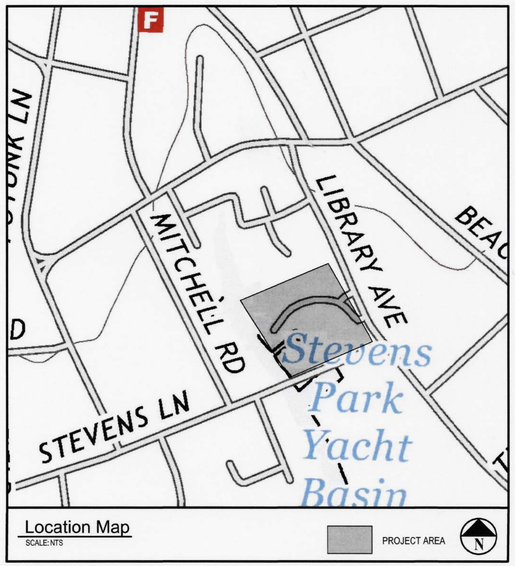
WESTHAMPTON BEACH HARBOUR HOUSE HOA

SANITARY SYSTEM PLAN

35 LIBRARY AVENUE
WESTHAMPTON BEACH, NY 11978

WHHH2101

JUNE 2023



Location Map
SCALE:NTS

PROJECT AREA

N

DRAWING LIST

H2M architects + engineers

538 Broad Hollow Road, 4th Floor East
Melville, NY 11747
631.756.8000 • www.h2m.com

STATE OF NEW YORK
NICHOLAS F. BONO
088951
LICENSED PROFESSIONAL ENGINEER

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
SJD	SJD	JMV	NFB

PROJECT No.:	DATE:	SCALE:
WHHH 2101	JUNE 2023	AS SHOWN

CLIENT
WESTHAMPTON BEACH HARBOUR HOUSE HOA

SANITARY SYSTEM PLAN

35 LIBRARY AVENUE
WESTHAMPTON BEACH, NY 11978

STATUS
FINAL BID DOCUMENT

DRAWING No.
G000

SUFFOLK COUNTY DEPARTMENT OF PUBLIC WORKS DIVISION OF SANITATION SUBDIVISION/SEWER PROJECTS

GENERAL NOTES (REVISED 2-10-17)

1. NO CONSTRUCTION SHALL COMMENCE UNTIL THE FOLLOWING CONDITIONS ARE MET:

   A. THE OWNER, ENGINEER AND CONTRACTOR SHALL ATTEND A PRECONSTRUCTION MEETING WITH DEPARTMENT OF PUBLIC WORKS REPRESENTATIVES.

   B. A PERMIT TO CONSTRUCT AND DISCHARGE FOR THE WASTE DISPOSAL SYSTEM (NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION) AND AN APPROVAL TO CONSTRUCT ISSUED BY THE SUFFOLK COUNTY DEPARTMENT OF PUBLIC WORKS (SCDPW) HAVE BEEN RECEIVED.

   C. THE OWNER OR HIS/HER REPRESENTATIVE HAS NOTIFIED SCDPW, IN WRITING, OF THEIR INTENTION TO COMMENCE CONSTRUCTION AND THEY SHALL SUBMIT AN ACCURATE SCHEDULE OF ANTICIPATED WORK PROGRESS AT LEAST 14 CALENDAR DAYS PRIOR TO ACTUAL COMMENCEMENT DATE. IF, FOR ANY REASON, CONSTRUCTION IS TEMPORARILY SUSPENDED, A WRITTEN NOTICE SHALL BE TRANSMITTED TO SCDPW. WRITTEN NOTICE OF RECOMMENCEMENT OF CONSTRUCTION, TOGETHER WITH A REVISED PROGRESS SCHEDULE, SHALL BE TRANSMITTED TO SCDPW AT LEAST THREE (3) WORK DAYS PRIOR TO ACTUAL RECOMMENCEMENT DATE.

   D. THE CONTRACTOR HAS FILED ALL NECESSARY APPLICATIONS WITH NYSDEC, THE SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES, SUFFOLK COUNTY DEPARTMENT OF PUBLIC WORKS, SUFFOLK COUNTY FIRE MARSHAL, AND THE LOCAL TOWN AND HAS OBTAINED ALL NECESSARY APPROVALS.

2. ALL SEWER CONSTRUCTION INCLUDED IN THIS PROJECT SHALL CONFORM TO THE LATEST REQUIREMENTS OF THE SCDPW'S GUIDELINES INCLUSIVE OF ALL REVISIONS AND ADDENDA THERETO. UNLESS OTHERWISE APPROVED BY SCDPW, ALL MATERIALS SHALL BE AMERICAN MADE. IN ALL CASES WHERE CONFLICTS EXIST BETWEEN THE CONTRACT DOCUMENTS AND THE LATEST REVISIONS OF THE SPECIFICATION FOR SEWER CONSTRUCTION, THE INTERPRETATION AND RULINGS OF THE SCDPW SHALL BE BINDING.

3. PRIOR TO THE INCORPORATION OF ANY MATERIAL OR EQUIPMENT INTO THE WORK, FIVE (5) COPIES OF SHOP DRAWINGS, CATALOG CUTS, CHARACTERISTIC CURVES, TEST RESULTS PERFORMANCE DATA, ETC. SHALL BE SUBMITTED TO THE SCDPW, DIVISION OF SANITATION. NO MATERIAL OR EQUIPMENT SHALL BE INCORPORATED INTO THE WORK UNTIL ALL REQUIRED SUBMITTALS ARE REVIEWED AND APPROVED, IN WRITING, BY THE SCDPW.

4. ALL SANITARY SEWER LINES SHALL BE LAID A MINIMUM DISTANCE OF 10.0' HORIZONTALLY AND 1.5' VERTICALLY BELOW ANY EXISTING OR PROPOSED WATER MAIN.

5. THE CONTRACTOR SHALL FURNISH AND INSTALL AN UNDERGROUND MARKING TAPE ALONG ALL SEWER LINES, FORCE MAINS AND HOUSE CONNECTIONS IN ACCORDANCE WITH SCDPW SPECIFICATIONS FOR SAME.

6. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION AND ELEVATION OF EXISTING UTILITIES (INCLUDING EXISTING SEWERS) BY FIELD INVESTIGATION. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE ADEQUACY OF ALL EXISTING SEWERS TO ACCEPT CONNECTION OF THE PROPOSED WORK. THE ENGINEER SHALL BE NOTIFIED OF ANY CONFLICTS BETWEEN EXISTING UTILITIES AND OF ANY INADEQUACY OF THE EXISTING SEWER LINES TO PROPERLY ACCEPT PROPOSED CONNECTIONS AND FLOWS.

7. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO RESTORE ALL AREAS DISTURBED BY HIS WORK, TO THE CONDITION AS BEFORE THE WORK COMMENCED.

8. DURING CONSTRUCTION, A REPRESENTATIVE OF THE SCDPW MUST BE PRESENT TO OBSERVE AND EXAMINE THE WORKMANSHIP AND MATERIALS BEING INCORPORATED IN THE PROJECT. THE DEPARTMENT SHALL BE THE SOLE JUDGE AS TO WHETHER THE CONSTRUCTION PROVIDED IS IN COMPLIANCE WITH DEPARTMENTAL REQUIREMENTS. AT ANY TIME DURING THE COURSE OF THE CONSTRUCTION THAT THE WORK IS DEEMED UNACCEPTABLE, A STOP WORK ORDER WILL BE ISSUED AND ANY WORK PERFORMED AFTER THE ISSUANCE OF SUCH AN ORDER SHALL NOT BE ACCEPTED OR APPROVED BY THE SCDPW. UNAPPROVED WORK AND/OR MATERIAL SHALL BE REMOVED AND REPLACED TO THE SATISFACTION OF THE SCDPW BEFORE APPROVAL TO RECOMMENCE WORK WILL BE GRANTED.

9. THE CONTRACTOR(S) SHALL BE RESPONSIBLE FOR MAINTAINING THE CONSTRUCTION SITE IN A NON-HAZARDOUS CONDITION ALL IN ACCORDANCE WITH THE REQUIREMENTS OF THE NEW YORK STATE DEPARTMENT OF LABOR, OSHA AND ALL OTHER AGENCIES HAVING JURISDICTION. UNLESS OTHERWISE APPROVED IN WRITING BY SCDPW, THE CONTRACTOR SHALL ERECT AND MAINTAIN ADEQUATE FENCING AROUND ALL OPEN EXCAVATIONS.

10. FINAL APPROVAL SHALL NOT BE GRANTED UNTIL ALL THE FOLLOWING REQUIREMENTS ARE FULFILLED TO THE SATISFACTION OF THE SCDPW.

