

Plans and Specifications for Mixing/Loading Pad and Pesticide Storage Building

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The following plan and specifications is developed from the material contained in the MWPS-37, *Designing Facilities for Fertilizer and Pesticide Containment*. It is a conceptual plan showing the integration of the functional areas such as storage and mixing/loading into a facility. The dimensions can be modified to accommodate various sizes of equipment or storage needs for a particular operation. More detailed information of construction can be found in the MWPS-37 Handbook.

Variations of this plan have been used in several demonstrations around Wisconsin including a cash grain farm, an orchard, a dairy farm and a golf course. The plan is fairly flexible in allowing different users to design and manage the space in the facility for their particular needs. The information in this paper attempts to describe the different areas in order to get a better understanding of the function of the area and how it relates to the rest of the building design. There are also appropriate specifications suggested that are based on the MWPS-37 which should help contractors determine the construction required in the facility.

Functional System Design

Each of the functional areas is provided with separate secondary containment This prevents an accidental spill in one area from contaminating an adjacent area or the entire facility. Ramping between areas allows easy access by hand truck or forklift for moving packages into the areas during the mixing process, or loading and unloading of product.

Sump Design

A shallow sump is also designed into each area to provide a low point in the area for recovering spilled material easily. The sumps are not designed to hold material for an extended time, but only allow recovery of as much of the material as possible. Accumulated solids in sumps should be cleaned out weekly or immediately after an accumulation of solids is evident. Fluid should be pumped directly into application equipment if possible or into labeled rinsate storage tanks. An 80 mesh screen is commonly used to screen the fluid from the pump to prevent clogging of nozzles or solids from deposits in the rinsate tanks.

The sumps are usually precast concrete surrounded by placed concrete or are poured as an integral part of the concrete slab. An alternative is to use a stainless steel sump surrounded by placed concrete described in MWPS-37.

Rinsate Management

Rinsate tanks should be cone bottom design or depressed outlet type tanks to allow complete draining of the tank and any accumulated solids.

The load pad should be washed down daily after use. Although it is good practice to minimize the amount of rinsate generated, it is also important to clean any spilled fertilizer or pesticide solutions off the pad to prevent degradation of the concrete.

Management

Maintain a list of all stored product kept in the facility in the emergency response plan for the facility. Keep this inventory up to date especially in spring when product moves in and out of the facility quickly. Over winter as little product as possible.

General Notes

This facility should be placed a minimum of 50 feet away from other buildings for fire protection reasons. Construction should comply with all applicable local and state building/construction codes. There may also be applicable Federal Environmental Protection Agency, State Environmental Protection Agency or State Department of Agriculture regulations.

Construction materials are suggested in the specifications and plans, but substitutions can be offered if performance is equivalent to suggested materials.

Pesticide Storage Areas

The pesticide storage areas include a heated and ventilated pesticide storage for year round storage and a seasonal storage area used to store liquid and dry formulations of agricultural pesticides and or fertilizer. Secondary containment is provided for all areas to contain potential spills and allow for reclamation of spilled materials and decontamination of the surfaces and liners of the facility. The secondary containment capacity of the pesticide storage area is approximately 95 gallons. The seasonal storage area has a secondary containment capacity of approximately 135 gallons.

The seasonal storage area is used to store the large quantity of product that is common in the spring rush. Depending on needs, this area may not require environmental control which can keep the coat down, but if necessary the entire area can be heated if over wintering is required for a large quantity of product. It is not **designed as a long term storage area.**

Mixing/Loading Pad

Mixing/loading pads are used to collect and contain spills from the handling and transfer of pesticides from storage to spray equipment. Unloading and transfer of pesticides into the storage building will also take place over the pad. Equipment will be parked on the pad during filling or maintenance. The pad should be cleaned after any leak or spill. Wash water or rinsate from the cleaning of the pad shall be collected and transferred to rinsate storage tanks located on the **pad. These rinsates** can be used as makeup water for subsequent sprayer loads or disposed of under label directions. The secondary containment capacity of the mixing loading pad is approximately 250 gallons.

