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Project Information (Check Applicable Box)

- ☐ Balance of Facilities
- ☐ Pretreatment
- ☐ HLW Vitrification
- ☐ LAW Vitrification
- ☐ Analytical
- ☒ Across all areas

Document is applicable to ALARA? ☐ Yes ☒ No

In general, any record that deals with Radiation, Radioactive Material, Occupational Dose, Dose Reduction, or Dose Rate are considered ALARA Records. (See 24590-WTP-GPP-SRAD-002, *Application of ALARA in the Design Process*, section 4.8 for additional guidance)

Additional Information for Correspondence

Subject Code(s) _____

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1 Introduction

In compliance with the Washington Administrative Code, WAC 173-303 WAC facilities have been designed to retain the radioactive and hazardous material through a confinement system designed for normal operations, anticipated operational occurrences, and potential accident conditions.

This report describes and provides references to the design criteria, load definitions, load combinations, material of construction, and methodology for the analysis/design of Pretreatment (PT), High Level Waste (HLW), and Low Activity Waste (LAW) facility buildings with emphasis on secondary containment components. It also includes several representative typical details.

2 Applicable Documents

2.1 Codes and Standards

2.1.1 ACI 349, *Code Requirements for Nuclear Safety-Related Concrete Structures.*

2.1.2 ACI 318, *Code Requirements for Structural Concrete.*

2.1.3 *Uniform Building Code* (UBC), 1997.

2.1.4 ANSI/AISC N690, *Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities.*

2.1.5 American Institute of Steel Construction (AISC), *Seismic Provisions for Structural Steel Buildings (1997), Supplement No. 2.*

2.1.6 AISC M016-89, *Manual of Steel Construction – Allowable Stress Design, Ninth Edition.*

2.1.7 ASCE 7, *Minimum Design Loads for Buildings and Other Structures.*

2.1.8 ASCE 4, *Seismic Analysis of Safety-Related Nuclear Structures and Commentary.*

2.1.9 *Safety Requirements Document, Volume II*, 24590-WTP-SRD-ESH-001-02, Rev. 0.

3 Description

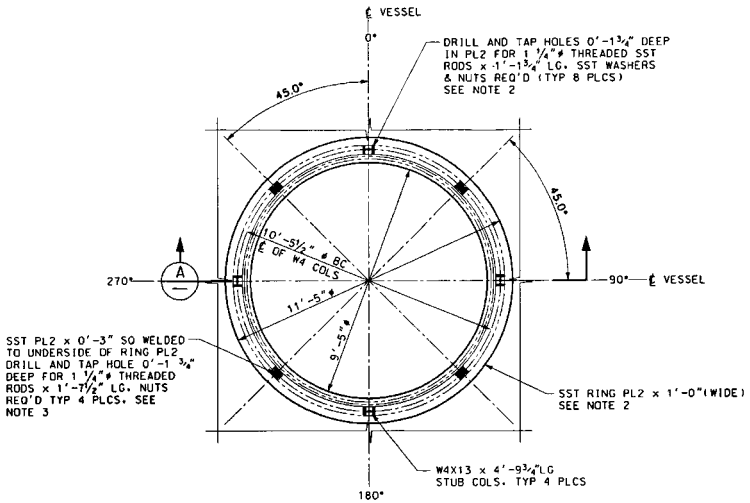
3.1 Design Methodology, Material, Loads, and Load Combinations

Methodology	Codes and specifications: • PT and HLW: General: ASCE 4 (Ref. 2.1.8) Concrete: ACI 349 (Ref. 2.1.1) Steel: ANSI N690 (Ref. 2.1.4) and AISC (Ref. 2.1.5) • LAW: General: UBC (Ref. 2.1.3) Concrete: ACI 318 (Ref. 2.1.2) Steel: AISC M016 (Ref. 2.1.6)
Dead Loads and Live loads:	ASCE 7 (Ref. 2.1.7) and SRD (Ref. 2.1.9)

