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Notice

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History Sheet

Rev	Date	Reason for revision	Revised by
0	6/24/02	Initial issue	Indra Ghosh
1	9/26/02	Issued for Permitting Use	Indra Ghosh / N. T. Desai
2	10/09/02	• Revised text in Section 1 • Added Yard Transfer Lines structural support description. • Changed material type from 304L to 316L on Fig. 4. • Added Reference to "LAB" building in all sections	Indra Ghosh / N. T. Desai
3	3/27/03	• Revised Figures 1,2,3 and 4, and deleted Figure 5 • Replaced Ref. 2.1.5 with Washington Administrative Code • Editorial changes in Section 3.1 as marked. Issued for Permitting Use	Indra Ghosh / N. T. Desai
4	2/12/04	• Addition of AEA Statement • Editorial changes in Section 3.2 as marked. • Revise Figure 1 to reflect changes to LAW vessel skirt • Deleted reference to the Lab in Figure 3 • Addition of Figure 5 describing the typical Laboratory vessel support details • Addition of Figures 6 and 7 providing typical Laboratory under sink and fume hood drain secondary containment drip pan details • Addition of Figure 8 describing typical Laboratory piping and pump pit sump weir details	Harsh Raval
5	8/4/04	Issued for Permitting Use	H. Raval, D. Robertson
6	8/25/04	Issued for Permitting Use	H. Raval, D. Robertson

Rev	Date	Reason for revision	Revised by
7	5/19/05	• Revised Section 3.1, Seismic Peak Ground Acceleration. Nathan Kyle • Corrected specification callout on Figure 1 • Revised typical PT sump and typical wall/mat penetration details on Figure 4 • Revised Note 3 and revised details on Figure 7 • General revision to Figure 8 (Added Details 1 and 2) • Revised Notes 3 and 4 for cupsink detail, and revised hot cell transfer port drain details on Figure 9. Added Note 5 for cupsink cover. • Revised Note 3, added Note 4 to embed plate detail on Figure 10. Added adjacent embed plate optional detail. • Added Figures 11 and 12. Issued for Permitting Use	Nathan Kyle
8	8/25/08	• Revised Figures 8 and 11 to provide additional sketch notes for Laboratory weir plans and sections • Addition of Figure 13 LAW Melter Encasement Assembly sketch Issued for Permitting Use	Bryson Bogart
9	2/8/10	• Added Figures 14 through 16, revised Figure 13 Issued for Permitting Use	Bryson Bogart, Dan Robertson

Contents

Figures

1 Introduction

In accordance with Chapter 173-303 Washington Administrative Code (Ref. 2.1.5), facilities that manage liquid dangerous waste must provide secondary containment[1]. At the Waste Treatment and Immobilization Plant, secondary containment systems have been designed to prevent a release of dangerous waste to the environment as required by the Code.

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), Low-Activity Waste (LAW) facilities, and Analytical Laboratory (LAB) building 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 Washington Administrative Code, Chapter 173-303.

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 11, 24590-WTP-SRD-ESH-01-001-02.

[1] With the exception of ancillary equipment as provided by 173-303-640(4)(f) and approved by DWP.

3 Description

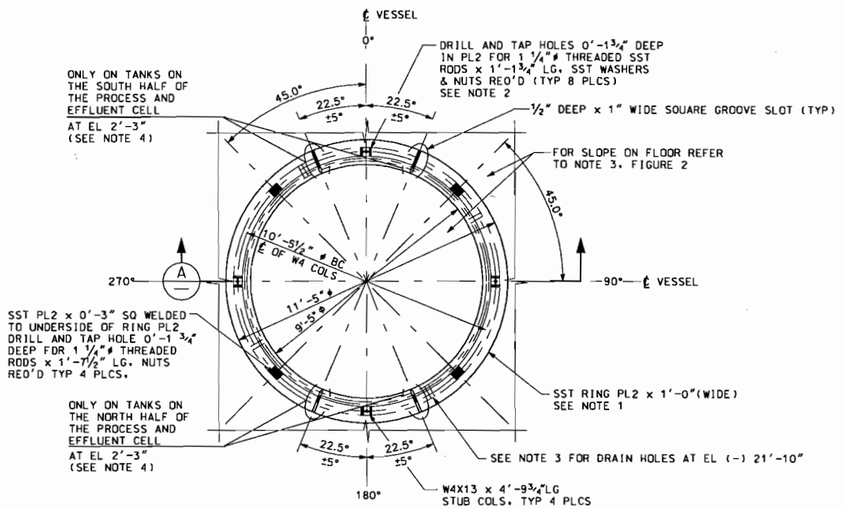
3.1 Design Methodology, Material, Loads, and Load Combinations

Methodology	Codes and specifications: • PT and HLW: General: ASCE 4 (Ref. 2.1.8). Concrete: ACI 349 (Ref. 2.1.1). Steel: ANSI/AISC N690 (Ref. 2.1.4) and AISC (Ref. 2.1.6). • LAW and LAB: 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), UBC (Ref. 2.1.3), and Tables 4-1 and 4-2 of 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 = 0.30g. Peak Ground Vertical Acceleration = 0.21g. • LAW and LAB: 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,' = 4,000 psi and 5,000 psi.
Reinforcing Bar	ASTM A706, deformed.
Steel	W Shape – ASTM A992 or A572 Grade 50; Angles and Channels - ASTM A36 or A529 Grade 50; 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 and LAB: ACI 318 (Ref. 2.1.2) and UBC (Ref 2.1.3).
Steel	• HLW and PT: Based on ANSI/AISC N690 (Ref 2.1.4) and AISC (Ref 2.1.6). • LAW and LAB: AISC M016-89 (Ref. 2.1.6) and UBC (Ref 2.1.3).
Stainless Steel Liners (SS)	Most commonly used in the process cells. Refer to Figures 2-5 for typical details. Refer to Figures 14 and 15 for ASX liner typical details.
Special Protective Coating	Material for coatings will be compatible with the dangerous waste.
Yard Transfer Lines Structural Support	Structural support for yard transfer lines (intra and inter facility waste transfer lines) is described in Ancillary Equipment Pipe Support Design, 24590-WTP-PER-PS-02-001.

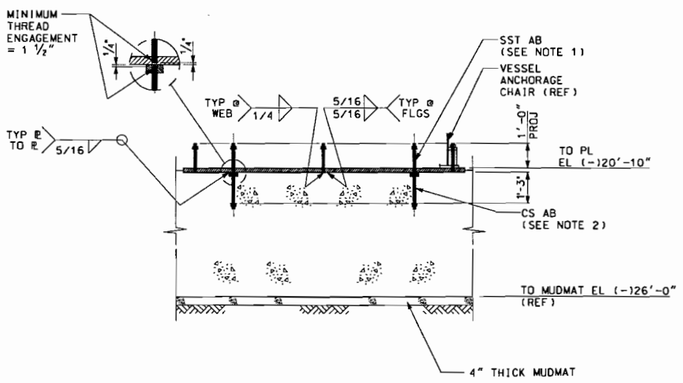
3.2 Typical Details

Figures 1 through 16 show several typical details related to secondary containment for PT, HLW, LAW, and LAB buildings.

