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ENGINEERING
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FINAL REPORT:
SURFACE RUNOFF CONTROL FACILITIES

FREEMAN CHEMICAL CORPORATION
SAUKVILLE, WISCONSIN

FEBRUARY 1986

APR 1 8 1986

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SURFACE RUNOFF CONTROL

1.0 INTRODUCTION

1.1 Purpose

The following report describes the final design of a surface runoff control system for the Freeman Chemical Corporation's (FCC) manufacturing facilities in Saukville, Wisconsin. The surface runoff control system is part of a comprehensive plan to control pollution by preventing runoff from all active areas on site from seeping into the ground, draining offsite or onto non-paved areas, or draining directly to the Milwaukee River via the existing storm sewer. The surface runoff system that will be described in this report includes concrete pads in all active areas of the property, surface trenches to collect the runoff from the roofs and pads and a conveyance sewer system to route the runoff to a storage/retention facility. Each element of the system will be described in detail in the following sections of the report.

1.2 General Design Considerations

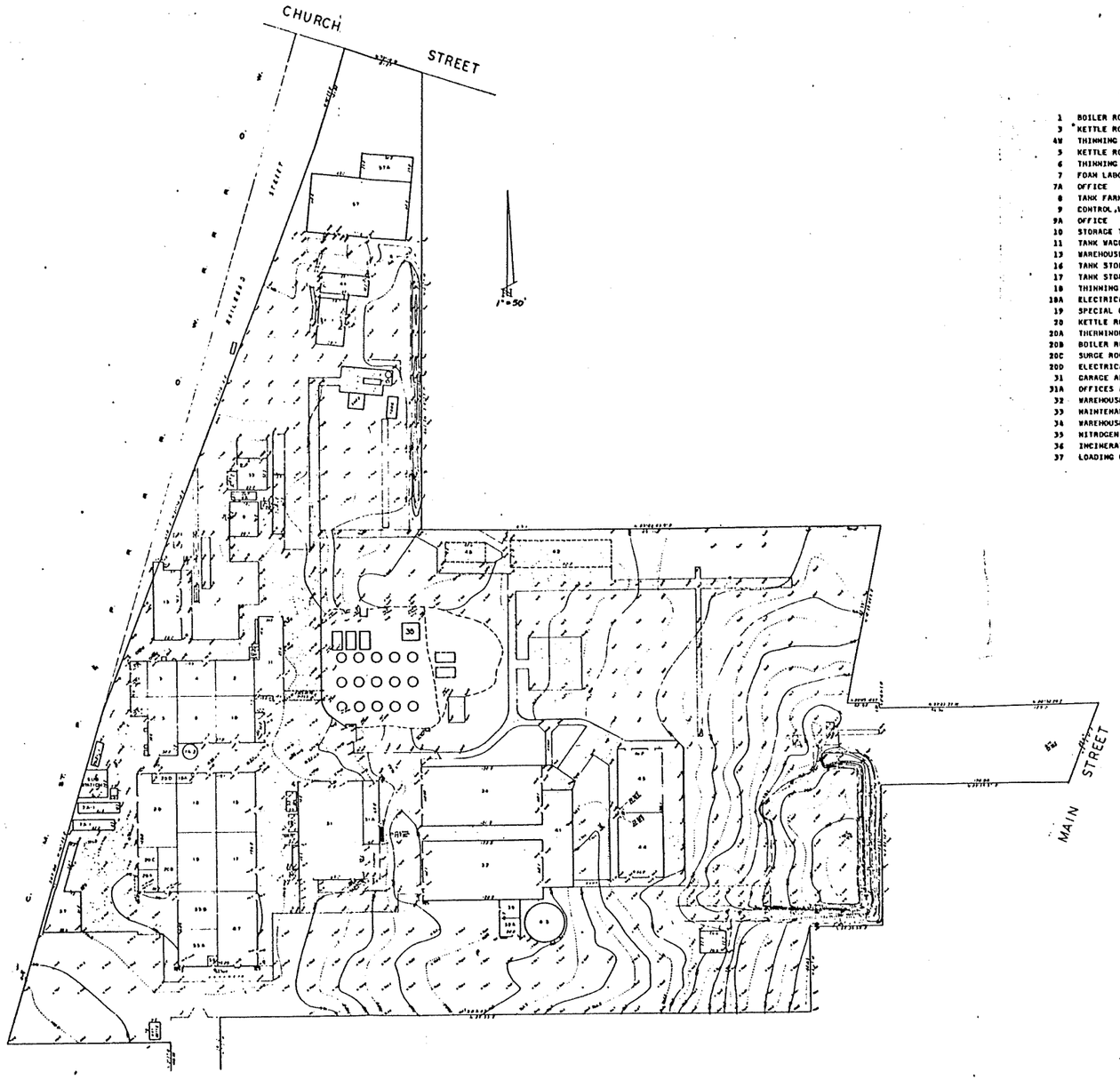
The design criteria for the surface runoff collection and conveyance system is based upon the 10 year, 24 hour duration rainfall of 3.8 inches over the entire 175,000 square foot drainage area. The system will be capable of conveying the resulting runoff volume to a storage/retention basin without system back-ups or overflows onto the non-paved portions of the drainage area. The surface drainage system will also provide for spill containment since the collection system can be manually closed to the storm sewer conveyance pipes using valves or gates at the inlets.

The retention facility is sized according to the criterion that 100,000 gallons will be capable of containing all rain storms of one inch or less and the first flush of all storms greater than one inch. Sufficient buffer capacity is available to handle any future expansion needs.

2.0 SURFACE RUNOFF AND GROUNDWATER INFILTRATION CONTROL

2.1 Description of Existing Site Drainage

Existing drainage conditions at the FCC are as shown in Figure 1. Existing pavement is shown by the dotted areas, while existing buildings are shown as numbered areas. For ease of description, the area comprised of buildings 1, 2, 3, 4, 5, 6, 10 and 11 will be referred to as the North Processing Complex and that comprised of buildings 16, 17, 18, 19, 20, 47 and 55 shall be referred to as the South Processing Complex.



KEY

1	BOILER ROOM	28	FOAM MACHINERY LABORATORY
3	KETTLE ROOM	39	ENGINEERING OFFICE
4W	THINNING ROOM	39A	FIRE PUMP ROOM
5	KETTLE ROOM	40	HOT ROOM
6	THINNING ROOM	41	EAST LOADING DOCK
7	FOAM LABORATORY	42	SHED WAREHOUSE
7A	OFFICE		
8	TANK FARM	44	WATER TANK
9	CONTROL LABORATORY	45A	WAREHOUSE
9A	OFFICE	45B	WAREHOUSE
10	STORAGE TANK ROOM	46	R.F.P. APPLICATION LABORATORY
11	TANK WAGON LOADING SHED	47	POLYESTER STORAGE ROOM
13	WAREHOUSE - RAW MATERIALS	48	TANK WAGON UNLOADING STATION
16	TANK STORAGE ROOM	49	FIRE EQUIPMENT SHED
17	TANK STORAGE ROOM	50	FIRE EQUIPMENT SHED
18	THINNING ROOM	51	MAINTENANCE STORAGE SHED
18A	ELECTRICAL CONTROL ROOM	52	MAINTENANCE PIPE SHED
19	SPECIAL PROCESS ROOM	53	OFFICE
20	KETTLE ROOM	54	ELECTRICAL CONTROL ROOM
20A	THERMINOL BOILER ROOM	55A	FOAM RAW MATERIAL
20B	BOILER ROOM	55B	FOAM MFG.
20C	SURGE ROOM	56	ELECTRICAL CONTROL ROOM
20D	ELECTRICAL CONTROL ROOM	57	TECHNICAL LAB. NO. 3
31	GARAGE AND OFFICES	58	GARAGE
31A	OFFICES AND LOCKER ROOM	59	10-6000 GAL. UNDERGROUND TANKS
32	WAREHOUSE	60	BACKFLOW PREVENTER
33	MAINTENANCE		
34	WAREHOUSE		
35	NITROGEN STORAGE		
36	INCINERATORS		
37	LOADING DOCK		

FIGURE 1

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FREEMAN CHEMICAL CORP.
PLANT MODERNIZATION

SCALE: 1:50 | APPROVED BY: | DRAWN BY: PINTAR
DATE: 4-9-86 | REVISED

EXISTING CONDITIONS – TOPOGRAPHY

DRAWING NUMBER
1-346-2.1

As can be seen from the contour lines of Figure 1, the area around the North and South Processing Complexes is generally flat at an elevation of approximately 771.50 feet. From the processing complexes to the west property line, the topography drops off slightly to approximately 771.30 feet west of the North Processing Complex, 771.20 feet west of the South Processing Complex and approximately 770.20 at the southwest corner of the property. From the Processing Complexes to the east, the topography drops off quickly at an average slope of approximately 2 percent to the large depression at the southeast corner of the property. The overall change in surface elevation from the west side of the property near the Processing Complexes to the east side of the property at the large natural depression is approximately 14 feet.

Present drainage in the area of the two Processing Complexes is away from the buildings in all directions. To the west and the south, runoff drains naturally off the property. The north side of the north Processing Complex has its drainage away from the buildings, but the overall drainage is poor with much of the rainfall ponding on the surface. From the Processing Complexes to the east, drainage follows the natural topography with the majority of the runoff from all property east of the Processing Complexes draining to the natural depression at the southeast corner of the plant. All roof areas on the property currently drain to the ground surface directly or via roof gutters and downspouts. A manmade earthen berm to the south and east of this depression prevents runoff from draining off the property. An inlet to the storm sewer placed at the center of the depression at an elevation of 757.17 feet drains runoff to a 24 inch diameter storm sewer which discharges to the Milwaukee River approximately 400 feet east of the Freeman property.

2.2 Proposed Site Drainage

2.2.1 Description

The proposed site drainage is shown in Figure 2. The drainage design is based on so-called "active" areas on the site. Active areas are those where handling, transport or storage of chemicals, or other materials routinely takes place. Consideration has also been given to those areas which will be active in the foreseeable future due to changes in building layouts and the placement of the tank farm. The primary design objective for this site drainage system was to prevent runoff from all active areas from seeping into the ground, draining off site or onto non-paved areas, or draining directly to the Milwaukee River via the existing storm sewer.

