

# BASIS OF DESIGN

For

# MIXED WASTE STORAGE FACILITY

WR NO. 012-2021

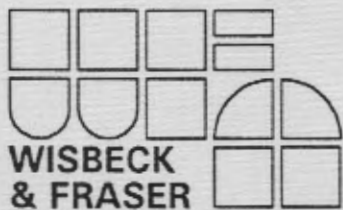
at

Puget Sound Naval Shipyard  
Bremerton, Washington

For

PSNS

Bremerton, Washington



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Final Submittal

# BASIS OF DESIGN

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## General

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### Project Scope:

This project will provide a permanent, long term, mixed hazardous waste storage facility for PSNS. Mixed waste consists of radioactive and hazardous waste which is stored in 55 gallon drums.

The building will be sited where existing Building 824 exists. Building 824 will be demolished as part of the construction.

### Proposed Facility:

Due to the cost limitation the facility size was reduced to 42' x 54'. **This will provide for storage of 800, 55 gallon, barrels of mixed waste when stacked 4 rows high.** Storage will be for dangerous materials, extremely hazardous waste, and carcinogenic materials. All stored materials are radioactive.

### Cost Limitation:

The 100% estimate for the 42' x 54' building is within the project cost limitation of \$260,000. The following items were deleted during a review of the project in order to remain within the cost limitation:

1. Building size reduced from 42' x 68' to 42' x 54'.
2. Painting interior of building was added.
3. Receptacles were limited to 4 receptacles on the interior.
4. One overhead door was deleted.
5. Eliminated overflow catch basin and berming at south side.
6. Electrical wiring changed from rigid galvanized steel to EMT where code allows.
7. Smooth face CMU is used. Textured CMU is an additive bid item.
8. Downspouts, gutters and flashings changed from stainless steel to galvanized.
9. Roofing changed from modified biturment to EPDM.
10. Grout CMU walls only on the west side where a 4-hour wall is needed.

## **CODES AND CRITERIA**

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Building codes, regulations and criteria drive the design for this building. Applicable codes include Federal, State and local regulations. Items listed below are specific codes and criteria applicable to this facility.

### **Navy Design Manuals:**

The following specific design manuals will be utilized as part of the design and have been consulted as part of this submittal. General design manuals are not listed.

- a. MIL-HDBK-1008A, Fire Protection For Facilities
- b. MIL-HDBK-1005, Hazardous Waste Storage

### **Federal Codes and Regulations:**

- a. NAVSEA 389-0288, Radiological Controls for Shipyards (Rev. 7, Mar. 88): This code sets the standards for storage and handling of radioactive materials.
- b. NFPA 101, Life Safety Code, 1991 Edition: Required by MIL-HDBK-1008.
- c. NFPA 801, Recommended Fire Protection Practice for Facilities Handling Radioactive Materials: Recommendations included by reference from NAVSEA 389-0288, Par. 524.
- b. Uniform Federal Accessibility Standards, CFR 101-19: The building is required by Uniform Federal Accessibility Standards (UFAS), Para. 4.1.4(8) to be handicapped accessible when the "intended use will require public access or which may result in employment of physically handicapped persons." Our interpretation is that handicapped accessibility is required due to the possibility of State inspectors being handicapped. Handicapped accessibility is provided.

### **State Codes and Regulations:**

- a. WAC 173-303, Dangerous Waste Regulations: The building, and facility siting, must conform to this regulation in order to receive a State permit. This regulation in turn requires conformance to EPA regulations. Facility siting requirements are not part of this scope of work, but are being prepared separately.
- b. Uniform Building Code (UBC), 1991 Edition: All structures built within State of Washington jurisdiction must conform to UBC, WAC 51-19. In addition our interpretation of WAC 173-303 is that all State laws shall be adhered to. WAC 173-303-395(2) requires that in a storage facility the owner/operator "shall design, maintain and operate his dangerous waste facility in compliance with all applicable federal, state and local laws and regulations."
- c. Uniform Fire Code (UFC), 1991 Edition: Conformance to the UFC is required by UBC and WAC 51-19.
- d. Washington State Energy Code (WSEC), Latest Edition: The building is unheated, except for the small mechanical room is heated to prevent freezing. Conformance is not required for unheated buildings.

