

**GENERAL NOTES**

THE CURRENT COUNTY OF DELAWARE REQUIREMENTS, TOGETHER WITH THE SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION INCLUDING ALL SUPPLEMENTS THERETO, SHALL GOVERN ALL CONSTRUCTION ITEMS THAT ARE A PART OF THIS PLAN. THE CONTRACTOR SHALL REFER TO THE "STANDARD PLANS AND SPECIFICATIONS FOR CONSTRUCTION OF SANITARY FACILITIES IN DELAWARE COUNTY, OHIO" FOR ALL NECESSARY CONSTRUCTION DETAILS.

APPROVAL OF THESE PLANS IS CONTINGENT UPON ALL REQUIRED SANITARY SEWER EASEMENTS BEING APPROVED BY THE COUNTY AND RECORDED PRIOR TO CONSTRUCTION.

THE CONTRACTOR SHALL NOTIFY THE COUNTY SANITARY ENGINEER'S OFFICE FORTY-EIGHT (48) HOURS PRIOR TO CONSTRUCTION.

ANY MODIFICATIONS TO THE WORK AS SHOWN ON THESE DRAWINGS MUST HAVE PRIOR WRITTEN APPROVAL BY THE COUNTY SANITARY ENGINEER.

THE CONTRACTOR IS RESPONSIBLE FOR THE INVESTIGATION, LOCATION, SUPPORT, PROTECTION, AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES WHETHER SHOWN ON THESE PLANS OR NOT. THE CONTRACTOR SHALL EXPOSE ALL UTILITIES OR STRUCTURES PRIOR TO CONSTRUCTION TO VERIFY THE VERTICAL AND HORIZONTAL EFFECT ON PROPOSED CONSTRUCTION. THE CONTRACTOR SHALL CALL, TOLL FREE, THE OHIO UTILITIES PROTECTION SERVICE (1-800-362-2764) 72 HOURS PRIOR TO CONSTRUCTION AND SHALL NOTIFY ALL UTILITY COMPANIES AT LEAST 48 HOURS PRIOR TO WORK IN THE VICINITY OF THEIR UNDERGROUND LINES.

THE IDENTITY AND LOCATION OF THE EXISTING UNDERGROUND UTILITY FACILITIES KNOWN TO BE LOCATED IN THE CONSTRUCTION AREA HAVE BEEN SHOWN ON THE PLANS AS ACCURATELY AS PROVIDED BY THE OWNER OF THE UNDERGROUND UTILITY. THE COUNTY OF DELAWARE AND/OR ENGINEER ASSUME NO RESPONSIBILITY AS TO THE ACCURACY OF THE UNDERGROUND FACILITIES SHOWN ON THE PLANS.

THE FOLLOWING UTILITIES AND OR OWNERS ARE LOCATED WITHIN THE WORK LIMITS OF THIS PROJECT AND DO NOT SUBSCRIBE TO A REGISTERED UNDERGROUND UTILITY PROTECTION SERVICE.

UTILITY	OWNER	TELEPHONE
WATER MAINS	DEL-CO WATER COMPANY, INC. 6773 OLENTANGY RIVER ROAD DELAWARE, OHIO 43015	740-548-7746
STORM SEWERS	DELAWARE COUNTY ENGINEER 50 CHANNING STREET DELAWARE, OHIO 43015 (CONTACTING AGENT ONLY)	740-833-2400
SANITARY SEWERS	DELAWARE COUNTY SANITARY ENGINEER 50 CHANNING STREET DELAWARE, OHIO 43015	740-833-2240

ALL WATER MAINS SHALL BE SEPARATED A MINIMUM OF 10 FEET HORIZONTALLY AND 1.5 FEET VERTICALLY FROM ALL PARALLEL SANITARY SEWERS.

WHENEVER A WATER MAIN AND SEWER MUST CROSS, THE WATER MAIN SHALL BE AT SUCH AN ELEVATION THAT THE CROWN OF THE SEWER IS AT LEAST 18", MEASURED BETWEEN THE OUTSIDE PIPE WALLS, BELOW THE BOTTOM OF THE WATER MAIN.

ALL SANITARY MAINS (8" AND LARGER) AND SERVICES (6") SHALL BE PVC PIPE MEETING THE REQUIREMENTS ASTM D-3034, UNLESS OTHERWISE NOTED.

ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER ARE PROHIBITED.

ALL SEWER PIPE WYE FITTINGS SHALL HAVE A TWO FOOT (MINIMUM) SERVICE EXTENSION INSTALLED PRIOR TO THE SERVICE BEING CAPPED AND BACKFILL BEING PLACED OVER THE MAINLINE LATERAL SEWER.

SEWER TRENCHES SHALL BE DE-WATERED TO 2" BELOW BELL OF PIPE PRIOR TO INSTALLATION OF PIPE.

THE CONTRACTOR SHALL PROVIDE AND INSTALL WYE POLES AT ALL WYE LOCATIONS AS CONSTRUCTED. WYE POLES SHALL EXTEND ABOVE EXISTING OR PROPOSED GRADE, WHICHEVER IS HIGHER, A MINIMUM OF 2' - 0".

THE CONTRACTOR AND SUB-CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR COMPLYING WITH ALL FEDERAL, STATE AND LOCAL SAFETY REQUIREMENTS TOGETHER WITH EXERCISING PRECAUTIONS AT ALL TIMES FOR THE PROTECTION OF PERSONS INCLUDING EMPLOYEES AND PROPERTY. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SUB-CONTRACTOR TO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.

ANY FIELD TILE DISTURBED DURING CONSTRUCTION SHALL BE REPLACED AS DIRECTED BY THE COUNTY WITH PVC PIPE SPANNING THE TRENCH. THE TRENCH SHALL BE FILLED WITH COMPACTED GRANULAR BACKFILL.

FINISH GRADE AT ALL SANITARY MANHOLES SHALL BE AT LEAST 6" (INCHES) BELOW TOP OF CASTING TO AVOID UNNECESSARY INFILTRATION INTO THE SANITARY SEWER SYSTEM.

ALL SANITARY SERVICES SHALL BE 6" AND INSTALLED AT 2.08% UNLESS OTHERWISE NOTED ON PLANS. BACKFILLING PER DELAWARE COUNTY ENGINEER STANDARD DRAWING DCED-RI00. SEE DETAIL THIS SHEET.

SERVICE RISERS SHALL BE INSTALLED WHERE DEPTHS FROM THE WYES TO THE EXISTING OR PROPOSED ELEVATIONS EXCEED 10 FEET. THE TOPS OF RISERS SHALL BE NO MORE THAN 10 FEET BELOW EXISTING OR PROPOSED SURFACE ELEVATION, WHICHEVER IS HIGHER, UNLESS OTHERWISE NOTED.

CONSTRUCTION ENTRANCE SHALL BE INSTALLED PRIOR TO SEWER CONSTRUCTION.

SANITARY SEWERS SHALL BE TESTED BY THE EXFILTRATION METHOD. ALLOWABLE LEAKAGE SHALL NOT EXCEED 100 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS. CONTRACTOR SHALL COOPERATE WITH DELAWARE COUNTY ENGINEER AND PROVIDE ALL NECESSARY EQUIPMENT TO PERFORM SEWER TEST. WHEN P.V.C. OR A.B.S. PIPE IS USED, A DEFLECTION TEST SHALL BE PERFORMED.

PIPE DEFLECTION SHALL NOT EXCEED 5% AT 30 DAYS AND 7.5% AT 90 DAYS. ALL INSTALLED PIPE SHALL BE TESTED FOR DEFLECTION (60) DAYS OR MORE AFTER THE TRENCH HAS BEEN BACKFILLED TO FINISH GRADE. THE METHOD OF TESTING SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER. IF RIGID BALLS OR MANDRELS ARE USED TO TEST THE PIPE DEFLECTION, NO MECHANICAL PULLING DEVICES SHALL BE USED. ANY LINES WHICH FAIL THE TEST MUST BE REPAIRED AND RETESTED. MANDREL SHALL BE PROVIDED BY THE DELAWARE COUNTY SANITARY ENGINEER.

**STANDARD DRAWINGS**

THE DELAWARE COUNTY STANDARD DRAWINGS LISTED ON THIS PLAN SHALL BE CONSIDERED A PART THEREOF.

01 SEWER INSTALLATION	13 DROP MANHOLE
02 TYPICAL SERVICE CONNECTION	15 WATERTIGHT MANHOLE CASTING
03 BRANCH CONNECTION AND RISER PIPE	23 CONCRETE REACTION BACKING DETAILS
04 OPTIONAL DUAL LATERAL EXTENSIONS	24 BACKING FOR VERTICAL BENDS
05 MANHOLE CHANNEL DETAIL	25 AUTOMATIC AIR RELEASE
06 MANHOLE TYPE A	ASTM D 2657 HEAT FUSION JOINING POLYOLEFIN PIPE AND FITTINGS

NOTE: THE CONTRACTOR AND ANY SUBCONTRACTORS SHALL BE SOLELY RESPONSIBLE FOR COMPLYING WITH ALL FEDERAL, STATE, AND LOCAL SAFETY REQUIREMENTS, TOGETHER WITH EXERCISING PRECAUTIONS AT ALL TIMES FOR PROTECTION OF PERSONS (INCLUDING EMPLOYEES) AND PROPERTY. IT IS ALSO THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SUBCONTRACTORS TO INITIATE, MAINTAIN, AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.

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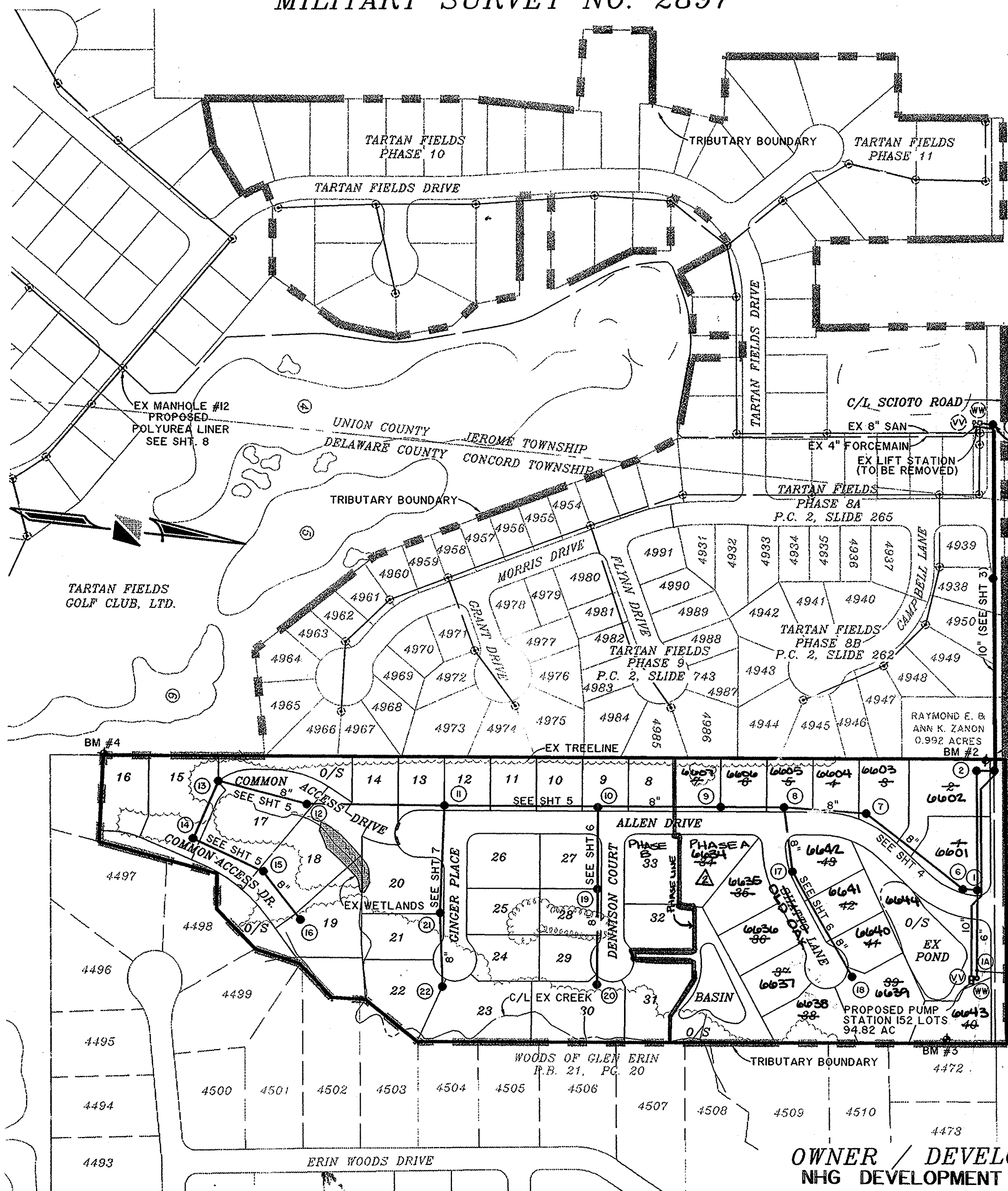
NOTICE TO CONTRACTORS: THE ELECTRONIC FILES FOR THIS PROJECT ARE INSTRUMENTS OF SERVICE OF, AND ARE OWNED BY R. D. ZANDE & ASSOCIATES, INC. DATA FROM SUCH ELECTRONIC FILES CAN BE PROVIDED FOR CONSTRUCTION STAKING. CONTACT MARY SHERRETS, P.E., ZANDE'S PROJECT MANAGER FOR THIS PROJECT. FOR INFORMATION ABOUT THE FEES ASSOCIATED WITH PROVIDING SUCH DATA AND THE RELEASE AND INDEMNITY THAT MUST BE SIGNED BEFORE THE DATA IS RELEASED.

CHANGE	PREPARED	DATE	DESCRIPTION OF CHANGE	SHEET NO.	APPROVED	APP'D DATE
1	R.D.D.	10-21-05	REVISED PIPE RUN FROM MAN 4 - MANS TO BE OPEN ON OVERLAY OF HARRIOTT RD. FROM STA 2430 TO STA 15400 - AS NOTED	1, 2, 3, 12A	DWZ	7-20-05
2	R.D.D.	10-21-05	SEPARATED INTO PHASES A & B, CORRECTED PIPE LENGTH	1-12		

**DELAWARE COUNTY, OHIO**

**THE OAKS PH A & B**

**SANITARY SEWER, FORCEMAIN & LIFT STATION IMPROVEMENTS SITUATED IN THE TOWNSHIP OF CONCORD, DELAWARE COUNTY BEING PART OF VIRGINIA MILITARY SURVEY NO. 2897**

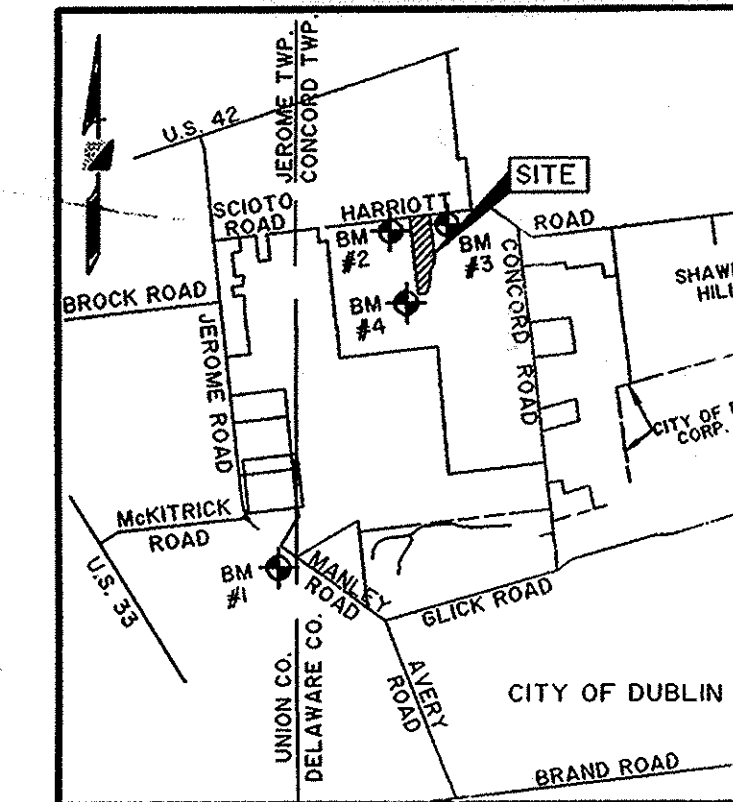


**INDEX MAP / TRIBUTARY MAP**  
SCALE: 1" = 200'

**OWNER / DEVELOPER**  
NHG DEVELOPMENT GROUP, LTD.  
941 CHATHAM LANE  
SUITE 100  
COLUMBUS, OHIO 43221  
(614) 457-0200  
FAX (614) 457-7295

**BENCH MARKS (NAVD 1988 DATUM)**

- SOURCE BENCH MARK:**
- BM 1 TOP OF A BRASS DISK DEL 04-0087, WEST SIDE OF JEROME ROAD APPROX. 100' SOUTH OF MAINTENANCE DRIVE AND 25' SOUTH OF C/L.
  - BM 2 COTTON GIN SPIKE SET IN EAST SIDE OF POWER POLE #126FNI, 50 SOUTH OF HARRIOTT ROAD & 25' SOUTH OF THE NORTHWEST PROPERTY CORNER. ELEV. = 950.24
  - BM 3 COTTON GIN SPIKE SET IN NORTH SIDE OF POWER POLE, 150' SOUTH OF HARRIOTT ROAD AND 10' WEST OF EAST PROPERTY LINE. ELEV. = 943.66
  - BM 4 COTTON GIN SPIKE SET IN NORTHEAST SIDE OF A 24" BEECH TREE AT SOUTHWEST PROPERTY CORNER. ELEV. = 963.74



**VICINITY MAP**  
NOT TO SCALE

**ESTIMATE OF QUANTITIES**

A	B	ITEM	UNIT	QTY.	DESCRIPTION
<b>SANITARY SEWER</b>					
13	B	604	EA	21	MANHOLE, TYPE A (2 W/ WATER TIGHT CASTING)
1	I	604	EA	2	MANHOLE, TYPE A W/ OUTSIDE DROP
		538	901	LF	8" DIA. SANITARY SEWER PIPE (8'-12" DEEP) W/TYPE I BEDDING
202	1048	901	LF	1450	8" DIA. SANITARY SEWER PIPE (12'-16" DEEP) W/TYPE I BEDDING
200	100	901	LF	300	8" DIA. SANITARY SEWER PIPE (16'-20" DEEP) W/TYPE I BEDDING
1056	644	901	LF	1700	8" DIA. SANITARY SEWER PIPE (20'+ DEEP) W/TYPE I BEDDING
29	-	901	LF	29	10" DIA. SANITARY SEWER PIPE (16'-20" DEEP) W/TYPE I BEDDING
565	-	901	LF	565	10" DIA. SANITARY SEWER PIPE (20'+ DEEP) W/TYPE I BEDDING
891	-	SPEC	LF	4967	10" DIA. HDPE SANITARY SEWER PIPE
218	119	914	LF	337	6" DIA. PIPE RISER
16	24	915	EA	42	8" X 6" DIA. WYE FITTINGS
2	-	915	EA	2	10" X 6" DIA. WYE FITTINGS
1	1	SPEC	EA	2	CLEANOUT
682	930	918	LF	1618	6" DIA. SANITARY HOUSE CONNECTION SERVICE
LUMP	-	SPEC	SUM	LUMP	MAINTENANCE OF TRAFFIC
220	-	SPEC	SY	220	PAVEMENT REPLACEMENT TYPE I
LUMP	-	SPEC	LUMP	SUM	LANDSCAPING REPAIRS
<b>FORCEMAIN &amp; PUMP STATION</b>					
1	-	203	HR	1	PROOF ROLLING
12	-	304	CY	12	AGGREGATE BASE
6	-	402	TONS	6	ASPHALT CONCRETE
6	-	404	TONS	6	ASPHALT CONCRETE
1503	-	SPEC	LF	1503	6" DIA. FORCE MAIN
1	-	SPEC	EA	1	LIFT STATION (COMPLETE)
1	-	SPEC	LUMP	1	EXISTING PUMP STATION AND VALVES TO BE REMOVED
1	-	SPEC	LUMP	1	EXISTING BIOXIDE TANK TO BE REMOVED AND REUSED
2	-	SPEC	EA	2	FLO-DAR SENSOR W/CONTROLS COMPLETE
1	-	SPEC	EA	1	AIR RELEASE VALVES-MODEL SL20B
55	-	SPEC	SY	55	6" PORTLAND CEMENT CONCRETE APPROACH
400	-	901	LF	400	10" DIA. SANITARY SEWER PIPE (12' - 16" DEEP) W/TYPE I BEDDING.

NOTE: ALL MANHOLE CASTINGS SHALL HAVE THE WORDS "DELAWARE COUNTY REGIONAL SEWER DISTRICT" STAMPED INTO THEM.

THIS IS TO CERTIFY THAT GOOD ENGINEERING PRACTICES HAVE BEEN UTILIZED IN THE DESIGN OF THIS PROJECT AND THAT ALL MINIMUM STANDARDS AS DELINEATED IN THE DELAWARE COUNTY ENGINEERING AND SURVEYING STANDARDS FOR SUBDIVISION DEVELOPMENT HAVE BEEN MET, INCLUDING THOSE STANDARDS GREATER THAN MINIMUM WHERE, IN MY OPINION, THEY ARE NEEDED TO PROTECT THE SAFETY OF THE PUBLIC.

PREPARED BY:  
**R.D. Zande & Associates, Inc.**  
1500 Lake Shore Drive, Suite 100, Columbus, Ohio 43204  
(614) 486-4383 1-800-340-2743  
FAX (614) 486-4387

REGISTERED ENGINEER  
E 64492  
7-21-05 DATE

**APPROVED BY:**

APPROVED THIS 5<sup>th</sup> DAY OF August, 2005  
*Jack Smelker*  
DELAWARE COUNTY SANITARY ENGINEER

APPROVED THIS 24<sup>th</sup> DAY OF Aug., 2005  
*Chris E. Bauman*  
DELAWARE COUNTY ENGINEER

APPROVED THIS 27<sup>th</sup> DAY OF Aug., 2005  
*James D. Ward*  
DELAWARE COUNTY COMMISSIONER

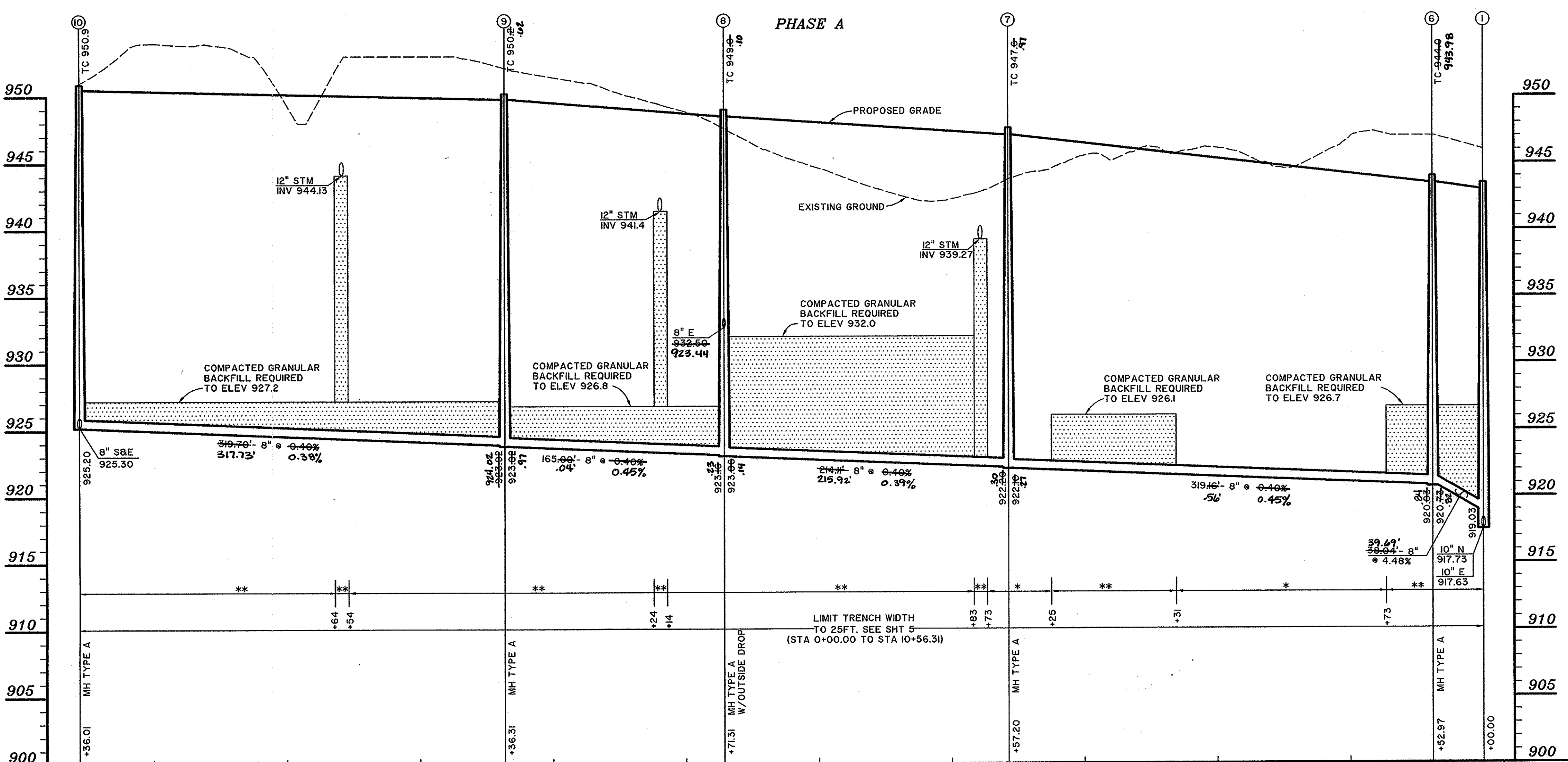
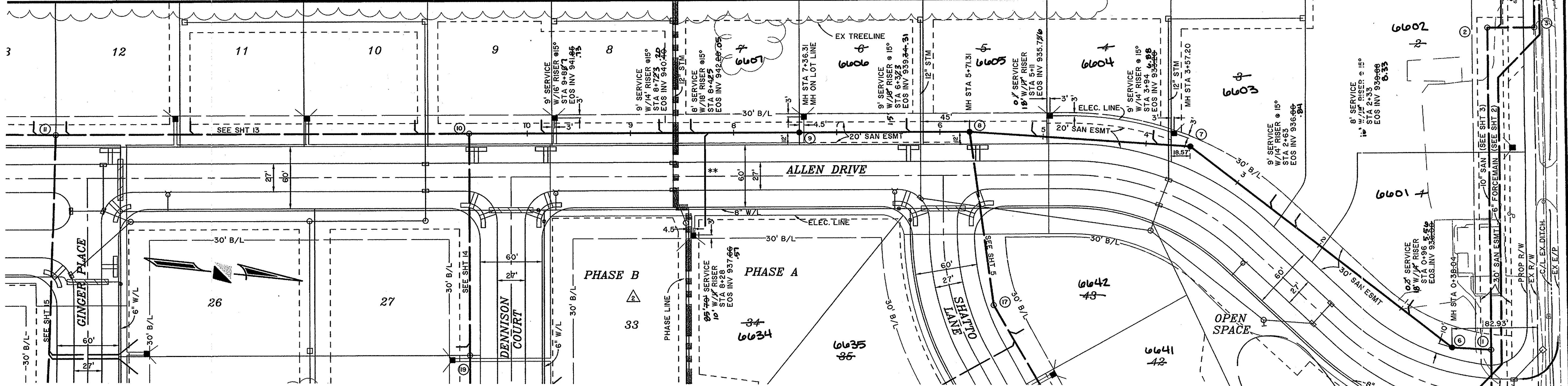
APPROVED THIS 29<sup>th</sup> DAY OF Aug., 2005  
*Christopher W. Goble*  
DELAWARE COUNTY COMMISSIONER

APPROVED THIS 29<sup>th</sup> DAY OF Aug., 2005  
*[Signature]*  
DELAWARE COUNTY COMMISSIONER









STATION	10	9	8	7	6	5	4	3	2	1	0	STATION
EX GRND	954.0	949.4	953.0	951.4	948.8	944.6	942.3	945.5	946.1	946.9	946.0	EX GRND
INVERT	925.0	924.6	924.2	923.7	923.3	922.8	922.4	921.8	921.4	921.0	919.0	INVERT
CUT	29.1	23.4	28.8	27.5	25.0	21.3	20.2	23.7	24.4	26.3	27.0	CUT

- NOTES:
- \* COMPACTED NATIVE BACKFILL, SEE DETAIL & GENERAL NOTES, SHEET I.
  - \*\* COMPACTED GRANULAR BACKFILL, SEE DETAIL & GENERAL NOTES, SHEET I.
- RISERS INSTALLED @ 45° FROM VERTICAL UNLESS NOTED. IF LESS THAN 45° THEN CONCRETE ENCASUREMENT SHALL BE PROVIDED PER STD DWG NO.03.
- ALL WATERLINES & STORM SEWERS MUST BE AT LEAST 10' FROM ALL SANITARY MANHOLES.
- COMPACTED GRANULAR BACKFILL LIMIT. THE REMAINDER OF THE TRENCH SHALL BE FILLED WITH COMPACTED NATIVE BACKFILL. SEE DETAIL AND GENERAL NOTES, SHEET I.
- PROPOSED ELECTRIC TRANSFORMERS

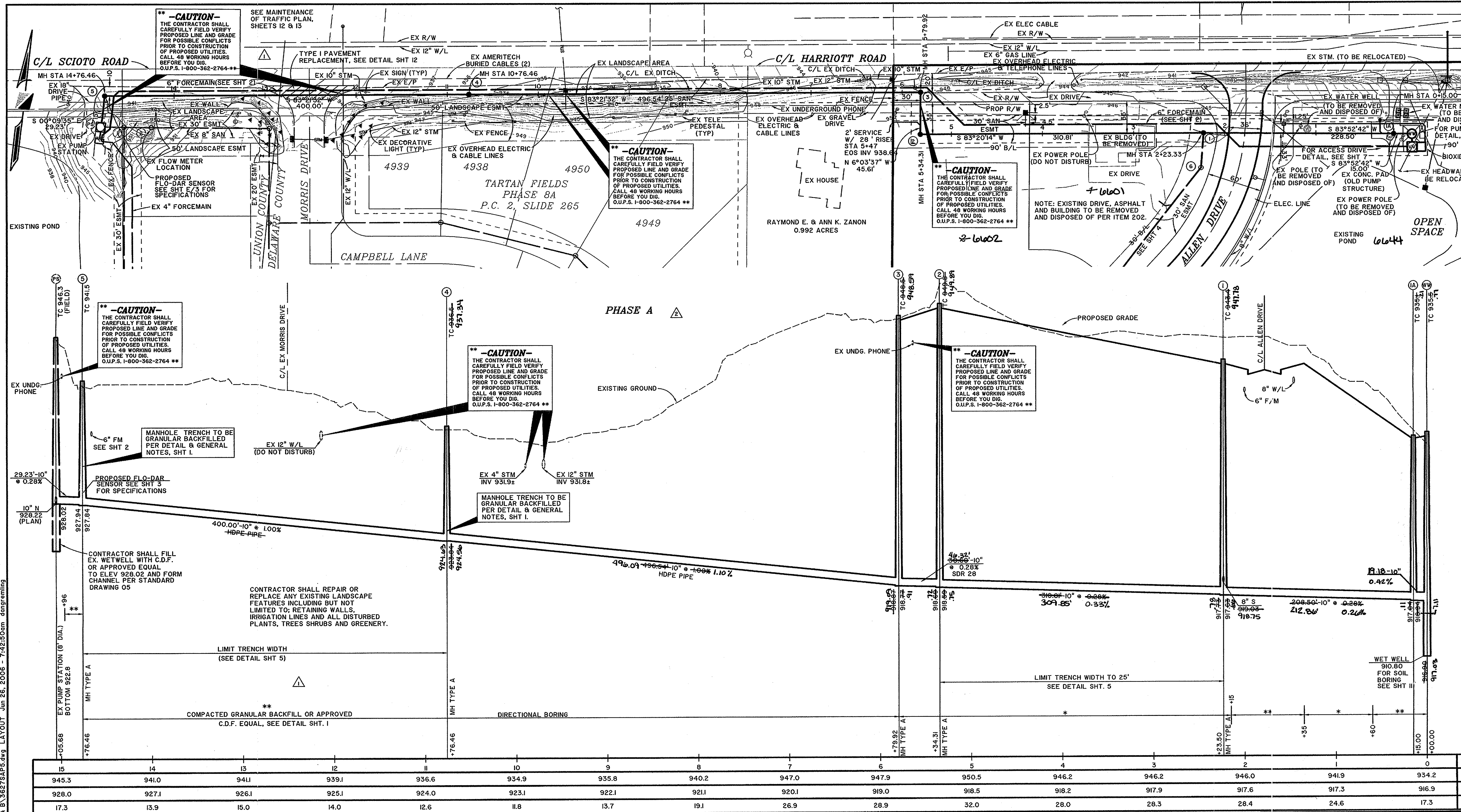
SEPARATED SANITARY PLAN INTO PHASES  
 SANITARY REVISED TO AS CONSTRUCTED 6/10/06  
 DELAWARE COUNTY, OHIO  
**THE OAKS**  
**PHASE A**  
 SANITARY SEWER IMPROVEMENTS  
 MH #1 TO MH #10

R.D. Zande & Associates, Inc.  
 1600 Lake Shore Drive, Suite 100, Columbus, Ohio 43204  
 (614) 486-4383 1-800-340-2748  
 FAX (614) 486-4387

SCALE: 1" = 50' HORIZ.  
 1" = 5' VERT.

AS CONSTRUCTED PLAN





P:\3627\The OAKS\SANITARY\San Phase A & B\3627SAPS.dwg LAYOUT Jun 26, 2006 - 7:42:50am dongreming

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	STA
945.3	941.0	941.1	939.1	936.6	934.9	935.8	940.2	947.0	947.9	950.5	946.2	946.2	946.0	941.9	934.2	EX G
928.0	927.1	926.1	925.1	924.0	923.1	922.1	921.1	920.1	919.0	918.5	918.2	917.9	917.6	917.3	916.9	INV
17.3	13.9	15.0	14.0	12.6	11.8	13.7	19.1	26.9	28.9	32.0	28.0	28.3	28.4	24.6	17.3	C

- △ SEPARATED SANITARY PLAN INTO PHASES A & B
- △ REVISED PIPE RUN FROM MH4 - MH5 TO BE OPEN CUT

NOTES:  
 \* COMPACTED NATIVE BACKFILL, SEE DETAIL & GENERAL NOTES, SHEET I.  
 \*\* COMPACTED GRANULAR BACKFILL, SEE DETAIL & GENERAL NOTES, SHEET I.  
 ALL WATERLINES & STORM SEWERS MUST BE AT LEAST 10' FROM ALL SANITARY MANHOLES AND FORCEMAIN.  
 ■ PROPOSED ELECTRICAL TRANSFORMER

DELAWARE COUNTY, OHIO  
**THE OAKS**  
**PHASE A**  
 SANITARY SEWER IMPROVEMENTS  
 STA 0+00.00 TO STA 15+05.51

R.D. Zande & Associates, Inc.  
 1800 Lake Shore Drive, Suite 100, Columbus, Ohio 43204  
 (614) 488-4388 1-800-340-2743  
 FAX (614) 488-4387

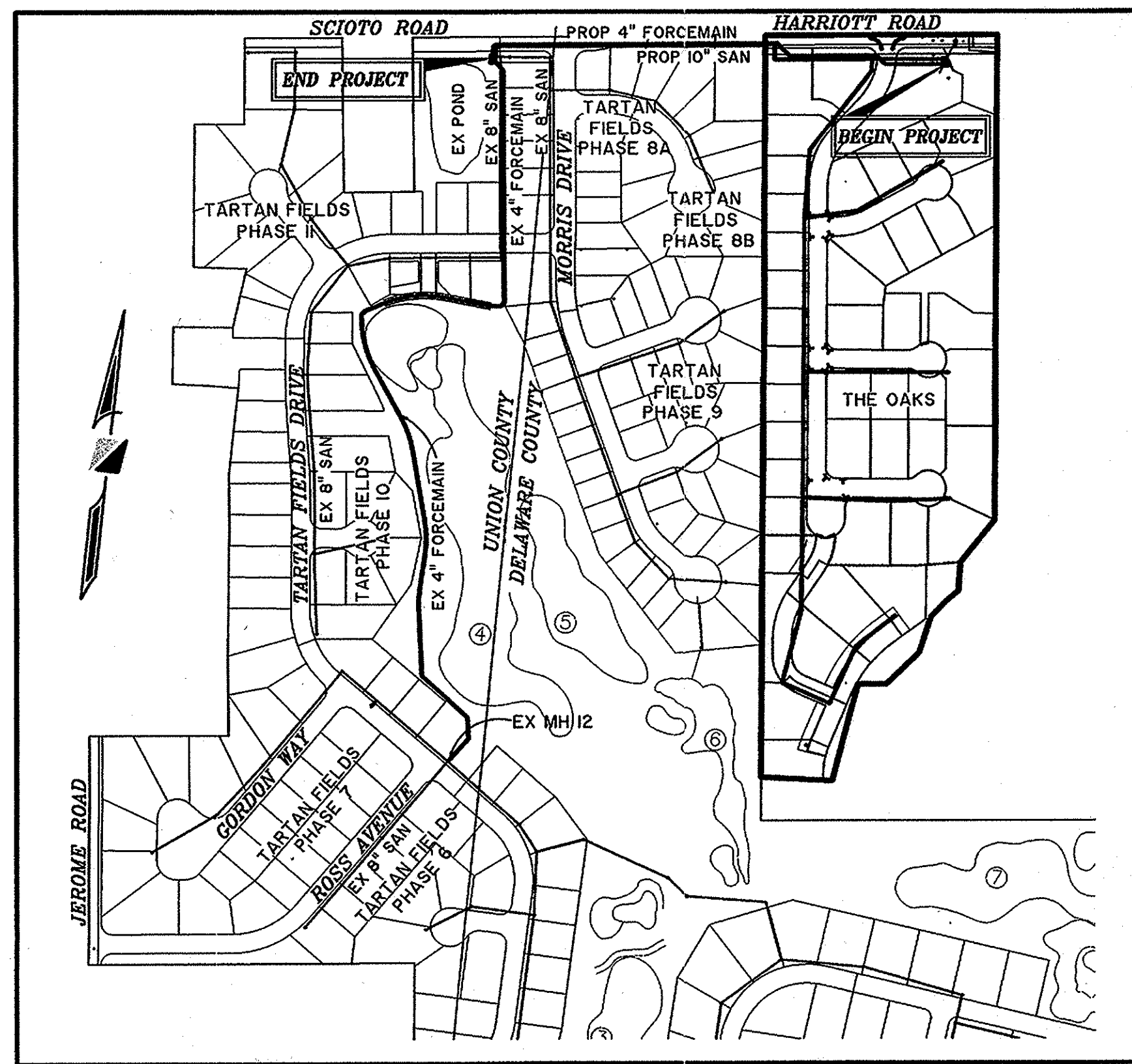
SCALE: 1" = 50' HORIZ.  
 1" = 5' VERT.

