

# Builder's Checklist for the Texas Coast and Shoreline

*Construction on the Gulf Coast presents many special problems due to great exposure to high winds, floodwaters, erosion, subsidence, and highly corrosive environments.*

*This checklist covers the most frequent problems encountered and can serve as a guide for persons investing in shoreline properties.*

*Investors should retain a registered professional engineer experienced and qualified in designing shoreline buildings.*

## LOCATION

Yes No

- Beach Access.** Does the structure block access to public beaches? Does it violate open-beach provisions of state law? [Contact the Texas Attorney General's Office or the General Land Office (GLO) of Texas.]
- Dune Protection.** Has care been taken to protect any dunes and their vegetation? Does the property meet requirements of state legislation for the protection of sand dunes? If the structure is a multiple-unit dwelling, motel, or subdivision, has a single joint access route or walkway to the beaches been planned? (Contact the GLO for further information.)
- Zoning Regulations.** Do the building and site plan conform to city and county zoning regulations on type of structure, location with respect to dunes and water, and other provisions of applicable zoning laws? (Check with your contractor or local building officer to be certain.)
- Building Permits.** Have the necessary city or county building permits been obtained? Have requirements of local utility districts, if any, been met? If the site is in a wetland or in navigable waters and require a permit from the U.S. Army Corps of Engineers or the GLO, has the permit been obtained?
- Evacuation Route.** Does the building site have an adequate means of evacuation in the event of a hurricane? Is the elevation of the evacuation route higher than the expected storm-tide elevations? Information on road elevations is available from cities, counties, and the Texas Department of Transportation.
- Insurability.** Have the requirements and recommendations of insurance companies been addressed pertaining to minimum floor elevation and structural requirements for insurability?
- Ownership.** Has particular attention been paid to boundaries between state-owned and privately owned lands, especially on waterfront structures? If in doubt, check with local government or the GLO.

## ELEVATION, EROSION, AND SUBSIDENCE

Yes No

- Construction in Floodplain.** Is the building in a designated floodplain? Have city, county, and other applicable flood levels been checked? Have requirements and recommendations of applicable floodplain-code requirements been met? (Consult your local city or county engineer.)

- Floor Elevation.** Is the minimum floor elevation of the structure above flood levels established by applicable codes and requirements?
- Breakaway Construction.** Do city or county building codes require "breakaway" construction below flood level?
- Local Erosion Rates.** If the structure is located near bay or Gulf waters, have local erosion rates been determined? [Contact the Bureau of Economic Geology, the Texas Coastal and Marine Council (TCMC), and the GLO—see the list of addresses.]
- Erosion Prevention.** Have measures been taken to prevent erosion from wind and floodwater runoff, including provision for adequate natural or planted vegetation?
- When Erosion Occurs.** If storm scour or erosion occurs, is the foundation still adequate to support gravity and wind loads on the structure? (See "Foundation Design.")
- Subsidence.** Does the location have a history of ground subsidence or sinkholes? If so, has this been taken into account in design, access, and hurricane evacuation routes? Have measures been taken to prevent subsidence in likely areas? (Contact the TCMC or the Bureau of Economic Geology.)

## WIND-LOAD DESIGN

Yes No

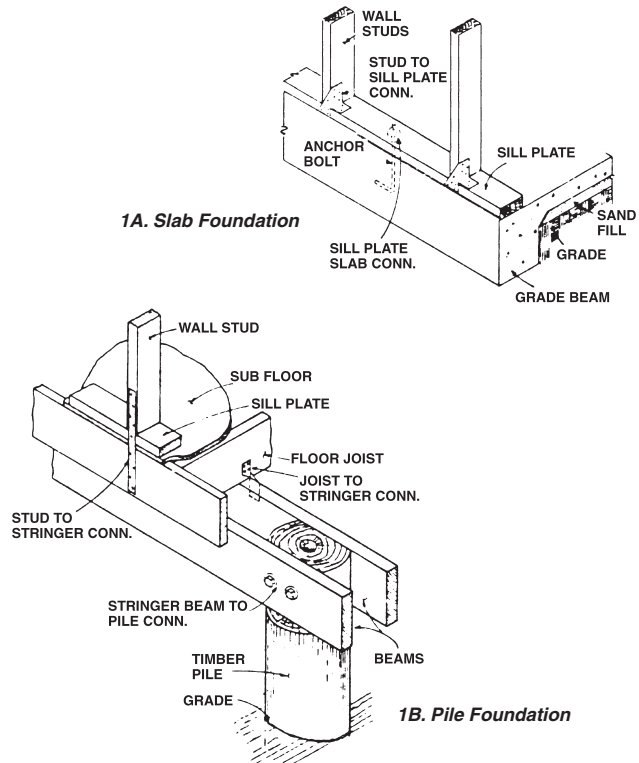
- Design Wind Velocity.** (Design wind velocity—DWV—is the wind speed that the structure has been designed to withstand.) Has the DWV been determined on the basis of governing building-code requirements or higher possible wind velocities? Has the effect of negative (suction) pressure been considered in all wind-load design? (Check with city or county building department officials to determine minimum DWV and pressures for which the structure must be designed.)
- Building-Frame Design.** Has the structural frame been designed to withstand pressures and suction forces of the DWV or possible higher wind velocities? Have shape factors and the effect of roof slope been taken into account in calculating DWV?
- General Building Design.** Have all building elements (doors, siding, railing, etc.) been designed to withstand forces of the DWV or possible higher wind velocities?
- Adequacy of Design.** Has the structure been designed by a registered professional engineer qualified to work in this field? Do building drawings have a registered PE's seal and signature?