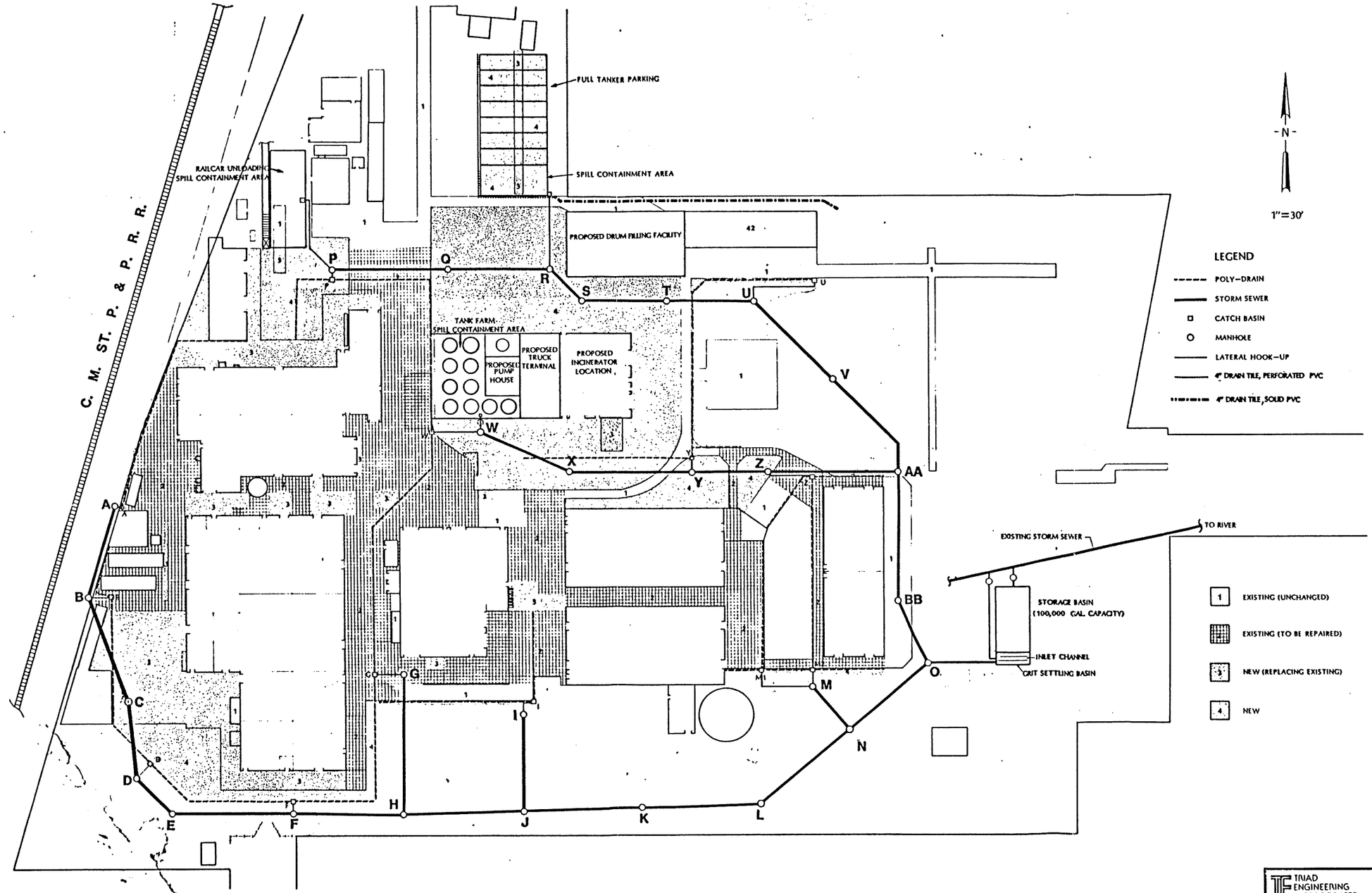

FIGURE 2

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FREEMAN CHEMICAL CORP.
PLANT MODERNIZATION

SCALE: 1" = 30'	APPROVED BY:	DRAWN BY PWTAR
DATE: 4-9-86		REVISED

RUNOFF COLLECTION — SURFACE DRAINAGE LAYOUT

DRAWING NUMBER 3.2A

The proposed site drainage system consists of concrete pavement in all active areas with all joints and cracks sealed with a chemically resistant compound. The storm water runoff from pavement in the active areas will drain to a collection system of in-ground prefabricated trenches, which discharge to catch basins. From the catch basins the flow shall discharge into manholes and into a storm sewer conveyance system which routes the flow to a storm water retention basin. This basin is to be located at the south-east corner of the property in the area of the natural depression as shown in Figure 2. Several areas on the property where the possibility of large volume spills exists, will be provided with spill containment structures. These structures will include normally-closed valve connections to the conveyance sewer system. These valves must be manually opened to discharge the accumulated storm water to the water retention basin. The elements of the proposed site drainage system as described above are explained in detail in the following sections of this report.

2.2.1.1 Pavement

Concrete pavement in all active areas of the site provides an impervious surface to prevent spills or storm water from seeping into the ground. A concrete surface also provides a medium for clean-up of material or chemical spills as well as a means for routing storm water to the collection system trenches. The pavement in active areas should provide a smooth surface free of open cracks and at a slope which provides for routing of storm water to the collection system trenches.

2.2.1.1.1 New Pavement

New concrete pavement will be installed in all designated active areas that presently are gravel. New pavement will also be included in all active areas where the existing pavement does not provide the desired drainage characteristics and is considered beyond repair. All new pavement shall be designed for a HS-20 wheel load capacity.

2.2.1.1.2 Repair of Existing Pavement

In active areas where existing pavement does not meet all of the desired drainage characteristics but is amenable to repair, repairs will be made by one or both of the following methods.

The first method is that of joint and crack repair. Since joints and cracks can provide a conduit for runoff and chemical spills to seep into the ground,

they will be filled with Ceilcote EJ-3, which is a compound that upon application is chemically cured to a rubbery state and which provides resistance to those chemicals which may be spilled or contained in the storm water runoff. Application of this material will take place by first thoroughly cleaning out the cracks using an air wand. Next the cracks will be filled with a granular filler material to a point approximately 1/4 inch to 1/2 inch from the surface. The pourable Ceilcote product is then applied to fill up the crack. Existing joints will be sealed in much the same way with only enough of the existing joint material removed such that the remaining may act as the filler material. Joints placed in new concrete pavement will be sealed in a similar manner.

The second type of concrete repair is that of cut-out and patching those existing areas which do not provide the desired drainage. This type of repair will utilize Set 45, a chemical action concrete which is fast setting and provides superior bonding to existing concrete bases. First, sawcuts are made around the damaged area, the unwanted concrete removed and the area is prepared with granular material prior to application of the Set 45 product.

2.2.1.2 Storm Water Collection System

The storm water runoff collection system consists of prefabricated trenches of polymer concrete construction, such as those manufactured by Polydrain, Inc. These trench systems will be placed in and around the perimeter of the active areas, as shown by the dotted lines in Figure 1, such that all stormwater runoff is collected by the trench system. All such trenches will be covered with a heavy-duty cast iron frame and grate with lockdowns capable of supporting fork truck and tank truck loadings.

Installation of the polydrain product requires the excavation of a trench 16 to 18 inches wide and a minimum of 4 inches deeper than the actual channel. Each one meter length of channel is then placed at the proper height using polydrain support brackets. Each channel length interlocks with the adjoining channel with a tongue and groove connection. After placement of the polydrain product, the remaining volume of the excavated trench is filled with concrete. Each section of polydrain has a built-in 0.6 percent slope. An end-plate shall be placed at the end of each channel

section with a 6 inch diameter pipe connection from the end plate into the catch basin as shown in Figure 3. Each catch basin will be provided with a 1 to 2 foot sump area below the discharge pipe of the manhole for grit accumulation and removal. The discharge to the manhole shall be equipped with a trap to act as a fire stop in the case of a flammable liquid spill. Each catch basin discharge shall also be equipped with a flap valve which could be closed in the case of a spill.

2.2.1.3 Storm Water Conveyance System

The storm water conveyance system consists of a network of reinforced concrete circular pipe as shown by the thick solid lines of Figure 2. The sizing of this system used the rational method of storm sewer design for the ten year storm. The minimum pipe length between manholes is 100 feet to provide easier access for cleanout purposes. All concrete pipe are a miminum of 12 inches in diameter and Class IV or V in strength as per ASTM C76. All pipe joints and precast manhole sections will utilize gaskets for sealing against infiltration or exfiltration, as per ASTM C443.

The proposed profiles of the conveyance sewer system are as shown in Figures 4 and 5.

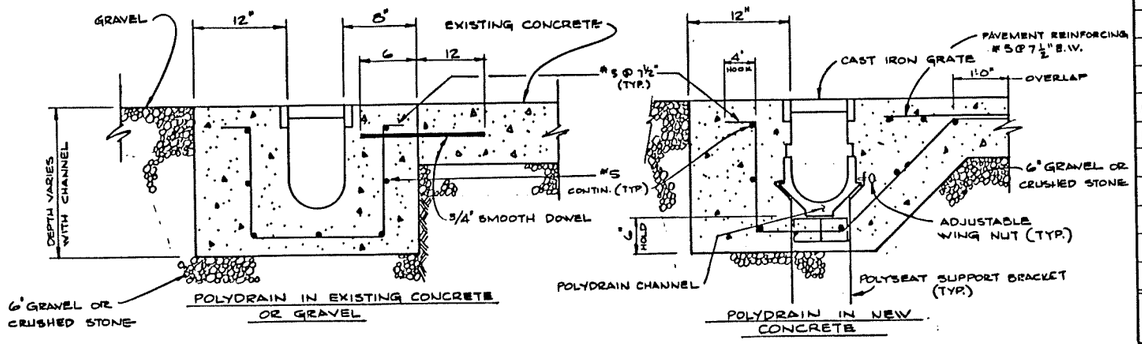
Due to the suspected interference with both marked and unmarked utilities on the Freeman property and for ease in construction, an easement has been applied for with the Soo Line Railroad which would allow a small portion of the conveyance sewer to be placed on their property.

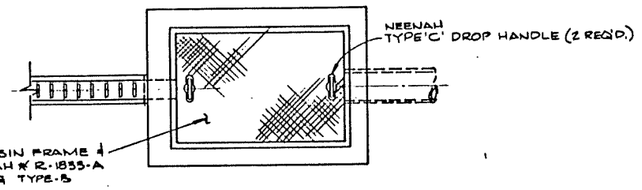
2.2.1.4 Storm Water Retention Basin

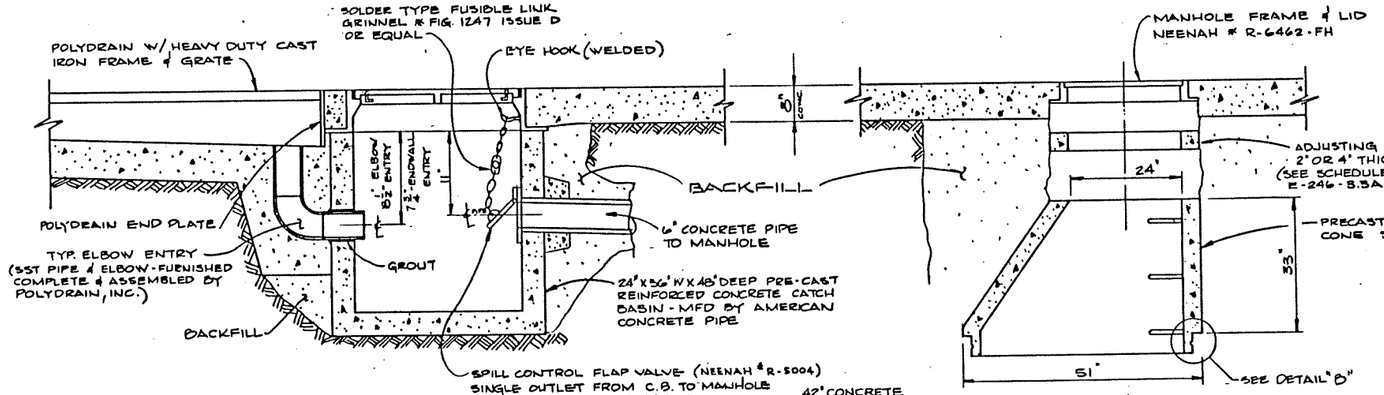
All storm water that is routed through the conveyance system enters the retention facility as shown in Figure 2. The retention facility is comprised of the following features:

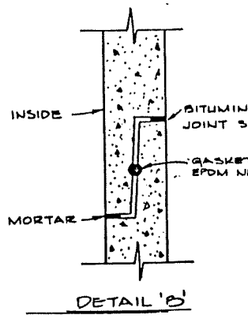
1. grit removal/feed channel
2. 100,000 gallon single tank, concrete basin with dimensions of 50' long by 25' wide and 10.5' deep
3. 18" bypass pipe to the existing storm sewer
4. pumped discharge to storm sewer, sanitary sewer, transport or treatment.