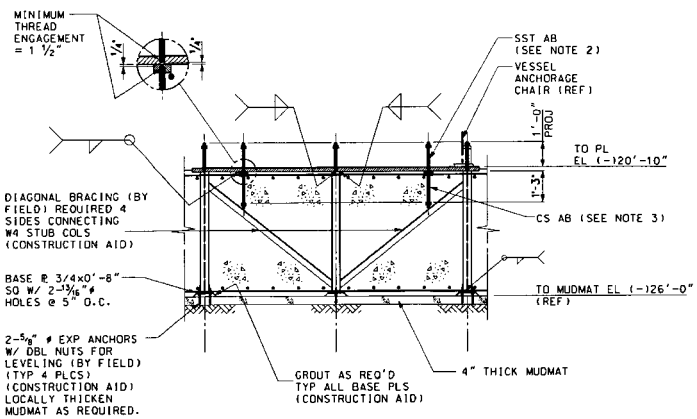
Seismic Loads	Site specific response spectra as specified in SRD (Ref. 2.1.9). • PT and HLW: Peak Ground Horizontal Acceleration = 0.26g Peak Ground Vertical Acceleration = 0.18g • LAW: Seismic Zone 2B (UBC, Ref. 2.1.3) Peak Ground Horizontal Acceleration = 0.24g Peak Ground Vertical Acceleration = 0.16g
Material	
• Concrete	28-day compressive strength, f_c' = 4,000 psi and 5,000 psi.
• Reinforcing Bar	ASTM A706, deformed.
• Steel	W Shape – ASTM A992; Angles, Channels, Plates – ASTM A36; Pipe – ASTM A53; Anchor Rods – ASTM F1554; Welded studs A108; Steel deck – ASTM A653.
Load Combinations	
• Concrete	• HLW and PT: Based on ACI 349 (Ref. 2.1.1) • LAW: ACI 318 (Ref. 2.1.2) and UBC (Ref. 2.1.3).
• Steel	• HLW and PT: Table Q1.5.7.1 of ANSI/AISC N690 (Ref. 2.1.4) and SRD (Ref. 2.1.9).
Stainless Steel Liners	Used mostly in the process cells. Refer to Figures 2 – 5.
Special Protective Coating	Material for coatings will be compatible with the hazardous waste.

3.2 Typical Details

Figures 1 through 5 show several representative details related to secondary containment for PT, HLW and LAW buildings.



VESSEL RING SUPPORT - PLAN VIEW



C3/C5 COLLECTION VESSEL EMBED ASSEMBLY

SECTION A

NOTES

1. STAINLESS STEEL MATERIAL:
   - ASTM A240. TYPE 304L FOR ANNULAR RING
   - ASTM A193. GRADE B8 FOR THREADED RODS
   - ASTM A194. GRADE 8 FOR HEAVY HEX NUTS
   - CONFORM TO F844. TYPE 304L FOR WASHERS
2. CARBON STEEL MATERIAL:
   - ASTM A992 FOR WIDE FLANGES
   - ASTM A36 FOR PLATES AND SHAPES (EXCEPT WIDE FLANGES)
   - ASTM F1554. GRADE 36. PLAIN FOR ANCHOR BOLTS
   - (THREADED ROD)
   - ASTM A 563. GRADE A HEAVY HEX. PLAIN FOR NUTS ANSI B1.1. CLASS 2A FIT FOR THREADS (UNC)
3. FURNISHING. DETAILING. FABRICATION AND DELIVERY SHALL BE IN ACCORDANCE WITH SPECIFICATION 24590-WTP-3PS-DD00-T0001. "PURCHASE OF STANDARD AND NON-STANDARD EMBEDDED STEEL ITEMS".
4. TOLERANCE = ± 3/16" EW. THE ANNULAR RING FABRICATOR SHALL PROVIDE AND DELIVER A TEMPLATE TO THE VESSEL MANUFACTURER. THE TEMPLATE SHALL BE MATCH DRILLED AND COMPOSED OF ⅛" THICK PLATE. THE TEMPLATE CAN BE DIVIDED INTO QUADRANTS AND MARKED TO MATCH. SHOW THE NORTH DIRECTION ON EA PIECE ON THE "UP" SIDE OF THE TEMPLATE. SEE TEMPLATE SKETCH.
5. FABRICATION TOLERANCES:
   - FLATNESS = ¼" ON TOP PLATE.
   - AB LOCATION ± 1/16"
   - ALL OTHER ITEMS NOT NOTED ABOVE SHALL FOLLOW STANDARD AISC TOLERANCES
6. ERECTION TOLERANCES:
   - ± ½" IN PLANE OF FLOOR.
   - LEVELNESS: ¼" FROM HP TO LP MEASURED ADJACENT TO EACH OF THE 8 ANCHOR BOLTS.