Figure 1 Typical Vessel Embed, Support, and Flat Bottom Tank Details for LAW 3 Building



TYPICAL VESSEL RING SUPPORT - PLAN VIEW

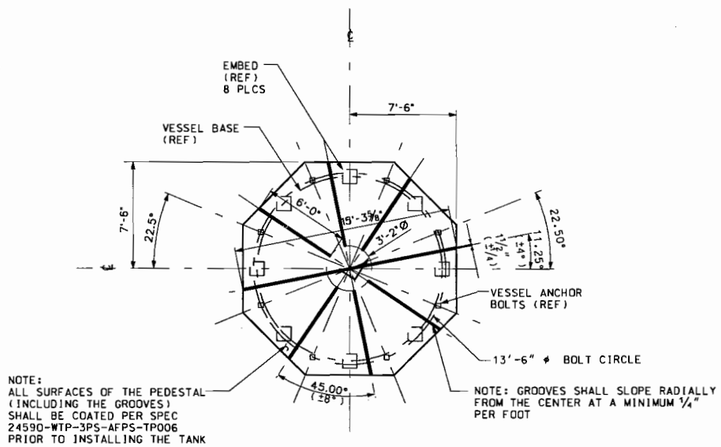


C3/C5 COLLECTION VESSEL EMBED ASSEMBLY

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. FOR THE ELEV (-) 21'-0" TANK, FOUR DRAIN HOLES SHALL BE PROVIDED ON THE SKIRT AND SKIRT BASE PLATE THE DRAIN HOLE SHALL BE FORMED BY REMOVING A 2-INCH WIDE STRIP FROM THE SKIRT RING, AND A 1-INCH RADIUS HALF-HOLE FROM THE SKIRT. DRAIN HOLES SHALL BE LOCATED AT 60°, 150°, 240°, AND 330° ORIENTATIONS.
4. FOR THE TANKS AT NOMINAL ELEV (+) 2'-0", TWO DRAIN SLOTS SHALL BE PROVIDED IN THE BASE RING TO ALLOW DRAINAGE TO THE LOW SIDE LINER PLATE EXTERIOR TO THE TANK.



CAUSTIC COLLECTION TANK

FIGURE 1
TYPICAL VESSEL EMBED, SUPPORT, AND FLAT BOTTOM TANK DETAILS FOR LAW BUILDING

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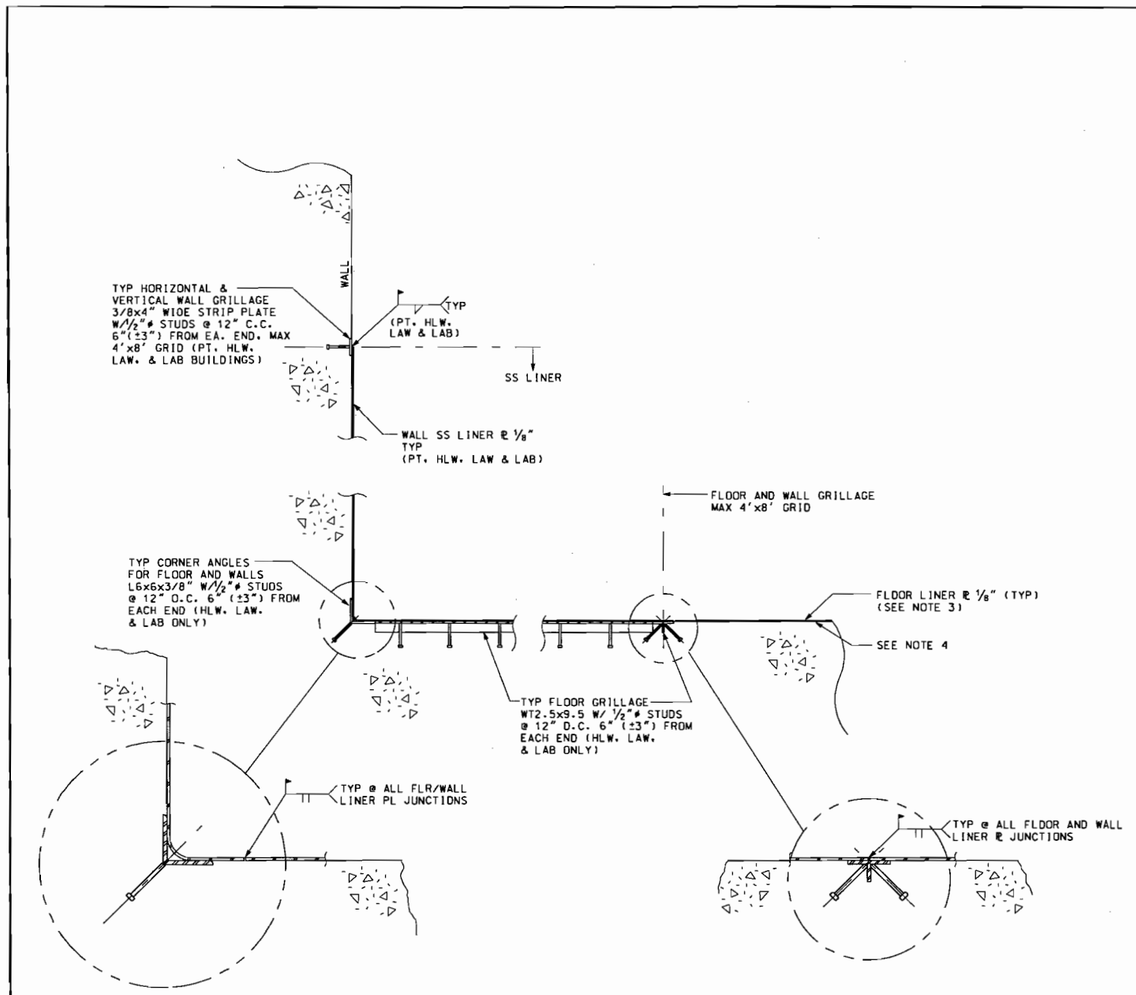
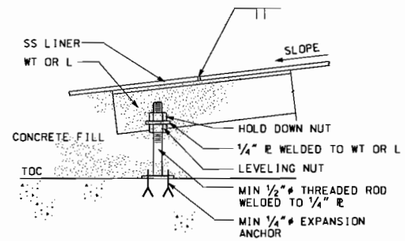
Figure 2 Liner Plate and Grillage Support Details for PT, HLW, LAW and LAB Buildings



NOTES:

1. EMBEDMENT MATERIALS SHALL CONFORM TO THE FOLLOWING:
   - ASTM A36 FOR PLATES, ANGLES
   - ASTM A992 FOR WT SECTIONS
   - ASTM A108 FOR WELDED STUDS
   - NO COATING REQUIRED (BARE STEEL)
2. LINER PLATE MATERIAL:
   - ASTM A240 TYPE 304L
3. THE FLOOR LINER PLATE SHALL BE SLOPED MIN 1% (OUTSIDE OF THE TANK PERIMETER & ALSO DIRECTLY UNDER THE TANK).
4. IN PT BUILDING THERE IS 4,000 PSI CONCRETE FILL BETWEEN THE TOP OF CONCRETE AND SS LINER PLATE.



FLOOR LINER GRILLAGE DETAIL
PT BLDG

BECHTEL

FIGURE 2

LINER PLATE AND GRILLAGE SUPPORT DETAILS FOR PT, HLW, LAW & LAB BUILDINGS

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Figure 3 Typical Process Vessel Support Details for PT and HLW Buildings