Additional capacity can be achieved by increasing the slopes on the ramps into the areas, adding additional height on the curbing of the areas or increasing the slopes on the floor areas of the facility. Also increasing the dimensions of the building will tend to increase the capacity of the building.

Personnel Safety Area

A personnel safety area should be developed in the facility. At a minimum, this area should include an emergency shower/eyewash, spill recovery kit and first aid kit. A clean clothes locker and storage for personnel protection equipment should also be available.

Waste Disposal Area

Disposal of empty containers should be according to label directions. These containers should be stored in the facility or in a separate roofed area until they are disposed of.

Building

The entire facility is roofed for several reasons. The roof prevents the entry of clean rainwater that potentially would have to be handled as a rinsate. A 100 year, 24 hour storm in **Wisconsin** is a 6 inch rainfall. This rainstorm would **generate** approximately 1000 gallons of rinsate on the mixing/loading pad area. Annually Wisconsin's precipitation would generate 5400 gallons of rinsate if it were allowed to accumulate on the pad. This would amount to eighteen 300 gallon sprayer loads. The entire building provides a secondary containment capacity of 480 gallons, but it is designed to allow isolated secondary containment of each of the functional areas.

Site Investigation

A site investigation should be performed to determine any pre-existing contamination on the site and/or well. Soil samples should be taken on the site and tested for pesticides used previously at the site. Water samples should be taken at the well and tested for pesticides used previously at the site.

Excavation and Sitework

All top soil, organic matter and debris should be removed from the site. Excavate to remove soil to a sufficient depth to allow the subbase and concrete slab to be situated on firm undisturbed soil at elevations shown on drawings. The compacted granular subbase should be placed in maximum 6 inch lifts.

Concrete Design

The concrete slab is designed as a floating slab. Depending on the complexity of the final design, the slab can be poured integral or may require separate pours. If separate pours are necessary, waterstops should be used at the cold joints.

Each of the functional areas is or can be poured separately from the others to allow simple construction. Control joints are at the high point of the ramp so that the joint can be maintained and most likely will not be exposed to water for extended periods of time.

At the entrance to the overhead doors, there is a ramped portion of concrete that extends into the building approximately 6 inches. This prevents rain and snow melt water from entering the building as it is shed from the door or as accumulated snow next to the door melts. There have been several buildings designed without this, and the common problem to them all is accumulation of rain and snow melt water into the sump of the loading pad.

Concrete Specifications

Concrete should be ready mix delivered to the site. The concrete mix and the pad construction should be designed to the following construction specifications:

Type I or Type II cement.

Minimum 28 day strength: 4,000 psi.

Air entrainment: 6 percent +/- 1 percent.

Water-cement ratio: 0.40-0.45.

Slump: 2-4 inch.

For improved workability a water reducing agent (plasticizer) should be added the plant or site and mixed according to manufacturer's recommendations.

Additional water should not be added.

Moist cured for not less than 14 days (28 days preferred).

No cold joints if possible.

Water stops at all cold joints.

Minimum vibration during placement.

Maximum aggregate size: 1 inch.

Control joints are cut into the green concrete at the specified locations at a depth of 2" or 1/3 the slab thickness.

Reinforcing bars should have at least 2 inch concrete cover on formed concrete surfaces and 3 inch minimum for concrete placed against soil or subbase.

Finish concrete with a steel power trowel, then wood float in direction of slope for a nonskid surface.

Use a polyurethane base joint sealer or equivalent.

The floor coating should be an epoxy base providing a chemical impervious and nonskid surface. Incorporate grit in final coat to provide for nonskid surface.

Steel Specifications

Reinforcing steel should be Grade 60 #4 reinforcing bar (epoxy coated is preferred).

Lap all splices 12 inches minimum.

Provide adequate support for all reinforcing bar during concrete placement to maintain position in the slab.

Post Frame Building Specifications

Typically the building shell is constructed separate from the concrete slab. This provides for the opportunity to use a post frame building and would not require footings integral to the slab.

A post frame building shell is suitable construction for the building shell. Stud frame and concrete block have also been used in other situations. Consult with local building codes to determine required construction for site.