## FACILITY REQUIREMENTS

Facility requirements are based upon a review of applicable codes for storage of mixed waste and the types of wastes to be stored. The building will be designed to conform to all Navy, local and national building codes. The codes contained in the Codes and Criteria section of this report have significant impacts upon the design of this facility.

### Types of Hazardous Materials Stored:

The facility will stored mixed waste, consisting of radioactive and hazardous waste which is mixed together. All waste is radioactive. A listing of the current amounts of waste which will be stored in the building was obtained from Kathy Walter, Code 106.52. Table 1 outlines a detailed compilation of the current waste characteristics, current quantity, and projected quantity.

Most of the waste is solid, although some liquid waste requires storage. In general, waste is classified per WAC 173-303, Dangerous Waste Regulations (WAC173) and the Uniform Fire Code (UFC) as follows:

WAC 173-303	UFC
Dangerous Waste - DW	Toxic (Sec. 80.312)
Extremely Hazardous - EHW	Highly Toxic (Sec. 80.312)
Carcinogenic	Carcinogenic (Sec. 80.315)
Radioactive - DW	Radioactive (Sec. 80.313)

Combustible Materials: Most of the waste is not combustible, however, some waste contains rags and debris. Waste containing rags and debris is considered to be combustible.

Combustible Liquids: A small amount (less than 5 gallons) of acetone with water is stored. This is classified as a Class II Flammable liquid in accordance with UBC and UFC. Storage is limited to the following amounts, without classification of the building as a liquid storage warehouse, in accordance with the Uniform Fire Code and Uniform Building Code:

Maximum Amounts of Class II Combustible Liquids (acetone & water)	UBC Table 9-A
<b>Sprinklered Building:</b>	240 pounds. (not in cabinet) 480 pounds. (in fire cabinet)

Limited Storage of Certain Materials: The following hazardous type materials will not be stored in this facility, or may be stored in this building only if limited to the amounts allowed in the Uniform Building Code or Uniform Fire Code. These materials may require additional building code requirements, such as separation of materials, differing fire protection systems, limitations on storage size and other requirements.

- Ignitable materials (as defined in WAC 173-303)
- Flammable materials in excess of the amounts listed above
- Flammable solids
- Liquid and solid oxidizers
- Organic peroxides
- Pyrophoric Materials
- Reactive or unstable materials
- Water-reactive Materials
- Corrosives

### Storage Layout and Capacity

All waste is stored in 55 gallon drums, 4 per pallet. Pallets will be stacked 4 rows high. Pallets will be handled by fork lift. WAC 173-303-630(5) requires that aisle spacing be minimum 30" and a row of drums be no more than 2 drums wide.

Pallets are laid out so that all aisles will be 36" clear. This is necessary to conform to handicapped access requirements of 36" aisles. Handicapped access is needed to allow for potential handicapped inspectors.

The capacity of storage is 800 drums when stacked 4 drums high.

### Spill Containment

Secondary containment of potential spills is required. The required capacity of containment is:

Secondary Containment	Required Amount
WAC 173-303-630(7)a	10% of volume of all containers
Uniform Building Code 902(e) and Uniform Fire Code Sec. 80.301(l)	largest container plus 20 minutes of fire protection water

Containment is provide for the total amount required by the UBC/UFC, including fire protection water.

Containment is through the use of liquid tight floors with curbs. Containment is calculated from the volume enclosed by the curbs with reductions for the volume of ramps, drums, and pallets, yielding the net containment when the facility if fully filled with waste. Curb height is 8", with 6" at the south door.

