

MASON & HANGER-SILAS MASON CO., INC.

CONTRACTOR OPERATOR

IOWA ARMY AMMUNITION PLANT

REPLACE/UPGRADE EXPLOSIVES COLLECTION SLIMPS STUDY

PROJECT 5895711-17, CLIN 0074AK, W/P 843806

14 DECEMBER 1990



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MASON & HANGER-SILAS MASON CO., INC.  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IA 52638

14 December 1990

REPLACE/UPGRADE EXPLOSIVES COLLECTION SUMPS STUDY

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Mason & Hanger-Silas Mason Co., Inc.  
Iowa Army Ammunition Plant  
Middletown, Iowa 52638

REPLACE/UPGRADE EXPLOSIVES COLLECTION SUMPS STUDY

PURPOSE

The purpose of the Replace/Upgrade Explosives Collection Sump Study is as follows:

1. Locate and record all of the in-ground explosives collection sumps located at the IAAP.
2. Prepare concept designs and preliminary cost estimates for replacement, or permanent closure of these sumps.

STUDY/EVALUATION

The first effort on this project was to review as-built drawings of all production lines and areas where in-ground explosives collection sumps were likely to be located, then retrieve construction drawings of the sumps shown.

Secondly, a study group consisting of the following personnel was established:

- F. C. Laue - M&H-S.M. Co. - Environmental Coordinator
- T. R. Noel - M&H-S.M. Co. - Safety Department
- R. H. Tiemeier - M&H-S.M. Co. - Plant Engineering Manager
- D. W. Weber - M&H-S.M. Co. - Plant Engineering, Civil/Structural Eng.
- J. G. Ketcham - M&H-S.M. Co. - Plant Engineering, Sr. Drafting Tech.

The study group then made a physical survey of all plant areas to develop preliminary spread sheets for all sumps. Interviews were conducted with production line superintendents and old records researched to establish former use of apparently abandoned collection sumps. The spread sheets were reviewed by knowledgeable plant personnel and additions and corrections made. The

study group then developed a priority system to be used for evaluation of these in-ground explosives collection sumps as follows:

- Priority 1 - Currently in use and replacement recommended for production operations.
- Priority 2 - Not currently used, but replacement recommended for planned future operations and/or M-Day production schedules.
- Priority 3 - Not currently in use and no known future production schedules or M-Day schedules require these sumps. It is recommended that these sumps be removed and permanently closed.

A final meeting of the study group was held to finalize the spread sheets and to determine sizes of the Priority 1 and 2 sumps to be replaced. The final spread sheets are shown in Appendix I.

Plant Engineering then proceeded with concept designs of Priority 1 and 2 sumps, shown in Appendix II. Preliminary estimates were prepared as shown in Appendix III to remove old sumps, construction of concrete vaults and installation of stainless steel tanks, as well as estimates for removal and permanent closure of Priority 3 sumps. These estimates are not to be used for funding purposes. Formal estimates will be prepared at the time project submissions are requested. In preparing concept designs and estimates for Priority 1 and 2 sumps recommended for replacement, the requirements of Paragraphs 264.193 and 264.194 of 40 CFR, Part II, Environmental Protection Agency dated 14 July 1986 were used. Specifically, stainless steel sump

tanks will be placed on stands within concrete vaults built in accordance with above requirements, or double-walled stainless steel tanks with interstitial continuous monitoring will be installed within existing concrete sumps where removal of the existing sump is impractical. In addition, each sump tank will be provided with a high liquid level alarm audibly annunciated near the sump tank as well as extended to the plant central alarm monitoring station at Security Headquarters, which is attended 24 hrs. per day, seven days per week. This also is in accordance with the above requirements. While it is not known exactly what EPA or State of Iowa regulations are, or will be, applicable to in-ground explosives collection sumps, we have applied the same requirements that are applicable to in-ground hazardous waste treatment tanks for design and estimating purposes in replacement of Priority 1 and 2 sumps. To the best of our knowledge, these in-ground explosive collection sumps were used to collect water laden with TNT, RDX, and Teteryl. The water from these collection sumps is then run through pink water carbon filtration systems. Explosive sludge is either run through the Explosive Waste Incinerator (EWI), or de-watered and sold commercially. There is no known extensive nitrobody soil contamination resulting from overflow, or leaking sumps. The estimates shown in Appendix III do not include any soil testing when the Priority 1 and 2 sumps are removed for replacement, or when Priority 3 sumps are removed and permanently closed. Also, the estimates were prepared on the basis of excavating only that soil required for the sumps removal with no extra excavation for soil contamination should future EPA, or State of Iowa rules be promulgated regarding soil testing and potential additional excavation, soil decontamination, etc. These costs, if any, must be added to those presented in this survey.

DESCRIPTION OF WORK REQUIRED

1. Priority 1 Sumps (See Spread Sheets, Appendix I)

a. Line 1, Item 12

This steel recirculation tank which is presently set on the ground collects explosives and water from washout of projectiles will be reinstalled within a concrete containment vault. Existing feed troughs will be reconnected from building to tank. A rain shelter will also be provided over tank and containment vault. A continuous high liquid level sensor will be provided for each of the two tank compartments. When a high liquid level is encountered, an audible local alarm will be enunciated at the tank site as well as extension of the alarm to Security Headquarters which is manned 24 hours per day, 7 days per week. Concept design is shown on Sketch No. SK-G-647, Appendix II. Cost estimate breakdown is shown on Pages 1 - 5, Appendix III.

Preliminary Cost Estimate: \$ 79,520.00

b. Line 2, Item 3

This in-ground concrete sump, which collects building and equipment washdown explosive contaminated water, will be removed and replaced with stainless steel tank on legs within a concrete vault. The existing concrete sump contains 1,122 gallons with a 6" of freeboard. The concept design is for a 6 ft. wide x 10 ft. long x 3 ft. deep tank which will contain 1,122 gallons with a 6 inch freeboard. The tank will be on legs approximately 12 inches off the bottom of the vault. The vault will be nominally 10 ft. wide x 14 ft. long x 3 ft. deep, which will adequately contain the

tank volume in the event of tank rupture. The vault will be constructed adjacent to the building it serves with a drain trough feeding the tank. A galvanized steel, insulated sandwich panel, rain tight shed will be constructed over the vault and tank. The interior of the shed will be heated during freezing weather with a thermostatically controlled unit heater to maintain a 40<sup>0</sup>F minimum temperature. A liquid level sensor and local audible alarm will be provided to alarm when the liquid level rises to within 6 inch of tank overflow. This alarm will also be extended to Security Headquarters which is manned 24 hours per day, seven days per week. The concrete vault will be constructed to comply with Paras. 264.193 and 264.194 of 40 CFR Part 11, Environmental Protection Agency, dated 14 July 1986. Concept design is shown on Sketch No. SK-G-645, Appendix II. Cost estimate breakdown is shown on Pages 5 - 10, Appendix III.

Preliminary Cost Estimate: \$ 57,350.00

c. Line 2, Item 8

This is a steel recirculating tank which is identical to Line 1, Item 12 (Para a., above). The concept design for this system is the same as Para. a., above. Concept design is shown on Sketch No. SK-G-647, Appendix II. Cost estimate breakdown is shown on Pages 1 - 5, Appendix III.

Preliminary Cost Estimate: \$ 79,520.00

d. Line 3, Item 1

This is an in-ground concrete sump the same as Line 2, Item 3, (Para. b., above). The concept design of this system is the same

as Para. b., above. Concept design is shown on Sketch No. SK-G-645, Appendix II. Cost estimate breakdown is shown on Pages 5 - 10, Appendix III.

Preliminary Cost Estimate: \$ 57,350.00

e. Line 3, Item 2

This is an in-ground concrete sump which is fed by a floor drain and also serves as a recirculation and drain system for a dust collection system. The existing sump is 673 gallon capacity with a 6 inch free board. The existing sump will be removed and replaced with a stainless steel tank 6 ft. wide x 6 ft. long x 3 ft. deep on legs containing 673 gallons nominal with 6 inches of freeboard. The tank will be installed within a concrete vault. Concept design for this system will be essentially the same as Item b, above, except for size. The concept design is shown on Sketch No. SK-G-645, Appendix II. Cost estimate breakdown is shown on Pages 28 - 31, Appendix III.

Preliminary Cost Estimate: \$ 51,885.00

f. Line 3, Item 3

This is an identical sump to that listed in Line 3, Item 2, (Para. e., above. The concept design is the same as Para. e., above. Concept design is shown on Sketch No. SK-G-645, Appendix II. Cost estimate breakdown is shown on Pages 28 - 31, Appendix III.

Preliminary cost Estimate: \$ 51,885.00

g. Line 3, Item 8

This is a concrete sump off of the ramp south of Bldg. 3-05-2. This sump is built-in under the floor of the sump building and is



of 1,480 gallon capacity with 6 inches of freeboard. The sump is used for wash down of portable equipment, funnels, etc., that are contaminated during the melt/pour process. The sump is constructed independently of the ramp extension and can be removed without rebuilding the wash down room. The wash down room will be renovated to include new stainless steel flooring and wainscoting and a new concrete vault and shelter constructed off of the washroom to hold a stainless steel sump tank 6 ft. wide x 10 ft. long x 3 ft. deep. This tank will hold 1,122 gallons with 6" of freeboard. A trough from a drain in the stainless steel floor of the sump room will feed the stainless steel sump tank. The concept design is shown on Sketch No. SK-G-646, Appendix II for this item. Cost estimate breakdown is shown on Pages 11 - 15, Appendix III.

Preliminary Cost Estimate: \$ 54,700.00

h. Line 3, Item 10

This is an in-ground steel recirculation tank identical to Line 1, Item 12 (Para. a., above). The design concept is the same as Para. a., above. The design concept is shown on Sketch No. Sk-G-647, Appendix II. Cost estimate breakdown is shown on Pages 1 - 5, Appendix III.

Preliminary Cost Estimate: \$ 79,520.00

i. Line 3, Item 12

This is an in-ground concrete sump essentially the same Line 3, Item 2 (Para. e., above. The design concept is the same as Para. e., above). The design concept is shown on Sketch No. SK-G-645, Appendix II. Cost estimate breakdown is shown on Pages 28 - 31,

Appendix III.

Preliminary Cost Estimate: \$ 51,885.00

j. Line 6, Item 7

This is a 5 ft. dia. x 5 ft. deep stainless steel tank buried directly in the ground and fed from a floor trough in Bldg. 6-49. It is used as an RDX collection sump from pelleting operations in Bldg. 6-49. The tank contains 660 gallons with 6" of freeboard. The design concept for this sump will be to remove the tank from the ground and re-install it on a stand within a concrete vault. The tank will be equipped with a high level alarm annunciated near the sump and extended to Security Headquarters which is attended 24 hours per day, seven days per week. A galvanized steel, insulated sandwich panel, rain tight shed will be constructed over the vault and tank. The interior of the shed will be heated during freezing weather with a thermostatically controlled unit heater to maintain a 40<sup>0</sup>F minimum temperature. The vault will be constructed to comply with Paras. 264.193 and 264.194 of 40 CFR Part II, Environmental Protection Agency, dated 14 July 1986. Concept design is shown on Sketch No. SK-G-643, Appendix II. Cost estimate breakdown is shown on Pages 20 - 23, Appendix III.

Preliminary Cost Estimate: \$ 52,380.00

k. Line 800, Item 2

This is a stainless steel tank, the same size as Line 6, Item 7, (Para. j., above). It receives washdown water from explosive operations in Bldg. 800-192. The concept design is the same as Para. j., above. Concept design is shown on Sketch No. SK-G-643,

Appendix II. Cost estimate breakdown is shown on Page 23A,  
Appendix III.

Preliminary Cost Estimate: \$ 46,240.00

i. Line 800, Item 3

This is a stainless steel tank, the same as Line 6, Item 7 (Para. j., above). It receives washdown water from projectile section-alizing operations in Bldg. 800-188. The concept design is the same as Para. j., above. Concept design is shown on Sketch No. SK-G-643, Appendix II. Cost estimate breakdown is shown on Page 23A, Appendix III.

Preliminary Cost Estimate: \$ 46,240.00

m. Explosives Disposal Area (BG), Item 1

This is an in-ground concrete sump which receives washdown water via a floor trough from Bldg. BG-199-1. It contains 1,297 gallons with 6" of free board. It also contains an overflow pipe which feeds a second in-ground concrete sump designed to collect an additional 1,000 gallons of deluge water in the event the deluge system in the building is activated. The concept design will be to remove both of these sumps and provide one 6 ft. wide x 20 ft. long x 3 ft. deep tank with an over flow baffle up to 6" below the top of the tank located at the center of the tank. The tank will contain 2,244 gallons, with 1,122 gallons on each side of the baffle. The tank will be installed in a 10 ft. wide x 24 ft. long x 4 ft. deep concrete vault. An insulated metal sandwich panel rain tight shed and high liquid level alarm will be provided as described in Para. b., above. Concept design is shown on Sketch

No. SK-BG-43, Appendix II. Cost estimate breakdown is shown on Pages 24 - 27, Appendix III.

Preliminary Cost Estimate: \$ 88,151.00

n. Explosives Disposal Area (BG), Item 3

This is an in-ground concrete sump of 1,729 gallon capacity which collects washdown water from the Explosives Decontamination Facility, BG-13. This sump will be removed and a 6 ft. wide x 15 ft. long x 3 ft. deep stainless steel tank containing 1,683 gallons with 6" of freeboard will be provided and installed in a concrete vault. A rain tight shed and high liquid level alarm will be provided as described in Para. b., above. Concept design is shown on Sketch No. BG-42, Appendix II. Cost estimate breakdown is shown on Pages 16 - 19, Appendix III.

Preliminary Cost Estimate: \$ 70,759.00

2. Priority 2 Sumps (See Spread Sheets, Appendix I)

a. Line 3A, Item 1

This is an in-ground concrete sump identical to Line 3, Item 2, Para. 1., e above. The scope of work will be the same as in Para. 1, e., above. Concept design is shown on Sketch No. SK-G-645, Appendix II. cost estimate breakdown is shown on Pages 28 - 31, Appendix III.

Preliminary Cost Estimate: \$ 51,885.00

b. Line 3A, Item 5

This is an in-ground concrete collection sump for projectile washout and equipment washdown. It contains 3,590 gallons with 6"

of freeboard. Due to the integral construction of this sump within Bldg. 3A-05-1, it is recommended that a double-walled stainless steel tank be installed within the existing concrete sump. Feed troughs from both the projectile washout area and building washdown will be extended into the new tank. The new double-walled tank will be 5 ft. wide x 12 ft.- 8 in. long x 2 ft.- 8 in. deep and will contain 1,028 gallons with 6" of freeboard. While this tank is considerably smaller than the existing concrete sump, water is now continuously pumped to a nearby pink water treatment plant from the sump. Therefore, it is determined that less retention time is required than prior to construction of the pink water treatment plant when the water was hauled by tank truck to a disposal area. The stainless steel tank will have a continuous monitor in the interstitial space between the walls which will alarm in the sump area should a leak develop in the tank. In addition, a continuous high liquid level alarm will be provided in the tank both locally at the sump area, as well as at Security Headquarters which is manned 24 hours per day, seven days per week. A steel, insulated metal sandwich panel, rain tight shed will be provided over the existing sump and new tank. The interior of the shed will be heated with a thermostatically controlled unit heater to maintain a minimum temperature of 40°F . Concept design is shown on Sketch No. SK-3A-221, Appendix II. Cost estimate breakdown is shown on Pages 32 - 35, Appendix III.

Preliminary Cost Estimate: \$ 61,550.00

c. Line 4A, Item 6

This is an in-ground concrete sump of 450 gallon capacity. The sump collects water contaminated with RDX from Bldg. 4A-58-2. This sump will be replaced with a 6 ft. wide x 6 ft. long x 3 ft. deep stainless steel tank containing 673 gallons with 6" freeboard installed within a concrete vault identical to that described in Para. 1.b. above. The design of the system will be the same as described in Para. 1. b., above, except for size. The concept design is shown on Sketch No. SK-G-645, Appendix II. The cost estimate breakdown is shown on Pages 28 - 31, Appendix III.

Preliminary Cost Estimate: \$ 51,885.00

d. Line 4A, Item 7

This is a 950 gallon capacity in-ground concrete sump which collects water contaminated with RDX from Bldg. 4A-63. It will be replaced with a stainless steel tank 6 ft. wide x 10 ft. Long x 3 ft. deep installed within a concrete vault. This tank will contain 1,122 gallons with 6" of freeboard. The concept design will be the same as described in Para. 1.b., above. The concept design is shown on Sketch No. SK-G-645, Appendix II. The cost estimate breakdown is shown on Pages 6 - 10, Appendix III.

Preliminary Cost Estimate: \$ 57,350.00

e. Lines 5A & 5B, Items 1, 2, 3, 4 and 16

These five (5) sumps are identical and are constructed of aluminum set directly in the ground. They have capacity of 748 gallons each. They will be replaced with stainless steel tanks 6 ft. wide x 6 ft. long x 3 ft. deep each, installed within a concrete vault.

The capacity of each tank is 673 gallons with 6" of freeboard. Concept design is the same as described in Para. 1.b., above, except for size. The concept design is shown on Sketch No. SK-G-645, Appendix II. Cost estimate breakdown is shown on pages 28 - 31, Appendix III.

Preliminary Cost Estimate: \$ 51,885.00 each

Total for Five (5) Sumps \$207,540.00

f. Lines 5A & 5B, Items 5, 6, 7 and 8

These four (4) sumps are identical and are constructed of aluminum set directly in the ground. They are of 660 gallon capacity each. They will be replaced with 6 ft. wide x 6 ft. long x 3 ft. deep stainless steel tanks installed within concrete vaults. The capacity of each tank will be 673 gallons with 6" of freeboard. concept design is the same as described in Para 1. b., above, except for size. Concept design is shown on Sketch No. SK-G-645, Appendix II. Cost estimate breakdown is shown on Pages 28 - 31, Appendix III.

Preliminary Cost Estimate: \$ 51,885.00

Total for Four (4) Sumps \$207,540.00

g. Line 6, Item 9

This is a 3 ft. dia. x 4 ft. deep stainless steel tank of 185 gallon capacity buried directly in the ground and fed from a floor trough in Bldg. 6-18-1. The design concept for this sump will be to remove it and reinstall on a stand within a concrete vault. Other design features are described in Para. 1.j., above. The concept design is shown on Sketch No. SK-G-643, Appendix II. The

cost estimate breakdown is shown on Page 23A, Appendix III.

Preliminary Cost Estimate: \$ 46,240.00

3. Priority 3 Sumps (See Spread Sheets, Appendix I)

All Priority 3 Sumps are not currently in use and have no planned future use. It is recommended that these sumps be excavated and removed. The excavated area will be backfilled, seeded and fertilized. Since no rules have been promulgated on removal of these explosive collection sumps no estimate is given for soil sampling and over excavation. The estimates are based on removal of that soil only as required to remove the sumps.

- a. Remove six (6) each, 673 gallon capacity in-ground concrete sumps as shown on Spread Sheets, Appendix I, as follows:

Line 1, Items 2, 3, & 7; Line 2, Items 4 & 5; Line 3A, Items 2 &

3. For cost estimate see Pages 36 - 37, Appendix III.

Preliminary Cost Estimate: \$ 9,210.00 each

Total for Six (6) Sumps \$ 55,260.00

- b. Remove five (5) each, 1,480 gallon capacity in-ground concrete sumps as shown on Spread Sheets, Appendix I, as follows:

Line 1, Items 5 & 6; Line 2, Items 6 & 7; Line 3, Item 7. For cost estimate breakdown see Pages 38 - 39, Appendix III.

Preliminary Cost Estimate: \$ 12,450.00 each

Total for Five (5) Sumps \$ 62,250.00

- c. Remove one (1) each 539 gallon capacity in-ground concrete sump as shown on the Spread Sheet, Appendix I, as follows:

Line 1, Item 7. For cost estimate breakdown see Pages 36 - 37, Appendix III.



Preliminary Cost Estimate: \$ 9,210.00

- d. Remove one (1) each 1,964 gallon capacity in-ground concrete sump as shown on the Spread Sheet, Appendix I, as follows:

Line 1, Item 11. For cost estimate breakdown see Pages 41 - 42, Appendix III.

Preliminary Cost Estimate: \$ 20,470.00

- e. Remove three (3) each 1,122 gallon capacity in-ground concrete sumps as shown on the Spread Sheet, Appendix I, as follows:

Line 2, Items 1, 2, & 9. For cost estimate breakdown see Pages 43 - 44, Appendix III.

Preliminary Cost Estimate: \$ 11,290.00 each

Total for Three (3) Sumps \$ 33,870.00

- f. Remove eighteen (18) 60 gallon capacity in-ground concrete sumps as shown on the Spread Sheets, Appendix I, as follows:

Line 1, Items 13 & 14; Lines 5A & 5B, Items 9, 10, 11, 12, 13, 14, 15, 17 & 18; Line 6, Items 10, 11 & 12; Line 7, Items 6, 7, 8 & 9. For cost estimate breakdown see Pages 45 - 46, Appendix III.

Preliminary Cost Estimate: \$ 4,750.00 each

Total for Eighteen (18) Sumps \$ 85,500.00

- g. Remove one (1) each 510 gallon capacity in-ground concrete sump as shown on the Spread Sheet, Appendix I, as follows:

Line 3, Item 11. For cost estimate breakdown see Page 47, Appendix III.

Preliminary Cost Estimate: \$ 10,250.00 each

- h. Remove one (1) each 660 gallon capacity stainless steel sump tank as shown on the Spread Sheet, Appendix I, as follows:

Line 1, Item 8. For cost estimate breakdown see Pages 48 - 49,  
Appendix III.2

Preliminary Cost Estimate: \$ 3,200.00 each

Summary

a. Priority 1 Sumps

The total preliminary cost estimate to replace all Priority 1 sumps shown in Description of Work Required, Para. 1,a. through n., above is \$ 867,385.00.

b. The total preliminary cost estimate to replace all Priority 2 sumps shown in Description of Work Required, Para. 2,a. through g., above is \$ 735,875.00.

c. The total preliminary cost estimate to remove all Priority 3 sumps shown in Description of Work Required, Para. 3,a. through h., above is \$ 280,010.00.

The estimates in a. and b. are based on replacing these sumps as if they were hazardous waste treatment sumps per EPA requirements. To our knowledge there are no EPA, or Iowa State rule governing these in-ground explosives collection sumps, at the present time. Should future rules be promulgated, the concept designs and preliminary estimates should be reviewed to ensure compliance.

MASON & HANGER-SILAS MASON CO., INC.  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IA 52638

14 December 1990

APPENDIX I

SPREADSHEET LISTING OF SLUMPS

Date: 25 April 1990  
 Revised: 11 July 1990

MASON & HANGER-SILAS MASON CO., INC.  
 IOWA ARMY AMMUNITION PLANT  
 MIDDLETOWN, IA 52638

IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 1

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	W. of 1-04 in Parking Area	400 Gal. Concrete-48" W x 48" L x 60 D	Waste from 1-04 Lab sinks & misc. floor drains	Black & Vetch #104-12-A	Active	No	No explosives are entered into this sump. Not an explosive collection sump. No action required on this survey.
2.	N of 1-50	673 Gal. Concrete-54" W x 96" L x 36" D	Waste water from explosive dust collection sys. & floor drains	D&Z #5428	Inactive	Yes	Not currently used. Would need only if Bldg. 1-50 is ever used again as screening building. Recommend demolition and closure - Priority 3.
3.	S. of 1-50	673 Gal. Concrete-54" W x 96" L x 36" D	Waste water from explosive dust collection sys. & floor drains	D&Z #5428	Inactive	Yes	Not currently used. Would need only if Bldg. 1-50 is ever used again as screening building. Recommend demolition and closure - Priority 3.
4.	W. of 1-155-1	2618 Gal. Concrete-96" W x 180" L x 39" D	Used to settle water from Pink Water Treatment Bldg.	1-05-2-U-1	Active	No	Not an explosives collection sump. Used to settle/ separate carbon in water from Pink Water Treatment plant, Bldg. 1-70-1. No action required on this survey.
5.	N. of 1-05-1	1480 Gal. Concrete-72" W x 72" L x 72" D	Used as explosives washout sump in World War II	D&Z #997 & 2657	Inactive	Yes	Not used for many years. Not required for any known future operations. Recommend demolition and closure - Priority 3.
6.	S. of 1-05-2	1480 Gal. Concrete-72" W x 72" L x 72" D	Used as explosives washout sump in World War II	D&Z #997 & 2657	Inactive	Yes	Not used for many years. Not required for any known future operations. Recommend demolition and closure - Priority 3.

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 Revised: 11 July 1990

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IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 1

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
7.	W. of 1-08-1	539 Gal. Concrete-54" W x 96" L x 36" D	Waste water from explosive dust collection system.	1-08-1-A-1 1-08-1-A-2	Inactive	Yes	Not used for many years. Not required for any known future operations. Recommend demolition and closure - Priority 3.
8.	W. side S. end of 1-12	660 Gal. Stainless steel 60 " dia x 60 D	Unknown	SK-G-213	Inactive	Unknown	Use unknown - Apparently received material from 1-12. Not currently used. Recommend demolition and closure - Priority 3.
9.	N. of 1-70	1964 Gal. Concrete 124" W x 228" L x 27" D	Waste water from Pink Water Treatment Facility	1-40-U-3 1-70-U-2	Inactive	No	Not an explosives collection sump. No action required as part of this survey.
10.	Abandoned con- taminated waste water collection system - Line 1	N/A	Conduit for treated water effluent from carbon columns	1-G/U-89	Inactive	No	Not explosives collection sumps. No action required as part of this survey. Entire U/G collection system should be evaluated in the future for disposition.
11.	W. of 1-40	1964 Gal. Concrete-124" W x 229" L x 27" D	Sump for explo- sive waste water from 1-40	1-40-U-3	Inactive	Yes	This sump has not been used for years. No future use known. Recommend demolition and closure - Priority 3.
12.	N.E. of 1-05-2	18,423 Gal. Steel - 168" Dia x 384" L x 84" D	Contaminated water recircu- lation tank	1-05-2-S-602	Active	Yes	This tank is installed on ground. Soil should be excavated to provide an above ground tank - Priority 1.

