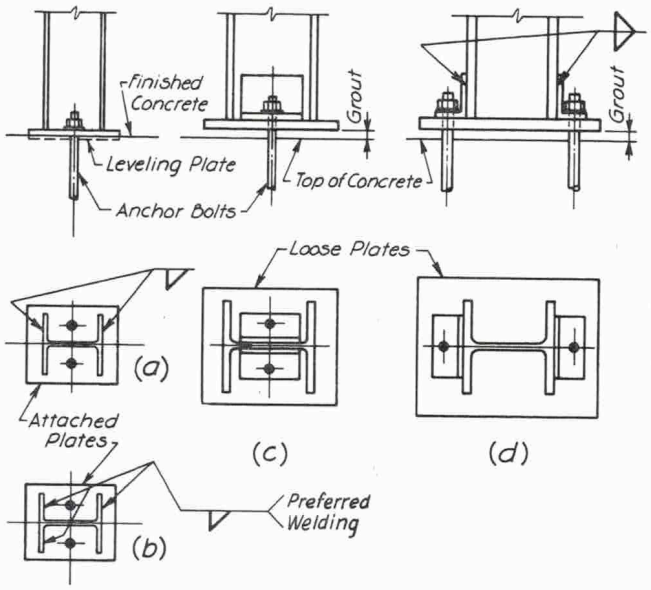

Figure 7-3

above the foundations. Attention paid to these details at the outset of a job will save much time and expense at a later date.

Small base plates, as shown in Figs. 7-3a and 7-3b, are often attached to the bottoms of columns in the shop. The difficulty of supporting such columns while leveling and grouting their bases makes it advisable to provide footings finished to the proper elevation. The required smooth bearing area is usually achieved by means of a steel leveling plate approximately ¼-in. thick. This is easy to handle and set level to elevation prior to erection of the columns. Holes serve as a setting template for the anchor bolts. Very light columns may be set with wedges or shims in lieu of a leveling plate.

Leveling plates and loose base plates that are small enough to be set manually are placed by the masonry contractor (see Figs. 7-3c and 7-3d). Larger base plates that must be lifted by a derrick or crane are set to elevation and leveled by the steel erector. This is accomplished either by using shims of various thicknesses (see Fig. 7-4a), or by leveling screws with weldments to the edges of the base plate (see Figs. 7-4b and 7-4c). The top of the rough masonry footing is purposely set 1 in. or so below the bottom of the base plate to provide for adjustment and subsequent grouting. Cement grout is worked under the plate to insure full bearing under the entire plate area. For large base plates, the design should call for one or more large-size holes near the center of the plate through which grout is poured to obtain an even distribution. If the structural contract includes steel anchor bolt setting templates, it is customary to furnish light plates, simila in all respects to leveling plates except that the overal size need be only large enough to include the bolt pat tern.

In lightly loaded structures, tall narrow frameworks and mill buildings where crane loading is a factor, hor izontal forces may tend to overturn columns, or cause an uplift from the base. To resist these forces, ancho bolts are used to tie the column to the foundation Anchor bolts also serve to locate and to prevent dis placement or overturning of columns due to accidenta collisions during erection.

For ordinary size anchor bolts, 1¼-in. dia. and less heavy clip angles bolted or welded to the columns, as shown in Figs. 7-3c and 7-3d, are generally adequate

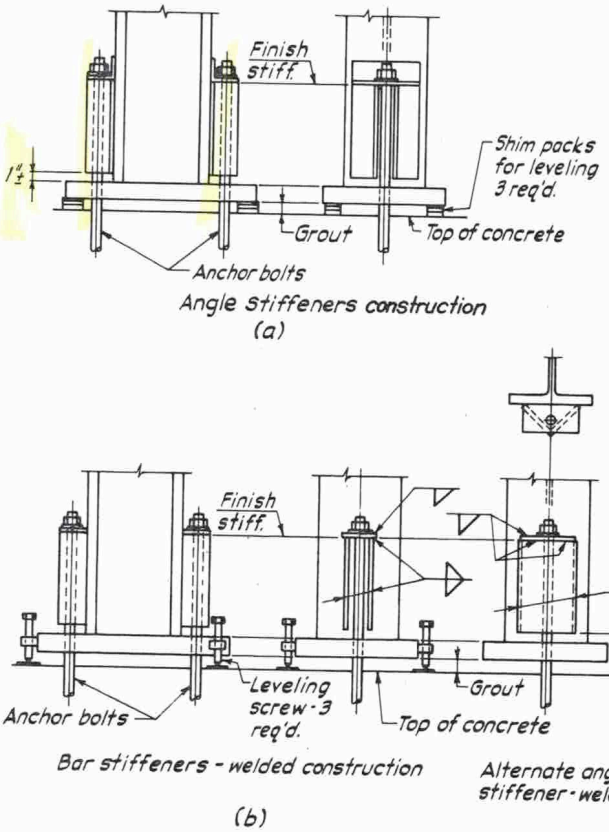

Figure 7-4

Table 7-1. Recomended Hole Sizes For Anchor Bolts

Bolt size	Hole size
3/4" to 1" incl.	Diameter + 5/16"
Over 1" to 2" incl.	Diameter + 1/2"
Over 2"	Diameter + 1"