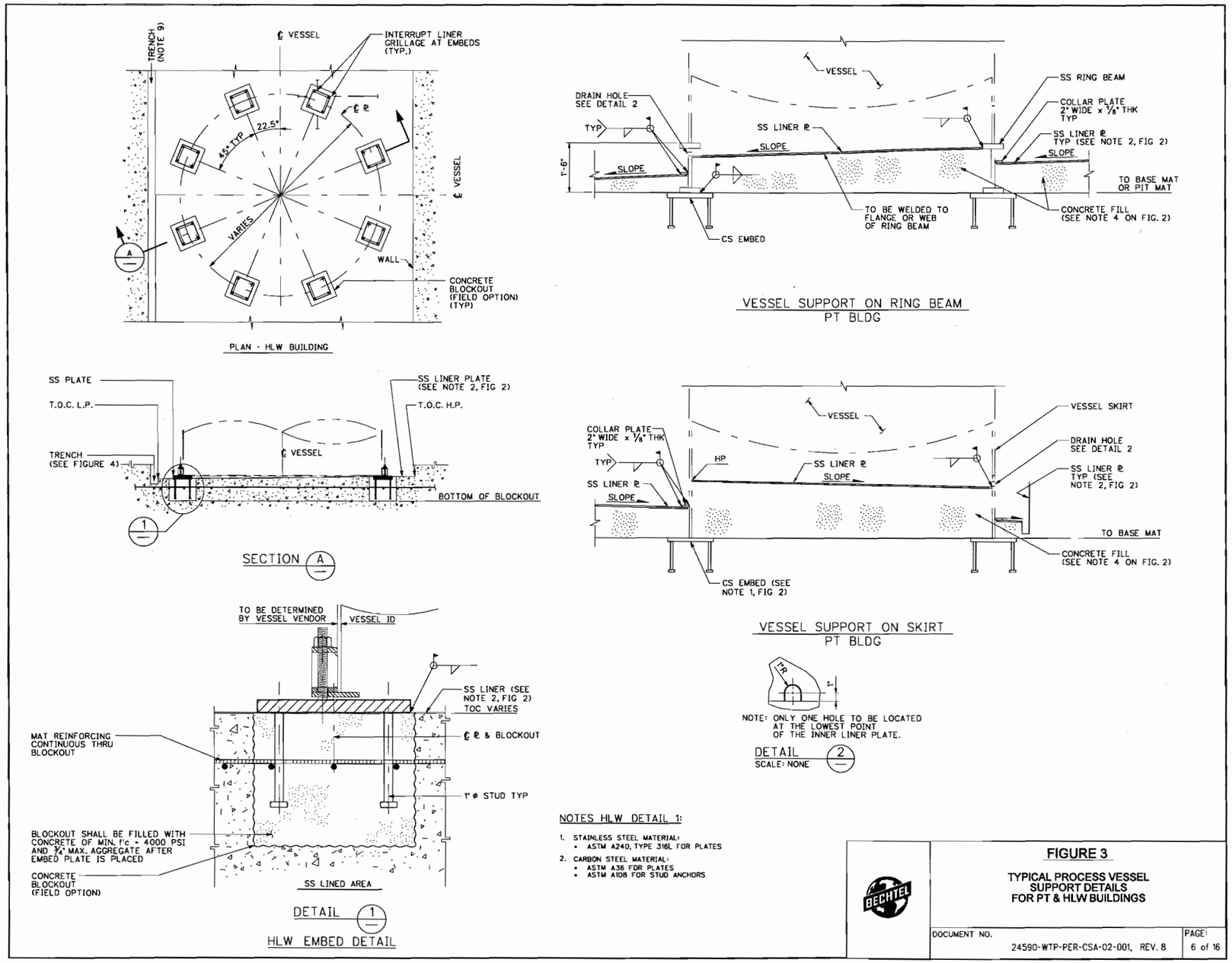

Figure 4 Misc. Typical Details Sumps, Trenches, Wall Penetrations, Embedded Plates and Special Protective Coating PT, HLW, LAW and LAB Buildings

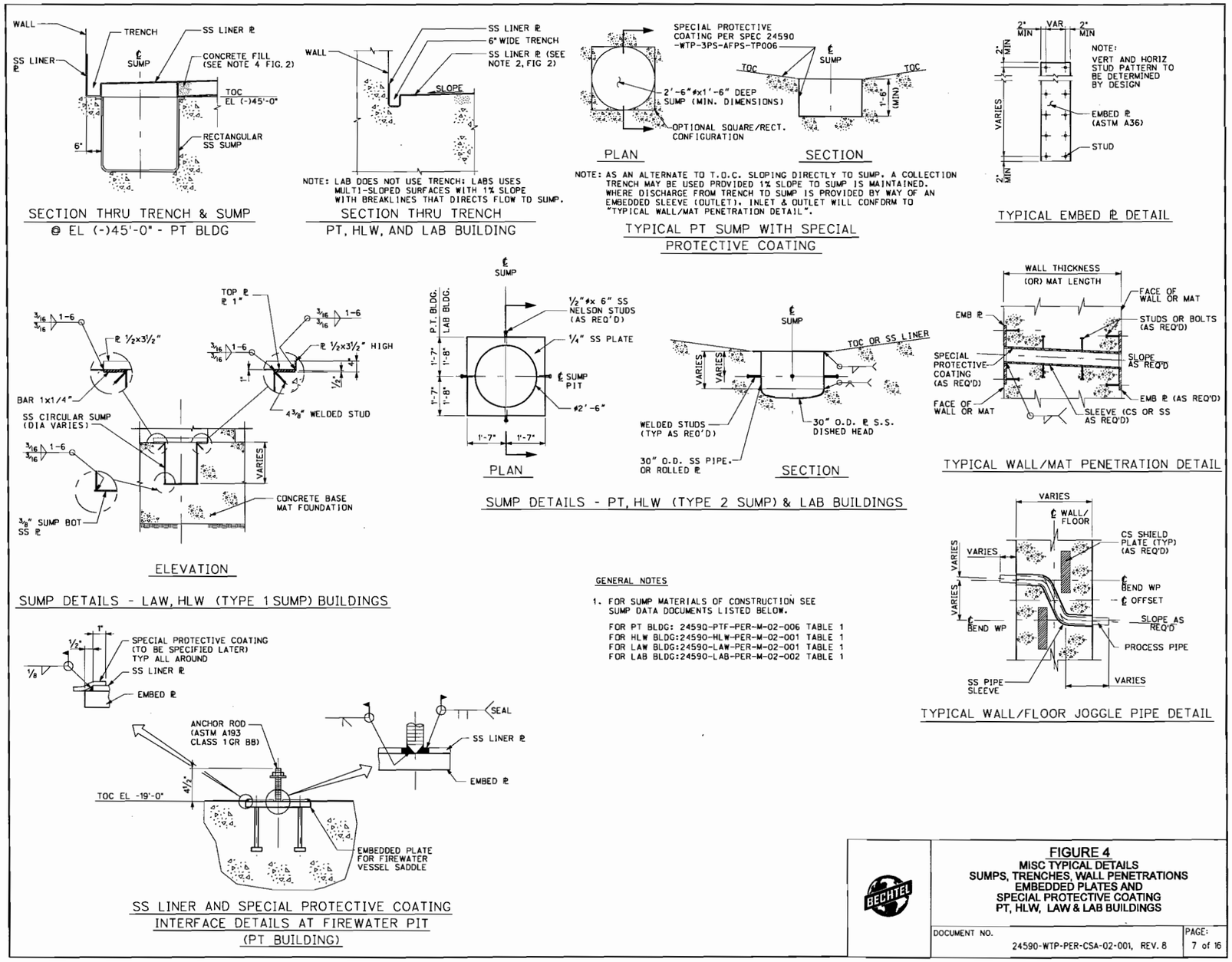

FIGURE 4
MISC TYPICAL DETAILS SUMPS, TRENCHES, WALL PENETRATIONS EMBEDDED PLATES AND SPECIAL PROTECTIVE COATING PT, HLW, LAW & LAB BUILDINGS

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Figure 5 Typical Process Vessel Support Details for LAB Building