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Date: 25 April 1990  
 Revised: 11 July 1990

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IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 1

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP.SUMP (Y or N)	REMARKS
13.	N. of 1-05-1	60 Gal. Concrete- 2' L x 2' W x 2' D	Sump for bldg. & equipment washdown	Similar construction to D&Z #166	Inactive	Yes	Bldg. 1-05-1 has not been used for many years. No future use known. Recommend demolition and closure - Priority 3.
14.	S. of 1-05-2	60 Gal. Concrete- 2' L x 2' W x 2' D	Sump for bidg. & equipment washdown	Similar construction to D&Z #166	Inactive	Yes	Bldg. 1-05-2 has not been used for many years. No future use known. Recommend demolition and closure - Priority 3.

Date: 25 April 1990  
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IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 2

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	S. of 2-05-1 (2-140-1)	1122 Gal. Concrete-90" W x 96" L x 36" D	Sump for explo- sives from dust/ fume collection system	D&Z #5428	Inactive	Yes	Currently inactive and no future requirements known. Recommend demolition and closure - Priority 3.
2.	N. of 2-05-1 (2-140-2)	1122 Gal. Concrete-90" W x 96" L x 36" D	Sump for explo- sives from dust/ fume collection system	D&Z #5428	Inactive	Yes	Currently inactive and no future requirements known. Recommend demolition and closure - Priority 3.
3.	N. of 2-05-2 (2-140-3)	1122 Gal. Concrete-90" W x 96" L x 36" D	Sump for floor drains in Bldg. 2-05-2	D&Z #5428	Active	Yes	Required for explosive melt-pour operations. Recommend replacement - Priority 1.
4.	S. of 2-50 (2-140-5)	673 Gal. Concrete-54" W x 96" L x 36" D	Sump for screen- ing system dust collection and floor drain	D&Z #5428	Inactive	Yes	Currently inactive - no future plans require TNT screening in Line 2. Recommend demolition and closure - Priority 3.
5.	S. of 2-06-1 (2-140-6)	673 Gal. Concrete-54" W x 96" L x 36" D	Sump for floor drains	D&Z #5428	Inactive	Yes	Not currently used - no known future plans require TNT screening in Line 2. Recommend demolition and closure - Priority 3.
6.	N. of 2-05-1 Off of Ramp 2-82-9	1480 Gal. Concrete-72" W x 72" L x 72" D	Used as sump for equipment and projectile washout	D&Z #997 & 2657	Inactive	Yes	Not currently used - no known future use. Recommend demolition and closure - Priority 3.

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IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 2

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
7.	S. of 2-05-2 Off of Ramp 2-82-9	1480 Gal. Concrete-72" W x 72" L x 72" D	Used as sump for equipment and projectile washout	D&Z #997 & 2657	Inactive	Yes	Not currently used - no known future. Recommend demolition and closure - Priority 3.
8.	Recirculating tank W. of 2-05-1	18,423 Gal. Steel - 168" dia x 384" L x 85" D	Recirculating tank for equip- ment & projec- tile washout	1-05-2-S-602	Active	Yes	Tank is 40% buried. Tank must be provided with concrete containment vault - Priority 1.
9.	W. of 2-05-1 Bldg. Sump	1122 Gal. Concrete-90" W x 96" L x 36" D	Collection sump for projectile washout & equip- ment washdown	D&Z #5428	Active	Yes	This sump was formerly used, however it is now bypassed and no longer used. Recommend demolition and closure - Priority 3.



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IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 3

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	N. of 3-05-2 (3-140-1)	1346 Gal. Concrete-108" W x 96" L x 36" D	Collection sump for dust collec- tion system and floor drain	D&Z #5428	Active	Yes	Required for explosive melt-pour operations in building 3-05-2. Recommend replacement - Priority 1.
2.	N. of 3-50 (3-140-2)	673 Gal. Concrete-54" W x 96" L x 36" D	Coll. sump f/TNT screening dust collection sys.& floor drain	D&Z #5428	Active	Yes	Required for TNT screening in Bldg. 3-50. Recommend replacement - Priority 1
3.	S. of 3-50 (3-140-3)	673 Gal. Concrete-54" W x 96" L x 36" D	Coll. sump f/TNT screening dust collection sys.& floor drain	D&Z #5428	Active	Yes	Required for TNT screening in Bldg. 3-50. Recommend replacement - Priority 1.
4.	N. of 3-70-3	36,098 Gal. Concrete-124" dia. x 90" deep	Solids contact basin	C.O.E. #26-12-01 Shts. P-4 & P-5	Inactive	No	Not an explosives collection sump. Formerly used for metal cleaning. No action required as part of this survey.
5.	N.W. of 3-70-3 (3-163-2)	15,568 Gal. Concrete-96" W x 96" L x 63" D	Neutralization basin	C.O.E. #26-12-01 Shts. P-4 & P-5	Inactive	No	Not an explosives collection sump. Formerly used for metal cleaning. No action required as part of this survey.
6.	In floor of Bldg. 3-01 North end (2) each	205 Gal. each Concrete-34" W x 58" L x 30" D	Acid/Alkali basin & chromic acid basin	C.O.E. #26-12-01 Shts. P-4 & P-5	Inactive	No	Not an explosives collection sump. Formerly used for metal cleaning. No action required as part of this survey.

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IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 3

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
7.	N. of 3-05-1 Off of Ramp 3-82-9	1480 Gal. Concrete-72" W x 72" L x 72" D	Used for sump out of projec- tiles & cleaning of equipment	D&Z #997 & 2657	Active	Yes	Not currently used. No future use known. Recommend demolition and closure - Priority 3.
8.	S. of 3-05-2 Off of Ramp 3-82-9	1480 Gal. Concrete-72" W x 72" L x 72" D	Used for sump out of projec- tiles & cleaning of equipment	D&Z #997 & 2657	Active	Yes	Required for explosive melt-pour operations in building 3-05-2. Recommend replacement - Priority 1.
9.	W. of 3-70-3	500 Gal. Steel tank underground		C.O.E. #26-12-0 Shts. P-4 & P-5	Inactive	No	Not an explosives collection sump. Formerly used for metal cleaning. No action required as part of this survey.
10.	E. of 3-05-1	18,423 Gal. Steel - 168" dia 384" L x 86" D	Explosive con- taminated waste water recircu- lating tank	3-05-1-S-619	Active	Yes	This tank has approximately 10% of its volume in the ground. Recommend excavation of soil to provide above ground tank - Priority 1.
11.	N.E. of 3-05-1 Bldg. sump	510 Gal. Concrete-36" W x 78" L x 42" D	Projectile wash- out and equip- ment cleaning sump	C.O.E. #36-36-02 Shts. 1 & 2	Inactive	Yes	Formerly used as sump for projectile washout and equipment cleaning. Sump is now bypassed and no longer used. Recommend demolition and closure - Priority 3.
12.	N.W. of 3-05-1 Bldg. sump	576 Gal. Concrete-48" W x 84" L x 33" D	Bldg. washdown and fume/dust collection sump	3-05-1-S-605	Active	Yes	This sump is currently in use to support operations in Bldg. 3-05-1. Recommend replacement - Priority 1.

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IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 3A-----

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	N. 3A-50-1 (3A-140-3)	673 Gal. Concrete-54" 96" L x 39" D	Collection sump for TNT screen- ing operations at Bldg. 3A-50-1	D&Z #5428	Inactive	Yes	Will need when, and if Line 3A melt-pours TNT. Line is not in production at the present time - Priority 2.
2.	W. of 3A-50-2 (3A-140-4)	673 Gal. Concrete-54" W x 96" L x 39" D	Collection sump for TNT screen- ing operations at Bldg. 3A-50-2	D&Z #5428	Inactive	Yes	This sump supports screening for Bldg. 3A-05-2 and hasn't been used for years. Recommend demolition and closure - Priority 3.
3.	S. of 3A-05-1	673 Gal. Concrete-54" W x 96" L x 39" D	Washdown for Bldg. 3A-05-1	D&Z #5428	Inactive	Yes	This sump has not been used for years. Entry to sump is not evident. Recommend demolition and closure - Priority 3
4.	W. of 3A-140-7	87,920 Gal Concrete-360" W x 492" L x 206" D	Cart bath water reservoir	3A-05-1-S-619	Inactive	No	Not an explosive collection sump. No action planned as part of this project.
5.	S. of 3A-05-1 (3A-140-1)	3,590 Gal. Concrete-72" W x 240" L x 54" D	Collection sump for projectile washout & equip- ment cleaning	3A-05-1-M-647 D&Z #2657	Inactive	Yes	Will need when, and if Line 3A commences melt-pour operations. Line is not in production at present time - Priority 2.

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IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 4A

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	East of N. end of 4A -22 (2 ea.)	660 Gal. Stainless steel- 5' round x 5' deep	Hazardous Waste Treatment sumps	C.O.E. #IA-40-13-04 Sht. M-12	Active	Yes	Presently planned for replacement on Project 5885711-05, or IA-W-16.
2.	N. of East Wing of 4A-22 (4 ea.)	660 Gal. Stainless steel- 5' round x 5' deep	Hazardous Waste Treatment sumps	C.O.E. #IA-40-13-04 Sht. M-12	Active	Yes	Presently planned for replacement on Project 5885711-05, or IA-W-16.
3.	S. of East Wing of 4A-22 (4 ea.)	660 Gal. Stainless steel- 5' round x 5' deep	Hazardous Waste Treatment sumps	C.O.E. #IA-40-13-04 Sht. M-12	Active	Yes	Presently planned for replacement on Project 5885711-05, or IA-W-16.
4.	N. of 4A-07 (2 ea.)	660 Gal. Stainless steel- 5' round x 5' deep	Hazardous Waste Treatment sumps	C.O.E. #IA-40-13-04 Sht. M-12	Active	Yes	Presently planned for replacement on Project 5885711-05, or IA-W-16.
5.	S. of 4A-07 (2 ea.)	660 Gal. Stainless steel- 5' round x 5' deep	Hazardous Waste Treatment sumps	C.O.E. #IA-40-13-04 Sht. M-12	Active	Yes	Presently planned for replacement on Project 5885711-05, or IA-W-16.
6.	E. of 4A-58-2	450 Gal. Concrete - 2'-8" W x 6'-6" L X 3'-0" D	RDX Holding Sump	C.O.E. #IA-40-02-07 Sht. S-43	Active	Yes	Line 4A is planned for layaway in FY91. This sump will be required for M-Day - Priority 2.

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LINE 4A

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
7.	N.W. of 4A-63	950 Gal. Concrete- 5'-0" W X 8'-6" L X 3'-0" D	RDX Holding Sump	C.O.E. #IA-40-02-07 Sht. S-43	Active	Yes	Line 4A is planned for layaway in FY91. This sump will be required for M-Day - Priority 2

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LINE 5A & 5B

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	E. of 5B-140-3	748 Gal. Alum. - 48" W x 120" L x 36" D	Collection sump from dust col- lection system in 5B-28	5-G/U-607 7-G/S-600	Inactive	Yes	Line is presently in Layaway for M-Day. Will be needed for pressing operations in 5B-28 at M-Day. Recommend replacement - Priority 2.
2.	W. of 5B-140-3	748 Gal. Alum. - 48" W x 120" L x 36" D	Collection sump from dust col- lection system in 5B-28	5-G/U-607 7-G/S-600	Inactive	Yes	Line is presently in Layaway for M-Day. Will be needed for pressing operations in 5B-28 at M-Day. Recommend replacement - Priority 2.
3.	E. of 5A-140-3	748 Gal. Alum. - 48" W x 120" L x 36" D	Collection sump from dust col- lection system in 5A-28	5-G/U-607 7-G/S-600	Inactive	Yes	Line is currently inactive, but this sump is needed for production of demolition blocks at M-Day. Recommend replacement - Priority 2.
4.	W. of 5A-140-3	748 Gal. Alum. - 48" W x 120" L x 36" D	Collection sump from dust col- lection system in 5A-28	5-G/U-607 7-G/S-600	Inactive	Yes	Line is currently inactive, but this sump is needed for production of demolition blocks at M-Day. Recommend replacement - Priority 2.
5.	S. of 5B-140-1	660 Gal Alum. - 60" dia x 60" deep	Collection sump for screening & blend. dust coll at Bldg. 5B-26	SK-G-213	Inactive	Yes	Line is presently in Layaway for M-Day. Will be needed for screening and blending operations at M-Day. Recommend replacement - Priority 2.
6.	S. of 5B-140-2	660 Gal Alum. - 60" dia x 60" deep	Collection sump for dust coll. from pelleting tables in 5B-29	SK-G-213	Inactive	Yes	Line is presently in Layaway for M-Day. Will be needed for screening and blending operations at M-Day. Recommend replacement - Priority 2.

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IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 5A & 5B

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
7.	S. of 5A-140-1	660 Gal. Alum. - 60" dia x 60" deep	Collection sump for dust coll. from screen. & blend. at 5A-26	SK-G-213	Inactive	Yes	Line is currently inactive, but this sump is needed for production of demolition blocks at M-Day. Recommend replacement - Priority 2.
8.	S. of 5B-140-2	660 Gal. Alum. - 60" dia x 60" deep	Collection sump for dust coll. from screen. & blend. in 5A-26	SK-G-213	Inactive	Yes	Line is currently inactive, but this sump is needed for production of demolition blocks at M-Day. Recommend replacement - Priority 2.
9.	W. of 5B-27	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166	Inactive	Yes	This sump was used to collect water from building wash down. Not used in recent years. Recommend demolition and closure - Priority 3.
10.	W. of 5B-25	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166	Inactive	Yes	This sump was used to collect water from building wash down. Not used in recent years. Recommend demolition and closure - Priority 3.
11.	W. of 5A-25	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166	Inactive	Yes	This sump was used to collect water from building wash down. Not used in recent years. Recommend demolition and closure - Priority 3.
12.	N. of 5B-55	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown	D&Z #166	Inactive	Yes	This sump was used to collect water from building wash down. Not used in recent years. Recommend demolition and closure - Priority 3.

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LINE 5A & 5B

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/INACTIVE	EXP. SUMP (Y or N)	REMARKS
13.	S. of 5B-55	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166	Inactive	Yes	This sump was used to collect water from building wash down. Not used in recent years. Recommend demolition and closure - Priority 3.
14.	S. of 5B-21	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166	Inactive	Yes	This sump was used to collect water from building wash down. Not used in recent years. Recommend demolition and closure - Priority 3.
15.	S. of 5A-21	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166	Inactive	Yes	This sump was used to collect water from building wash down. Not used in recent years. Recommend demolition and closure - Priority 3.
16.	N. of 5A-28	748 Gal. Alum. - 48" W x 120" L x 36" D	Dust Collection system for operations in 5A-28	5-G/U-607 7-G/S-600	Inactive	Yes	Line is currently inactive, but this sump is needed for production of demolition blocks at M-Day. Recommend replacement - Priority 2.
17.	N. of 5A-56	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166	Inactive	Yes	This sump was used to collect water from building wash down. Not used in recent years. Recommend demolition and closure - Priority 3.
18.	N. of 5B-56	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166	Inactive	Yes	This sump was used to collect water from building wash down. Not used in recent years. Recommend demolition and closure - Priority 3.



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LINE 6

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	S. of 6-91	185 Gal. Stainless steel- 3' dia. x 4' deep	Explosive col- lection sump from Bldg. 6-91	6-G/S-603	Inactive	Yes	This sump is planned for demolition and closure on Corps of Engineers Project. See message from CEMRO-ED-EA to SMCIO-EN dated 29 November 1989.
2.	(3) S. of 6-25	185 Gal. each Stainless steel- 3' dia. x 4' deep	Explosive col- lection sump from Bldg. 6-25	6-G/S-603	Inactive	Yes	This sump is planned for demolition and closure on Corps of Engineers Project. See message from CEMRO-ED-EA to SMCIO-EN dated 29 November 1989.
3.	S.E. of 6-35	185 Gal. Stainless steel- 3' dia. x 4' deep	Explosive col- lection sump from Bldg. 6-35	6-G/S-603	Inactive	Yes	This sump is planned for demolition and closure on Corps of Engineers Project. See message from CEMRO-ED-EA to SMCIO-EN dated 29 November 1989. Removed in May 1990.
4.	N.E. of 6-35	185 Gal. Stainless steel- 3' dia. x 4' deep	Explosive col- lection sump from Bldg. 6-35	6-G/S-603	Inactive	Yes	This sump is planned for demolition and closure on Corps of Engineers Project. See message from CEMRO-ED-EA to SMCIO-EN dated 29 November 1989. Removed in May 1990.
5.	(2) S. of 6-89	660 Gal. each Stainless steel- 5' dia. x 5' deep	Explosive waste treatment sump	SK-G-213	Inactive	Yes	This sump is planned for demolition and closure on Corps of Engineers Project. See message from CEMRO-ED-EA to SMCIO-EN dated 29 November 1989.
6.	(2) S. of 6-88	660 Gal. each Stainless steel- 5' dia. x 5' deep	Explosive col- lection sump	SK-G-213	Inactive	Yes	This sump is planned for demolition and closure on Corps of Engineers Project. See message from CEMRO-ED-EA to SMCIO-EN dated 29 November 1989.

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LINE 6

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
7.	S.E. of 6-49	660 Gal. Stainless steel- 5' dia. x 5' deep	Explosive waste treatment sump	6-49-P-611 SK-G-213	Active	Yes	Presently used for wash down and dust collection from pelleting operations in Bldg. 6-49. Recommend replacement - Priority 1.
8.	S. of 600-86-2	660 Gal. Stainless steel- 5' dia. x 5' deep	Never used. Collection sump for Bldg. 600-86-2	C.O.E. #35-06-02 Sht. C-7	Inactive	Yes	Collection sump for Chemistry Laboratory which was never used. Recommend demolition and closure - Priority 3. Removed in May 1990.
9.	N. of 6-18-1	185 Gal. Stainless steel- 3' dia. x 4' deep	Explosive collection sump for RDX wash operations	6-G/S-603	Inactive	Yes	This sump will be required for M-Day operations - Priority 2.
10.	W. of 6-19	60 Gal. Concrete 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166 (TYP)	Inactive	Yes	This sump has not been used for years. Was formerly used as a building washdown sump. Recommend demolition and closure - Priority 3.
11.	W. of 6-96	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166 (TYP)	Inactive	Yes	This sump has not been used for years. Was formerly used as a building washdown sump. Recommend demolition and closure - Priority 3.
12.	E. of 6-98	60 Gal. Concrete - 24" W x 24" L x 24" D	Bldg. washdown sump	D&Z #166 (TYP)	Inactive	Yes	This sump has not been used for years. Was formerly used as a building washdown sump. Recommend demolition and closure - Priority 3.

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LINE 7

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	S.E. of 7-36	748 Gal. Alum. - 48" L x 120" L x 36" D	Black powder collection sump	7-G/S-600	Inactive	Yes	This line has been excessed. Recommend demolition and closure - Priority 3. Removed in May 1990.
2.	W. of 7-19-2	660 Gal. Aluminum 60" dia. x 60" deep	Black powder sump	7-G/S-600	Inactive	Yes	This line has been excessed. Recommend demolition and closure - Priority 3. Removed in May 1990.
3.	S. of 7-19-1	660 Gal. Aluminum 60" dia. x 60" deep	Black powder sump	7-G/S-600	Inactive	Yes	This line has been excessed. Recommend demolition and closure - Priority 3. Removed in May 1990.
4.	S. of 7-54-2	660 Gal. Aluminum 60" dia. x 60" deep	Black powder sump	7-G/S-600	Inactive	Yes	This line has been excessed. Recommend demolition and closure - Priority 3. Removed in May 1990.
5.	S.E. of 7-64	660 Gal. Aluminum 60" dia. x 60" deep	Black powder sump	7-G/S-600	Inactive	Yes	This line has been excessed. Recommend demolition and closure - Priority 3. Removed in May 1990.
6.	N. of 7-18	60 Gal. Concrete - 24" x 24" x 24" deep	Bldg. washdown sump	D&Z #166 2	Inactive	Yes	This line has been excessed. Recommend demolition and closure - Priority 3.

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LINE 7

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
7.	S. of 7-67	60 Gal. Concrete - 24" x 24" x 24" deep	Bldg. washdown sump	D&Z #166	Inactive	Yes	This line has been excessed. Recommend demolition and closure - Priority 3.
8.	S.W. of 7-54-1	60 Gal. Concrete - 24" x 24" x 24" deep	Bldg. washdown sump	D&Z #166	Inactive	Yes	This line has been excessed. Recommend demolition and closure - Priority 3.
9.	S.W. of 7-54-2	60 Gal. Concrete - 24" x 24" x 24" deep	Bldg. washdown sump	D&Z #166	Inactive	Yes	This line has been excessed. Recommend demolition and closure - Priority 3.

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LINE\_9\_\_\_\_\_

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	Two sumps E. of 9-14	660 Gal. each Stainless steel 60" dia. x 60" deep	Hazardous waste treatment tank	9-G/S-600	Inactive	Yes	Current and planned operations do not require these tanks. Recommend demolition and closure - Priority 3. Removed in May 1990.
2.	Two sumps E. of 9-57	660 Gal. each Stainless steel 60" dia. x 60" deep	Hazardous waste treatment tank	9-G/S-600	Inactive	Yes	Current and planned operations do not require these tanks. Recommend demolition and closure - Priority 3. Removed in May 1990.
3.	Two sumps W. of 9-58	660 Gal. each Stainless steel 60" dia. x 60" deep	Hazardous waste treatment tank	9-G/S-600	Inactive	Yes	Current and planned operations do not require these tanks. Recommend demolition and closure - Priority 3. Removed in May 1990.

Date: 25 April 1990  
 Revised: 11 July 1990

MASON & HANGER-SILAS MASON CO., INC.  
 IOWA ARMY AMMUNITION PLANT  
 MIDDLETOWN, IA 52638

IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE 800

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	Two sumps N. of 800-04	660 Gal. Stainless steel 60" dia. x 60" deep each	Industrial waste - not explosive	SK-G-213	Inactive	No	Not an explosive collection sump - not part of this survey - No action required.
2.	N.W. of 800-192	660 Gal. Stainless steel 60" dia. x 60" deep	Explosive collection sump from Bldg. 800-192	SK-G-213	Active	Yes	This sump is currently required for operations in Bldg. 800-192. Recommend replacement - Priority 1.
3.	W. of 800-188	660 Gal. Stainless steel 60" dia. x 60" deep	Explosive coll. sump f/sectionalizing operation Bldg. 800-188	SK-G-213	Active	Yes	This sump is currently required for sectionalizing projectiles at Bldg. 800-188. Recommend replacement - Priority 1.
4.	N. of 800-04 (800-70-2)	36,098 Gal. Concrete - 96" W x 96" L x 63" D	Solids Contact Basin for metals treatment	C.O.E. #26-12-02 Shts. P-4 & S-3	Inactive	No	Not an explosive collection sump - not part of this survey - No action.
5.	N. of 800-70-2	15,568 Gal. Concrete - 96" W x 96" L x 63" D	Neutralization Basin for metals treatment	C.O.E. #26-12-02 Sht. S-2	Inactive	No	Not an explosive collection sump - not part of this survey - No action.
6.	E. of 800-70-2	500 Gal. Steel Tank Underground	Collection sump for metals treatment	C.O.E. #26-12-02 Shts. P-2 & P-4	Inactive	No	Not an explosive collection sump - not part of this survey - No action.

Date: 25 April 1990  
 Revised: 11 July 1990

MASON & HANGER-SILAS MASON CO., INC.  
 IOWA ARMY AMMUNITION PLANT  
 MIDDLETOWN, IA 52638

IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY

LINE BG

ITEM NUMBER	SUMP LOCATION	SUMP SIZE CAPACITY	SUMP/USE MATERIAL	DRAWING NUMBER	ACTIVE/ INACTIVE	EXP. SUMP (Y or N)	REMARKS
1.	S. of EW1 Bldg. BG-199-1	1,297 Gal. Concrete - 48" W x 96" L x 65" D	Building wash down sump - overflows into fire prot. water sump	C.O.E. #36-15-04 Sht. S-7	Active	Yes	This sump can contain some explosives from building washdown. Recommend installation of stainless steel tank within existing concrete sump. Priority 1.
2.	S. of EW1 Bldg. BG-199-1	1,316 Gal. Concrete - 48" W x 96" L x 66" D	Fire protection water sump - feeds from Bldg. wash down sump	BG-199-1-S-600	Active	Yes	This sump is required only in the event of activation of the fire protection system in BG-199-1. Not an explosive collection sump. No action recommended as part of this survey.
3.	N. of BG-13	1,616 Gal. Concrete - 80" W x 102" L x 66" D	Decontamination wash out material	BG-G/S-2	Active	Yes	This sump is currently used for decontamination operations. Recommend replacement - Priority 1.