SANITARY REVISED TO AS CONSTRUCTED 6/10/06

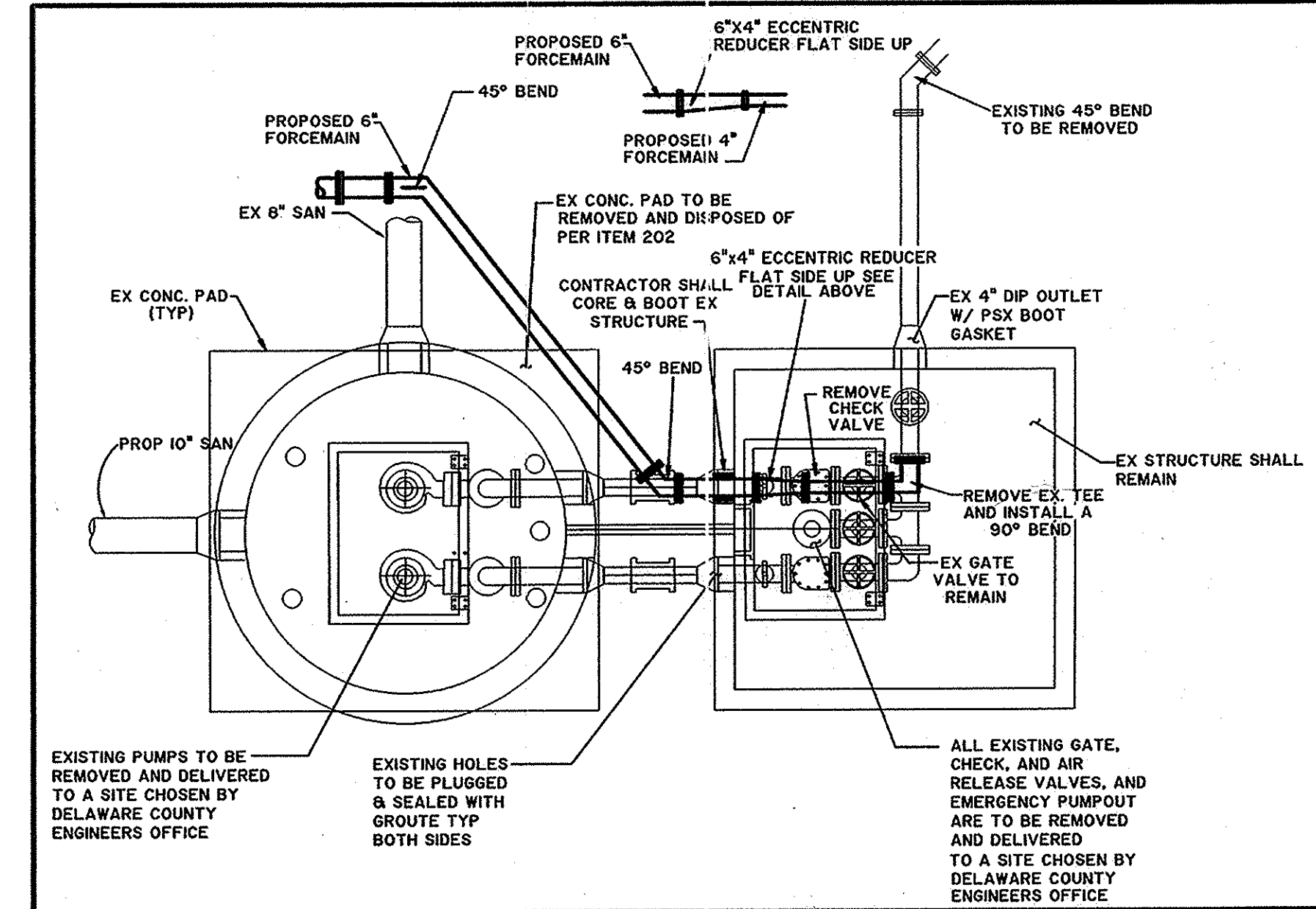
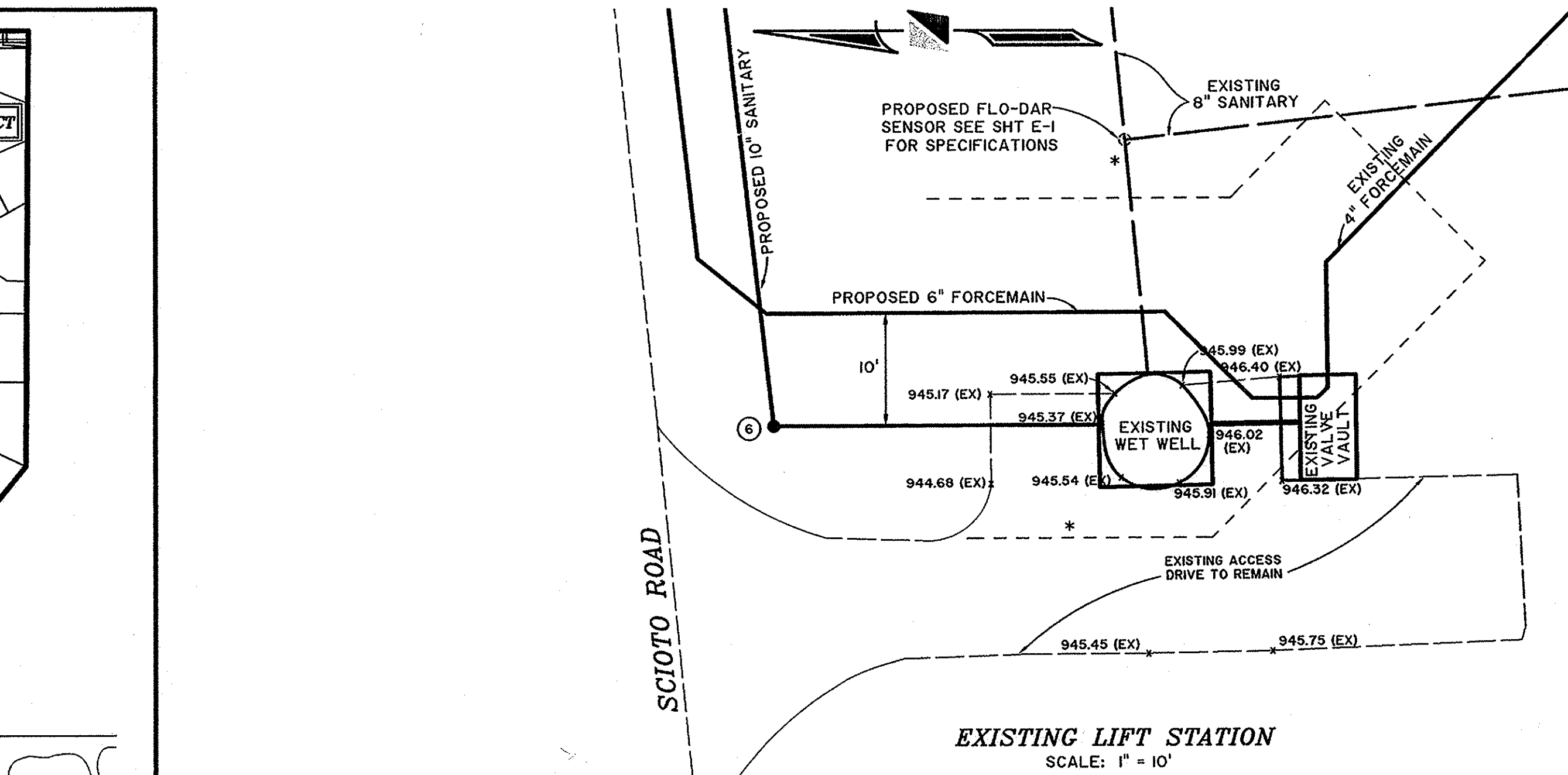
AS CONSTRUCTED PLAN







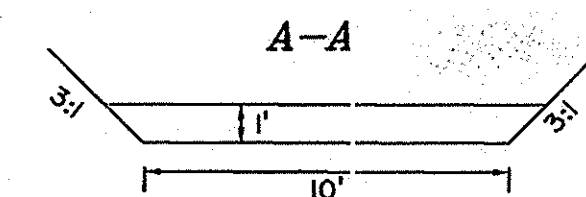
INDEX MAP  
SCALE: 1" = 400'



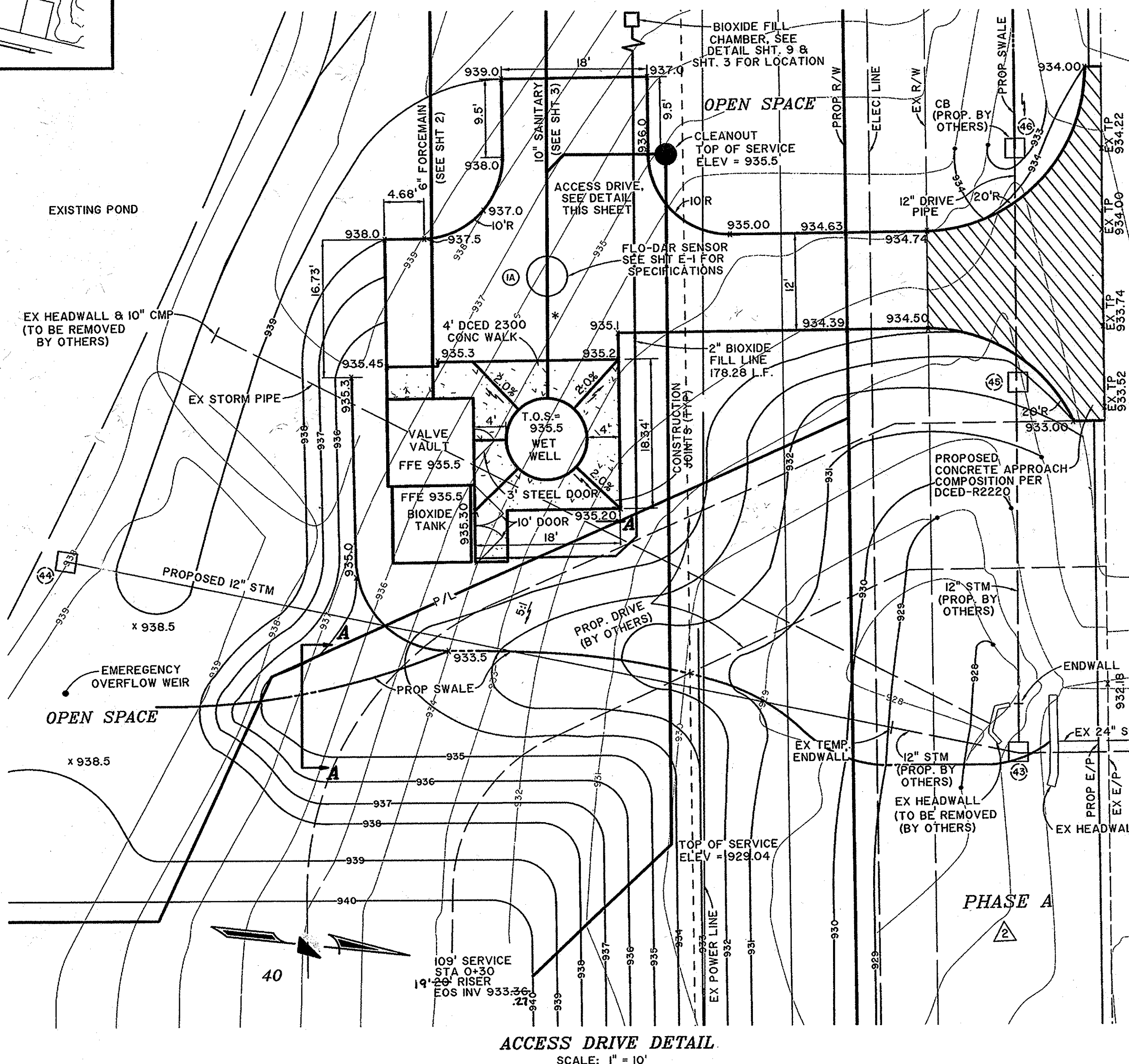
FORCE MAIN TIE-IN DETAIL  
SCALE: NOT TO SCALE

OVER FLOW CHANNEL CAPACITY  
AT 1 FT. DEEP  
 $Q_c = 156.16$  CFS

FLOW ENTERING POND  
 $Q_{100} = 40.70$  CFS



- \* EX MH 12 UPGRADE (SEE INDEX MAP THIS SHEET FOR MANHOLE LOCATION)  
THIS ITEM OF WORK SHALL CONSIST OF PATCHING/PROFILING AND SEALING WITH A POLYUREA LINER THE INTERIOR MANHOLE WALLS AND BENCH SURFACES OF THE MANHOLES DENOTED IN THE PLANS AND IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS.
- A. SEALING MATERIAL
    1. ELASTOGARD ARC, TWO COMPONENT, 100% SOLIDS, PURE POLYUREA, AS MANUFACTURED BY ELASTOMER SPECIALTIES, INC. OR APPROVED EQUAL.
    2. PROPERTIES
      - a. TENSILE STRENGTH (ASTM D412)
        - >4500psi AT 28 DAYS
      - b. ELONGATION (ASTM D412)
        - 460%
      - c. TEAR STRENGTH (ASTM D624)
        - 570 pli
      - d. VOLATILE MATTER CONTENT (ASTM D2584)
        - 0%
      - e. DUROMETER HARDNESS, SHORE D (ASTM D2240)
        - 52%
  - B. MANHOLE CLEANING AND PREPARATION  
PREPARATION OF ALL SURFACES SHALL FOLLOW NACE NO. 6/SSPC-SP10 GUIDELINES AS FOLLOWS:
    1. HYDROBLAST OR DRY MEDIA BLAST SURFACES TO BE COATED TO REMOVE ANY LAITANCE, MINERAL DEPOSITS, CONTAMINANTS OR WEAK SURFACE MATERIAL, LEAVING A SOUND SURFACE WITH ADEQUATE PROFILE AND SURFACE POROSITY. TAKE PRECAUTIONS TO AVOID LOSING ANY MEDIA OR DISLODGED STRUCTURAL DEBRIS IN INVERT. REMOVE ANY SPENT MEDIA.
    2. IDENTIFY ANY LEAKS OR INFLOW SITES AND REPAIR BY DRILLING THROUGH THE STRUCTURE WALL AND INJECTING HYDROPHILIC GROUT, ESI HYDROLOC, OR EQUAL.
    3. FILL ANY LARGE VOIDS IN THE RISER AREA THAT ARE NOT READILY ABLE TO BE ELIMINATED BY THE COATING PROCESS USING AN EPOXY/SAND MORTAR MIX OR A POLYMER MODIFIED HYDRAULIC CEMENT.
    4. INSPECT THE AREA BETWEEN THE COVER FRAME AND CONE SECTION AND REMOVE ANY LOOSE MORTAR OR DISPLACED GASKET MATERIAL. FILL AND LEVEL THE ENTIRE VOID WITH A 100% SOLIDS, HIGH ELONGATION POLYUREA, ESI ELASTOGEL, OR EQUAL, TO CREATE A "FORMED IN PLACE" SEAL AND IMPACT BARRIER.
    5. ALLOW ALL SURFACES TO DRY PRIOR TO PRODUCT APPLICATION. CONTRACTOR MAY EXPEDITE THE PROCESS USING A FORCED AIR VENTILATOR AND/OR ELECTRIC HEATED BLOWER IF ACCEPTABLE TO MANUFACTURER.
  - C. APPLICATION OF SEALING MATERIAL
    1. FOLLOW MANUFACTURER'S RECOMMENDED PROCEDURE, INCLUDING PREPARATORY WORK.
    2. APPLY APPROXIMATELY 10 MIL OF WATERBORNE EPOXY PRIMER ESI POXYPRIME H2O OR EQUAL. ALLOW TO DRY UNTIL THE SURFACE IS RESIDUE FREE WHEN TOUCHED. CONTRACTOR MAY EXPEDITE THE PROCESS USING A FORCED AIR VENTILATOR AND/OR ELECTRIC HEATED BLOWER IF ACCEPTABLE TO MANUFACTURER.
    3. APPLY APPROXIMATELY 125 MIL OF 100% SOLIDS POLYUREA ESI ARC OR DLX OR EQUAL.
- NOTE: ROBOTIC, CONSTANT HIGH PRESSURE APPLICATION OF THESE MATERIALS IS REQUIRED TO ENSURE UNIFORMITY OF MIL THICKNESS THROUGHOUT THE STRUCTURE. HAND-TROWELING, BRUSHING, OR SIMILAR METHODS OF APPLICATION WILL NOT BE ACCEPTABLE.



ACCESS DRIVE DETAIL  
SCALE: 1" = 10'

NOTES FOR DISPOSITION OF EXISTING LIFT STATION:

- CONTRACTOR SHALL BE RESPONSIBLE FOR BYPASS PUMPING DURING THE ABANDONING OF THIS LIFT STATION AND CONNECTION OF PROPOSED FORCEMAIN TO EXISTING FORCEMAIN.
- EX BUILDING TO REMAIN.
- CONTRACTOR SHALL REMOVE AND DISPOSE ALL NECESSARY PIPING AND VALVES IN VALVE PIT AND DELIVERED TO A SITE CHOSEN BY DELAWARE COUNTY SANITARY ENGINEERING DEPARTMENT.
- PUMPS AND ELECTRICAL PANEL TO BE REMOVED AND DELIVERED TO A SITE CHOSEN BY DELAWARE COUNTY SANITARY ENGINEER DEPARTMENT AT THE TIME OF DISPOSITION.
- WET WELL BOTTOM TO BE FILLED WITH CDF FLASH FILL OR #57 W/ THE TOP 2 FT CONCRETE (OR APPROVED/EQUAL) AND FORM A CHANNEL PER STANDARD DRAWING 05.
- THE EXISTING APPROACH AND ACCESS DRIVE IS TO REMAIN INTACT FOR ACCESS TO EXISTING MANHOLE.
- BIOXIDE TANK IS TO BE REMOVED & REUSED FOR THE PROPOSED LIFT STATION, IF APPLICABLE.

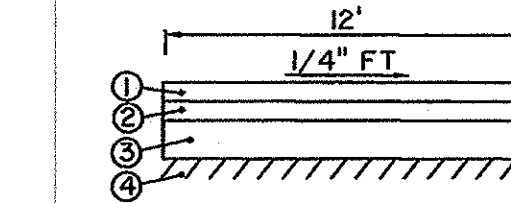
NOTES:

- ALL FILLS WITHIN LIFT STATION SITE PLAN SHALL BE ENGINEERED FILLED PER ITEM 203.
- ALL MATERIAL PLACED SHALL BE TESTED, REVIEWED AND ACCEPTED BY THE DELAWARE COUNTY SANITARY DEPARTMENT PRIOR TO CONSTRUCTION OF STRUCTURES, ASPHALT, OR CONCRETE.

CONTRACTOR TO OBTAIN DRIVE PERMIT FROM DELAWARE COUNTY PERMIT DEPARTMENT.

THE LINES PROVIDING ELECTRIC TO THE FLO-DAR SENSORS ARE TO BE ENCLOSED IN A PVC CONDUIT COSTS ARE TO BE INCLUDED WITH VARIOUS BID ITEMS.

CONCRETE APPROACH COMPOSITION PER DCED-2220  
8" P.C. CLASS C PER ITEM 305



- ① 1 1/2" ASPHALT CONCRETE ITEM 404
- ② 1 1/2" ASPHALT CONCRETE ITEM 402
- ③ 9" STABILIZED CRUSHED AGGREGATE, ITEM 304
- ④ SUBGRADE TO BE COMPACTED PER ITEM 203 AND PROOF ROLLED

ACCESS DRIVE  
TYPICAL SECTION  
NOT TO SCALE

Sanitary Revised to As Constructed  
SEPARATED SANITARY PLAN INTO PHASES A

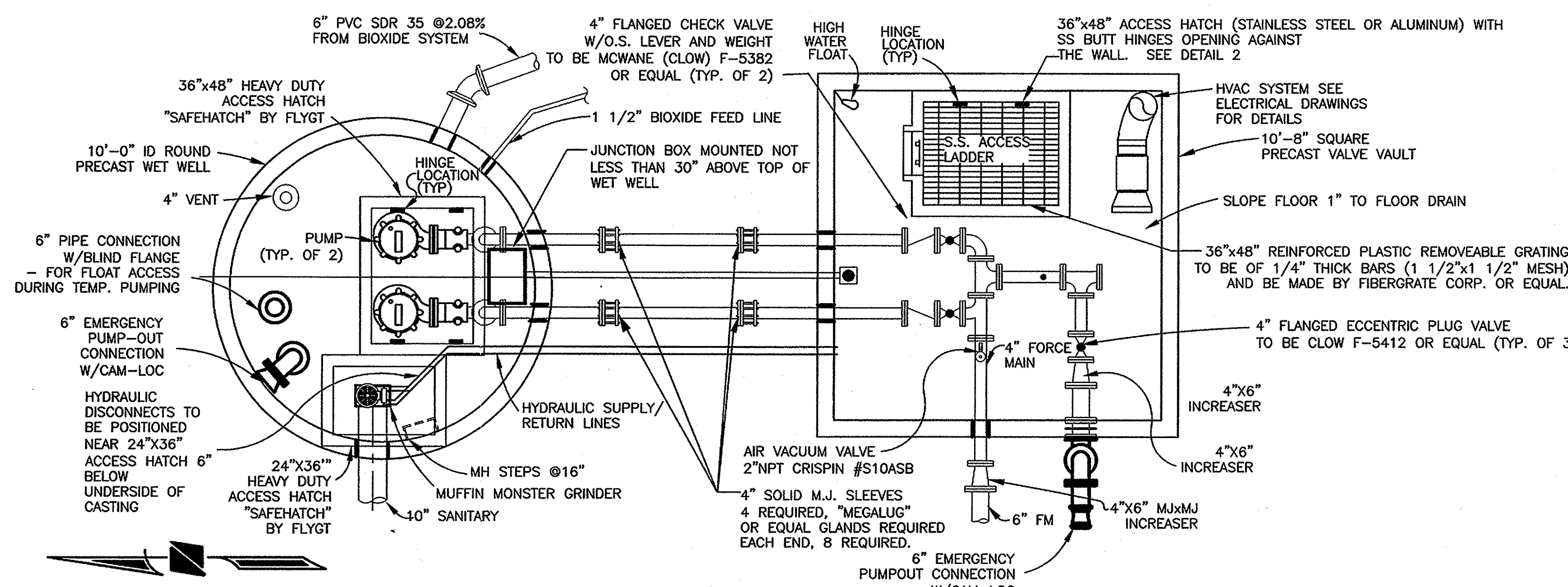
DELAWARE COUNTY, OHIO  
**THE OAKS**  
PHASE A  
LIFT STATION DETAILS  
FORCEMAIN TIE-IN DETAILS & NOTES

R.D. Zande & Associates, Inc.  
1600 Lake Shore Drive, Suite 100, Columbus, Ohio 43204  
(614) 488-4883 1-800-340-2743  
FAX (614)-488-4387

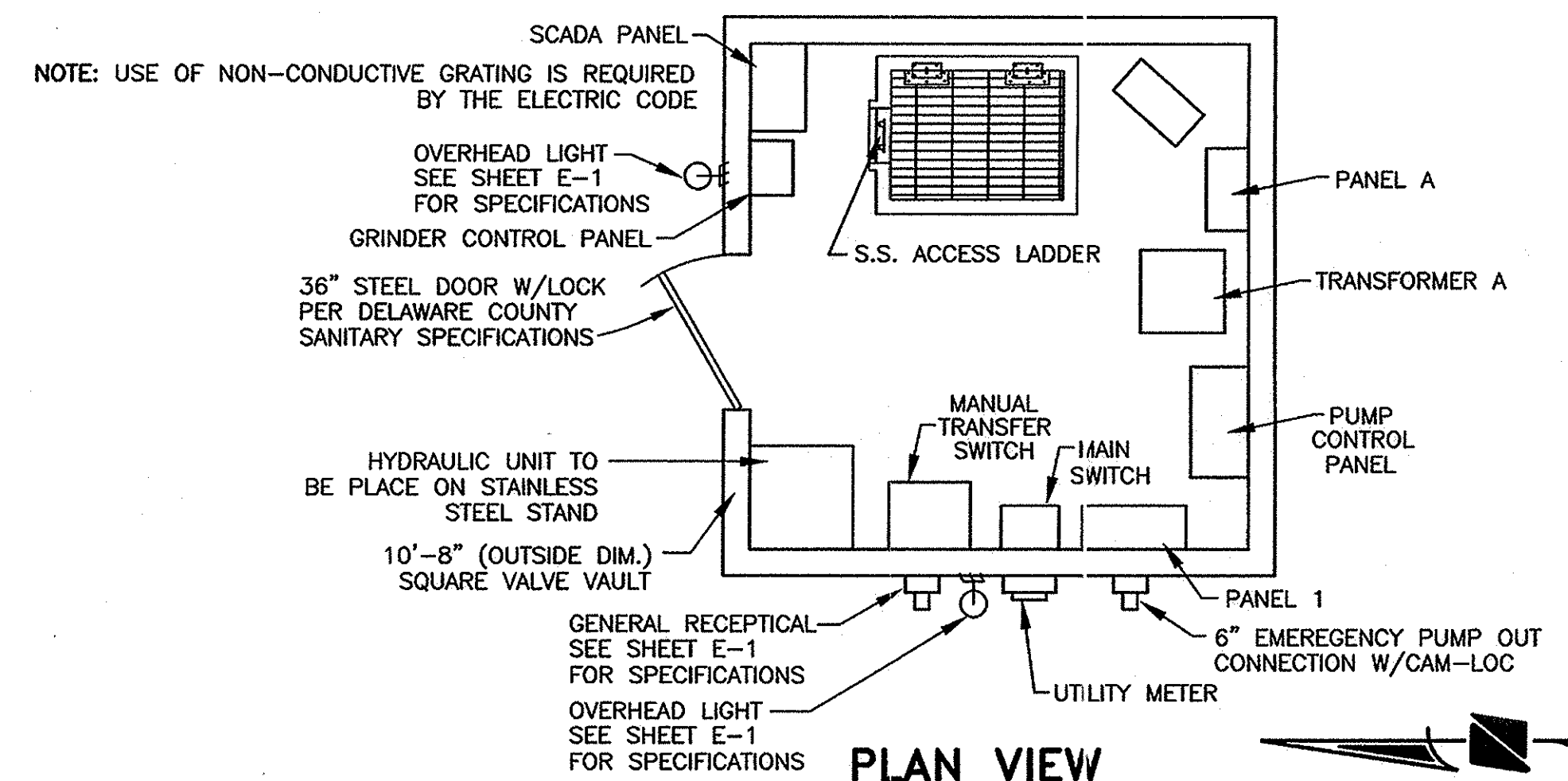
SCALE: AS SHOWN

AS CONSTRUCTED PLAN



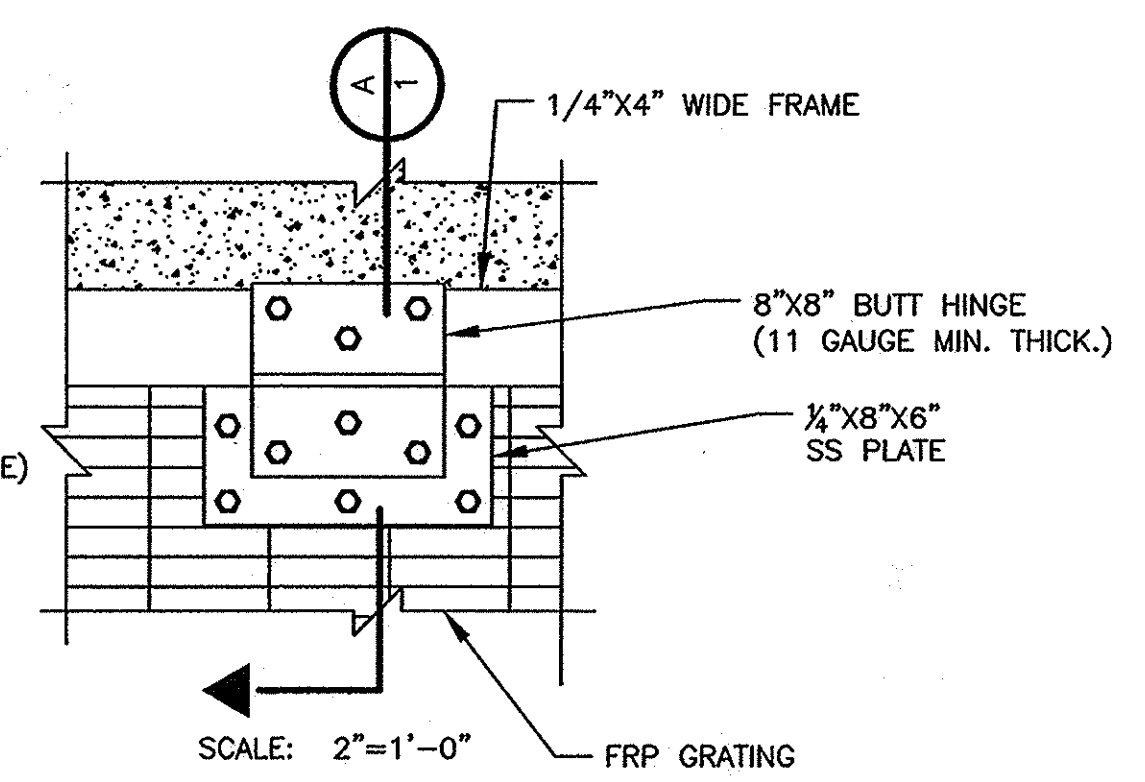
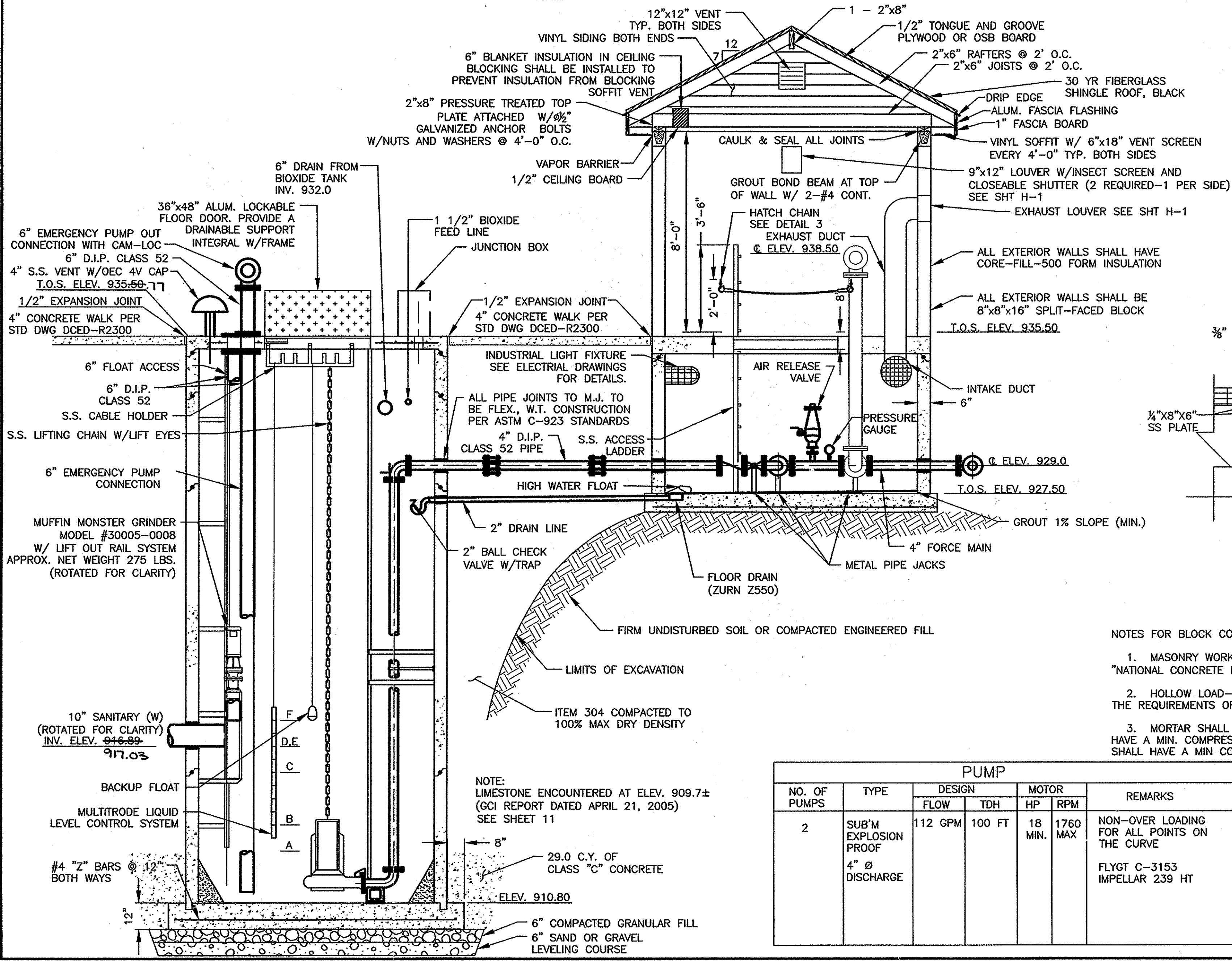


**PLAN VIEW**  
NOT TO SCALE

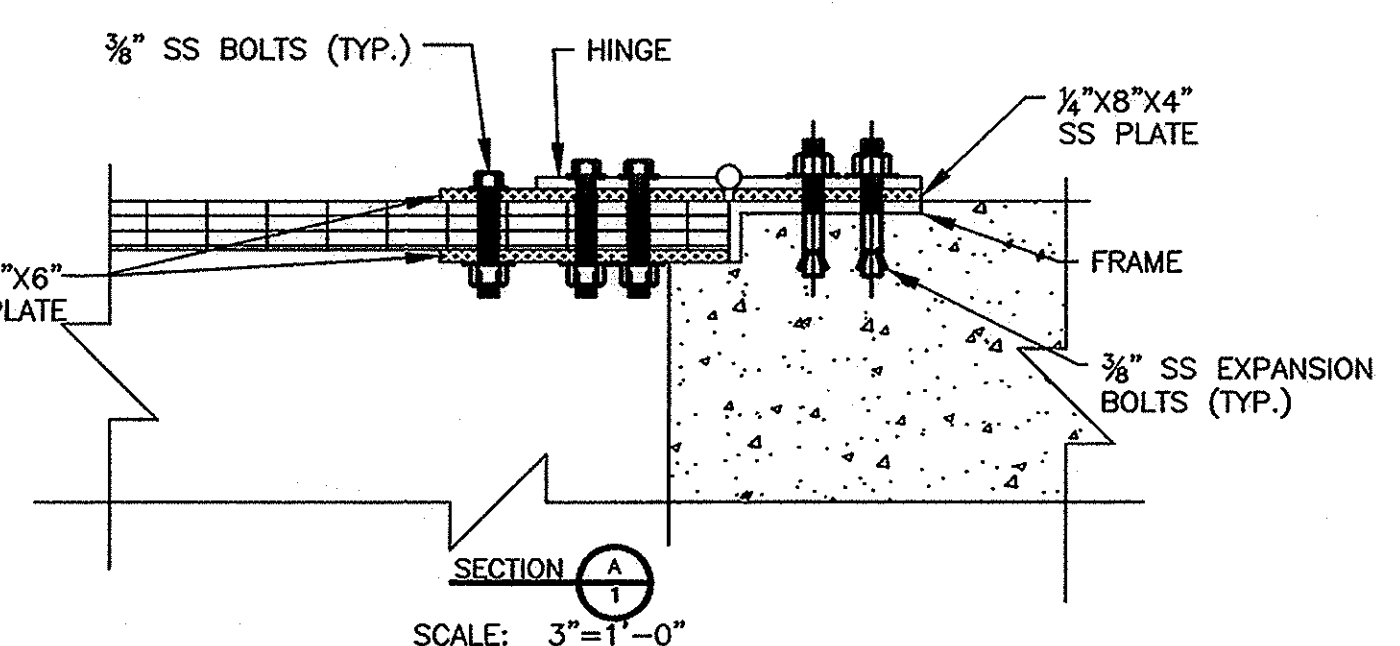


**PLAN VIEW**  
NOT TO SCALE

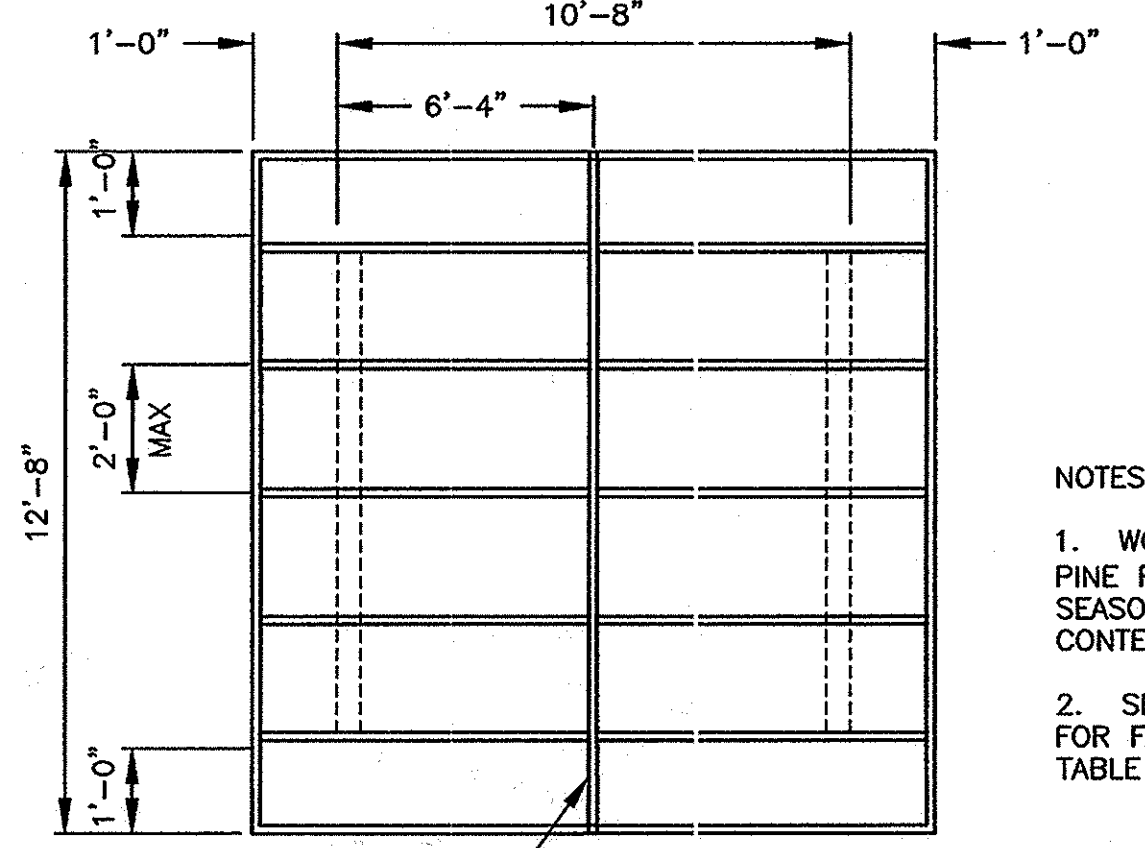
SEE SHTS E1-E6 FOR ELECTRICAL DETAILS



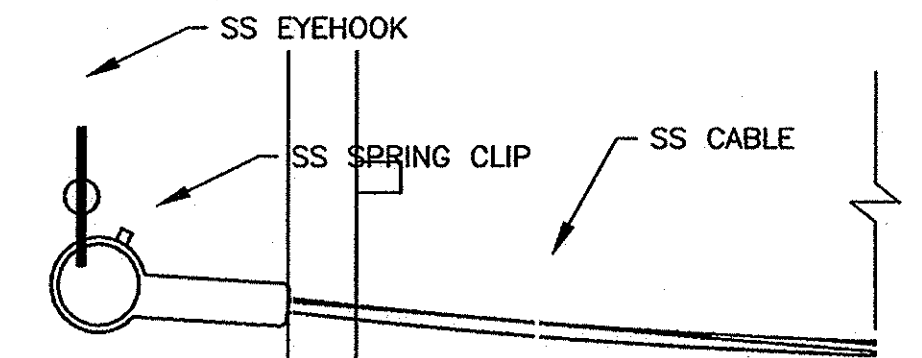
**SECTION A**  
SCALE: 2"=1'-0"



**GRATE HINGE DETAIL 2**  
SCALE: 3"=1'-0"



**ROOF FRAMING PLAN**  
N.T.S.



**HATCH CHAIN DETAIL 3**

- NOTES FOR BLOCK CONSTRUCTION:
- MASONRY WORK SHALL CONFORM TO THE LATEST EDITION OF THE "NATIONAL CONCRETE MASONRY ASSOCIATION."
  - HOLLOW LOAD-BEARING CONCRETE MASONRY UNITS SHALL MEET THE REQUIREMENTS OF ASTM C90
  - MORTAR SHALL BE TYPE S IN ACCORDANCE WITH ASTM C-270 AND HAVE A MIN. COMPRESSIVE STRENGTH OF 1,800 PSI IN 28 DAYS. GROUT SHALL HAVE A MIN COMPRESSIVE STRENGTH OF 2,500 PSI IN 28 DAYS.

NO. OF PUMPS	TYPE	PUMP				REMARKS	PUMP CONTROL		
		DESIGN FLOW	TDH	MOTOR HP	RPM		FLOAT	FLOAT ACTION	ELEV
2	SUB'M EXPLOSION PROOF 4" DISCHARGE	112 GPM	100 FT	18 MIN.	1760 MAX	NON-OVER LOADING FOR ALL POINTS ON THE CURVE FLYGT C-3153 IMPELLAR 239 HT	A	BACKUP FLOAT PUMP OFF	912.3
							B	PUMP OFF	912.3
							C	LEAD PUMP ON	914.5
							D	LAG PUMP ON	915.5
							E	ALARM ON	916.0
							F	BACKUP FLOAT PUMP ON	916.0

NOTES: ALUMINUM IN CONTACT WITH CONCRETE SHALL BE COVERED WITH A BITUMASTIC MATERIAL.  
THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANTI-FLOATATION METHODS NEEDED DURING CONSTRUCTION UNTIL EARTH BACKFILL IS PROPERLY PLACED.