## FOUNDATION DESIGN

Yes No

- Wave Forces. If the building is in a floodplain, has the foundation been designed to withstand wave forces and battering action from floating debris?
- Erosion. Has the foundation been designed to adequately withstand the effect of erosion or scour due to wind and water runoff? A structure built on pilings and properly anchored is generally much less susceptible to severe storm damage than a structure built on a slab foundation (Figure 1A).
- Pile Foundation. If a pile foundation is used (Figure 1B), are pilings driven deep enough below the scour zone to resist forces of the DWV or possible higher velocities and wave forces after scouring has taken place? Knowledge of the nature and character of the soil under the structure is necessary to make this determination.
- Pile Spacing. Are the piles or other foundations spaced widely enough apart to allow free flow of floodwater runoff and withstand the effects of storm scour and erosion?
- Corrosion Resistance. Have pilings been properly treated to prevent damage due to constant moisture, salt water, marine borers, and rot?

Figure 1. Foundations



## WOOD-FRAME BUILDING CONSTRUCTION

Yes No

- Sill Plate.** Are sill plates (Figure 2) securely attached to the foundation by anchor bolts (or metal straps in pile foundations) to resist uplift and lateral forces caused by DWV?
- Wall Connections.** Are wall studs securely attached to sill plates and top plates?
- Roof.** Are rafters and joists securely attached to top plates?
- Hurricane Straps.** Are metal hurricane straps required by governing building codes? These straps are highly recommended on all coastal construction.
- Continuous Connection.** Have metal straps been included to ensure a positive continuous connection from the foundation to the structural members of the roof?
- Member Design.** Have floor, roof, and wall members been designed to carry additional loads due to wind velocities higher than the DWV?
- Connection Design.** Are member connections (Figure 3) and fasteners adequate to carry loads from the DWV or higher velocities established for the area?
- Wall Bracing.** Is diagonal wall bracing or properly attached plywood wall sheathing included to resist high lateral loads on the structure?
- Corrosion.** Are bolts, straps, plates, nails, and all other metal fasteners hot-dip galvanized or otherwise protected from corrosion?

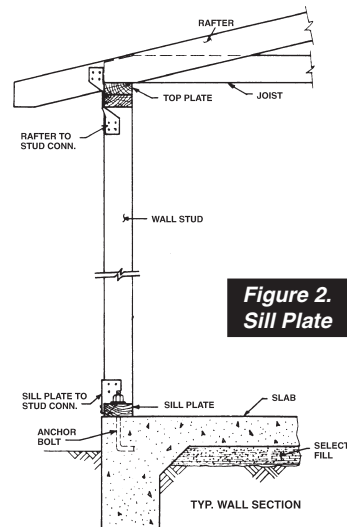


Figure 2. Sill Plate

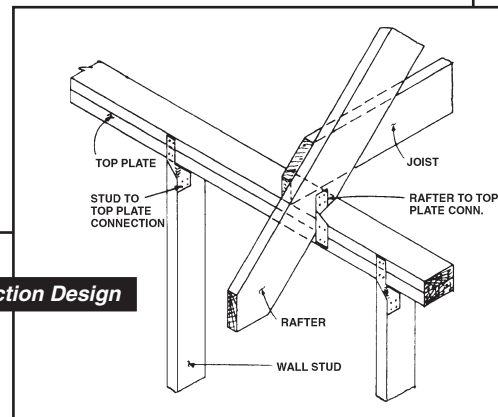


Figure 3. Connection Design

## ROOFING, SIDING, AND TRIM

Yes No

- Roofing System.** Can you determine whether the roof has been adequate in previous high winds?
- Built-up Roof.** Are all layers properly adhered to previous layers and to the structural roof itself? Has loose gravel been eliminated from the roof to avoid damage to windows and other structures during high wind?
- Shingles.** Has shingle exposure been decreased and fasteners added to reduce high uplift pressure on roofs?
- Securely Attached Corners and Edges.** Have the corners and edges of shingles, roofing material, siding, and any other building elements been securely attached to prevent loosening during high winds?
- Roof Panels.** If roof panels are used, have they been securely attached to the structural frame to resist design uplift pressures?
- Wall Siding.** Has the wall siding been attached properly to withstand design wind velocities?
- Shutters.** Have shutters been included for all glass openings and any other opening that may need protection from high winds? Can shutters be closed quickly and easily?