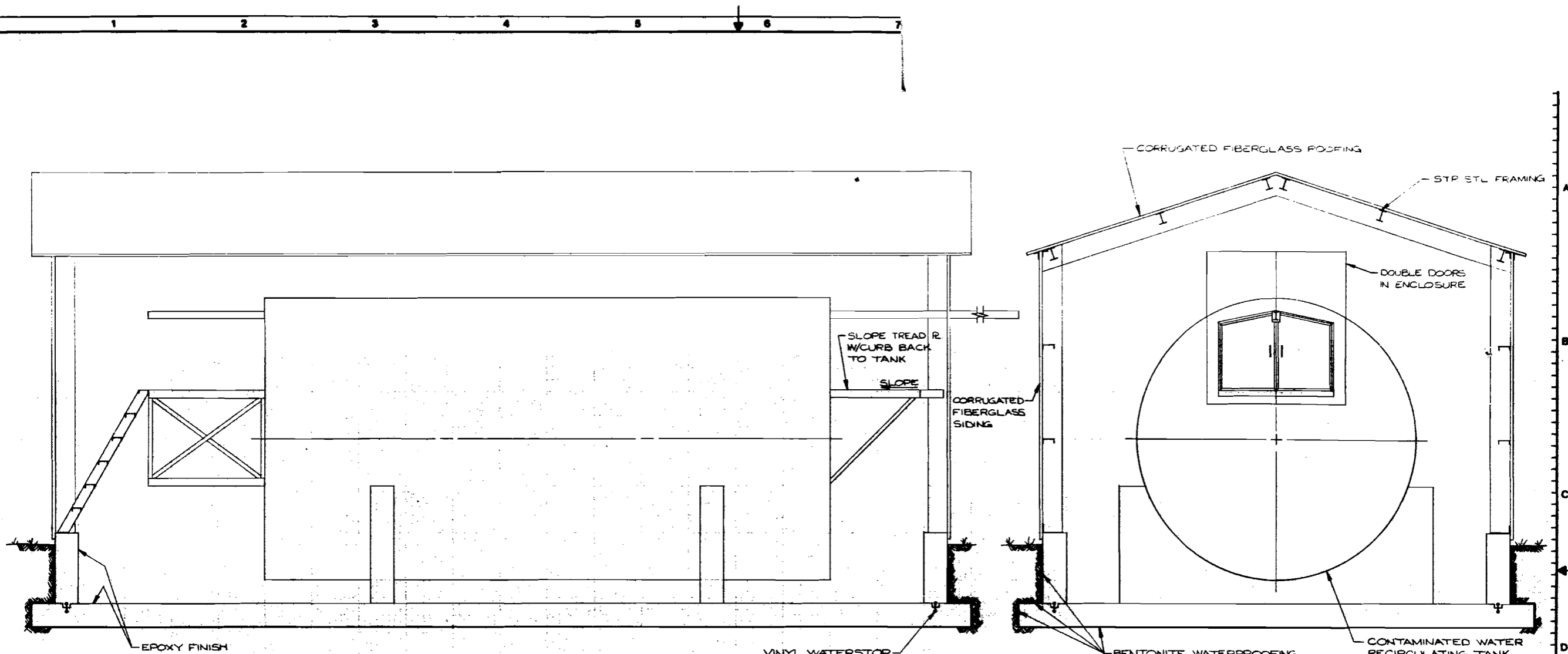
MASON & HANGER-SILAS MASON CO., INC.  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IA 52638

14 December 1990

APPENDIX II

CONCEPT DESIGN SKETCHES OF PRIORITY 1 & 2 SLUMPS





- REF DWG -  
CONTAMINATED WATER RECIRCULATING TANK I-05-2-S-602

**- NOTES -**

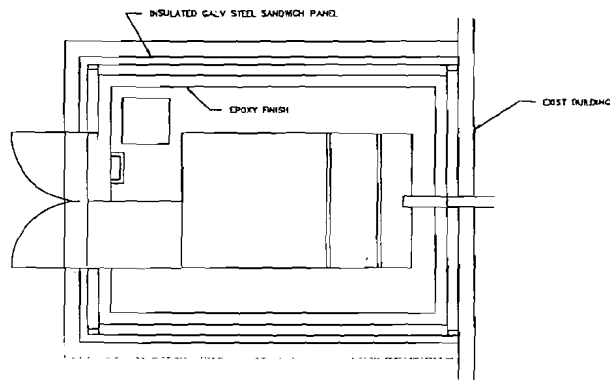
- 1.) REFERENCE 'IAAP IN-GROUND EXPLOSIVE COLLECTION SUMP SURVEY' ITEM #12 SHT 2, ITEM #8 SHT 5, ITEM #10 SHT 7
- 2.) DESIGNED TO COMPLY WITH THE REQUIREMENTS OF THE ENVIRONMENTAL PROTECTION AGENCY 40CFR PART 264, PARAGRAPH 264.193 (d)(2)
- 3.) THIS SKETCH WAS PREPARED FOR EXPLOSIVE COLLECTION SUMP SURVEY PROJECT #5895711-17, CLIN #0074AK

TOLERANCES UNLESS OTHERWISE NOTED	
FRACTIONAL:	_____
DECIMAL:	_____
ANGULAR:	_____
ALL DIM IN INCHES BREAK ALL SHARP EDGES	

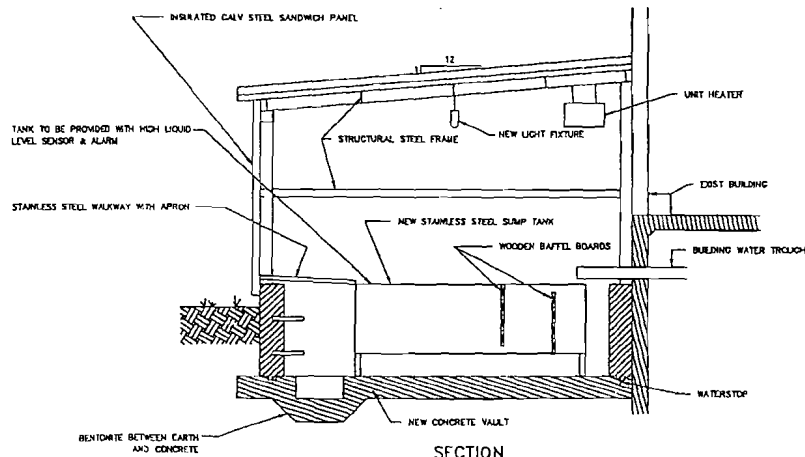
*Mason & Hanger-Pilas Mason Co., Inc.*  
ENGINEERS OPERATORS OF CONTRACTORS  
**IOWA ARMY AMMUNITION PLANT**  
MIDDLETOWN, IOWA 52638

CONCEPT DESIGN  
SECONDARY CONTAINMENT FOR  
CONTAMINATED WATER  
RECIRCULATING TANK

REV.	DATE	BY	CHECK	DESCRIPTION	APPROVED BY	DATE	PROJ. NO.	W.D.
ORIGINAL APPROVAL								
DATE	11-13-90							
DESIGNER	WEBER	DRAWN	JK	CHECK	SCALE	DATE	JOB	DRAWING NO.
					1/2" = 1'-0"	11/15/90		SK-G-647



PLAN



SECTION

BILL OF MATERIAL		DESCRIPTION
PC REQ	MATL. MATL. REF.	

NOTE:  
 1.) THIS SKETCH WAS PREPARED FOR EXPLOSIVE COLLECTION SUMP STUDY  
 PROJ. #5699711-17, CLIN #00744K  
 2.) THIS DESIGN CONCEPT IS APPLICABLE TO 873 GAL. CAP. AND  
 1122 GAL. CAP. TANKS AS SHOWN ON SK-G-844, EXCEPT FOR BLDG. AND VAULT LENGTH

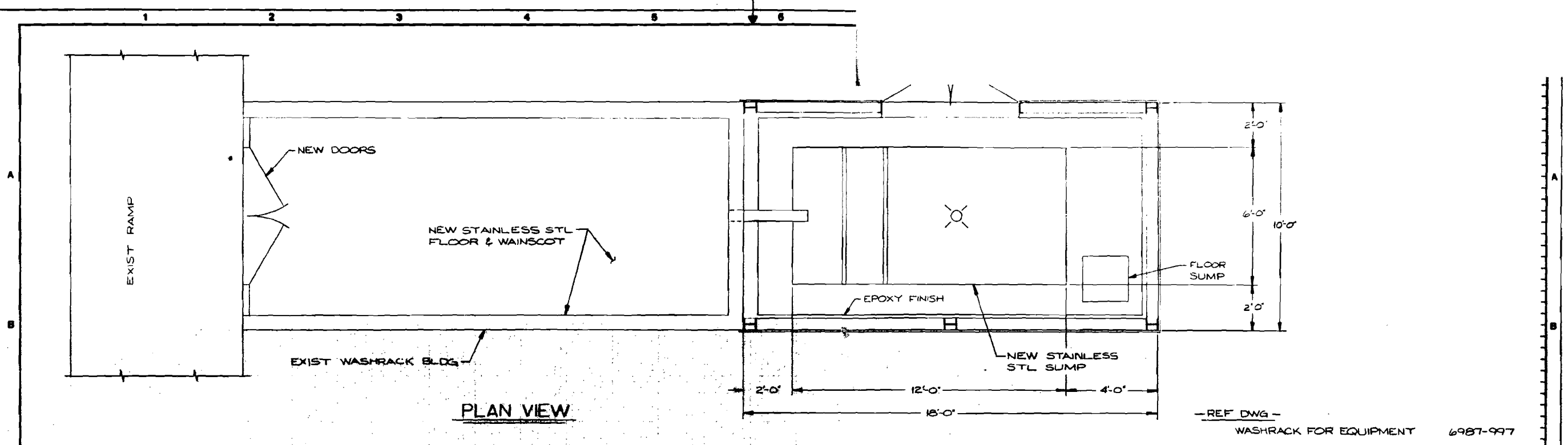
TOLERANCES UNLESS OTHERWISE NOTED	
FRACTIONAL:	_____
DECIMAL:	_____
ANGULAR:	_____
ALL DIMENSIONS ARE IN INCHES	
DRAWN BY	SCALE: 1/2" = 1'-0"
DESIGN BY	DATE
ORGANIZATION	DATE
1/22/98 (REV. 6/27/98)	

**MASON & HANCOCK-SILAS MASON CO., INC.**  
 ENGINEERS OPERATORS OF CONTRACTORS  
**IOWA ARMY AMMUNITION PLANT**  
 MIDDLETOWN, IOWA 52635-9701

**BLDG WASHDOWN SUMP CONCEPT**

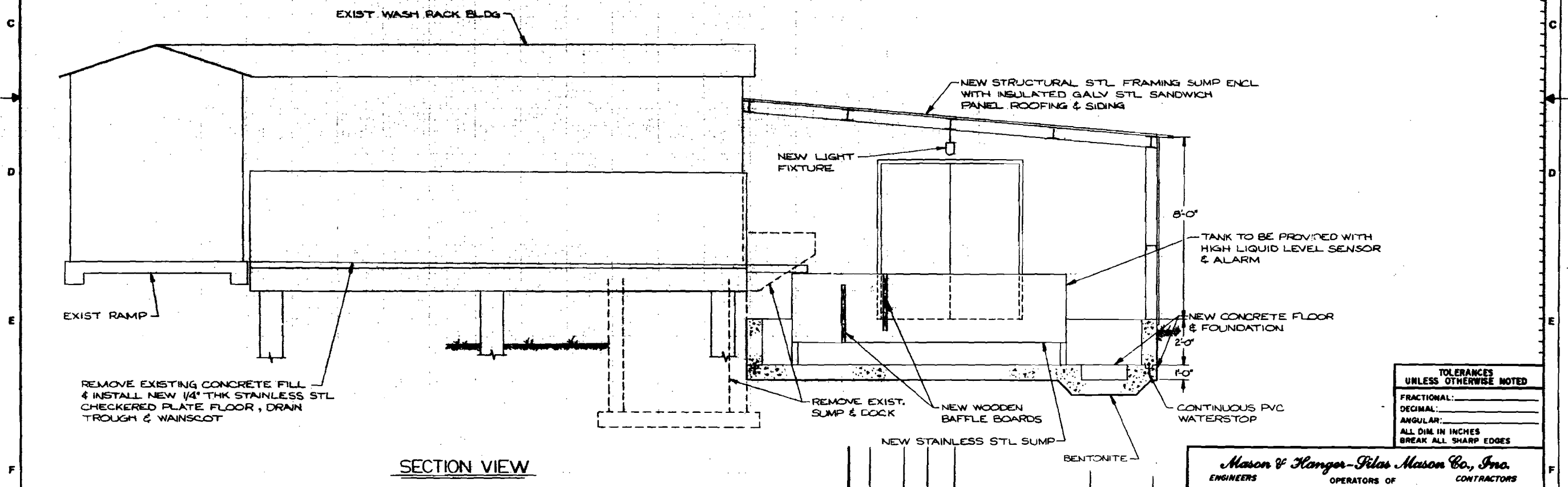
REV.	DATE	BY	CHECK	DESCRIPTION	APPROVED BY	DATE	FILE NO.	PROJ.	CHG. NO.	ITEM
				REVISIONS			BLDG-28-90	CHG. NO. SK-G-845	REV.	SHT. 1

42



PLAN VIEW

- REF DWG -  
WASHRACK FOR EQUIPMENT 6987-997



SECTION VIEW

TOLERANCES  
UNLESS OTHERWISE NOTED  
FRACTIONAL:  
DECIMAL:  
ANGULAR:  
ALL DIM IN INCHES  
BREAK ALL SHARP EDGES

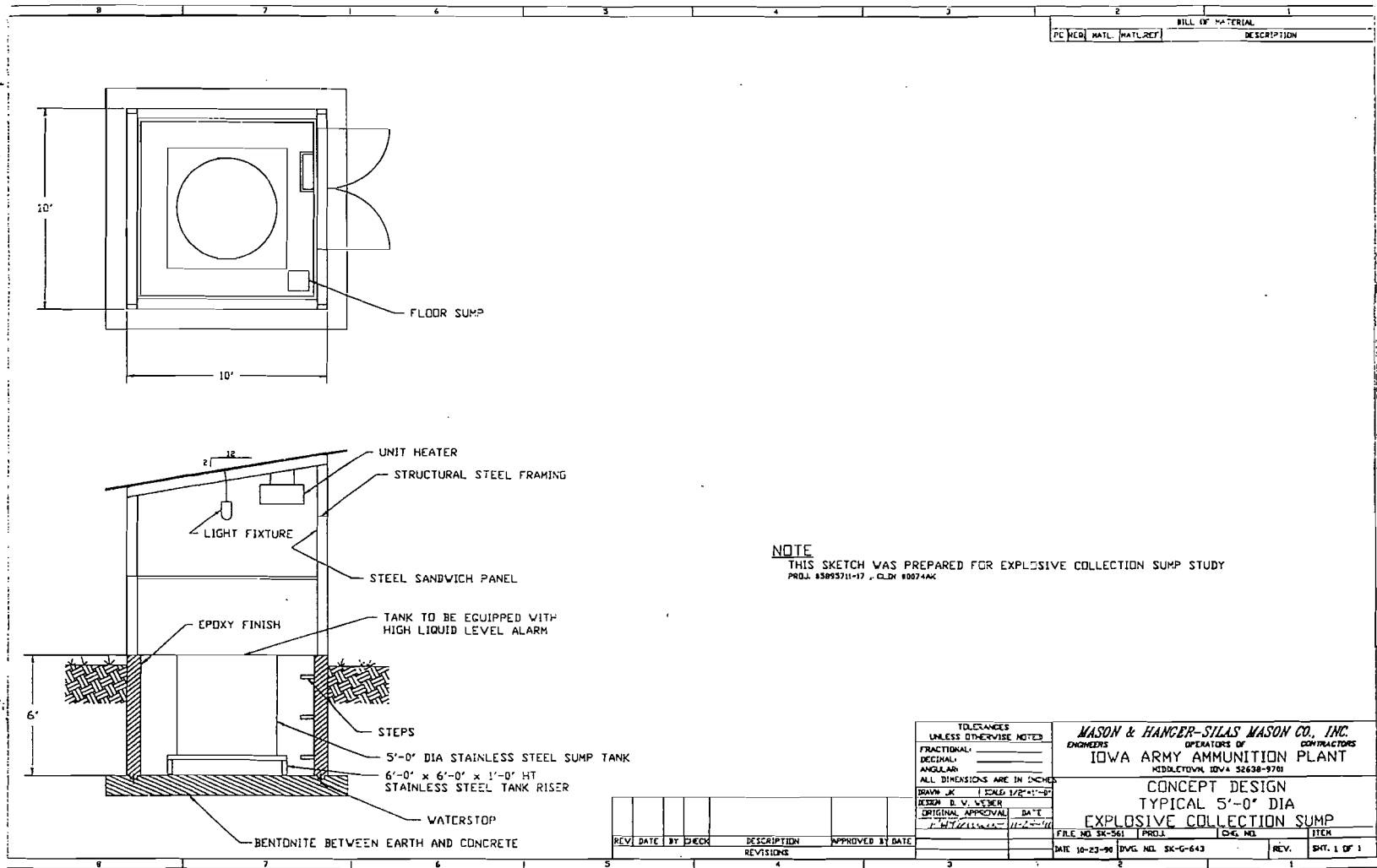
REMOVE EXISTING CONCRETE FILL & INSTALL NEW 1/4" THK STAINLESS STL CHECKERED PLATE FLOOR, DRAIN TROUGH & WAINSCOT

-NOTE-  
THIS SKETCH WAS PREPARED FOR EXPLOSIVE COLLECTION SUMP SURVEY PROJECT #5895711-17, CLIN #0074AK

Mason & Hanger-Piles Mason Co., Inc.  
ENGINEERS OPERATORS OF CONTRACTORS  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IOWA 52638

CONCEPT DESIGN  
WASHRACK SUMP 43

REV	DATE	BY	CHECK	DESCRIPTION	APPROVED BY	DATE	PROJ NO.	ED.	W.D.
ORIG				APPROVAL					
				REVISIONS					
				DESIGN					
				CHECK					
				SCALE					
				DATE					
				JOB					
				DRAWING NO.					
				DATE					
				REV.					

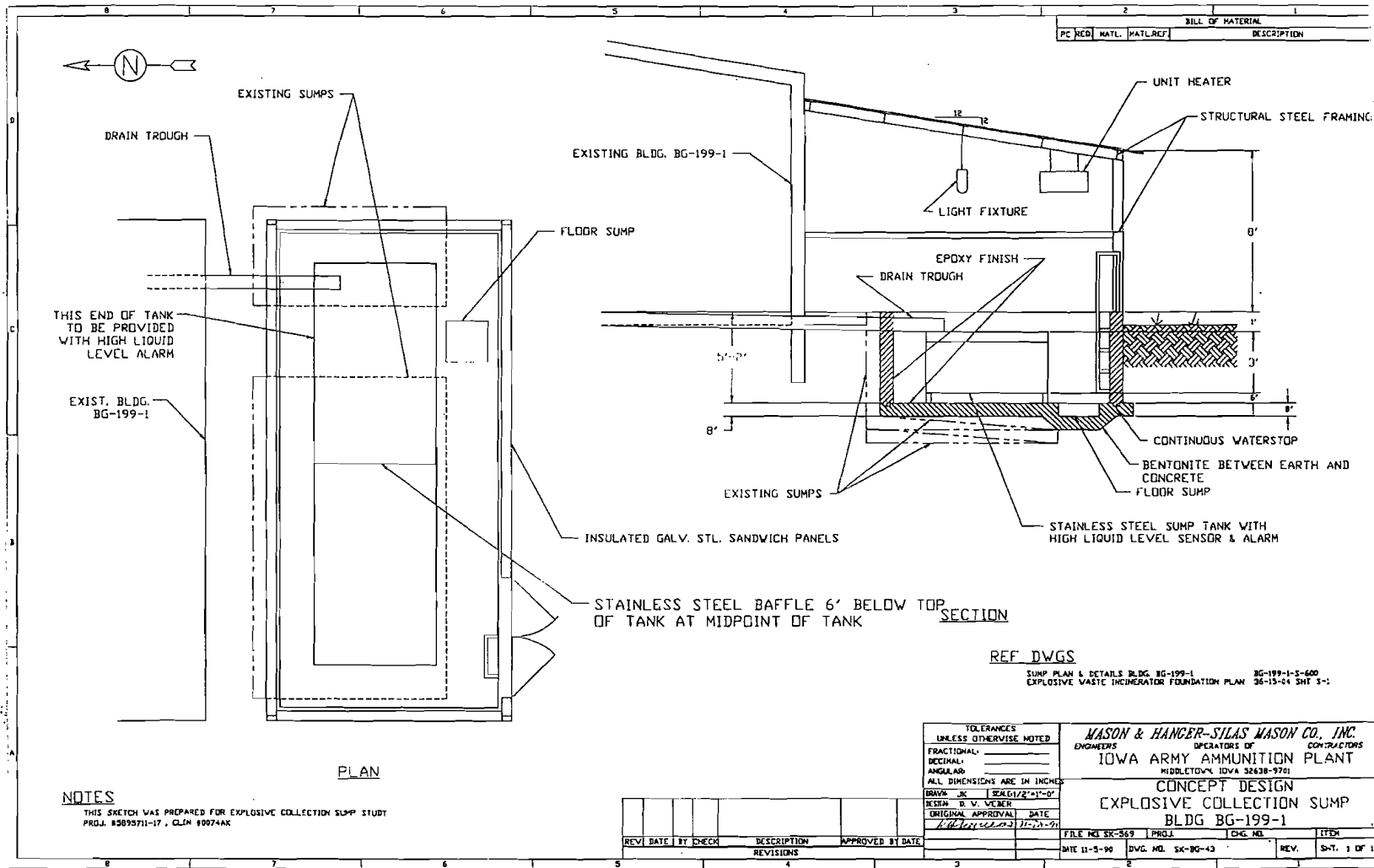


BILL OF MATERIAL		DESCRIPTION
PC	REQ	MATL

**NOTE**  
 THIS SKETCH WAS PREPARED FOR EXPLOSIVE COLLECTION SUMP STUDY  
 PROJ. #5895711-17, CLIN #0074AK

TOLERANCES UNLESS OTHERWISE NOTED FRACTIONAL: _____ DECIMAL: _____ ANGULAR: _____ ALL DIMENSIONS ARE IN INCHES DRAWN JK   SCALE 1/2"=1'-0" DESIGN D. V. LESHER ORIGINAL APPROVAL DATE 11-20-96 P. H. ZILLES		<b>MASON &amp; HANGER-STILAS MASON CO., INC.</b> ENGINEERS OPERATORS OF CONTRACTORS IOWA ARMY AMMUNITION PLANT MIDDLETON, IOWA 52638-9701 CONCEPT DESIGN TYPICAL 5'-0" DIA EXPLOSIVE COLLECTION SUMP	
FILE NO SK-561	PROJ.	DWG. NO.	TITLE
DATE 10-23-96	DWG. NO. SK-G-643	REV.	SHT. 1 OF 1

REV.	DATE	BY	CHECK	DESCRIPTION	APPROVED BY	DATE
				REVISIONS		



BILL OF MATERIAL				
PC	RED	MATL.	MATL. REF.	DESCRIPTION

THIS END OF TANK TO BE PROVIDED WITH HIGH LIQUID LEVEL ALARM

EXIST. BLDG. BG-199-1

EXISTING BLDG. BG-199-1

FLOOR SUMP

INSULATED GALV. STL. SANDWICH PANELS

STAINLESS STEEL BAFFLE 6' BELOW TOP OF TANK AT MIDPOINT OF TANK

SECTION

REF DWGS

SUMP PLAN & DETAILS BLDG. BG-199-1  
EXPLOSIVE WASTE INCINERATOR FOUNDATION PLAN 36-15-64 SHF 3-1

**NOTES**

THIS SKETCH WAS PREPARED FOR EXPLOSIVE COLLECTION SUMP STUDY  
PROJ. #3095711-17, CLIN 00074K

PLAN

TOLERANCES UNLESS OTHERWISE NOTED	
FRACTIONAL	_____
DECIMAL	_____
ANGULAR	_____
ALL DIMENSIONS ARE IN INCHES	
DRWS. BY	1/24/12/11-07
DESIGN	D. V. WEBER
ORIGINAL APPROVAL	DATE
	11-15-07

**MASON & HANGER-SILAS MASON CO., INC.**  
ENGINEERS OPERATORS OF CONTRACTORS  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IOWA 52638-9701  
**CONCEPT DESIGN**  
**EXPLOSIVE COLLECTION SUMP**  
**BLDG BG-199-1**

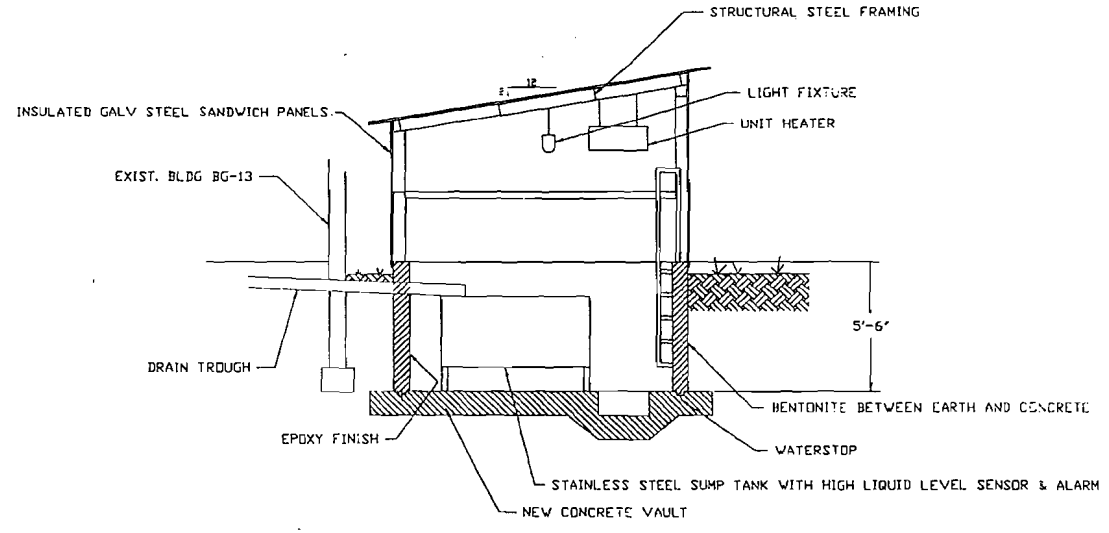
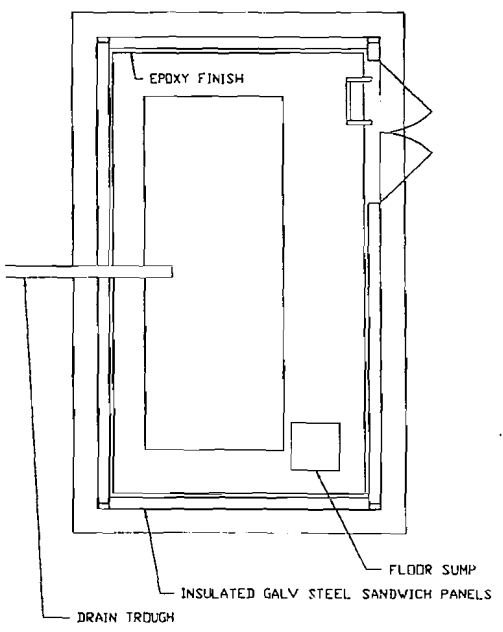
REV	DATE	BY	CHECK	DESCRIPTION	APPROVED BY	DATE

