

ITEM 837 - 90" LINER PIPE, TYPE B POLYETHYLENE, AS PER PLAN

THE REQUIREMENTS OF ITEM 837 AND SUPPLEMENTAL SPECIFICATION 937 SHALL APPLY EXCEPT AS MODIFIED HEREIN.

REQUIRED SUBMITTALS:

THE CONTRACTOR SHALL SUBMIT THE FOLLOWING INFORMATION TO THE ENGINEER FOR REVIEW AND APPROVAL BEFORE STARTING THE WORK:

- A. PIPE LAYOUT IN FULL DETAIL INCLUDING DIMENSIONS AND CONSTRUCTION SEQUENCE.
- B. LOCATION OF PIPE SUPPORTS AND/OR BLOCKING.
- C. PIPE MANUFACTURER'S LIMITATIONS FOR GROUTING PRESSURES SPECIFIC TO GROUTING THE ANNULAR SPACE BETWEEN THE LINER PIPE AND THE EXISTING CULVERT.
- D. LIST OF EQUIPMENT TO BE EMPLOYED IN THE LINING PROCESS.
- E. DETAILS SHOWING THE CONTRACTOR'S PROPOSED METHODS OF LIFTING, LOWERING, AND INSTALLING THE LINER PIPE.
- F. WRITTEN PROOF THAT THE LINER PIPE MANUFACTURER CONCURS WITH PROPOSED INSTALLATION DETAILS (METHODOLOGY AND PROCEDURES).
- G. THE PIPE MANUFACTURER'S CUSTOM DESIGN CALCULATIONS FOR THE RING STIFFNESS CONSTANT (RSC) OR CONSTANTS TO BE USED ALONG THE LENGTH OF THE PIPE. IF MORE THAN ONE RSC IS SPECIFIED TO ACCOMMODATE DIFFERENT LOADING CONDITIONS ALONG THE PIPE, A LAYOUT SHALL BE PROVIDED TO THE ENGINEER AND THE PIPES DELIVERED TO THE PROJECT SITE SHALL BE CLEARLY MARKED WITH THEIR RSC. THE FOLLOWING DESIGN PARAMETERS ARE FOR THE PIPE MANUFACTURER'S INFORMATION AND USE AS DETERMINED APPROPRIATE BY THE PIPE MANUFACTURER'S ENGINEER: FOR SOIL PARAMETER TABLE, SEE SHEET 4/11.
- H. THE CONTRACTOR SHALL SUBMIT CALCULATIONS DOCUMENTING THAT THE ACTUAL PRESSURE APPLIED TO THE HDPE LINED PIPE DURING CONSTRUCTION DOES NOT EXCEED THE MANUFACTURER'S MAXIMUM ALLOWABLE. THE CONTRACTOR'S WORK PLAN SUBMITTED TO THE ENGINEER, AS DESCRIBED IN "ITEM 837 - BACKFILL FOR LINER PIPE, AS PER PLAN" SHALL BE REFLECTED IN THEIR CALCULATIONS.

I. IF THE CONTRACTOR'S GROUTING PROCEDURE REQUIRES INTERNAL BRACING OF THE HDPE LINER PIPE DURING CONSTRUCTION, CALCULATIONS AND DETAILS MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

THESE SUBMITTALS SHALL BE SIGNED AND STAMPED BY A LICENSED OHIO PROFESSIONAL ENGINEER WITH SIGNIFICANT EXPERIENCE IN LINING AND GROUTING LARGE DIAMETER STORM SEWERS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE SIGNING ENGINEER'S RESUME DEMONSTRATING SIGNIFICANT EXPERIENCE IN THIS AREA OF WORK.

CLEANOUT OF EXISTING CULVERT:

ACCUMULATED SEDIMENT, DEBRIS AND WATER SHALL BE REMOVED FROM INSIDE THE EXISTING CULVERT PRIOR TO INSTALLING THE LINER PIPE. ALL MATERIALS REMOVED SHALL BE DISPOSED OF AS PER 105.16 AND 105.17. THE EXISTING PIPE SHALL BE CLEANED OF ALL SEDIMENT, DEBRIS, AND WATER TO THE SATISFACTION OF THE ENGINEER.