The Uniform Fire Code, Sec. 80.301(l) also requires that overflow water from the fire protection system be directed to a safe location away from the building, valves, means of egress, fire access roadway, adjoining property or storm drains. Due to the restricted nature of this site, we do not see a feasible method of conforming to this requirement. Overflow water is directed to the south of the building by reducing the curb height at this door. A 4" high berm is provided to prevent the water from entering storm drainage systems. After this area is filled, excess flow will enter the storm system if the sprinkler system is not shut off.

### Liquid Tight Floors

Liquid-tight floors are required by the UBC and UFC. Liquid tight floors are constructed of concrete slabs with epoxy floor coating and water stops. Floors slope to drain to sump pits. Two sump pits are provided so that slope will be about equal in both directions.

### Explosion Control

Explosion control is required by the UFC, Sec. 80.301(q). No explosive items are known to be housed in this facility and explosion control is not provided.

Occupancy: UBC: H-7, Health hazard

**Construction Type:**

Type II-N construction is provided, to conform to the following UBC requirement:

UBC: Type II-N allowed (per UBC Table 5-C)

The following military codes require fire resistive construction. This would require solid grouting of all exterior walls. To reduce cost and keep within budget this is not provided.

MIL-HDBK-1008: Type I-FR or II-FR (2.1.5.1(e))  
MIL-HDBK-1005: Fire Resistant (Type I-FR or II-FR) (Sec. 2.2(a)(1))  
NAVSEA 389-0288: Type I or II allowed (Sec. 524(A))

**Fire Protection Sprinkler System**

A fire protection sprinkler system is required by the UBC, and UFC. A preaction fire protection sprinkler system is provided. The fire protection sprinkler system is required by the following code sections:

UBC: Fully sprinklered (Sec. 3802(f))  
UFC: Fully sprinklered (Sec. 80.301(p))  
MIL-HDBK-1008: Fully sprinklered where extra hazard occupancy  
Appendix B: Extra hazard where >50 gal. of flammable liquids are stored.

**Site Fire Hydrants**

Two existing fire hydrants are located across Farragut Ave., approximately 70' and 120' from the building. This is within the 350' hose distance to all portions of the building as required by MIL-HDBK-1008.

**Allowable Area: Per UBC**

Basic Allowable Floor Area (II-FR): H-7 occupancy 39,900 s.f.

**Exterior Wall Construction:**

West Wall, next to Building 818:

UBC, Table 9-C:  
4-hr wall required (<5' to imaginary property line between buildings)  
MIL-HDBK-1008, Par. 4.12.2.1(1)  
4-hr wall required (<10' to imaginary property line between buildings)

East Wall of Building 818: B-4 occupancy, Power Plant:

UBC, Table 5-A:  
Put imaginary property line 5' from building so no exterior wall protection or opening protection is required, otherwise 1-hr wall with protected openings.

East Wall, next to Building 455:

MIL-HDBK-1008A, Par. 4.12.2.1(1)

2-hr wall required from 10'-50' to imaginary property line between buildings.

**Hazard Classification:**

General: Ordinary hazard, group 3

**Separation Walls:**

UBC: 2-hr firewall separation required around mechanical room (Sec. 908).

**Travel Distance:** UBC: 100' max. for H-7 occupancy.

**Occupant Load:** UBC: 1 person per 300 s.f. per Table 33-A, Item 26.

**Total Number of Occupants:** 10 people

**Exit Corridor Protection:** None required.

**Number of Exits Required:** UBC: 2 minimum per 3319(a).

## **SITE PLANNING**

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Existing building 824 will be removed and the new building will be built in it's location. The existing building is not adequate for this facility because it is built of wood frame construction with inadequate foundations.

Other site work is limited to patching of existing paving and new utility services. New paving patches will be sloped to drain away from the building.

### **Demolition of Building 824:**

Demolition will include all portions of the existing building, including floor slabs and foundations. Little is known about the existing foundation system. Drawings for the original building are incomplete. It appears that the foundation consists of concrete piers at each column line with a concrete grade beam around the perimeter. A concrete slab was added to the interior of the building at some time after it's original construction. A core sample of this slab showed an approximate 3" thick concrete slab.