    A. THE SYSTEM SHALL BE SUBJECTED TO TESTING TO ESTABLISH THE ADEQUACY OF INDIVIDUAL COMPONENTS AND OF THE OVERALL SYSTEM'S ABILITY TO MEET THE REQUIREMENTS OF THE APPROVED CONTRACT DOCUMENTS. ALL ACCEPTANCE TESTING SHALL BE PERFORMED AT NO COST TO THE DEPARTMENT AND NO ACCEPTANCE TESTING SHALL BE PERFORMED UNLESS WITNESSED BY A DULY AUTHORIZED REPRESENTATIVE OF THE SCDPW. THE DEPARTMENT SHALL BE THE SOLE JUDGE AS TO THE ADEQUACY OF THE ITEMS TESTED AND DEFECTS SHALL BE CORRECT TO THE SATISFACTION OF THE SCDPW.

    B. REPRODUCIBLE "AS-BUILT" RECORD DRAWINGS OF THE COMPLETED SEWAGE COLLECTION SYSTEM SHALL BE SUBMITTED TO THE SCDPW. "AS-BUILTS" MUST BE SIGNED AND SEALED BY A DULY LICENSED NEW YORK STATE LAND SURVEYOR AND MUST SUPPLY A SUITABLE PERMANENT RECORD OF THE EXACT LOCATION AND ELEVATION OF SEWER LINES, STRUCTURES, STUBS, HOUSE CONNECTIONS, WYES AND APPURTENANCES. "AS-BUILTS" SHALL BE PREPARED IN ACCORDANCE WITH SCDPW STANDARDS FOR "AS-BUILT" DRAWINGS FOR SEWER CONSTRUCTION AND MUST BE INK ON MYLAR OR EQUAL DRAFTING MEDIA AND DIGITAL (AUTOCAD), AS REQUIRED BY SCDPW. PLANS MUST BE IN THE FOLLOWING COORDINATE SYSTEMS:

       - HORIZONTAL COORDINATE SYSTEM: NAD 1983, STATE PLANE, NEW YORK, LONG ISLAND ZONE, US SURVEY FEET.
       - VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988

       ALL SHEETS OF THE AS-BUILT DRAWINGS SHALL INDICATE THE HORIZONTAL COORDINATE SYSTEM AND VERTICAL DATUM SYSTEM. ELEVATIONS OF POINTS OF CONTROL IN DIFFERING DATUM MUST NOTE THE ORIGINAL DATUM AND ITS CORRESPONDING ELEVATION AND 1988 (NAVD) DATUM AND ELEVATION ON PLANS.

    C. REPRODUCIBLE "AS-BUILT" RECORD DRAWINGS OF THE COMPLETED SEWAGE WORKS SHALL BE SUBMITTED TO THE SCDPW. "AS-BUILTS" MUST INCLUDE, BUT NOT BE LIMITED TO, SITE PLAN, OPERATION AND MAINTENANCE MANUALS SCHEMATICS AND ELEMENTARY DRAWINGS OF ELECTRICAL, MECHANICAL AND PROCESS SYSTEMS. DRAWINGS MUST BE SIGNED AND SEALED BY NEW YORK STATE LICENSED PROFESSIONAL ENGINEER, AND MUST BE INK ON MYLAR OR EQUAL DRAFTING MEDIA AND DIGITAL (AUTOCAD) AS REQUIRED BY SCDPW. PLANS MUST BE IN THE FOLLOWING COORDINATE SYSTEMS:

       - HORIZONTAL COORDINATE SYSTEM: NAD 1983, STATE PLANE, NEW YORK, LONG ISLAND ZONE, US SURVEY FEET.
       - VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988

       ALL SHEETS OF THE AS-BUILT DRAWINGS SHALL INDICATE THE HORIZONTAL COORDINATE SYSTEM AND VERTICAL DATUM SYSTEM. ELEVATIONS OF POINTS OF CONTROL IN DIFFERING DATUM MUST NOTE THE ORIGINAL DATUM AND ITS CORRESPONDING ELEVATION AND 1988 (NAVD) DATUM AND ELEVATION ON PLANS.

    D. A "CERTIFICATE OF COMPLIANCE" FOR ALL MATERIAL, WORK AND EQUIPMENT INCORPORATED INTO THE PROJECT MUST BE SUBMITTED TO THE SCDPW, IF NEEDED. THE CERTIFICATE MUST BE ATTESTED TO AND SIGNED BY A DULY COMMISSIONED NOTARY PUBLIC.

11. ALL MATERIAL AND METHODS OF CONSTRUCTION MUST COMPLY WITH THE TECHNICAL SPECIFICATIONS FOR THE CONSTRUCTION OF BUILDING SEWER CONNECTIONS.

12. TESTING OF FORCE MAIN - (METHOD I OR METHOD II MAY BE IMPLEMENTED):

    METHOD I:

    a) FORCE MAINS SHALL BE SUBJECTED TO A PRESSURE TEST OF TWO HUNDRED (200) PSI FOR A PERIOD OF THIRTY (30) MINUTES, MEASURED AT THE LOWER END OF THE SECTION. PUMPS, PIPE CONNECTIONS, GAUGES AND ALL NECESSARY APPARATUS WILL BE FURNISHED BY THE CONTRACTOR, AND ALL DEFECTIVE PIPE, COUPLINGS AND FITTINGS WILL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE.

    b) THEN THE FORCE MAIN SHALL BE TESTED FOR LEAKAGE AT SEVENTY-FIVE (75) PSI FOR A PERIOD OF SIX (6) HOURS, MEASURE AT THE LOWER END OF THE SECTION. AT SUCH PRESSURE THE LEAKAGE SHALL NOT EXCEED FORTY-SIX (46) GALLONS PER INCH DIAMETER PER MILE PER TWENTY-FOUR (24) HOURS. ALL NECESSARY PUMPS, GAUGES AND OTHER APPARATUS WILL BE FURNISHED BY THE CONTRACTOR. IN THE EVENT THAT THE FORCE MAIN FAILS TO MEET THE LEAKAGE TEST, THE CONTRACTOR, AT HIS OWN EXPENSE WILL LOCATE AND REPAIR THE DEFECTIVE PIPE OR JOINTS UNTIL THE LEAKAGE IS WITHIN THE ALLOWABLE LIMIT.

    METHOD II:

    a) FORCE MAINS SHALL BE SUBJECTED TO A PRESSURE TEST OF TWO HUNDRED (200) PSI FOR A PERIOD OF TWO (2) HOURS MEASURE AT THE LOWER END OF THE SECTION. AT SUCH PRESSURE THERE SHALL BE NO LEAKAGE LOSS. ALL NECESSARY PUMPS, GAUGES AND OTHER APPARATUS WILL BE FURNISHED BY THE CONTRACTOR. IN THE EVENT THAT THE FORCE MAIN FAILS TO MEET THE LEAKAGE TEST, THE CONTRACTOR AT HIS OWN EXPANSE WILL LOCATE AND REPAIR THE DEFECTIVE PIPE ON JOINTS UNTIL THERE IS NO LEAKAGE LOSS.

13. TESTING OF GRAVITY SEWER

    A. EXFILTRATION TEST - ALL SANITARY SEWERS CONSTRUCTED IN LESS THAN TWO (2) FEET AND ABOVE THE GROUNDWATER ELEVATION, SHALL BE SUBJECT TO AN EXFILTRATION TEST. TOTAL EXFILTRATION SHALL NOT EXCEED 100 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS. EXFILTRATION TESTING SHALL BE IN ACCORDANCE WITH DEPARTMENT STANDARDS.

    B. INFILTRATION TEST - ALL SANITARY SEWERS CONSTRUCTED MORE THAN TWO (2) FEET BELOW THE GROUNDWATER ELEVATION, SHALL BE SUBJECT TO AN INFILTRATION TEST. TOTAL INFILTRATION SHALL NOT EXCEED 100 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS. GROUNDWATER ELEVATION MUST BE AT LEAST TWO (2) FEET ABOVE CROWN OF PIPE AT THE UPSTREAM MANHOLE. INFILTRATION TESTS SHALL BE PERFORMED USING A CALIBRATED 90-DEGREE V-NOTCH WEIR SPECIFICALLY SIZED FOR THE SIZE SEWER BEING TESTED. INFILTRATION TESTING SHALL BE IN ACCORDANCE WITH DEPARTMENT STANDARDS.

    C. DEFLECTION TEST - ALL SANITARY SEWERS CONSTRUCTED OF PVC SDR 35 PIPING SHALL PASS A MANDRAL DEFLECTION TEST, SANITARY SEWERS CONSTRUCTED OF CLASS 53 DUCTILE IRON PIPE OR PVC DR-18 PIPING ARE EXEMPT FROM THIS REQUIREMENT. NO SECTION OF SEWER SHALL BE TESTED BEFORE AT LEAST 30-DAYS HAVE ELAPSED FROM THE DATE OF COMPLETED BACKFILL OVER THE SECTION. THE DEFLECTION, OR DEFORMATION OF THE PIPE DUE TO EXTERNAL LOADING, SHALL NOT EXCEED 5.0 PERCENT. THE MANDRAL SHALL BE SIZED FOR 95% OF THE AVERAGE INSIDE DIAMETER AS PRESENTED IN ASTM D3034, TABLE XI.I. FOR SDR PVC SEWER PIPE. IF ANY SECTION OF PIPE FAILS THE DEFLECTION TEST, THE OVERLY DEFLECTED PIPE SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR IN ACCORDANCE WITH DEPARTMENT STANDARDS.

