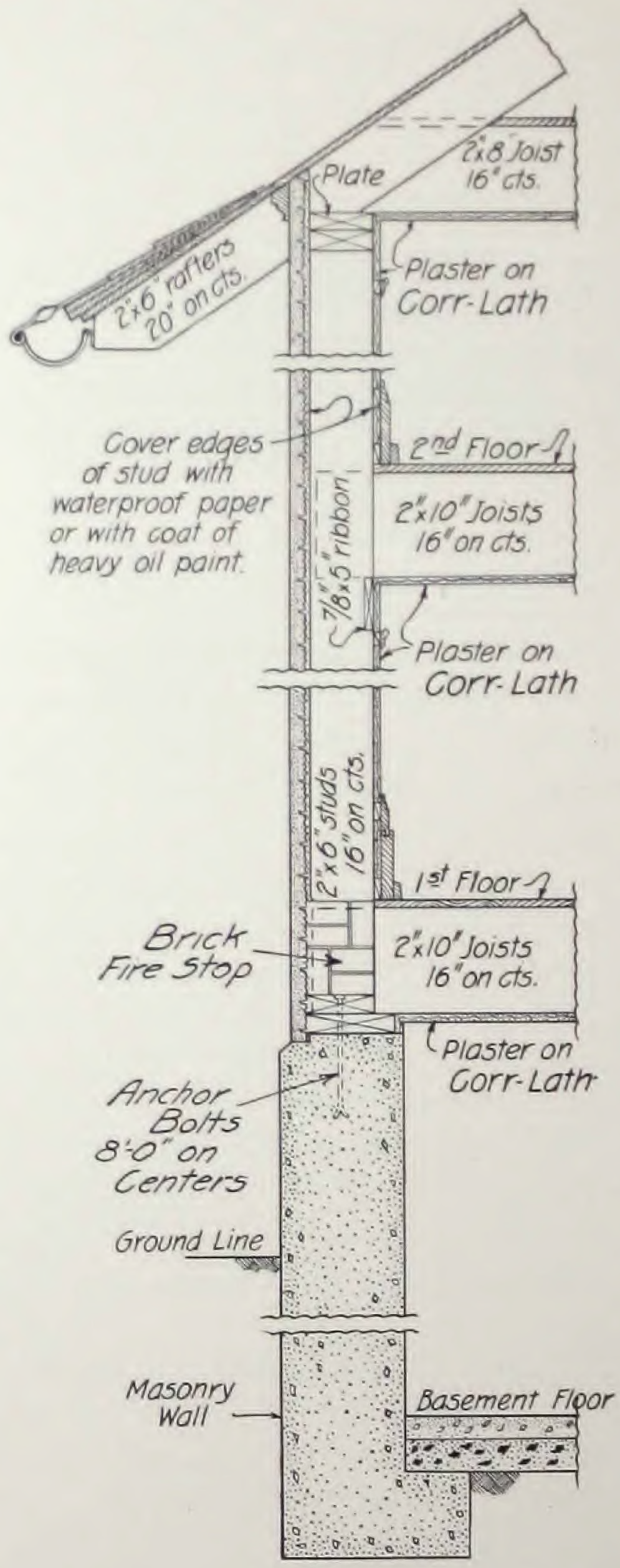
This is the strongest and most permanent type of construction known. It will not crack, the metal of CORR-MESH having the same coefficient of expansion as the cement mortar. The advantage of this over the usual ¾-inch plaster coating on light lath is obvious. If CORR-LATH is used for the inner side of the wall (designing details page 40–41) and plastered according to specifications on page 42, an insulating space of unusual efficiency is furnished against heat in summer and cold in winter.

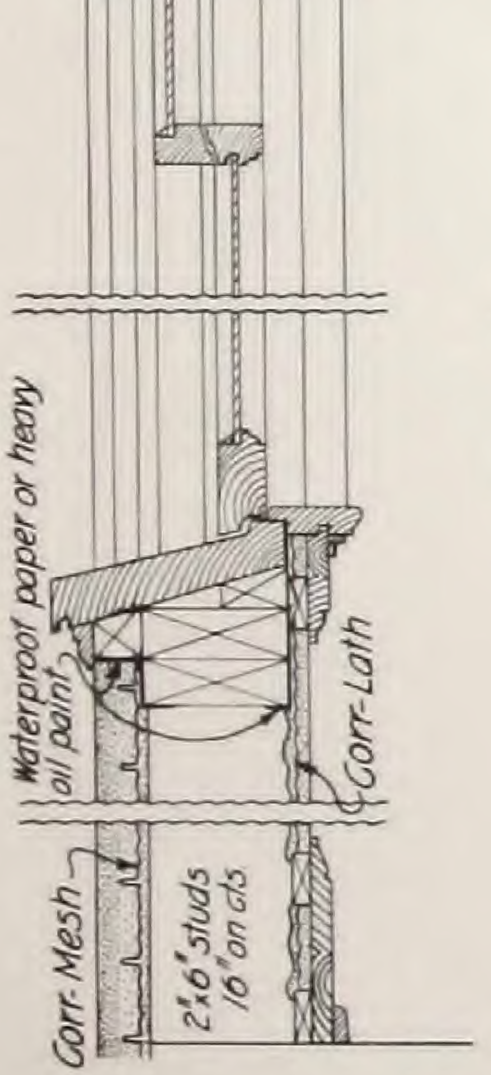
Designing details and complete specifications on following pages.

CORR-MESH with cement mortar is also applicable for garages, stables and other outbuildings, fences, troughs, tanks and other similar purposes. These are covered on pages 48 to 51.

If you are interested in residence construction, write us describing your building and requesting our "MONOGRAPH ON STUCCO CONSTRUCTION."