A MANDREL OF SUITABLE SIZE RELATIVE TO THE LINER PIPE SHALL BE PULLED THROUGH THE EXISTING STORM SEWER TO VERIFY THE STORM SEWER IS NOT OBSTRUCTED AND THAT THE LINER PIPE WILL FIT. ANY REPAIRS REQUIRED SHALL BE COMPLETED PRIOR TO THE START OF INSTALLING THE LINER PIPE.

TECHNICAL SUPPORT:

THE PIPE MANUFACTURER SHALL PROVIDE TECHNICAL SUPPORT THROUGH THE SERVICES OF AN ON-SITE REPRESENTATIVE DURING THE ENTIRE INSTALLATION AND GROUTING OF THE LINER PIPE.

PAYMENT:

ALL COSTS ASSOCIATED WITH THE ABOVE REQUIREMENTS SHALL BE CONSIDERED INCIDENTAL TO ITEM 837 - 90" LINER PIPE, TYPE B POLYETHYLENE, AS PER PLAN, AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THIS ITEM.

ITEM 837 - BACKFILL FOR LINER PIPE, AS PER PLAN

THIS ITEM SHALL CONSIST OF FURNISHING ALL MATERIALS AND EQUIPMENT, AND PERFORMING ALL WORK NECESSARY TO GROUT THE ANNULAR SPACE BETWEEN THE LINER PIPE AND EXISTING STORM SEWER SHOWN ON THE PLANS.

THE CONTRACTOR'S WORK SHALL INCLUDE MOBILIZATION AND DEMOBILIZATION NECESSARY TO PERFORM ALL GROUTING, FURNISHING, HANDLING, TRANSPORTING, AND STORING OF ALL MATERIALS AND EQUIPMENT FOR GROUTING; MIXING, AND INJECTING GROUTS; CAPPING, PATCHING, AND PLUGGING THE FINISHED GROUT HOLES; CLEANUP OF WORK AREAS; AND ALL OTHER OPERATIONS INCIDENTAL TO GROUTING.

REQUIRED SUBMITTALS:

- A. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER, COPIES OF INDEPENDENT LABORATORY TEST REPORTS, INCLUDING ALL TEST DATA CERTIFYING THAT THE SELECTED PRODUCTS WILL PRODUCE GROUTS WITH THE CHARACTERISTICS AND THE QUALITIES REQUIRED FOR COMPLETION OF THIS PROJECT. MIX DESIGN SUBMITTAL SHALL INCLUDE DETAILED MIX CHARACTERISTICS SUCH AS 28 DAY COMPRESSIVE STRENGTH PER ASTM 495, SLURRY DENSITY AND SET GROUT DENSITY PER ASTM A138, SET TIME PER ASTM 403, FLOW PER ASTM C939, AND SHRINKAGE PER ASTM C827 AND CRD-C621. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER, THE MANUFACTURER'S MAXIMUM ALLOWABLE PRESSURE THAT CAN BE APPLIED TO THE HDPE LINER PIPE DURING CONSTRUCTION.

ITEM 837 - BACKFILL FOR LINER PIPE, AS PER PLAN (CONT.)

B. THE CONTRACTOR SHALL SUBMIT A WORK PLAN TO THE ENGINEER, FOR REVIEW, INCLUDING WORKING DRAWINGS AND DESCRIPTIONS OF HIS PROPOSED GROUTING SYSTEMS AND METHODS INCLUDING BUT NOT LIMITED TO; EQUIPMENT; METHODS; MEANS OF ACCURATELY MEASURING GROUT PRESSURES, QUANTITIES OF GROUT INJECTED, AND RATE OF GROUT INJECTION; CERTIFICATION OF CALIBRATED PRESSURE GAUGES; PROPOSED GROUT MIXES AND THE LIMITS OF LIFT SEGMENTS. THE WORK PLAN SHALL INCLUDE A DESCRIPTION OF METHODS TO BE USED FOR MONITORING QUALITY OF GROUT AND EFFECTIVENESS OF GROUTING OPERATIONS. THE WORK PLAN SHALL ALSO DESCRIBE METHODS TO BE USED FOR CONTROLLING LINER PIPE FLOTATION AND MOVEMENTS DURING GROUTING OPERATIONS. THE SUBMITTAL SHALL BE MADE A MINIMUM OF 30 DAYS PRIOR TO COMMENCEMENT OF GROUTING OPERATIONS.

C. THE CONTRACTOR SHALL SUBMIT GROUT MIXES A MINIMUM OF 30 DAYS PRIOR TO COMMENCEMENT OF GROUTING OPERATIONS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AS LEAST 24 HOURS IN ADVANCE OF THE START OF GROUTING OPERATIONS.