14. TESTING OF AIR PIPING - BLOWER AIR PIPING SHALL BE TESTED AT 50 PSIG MINIMUM OR 200% OF THE WORKING PRESSURE. WHEN THE REQUIRED PRESSURE FOR THE TEST IS REACHED, SHUT OFF THE VALVE IN THE SUPPLY LINE FROM THE PUMP. MAINTAIN THE TEST PRESSURE LONG ENOUGH TO VISUALLY INSPECT ALL JOINTS OR A MINIMUM OF 10 MINUTES. THERE SHALL BE NO DROP IN THE TEST PRESSURE DURING THIS TIME.

15. ABOVE GROUND PIPING - ALL ABOVE GROUND PIPING SHALL BE SUBJECT TO PRESSURE AND LEAKAGE TESTING IN ACCORDANCE WITH DEPARTMENT STANDARDS. IF ANY SECTION OF PIPE FAILS, ALL REPAIRS SHALL BE MADE BY THE CONTRACTOR IN ACCORDANCE WITH DEPARTMENT STANDARDS.

16. STRUCTURAL DESIGN REQUIREMENTS - ALL STRUCTURAL REQUIREMENTS SHOULD BE INCORPORATED ON THE CONSTRUCTION PLANS. THESE DETAILS INCLUDE REINFORCING BAR SIZES AND LENGTHS, CONCRETE WALL THICKNESS (MINIMUM 15") AND CORNER DETAILS. ANY DESIGN DETAIL REQUIREMENTS, SUCH AS ABOVE, NOT INCORPORATED IN THE DESIGN DRAWINGS WILL HAVE TO BE PROVIDED PRIOR TO CONSTRUCTION. IF DESIGN DETAILS ARE PROVIDED BY A CONTRACTOR, THEY MUST BE REVIEWED AND STAMPED BY THE PROFESSIONAL DESIGN ENGINEER.

17. ALL PUMPING STATIONS SHALL HAVE A PREFABRICATED CONCRETE OR A MASONRY BLOCK BUILDING WHICH WILL BE USED TO HOUSE THE CONTROL PANELS, AND IF REQUIRED BY SCDPW, THE EMERGENCY GENERATOR. HEAT AND/OR AIR CONDITIONING SHALL BE PROVIDED AS REQUIRED FOR THE EQUIPMENT.

18. UNLESS OTHERWISE APPROVED BY SCDPW, ALL PUMPING STATION CONTROL BUILDINGS WILL BE REQUIRED TO BE EQUIPPED WITH AN ODOR CONTROL SYSTEM FOR THE OPERATION OF THE PUMP STATION/FORCE MAIN.

19. ANY WORK PERFORMED IN A PUBLIC RIGHT OF WAY SHALL REQUIRE A ROAD OPENING PERMIT FROM THE AUTHORITY HAVING JURISDICTION. CONTRACTOR TO SUBMIT A MAINTENANCE AND PROTECTION OF TRAFFIC PLAN FOR APPROVAL PRIOR TO THE COMMENCEMENT OF ANY WORK IN A RIGHT OF WAY.

MARKING TAPE NOTES

A. SCOPE

THE CONTRACTOR SHALL FURNISH AND INSTALL AN UNDERGROUND MARKING TAPE ALONG ALL SEWER LINES, MAINS AND HOUSE CONNECTIONS.

B. MATERIALS

THE MATERIAL SHALL BE METALLIC DETECTABLE TAPE WITH A MINIMUM THICKNESS OF 4.5 MIL. THE TAPE SHALL BE RESISTANT TO ALKALIS, ACIDS AND OTHER DESTRUCTIVE ELEMENTS. THE TAPE SHALL BE GREEN IN COLOR, 3" MINIMUM WIDTH, MARKED WITH THE WORDS, "CAUTION-SANITARY SEWER". THE WARNING SHALL BE REPEATED EVERY 16" - 36".

C. INSTALLATION

AFTER PARTIALLY BACKFILLING AND LEVELING THE TRENCHES TO A HEIGHT OF 18" - 24" ABOVE THE CROWN OF PIPE, THE ROLL OF TAPE SHALL BE MOUNTED ON A WHEEL AND SPREAD ABOVE THE PREPARED SURFACE AS STRAIGHT AS POSSIBLE. THE TAPE SHALL BE HELD IN POSITION BY ADDING BACKFILL WITH HAND SHOVES BEFORE USING MECHANICAL EQUIPMENT TO FINISH THE BACK FILL.

IF THE SEWER LINE OR HOUSE CONNECTION DOES NOT END INTO A MANHOLE, THE TAPE SHALL BE EXTENDED AT LEAST THREE (3) FEET BEYOND THE PLUGGED END OF THE LINE.

GENERAL WORK NOTES

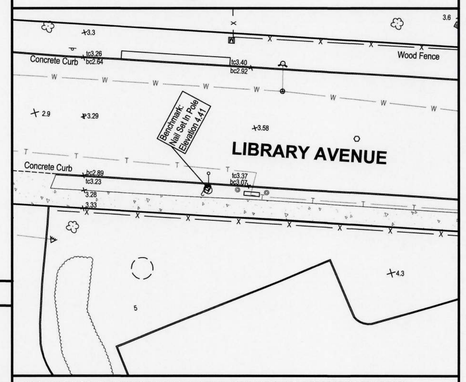
1. BIDS SHALL BE BASED ON NORMAL SEASONAL WORKING CONDITIONS WITH FROST PENETRATION OF NOT MORE THAN FOUR (4) INCHES.
2. MISCELLANEOUS WORK, INCLUDING PROTECTION OF EXISTING CURBING; HAND-DIGGING AROUND AND BRACING OF POLES AND SIGNS; REMOVING AND REPLACING MAILBOXES, SIGNS, PROTECTION OF UNDERGROUND UTILITIES, CROSSING UNDER, OVER OR ADJACENT TO UNDERGROUND UTILITIES; SURFACE OR SUB-SURFACE STRUCTURES; SHEETING REQUIRED DUE TO LOCATION OF SEWER OR BUILDING CONNECTIONS AND CLOSE PROXIMITY OF EXISTING UTILITIES, CURBS, AND IMPROVEMENTS; PROTECTION OF PEDESTRIAN AND VEHICULAR TRAFFIC, ETC., SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND WILL BE COMPLETED AT NO ADDITIONAL COST TO THE OWNER.
3. RESTORE ALL AREAS DAMAGED/REMOVED DURING INSTALLATION OF THE SEWER. THESE AREAS INCLUDE, BUT ARE NOT LIMITED TO FOLLOWING; DRIVEWAY APRONS, DRIVEWAYS, WALKWAYS, TRAFFIC SIGNS, COMMERCIAL SIGNAGE, TRAFFIC SIGNAL LOOPS, PAVEMENT STRIPING AND MARKINGS, CURBING, SIDEWALKS, UTILITY POLES, FENCING, GUIDE RAILS, LANDSCAPING, TREES, MAILBOXES, POSTS, POLES, STEPS AND VEHICLES.
4. INSTALL PIPE TO PROVIDE A MINIMUM COVER TO FINISH GRADE OF 4.5 FEET UNLESS OTHERWISE NOTED ON PLANS.
5. THE TRAFFIC MAINTENANCE DETAILS CONTAINED IN THE SPECIFICATIONS REPRESENT MINIMUM REQUIREMENTS. THEY DO NOT IN ANY WAY LESSEN THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN VEHICULAR AND PEDESTRIAN TRAFFIC, AND TO PROTECT THE PUBLIC AND HIS OWN EMPLOYEES FROM ALL DAMAGE TO PERSON AND PROPERTY.
6. PROVIDE 72 HOURS ADVANCE NOTICE OF EXCAVATION TO EACH OPERATOR OF OVERHEAD AND/OR UNDERGROUND UTILITIES LISTED ON THE CENTRAL REGISTRY OF THE TOWN OF SOUTHAMPTON PER INDUSTRIAL CODE RULE No. 53.
7. PIPE AND MATERIAL SHALL NOT BE STOCKPILED IN ANY THOROUGHFARE OR BLOCKING ACCESS TO BUILDINGS..
8. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF UNDERGROUND UTILITIES, GAS MAINS, WATER MAINS, ELECTRIC CONDUITS, TELEPHONE CONDUITS, FIBER OPTIC CONDUITS, DRAINAGE LINES AND EXISTING SANITARY SEWER LINES. NO EXTRA COMPENSATION WILL BE MADE TO THE CONTRACTOR FOR ANY INCONVENIENCE CAUSED HIM BY ENCOUNTERING THE AFOREMENTIONED UTILITIES. SHOULD IT BE NECESSARY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE RELOCATION OF ANY UNDERGROUND UTILITIES WHICH CONFLICT WITH THE PROPOSED CONSTRUCTION, IN ACCORDANCE WITH THE "RULES AND REGULATIONS GOVERNING THE ACCOMMODATION OF UTILITIES WITHIN THE STATE HIGHWAY RIGHT-OF-WAY".
9. PERFORM DAILY CLEAN-UP OPERATIONS WHICH INCLUDE SWEEPING OF ROADWAYS AND REMOVAL OF DEBRIS AND EXCESS CONSTRUCTION MATERIAL TO THE SATISFACTION OF THE ENGINEER AND THE PROPER ROAD AUTHORITY.
10. WHERE THE SANITARY SEWER IS INSTALLED IN THE PAVEMENT AREA OR LAWN AREA, PROTECT THE ADJACENT LAWN OR PAVEMENT AREAS. ADJACENT AREAS DAMAGED DUE TO THE NEGLIGENCE OF THE CONTRACTOR SHALL BE REPLACED AS REQUIRED AT THE CONTRACTOR'S EXPENSE.
11. GRASSED AREAS DAMAGED DURING CONSTRUCTION SHALL RECEIVE TOPSOIL AND SOD.
12. THE CONTRACTOR MAY EXCAVATE AND STOCKPILE SOIL AT THOSE LOCATIONS APPROVED BY THE OWNER.
13. OBTAIN, AND HAVE ON THE JOB SITE AT ALL TIMES, THE PROPER ROAD OPENING AND OTHER PERMITS AS REQUIRED BY NEW YORK STATE, SUFFOLK COUNTY, THE TOWN OF SOUTHAMPTON, AND THE VILLAGE OF WESTHAMPTON BEACH OR ANY OTHER PERMITTING AGENCY. THE COST OF SUCH PERMITS SHALL BE SOLE RESPONSIBILITY OF THE CONTRACTOR.
14. MARK LOCATIONS WHERE EXISTING LAWN IRRIGATION SYSTEM IS ENCOUNTERED. RESTORE IRRIGATION PIPING DAMAGED DURING THE WORK AT NO ADDITIONAL COST TO OWNER.
15. COORDINATE STAGING AREA LOCATION WITH OWNER PRIOR TO COMMENCEMENT OF WORK.