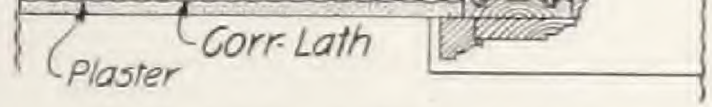
Designing Details



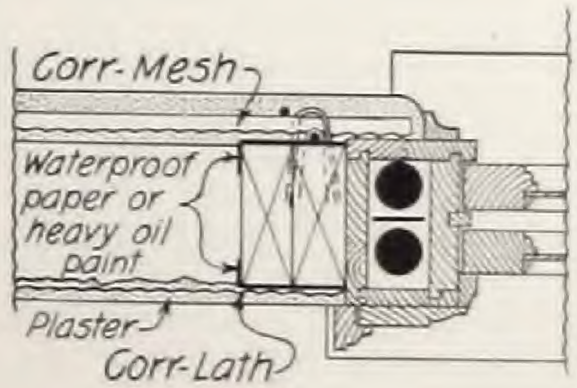


VERTICAL SECTION THROUGH WINDOW

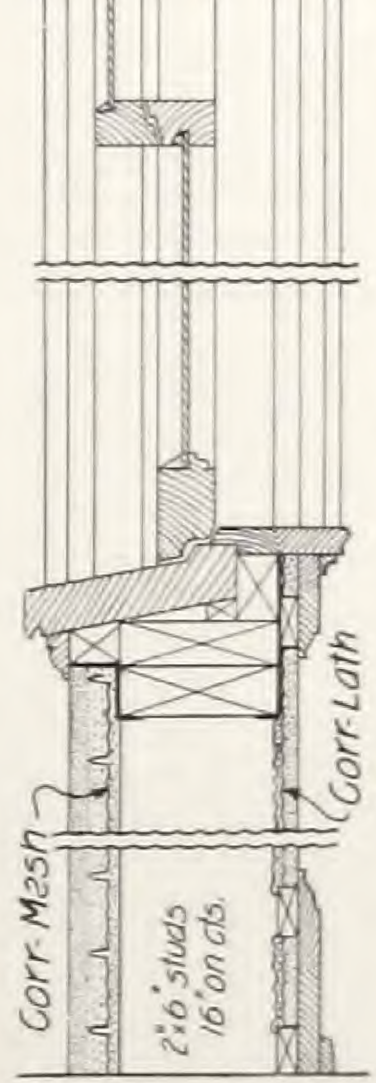
Window Frame without Exterior Casing



HORIZONTAL SECTION THROUGH WINDOW JAMB



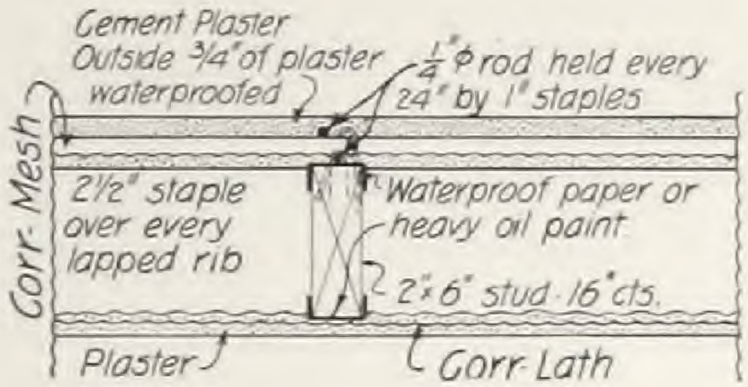
HORIZONTAL SECTION THROUGH WINDOW JAMB



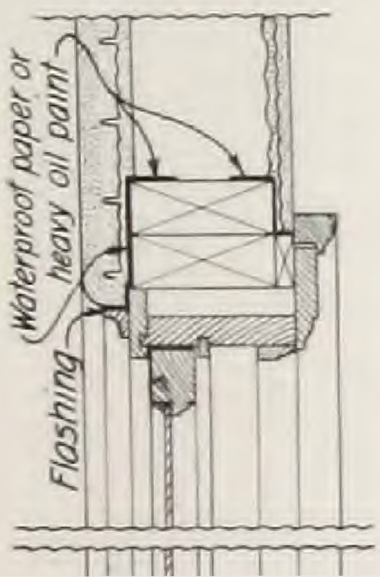
VERTICAL SECTION THROUGH WINDOW

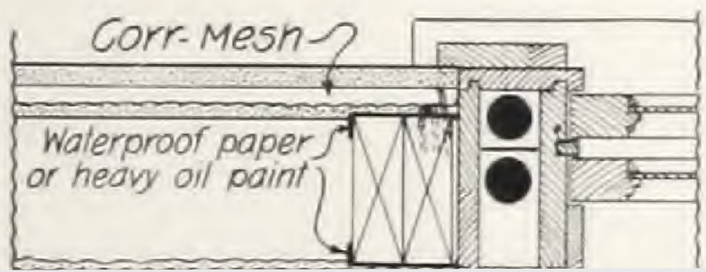
Window Frame with Exterior Casing

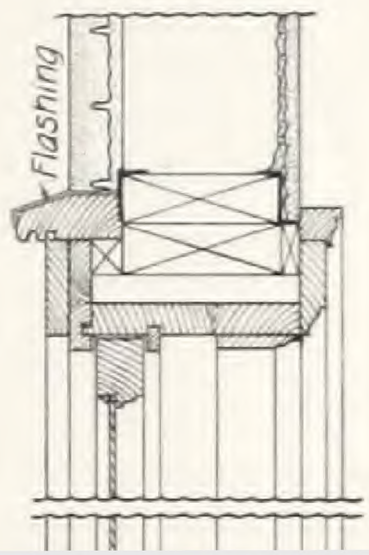
Designing Details



HORIZONTAL SECTION THROUGH EXTERIOR WALL







Specifications

Framework

Wooden framework of structure shall be standard as for ordinary framework for residences.

Studs shall be spaced not more than 24 inches center to center.

The faces of the studs, and for one inch back of the face on each side where the plaster may come in contact with them, shall be thoroughly waterproofed with waterproof paper, tar, asphalt or waterproofed paint.

Sheathing

No sheathing boards shall be used. The CORR-MESH shall be fastened direct to the studding and back-plastered.

Furring

¼-inch diameter rods shall be fastened direct to the studding, using 1-inch No. 14 gauge staples placed 24 inches apart.

Corr-Mesh

CORR-MESH of .....gauge, galvanized or painted, with ribs ¾-inch high spaced not more than 3¼ inches center to center, manufactured by the Corrugated Bar Company, Buffalo, N. Y., shall be used.

Place CORR-MESH, with rib side out, horizontally over the ¼-inch diameter furring rods, driving 2½-inch No. 14 gauge galvanized staples over every other rib and over the furring strips into the studding. Each rib shall be fastened at every other stud. The outside ribs of adjacent sheets shall be interlocked. Ends of sheets shall lap 6 inches and all ends of ribs shall be fastened together by punching with the CORR-MESH Hand Punch or wiring.

Corners

There shall be strips of CORR-LATH bent around the corners and stapled over or wired to the CORR-MESH.

Cement Plaster, Application and Protection

See pages 22 and 23.

Finish

The exterior finish for the outer wall may be smooth troweled, stippled, sand floated, sand sprayed, splatter dash, pebble dash, or any other cement or stucco finish desired.

Inner Side of Wall

For the inside of the wall..... CORR-LATH shall be used, securely attached to the wood studding by small staples. This shall be plastered 3 coats to ¾-inch grounds with a high grade of patent or lime plaster, which shall be acceptable to the architect.

THESE SPECIFICATIONS ARE INCOMPLETE.

Write us for a copy of the "MONOGRAPH ON STUCCO CONSTRUCTION," giving complete specifications for Solid Stucco houses.

Stucco Veneer Residences

Where a stucco residence of excellent quality and moderate first cost is desired, CORR-MESH LATH (ribs $\frac{5}{16}$-inch high) is fastened to the timber sheathing and plastered with cement mortar. This gives a very handsome finish, is economical, does not crack and, together with CORR-LATH for the inside of the wall and plastered according to specifications, affords an excellent insulation against heat in summer and cold in winter.

The ribs run horizontally and serve as longitudinal temperature reinforcements from end to end of wall, thus preventing cracks.

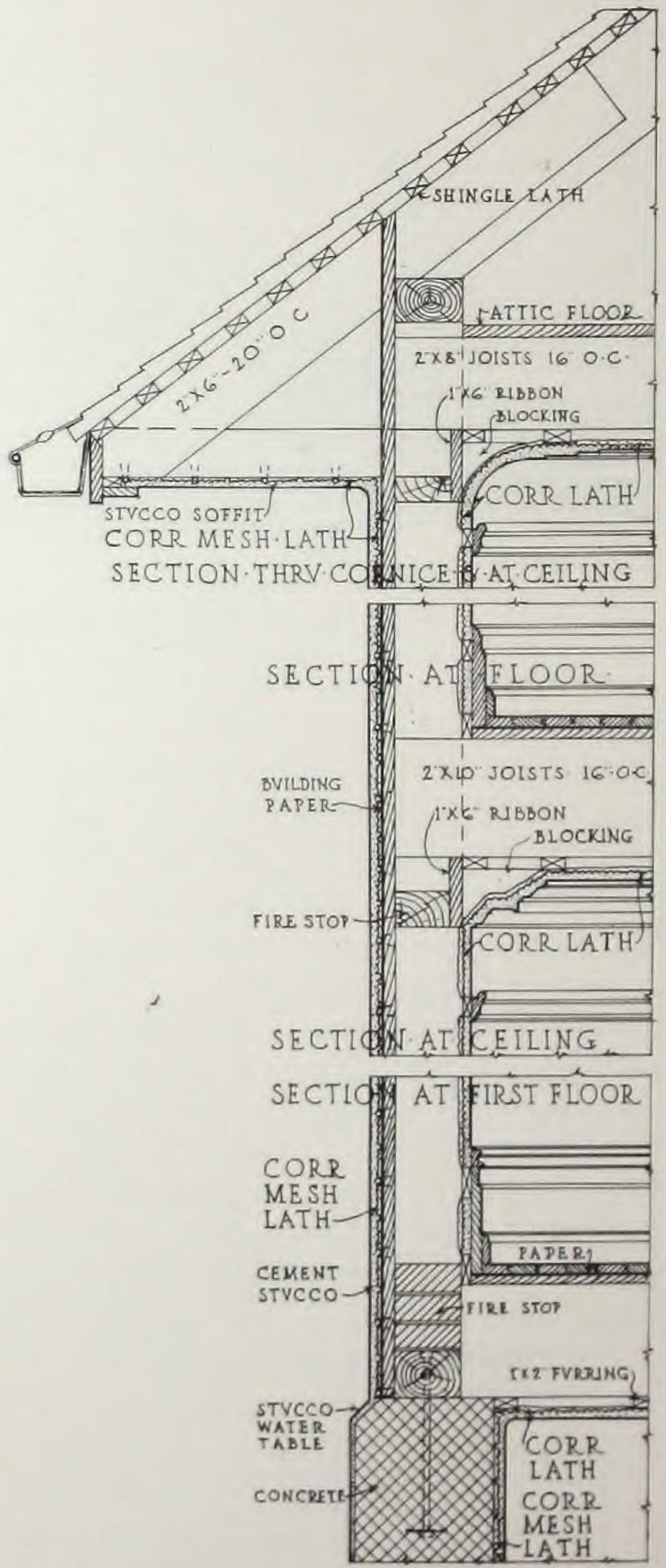
The tensile strength and coefficient of expansion of CORR-MESH LATH per foot of width are equal to those of a $\frac{3}{4}$-inch thickness of stucco for the same width, thus making the cement and steel absolutely a unit in expansion and contraction. The slight and very gradual slipping of the stucco over the sheathing, caused by changes of temperature, is thus permitted without cracking. The ribs hold the mesh away from the wall a sufficient distance for the plaster to key perfectly on the inside of the mesh, eliminating metal or wood furring strips. This increases speed and reduces cost of erection.

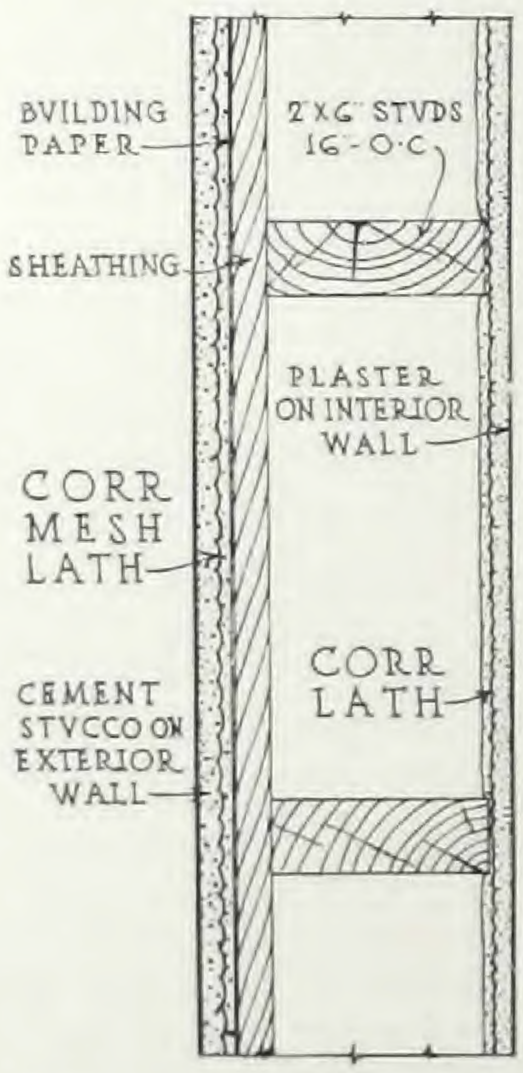
In CORR-MESH LATH, the Mesh is stiff and smooth and the plaster can be spread rapidly.