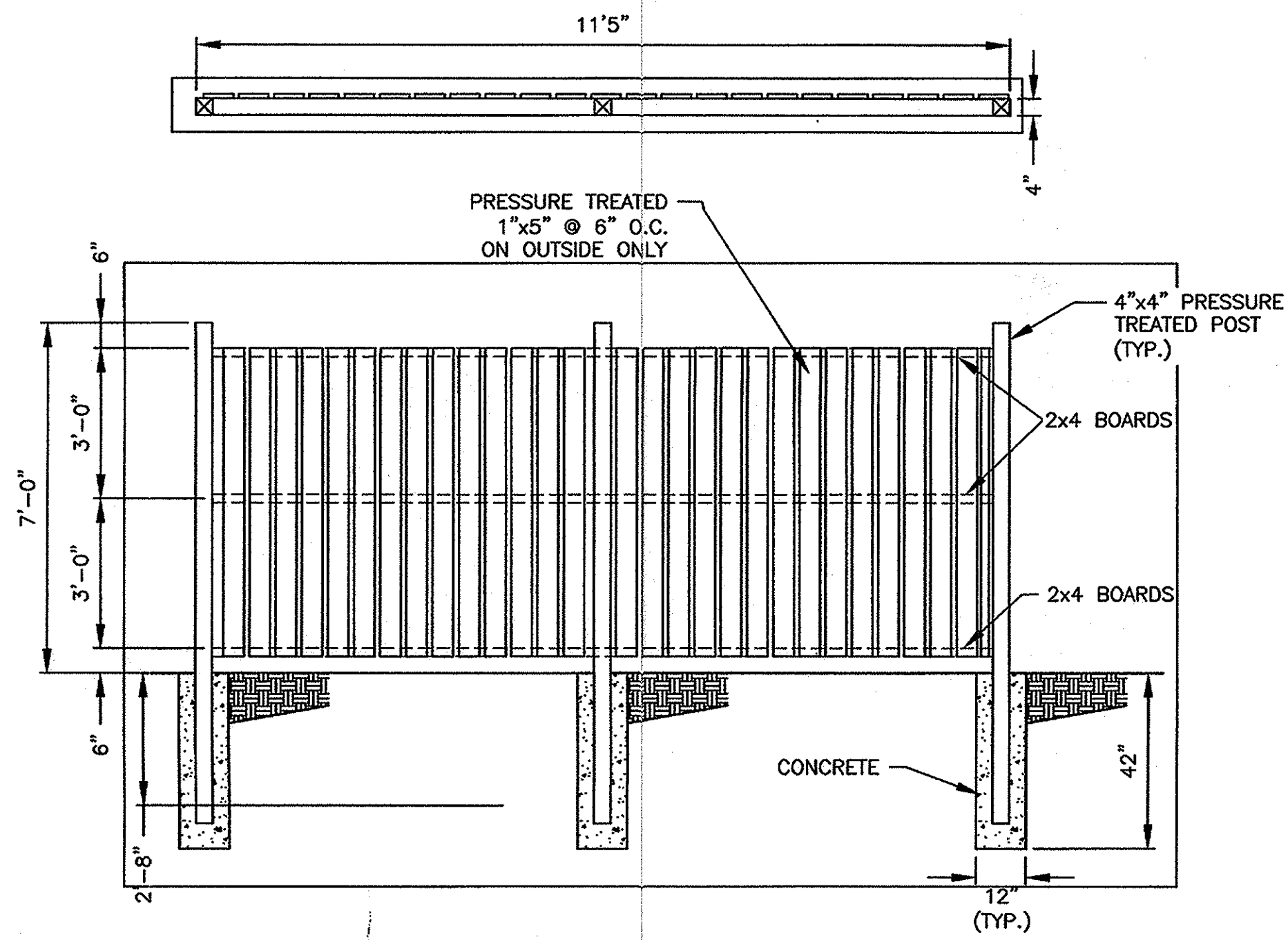
DELAWARE COUNTY, OHIO  
**THE OAKS PHASE A**  
LIFT STATION DETAILS & NOTES

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1500 Lake Shore Drive, Suite 100, Columbus, Ohio 43204  
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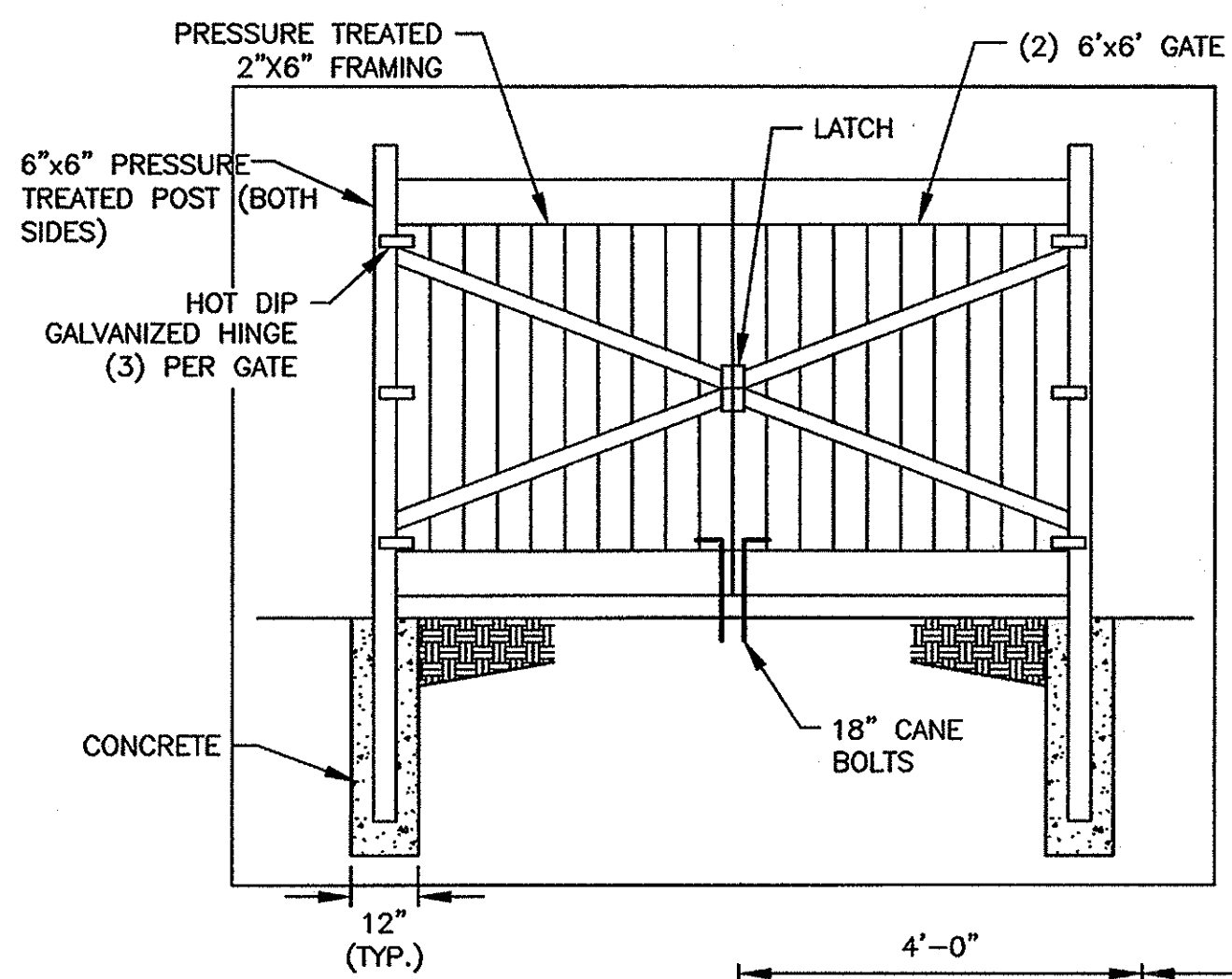
SCALE: AS NOTED

AS CONSTRUCTED PLAN

P:\3627\The OAKS\SANITARY\_Son Phase A & B\3627SP01.dwg Layout Jun 26, 2006 - 8:48:39am dngmgram



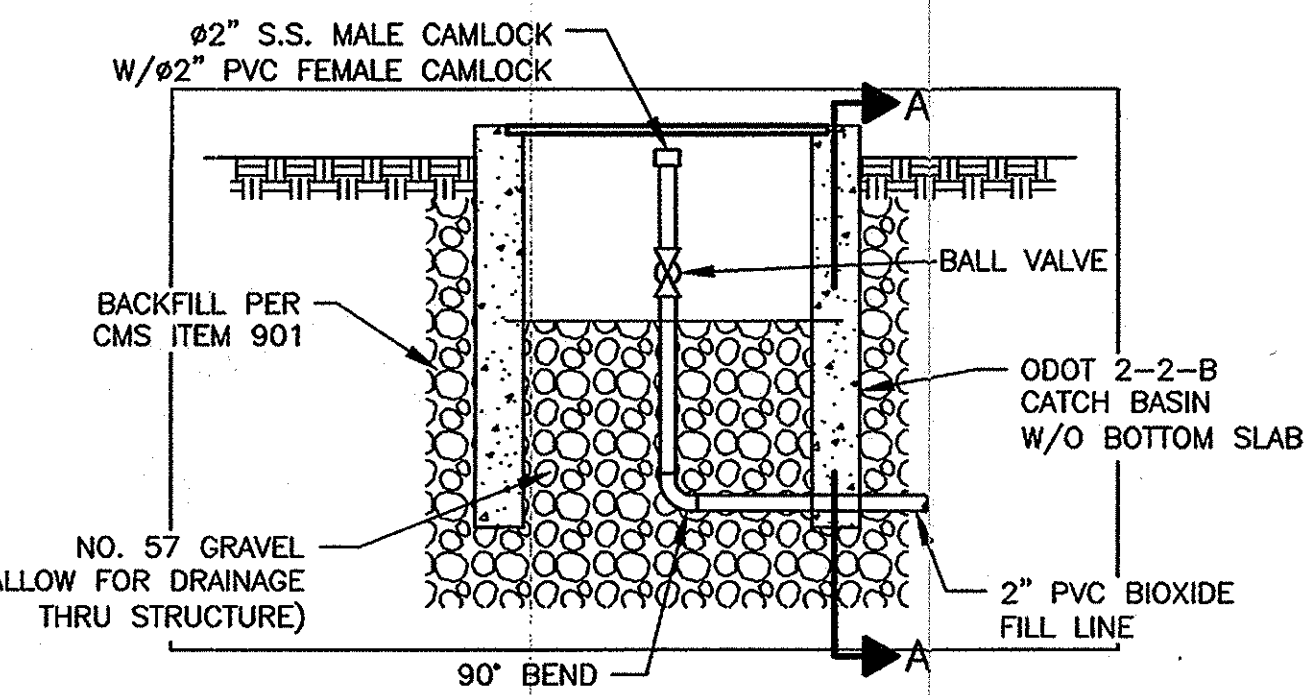
**BIOXIDE SYSTEM FENCE DETAIL**  
NOT TO SCALE



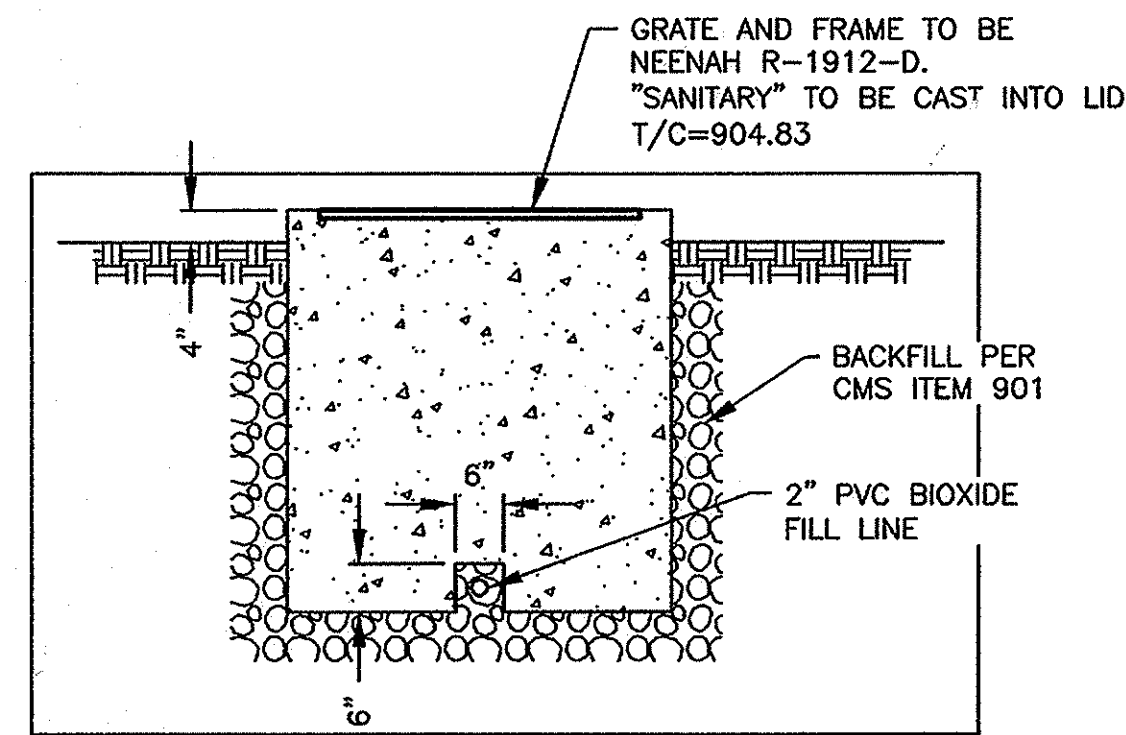
**BIOXIDE SYSTEM GATE DETAIL**

**NOTES:**

1. CONTRACTOR TO FURNISH CONCRETE PAD WITH ALL IN-SLAB PIPING AND CONDUIT
2. ALL PIPING AND APPURTENANCES SHALL BE PVC, SCH 80
3. ALL ELECTRICAL CONDUIT AND WIRING BY CONTRACTOR
4. UTILIZE SWEEPS ONLY (NO ELBOWS) FOR CONDUIT DIRECTIONAL CHANGES
5. CONTRACTOR TO FURNISH AND INSTALL ALL NECESSARY SLAB OPENINGS, SLEEVES AND SEALANT
6. CONTRACTOR TO FURNISH AND INSTALL ALL NECESSARY HANGERS, SUPPORTS AND BLOCKING FOR PIPING
7. ALL HARDWARE REQUIRED FOR INSTALLATION SHALL BE STAINLESS STEEL, FURNISHED AND INSTALLED BY CONTRACTOR
8. SEE SUPPLEMENTAL STANDARD DETAILS FOR CHEMICAL FEED UNIT, CALIBRATION PEDESTAL, PIPING SUPPORT, STORAGE TANK, LEVEL GAUGE AND VARIOUS OTHER COMPONENTS
9. TWO COATS OF WEATHER PROOFING SEALER SHALL BE APPLIED TO ALL WOOD SURFACES
10. ALL WOOD SHALL BE PRESSURE TREATED OR APPROVE EQUAL

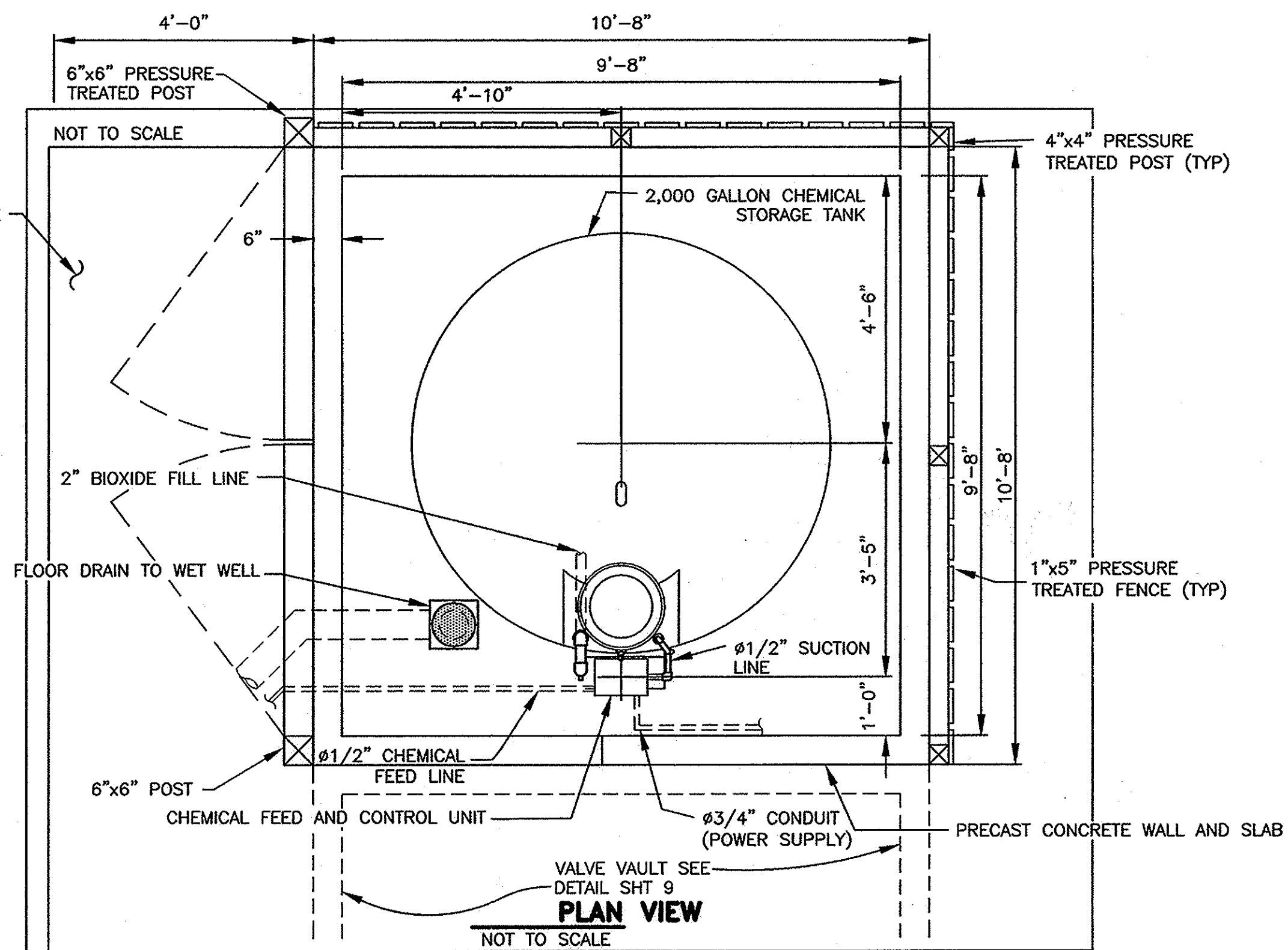


**VALVE BOX**

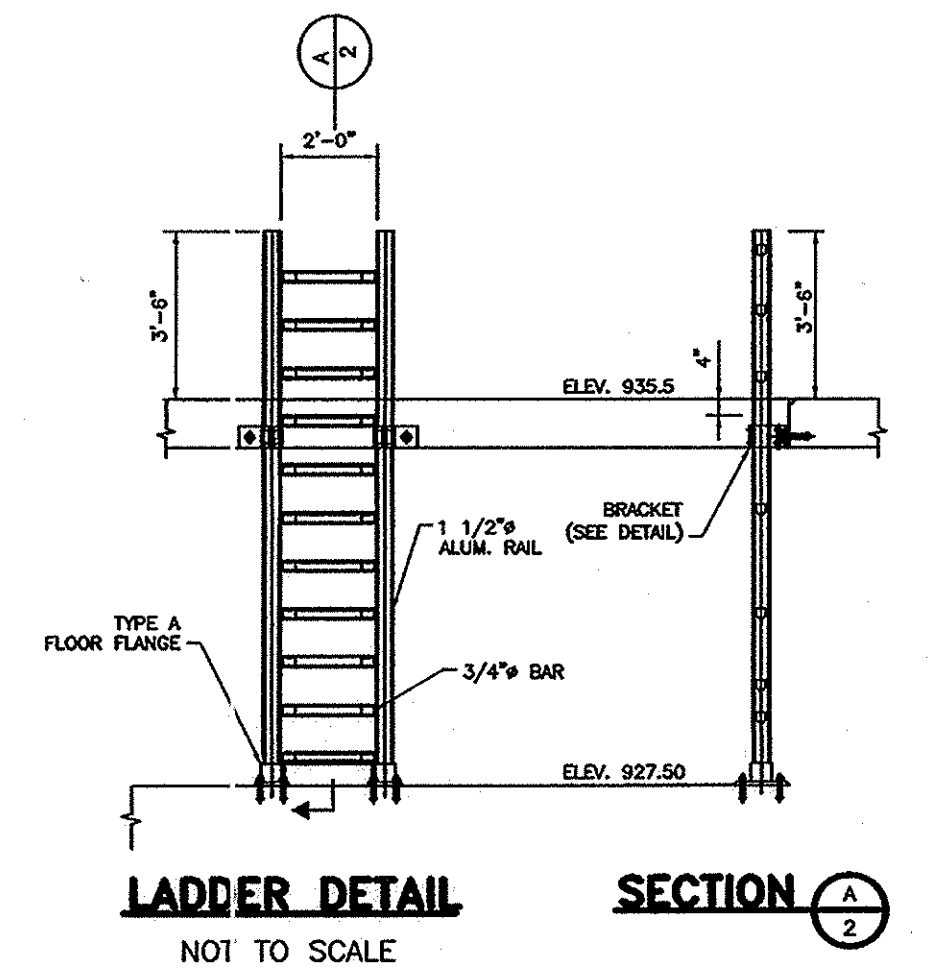


**SECTION A-A**

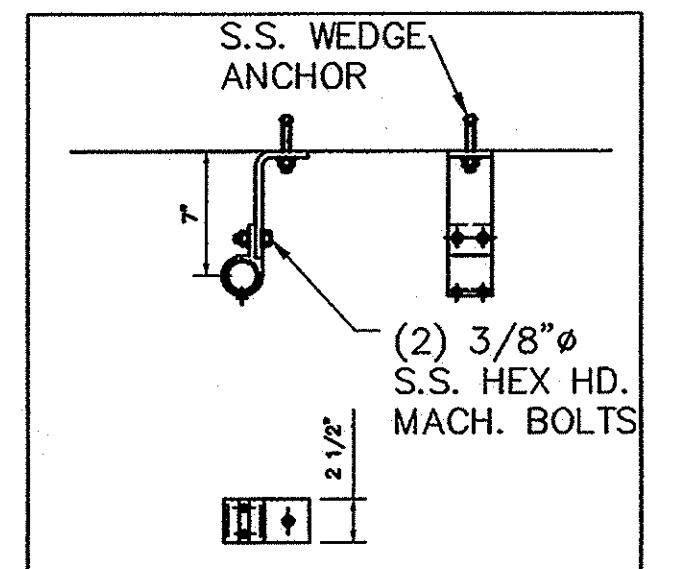
**BIOXIDE FILL BOX DETAIL AT EAST EDGE OF PUMP STATION ACCESS DRIVE**  
NOT TO SCALE



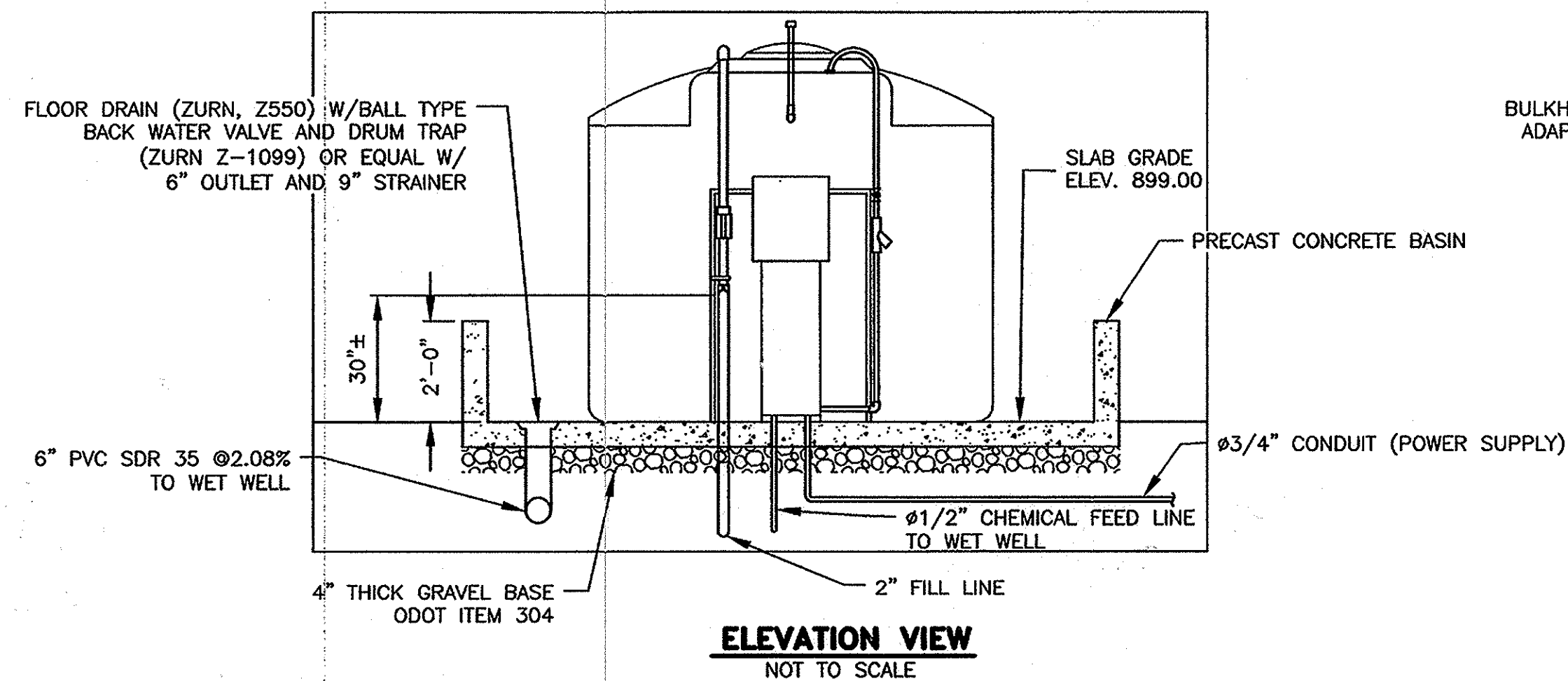
**PLAN VIEW**  
NOT TO SCALE



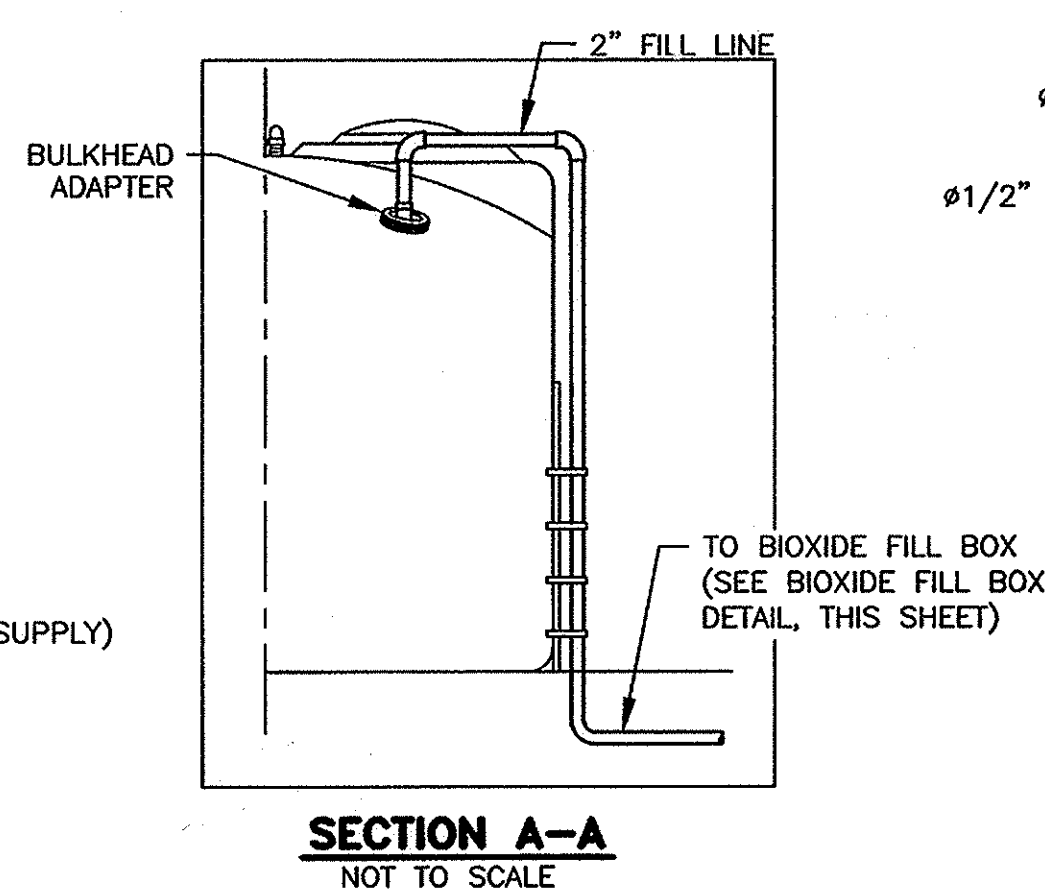
**LADDER DETAIL SECTION A-2**  
NOT TO SCALE



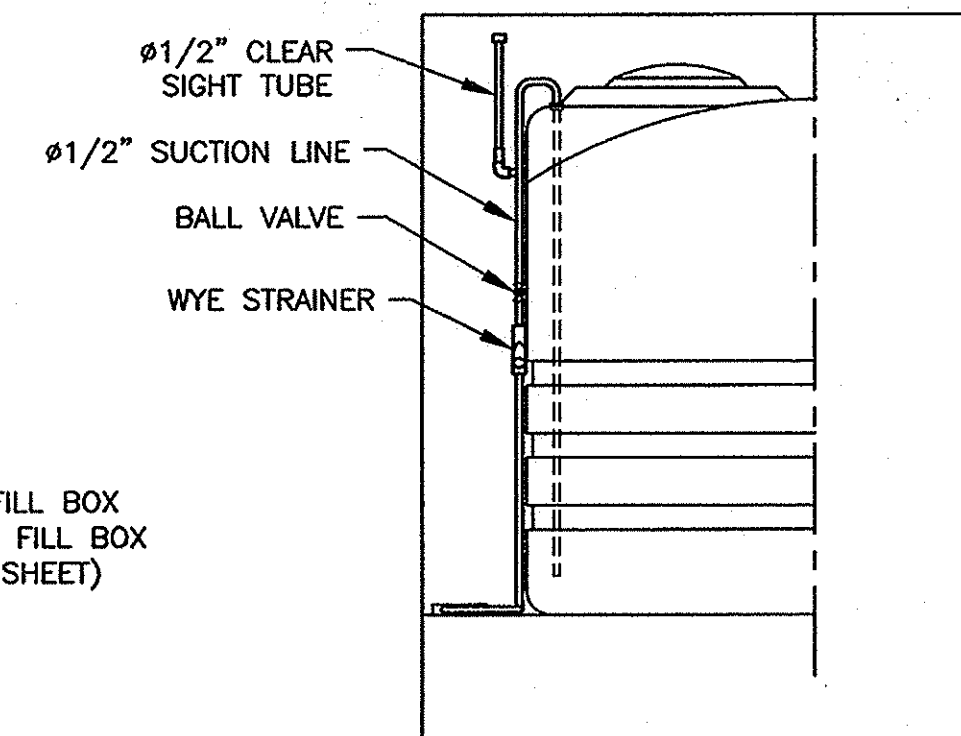
**LADDER BRACKET DETAIL**  
NOT TO SCALE



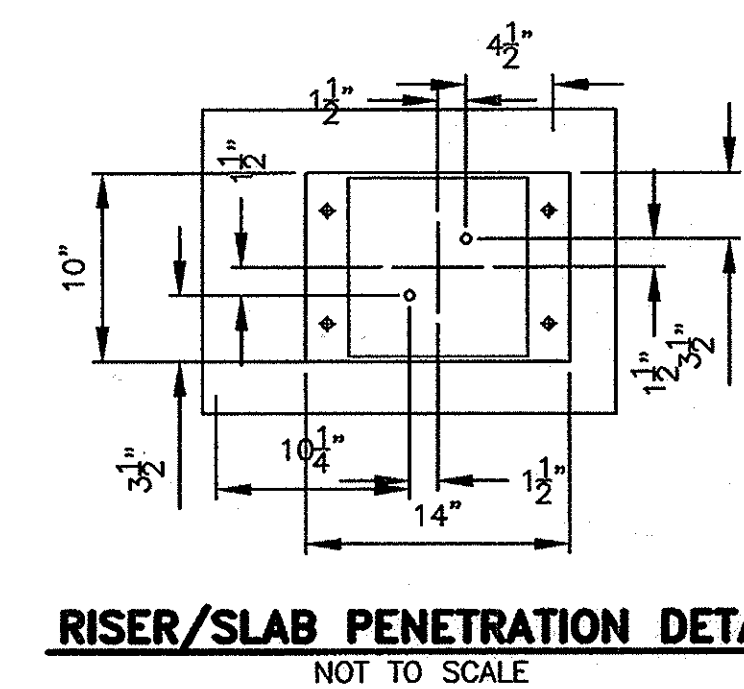
**ELEVATION VIEW**  
NOT TO SCALE



**SECTION A-A**  
NOT TO SCALE



**SECTION B-B**  
NOT TO SCALE



**RISER/SLAB PENETRATION DETAIL**  
NOT TO SCALE

DELAWARE COUNTY, OHIO  
**THE OAKS**  
PHASE A  
LIFT STATION DETAILS & NOTES

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FAX (614) 488-4887

SCALE: 3/8" = 1'-0"

SEPARATED SANITARY PLAN INTO PHASES A & B



GENERAL NOTES

THE COUNTY OF DELAWARE, TOGETHER WITH THE SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION INCLUDING ALL SUPPLEMENTS THERETO, SHALL GOVERN ALL CONSTRUCTION ITEMS THAT ARE A PART OF THIS PLAN. THE CONTRACTOR SHALL REFER TO THE "STANDARD PLANS AND SPECIFICATIONS FOR CONSTRUCTION OF SANITARY FACILITIES IN DELAWARE COUNTY, OHIO" FOR ALL NECESSARY CONSTRUCTION DETAILS.

THE SURFACES WITH WHICH THE RUBBER GASKET COMES IN CONTACT SHALL BE CLEANED THOROUGHLY JUST PRIOR TO ASSEMBLY.

ANY MODIFICATIONS TO THE WORK AS SHOWN ON THESE DRAWINGS MUST HAVE PRIOR WRITTEN APPROVAL BY THE COUNTY SANITARY ENGINEER.

COMMENCEMENT OF WORK THE CONTRACTOR SHALL NOTIFY THE COUNTY ENGINEER 48 HOURS PRIOR TO COMMENCING WORK ON THIS PROJECT, HOLIDAYS AND WEEKENDS EXCLUDED.

EXISTING UTILITIES

THE CONTRACTOR IS RESPONSIBLE FOR THE INVESTIGATION, LOCATION, SUPPORT, PROTECTION, AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES WHETHER SHOWN ON THESE PLANS OR NOT. THE CONTRACTOR SHALL EXPOSE ALL UTILITIES OR STRUCTURES PRIOR TO CONSTRUCTION TO VERIFY THE VERTICAL AND HORIZONTAL EFFECT ON PROPOSED CONSTRUCTION. THE CONTRACTOR SHALL CALL, TOLL FREE, THE OHIO UTILITIES PROTECTION SERVICE (1-800-362-2764) 72 HOURS PRIOR TO CONSTRUCTION AND SHALL NOTIFY ALL UTILITY COMPANIES AT LEAST 48 HOURS PRIOR TO WORK IN THE VICINITY OF THEIR UNDERGROUND LINES.

THE IDENTITY AND LOCATION OF THE EXISTING UNDERGROUND UTILITY FACILITIES KNOWN TO BE LOCATED IN THE CONSTRUCTION AREA HAVE BEEN SHOWN ON THE PLANS AS ACCURATELY AS PROVIDED BY THE OWNER OF THE UNDERGROUND UTILITY. THE COUNTY OF DELAWARE AND/OR ENGINEER ASSUME NO RESPONSIBILITY AS TO THE ACCURACY OF THE UNDERGROUND FACILITIES SHOWN ON THE PLANS.

THE FOLLOWING UTILITIES AND OR OWNERS ARE LOCATED WITHIN THE WORK LIMITS OF THIS PROJECT AND DO NOT SUBSCRIBE TO A REGISTERED UNDERGROUND UTILITY PROTECTION SERVICE.

Table with 3 columns: UTILITY, OWNER, TELEPHONE. Lists Water Mains, Storm Sewers, Sanitary Sewers, and Telephone services with their respective owners and contact numbers.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL RESIDENTS OF INTERRUPTION TO THEIR UTILITIES THAT WILL BE CAUSED BY CONSTRUCTION AT LEAST 24 HOURS IN ADVANCE.

SUPPORTING AND/OR PROTECTING EXISTING WATER LINES, GAS MAINS, TELEPHONE CONDUIT, STORM SEWERS, ETC., SHALL BE INCLUDED IN PAYMENT FOR THE VARIOUS CONTRACT ITEMS OF WORK.

ALL WORK REQUIRED FOR THE MAINTENANCE OF SERVICE OF EXISTING UTILITIES SHALL BE DONE BY, AND AT THE EXPENSE OF THE CONTRACTOR.

ALL MAINTENANCE, REPAIR AND/OR REPLACEMENT OF EXISTING UTILITIES SHALL BE IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE VARIOUS UTILITY COMPANIES HAVING JURISDICTION. ALL EXISTING STORM SEWERS, DRAINAGE DRAINS, AND OTHER SURFACE DRAIN PIPES, WHETHER SHOWN ON THE CONTRACT DRAWINGS OR NOT, REMOVED OR DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED AND RECONNECTED BY THE CONTRACTOR AS DIRECTED BY THE ENGINEER, AT NO COST TO THE COUNTY.

IT IS ASSUMED THAT THERE ARE WATER AND GAS BRANCH LINES, ETC., SERVING EACH RESIDENCE. THE CONTRACTOR SHALL REPAIR AND REPLACE THESE UTILITIES IF DAMAGED AT NO COST TO THE COUNTY.

INSTALLATION THE CONTRACTOR AND SUB-CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR COMPLYING WITH ALL FEDERAL, STATE AND LOCAL SAFETY REQUIREMENTS TOGETHER WITH EXERCISING PRECAUTIONS AT ALL TIMES FOR THE PROTECTION OF PERSONS INCLUDING EMPLOYEES AND PROPERTY. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SUB-CONTRACTOR TO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.

ANY FIELD TILE DISTURBED DURING CONSTRUCTION SHALL BE REPLACED AS DIRECTED BY THE COUNTY WITH PVC PIPE SPANNING THE TRENCH. THE TRENCH SHALL BE FILLED WITH COMPACTED GRANULAR BACKFILL.

FINISHED GRADE AT ALL SANITARY MANHOLES SHALL BE AT LEAST 6" BELOW TOP OF CASTING TO AVOID UNNECESSARY INFILTRATION INTO THE SANITARY SEWER SYSTEM.

THE IDENTITY AND LOCATION OF THE EXISTING UNDERGROUND UTILITY FACILITIES KNOWN TO BE LOCATED IN THE CONSTRUCTION AREA HAVE BEEN SHOWN ON THE PLANS AS ACCURATELY AS PROVIDED BY THE OWNER OF THE UNDERGROUND UTILITY. THE COUNTY OF DELAWARE AND/OR ENGINEER ASSUME NO RESPONSIBILITY AS TO THE ACCURACY OF THE UNDERGROUND FACILITIES SHOWN ON THE PLANS.

FINAL CONNECTION SHALL NOT BE MADE TO THE RECEIVING SANITARY SEWER SYSTEM UNTIL THE PHASE PROJECT HAS BEEN FULLY INSTALLED.

USE OF PREMISES

IN ADDITION TO DIRECT REQUIREMENTS OF THE CONTRACT SPECIFICATION, THE CONTRACTOR SHALL OBSERVE AND CONFORM TO THE SPECIFIC REQUIREMENTS OF ALL RIGHT-OF-WAY, INCLUDING EASEMENTS, COURT ENTRIES, RIGHT-OF-ENTRY, OR ACTION FILED IN COURT IN ACCORDANCE WITH THE CODE OF APPLICABLE GOVERNING AGENCY.

THE CONTRACTOR SHALL NOT TRESPASS UPON OR IN ANY WAY DISTURB PROPERTY ADJACENT TO THE STREET RIGHT-OF-WAY WITHOUT FIRST OBTAINING WRITTEN PERMISSION FROM THE OWNER TO DO SO. A COPY OF SUCH WRITTEN PERMISSION SHALL BE FURNISHED TO THE ENGINEER.

IF THE CONTRACTOR FINDS IT NECESSARY TO OBTAIN ADDITIONAL WORKING AREA, IT SHALL BE HIS RESPONSIBILITY FOR ITS ACQUISITION. ALL REQUIREMENTS LISTED UNDER THE "USE OF PREMISES" SHALL APPLY IF ADDITIONAL AREA IS OBTAINED.

THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, RESTORE SUCH PROPERTY TO THE FULL SATISFACTION OF THE OWNER, AND SHALL OBTAIN FROM THE OWNER A WRITTEN RELEASE STATING THAT RESTORATION HAS BEEN SATISFACTORILY MADE. A COPY OF THE WRITTEN RELEASE SHALL BE FURNISHED TO THE ENGINEER.

THE CONTRACTOR SHALL NOT WASTE ANY EXCESS EARTH, STONE, OR OTHER EXCAVATED MATERIAL ON ANY PROPERTY WITHOUT FIRST OBTAINING WRITTEN PERMISSION OF THE OWNER OF THE PROPERTY AND SECURING THE APPROVAL OF THE ENGINEER. ONE COPY OF THE OWNER'S WRITTEN PERMISSION AND ONE COPY OF A WRITTEN RELEASE FROM THE OWNER STATING AT THE WORK HAS BEEN COMPLETED SATISFACTORILY, SHALL BE FURNISHED TO THE ENGINEER.

ALL ITEMS WITHIN THE STREET RIGHT-OF-WAY SHALL BE REMOVED, OR REMOVED AND REPLACED OR RESTORED AS REQUIRED BY THE CONTRACT DRAWINGS AND DETAILED PROVISIONS, AS DIRECTED BY THE ENGINEER.

PROTECTION OF TREES

SPECIAL CARE SHALL BE TAKEN TO AVOID DAMAGES TO TREES AND THEIR ROOT SYSTEM. MACHINE EXCAVATION SHALL NOT BE USED WHEN, IN THE OPINION OF THE ENGINEER, IT WOULD ENDANGER TREE ROOTS. IN GENERAL, WHERE THE LINE OF TRENCH FALLS WITHIN THE LIMITS OF THE LIMB SPREAD, THE LEAVING OF HEADERS ACROSS THE TRENCH TO PROTECT ROOTS WILL BE REQUIRED. THE OPERATION OF ALL EQUIPMENT, PARTICULARLY WHEN EMPLOYING ROCKS, THE STORAGE OF MATERIALS, AND THE DEPOSITION OF EXCAVATION SHALL BE CONDUCTED IN THE MANNER WHICH WILL NOT INJURE TREES, TRUNKS, BRANCHES OR THEIR ROOTS UNLESS SUCH TREES ARE DESIGNATED BY THE ENGINEER FOR REMOVAL.

LIFT STATION GENERAL NOTES

THE CONTRACTOR SHALL COMPLY WITH THE MATERIAL AND CONSTRUCTION REQUIREMENTS OF THE DELAWARE COUNTY DOCUMENT ENTITLED "STANDARD PLANS AND SPECIFICATIONS FOR CONSTRUCTION OF SANITARY FACILITIES. THE CONTRACTOR SHALL OBTAIN ANY AND ALL PERMITS REQUIRED BY THE BOARD OF HEALTH AND PAY ALL PERMIT FEES.

THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, TOOLS, TRANSPORTATION, INCIDENTALS AND APPURTENANCES TO COMPLETE IN EVERY DETAIL, AND LEAVE IN WORKING ORDER, ALL ITEMS OF WORK AS SHOWN ON THE DRAWINGS OR MATERIALS OR WORK NOT SPECIFICALLY MENTIONED OR SHOWN ON THE DRAWINGS, BUT NECESSARY TO COMPLETE THE WORK, SHALL BE FURNISHED.

THE CONTRACTOR IS REQUIRED TO VISIT THE SITE AND FULLY INFORM HIMSELF CONCERNING ALL CONDITIONS AFFECTING THE SCOPE OF THE WORK. FAILURE TO VISIT THE SITE SHALL NOT RELIEVE THE CONTRACTOR FROM ANY RESPONSIBILITY IN THE PERFORMANCE OF THIS CONTRACT.

THE CONTRACTOR SHALL INVESTIGATE AND LOCATE ALL EXISTING UTILITIES AND NOTIFY ALL UTILITY COMPANIES A MINIMUM OF 48 HOURS PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITIES THAT WILL DISTURB OR ENCRUSCH UPON EXISTING UTILITIES.

THE CONTRACTOR SHALL PROVIDE 6" OF SAND OR GRIT LEVELING BASE, DEPENDING ON SUBSURFACE SOIL CONDITIONS, UNDER EACH CONCRETE STRUCTURE FOLLOWED BY A MINIMUM OF 6" COMPACTED GRANULAR FILL.

THE CONTRACTOR SHALL GRADE THE AREA AROUND THE LIFT STATION TO DRAIN SURFACE WATER AWAY FROM THE STRUCTURES.

ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED AFTER FINAL GRADING.

ALL GENERAL NOTES SHOWN ON THIS SHEET, SHALL BE CONSIDERED AS A REQUIREMENT FOR THE CONSTRUCTION WORK OF THE LIFT STATION.

THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, TOOLS, TRANSPORTATION, INCIDENTALS AND APPURTENANCES TO COMPLETE IN EVERY DETAIL, AND LEAVE IN WORKING ORDER ALL ITEMS OF WORK CALLED FOR AND/OR SHOWN ON THE ACCOMPANYING DRAWINGS. ANY MATERIAL OR WORK NOT SPECIFICALLY MENTIONED OR SHOWN ON THE DRAWINGS, BUT NECESSARY TO COMPLETE THE WORK, SHALL BE FURNISHED.

ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SYSTEM ARE PROHIBITED.

ELECTRICAL NOTES

THE CONTRACTOR SHALL PROVIDE ALL ELECTRICAL COMPONENTS AND DEVICES TO PROPERLY SERVE THE ELECTRICAL REQUIREMENTS OF THE LIFT STATION. ALL WORKMANSHIP, MATERIALS AND EQUIPMENT SHALL CONFORM TO THE OHIO BASIC BUILDING CODE, THE NATIONAL ELECTRICAL CODE, LOCAL BUILDING CODES AND ALL OTHER REGULATIONS BY AUTHORITIES HAVING JURISDICTIONAL RIGHTS FOR THE ENFORCEMENT OF CONSTRUCTION AND SAFETY STANDARDS. THE CONTRACTOR SHALL PAY ALL COSTS OR FEES FOR ANY PERMITS OR AGENCY INSPECTION CHARGES ASSOCIATED WITH THE ELECTRICAL WORK.

ELECTRICAL SERVICE SHALL BE PROVIDED TO WITHIN APPROXIMATELY TEN (10) FEET OF THE PROPOSED LIFT STATION, TERMINATING AT THE CONTRACTOR'S POLE. ALL ELECTRICAL CONNECTION WORK SHALL BE PERFORMED BY THE LIFT STATION CONTRACTOR. THE COST FOR PURCHASING AND INSTALLING THE ELECTRIC METER SHALL BE AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS AND PAY ALL FEES REQUIRED FOR MAKING THE PROPER CONNECTIONS TO THE OHIO EDISON SERVICE WIRING.

A FEMALE RECEPTACLE FOR CONNECTION TO DELAWARE COUNTY'S PORTABLE EMERGENCY GENERATOR SHALL BE PROVIDED AT THE ELECTRICAL CONTROL PANEL. THE ELECTRICAL SERVICE RATING OF THE RECEPTACLE SHALL BE 200A, 480VAC. MANUFACTURER SHALL BE CROUSE-HINDS.

A MANUAL TRANSFER SWITCH SHALL BE PROVIDED TO TRANSFER LOADS FROM THE LINE SOURCE TO A PORTABLE EMERGENCY GENERATOR. THE SWITCH SHALL BE NON-FUSIBLE, 2 POLE, DOUBLE THROW, IN A NEMA 3R ENCLOSURE MOUNTED ON THE INSIDE OF THE STATION ENCLOSURE. MANUFACTURER SHALL BE SQUARE D CLASS OR APPROVED EQUAL.

PROVIDE AND INSTALL A LIGHTNING ARRESTOR PER DELAWARE COUNTY STANDARDS.