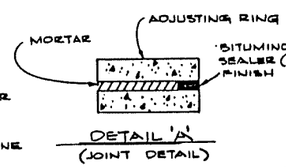
A plan view, a cross section, and several details of the facility is shown in Figures 6 and 7. Details of each component are described as follows:

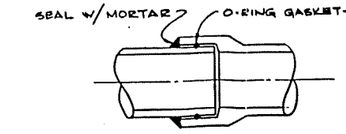


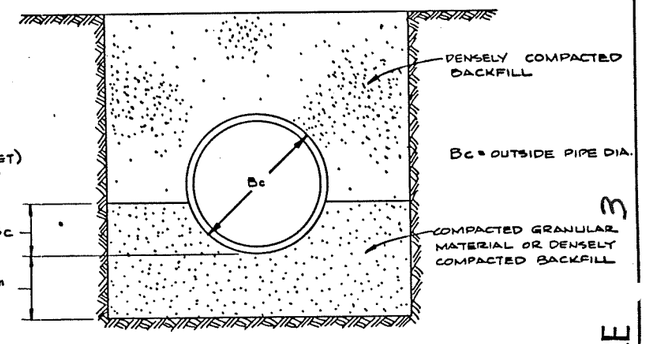












POLYDRAIN SYSTEM

CATCH BASIN MARK	UNIT	TOTAL	POLYDRAIN CHANNEL SECTION IDENTIFICATION NUMBERS 010	020	030	040	050	060	070	080	090	100	110	120	130	140	150	160	170	180	190	200	210	220	280	240	250	260	270	280	290	300	CATCH BASIN CONNECTN INFO. POLY WALL ENT.	END WALL ENT.
A	1	187'	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2/0	2	20' 190 ; 190 370	27		1
B	1	46'																	1	1	1	1	1	1	1	1	1	1	0	1	1				
	2	95'		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
D	1	39'																	1	1	1	1	1	1	1	1	1	1	1	1	1				
	2	39'																	1	1	1	1	1	1	1	1	1	1	1	1	1				
F	1	75'							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
	2	59'													1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
G	1	95'		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0/1	1			
	2	95'		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0/1	1			
I	1	115'										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0/1	1			
	2	65.5'																												0/1	1			
M1	1	26'																												0/1	1			
	2	98'	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0/1	1			
M2	1	33'																												0/1	1			
	2	72'								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0/1	1			
	3	53.5'																												0/1	1			
P	1	69'									1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0/1	1	60' 230 ; 230 370			
	2	91'			1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0/1	1	45' 230 ; 45' 230 370			
U	1	121'																	1	1	1	1	1	1	1	1	0	1	1	1	1	45' 230 ; 115' 230 370	1		
W	1	98'	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0/1	1			
Y	1	92			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0/1	1			
	2	120																																
	3	35'																																
Z	1	72.5									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0/1	1			
	2	69																																
	3	49																																
TOTALS		2095'	3	8	9	9	10	10	10	10	12	14	15	15	16	16	18	19	21	22	23	24	24	24	22	24	25	24	23	24	21/111	27	9	27	25	1

CATCH BASIN CONNECTN INFO.: POLY WALL ENT. = 27; END WALL ENT. = 1

* ENTRY DEPTH IS APPROX. ℄ OF ENTRY PIPE TO CATCH BASIN

** SECOND NUMBER IS POLYDRAIN SECTION TO BE USED TO CREATE ANGLE INDICATED (FIRST NO.).

SIDEWALL EXTENSION

010	020	030	040	050	060	070	080	090	100	110	120	130	140	150	160	170	180	190	200	210	220	230	260	250	260	270	280	290	300
010	020	030	040	050																									

NOTE:

1) THE TOTAL POLYDRAIN SYSTEM HAS BEEN BROKEN DOWN FOR CONSTRUCTION SCHEDULING & INFORMATION ONLY. CONTRACTOR WILL BE RESPONSIBLE FOR THE TAKEOFF & CONSTRUCTION OF THE TOTAL REQ'D DRAINAGE SYSTEM.
2) PRECAST CONCRETE MANHOLE DETAILS SHOWN ARE BASED ON MATERIALS AS MANUFACTURED BY WAUKESHA CONCRETE PROD. Co., INC., AN EQUIVALENT SUPPLIER MAY BE SELECTED AT CONTRACTORS' OPTION.
3) PRECAST CONCRETE CATCH BASIN DETAILS SHOWN ARE BASED ON MATERIALS AS MANUFACTURED BY AMERICAN CONCRETE PIPE Co, INC. AN EQUIVALENT SUPPLIER MAY BE SELECTED AT CONTRACTORS' OPTION.

FIGURE 3

TRIAD ENGINEERING INCORPORATED
3333 north mayfair road
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FREEMAN CHEMICAL CORP.
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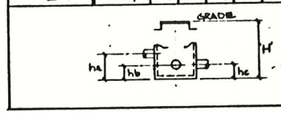
SCALE: NOTED	APPROVED BY:	DRAWN BY: VINTAR
DATE: 4-9-86		REVISED

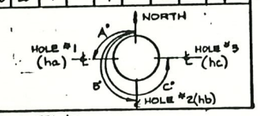
RUNOFF COLLECTION - COLLECTION SYSTEM DETAILS

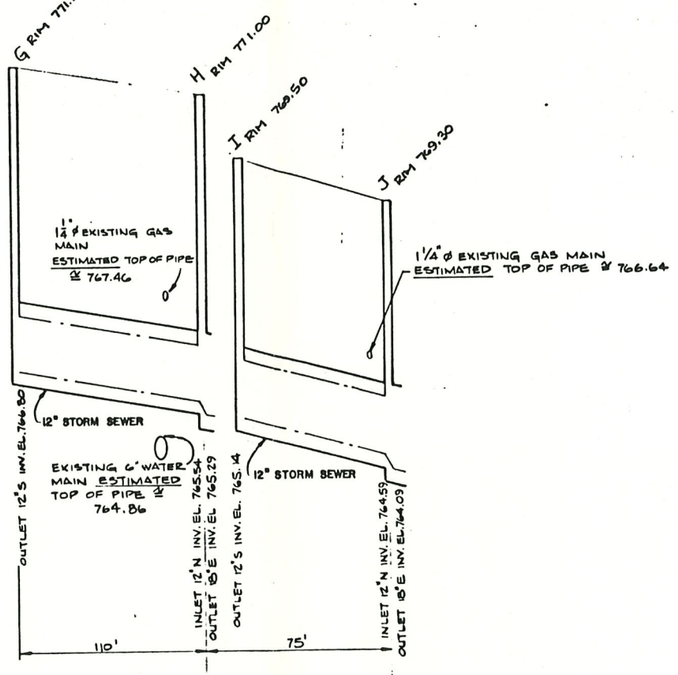
DRAWING NUMBER: E-246-3.2B

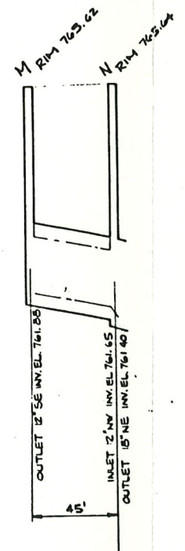
MANHOLE SCHEDULE (SEE NOTE 3)

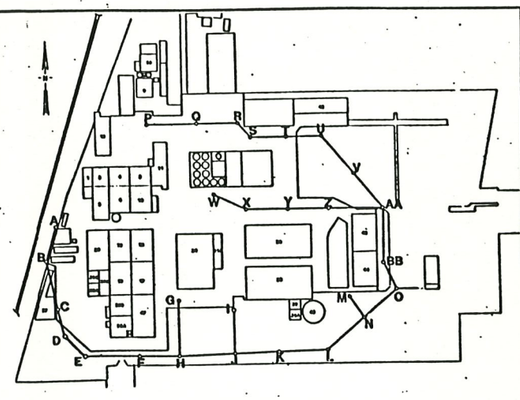
MANHOLE MARK	MANHOLE DEPTH "H"	HOLE #1 Ø"	HOLE #1 A°	HOLE #1 ha"	HOLE #2 Ø"	HOLE #2 B°	HOLE #2 hb"	HOLE #3 Ø	HOLE #3 C°	HOLE #3 hc"	BASE 36"	BASE 54"	CONE 42"	RING 2"	RING 4"	CONE 33"	NEENAH COVER R-462-PH
A	42"	20"	163	16¾	10	253	19	—	—	—	1		1				1 ea.
B	50"	20	200	18	10	270	25	20	343	20½	1		1		2		
C	60"	20	20	17½	20	188	17½	—	—	—		1	1				
D	68"	20	8	21	24	225	18¼	10	315	42"		1	1		2		
E	73"	24	45	20¾	24	270	20¾	—	—	—	1					1	
F	77"	10	0	24	24	90	19¾	24	270	19¾	1				1	1	
G	68"	10	90	40	20	180	17½	—	—	—		1	1		2		
H	79"	20	0	19½	24	90	20½	26	270	19½	1			1	1	1	
I	64"	10	0	38	20	180	17¾	—	—	—			1		1		
J	73"	20	0	22	26	90	22½	26	270	19½	1					1	
K	66"	26	90	21	24	270	21	—	—	—		1	1	1	1		
L	73"	26	90	22	26	311	22	—	—	—	1					1	
M	60"	10	0	35	10	90	25	20	221	21		1	1				
N	62"	20	41	23	26	131	22½	26	311	20		1	1	1			
O	60"	26	25	37	24	131	54	30	270	32½		1	1				
P	73"	10	45	27	10	180	27	20	270	21	1					1	
Q	73"	20	90	21	20	270	21	—	—	—	1					1	
R	60"	10	0	24	20	90	20½	20	225	18		1	1				
S	60"	20	45	23	20	270	20½	—	—	—		1	1				
T	60"	20	90	24½	20	270	24½	—	—	—		1	1				
U	60"	10	0	26	20	90	24	24	225	24½		1	1				
BB	60"	26	0	30	26	205	27½	—	—	—		1	1				
V	42"	24	42	19½	24	222	19½	—	—	—	1						
W	60"	10	0	35	10	90	25	20	245	17¼		1	1				
X	60"	20	65	22¾	20	270	20½	—	—	—		1	1				
Y	60"	10	0	35	20	90	24½	24	270	23		1	1				
AA	42"	24	0	20½	26	90	19¾	26	180	19¾	1						
Z	50"	24	90	21½	10	180	22	26	270	20	1				2		











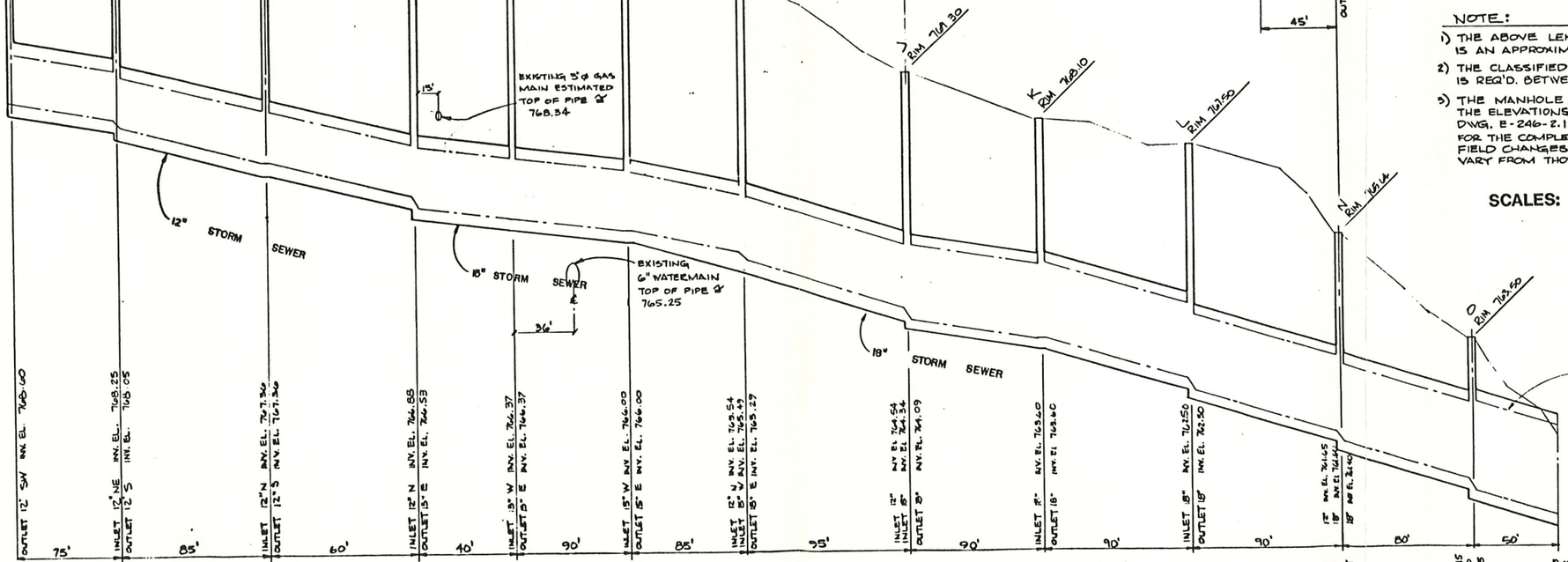
LOCATION MAP

CONCRETE PIPE SCHEDULE		
DIAMETER	CLASSIFICATION	LENGTH (SEE NOTE #1)
12"	TYPE IV	940 LIN. FT
15"	TYPE IV	280
	TYPE V	175
18"	TYPE IV	695
21"	TYPE IV	50
TOTALS		2140