Designing details and specifications on following pages.

If you are interested in residence construction, write us describing your building and requesting our "MONOGRAPH ON STUCCO CONSTRUCTION."

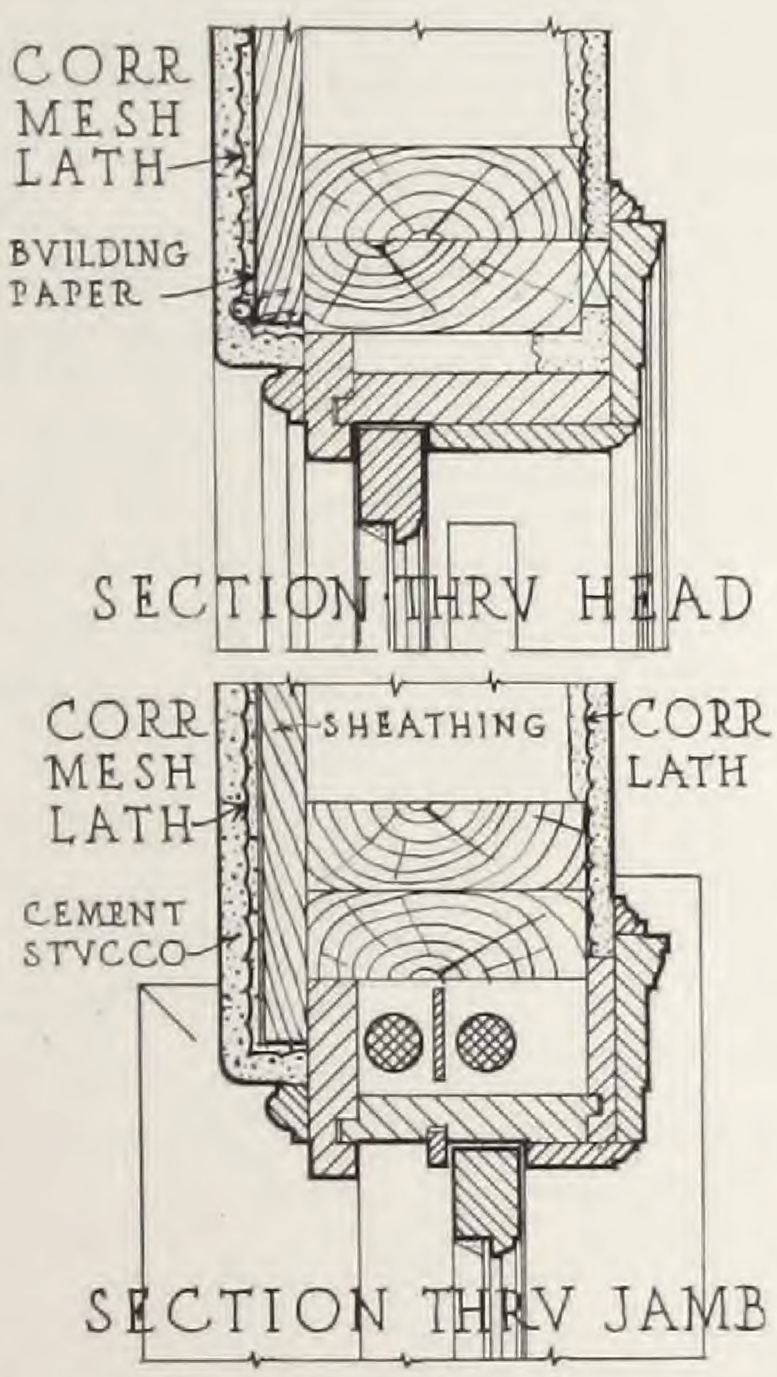
Designing Details



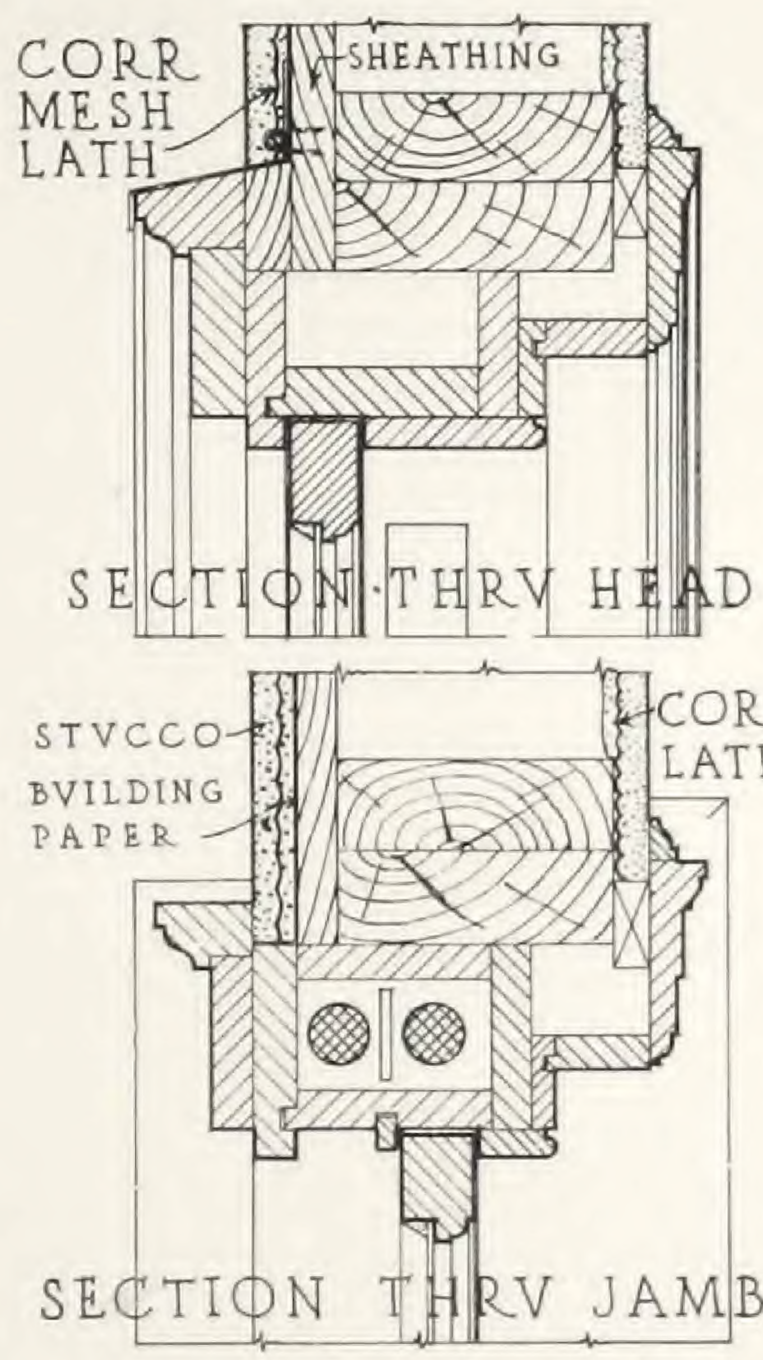


HORIZONTAL SECTION THROUGH WALL

Designing Details



SECTION THRV HEAD

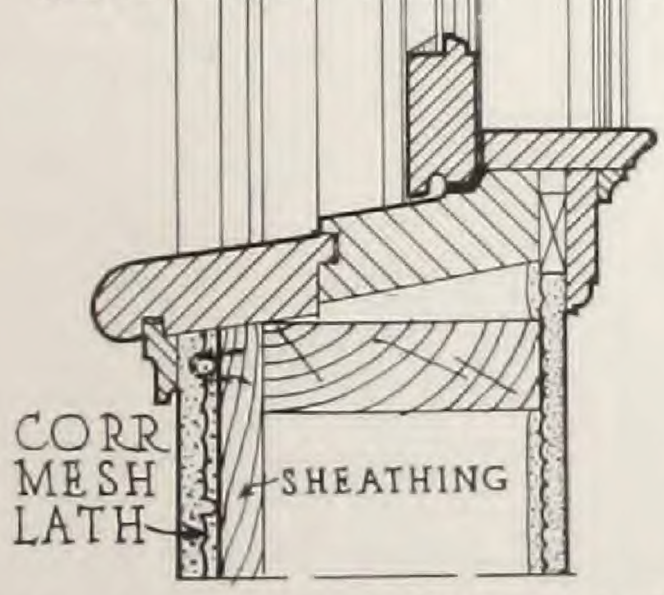


SECTION THRV HEAD

SECTION THRV JAMB

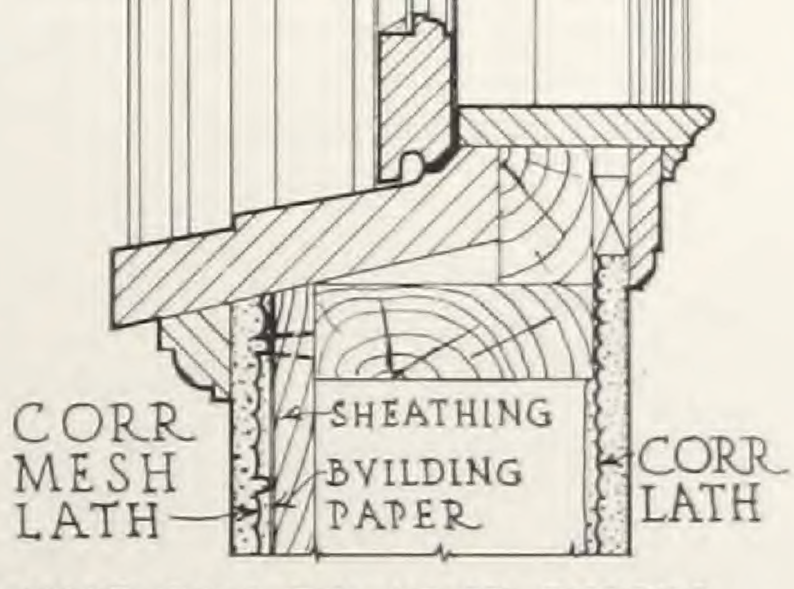
SECTION THRV JAMB

SECTION THRV SILL



WINDOW FRAME WITHOVT
EXTERIOR CASING

SECTION THRV SILL



WINDOW FRAME WITH
EXTERIOR CASING

Specifications

Framework

Wooden framework of structure shall be standard, as for ordinary framework for residences. Studs spaced 16 inches center to center.