PUMP MONITORING EQUIPMENT SHALL BE MULTITRODE MONITOR PROP MODEL (MOPV PRO-3)

PUMP CONTROL EQUIPMENT SHALL BE MULTITRODE MODEL (MT2PC-3 DUPLEX)

LEVEL SENSING EQUIPMENT SHALL BE MULTITRODE (LEVEL SENSING PROBE)

THE TELEMETRY SYSTEM SOFTWARE SHALL BE MULTITRODE OUTPOST CONTROL AND MONITORING SOFTWARE.

ALL TELEMETRY COMPONENTS SHALL BE MOUNTED IN A NEMA 4X 316 STAINLESS STEEL ENCLOSURE WITH A FABRICATED BACK PANEL AND STRIP HEATER. THE TELEMETRY PANEL SHALL BE INSTALLED IN THE LIFT STATION ENCLOSURE AND MOUNTED NEAR THE PUMP CONTROL PANEL.

ALL PUMP MOTOR STARTERS SHALL BE SOLID STATE TYPE, SERIES SMC BY ALLEN-BRADLEY.

LIFT STATION SPECIFICATIONS

GENERAL

THE SCOPE OF WORK UNDER THIS CONTRACT INCLUDES FURNISHING AND INSTALLING THE LIFT STATION, COMPLETE AS SHOWN ON THE DRAWINGS AND AS SPECIFIED HEREIN.

WET WELL AND VALVE VAULT

THE WET WELL SHALL BE CONSTRUCTED OF 9' ID ROUND PRECAST CONCRETE VAULT. THE VALVE CHAMBER SHALL BE CONSTRUCTED OF A 10'-8"x10'-8" PRECAST CONCRETE VAULT. CONCRETE SHALL COMPLY WITH ACI COMMITTEE 350 REQUIREMENTS FOR SANITARY STRUCTURES AND ODOT CMS ITEM 511 - CONCRETE FOR STRUCTURES; REINFORCING STEEL PER ODOT CMS ITEM 709 - REINFORCING STEEL. CONCRETE SHALL TEST MINIMUM 4500 PSI AT 28 DAYS AND FINISH SHALL BE FREE OF SPILLS, CHIPS, AND HONEYCOMBS. THE VALVE VAULT STRUCTURE SHALL BE DESIGNED AND MANUFACTURED TO WITHSTAND THE ADDED LOADING OF THE BLOCK BUILDING TO HOUSE THE ELECTRICAL EQUIPMENT. ALL PRECAST STRUCTURES AND THEIR REINFORCEMENT SHALL BE DESIGNED AND STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF OHIO. OPENINGS FOR PIPING, Sumps, ROOF HATCHES, ELECTRICAL CONDUIT AND SENSOR LINES SHALL BE CAST SMOOTHLY INTO THE STRUCTURE. CHIPPING OR PUNCHING OPENINGS WILL NOT BE ALLOWED UNDER ANY CIRCUMSTANCES.

ASPHALTIC TAR BASED MASTIC SEALANT SHALL BE NEATLY APPLIED BETWEEN PRECAST SECTIONS BEFORE THE NEXT SECTION IS INSTALLED. TWO COATS OF THOROSOLE WATERPROOFING SHALL BE LIBERALLY APPLIED ON ALL SECTION SEAMS, INSIDE AND OUTSIDE, AFTER WHICH TWO COMPLETE COATS SHALL BE APPLIED TO ALL EXTERIOR CONCRETE SURFACES. DRYING TIME BETWEEN SUCCESSIVE COATS SHALL BE THE MINIMUMS RECOMMENDED BY THE MANUFACTURER. SILICON CAULKING SHALL BE APPLIED AT ALL PERPENDICULAR JOINTS.

CONTRACTOR SHALL SUBMIT 6 SETS OF SUPPLIER'S SHOP DRAWINGS WITH ALL DIMENSIONS AND PERTINENT INFORMATION INCLUDED.

ACCESS HATCH AND FRAME ASSEMBLY

THE WET WELL TOP SHALL BE FITTED WITH DOUBLE LEAF 36"x48" AND A 24"x36" HEAVY-DUTY ACCESS COVERS SAFEHATCH BY FLYGT. EACH DOOR SHALL HAVE A HANDLE, LATCH, HOLD IT IN THE OPEN POSITION, AND LOCKABLE HASP. THE ACCESS COVERS, COVER FRAMES, AND TOP SLAB SHALL BE DESIGNED FOR A 300 P.S.F. LIVE LOAD. THE FRAME ASSEMBLIES SHALL BE PLACED IN THE CONCRETE WET WELL TOP WHEN IT IS POURED.

THE VALVE VAULT TOP SHALL BE FITTED WITH A 36"x48" ACCESS COVER. THE FRAME ASSEMBLY SHALL BE PLACED IN THE CONCRETE WET WELL TOP WHEN IT IS POURED. THE DOOR SHALL BE REINFORCED PLASTIC GRATING TO BE OF 1/2" THICK BARS (1/2" x 1/2" MESH) AND BE MADE BY FIBERGRATE CORP. OR EQUAL. HINGES SHALL BE BOLTED TO BOTH THE VALVE VAULT FLOOR AND THE GRATING AS SHOWN ON THE DRAWINGS. HATCH SHALL BE ABLE TO BE SECURED TO THE WALL BY CLIPPING A STAINLESS STEEL CABLE ACROSS THE OPEN HATCH. THE CABLE SHALL HAVE STAINLESS STEEL SPRING CLIPS ON EACH END TO CLIP TO SS EYEHOOKS ATTACHED TO THE WALL.

INSTALL ON FIXED LADDER BELOW GRATING COVER, AND TO EXTEND 3.5 FT ABOVE FINISH FLOOR.

PIPING

THE CONTRACTOR SHALL FURNISH AND INSTALL ALL PIPING, FITTINGS AND VALVES REQUIRED IN THE WET WELL AND VALVE VAULT AS SHOWN ON THE DRAWINGS. PIPE, FITTINGS AND VALVES SHALL BE FLANGED DUCTILE IRON CLASS 52 MINIMUM, CONFORMING TO AWWA C110, C150 AND C151. GASKETS SHALL BE FULL FACED RUBBER MEETING THE REQUIREMENTS OF AWWA C111.

PUMPS

FURNISH AND INSTALL TWO (2) SUBMERSIBLE PUMPS WITH DUPLEX CONTROLS AS MANUFACTURED BY FLYGT CORPORATION (MODEL NO. NP 3153). PUMPS SHALL BE PROVIDED BY A MUNICIPAL PROVIDER.

MOTORS AND RELATED ELECTRICAL EQUIPMENT SHALL BE EXPLOSION PROOF MEETING THE REQUIREMENTS OF THE NATIONAL ELECTRIC CODE FOR CLASS 1, DIVISION 1, GROUP D ENVIRONMENTS.

PUMP IMPELLERS SHALL BE NEVA CLOG 239 HT CAPABLE OF PASSING A 3-INCH SPHERE.

EACH PUMP SHALL HAVE A CAPACITY OF 112 GPM AT A TOTAL DYNAMIC HEAD AT 100 FEET. MOTORS SHALL BE 1760 RPM DESIGN, 3 PHASE, 50 HZ, 3 PHASE, 60 HZ POWER. PUMP SHUT OFF HEAD SHALL BE 140 FEET (MIN). MOTOR SHALL BE NON-OVERLOADING OVER THE FULL RANGE OF PUMP CURVE. PUMP EFFICIENCY AT DESIGN FLOW SHALL EXCEED 40%.

MOTORS SHALL HAVE TWO (2) HEAVY DUTY BALL BEARINGS; DESIGN LIFE SHALL BE 50,000 HOURS (8-10). HEAT SENSORS SHALL BE IMBEDDED IN EACH MOTOR WINDING TO STOP MOTOR IF WINDING EXCEEDS A TEMPERATURE OF 125°C; MOTOR TO BE RE-ENERGIZED WHEN TEMPERATURE RETURNS TO SAFE OPERATING TEMPERATURE. THE COMMON PUMP/ MOTOR SHAFT SHALL BE 416 STAINLESS STEEL.

PUMP VOLUTE CASES SHALL BE CAST IRON WITH 4" DISCHARGE FLANGE. WEARING SURFACES SHALL BE FITTED WITH REPLACEABLE BRONZE WEARING RINGS. PROVIDE EACH PUMP WITH A 4"x4" SLIDE-AWAY BASE ELBOW IF REQUIRED BY THE PUMP MANUFACTURER.

PUMP AND MOTOR CASTINGS SHALL BE HIGH TENSILE STRENGTH CAST IRON TREATED WITH PHOSPHATE AND CHROMATE RINSE. ALL FASTENERS, FOR EACH ASSEMBLED PUMP AND MOTOR UNIT, SHALL BE 302 STAINLESS STEEL.

PUMPS SHALL INCLUDE ITT FLYGT 4901 FLUSH VALVE.

POWER CABLES - EACH POWER CORD AND CONTROL CORD SHALL BE DOUBLE SEALED. THE POWER & CONTROL CONDUCTOR SHALL BE SINGLE STRAND SEALED WITH EPOXY POTTING COMPOUND AND THEN CLAMPED IN PLACE WITH RUBBER SEAL BUSHING TO SEAL OUTER JACKET AGAINST LEAKAGE AND TO PROVIDE FOR STRAIN PULL. CORDS SHALL WITHSTAND A PULL OF 300 POUNDS. INSULATION OF POWER AND CONTROL CORDS SHALL BE TYPE SO, SOW, OR SOW-A. BOTH CONTROL AND POWER CORDS SHALL HAVE A GREEN CARRIER GROUND CONDUCTOR THAT ATTACHES TO THE MOTOR FRAME. CONTRACTOR SHALL FIELD MEASURE FOR REQUIREMENTS OF CABLE LENGTHS TO CONNECTION POINTS; NO FIELD SPLICING OF CABLES WILL BE ALLOWED.

SEALS - EACH MOTOR SHALL BE PROTECTED BY TWO (2) MECHANICAL SEAL ASSEMBLIES, IN TANDEM, WITH A SEAL CHAMBER BETWEEN THE SEALS. SEAL CHAMBERS SHALL BE OIL FILLED TO LUBRICATE SEAL FACES AND TO TRANSMIT HEAT FROM SHAFTS TO OUTER SHELLS. SEAL FACES SHALL BE CARBON AND CERAMIC LAPPED TO A FLATNESS OF ONE LIGHT BAND. LOWER SEAL FACES SHALL BE TUNGSTEN CARBIDE. A DOUBLE ELECTRODE SHALL BE MOUNTED IN THE SEAL CHAMBER TO DETECT ANY WATER ENTERING THE CHAMBER THROUGH THE BOTTOM SEAL. WATER IN THE CHAMBER SHALL ILLUMINATE A WARNING LIGHT IN THE CONTROL PANEL AND ALSO ACTIVATE A FAULT CIRCUIT OF THE MOTOR SYSTEM. THE SIGNALING SHALL NOT STOP THE MOTOR. A MINI CAS (CONTROL AND STATUS) MONITORING UNIT SHALL BE MOUNTED IN THE CONTROL PANEL AND CONNECTED TO THE THERMAL SWITCHES AND FLOAT LEAKAGE SENSOR AS DETAILED IN THE ELECTRICAL SPECIFICATIONS WITHIN DRAWINGS E-2.

PUMP MONITORING SHALL BE PROVIDED AS DETAILED IN THE ELECTRICAL SPECIFICATIONS.

PUMP INSTALLATION

LIFT-OUT RAIL SYSTEM - PROVIDE TWO (2) PUMP SLIDE ASSEMBLY UNITS INCLUDING 4"x4" FLANGED ELBOWS AND MOUNTING BASES. THE DESIGN OF THIS SYSTEM SHALL BE SUCH THAT A MINIMUM UP OR DOWN FORCE, VIA LIFTING CHAINS, EXERTED BETWEEN THE STATIONARY BASE ELBOW AND THE PUMP DISCHARGE FLANGE WILL BE SUFFICIENT TO REMOVE OR PLACE THE PUMPS INTO PROPER POSITION FOR LEAK-PROOF OPERATION.

A SEAL PLATE SHALL BE ATTACHED TO EACH PUMP AND WITH AN "O" RING EMBEDDED IN MACHINED FACE TO MATE AGAINST BASE ELBOWS. TAPERED LUG CONNECTIONS SHALL ALLOW FOR POSITIVE LEAK-PROOF SEALS AS WELL AS EASY REMOVAL AND REPLACEMENT. PROVIDE TWO (2) PUMP CONNECTION UNITS.

TWO (2) RAIL PIPES SHALL BE USED TO GUIDE THE PUMP FROM THE SURFACE TO THE DISCHARGE BASE CONNECTION. THE GUIDE RAILS SHALL BE 2-INCH SCHEDULE 40 STAINLESS STEEL PIPE. THE WEIGHT OF THE PUMP SHALL BEAR SOLELY ON THE DISCHARGE BASE AND NOT ON THE GUIDE RAILS. RAIL SYSTEMS WHICH REQUIRE THE PUMP TO BE SUPPORTED BY LEGS WHICH MIGHT INTERFERE WITH THE FLOW OF SOLIDS INTO THE PUMP SUCTION WILL NOT BE CONSIDERED. THE GUIDE RAIL SHALL BE FIRMLY ATTACHED TO THE ACCESS HATCH FRAME. CONTRACTOR SHALL INSTALL AN INTERMEDIATE GUIDE FOR EACH PUMP AS DIRECTED BY THE MANUFACTURER.

AND ADEQUATE LENGTH OF 1/2" DIAMETER STAINLESS STEEL LIFTING CHAIN SHALL BE SUPPLIED FOR REMOVING EACH PUMP. THE CHAIN SHALL BE OF SUFFICIENT LENGTH AND SHALL INCLUDE AND ADEQUATE NUMBER OF LIFTING RINGS FOR EASY REMOVAL. PROVIDE AND INSTALL CHAIN FOR TWO (2) PUMP UNITS. CHAIN SHALL BE RATED AT 1600# (MIN) SAFE WORKING LOAD CAPACITY. LIFT EYES SHALL BE PROVIDED FOR ALL LIFT CHAINS.

OPERATION AND MAINTENANCE MANUALS: THREE (3) COPIES OF THE MANUFACTURER'S O & M MANUALS, FOR THE SPECIFIED PUMPS, SHALL BE DELIVERED TO THE OWNER TO FAMILIARIZE THEMSELVES WITH THE OPERATION OF THESE PUMPS.

PUMP CONTROLS

A 60" PROBE BY MULTITRODE (MODEL NO. 1.5/10/C) WITH 10 SENSORS SPACED AT 6" INTERVALS SHALL BE PROVIDED AND INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDED INSTALLATION IN THE WET WELL FOR THE CONTROL OF THE PUMPS AND ALARM AT THE LEVELS INDICATED ON THE PLANS. BACKUP FLOATS SHALL BE PROVIDED IN CASE OF FAILURE OF THE MULTITRODE. AN APPROPRIATELY SIZED STAINLESS STEEL STRAIN RELIEF FOR PUMP CORDS SHALL BE PROVIDED AND INSTALLED ON STAINLESS STEEL HOOKS ANCHORED NEAR THE HATCH SO THE PUMPS OR FLOAT MAY BE REMOVED WITHOUT ENTERING THE WET WELL.

A DUPLEX PUMP CONTROLLER IN A NEMA 12 STAINLESS STEEL PANEL SHALL BE MOUNTED IN THE BUILDING AS SHOWN ON THE DRAWINGS. IT SHALL CONTAIN A CIRCUIT BREAKER, MAGNETIC STARTER, HAND-OFF-AUTO SELECTOR SWITCH, ELAPSED TIME METER, AND SEAL LEAK INDICATING LIGHT FOR EACH PUMP. PROVIDE 1" PVC CONDUIT FROM THE JUNCTION BOX TO THE PANEL AND SEAL FITTINGS WHERE CONDUIT ENTERS THE PANEL. THE CONTROLLER SHALL CONTAIN AN ALTERNATOR RELAY TO ALTERNATE PUMPS ON EACH SUCCESSIVE PUMP CYCLE AND SHALL TURN ON THE SECOND (LAG) PUMP IF THE FIRST (LEAD) PUMP FAILS OR THE INFLOW EXCEEDS THE CAPACITY OF ONE PUMP.

EACH PUMPS POWER CABLE SHALL BE SUPPORTED FROM THE WET WELL BY BASKET WEAVE STAINLESS STEEL CABLE SUPPORT GRIPS (KELLUM GRIPS).

A 480VAC DUPLEX CONVENIENCE OUTLET WITH GROUND FAULT INTERRUPT PROTECTION SHALL BE PROVIDED.

LEVEL SENSOR CABLE SHALL BE INSTALLED IN A 1" PVC CONDUIT FROM THE LEVEL SENSOR HEAD TO THE JUNCTION BOX. PROVIDE SEAL FITTINGS WHERE CONDUIT ENTERS THE CONTROL PANEL.

EACH PUMP POWER CABLE SHALL BE INSTALLED IN A 2" PVC CONDUIT FROM THE WET WELL TO THE PUMP CONTROL PANEL. PROVIDE SEAL FITTINGS WHERE CONDUIT ENTERS THE CONTROL PANEL.

VALVE VAULT

A HIGH WATER FLOAT SHALL BE PROVIDED IN THE VALVE VAULT AND SHALL TRIGGER AN ALARM SHOULD THE WATER REACH A LEVEL OF 2'.

ODOR CONTROL

THE CONTRACTOR SHALL PROVIDE THE REQUIRED ITEMS FOR A BIOXIDE ODOR CONTROL SYSTEM, AS MANUFACTURED AND INSTALLED BY US FILTER, TO BE INSTALLED ADJACENT TO THE VALVE VAULT. THE BIOXIDE ODOR CONTROL SYSTEM WILL CONSIST OF A 2,000 GALLON STORAGE TANK AND A CLOSING PUMP THAT FEEDS DIRECTLY TO THE WET WELL. THE CONTRACTOR SHALL PROVIDE ALL ELECTRICAL, TUBING, AND MOUNTING REQUIREMENTS FOR THE PROPER OPERATION OF THE ODOR CONTROL SYSTEM AS REQUIRED BY THE DRAWINGS.

THE CHEMICAL STORAGE TANK SHALL BE MOUNTED ON A CURBED CONCRETE PAD ENCLOSED BY AN 8-FOOT HIGH CEDAR FENCE WITH A PADLOCKED GATE.

DELAWARE COUNTY SHALL BE CAST INTO BIOXIDE FILL LINE LID.

CONFINED SPACE ENTRY SIGNS

CONFINED SPACE ENTRY SIGNS SHALL BE PROVIDED AND INSTALLED AT BOTH SIDES OF ENTRY DOORS AT THE FOLLOWING LOCATIONS:

WET WELL: SIGN POSTS SHALL BE 4"x4" (NOMINAL) MEETING THE REQUIREMENTS OF ODOT CMS ITEM 710.14 x 7'-0" PRESSURE TREATED LUMBER

INSTALLATION

INSTALL POSTS ON OPPOSITE SIDES OF EACH STRUCTURE NEAR EACH ACCESS OPENING AS DIRECTED ON SITE BY THE ENGINEER. POSTS TO BE PLACED IN 8" DIAMETER HOLES AT DEPTHS OF 3.0' (MIN.) BELOW FINISHED GRADE. POSTS SHALL BE SET PLUMB, CENTERED IN HOLES WITH CONCRETE AROUND THEM TO WITHIN 6" FROM FINISHED GRADE.

SECURE EACH SIGN NEAR TOP OF POSTS THAT EXTEND 4' ABOVE FINISHED GRADE; USE 2-3/8"x3" CADMIUM PLATED LAG SCREWS AND WASHERS FOR ATTACHMENT. SIGNS SHALL BE READABLE FROM SIDES FACING AWAY FROM STRUCTURES. A TOTAL OF TWO (2) SIGNS ARE REQUIRED AT EACH OF THE STRUCTURES.

VALVE CHAMBER: SIGNS SHALL BE SECURED TO BUILDING AT DOOR LOCATION.

PAINTING

ALL VALVE CHAMBER PIPING AND VALVES SHALL BE PAINTED (EXCEPT FLANGES AND MACHINED EDGES). ALL PAINTING PREPARATIONS AND APPLICATION SHALL BE IN ACCORDANCE WITH STANDARD PRACTICE AND PER PAINT MANUFACTURER'S RECOMMENDATIONS.

PAINT BRAND TYPES SHALL BE ICI DEVCO COATINGS (STATED); EQUIVALENT TYPES BY SHERWIN-WILLIAMS, DETROIT GRAPHITE, RUSTOLEUM OR EQUAL.

APPLICATION:

PRIMING PIPING - ONE (1) COAT OF (TAR STOP) VALVES - ONE (1) COAT OF (RUST PENETRATING PRIMER NO. 622)

FINISH COATS

BROWN COLOR, TWO (2) COATS OF (GLAMORTEX ENAMEL)

PRESSURE GAUGES

PUMP PRESSURE GAUGES SHALL BE PROVIDED AND INSTALLED ON THE DISCHARGE LINES OF EACH PUMP FURNISHED AND PLACED ON THE PROJECT. LOCATIONS OF GAUGES SHALL BE ON TOPS OF THE HORIZONTAL DISCHARGE PIPING, INSIDE THE VALVE CHAMBER AND UPSTREAM FROM EACH CHECK VALVE.

GAUGE AND ACCESSORY REQUIREMENTS:

PRESSURE GAUGES SHALL BE SOLID FRONT, LIQUID FILLED GAUGES WITH CLEAR GLASS WINDOWS, BOTTOM 1/4" NPT OUTLET AND STAINLESS STEEL BOURDON TUBE. ALL GAUGES SHALL BE DUAL-CALIBRATED IN FEET OF WATER AND PSIG. GAUGES SHALL BE 4 1/2" IN DIAMETER. ALL GAUGES SHALL BE FITTED WITH AN APPROVED IMPULSE DAMPENER. GAUGES SHALL BE NO. 127581 WITH NO. 11105 IMPULSE DAMPENER, BY ASCROFT, OR APPROVED EQUAL BY U.S. GAUGE, H.O. TRERICE CO., HELICOID OF ROBERTSHAW.

PUMP DISCHARGE SIDE GAUGES SHALL HAVE FULL DIAL REGISTRATION FOR 0 TO 100 PSIG/0 TO 200 FEET.

START-UP

THE CONTRACTOR SHALL ARRANGE AND CONDUCT A PUMP STATION START-UP MEETING WITH THE OWNER PRIOR TO DISCHARGE OF SEWAGE TO PUMP STATION.

ALL ASPECTS OF THE PUMP STATION OPERATION SHALL BE TESTED AND DOCUMENTED AS DETAILED IN THE ELECTRICAL SPECIFICATIONS WITHIN THE ELECTRICAL DRAWINGS.

HYDRAULIC POWERED GRINDER

A HYDRAULIC POWERED GRINDER (MUFFIN MONSTER) AS MANUFACTURED BY JWC ENVIRONMENTAL SHALL BE PROVIDED. THE INSTALLATION OF THE GRINDER SHALL INCLUDE A STAINLESS STEEL FRAME AND RETRIEVAL SYSTEM MOUNTED ON THE INTERIOR WALL OF THE WET WELL AT THE INLET OF THE INFLUENT LINE. ALL CONTROL AND HYDRAULIC POWER SUPPLY WILL BE INSTALLED COMPLETE AS PART OF THE GRINDER INSTALLATION. APPROXIMATE NET WEIGHT OF GRINDER IS 330 LBS.

TEST BORING LOG table with columns for Depth, Sample Depth, Type of Sample, Blows per 6" on Sampler, Moisture, Strata Change Depth, Soil Identification, and Proportions Used. Includes data for 18.0, 20.0, 40.0, 5.5-10.0, 13.5-15.0, 18.5-20.0, and 21.5 depths.

\* The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

720 Greencrest Drive • Westerville, Ohio 43081 • 614-895-1400



DELAWARE COUNTY, OHIO THE OAKS PHASE A LIFT STATION GENERAL NOTES R.D. Zande & Associates, Inc. 1600 Lake Shore Drive, Suite 100, Columbus, Ohio 43204 (614) 486-4387 FAX (614) 486-4387

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**SEQUENCE OF CONSTRUCTION**

**PHASE 1**

ERECT TRAFFIC CONTROL PER FIGURE 6H-10 OF THE OMUTCD TO MAINTAIN TWO-WAY/ONE-LANE TRAFFIC WITH FLAGGERS ALONG THE SOUTH SIDE OF HARRIOTT ROAD. CONSTRUCT MANHOLE 4 AT STA. 10+76.29. REPLACE PAVEMENT AS NEEDED PER DCED-R1441, TYPE I. SEE DETAIL THIS SHEET.

**PHASE 2**

ERECT TRAFFIC CONTROL PER FIGURE 6H-10 OF THE OMUTCD TO MAINTAIN TWO-WAY/ONE-LANE TRAFFIC WITH FLAGGERS ALONG THE SOUTH SIDE OF HARRIOTT ROAD. CONSTRUCT MANHOLE 5 AT STA. 10+76.29. REPLACE PAVEMENT AS NEEDED PER DCED-R1441, TYPE I. SEE DETAIL THIS SHEET.

ALLOWABLE TIMES TO REDUCE HARRIOTT ROAD TO TWO-WAY/ONE-LANE ROADWAY.

WEEKDAYS 9:00AM - 3:00PM

**ALTERNATE METHODS**

IF THE CONTRACTOR SO ELECTS, S/HE MAY SUBMIT ALTERNATE METHODS FOR THE MAINTENANCE OF TRAFFIC, PROVIDED THE INTENT OF THE ABOVE PROVISIONS IS FOLLOWED AND NO ADDITIONAL INCONVENIENCE TO THE TRAVELING PUBLIC RESULTS THEREFROM. NO ALTERNATE PLAN SHALL BE PLACED INTO EFFECT UNTIL APPROVAL HAS BEEN GRANTED, IN WRITING, BY THE DIRECTOR.

**PLACEMENT OF ASPHALT CONCRETE**

TWO-WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES EXCEPT THAT ONE-WAY TRAFFIC WILL BE PERMITTED FOR MINIMUM PERIODS OF TIME CONSISTENT WITH THE REQUIREMENTS OF THE SPECIFICATIONS FOR PROTECTION OF COMPLETED ASPHALT CONCRETE COURSES.

**TRENCH FOR WIDENING**

TRENCH EXCAVATION FOR BASE WIDENING SHALL BE ONLY ON ONE SIDE OF THE PAVEMENT AT A TIME. THE OPEN TRENCH SHALL BE ADEQUATELY MAINTAINED AND PROTECTED WITH DRUMS OR BARRICADES AT ALL TIMES. PLACEMENT OF PROPOSED SUBBASE AND BASE MATERIAL SHALL FOLLOW AS CLOSELY AS POSSIBLE BEHIND EXCAVATION OPERATIONS. THE LENGTH OF TRENCH WHICH IS OPEN AT ANY ONE TIME SHALL BE HELD TO A MINIMUM AND SHALL AT ALL TIMES BE SUBJECT TO APPROVAL OF THE ENGINEER.

**OVERNIGHT TRENCH CLOSING**

THE BASE WIDENING SHALL BE COMPLETED TO A DEPTH OF NO MORE THAN FIVE INCHES BELOW THE EXISTING PAVEMENT BY THE END OF EACH WORK DAY. NO TRENCH SHALL BE LEFT OPEN OVERNIGHT EXCEPT FOR A SHORT LENGTH, 25 FEET OR LESS, OF A WORK SECTION AT THE END OF THE TRENCH. IN CASE WORK MUST BE SUSPENDED BECAUSE OF INCLEMENT WEATHER OR OTHER REASONS, THE TRENCH FOR THE UNCOMPLETED BASE WIDENING SHALL BE BACKFILLED AT THE DIRECTION OF THE ENGINEER.

**DUST CONTROL**

THE CONTRACTOR SHALL FURNISH AND APPLY WATER FOR DUST CONTROL AS DIRECTED BY THE ENGINEER. THE FOLLOWING CONTINGENCY QUANTITY HAS BEEN INCLUDED FOR DUST CONTROL PURPOSES:

616, WATER 2.5 M GAL.

**DROPOFFS IN WORKZONE**

THE DROPOFF ADJACENT TO THE TRAVELED LANE SHALL BE NO GREATER THAN 5 INCHES BELOW THE EXISTING PAVEMENT BY THE END OF EACH WORK DAY. THIS REQUIREMENT MAY BE MET BY TEMPORARILY PLACING SUBBASE AND BASE MATERIAL TO WITHIN 5 INCHES OF THE EXISTING GRADE ADJACENT TO THE TRAVELED LANE AND SLOPING THE MATERIAL AT 3:1 OR FLATTER WITHIN THE EXCAVATED AREA. PLACEMENT OF PROPOSED SUBBASE AND BASE MATERIAL SHALL FOLLOW AS CLOSELY AS POSSIBLE BEHIND EXCAVATION OPERATIONS DURING WORKING HOURS. THESE REQUIREMENTS SHALL BE MET AT NO ADDITIONAL COST.

**ITEM 614, REPLACEMENT SIGN**

FLAT SHEET SIGNS FURNISHED BY THE CONTRACTOR IN ACCORDANCE WITH THE REQUIREMENTS OF THE PLANS, SPECIFICATIONS AND PROPOSAL WHICH BECOME DAMAGED BY TRAFFIC FOR REASONS BEYOND THE CONTROL TO THE CONTRACTOR SHALL BE REPLACED IN KIND WHEN ORDERED BY THE ENGINEER. REPLACEMENT SIGNS SHALL BE NEW. OTHER MATERIALS MAY BE IN USED BUT GOOD CONDITION SUBJECT TO APPROVAL BY THE ENGINEER.

PAYMENT FOR THE NEW SIGNS SHALL BE MADE AT THE CONTRACT PRICE PER SQUARE FOOT FOR ITEM 614, REPLACEMENT SIGN, AND SHALL INCLUDE THE COST OF REMOVING AND DISPOSING OF DAMAGED SIGNS, HARDWARE AND SUPPORTS, AND PROVIDING THE NECESSARY REPLACEMENT HARDWARE, SUPPORTS, ETC.

**ITEM 614, REPLACEMENT DRUM**

DRUMS FURNISHED BY THE CONTRACTOR IN ACCORDANCE WITH THE REQUIREMENTS OF THE PLANS, SPECIFICATIONS AND PROPOSAL WHICH BECOME DAMAGED BY TRAFFIC FOR REASONS BEYOND THE CONTROL OF THE CONTRACTOR SHALL BE REPLACED IN KIND WHEN ORDERED BY THE ENGINEER. REPLACEMENT DRUMS SHALL BE NEW. PAYMENT FOR THE NEW DRUMS SHALL BE MADE AT THE CONTRACT PRICE PER EACH FOR ITEM 614, REPLACEMENT DRUM, AND SHALL INCLUDE THE COST OF REMOVING AND DISPOSING OF THE DAMAGED DRUM, AND PROVIDING AND MAINTAINING THE REPLACEMENT DRUM IN ACCORDANCE WITH THE CONTRACT REQUIREMENTS FOR THE ORIGINAL DRUM.

**COVERING OF SIGNS**

WHERE THE PLANS CALL FOR A PERMANENT SIGN TO BE COVERED, THE CONTRACTOR SHALL DO SO IN SUCH A MANNER AS TO AVOID DAMAGING THE PERMANENT SIGN WHEN THE COVER IS REMOVED. THE COVER SHALL BE TOTALLY OPAQUE. THE USE OF ADHESIVE TAPE APPLIED DIRECTLY TO A SIGN FACE IS STRICTLY PROHIBITED.

**ITEM 614, LAW ENFORCEMENT OFFICER (WITH PATROL CAR)**

IN ADDITION TO THE REQUIREMENTS OF 614 AND THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (OMUTCD), A UNIFORMED LAW ENFORCEMENT OFFICER (AND OFFICIAL PATROL CAR WITH WORKING TOP MOUNTED EMERGENCY FLASHING LIGHTS) SHALL BE PROVIDED FOR CONTROLLING TRAFFIC FOR THE FOLLOWING TASKS:

FOR LANE CLOSURES: DURING INITIAL SET-UP PERIODS, TEAR DOWN PERIODS, SUBSTANTIAL SHIFTS OF A CLOSURE POINT OR WHEN NEW LANE CLOSURE ARRANGEMENTS ARE INITIATED.

DURING THE ENTIRE ADVANCE PREPARATION AND CLOSURE SEQUENCE WHERE COMPLETE BLOCKAGE OF TRAFFIC IS REQUIRED.

DURING A TRAFFIC SIGNAL INSTALLATION.

LAW ENFORCEMENT OFFICERS (LEO'S) SHOULD NOT BE USED WHERE THE OMUTCD INTENDS THAT FLAGGERS BE USED. THE LEO'S ARE CONSIDERED TO BE EMPLOYED BY THE CONTRACTOR AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR THEIR ACTIONS. ALTHOUGH THEY ARE EMPLOYED BY THE CONTRACTOR, THE PROJECT ENGINEER SHALL HAVE CONTROL OVER THEIR PLACEMENT. THE OFFICIAL PATROL CAR SHALL BE A PUBLIC SAFETY VEHICLE AS REQUIRED BY THE OHIO REVISED CODE.

IT IS THE CONTRACTORS RESPONSIBILITY TO MAKE ARRANGEMENTS WITH THE DELAWARE COUNTY SHERIFFS DEPARTMENT REGARDING THE NEED FOR LAW ENFORCEMENT OFFICERS.

LAW ENFORCEMENT OFFICERS (WITH PATROL CAR) REQUIRED BY THE TRAFFIC MAINTENANCE TASKS ABOVE SHALL BE PAID FOR ON A UNIT PRICE (HOURLY) BASIS UNDER ITEM 614, LAW ENFORCEMENT OFFICER (WITH PATROL CAR). THE FOLLOWING ARE ESTIMATED QUANTITIES:

614, LAW ENFORCEMENT OFFICER WITH PATROL CAR 40 HOURS

THE HOURS PAID SHALL INCLUDE MINIMUM SHOW-UP TIME REQUIRED BY THE LAW ENFORCEMENT AGENCY INVOLVED.

IF CONTRACTORS WISH TO UTILIZE LEO'S FOR FLAGGING AND TRAFFIC CONTROL OTHER THAN FOR THAT REQUIRED IN THESE PLANS, THEY MAY DO SO AT THEIR OWN EXPENSE. PAYMENT FOR THE EXCESS ABOVE THE CONTRACT REQUIREMENTS WILL BE INCLUDED UNDER ITEM 614 MAINTENANCE OF TRAFFIC.

**NOTES:**

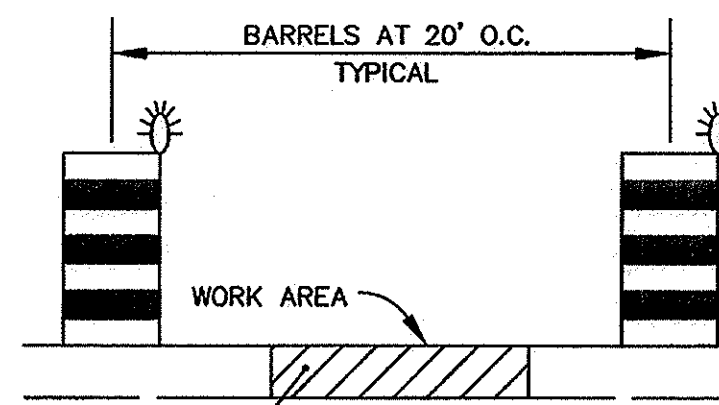
THE PROJECT SHALL BE VIDEO TAPED PRIOR TO CONSTRUCTION. ONE COPY OF THE VIDEO SHALL BE SUBMITTED TO THE DELAWARE COUNTY ENGINEER FOR OUR RECORDS.

ANY DAMAGE TO THE EXISTING ROADWAY, INCLUDING DAMAGE TO THE PAVEMENT, SHOULDER, DITCH, ETC. CAUSED BY CONSTRUCTION ACTIVITIES SHALL BE REPAIRED BY THE CONTRACTOR AT THE DISCRETION OF THE DELAWARE COUNTY ENGINEER.

**LEGEND**

LIGHTED BARREL

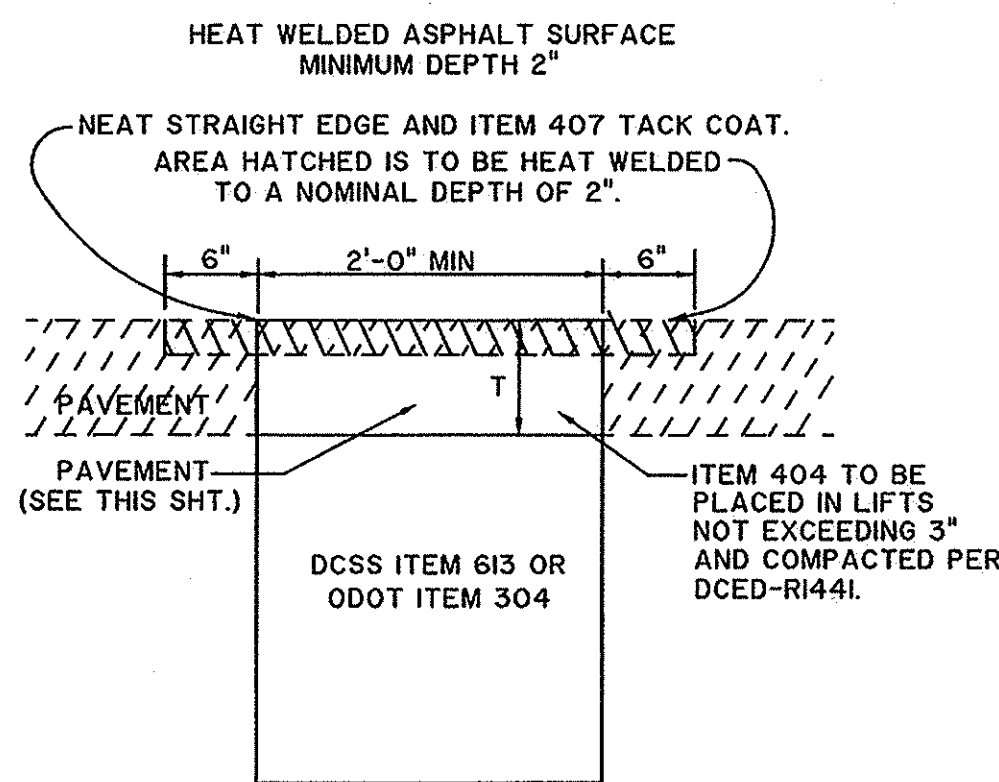
DAMAGED PAVEMENT (TO BE REPLACED)



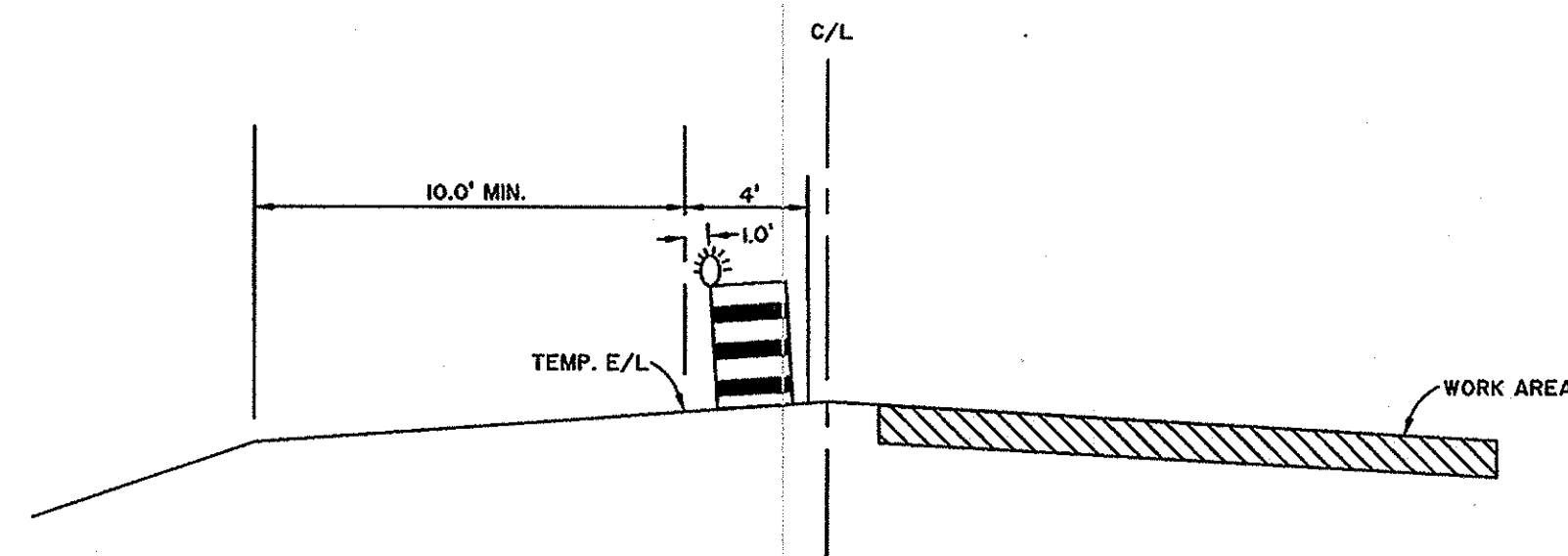
PERMANENT PAVEMENT—REPLACEMENT AS NEEDED, SEE TYPICAL SECTION THIS SHEET.