FILE NO. SK-569	PROJ.	ENG. NO.	ITEM
DATE 11-3-90	DWG. NO. SK-BG-43	REV.	SH-T. 1 OF 1

45

8	7	6	5	4	3	2	1
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BILL OF MATERIAL		DESCRIPTION
PC	REQ	



**NOTE**  
 THIS SKETCH WAS PREPARED FOR EXPLOSIVE COLLECTION SUMP STUDY  
 PROJ. #5895711-17, CLIN #0074AK

**REF DWG**  
 PAB & TROUGH DETAILS BG-5/5-2  
 PLANS & DETAILS VEHICLE DECONTAMINATION FAC. 95-543-1

TOLERANCES UNLESS OTHERWISE NOTED	
FRACTIONAL	
DECIMAL	
ANGULAR	
ALL DIMENSIONS ARE IN INCHES	
DRAWN BY	DATE
DESIGN BY	DATE
ORIGINAL APPROVAL	DATE

**WASON & HANGER-SILAS WASON CO., INC.**  
 CONTRACTORS  
 OPERATORS OF  
**IUWA ARMY AMMUNITION PLANT**  
 MIDDLETOWN, IDVA 52630-9701  
**CONCEPT DESIGN**  
**EXPLOSIVE COLLECTION SUMP**  
**BLDG BG-13**

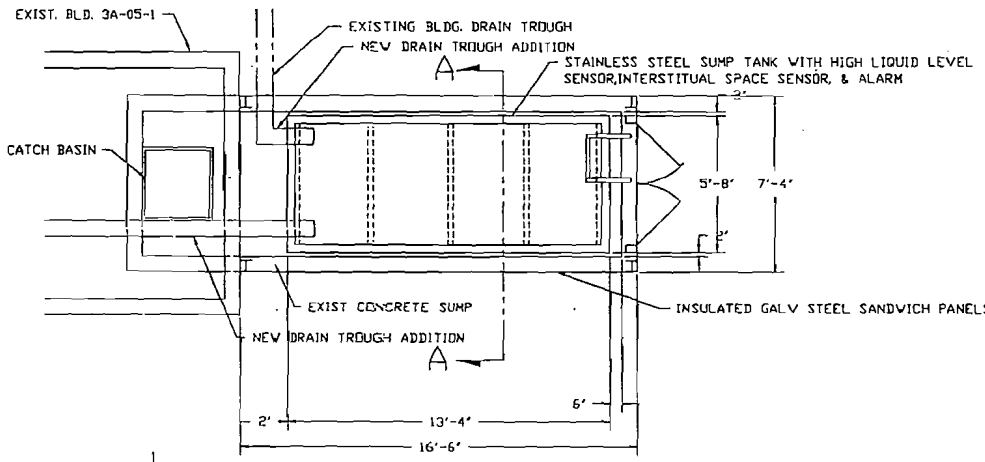
REV.	DATE	BY	APPROVED BY	DATE	DESCRIPTION

FILE NO.	10-29-79	DWG. NO.	1K-PG-4E	ITEM	1
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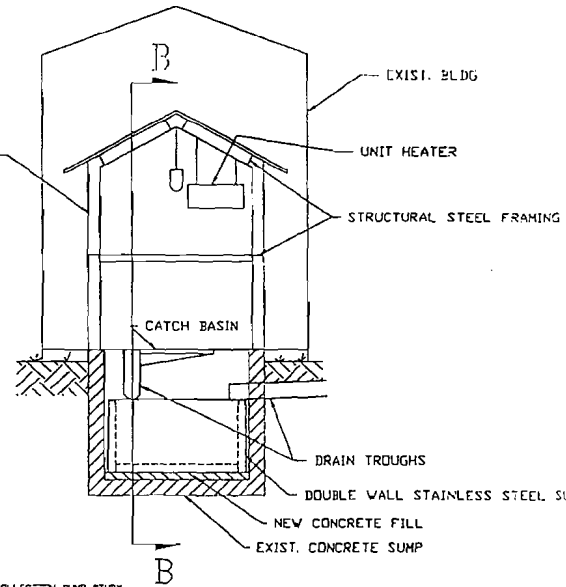
8	7	6	5	4	3	2	1
---	---	---	---	---	---	---	---

47

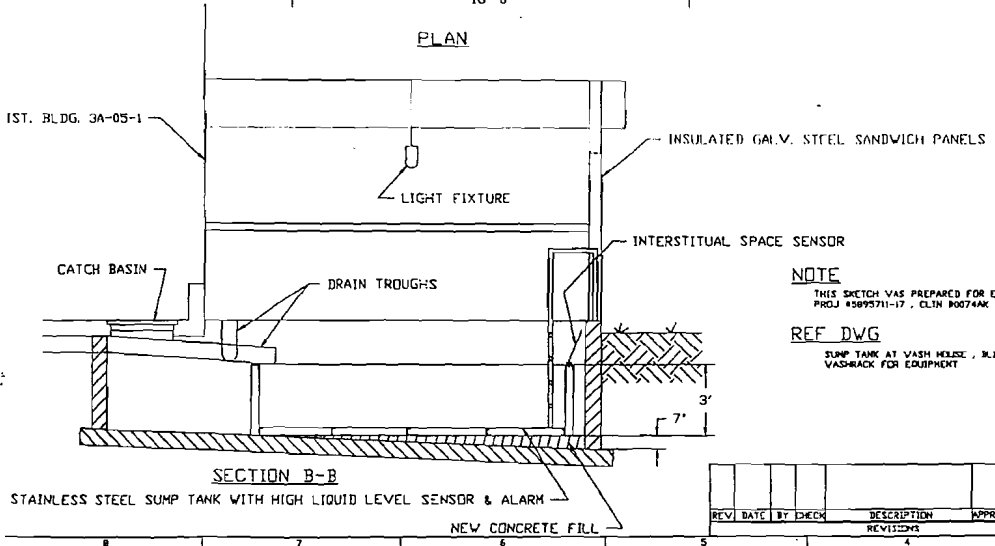
BILL OF MATERIAL	
PC REQ. MATL. (WATER)	DESCRIPTION



PLAN



SECTION A-A



SECTION B-B

**NOTE**

THIS SKETCH WAS PREPARED FOR EXPLOSIVE COLLECTION SUMP STUDY  
 PROJ #5895711-17, ELIN 900744K

**REF DWG**

SUMP TANK AT WASH RELEASE, BLDG 3A-05-1  
 VADTRACK FOR EQUIPMENT

REV	DATE	BY	CHECK	DESCRIPTION	APPROVED BY	DATE

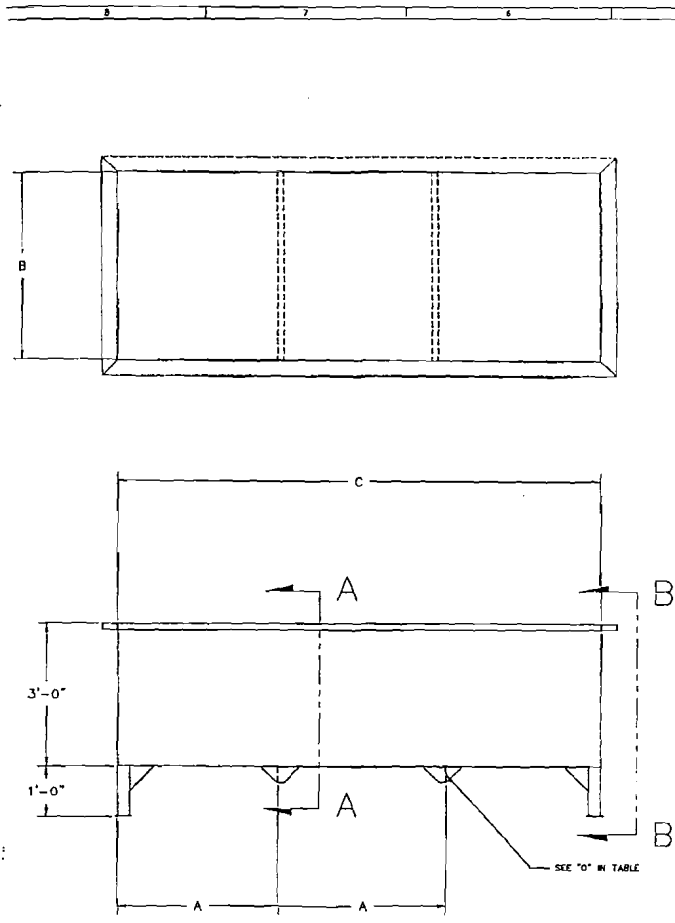
3A-05-1-M-647  
 6/8/7-2657

**MASON & HANGER-SILAS MASON CO., INC.**  
 ENGINEERS OPERATORS OF CONTRACTORS  
 IOWA ARMY AMMUNITION PLANT  
 MIDDLETOWN, IOWA 52638-9700

CONCEPT DESIGN  
 EXPLOSIVE COLLECTION SUMP  
 BLDG. 3A-05-1

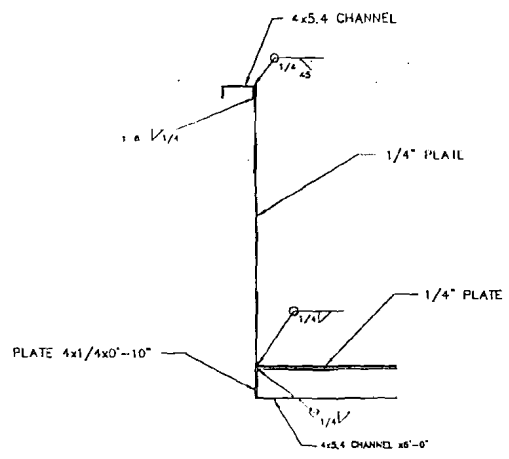
FILE NO. SX-571	PREL.	CHK. NO.	ITEM
DATE 11-15-90	DWG. NO. SX-3A-221	REV.	SHT. 1

47



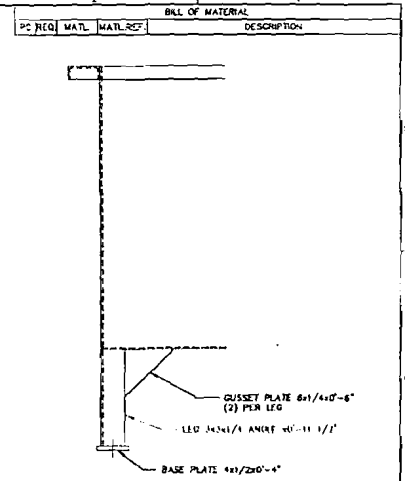
TANK ASSEMBLY

SCALE 1/2"=1'-0"



SECTION A-A

SCALE 1"=1'-0"



SECTION B-B

SCALE 1"=1'-0"

TANK CAP.	DM "A"	DM "B"	DM "C"	NO. OF CROSS SUPTS "D"
873	3'-0"	6'-0"	6'-0"	1
1122	3'-4"	6'-0"	10'-0"	2
1663	3'-0"	6'-0"	15'-0"	4
2244	3'-4"	6'-0"	20'-0"	5

NOTES

- 1) ALL STEEL TO BE TYPE 304 STAINLESS STEEL
- 2) TANK CAPACITY COMPUTED BASED ON 8" FREEBOARD.
- 3) 2244 GAL. TANK TO HAVE 2'-6" HIGH BULKHEAD TO DIVIDE TANK INTO TWO 10'-0" LONG COMPARTMENTS
- 4) THIS SKETCH WAS PREPARED FOR EXPLOSIVE COLLECTION SUMP STUDY  
PROJ #5895711-17, QJN #00744K

TOLERANCES UNLESS OTHERWISE NOTED

FRACTIONAL: \_\_\_\_\_

DECIMAL: \_\_\_\_\_

ANGULAR: \_\_\_\_\_

ALL DIMENSIONS ARE IN INCHES

DATE: \_\_\_\_\_ SCALE: NOTED

DESIGNER: WEBER

DATE: 12-27-77

**MASON & HANCOCK-SILAS MASON CO., INC.**  
ENGINEERS OPERATORS OF CONTRACTORS  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IOWA 52638-9701

SUMP TANK CONCEPT

REV.	DATE	BY	CHECK	DESCRIPTION	APPROVED BY	DATE	FILE NO. SK-582	PROJ.	CHG. NO.	ITEM
							DATE 10-23-80	DWG. NO. SK-G-844		REV. 1
										SHT. 1



MASON & HANGER-SILAS MASON CO., INC.  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IA 52638

14 December 1990

APPENDIX III

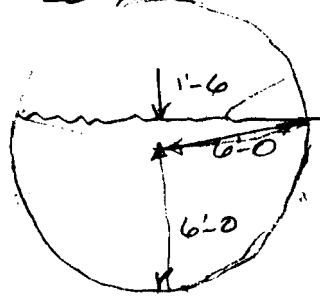
PRELIMINARY DESIGNS

AND

COST ESTIMATES BREAKDOWN

PROJECT \_\_\_\_\_ LOCATION NE OF 1-OS-2 LINE ITEM 17 DATE \_\_\_\_\_  
 SUBJECT PRIORITY 1 SUMP RENOVATION COMPUTED BY \_\_\_\_\_  
 CHECKED BY \_\_\_\_\_

COMPUTE VOL. WATER 7' 6" DEEP IN 12'-0" Ø TANK  
 24'-0" LONG



$$\sqrt{(6')^2 - (1.5')^2} = 5.81$$

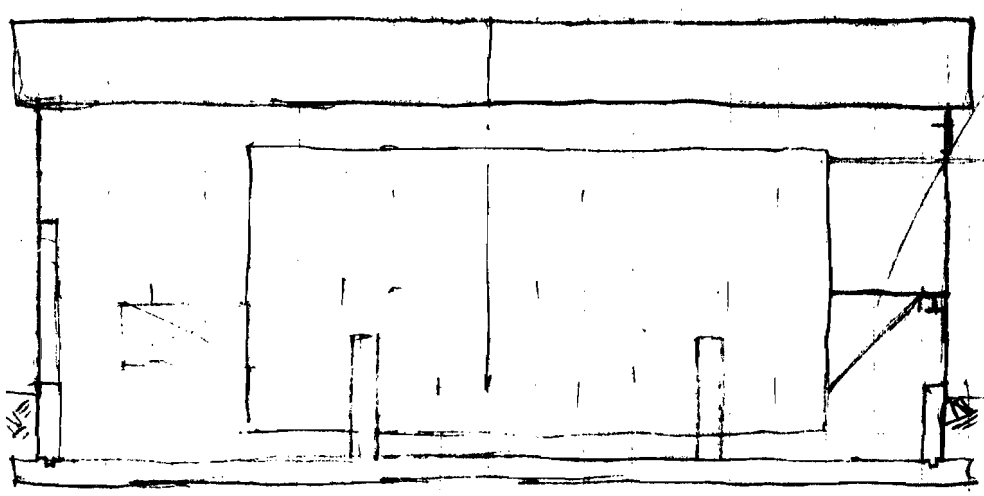
$$V = \left( \frac{\pi (6')^2}{2} + \frac{(5.81)(2)(1.5)}{2} \right) 24$$

$$= (56.5 + 8.7)(24)$$

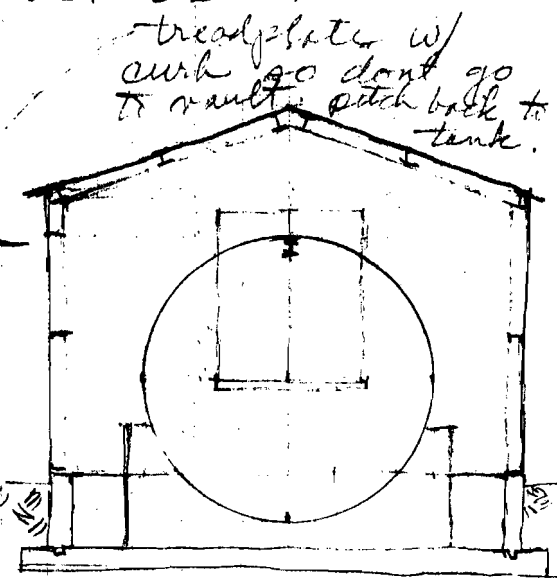
$$= (65.2)(24) = 1564.8$$

TANK PLUS ENDWORKS IS 23' LONG  
 MAKE VAULT 18' W X 36' L INSIDE  
 COMPUTE DEPTH REQ'D.

$$D = \frac{1564.8}{(18)(36)} = 2.42 \text{ FT MAKE VAULT 3' DEEP}$$



LONGITUDINAL SECTION



TRANSVERSE SECTION

DESIGN MAIN FRAME

$$M = \frac{1}{8} (18')(50')(18')^2$$

$$= 36.45$$

$$S = 18.23 \text{ IN}^3 \text{ W10X21}$$

$$S = 21.5$$

DESIGN FURLIN

$$M = \frac{1}{8} (5')(50')(18')^2$$

$$= 10.12$$

$$S = 5.06 \text{ IN}^3 \text{ M6X18}$$

- 1 - S = 7.24

DESIGN GIRT

$$M = \frac{1}{8} (6')(30')(18')^2$$

$$= 7.29$$

$$S = 3.65 \text{ IN}^3 \text{ [S]X10}$$

$$S = 4.8$$

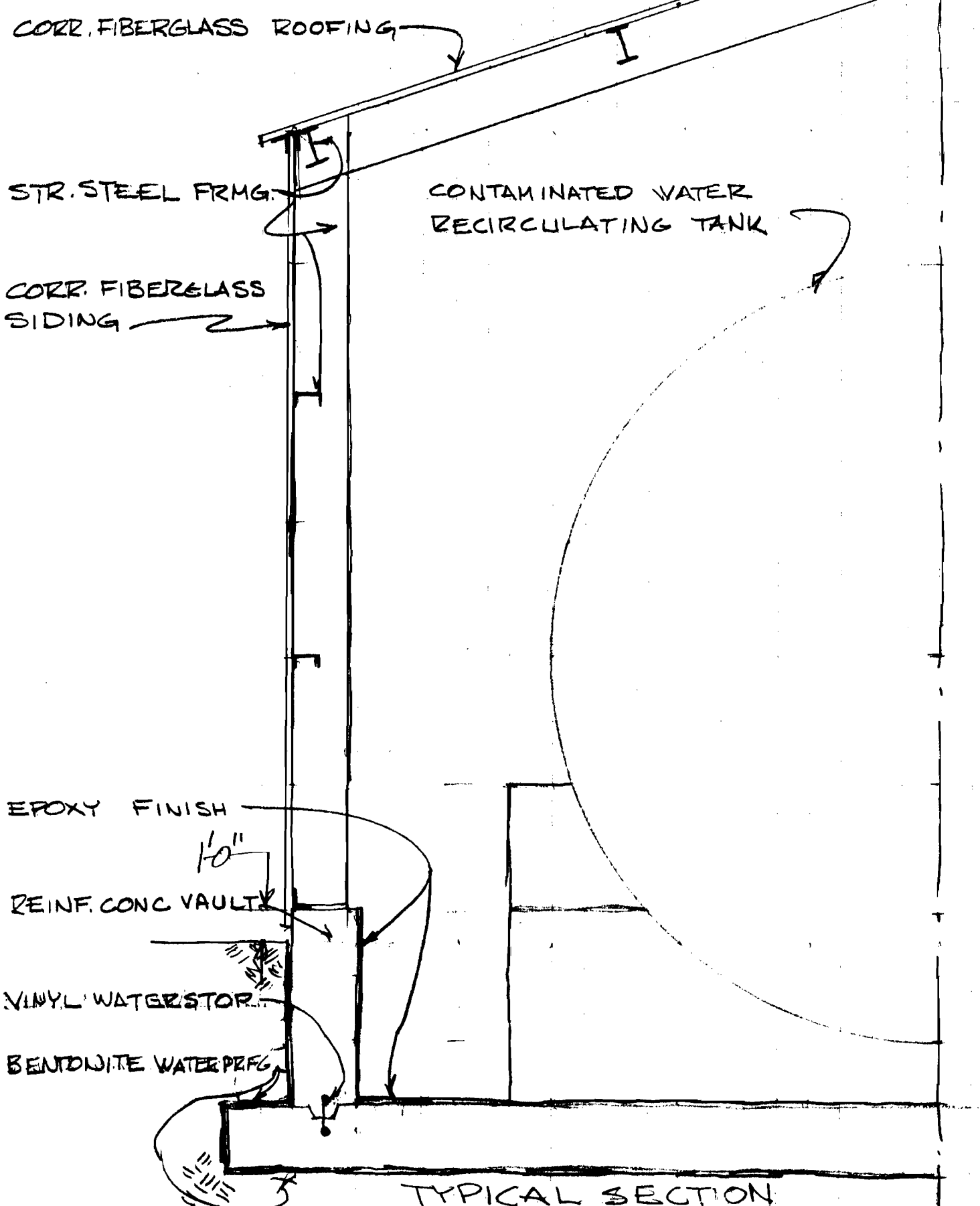
PROJECT \_\_\_\_\_ LOCATION \_\_\_\_\_

DATE \_\_\_\_\_

SUBJECT \_\_\_\_\_

COMPUTED BY \_\_\_\_\_

CHECKED BY \_\_\_\_\_



TYPICAL SECTION

SCALE 1/2" = 1'-0" 51

PROJECT

LOCATION

DATE

DATE

SUBJECT

COMPUTED BY

CHECKED BY

## MATERIAL TAKE OFF

## CONC FORMS

$$\begin{aligned}
 A &= (22+40)(2) + (20+38)(2)(4)(2) + (18)(6)(4) \\
 &= 124 + 928 + 432 \\
 &= 1484 \text{ SFCA}
 \end{aligned}$$

## CONCRETE

$$\begin{aligned}
 V &= (22)(40) + (20+38)(2)(4) + (18)(5)(2) \\
 &= 880 + 464 + 180 \\
 &= 1524
 \end{aligned}$$

$$= 56.5 \text{ CY}$$

$$\begin{aligned}
 \text{BENTONITE PANEL} &= 40(22) + (20+40)(2)(4) = 1360 \text{ SF}
 \end{aligned}$$

## REINF

$$\text{WT} = (4)(1.04)(56.25)(27) = 6318 \#$$

WATER STOP 120 LF

## STR. STEEL

$$\begin{aligned}
 \text{WT} &= (3) [(2)(12) + 20](21.5) + 6(38)(12) + 2(38+18)(2)(10) + 2(38+18)(4)(9) + \\
 &\quad (40)(2)(10) \\
 &= 2838 + 2736 + 2240 + 549 + 800 \\
 &= 9163 \#
 \end{aligned}$$

## SIDING &amp; ROOF

$$\begin{aligned}
 A &= (38+20)(2)(12) + 20(38) \\
 &= 1392 + 760 \\
 &= 2152
 \end{aligned}$$

## FLASHING

$$\begin{aligned}
 L &= 12(4) + 20(2) + 38(2) + 26(2) \\
 &= 48 + 20 + 76 + 52 \\
 &= 196 \text{ LF}
 \end{aligned}$$

## DOORS &amp; HDWR

ZPR 6070

PAINT

5 GAL

EPOXY

15 GAL

-3-

PROJECT LOCATION

DATE

SUBJECT

COMPUTED BY

CHECKED BY

LABOR

	PIPE	SHM	ELEC	LAB	EQO	IRN	W	CARP	PAINT
DISCONNECT UTIL TO TANK	48	24	48	24					
REMOVE TANK				16	8	32			
EXCAVATE FOR VAULT				12	12				
FORM VAULT FLOOR				12				24	
FAB & PLACE REINF						24			
PLACE VOLCLAY & WATERSTOP				12				24	
PLACE CONC. FLOOR				24				24	
REMOVE FLOOR FORMS				8				8	
FORM WALLS				24				48	
FAB & PLACE WALL REINF						48			
PLACE WALL CONC.				32				24	
STRIP WALL FORMS				24				24	
INSTALL VOLCLAY PANELS				8				16	
BACKFILL				8	8				
SET TANK IN NEW VAULT				16	8	32			
SET BLDG FRAMING				16	16	48			
INSTALL SIDING	48			24					
INSTALL ROOFING	48			24					
INSTALL DOORS								16	
INSTALL FLSHG	48								
INSTALL EPOXY & PAINT									40
RECONNECT UTIL TO TANK	48	24	48	24					
	96	192	96	308	52	160	203	40	

EQUIP RENTAL  
 CRANE 32  
 BACKHOE 20

PROJECT \_\_\_\_\_ LOCATION \_\_\_\_\_

DATE \_\_\_\_\_

SUBJECT \_\_\_\_\_

COMPUTED BY \_\_\_\_\_

CHECKED BY \_\_\_\_\_

RECAP MATERIAL	QUAN	UNIT	PRICE	AMOUNT
CONC FORMS	1484	SFA	154	2290
CONCRETE	56.5	CY	65 <sup>00</sup>	3670
BENTONITE P/M	1360	SF	092	1250
REINF STEEL	6318	LB	030	1900
WATERSTOP	120	LF	810	970
STR. STEEL	9163	LB	061	5590
SIDING & RFG	2152	SF	165	3550
FLASHING	196	LF	160	310
DOORS & HDWR	2	EA	500 <sup>00</sup>	1000
PAINT	5	GAL	12 <sup>00</sup>	60
EPOXY	15	GAL	48 <sup>00</sup>	720

21310

EQUIPMENT

CRANE	32	HR	126 <sup>55</sup>	4050
BACKHOE	20	HR	28 <sup>30</sup>	570

4620

LABOR

PIPE FITTER	96		1970	1890
JHT METAL	192		2024	3890
ELECTRICIAN	96		1927	1850
LABORER	308		1270	3910
EQUIP OPERATOR	52		2040	1060
IRON WORKER	160		1846	2950
CARPENTER	208		1608	3340
PAINTER	40		1220	490