Sheathing

Sheathing boards shall be not less than 6 inches nor more than 8 inches wide, dressed one or both sides to a uniform thickness of $\frac{7}{8}$-inch. They shall be laid diagonally across the wall studs and fastened with two nails at each stud.

Waterproofing

A substantial paper well impregnated and thoroughly waterproofed with tar or asphalt shall be laid in horizontal layers over the sheathing.

Furring

No furring strips required; CORR-MESH LATH ribs act as furring.

Corr-Mesh Lath

CORR-MESH LATH of.....gauge, with ribs $\frac{5}{16}$-inch high spaced not more than 3 inches center to center, galvanized or painted, manufactured by the Corrugated Bar Co., Buffalo, N. Y., shall be used.

Application of Corr-Mesh Lath

Place CORR-MESH LATH with the rib side in, horizontally over the waterproof paper, driving $1\frac{1}{2}$-inch No. 14 gauge galvanized staples over every second rib. Staples to be placed in vertical rows not over 20 inches apart, each rib being fastened by every other vertical row of staples. The outside ribs of adjacent sheets of CORR-MESH LATH shall be interlocked, and sheets shall lap at the ends at least 6 inches and a staple be driven over the ends of each rib.

Corners

There shall be strips of CORR-LATH bent around the corners and stapled over the CORR-MESH LATH.

Cement Plaster

Same as specified on pages 22 and 23.

Application of Cement Plaster

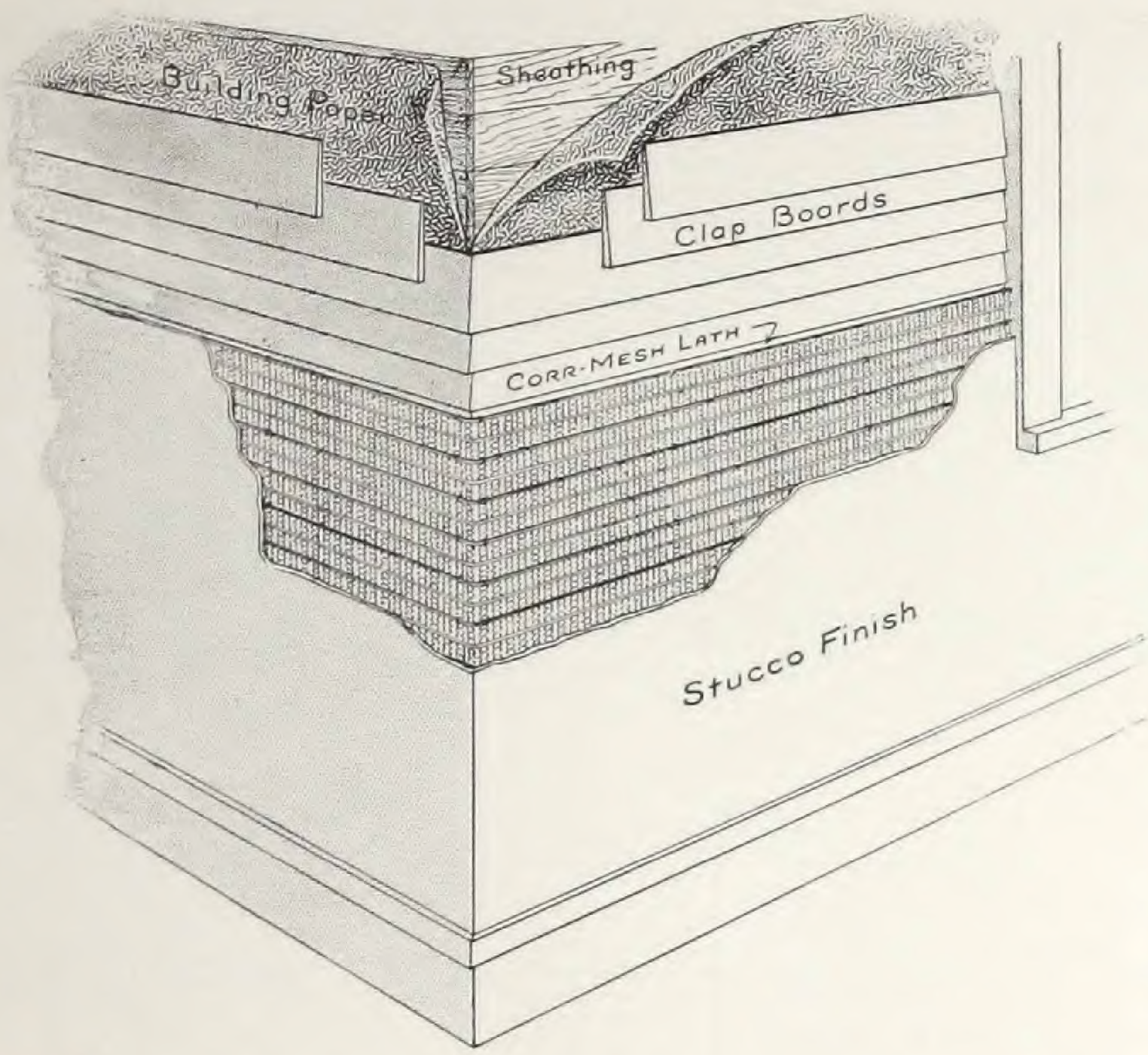
The first coat shall be applied on the CORR-MESH LATH and thoroughly pushed through so as to completely embed the mesh of the lath on both sides. The first coat shall have a minimum thickness over the lath at any point of not less than $\frac{1}{4}$-inch. The intermediate coat, which shall be put on as soon as possible after the first coat has set, shall have a thickness of not less than $\frac{1}{4}$-inch nor more than $\frac{3}{8}$-inch. The final coat shall have a thickness of $\frac{1}{4}$-inch when plastered over an intermediate coat, or of $\frac{3}{8}$-inch when plastered directly on the scratch coat.

Protection and Finish: See pages 23 and 42.

Inner Side of Wall: See page 42.

THESE SPECIFICATIONS ARE INCOMPLETE

Write us for a copy of the "MONOGRAPH ON STUCCO CONSTRUCTION," giving complete specifications for Stucco Veneer houses.



Stuccoing Old Wooden Houses

Old wooden houses may be transformed at small cost into beautiful stucco residences at greatly increased value by Corr-Mesh Lath and cement mortar.

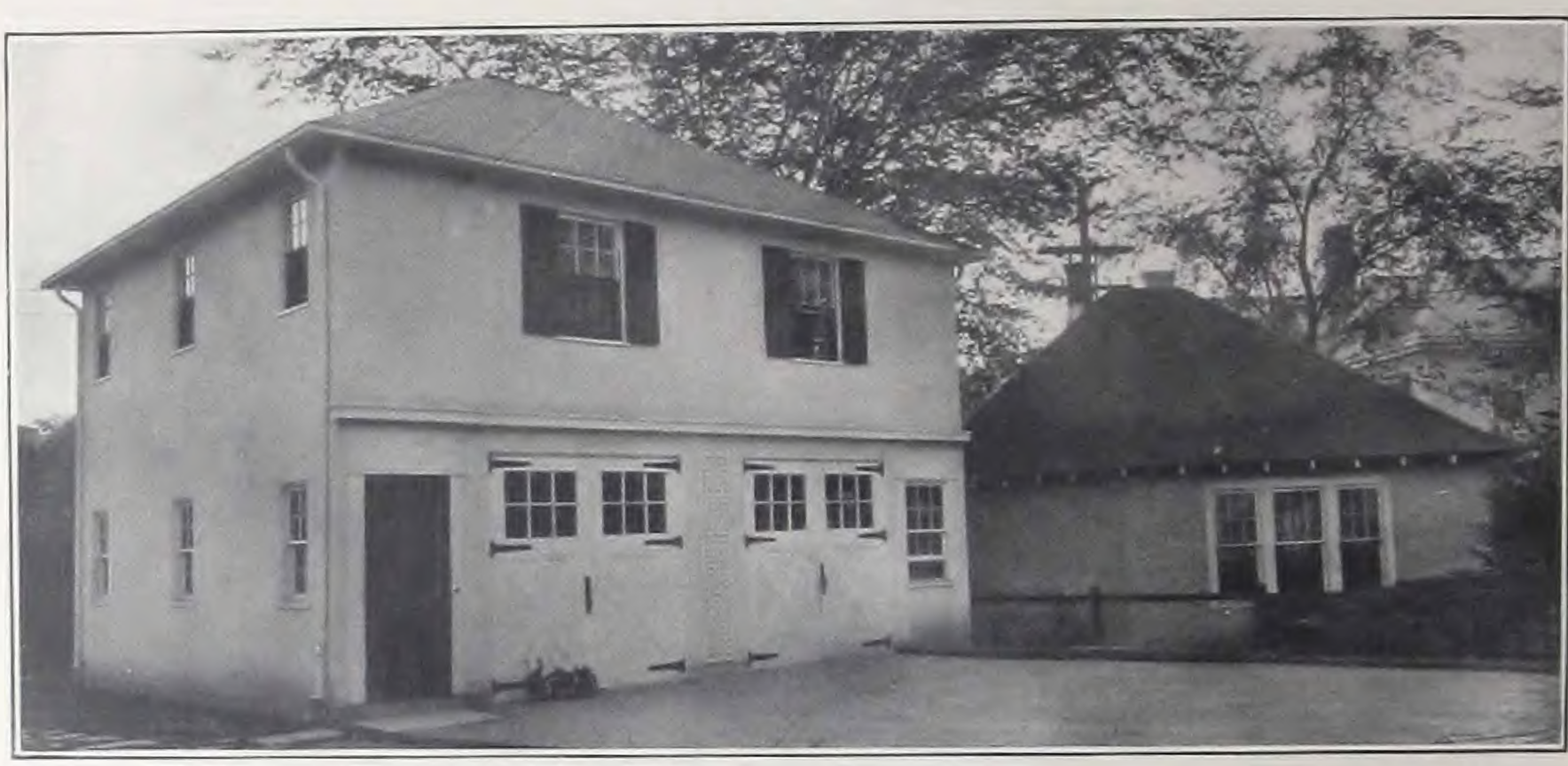
Corr-Mesh Lath (ribs $\frac{5}{16}$-inch high) is both lath and furring. It is fastened against the old siding with the ribs in; this holds the mesh away from the wall and leaves plenty of space for the plaster to key perfectly on the inside of the mesh.