NOTE:

1) THE ABOVE LENGTH OF STORMSEWER CONSTRUCTION IS AN APPROXIMATION, AND IS PROVIDED FOR INFORMATION ONLY.
2) THE CLASSIFIED 15"Ø TYPE IV REINFORCED CONCRETE IS REQ'D. BETWEEN MANHOLES U, V, & AA ONLY.
3) THE MANHOLE SCHEDULE FORMULATED BASED ON THE ELEVATIONS GIVEN ON THE EXISTING TOPOGRAPHY; DWG. E-246-2.1. CONTRACTOR WILL BE RESPONSIBLE FOR THE COMPLETE INSTALLATION INCORPORATING ANY FIELD CHANGES REQ'D. IF THE ACTUAL ELEVATIONS VARY FROM THOSE GIVEN.

SCALES: HORIZONTAL: 1"=30'
VERTICAL: 1"=1'



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wauwatosa, wisconsin 53222
414/771-3050

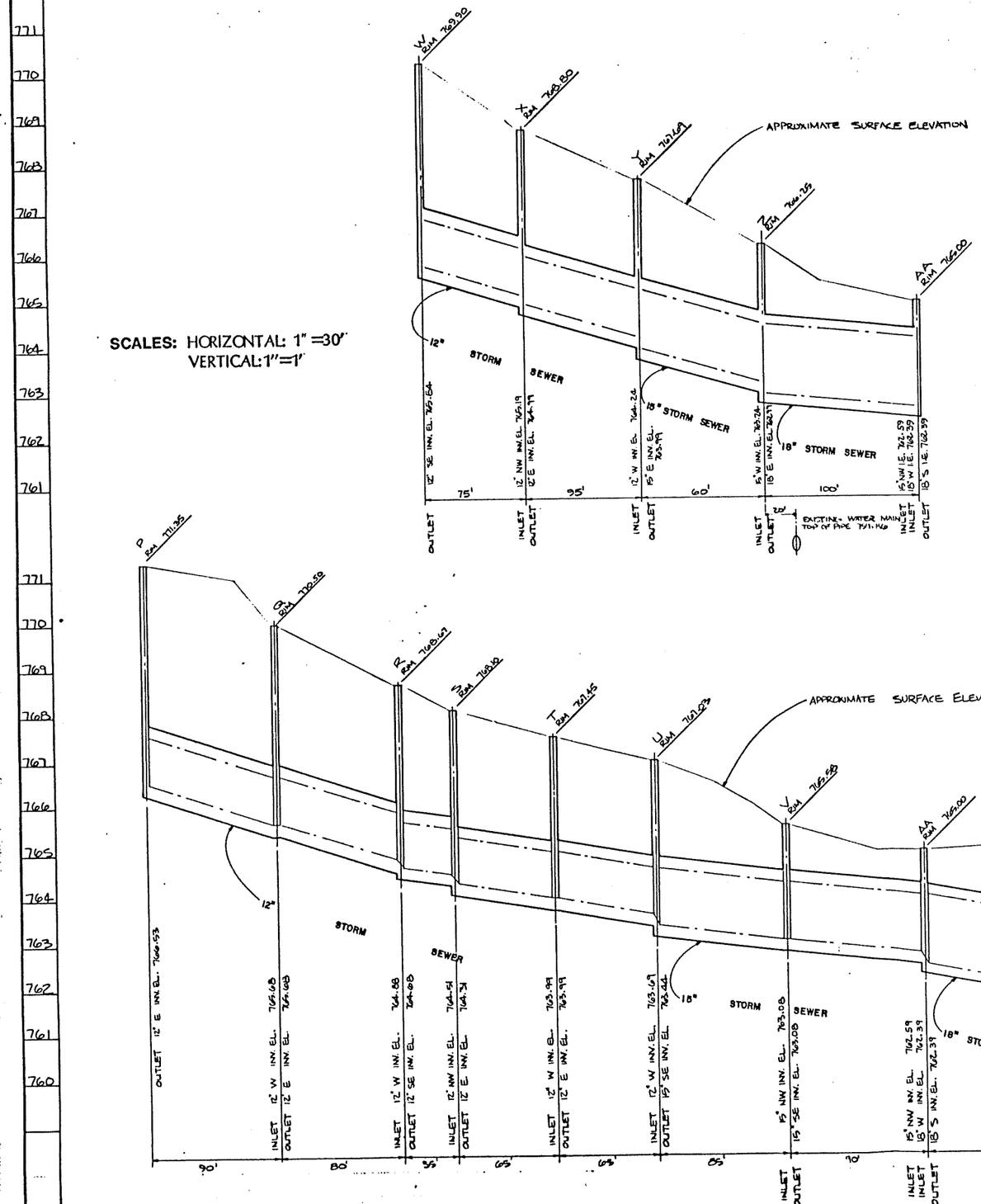
FREEMAN CHEMICAL CORP.
PLANT MODERNIZATION

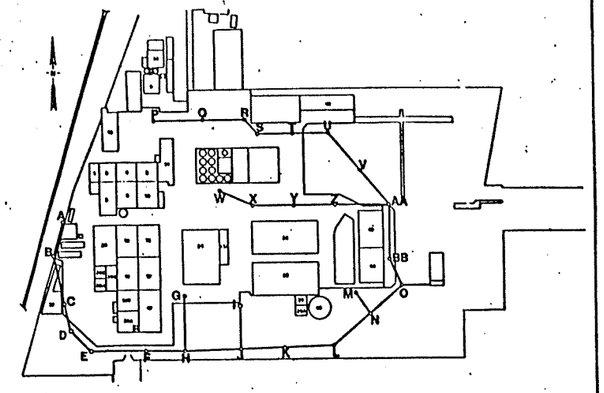
SCALE: NOTED | APPROVED BY: | DRAWN BY: SFG
DATE: 4-9-86 | DES'GNED

RUNOFF COLLECTION: SOUTH STORMWATER CONVEYANCE SEWER PROFILE

DRAWING NUMBER E-246-3.3A

FIGURE 4





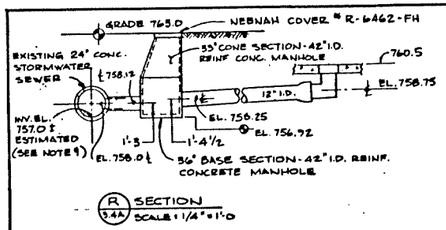
LOCATION MAP

NOTE:

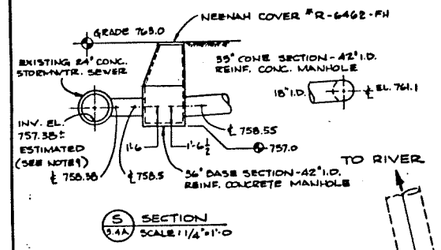
ALL SURFACE AND RIM ELEVATIONS ARE APPROXIMATE.

FIGURE 5

TRIAD ENGINEERING INCORPORATED	3333 north mayfair road wauwatosa, wisconsin 53222 414/771-5200
FREEMAN CHEMICAL CORP. PLANT MODERNIZATION	
DESIGN: NJTED	DRAWN BY: TJKD
DATE: 4-9-86	APPROVED BY:
RUNOFF COLLECTION- NORTH STORMWATER CONVEYANCE SEWER PROFILE	DRAWING NO. S-346-3.38

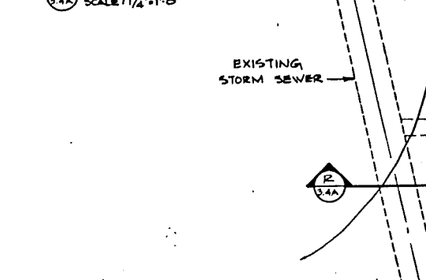


R 3.4A SECTION
SCALE: 1/4"=1'-0

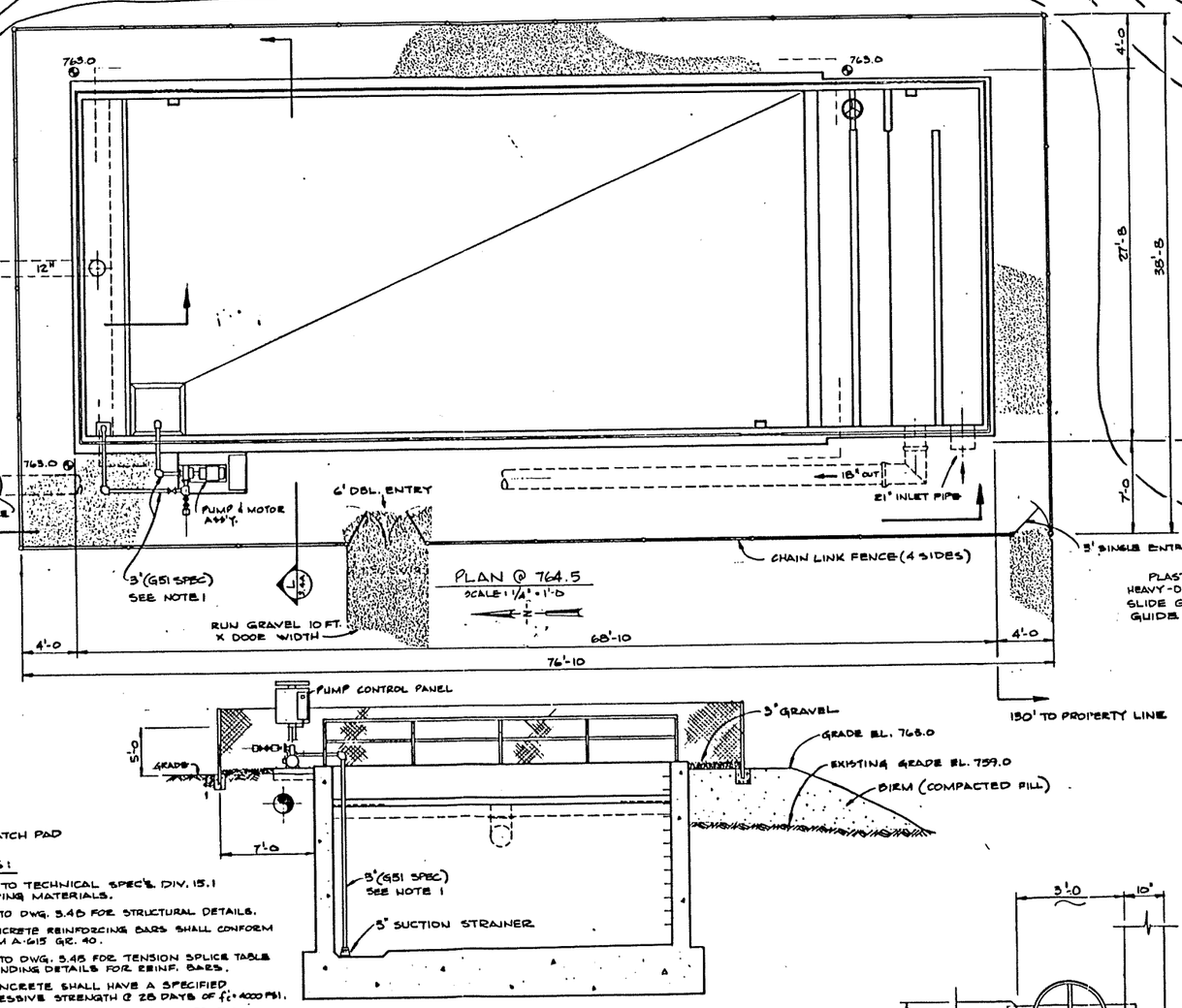


S 3.4A SECTION
SCALE: 1/4"=1'-0

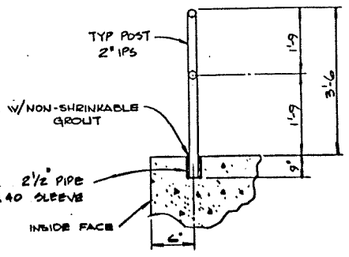
CONTROL PANEL & SUPPORT
SCALE: 3/4"=1'-0