19380

8910

54220

+ 33% O&E P

18070

72290

+ 10% CONTIN

7230

79520

PROJECT

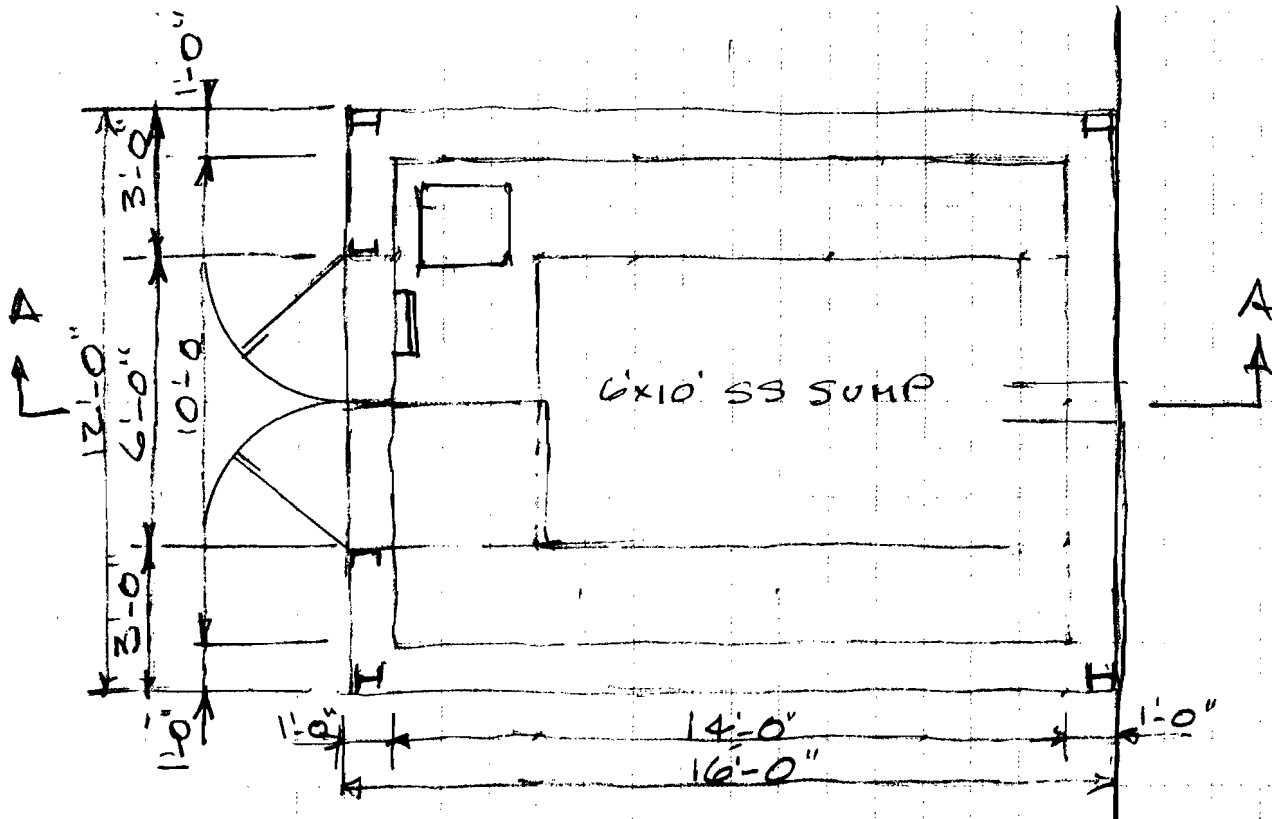
LOCATION NORZOS-2 LINEZ ITEM 3

DATE

SUBJECT

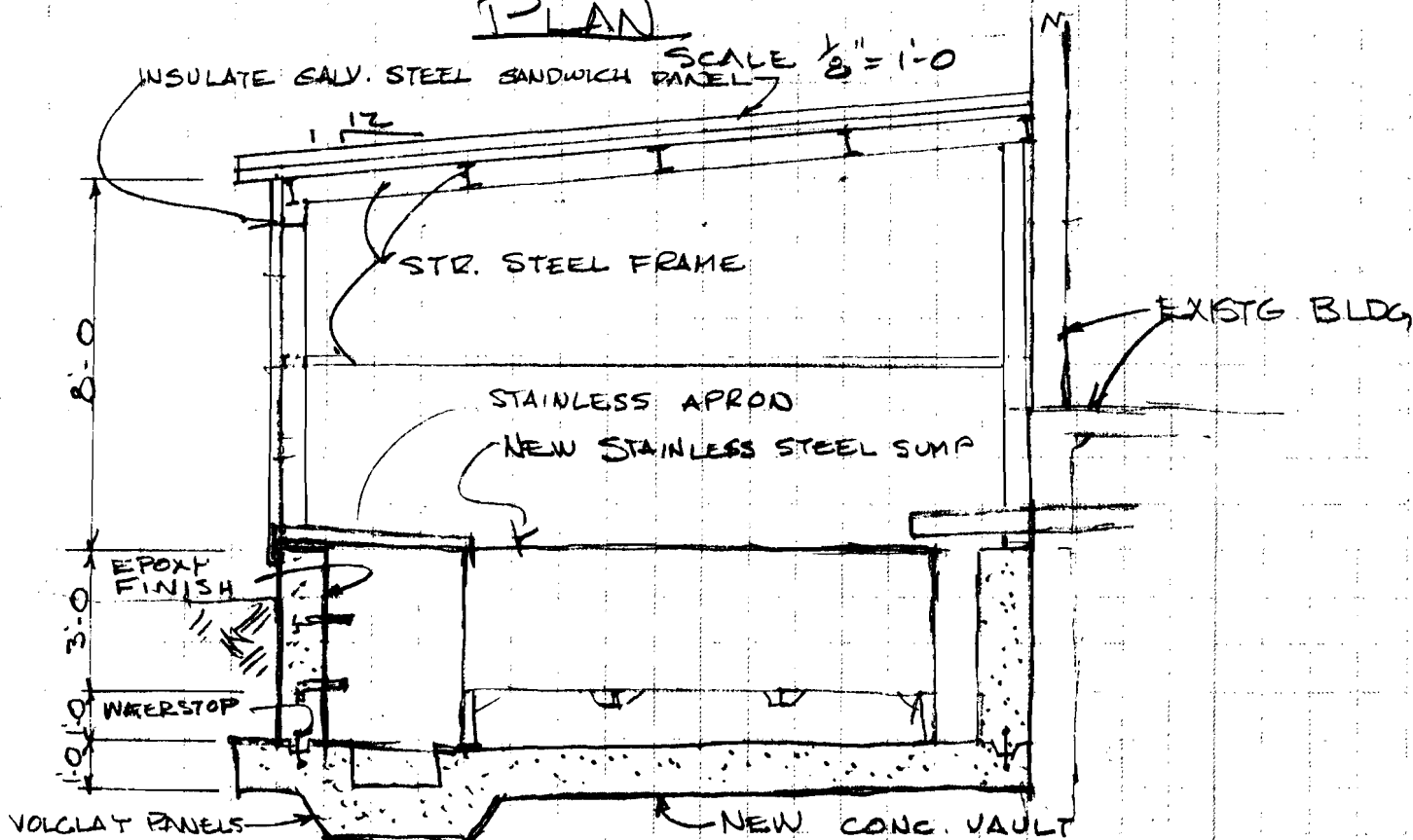
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PLAN

SCALE 1/8" = 1'-0"



SECTION A A

SCALE 1/8" = 1'-0"

PROJECT

LOCATION N OF 2-05-2

DATE

SUBJECT

COMPUTED BY

CHECKED BY

DESIGN SS SUMP 6W X 10L X 3D = 180 FT<sup>3</sup> = 1346 GAL

USE SIDES & ENDS AS BEAMS

DESIGN BOTTOM TRY 1/4" ϕ

$$I_{\text{req}} = \frac{1}{12}(12)(.25)^3 = 0.0156 \text{ IN}^4$$

$$24,000 = \frac{M(0.125)}{0.0156}$$

$$M = 2995 \text{ LBS} = 249.6 \text{ FT} \cdot \text{LBS}$$

$$249.6 = \frac{1}{8}(3)(62.5)(L)^2$$

$$L^2 = \frac{249.6(8)}{3(62.5)}$$

$$= 10.64$$

$$L = 3.26 \text{ space supports @ 3'-4" o.c.}$$

DESIGN BOTTOM SUPPORTS

$$W = 3.33(3)(62.5) = 624 \text{ LBS}$$

$$M = \frac{1}{8}(624)(6)^2$$

$$= 2808$$

$$S = 1.41 \text{ IN}^3 \text{ USE } [4 \times 5.4$$

CHECK SHEAR

$$V = 3(624) = 1872$$

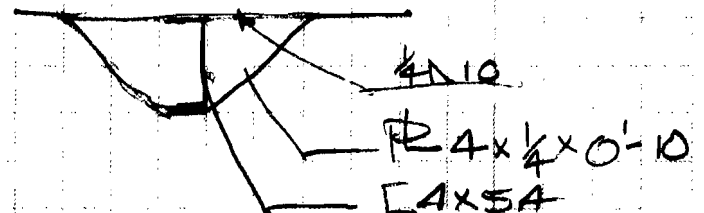
CHECK TOP RAIL

$$P = \frac{62.5(3)^2}{2} = 281 \text{ LBS}$$

$$W = \frac{P}{3} = \frac{281}{3} = 93 \text{ LBS}$$

$$M = \frac{1}{8}(93)(10)^2 = 1162.5 \text{ LBS}$$

$$S = 0.58 \text{ IN}^3 [4 \times 5.4 \text{ OK} - \text{GA-EA WAY}$$



DESIGN LEGS

$$P = \left[ \frac{60}{DL} (3+6+3)(5) + \frac{18}{LL} 3(6) \right] 10 + \frac{3(6)(5)(62.5)}{2}$$

$$= 390 + 2812.5 = 3203$$

USE L 3x3x1/4 W/ 2x6x1/4x10 GUSSET



PROJECT

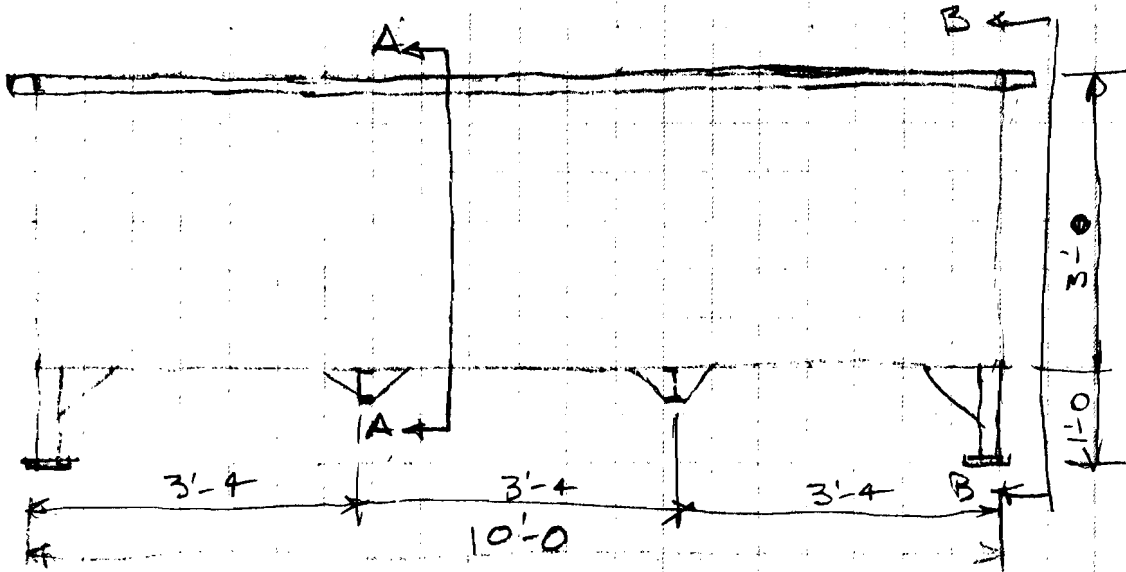
LOCATION

DATE

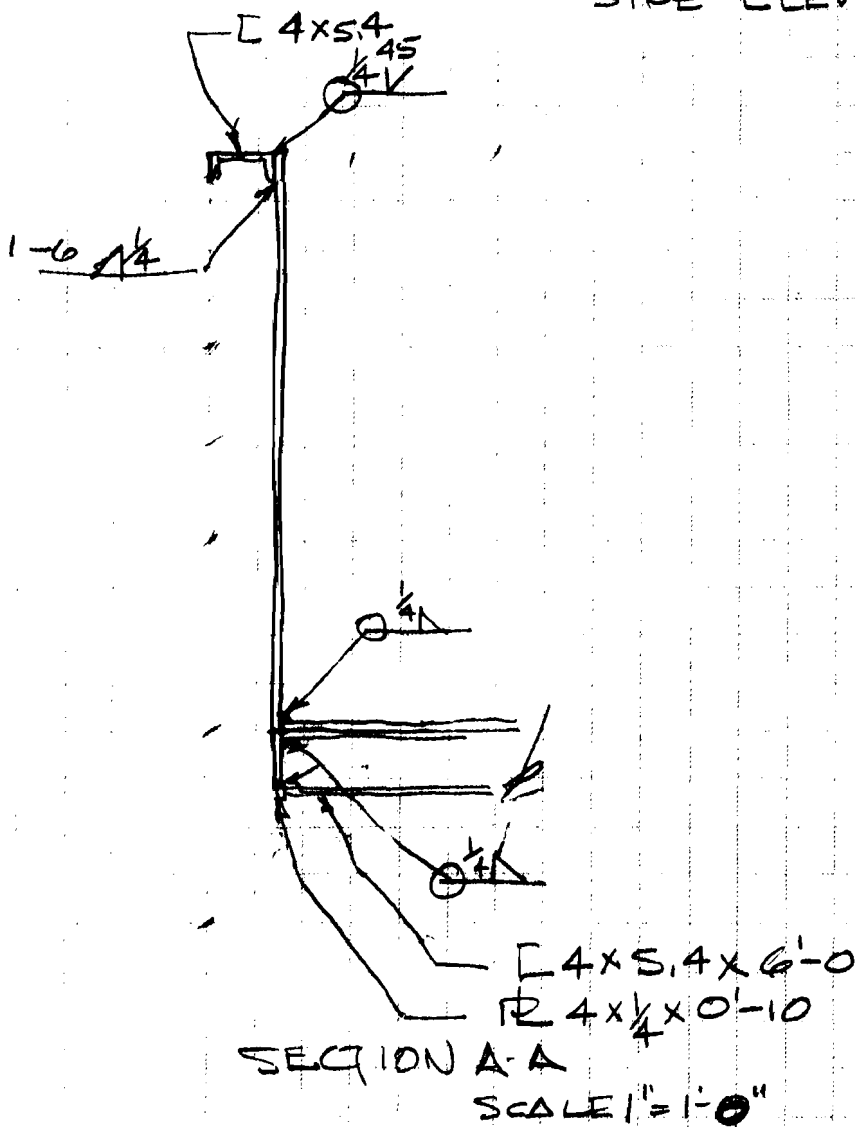
SUBJECT

COMPUTED BY

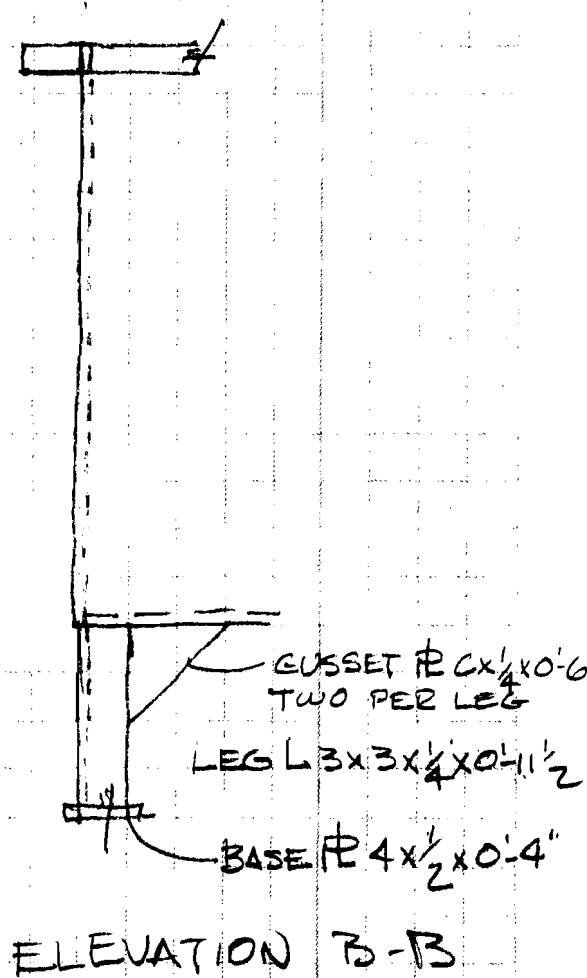
CHECKED BY



SIDE ELEVATION  $\frac{1}{2}'' = 1'-0''$



SECTION A-A  
SCALE 1'' = 1'-0''



ELEVATION B-B

-6 B-

PROJECT \_\_\_\_\_

LOCATION \_\_\_\_\_

DATE \_\_\_\_\_

DATE \_\_\_\_\_

SUBJECT \_\_\_\_\_

COMPUTED BY \_\_\_\_\_

CHECKED BY \_\_\_\_\_

COMPUTE WTS FOR STD SIZE SUMPS

6W x 6L x 3D

$$WT = \left[ \overset{\text{BOT}}{(6)(6)} + 4 \overset{\text{SIDES}}{(6)(3)} \right] 10 + 5 \overset{\text{STIFFNER}}{(6)(5.4)} + 4 \overset{\text{LEG}}{(1)(4.9)} + 2 \overset{\text{GUSSETS}}{(10)}$$

$$= 1080 + 162 + 20 + 20 = 1282 \# (3^{38}) = 4330$$

6W x 10L x 3D

$$WT = \left[ (6)(10) + (6)(3)(2) + 10(3)(2) \right] 10 + \left[ (4)(6) + (2)(10) \right] 5.4 + 4(1)(4.9) + 3(10)$$

$$= 1560 + 238 + 20 + 30 = 1848 \# (3^{38}) = 6250$$

6W x 15L x 3D

$$WT = \left[ (6)(15) + (6)(3)(2) + 15(3)(2) \right] 10 + \left[ (6)(6) + 2(15) \right] 5.4 + 4(1)(4.9) + 4(10)$$

$$= 2160 + 357 + 20 + 40 = 2577 \# (3^{38}) = 8710$$

6W x 20L x 3D

$$WT = \left[ \overset{\text{BOT}}{(6)(20)} + (6)(3)(3) + 2 \overset{\text{SIDES}}{(3)(2)} \right] 10 + \left[ \overset{\text{EXTRA FOR BAFFLE STIFFNER}}{(6)(8) + 2(20)} \right] 5.4 + 4(1)(4.9) + 4(10)$$

$$= 2940 + 475 + 20 + 40 = 3475 \# (3^{38}) = 11750$$

PROJECT

LOCATION

SUBJECT

## DESIGN ROOF FRAMING

## MAIN FRAMES

$$DL = 1.0 \text{ PSF} \quad LL = 30 \text{ PSF} \quad TL = 40 \text{ PSF}$$

$$M_{\text{MAX}} = \frac{1}{8} (40)(6)(16)^2$$

$$= 7.68 \text{ 'K}$$

$$S_{\text{REQ}} = 384 \text{ IN}^3 \quad \text{USE W 6 X 15}$$

## PURLINS

$$M_{\text{MAX}} = \frac{1}{8} (40)(4)(12)^2$$

$$= 2.88$$

$$S_{\text{REQ}} = 1.44 \quad \text{USE W 6 X 12}$$

## GIRTS

$$M_{\text{MAX}} = \frac{1}{8} (20)(5)(6)^2$$

$$= 3.2$$

$$S_{\text{REQ}} = 1.6 \quad \text{USE C 5 X 6.7}$$

## MATERIAL TAKE OFF

## CONG FORMS

$$A = (14 + 18)(2) + (12 + 16)(2)(4)(2)$$

$$= 64 + 448$$

$$= 512 \text{ SFCA}$$

## CONCRETE

$$V = \frac{(14)(18) + (12 + 16)(2)(4)}{27}$$

$$= 17.6 \text{ CY}$$

## BENTONITE PANEL

$$A = 4(16 + 12)(2) + (16)(20) = 544$$

## REINF STEEL

$$WT = 4(1.04)(17.6)(27) = 1977 \#$$

PROJECT

LOCATION

SHM

DATE

SUBJECT

COMPUTED BY

CHECKED BY

WATER STOP

$$L = (16 + 12)(2) = 56 LF$$

STR. STEEL

$$W = 2(8 + 9 + 16)(15) + 5(12)(12) + [(14)(2) + 22]6.7 + 19(4.9)$$

$$= 990 + 720 + 402 + 93$$

$$= 2205 \#$$

SIDING & ROOF & INSUL ROOF

$$EXT = (10)(10)(2) + 8(12) + (12)(17)$$

$$= 620 SF$$

FLASHING

$$L = 12 + 2(16) + 12 + 4(10) + 20 + (16)(2)(12)$$

$$= 160 LF$$

DOORS & HRDWR

1 PR 6070

PAINT EPOXY  
SEAL LOCAL

LADDER 4 LF

APRON 160 LB

PROJECT

LOCATION

DATE

SUBJECT

COMPUTED BY

CHECKED BY

LABOR	PIPE	SHM	ELEC	LAB	CARP	ROOF	IW	PAINT
REMOVE EXIST PUMPS & EQ.	48	16	32	32				
REMOVE WOOD STR.				32	32			
EXC. AROUND SUMP				16		8		
REMOVE CONC SUMP				160		80		
FORM VAULT FLOOR				8	16			
FAB & PLACE FL REINF							16	
PLACE BENTONITE & WATERSTOP				8	16			
PLACE CONC FLOOR				16	16			
REMOVE FL FORMS				8	8			
FORM WALLS				16	32			
FAB & PLACE WALL REINF							24	
PLACE WALL CONC				32	16			
STRIP WALL FORMS				16	16			
INSTALL VOLCLAY PANELS				8	16			
BACKFILL				8		8		
INSTALL EPOXY LINING								16
SET NEW SUMP				8		8	24	
SET BLDG FRMG				16		16	32	
INSTALL INSUL WALL PANELS	32			16				
INSTALL INSUL ROOF PANELS	32			16				
INSTALL DOORS						16		
INSTALL FLASHG	32							
PAINT STR. STEEL DOORS								32
FAB & INSTALL APRON							32	
FAB & INSTALL STAIR							32	
FAB & INSTALL Baffles						16		
INSTALL PUMPS & EQ.	80	40	64	40				
	128	192	96	456	200	120	160	48

EQUIP RENTAL

CRANE	24 HR
AIR COMP & JACK HAMMER	80 HR
BACKHOE	16 HR

PROJECT

LOCATION

DATE

BY

DATE

SUBJECT

COMPUTED BY

CHECKED BY

RECAP  
MATERIAL  
CONC FORMS

CONCRETE  
BENTONITE PANEL  
REINF STEEL

WATERSTOP

STR. STEEL

INSUL RFG SIDING

FLSHG

DOORS & HDWR 6070

PAINT

EPOXY

LADDER

APRON SS

031-182

2000

033-130

4650

071-301

0100

082-101

1000

081-198

5200

051-255

1500

074-282

0600

076-204

0300

033-118

0320

055-158

010

157-250

1000

QUAN

UNIT PRICE

AMOUNT

512SFA

1.54

790

17.6CY

65.00

1150

544SF

0.92

500

1977LB

0.30

590

56LF

8.10

450

2205LB

0.61

1350

620SF

4.45

2760

160LF

1.60

260

.1EA

500.00

500

5GAL

12.00

60

10GAL

48.00

480

4LF

20.00

80

160LB

3.00

480

9450

EQUIPMENT

CRANE

AIR COMP & JACK HAMMER

BACKHOE

016-460

2600

016-408

0400

24HR

126.55

3040

80 HR

17.50

1400

16 HR

28.30

450

4890

LABOR

PIPEFITTER

SHT METAL

ELECTRICIAN

LABORER

CARPENTER

EQ OPERATOR

IRON WORKER

PAINTER

128

19.70

2520

192

20.24

3890

96

19.27

1850

456

12.70

5790

200

16.08

3220

120

20.40

2450

160

18.46

2950

48

12.20

580

23250

6945

8910

3910

13035

52140

5210

57350

6X10 S.S. SUMP  
SUMP ELECTRICAL

+33% O&P

+10% CON

PROJECT \_\_\_\_\_

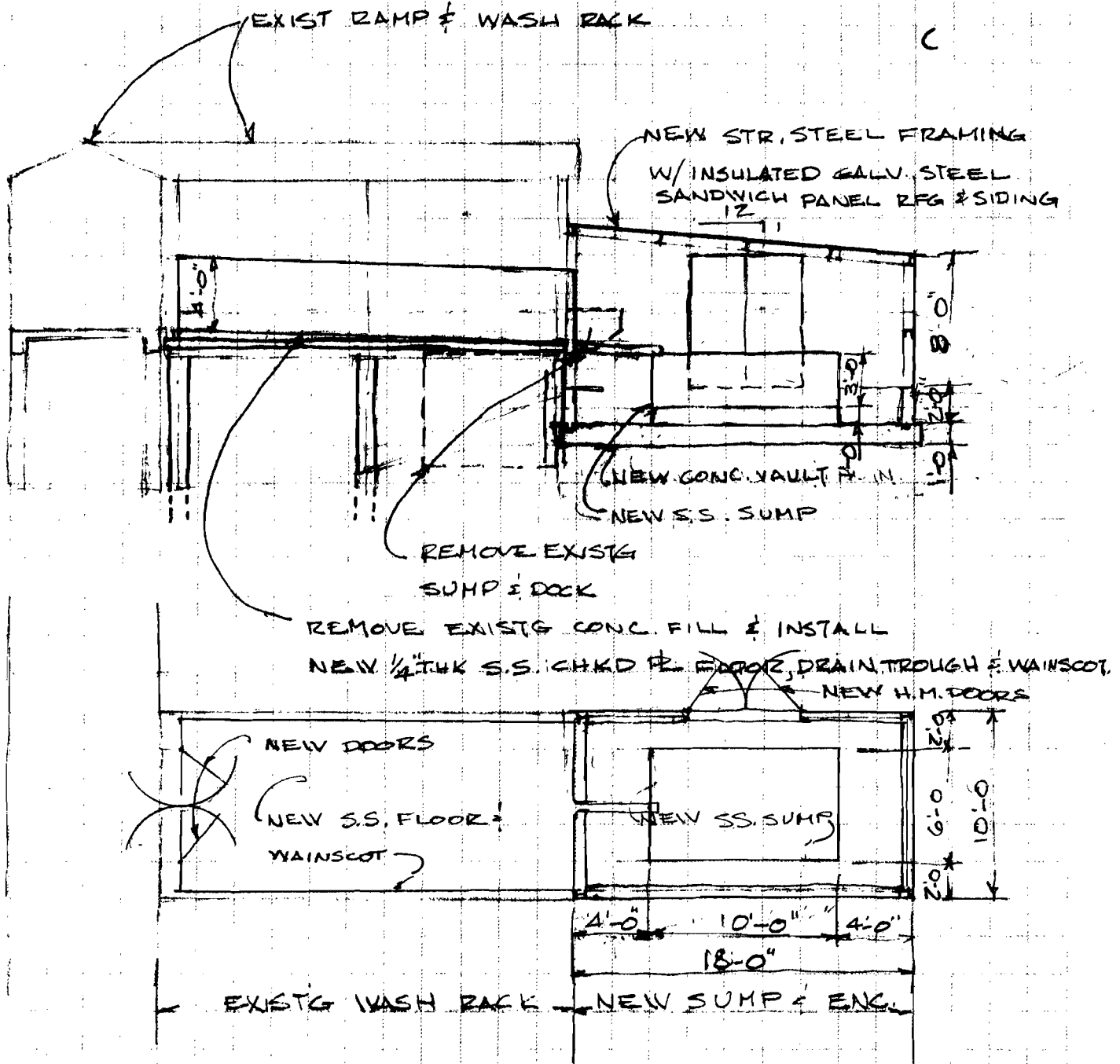
LOCATION S OF 3-PS-2 LINE 310M 8

DATE \_\_\_\_\_

SUBJECT \_\_\_\_\_

COMPUTED BY \_\_\_\_\_

CHECKED BY \_\_\_\_\_



PROJECT \_\_\_\_\_ LOCATION \_\_\_\_\_

DATE \_\_\_\_\_

SUBJECT \_\_\_\_\_

COMPUTED BY \_\_\_\_\_

CHECKED BY \_\_\_\_\_

COMPUTE DEPTH REQD FOR CONCRETE VAULT

$$\text{VOL NEW SUMP} = 6(12)(3) = 216$$

INSIDE DIMENSIONS NEW CONC VAULT = 8'-8" W X 16'-8"