The sheets are placed horizontally and the ribs act as temperature reinforcement as explained on page 43.

The corners may be reinforced by lapping Corr-Lath over the Corr-Mesh Lath and wiring, but this is not necessary if the ribs are bent and run continuous around the corner as shown by the above illustration.

Corr-Mesh Lath, due to the close spacing of the ribs, makes a firm surface on which to spread the plaster. It can be readily cut to fit around openings, corners, etc., where the old trim may be replaced by either a new and heavier trim or plastered corners.

For specifications for mixing the cement plaster and protecting the finished work, see pages 22 and 23.



Garages, Stables, Outbuildings

Garages, stables and outbuildings of solid stucco construction with CORR-MESH are low in cost, permanent and free from repair expense.

The framework may be either of timber or, if desired to have absolutely fireproof, of light structural steel or reinforced concrete. Where timber frame is used the details on pages 39, 40, 41 and 42 may be followed.

This construction is readily adapted to any style of architecture or finish and can be made to harmonize with any surroundings. They are frequently built with light structural steel frames and have an asbestos shingle roof.

CORR-MESH in Place Receiving First Coat of Plaster

Finished Garage

Amusement Park and County Fair Buildings

For buildings of this class fireproofing is very important as no insurance can be obtained on them. The opportunity for fire is enormous. One plant has been wiped out completely four times in the last ten years.

Corr-Mesh with cement mortar applied to wooden frames makes an inexpensive but attractive construction, furnishing a building which is fireproof and insurable.

CORR-MESH FENCE, BUFFALO, N. Y.

Fences

A CORR-MESH fence always presents an artistic and substantial appearance. While first cost is somewhat greater than wood, the expense of repairs and occasional renewal is entirely eliminated, and in the end this style of fence will prove a profitable investment.

In post construction, several sheets should be laid flat, with the outside adjoining ribs interlocked and securely pinched together, the total width being made equal to the perimeter of the posts.

For square posts, bend the CORR-MESH so that there will be a large rib at each corner of the post.

For round posts, these sheets naturally spring around to a true circle. Lock the outside meeting ribs as previously described.

Securely wire sheets forming panels to the CORR-MESH post reinforcement.

Fill inside of post with concrete, and cement plaster the outside.

For detailed specifications covering application of cement plaster, refer to pages 22 and 23.

Write us fully, and we will submit details to meet your requirements.

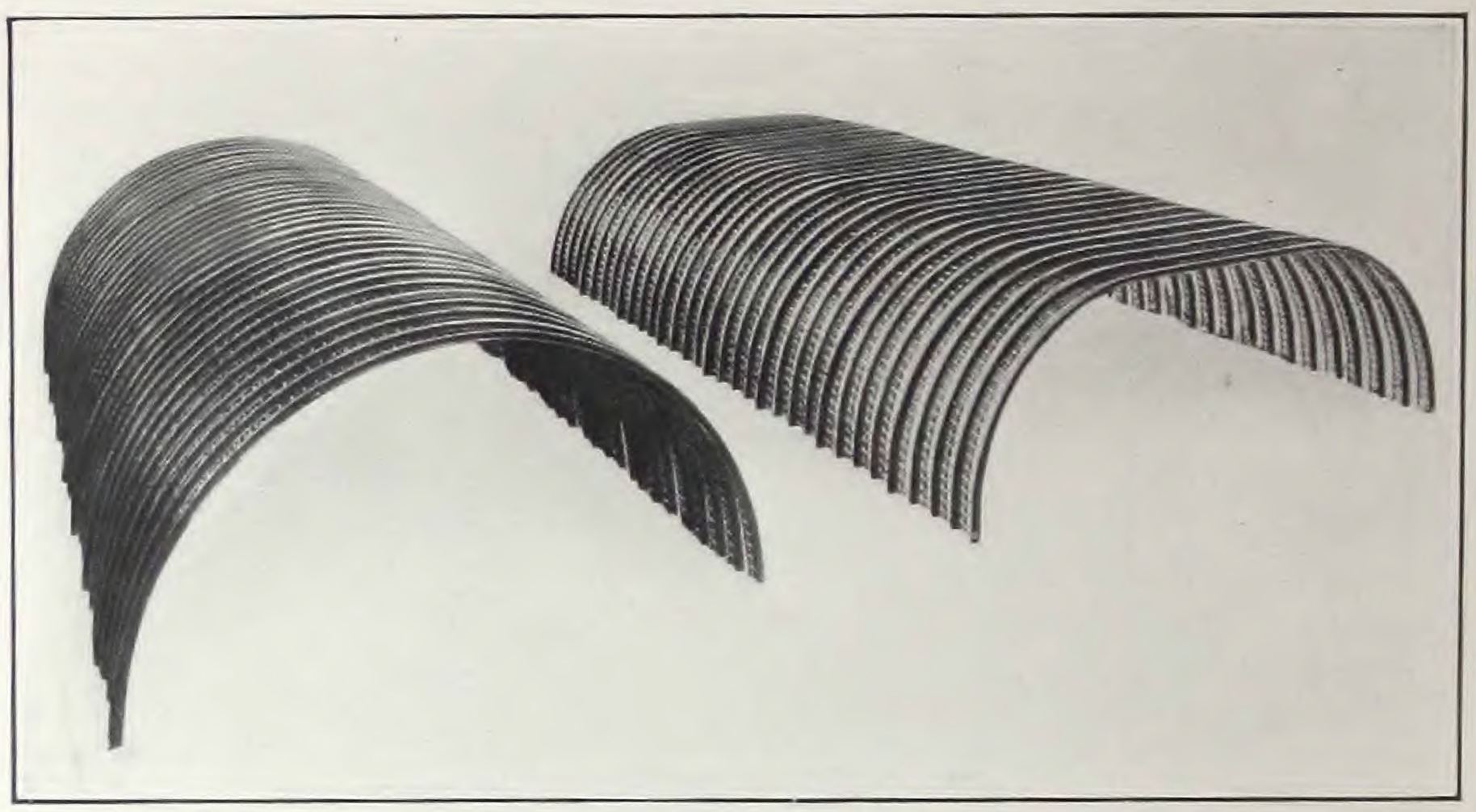
Silos and Tanks

Corr-Mesh provides a very strong, stiff wall for silos, tanks, reservoirs, etc. Corr-Mesh sheets are furnished bent to exact radius at the shops, and should be set up on edge with outside ribs interlocked and securely pinched together.

Corrugated Bars, spaced 2 to 3 feet apart, should be placed in a vertical direction on the inside of the tank securely wired to the Corr-Mesh. These bars will serve to line up the sheets and provide additional stiffness for the wall.

Corr-Mesh sheets should be placed with the ribs outside and plastered to a total thickness of at least $2\frac{1}{2}$ inches. Both inside and outside surfaces should be finished with a $\frac{3}{4}$-inch coat of cement mortar, waterproofed with Corr-Bar-O Base, as directed by printed specifications of the manufacturer.

For complete detailed specifications covering application of cement plaster, refer to pages 22 and 23.