For the post frame shell use 6" x 6" treated wood post foundation at 8' on center (OC). A minimum of 4' post depth should be adequate. Posts should rest on 6" thick x 18" diameter precast concrete footing. Building roof construction to be pre-engineered truss at 8' OC designed for appropriate snow load at the site. 2" x 6" girts at 2'-6" OC for the sidewall and 2" x 6" purlins at 24" OC dropped between the truss and supported by joist hangers should be used for the roof. Full length painted ribbed 29 Ga steel siding and roofing should be used.

An option in some areas may be to insulate the entire area and use fencer for security of adjacent storage areas if needed.

The exterior walk doors should open to outside. A self closing door with exit lock and panic hardware is recommended. The door should be metal construction, solid core, with metal jamb and weather seal, and a 3/4 hour fire rating.

The splash skirt or interior liner should be plywood with epoxy paint or painted steel. The liner should allow water to shed onto the loading pad or inside the building.

Pesticide Storage Room

Specifications

Wall construction should be 2" x 6" treated wood sill anchored to slab or curb 4' OC. The wall is 2" x 6" wood stud at 16" OC insulated with 6 inch Kraft faced fiberglass batt. The ceiling is 2" x 10" joist at 16" OC insulated with 12 inch Kraft faced fiberglass batt. Use a 6 mil vapor barrier with taped joints to produce continuous vapor barrier on the warm side of the wall or interior of room before the interior liner is installed.

The interior liner should be 1 layer of 5/8" Type X gypsum wallboard covered with 1/2" exterior grade plywood laminated with High Density Polyethylene (HDPE) or equivalent to provide a surface impervious to chemicals and easily cleaned and decontaminated. An alternative liner is 29 Ga ribbed steel.

The exterior liner on storage room should be 1 layer 5/8" Type X gypsum wallboard covered with full length 29 Ga white painted steel.

Electrical Specifications

The electrical service should comply with Class 1 Division 2 of National Electric Code. The service should be sized to provide all electrical requirements for installed lighting, heating, outlets and ventilating equipment rated at 110/220 V and approximately 100-200 amp, depending on load. Provide exterior disconnect of electrical service in locked weather proof cabinet and separate meter for building.

All duplex electric outlets located as per plan equipped with Ground Fault Circuit Interrupters (GFCI) circuit.

Lighting

Lights may require some offset from the centerline of the building, especially if overhead doors are used. Since it is common during the use of the building that the overhead doors are up during the day they may cover up the lights if they are not positioned correctly, effectively limiting lighting. This may not be a problem during midday with the sun shining, but there could be low light levels during cloudy days and also at dusk and dawn when the building is just getting setup or just getting cleaned up. An option may be to use roll up doors, bi fold doors or sliding doors. Another option may be to position the lights on the sidewall up high but not obscured by the overhead door in the open position.

Fluorescent or incandescent lighting fixture with vapor protection on same switch with ventilation fan to be placed on the exterior of the pesticide storage room.

Fluorescent, incandescent or high pressure sodium lighting fixtures with vapor protection in remainder of building.

Exterior weather resistant fluorescent or high pressure sodium light on photocell and/or motion sensor.

Fire safety

Optional dry chemical fire suppression system.

Smoke and heat alarms with remote warning system tied to residence or fire official.

Plumbing Specifications

Frost hydrant to be located as per plan. Water system beyond frost hydrant should be designed to allow draining during winter to prevent freezing. Water source to building to be provided with a reduced pressure principle backflow (RPPB) prevention device or a water storage tank and air gap to prevent backflow. All water and drain plumbing should be above ground. No open drains to outside of building or to underground storage should be allowed.

HDPE, or stainless steel (type 304, 306, 316) rinsate tanks.

Counter top and sink as per plan. Drain to rinsate collection tanks in secondary containment.

Equipment

Equipment is available from safety supply houses including Lab Safety Supply (P.O. Box 1368, Janesville, Wisconsin 53547-1368. Phone (800) 356-0783) or Gempler, Inc. (P.O. Box 270, 211 Blue Mound Road, Mt. Horeb, Wisconsin 53572. Phone (800) 382-8473). Alternative suppliers can be used if equivalent

15-18 inch wide movable shelving as per plan to be anchored to wall for support. Steel construction capable of supporting loads from stored materials.