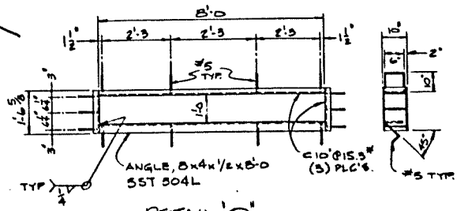
PUMP & CONTROL PANEL PAD LAYOUT
SCALE: 1/2"=1'-0



L 3.4A SECTION
SCALE: 1/4"=1'-0

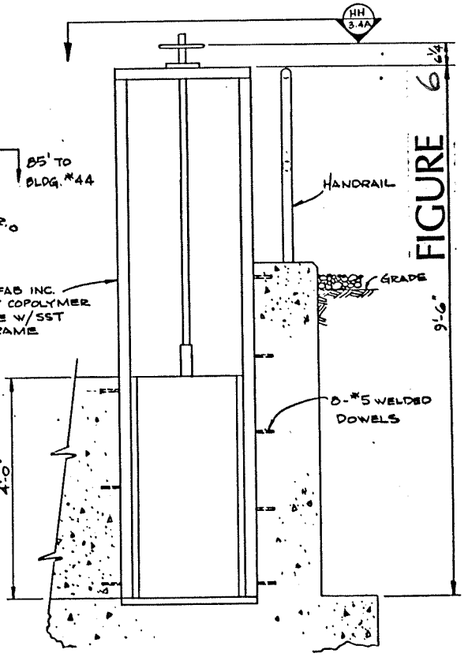


HANDRAIL DETAIL
SCALE: 3/4"=1'-0



DETAIL "Q"
SCALE 1 1/2"=1'-0
(FROM 4.1.B)

HH 3.4A VIEW
SCALE 1"=1'-0



H 3.4B DETAIL (FROM SHT. 1)
SCALE: 1"=1'-0
(LOOKING NORTH)

NOTES:

1) REFER TO TECHNICAL SPEC'S. DIV. 15.1 FOR PIPING MATERIALS.
2) REFER TO DWG. 3.4B FOR STRUCTURAL DETAILS.
3) ALL CONCRETE REINFORCING BARS SHALL CONFORM TO ASTM A-615 GR. 40.
4) REFER TO DWG. 3.4B FOR TENSION SPLICE TABLE AND BENDING DETAILS FOR REINF. BARS.
5) ALL CONCRETE SHALL HAVE A SPECIFIED COMPRESSIVE STRENGTH @ 28 DAYS OF f'_c = 4000 PSI.
6) ALL CONCRETE SHALL BE PROPORTIONED BY LABORATORY TRIAL BATCHES.
7) CONCRETE PROTECTION OF REINFORCEMENTS SHALL BE AS FOLLOWS UNLESS OTHERWISE INDICATED
   - I. FOOTINGS
     - a. AT FORMED SIDES & ENDS, & BOTTOMS BEARING ON WORKMAT ..... 2"
     - b. AT UNFORMED SIDES & ENDS, & BOTTOMS BEARING ON EARTH ..... 3"
   - II. WALLS ..... 2"
8) NO BACKFILL SHALL BE PLACED AGAINST ANY SUBSTRUCTURE WALLS UNTIL WALLS HAVE ATTAINED SPECIFIED STRENGTH.
9) THE EXISTING 24" CONCRETE STORMWATER SEWER ELEVATION & LOCATION IS APPROXIMATE ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL INSTALLATION.

FIGURE

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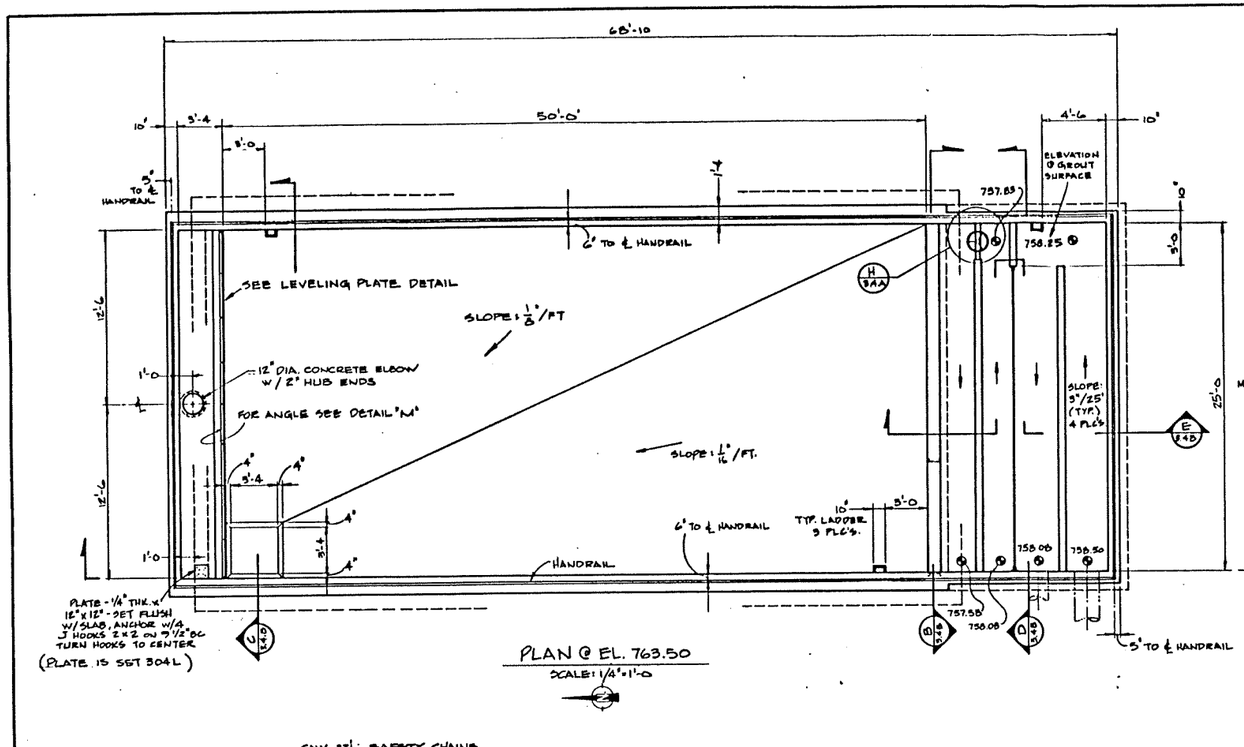
FREEMAN CHEMICAL CORP.
PLANT MODERNIZATION

SCALE 1/4"=1'-0 | APPROVED BY | DRAWN BY PINTAIL
DATE 4-9-86 | | REVISED

RUNOFF COLLECTION-STORAGE BASIN GENERAL LAYOUT & EQUIPMENT

DRAWING NUMBER E-346-3.4A



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414/771-5050

FREEMAN CHEMICAL CORP.
PLANT MODERNIZATION

DESIGN NOTED	APPROVED BY	DRAWN BY PINTAR
DATE 4-9-86		REVISED

RUNOFF COLLECTION - STORAGE BASIN STRUCTURAL DETAILS

DRAWING NUMBER 0-244-3.4B

FIGURE 7

Feed/Grit Removal Channel

Flow from the conveyance system enters this structure from a 21 inch feed line into a 3 foot wide channel that is sloped at 1 percent as it travels the 25 foot width of the tank. From here the flow is routed into the next channel and flows back along the width until the flow elevation builds up to overflow the 12 inch weir plate. The flow then enters the third channel which contains an adjustable gate which when lowered prevents the flow from entering the basin. When the gate is closed, the elevation of the water surface in the first three channels builds up until the invert of the 18 inch bypass line is reached and all additional arriving flow is directed to the storm sewer.

When the bypass gate is open, the arriving flow enters the final distribution channel which has a 1 by 8 foot rectangular opening to the retention basin. This opening is located so that minimal turbulance or mixing is encountered when the basin is at capacity. In addition, the opening allows the channels to back-up when the basin is full and automatically bypasses any arriving flow.

Retention Basin

The capacity of this facility is approximately 100,000 gallons which is equivalent to one inch of rainfall over the drainage area. The tank can be emptied at any time using a lift pump at the back corner of the tank. The pump lifts the contents of the tank to the surface elevation at which point a two valve arrangement allows discharge to the storm sewer i.e. to the Milwaukee River, to the sanitary sewer, or to a quick disconnect fitting would permit pumping to a tank truck or other type of vessel for transport and /or treatment.

Bypass

The 18 inch bypass line that leads to the storm sewer is used when the tank is at 100 percent capacity or when the adjustable gate in the feed channel is closed. The gate can be closed to contain only the first flush of certain storms or to prevent additional flow from entering the tank when it is full.

2.2.1.5 Existing Utilities

The approximate locations of the major utilities known to be on site are shown on Figure 8. In many areas these existing utilities dictated the location and/or vertical placement of the storm sewer conveyance system. Of particular concern are those locations where it was necessary to cross existing utilities with the conveyance system pipes. These locations include crossing of existing gas mains, water mains, sanitary sewers and storm sewers.

The crossing of the existing 24" storm sewer east of Building 44 is especially critical, since the existing storm sewer is quite shallow and since this crossing dictates the elevation of the entire northern leg of the conveyance system.

It is a general belief of plant personnel that many other utilities exist on the site which are not shown on any of the drawings. The areas to the east and west of the north and south processing complexes are strongly suspected of having numerous unmarked utilities. New construction was kept from these areas for this reason.