BECHTEL

FIGURE 1

TYPICAL VESSEL EMBED AND SUPPORT DETAIL FOR LAW BUILDING

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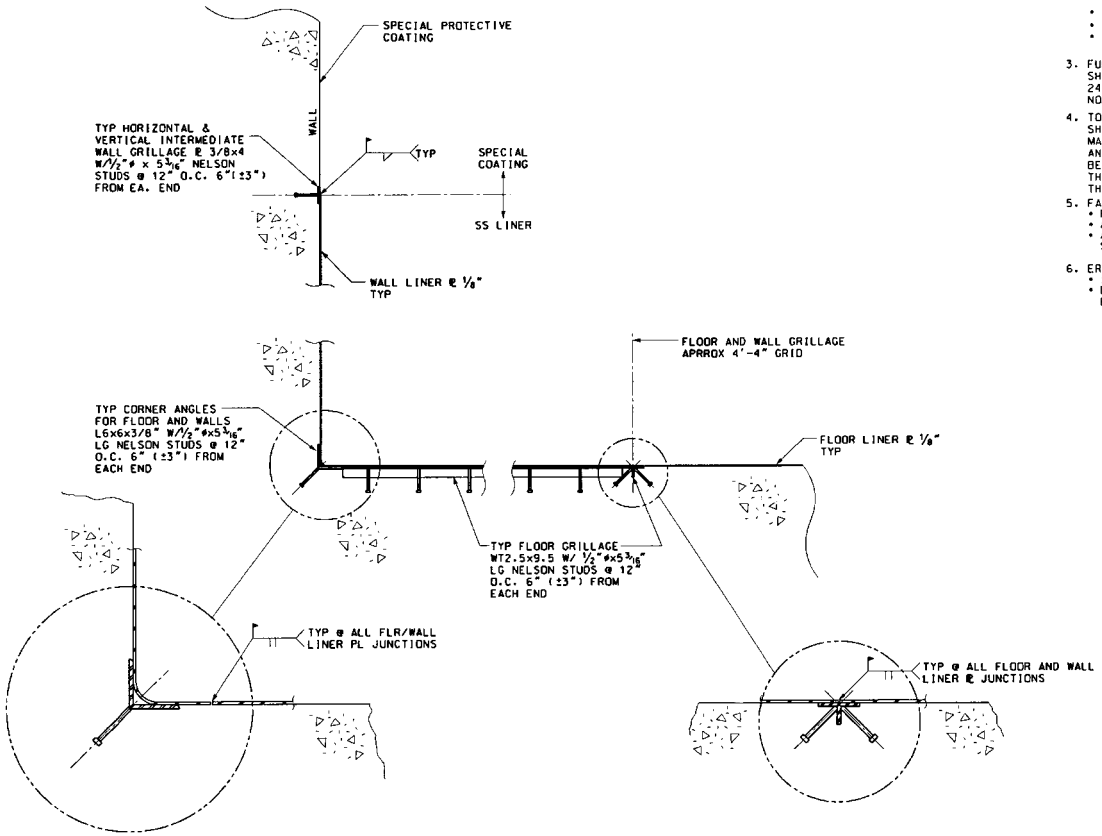

NOTES

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3. FURNISHING, DETAILING, FABRICATION AND DELIVERY SHALL BE IN ACCORDANCE WITH SPECIFICATION 24590-WTP-3PS-0000-T0001, "PURCHASE OF STANDARD AND NON-STANDARD EMBEDDED STEEL ITEMS".
4. TOLERANCE = ± 3/16" EW. THE ANNULAR RING FABRICATOR SHALL PROVIDE AND DELIVER A TEMPLATE TO THE VESSEL MANUFACTURER. THE TEMPLATE SHALL BE MATCH DRILLED AND COMPOSED OF 1/8" THICK PLATE. THE TEMPLATE CAN BE DIVIDED INTO QUADRANTS AND MARKED TO MATCH. SHOW THE NORTH DIRECTION ON EA PIECE ON THE "UP" SIDE OF THE TEMPLATE. SEE TEMPLATE SKETCH.
5. FABRICATION TOLERANCES:
   - FLATNESS = 1/4" ON TOP PLATE.
   - AB LOCATION ± 1/16"
   - ALL OTHER ITEMS NOT NOTED ABOVE SHALL FOLLOW STANDARD AISC TOLERANCES
6. ERECTION TOLERANCES:
   - ± 1/2" IN PLANE OF FLOOR.
   - LEVELNESS: 1/4" FROM HP TO LP MEASURED ADJACENT TO EACH OF THE 8 ANCHOR BOLTS.