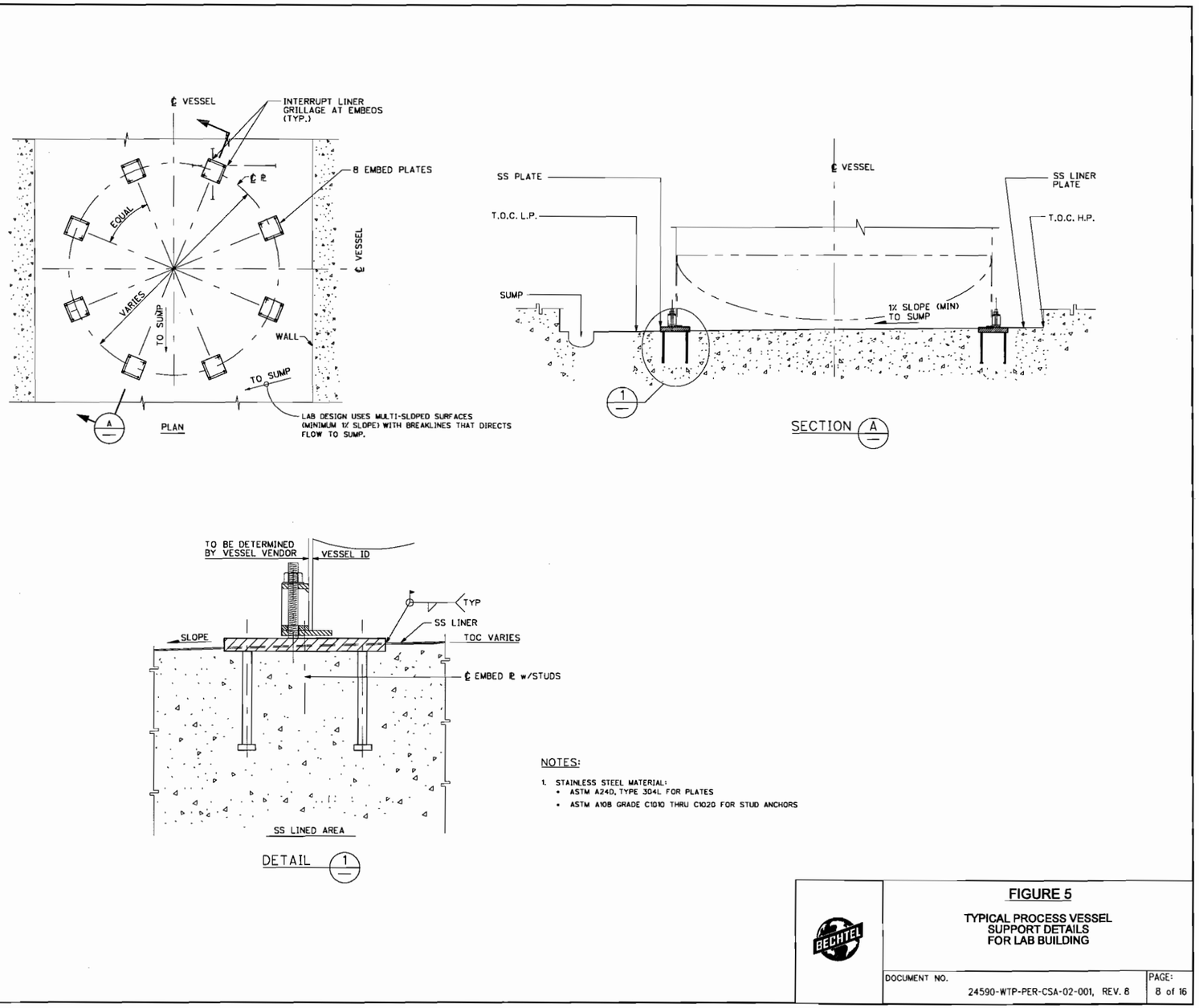
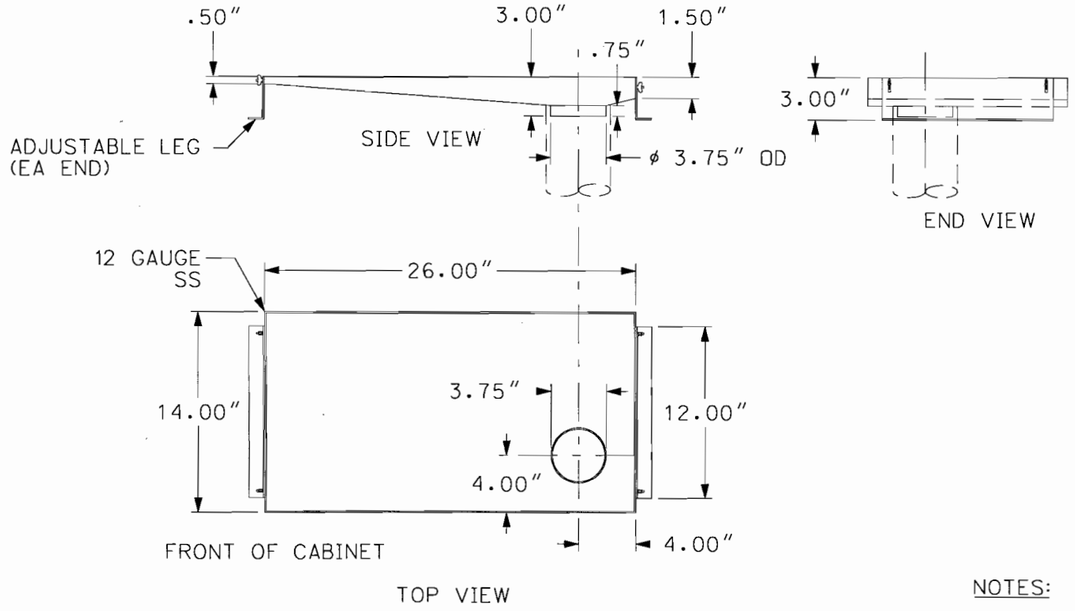


Figure 6 **Plan View of Typical Under Sink and Fume Hood Drain for LAB Bldg Secondary Containment Leak Collection Pan**



DETAIL VIEWS

NOTES:

1. PIPE ASSEMBLY SHOP FABRICATED.
2. AIR TIGHT WELDS TO 50 PSIG.
3. LEAK COLLECTION PAN SHOP WELDED IN 12 GAUGE (0.1065"), 304L STAINLESS STEEL.

BECHTEL

FIGURE 6

PLAN VIEW OF TYPICAL UNDER SINK
AND FUME HOOD DRAIN FOR LAB BLDG
SECONDARY CONTAINMENT LEAK COLLECTION PAN

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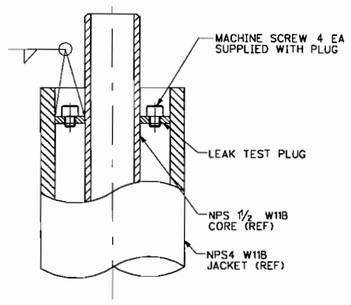
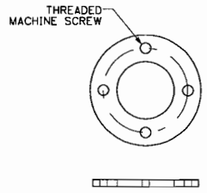
Figure 7 Section View of Typical Laboratory Under Sink and Fume Hood Drain for LAB Bldg Secondary Containment Leak Collection Pan, Including Leak Test Plug

NOTES:
1. FABRICATION SHALL BE IN ACCORDANCE WITH SPECIFICATION 24590-WTP-3PS-PS02-T0001, SHOP FABRICATION OF PIPING.
2. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED
3. PLUG SHALL BE HASTELLOY ASTM B 168 (UNS N06022).

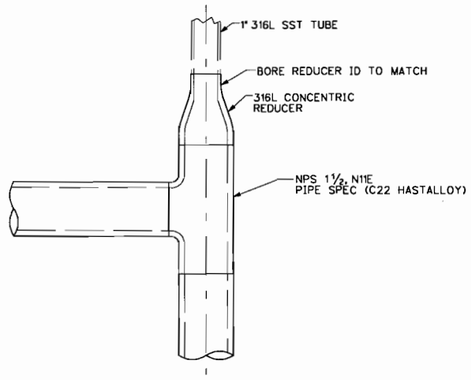


ASSEMBLY VIEW

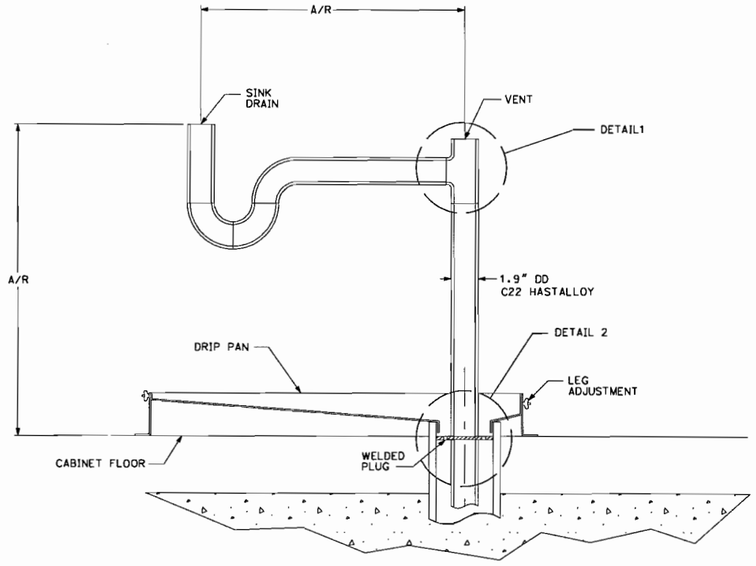
DETAIL 2
LEAK TEST PLUG
PIPE CLASS W11B



PLUG DETAIL



DETAIL 1
VENT TUBE ADAPTOR DETAIL
PIPE CLASS N11E
(SEE NOTE 1)