2.2.2 Design Assumptions

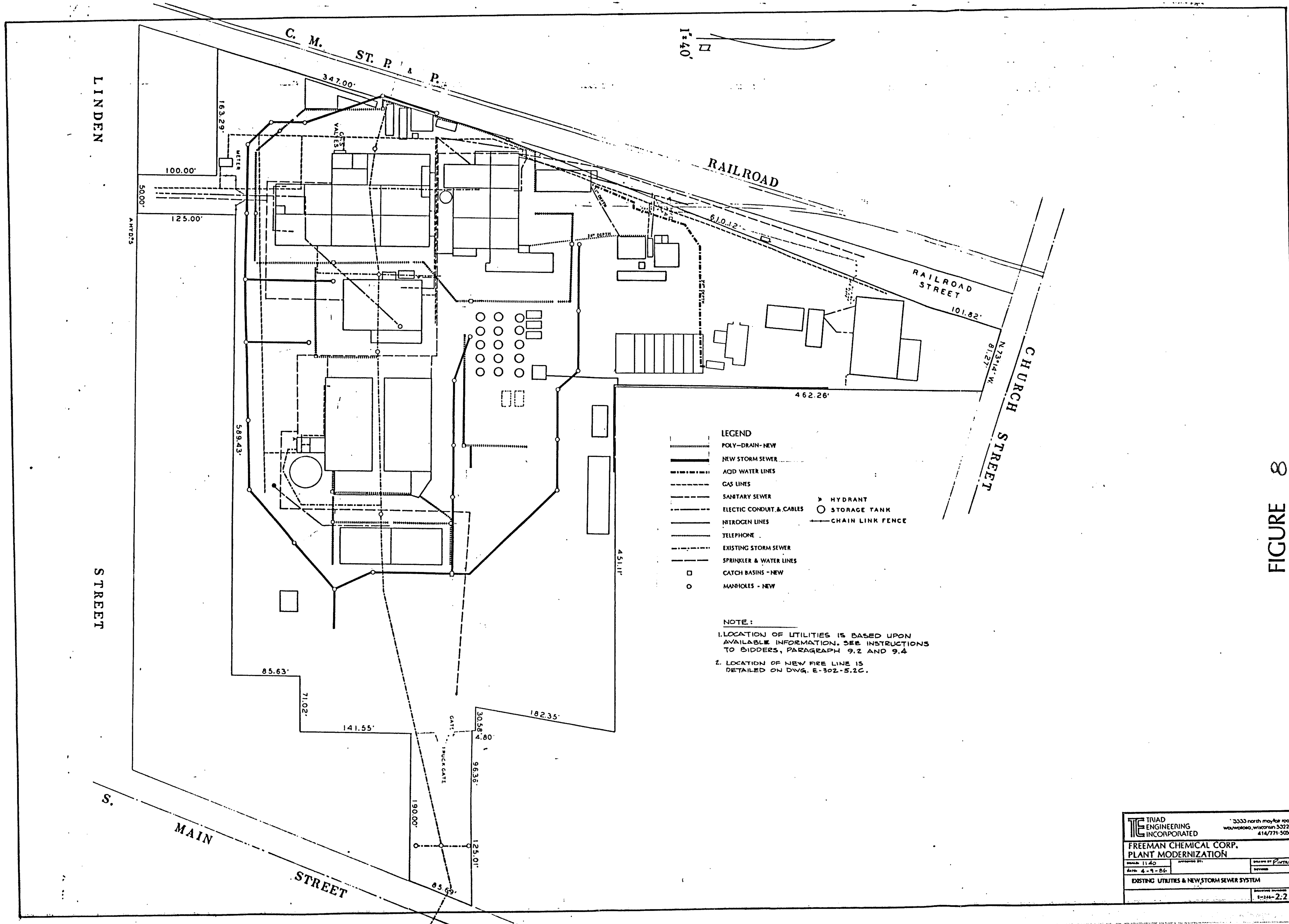
The collection and conveyance facilities are designed to route stormwater with minimal ponding on the surface or back-ups in the system. The 10 year design storm as calculated by SEWRPC is used as the basis for the design. The storm total of 3.8 inches is used for a 24 hour duration with the rational formula for the conveyance sewer design.

The stormwater retention basin was sized to handle the total volume of all storms of 1 inch or less rainfall. For storms of rainfall greater than one inch, the first flush will be totally contained by the 100,000 gallon facility.

2.2.3 Runoff and Spill Containment Areas

2.2.3.1 Description

Three areas on site where the possibility of a large-volume spill exists shall be provided with runoff and spill containment structures. The purpose of such a structure is to contain the volume of the largest tank within the area it surrounds, should a spill occur, with an additional volume provided for rainfall. Each



C. M. ST. P. & P.
RAILROAD
RAILROAD STREET
LINDEN STREET
CHURCH STREET
S. MAIN STREET
1"=40'
347.00'
163.29'
100.00'
50.00'
125.00'
610.12'
101.82'
N 73°14' W. 81.27'
462.26'
451.11'
589.43'
85.63'
71.02'
141.55'
182.35'
30.58'
4.80'
96.36'
190.00'
125.01'
85.69'
METER
GAS VALVES
TRUCK GATE
GATE
LEGEND
POLY—DRAIN-NEW
NEW STORM SEWER
AOD WATER LINES
GAS LINES
SANITARY SEWER
ELECTIC CONDUIT & CABLES
NITROGEN LINES
TELEPHONE
EXISTING STORM SEWER
SPRINKLER & WATER LINES
CATCH BASINS - NEW
MANHOLES - NEW
HYDRANT
STORAGE TANK
CHAIN LINK FENCE
NOTE:
1. LOCATION OF UTILITIES IS BASED UPON AVAILABLE INFORMATION. SEE INSTRUCTIONS TO BIDDERS, PARAGRAPH 9.2 AND 9.4
2. LOCATION OF NEW FIRE LINE IS DETAILED ON DWG. E-302-5.2C.
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PLANT MODERNIZATION
1:40
4-9-86
EXISTING UTILITIES & NEW STORM SEWER SYSTEM
2:2

FIGURE 8

area drains to a common point within the structure from which there is a valved connection to the storm water conveyance system. These valves shall be normally closed and shall be opened only to discharge accumulated rainfall to the conveyance system. These valves have indicators as to whether the valve is open or closed and shall be provided with lock-outs to allow only authorized personnel access to them. The following sections discuss each runoff and spill containment area in greater detail.

2.2.3.2 Railroad Tank Car Unloading Area

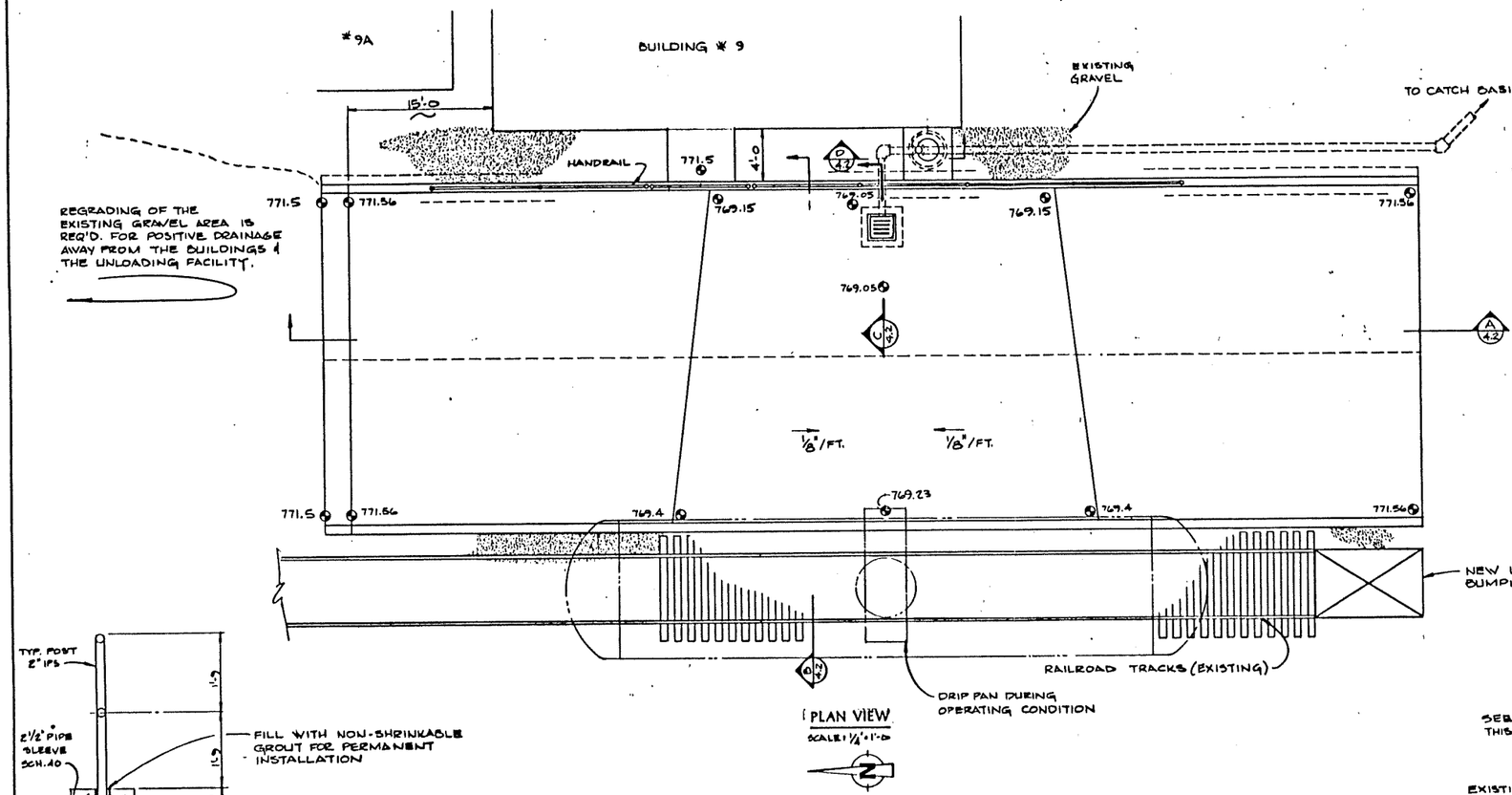
A runoff and spill containment area shall be located north of the North Processing Complex, where an off-load track from the Soo Line Railroad enters the Freeman property, as shown on Figure 2. Details of this containment area are shown in Figure 9. This containment area is provided to allow for the possibility of a large volume spill from a tank car while parked on the Freeman property. It is estimated, based on current and future material purchasing, that such a tank car will be parked on the Freeman property in this area 24 to 36 days out of the year.

An average tank car has a volume of 23,000 gallons. This spill containment area is provided with a capacity of 24,000 gallons which allows a volume of 1000 gallons for rainfall, over an area of 2000 square feet which equals 0.8 inches of rainfall.

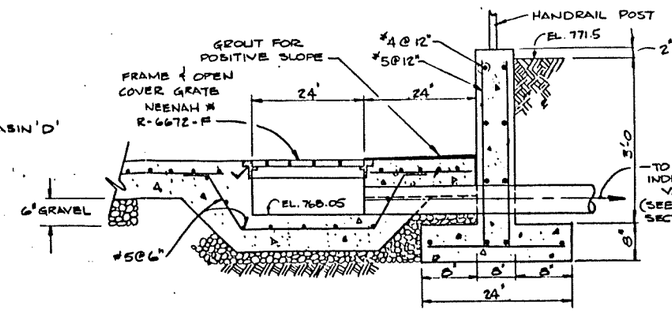
2.2.3.3 Full Tank Truck Parking Area

A runoff and spill containment area will be located north of the Tank Farm area along the northeast property line, as shown on Figure 2. Details of this containment area are shown in Figure 10. This containment area is provided to allow for the possibility of a large volume spill from a tank truck parked on the Freeman property. It is estimated that 5 such tank trucks will be parked in this area each day. The area has capacity for parking 7 tank trucks with space available to the north for additional spaces after the existing incinerator is replaced.

An average tank truck has a volume of 7000 gallons. This spill containment area is designed for a capacity of 7700 gallons which allows for a rainfall volume of 700 gallons over an area of 5400 square feet which equals 0.2 inches of rainfall.