BECHTEL

FIGURE 2

LINER PLATE AND GRILLAGE SUPPORT DETAILS FOR LAW BUILDING

DOCUMENT NO.	PAGE:
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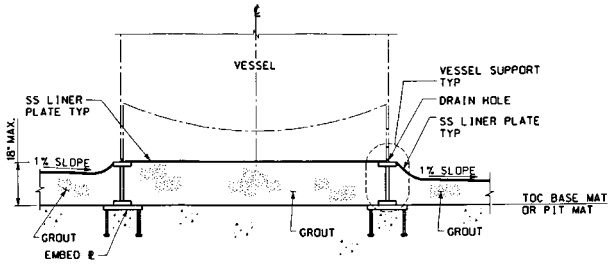
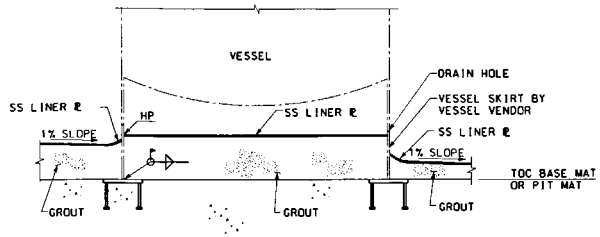
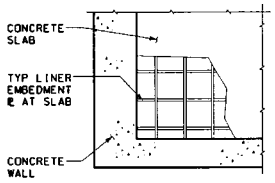


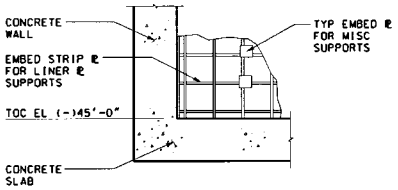
VESSEL SUPPORT ON RING BEAM
PT BLDG



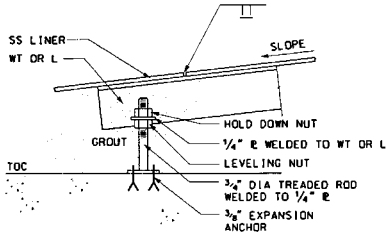
VESSEL SUPPORT ON SKIRT
PT BLDG



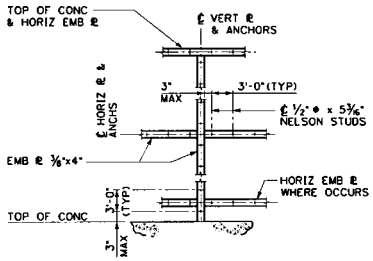
FLOOR LINER GRILLAGE PLAN
PT BLDG



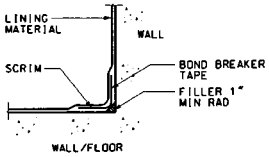
WALL LINER GRILLAGE ELEVATION
PT BLDG

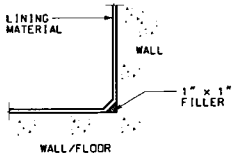


FLOOR LINER GRILLAGE DETAIL
PT BLDG



WALL LINER GRILLAGE DETAIL
PT BLDG





SPECIAL PROTECTIVE COATING AT FLOOR-WALL JUNCTION

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FIGURE 3

TYP LINER PLATE AND GRILLAGE SUPPORT DETAILS
PROCESS VESSEL SUPPORT DETAILS
& SPECIAL PROTECTIVE COATING DETAILS
FOR PT, HLW & LAW BUILDING

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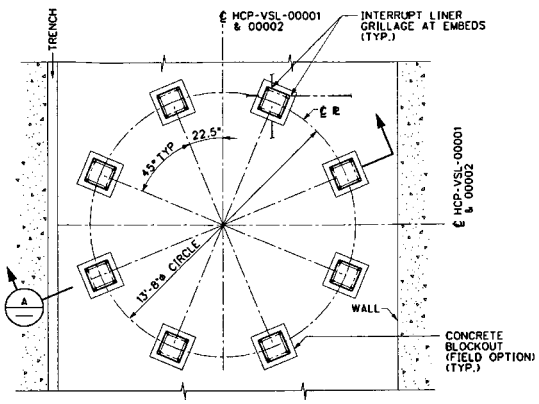
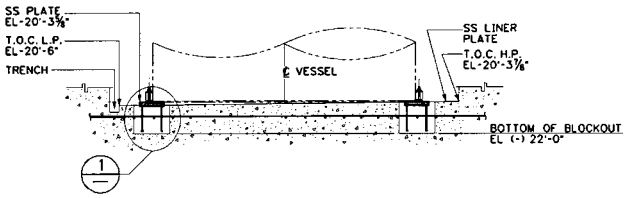
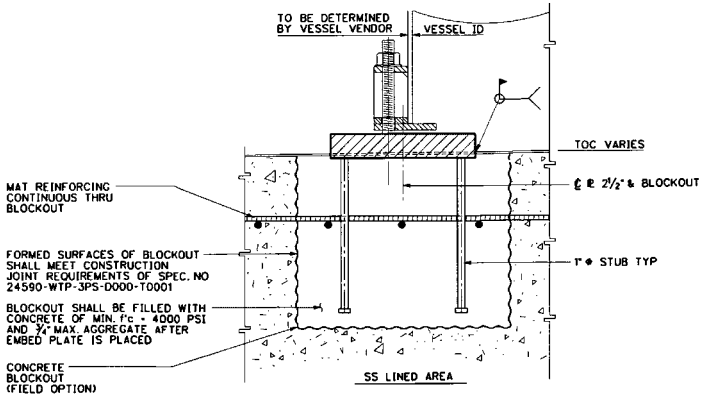