Underground piping existing which connects existing interior mounted downspouts to the storm water system. Exact layout of these pipes cannot be determined. These pipes will be removed as part of the demolition.

### **Lead Paint:**

Existing siding, roofing and window paint on the exterior of the building contains lead. A TCLP test was conducted by our firm verifying a lead content in excess of EPA regulations.

An additional test was performed by PSNS on the lead paint when it is composite with the underlying steel and wood. This TCLP test indicated that the paint was not in excess of EPA requirements. We have been instructed to treat this material as non-hazardous during the demolition of the building.

### **Soils and Concrete:**

The Navy tested the soil around the building, at the soil boring location, for hazardous waste. No hazardous waste was found. The Navy does not believe that the existing concrete slab contains hazardous materials. It is unknown, to us, if testing has been done.

### **Temporary Building, South of Building 824:**

The existing temporary building on the south side will require removal and relocation by the Government.

### **New Building:**

The new building will occupy the same approximate location as existing building 824, although the footprint will be smaller. The site is extremely tight for the building, requiring a fire wall on the west side to protect the adjacent structure.

Access for the building will be on the north and south ends. This will allow good loading, unloading and fire department access.



## CIVIL ENGINEERING

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### Codes and Criteria

#### Design Manuals and Criteria

DM-2.02	Structural Engineering - Loads
DM-2.1	Structural Engineering - General Requirements
NAVFAC P-355	Seismic Design for Buildings

#### Other Publications

WSDOE	Criteria for Sewage Works Design
ACI 318-89	Building Code Requirements for Reinforced Concrete & Commentary
UBC 1991	Uniform Building Code, 1991 edition
UPC	Uniform Plumbing Code, 1991 edition

## CIVIL ENGINEERING

### Exterior Water Distribution System:

An existing 12-inch water main is located approximately 7 feet north of the proposed building location. A direct wet connection with a tapping tee and a gate valve is proposed. The water system will be extended in an southerly direction from the new gate valve, with an 8-inch diameter water main to the building. The new line to the building will have a backflow preventer before entering the building as a sprinkler system supply line. Upstream of the backflow preventer a 1-1/2-inch diameter service line with a corporation stop will supply the building with potable water. A minimum of 3 feet depth of cover would be provided to protect the water lines from breaking and freezing.

### Storm Sewer Drainage System

The new storage facility lies over an existing 10" storm drain (VCP) which will have to be rerouted. This existing line will be realigned to serve additionally as a collector line for 2 downspouts on the East side and 1 downspout on the South side of the facility, and to collect runoff from a floor drain in Bldg # 455. The new collector lines will rejoin the existing system at a new catch basin on the South side of the facility. Since the impervious surface area is not increasing, The design flow rate will not increase. As part of the site preparation, each of 3 existing catch basins will be replaced with a new catch basin a short distance away.

## ARCHITECTURAL

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### **Energy Conservation:**

No special energy conservation measures are provided. The building is unheated, except for the small mechanical room if kept above freezing.

### **Handicapped Accessibility:**

Accessibility is provided by a ramped entry door at the south end of the building.

### **General Configuration:**

The building was sized to allow for the maximum amount of storage. Aisles between rows are sized to be 36" minimum. A mechanical room is provided in one corner of the facility to allow for fire fighting and maintenance personnel to service equipment without breaching the storage area.

### **Building Construction:**

Roof: EPDM sheet roofing, minimum roof insulation, steel roof deck and steel joists. Roofs slope 1/2:12 minimum. Roof deck and joist are spray-applied fireproofed with cementitious fireproofing to conform to UBC requirements for 1-HR roof construction necessary for Type II-FR construction.

Exterior Walls: 8" textured CMU, painted. Walls have a split faced and fluted texture in a striped pattern.

Exterior Windows: None

Exterior Doors: Exterior doors will be painted, insulated, steel doors with steel frames. Coiling doors are chain operated.

Floors: Floor is constructed of concrete with water tight epoxy floor coating.