**HARRIOTT ROAD SECTION A-A**

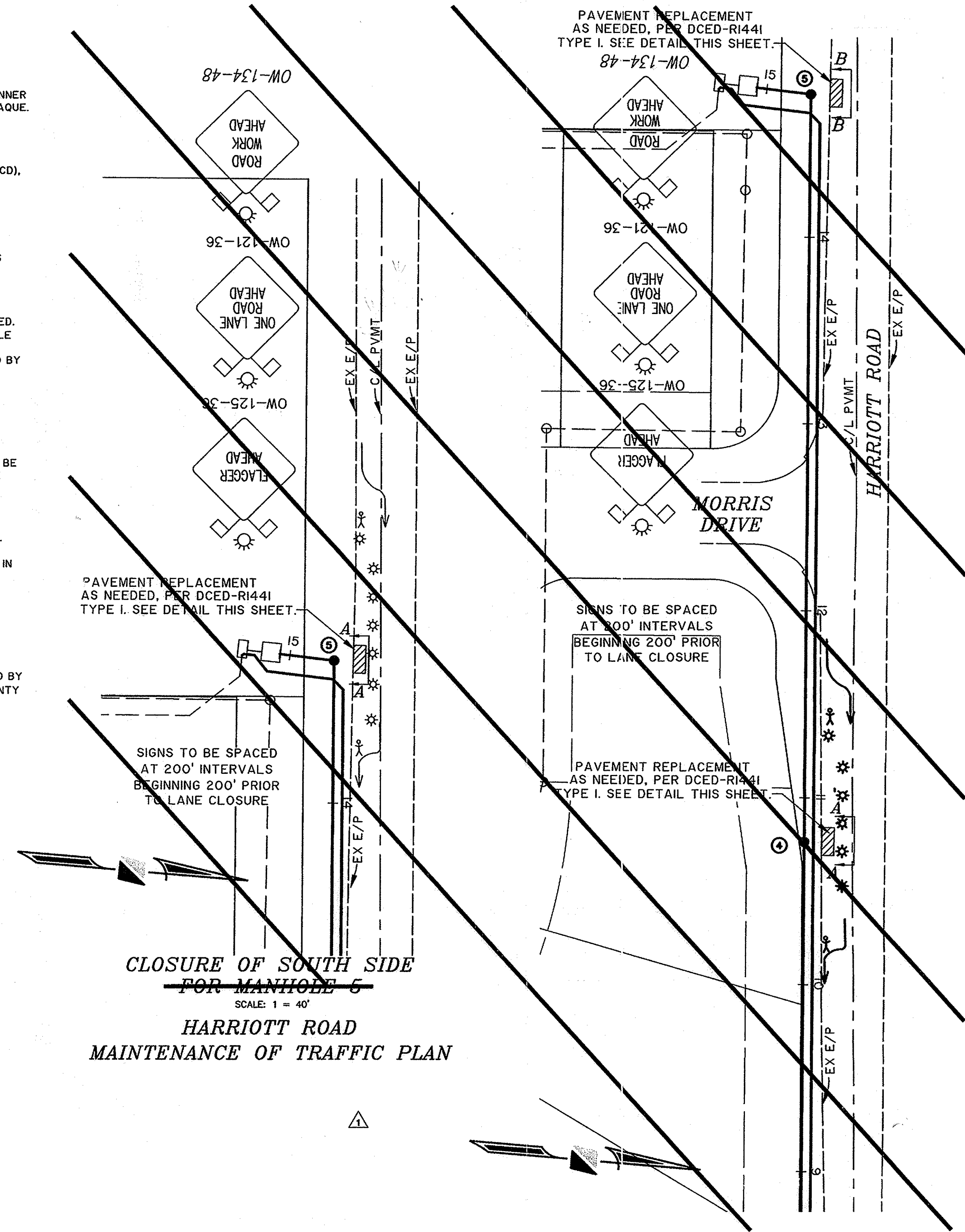
NOT TO SCALE (COST TO BE INCLUDED IN VARIOUS BID ITEMS)



**TYPE I STANDARD FLEXIBLE ASPHALT REPAIR WITH FLEXIBLE HEATWELD SURFACE**  
NOT TO SCALE



**TWO-WAY/ONE-LANE TRAFFIC SHIFT**



**CLOSURE OF SOUTH SIDE FOR MANHOLE 5**

SCALE: 1" = 40'

**HARRIOTT ROAD MAINTENANCE OF TRAFFIC PLAN**

**CLOSURE OF SOUTH SIDE FOR MANHOLE 4**

SCALE: 1" = 40'

DELAWARE COUNTY, OHIO  
**THE OAKS PHASE A**  
SANITARY SEWER, FORCEMAIN & LIFT STATION IMPROVEMENTS

**MAINTENANCE OF TRAFFIC**

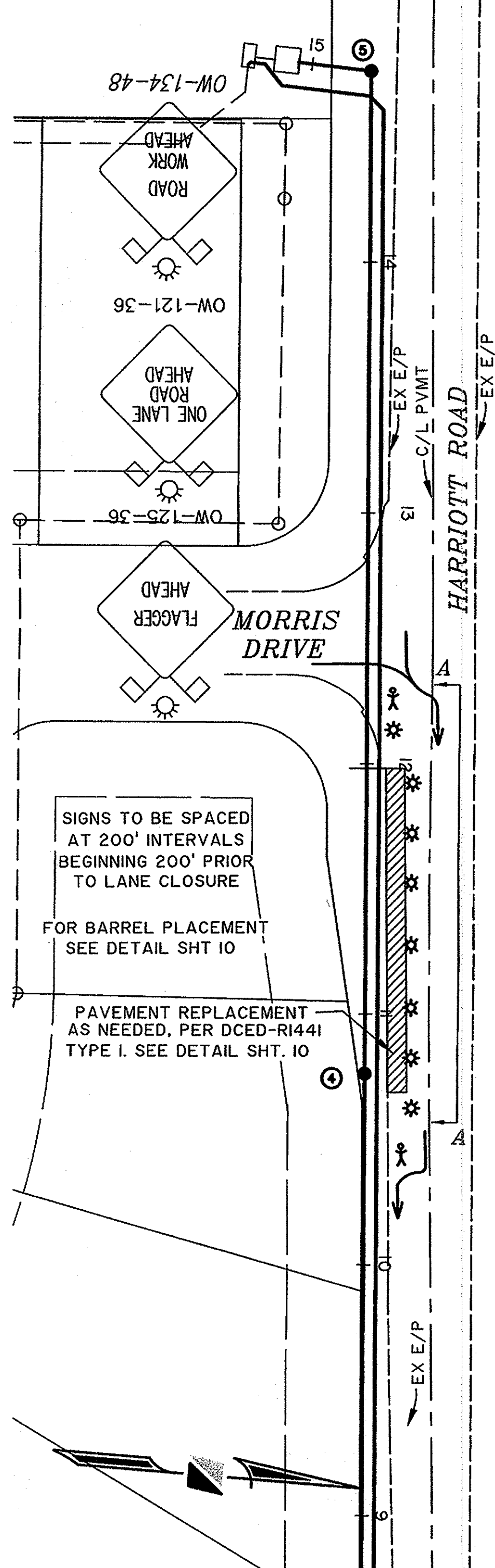
SCALE: AS NOTED

- SEPARATED SANITARY PLAN INTO PHASES A & B
- REVISED PIPE RUNS TO BE OPEN CUT

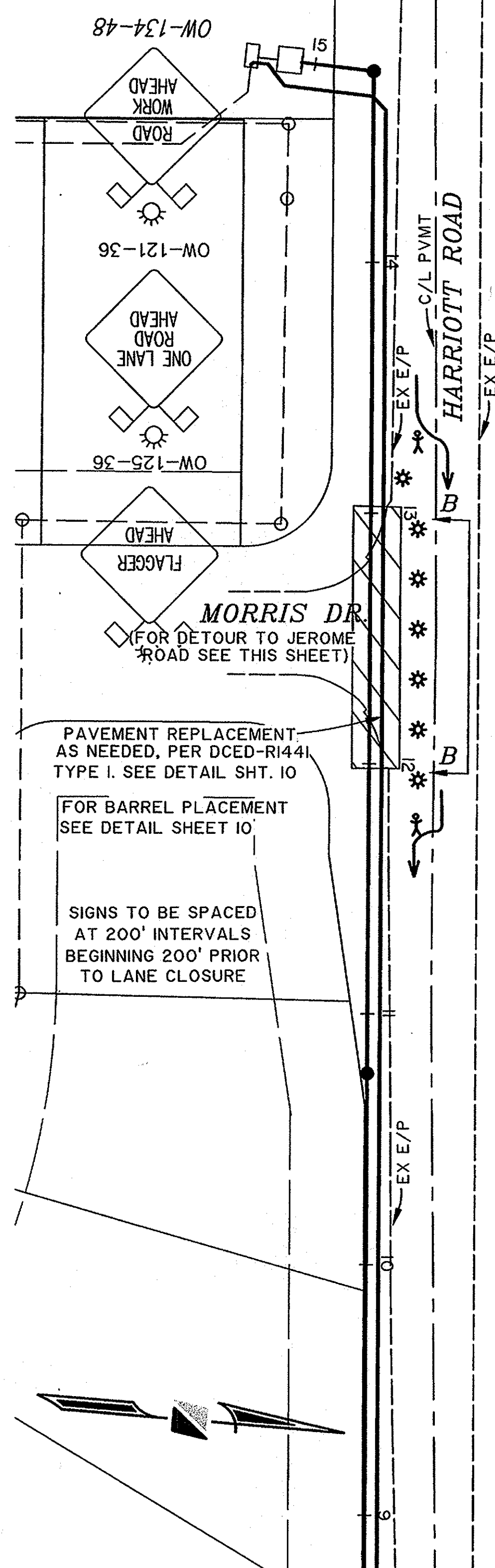
**R.D. Zande & Associates, Inc.**  
1600 Lake Shore Drive Suite 100, Columbus, Ohio 43216  
(614) 488-4382 1-800-540-2745  
FAX (614) 488-4387

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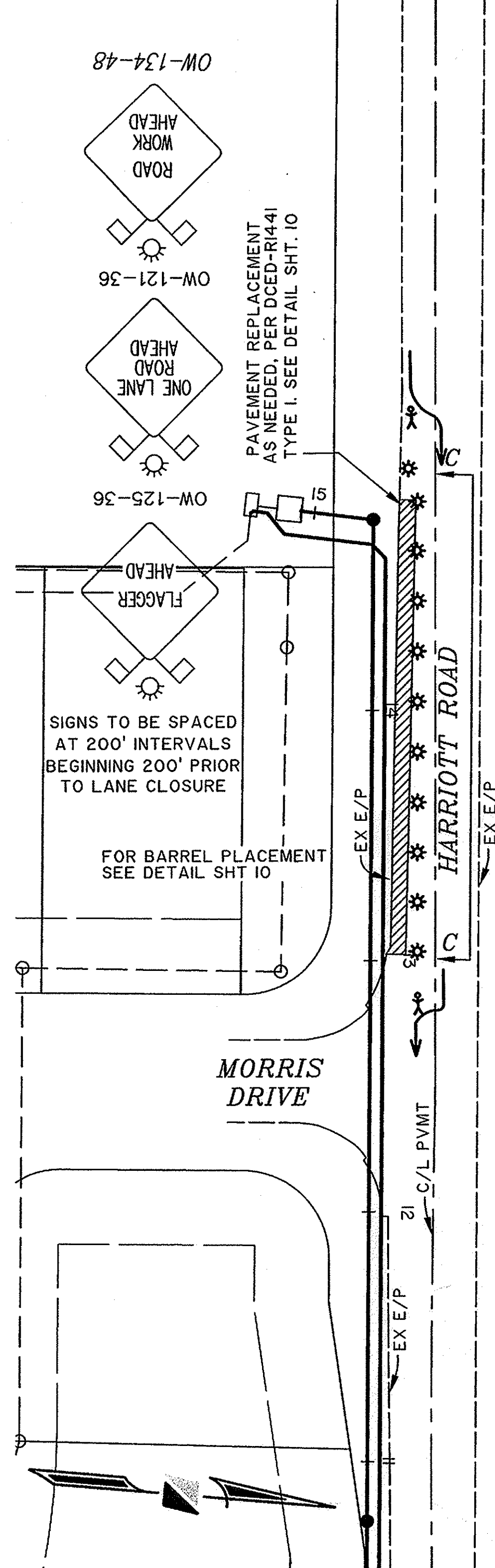




**SECTION A-A**  
**CLOSURE OF SOUTH SIDE**  
**FOR MANHOLE 4**  
 SCALE: 1 = 40'

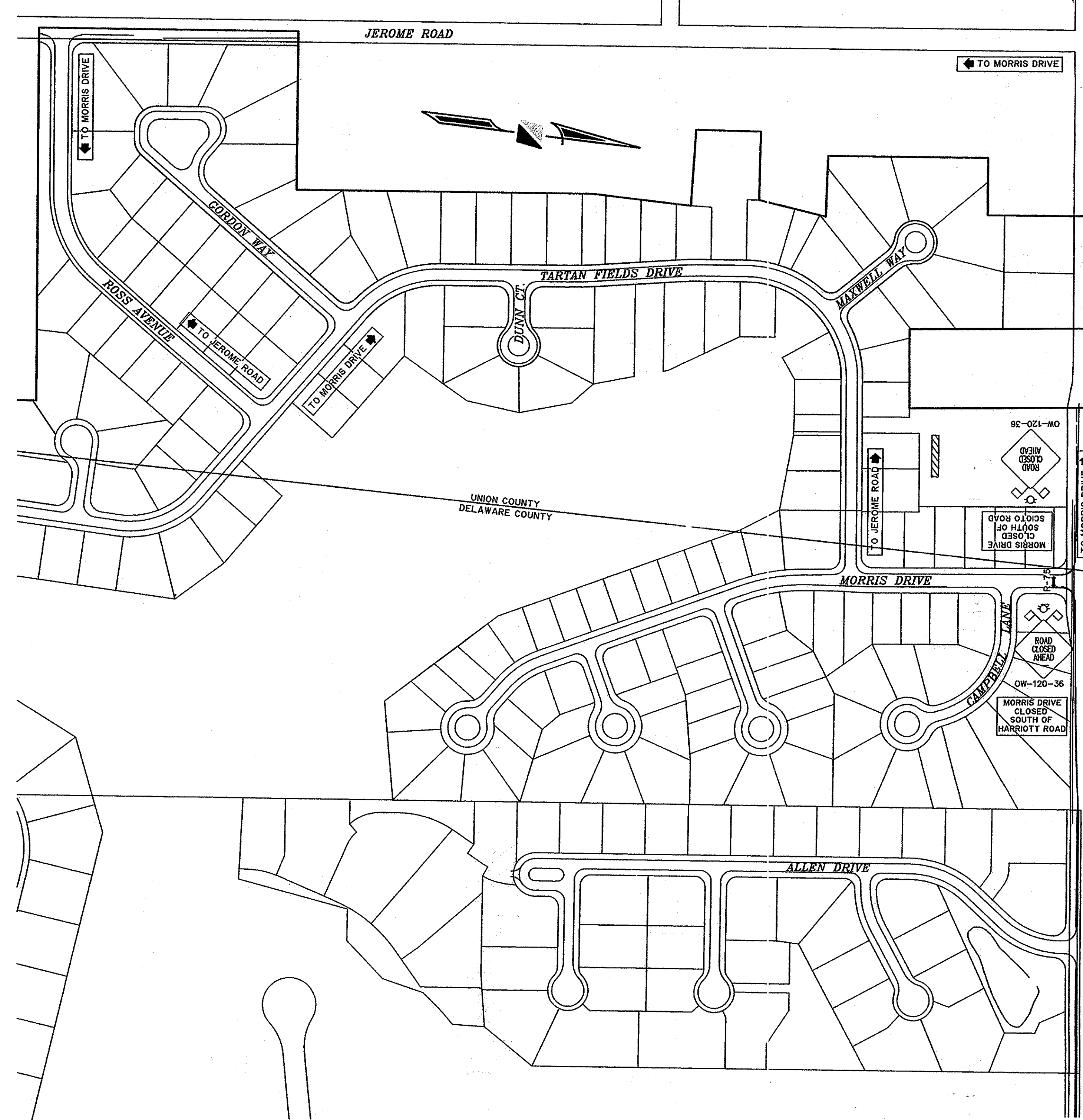


**SECTION B-B**  
**CLOSURE OF SOUTH SIDE**  
**FOR MORRIS DRIVE**  
 SCALE: 1 = 40'



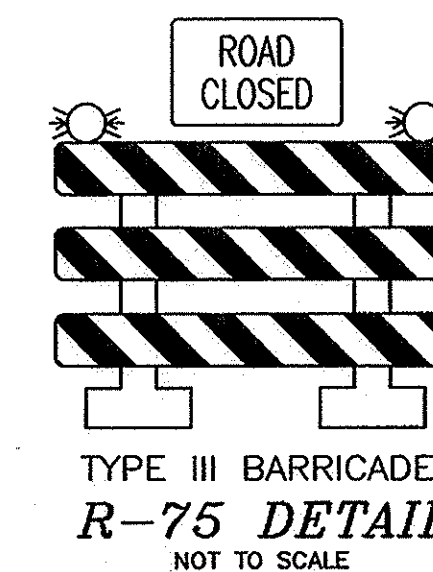
**SECTION C-C**  
**CLOSURE OF SOUTH SIDE**  
**FOR MANHOLE 5**  
 SCALE: 1 = 40'

NOTE: A FULL WIDTH OVERLAY (1 1/2" OF ITEM 404) IS REQUIRED ON HARRIOTT ROAD IF THE EXISTING PAVEMENT ON HARRIOTT ROAD IS DISTURBED AND PAVEMENT REPLACEMENT IS REQUIRED. THE LIMITS OF THE OVERLAY SHALL NOT EXCEED THE LIMITS OF THE DISTURBANCE. CONTRACTORS SHALL PROVIDE A BUTT JOINT ODOT 8.P.3.1 AT THE LIMITS OF THE OVERLAY ON HARRIOTT ROAD.



**MORRIS DRIVE**  
**MAINTENANCE OF TRAFFIC PLAN**  
 SCALE: 1 = 200'

- LEGEND**
- ☼ LIGHTED BARREL
  - ♠ LAW ENFORCEMENT OFFICER
  - FLOW OF TRAFFIC
  - ▨ OPEN TRENCH

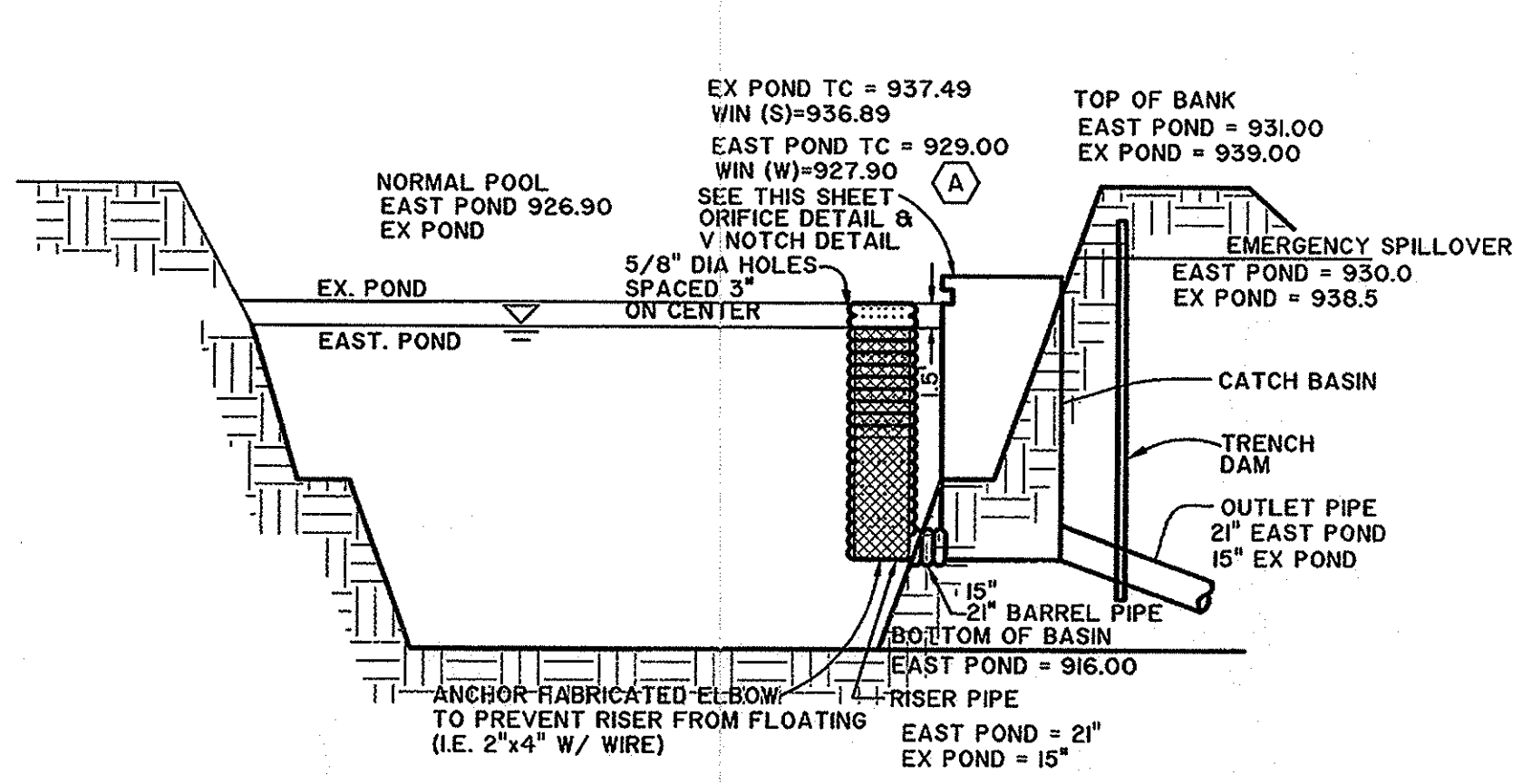


SEPARATED SANITARY PLAN INTO PHASES A & B

DELAWARE COUNTY, OHIO  
**THE OAKS**  
**PHASE A**  
 SANITARY SEWER, FORCEMIAN & LIFT STATION IMPROVEMENTS  
 MAINTENANCE OF TRAFFIC  
 SCALE: AS NOTED  
 R.D. Zande & Associates, Inc.  
 1600 Lake Shore Drive Suite 100, Columbus, Ohio 43216  
 (614) 488-4333 1-800-340-2743  
 FAX (614)-488-4387

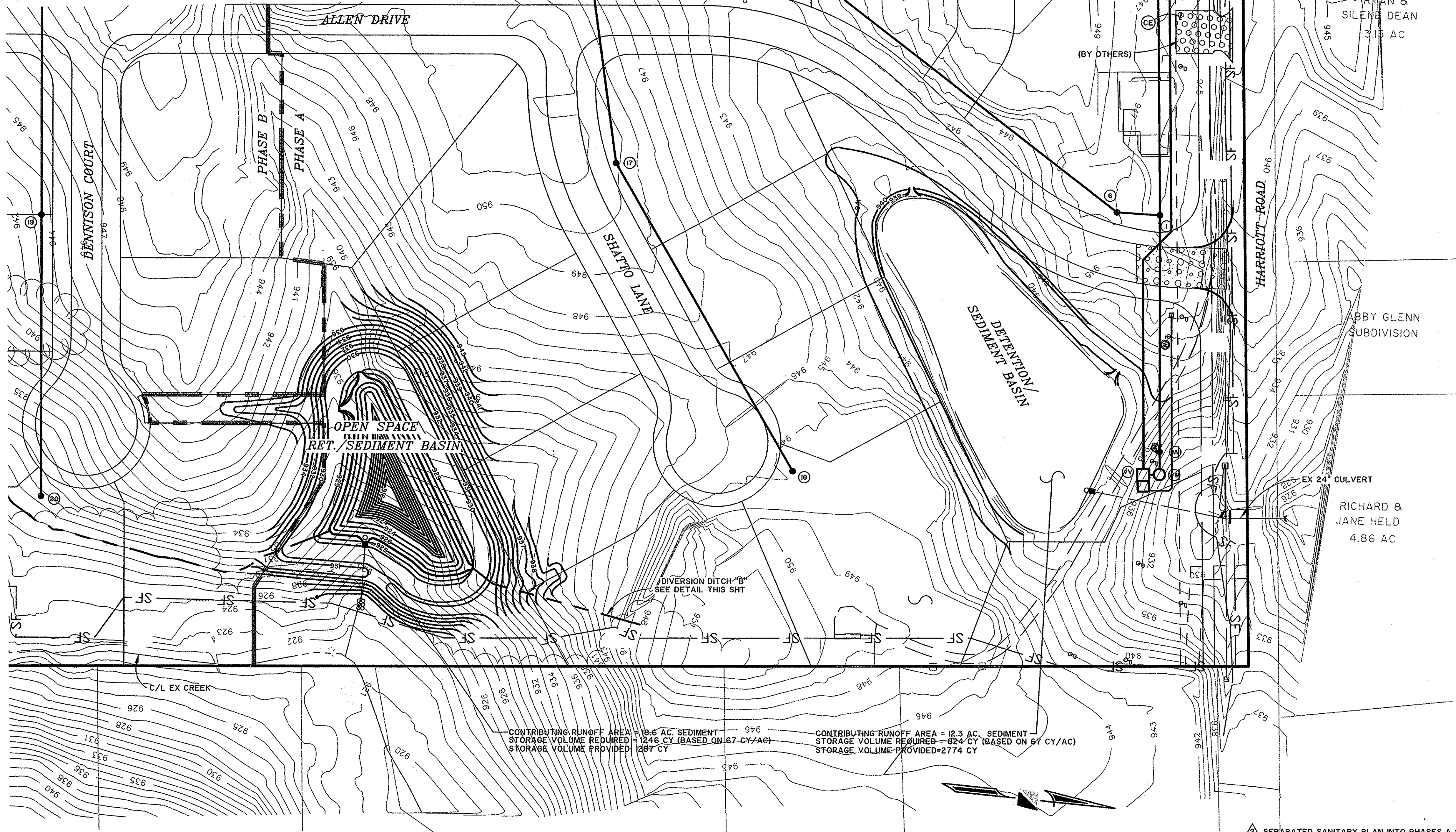
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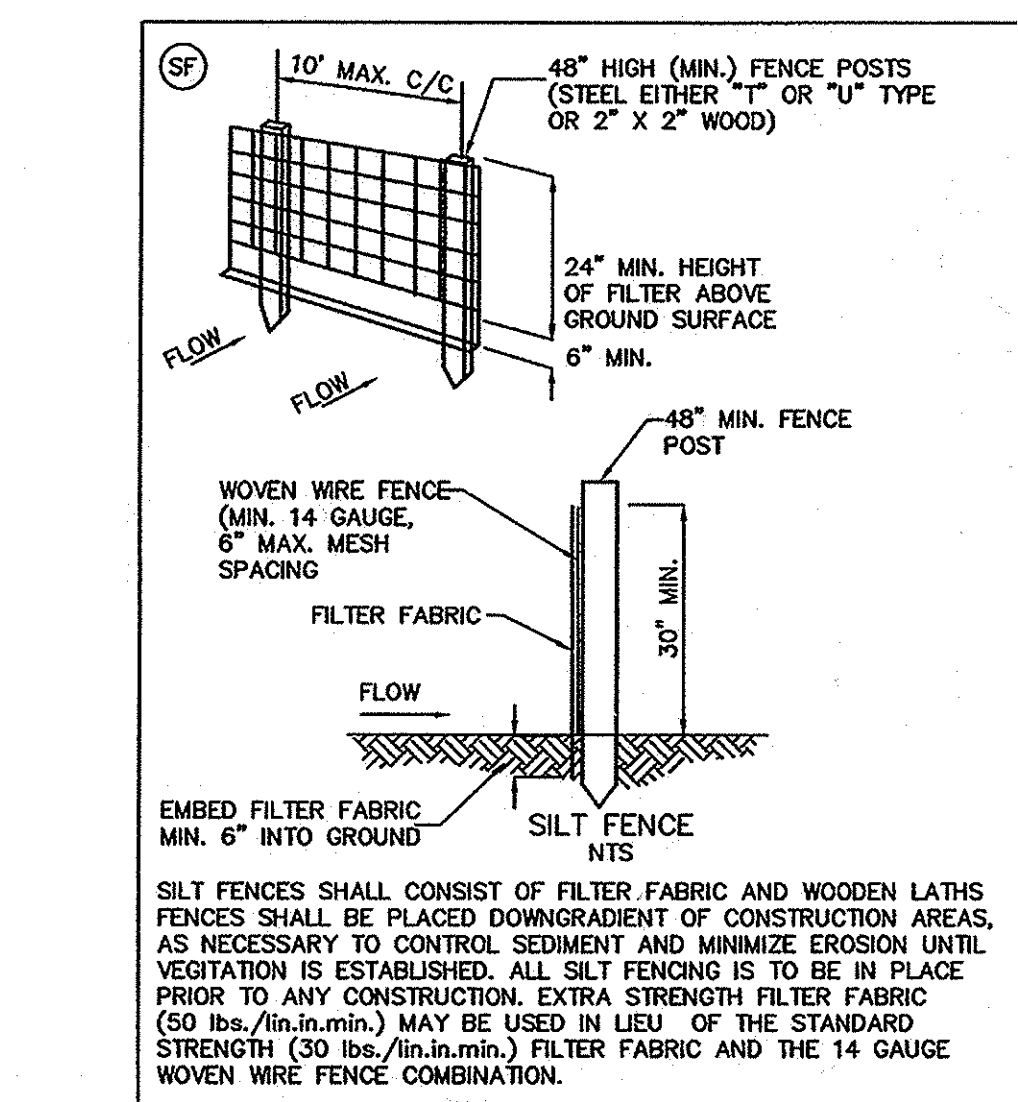
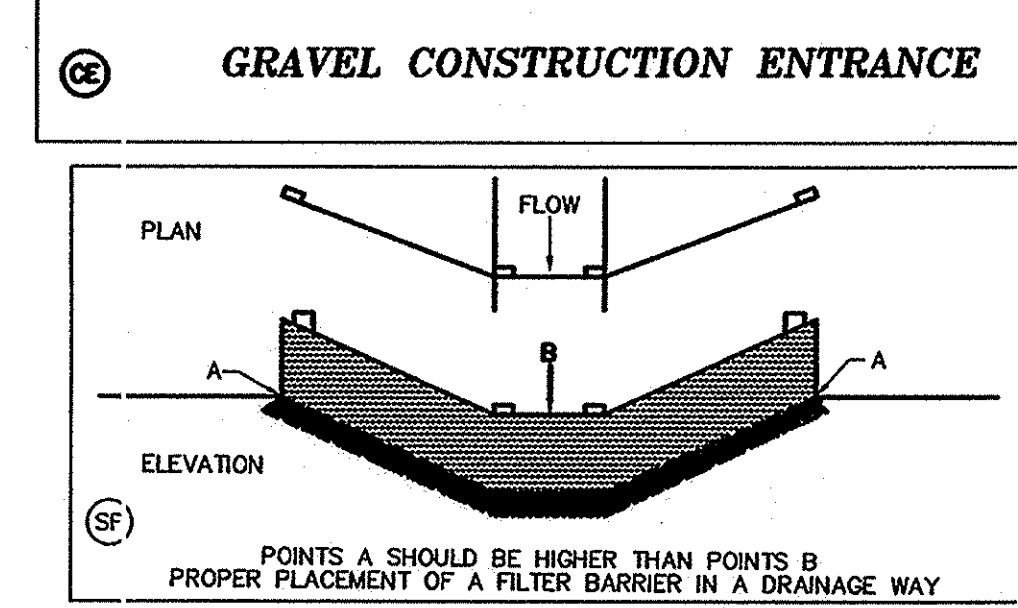
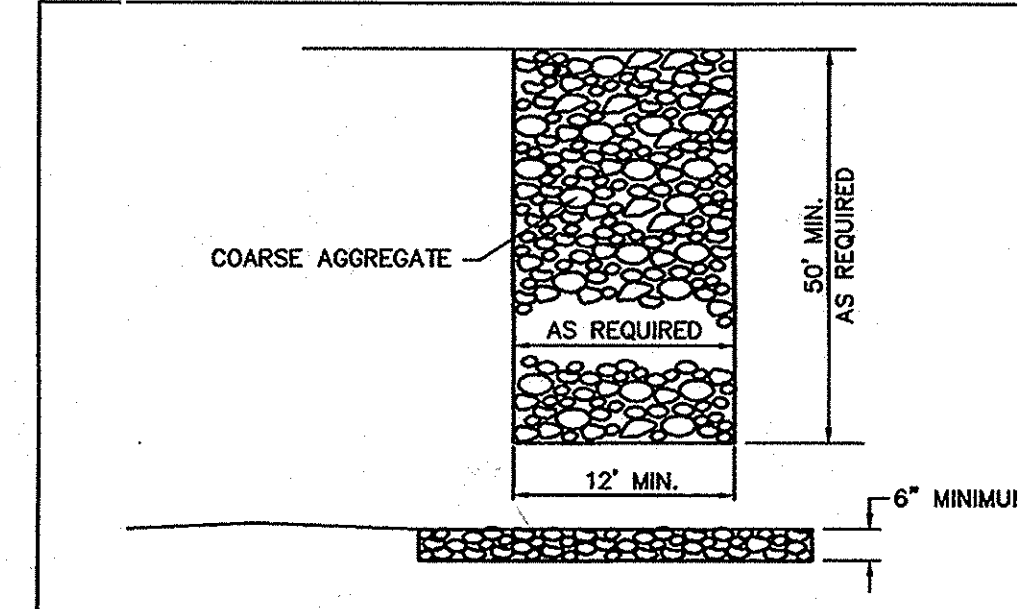
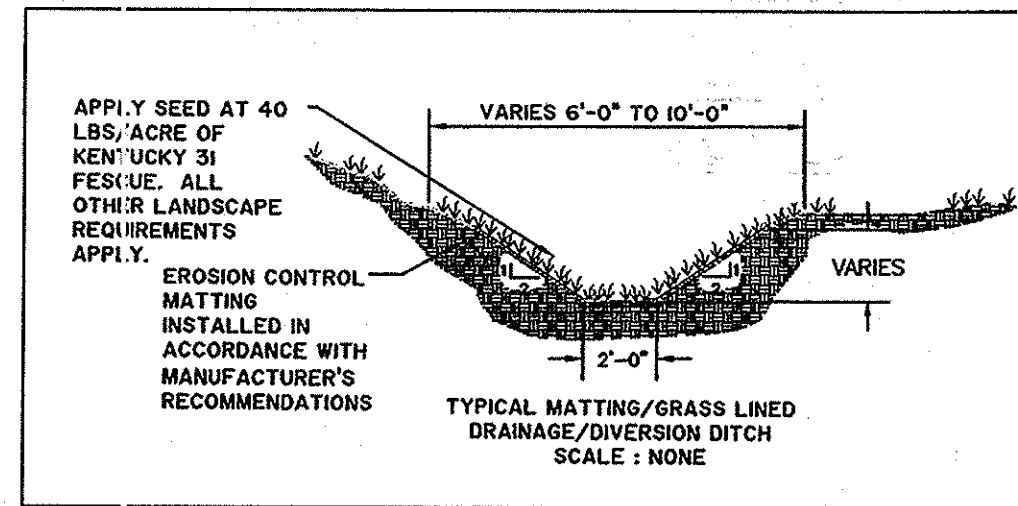
**SEDIMENT BASIN RISER DETAIL  
EAST POND & EX. POND**

NOT TO SCALE  
 (A) CATCH BASIN WINDOW AND V-NOTCH WEIR TO BE TEMPORARILY BLOCKED SHUT. BLOCKING TO BE REMOVED UPON SITE STABILIZATION.



CONTRIBUTING RUNOFF AREA = 18.6 AC. SEDIMENT STORAGE VOLUME REQUIRED = 1246 CY (BASED ON 67 CY/AC) STORAGE VOLUME PROVIDED = 1287 CY

CONTRIBUTING RUNOFF AREA = 12.3 AC. SEDIMENT STORAGE VOLUME REQUIRED = 824 CY (BASED ON 67 CY/AC) STORAGE VOLUME PROVIDED = 2774 CY



- SEQUENCE OF CONSTRUCTION**
1. REFER TO THE OAKS PREGRADE PLAN.
  2. REPAIR SILT FENCE AS NEEDED.
  3. CONSTRUCT SANITARY SEWER AND LIFTSTATION. LIMIT GRADING/DISTURBANCE TO TRENCH AND LIFT STATION SITE PLAN ONLY.
  4. GRADE LIFTSTATION PARKING AREA AND DRIVE ENTRANCE.
  5. LEAVE EROSION CONTROL MEASURES AND RISERS IN PLACE UNTIL SITE IS STABILIZED.

DELAWARE COUNTY, OHIO

**THE OAKS  
PHASE A**

**SANITARY EROSION CONTROL PLAN**

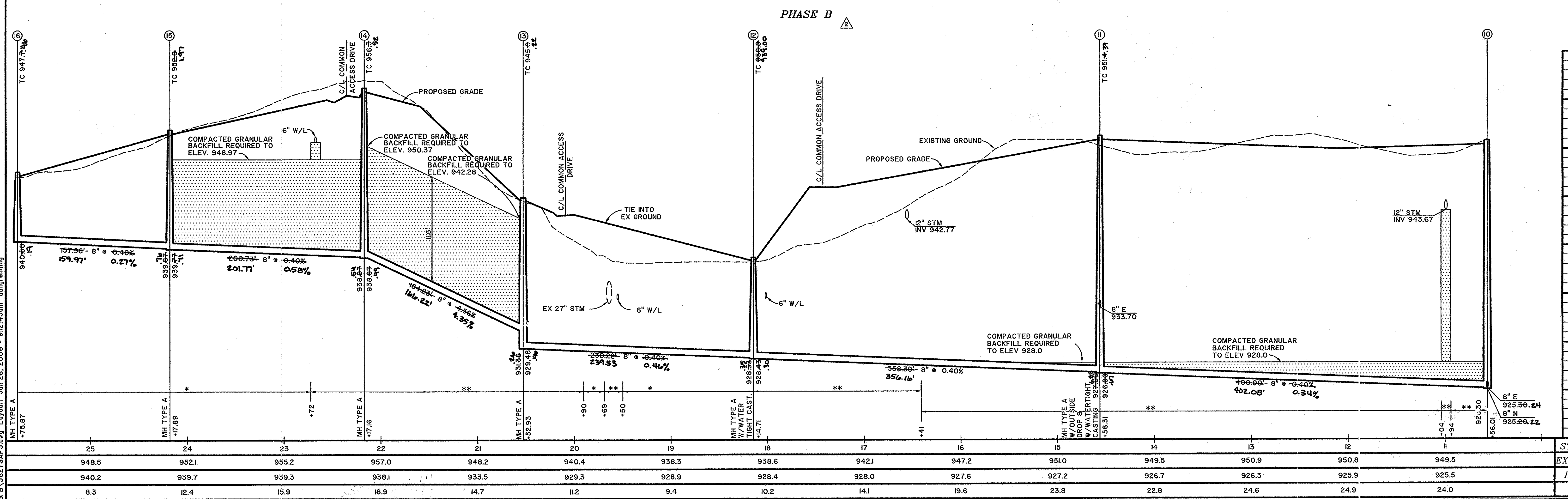
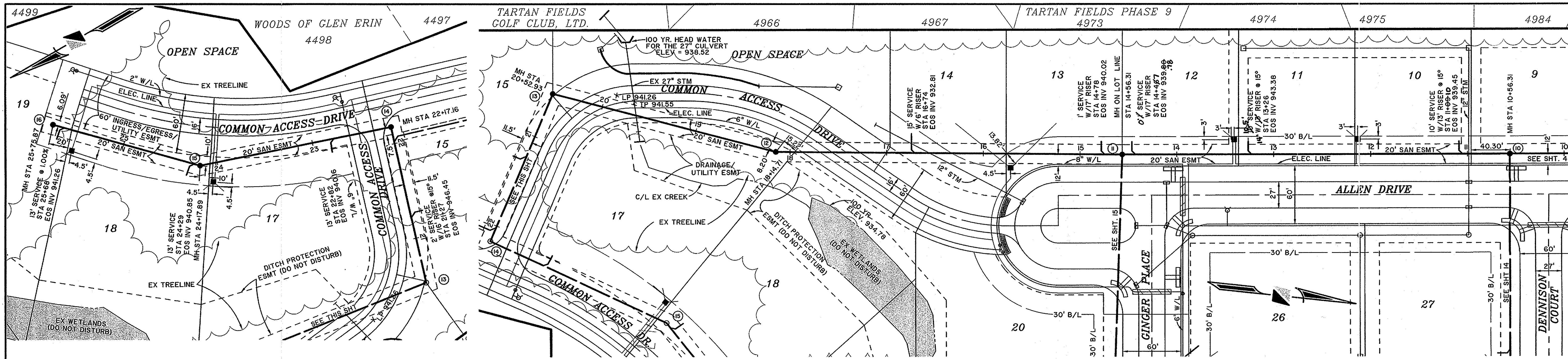
R.D. Zande & Associates, Inc.  
 1600 Lake Shore Drive, Suite 100, Columbus, Ohio 43204  
 (614) 488-4383 1-800-940-2743  
 FAX (614) 488-4387

SCALE: 1" = 50'

P:\362\The OAKS\SANITARY\_Son Phase A & B\3627SAER.dwg Layout Jun 26, 2006 - 9:11:09am dongreming

SEPARATED SANITARY PLAN INTO PHASES A & B





**NOTES:**

- \* COMPACTED NATIVE BACKFILL, SEE DETAIL & GENERAL NOTES, SHEET I.
- \*\* COMPACTED GRANULAR BACKFILL, SEE DETAIL & GENERAL NOTES, SHEET I.
- ≠ THE CONTRACTOR MAY BE REQUIRED TO TEMPORARILY DAM THE DITCH AND PUMP THE WATER WHILE THE SANITARY IS CONSTRUCTED. COST TO BE INCLUDED IN VARIOUS BID ITEMS.
- PROPOSED ELECTRICAL TRANSFORMERS

RISERS INSTALLED @ 45° FROM VERTICAL UNLESS NOTED. IF LESS THAN 45° THEN CONCRETE ENCASEMENT SHALL BE PROVIDED PER STD DWG NO.03.

ALL WATERLINES & STORM SEWERS MUST BE AT LEAST 10' FROM ALL SANITARY MANHOLES.

SEPARATED SANITARY PLAN INTO PHASES A & B

DELAWARE COUNTY, OHIO

**THE OAKS**

**PHASE B**

SANITARY SEWER IMPROVEMENTS

MH #10 TO MH #16

R.D. Zande & Associates, Inc.