GENERAL WORK NOTES- CONT'D

16. WORK SHOWN IS NEW UNLESS SPECIFICALLY NOTED OR OTHERWISE INDICATED AS EXISTING.
17. DO NOT SCALE MEASURE ANY DRAWING. VERIFY THE FIGURES, DIMENSIONS & DESIGN INTENTION SHOWN ON THE DRAWINGS BEFORE BEGINNING LAYOUT OF THE WORK AND REPORT ANY ERRORS, INACCURACIES, MISSING DIMENSIONAL REQUIREMENTS OR CONFLICTS TO THE ENGINEER IN WRITING BEFORE BEGINNING ANY WORK.
18. ALL WORK SHALL COMPLY WITH ALL APPLICABLE CODES, LAWS AND STATUTES AS REQUIRED. STRICTLY ADHERE TO MANUFACTURER'S PRINTED INSTRUCTIONS.
19. VERIFY EXACT LAYOUT COMPATIBILITY WITH ALL EXISTING CONDITIONS BEFORE BEGINNING WORK..
20. ALL WORK SHOWN IS INCLUDED AS WORK OF CONTRACT WHHH 2101 UNLESS OTHERWISE NOTED.
21. THE ENGINEER'S ROLE IS NOT TO SUPERVISE, DIRECT, OR HAVE CONTROL OVER THE MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES OF CONSTRUCTION SELECTED OR USED BY THE CONTRACTOR FOR SECURITY OR SAFETY AT THE SITE, FOR SAFETY PRECAUTIONS AND PROGRAMS INCIDENTAL TO THE CONTRACTOR'S WORK IN PROGRESS, NOR ANY FAILURE OF THE CONTRACTOR TO COMPLY WITH LAWS AND REGULATIONS APPLICABLE TO THE CONTRACTOR'S FURNISHING AND PERFORMING THE WORK AS SHOWN AND/OR SPECIFIED.
22. EXISTING UTILITIES AS LOCATED BY SINGER UTILITY ENGINEERING, P.C. LOCATED AT 668 STONY HILL ROAD, #105 YARDLEY, PA 19067 ON UTILITY DESIGNATING PLAN DATED JUNE 2019.

BENCHMARK

SCALE: 1"=20'



BENCHMARK LOCATED APPROXIMATELY 250 FEET NORTHWEST OF INTERSECTION OF LIBRARY AVENUE AND STEVENS LANE

GENERAL WORK NOTES- CONT'D

23. INSTALLATION MUST START AT THE POINT IN THE SYSTEM WITH THE LOWEST ELEVATION OR THE CONNECTION TO THE EXISTING SYSTEM.
24. COMPONENTS OF AN EXISTING SEWER SYSTEM CANNOT BE DUG UP AND/OR EXPOSED FOR ANY REASON WITHOUT APPROVAL FROM THIS OFFICE. ANY EXCAVATION FOR ANY REASON THAT IS TO BE DONE WITHIN 10 FT. OF ANY COMPONENT OF A SEWER SYSTEM CANNOT BE COMMENCED WITHOUT APPROVAL FROM THE SCDPW.
25. A PLUG MUST BE INSTALLED AS CLOSE TO THE CONNECTION TO THE EXISTING SEWER SYSTEM AND AS SOON AS POSSIBLE. THE PLUG SHALL REMAIN UNTIL A REPRESENTATIVE OF THIS OFFICE GRANTS APPROVAL TO REMOVE IT. ALL PLUGS MUST BE SECURED TO PREVENT THE PLUG FROM GOING DOWN THE PIPE.
26. ALL MANHOLE LOCATIONS AND ELEVATIONS MUST BE LAID OUT BY A L.L.S. BEFORE ANY WORK PERTAINING TO THE INSTALLATION OF THE SEWER SYSTEM CAN BE COMMENCED.
27. ALL 8 IN. DIAMETER OR GREATER PIPE MUST BE SET WITH A PROPERLY CALIBRATED PIPE LASER. THE FIRST 2 FULL LENGTHS OF PIPE, THE MIDWAY POINT AND LAST FULL LENGTH OF PIPE IN EVERY RUN MUST BE CHECKED FOR PROPER SLOPE WITH A SIGHT LEVEL OR TRANSIT.
28. AT LEAST ONE MEMBER OF THE INSTALL CREW MUST BE ON SITE AND ABLE TO DEMONSTRATE TO THE SATISFACTION OF THIS OFFICE THE ABILITY TO PROPERLY SET A PIPE LASER, TAKE ELEVATION READINGS AND CALCULATE SLOPES BASED ON ELEVATIONS TAKEN ON SITE. IF THIS CANNOT BE DEMONSTRATED, THEN THE PRESENCE OF A L.L.S. OR P.E. WILL BE REQUIRED TO PERFORM THESE TASKS FOR THE REMAINDER OF THE INSTALL.
29. ALL OPEN INCOMPLETE PIPES MUST BE CAPPED OR PLUGGED BY THE END OF THE DAY IT IS INSTALLED. ALL STUBS, LATERALS AND HOUSE CONNECTIONS MUST BE CAPPED OR PLUGGED IMMEDIATELY UPON INSTALLATION.
30. PIPE MUST BE JOINED IN ACCORDANCE WITH MANUFACTURES SPECS. UNDER NO CIRCUMSTANCE CAN PIPE BE JOINED WITH THE AID OF A MACHINE OF ANY KIND OR JACK OF ANY KIND.
31. INSTALLS AT DEPTHS OF 5' OR GREATER THAT CANNOT ACCOMMODATE A 1:1 TRENCH SLOPE RATIO MUST USE OSHA COMPLIANT METHODS OF SHORING THE EXCAVATION AREA.
32. ALL PIPES MUST BE PLACED ON UNDISTURBED STABLE VIRGIN GROUND. IF UNSTABLE OR UNSUITABLE MATERIAL IS ENCOUNTERED IN THE SUB GRADE OF A PIPE IT MUST BE REMOVED TO THE SATISFACTION OF THE REPRESENTATIVE OF THE SCDPW AND REPLACED WITH 14 IN. BLUESTONE TO THE ELEVATION OF THE SPRING LINE OF THE PIPE.
33. THE BUCKET OF THE EXCAVATOR MUST BE EQUIPPED WITH A GRADE BAR. OVER EXCAVATION OF 4IN. OR MORE WILL BE CONSIDERED UNSTABLE SUB GRADE.
34. UNSTABLE OR UNSUITABLE MATERIALS ARE CLAY, BOG, SUPER SATURATED, ORGANIC OR DELETERIOUS MATERIALS.
35. ALL SEWER PIPE MUST HAVE THE HAUNCH PROPERLY COMPACTED WITH CLEAN COMPACTABLE FILL USING A HAUNCH COMPACTING TOOL OR THE HANDLE OF A SHORT-HANDLE SHOVEL. USING ONES FEET IS NOT ACCEPTABLE. IF IT IS NOT UNDERSTOOD ON HOW TO ACCOMPLISH THIS IT IS YOUR RESPONSIBILITY TO REQUEST A REPRESENTATIVE OF SCDPW TO DEMONSTRATE.
36. ALL PIPE INSTALLED IN A DAY MUST BE BACKFILLED WITH CLEAN FILL 2 FT. ABOVE THE PIPE BY THE END OF THE DAY IT IS INSTALLED. THE BACKFILL MUST BE TAMPED AND SEWER MARKING TAPE LAID AT THIS ELEVATION.
37. ALL MANHOLE TOP SLABS AND COVERS MUST BE SECURE AND PREVENT INFILTRATION OF ANY SOLIDS AND/OR LIQUIDS FROM THE TIME THEY ARE INSTALLED UNTIL THE TIME FINAL GRADING AND PAVING IS COMPLETE. MANHOLES MUST ALSO BE PROTECTED FROM TRAFFIC.
38. MANHOLE TROUGHS MUST BE SMOOTH AND SHAPED TO FACILITATE SEWAGE FLOW. BENCHES SHOULD BE SHAPED SO THAT THE ENTIRE MANHOLE WILL DRAIN INTO THE TROUGH, INCLUDING INSIDE THE BOOT. HOWEVER THE BOOT MUST REMAIN FLEXIBLE AND CONCRETE MUST NOT BE ABOVE THE BOTTOM HALF OF THE PIPE INSIDE THE BOOT.
39. PRELIMINARY AS-BUILTS MUST BE APPROVED BY THIS OFFICE BEFORE ANY SEWER TESTING MAY BEGIN.
40. ALL SEWER MAINS 8 IN. OR LARGER WILL BE LEAK TESTED AND LAMPED, AND IN THIS ORDER.
41. LEAK TESTING WILL BE AN EXFILTRATION OR INFILTRATION TEST. TO PERFORM AN EXFILTRATION TEST THE UPSTREAM STRUCTURE OF RUN BEING TESTED MUST BE FILLED WITH CLEAR WATER TO AT LEAST 2 FT. ABOVE THE DOWNSTREAM OPENING OF THE UPSTREAM STRUCTURE OF RUN BEING TESTED OR 2 FT. ABOVE GROUND WATER, WHICH EVER ELEVATION IS HIGHER. IF THIS CANNOT BE ACCOMPLISHED THAN AN INFILTRATION TEST MUST BE PERFORMED.
42. THE PIPE TO BE LEAK TESTED WILL HAVE THE UPSTREAM PENETRATIONS IN THE UPSTREAM STRUCTURE AND THE UPSTREAM PENETRATION IN THE DOWNSTREAM STRUCTURE WATER TIGHT PLUGGED.
43. LEAK TESTING STARTS AFTER A REPRESENTATIVE OF THIS OFFICE STARTS THE TESTS. THE TEST WILL LASTS FOR A MIN. OF 6 HOURS. DURING THE DURATION OF TEST ANY TAMPERING OR INTERRUPTION OF THE TEST WILL NEGATE THE TEST AND IT WILL HAVE TO BE RESET.
44. AFTER IT IS DETERMINED THAT TESTING IS COMPLETE, WATER MUST BE DROPPED FROM DOWNSTREAM STRUCTURE AND UPSTREAM PLUGS MUST BE REMOVED. ANY WATER BEHIND UPSTREAM PLUGS NEGATES TEST.
45. WATER USED FOR TESTING MAY NOT BE SENT INTO ACTIVE SEWERS.
46. LAMP TEST IS A VISUAL INSPECTION INSIDE THE PIPE. THIS TO VERIFY THAT THE PIPE IS FREE OF OBSTRUCTIONS, DEFECTS AND THE PIPE IS STRAIGHT AND TRUE.
47. IF SDR-35 PIPE IS INSTALLED THAN IT MUST BE INSTALLED, BACKFILLED, LEFT UNDISTURBED FOR 30 CALENDAR DAYS AND PASS A MANDREL TEST BEFORE LEAK TESTING CAN BEGIN.
48. NO EXCAVATION OR PREP WORK FOR FINAL CONNECTIONS MAY BE DONE WITHOUT APPROVAL FROM THE SCDPW.
49. NO HOUSE CONNECTION PLUGS CAN BE REMOVED WITHOUT APPROVAL FROM THE SCDPW.
50. HOUSE TRAPS AND/OR BUILDING SEWER OUTLETS MUST BE CAPPED OR PLUGGED TO PREVENT ANY DISCHARGE OF ANY KIND.
51. FINAL CONNECTION CANNOT BE MADE WITHOUT APPROVAL FROM THE SCDPW.