$$\text{DREQD} = \frac{216}{(8.67)(16.67)} = 1.49' \text{ USE } 2'-0"$$



PROJECT

LOCATION S OF 3-05-2

DATE

SUBJECT

COMPUTED BY

CHECKED BY

USE SAME FRAMING AS DESIGNED & SHOWN ON PGS 6&7

### MATERIAL TAKEOFF

#### CONC FORMS

$$A = (11 + 19)(2)(2) + (10 + 18)(2)(2)(2)$$

$$= 120 + 224$$

$$= 344 \text{ SFCA} \checkmark$$

#### CONCRETE

$$V = \frac{(11)(19)(4)}{27} + \frac{(10 + 18)(2)(2)(1.67)}{27} - (120)(2.4)$$

$$= 10.6 \text{ CY} \checkmark$$

$$\text{VOL CLAY } (11)(19) + (18 + 10)(2)(2) = 321 \text{ SF} \checkmark$$

#### REINF STEEL

$$\text{WT} = 6(10.6)(10.6)(27) =$$

$$= 1786 \# \checkmark$$

#### EPOXY 10 GAL

#### STR. STEEL

$$W = \begin{matrix} \text{FRAME} \\ (5 + 18 + 9.5)(2)(15) \end{matrix} + \begin{matrix} \text{PURLIN} \\ 5(10)(12) \end{matrix} + \begin{matrix} \text{GIRT DOOR FR.} \\ ((18)(2) + (10) + 22)(2.7) \end{matrix} + \begin{matrix} \text{BASE L} \\ ((18)(2) + 10)(4.9) \end{matrix}$$

$$= 1065 \quad + \quad 720 \quad + \quad 456 \quad + \quad 225$$

$$= 2466 \#$$

#### SIDING ROOFING & INSUL ROOF

$$A = \begin{matrix} \text{SIDING} \\ (10)(18)(2) \end{matrix} + \begin{matrix} \text{ROOFING} \\ 8(10) \end{matrix} + \begin{matrix} \text{INSUL} \\ 10(18) \end{matrix}$$

$$= 360 \quad 80 \quad 180$$

$$= 620 \text{ SF}$$

#### FLASHING

$$L = \begin{matrix} \text{JAMB} \\ 10 + 2(13) = 10 \end{matrix} + \begin{matrix} \text{WIRE} \\ 4(10) \end{matrix} + \begin{matrix} \text{CORNER} \\ 20 \end{matrix} + \begin{matrix} \text{DOOR} \\ 18(2) + 10 \end{matrix}$$

$$= 10 + 46 + 40 + 20 + 46$$

$$= 162 \text{ LF}$$

#### DOOR & HWDR

1 PR 6070 HOLLOW METAL & 1 PR BUMPER DOORS.

PROJECT

LOCATION

S OF 3-05-2

DATE

SUBJECT

COMPUTED BY

CHECKED BY

CONC FLOOR TOPPING UNDER NEW SS FL

$$V = \frac{(6.33 + 1.16)}{2} \left( \frac{20 \times 10}{27} \right)$$

$$= 1.85 \text{ CY}$$

STAINLESS STEEL FLOOR, WAINSCOT &amp; TROUGH

$$W = \left[ (20)(10) + (20)(2) + 10(4) + 2(10+3) \right] 10$$

$$= (200 + 200 + 26)(10)$$

$$= 4260 \#$$

PAINT 5 GAL

BUMPER DOORS 1 PR

PROJECT

LOCATION

S OF 3-05-2

DATE

SUBJECT

COMPUTED BY

CHECKED BY

LABOR	CARP	LAB	EQOP	ENK	SHTM	PAINT	PIPE	ELEC
REMOVE EXISTG DOORS	16	8						
REMOVE FL TOPPING & DOK		80	40					
EXC SUMP & GRADE SITE	16	16						
REMOVE SUMP	160	80						
FORM VAULT FL	16	8						
PLACE VOLCLAY	8	16						
PLACE VAULT FL CONC.	32	16						
FORM VAULT WALLS								
FAB & PLACE REINF				16				
PLACE WALL CONC	16	32						
STRIP WALL FORMS	16	16						
PLACE VOLCLAY	16	8						
BACK FILL		8	8					
INSTALL EPOXY LINING						16		
SET NEW SUMP		8	8	24				
SET BLDG FRMG		16	16	32				
INSTALL INSUL WALL PANELS		16			32			
INSTALL INSUL ROOF PANELS		16			32			
INSTALL HM DOORS	16							
INSTALL FLASHG					32			
PAINT STR ST & DOORS						32		
FAB & PLACE TOPPING, REINF	16			16				
PLACE CONC FL TOPPING	16	16		16				
PLACE 1/4" SS PL FLOOR				16				
PLACE 1/4" SS PL MAINSCOT				32				
PLACE 1/4" SS PL TROUGH				16				
INSTALL BUMPER DOORS	16			8				
MISC MECH & ELEC							80	80
	176	496	168	176	96	48	80	80

EQUIP RENTAL

CRANE	24HR
AIR COMP & JACK HAMMER	120HR
BACKHOE	24HR

PROJECT

LOCATION

DATE

SUBJECT

COMPUTED BY

CHECKED BY

RECAP

MATERIAL

CONC FORMS

CONCRETE

REINF STEEL

FILL SAND

STR STEEL

INSUL, SIDING & RFG

FLSHG

HM DOOR & HDWR

CONC FL TOPPING

SS FL WAINSCOT & TROUGH

PAINT

BUMPER POOLS

WATER STOP

VOICLAY

EPOXY

EQUIPMENT

CRANE

AIR COMP & JACK

BACK HOE

LABOR

CARPENTER

LABORER

EQ OPERATOR

IRON WORKER

SHEET METL WORKER

PAINTER

PIPEFITTER

ELECTRICIAN

6X10 SS SUMP

SUMP ELECTRICAL

QTY	UNIT	PRICE	AMOUNT
568 SF	FLA	1.54	870
13.4 CY	CONC	6.500	870
1505 #	REINF	0.30	450
15 CY	SAND	14.35	220
2466 #	STR	0.61	1500
620 SF	INSUL	4.45	2760
162 LF	FLSHG	1.60	260
1 EA	HM DOOR	500.00	500
1185 CY	CONC FL	75.00	140
4260 LB	SS FL	3.38	14400
5 GAL	PAINT	12.00	60
1 PR	BUMPER POOL	2100.00	2100
46 LF	WATER STOP	8.12	370
32 SF	VOICLAY	9.38	300
1 GAL	EPOXY	48.00	480
24 HR	CRANE	126.55	3040
120 HR	AIR COMP & JACK	17.50	2100
24 HR	BACK HOE	28.30	680
176 HR	CARPENTER	16.08	2830
496 HR	LABORER	12.70	6300
168 HR	EQ OPERATOR	20.40	3410
176 HR	IRON WORKER	18.46	3250
96 HR	SHEET METL WORKER	20.24	1940
48 HR	PAINTER	12.20	590
80 HR	PIPEFITTER	19.70	1580
80 HR	ELECTRICIAN	19.27	1540

24410

5820

21440

6945

8910

37295

12452

49727

4973

+33900 W&P

+10% CONTIN

\$54700

PROJECT

LOCATION BG-13 BG ITEM 3

DATE

SUBJECT

COMPUTED BY

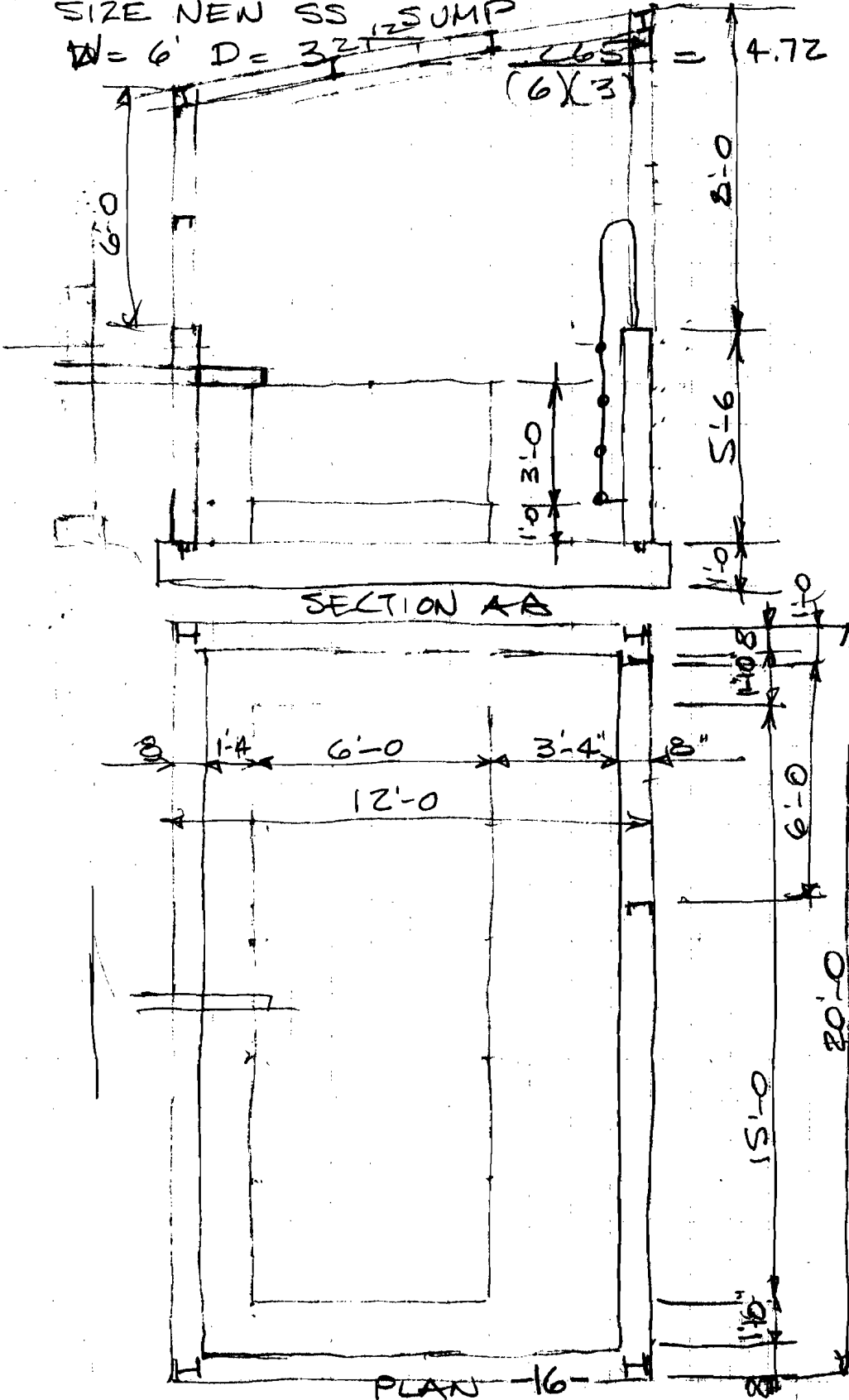
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COMPUTE VOL OF EXISTG SUMP

$$V = (6.67)(8.67)(100.16 - 95.58) = 265 \text{ FT}^3 = 1981 \text{ GAL}$$

SIZE NEW SS SUMP

$$W = 6' \quad D = 32 \text{ FT} \quad \frac{265}{(6 \times 3)} = 4.72 \text{ USE 15}$$



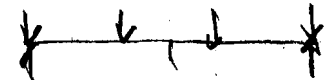
SIZE PURLIN

$$M = \frac{1}{8} (.2)(20)^2 = 10 \text{ K}$$

$$S = 5 \text{ IN}^3 \text{ USE W6X9}$$

SIZE END FRAMES

$$W(1.2) = 2 \text{ K}$$



$$M = 2(6) - 2(2) = 8 \text{ K}$$

$$S = 4 \text{ IN}^3 \text{ USE W6X15}$$

SIZE GIRT & EDGE PURLIN

$$M = \frac{1}{8} (.1)(20)^2 = 5 \text{ K}$$

$$S = 2.5 \text{ IN}^3 \text{ USE } [6 \times 8.2$$

PROJECT

LOCATION

BG 13 (REV1)

DATE

SUBJECT

COMPUTED BY

CHECKED BY

## MATERIAL TAKEOFF

## CONC FORMS

$$A = (21 + 13)(2) + (6)(20)(4) + 6(12)(4) = 836 \text{ SFCA}$$

## CONC.

$$V = \frac{(21)(13) + (6)(20)(2)(.67) + 6(12)(2)(.67)}{2.7} = 19.6 \text{ CY}$$

## REINF STEEL

$$WT = 6(1.04)(19.6)(27) = 3302 \#$$

## WATERSTOP

$$L = (20 + 12)(2) = 64 \text{ LF}$$

## VOL CLAY

$$A = (23)(15) + 6(20)(2) + 6(12)(2) = 729 \text{ SF}$$

## STR STEEL

$$WT \begin{matrix} \text{FRAME} & \text{PURLIN} & \text{EIRT} & \text{DOOR FR} & \text{BASEL} \\ (26)(2)(16) & + 4(20)(9) & + 64(8.2) & + 23(8.2) & + 64(4.9) = 2580 \# \end{matrix}$$

## EPOXY 20 GAL

## SIDING &amp; RFG

$$A = 7(12)(2) + (20)(7)(2) + (20)(14) = 728 \text{ SF}$$

## FLASH

$$L = \begin{matrix} \text{CORNER} & \text{BEAVE} & \text{PAKE} & \text{DOO} & \text{BASE} & \text{BASE} \\ 7(4) & + (20)(2) & + (12)(2) & + 21 & + (20)(2) & + 12(2) = 177 \text{ LF} \end{matrix}$$

## DOOR &amp; HDWR

1 PR 6070 HM & HDWR.

## PAINT 5 GAL

PROJECT

LOCATION

BC-13 REV1

DATE

SUBJECT

COMPUTED BY

CHECKED BY

	EQ OP	LAB	CARP	IRN NKR	SHT UTL	PAINT	PIPE	ELEC
LABOR								
EXCAVATE EXT. EXISTG TANK	16	16						
REMOVE EXISTG CONC SUMP	40	80						
FORM NEW MOUT BOTT		8	16					
PLACE VOLCLAY		16 <sup>hr</sup>	8					
FAB & PLACE REINF		16		32				
PLACE FLOOR CONC		16 <sup>hr</sup>	16					
STRIP FORMS		8 <sup>hr</sup>	8					
FORM WALLS		16	32 <sup>hr</sup>					
FAB & PLACE WALL REINF		16		32				
PLACE WALL CONC		16 <sup>hr</sup>	16					
PLACE VOLCLAY		16	16					
BACKFILL	8	8						
INSTALL EPOXY	8			16		16		
SET NEW SUMP	16			48				
SET STR STEEL								
INSTALL RFG & SIDING		16			64			
INSTALL FLSHG					32			
INSTALL DOORS			16					
PAINT STR SY & DRS						32		
MISC PIPE & ELEC							40	40
	88	248	128	128	96	48	40	40

EQUIP RENTAL

BACKHOE	24
AIR COMP & JACK HAMMER	40
CRANE	24

PROJECT

LOCATION

BC-13 DEV1

DATE

SUBJECT

COMPUTED BY

CHECKED BY

RECAP

MATERIAL

CONC FORMS

CONCRETE

REINF STEEL

WATER STOP

VOLCLAY

STR. STEEL

EPOXY

SIDING & RFG

FLS HG

DOORS & HDWR

PAINT

LADDER

EQUIPMENT RENTAL

BACKHOE

AIR COMP & JACK HMR

CRANE

LABOR

EQUIP OP

LABORER

CARPENTER

IRON WKR

SHT MTL

PAINT

PIPE

ELEC

6'x15' S.S. SUMP

SUMP ELECTRICAL

QUAN

UNIT PRICE

AMOUNT

031-182

2000

033-130

4650

032-107

1000

031-198

5200

071-301

0100

051-255

1500

033-118

0320

074-202

0600

076-204

0300

131-523

1500

016-408

0400

016-420

0300 & 0930

016-460

2600

836 SEEA

19.6 CY

3302 #

64 LF

729 SF

2580 #

20 GAL

728 SF

177 LF

1 EA

SEAL

1 EA

24 HR

40 HR

24 HR

88 HR

248 HR

128 HR

128 HR

96 HR

48 HR

40 HR

40 HR

1.54

65.00

0.30

8.10

0.92

0.61

48.00

4.45

1.60

5.00

12.00

195.00

2830

1750

12655

2040

1270

1608

1846

2024

1220

1970

1927

1290

1270

990

520

670

1570

960

3240

280

500

60

200

680

700

3040

1800

3150

2060

2360

1940

590

790

770

11550

4420

13460

9905

8910

48245

16081

64326

6433

70759

+33% OH & P

+10% CONTIN



PROJECT

LOCATION

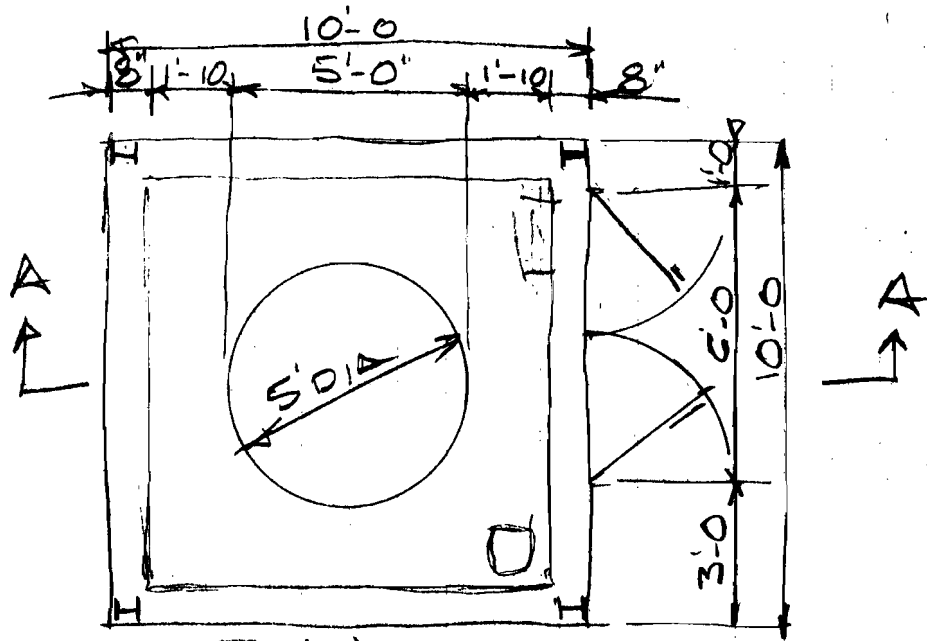
SE. OF 649 LINE 6 (TENT)

DATE

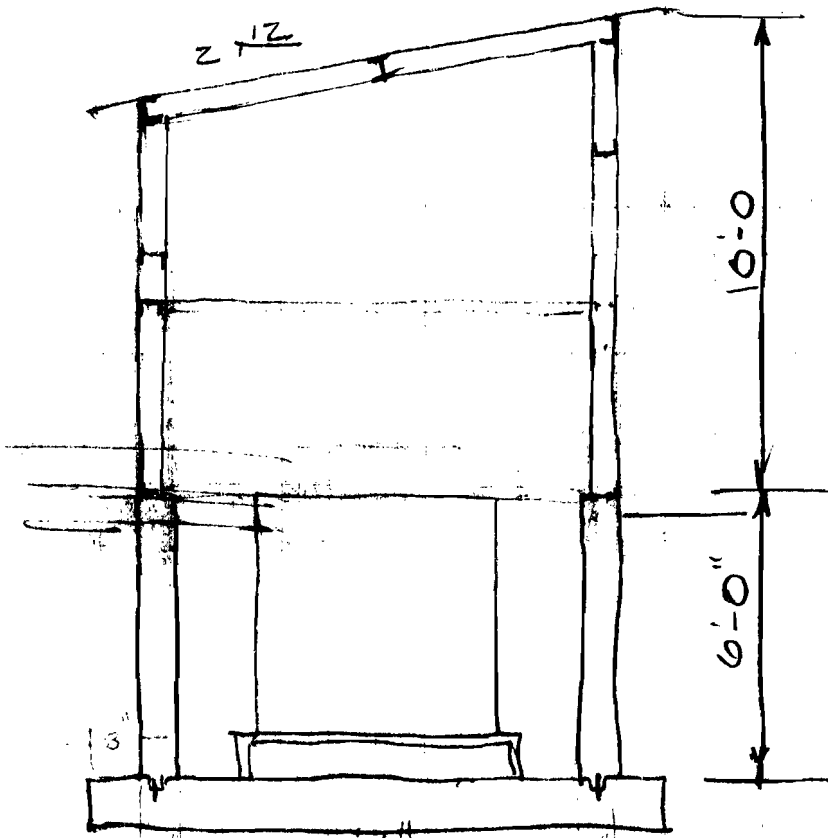
SUBJECT

COMPUTED BY

CHECKED BY



PLAN



SECTION A-A

PROJECT

LOCATION

DATE

SUBJECT

COMPUTED BY

CHECKED BY

CHECK BOUANCY

$$B = (10)(10)(7)(62.5) = 43750$$

$$WT = \left[ \overset{144}{12}(12)(1) + 4 \overset{177}{(11)(6)(1.67)} \right] 150 + \overset{512.5}{180}(10) \\ 48150 + 1800 = 49,950 > 43750$$

MATERIAL TAKEOFF

CONC FORMS

$$SFCA = 12(4) + 6(9)(8) = 520 SFCA$$

CONC.

$$V = \frac{(12)(12)(1) + 4(11)(6)(1.67)}{27} = 12 CF$$

REINF. STEEL

$$W = 6(1.04)(12)(27) = 2022 \#$$

VOL CLAY

$$A = (12)(12) + 4(12) + 6(11)(4) = 456 SF$$

WATER STOP

$$L = 10(4) = 40 LF$$

STR. STEEL

$$W = 2 \left( \overset{56}{56} \right) (15.5) + \overset{91}{91} (8.2) + \overset{40}{40} (4.9) = 2678 \#$$

SIDING, REG &amp; INSUL.

$$A = 2 \frac{(8+10)}{2} (10) + 8(10) + 10(10) + 10(12) = 480 SF$$

FLASHING

$$L = 4 \overset{CORNER}{(10)} + 4 \overset{EAVE \& PAKE}{(10)} + 4 \overset{BASE}{(10)} + \overset{DOOR}{21} = 141 LF$$

DOOR &amp; HDNR 1 PR 6070 HM DOORS &amp; HDNR,

LADDER = 9 LF

EPOXY 10 GAL

$$\text{STAINLESS STEEL } \left( \overset{5}{5} \right) \left( \overset{11}{11} \right) \left( \overset{6}{6} \right) \left( \overset{2}{2} \right) + 4 \left( \overset{10}{10} \right) = 1545 \#$$

PROJECT

LOCATION

DATE

SUBJECT

COMPUTED BY

CHECKED BY

LABOR	HVY EQUIP	LAB	IRN WKR	SM	ELEC.	PIPE	CARP	PAINT
REMOVE EXISTG TANK	8	8	8	8	8	8		
EXC. VAULT FNDTN	8	8						
FORM VAULT FL.		8						16
PLACE VOLCLAY		8						8
FAB & PLACE FL REINF		8	16					
PLACE FL CONC.		16						8
STRIP FORMS		8						8
FORM VAULT WALLS		16						32
FAB & PLACE WALL REINF		16	32					
PLACE WALL CONC.		16						16
STRIP WALL FORM		16						8
PLACE WALL VOLCLAY		8						16
BACK FILL VAULT	8	8						
SET STR. STEEL	8	8	32					
INSTALL ROOF & WALL PANEL		16		32				
INSTALL FLASHG		16		32				
INSTALL EPOXY								16
INSTALL DOORS & HDWR							16	
INSTALL TANK & STAND		8	24					
INSTALL TROUGH & PIPING				40		40		
INSTALL ELEC					40			
PAINT DOORS & STR. STL								16
	32	192	112	112	48	48	128	32

EQUIPMENT

BACKHOE 24  
 CRANE 8

PROJECT

LOCATION

DRAW

DATE

SUBJECT

COMPUTED BY

CHECKED BY

RECAP

MATERIAL

CONC FORMS

CONCRETE

REINF STEEL

BENTONITE

WATERSTOP

STR STEEL

INSUL REFRIG SIDING

FLSHG

DOOR & HDWR

PAINT

EPOXY

LADDER

STAINLESS STEEL TANK STD

COST LINE 13765 + 3880 + 6565

EQUIPMENT

BACKHOE

CRANE

LABOR

HUY. EQUIP.

