1.0 Authority

Wisconsin Administrative Code Trans 277.04 regulates salt storage facility ("salt shed") requirements. It does not offer guidance as to how to design a building to meet state building codes. This policy attempts to guide a salt shed designer with the building design and make other suggestions for the site but does not provide a comprehensive list of potentially applicable building code requirements.

Salt sheds are required to comply with the WI Commercial Building Code SPS 361-366 which adopts the 2009 edition of the International Building Code. The Wisconsin Department of Transportation (WisDOT) salt shed and loader building plans shall be designed in accordance with the International Building Code (IBC) and State of Wisconsin requirements set forth by the Department of Safety and Professional Services (DSPS).

2.0 Terms

Common Path of Travel – IBC s. 1002.1 that portion of exit access where the occupants are required to traverse before two separate and distinct paths of egress travel to two exits are available. Paths that merge are common paths of travel. Common paths of egress travel shall be included within the permitted travel distance.

Commercial Building – A place where people work. A public place. (See statutory definitions of "Place of employment" and "Public building" s. 101.01(11) and 101.01(12) respectively). Salt sheds are commercial buildings.

Double Trucking – This term refers to the trucking of salt a second time after the initial trucking and delivery from the salt vendor. In the past, some counties had all their salt from a vendor delivered to one larger location and the county would later load and truck the salt again from that location to a smaller shed location within the same county.

DSPS – Department of Safety and Professional Services

Fire Area – SPS 362.0902(2) "Fire Area" means the aggregate floor area enclosed and bounded by fire walls, fire barriers, exterior walls or fire-resistance-rated horizontal assemblies of a building.

IBC – International Building Code (different versions adopted by all 50 states)

Petition for Variance – DSPS can grant a variance to a portion of the rule or code. A Petition for Variance is a request to DSPS to approve alternative design features and measures providing an equivalent degree of health, safety, and welfare to the code requirement(s) and intent. If granted it would only apply to the one building specified in the petition.

Unlimited Area Building – IBC section 507.2 can apply to salt sheds which can simplify the review and reduce the requirements of a new larger salt storage structure. Section 507.2 applies to "nonsprinklered, one story" buildings that meet the requirements of an S-2 building (Low-hazard storage) as most salt sheds would. The key requirement of an Unlimited Area Building is the 60-foot public way or perimeter - free of other buildings.

Utility Building – A smaller building where the intended use is NOT to store salt. Utility or miscellaneous classified buildings such as loader buildings are required to meet Wisconsin Commercial Building code and the IBC code for fire and life hazard as other buildings of similar occupancy or classification type.

3.0 Building Classifications

S-1: Moderate-hazard storage - Buildings occupied for storage uses that are not classified as Group S-2. Characterized by storage of combustible commodities.

S-2: Low-hazard storage - Includes, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions. Also includes parking/storage of motor vehicles such as a front end loader. (A salt or sand storage building is recognized as a S2-Storage Low Hazard occupancy.)

Unlimited Area Building - IBC section 507.2. The area of a group F-2 or S-2 building no more than one story in height shall not be limited when the building is surrounded and adjoined by public ways or yards not less than 60 feet in width.

4.0 Building Designs

All building designs must meet DSPS Commercial Building Code and adopted IBC codes. Depending upon the volume of the building, DSPS approval or a design professional signature and stamp may be required as summarized in Table A below (note: building volume includes attic space and other void spaces within the enclosing walls and roof of the building):

Table A: Large Building Requirements

Building Size (cubic ft.)	*Must meet IBC*	*Requires DSPS Review/Approval*	*Architect or P.E. Stamp*
0 - 25,000	✓		
25 - 50,000	✓	✓	
Over 50,000	✓	✓	✓

4.1 Building Style - Salt Capacity

One of the primary factors to consider when designing a salt shed is the salt capacity. Roof styles and structural walls are significant contributing factors in determining the storage capacity of the building.

Roof Styles:

- **Domes** - A dome shaped salt shed is the most efficient structure to house a salt pile. But other factors may make a dome less desirable such as aesthetics, difficulty in roof repair and interior lighting.
- **Standard truss** roofs have flat, horizontal bottom chords on the inside of the building. Salt cannot be stored within the roof area even though that interior roof area is part of the calculations in Table A above.
- **Hi-arch truss** roofs may look the same on the outside as a standard truss, but inside the bottom chord is not horizontal across the entire width of the building. This allows for some salt storage within the roof area. Hi-arch trusses usually have a steeper pitch to the roof.
- **Canvas frame structures** have a metal frame with a canvas roof. This style of structure usually allows significant salt storage within the 'roof area. These structures are usually less expensive to build but may be more susceptible to damage. This style of building has not been around as long as the others, so the department does not have long term experience with their use.

Almost all salt shed capacities can be increased by constructing a structural wall (usually concrete or wood) around the perimeter of the building. This wall is designed to hold back the horizontal forces of the salt pile and raise the roof for a larger pile inside. While structural wall design can complicate the engineering of the building, the inclusion of a structural wall provides for more salt storage capacity with a smaller footprint. The height of the structural wall can vary greatly and significantly change the storage capacity of the building.