Exhaust fan ducted to within 12 inches from the floor. 150 cfm capacity at 1/8" static pressure during occupancy and operated by exterior switch located near door of storage room. Exhaust fan and lights on same switch. Indicator light on exterior of pesticide storage room to indicate lights and fan are on.

Louvered openings for passive inlet of air during exhaust ventilation, providing approximately 36 square inches and located opposite of exhaust fan, as per plan, approximately 12 inches off floor.

10,000 Btu electric heater capable of maintaining winter interior temperature of 50°F.

Three 10# ABC Halon fire extinguisher located near doors.

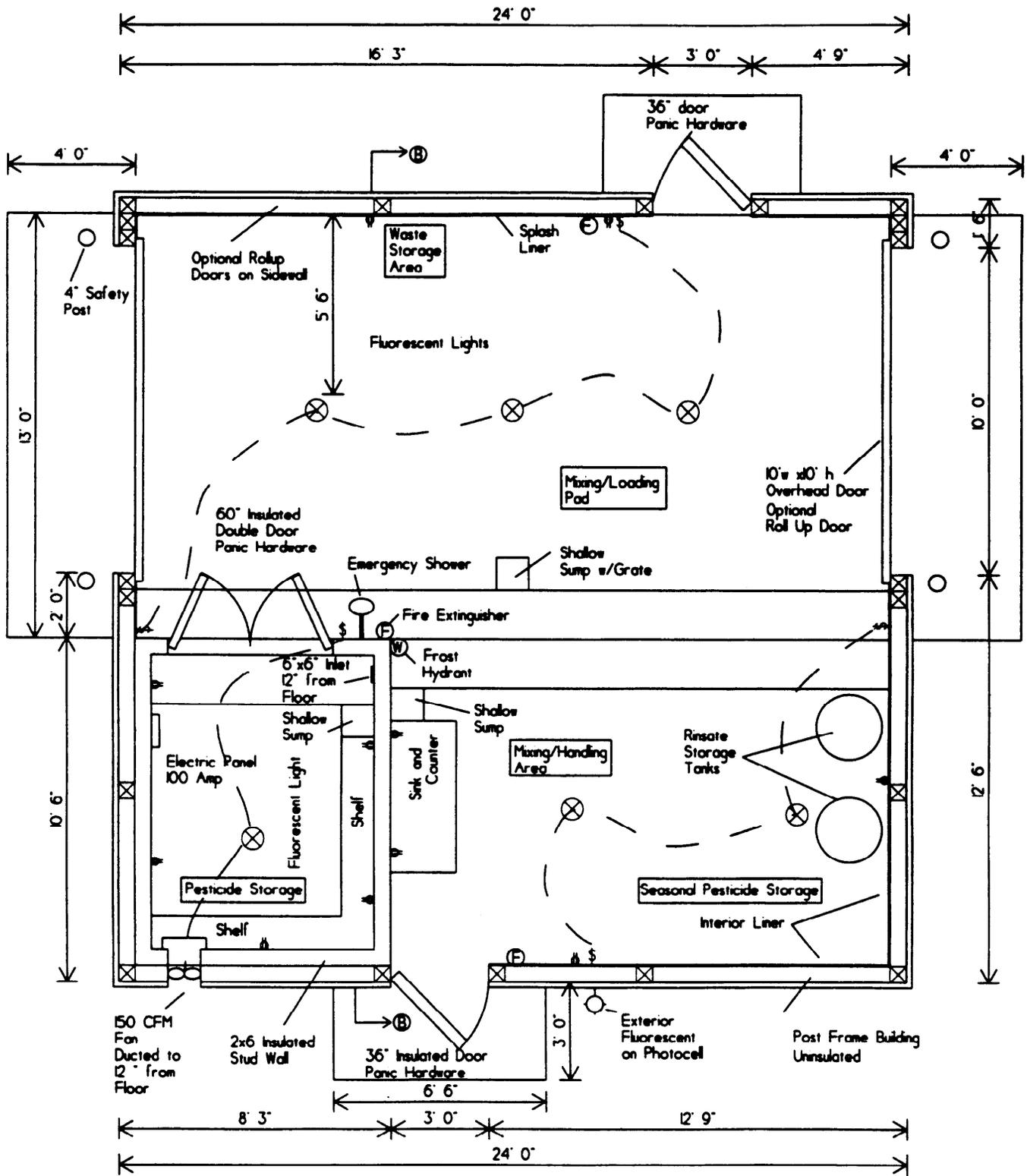
Exterior visible signs to indicate "Pesticide Storage", "No Smoking", and NFPA sign at entry doors. "EXIT" signs located on all exits.