UTILITY COORDINATION NOTES

1. IN ACCORDANCE WITH THE STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA CI/ASCE 38-02 THE SUBSURFACE UTILITY ENGINEERING (SUE) QUALITY LEVELS OF SERVICE (ACCURACY) IS QL-D = QUALITY LEVEL D. UTILITY INFORMATION OBTAINED FROM RECORD INFORMATION.
2. LOCATION OF ALL UNDERGROUND UTILITIES, ELECTRIC AND TELEPHONE CONDUITS, STORM DRAINS, UNDERGROUND STRUCTURES, CESSPOOLS AND UNDERGROUND PIPING SHALL BE MARKED OUT BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF UNDERGROUND UTILITIES, GAS MAINS, ELECTRIC AND TELEPHONE CONDUITS. NO EXCAVATION SHALL COMMENCE UNTIL COMPLETE MARK-OUT HAS BEEN PERFORMED.
3. LOCATION OF ALL UNDERGROUND UTILITIES BOTH PUBLIC AND CUSTOMER OWNED, WERE OBTAINED FROM EITHER OLD MAPS, SURVEYS, DRAWINGS AND RECORDS SUPPLIED BY OTHERS. THE OWNER AND ENGINEER DO NOT GUARANTEE OR ACCEPT RESPONSIBILITY FOR ANY DAMAGE TO SUCH FACILITIES DUE TO DISCREPANCIES IN LOCATION AND SIZE SHOWN ON THE PLANS OR THOSE UTILITIES NOT SHOWN, NOR WILL ANY COMPENSATION BE MADE TO THE CONTRACTOR FOR ANY INCONVENIENCE CAUSED HIM BY ENCOUNTERING THE AFOREMENTIONED UTILITIES OR FOR THOSE UTILITIES WHICH ARE NOT SHOWN, OR ARE INCORRECTLY SHOWN ON THE PLANS. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF ALL UNDERGROUND UTILITIES.
4. CONTRACTOR SHALL HAND DIG TO LOCATE AND EXPOSE EXISTING UTILITIES. ANY DAMAGE TO EXISTING UTILITIES SHALL BE REPAIRED IMMEDIATELY BY CONTRACTOR AT NO COST TO OWNER.

CIVIL LEGEND

—FO—	EXISTING FIBER OPTIC
—CTV—	EXISTING CABLE TELEVISION
—TV—	EXISTING TELEVISION
— T —	EXISTING TELEPHONE
—D—	EXISTING DRAINAGE
—SL—	EXISTING STREET LIGHT
—W—	EXISTING WATER
—G—	EXISTING GAS
—OH—	EXISTING OVERHEAD WIRE
—OH/TR—	EXISTING TRAFFIC SIGNAL
—E—	EXISTING UNDERGROUND ELECTRIC
—S—	EXISTING SEWER
—LPS—	EXISTING LOW PRESSURE SEWER
— L —	EXISTING ROOF LEADER
—FM—	EXISTING FORCEMAIN
—S—	NEW SEWER
—LPS—	NEW LOW PRESSURE SEWER
—FM—	NEW FORCE MAIN
—E—	NEW UNDERGROUND ELECTRIC
—V—	NEW VENT PIPE
—x—x—	FENCE
◉	NEW SEWER MANHOLE
AMH ◉	NEW AIR RELIEF MANHOLE
CO ●	NEW LOW PRESSURE CLEAN OUT OR FORCE MAIN CLEAN OUT
⊕ SB-3	SOIL BORING AND NUMBER
LP GPS ◉	NEW LOW PRESSURE GRINDER PUMP STATION

✿	TREE - DECIDUOUS
✹	TREE - CONIFEROUS
⊖	SHRUB
⌖	BORING INSTRUMENTED WITH PIEZOMETER
·	BORING
⊞	TEST PIT
●	IRON PIN
△	CONTROL POINT
▣	BENCHMARK
⊖	MARKER POST
⊕	RAILROAD SPIKE
□	SURVEY MONUMENT
●	PK NAIL
⊙	POST
◎	WELL
⊗	WATER VALVE
⊖	WATER METER
∘	WATER CURB BOX
⌖	FIRE HYDRANT
·	CLEANOUT
♉	SPIGOT
♉	DOWNSPOUT
Ⓢ	STORM MANHOLE
▨	STORM INLET
Ⓢ	SANITARY MANHOLE
▒	GRAVEL PARKING LOT

▲	VENT
⊠	GAS VALVE
⊘	GAS METER
▫	GAS CURB BOX
TV	CABLE TV UTILITY BOX
T	TELECOMMUNICATIONS UTILITY BOX
Ⓣ	TELECOMMUNICATIONS MANHOLE
Ⓔ	ELECTRICAL MANHOLE
E	ELECTRICAL UTILITY BOX
○→	LIGHT POST
⌀	UTILITY POLE
≻	GUY WIRE
◑	GUY POLE
Ⓜ	MANHOLE - UNKNOWN UTILITY
JB	JUNCTION BOX
▭	MAILBOX
⍿	SIGN
⏏	STUMP
▭	WEIR
○	WATER MANHOLE
○	GAS MANHOLE
○S	SEWER VENT
☒	UNKNOWN VALVE

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CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK · NICHOLAS F. BONO · 088951 · LICENSED PROFESSIONAL ENGINEER

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
SJD/AV	SJD	JMV	NFB

PROJECT No.:	DATE:	SCALE:
WHHH 2101	JUNE 2023	AS SHOWN

CLIENT

Westhampton Beach Harbour House HOA

Westhampton Beach Harbour House Sanitary System Plan

35 Library Avenue
Westhampton Beach, NY 11978

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SHEET TITLE

DRAWING CONVENTIONS, ABBREVIATIONS AND NOTES

DRAWING No.