1600 Lake Shore Drive, Suite 100, Columbus, Ohio 43204

(614) 488-8888 1-800-340-2749

FAX (614) 488-4587

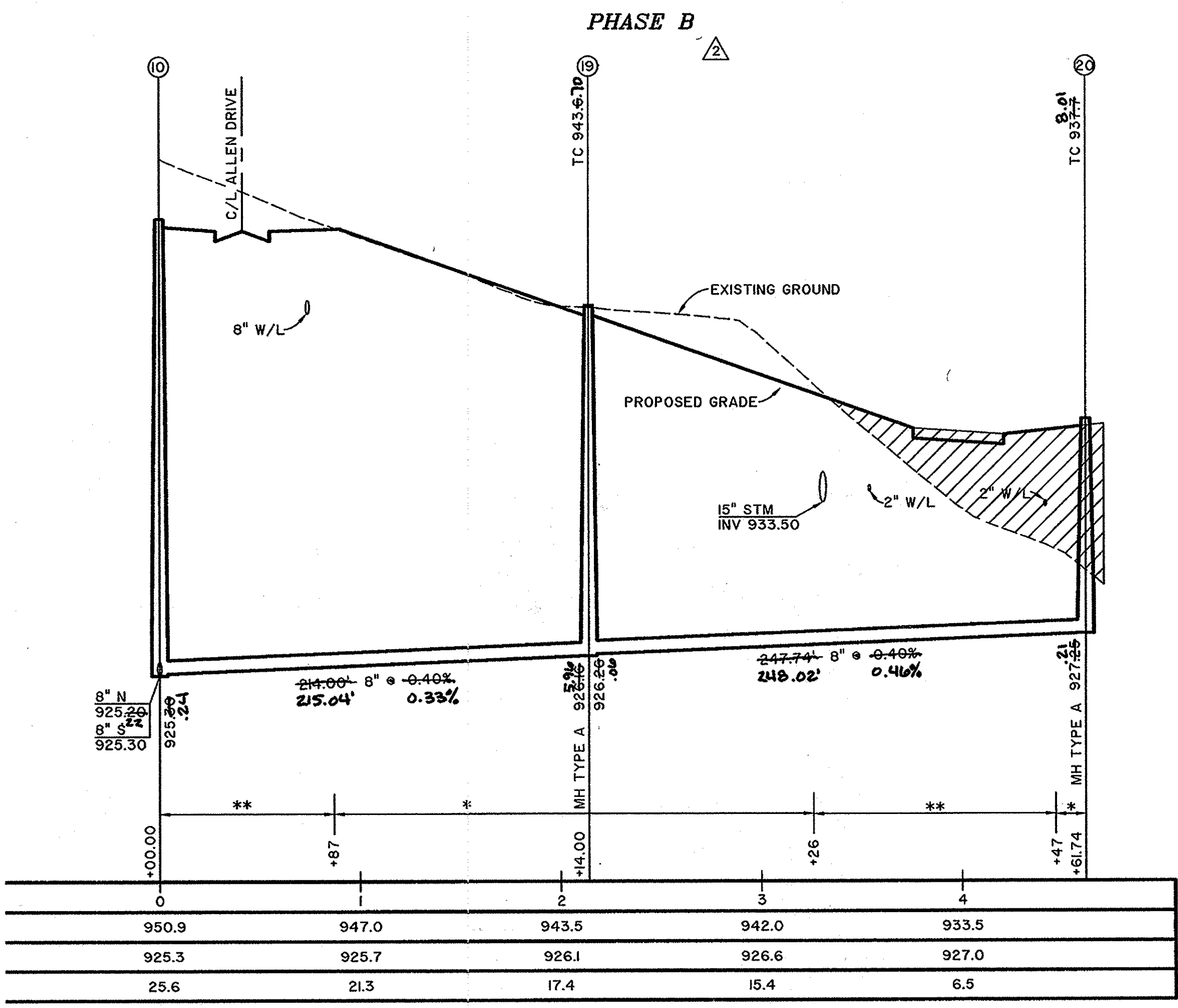
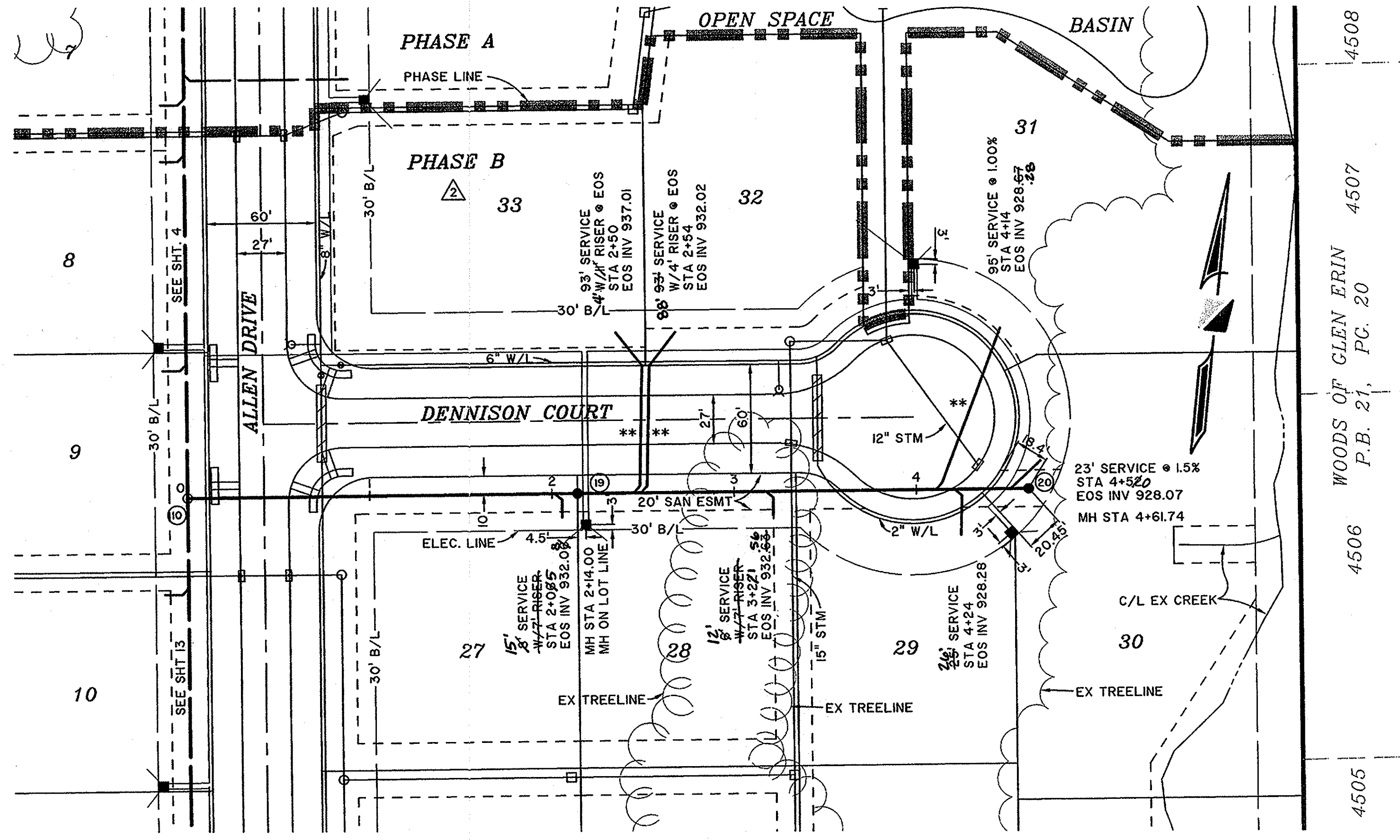
SCALE: 1" = 50' HORIZ.  
1" = 5' VERT.

AS CONSTRUCTED PLAN

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950.9	947.0	943.5	942.0	933.5
925.3	925.7	926.1	926.6	927.0
25.6	21.3	17.4	15.4	6.5

- NOTES:
- \* COMPACTED NATIVE BACKFILL, SEE DETAIL & GENERAL NOTES, SHEET I.
  - \*\* COMPACTED GRANULAR BACKFILL, SEE DETAIL & GENERAL NOTES, SHEET I.
  - RISERS INSTALLED @ 45° FROM VERTICAL UNLESS NOTED. IF LESS THAN 45° THEN CONCRETE ENCASUREMENT SHALL BE PROVIDED PER STD DWG NO.03.
  - ALL WATERLINES & STORM SEWERS MUST BE AT LEAST 10' FROM ALL SANITARY MANHOLES.

☐ COMPACTED FILL PRIOR TO EXCAVATING PER ITEM 203.

DELAWARE COUNTY, OHIO  
**THE OAKS**  
**PHASE B**  
 SANITARY SEWER IMPROVEMENTS  
 DENNISON COURT

**R.D. Zande & Associates, Inc.**  
 1500 Lake Shore Drive, Suite 100, Columbus, Ohio 43204  
 (614) 488-4883 1-800-340-2745  
 FAX (614) 488-4887

SANITARY REVISED TO AS CONSTRUCTED 4/06  
 SEPARATED SANITARY PLAN INTO PHASES A & B

SCALE: 1" = 50' HORIZ.  
 1" = 5' VERT.

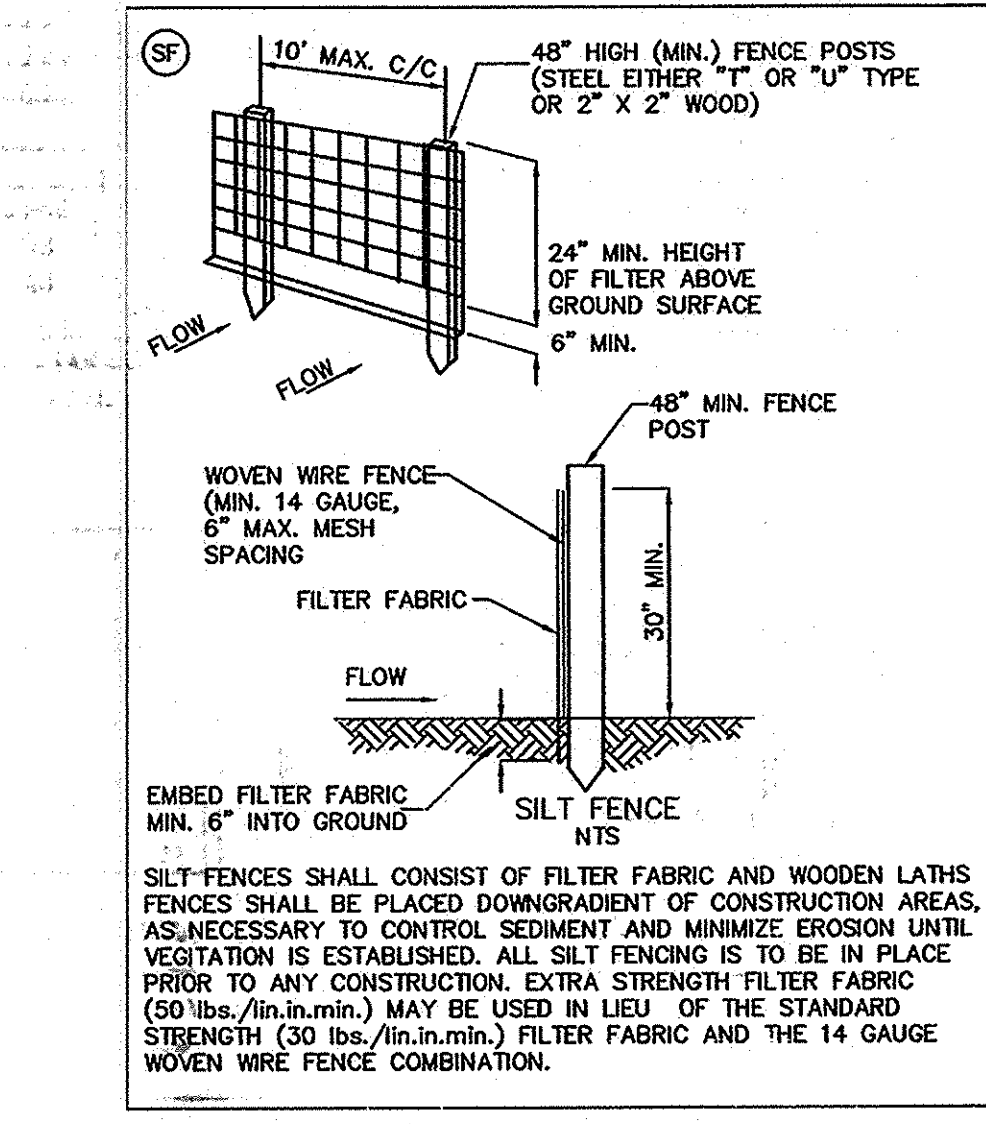
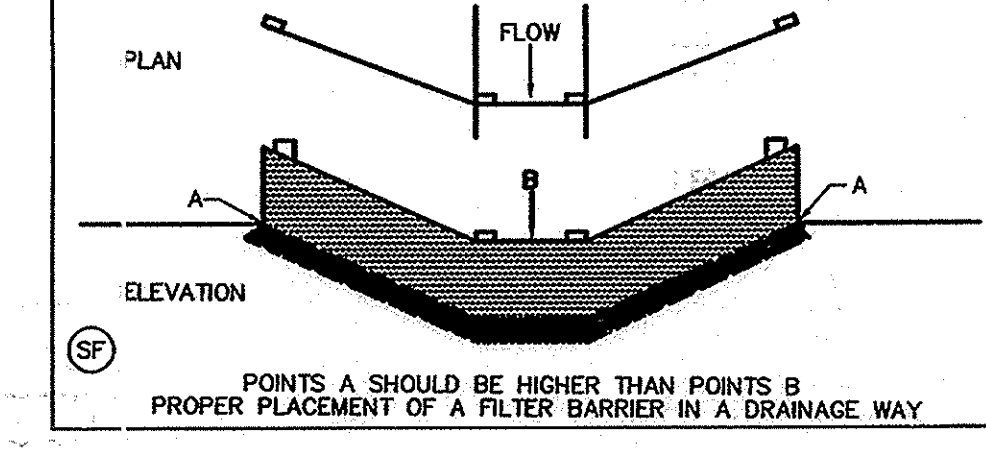
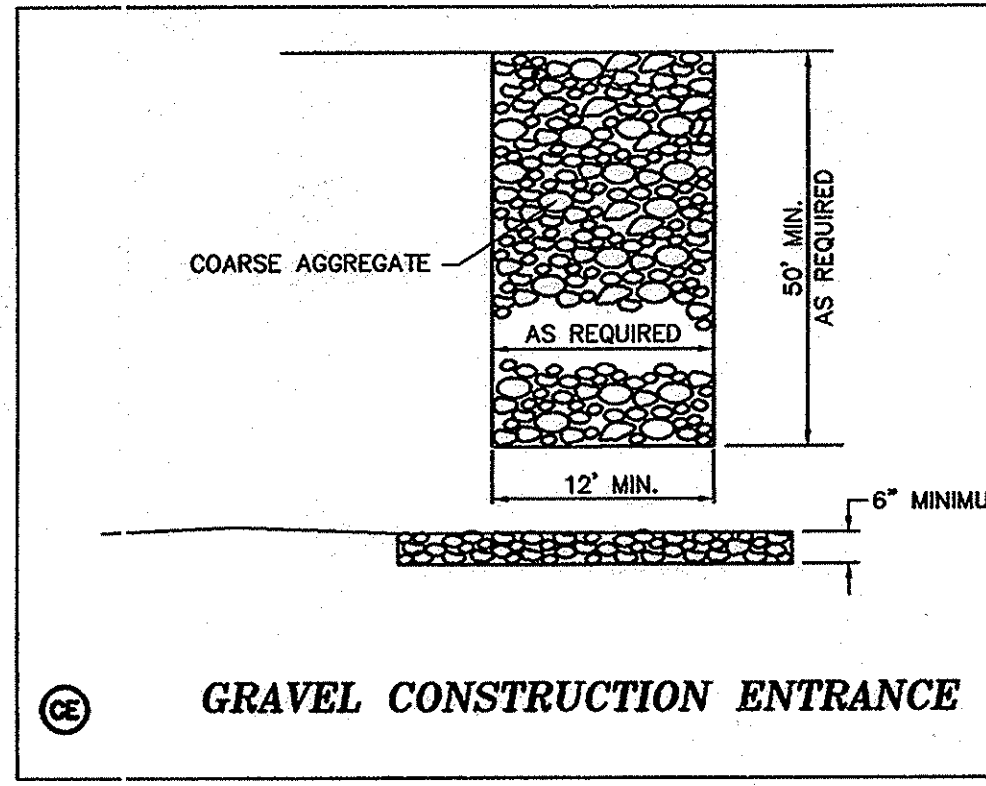
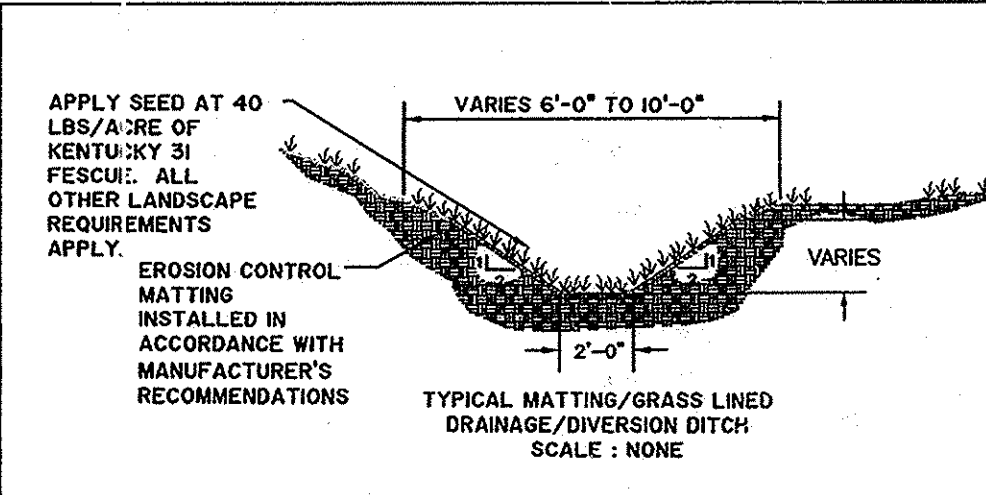
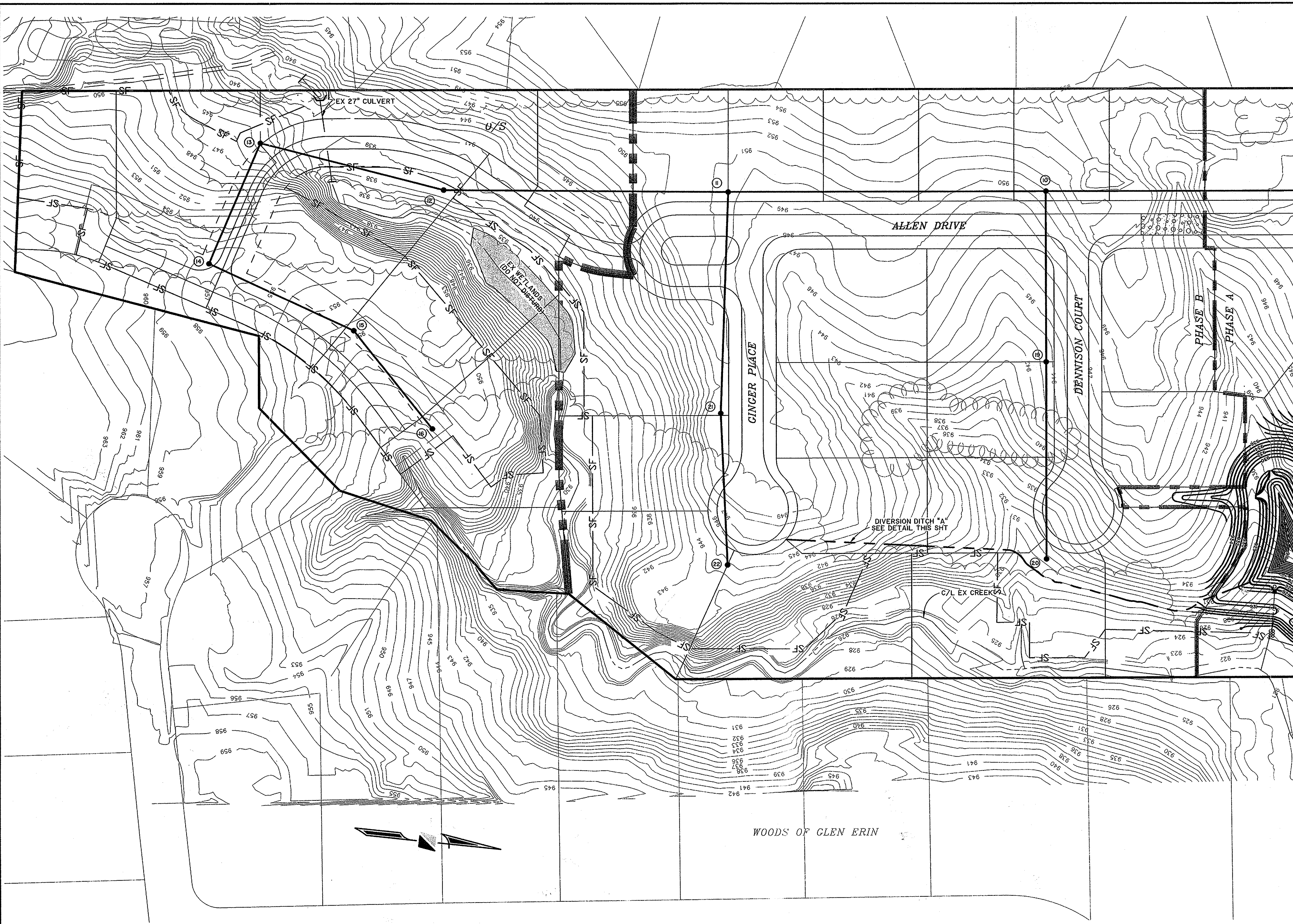
AS CONSTRUCTED PLAN







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- SEQUENCE OF CONSTRUCTION**
1. REFER TO THE OAKS PREGRADE PLAN.
  2. REPAIR SILT FENCE AS NEEDED.
  3. CONSTRUCT SANITARY SEWER AND LIMIT GRADING/DISTURBANCE TO TRENCH ONLY.
  4. LEAVE: EROSION CONTROL MEASURES AND RISERS IN PLACE UNTIL SITE IS STABILIZED.

DELAWARE COUNTY, OHIO

**THE OAKS  
PHASE B**

SANITARY EROSION CONTROL PLAN

R.D. Zande & Associates, Inc.  
1000 Lake Shore Drive, Suite 100, Columbus, Ohio 43204  
(614) 488-4883 1-800-840-2743  
FAX (614) 488-4387

SCALE: 1" = 60'

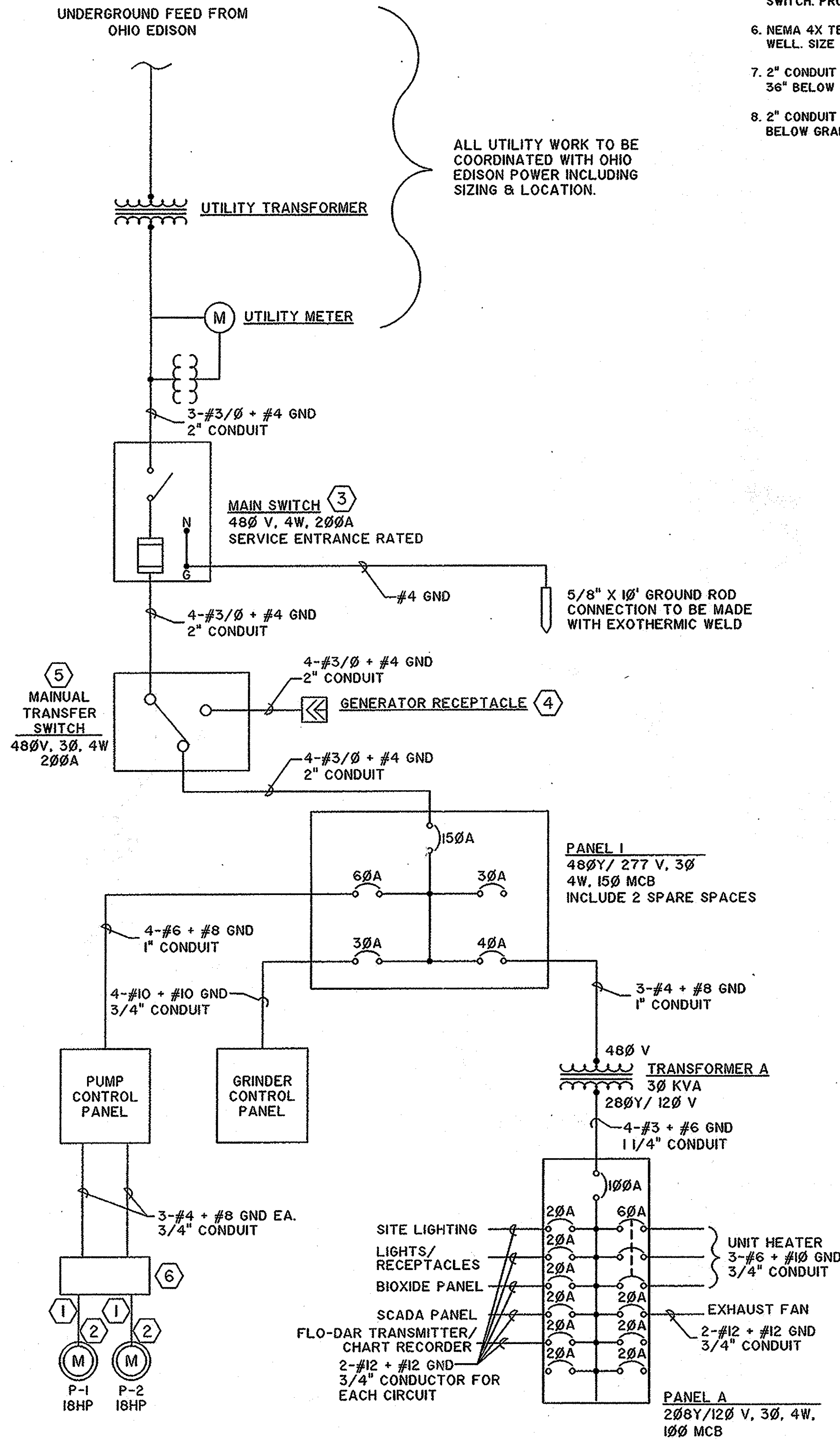
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SEPARATED SANITARY PLAN INTO PHASES A & B

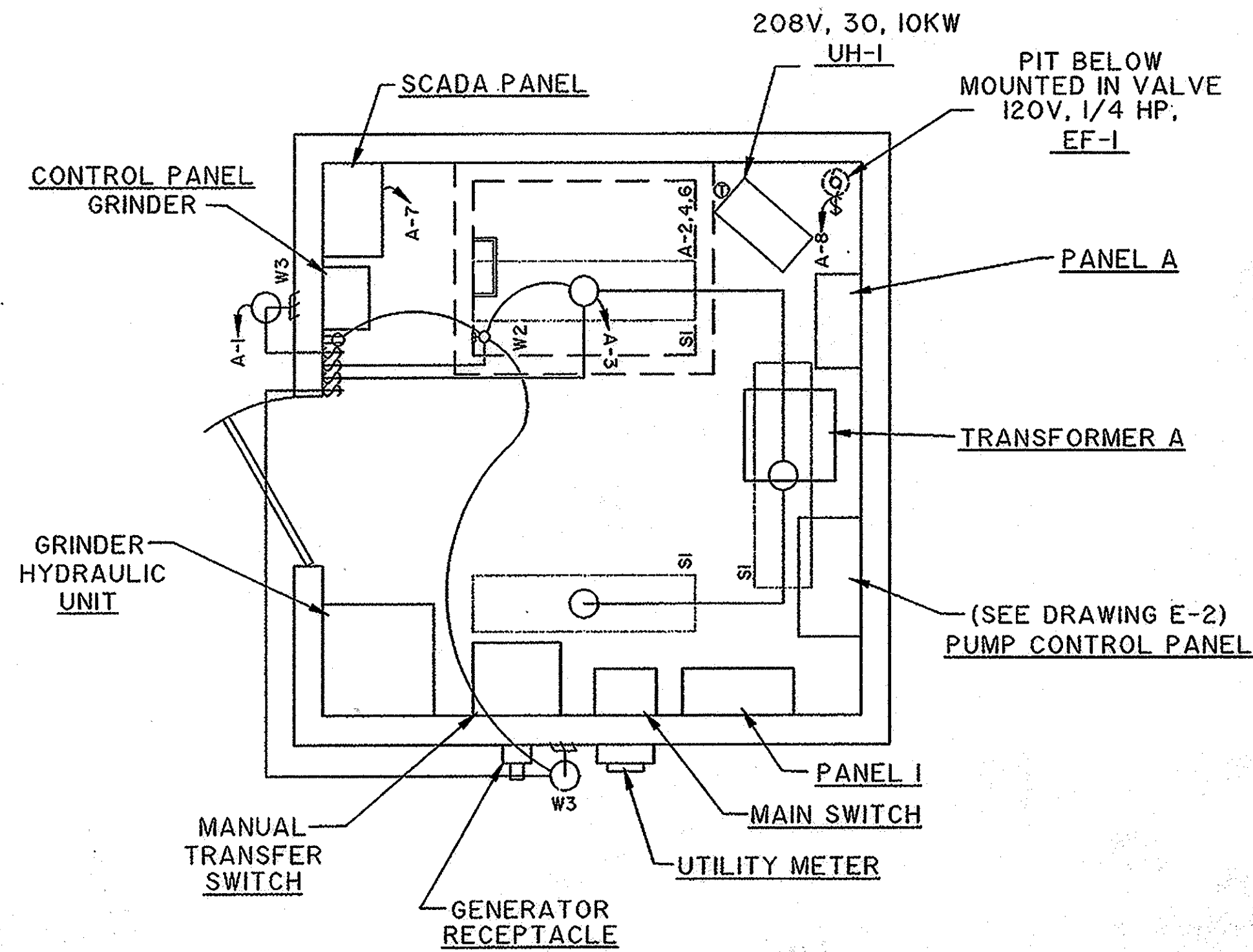


**CODED NOTES**

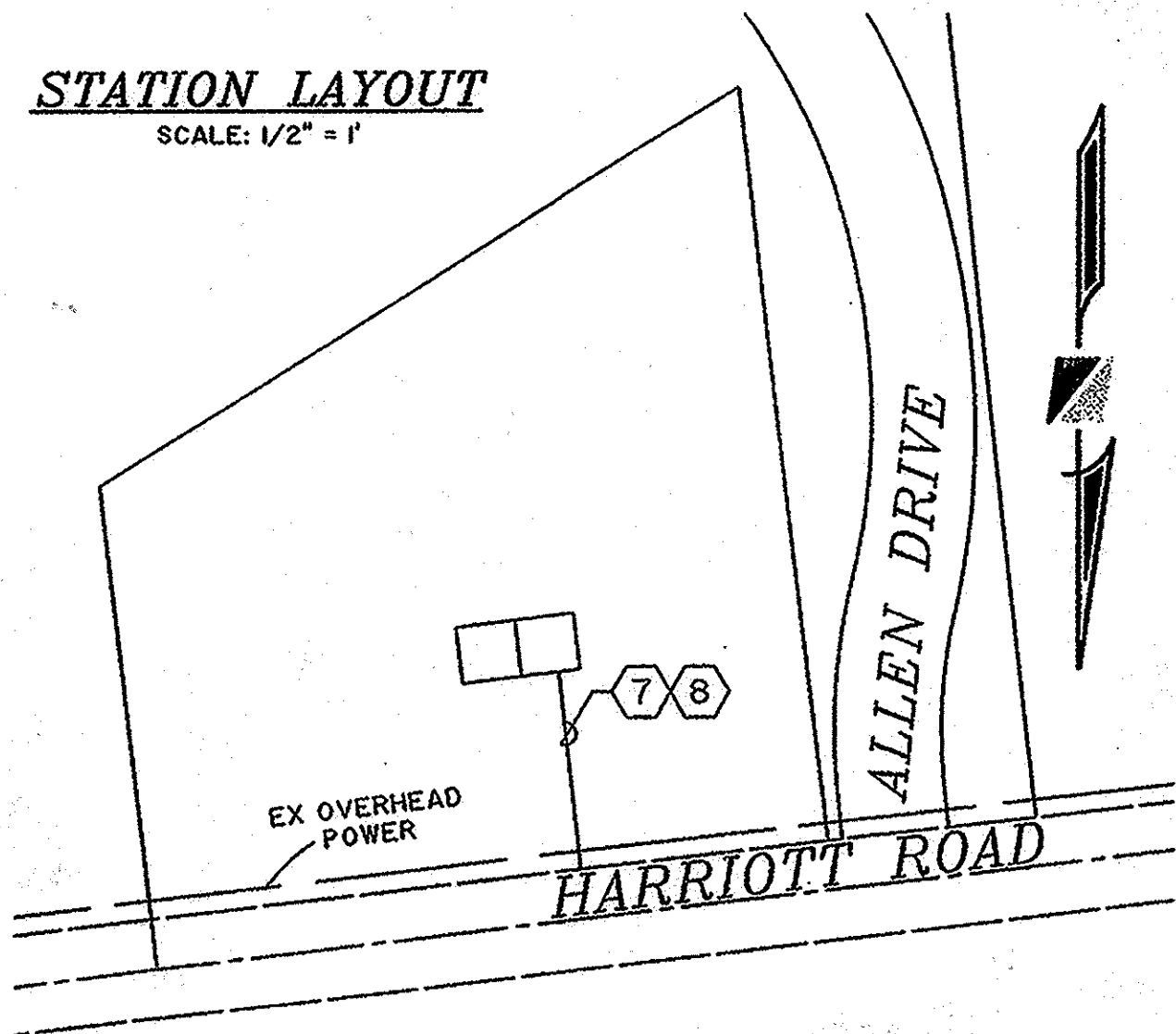
1. PROVIDE SEAL-OFFS WHERE CABLING ENTERS WETWELL.
2. CABLING PROVIDED WITH MULTI-TRODE PUMP PACKAGE. COORDINATE IN FIELD.
3. MAIN SWITCH TO BE 600V, 200A, 4 WIRE HEAVY-DUTY DISCONNECT SWITCH WITH 150A CLASS J FUSES. PROVIDE NEMA I ENCLOSURE AND SERVICE ENTRANCE RATING.
4. GENERATOR RECEPTACLE TO BE 200A AND CROUSE HINDS MODEL AREA 20412X. CONFIRM HUB SIZE WITH MUNICIPAL AUTHORITY.
5. TRANSFER SWITCH SHALL BE 600V, 200A, 3P DOUBLE THROW MANUAL DISCONNECT SWITCH. PROVIDE NEMA I ENCLOSURE AND PAD-LOCKABLE HANDLE.
6. NEMA 4X TERMINAL BOX WITH QUICK-RELEASE LATCHES. LOCATED AT TOP OF WET WELL. SIZE AND TERMINALS TO BE COORDINATED WITH WIRING SIZES.
7. 2" CONDUIT FOR SBC COMMUNICATIONS TELEPHONE SERVICE. APPROX. 60' LONG AND 36" BELOW GRADE.
8. 2" CONDUIT FOR OHIO EDISON ELECTRIC SERVICE. APPROX. 60' LONG AND 36" BELOW GRADE.



**POWER ONE-LINE DIAGRAM**  
NOT TO SCALE



**STATION LAYOUT**  
SCALE: 1/2" = 1'



**SERVICE LOCATION**  
NOT TO SCALE

**FIXTURE SCHEDULE**

NOTE: FIXTURE NUMBER, LETTER PREFIX INDICATES TYPE OF MOUNTING AS FOLLOWS:  
 CL-CEILING MOUNTED; S-STEM SUSPENDED; W-WALL MOUNTED; R-CEILING RECESSED;  
 WR-WALL RECESSED; CV-COVE MOUNTED; UC-UNDER CABINET; RF-ROOF MOUNTED;  
 P-POST; GR-GROUND; H-MOUNTED IN HOOD.

FIXTURE NUMBER	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMPS	REMARKS
S1	ENCLOSED AND GASKETED ACRYLIC LENS FIXTURE WITH FIBERGLASS HOUSING AND ELECTRONIC BALLAST	LITHONIA	DMW 2 32 120 6EB	(2) 32W T8	
W2	EXPLOSION PROOF LIGHT WITH COMPACT FLUORESCENT LAMP AND GLASS GLOBE WITH GUARD	CANLET	6802FWF26H20G-GSC	(1) 26W TRT	CONTROL BY SWITCH NEAR DOOR, PROVIDE LABEL INDICATING USE; MOUNT IN PIT, FIELD COORDINATE LOCATION
W3	WET LOCATION LISTED FLOODLIGHT WITH WIRE GUARD	GE	WISR7MOHL5N3DBQ	(1) 175 W MH	CONTROL BY SWITCH NEAR DOOR AND PHOTO CELL (PRECISION LUMATROL ST-15) IN SERIES. PROVIDE LABEL INDICATING USE; FIELD COORDINATE LOCATION.

PANEL ID: P-1 VOLTAGE: 480 / 277 PANEL TYPE: SQUARE D OR EQUAL  
 LOCATION: PUMP HOUSE PHASE: 3 ENCLOSURE: NEMA 1  
 MOUNTINGS: SURFACE WIRE: 4  
 MAIN TYPE: M.C.B. MAIN SIZE: 150 AMPS

ALL CIRCUIT BREAKERS SHALL BE STANDARD BOLT-ON TYPE, UNLESS NOTED OTHERWISE  
 NOTE: MINIMUM BREAKER AIC TO BE 10,000 AMPS SYMMETRICAL.  
 \*\* - SEE ONE LINE DIAGRAM FOR WIRE AND CONDUIT SIZE.

GND SIZE	WIRE SIZE	BRANCH CIRCUIT DESCRIPTION	CKT BKR SIZE	CKT BKR OPTION	CONN. LOAD (KVA)	CKT NO.	PHASE	CKT NO.	CONN. LOAD (KVA)	CKT BKR OPTION	CKT BKR SIZE	BRANCH CIRCUIT DESCRIPTION	WIRE SIZE	GND SIZE
**	**	PUMP CONTROL PANEL	60/3	--	16.312	1	A	2	0.000	--	30/3	SPARE	**	**
**	**		--	--	16.312	3	B	4	0.000	--	--		**	**
**	**		--	--	16.312	5	C	6	0.000	--	--		**	**
**	**	MUFFIN MONSTER	30/3	--	1.300	7	A	8	4.110	--	40/3	TFMRI P-A	**	**
**	**		--	--	1.300	9	B	10	4.110	--	--		**	**
**	**		--	--	1.300	11	C	12	4.110	--	--		**	**
**	**	SPACE	--	--	0.000	13	A	14	0.000	--	--	SPACE	**	**
**	**		--	--	0.000	15	B	16	0.000	--	--		**	**
**	**		--	--	0.000	17	C	18	0.000	--	--		**	**

CONNECTED LOAD PANEL SUMMARY  
 PHASE A: 21.7 KVA 78.4 AMPS  
 PHASE B: 21.7 KVA 78.4 AMPS  
 PHASE C: 21.7 KVA 78.4 AMPS  
 TOTAL: 65.2 KVA

BREAKER OPTIONS (IF USED):  
 EX - EXISTING BREAKER  
 LO - LOCK-ON DEVICE  
 GF - GND FAULT CKT INTERRUPTER  
 IG - ISOLATED GROUND  
 SH - SHUNT TRIP BREAKER

PANEL ID: A VOLTAGE: 208 / 120 PANEL TYPE: SQUARE D OR EQUAL  
 LOCATION: PUMP HOUSE PHASE: 3 ENCLOSURE: NEMA 1  
 MOUNTINGS: SURFACE WIRE: 4  
 MAIN TYPE: M.C.B. MAIN SIZE: 100 AMPS

ALL CIRCUIT BREAKERS SHALL BE STANDARD BOLT-ON TYPE, UNLESS NOTED OTHERWISE  
 NOTE: MINIMUM BREAKER AIC TO BE 10,000 AMPS SYMMETRICAL.

GND SIZE	WIRE SIZE	BRANCH CIRCUIT DESCRIPTION	CKT BKR SIZE	CKT BKR OPTION	CONN. LOAD (KVA)	CKT NO.	PHASE	CKT NO.	CONN. LOAD (KVA)	CKT BKR OPTION	CKT BKR SIZE	BRANCH CIRCUIT DESCRIPTION	WIRE SIZE	GND SIZE
12	12	SITE LIGHTING	20/1	--	0.225	1	A	2	3.333	--	60/3	HEATER	6	10
12	12	LIGHTS/ RECEPT	20/1	--	0.405	3	B	4	3.333	--	--		6	--
12	12	BIOXIDE PANEL	20/1	--	0.500	5	C	6	3.333	--	--		6	--
12	12	SCADA SYSTEM	20/1	--	0.500	7	A	8	0.696	--	20/1	EF-1	12	12
		SPARE	20/1	--	0.000	9	B	10	0.000	--	20/1	SPARE		
		SPARE	20/1	--	0.000	11	C	12	0.000	--	20/1	SPARE		

CONNECTED LOAD PANEL SUMMARY  
 PHASE A: 4.8 KV 39.6 AMPS  
 PHASE B: 3.7 KV 31.2 AMPS  
 PHASE C: 3.8 KVA 31.9 AMPS  
 TOTAL: 12.3 KV

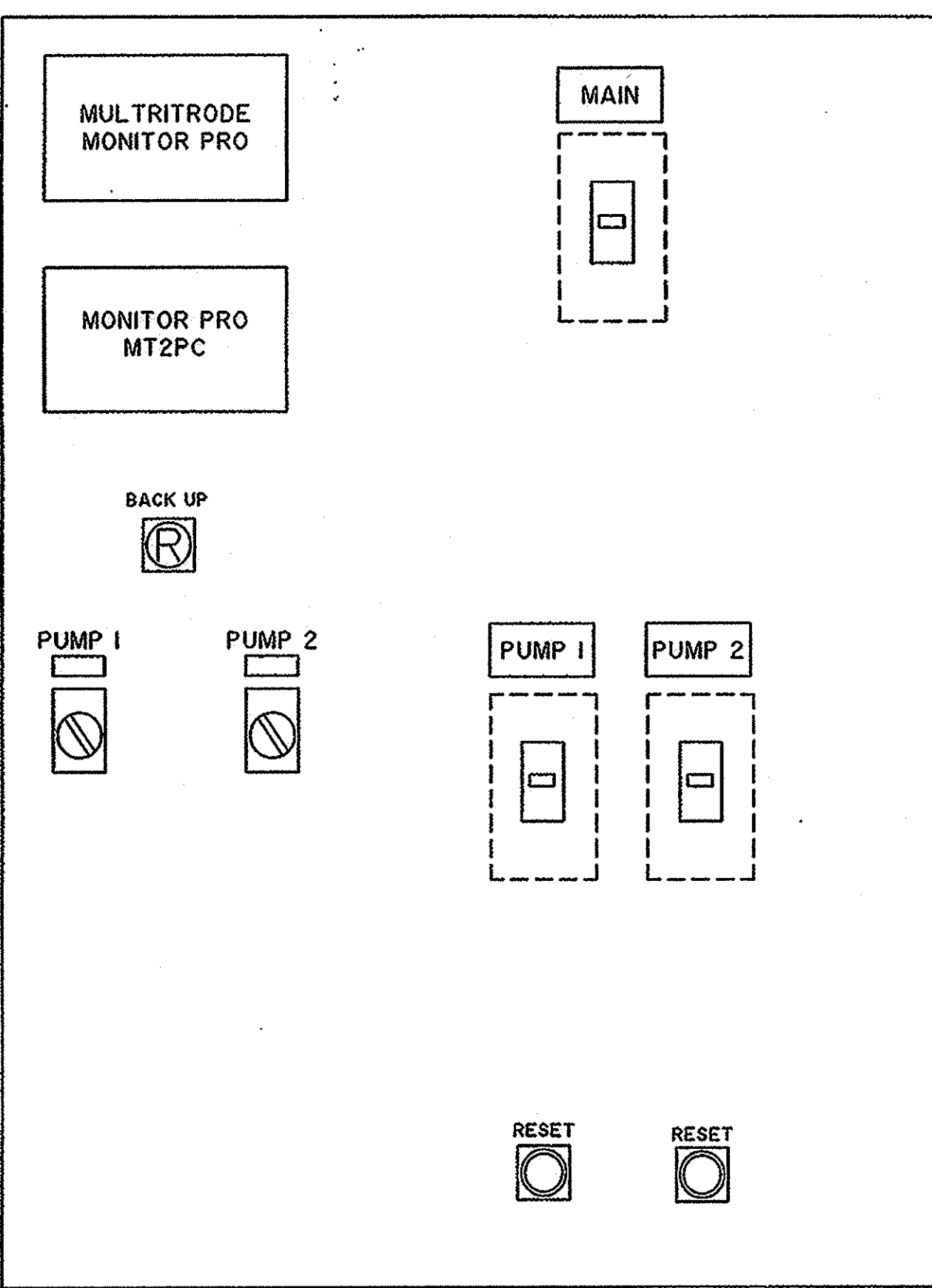
BREAKER OPTIONS (IF USED):  
 EX - EXISTING BREAKER  
 LO - LOCK-ON DEVICE  
 GF - GND FAULT CKT INTERRUPTER  
 IG - ISOLATED GROUND  
 SH - SHUNT TRIP BREAKER

DELAWARE COUNTY, OHIO  
**THE OAKS**  
 SANITARY SEWER PUMP STATION  
 ELECTRICAL DIAGRAMS

SCALE: HORIZ. 1"=50'  
 VERT. 1" = 5'

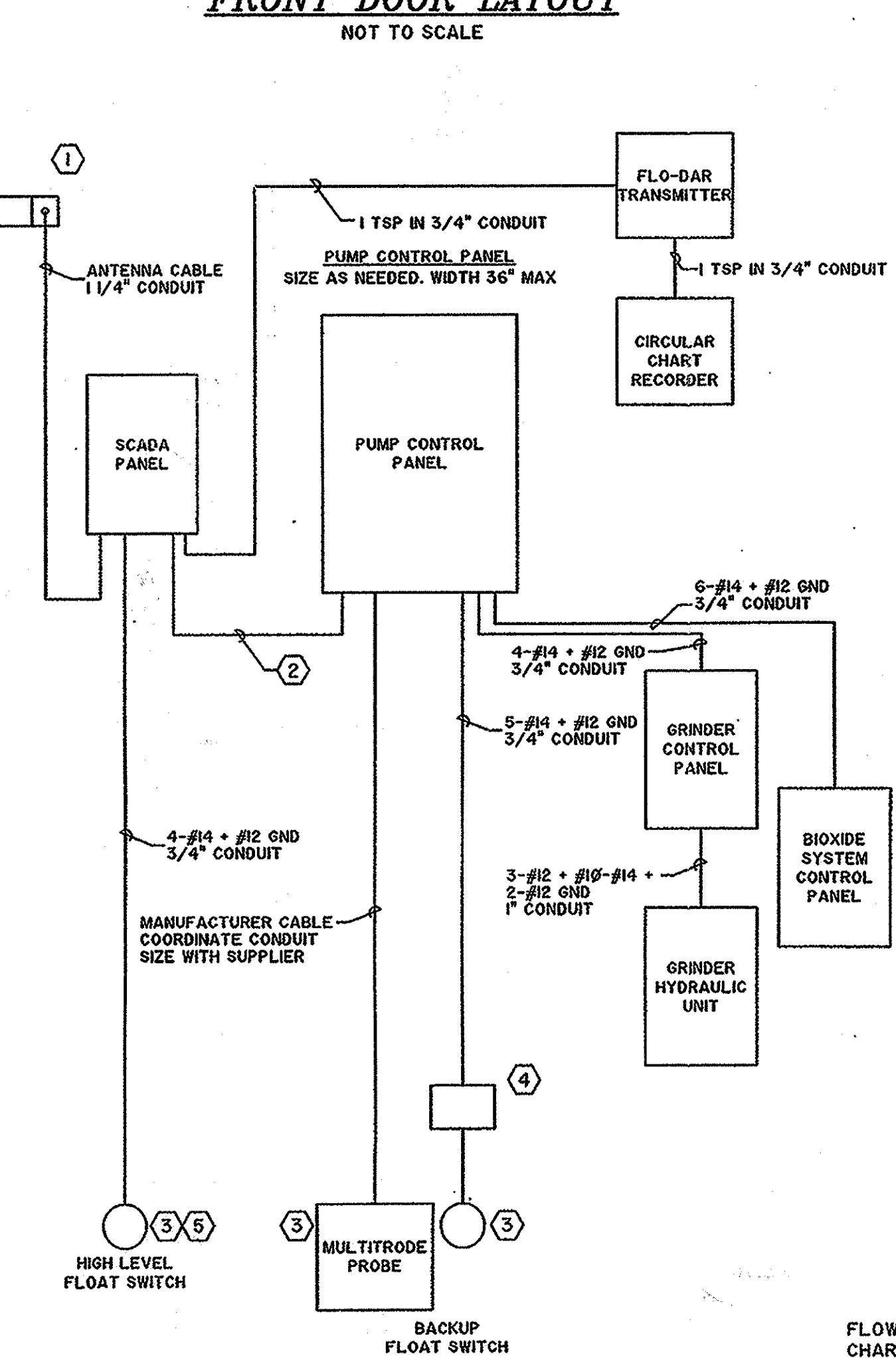
R.D. Zande & Associates, Inc.  
 1600 Lakeshore Drive, Suite 100, Columbus, Ohio 43260  
 (614) 486-4385 1-800-340-2745  
 FAX (614) 486-1851





**PUMP CONTROL PANEL FRONT DOOR LAYOUT**

NOT TO SCALE



**CONTROLS DIAGRAM**

NOT TO SCALE

**CODED NOTES**

1. ANTENNA TO BE MOUNTED ON 1 1/4" GRC ON OUTSIDE OF BUILDING. COORDINATE LOCATION WITH OWNER.
2. COMMUNICATION CABLE TO BE PROVIDED BY RADIO SYSTEM SUPPLIER & INSTALLED BY ELECTRICAL CONTRACTOR. 3/4" CONDUIT TO BE INSTALLED BY THE ELECTRICIAN.
3. ALL SIGNALS INTO AND OUT OF WET WELL TO BE SEALED PER NEC REQUIREMENTS.
4. NEMA 4X TERMINAL BOX WITH QUICK RELEASE SIZE LATCHES TO BE MOUNTED AT TOP OF WET WELL. SIZE TO BE COORDINATED WITH WIRING REQUIREMENTS.
5. FLOAT INSTALLED IN THE SOUTHWEST CORNER OF THE VAULT.