D. THE CONTRACTOR SHALL SUBMIT MANUFACTURER'S PRINTED INSTRUCTIONS ACCOMPANYING PRE-MIX CONTAINERS.

MATERIALS

CELLULAR GROUT:

THE MIX SHALL INCLUDE A SINGLE BRAND OF ASTM C150 TYPE II PORTLAND CEMENT. GROUT SHALL BE OF A FLUID DESIGN FOR LOW-PRESSURE INSTALLATION WHICH WILL FILL ALL VOIDS. SITE CONDITIONS AT THE TIME OF GROUTING FOR EACH LIFT SEGMENT TO BE GROUTED SHALL DETERMINE REQUIRED VARIATIONS TO MIX DESIGN. GROUT SHALL ATTAIN AN AVERAGE 28-DAY COMPRESSIVE STRENGTH OF 300 PSI AND A 24-HOUR COMPRESSIVE STRENGTH OF 100 PSI. WET DENSITY (UNIT WEIGHT) OF THE CELLULAR GROUT SHALL NOT BE LESS THAN 65 PCF IN AREAS WHERE WATER IS PRESENT IN THE SPACE BETWEEN THE LINER PIPE AND THE EXISTING PIPE. IN THE ABSENCE OF WATER, THE WET DENSITY SHALL NOT BE LESS THAN 45 PCF. THE CONTRACTOR SHALL OBTAIN CONCURRENCE FROM THE ENGINEER PRIOR TO PLACING CELLULAR GROUT WITH A WET DENSITY OF LESS THAN 65 PCF OR GREATER THAN 70 PCF.

FLY ASH MAY BE ADDED TO THE GROUT MIXES WHEN APPROVED BY THE ENGINEER. FLY ASH SHALL CONFORM TO THE REQUIREMENTS OF ASTM C618, CLASS F.

FOAMING AGENTS SHALL CONFORM TO ASTM C869. ACCEPTABLE PRODUCTS ARE MEARLCRETE FOAM LIQUID CONCENTRATE, CELLUFOAM CONCRETE SYSTEMS FOAM LIQUID CONCENTRATE, RHEOCELL 30 OR ELASTIZELL EF.

GROUT SET TIMES FOR SELECTED MIX DESIGN SHALL BE USED TO HELP ESTABLISH GROUT LIFT SEGMENTS. GROUT LIFT SEGMENTS MUST BE OF APPROPRIATE SIZE SUCH THAT THE COMPLETE LIFT SEGMENT CAN BE MONOLITHICALLY GROUTED PRIOR TO INITIAL GROUT SET AND LOSS OF FLUIDITY.

INSTALLATION

GROUTING SHALL BE PERFORMED IN A MANNER SUCH THAT ALL VOIDS BETWEEN THE EXISTING STORM SEWER AND LINER PIPE WILL BE FILLED WITH GROUT.

CONTRACTOR SHALL EMPLOY SUFFICIENT EQUIPMENT TO COMPLETE ALL WORK IN A PROPER AND TIMELY MANNER, AS SPECIFIED, SUBMITTED AND APPROVED. GROUT MIXING, PUMPING, AND DISTRIBUTION EQUIPMENT SHALL BE OF SUFFICIENT CAPACITY TO GROUT EACH LIFT SEGMENT PRIOR TO INITIAL GROUT SET. EQUIPMENT SHALL BE MAINTAINED IN A CLEAN AND GOOD WORKING CONDITION AT ALL TIMES. GROUT INJECTION POINTS SHALL BE SPACED NO GREATER THAN 50-FEET APART; THIS SHALL BE ACCOMPLISHED BY USE OF PIPING, DRILL HOLES, OR OTHER APPROVED METHODS.

ALL GROUT SHALL BE MAINTAINED AT TEMPERATURES ABOVE 50 DEGREES F UNTIL INJECTED. THE TEMPERATURES OF MIXING WATER SHALL RANGE FROM 50 DEGREES F TO 100 DEGREES F WHEN ADDED TO THE GROUT MIXER. GROUT MATERIALS SHALL BE STORED AT TEMPERATURES ABOVE FREEZING.

CONTRACTOR SHALL DEWATER THE ANNULAR SPACE PRIOR TO GROUT INSTALLATION TO PREVENT GROUT CONTAMINATION.