Emergency eyewash/shower located as per plan.

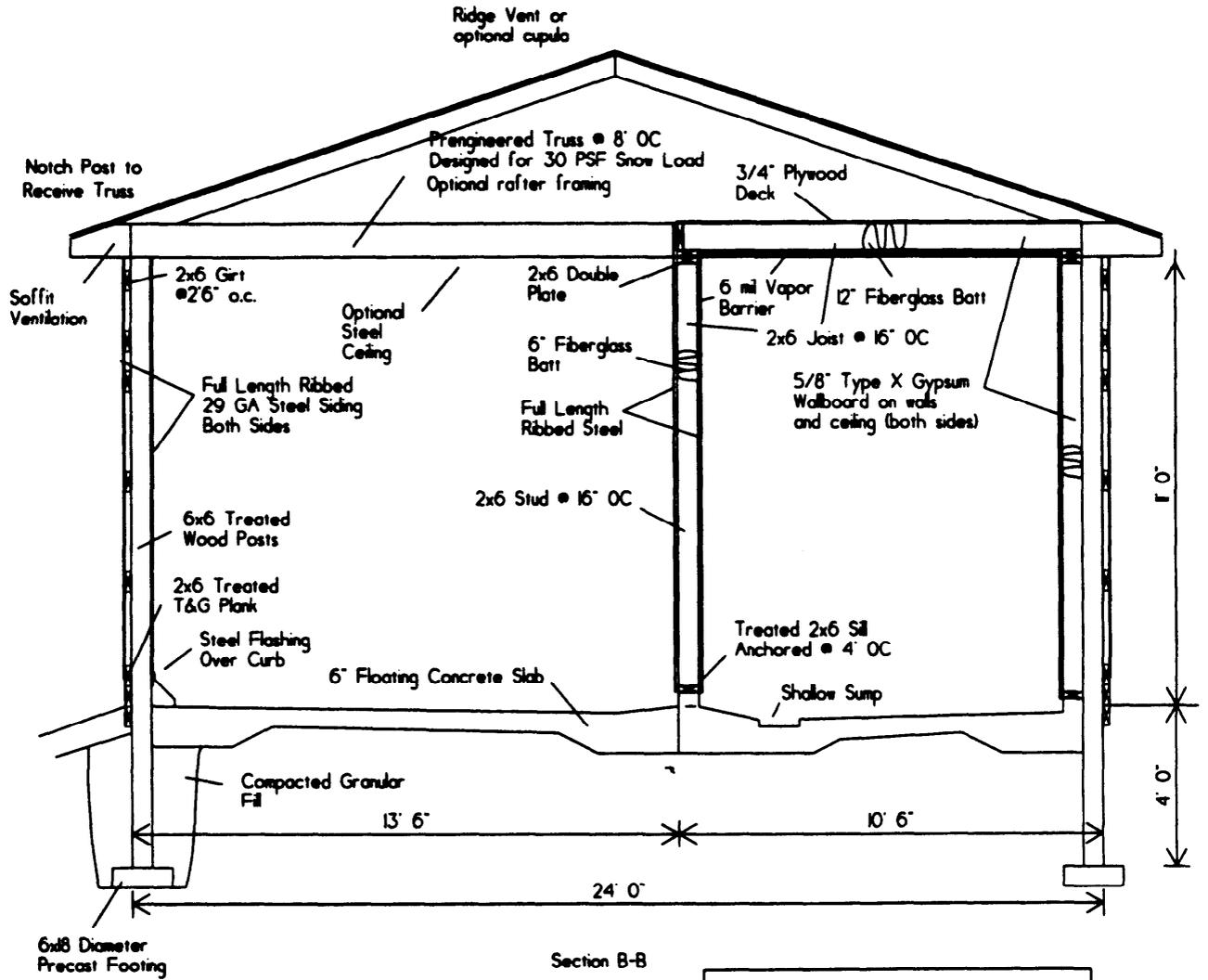
Ion type fire smoke alarm located as per plan, option to signal remote site such as main office.