Interior Walls: Interior walls are limited to construction of a 2-hr firewall between the mechanical room and storage room. Wall is constructed of water resistant gypsum board and metal studs.

Finishes: Finishes are limited to painting of the gypsum board and epoxy floor coating.

## STRUCTURAL

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### Codes and Criteria

See references in civil section.

### Foundation Conditions

The foundation is a conventional continuous footing, founded 18" below grade. The slab and perimeter 8" by 8" curb are cast monolithically over the footing. The 8" CMU wall is built up from the curb. Two sumps are located in the interior of the slab and the slab is sloped to these sumps at 1%. The slab is used to store barrels of hazardous waste, and along with the curb and sumps, form a secondary containment area for any leakage of the barrels. Containment is provided at the doors by exterior and interior concrete ramps. The interior ramps are placed over the slab-on grade and against the curb.

The important design considerations of the slab-on-grade are the relatively high storage live load (800 psf) and the drying shrinkage of the slab. To enable the concrete slab to function as a secondary containment area, a topping has been specified. Construction joints with sealant and waterstops have been used to break up the slab into smaller segments in order to force the drying shrinkage to come out at the construction joints with waterstops.

The slab has been designed for the storage live loads in accordance with the Wire Reinforcement Institute (WRI) method, based on a live load of 800 psf and a subgrade modulus of 400 pci. The reinforcement is used to resist shrinkage and temperature stresses and controls crack widths as well as provide a bridge for the support of loads across the construction joint by shear friction.

Because the slab and curbs are to function as a containment for the spillage of hazardous wastes, the following measures have been taken to mitigate the shrinkage cracking between the joints:

1. For strength purposes (resisting the 800 psf live load), the slab-on-grade requires a compressive strength of only 3000 psi, however, in order to minimize cracking due to drying shrinkage the water/cement ratio has been held to 0.43. Since compressive strength of concrete is a direct function of water/cement (w/c) ratio, this will result in a much higher compressive strength than the specified minimum of 3000 psi. The contract documents set the minimum compressive strength required at 5000 psi in order to make it closer to that which will be achieved at a w/c ratio of 0.43.
2. In addition to a low w/c ratio, the curing period has been extended from 7 days (per ACI 301, section 12.2.3) to 21 days. This will also help to lessen the drying shrinkage.
3. The slab reinforcement has been increased over nominal shrinkage and temperature reinforcement ratios to control net shrinkage between the joints as well as bridge the storage loads across the construction joints by shear friction.

A minimum of 30 days has been specified between placing the slab and application of the floor coating.

### Type of Construction

The roof framing consists of steel roof deck supported by double-pitched, open web steel joists spanning 42 feet and spaced at 6 feet on center. The joists are supported by 8" exterior,

concrete masonry (CMU) walls grouted at a 32". The west wall is a 4-hour fire wall and is solid grouted. There are no interior structural walls.

A 12' wide by 12' high (approx.) coiling service door and mandoor are located at each end of the building. There are no windows.

### Materials

Concrete masonry units ASTM C 90, Grade N-1

Cast-in-place Concrete  $F'_c = 5000$  psi @ slab-on-grade  
3000 psi @ footings

Steel reinforcing bars  $F_y = 60,000$  psi

Structural steel  $F_y = 36,000$  psi

### Loads

The live loads are as follows:

Roof:	
Snow load	25 psf
Wind uplift	
Slab:	
Palletized concrete drums	800 psf (stacked 4 high)

The dead loads are assumed as follows:

Roof	15 psf
CMU walls, based on solid grouted	84 psf

### Lateral Forces

The wind load coefficients (by UBC) are as follows:

$C_e = 1.13$  (Exposure C)  
 $C_q = 1.3$   
 $I = 1.15$  (Hazardous Facility)  
Basic Wind Speed = 80 mph

The seismic coefficients (by UBC) are as follows:

$Z = 0.30$  (Zone 3)  
 $I = 1.25$  (Hazardous Facility)  
 $R_w = 6$  (Box/ Bearing wall system)

## MECHANICAL

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### SCOPE OF WORK:

The work covered by the specifications will consist of furnishing all labor, materials, equipment, supervision and services necessary to complete all of the mechanical work shown on the final construction drawings.