G100

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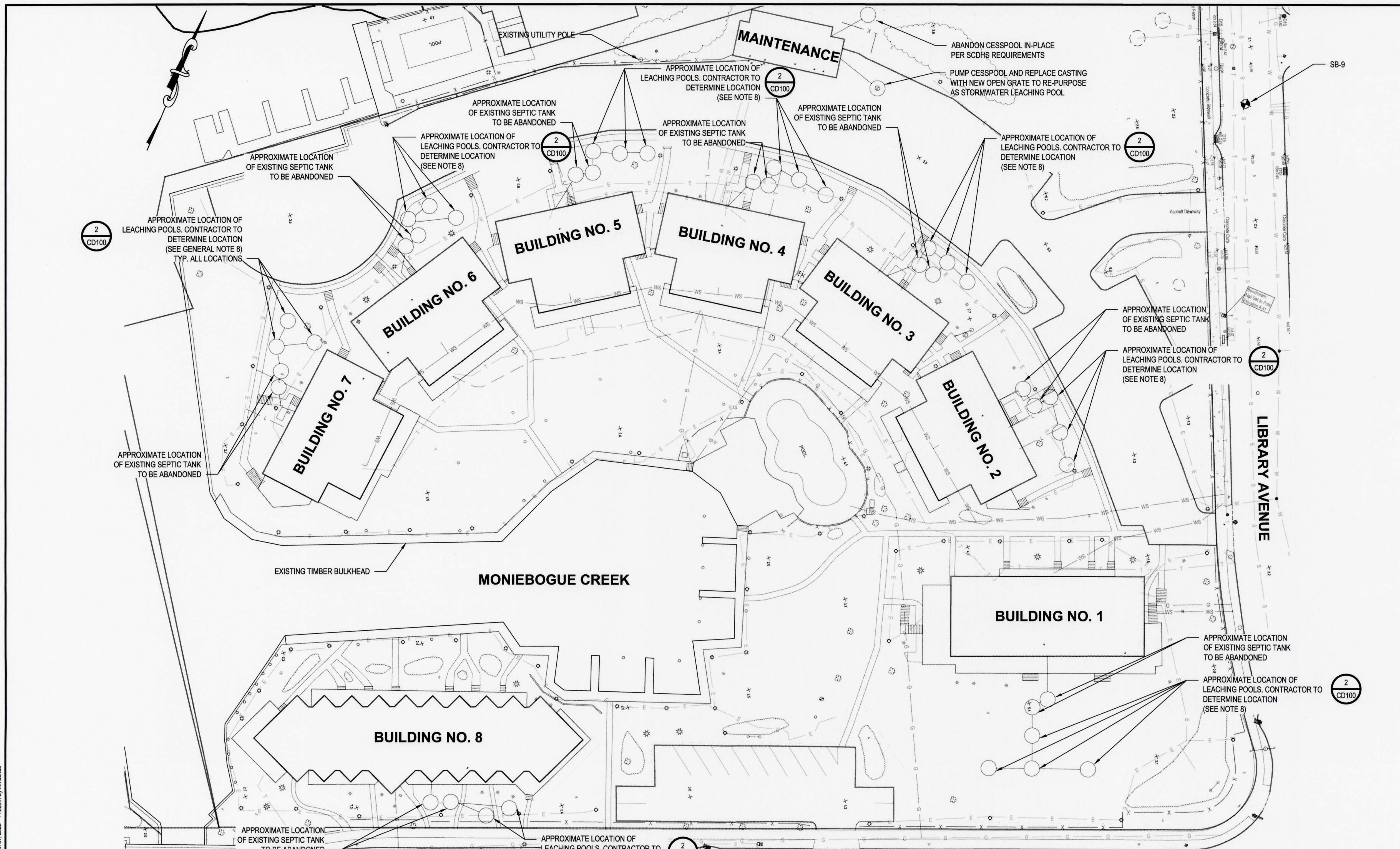


Existing Site and Abandonment Plan

SCALE: 1"= 30'

GENERAL NOTES:

1. VERIFY ALL EXISTING STRUCTURES ELEVATIONS AND COORDINATE INVERT ELEVATIONS OF NEW STRUCTURES AND PIPES PRIOR TO INSTALLATION OF NEW WORK AND REUSE OF EXISTING STRUCTURES IDENTIFIED TO REMAIN ON PLANS.
2. CONFIRM LOCATION OF ALL LEACHING POOLS AND SEPTIC TANKS PRIOR TO MODIFICATION/ABANDONMENT.
3. OBTAIN A PRIVATE UTILITY MARK OUT ON THE PROPERTY BEFORE PERFORMING ANY EXCAVATION WORK.
4. THE CONTRACTOR SHALL REPAIR AND RESTORE ALL AREAS DISTURBED AND/OR DAMAGED BY WORK ACTIVITIES TO MATCH PRE-EXISTING CONDITIONS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND OFFSITE DISPOSAL OF ALL WASTE MATERIALS GENERATED FROM WORK SPECIFIED HEREIN.
6. COORDINATE AND FILE FOR SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES FORM WWM-080 TO CERTIFY THE ABANDONMENT OF THE EXISTING LEACHING POOLS UPON COMPLETION OF THE NEW WORK.
7. CONTRACTOR RESPONSIBLE FOR ANY SHEETING DESIGN & DEWATERING AS NECESSARY WITHIN THE EXCAVATION AREA FOR THE PROPOSED SYSTEM.
8. IF EXISTING LEACHING STRUCTURES ARE IN GOOD CONDITION AND PRECAST CONCRETE CONSTRUCTION THEY SHALL BE PUMPED, AND CONNECTED TO ROOF LEADERS TO REPURPOSE AS STORMWATER LEACHING POOLS. POOLS WITH DETERIORATED CONCRETE OR BLOCK POOLS SHALL BE ABANDONED IN-PLACE PER SCDHS REQUIREMENTS.
9. SEPTIC TANKS TO BE ABANDONED IN PLACE SHALL BE PUMPED OUT, HAVE TOP SLABS REMOVED AND HOLES PUNCHED THROUGH THE BASE SLAB BEFORE FILLING WITH $\frac{3}{4}$" CRUSHED STONE. CHIMNEYS AND COVERS TO BE REMOVED AND DISPOSED OF.
10. RETAIN A NYSDEC PART 364 LICENSED LIQUID WASTE TRANSPORTER TO PUMP OUT ALL LEACHING POOLS AND SEPTIC TANKS.
11. SEQUENCE WORK SUCH THAT SANITARY SERVICE IS MAINTAINED TO ALL UNITS FOR THE DURATION OF THE PROJECT. PROVIDE SANITARY SEWER BYPASS AS REQUIRED TO COMPLETE WORK.
12. REMOVE AND DISPOSE OF ALL EXISTING MANHOLES, GRAVITY PIPE, AND ASSOCIATED APPURTENANCES OFF-SITE.
13. LOCATION OF EXISTING ON-SITE SANITARY DISPOSAL SYSTEMS IS APPROXIMATE AND BASED ON 1961 PLUMBING SITE PLAN PROVIDED BY WESTHAMPTON BEACH HARBOUR HOUSE ASSOCIATION.
14. POOL BACKWASH WATER DISPOSAL SYSTEM NOT SHOWN AND IS EXCLUDED FROM SEWER CONNECTION.

SEWAGE DISPOSAL CALCULATIONS:

SCDHS DESIGN FLOW CALCULATIONS
LOT AREA: 5.24 ACRES
LAND USE CODE: 210

SANITARY FLOW IS BASED ON THE SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES STANDARDS FOR APPROVAL OF PLANS AND CONSTRUCTION FOR SEWAGE DISPOSAL SYSTEMS FOR OTHER THAN SINGLE-FAMILY RESIDENCES DATED JULY 21, 2020.