**FLO-DAR SENSOR SPECIFICATIONS**

PERMANENT FLO-DAR SENSOR WITH FLO-STATION ELECTRONICS (WITH DISPLAY OR WITHOUT DISPLAY) / (12 VDC OR AC POWERED)

**DATA STORAGE**

64K (16K CYCLES OF VELOCITY/LEVEL DATA)

**LOCAL TERMINAL**

RS232C @ 19.2K BAUD

**OPTIONAL DISPLAY (MODELS 1101-3 AND 1101-4)**

**DIMENSIONS:**

1" x 3" FOUR LINES OF TEXT DISPLAY, FLOW, LEVEL, VELOCITY, TOTAL OR ANY COMBINATION OF ANY FOUR CHANNELS CONTAINING DATA. SCREENS MAY BE PROGRAMMED TO ALTERNATE VALUES DISPLAYED.

**TIMEBASE ACCURACY**

1 SECOND PER DAY

**OUTPUTS**

FOUR 4-20 mA OUTPUTS; SYSTEM-ISOLATED, UP TO 600Ω LOAD. EACH OUTPUT IS SELECTABLE BETWEEN FLOW, LEVEL, VELOCITY, OR SURCHARGE LEVEL.

**CONTACT CLOSURE**

DRY CONTACT CLOSURE WITH ADJUSTABLE DURATION SELECTABLE FOR FLOW-PROPORTIONAL OR ALARM BASE ON: FLOW, LEVEL, VELOCITY, SURCHARGE LEVEL, TEMPERATURE, BATTERY VOLTAGE, EACH SAMPLE, BAD SAMPLE OR ANALOG INPUT. RATING: 1A @ 30VDC (RESISTIVE) 0.5A @ 125 VAC (RESISTIVE)

**POWER REQUIREMENTS**

AC: 100-240 VAC, 47-63 Hz, 15 WATTS (20 WATTS WITH DISPLAY; BACKLIGHT ON)  
DC: 8 TO 14.4 VDC, 15 WATTS

**HOUSING**

MATERIAL: ABS PLASTIC, NEMA 4  
DIMENSIONS: 10.2" W x 9.3" H x 4" D (25.9 CM W x 23.6 CM H x 10.2 CM D)  
WEIGHT: 5 LBS.  
TEMPERATURE OPERATING RANGE: 14°F TO 122°F (-10°C TO 50°C)  
TEMPERATURE STORAGE RANGE: (WITHOUT DISPLAY) -40°F TO 140°F (-40°C TO 60°C) (WITH DISPLAY) 4°F TO 140°F (-20°C TO 60°C) W/ DISPLAY

**SET-UP/DATA RETRIEVAL**

FLO-WARE FOR WINDOWS SOFTWARE IS THE USER ON-SITE SET-UP, DATA MANAGEMENT, AND REPORT GENERATION SOFTWARE. IT IS COMPATIBLE WITH DESKTOP/PORTABLE COMPUTERS UTILIZING WINDOWS 95/98/2000/ME/NT/XP. FLO-WARE FOR WINDOWS SOFTWARE CAN RETRIEVE DATA FROM BOTH FLO-TOTE AND FLO-DAR FLOWMETERS. FLO-WARE FX FOR THE POCKETPC HAS ALL OF THE SAME FUNCTIONALITY AS FLO-WARE FOR WINDOWS WITH THE EXCEPTION OF REPORT GENERATION.

**FLO-DAR SENSOR SPECIFICATION ALL MODELS**

**ENCLOSURE**

MATERIAL: POLYSTYRENE  
DIMENSIONS: 6.9" W x 16.65" L x 11.7" D (17.5 CM x 42.3 CM x 29.7 CM)  
WEIGHT: 10.5 LBS (4.8KG)  
TEMPERATURE OPERATING RANGE: 14°F TO 122°F (-10°C TO 50°C)  
STORAGE RANGE: -40°F TO 140°F (-40°C TO 60°C)  
SENSOR CABLE MATERIAL: POLYURETHANE JACKETED STANDARD LENGTH: 30' (9.14M), MAXIMUM 1000' (304.8M)  
DISCONNECTABLE AT BOTH SENSOR AND MONITOR

**VELOCITY MEASUREMENT**

METHOD: RADAR METHOD: 0.75 TO 20 FT/S (0.23 M/S TO 6.10 M/S)  
ACCURACY: ±0.5%; ±0.1 FT/S (±0.03 M/S)

**LEVEL MEASUREMENT**

METHOD: ULTRASONIC  
STANDARD OPERATING RANGE: 0.25 TO 60 IN (0.634 TO 152.4 CM)  
OPTIONAL OPERATING RANGE: 0 (0 CM) TO 224 IN (5.7 M) (WITH 16" DEADBAND)  
TEMPERATURE COMPENSATED  
ACCURACY: ±0.25 IN (±0.64 CM) 1% ACCURACY

**SURCHARGE LEVEL MEASUREMENT**

METHOD: PIEZO-RESISTIVE PRESSURE TRANSDUCER  
MAXIMUM RANGE: 138 INCHES (3.5 METERS)

**FLOW MEASUREMENT**

BASED ON CONTINUITY EQUATION. ACCURACY: ±5.0% OF READING TYPICAL WHERE FLOW IS IN A CHANNEL WITH UNIFORM FLOW CONDITIONS AND IS NOT SURCHARGED.

FLOW MEASURING EQUIPMENT SHALL BE AS SHOWN ON DETAIL OR APPROVED EQUAL. THE CHART RECORDER SHALL BE HONEYWELL MODEL DR 454T TRUELINE RECORDER, OR APPROVED EQUAL. THE FLOW METERING EQUIPMENT SHALL INCLUDE ALL CONNECTION WIRING, MOUNTING BRACKETS, AND OTHER INCIDENTALS AS REQUIRED FOR A COMPLETE, WORKING INSTALLATION. THE CONTRACTOR SHALL FURNISH TO THE ENGINEER, PRIOR TO ACCEPTANCE, ALL EQUIPMENT, MANUALS SUPPLIED BY THE MANUFACTURERS AS WELL AS FIFTY (50) BALNK RECORDING CHARTS.

**PUMP CONTROL OPERATIONAL DESCRIPTION**

THE PUMP CONTROL PANEL (CP-1) SHALL CONTROL TWO WASTEWATER LIFT PUMPS. THE SEQUENCE OF OPERATION WITH FEATURES REQUIRED FOR OPERATION, SAFETY & MONITORING SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:

1. EACH PUMP SHALL BE CONTROLLED BY A "HAND-OFF-AUTO" SELECTOR SWITCH AND A DUPLEX PUMP CONTROLLER.
2. A SELECTOR SWITCH AND START PUSHBUTTON SHALL BE PROVIDED FOR EACH PUMP. THE SELECTOR SWITCH WILL CONTROL THE PUMP IN THE FOLLOWING MANNER. IN THE "OFF" POSITION, THE PUMP WILL NOT RUN. IN THE "HAND" POSITION, THE PUMP WILL RUN WHEN THE START PUSHBUTTON IS PRESSED UNTIL THE SELECTOR SWITCH IS TURNED TO THE "OFF" POSITION. PROCESS INTERLOCKS SUCH AS LEVEL SWITCHES AND DUPLEX CONTROLLER WILL BE BYPASSED WHEN IN HAND MODE. SAFETY INTERLOCKS SUCH AS WINDING TEMP, SEAL FAILURE, PUMP OVERLOAD WILL FUNCTION IN HAND MODE. IN THE "AUTO" POSITION THE PUMP WILL RUN BASED ON THE SIGNALS FROM THE DUPLEX PUMP CONTROLLER.

3. A SINGLE DUPLEX PUMP CONTROLLER SHALL BE PROVIDED TO CONTROL THE TWO PUMPS. THE DUPLEX PUMP CONTROLLER SHALL PROVIDE THE FOLLOWING CONTROL BASED ON A MULTI-POINT LEVEL PROBE. PUMP CONTROLLER SHALL ACCEPT INPUTS FROM A MULTI-POINT PROBE (10 POINTS). THE CONTROLLER WILL BE ABLE TO SELECT 4 SIGNALS TO USE AS CONTROL POINTS AS DESCRIBED BELOW. THE FOLLOWING SEQUENCE SHALL BE USED TO CONTROL THE PUMPS:

- LEVEL 1: LOW LEVEL (ALL PUMPS OFF)
- LEVEL 2: LEAD PUMP ON
- LEVEL 3: LAG PUMP ON
- LEVEL 4: HIGH LEVEL ALARM

NOTE: ELEVATIONS FOR LEVELS ARE SHOWN ON "PUMP STATION PLAN VIEW & CROSS SECTION".

4. THE ONE-FLOAT BACK-UP LEVEL CONTROL SYSTEM SHALL CONTROL THE PUMPS IN THE FOLLOWING MANNER:

FLOAT 1 - ONE PUMP ON (SET 1 FT ABOVE LEVEL 3 NOTED ABOVE); PUMP SHALL RUN FOR 10 MINUTES THEN SHUT OFF.

5. MOTOR STARTERS SHALL BE "SOFT START" AND SHALL BE PROGRAMMED FOR INTERACTIVE PUMP CONTROL TO HELP ELIMINATE FLUID SURGES DURING STARTING AND STOPPING. THE MOTOR STARTERS SHALL BE ISOLATED FROM THE PUMP MOTORS WHEN THE INSULATION MONITOR IS IN ITS TEST CYCLE.

**CONTROL PANEL WIRING & FABRICATION REQUIREMENTS**

1. PROVIDE A NEW PUMP CONTROL PANEL, GRINDER CONTROLLER PANEL, AND SCADA SYSTEM PANEL CONSTRUCTED OF NEW AND UNDETERIORATED PARTS AND COMPONENTS.

2. PROVIDE PANEL SCHEMATICS AND PANEL LAYOUT DRAWINGS FOR EACH CONTROL PANEL SUPPLIED. ITEMS ON THE SCHEMATIC SHALL BE LABELED TO MATCH THE LABELS USED ON THE PANEL LAYOUT AND BILL OF MATERIAL.

3. PROVIDED WIRING INSIDE PANELS THAT IS NEATLY BUNDLED WITH WIRE TIES AND/OR RUN INSIDE PLASTIC WIRE THROUGHS. TERMINATE ALL DEVICE WIRING ON TERMINAL STRIPS WITH NO MORE THAN (2) TWO WIRES PER SCREW. PROVIDE 20% ADDITIONAL SPARE TERMINAL BLOCKS IN EACH PANEL. PROVIDE TERMINALS FOR INCOMING POWER AND NEUTRAL CONNECTIONS. PROVIDE ONE WIRED TERMINAL FOR EVERY (2) TWO FIELD DEVICES POWERED FROM THE SAME WIRE. PROVIDE ONE WIRED TERMINAL FOR EVERY (2) TWO FIELD DEVICES SHARING A COMMON NEUTRAL. PROVIDE SEPARATE TERMINALS FOR DC VOLTAGE / ANALOG SIGNAL WIRING. PROVIDE SPARE TERMINALS FOR SIGNAL CABLE SHIELD TERMINATIONS.

4. PROVIDE ISOLATED SPACE INSIDE PANEL FOR INTRINSICALLY SAFE WIRING AS REQUIRED BY NEC AND MANUFACTURER'S RECOMMENDATION.

5. LABEL ALL TERMINALS AND WIRES WITH INDIVIDUAL AND UNIQUE WIRE NUMBERS. PROVIDE INDUSTRIAL TYPE WIRE MARKERS, SUCH AS GRADY "WRAP AROUND" TYPE WIRE LABELS. PROVIDE LABELS WITH NUMBERS THAT ARE PRINTED, NOT HAND WRITTEN, ON EACH WIRE LABEL. PROVIDE NAME PLATES WITH INDIVIDUAL DESIGNATIONS FOR ALL CONTROL RELAYS, BREAKERS, FUSES, AND OTHER MISCELLANEOUS EQUIPMENT MOUNTED INSIDE PANELS. PROVIDE SUFFICIENT WIRING SO THAT ALL DOORS MAY BE FULLY OPENED FOR PANEL ACCESS WITHOUT HAVING TO DISCONNECT ANY WIRING. TERMINAL BLOCKS, ETC. DESIGN INTERIOR OF PANELS SO THAT ALL DEVICES, WIRING, TERMINAL BLOCKS, ETC., ARE EASILY ACCESSIBLE FOR MAINTENANCE AND TESTING.

6. PROVIDE UL LISTED TYPE MTW WIRE WITH 600V INSULATION, MINIMUM SIZE #18 AWG COPPER FOR DC VOLTAGE / ANALOG SIGNAL PANEL WIRING, UNLESS NOTED OTHERWISE ON THE DRAWINGS. KEEP ALL DC VOLTAGES/ ANALOG SIGNAL WIRING SEPARATE FROM 120V WIRING.

7. PROVIDED UL LISTED TYPE MTW WIRE 600V INSULATION, MINIMUM SIZE #16 AWG COPPER FOR 120 VAC PANEL WIRING.

8. COLOR CODE ALL 120 AC PANEL WIRING AS DETAILED IN THE ELECTRICAL SPECIFICATIONS TO IDENTIFY IT SEPERATELY FROM ANALOG SIGNAL AND COMMUNICATIONS WIRING, AND KEEP 120 VAC WIRING IN SEPERATE WIRING THROUGHS FROM ALL OTHER WIRING. PANELS ARE ARRANGED SUCH THAT ALL WIRING FROM THE TERMINAL BLOCKS TO THE FIELD IS SEPERATED FROM THAT WIRING WITHIN THE PANEL. MAINTAIN THIS SEGREGATION.

9. PROVIDE PANELS THAT ARE FACTORY WIRED AND TESTED PRIOR TO SHIPMENT SO THAT FIELD INSTALLATION WILL CONSIST ONLY OF SETTING PANELS IN PLACE AND MAKING FINAL FIELD CONNECTIONS.

10. PROVIDE AND INSTALL ALL SWITCHES, PILOT LIGHTS, AND OTHER PANEL DEVICES AS SPECIFIED HEREIN OR AS NOTED ON THE DRAWINGS.

11. PROVIDE AND INSTALL ALL PLUG-IN CONTROL RELAYS IN CONTROL PANELS AS NOTED ON THE DRAWINGS.

12. PROVIDE ORIGINAL AND (3) THREE SPARE FUSES FOR EACH TYPE AND SIZE FUSE IN THE PANEL.

13. MOUNT SUB PANEL AS INDICATED ON THE DRAWINGS.

**PUMP CONTROL PANEL COMPONENT DESCRIPTIONS**

1. PUMP CONTROL PANEL (CP-1): PROVIDE A NEMA 12 ENCLOSURE THAT IS UL, CSA, AND IEC APPROVED AND SIZED AS REQUIRED. PROVIDE ENCLOSURE COMPLETE WITH FULL SIZE SUB PANEL. ENCLOSURE SHALL BE PROVIDED BY PUMP SUPPLIER MODEL NP3153. PROVIDE ENCLOSURE THAT IS FABRICATED FROM 14-GAUGE STEEL WITH THE FOLLOWING FEATURES:

- A. CONTINUOUSLY WELDED AND GROUND SMOOTH SEAMS.
- B. OIL-RESISTANT CONTINUOUSLY GASKETED DOORS.
- C. 3-POINT LATCHING MECHANISM OPERATED BY AN OIL-TIGHT KEY LOCKING HANDLE.
- D. HEAVY GAUGE CONTINUOUS HINGES.
- E. REMOVABLE PRINT POCKET MOUNTED ON DOOR.
- F. COLLAR STUDS FOR MOUNTING SUB PANEL.
- G. GROUND STUD WELDED ON DOOR.
- H. FINISH TO BE WHITE EPOXY POLYESTER COATED INSIDE AND ASME 6I HIGH SOLIDS RECOATABLE GRAY FINISH OUTSIDE.
- I. SUB PANEL TO BE FULL SIZE OF ENCLOSURE AND CONSTRUCTED OF 10 OR 12-GUAGE STEEL WITH WHITE EPOXY POLYESTER COATED FINISH.

2. DUPLEX PUMP CONTROLLER (DPC-1): PROVIDE A MULTITRODE LIQUID LEVEL CONTROL SYSTEM AND PROBE AS MANUFACTURED BY FLYGT. PROVIDE MULTITRODE MODEL NO. MT2PC DUPLEX PUMP CONTROLLER AND MULTITRODE PROBE WITH THE FOLLOWING FEATURES:

- A. 120 VAC POWERED
- B. HI INTENSITY LED'S (RED & GREEN)
- C. LEVEL INDICATION AND PUMP/FAULT STATUS
- D. MONITORING FOR FOUR LEVELS OF MOTOR FAULTS
- E. MULTIPLE PUMP OPERATION
- F. PUMP ALTERNATING CAPABILITY
- G. MULTIPLE LEVEL INPUTS FROM: MULTI-SENSOR PROBES, 4-20MA, BALL FLOATS
- I. REMOVABLE FRONT KEYPAD FOR REMOTE MOUNTING.
- J. MULTITRODE PROBE WITH (4) SENSING RANGES (MIN). LENGTH AS REQUIRED
- \*PROVIDE SPARE DUPLEX PUMP CONTROLLER

3. PUMP CONTROL MONITOR (PCM-1): PROVIDE A MONITOR PRO PUMP MONITORING SYSTEM AS MANUFACTURED BY FLYGT. PROVIDE FLYGT MODEL MONITOR PRO-3 WITH THE FOLLOWING FEATURES:

- A. 120 VAC POWERED
- B. FOUR (4) LINES BY FORTY (40) CHARACTER LCD DISPLAY.
- C. SIX (6) DIGITAL INPUTS, TWO (2) ANALOG INPUTS.
- D. THREE (3) RELAY OUTPUTS.
- E. REMOVABLE FRONT KEYPAD FOR REMOTE MOUNTING.
- F. MONITORING FOR UP TO THREE PUMPS FOR:
  1. OVER CURRENT
  2. UNDER CURRENT
  3. PHASE FAIL
  4. PHASE ROTATION
  5. MOTOR INSULATION TESTING
  6. MOTOR GROUND SHORT PROTECTION
  7. PUMP STARTS PER HOUR
  8. FLOW RATE AND EFFICIENCY
  9. HOURS RUN LAST AND TOTAL
  10. DUAL POWER SUPPLY BACKUP
  11. DATA LOGGER
  12. RS232, RS422 AND RS485 COMMUNICATIONS
  13. MODBUS PROTOCOL OPTION, CAPABLE OF COMMUNICATING WITH WESTERMAN TELEMETRY SYSTEM.

4. PUMP INSULATION MONITOR (PI-IM, P2-IM): PROVIDE A SUBMERS MOTOR INSULATION-MONITORING DEVICE AS MANUFACTURED BY FLYGT. PROVIDE FLYGT AUTOMATIC MOTOR INSULATION MONITORING DEVICE COMPLETE WITH RELAY AND SOCKET WITH THE FOLLOWING FEATURES:

- A. 120 VAC POWERED
- B. "POWER ON" INDICATING LIGHT
- C. "LOW MEG" INDICATING LIGHT
- D. "500 VDC ON" INDICATING LIGHT
- E. "MOTOR RESET" PUSHBUTTON
- F. "MEG TEST" PUSHBUTTON
- G. "EMERGENCY BYPASS" PUSHBUTTON

5. PUMP LEAK/TEMPERATURE SWITCH (P1-LTS, P2-LTS) PROVIDE A MINICASS II PUMP MOTOR HIGH WINDING TEMPERATURE AND SEAL LEAKAGE MODULE AS MANUFACTURED BY FLYGT. PROVIDE FLYGT MINICASS II MODULES COMPLETE WITH SOCKETS AND THE FOLLOWING FEATURES:

- A. 20 - 30 VAC POWERED.
- B. TWO CURRENT SENSING RELAYS, ONE UNDER CURRENT SENSING RELAY FOR OVER TEMPERATURE AND ONE CURRENT SENSING RELAY FOR SEAL LEAKAGE.
- C. 12 VDC VOLTAGE OUTPUT TO SENSORS.
- D. YELLOW LED FOR SUPPLY VOLTAGE PRESENT.
- E. RED LED FOR OVER TEMPERATURE INDICATION.
- F. RED LED FOR SEAL LEAKAGE INDICATION.
- G. MANUAL RESET FOR WINDING OVER TEMPERATURE INTEGRAL WITH UNIT.
- H. AUTOMATIC RESET FOR SEAL LEAKAGE.

6. CIRCUIT BREAKER (CB-1, CB-2, CB-3): PROVIDE MOLDED CASE CIRCUIT BREAKERS WITH INVERSE TIME AND INSTANTANEOUS TRIPPING CHARACTERISTICS SIZE PER NEC REQUIREMENTS. ALL CIRCUIT BREAKERS SHALL HAVE GROUND FAULT PROTECTION WHERE INDICATED OR AS REQUIRED BY NEC. CIRCUIT BREAKERS SHALL BE OPERATED BY A TOGGLE-TYPE HANDLE AND SHALL HAVE A QUICK-MAKE/QUICK-BREAK OVER-CENTER SWITCHING MECHANISM THAT IS MECHANICALLY TRIP-FREE. AUTOMATIC TRIPPING OF THE BREAKER SHALL BE CLEARLY INDICATED BY THE HANDLE POSITION. CONTACTS SHALL BE NON-WELDING SILVER ALLOY, AND ARC EXTINCTION SHALL BE ACCOMPLISHED BY MEANS OF ARC CHUTES. A PUSH-TO-TRIP BUTTON ON THE FRONT OF THE CIRCUIT BREAKER SHALL PROVIDE A LOCAL MANUAL MEANS TO EXERCISE THE TRIP MECHANISM. EACH CIRCUIT BREAKER SHALL BE MOUNTED TO THE REAR OF THE FRONT PANEL SWINGOUT. CARE SHALL BE TAKEN TO PREVENT WIRE STRANDS FROM TOUCHING ANY PART OF THE PANEL. BREAKER OPERATING SWITCH SHALL BE ACCESSIBLE THROUGH A CUT OUT IN THE FRONT PANEL ASSEMBLY FOR EACH BREAKER.

7. SMART MOTOR CONTROLLER (PI-SMC, P2-SMC): PROVIDE ALLEN BRADLEY BULLETIN I50 SMART MOTOR CONTROLLER / SM DIALOG PLUS. PROVIDE SMC DIALOG PLUS UNITS THAT ARE PROPERLY SIZED FOR THE LOAD THEY ARE CONTROLLING. PROVIDE UNITS WITH THE FOLLOWING FEATURES:

- A. 480 VAC RATED POWER CIRCUIT.
- B. 120 VAC RATED CONTROL CIRCUIT.
- C. MULTIPLE STARTING MODES.
- D. ELECTRONIC MOTOR OVERLOAD PROTECTION.
- E. METERING.
- F. BUILT-IN COMMUNICATION PORT.
- G. 2-LINE, 16 CHARACTER BACKLIT LCD DISPLAY.
- H. KEYPAD PROGRAMMABLE.
- I. 3 PROGRAMMABLE AUXILIARY CONTACTS.
- J. BYPASS CONTACTOR.
- K. ISOLATION CONTACTOR.

8. CONTROL POWER TRANSFORMER (CPT-1): PROVIDE A CONTROL POWER TRANSFORMER THAT IS SIZED PROPERLY TO SUPPLY 120VAC CONTROL POWER FOR THE PUMP CONTROL PANEL AND ITS ASSOCIATED EQUIPMENT. PROVIDE A TRANSFORMER THAT IS 480 VAC SINGLE PHASE PRIMARY, 120 VAC SINGLE PHASE SECONDARY.

9. PUMP SELECTOR SWITCH (P1-SSI, P2-SSI): PROVIDE ALLEN BRADLEY MODEL 800T (NEMA 4) 3 POSITION MAINTAINED CONTACT NON-ILLUMINATED SELECTOR SWITCHES WITH CONTACTS RATED FOR 125 VAC OPERATION. PROVIDE SWITCHES COMPLETE WITH CONTACTS AS REQUIRED AND LEGEND PLATES ENGRAVED AS SHOWN ON THE CONTRACT DRAWINGS.

10. BACK UP FLOAT SYSTEM IN OPERATION PILOT LIGHT (PL-BU): PROVIDE RED ALLEN BRADLEY MODEL 800T PILOT LIGHTS RATED FOR 125 VAC. PROVIDE COMPLETE UNIT WITH ENGRAVED LEGEND PLATES AS SHOWN ON THE CONTRACT DRAWINGS.

11. MISC. CONTROL RELAYS: PROVIDE 120 VAC CONTROL RELAYS WITH DPDT CONTACTS RATED FOR 5 AMPS (MINIMUM) AT 120 VAC. PROVIDE RELAYS AS REQUIRED, COMPLETE WITH MOUNTING SOCKETS.

12. PUMP CONTROL PANEL INTERIOR LIGHT: PROVIDE HOFFMAN LOW PROFILE 120 VAC FLUORESCENT LIGHT, OR APPROVED EQUAL. PROVIDE LIGHT COMPLETE WITH INTEGRALLY MOUNTED MANUAL SWITCH AND PROPERLY SIZED LAMP.

13. A ONE-FLOAT BACK-UP LEVEL CONTROL SYSTEM SHALL BE INCLUDED TO ACT AS AN EMERGENCY BACK-UP LEVEL CONTROL SYSTEM IN THE EVENT THAT THE MAIN (DUPLEX) SYSTEM SHOULD FAIL. THE BACKUP SYSTEM WILL OPERATE WHEN THE PUMP SELECTOR SWITCHES ARE IN AUTO MODE. INDICATION SHALL BE PROVIDED ON THE CONTROL PANEL WHEN THE BACKUP FLOAT SYSTEM IS IN OPERATION AND A SIGNAL SHALL BE SENT TO THE TELEMETRY SYSTEM. THE BACK-UP LEVEL CONTROL SYSTEM WILL INCLUDE AN ENCAPSULATED MERCURY FLOAT SWITCH SUITABLE FOR SUSPENDING DIRECTLY INTO WET WELL. FURNISH FLOAT WITH REQUIRED LENGTH OF 1 1/2 SJO CORD AND SHALL BE UL APPROVED AND SUITABLE FOR OPERATING INTRINSICALLY SAFE RELAYS. PROVIDE FLAT STAINLESS STEEL MOUNTING BRACKETS FOR SUSPENDING FLOAT WITH CORD GRIPS INCLUDED.

14. ALL CONTROL PANEL COMPONENTS SHALL BE INTERGRATED TO FORM A COMPLETE AND FUNCTIONING SYSTEM.

15. INTERCONNECTION SCHEMATICS SHALL BE SUBMITTED WITH SHOP DRAWINGS THAT DETAIL HOW EACH COMPONENT IS WIRED AND CLEARLY INDICATE FACTORY AND FIELD WIRING REQUIREMENTS.

16. ALL PROGRAMMABLE SETTINGS SHALL BE SUBMITTED WITH SHOP DRAWINGS THAT DETAIL HOW THE SYSTEM WILL FUNCTION.

**CONTROL PANEL INSTALLATION REQUIREMENTS**

1. WIRE ALL POWER AND DEVICES TO THE CONTROL PANELS AS DETAILED ON THE CONTRACT DRAWINGS.
2. CLEARLY IDENTIFY AND MARK ALL CONDUITS ENTERING AND LEAVING THE CONTROL PANELS AS TO THEIR DESTINATION.
3. KEEP ALL FIELD WIRING NEAT AND BUNDLED INSIDE THE CONTROL PANELS. ALL FIELD WIRING SHALL BE CONTAINED IN WIREWAY PROVIDED WITHIN THE CONTROL PANELS.
4. TAKE CARE TO KEEP CONDUIT FILINGS FROM ENTERING PANELS WHEN INSTALLING CONDUITS.
5. PROVIDE 3/4" PLYWOOD MOUNTING BOARD ON WALL WHERE PANELS ARE MOUNTED.

DELAWARE COUNTY, OHIO  
**THE OAKS**  
SANITARY SEWER PUMP STATION  
ELECTRICAL DIAGRAMS

SCALE: HORIZ. 1"=50'  
VERT. 1"=5'

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SECTION 16010  
GENERAL PROVISIONS

PART 1 GENERAL

1.01 SECTION INCLUDES.

- A. Description of project drawings and specifications.
- B. General product requirements.
- C. Requirements for substitutions.

1.02 RELATED SECTIONS.

- A. The General Conditions and other Contract Documents as set forth in the foregoing pages are hereby incorporated into and become a part of the Specifications for work under this title, insofar as they apply hereto.
- B. All Specifications under this Division Title are directed to and are the responsibility of the Electrical Contractor. Unless other trades or persons are specifically mentioned, "Electrical Contractor" is inferred and intended.

1.03 DESCRIPTION.

- A. The Drawings accompanying these Specifications are complementary each to the other and what is called for by one shall be as if called for by both.
- B. Consult all Contract Drawings that may affect the location of equipment, conduit and wiring and make minor adjustments in location to secure coordination.
- C. Wiring layout is schematic and exact locations shall be determined by structural and other conditions. This shall not be construed to mean that the design of the system may be changed; it refers only to the exact locations of conduit and equipment to fit into the building as constructed and with the coordination of conduit and other equipment with piping and equipment included under other divisions of the Specifications.
- D. Coordinate layout of work with other trades. Make minor adjustments in location required for coordination. Locations of structural systems, heating work and plumbing lines shall take preference over locations of conduit lines where conflict occurs.
- E. Other than minor adjustments shall be submitted to the Engineer for approval before proceeding with the work.
- F. The location of outlets and switches shown on the Drawings is approximate, and the Engineer shall have the right to relocate any outlets or switches before they are installed without additional cost.

1.04 SUBMITTALS.

- A. The Contractor shall submit to the Engineer for review, within six weeks after date of contract, six (6) copies of manufacturer's drawings and wiring diagrams. The Engineer will review Contractor's shop drawings and related submittals (as indicated below) with respect to the ability of the detailed work, when complete, to be a properly functioning integral element of the overall system designed by the Engineer. Before submitting a shop drawing or any related material to the Engineer, Contractor shall: review each such submission for conformance with the means, methods, techniques, sequences, and operations of construction, and safety precautions and programs incidental thereto, all of which are the sole responsibility of Contractor; approve each such submission before submitting it; and so stamp each such submission before submitting it. The Engineer shall assume that no shop drawing or related submittal comprises a variation unless Contractor advises Engineer otherwise via a written instrument, which is acknowledged by Engineer in writing. The items, types of submittals and related material (if any called for are indicated below:

ITEMS

Lighting and Power Panels  
Fuses  
Lighting Fixtures  
Transformers  
Conduit

TYPE SUBMITTALS REQUIRED

Shop Drawings/ Catalog Cuts  
Catalog Cuts  
Catalog Cuts  
Shop Drawings/ Catalog Cuts  
Shop Drawings/ Catalog Cuts

- B. The Engineer shall return shop drawings and related materials with comments provided that each submission has been called for and is stamped by Contractor as indicated above. The Engineer shall return without comment material not called for or which has not been approved by Contractor.
- C. Engineer's review of Manufacturer's Drawings or Schedules shall not relieve the Contractor from responsibility for errors or omissions in Manufacturer's Drawings or Schedules and deviation from Engineer's Drawings or Specifications.
- D. At the completion of the Job, before final payment is made, the Contractor shall submit six (6) copies of Manufacturer's "As-Built" Drawings. Included with the Drawings shall be The Operating and Maintenance Manuals as called for in Section 16011.

PART 2 PRODUCTS

2.01 MATERIALS.

- A. All materials shall be new and undeteriorated and of a quality not less than the minimum specified.
- B. Materials and equipment for which there are Underwriters' Laboratories standard requirements, listing and labels, shall have listing of Underwriters' Laboratories and be so labeled.

2.02 SUBSTITUTIONS.

- A. It is the intent of this article to make the Specification open in every respect to all available brands of material of equal quality during the period of bidding.
- B. Bid shall be based on furnishing the brands of material and equipment mentioned in the Specifications. Submit, attached to the bid, selected list of all material and equipment brands intended to be furnished if awarded the contract. No change of brands shall be made after receipt of bid and attached material brands list, unless approved in writing by the construction manager.
- C. The Electrical Contractor is invited to bid on any other equal or similar brands of material and equipment they may desire to furnish or substitute, stating the difference in cost, if any. Other brands must be clearly stated on a substitution sheet. Contractor should be prepared to submit sample material three (3) weeks. All transportation costs associated with getting and returning the samples shall be born by the contractor.
- D. Where the Contractor furnishes equipment or material specified as equal or which is accepted as a substitution, he is responsible for all modifications required for his work, and work of all other trades to install the equipment and insure performance as originally specified.

2.03 GUARANTEES.

- A. The Electrical Contractor shall be responsible for all defects, repairs and replacements in materials and workmanship for a period of one (1) year after final written acceptance by the Owner.
- B. Product guarantees greater than one (1) year shall be passed along to the Owner for full benefit of the manufacturer's warranty.

2.04 QUANTITIES.

- A. Items may be referred to as singular or plural on the Drawings and in the Specifications. The Contractor is responsible for determining quantity of each item required.

PART 3 EXECUTION

3.01 INSTALLATION.

- A. Furnish and install all necessary hangers, supports, straps, boxes, fittings, and other similar appurtenances not indicated on the Drawings but which are required for a complete and properly installed system consistent with the Architectural treatment of the building.
- B. Contractor shall inform himself fully regarding peculiarities and limitations of space available for installation of materials and apparatus under this contract, and see that all equipment necessary to be reached from time to time for operation and maintenance are made easily accessible. Clearances, when possible, shall be greater than those required by code.
- C. Working Clearances: At least 6'-6" clearance must be maintained in front of all electrical equipment. Provide at least 3'-6" for 480/277 volt and 3'-0" for 208/120 volt clear space in front of all electrical equipment as wide as the equipment with a minimum of 2'-6" wide. The same clearance shall be required at the rear of rear access equipment.

(CONTINUED IN NEXT PARAGRAPH)..

3.02 WORKMANSHIP.

- A. Electrical work shall meet or exceed the standards of installation and workmanship set forth in the latest edition of the National Electrical Contractors Association publication entitled NECA Standard of Installation, except as otherwise modified in these specifications or shown on the Drawings.
- C. The Electrical Contractor, insofar as the work is concerned, shall at all times keep the premises in a neat and orderly condition, and at the completion of the work shall properly clean up and cart away debris and excess materials.

SECTION 16020  
WORK INCLUDED

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of work included.
- B. Coordination requirements.

1.02 RELATED SECTIONS

- A. Not used.

1.03 DESCRIPTION

- A. Furnish all materials, labor, tools, transportation, incidentals and appurtenances to complete in every detail and leave in working order all items of work called for herein and shown on the accompanying Drawings.
- B. It is the intent that the ensuing work shall be complete in every respect and that any material or work not specifically mentioned or shown on the Drawings, but necessary to fully complete the work, shall be furnished.
- C. Contact the Engineer immediately if there is any question regarding the meaning or intent of either Plans or Specifications, or upon noticing any discrepancies or omissions in either Plans or Specifications.

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

3.01 TEMPORARY SERVICE

- A. Furnish and install weatherproof temporary services to a central location as determined on the site by the construction manager and the power company. The temporary service size is to be 100 Amps, 208/120 volt, 3-phase, 4-wire and shall be installed in accordance with the power company's recommendations.
- B. Furnish and install a weatherproof temporary panel. Extension of service to other parts of the project from this panel shall be at the expense of the Contractor requesting such service.
- C. Cost of current consumed shall be the responsibility of the Electrical Contractor.
- D. Temporary wiring and lighting shall be installed by the Electrical Contractor in accordance with NEC and OSHA.

3.02 CUTTING AND PATCHING

- A. Avoid cutting of concrete, masonry and other work by use of inserts and sleeves, and when necessary shall be done by the Electrical Contractor with such tools and methods as to prevent unnecessary damage to surrounding areas or equipment.
- B. This Contractor shall give the General Contractor locations and sizes of all openings required for the installation of electrical equipment before walls, etc., are started. If it becomes necessary to cut into new work because of the failure of this Contractor to notify the General Contractor, then the General Contractor shall coordinate any necessary cutting by this Contractor. Patching shall be at this Contractor's expense.
- C. No cutting shall be done which will in any way reduce the structural strength of the building. Should such cutting be found necessary the Engineer must first be fully informed of, and consent to, the proposed operation.
- D. All cutting through poured concrete slabs and walls shall be done with core drills. No jackhammers will be allowed.
- E. Repair of damages, by this Contractor, to newly patched and refinished areas shall be done by the General Contractor at this Contractor's expense) in kind to match existing condition.

3.03 CLEANING AND PAINTING

- A. All electrical equipment shall be kept dry and clean during the construction period. Switchgear, Motor Control Centers, Generators, etc., shall be covered with fiberglass reinforced plastic sheeting as a minimum form of protection. Provide additional protection, if job conditions so require.
- B. Interiors of all enclosures, switchgear, motor control centers, etc. shall be thoroughly vacuumed, cleaned and all dirt and debris removed before installing trim or covers.
- C. All finished surfaces of equipment furnished under this Contract shall be thoroughly cleaned of dirt and all scratched or damaged surfaces shall be touched up with matching materials before final acceptance of the work. No exposed ferrous metal surfaces shall be left unpainted. Touch-up all galvanized, if scratched, with two coats of aluminum paint.
- D. Prime and paint both sides and edges of all wood mounting panels with two coats of gray flameproof paint.

3.04 EXCAVATION AND BACKFILL

- A. Provide all excavation and backfill necessary to get the work in place. Such excavation shall be carried to dimensions and depths indicated or as necessary for the proper installation and completion of the work.
- B. Remove all formwork and debris before backfill is placed. Backfill is to be brought to proper elevation and shall be puddled, tamped and thoroughly compacted. Finished grade shall be replaced in kind, i.e., sod, gravel, blacktop, concrete, etc.
- C. Surplus earth removed from excavations shall be removed from the site by this Contractor, unless the General Contractor requests that it be retained as fill to establish rough grades.

SECTION 16025  
CODES AND FEES

PART 1 GENERAL

1.01 SECTION INCLUDES.

- A. Description of applicable codes, standards and permit requirements.

1.02 RELATED SECTIONS.

(Not used)

1.03 DESCRIPTION.

- A. All work performed under this Specification shall be done in accordance with the latest edition of the National Electrical Code as prepared and published by the National Fire Protection Association, National Electrical Safety Code, Standards of National Bureau of Fire Underwriters, and any Federal, State Codes or Local Codes applying.
- B. Obtain and pay for all permits required by all laws and regulations or public authority having such jurisdiction. File drawings necessary to obtain permits.
- C. The Electrical Contractor shall obtain and pay for all metering equipment required by the Power Company for service, if required.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

SECTION 16030  
TESTS AND INSPECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES.

- A. Description of tests and inspections.
- B. Description of unacceptable work correction procedure.
- C. Description of Guarantee.

1.02 RELATED SECTIONS.

(Not used)

1.03 DESCRIPTION.

- A. Obtain all inspections required by all laws, ordinances, rules, regulations or public authority having jurisdiction and obtain certificates of such inspections and submit it to the Engineer. Pay all fees, charges, and other expenses in connection therein.
- B. Before any electrical work is covered, the Engineer will inspect the electrical work completed at that time.
- C. When the Engineer makes final inspection of all electrical work he will order tests performed as deemed necessary. These tests may include operation of lights and equipment, continuity of conduit system, grounding resistances and insulation resistances and checking out the operation of the various systems. This Contractor shall provide such assistance as required (including manpower and tools) to start and stop the various systems, etc. and simulate control sequences. The Contractor (not the Engineer) is responsible to turn on the systems and demonstrate they are operating properly.
- D. Submit data taken during such test to Engineer.
- E. Work shall be unacceptable when found to be defective or contrary to the Plans, Specifications, and Codes specified or accepted standards of good workmanship.
- F. The Contractor shall promptly correct all work found unacceptable by the Engineer whether observed before or after substantial completion and whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting such unacceptable work, including compensation for the Engineer's additional services made necessary thereby.
- G. This Contractor is responsible for all defects, repairs and replacements in materials and workmanship, for a period of one (1) year after the Engineer approves final payment.