SECTIONAL VIEW

FIGURE 7
SECTION VIEW OF TYPICAL LABORATORY UNDER SINK AND FUME HOOD DRAIN FOR LAB BLDG SECONDARY CONTAINMENT LEAK COLLECTION PAN, INCLUDING LEAK TEST PLUG

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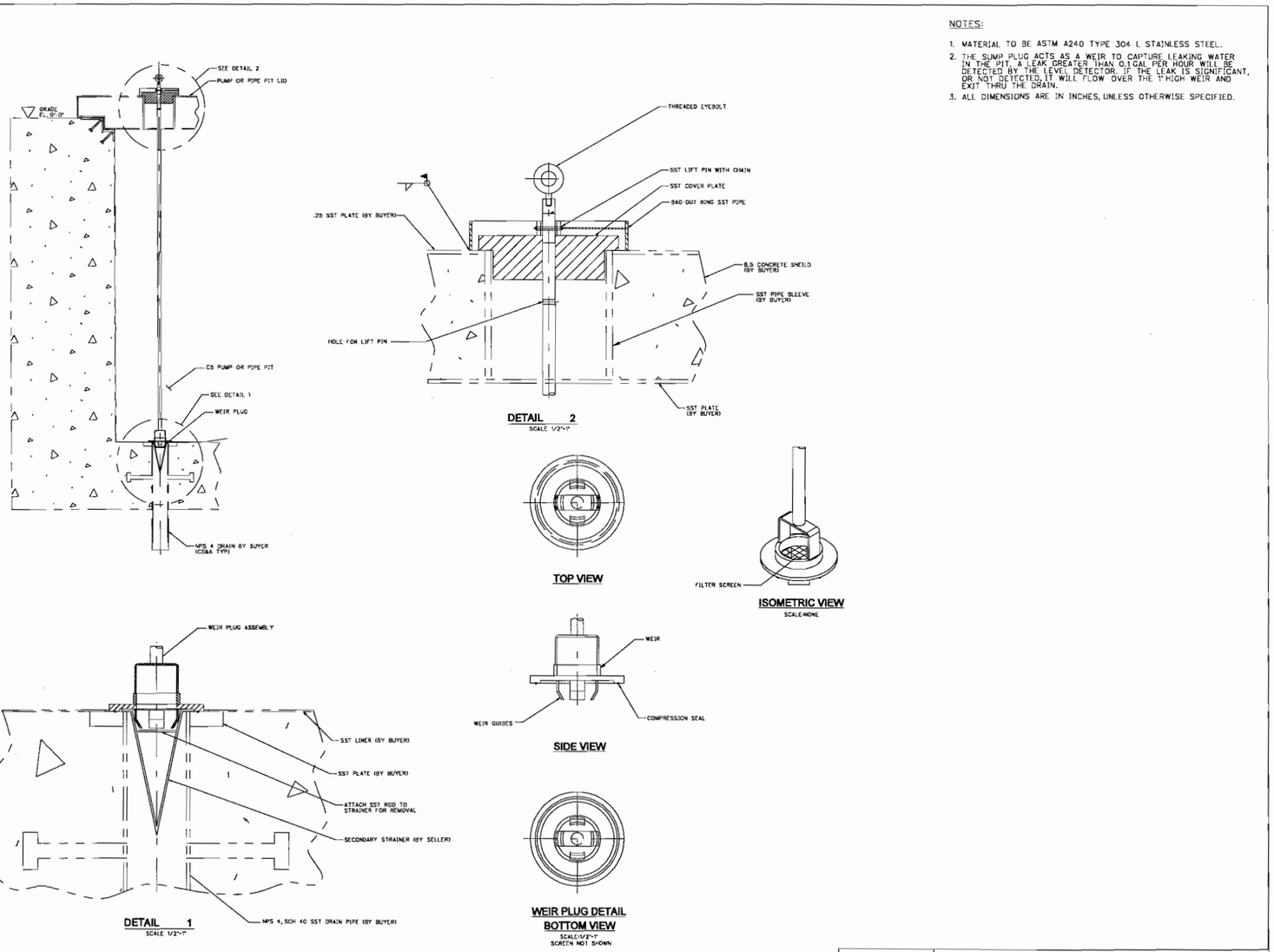
Figure 8 Typical Laboratory Piping and Pump Pit Sump and Weir Details for LAB Building



NOTES:

1. MATERIAL TO BE ASTM A240 TYPE 304 L STAINLESS STEEL.
2. THE SUMP PLUG ACTS AS A WEIR TO CAPTURE LEAKING WATER IN THE PIT. A LEAK GREATER THAN 0.1 GAL PER HOUR WILL BE DETECTED BY THE LEVEL DETECTOR. IF THE LEAK IS SIGNIFICANT, OR NOT DETECTED, IT WILL FLOW OVER THE 1" HIGH WEIR AND EXIT THRU THE DRAIN.
3. ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE SPECIFIED.

FIGURE 8

TYPICAL LABORATORY C5 PIPING AND PUMP PIT SUMP AND WEIR DETAILS FOR LAB BUILDING

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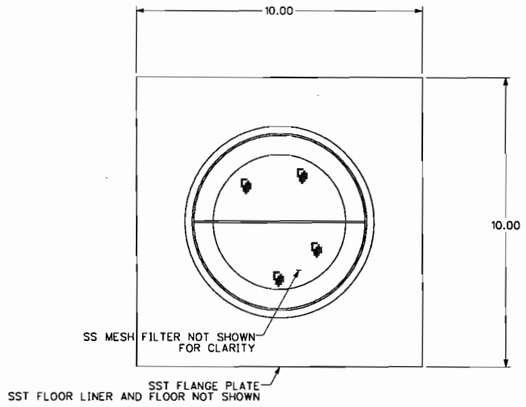
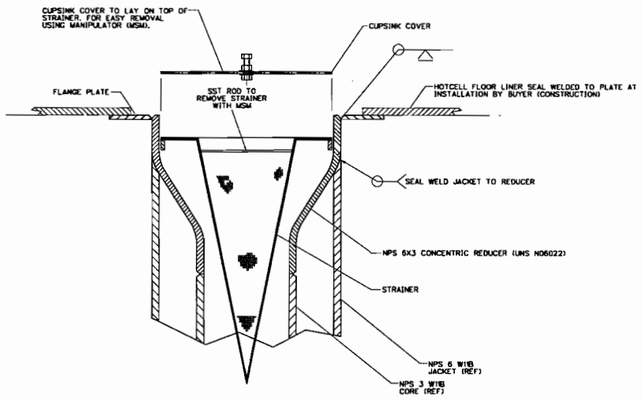
Figure 9 Typical Hot Cell Floor Drain Detail and Transfer Port Drain Detail for LAB Building

NOTES:

1. FABRICATION SHALL BE IN ACCORDANCE WITH SPECIFICATION 24590-WTP-3PS-PS02-T0001, SHOP FABRICATION OF PIPING.
2. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED
3. MATERIAL FOR THE FLANGE PLATE SHALL BE ASTM A240 TYPE 316L, STAINLESS STEEL. ALL OTHER STAINLESS STEEL ITEMS TO BE 300 SERIES.
4. MATERIAL: 14 GA., SST, PERFORATED PLATE 1/8" DIA. HOLES ON 3/16" CENTERS (40% OPEN AREA, 33 HOLES/SQ. IN.).
5. CUPSINK COVER - SST REGIMESH SINTERED WOVEN WIRE MESH GRADE 1 FILTER OR EQUIVALENT.