Clothes locker.

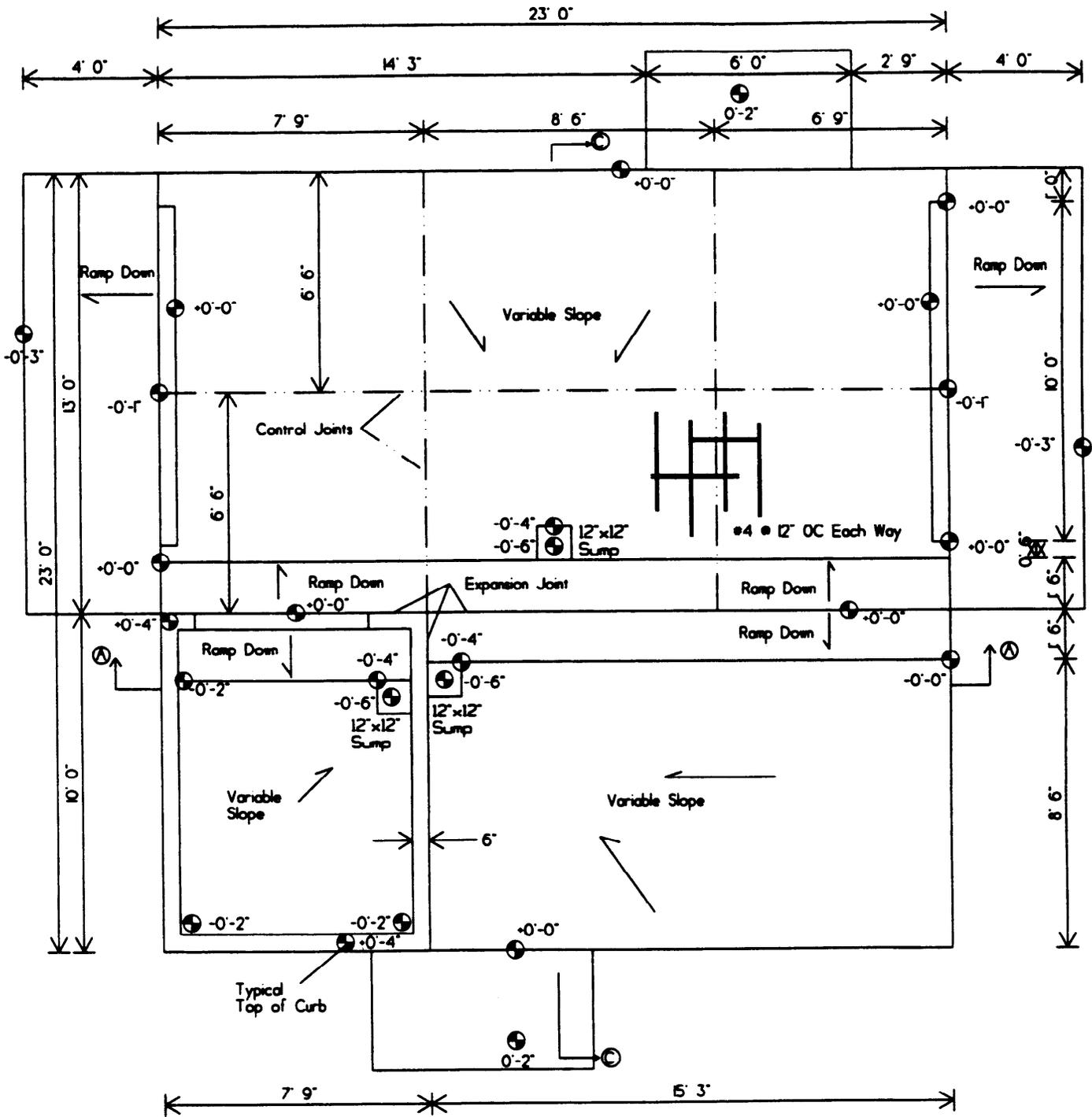
Personal safety kit and spill kit.