to transfer overturning or uplift forces from the column shaft to the anchor bolts. When a more positive anchorage is needed to provide against uplift or to resist a calculated moment force, stiffeners are employed with horizontal fitting angles or bars. In such cases, the design plans should contain sketches and design of the required base details (see Fig. 7-4).

Table 7-1 gives recommended hole sizes in steel members to accommodate anchor bolts. The oversize permits a reasonable tolerance for misalignment in setting the bolts and permits more precision in the adjustment of the base plate and column to their correct center lines. The oversize hole should be covered with a flat washer.

Anchor bolts are sometimes located and drilled into the foundation after a piece has been installed in final position. The details should be arranged and dimensioned to permit access and clearance for the drilling. The bolts should be spaced to miss the reinforcing bars.

Insert holes are sometimes precast in the foundation. These holes are oversize and accommodate a "swedge" type bolt which is grouted in the hole, usually with the piece installed in final position. These holes should be sealed in locations subject to freezing, to avoid spalling of the foundation by the freeze-thaw cycle of water-filled holes.

Observe that the angle or bar stiffeners in the moment base of Fig. 7-4 are cut back about 1 in. from the base plate. This eliminates a pocket and permits drainage to protect the column base. These stiffeners are intended to resist uplift from an overturning moment and are not usually designed as part of the column area in bearing on the base plate. The clip angles shown in Figs. 7-3c and 7-3d preferably should be set back from the column end about 1/8-in. for the same reasons.

Base Plates

In the absence of specific job requirements, the surface preparation of rolled steel base plates is governed by AISC Specification Sect. 1.21.3. This section stipulates that if satisfactory contact in bearing is present in plates 2 in. or less in thickness, machining is not necessary. Plates over 2 in. through 4 in. in thickness may be either straightened to obtain this contact, or finished at the option of the fabricator. To insure satisfactory flatness, all unfinished base plates and leveling plates are noted "Straighten" on detail drawings. Plates over

Table 7-2. Finish Allowances (Carbon Steel)

Size	Thickness, in.	Add to Fin. One Side, in.	Add to Fin. Two Sides, in.
Maximum dimension 24" or less	1 1/4 or less	1/16	1/8
	Over 1 1/4 to 2 incl.	1/8	1/4
Maximum dimension over 24"	1 1/4 or less	1/8	1/4
	Over 1 1/4 to 2 incl.	3/16	3/8
56" wide, or less	Over 2 to 7 1/2 incl.	1/4	3/8
	Over 7 1/2 to 10 incl.	1/2	5/8
	Over 10 to 15 incl.	3/4	7/8
Over 56" wide to 72" wide	Over 2 to 6 incl.	1/4	3/8
	Over 6 to 10 incl.	1/2	5/8
	Over 10 to 15 incl.	3/4	7/8

4 in. thick must be finished. However, finishing is n required on the underside of base plates when grout used to insure full contact on the foundations.

When finishing is required, as for **BP2** in Fig. 7- the plate must be ordered thicker than the specifie finished dimension to allow for the cut. Finish allo ances will vary, depending on the overall dimensio and thickness of the plates.

Table 7-2 provides information on finish allowanc for carbon steel for a variety of plate widths and thic nesses and for finishing one or both surfaces. The tabulated finish allowances are based on many yea of experience and have been proven satisfactory f structural work. Manual Part 1 lists mill flatness tc erances for both carbon and alloy steels, and an a justment should be made in applying Table 7-2 to all steel base plates in proportion to the differences wi carbon steel. Base plate thickness should be specifi in multiples of eighths of an inch.

Since no useful purpose is served by finishing mo than the area in contact with the finished end of tl column, the shop detail is dimensioned to show tl area on which finishing (Fin.) is required (see Fig. 5). To reduce machine time, the cut should be ma in the direction producing the least possible finish area. The finishing is usually carried across the fi width of the plate to avoid interrupted machining o erations, although it is not required from a desi standpoint.