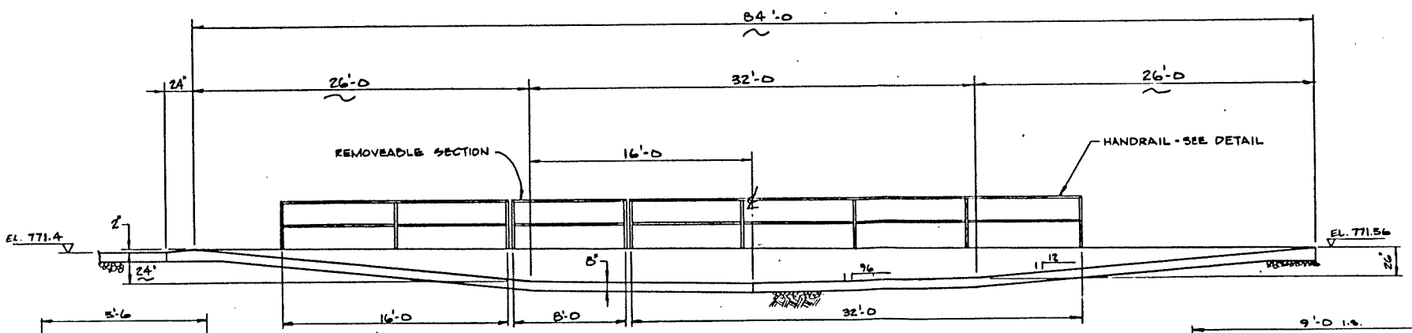


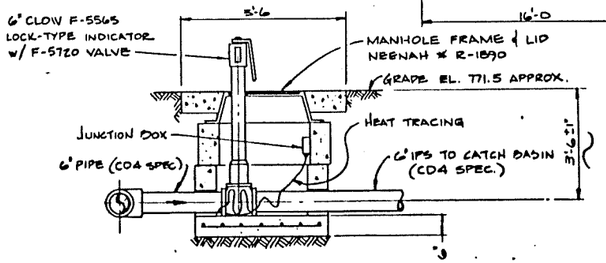
PLAN VIEW
SCALE: 1/4"=1'-0



C 4.2 SECTION
SCALE: 1"=1'-0

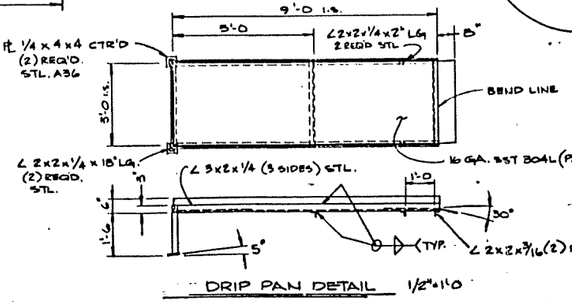
HANDRAIL DETAIL
NTS



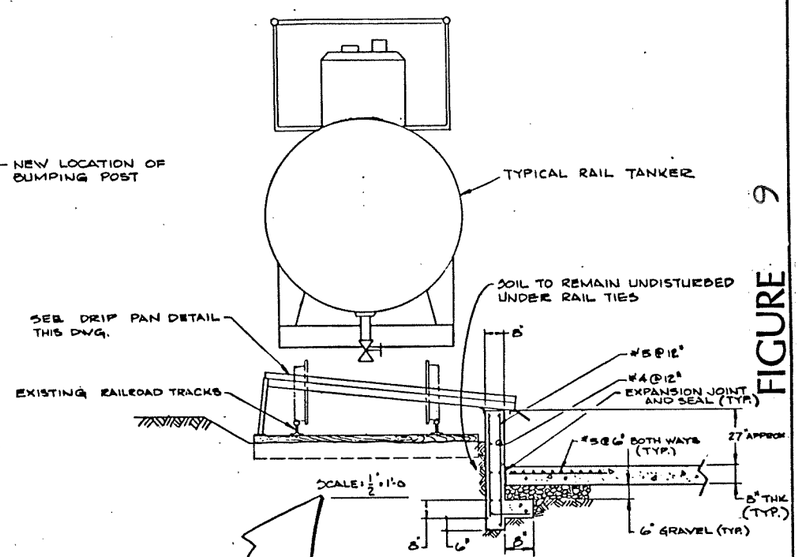


D 4.2 SECTION
SCALE: 3/4"=1'-0

A 4.2 SECTION
SCALE: 1/4"=1'-0
-APPROX. BASIN CAPACITY: 24,000 GAL.



DRIP PAN DETAIL 1/2"=1'-0



B 4.2 SECTION
SCALE: 1/4"=1'-0

FIGURE 9

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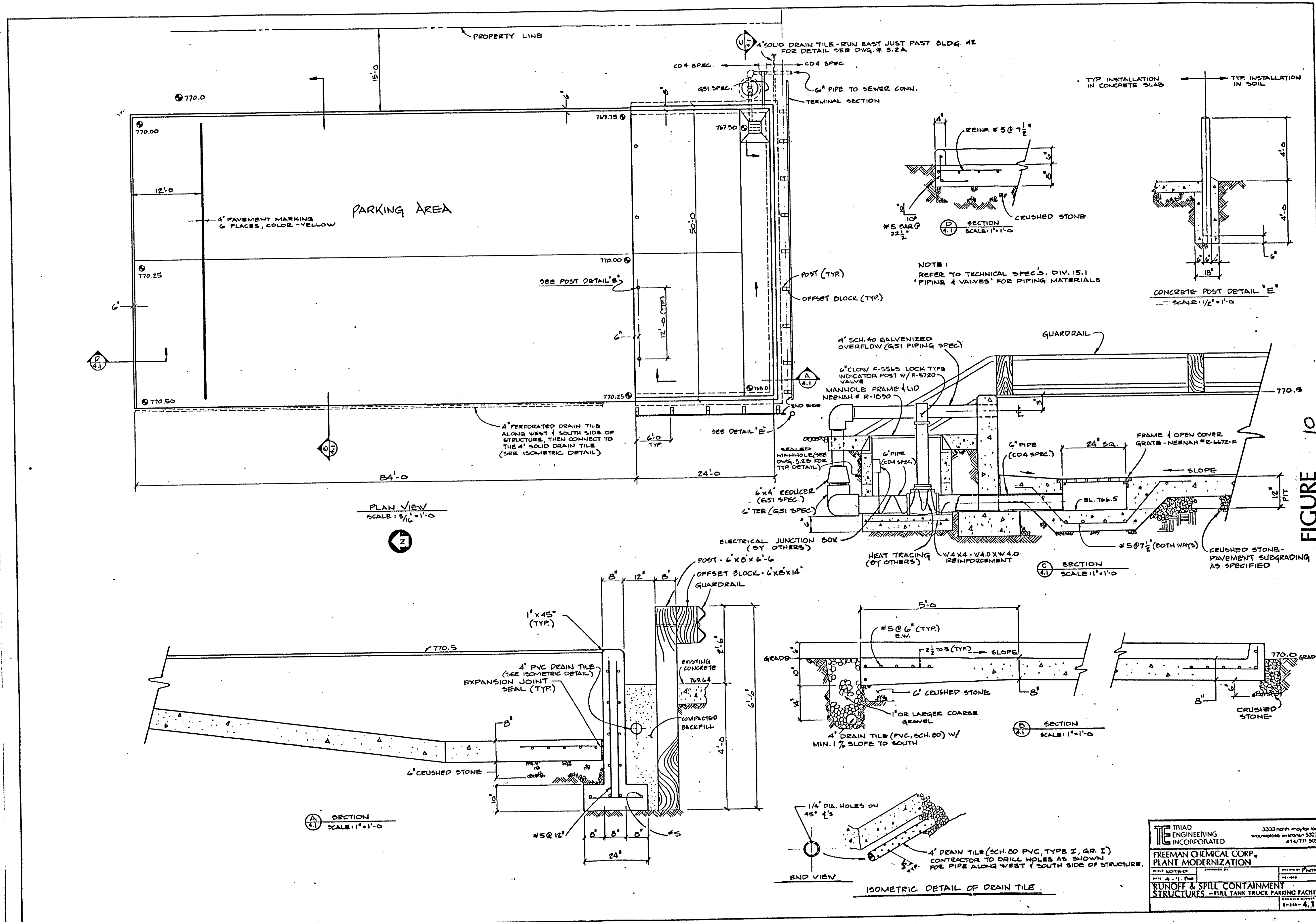
FREEMAN CHEMICAL CORP. PLANT MODERNIZATION	
SCALE: NOTED	APPROVED BY:
DATE: 4-9-86	DRAWN BY: PINTAR
RUNOFF & SPILL CONTAINMENT STRUCTURES - RAIL CAR UNLOADING FACILITY	DRAWING NUMBER: E-302-4.2



PROPERTY LINE
4" SOLID DRAIN TILE - RUN EAST JUST PAST BLDG. 42 FOR DETAIL SEE DWG. # 3.2A
CD4 SPEC.
G51 SPEC.
6" PIPE TO SEWER CONN.
TERMINAL SECTION
PARKING AREA
4" PAVEMENT MARKING 6 PLACES, COLOR - YELLOW
12'-0
15'-0
50'-0
12'-0 (TYP.)
SEE POST DETAIL 'E'
POST (TYP.)
OFFSET BLOCK (TYP.)
770.0
770.00
770.25
770.50
767.75
767.50
770.00
770.25
768.0
END SHOE
4" PERFORATED DRAIN TILE ALONG WEST & SOUTH SIDE OF STRUCTURE, THEN CONNECT TO THE 4" SOLID DRAIN TILE (SEE ISOMETRIC DETAIL)
SEE DETAIL 'E'
6'-0 TYP
84'-0
24'-0
PLAN VIEW
SCALE: 3/16" = 1'-0
REINF. #5 @ 7 1/2"
#5 BAR @ 22 1/2"
CRUSHED STONE
SECTION D 4.1
SCALE: 1" = 1'-0
NOTE: REFER TO TECHNICAL SPEC'S. DIV. 15.1 'PIPING & VALVES' FOR PIPING MATERIALS
TYP. INSTALLATION IN CONCRETE SLAB
TYP. INSTALLATION IN SOIL
CONCRETE POST DETAIL 'E'
SCALE: 1/2" = 1'-0
4" SCH. 40 GALVENIZED OVERFLOW (G51 PIPING SPEC)
6" CLOW F-5565 LOCK TYPE INDICATOR POST W/ F-5720 VALVE
MANHOLE FRAME & LID NEENAH # R-1650
GUARDRAIL
770.5
SEALED MANHOLE (SEE DWG. 3.2B FOR TYP. DETAIL)
6" PIPE (CD4 SPEC.)
6" PIPE (CD4 SPEC.)
24" SQ.
FRAME & OPEN COVER GRATE - NEENAH # R-6672-F
SLOPE
EL. 766.5
12" PIT
6"x4" REDUCER (G51 SPEC.)
6" TEE (G51 SPEC.)
ELECTRICAL JUNCTION BOX (BY OTHERS)
HEAT TRACING (BY OTHERS)
W4 X 4 - W4.0 X W4.0 REINFORCEMENT
#5 @ 7 1/2" (BOTH WAYS)
CRUSHED STONE - PAVEMENT SUBGRADING AS SPECIFIED
SECTION C 4.1
SCALE: 1" = 1'-0
POST - 6"x8"x6'-6
OFFSET BLOCK - 6"x8"x14"
GUARDRAIL
1"x45° (TYP.)
770.5
4" PVC DRAIN TILE (SEE ISOMETRIC DETAIL)
EXPANSION JOINT SEAL (TYP.)
EXISTING CONCRETE
769.64
COMPACTED BACKFILL
6" CRUSHED STONE
#5 @ 12"
#5
24"
SECTION A 4.1
SCALE: 1" = 1'-0
5'-0
#5 @ 6" (TYP.) E.W.
2 1/2 TO 3 (TYP.)
SLOPE
GRADE
6" CRUSHED STONE
1" OR LARGER COARSE GRAVEL
4" DRAIN TILE (PVC, SCH. 80) W/ MIN. 1% SLOPE TO SOUTH
770.0 GRADE
CRUSHED STONE
SECTION B 4.1
SCALE: 1" = 1'-0
1/4" DIA. HOLES ON 45° ℄'s
END VIEW
4" DRAIN TILE (SCH. 80 PVC, TYPE I, GR. I) CONTRACTOR TO DRILL HOLES AS SHOWN FOR PIPE ALONG WEST & SOUTH SIDE OF STRUCTURE.
ISOMETRIC DETAIL OF DRAIN TILE
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FREEMAN CHEMICAL CORP., PLANT MODERNIZATION
NOTED
4-9-86
RUNOFF & SPILL CONTAINMENT STRUCTURES - FULL TANK TRUCK PARKING FACILITY
4.1

FIGURE 10

2.2.3.4 Reconstructed Tank Farm Area and Truck Terminal Facility

A runoff and spill containment area will be at the reconstructed tank farm as shown in Figures 11 and 12. This containment area is provided to allow for the possibility of a large volume spill from a tank within the tank farm. The tank farm consists of one-30,260 gallon tank, two-25,520 gallon tanks and seven-15,000 gallon tanks.