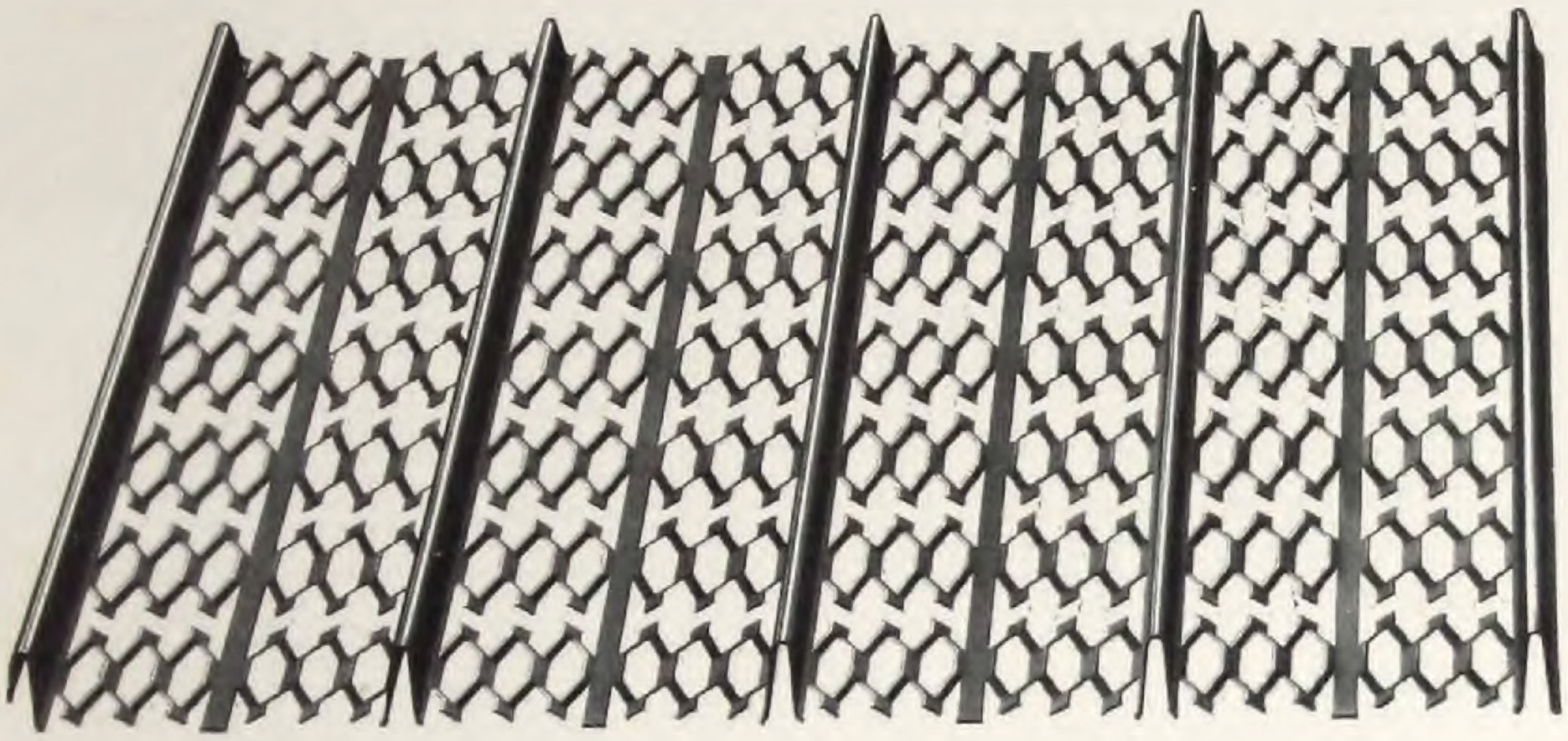
Conduits, Sewers and Culverts

Corr-Mesh is used very extensively in the construction of sewers and conduits, making them indestructible and repair-free. They are easily, rapidly and economically built, as the great expense of circular centering is entirely dispensed with.

The sheets of Corr-Mesh, bent at the shop to proper radius, are set in position with the outside ribs interlocked and cement mortar then plastered on inside and outside to a total thickness of 2 to 3 inches.

Longitudinal rods, wired to the ribs, should be spaced about 24 inches apart to provide for shrinkage and temperature changes.

For detailed specifications covering application of cement plaster refer to pages 22 and 23.



Corr-Mesh — The Material

Detailed Information on Corr-Mesh
Ribs ¾-inch high

Gauges

U. S. Gauges No. 24, No. 26 and No. 28 carried in stock. Other gauges can be furnished special if required.

Lengths of Sheets

6, 8, 10 and 12 feet. We will cut to any intermediate length without additional charge, but waste incurred in cutting from nearest standard length will be charged to purchaser.

Laps

In ordering, make no allowance for side laps, as ribs interlock and material for side laps is included in the 13 inches center to center of outside ribs. See various specifications for end laps.

Protection

All Corr-Mesh shipped painted unless ordered otherwise. Galvanized Corr-Mesh (ribs ¾-inch high) can be furnished on special order.

Bundles

Sixteen sheets to the bundle.

When ordering, be sure to state gauge, height of ribs, lengths of sheets, painted or galvanized, desired.

Table I—Weights and Areas of Corr-Mesh
Ribs ¾-inch high

LENGTH OF SHEETS	SQUARE FEET PER 100 SHEETS	Approximate weight, painted, in pounds per 100 sheets		
		GAUGE		
		24	26	28
0′–3″	27.1	26	20	16
0′–6″	54.2	53	39	33
1′–0″	108.3	105	79	66
2′–0″	216.7	210	158	132
3′–0″	325.0	316	237	197
4′–0″	433.3	421	316	263
5′–0″	541.7	526	395	329
6′–0″	650.0	631	473	395
7′–0″	758.3	736	552	460
8′–0″	866.7	842	631	526
9′–0″	975.0	947	710	592
10′–0″	1083.3	1052	789	658
11′–0″	1191.6	1157	868	723
12′–0″	1300.0	1263	947	789
ADD FOR GALVANIZED		16%	21%	25%

Standard Method Bending, Bundling and Crating Corr-Mesh

FIG. 1
Nearest Possible Approach to a One-piece Circle Opening 12 Inches

FIG. 2
Three-piece Circle

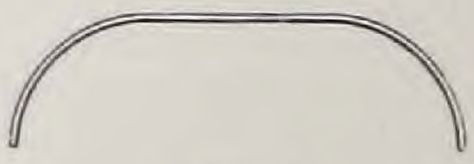


FIG. 3
Intermediate Portion Straight

Sheets may be ordered bent to any radius over 12 inches

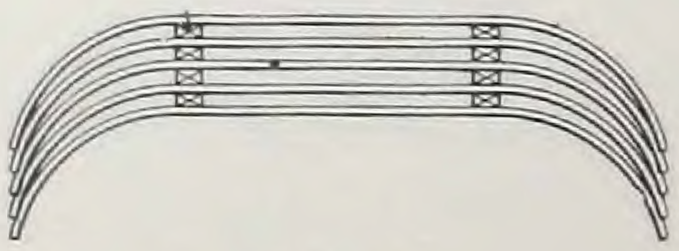


FIG. 4
Method Crating Sheets With Arched Ends

FIG. 5
Bundling for Flat Sheets Can be Supplied in Minimum Carloads

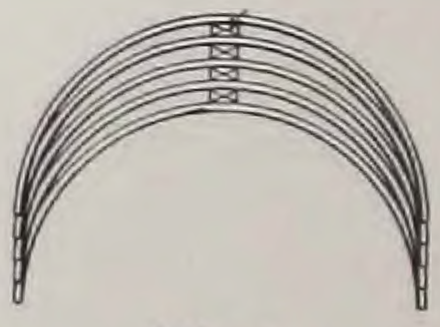
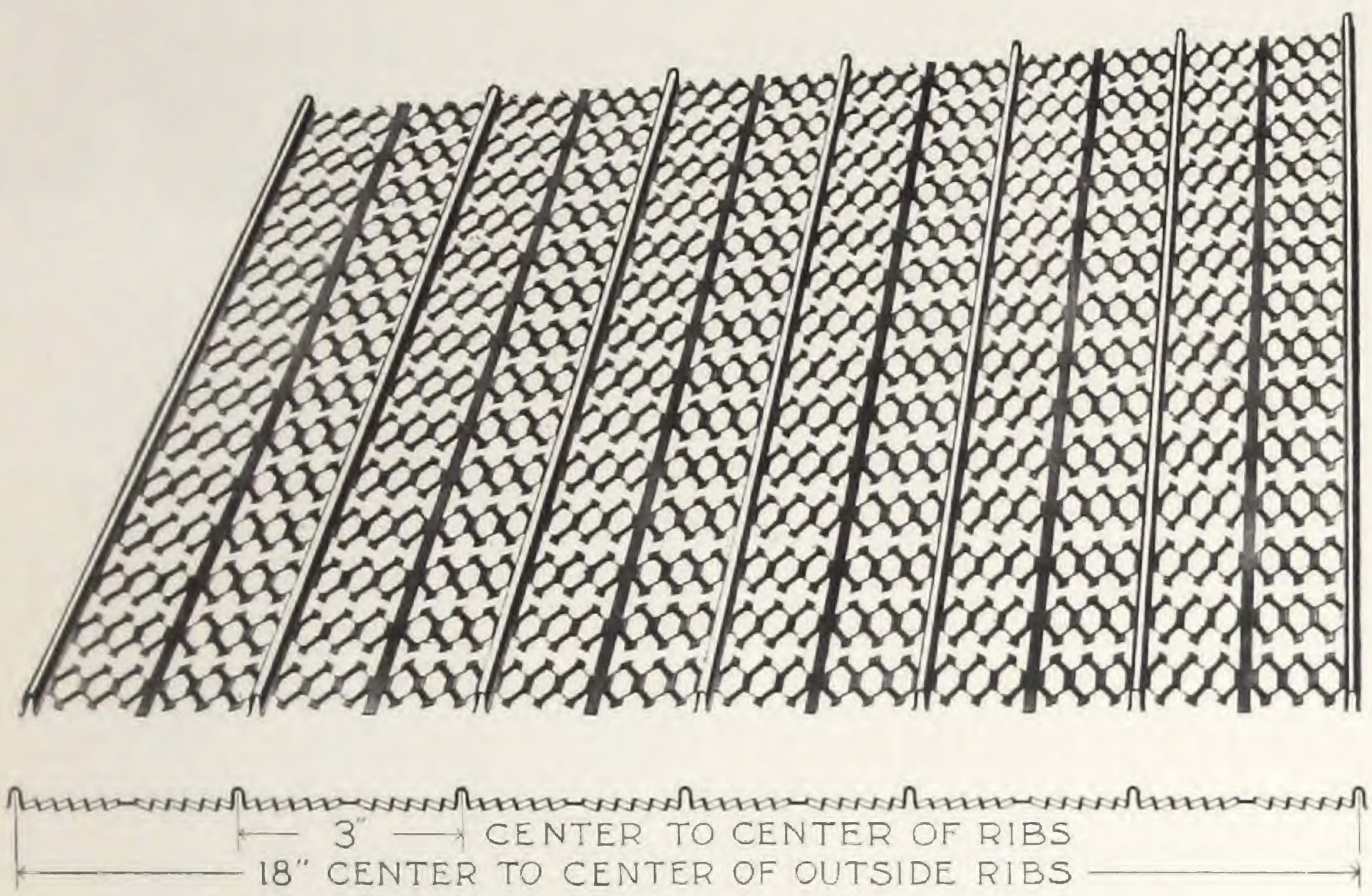


FIG. 6
Method Crating Arch Sheets



Corr-Mesh Lath — The Material

Detailed Information on Corr-Mesh Lath
Ribs $\frac{5}{16}$-inch high

Gauges

U. S. Gauges No. 24, No. 26 and No. 28 carried in stock. Other gauges can be furnished special if required.

Lengths of Sheets

6, 8 and 12 feet. We will cut to any intermediate length without additional charge but waste incurred in cutting from nearest standard length will be charged to purchaser.