PLAN - HCP VSL 00001 & 00002



SECTION A



DETAIL 1

NOTES:

1. STAINLESS STEEL MATERIAL:
   - ASTM A240, TYPE 304L FOR PLATES
2. CARBON STEEL MATERIAL:
   - ASTM A36 FOR PLATES
   - ASTM A108 FOR STUD ANCHORS
3.

TOLERANCE	
LATERAL ALIGNMENT IN BOTH DIRECTIONS IN THE PLANE OF THE SLAB OR WALL. LEVEL ALIGNMENT THROUGH THE SLAB OR WALL.	2"
ELEVATION OF TOP OF LEVEL EMBED ℞	+ 0, - ⅛"

FIGURE 4

TYPICAL PROCESS VESSEL VESSEL SUPPORT DETAIL FOR HLW BUILDING

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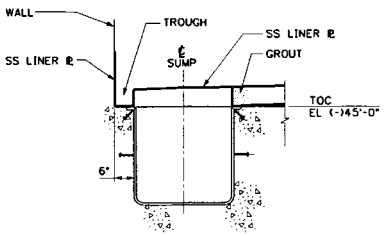
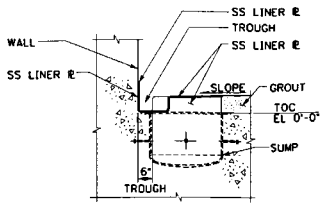


SECTION THRU TROUGH & SUMP
@ EL (-)45'-0"



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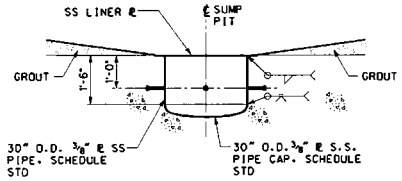
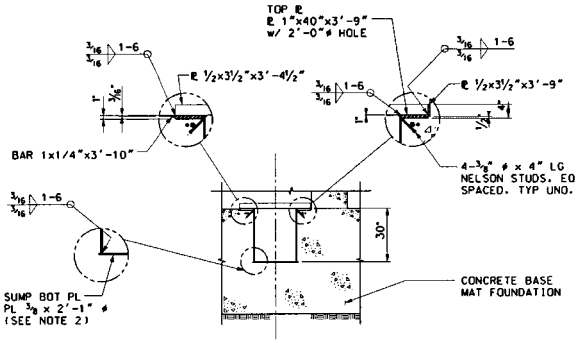
@ EL 0'-0"

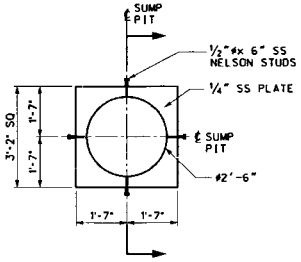


SECTION THRU SUMP

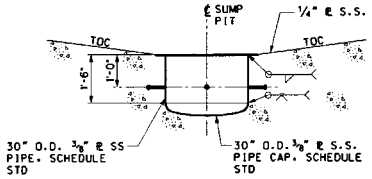
TROUGH AND SUMP DETAILS - PT BUILDING



ELEVATION



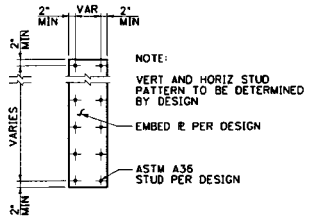
PLAN



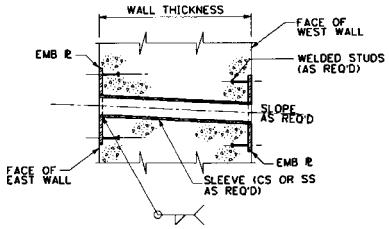
SECTION

SUMP DETAILS - LAW BUILDING

SUMP DETAILS - HLW BUILDING



EMBED ℞ DETAIL



WALL PENETRATION DETAIL

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FIGURE 5

MISC TYPICAL DETAILS FOR
SUMPS, TROUGH,
WALL PENETRATIONS
& EMBED PLATES
FOR PT, HLW & LAW BUILDINGS

Drawn

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