ENDS OF SEGMENT TO BE GROUTED SHALL BE BULKHEADED WITH 4,000 PSI CONCRETE OR NON-SHRINK, NON-METALLIC GROUT. BULKHEADS SHALL BE WATERTIGHT AND SHALL BE EQUIPPED WITH SUITABLE INJECTION AND VENT PIPES.

THE GROUTING PROCEDURE MUST BE DESIGNED SUCH THAT THE PROPOSED INVERTS AND SLOPES SHOWN ON THE PLANS ARE PROVIDED. TWO OPTIONS FOR THE CONTRACTOR TO CONSIDER ARE BRIEFLY DESCRIBED BELOW FOR CONSIDERATION. THE CONTRACTOR IS NOT LIMITED TO THESE TWO OPTIONS AND IS AUTHORIZED TO FOLLOW HIS OWN PROCEDURE. IN ALL CASES, THE CONTRACTOR SHALL SUBMIT HIS WORK PLAN AS DESCRIBED EARLIER IN ITEM 837. NOTE THAT FILLING THE LINER PIPE WITH WATER TO PREVENT OF CONTROL FLOTATION IS NOT DESIRABLE AND WILL ONLY BE ALLOWED IF APPROVED BY THE ENGINEER. THE TWO OPTIONS FOR CONSIDERATION ARE AS FOLLOWS.

OPTION 1) AS THE INITIAL GROUT LIFT IS POURED THE LINER PIPE IS REQUIRED TO FLOAT ABOVE THE GUIDE RAILS THAT WERE USED TO PUSH THE LINER PIPE INTO THE EXISTING CMP. THE GROUT MUST BE DESIGNED TO FLOW UNDER AND FILL THE ANNULAR SPACE BELOW THE PROPOSED LINER PIPE AS THE LINER PIPE FLOATS INTO POSITION. BLOCKING PLACED BEFORE THE LINER PIPE IS INSERTED, TO THE SATISFACTION OF THE ENGINEER, WILL BE REQUIRED TO RESTRICT THE LINER PIPE FROM FLOATING ABOVE ITS INTENDED INVERT. AFTER THE INITIAL GROUT LIFT IS PLACED AND SETS, SUBSEQUENT GROUT LIFTS SHALL BE PERFORMED.

ITEM 837 - BACKFILL FOR LINER PIPE, AS PER PLAN (CONT.)

OPTION 2) GUIDE RAILS ATTACHED TO THE BOTTOM OF THE EXISTING CMP SHALL BE CUT AND/OR FABRICATED TO ACCOUNT FOR THE THICKNESS OF THE PROPOSED LINER PIPE SUCH THAT AFTER THE LINER PIPE IS PUSHED INTO POSITION IT WILL BE AT ITS REQUIRED INVERT AND SLOPE AS SHOWN ON THE PLANS. THE GROUTING PROCEDURE SHALL BE DESIGNED SUCH THAT BUOYANCY IS NOT REACHED IN THE INITIAL AND SUBSEQUENT GROUT LIFTS AND THE LINER PIPE WILL NOT BEGIN TO FLOAT. AFTER THE INITIAL GROUT LIFT IS PLACED AND SETS, SUBSEQUENT GROUT LIFTS SHALL BE PERFORMED. THE ANNULAR SPACE BELOW THE PROPOSED LINER PIPE MUST BE FILLED WITH GROUT, POSSIBLY BY DRILLING HOLES IN THE LINER PIPE AND GROUTING FROM WITHIN THE LINER PIPE.

A CONFINED SPACE SURVEY INSIDE OF THE EXISTING 180-INCH CMP AND EXISTING 120-INCH CMP WAS PERFORMED TO DETERMINE IF IT IS FEASIBLE TO LINE THE EXISTING CMP'S USING HDPE LINER PIPE. AS SUCH, THE INVERT, CROWN, AND AT MOST LOCATIONS THE LARGEST LEFT AND RIGHT OFFSETS FROM THE ESTABLISHED BASELINE OF THE EXISTING AND PROPOSED CULVERT WERE MEASURED. THE INFORMATION PROVIDED IN THE TABLE BELOW IS FOR INFORMATION ONLY AND ITS USE WILL REQUIRE VERIFICATION BY THE CONTRACTOR.