Laps

In ordering, make no allowance for side laps, as ribs interlock and material for side laps is included in the 18 inches center to center of outside ribs. See various specifications for end laps.

Protection

All Corr-Mesh Lath shipped painted unless ordered otherwise.

Galvanized Corr-Mesh Lath (ribs $\frac{5}{16}$-inch high) can be furnished from stock in 24, 26 and 28 gauges, sheets eight feet long. Other lengths can be furnished on special order.

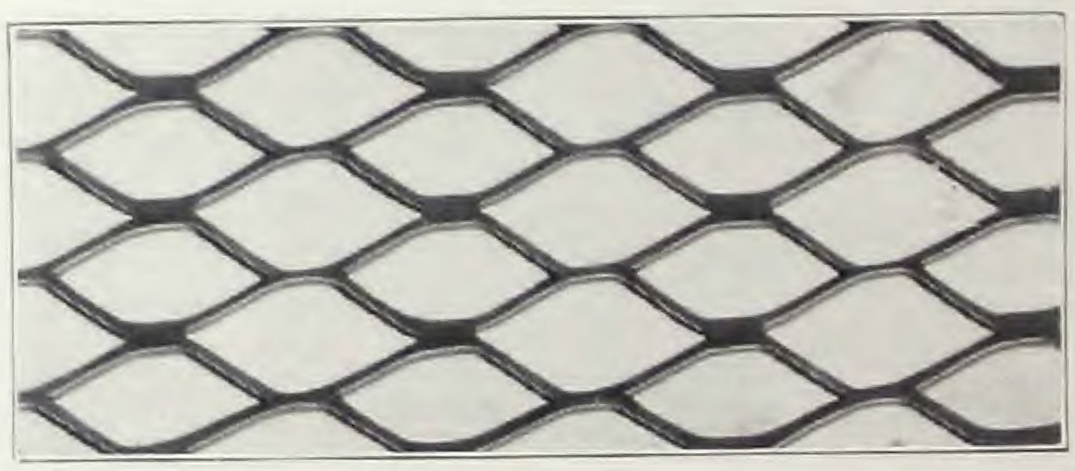
Bundles

12 sheets of the same gauge and length to the bundle. All shipments in quantities of even bundles. No broken bundles (less than 12 sheets).

Table II—Weights and Areas of Corr-Mesh Lath

Ribs $\frac{5}{16}$-inch high

LENGTH OF SHEETS	SQUARE YDS. PER BUNDLE OF 12 SHEETS	Approximate weight, painted, in pounds per bundle		
		GAUGE		
		24	26	28
6′–0″	12	67	51	42
8′–0″	16	90	67	56
12′–0″	24	134	101	84
ADD FOR GALVANIZED		16%	21%	25%



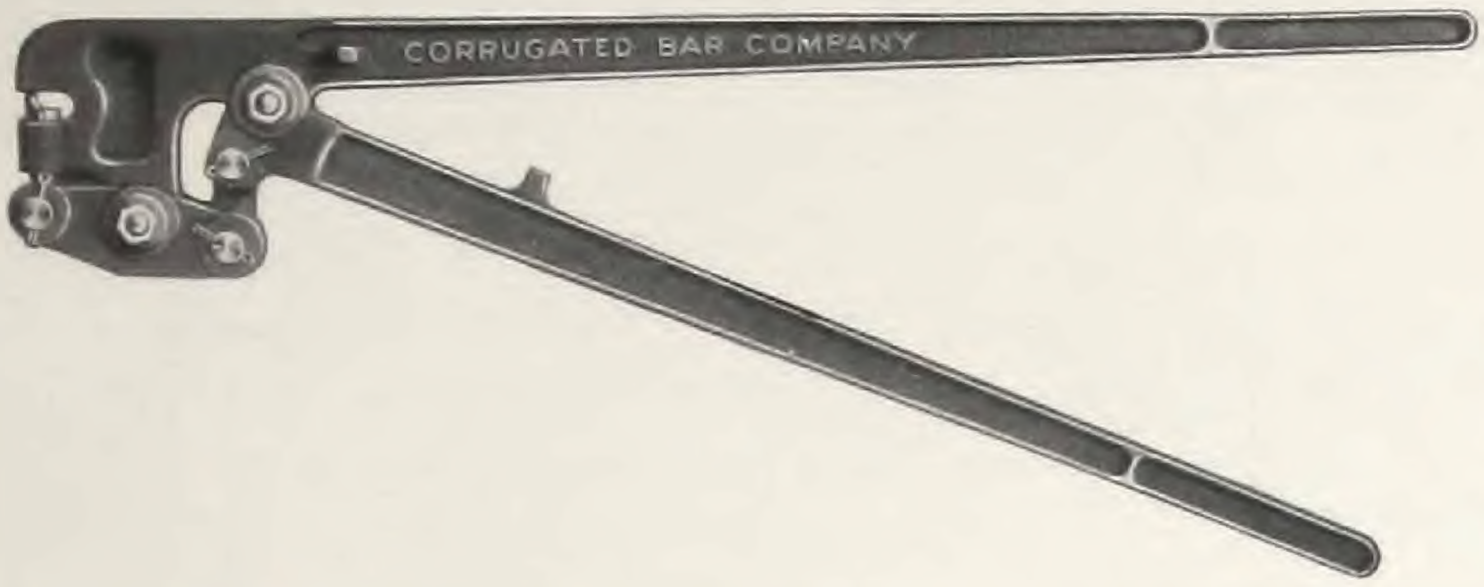
Corr-Lath—The Material

CORR-LATH gives perfect bond with a minimum of plaster. It is ideally adapted for use in all complicated curved work, wrapping columns or beams, furring, and ornamental plastering work. CORR-LATH can be furnished in 24, 25, 26 and 27 gauges.

Table IX—Approximate Weight per Square Yard

	Plain	Galvanized
27 Gauge	2.34 lbs.	2.8 lbs.
26 Gauge	2.50 lbs.	3.1 lbs.
25 Gauge	3.00 lbs.	3.6 lbs.
24 Gauge	3.40 lbs.	4.1 lbs.

Size of Sheet, 24″ x 96″. Packed 15 sheets to the bundle (26⅔ square yards).



Corr-Mesh Hand Punch

For fastening together Corr-Mesh sheets

This punch is so constructed that it easily punches through several thicknesses of No. 24 gauge metal. In punching a hole through two or more ribs of Corr-Mesh or Corr-Mesh Lath nested and pressed together, it causes the metal around the hole to interlock in such a manner as to securely fasten the ribs together, making a connection much stronger than wiring. The accompanying cut is from a photograph and illustrates how this punch locks the sheets together.

Hand punches can be furnished with either 24-inch or 36-inch handles. The latter is recommended for roof and floor work.

Corr-Mesh Hand Shear

For shearing Corr-Mesh sheets

It is often necessary to cut and fit Corr-Mesh or Corr-Mesh Lath on the job. With the Corr-Mesh Hand Shear the sheets can be easily cut without deforming the ends of the ribs. These shears are so light that a workman can easily carry them in one hand.

Channels and Prong Angles

Sheet Metal Channel

Prong Angle

1¼-Inch Rolled Channel

The accompanying illustrations show the Sheet Metal Prong Angles and Channels for fastening CORR-MESH partitions to floor and ceiling as shown on pages 12 and 13. We carry these Prong Angles and Channels in stock in 10-foot lengths and supply them at low cost.

We also carry in stock 1¼-inch rolled Channels for CORR-MESH suspended ceilings (see page 37).

CORR-MESH Held by Channel

CORR-MESH Rib Held by Prong of Angle

Corr-Mesh Beam Hangers

CORR-MESH Beam Hangers, used on suspended ceilings for fastening the small rolled channels directly to the bottom flanges of I-beam stringers (see page 37), are carried in stock in sizes to fit the flanges of 4-inch to 12-inch standard I-beams, inclusive.

Hook Bolts and Ceiling Hangers

Hook Bolts and Ceiling Hangers (see page 37) are carried in stock and furnished at low cost.

The Ceiling Hangers can be furnished with hook bolts of any required length. These bolts, as shown by accompanying illustration, are supplied with double nuts and are threaded 2½ inches for purpose of adjustment.

Corr-Mesh Wall Clips

FIG. 13

Wall Clips are for fastening CORR-MESH to the sides of steel frame buildings. They are made with different openings between the jaws so that they can be used on any thickness of steel from ¼ inch to $\frac{9}{16}$ inch inclusive. The clips grip with such strength that they readily support, without slipping or sagging, several times as much weight as they are required to carry in practice.