LABORER

IRON WORKER

SHT MTL

ELEC

PIPE

CARPENTER

PAINT

SUMP ELECTRICAL

QUAN UNIT PRICE AMOUNT

520EFC

1 54

800

12CY

65 00

780

2022#

030

610

456SF

092

420

40LF

8 10

320

2678#

061

1630

480SF

445

2140

141LF

160

230

1EA

500 00

500

5GAL

12 00

60

10GAL

48 00

480

9LF

20 00

180

1545LB

3.38

5220

13370

24HR

28 30

680

8HR

126 55

1010

1690

32HR

20 40

650

192HR

12 70

2440

112HR

18 46

2070

112HR

20 24

2270

48HR

19 27

920

48HR

19 70

950

128HR

16 08

2060

32HR

12 20

390

11750

8910

35720

+33% O&EP

11900

47620

+10% CONTIN

4760

52380

PROJECT

LOCATION NO F6-18-1 LINE 6 ITEM 9

DATE

SUBJECT 3' DIA X 4' DEEP TANK

COMPUTED BY

CHECKED BY

USE SAME SIZE VAULT AS FOR 5' DIA X 5' DTANK  
SEE PG 23.  
RECAP

MATERIAL	QUAN	UNIT PRICE	AMOUNT	
CONK FORMS	031-182 2000	520 SCFA	154	800
CONCRETE	033-130 4650	12 CY	65 <sup>00</sup>	780
REINF STEEL	032-107 1000	2022#	030	610
BENTONITE	071-301 0100	456 SF	092	420
WATERSTOP	031-198 5200	40 LF	810	320
STR STEEL	051-255 1500	2675#	061	1630
INSUL RFG & SIDING	074-202 2600	480 SF	445	2140
FLASH	076-204 0300	141 LF	160 <sup>00</sup>	230
DOOR & HDWR		1 EA	500	500
PAINT		5 GAL	1200	60
EPOXY	033-118 0320	10 GAL	4800	480
LADDER	055-158 010	9 LF	2000	180
STAINLESS STAND	7.35(25)+24(5)	304#	338	1030
<u>EQUIP</u>				9180
BACKHOE	016-408 0400	24 HR	2830	680
CRANE	016-460 2600	8 HR	1265	1010
<u>LABOR</u>				1690
HVY EQUIP		32 HR	20 <sup>40</sup>	650
LABORER		112 HR	1270	2440
IRON WKR		112 HR	1846	2070
SM7 MTL		112 HR	2024	2270
ELEC		48 HR	1927	920
PIPE		48 HR	1970	950
CARPENTER		128 HR	1608	2060
PAINT		32 HR	1220	390
SUMP ELECTRICAL				11750
				8910
				31530
		+33% O&P		10510
		+10% CONTIN		4200
				<u>46240</u>

PROJECT

LOCATION

BG-199-1 BG ITEM 1

SHEET

OF

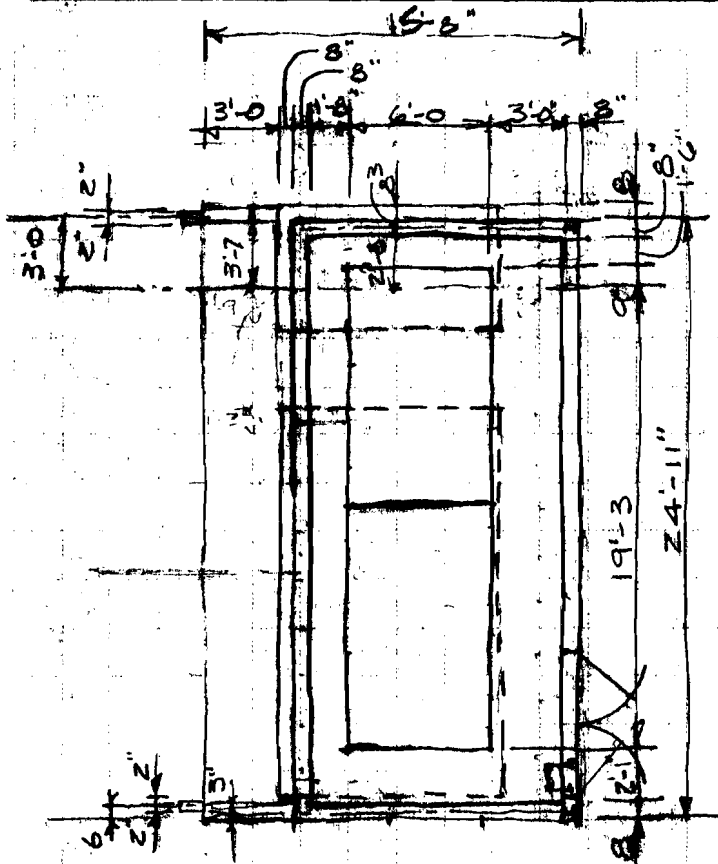
21/21/19

DATE

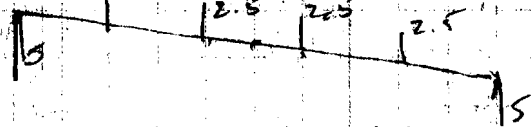
SUBJECT

COMPUTED BY

CHECKED BY



DESIGN END FRAME



$$M = 10(5) - 6(25) - 2(25)$$

$$= 50 - 15 - 5$$

$$= 30'K$$

$$S = 15 \cdot 2 \text{ USE MBX17}$$

PURLINS

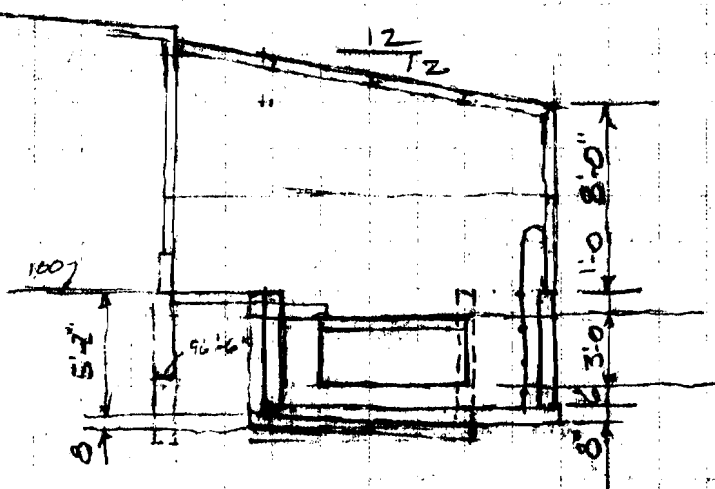
$$M = \frac{1}{8} (.2)(25)$$

$$= 15.6'K$$

$$S = 7.5 \text{ USE W6X16}$$

EAVE STRUTS & GIRTS

$$S = 375 \text{ E6X8.2}$$



PROJECT

LOCATION

BG-199-1

DATE

COMPUTER BY

CHECKED BY

## MATERIAL TAKEOFF

CONC. FORMS

$$A = (26 + 16)(2) + (4.5)(25)(4) + 4.5(16)(4) = 822 \text{ SFCA}$$

CONC.

$$V = \frac{(26)(16)(.67) + (25)(4.5)(2)(.67) + (16)(4.5)(2)(.67)}{27} = 19.5 \text{ CY}$$

REINF STEEL

$$WT = 6(1.04)(19.5)(27) = 3285 \#$$

WATERSTOP

$$L = (25 + 12)(2) = 74 \text{ LF}$$

VOLCLAY

$$A = (14)(29) + (25 + 12)(2)(4.5) = 739 \text{ SF}$$

STR STEEL

$$WT = \underbrace{(24)(2)(17)}_{\text{RAVE}} + 3 \underbrace{(25)(16)}_{\text{DUE LIN}} + \underbrace{(3)(25) + 2(16) + (23)}_{\text{EAVE STRUT + CHIST}}(8.2) + \underbrace{(25 + 2)(16)}_{\text{BASEL}}(4.9) = 3361 \#$$

EPOXY ZDGAL

SIDING &amp; RFG

$$A = 8(25) + 2(9.5)(16) + (16)(25) = 904 \text{ SF}$$

FLASH

$$L = \underbrace{4(9.5)}_{\text{CORNER}} + \underbrace{25}_{\text{EAVE}} + \underbrace{2(16)}_{\text{RAVE}} + \underbrace{21}_{\text{DOOR}} + \underbrace{57}_{\text{BASE}} = 173 \text{ LF}$$

DOOR

1 PR 6070 HM &amp; HDWR.

PAINT 5 GAL

LADDER

PROJECT

LOCATION

BG-199-1

DATE

SUBJECT

COMPUTED BY

CHECKED BY

	EQOP	LAB	CARP	IRN WKR	PAINT	SHT MTL	PIPE	ELEC
LABOR								
REMOVE EXISTG PUMPS & EXCAVATE EXISTG SUMPS	32	16 <sup>12</sup>				16	48	32
REMOVE WALLS OF SUMPS	80	160						
FORM NEW VAULT BOT		8	16					
PLACE BOT VCLAY		16	8					
FAB & PLACE BOT REINF		16		32				
PLACE FLOOR CONC.		16	16 <sup>12</sup>					
STRIP FLOOR FORMS		8 <sup>80</sup>	8					
FORM WALLS		24	48					
FAB & PLACE WALL REINF		16		48				
PLACE WALL CONC.		16	16					
INSTALL VCLAY		16	16					
BACKFILL	8	8 <sup>40</sup>						
INSTALL EPOXY					32			
SET NEW SUMP	8			16 <sup>80</sup>				
SET STR STEEL	16			48				
INSTALL REG & SIDING		32				64		
INSTALL FLSHG						32		
INSTALL DOORS			16					
INSTALL LADDER				16				
PAINT DOOR & STR STEEL					32			
REINSTALL PUMPS & EXCAVATE		40				40	80	64
	160	396	144	160	64	152	128	96

EQUIP RENTAL

BACK HOE	24
AIR COMPRESSOR	40
CRANE	24



PROJECT

LOCATION

BC-199-

DATE

SUBJECT

COMPUTED BY

CHECKED BY

# RECAP

## MATERIAL

CONC FORMS

CONCRETE

REINF STEEL

WATER STOP

BENTONITE

STR. STEEL

EPOXY

SIDING PFC & INSUL

LSHG

DOORS & HDWR

PAINT

LADDER

031-182

2000

033-130

4650

032-107

1000

031-198

5200

071-301

0100

051-255

1500

033-118

0320

074-202

0600

076-204

0300

131-523

1500

QUAN

8225EA

19.5 CY

3285#

74LF

739SF

3361#

20EAL

904SF

173LF

1 EA

10EAL

1 EA

UNIT PRICE

154

65.00

0.30

8.10

0.92

0.61

48.00

4.45

1.60

500.00

12.00

195.00

AMOUNT

1270

1270

990

600

680

2050

960

4020

280

500

120

200

12940

## EQUIPMENT RENTAL

BACKHOE

AIR COMP. J/A

CRANE

016-408

0400

016-420

0300

016-460

2600

24HR

40HR

24HR

2830

1750

12655

680

700

3040

4420

## LABOR

EQUIP OP

LABORER

CARPENTER

IRN WKIZ

PAINT

SHF MTL

PIPE

ELEC

6'x20' SS SUMP

SUMP ELECTRICAL

160 HR

392 HR

1144 HR

160 HR

64 HR

152 HR

128 HR

86 HR

2040

1270

1608

1846

1220

2024

1970

1927

3260

4980

2320

2950

780

3080

2520

1850

21740

12098

8910

60103

20034

80137

8014

88151

+3370.045P

+10% CONTIN

PROJECT

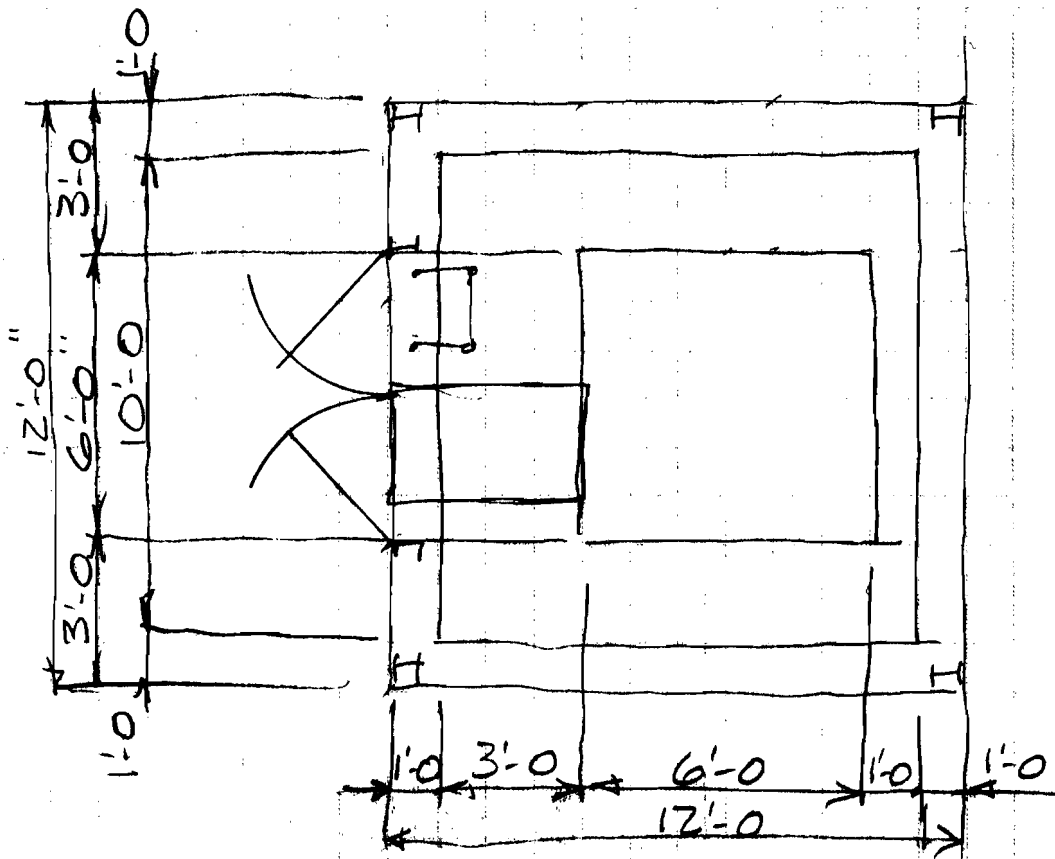
LOCATION N of 3-50 LINE 3 ITEM 2

DATE

SUBJECT

COMPUTED BY

CHECKED BY



SIZE FRAME  
 $6(4) \text{ @ } 1.2' = 1.2' K$

$$M = (1.2)(6) - 1.2(2) = 4.8' K$$

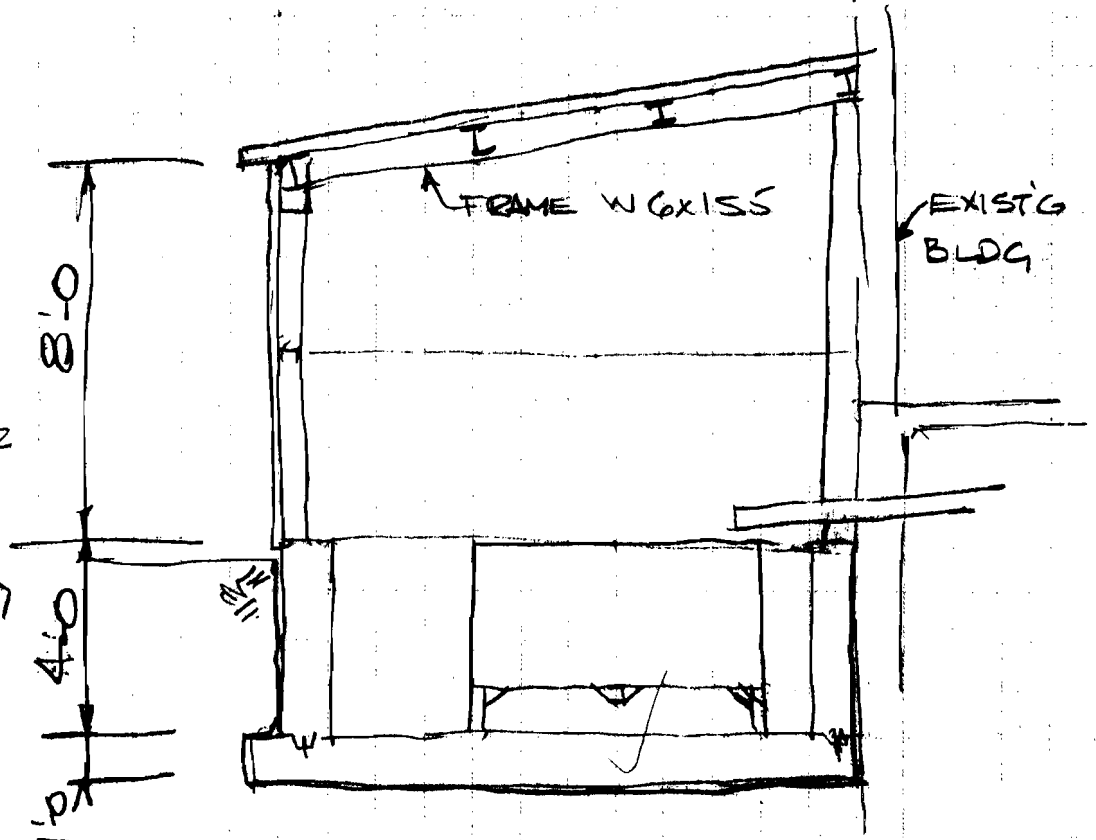
S = 2.4 USE W6x15

PURLIN

$$M = \frac{1}{8} (.2)(12)^2 = 3.6 \text{ USE H6x12}$$

GIRTS

$$M = \frac{1}{8} (.1)(12)^2 = 1.8 \text{ USE I5x6.7}$$



PROJECT

LOCATION N. OF 3-50(3-140-2)

DATE

SUBJECT

COMPUTED BY

CHECKED BY

## MATERIAL TAKE OFF

## CONC FORMS

$$A = (13)(3) + 4(12)(7) = 375 \text{ SFCA}$$

## CONCRETE

$$V = \frac{(13)(13) + 4(12)(4)}{27} = 13.4 \text{ CY}$$

## REINF STEEL

$$WT = 6(1.04)(13.4)(27) = 2260 \#$$

## WATERSTOP

$$L = 12(4) = 48 \text{ LF}$$

## VOLCLAY

$$A = (13)(13) + 4(12)(4) = 361 \text{ SF}$$

## STR STEEL

$$W = \underset{\text{FRAME}}{64(15)} + \underset{\text{PURLIN}}{48(12)} + \underset{\text{GIRT \& DOOR FR}}{(36+25)(6.7)} + \underset{\text{BASEL}}{36(4.9)} = 1593 \#$$

## EPOXY 10 GAL

## SIDING 2 RFG

$$A = (9)(12)(3) + (12.5)(12) = 474 \text{ SF}$$

## FLSHG

$$A = \underset{\text{CORNER}}{4(9)} + \underset{\text{BASE}}{3(12)} + \underset{\text{FAUCET RAKE}}{3(12)} + \underset{\text{DOOR}}{20} = 128 \text{ SF}$$

## DOOR &amp; HDWR

1 PR 6070 HM &amp; HDWR

## PAINT 5 GAL.

PROJECT \_\_\_\_\_ LOCATION N OF 3-50(3-140-2)  
 SUBJECT \_\_\_\_\_

LABOR	EROP	LAB	CAPP	12IN WKR	SHT MTL	PIPE	ELEC	PAINT
REMOVE EXISTG PUMPEEQ		32			16	40	40	
REMOVE WOOD STR.		32	32					
EXC AROUND SUMP	8	16						
REMOVE CONC SUMP	80	160						
FORM VAULT FL		8	16					
FAB & PLACE FL REIN					16			
PLACE VOLCLAY & WATERSTOP		8 <sup>70</sup>	16					
PLACE CONC FL		16	16 <sup>70</sup>					
REMOVE FL FORMS		8	8					
FORM WALLS		16	32					
FAB & PLACE WALL REIN					24			
PLACE WALL CONC		32	16					
STRIP WALL FORMS		16 <sup>70</sup>	16					
INSTALL VOLCLAY		8	16					
BACKFILL	8	16						
INSTALL EPOXY								16
SET NEW SUMP	8	8 <sup>70</sup>		24 <sup>70</sup>				
SET BLDG FRMG	16	16		32				
INSTALL WALL PANELS		8			24			
INSTALL ROOF PANELS		8			16			
INSTALL DOORS			16					
INSTALL FLASHG					32			
PAINT STR ST & DOORS								32
FAB & INSTALL APRON				32				
FAB & INSTALL STAIR				32				
INSTALL PUMPS & EQUIP		40			40	80	64	
		120	408	184	160	128	104	48

EQUIP RENTAL  
 CRANE 24 HR  
 AIR COMP & JH 80 HR  
 BACKHOE 16 HR

PROJECT

LOCATION NOE 3-50 (3-140-2)

DATE

SUBJECT

COMPUTED BY

CHECKED BY

RECAP MATERIAL

CONC FORMS

CONCRETE

REINF STEEL

WATERSTOP

VOLCLAY

STR STEEL

INSUL SIDING

EPOXY

FLASH

DOOR & HDWR

LADDER

APRON SS

031-182  
2000  
033-130  
4650  
032-107  
1000  
031-198  
5200  
071-301  
0100  
051-255  
1300  
074-202  
0600  
038-118  
0320  
076-204  
0300  
  
055-158  
010  
157-250  
1000

QUAN  
375 SFCA  
134 CY  
2260 #  
48 LF  
361 SF  
1593 #  
474 SF  
10 GAL  
128 SF  
1 EA  
9 LF  
160 LB

UNIT PRICE  
1 54  
65 00  
0 30  
8 10  
0 92  
0 61  
4 45  
48 00  
1 60  
5 00  
20 00  
3 33

AMOUNT  
580  
870  
680  
390  
330  
970  
2110  
480  
200  
500  
180  
540

7830

EQUIPMENT

CRANE

AIR COMPD JH

BACKHOE

016-460  
2600  
016-420  
0300 & 0930  
016-408  
0400

24 HR  
80 HR  
16 HR

126 55  
17 50  
28 50

3040  
1400  
460

4900

LABOR

EQ. OP.