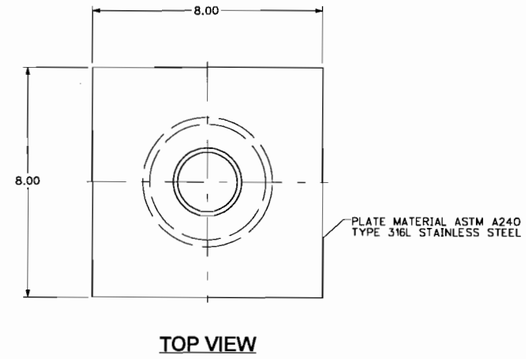




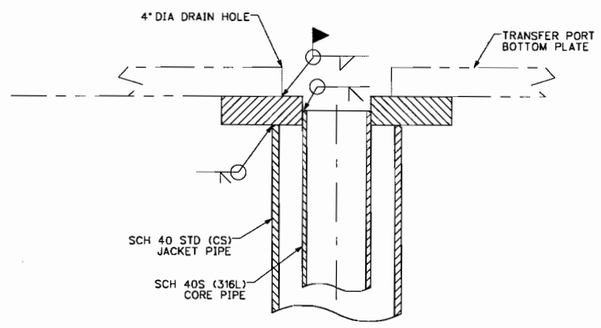
HOTCELL CUPSINK (FLOOR DRAIN) DETAIL
NPS 3 CORE PIPE
PIPE CLASS W16

NOTES:

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
2. FABRICATION SHALL BE IN ACCORDANCE WITH SPECIFICATION 24590-WTP-3PS-PS02-T0001, SHOP FABRICATION OF PIPING.
3. PIPE CLASS S32B
4. DIMENSION TO SLIP FIT WITH OD OF CORE PIPE.



TOP VIEW



SECTION VIEW

HOT CELL TRANSFER PORT DRAIN

FIGURE 9

TYPICAL HOT CELL FLOOR DRAIN DETAIL AND TRANSFER PORT DRAIN DETAIL FOR LAB BUILDING

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Figure 10 Typical HLW Building Sump Details & Typical PT Building SS Liner/CS Embed Detail

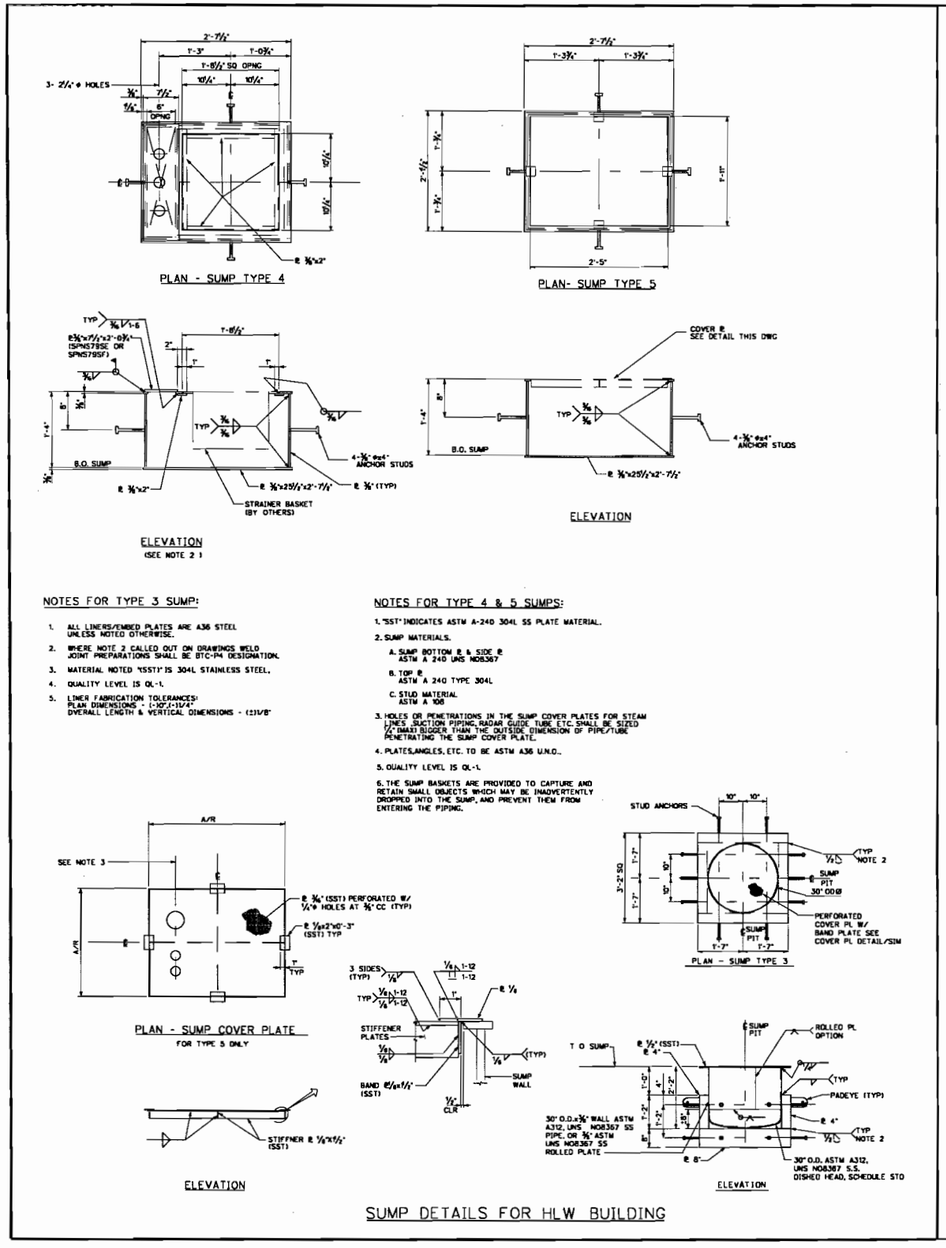

FIGURE 10

TYPICAL HLW BUILDING SUMP DETAILS & TYPICAL PT BUILDING SS LINER/CS EMBED DETAIL

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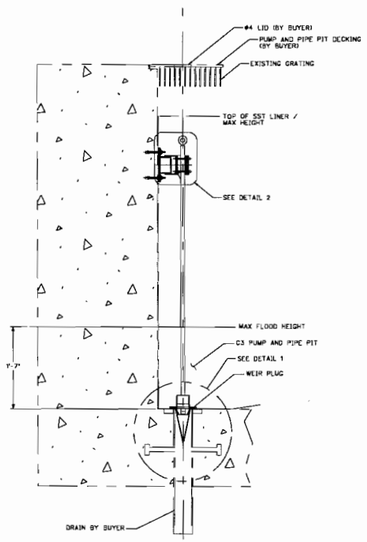
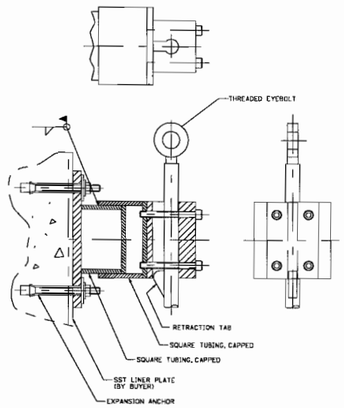
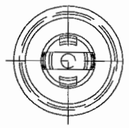
Figure 11 **Typical Laboratory C3 Piping and Pump Pit Sump and Weir Details for LAB Building**

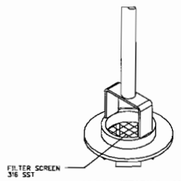




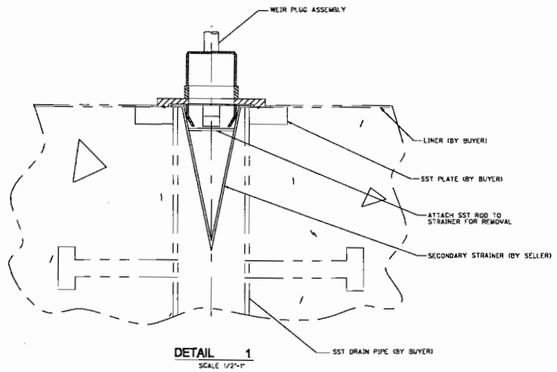
DETAIL 2
SCALE 1/2"=1"



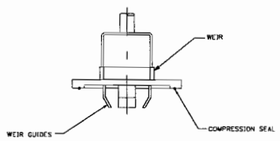
TOP VIEW



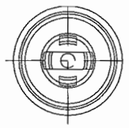
ISOMETRIC VIEW
SCALE:NONE



DETAIL 1
SCALE 1/2"=1"



SIDE VIEW



WEIR PLUG DETAIL
BOTTOM VIEW
SCALE:1/2"=1"
SCREEN NOT SHOWN

NOTES:

1. MATERIAL TO BE ASTM A240 TYPE 304 L STAINLESS STEEL.
2. THE SUMP PLUG ACTS AS A WEIR TO CAPTURE LEAKING WATER IN THE PIT. A LEAK GREATER THAN 0.1 GAL PER HOUR WILL BE DETECTED BY THE LEVEL DETECTOR. IF THE LEAK IS SIGNIFICANT, OR NOT DETECTED, IT WILL FLOW OVER THE 1" HIGH WEIR AND EXIT THRU THE DRAIN.
3. ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE SPECIFIED.