The containment wall surrounding the tank farm is 3.5 feet high providing a containment volume of 36,500 gallons. Thus a volume of 6240 gallons is provided for rainfall, over an area of 1622 square feet, which equals 6.2 inches of rainfall.

The reconstructed tank farm area also includes a new truck terminal facility just east of the tank farm. This facility will allow trucks that are loading or unloading materials at the tank farm to pull in out of the elements. This facility is also equipped with indoor spill containment to keep a spill from traveling out onto the pavement. All pumps servicing the tank farm area are inside the pumphouse between the tank farm and the truck terminal. The area just east of the truck terminal is reserved for the proposed incinerator building.

2.2.4 Spill Control in Other Areas

Spill control in areas other than those containment areas previously described will follow several scenarios as detailed below.

The main difference between spill control in the containment areas and that in other active areas on the site is operator intervention. It is presumed that in the Tank Car Unloading Area, the Full Tank Truck Parking Area, and the Reconstructed Tank Farm Area that operator intervention will be minimal if any at all (i.e. at night). Therefore, the spill containment provided is the maximum of what might be expected to occur or the volume of the largest tank plus an allowance for rainfall.

In the other active areas there are two types of spills which could occur. The first will be referred to as a liquid spill and shall include all liquids such as solvents or other chemicals which remain in a liquid state after the spill occurs. The second type of spill is a material spill

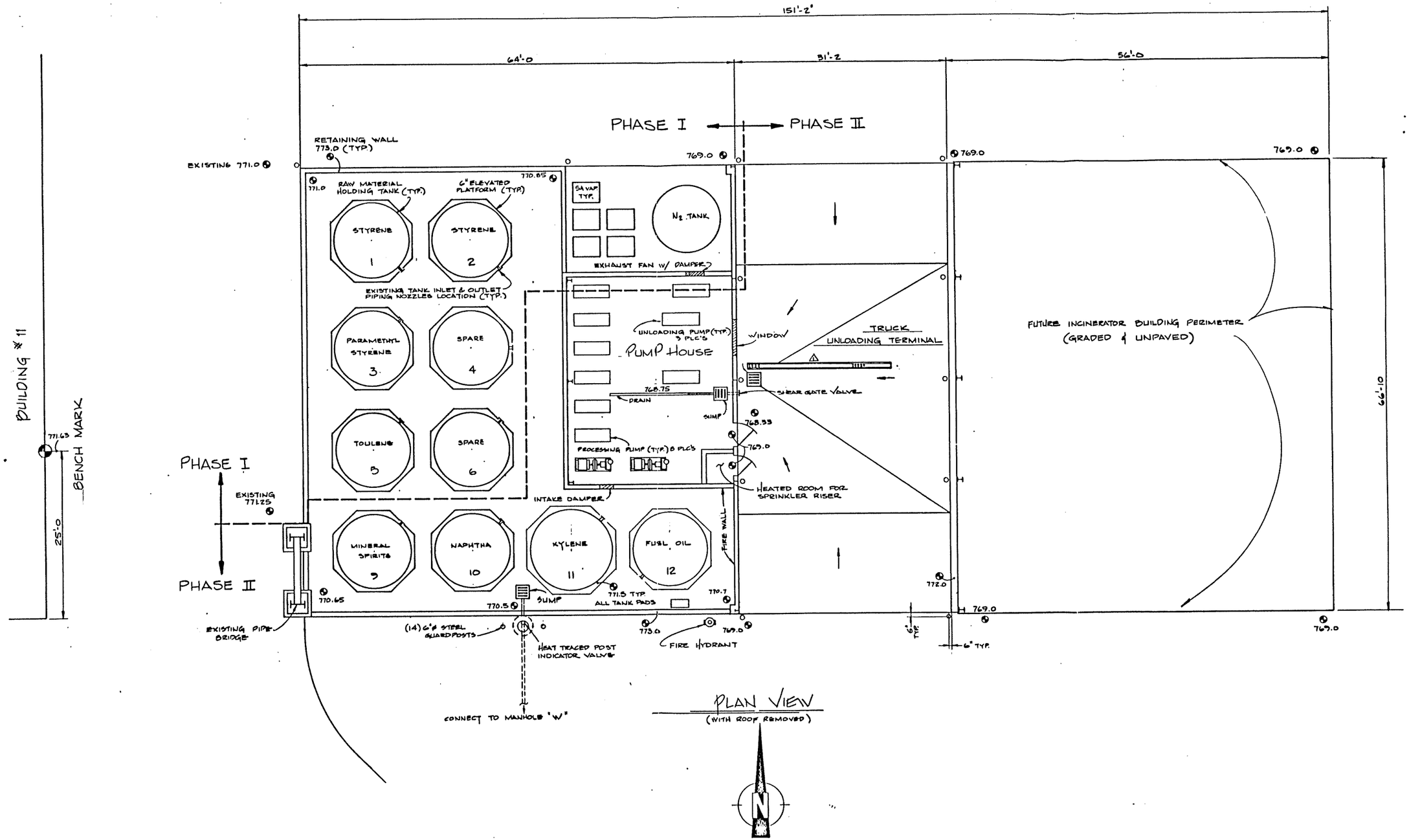

FIGURE 11

REV	DESCRIPTION	BY	DATE
1	ADDED TRENCH IN TRUCK AREA		

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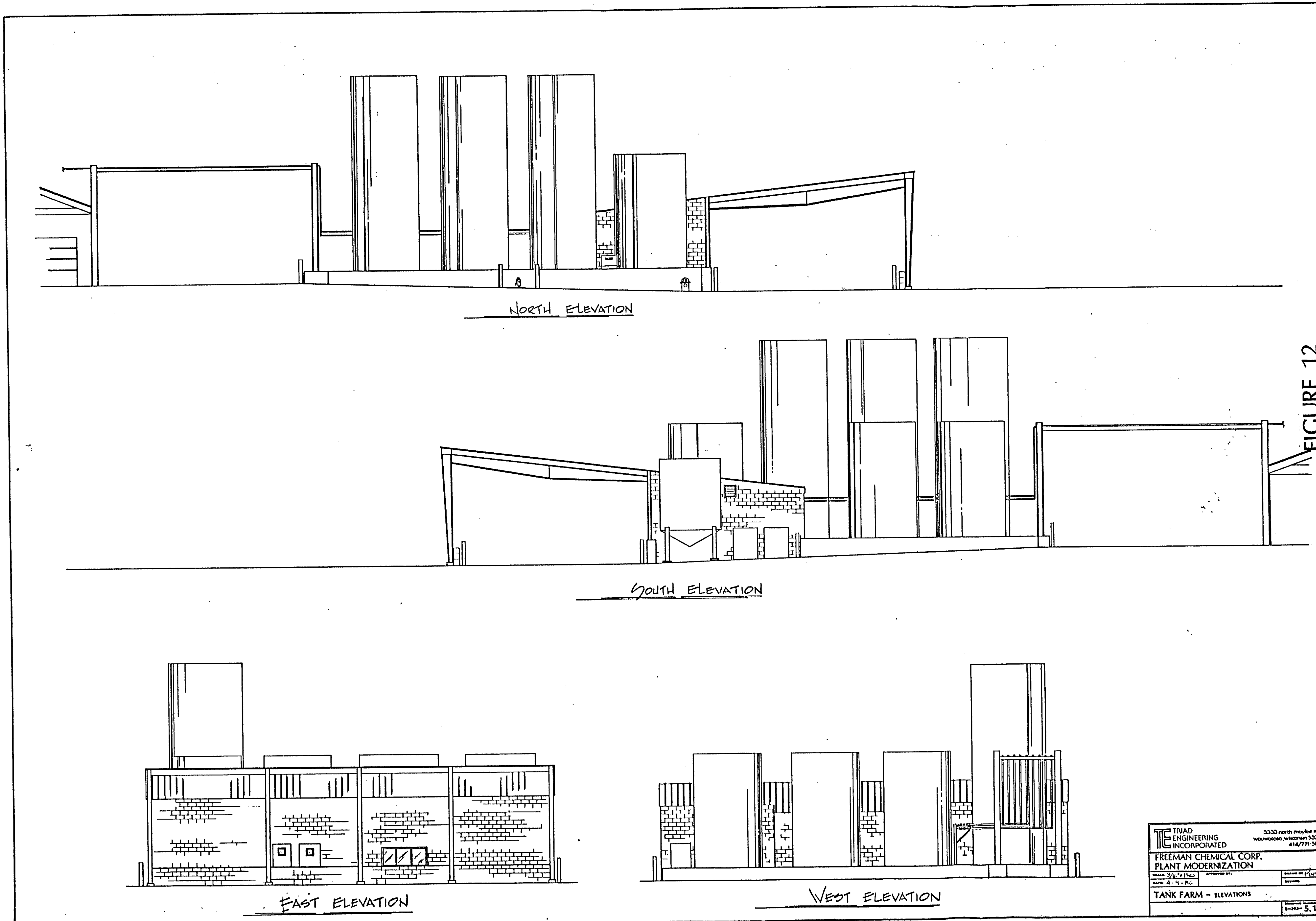
3333 north mayfair road
wauwatosa, wisconsin 53222
414/771-3080

FREEMAN CHEMICAL CORP.
PLANT MODERNIZATION

SCALE 1/16"=1'-0 | APPROVED BY | DRAWN BY PMM
DATE 4-9-86 | REVISED

TANK FARM - PLAN & GENERAL LAYOUT

DRAWING NUMBER 5-2423-5.1A



NORTH ELEVATION
SOUTH ELEVATION
EAST ELEVATION
WEST ELEVATION
TRIAD
ENGINEERING
INCORPORATED
3333 north mayfair road
wauwatosa, wisconsin 53222
414/771-5050
FREEMAN CHEMICAL CORP.
PLANT MODERNIZATION
TANK FARM - ELEVATIONS
5.1B

FIGURE 12

and includes all spills (liquid or solid) which congeal into a solid mass after equilibrating to ambient conditions. Of these two types of spills there are small volume (i.e. 55-gallon drum) and large volume (i.e. a 7000-gallon) tank trucks.

The small volume spills of both types can be easily handled by the proposed drainage system. Small volume liquid spills will be conveyed by means of the concrete pads to the collection trenches where the volume will be discharged to the conveyance sewer and collected in the storage basin. The concrete pads provided in active areas will provide a means for clean-up of small volume material spills with the assumption that a small volume materal spill will not travel far enough to cause a problem in the trench or sewer systems.

A large volume liquid spill in an active area will be handled in the same manner as that for a small volume liquid spill, in that the liquid will be allowed to enter the drainage system where it will collect in the storage basin. Recall that the outlets from the catch basins to the conveyance sewer system will be equipped with a liquid trap to act as a fire stop in the case of a flammable solvent spill.

It is the case of the large volume material spill which requires special provisions to protect against plugging of the conveyance sewer. Therefore, flap valves will be provided on the outlets from the catch basins to the manholes. Since operator intervention is assumed to be high in these areas, the time between occurance of such a spill and its detection would be minimal. Upon detection of such a spill, the operator would immediately manually close the flap valve for that area in order to close off discharge to the storm water conveyance system, thus preventing such a spill from permanently plugging the conveyance system pipes. Such a spill would then be allowed to pond on the paved surface while the appropriate action is taken by the operator to prevent further spillage and until such time that the material can be cleaned up.