1.04 SUBMITTALS.

(Not used)

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.01 PERFORMANCE.

(Not used)

3.02 LIGHTING.

- A. All lamps in all fixtures shall be installed new and the entire system shall be checked for satisfactory operation.

3.03 PHASE ROTATION.

- A. Prove that the panelboards, etc., are connected for clockwise (A-B-C) rotation as marked by the manufacturer.
- B. Prove that all electrical equipment is connected for clockwise rotation (A-B-C).

3.04 LOAD BALANCE.

- A. Prove that loads are balanced across all phases of panelboards.
- B. Obtain optimum phase balance under full load condition by reconnection of panelboard feeders at the main switchboard. Any panelboards requiring circuit changes for balance shall reflect these changes in the panel directory and wire color identification. Color change can be made with colored tape at panel.
- C. Pay special attention to prevent reverse rotation of motors during load balance and adjustment.

3.05 EQUIPMENT.

- A. Provide necessary electrical personnel and testing instruments as required to assist in testing of installation.

DELAWARE COUNTY, OHIO  
THE OAKS  
SANITARY SEWER PUMP STATION  
ELECTRICAL NOTES

SCALE: HORIZ. 1"=50'  
VERT. 1"= 5'

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SECTION 16111  
CONDUITS

PART 1 GENERAL

1.01 SECTION INCLUDES.

- A. All conduits, fittings, hardware, etc., for a complete raceway system.

1.02 RELATED SECTIONS.

- A. See Section 16130 - Boxes and Plates.

1.03 DESCRIPTION.

- A. Furnish and install complete conduit system as specified herein and shown on the Drawings.

1.04 SUBMITTALS.

- A. Product data:  
1. Manufacturers cutsheets on all products proposed for use.

PART 2 PRODUCTS

2.01 CONDUIT - ELECTRICAL METALLIC TUBING (emt)

- A. All wiring in building interior including feeders, branch circuits, and auxiliary wiring shall be run in thin wall (EMT) conduit.
- B. All steel conduits shall be galvanized and all conduits shall have the manufacturer's name and U.L. label attached to or stamped on each piece.
- C. Each section of conduit furnished shall be straight, free from blisters and other defects and in 10'-0" lengths. Galvanizing shall be of such nature and so applied that it will not crack or flake when conduit is bent.
- D. All conduit sizes stated herein or marked on the Drawings is minimum size and shall be no less than 3/4" unless otherwise noted.

2.02 CONDUIT - Rigid Metallic.

- A. All conduits on building exterior, in exterior partitions, in poured concrete, buried beneath concrete slabs or in fire pump rooms shall be rigid heavy wall conduit or intermediate metal conduit (IMC).
- B. Exception - IMC shall not be installed in earth or below concrete slabs.
- C. All steel conduits shall be galvanized and all conduits shall have the manufacturer's name and U.L. label attached to or stamped on each piece.
- D. Each section of conduit furnished shall be straight, free from blisters and other defects and in 10'-0" lengths. Galvanizing shall be of such nature and so applied that it will not crack or flake when conduit is bent.
- E. All conduit sizes stated herein or marked on the Drawings is minimum size and shall be no less than 3/4" unless otherwise noted.

2.03 CONDUIT - Flexible Metallic

- A. Flexible neoprene-clad galvanized steel conduit shall be used for "makeup" connections to rotating machinery and heating elements. Lighting fixtures may be supplied with short lengths of flexible conduit with green ground wire.
- B. Minimum size shall be 3/4" trade size.

2.04 CONDUIT - Rigid Non-Metallic.

- A. Non-metallic conduit and fittings for concrete encasement shall be rigid PVC, power and communication type EB, UL Listed.
- B. Non-metallic conduit and fittings for direct burial shall be rigid Schedule 80 PVC.
- C. Non-metallic conduit and fittings specified or shown on the drawings for interior applications shall be rigid Schedule 40 PVC.
- D. Non-metallic supports for grounding electrode conduits shall be Bumdy Nylocip or by Clic.

2.05 CONDUIT FITTINGS - Metallic.

- A. All connectors shall be of the insulated throat type. All fittings shall be steel. No die cast fittings will be allowed. Contractor may use Thomas and Betts, Raco, Steel City, or Midwest fittings. All rigid and IMC conduit shall have threaded connections.
- B. "Mineralac" type supports and "Unistrut" type one bolt supports with square ends shall not be used at any location. "Mineralac" type supports or "Unistrut" type one bolt supports of any design shall not be used below 9'-0" above the floor.
- C. Explosion-proof conduit seals and fittings shall be labeled or listed for hazardous locations as indicated on the drawings.

PART 3 EXECUTION

3.01 INSTALLATION.

- A. All rigid or intermediate (IMC) conduit entering cabinets, pull boxes, junction boxes or outlet boxes shall be secured with thread, weatherproof, insulated bushing hubs.
- B. No more than four (4) 90 degree bends will be allowed in any one conduit run. Where more bends are necessary in any single run, a pull box shall be installed; pull boxes shall also be installed in long runs at a maximum separation of 100'-0". All conduits except in concrete slab or earth shall be routed parallel or perpendicular to the lines of the building and no out of plumb or diagonal lines will be accepted.
- C. All conduit shall be substantially supported by pipe straps or suitable clamps or hangers attached to the elements of the building structure to provide rigid installation; in no case shall conduit be attached or supported from adjoining pipe or installed in such a manner as to prevent the ready removal of other pipe for repairs.
- D. Strap iron hangers and wire will not be approved for conduit support.
- E. Rigid or IMC conduit in poured concrete or buried beneath concrete slabs shall have a 1" minimum cover.
- F. Exposed conduits rising from floor to surface panels, or boxes, shall have a 4" high concrete curb encasing the conduits at the floor line. Curb to have chamfered edges.
- G. Exercise necessary precaution to prevent accumulation of water, dirt, or concrete in conduits during execution of electrical work. Conduit in which water or foreign material has been permitted to accumulate shall be thoroughly cleaned, or replaced where such accumulations cannot be removed.
- H. All conduits must be kept dry and free of water or debris with approved pipe plugs or caps. Care shall be given that plugs or caps are installed before pouring of concrete.
- I. Flexible conduit may only be used as follows:  
1. Lighting fixtures may be supplied with short lengths not longer than 6'-0". All other lighting fixtures may use liquid tight flexible conduit with short lengths not longer than 6'-0".  
2. Make up connections to transformers in lengths not longer than 2'-0", shall be in liquid tight flexible conduits.  
3. All expansion joints, flexible connections, and vibration isolators shall be bridged with short lengths or liquid tight flexible conduit not longer than 2'-0".
- J. All connections to rotating machinery and heating elements shall be made with short lengths (minimum 12") of liquid-tight conduit. Where motors are mounted on sliding bases, the flexible connection shall be long enough to allow full travel of the motor on the base (maximum 36").
- K. Install explosion-proof fittings and seals required for hazardous locations indicated on the drawings. All connections passing in to or out of the wet well shall be sealed per NEC requirements.
- L. Pull Wires:  
1. A pull wire shall be installed in all empty conduits. In dry locations, pull wire shall be No. 14 gauge galvanized iron or nylon pull cord.  
2. Both ends of all pull wire shall be identified by means of labels or tags, reading "PULL WIRE" and shall be numbered to refer to the same pull wire.
- M. Seal water and moisture tight, all conduits entering from outside the building.

SECTION 16120  
WIRE AND CABLE (600V AND BELOW)

PART 1 GENERAL

1.01 SECTION INCLUDES.

- A. Description of wire and cable provided for the contract work.

1.02 RELATED SECTIONS.

(Not used)

1.03 DESCRIPTION.

- A. Furnish and install all wiring required to connect complete power, lighting, grounding, control, and auxiliary systems.

1.04 SUBMITTALS.

(Not used)

PART 2 PRODUCTS

2.01 STANDARDS.

- A. Where no size or type is shown, conductors shall not be less than #12 AWG.
- B. All conductors shall be stranded and of the AWG size and type shown on the Drawings. Insulation shall be type XHHW, THHN, or THWN for conductors up to 12 AWG, and type THW for conductors 4 AWG and larger. All conductors shall be copper and have 600-volt insulation; be UL labeled and have American manufacturer.
- C. All conductors shall be stranded unless otherwise noted and conform to the latest edition of the Underwriters Laboratories, Inc., "Standard for Rubber Covered Wires and Cables" and the National Electrical Code.
- D. No wire used for lighting or power shall be smaller than #12 AWG.
- E. No wire used for control circuits shall be smaller than #14 AWG.

PART 3 EXECUTION

3.01 INSTALLATION.

- A. All conductors shall be continuous from box-to-box. No joints shall be permitted in the circuit other than in junction boxes or fixtures.
- B. Equipment ground conductors shall be same insulation type as the associated circuit conductors.
- C. The ampacity of all conductors shall be at least as great as the rating of the fuse or circuit breaker on the line side of the conductors. Note the ampacity reduction required by Code when more than three conductors are placed in a raceway.  
1. All conductors for distribution and control equipment terminations shall be based on full 75°C ampacity.  
2. All conductors for appliance and utilization equipment terminations rated 100 amperes or less shall be based on 60°C ampacity.
- D. Provide cable supports for vertical raceways per NEC Table 300-19 (a).
- E. Wiring installed in separate conduits.  
1. Control wiring.
- F. Swab conduits free of moisture, dirt and grease before pulling wire. Care shall be exercised while installing wire in conduits so that conductor insulation will not be injured. No oils, grease or compounds other than Ideal "Wire Lube", "Yellow 77", or equal UL approved wire pulling lubricants shall be used for pulling in any conductors.
- G. Remove all wire cut dead.

3.02 CONNECTIONS.

- A. All connections are to be made using pressure type terminals, unless noted below
- B. Where connections are to be made to devices or equipment under screw heads only, install insulated, crimp type spade clips on the wire ends before the connections are made.
- C. Devices shall not be used as through connection points. Where through circuits are involved they shall be spliced in the box and a pigtail connected to the device.
- D. Connectors shall contain only one wire unless they are listed for multiple conductors.
- E. Joints in #10 and smaller wire shall be made using the following types of connectors: Minnesota Mining and Manufacturing "Scotch Lok", Ideal Industries, Inc. "Wing Nut", or Thomas and Betts Co. Type "PT". Connectors shall be used only within their range. Other threaded-on types of insulated connectors shall not be used.
- F. Joints in #8 and larger wire or joints in any wires above the range of threaded-on connectors shall be made using pressure type mechanical connectors applied after wires are cleaned and then insulated using two (2) layers of "Scotchfil" brand electrical insulation putty and covered by two (2) half-lapped layers of "Scotch 88", or Plymouth Slipnot Gray vinyl plastic electrical tape. Connectors can be installed and sealed against moisture by installing Raychem "TCS (indoor) or WCSM (exterior)" sealant coated heat shrink tubing.

3.03 WIRE COLOR CODE.

- A. The following color code shall be used:

	208Y/120 Volt	480Y/277 Volt
--	---------------	---------------

Phase A:	Black	Brown
Phase B:	Red	Purple
Phase C:	Blue	Yellow
Neutral:	White	Gray
Equipment Ground:	Green	Green

- All control circuits shall use black for power, red for control, and white for neutral.
- Yellow wire is to be used for foreign voltages in all panels, enclosures and cabinets.
- Conductors No. 10 AWG or smaller shall have insulation colored as noted above.
- Conductors No. 8 AWG or larger shall have insulation colored as noted above or colored tape, minimum size 1/2", wrapped twice around at the following points:  
1. At each terminal.  
2. At each conduit entrance.  
3. At intervals not more than 12 inches apart in all boxes, panel tubs, switchboards, etc.
- Equipment grounding conductors No. 8 AWG and larger shall be green or green tape applied in a continuous wrap where visible at panels and junction boxes, etc.

3.04 MARKING.

- A. All branch circuits shall be marked in the panelboard gutters. Markers shall indicate corresponding branch-circuit numbers.
- B. All signal and control wires shall be marked at all termination points, such as cabinets, terminal boxes, equipment racks, control panels, consoles, etc.
- C. The wire markers shall be Thomas and Betts vinyl tape type WM wrapped once around the wire and the adhesive sides placed together to form a flag.
- D. These wire markers shall be installed when wire is pulled.

SECTION 16130  
BOXES AND PLATES

PART 1 GENERAL

1.01 SECTION INCLUDES.

- A. Description of boxes and plates provided for the contract work.

1.02 RELATED SECTIONS.

- A. 16111 - CONDUITS.
- B. 16140 - WIRING DEVICES.

1.03 DESCRIPTION.

- A. Furnish and install all outlet, junction, and pull boxes as indicated on the Drawings and as necessary to install the required conduit and wiring in a neat and workmanlike manner.
- B. Furnish and install all outlet and junction box covers and wiring device plates.

1.04 SUBMITTALS.

(Not used)

PART 2 PRODUCTS

2.01 STANDARDS.

- A. Pull boxes and junction boxes shall be galvanized and of the correct size and gauge, in accordance with Code requirements and shall be Underwriters Laboratories labeled.

2.02 BOXES FOR FLUSH WORK.

- A. Flush outlet, junction and pull boxes shall be pressed steel galvanized or sherardized and shall be a minimum of 4" square or octagonal similar to Appleton #40. Steel boxes cast in concrete shall be designed for concrete installation.
- B. Flush wall boxes in brick, or other finished masonry walls shall be Steel City GW-115-C Series, or Raco 695 Series.

2.03 BOXES FOR EXTERIOR WORK.

- A. Boxes at exterior areas to be watertight and dust-tight with gasketed covers.

2.04 BOXES FOR EXPOSED WORK.

- A. All boxes for exposed work shall be "FD" type with threaded hubs for rigid conduit riser.

2.05 BOXES FOR HAZARDOUS LOCATIONS.

- A. All explosion proof boxes shall be listed or labeled for the hazardous location as indicated on the Drawings.

2.06 PLATES AND COVERS.

- A. Switch covers for exposed boxes shall be single gang with spring loaded, weatherproof covers, cast copper free aluminum with a neoprene gasket.
- B. Receptacle covers shall be single gang with gasketed spring loaded individual cover doors. Covers shall be cast copper free aluminum.
- C. Blank outlets where required in finished areas shall match wiring device covers in that area.
- D. Plates of satin finish #302 stainless steel as manufactured by Slater may be furnished at this Contractor's option.

PART 3 EXECUTION

3.01 INSTALLATION.

- A. All boxes shall be rigidly supported from building structure independent of the conduit system. Boxes cast into masonry or concrete are considered to be rigidly supported.
- B. Close all unused and open knockouts and hubs with plugs of the proper size.

DELAWARE COUNTY, OHIO  
THE OAKS  
SANITARY SEWER PUMP STATION  
ELECTRICAL NOTES

SCALE: HORIZ. 1"=50'  
VERT. 1"=5'

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**SECTION 16140  
WIRING DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES.**

- A. Description of wiring devices for branch circuits.

**1.02 RELATED SECTIONS.**

- A. 16120 - WIRE AND CABLE.
- B. 16130 - BOXES AND PLATES.

**1.03 DESCRIPTION.**

- A. Furnish and install all wiring devices where shown on the Drawings.
- B. Wiring devices shall be furnished in strict accordance with the catalogue numbers and manufacturers listed in the Schedule, which follows. Other special purpose devices shall be as specified on the Drawings.

**1.04 SUBMITTALS.**

(Not used)

**PART 2 PRODUCTS**

**2.01 STANDARDS.**

- A. Duplex Grounding Type Receptacle - 20 amp, 125 volt - NEMA 5-20R.
  - a. Hubbell - 5352-I
- B. Duplex Grounding Type Receptacle - 15 amp, 125 volt - NEMA 5-15R.
  - a. Hubbell - 5252-I
- C. Single pole Switches - 20 amp, 120/277 volt.
  - a. Hubbell - 1221-I
- D. Double Pole Switches - 20 amp, 120/277 volt.
  - a. Hubbell - 1222-I
- E. Weatherproof Receptacle - 20 Amp, 125 Volt - NEMA 5-20R.
  - a. Hubbell - GF 5362-I with Intermatic Guardian 1 Series, NEMA 3R cover.
- F. G.F.I. Receptacle - 20 Amp, 125 Volt - NEMA 5-20R.
  - a. Hubbell - GF 5362-I with S26 or WP-26 W.P. Cover
- G. G.F.I. Receptacle - 15 Amp, 125 Volt - NEMA 5-15R.
  - a. Hubbell - GF 5262-I with S26 or WP-26 W.P. Cover

**2.02 SUBSTITUTIONS.**

- A. The Electrical Contractor may, upon approval by Engineer, furnish equal devices by Slater, Hubbell, P & S, General Electric, Leviton, Eagle or Woodhead.

**PART 3 EXECUTION**

**3.01 INSTALLATION.**

- A. Install wiring devices in a neat and workmanlike manner.
- B. Ground all receptacles in accordance with Article 250-146 of NEC and as indicated in the Grounding Section of this Specification.
- C. Wiring devices specified are side and back wired type and shall be back wired.

General use duplex receptacles shall be grounding type, 15 Amp, and 125 Volt. If there is only one receptacle on a 20 Amp circuit, then it shall be 20 Amp rated.

**SECTION 16163  
208Y/120 VOLT LIGHTING PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES.**

- A. Description of lighting panels.

**1.02 RELATED SECTIONS.**

- A. 16111 - CONDUITS.
- B. 16195 - IDENTIFICATION.

**1.03 DESCRIPTION.**

- A. Furnish and install, as scheduled and shown on the Drawings, lighting panels for operation on 208Y/120 volt, 3 phase, 4-wire service.
- B. Each panel shall be connected with a feeder as sized on the Drawings.

**1.04 SUBMITTALS.**

(Not used)

**PART 2 PRODUCTS**

**2.01 STANDARDS.**

- A. The panels shall be Square D, type NQOD, unless otherwise noted, with branch breakers as scheduled on the Drawings.
- B. General Electric type AQ, I-T-E Electrical Products type S1, Park Ohio Electric (with Westinghouse/Cutler-Hammer breakers) or Westinghouse type B10B panels may be furnished at this Contractor's option.
- C. All terminations shall be marked "75°C only", "60/75°C" or listed for use with 75°C insulated conductors at full 75°C ampacity.

**2.02 CONSTRUCTION.**

- A. All bus bars shall be silver or tin plated copper.
- B. Cabinets shall be of commercial galvanized sheet steel, code gauge and size, surface or flush mounted as called for in the Drawings. Flush panels shall be finished with prime coat only. Doors shall be fitted with chrome plated combination lock and catch, and all keyed alike.  
Note: Tubs shall be 20" wide.
- C. Directory card and frame inside panel door.
- D. Neutral assembly shall have individual anti-turn solderless terminals, similar to Square D type PK, for connection of ultimate number of neutral wires. Sheet metal terminal strips and connections will be rejected.

(CONTINUED IN NEXT PARAGRAPH)..

- E. Panel shall have a copper ground bar similar to neutral bar in number, size, and type of anti-turn solderless lugs. This ground bar shall be factory bonded to the panel tub in the gutter space opposite the mains and the neutral assembly and shall have the screwdriver slots facing the front of the panel. Ground bars in panel side gutters will be rejected. Sheet metal terminal strips and connections will be rejected. Note that the height of the panel tub may be higher than normal because of the ground bar.

**2.03 CIRCUIT BREAKERS.**

- A. The branch breakers shall be type QOB or QOB-H rated 10,000 A.I.C. minimum, molded case, temperature compensated, quick-make, quick-break, with thermal-magnetic trip and permanently bolted to bus bars.
- B. Breakers that are used to switch fluorescent lighting shall be type SWD.
- C. Breakers that feed heating, air conditioning and refrigeration equipment shall be listed as "HACR" type.

**PART 3 EXECUTION**

**3.01 INSTALLATION.**

- A. Panels shall be mounted with top of panel at 6'-0" above floor.
- B. Directory cards shall be correctly filled in by typewriter for circuits as installed, before final payment is made.
- C. Furnish and install identification nameplate that reads "CAUTION SERIES RATED SYSTEM", "IDENTICAL COMPONENT REPLACEMENT REQUIRED".
- D. Additional identification shall be furnished as specified in Section 16195.

**SECTION 16164  
480/277 VOLT LIGHTING PANELS**

**PART 1 GENERAL**

**1.01 SCOPE**

- A. Furnish and install, as scheduled and shown on the Drawings, lighting panels for operation on 480/277 volt, 3 phase, 4-wire service.
- B. Each panel shall be connected with a feeder as sized on the Drawings.

**PART 2 PRODUCTS**

**2.01 STANDARDS**

- A. The panels shall be Square D, Type NEHB, unless otherwise noted, with branch breakers as scheduled on the Drawings.
- B. General Electric Type AE, Siemens Electrical Products Type P2, Park Ohio Electric or Cutler Hammer type H14B panels may be furnished at this Contractor's option.
- C. All terminations shall be marked "75°C only", "60/75°C" or listed for use of 75°C insulated conductors at full 75°C ampacity.

**2.02 CONSTRUCTION**

- A. All bus bars shall be silver or tin plated copper.
- B. Cabinets shall be of commercial galvanized sheet steel, code gauge and size, surface or flush mounted as called for in the Drawings. Flush panels shall be finished with prime coat only. Doors shall be fitted with chrome plated combination lock and catch, and all keyed alike.  
Note: Tubs shall be 20" wide. Directory card and frame shall be inside panel door.

- C. Directory card and frame inside panel door.

- D. Neutral assembly shall have individual anti-turn solderless terminals, similar to Square D type PK, for connection of ultimate number of neutral wires.

- E. Panel shall have a copper ground bar similar to neutral bar in number, size, and type of anti-turn solderless lugs. This ground bar shall be factory bonded to the tub in the gutter space opposite the mains and the assembly and shall have the screwdriver slots facing the front. The height of the panel tub may be higher than normal because of the ground bar.

**2.03 CIRCUIT BREAKERS**

- A. The branch breakers shall be type EHB rated 14,000 A.I.C. minimum, molded case, temperature compensated, quick-make, quick-break, with thermal-magnetic trip and permanently bolted to bus bars.
- B. Breakers that are used to switch 277 volt fluorescent lighting shall be type SWD.
- C. Breaker that feed heating, air conditioning and refrigeration equipment shall be listed "HACR" type.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Panels shall be mounted inside with top of panel at 6'-0" above floor.
- B. Directory cards shall be correctly filled in by typewriter for circuits as installed, before final payment is made.
- C. Furnish and install identification nameplate that reads "CAUTION SERIES RATED SYSTEM" "IDENTICAL COMPONENT REPLACEMENT REQUIRED".
- D. Additional identification shall be furnished as specified in Section 16195.

**SECTION 16170  
DISCONNECTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES.**

- A. Description of disconnect switches.

**1.02 RELATED SECTIONS.**

- A. 16111 - CONDUITS.
- B. 16195 - IDENTIFICATION.

**1.03 DESCRIPTION.**

- A. The Electrical Contractor shall furnish and install heavy duty fusible disconnect or non-fusible disconnect switches where shown on the Drawings, in conformance with N.E.C. requirements for each unit of equipment.

**1.04 SUBMITTALS.**

(Not used)

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS.**

- A. Square D, General Electric, Siemens, or Cutler-Hammer disconnect switches may be furnished at Contractor's option.
- B. Switches shall be wall mounted in general purpose enclosure unless otherwise noted. They shall be NEMA heavy-duty type shall have the rating, capacity, and number of poles for the service intended.
- C. Switches in exterior locations shall be NEMA 3R unless otherwise noted.

(CONTINUED IN NEXT PARAGRAPH)..

- D. All switches have provisions for padlocking and shall be by the same manufacturer.

- E. Fusible switches shall have Class R fuse clips.

- F. Switches for use on motor circuits shall be horsepower rated.

**PART 3 EXECUTION**

**3.01 INSTALLATION.**

- A. Switches shall be installed to provide code required clearance and shall be generally wall mounted at 6'-0" to top.
- B. Disconnects mounted on equipment shall be field coordinated and located to clear any access openings or paths.
- C. Provide free standing unistrut support frame for switches that cannot be wall or equipment mounted. Frame shall be full height and attached at the floor and ceiling, or angle braced to floor or poured into concrete equipment pad in order to provide rigid structure. Minimum height to top of floor mounted switches shall be 36".

**SECTION 16181  
FUSES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES.**

- A. Description of fuses.

**1.02 RELATED SECTIONS.**

- A. 16480 - LOW VOLTAGE MOTOR CONTROL CENTER.
- B. 16901 - INSTRUMENTATION AND CONTROLS FUNCTIONAL REQUIREMENTS.
- C. 16903 - CABINETS, CONSOLES, PANELS, AND ENCLOSURES.

**1.03 DESCRIPTION.**

- A. Provisions of this Section shall apply to all fuses and fused equipment of 600 volts or less as shown on the Drawings.
- B. Furnish and install all fuses as described below.

**1.04 SUBMITTALS.**

(Not used)

**PART 2 PRODUCTS**

**2.01 STANDARDS.**

- A. All fuses above 600 amperes shall be UL Class L, Bussman "Hi-Cap" Type KRP-C.
- B. All fuses 600 amperes and below shall be UL Class RK-1, Bussmann "Lo-Peak" Type LPN/S-RK, Gould/Shawmut "Amp-Tap II" Type A2/6D-R or Littlefuse Type LLN/S-RK, unless otherwise noted.

**PART 3 EXECUTION**

**3.01 SPARE FUSES.**

- A. Furnish one set of three spare fuses for each size and type of fuse used. Spare fuses shall be mounted in fuse cabinet mounted adjacent to each piece of Service Equipment.

**3.02 VOLTAGE RATING.**

All fuses shall have proper voltage rating for the system voltage in which they are fused.

**SECTION 16195  
IDENTIFICATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES.**

- A. Description of identification.

**1.02 RELATED SECTIONS.**

- A. 16155 - MOTOR STARTERS AND CONTROLS.
- B. 16163 - 208Y/120 VOLT LIGHTING PANELS.
- C. 16170 - DISCONNECTS.

**1.03 DESCRIPTION.**

- A. Each piece of service equipment and individual switches, all disconnects, starters, all exhaust fan manual starting switches, all power and lighting panels, all cabinets and pull boxes for auxiliary systems, such as telephone, clock equipment, public address, fire alarm and emergency exit lights, etc., shall be identified on the front cover or trim with its name and designation number or letter as shown on the Drawings and with the voltage available within the panel.

**1.04 SUBMITTALS.**

(Not used)

**PART 2 PRODUCTS**

**2.01 GENERAL.**

- A. Identification shall be in the form of laminated plastic nameplates, white face, with the letters engraved into the black background, minimum 1/4" high. Plates shall be drilled on each end for sheet metal screw attachment. No "Dymo" or similar tape type labels will be allowed.

**PART 3 EXECUTION**

**3.01 INSTALLATION.**

- A. Plastic nameplates shall be attached to face of electrical device by sheet metal screws. Locate plate so wording reads horizontally and plate does not obstruct other identification plates, latches or operators.
- B. Install nameplate at power receptacles where the nominal voltage between any pair of contacts is greater than 150 volt.
- C. Branch-Circuit Panelboards: Per NEC 210-4d, a phase color-code nameplate shall be mounted on the inside trim adjacent to the manufacturer's nameplate. Refer to Section 16120, 3.03A for proper color code for voltage utilized.
- D. Where circuit breakers or fuses are applied in compliance with the series combination ratings marked on the equipment by the manufacturer, the equipment enclosure(s) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall be readily visible and state "Caution - Series Rated System."

**DELAWARE COUNTY, OHIO  
THE OAKS  
SANITARY SEWER PUMP STATION  
ELECTRICAL NOTES**

SCALE: HORIZ. 1" = 50'  
VERT. 1" = 5'

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SECTION 16280  
SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install Surge Protective Device (SPD) units as shown on the Drawings and herein specified.

1.02 SUBMITTALS

- A. For Review:
1. Product data sheets of all components
2. All operating parameters including UL 1449 voltage category
3. Independent test data on maximum single and repetitive surge current.
B. To be included in Operation and Maintenance Manuals:
1. One copy of each approved submittal

1.03 MANUFACTURERS

- A. Surge Protective Devices
1. Liebert Corporation
2. Current Technology Inc.
3. Advanced Protection Technologies
4. Cutler-Hammer

PART 2 PRODUCTS

2.01 SURGE PROTECTIVE DEVICES

- A. Surge Protective Device (SPD) units shall be self-contained, wall mountable, solid-state devices in a NEMA 12, enameled steel enclosure with hinged door and locking handle.
B. SPD units shall consist of an engineered system to achieve suppression using one or more of the following components:
1. Doped selenium plates
2. Metal Oxide Varistors (MOV) in enclosed replaceable modules
3. Silicon Avalanche Diodes (SAD) in enclosed replaceable modules
C. SPD unit components shall be arranged to operate bi-directionally, in parallel with the line, have sine wave tracking characteristics, and have seven modes of protection as follows:
1. Each Phase: Line to Neutral
2. Each Phase: Line to Ground
3. Neutral - Ground
D. SPD units shall be classified by U.L. with the following ratings:
Maximum Clamping Voltage L-N Maximum Clamping Voltage N-G
480/277 volt 3 phase "WYE" units 800 volt 800
E. SPD units shall be capable of surviving the following surge current on a single impulse basis without performance degradation of more than 10%.
1. SPD units located at Service Entrance Switchgear 120,000 amps per mode
2. SPD units located at Power Distribution Panels 80,000 amps per mode
3. SPD units located at downstream panelboards 60,000 amps per mode
F. SPD units shall have Form C summary output contacts for remote monitoring capability.
G. SPD units shall have integral noise filtering of the following minimum attenuation level:
1. 10 KHz through 100 MHz- 34 dB
H. SPD units shall have integral diagnostic indicating lights.
I. SPD shall be listed in accordance with UL 1449 Second Edition to include Section 37.3 highest fault current category. SPD shall be UL 1283 listed. SPD shall be tested to ANSI C62.41 and C62.45 standards.
J. SPD shall be modular in design. SPD for service entrance shall provide two modules per phase for redundant protection.
K. SPD shall include a fused disconnect switch or circuit breaker where a dedicated fused switch or circuit breaker is not furnished.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install surge suppressors where shown on the Drawings, and in accordance with manufacturer's written instructions.
B. Units shall be installed as close as possible to the equipment being protected (preferably closed nipple). Conductors and conduit shall be run horizontally directly from electrical equipment to surge suppressor enclosure.

3.02 EQUIPMENT DEMONSTRATION

- A. After all system tests have been completed, schedule an instruction period with the Owner. Instruction to be provided by manufacturer's authorized field technician.
B. Instruction shall include:
1. Location of all components of the system and explanation of their function
2. Demonstration of equipment
3. Maintenance and repair procedures
4. Programming procedures
5. Review of documents in Record and Information Manuals

3.03 EXTENDED WARRANTY/SPARE PARTS

A. Provide a five-year extended warranty or a complete spare parts package in accordance with manufacturer's standard arrangement.

SECTION 16402  
UNDERGROUND ELECTRICAL SERVICE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of electric service.

1.02 RELATED SECTIONS

- A. 16111 - CONDUITS
B. 16120 - WIRE AND CABLE

(CONTINUED IN NEXT PARAGRAPH)...

1.03 DESCRIPTION

- A. Provide underground 480Y/277 volt, 3-phase, 4 wire electric service for lighting and power as supplied by Ohio Edison.
B. Ohio Edison, the Power Company, shall furnish and install primary cable, meter, current transformers, pad-mounted transformer, transformer grounding and all transformer connections. The Power Company shall also furnish the meter trim to the Electrical Contractor.
C. The Electrical Contractor shall furnish and install the trenching, backfill, primary duct with pull wire, secondary duct and secondary conductors with high-pressure, crimp-type cable lugs. The contractor shall install the meter trim furnished by the power company. The contractor shall install the CT cabinet and provide a 2" rigid galvanized conduit from the CT cabinet to the meter base. Ohio Edison shall provide the transformer pad.

1.04 SUBMITTALS

A. Not used.

PART 2 PRODUCTS

2.01 GENERAL

A. See Specification Sections pertaining to material and products used.

PART 3 EXECUTION

3.01 INSTALLATION (FOR PAD MOUNTED TRANSFORMERS)

- A. Provide Schedule 40 PVC ducts from the primary compartment of the Power Company's pad mounted transformer to the service disconnect switch.
B. Ohio Edison shall provide trenching and backfill for the primary wiring that they are furnishing.
C. All conductors shall extend 5' beyond conduit at transformer to facilitate connection by the Power Company. Coordinate work with the Power Company prior to installation.
D. The Electrical Contractor shall obtain and pay for all metering as required by the Power Company.
E. Contact the Power Company for concrete transformer pad and primary duct specifications. Install pad per Power Company requirements.
F. Furnish and install conduit as required for Power Company metering.

SECTION 16451  
GROUNDING (WIRED SYSTEM)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of main switchboard.

1.02 RELATED SECTIONS

- A. 16111 - CONDUIT.
B. 16120 - WIRE AND CABLE.

1.03 DESCRIPTION

- A. Grounding of the service and service entrance equipment shall be in accordance with the National Electric Code.
B. All feeders and branch circuits over 100 volts shall include a Grounding Conductor sized in accordance with NEC Table 250-122, except not be smaller than #12 for power and lighting circuits and #14 for control circuits. All ground conductors shall be Green, or as specified under Section 16120, "WIRE AND CABLE".

1.04 SUBMITTALS

(Not used)

PART 2 PRODUCTS

2.01 GENERAL

- A. All ground clamps shall be Penn-Union "GPL" type or similar by O.Z. or Bundy.
B. All cable connections to ground rods shall be by "Cadweld", "Thermoweld", or "Heliarc" welding process by using recommended molds, compound and correct gas mixtures.
C. Conduit grounding type bushing shall be T & B Series 3870 with appropriate size ground wire terminal.
D. Conduit for solitary ground conductors shall be rigid PVC non-metallic electrical conduit with U.L. label.
E. All panels shall be furnished with a copper ground bar similar to the neutral bar and having the same number, size and type of lugs. The ground bar shall be factory bonded to the panel tub above or below the neutral assembly, but shall not be in a gutter.
F. Enclosures, junction and pull boxes shall utilize a "panel" type ground bar or U.L. Listed grounding lugs or screws, as the number of ground conductors dictates.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Neutral shall be bonded to ground at service entrance through a #6 AWG bonding jumper. Run #6 AWG from the service entrance ground building steel via the main service ground bus bar as detailed on the drawings. In addition from the service entrance ground run #6 AWG to a driven ground system where shown on the Drawings. Driven ground system shall consist of a 5/8" x 10'-0" copperweld ground rod. All connections to ground rods shall be by specified welding process.
B. The ground conductor shall be connected to the neutral in only two locations - on the supply side of the service disconnect means per NEC-250-24 and on separately derived systems per NEC 250-30. Because the ground is lost through the transformer, it must be re-established by use of a grounding conductor, minimum size per NEC Table 250-66, connecting the transformer secondary neutral point to the transformer enclosure and to the interior cold water system or to building structure ground.
C. All solitary ground conductors shall be run in rigid PVC non-metallic conduit. Solitary ground conductors shall not be placed through metallic sleeves or conduits and shall not be completely encircled by metallic hangers or supports.
D. All conduits entering switchboards and substations shall be bonded together with #10 AWG wire connected to a conduit grounding bushing. These shall then be bonded to the ground bus in the equipment item.
E. All enclosures, boxes, fixtures, receptacles, etc., shall be grounded by being securely bonded to the grounding conductor. Boxes, conduit, etc., shall not be used as part of the grounding "conductor" system.
F. Enclosures not requiring a ground bar shall have all ground conductors connected together and a pigtail the size of the largest conductor bonded to the enclosure with a single ground connector used for no other purpose.
G. At each receptacle box, the ground conductor shall enter and connect, with normal wiring connector, to: 1) The ground pigtail to receptacle; 2) The ground pigtail to box ground screw; and 3) The outgoing ground conductor to next device, if not at end of run. Metal to metal contact between the device yoke and the outlet box is not acceptable as a bond for either surface mounted boxes or flush type boxes.
H. Motor terminal boxes shall be grounded by the use of manufacturer supplied ground lug or by drilling and tapping a hole for a ground screw. Remove paint prior to making the connection.
I. Lighting fixtures shall be grounded by the use of a manufacturer supplied ground lug or pigtail or by the use of ground clips fastened on bare metal that is free of paint.

(CONTINUED IN NEXT PARAGRAPH)...

J. Conduit system shall be electrically continuous. All locknuts shall cut through enameled or painted surfaces on enclosures. Where enclosures and non-current carrying metals are isolated from the conduit system, use bonding jumpers with approved clamps. Where reducing washers are used and where concentric or eccentric knockouts are not completely removed bonding bushings shall be required.

SECTION 16460  
DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of dry type transformers.

1.02 RELATED SECTIONS

- A. 16111 - CONDUITS.
B. 16120 - WIRE AND CABLE.

1.03 DESCRIPTION

- A. Furnish and install as indicated on the Plans, single and three phase, 60 Hertz, dry type, air cooled, two winding, insulated, high efficiency, low sound level transformers as herein specified.
B. Transformers shall be rated for use with systems of 600 volts or below.

1.04 SUBMITTALS

(Not used)

PART 2 PRODUCTS

2.01 STANDARDS

- A. Transformers shall be constructed in accordance with the latest standards of IEEE, ANSI, and NEMA.
B. Transformers shall be Underwriters' Laboratories, Inc., approved and shall carry the U.L. Label. The Drawings shall show the Underwriters' Laboratories file numbers for both the insulated system approved and the transformer approved.
C. Transformers shall be Niagara single phase S220-115 or three phase T-220-115 or equal by Sorgel, General Electric, ITB Electrical, Hevi-Duty or Westinghouse.

2.02 CONSTRUCTION

- A. Coils must be wound continuous (no splices) and shall be vacuum impregnated with non-hydroscopic thermo-setting varnish. Coils shall use an Underwriters' Laboratory approved 220°C insulation system and the average temperature rise shall not exceed 115°C above a 40°C maximum ambient with 100% of rated load connected on the secondary. Oversizing of transformers to meet the temperature rise will not be acceptable.
B. Cores shall be manufactured with a high grade, non-aging silicon steel stacked without gaps and firmly clamped with structural angles. The core and coil assembly shall be mounted on vibration pads and bolted to the enclosure. Coils mounted vertically, one above the other, will not be acceptable.
C. The enclosure shall be provided with lifting eyes or brackets and ventilated openings designed to prevent access to live parts. Top of case temperatures shall not exceed U.L. acceptable levels.
D. The terminal compartment shall be so designed to permit the use of 75°C wire. All terminations shall be marked "75°C only", "60/75°C" or listed for use of 75°C insulated conductors at full 75°C ampacity.
E. Transformer KVA capacity and voltage shall be as shown on the Drawings. All 3-phase transformers shall have 480 volt, 3 phase, 3-wire delta connected primaries and 208-wye/120 volt, 3 phase, 4-wire connected secondaries. Transformers 15 KVA and larger shall have six (6) 2-1/2% full capacity primary taps 2 AN and 4 BN.
F. Design sound levels shall not exceed the following:
10 to 50 KVA 45 db
51 to 150 KVA 50 db

PART 3 EXECUTION

3.01 INSTALLATION

- A. All transformers except wall mounted shall be mounted on 4" concrete pads. Neoprene rubber vibration isolators shall be provided between transformer case and concrete pad. Connections shall be made with flexible conduit. Vibration isolation pads shall be ribbed neoprene rubber, Consolidated Kinetics "NPD" or approved equal.

SECTION 16501  
LIGHTING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of lighting fixtures.

1.02 RELATED SECTIONS

- A. 16111 - CONDUITS.
B. 16120 - WIRE AND CABLE.

1.03 DESCRIPTION

- A. Contractor shall furnish and install lighting fixtures and lamps as indicated in Fixture Schedule shown on Drawings, and specified herein.
B. All lighting fixtures are indicated on the Drawings with an identifying letter and number, i.e., L1, P1, EX1, etc. Refer to the Fixture Schedule on the Drawings that identifies the fixture in accordance with letter and number and indicates the type of mounting of the fixture in accordance with the Legend Section of the Schedule.

1.04 SUBMITTALS

A. Catalog cuts.

PART 2 PRODUCTS

2.01 STANDARDS

- A. Lighting fixtures scheduled on the Drawings are specified as standards for design, quality, and appearance. Fixtures of other manufacturers will be considered by the Architect provided they are equal to or better than the standard. Refer to Section 16010, General Provisions.
B. Fixture materials given with the standard fixtures shall be maintained if alternate manufacturers are used, i.e., metal sides for metal sides, acrylic plastic louvers for acrylic plastic louvers, etc.
C. Lamp sockets for bare tube fluorescent fixtures shall be spring-loaded turret type.

2.02 BALLASTS

- A. All ballasts of non-compact fluorescent fixtures shall be electronic non-dimming (unless otherwise indicated), rapid start CBM and UL approved and of the HPP Type. They shall be sound rated "A" class P, as manufactured by Advance, Mark V; Btu Industries, E2P Type; or Magnetek-Triad, B Series.
B. All compact lamp ballasts shall be electronic, UL approved, high power factor, THD less than 10% starting temperature of -5°F and shall contain end of lamp life fault mode shutdown protection, Class P, energy saving, by Valmont Electric, Universal, or Advance Company.

(CONTINUED IN NEXT PARAGRAPH)...

C. All High Intensity Discharge (HID) ballasts shall be high power factor type, shall have fused primaries and have line starting current that is lower than the operating current. Current crest factor shall not exceed 1.8.

1) High-pressure Sodium - Valmont Electric - Auto Regulating, Holophane - Lead or Widelite - Regulating.

2.03 LAMPS

- A. All lamp holders installed by the Electrical Contractor shall be furnished complete with new lamps of the size indicated on the Fixture Schedule.
B. Fluorescent lamps shall be cool white for fixtures with low temperature ballasts and fixtures in locations below 60 °F. All other fluorescent lamps shall be energy saving cool white General Electric Watt-Miser, Sylvania Super Saver, or Philips Econo-Watt.
C. Incandescent lamps shall be designed to operate on 125 volts.
D. Metal halide lamps shall have 20,000-hour life rating (vertical) and 15,000 hours for all other mounting. Lamp current crest factor shall not exceed 1.8 and shall be compatible with ballast being utilized. All HID lamps not enclosed shall be T-rated (self extinguishing).

PART 3 EXECUTION

3.01 GENERAL

- A. Furnish all mounting straps, frames, rings and other accessories required for a complete lighting installation. Should a conflict occur with the building structure that will not allow proper installation of fixtures, the Architect shall be contacted before proceeding.
B. All light fixtures shall be installed with centerlines symmetrical to the building, or at angles so designated by the plans. Fixtures not set thus shall be removed and reinstalled at this Contractor's expense.
C. Any fixtures scratched, bent, cracked or in any way damaged before acceptance by Owner shall be replaced at this Contractor's expense.
D. All lamps shall be in working order at the time of final acceptance of the work by the Owner and Engineer.

All lighting fixtures are to be grounded on the interior of the fixture housing, on clean bare metal (free of paint), by use of a pigtail and fastened by a screw used for no other purpose.

DELAWARE COUNTY, OHIO  
THE OAKS  
SANITARY SEWER PUMP STATION  
ELECTRICAL NOTES

SCALE: HORIZ. 1"=50'  
VERT. 1"= 5'

R.D. Zande & Associates, Inc.  
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