FIGURE 11

TYPICAL LABORATORY C3 PIPING AND PUMP PIT SUMP AND WEIR DETAILS FOR LAB BUILDING

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Figure 12 Typical RLD Condensate Tank Support Details for PT Building (Exterior)

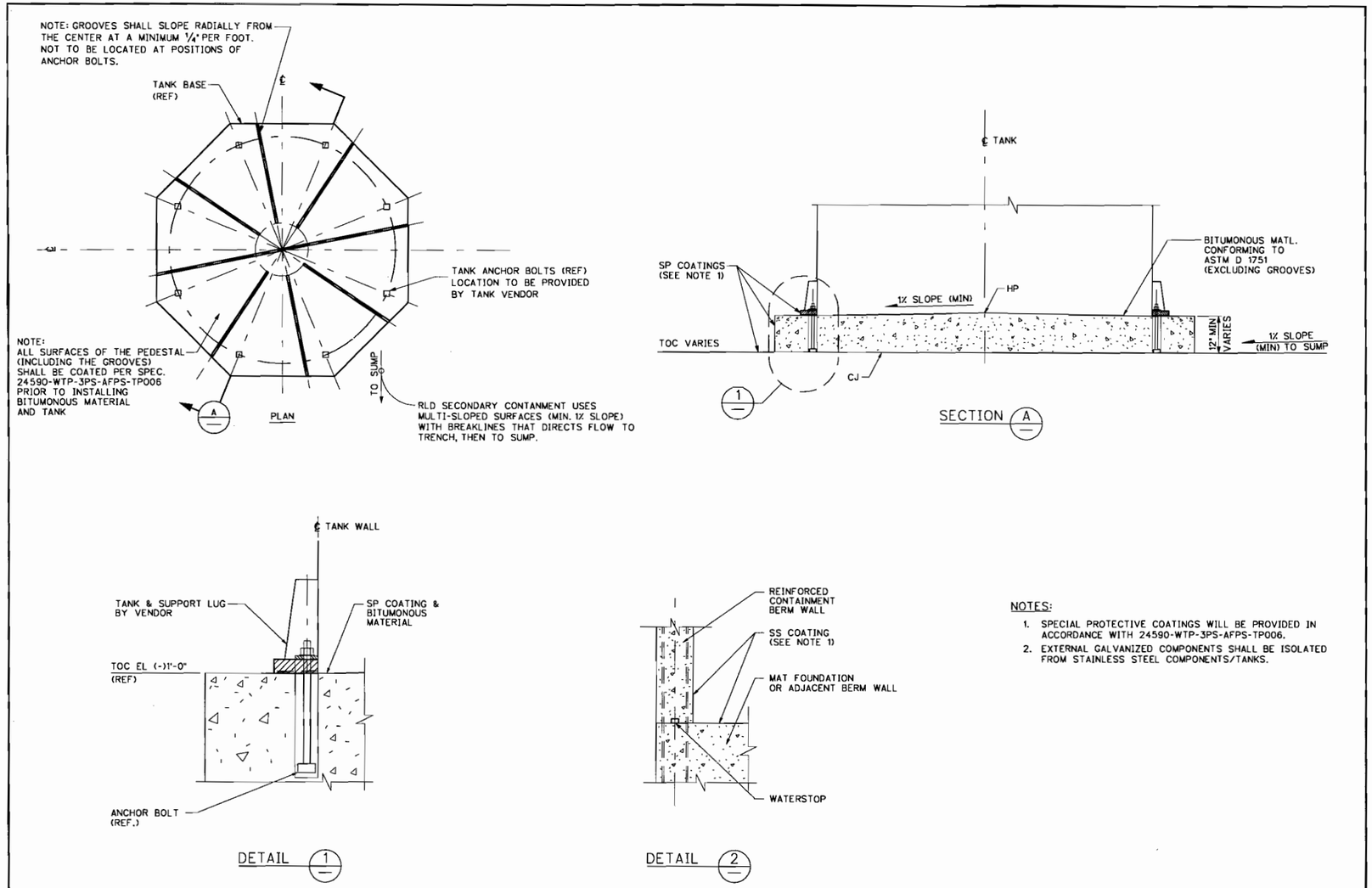


Figure 13 LAW Melter Encasement Assembly Secondary Containment Details

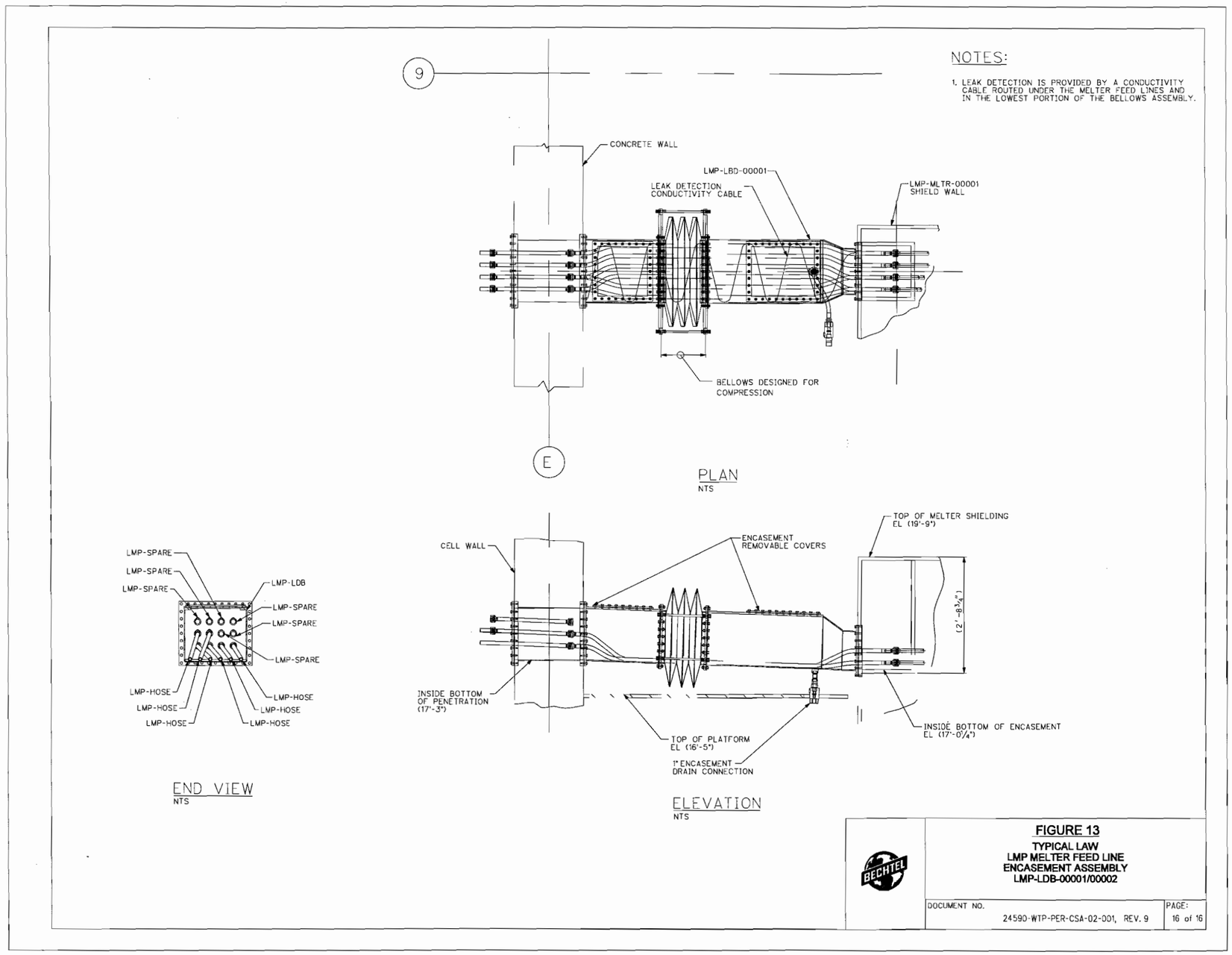


Figure 14 Typical Autosampling System ASX Sampler Full Half Section

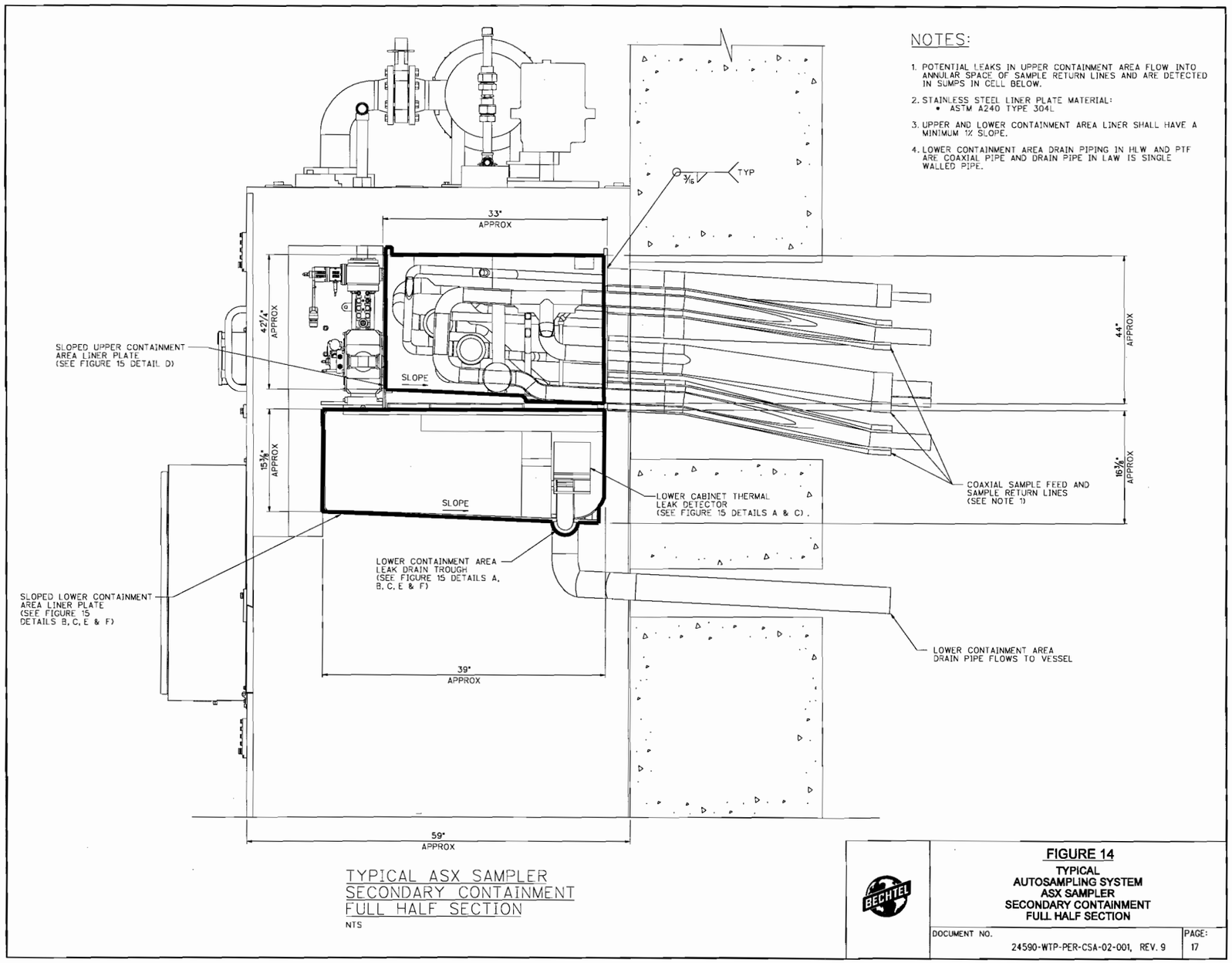
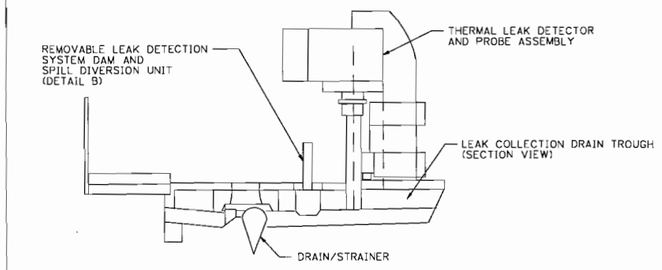
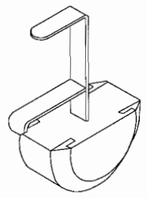


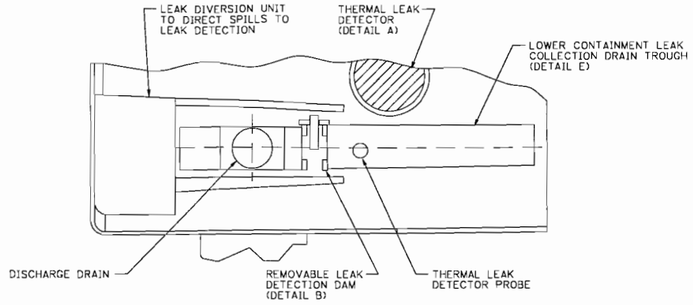
Figure 15 Typical Autosampling System Lower Containment Area Leak Detection Details



