One of the most promising recent developments in construction — lightweight steel framing — is rapidly penetrating another important low-rise market: as the load-bearing structure for buildings three, four and even five stories high.

Originally developed as the structural support for one and two-story buildings, lightweight framing also found application as curtain wall framing in high-rise construction. More recently, it has won a good-size share of the smaller medical building field, and made inroads into residential and commercial markets.

Now, taking into account certain design considerations, it is being used increasingly for structures three to five stories tall.

In this newest trend, the system has already served as the framing for a variety of building types throughout the U.S. Examples include: Yardarm Beach Condominiums in Westhampton Beach, N.Y.; Hastings College Women's Dormitory, Hastings, Nebr.; Days Inn motels in five Southeastern cities; El Capitan apartments, Seattle; Global Office Building, Washington, Pa.; and Place de Desiderata condominium apartments, Kenneth City, Fla. The system is also finding strong use in retirement projects, such as Friendship Village, Milwaukee; Casa de los Amigos, Redondo Beach, Calif.; and Plaza Verde and Washington Square, in

In five Southeastern cities, the Days Inn of America chain has constructed three-story motels utilizing lightweight steel framing. They range in guest accommodations from 170 to 184 rooms, and from 61,000 to 66,000 square feet in overall area.

These steel stud-and-track wall sections were used in the 50,000-square-foot Ellen Memorial Health Care Center, a $1.5 million nursing home in Honesdale, Pa. The project designer, Swendson Engineering, estimates that use of this framing rather than block construction resulted in a 25 percent savings on framing costs. Its success led Swendson and the contractor, Dorsan, Inc., to collaborate on a duplicate building, the Carpenter Care Center in Tunkhannock, Pa.
Photo at left shows a 12' x 60' module built for export as a field hospital or clinic. Piled inside the module are steel stud panels that will serve as exterior walls when a 60' x 60' building (made up of five modules) is erected overseas. Foreground of shot at right shows the steel floor joists.

Centralia, Ill. and Hinsdale, Ill., respectively.

Basically, lightweight steel framing embodies use of steel floor joists and steel wall studs to carry a low-rise building’s entire structural load. Increasing specification by architects is credited, in part, to its compatibility with all exterior and interior facing materials. Contractors capitalize on its reduced enclosure time because complete wall and floor framing assemblies can be prefabricated into large panels and facings preattached to the framing.

To support buildings up to and including five stories, the system’s overall construction techniques remain much the same. What changes is the need for extra-strength studs as well as a few revamped erection and fastening procedures. The Sheet Committees of American Iron and Steel Institute, some of whose members fabricate the components, list the following suggestions:

• Stud thickness requirements, for example, are related to the loads to be carried. On single- and two-story buildings — the bulk of the system’s use to date — steel studs 0.036" to 0.060" thick are adequate. For buildings three floors and higher, load-bearing studs may be at least 0.075" thick, with some heavily-loaded areas requiring 0.105" thickness. (Steel joists are affected only by floor or roof loads and spans, so their thickness does not change with building height.)

• Vertical stud height (studs are normally 8' to 9' in height) also plays a role. The shorter the stud, the more load it can take.

• In the area of assembly procedures, both screw fastening and
welding of framing components are acceptable for the taller buildings.

- Diagonal bracing may be required for load-bearing construction, to prevent racking from wind or earthquake forces. As a building rises in height, the size and amount of this bracing must also increase. Steel stud walls can also be braced for racking shear loads with approved sheathing materials, such as plywood, gypsum sheathing board or gypsum wallboard.

- Bridging or strapping may be required to provide lateral support to the studs. When lateral bracing is needed, it is normally positioned at the stud’s mid-height point or at the third point levels.

- Each manufacturer of lightweight steel framing has developed systems with varying sizes of studs and joists, and minimum yield points of the steels used to fabricate the members. They should be contacted, or their literature examined, to determine allowable loads and spans.

A prime attribute of lightweight steel framing is its non-combustibility. This factor is one of the reasons it’s so popular for hospitals, clinics and nursing/retirement homes. For all heights of low-rise buildings — and the taller ones usually have fire codes that stipulate non-combustible framing — wall assemblies can achieve one and two-hour fire resistance ratings.

As for cost, a five-story building with lightweight steel framing will be priced only slightly higher than a two-

One word — economy — is the basic reason steel stud framing was chosen for the Global Office Building, in Washington, Pa., according to Frank Irey, Jr., president of the general contracting firm bearing his name. The 50,000-square-foot structure is topped by a penthouse supporting a heliport.

According to Charles F. Aldrian, Shepherd, Legan, Aldrian - in planning the Friendship Village retirement community. Continued on page 30