CONFINED SPACE SURVEY					
STATION	INVERT	CROWN	LEFT	RIGHT	DESCRIPTION
6+00	611.60	627.41	7.41	7.43	INLET EXISTING 180" CMP
6+50	611.39	626.45	7.81	7.69	
7+00	611.06	626.30	8.08	7.37	
7+50	610.90	626.23	8.11	7.39	
8+00	610.59	625.91	8.08	7.33	
8+50	610.47	625.58	8.00	7.60	
9+00	610.21	625.29	7.76	8.00	
9+50	610.10	625.11	7.88	7.83	
10+00	610.04	624.83	8.09	7.91	
10+50	609.71	624.67	8.03	7.78	
11+00	609.69	624.68	8.14	7.62	
11+50	609.49	624.47	8.36	7.40	
12+00	609.46	624.31	8.66	7.44	
12+50	609.44	624.31	8.30	7.60	
13+00	609.24	624.42	7.91	7.72	
13+50	609.60	624.59	7.72	7.91	
14+00	609.39	624.63	7.40	8.04	
14+50	609.14	624.25	7.55	7.86	
15+00	609.05	624.10	8.07		
15+50	(OBSTRUCTION)	624.37	7.90		
15+98.6	608.78	624.12	7.70	7.65	OUTLET EXISTING 180" CMP
16+05	608.97	619.27	5.26	5.21	INLET EXISTING 120" CMP
16+50	608.92	618.72	5.17	5.70	
17+00	608.69	618.43	5.34	5.52	
17+50	608.93	618.49	5.42	5.43	
18+00	608.58	618.08	5.56	5.55	
18+50	608.59	618.83	5.36	5.16	
18+65.7	608.65	619.18	5.14	5.08	OUTLET EXISTING 120" CMP

GROUT SHALL BE PLACED USING LOW PRESSURE. IN NO CASE SHALL PRESSURE ON THE LINER PIPE EXCEED PIPE MANUFACTURER RECOMMENDATIONS, AT ANY POINT ALONG THE LIFT SEGMENT BEING GROUTED. A PRESSURE GAUGE SHALL BE LOCATED NEAR THE GROUT INJECTION POINTS TO MONITOR PRESSURE ON THE LINER PIPE.

GROUTING PRESSURE SHALL BE SUFFICIENT TO EXPEL WATER AND FILL ALL VOIDS BETWEEN THE LINER PIPE AND THE EXISTING STORM SEWER, WITHOUT DAMAGE TO THE LINER PIPE. GROUTING PRESSURE AND PRESSURE AGAINST BLOCKING DUE TO BUOYANCY SHALL NOT EXCEED PIPE MANUFACTURER RECOMMENDATIONS.

MIX GROUT FOR SUFFICIENT TIME TO OBTAIN MAXIMUM PLASTICITY. WATER SUPPLY LINE SHALL BE EQUIPPED WITH A FLOW METER CAPABLE OF MEASURING TO THE NEAREST ONE-TENTH CUBIC FOOT.

PAYMENT

PAYMENT FOR FURNISHING GROUT BACKFILL, LABOR, AND EQUIPMENT NEEDED TO COMPLETE THIS WORK AS DESCRIBED ABOVE AND IN THE ITEM 837 SPECIFICATION WILL BE MADE AT THE CONTRACT UNIT PRICE FOR ITEM 837 - BACKFILL FOR LINER PIPE, AS PER PLAN.

ITEM 837 - 132" LINER PIPE, TYPE B POLYETHYLENE, AS PER PLAN

THE REQUIREMENTS OF ITEM 837 - 90" LINER PIPE, TYPE B POLYETHYLENE, AS PER PLAN, SHALL APPLY.

PAYMENT:

ALL COSTS ASSOCIATED WITH THE ABOVE REQUIREMENTS SHALL BE CONSIDERED INCIDENTAL TO ITEM 837 - 132" LINER PIPE, TYPE B POLYETHYLENE, AS PER PLAN, AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THIS ITEM.

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DESIGN AGENCY: PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC. 614 W. SUPERIOR AVE., SUITE 400 CLEVELAND, OHIO 44115
 DATE: 6-19-08
 REVIEWED: RJO
 DRAWN: NAL
 DESIGNED: PWP
 CHECKED: BMG
 STRUCTURE FILE NUMBER: 4300548
 GENERAL NOTES II
 BRIDGE NO. LAK-2-0395
 STATE ROUTE 2 OVER TRIBUTARY OF CHAGRIN RIVER
 LAK-2-3.32
 PID No. 13486
 3 / 11
 1318
 1679