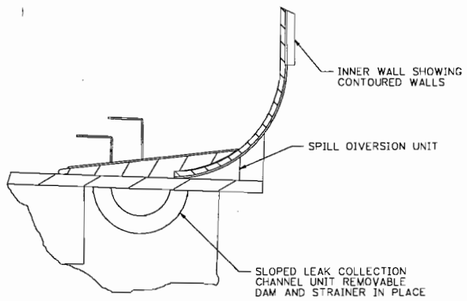
DETAIL A
SECTION VIEW OF DETAIL C
NTS



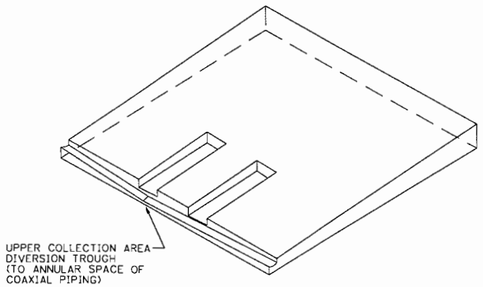
DETAIL B
ISOMETRIC VIEW
REMOVABLE LEAK DETECTION
SYSTEM DAM (WEIR)
NTS



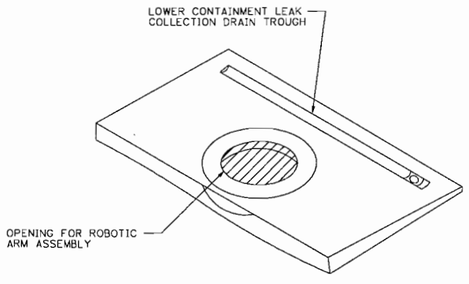
DETAIL C
PLAN VIEW OF DETAIL A
LOWER CONTAINMENT AREA
AND LEAK DIVERSION UNIT
NTS



DETAIL F
SECTION VIEW
NTS



DETAIL D
ISOMETRIC VIEW
UPPER CONTAINMENT AREA
LINER PLATE
NTS



DETAIL E
ISOMETRIC VIEW
LOWER CONTAINMENT AREA
LINER PLATE
NTS

FIGURE 15
TYPICAL AUTOSAMPLING SYSTEM CONTAINMENT AREA AND LEAK DETECTION DETAILS

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Figure 16 HLW Building HOP Drum Transfer Tunnel Drip Pan Plan, Sections and Details