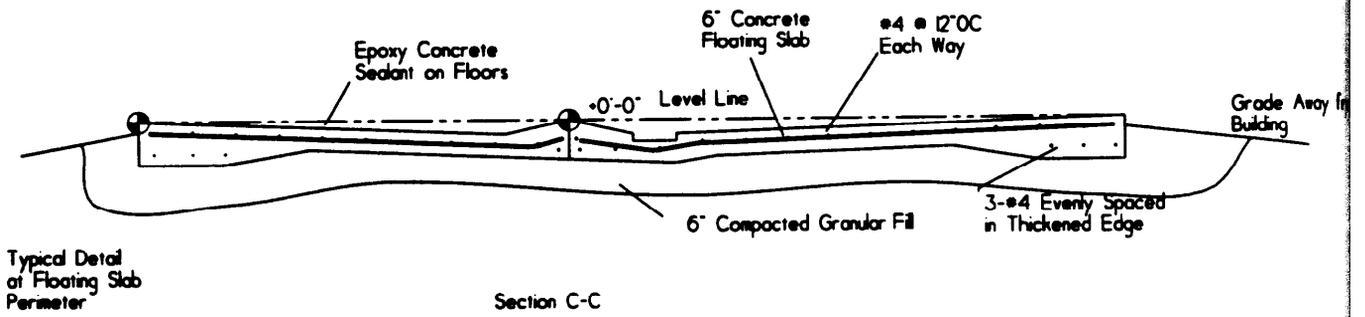
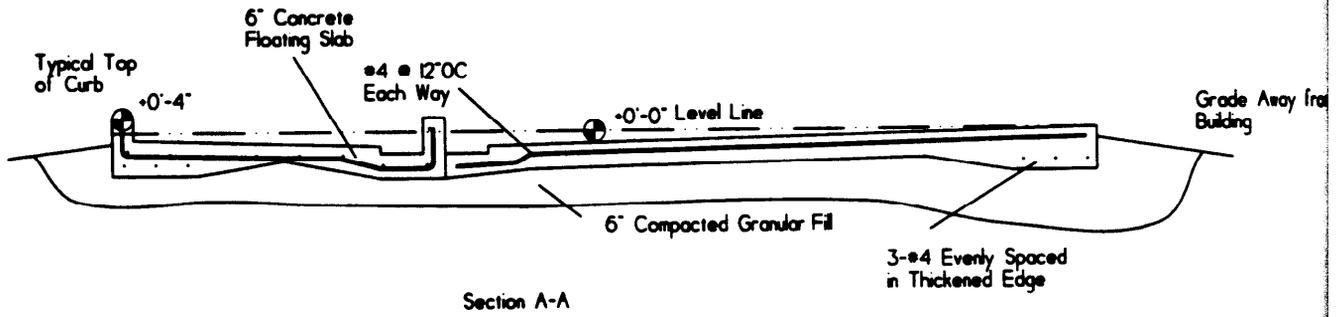
PESTICIDE STORAGE MIXING/LOADING PAD	
BUILDING PLAN	
DESIGNED BY: DAVID W. KAMMEL 1/1/93	
A.E. UW-Madison	1 OF 4 1/4" = 10'



PESTICIDE STORAGE MIXING/LOADING PAD	
BUILDING CROSS SECTION	
DESIGNED BY: DAVID W. KAMMEL	11/1/93
A.E. UW-Madison	2 of 4 1/4" - 10"



PESTICIDE STORAGE MIXING/LOADING PAD	
CONCRETE PLAN	
DESIGNED BY: DAVID W. KAMMEL 1/1/93	
A.E. UW-Madison	3 OF 4 1/4" - 10"



PESTICIDE STORAGE MIXING/LOADING PAD	
CONCRETE CROSS SECTIONS	
DESIGNED BY: DAVID W. KAMMEL 11/1/93	
A.E. UW-Madison	4 OF 4 1/4" - 10"