These clips are accurately beveled to fit into the ribs of the CORR-MESH. Type "A" is for use where the CORR-MESH lies flat against the flange of the supporting stud (see Fig. 14). Type "B" is for use where the CORR-MESH lies across the edge of the flange of the supporting stud (see Fig. 15).

Wall Clip Type A

FIG. 14
Method of Attaching CORR-MESH with Wall Clip A

Wall Clip Type B

FIG. 15
Method of Attaching CORR-MESH with Wall Clip B

CORR-MESH is fastened to type "A" clips by punching through the ribs with the special punch where the ribs cross the openings forming the jaws of the clip.

CORR-MESH is fastened to type "B" clips by punching the ribs through the holes in the backs of the clips.

The accompanying illustrations are photographs showing how these clips are used. The test weight hung as shown in Fig. 13 for several months, and was then taken down.

Corr-Mesh Roof Clips

Roof Clip

The CORR-MESH Roof Clips securely fasten CORR-MESH to structural steel purlins. The groove in the top of the clip is placed over a rib of the CORR-MESH and the jaws grip the flange of the purlin (see Fig. 16). These clips are furnished with different openings between the jaws and fit over steel from ¼ inch to $\frac{7}{16}$ inch thick inclusive.

FIG. 16
Method o Attaching CORR-MESH with Roof Clip

They are put on entirely from above after CORR-MESH is in place.

Corr-Bar-O Waterproofing Products

The moisture and water absorbent property of concrete is its one inherent fault, which, when eliminated, makes concrete construction acceptable where permanent waterproof and damp-proof results are necessary. This thirst of concrete for water is due primarily to the fact that cement and stone are both more or less porous, and experience has shown that no mixture of these constituents alone can form an absolutely non-porous or water-tight mass.

The manner in which a concrete structure should be waterproofed depends largely upon such local conditions as temperature, atmosphere, soil, etc., in connection with the requirements which that particular structure will have to meet. No one waterproofing material is best suited for all conditions, but our chemists, working in conjunction with our corps of experienced engineers, have so prepared our line of Corr-Bar-O Waterproofing Products that there is no problem so complex but that the desired result can be economically obtained by the proper use of some of these products.

The Membrane Method, the Integral Method, and the Surface Coating Method are the three different ways by which concrete can be made waterproof, and each has its own particular field. Our products cover all three of these methods.

No. 1—Corr-Bar-O Solid Cement

This product is a compound of the purest and most suitable paraffine-hydrocarbons that can be prepared, containing less than 1 per cent. of mineral matter. It is strong and elastic, a non-conductor of electricity, remains tough and waxy throughout an extremely great range of temperature and is able to permanently resist the action of sun and atmosphere, which tends to dry out and make brittle the asphalt and tarry materials.

The Solid Cement is not affected by either partial or constant immersion in water, and is unaffected by alkalies or such acids that are likely to come in contact with it. It is especially adapted for water-

proofing foundations, basements, etc., where the water is under but little hydrostatic pressure.

No. 2—Corr-Bar-O Waterproofing Felt

This product is a flexible sheet of waterproofing material consisting of a high-grade wool felt carefully saturated with CORR-BAR-O SOLID CEMENT.

CORR-BAR-O FELT is especially adapted for waterproofing swimming pools, tunnels, reservoirs, and other structures where it is necessary to provide an absolutely permanent waterproofing membrane capable of withstanding a pressure of several hydrostatic feet.

No. 3—Corr-Bar-O Primer

This is a specially prepared black paraffine product. It is water repellant, and when applied to either the exterior or the interior of a wall, it seals up the pores and forms a tough damp proofing coating.

CORR-BAR-O PRIMER is unaffected by water, atmospheric gases, temperature, soil acids and sewage. It is especially adapted for damp-proofing basements, foundations, etc., that are not subjected to a direct hydrostatic pressure. Where there is water pressure a second coat should be applied.

No. 4—Corr-Bar-O Filler

This is a paraffine product especially compounded for cold application to surfaces of brick, concrete and stone masonry that are to be faced with stone, brick or other materials.

The discoloration and efflorescence of brick-work and masonry are usually caused by their absorption of alkali bearing waters from adjacent materials.

CORR-BAR-O FILLER is damp-proof, is unaffected by alkalies and by such acids as are likely to come in contact with it in ordinary use, effectually seals up the surface pores of the materials to which it is applied, completely covers the surface and, at small cost, makes it impossible for moisture to get through into the facing materials.

No. 5—Corr-Bar-O Binder

This product is an especially prepared damp-proofing liquid which, when applied to the inside surface of brick, masonry or concrete, serves the double purpose of forming a positive bond between the plaster and the masonry, and of providing a continuous damp-proofing membrane which effectively protects the plaster from any dampness coming from without.

No. 6—Corr-Bar-O Waterproofing Base (*Integral Method*)

This product is a white paste which is mixed into the water that is used to moisten the dry mixture of cement and aggregate. By stirring the BASE thoroughly into the mixing water, a uniform distribution of the BASE throughout the entire mass of the concrete is assured, and an efficient waterproofing is obtained at practically no additional expense other than the cost of the BASE. The amount of BASE necessary to effectually and permanently waterproof a mass of concrete is very small in proportion to the other materials used. The BASE may be effectively employed in varied proportions as adapted to specific conditions. On heavy mass concrete construction five pounds of BASE per cubic yard would be a maximum requirement.

CORR-BAR-O BASE neither lessens the strength of concrete nor affects its setting or hardening properties. It does not change the natural concrete color, impart an odor or affect the reinforcing steel. It is unaffected by oils, alkalies, gases and the range of atmospheric temperature, and is not decomposed by such acids as are likely to reach the concrete. It is used for waterproofing dams, foundations, basements, concrete cisterns, conduits, sewer pipe, cement blocks, floors, cement finish on basement floors, masonry, etc.

It is especially adapted for waterproofing old structures by being mixed in a rich mixture of cement and sand, and applied to the old masonry as an exterior coating.

No. 7—Corr-Lith

This is a preparation for the hardening of cement top finish and rendering the surface dust proof. It consists of crushed steel prepared by a special process and reduced to that degree of fineness ascertained to be the most efficient in practice.

Where CORR-LITH is used for hardening a topping coat ¾-inch or more in thickness, the CORR-LITH shall be added in the proportion of 5 pounds of CORR-LITH to each sack of cement.

Where CORR-LITH is used for surface treatment, 15 pounds of CORR-LITH mixed with an equal weight of cement, should be dusted on an area of 100 square feet.

Floors treated with CORR-LITH are so hard that the surface cannot be scratched with a knife, and their length of life is naturally, therefore, much greater than that of ordinary cement finish.

No. 8—Corr-Bar-O Liquid Damp-Proofing

This product is a transparent waterproofing liquid for coating the exterior and interior walls of completed structures. It penetrates into the pores, dries quickly, and gives the surface a slightly lighter and brighter shade.

CORR-BAR-O LIQUID DAMP-PROOFING prevents efflorescence and neither stains nor discolors, making it possible to damp-proof brickwork, cut stone, stucco, concrete blocks, etc., without changing their color.

One gallon of CORR-BAR-O LIQUID DAMP-PROOFING covers approximately 200 square feet with one coat.

No. 9—Corr-Bar-O Interior Finishes

This product consists of a carefully graded line of white and colored interior wall finishes.

The pigments selected for the manufacture of CORR-BAR-O INTERIOR FINISHES are the most durable that can be obtained, and have been chosen because of their ability to resist the alkali in the concrete. The oils used are unsaponifiable and unaffected by the action of moisture and dilute alkali and they have been manufactured with great care and attention. These FINISHES have successfully withstood the most severe and rigid experimental tests, and are capable of serving the double purpose of damp-proofing as well as furnishing a satisfactory method of finishing concrete and plaster walls.

Color cards showing the seven different shades in which CORR-BAR-O INTERIOR FINISHES are furnished can be obtained on application. These shades include white, concrete gray, terra-cotta, deep green, etc., and may be used either singly or in combination. Other color effects can be produced by mixing.

One gallon of CORR-BAR-O INTERIOR FINISH covers approximately 200 square feet with one coat.

No. 10—Corr-Bar-O Exterior Finishes

This product consists of a carefully graded line of white and colored exterior wall finishes.

The pigments selected for the manufacture of CORR-BAR-O EXTERIOR FINISHES are the most durable that can be obtained, and have been chosen because of their ability to resist the alkali of the concrete. The oils are unsaponifiable and unaffected by the action of moisture, dilute alkali and atmospheric conditions, and have been manufactured with great care and attention. These finishes have successfully withstood the most severe and rigid experimental tests and are capable of serving the double purpose of damp-proofing as well as furnishing a satisfactory wall finish.

CORR-BAR-O EXTERIOR FINISHES are furnished in seven standard shades. Color cards are furnished upon request.

No. 11—Corr-Bar-O Floor Enamels

This product is prepared from an extremely durable grade of pigment. It is unaffected by the alkali present in concrete, and is especially designed for damp-proofing and finishing cement floors in power plants, factories, warehouses and all constructions where concrete is used as a flooring material.

CORR-BAR-O FLOOR ENAMELS prevent the rapid disintegration and wearing away of concrete floors and the formation of that particularly objectionable dust which is always raised when concrete floors are swept. These FLOOR ENAMELS produce an elastic, tough, hard, glossy surface, are not affected by lubricating oils or water, and are easily cleaned.

CORR-BAR-O FLOOR ENAMELS are furnished in seven standard shades. Color cards are furnished upon request.

CORRUGATED BAR COMPANY

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