FLOW DENSITY ANALYSIS
NUMBER OF UNITS: 13 CONDO UNITS > 1200 SQ. FT
37 CONDO UNITS 601 - 1200 SQ.FT
1 MAINTENANCE BUILDING 1325 SQ.FT

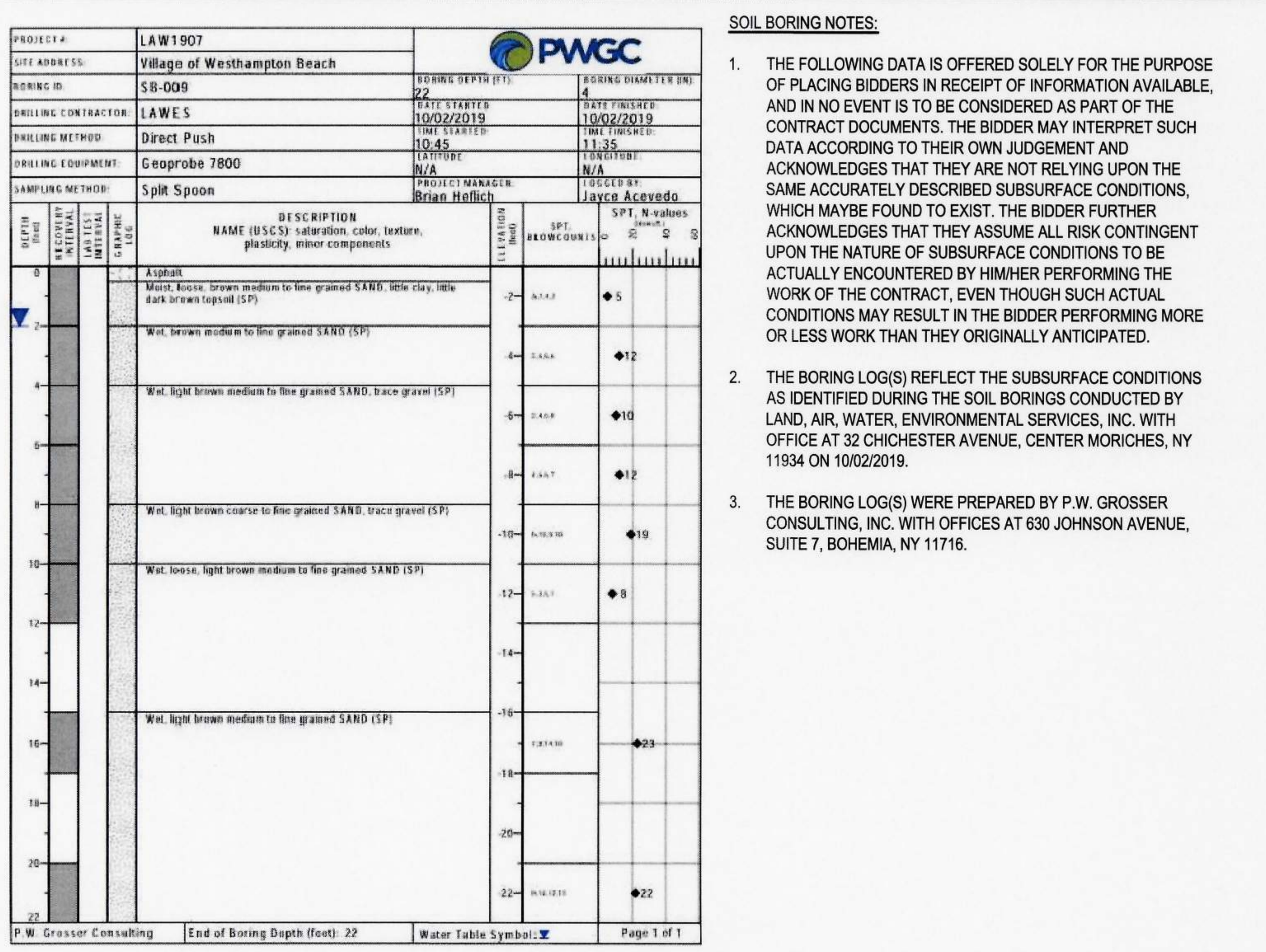
STRUCTURE USE: HOUSING UNIT > 1,200 SQ. FT.
601 - 1200 SQ. FT. HOUSING UNIT
MAINTENANCE BUILDING

DENSITY LOAD:
HOUSING UNIT > 1,200 SQ. FT 300 GPD/UNIT
601 - 1200 SQ. FT. HOUSING UNIT 225 GPD/UNIT
MAINTENANCE BUILDING 0.03 GPD/SQ. FT.
KITCHEN/GRAY LOAD: 0 GPD/UNIT

DESIGN FLOW: 37 UNITS X 225 GPD/UNIT = 8,325 GPD
13 UNITS X 300 GPD/UNIT = 3,900 GPD
1325 SQ. FT. X 0.03 GPD/ SQ. FT. = 40 GPD

TOTAL = 12,265 GPD

DESIGN FLOW BY BUILDING			
BUILDING #	601-1200 SF UNITS	1200+ SF UNITS	RESIDENTIAL BUILDING GPD
1	7	1	1875 GPD
2	4	2	1500 GPD
3	4	2	1500 GPD
4	4	2	1500 GPD
5	4	2	1500 GPD
6	4	2	1500 GPD
7	4	2	1500 GPD
8	6	0	1350 GPD
MAINTENANCE	0.03 GPD/SF x 1325 SF		40 GPD
TOTAL	37	13	12265 GPD

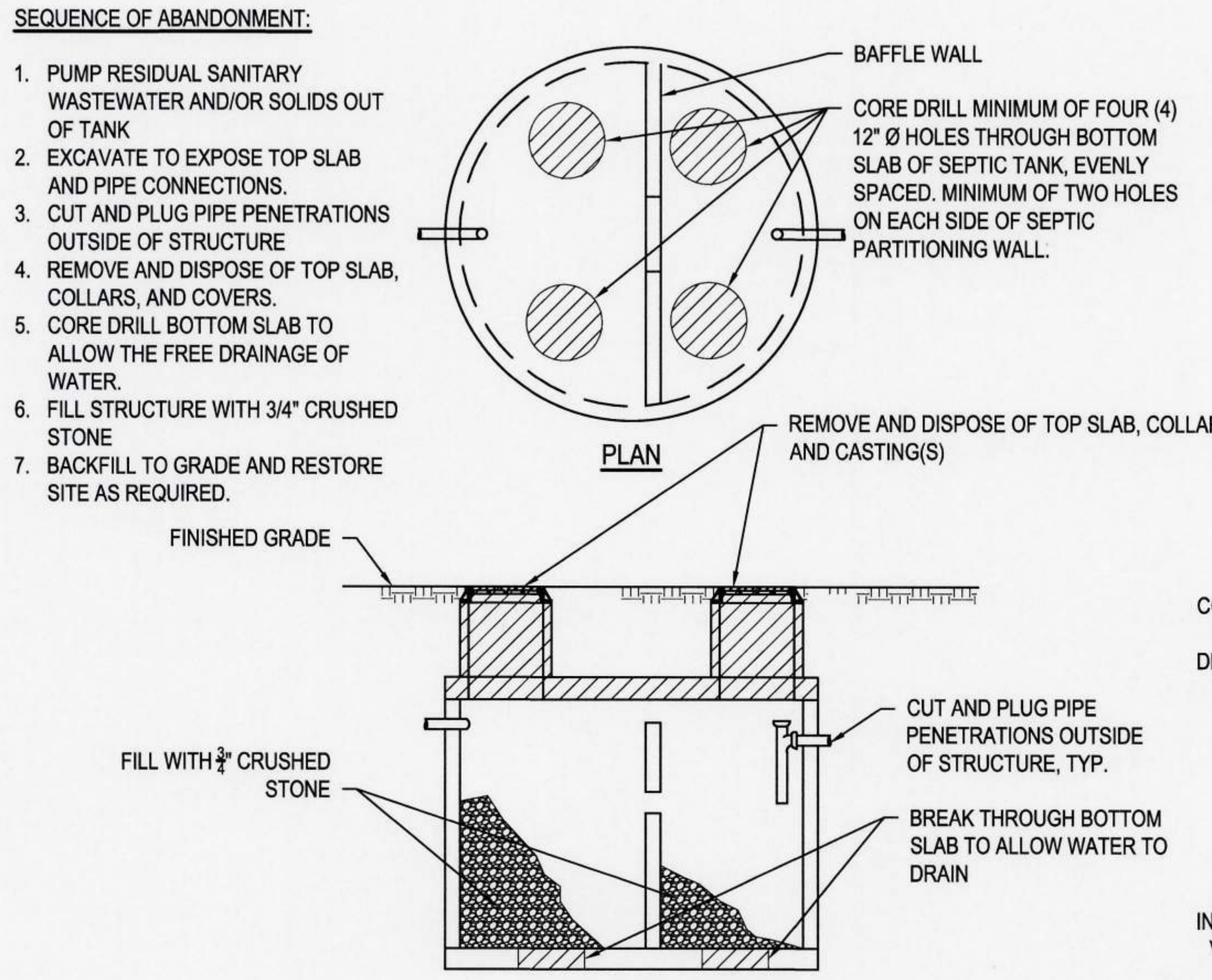


SOIL BORING NOTES:

1. THE FOLLOWING DATA IS OFFERED SOLELY FOR THE PURPOSE OF PLACING BIDDERS IN RECEIPT OF INFORMATION AVAILABLE, AND IN NO EVENT IS TO BE CONSIDERED AS PART OF THE CONTRACT DOCUMENTS. THE BIDDER MAY INTERPRET SUCH DATA ACCORDING TO THEIR OWN JUDGEMENT AND ACKNOWLEDGES THAT THEY ARE NOT RELYING UPON THE SAME ACCURATELY DESCRIBED SUBSURFACE CONDITIONS, WHICH MAYBE FOUND TO EXIST. THE BIDDER FURTHER ACKNOWLEDGES THAT THEY ASSUME ALL RISK CONTINGENT UPON THE NATURE OF SUBSURFACE CONDITIONS TO BE ACTUALLY ENCOUNTERED BY HIM/HER PERFORMING THE WORK OF THE CONTRACT, EVEN THOUGH SUCH ACTUAL CONDITIONS MAY RESULT IN THE BIDDER PERFORMING MORE OR LESS WORK THAN THEY ORIGINALLY ANTICIPATED.
2. THE BORING LOG(S) REFLECT THE SUBSURFACE CONDITIONS AS IDENTIFIED DURING THE SOIL BORINGS CONDUCTED BY LAND, AIR, WATER, ENVIRONMENTAL SERVICES, INC. WITH OFFICE AT 32 CHICHESTER AVENUE, CENTER MORICHES, NY 11934 ON 10/02/2019.
3. THE BORING LOG(S) WERE PREPARED BY P.W. GROSSER CONSULTING, INC. WITH OFFICES AT 630 JOHNSON AVENUE, SUITE 7, BOHEMIA, NY 11716.