LABORER

CARPENTER

IRON WKR

SHT MTL

PIPE

ELEC

PAINT

6'x6' SS SUMP

SUMP ELECTRICAL

120 HR  
408 HR  
184 HR  
160 HR  
128 HR  
120 HR  
104 HR  
48 HR

20 40  
12 70  
16 08  
18 46  
20 24  
19 70  
19 27  
12 20

2450  
5180  
2960  
2950  
2590  
2360  
2000  
590

21080  
5386  
8910

+33% O&P

+10% CONTIN

35376  
11792  
47168  
4717  
51885

PROJECT

LOCATION S OF 3A-05-1 LINES 3/ITEM 5

DATE

SUBJECT

PRIORITY 2 SUMP RENOVATION

COMPUTED BY

CHECKED BY

DESIGN FRAME

$$L = 4(6)(0.5) = 3.2^k$$

$$M = 3.2(4) = 3.2^k$$

$$S = 1.6$$

PURLIN

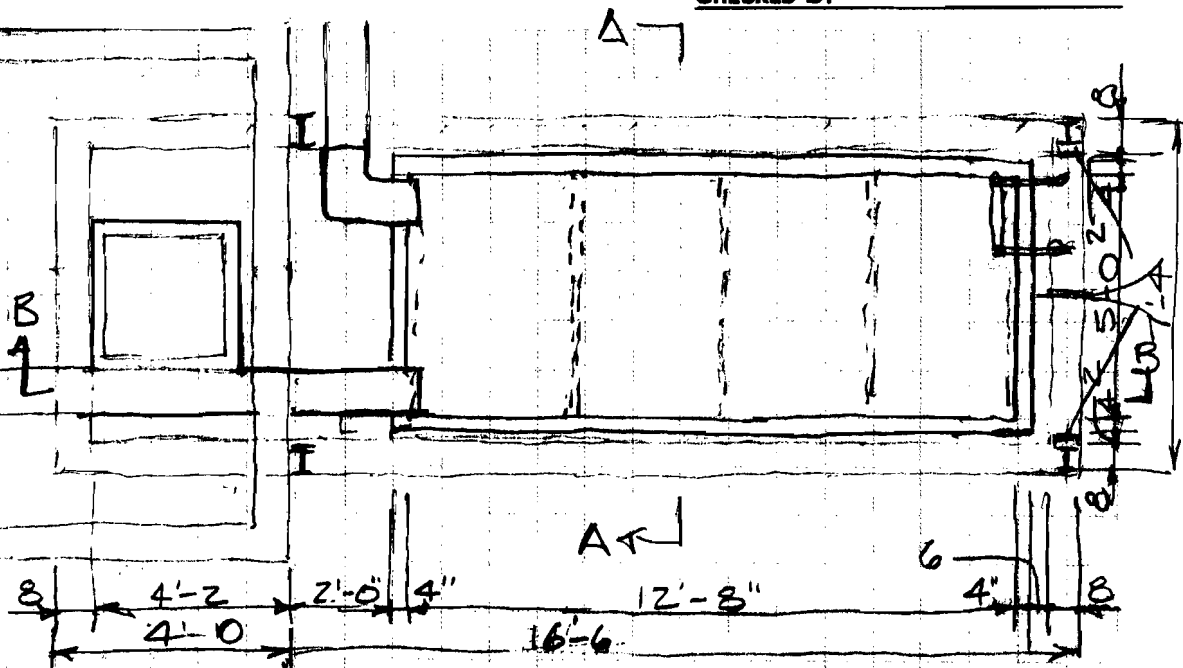
$$M = \frac{1}{8}(1.1)(16) = 3.2$$

$$= 1.6$$

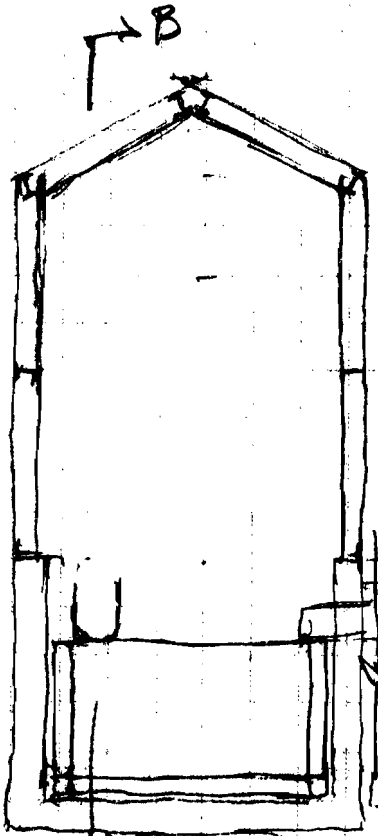
GIRT

$$M = \frac{1}{8}(0.08)(6) = 2.6$$

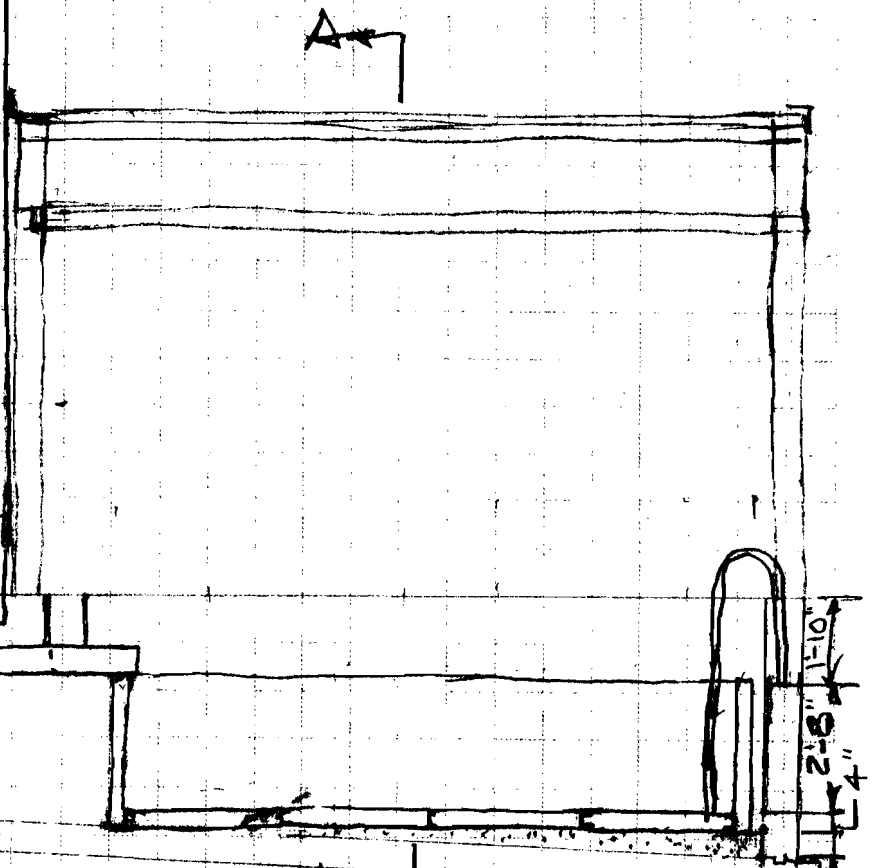
$$S = 1.3$$



PLAN



SECTION A-A



SECTION B-B

$$\text{SUMP VOLUME} = (2.67)(5.0)(2.67 + 0.5)$$

$$= 137.45$$

$$= 1028 \text{ GAL}$$

PROJECT

LOCATION

S OF 3A-OS-1

DMSI

OF

DMSI

SUBJECT

DATE

COMPUTED BY

CHECKED BY

## MATERIAL TAKEOFF

## CONC. FILL

$$V = \frac{6(.68)(14)}{2(27)} = 1.1 \text{ CY}$$

## STAINLESS TROUGH SYSTEM

$$WT = ((3 \times 3) + (3 \times 11))(10) = 420 \#$$

## STAINLESS DBL WALL TANK

$$WT = 10 \left[ 5.67(3)(2) + (13.33)(3)(2) + (5)(2.67)(2) + (12.67)(2.67)(2) + (5)(12.67) + (5.67)(13.33) \right] + 5(5.67)(5.4) = 3473 + 153 = 3626 \#$$

## STRUCTURAL

USE W6X12 FRAME &amp; RAILS &amp; 5X6.7

$$W = \left[ 2(24) + 4(16.5) \right] 12 + \frac{49}{328}(6.7) + \frac{19}{240}(4.9) + \frac{25}{128}(6.7) = 2104 \#$$

## SIDING &amp; RFG

$$\Delta = (8)(41) + \frac{2(8)}{2} + 8(16.5) = 468 \text{ SF}$$

## FLASH

CORNER EAVE RAKE DOOR RIDGE

$$\Delta = 8(4) + 33 * 10 + 20 + 17 = 112 \text{ SF}$$

## DOOR &amp; HDWR

1 PR 6070 HM &amp; HDWR

## LADDER

L=6 LF.

## PAINT

SCAL

PROJECT

LOCATION S OF 3A-05-1

DATE

SUBJECT

COMPUTED BY

CHECKED BY

LABOR	LAB	CAPP	EQOP	IRNWK	SHITL	PAINT	PIPE	ELEC
REMOVE PUMPS & EQ							40	40
PLACE CONC FILL	16	16						
SET TANK	8		8	24				
SET BLDG FRAMING	16		16	32				
INSTALL SIDING	8				16			
INSTALL REG	8				16			
INSTALL DOORS		16						
INSTALL FLSHG					32			
PAINT STR ST & DOOR						32		
FAB & INSTALL TROUGH SYS, 40				80				
INSTALL LADDER				16				
INSTALL PUMPS & EQ,							80	40
	96	32	24	152	64	32	120	80

EQUIP RENTAL  
CRANE 24HR





PROJECT \_\_\_\_\_ LOCATION NO. 1-50 LINE 1 ITEM 2 DATE \_\_\_\_\_  
 SUBJECT PRIORITY 3 SUMP DEMOLITION & REMOVAL COMPUTED BY \_\_\_\_\_  
 CHECKED BY \_\_\_\_\_

COMPUTE VOL OF CONC.  
 $V = (4.5)(8) + 2(8)(3) + 2(4.5)(3)$   
 $= 111 \text{ FT}^3$

LABOR

- REMOVE EXISTG ELEC & PLBG
- REMOVE FRAME STRUCTURE
- EXC AROUND SUMP
- REMOVE EXISTG CONC.
- LOAD & HAUL CONC
- BACKFILL
- FINE GR SEED & FERT

PIPE ELECCARP LAB EQ OPTKCD.

16	16				
	16	16			
		8	8		
		80	40		
		8	8	8	
		8	8	8	
		16	8		
16	16	16	136	72	16

EQUIPMENT

- BACKHOE LOADER 32 HR
- AIR COMP & JACK HAM 40 HR
- DUMP TRUCK 16 HR

MATERIAL

SAND BACKFILL  $\frac{(8)(2)(4)}{27} = 15 \text{ CY}$

TOP SOIL  $\frac{10(14)(.5)}{27} = 3 \text{ CY}$

SEED & FERTILIZER.

PROJECT

LOCATION NOE1-50 LINE I ITEM 2

DATE

SUBJECT

COMPUTED BY

CHECKED BY

RECAP

MATERIAL

SAND BACKFILL <sup>022-212</sup> 0600  
 TOP SOIL <sup>022-212</sup> 0800  
 SEED & FERT

QUAN	UNIT PR	AMOUNT
15 CT	7 <sup>15</sup>	110
3 CT	11 <sup>65</sup>	40
LS	—	<u>20</u>

170

EQUIPMENT

BACKHOE <sup>016-408</sup> 0400  
 AIR COMP & JK HMR <sup>016-420</sup> 0300 & 0930  
 TRUCK <sup>016-408</sup> 5300

32 HR	28 <sup>30</sup>	910
40 HR	17 <sup>50</sup>	700
16 HR	14 <sup>10</sup>	<u>230</u>

1840

LABOR

PIPEFITTER  
 ELEC  
 CARPENTER  
 LABORER  
 EQ OP  
 TRUCK DRIVER

16 HR	19 <sup>70</sup>	320
16 HR	19 <sup>27</sup>	310
16 HR	16 <sup>08</sup>	260
136 HR	12 <sup>70</sup>	1730
72 HR	20 <sup>40</sup>	1470
16 HR	11 <sup>12</sup>	<u>180</u>

4270

6280

2090

8370

840

9210

+33% OH & P

+10% CONTIN

PROJECT

LOCATION NO. 01-05-1 LINE 1 ITEMS

DATE

SUBJECT

COMPUTED BY

CHECKED BY

COMPUTE VOL OF CONC.

$$V = (6)(6) + 4(6)(6) = 180 \text{ FT}^3$$

LABOR

REMOVE EXISTG ELEC & PLBG  
 REMOVE FRAME STR  
 EXC AROUND SUMP  
 REMOVE EXISTG CONC  
 LOAD & HAUL CONC.  
 BACK FILL  
 FINE GR & SEED

PIPE ELEC CARP LAB EQO PTRKD

16	16				
		24	24		
			8	8	
			128	64	
			12	12	12
			8	8	8
			16	8	
16	16	24	196	100	20

EQUIPMENT

BACKHOE LOADER 36HR  
 AIR COMP & JK HAM 64HR  
 DUMP TRUCK 20HR

MATERIAL

SAND BACKFILL  $\frac{(12)(12)(7)}{27} = 40 \text{ CY}$

TOP SOIL  $\frac{16(6)(.5)}{27} = 5 \text{ CY}$

SEED & FERTILIZER

PROJECT

LOCATION NO. 1-05-1 LINE ITEMS

DATE

SUBJECT

COMPUTED BY

CHECKED BY

RECAP

MATERIAL

SAND BACKFILL  
TOP SOIL  
SEED & FERT

022-212  
0600  
022-212  
0800

QUAN	UNIT PR.	AMOUNT
40CY	7.15	290
5CY	11.65	60
LS	-	30

380

EQUIPMENT

BACKHOE  
AIR COMPACT HAM  
TRUCK

016-408  
0400  
016-420  
0300 & 0930  
016-408  
5300

36HR	28.30	1020
64HR	17.50	1120
20HR	14.10	280

2420

LABOR

PIPEFITTER  
ELECTRICIAN  
CARPENTER  
LABORER  
EQ OP  
TRK DR

16HR	19.70	320
16HR	19.27	310
24HR	16.08	390
196HR	12.70	2490
100HR	20.40	2040
20HR	11.12	220

5770

8570

2850

11320

1130

12450

+ 33% O.H. & P

+ 10% CONTIN

PROJECT \_\_\_\_\_

LOCATION W 01-08-1 LINE I ITEM 7

DATE \_\_\_\_\_

SUBJECT \_\_\_\_\_

COMPUTED BY \_\_\_\_\_

CHECKED BY \_\_\_\_\_

SEE PGS 36 & 37

THIS SUMP SIMILAR SIZE THEREFORE  
REMOVAL COST IS ESTIMATED AT ~~\$~~ 9,210

PROJECT \_\_\_\_\_ LOCATION W 0 F 1 - 40 LINE 1 ITEM 11

DATE \_\_\_\_\_

SUBJECT \_\_\_\_\_

COMPUTED BY \_\_\_\_\_

CHECKED BY \_\_\_\_\_

COMPUTE VOL OF CONC

$$V = (10.33)(19.08) + 2(10.33)(2.25) + 2(19.08)(2.25)$$

$$= 329 \text{ FT}^3$$

LA BOTZ

- REMOVE EXISTG ELEC & PLBG
- REMOVE FRAME STRUCTURE
- EXC AROUND SUMP
- REMOVE EXISTG CONC.
- LOAD & HAUL CONC.
- BACKFILL
- FINE GR & SEED

PIPE ELEC CARP LAB EQ OPT TKD

24	24				
		24	24		
		16	16		
		240	120		
		16	16	16	
		12	12	12	
		16	8		
24	24	24	324	172	28

EQUIPMENT

- BACKHOE LOADER 52 HR
- AIR COMP & JACKHAM 120 HR
- TRUCK 28 HR

MATERIAL

SAND BACKFILL  $\frac{(30)(20)(325)}{27} = 72$

TOP SOIL  $\frac{(20)(30)(15)}{27} = 12 \text{ CY}$

SEED & FERTILIZER

PROJECT

LOCATION W OF I-40 LINE ITEM 11

DATE

SUBJECT

COMPUTED BY

CHECKED BY

RECAP

MATERIAL  
SAND BACKFILL  
TOP SOIL  
SEED & FERT

022-212  
0600  
022-212  
0800  
—

QUAN	UNIT	PR.	AMOUNT
72CY		7.15	510
12CY		17.50	210
LS		—	30

750

EQUIPMENT  
BACKHOE  
AIR COMP. JK HAM  
TRUCK

016-408  
0400  
016-420  
0300 & 0930  
016-408  
5300

52HR		28.30	1470
120HR		17.50	2100
28HR		14.10	390

3960

LABOR  
PIPEFITTER  
ELECTRICIAN  
CARPENTER  
LABORER  
EQ OP  
TRUCK DR.

24HR		19.70	470
24HR		19.27	460
24HR		16.08	390
324HR		12.70	4110
172HR		20.40	3510
28HR		11.12	310

9250

13960

4650

18610

1860

20470

+ 33% OHP

+ 10% CONTIN



PROJECT

LOCATION SOE2-05-1 LINE 2 ITEM 1

DATE

SUBJECT

COMPUTED BY

CHECKED BY

COMPUTE VOL OF CONC.

$$V = (7.5)(8) + (7.5)(3)(2) + 8(3)(2)$$

$$= 153 \text{ FT}^3$$

## LABOR

REMOVE EXISTG ELEC & PLBG  
 REMOVE FRAME STRUCTURE  
 EXC AROUND SUMP  
 REMOVE EXISTG CONC  
 LOAD & HAUL CONC  
 BACK FILL  
 FINE GR & SEED

PIPE ELEC CARP LAB EQ OPTRKD

16	16			
	16	16		
	8	8		
	112	56		
	12	12	12	
	8	8	8	
	16	8		
16	16	16	172	92 20

## EQUIPMENT

BACKHOE LOADER 36 HR  
 AIR COMP & JK HAM 56 HR  
 DUMP TRK 20 HR

## MATERIAL

SAND BACKFILL  $\frac{(12)(13)(4)}{27} = 25 \text{ CY}$

TOP SOIL =  $\frac{14(15)(.5)}{27} = 4 \text{ CY}$

SEED & FERTILIZER

PROJECT

LOCATION SOFZ-05-1 LINE 2 ITEM 1

DATE

SUBJECT

COMPUTED BY

CHECKED BY

RECAP

MATERIAL

SAND BACKFILL  
TOP SOIL  
SEED & FERT

022-212  
0600  
022-212  
0800

25CY 7'5  
4CY 11'5  
LS -

180  
50  
20

250

EQUIPMENT

BACKHOE  
AIR COMP & JK HAM  
TRUCK

016-408  
0400  
016-480  
0300+0930  
016-408  
5300

36HR 28'20  
56HR 17'50  
20HR 14'10

1020  
980  
280

2280

LABOR

PIPE FITTER  
ELECTRICIAN  
CARPENTER  
LABORER  
EQ OP  
TRUCK DRIVER

16HR 19'70  
16HR 19'27  
16HR 16'08  
172HR 12'70  
92HR 20'40  
20HR 11'12

320  
310  
260  
2180  
1880  
220

5170  
7700  
2560  
10260  
1030  
11290

+ 33% O&P

+ 10% CONTIN

PROJECT

LOCATION NOE1-05-1 LINE I ITEM 3

DRAWN

BY

DRAWN

DATE

SUBJECT

COMPUTED BY

CHECKED BY

COMPUTE VOL OF CONC.

$$V = (4)(4) + 2(3)(4) = 40 \text{ FT}^3$$

LABOR

PIPE ELEC CARP LAB EQ OPT TKD

REMOVE ELEC & PLBG

8 8

REMOVE FRAME STR

8 8

EXC. AROUND SUMP

4 4

REMOVE EXISTG CONC

32 16

LOAD & HAUL CONC.

4 4 4

BACKFILL

4 4 4

FINE GR SEED & FERT

8 4

---

8 8 8 60 32 8

EQUIPMENT

BACKHOE LOADER

20 HR

AIR COMP & JK HAM

32 HR

TRUCK

8 HR

MATERIAL

SAND BACKFILL  $\frac{(6)(6)(4)}{27} = 5 \text{ CT}$

TOP SOIL  $\frac{(8)(8)(.5)}{27} = 1 \text{ CT}$

SEED & FERTILIZER

PROJECT

LOCATION NOV 1854 LINE ITEM 13

DATE

SUBJECT

COMPUTED BY

CHECKED BY

RECAP  
SAND BACKFILL  
TOP SOIL  
SEED & FERT

022-212  
0600  
022-212  
0800

QUAN UNIT PR  
5CY 7.5  
1CY 11.65  
LS —

AMOUNT  
40  
10  
10

60

EQUIPMENT  
BACKHOE  
AIR COMP & JK HAM  
TRUCK

016-408  
0400  
016-420  
0300 & 0930  
016-408  
5300

20HR 28.30  
32HR 17.50  
8HR 14.10

570  
560  
110

1240

LABOR  
PIPEFITTER  
ELECTRICIAN  
CARPENTER  
LABORER  
EQ OP  
TRK DRVR

8HR 19.70  
8HR 19.17  
8HR 16.08  
60HR 12.70  
32HR 20.40  
8HR 11.12

160  
150  
130  
760  
650  
90

1940  
3240  
1080  
4320  
430  
4750

+ 33% O&P  
+ 10% CONTIN

PROJECT

LOCATION NE OF 3-05-1 LINE 3 ITEM 11

DATE

SUBJECT

COMPUTED BY

CHECKED BY

COMPUTE VOL OF CONC.

$$V = 5(8.5) + 4(3.5)(2) + 8.5(3.5)(2) \\ = 130 \text{ FT}^3$$

THIS SUMP SIZE IS AVERAGE OF THOSE ON PGS 36-37 & 43-44 THEREFORE

$$\text{COST} = \frac{9,210 + 11,290}{2} = \$10,250$$

CONC BASE =  $(6)(6)(.67) = 24 \text{ FT}^3$

LABOR	PIPE	ELEC	LAB	EQOP	1W	TRKD
REMOVE ELEC & PLB/G	8	8				
EXC. AROUND SUMP & REMOVE			8	8	4	
REMOVE CONC BASE			16	8		
LOAD & HAUL CONC			2	2		2
BACKFILL			2	2		2
SEED & FERT			4	4		
	8	8	32	24	4	4

EQUIPMENT

BACKHOE	16 HR
AIR COMP & JACKHAM	8 HR
TRUCK	4 HR

MATERIAL

SAND BACKFILL  $\frac{10(10)(6)}{27} = 22 \text{ CY}$

TOP SOIL  $\frac{(12)(12)(.5)}{27} = 3 \text{ CY}$

SEED & FERTILIZER

PROJECT LOCATION W SIDE SEND 1-12 LINE 1 ITEM 8 DATE

SUBJECT COMPUTED BY

CHECKED BY

RECAP		QUAN	UNIT/R	AMOUNT	
MATERIAL					
SAND BACKFILL	022-212 0600	22 CY	7 15	160	
TOP SOIL	022-212 0800	3 CY	11 65	30	
SEED & FERT	-	LS	-	20	
					210
EQUIPMENT					
BACKHOE	016-408 0400	16 HR	28 30	450	
AIR COMP & JK HAM	016-420 0300 1093	8 HR	17 50	140	
TRUCK	016-408 5300	4 HR	14 10	60	
					650
LABOR					
PIPEFITTER		8 HR	19 70	160	
ELECTRICIAN		8 HR	19 17	150	
LABORER		32 HR	12 70	410	
EQ OP		24 HR	20 40	490	
IRN WKR		4 HR	18 46	70	
TRK DR		4 HR	11 12	40	
					1320
					2180
				+33% O&P	730
					2910
				+10% CONTIN	290
					3200

\*  
SUMP ALARM SYSTEM

COST ESTIMATE

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT LABOR	TOTAL LABOR	UNIT MATERIAL	TOTAL MATERIAL	TOTAL LABOR & MATL
1	NEMA 7 & 9 PRESSURE SWITCH	EA	1	50	50	180	180	230
2	NEMA 7 & 9 ENCLOSURE W/RELAY	EA	1	150	150	200	200	350
3	NEMA 7 & 9 RED LIGHT	EA	1	32	32	119	119	151
4	NEMA 3R HORN	EA	1	50	50	505	505	555
5	PRESSURE GAGE	EA	1	25	25	50	50	75
6	NEMA 7 & 9 SILENCE SWITCH	EA	1	32	32	129	129	161
7	1/2" ALUM. CONDUIT	FT	75	2	150	0 <sup>80</sup>	60	210
8	FILTER REGULATOR	EA	1	12	12	78	78	90
9	1/2" PIPE	FT	50	3 <sup>19</sup>	157	0 <sup>20</sup>	45	202
10	1/4" POLYETHYLENE TUBING	FT	100	0 <sup>30</sup>	30	0 <sup>4</sup>	11	41
11	NEMA 7 & 9 MISC. FITTINGS, ETC.	LS	-	-	75	-	75	150
12	MISC. ITEMS	LS	-	-	25	-	25	50
	* ELECTRIC SERVICE FROM LIGHTING & HEATING SERVICE							
	<b>TOTAL</b>							2265

-50-

PROJECT: SUMP ELECTRICAL

DATE: 11/1/90

ENGR: RT2



SUMP LIGHTING & HEATING

COST ESTIMATE

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT LABOR	TOTAL LABOR	UNIT MATERIAL	TOTAL MATERIAL	TOTAL LABOR & MATL
1	NEMA 7*7 INCAN. LGT. FIXTURE	EA	2	60	120	225	450	570
2	NEMA 7*7 LIGHT SWITCH	EA	1	35	35	125	125	160
3	NEMA 7*9 3 KW HEATER	EA	1	100	100	3800	3800	3900
4	NEMA 7*9 THERMOSTAT	EA	1	30	30	150	150	180
5	1/2" ALUM. CONDUIT	FT	200	2	400	0 <sup>80</sup>	160	560
6	#12 THRU WIRE	FT	700	0 <sup>18</sup>	126	0 <sup>06</sup>	42	168
7	NEMA 7*9 CIRCUIT BREAKER	EA	1	90	90	465	465	555
8	NEMA 3R DISCONNECT SWITCH	EA	1	75	75	125	125	200
9	NEMA 7*9 MISC. FITTINGS, ETC.	LS	-	-	150	-	150	300
10	MISC. ITEMS	LS	-	-	25	-	25	50
	SUBTOTAL				1939		6969	8908
	CONTINGENCY @ 10%				194		697	891
	SUBTOTAL				2133		7666	9799
	O&P @ 33%				704		2530	3234
	TOTAL				2837		10196	13033

PROJECT: SUMP ELECTRICAL

DATE: 11/1/90  
ENGR: RTB

-51-

105

SUMP DOUBLE WALL ALARM SYSTEM

**COST ESTIMATE**

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT LABOR	TOTAL LABOR	UNIT MATERIAL	TOTAL MATERIAL	TOTAL LABOR & MATL.
1	LIQUID LEVEL SYSTEM	EA	1	100	100	650	650	750
2	1/2" ALUM. CONDUIT	FT	100	2	200	0 <sup>80</sup>	80	280
3	#14 WIRE NEMA 7 #9	FT	300	0 <sup>15</sup>	45	0 <sup>05</sup>	15	60
4	MISC. FITTINGS, ETC.	LS	-	-	100	-	100	200
5	MISC. ITEMS	LS	-	-	25	-	25	50
	SUBTOTAL				470		870	1340
	CONTINGENCY @ 10%				<del>47</del>		<del>87</del>	<del>134</del>
	SUBTOTAL				<del>517</del>		<del>957</del>	<del>1474</del>
	O&P @ 33%				<del>171</del>		<del>316</del>	<del>487</del>
	* ELECTRIC SERVICE FROM LIGHTING & HEATING SERVICE							
	TOTAL				688		<del>1273</del>	1761

PROJECT: DOUBLE WALL SUMP ALARM

DATE: 11/1/90  
ENGR: RJB

**HUFFMAN WELDING & MACHINE, INC.**

R. R. NO. 2                      BOX ~~36~~<sup>92</sup>                      HIGHWAY 61 WEST

FORT MADISON, IOWA 52627

PHONE: 319/372-7232

November 20, 1990

Mason & Hanger - Silas Mason Co., Inc.  
Iowa Army Ammunition Plant  
Middletown, IA 52638-9701

Attention: Richard H. Tiemeier

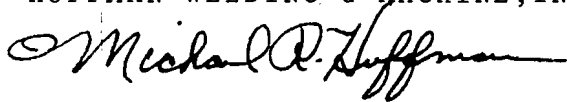
We submit the following estimate on the tanks you requested per your concept drawing on the "Sump Tank Concept".

- |                             |   |            |
|-----------------------------|---|------------|
| 1) Tank 36" dp x 72" x 72"  | = | \$5,386.00 |
| 2) Tank 36" dp x 72" x 120" | = | 6,945.00   |
| 3) Tank 36" dp x 72" x 180" | = | 9,905.00   |
| 4) Tank 36" dp x 72" x 240" | = | 12,093.00  |

NOTE: All material quoted is type 304 Stainless Steel.

Quotation is good for 30 days from today's date.

Sincerely,  
HUFFMAN WELDING & MACHINE, INC.



MICHAEL R. HUFFMAN  
VICE PRESIDENT

MRHsde