## UTILITIES

Yes No

- Telephone and Electrical.** Has all wiring been encased in a noncorrosive, watertight conduit? Are all conduits placed to avoid damage due to flooding, erosion, and floating debris? Have junction boxes and breaker boxes been located above flood level and in a place not subjected to driving rain?
- Water and Sewerage.** Are all water and sewer lines constructed of a noncorrosive material and located to avoid damage and contamination due to flooding, erosion, and floating debris?

## QUALITY ASSURANCE

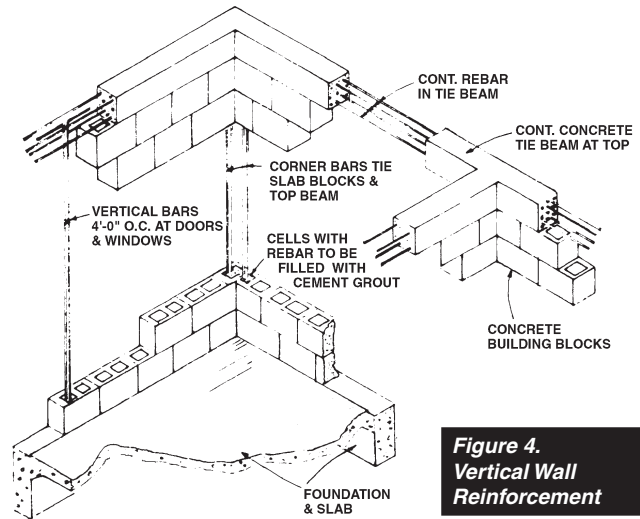
Yes No

- Plans and Specifications.** Does the contractor have a complete set of detailed construction drawings and specifications that cover all aspects of construction?
- Contractor.** Is the contractor qualified and experienced in coastal construction?
- Inspection.** Have arrangements been made to have a qualified registered professional engineer inspect the construction of the building? Have local building regulations been checked to see whether inspections are required?

## CONCRETE-BLOCK BUILDING CONSTRUCTION

Yes No

- Design.** Has the structure been designed by a registered professional engineer to resist pressures and suction forces of the DWV established by the city or county, or to resist possible higher storm velocities?
- Vertical Wall Reinforcement.** Has vertical reinforcing steel and concrete (Figure 4) been included at corners, at openings, and at regular intervals along walls without openings?
- Bond Beam.** Has a properly designed reinforced-concrete bond beam, which will resist uplift forces, been provided at the top of the wall, continuously around the structure?
- Roof Anchors.** Has the roof system been securely anchored to the bond beam to resist uplift forces due to the DWV?
- Tie to Foundation.** Has vertical wall reinforcement been adequately tied to the foundation and to the bond beam to form a continuous tie from the foundation to the roof?



**Figure 4.**  
**Vertical Wall Reinforcement**

### For Additional Information on Shoreline Construction

**Bureau of Economic Geology**  
University of Texas at Austin  
University Station, Box X  
Austin, TX 78713-8924  
512-471-1534  
www.beg.utexas.edu

**Federal Emergency Management Agency**  
Region VI  
800 N. Loop 288  
Denton, TX 76201-3606  
940-898-5127  
www.fema.gov

**Federal Emergency Management Agency**  
National Flood Insurance Program  
500 C Street S.W.  
Washington, DC 20472  
www.fema.gov

**Texas General Land Office**  
1700 N. Congress Ave. Suite 935  
Austin, TX 78701-1495  
1-800-998-4GLO (-4456)  
www.glo.state.tx.us

**Texas Department of Transportation**  
125 East 11th Street  
Austin, TX 78701  
1-800-558-9368  
www.dot.state.tx.us

**Office of the Attorney General**  
P.O. Box 12548  
Austin, TX 78711-2548  
512-463-2100  
www.oag.state.tx.us

**Texas Windstorm Insurance Association**  
P.O. Box 99090  
Austin, TX 78709-9090  
512-899-4900  
www.twia.org

**Insurance Information Institute**  
110 William Street  
New York, NY 10038  
212-346-5500  
www.iii.org

**U.S. Army Corps of Engineers**  
P.O. Box 1229  
Galveston, TX 77553-1229  
409-766-3004  
www.swg.usace.army.mil

**Governor's Division of Emergency Management**  
Texas Department of Public Safety  
P.O. Box 4087  
Austin, TX 78773-0220  
512-424-2138 (during office hours)  
512-424-2000 (after hours)  
www.txdps.state.tx.us/dem/pages/index.htm