NOTES: These drawings are not complete building plans - rather, their intent is to show concepts, selected design recommendations and application differences based on recent USDA research and field experiences. These drawings in turn can be used in preparation of more complete, individually engineered designs. Consult a registered engineer to prepare your plan.

General Design:
1. Floor foundation design is from USDA calculation. A self bearing capacity of 2000 lbs./sq. ft. is used with a concentrated truck wheel load of 4000 lbs.
2. Potato specific weight of 42 lbs. per cubic foot (65 lbs. each.)
3. Clean, well, smooth-skinned, undamaged potatoes (i.e. no insects that cause a horizontal wall pressure of an Equivalent Fluid Density of 12 lbs. per cubic foot.)
4. Maximum potato depth of 18 ft. with binwall stud height of 18 ft. on a 1 ft. high foundation.
5. Lumber bending stress (F = 1725 psi) was more critical than horizontal shear stress (F = 95 psi) for sheathing. The allowable compression force used was 825 psi perpendicular and 50% in grain.
6. Lumber design allowable stresses were not adjusted for moisture or temperature as permitted by the USDA National Design Specifications.
7. No special design conditions were used for snow or wind loads. The design snow load was 15 lbs. per sq. ft. of roof.
8. Vapor barriers must be correctly installed (i.e. insulation stays dry) caulked along edges with nailed and taped joints.

Ventilation Design:
1. Ventilation ducts always 1 cu. ft. per minute per CWT (1 CWT = 1000 lbs.)
2. Vent duct maximum speed of 1500 feet per minute (17 mph)
3. "Through" type ventilation with 14% of the required air at each sidewall and 14% through the bottom center of the bin. Extra duct capacity is required for well ventilating the single-wall designs.
4. Single-wall meets ventilation rate of 1 cu. ft. per minute per sq. ft. of wall surface with airflows regulated by ventilation at top wall vent opening.
5. As steel duct transitions, a downstream duct cross-sectional area of 0.75 to 0.87 minimum of upstream cross-sectional duct area.
6. A 1:2 approximate ratio of gross duct cross-sectional area in air cell plot area or an effective size area to duct cross-sectional area of 0.87.
7. Experience is limited with the plywood-covered linear ducts. Under extreme conditions of wind, moisture, and large potatoes in each slot in the plywood may be needed to be some form of through - then design for 1 CWT instead of 2.
8. See USDA Circular A-60, "Potato Storage Ventilation," for air heating design recommendations or the most up-to-date publication.

POTATO STORAGE - 88,000 CWT SINGLE EXTERIOR WALL: Intended for use with more detailed planning, these drawings show the major construction and ventilation features for a 80' x 204' building with 8 storage bins and a cross-alley work area. These major features change with changes in storage size. Two other sets of drawings are available for storage capacities of 88,000 CWT single exterior wall 80' x 172' and for 88,000 CWT double exterior wall 80' x 204'.
POTATO STORAGE - 86,000 C.W.T.
80' X 204' SINGLE EXT WALL (CROSS-ALLEY)

EXTERN. AGRICULTURAL ENGINEERING, M.S. U.S. DA. NAV POTATO GROWERS ASSN.

1. CROSS SECTION
2. CROSS SECTION
3. FRONT ELEVATION
4. SIDE ELEVATION

- ROOF VENTS
- VENTILATION PANES
- PLUGMEN PARTITION
- TRANSITION VENTILATION DUCTS
- LEANER VENTILATION DUCTS
- PLENUM DOOR
- COMMERCIAL TRUSS RAFTER DESIGN
- COMMERCIAL TRUSS RAFTER DESIGN
- AIR RETURN DOOR
- BIN FRONT DOORS
- INSULATED BIN DOORS
- VENTILATION HOOD
- INSULATED BIN DOORS
- INSULATED OVERHEAD DOOR
- TRUCK ON/OFF PORT WITH INSULATED DOOR
- PERSONNEL DOOR
- BUMPERS

1/2" VENTS/DOORS X ATTIC AREA; 1/4 AT RIDGE, 1/4 AT EACH EAVE
CROSS SPACING
32 FT. MAX SPACING
CEILING INSULATION R-40
BIN FRONT DOORS
SLOPE FLOOR TRENCH BED
1 4
4

Scale: 3/32" = 1'-0"
Caution: Some Areas Cannot Use "Floating" Web Foundation Shown.

NOTE: Drawings are intended to show concepts and typical features of potato storage buildings; a structural engineer should be consulted when a specific building is to be built.
Ventilation Design:

1. Ventilation duct size is 1 cu. ft. per minute per CWT (1 CFM/CWT).
2. Vent duct maximum speed is 1800 feet per minute (17 mph).
3. "Through" type ventilation with 1⁄4 the needed airflow for potatoes along each side wall and 1⁄4 through the bottom-center of the bin. Extra duct capacity is required for wall venting of the single-wall designs.
4. Single-wall side wall ventilation rates of 1 cu. ft. per minute per sq. ft. of wall surface with airflow regulated by restriction at top wall vent opening.
5. At vent duct transitions, a downstream duct cross-section area of 0.75 to 0.87 minimum of upstream cross-section duct area.
6. A 1.3 approximate ratio of grass duct cross-section area to air exit slot area or an effective slot area to duct cross-section area of 0.81.
7. Experience is limited with the plywood-covered slotted ducts. Under extreme conditions of wind, moody, small potatoes and very large ducts a center slot in the plywood may be needed to let some air through - then design for 3 slots instead of 2.
8. See USDA Circular AS-90, "Potato Storage Ventilation," for air handling design recommendations or the most up to date publication.

NOTE: Changing dimensions of potato bin will change ventilation requirements.
NOTE: Proper slot size is critical to provide uniform air distribution.

NOTE: Changing dimensions of potato bin will change ventilation requirements.