The main items of work include, but are not necessarily limited to the following:

- a. Ventilating Systems
- b. Plumbing Systems
- c. Fire Protection Systems

### DESIGN CRITERIA:

- a. DM 3.03 January 1987
- b. NAVFAC P-89 Weather Data
- c. 1989 ASHRAE Standard 62
- d. 1991 Uniform Mechanical Code
- e. 1991 Uniform Plumbing Code
- f. 1991 Uniform Building Code
- g. 1991 Uniform Fire Code
- h. National Fire Protection Association applicable codes.
- i. MIL-HDBK-1005/13 Hazardous Waste Storage
- j. 1991 Washington State Energy Code (WSEC)

### Design Conditions:

Temperatures: (Deg. F)

	Outside*	Inside
Winter:	25 Dry Bulb	50 Dry Bulb
Summer:	78 Dry Bulb/ 64Wet Bulb	

\* Per NAVFAC P-89 weather data 97.5% winter value and 2.5% summer value for Bremerton

### Ventilation:

Minimum required ventilation rate from MIL-HDBK-1005 - 1 cfm/s

### HEATING AND VENTILATION

Because this is a storage facility and not intended for human occupancy, a minimum continuous ventilation rate will be maintained in accordance with MIL-HDBK-1005 at 1 cfm/sf for Hazardous Waste Storage. This ventilation will be accomplished by using roof mounted exhaust fans to maintain a negative pressure in the space. The building will be unheated.

Because there is no heating requirement for the building, steam service will not be installed. The only heated space will be the mechanical equipment room that houses the sprinkler control valve and the water service. The mechanical room will be heated by an electric unit heater that will maintain 50 F minimum in the space through a unit mounted thermostat. A separator control system will not be furnished, and the building will not be connected to the Shipyard Control System.

## **PLUMBING**

Because the storage facility contains radioactive, carcinogenic, and highly toxic material, the area will not have any floor drains. All wastes will be captured by the water tight floor and curb as secondary containment. Two sump pits are provided to collect all wastes and must be removed with portable pumping systems.

An emergency eyewash and shower will be provided. If an emergency occurs, the water from the shower will be spilled over the floor and be contained in the same manner as all other wastes. One interior and one exterior hose bibb will be provided for convenience.

Water service will be brought into the mechanical equipment room and will be provided with a reduced pressure backflow preventer and shutoff valves.

## **FIRE PROTECTION**

A preaction sprinkler system will be provided throughout the building designed for Ordinary Hazard at a density of 0.18 gpm/sf over a minimum design area of 3000 sf.. The secondary containment of the facility is designed to hold the full flow of this sprinkler density for a maximum duration of 20 minutes.

The main sprinkler alarm valve will be located in the mechanical equipment room for access without entering the facility.

# ELECTRICAL

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## SCOPE OF WORK

The work covered by the specifications will consist of furnishing all labor, materials, equipment, supervision, and services necessary for the proper completion of all electrical work shown on the final construction drawings.

The main items of work are enumerated below. The work will include, but not necessarily be limited to, the following items:

- a. Lighting, convenience and power outlets
- b. Lighting fixtures and lamps
- c. Power Distribution Panels and Circuit Breakers
- d. Transformers, as required
- e. Connection of motors and appliances
- f. Motor disconnects, starters and pushbuttons
- g. Emergency lighting and power

Special Systems will include:

- a. Fire alarm system

## DESIGN CRITERIA

- a. Appendix A - Statement of Architect/Engineer Services (WR No. 012-2021) H62474-91-D-2170, 09 Oct. 1992).
- b. MIL-HDBK-1008A: Fire Protection for Facilities
- c. MIL-HDBK-1005: Hazardous Waste Storage
- d. Uniform Building Code, 1991 Edition
- e. National Fire Protection Association (NFPA), Codes, Standards, Recommended Practices, Manuals and Guides
- f. ANSI/NFPA 70, "National Electrical Code"
- g. Illuminating Engineering (IES) Lighting Handbook
- h. Department of Labor, OSHA, Occupational Safety and Health Standards
- i. National Safety Council, "Accident Prevention Manual"

## LIGHTING SYSTEMS

The main storage bay lighting consists of metal halide low-bay fixtures. Equipment rooms consist of industrial fluorescents. Exterior lighting will be high pressure sodium with photocell control. Approximate minimum average maintained foot-candle levels will be as indicated below:

<u>Area</u>	<u>Illumination Level (fc)</u>
Main Storage Bay	30
Mechanical Room	10

## BUILDING POWER

Power obtained from an existing motor control center in adjacent Building 818. 480V-1 phase is transformed to 120/240V which feeds lighting, mechanical, and receptacles.

## EMERGENCY POWER

Per the Uniform Building Code, emergency power is required for this building. Due to budget constraints an emergency generator will not be provided. Power is derived from building 818, which contains 4160V Substation 86. A panel tapped ahead of the main disconnect switch in the Mixed Waste Storage Facility is provided to feed the fire alarm control panel, the pre-action sprinkler system, and egress lighting. All of these items also have integral battery units. In order to comply with code, the adjacent building 818 must be made a priority building for the base power plant switching system in the event of a utility power outage.

## RECEPTACLES

**General Purpose Receptacles:** Unless otherwise indicated, duplex convenience outlets will be provided in all areas in permanent or floor-to-ceiling walls per the NEC requirements. Receptacles will be 120V, 60 Hz, 3-wire grounding type NEMA 5-20R.

**GFCI Receptacles:** Duplex convenience outlets located in all areas or on the building exterior will be ground-fault circuit-interrupter type for protection of personnel.

## FIRE ALARM SYSTEM

The Base standard is Gamewell 100mA loop. A Fire Alarm Control Panel (FACP) will be provided to interface with the Pre-Action Fire Sprinkler System and the Base Fire Station. A master box with an pull station and light, mounted outside, will be connected to the Base Gamewell loop via the existing master box in adjacent building 818. The storage bay contains combination horn/strobes and pull stations. A fire alarm bell is mounted outside to match the existing base standard.

## TELEPHONE SYSTEM

A conduit-only system will be provided for wall-mounted telephones. Wall-mounted phone boxes are placed near the doorways. The telephone service will be provided from the existing telephone cabinet in adjacent Building 818.

## ADDITIONAL RECOMMENDATIONS

The many codes that apply to a facility of this type include systems and requirements that would far exceed the proposed Maximum Allowable Construction Cost (MACC) for the building. In addition the codes refer to systems that, while not specifically required, are recommended.

### CODE REQUIREMENTS

- a. Explosion Proof Fixtures: All devices inside the facility are required to be corrosive /explosion proof type with all penetrations sealed. This requirement is found in MIL-HDBK-1005 Hazardous Waste Storage, and MIL-HDBK-1008 Fire Protection for Facilities. However, due to budget restrictions, we have been directed to provide non-explosion proof fixtures.
- b. Emergency Power: For H-7 occupancies, standby or emergency power is required to maintain mechanical, electrical and alarm systems. This requirement is found in the Uniform Building Code 1991, and the Uniform Fire Code 1991. However, due to budget restrictions, we have been directed to not provide an engine/generator system.



#### CODE SUGGESTIONS

- a. Lightning Protection: A lightning protection system would be provided per NFPA requirements. However, due to budget restrictions, we have been directed to not provide lightning protection.
  
- b. Building Security System: A building security system is recommended due to the sensitive nature of the facility. This system would consist of both motion and infrared detection for interior areas. Door access security would also be provided. However, due to budget restrictions, we have been directed to not provide a security system.

END OF BASIS OF DESIGN