Table B provides a list of sizes and styles of salt sheds as compared to the storage capacity of the building.

Table B: Sample Building Sizes

Approx. Salt Capacity	Roof Style	L x W x H
1,000 tons	Dome	67' diameter x 22' to peak
6,000 tons	Dome	122' diameter x 40' to peak
10,000 tons	Dome	150' diameter x 50' to peak
2,000 tons	Hi-Arch Truss	60 x 40 x 24 (10' structural wall)
15,000 tons	Hi-Arch truss	160 x 80 x 30
1,000 tons	Standard Truss	60 x 40 x 24 (10' structural wall)
10,000 tons	Standard Truss	160 x 80 x 30

5.0 Important Considerations for Salt Sheds

Salt shed design can be complicated by site conditions as well as specific facility needs (i.e., loader storage, brine storage). Some of the critical factors when designing a salt shed are listed below:

1. **Sprinkler Systems**: If commercial motor vehicles (defined by DSPS as a semitrailer tractor or trucks with a gross vehicle weight over 26,000 lbs.) are stored in an enclosed shed, a sprinkler system is required. The department recommends designing salt sheds that do not require sprinkler systems because of the cost, need to potentially heat the shed so the pipes do not freeze, and required future inspections and testing of a sprinkler system.

2. **Attached Buildings**: If a lean-to is added to a shed for commercial motor vehicle storage, a sprinkler system will be required if it is enclosed. If it is enclosed and the building exceeds 5,000 sq. ft., the entire building must be sprinklered or the lean-to must be separated from the salt shed with a fire barrier. If an enclosed lean-to is less than 10% of total building area, a sprinkler system may not be required if a “variance” is requested and approved by DSPS demonstrating an equivalent degree of safety to the code requirement and intent.

3. **HVAC Considerations**: If a heated loader shed is added onto a shed with a shared wall, a fire barrier is required between the salt shed and the loader area when the fire area exceeds 5,000 sq. ft. Additional ventilation requirements may apply to the loader area and an HVAC review will be required.

4. **Stand-alone Building**: The salt shed should be stand-alone when possible to lessen the IBC requirements and simplify the DSPS review process. A buffer (no build) zone should surround each shed and it may allow a frontage increase to the building base area determined from Table 503 of 2009 IBC. Usually 30 feet, this may allow for larger buildings based on the frontage increase calculated from IBC s. 506.2. For sheds with more than 10,000 CY of storage, the buffer zone should be extended to 60’ and the building may be permitted to be classified as an “Unlimited Area” building in accordance with IBC s. 507.2.

5. **Egress and Doors:** The depth or width of the shed should not exceed 100’ if possible. If the common path of egress travel to a point where two independent directions of egress travel are available and is more than 100 feet, then additional exit doors may be required. A “petition for

variance" demonstrating an equivalent degree of safety may be applied for from DSPS in the design phase.

6. **Land Considerations**: When planning the land area needed for the salt shed site be sure to consider the "Maximum Acres Eligible" for computations and the agreement in HMM 02-15-50 section 4.0.

6.0 Requirements for Loader Sheds

Enclosed loader and salt sheds exceeding 5,000 sq. ft. will need to be ventilated and have a sprinkler system (or fire barrier separation), and will require DSPS building, HVAC, and fire protection (if sprinklered) plan review. All reviews will be assessed a review and inspection fee by the DSPS. See Table B for a summary.

Enclosed loader and salt sheds less than 5,000 sq. ft. do not require sprinkler protection.

6.1 Requirements for Loader Bays

Enclosed loader bays over 850 sq. ft. require ventilation and DSPS – HVAC plan review, see Table C.

If multiple bays are desired in a loader shed:

1. Individual bays should not exceed 5000 sq. ft. (so sprinklers won't be required)
2. Fire barriers should be built between bays.
3. The loader shed should be a minimum of 60 feet from the salt shed

Table C: Loader Bay Requirements

Loader Bay Size (sq. ft.)	*"Fire Area" size (sq. ft.)*	*Requires DSPS-HVAC Review*	*Requires Sprinkler System*	*Requires Ventilation*
Less than 850	Less than 5,000			
Less than 850	Over 5,000	✓	✓	
Over 850	Less than 5,000	✓		✓
Over 850	Over 5,000	✓	✓	✓

7.0 The Approval Process

Most salt shed building designs will require approval from DSPS – see Table A. Buildings with HVAC, fans, sprinkler systems, plumbing and some other special features will require review and approval of those systems as well. DSPS is the only agency requiring approval. Local units of government cannot place requirements on the building or the site.

Questions regarding salt shed designs can be emailed to DSPSSBBuildingTech@wisconsin.gov. An appointment must be scheduled with DSPS for plan review and conditional approval of salt shed facilities. A conditional approval shall be obtained before any salt shed project is "let to bid". The conditional approval letter from DSPS is just that and indicates that within the letter. It does not relieve the building owner from complying with code requirements if a requirement was missed during the design or plan review process.

Expect and invite an inspection from DSPS personnel. The building will need to pass inspection before salt can be stored in it.