SEQUENCE OF ABANDONMENT:

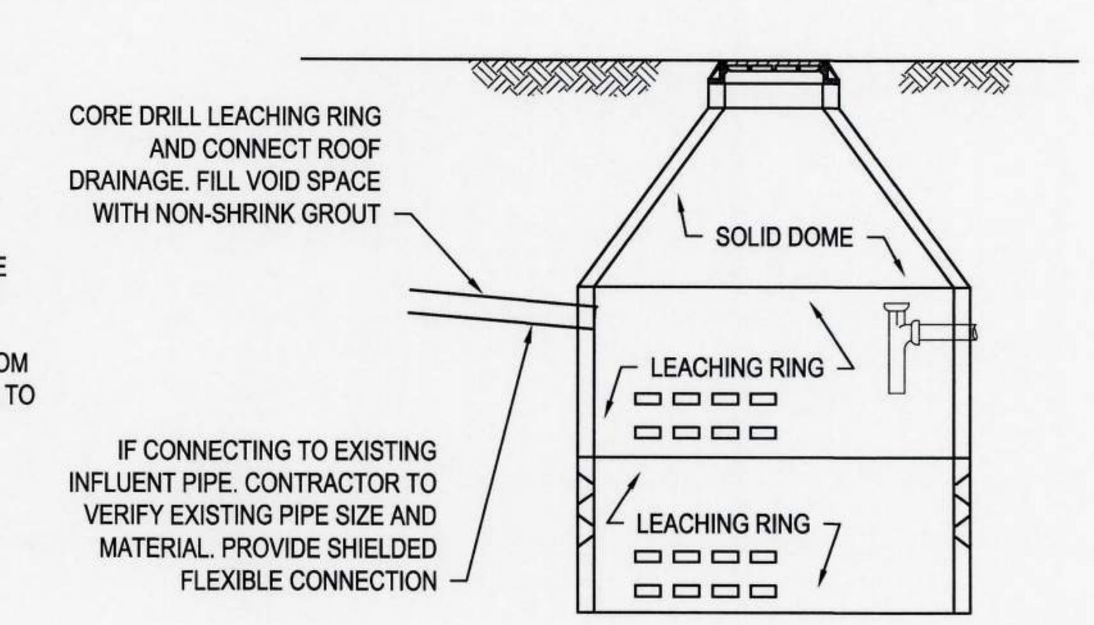
1. PUMP RESIDUAL SANITARY WASTEWATER AND/OR SOLIDS OUT OF TANK
2. EXCAVATE TO EXPOSE TOP SLAB AND PIPE CONNECTIONS.
3. CUT AND PLUG PIPE PENETRATIONS OUTSIDE OF STRUCTURE
4. REMOVE AND DISPOSE OF TOP SLAB, COLLARS, AND COVERS.
5. CORE DRILL BOTTOM SLAB TO ALLOW THE FREE DRAINAGE OF WATER.
6. FILL STRUCTURE WITH 3/4" CRUSHED STONE
7. BACKFILL TO GRADE AND RESTORE SITE AS REQUIRED.



1 **Septic Tank Abandonment Detail**
SCALE: NTS

SEQUENCE OF MODIFICATION:

1. PUMP RESIDUAL SANITARY WASTEWATER AND/OR SOLIDS OUT OF POOL
2. EXCAVATE TO EXPOSE TOP SLAB OR DOME AND PIPE CONNECTION(S)
3. CONNECT ROOF DRAINAGE LEADER TO LEACHING POOL.
4. BACKFILL TO GRADE AND RESTORE SITE AS REQUIRED.



2 **Leaching Pool Modification Detail**
SCALE: NTS

GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

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CONSULTANTS:

MARK	DATE	DESCRIPTION

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
SJD/AV	SJD	JMV	NFB
PROJECT No.: WHHH 2101	DATE: JUNE 2023	SCALE: AS SHOWN	

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Westhampton Beach Harbour House Sanitary System Plan

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SHEET TITLE
EXISTING SITE AND SANITARY SYSTEM ABANDONMENT PLAN

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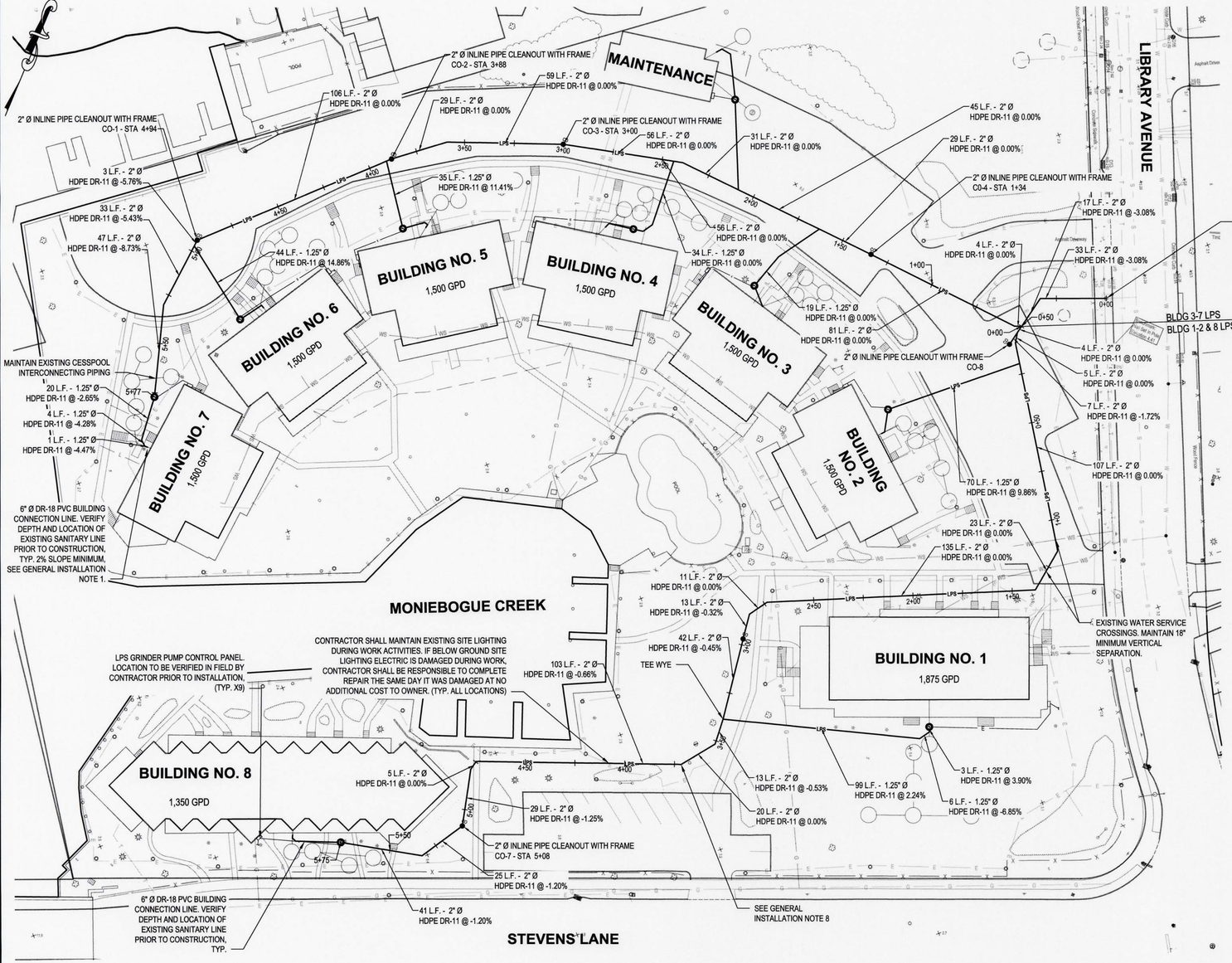
CD 100



Proposed Sanitary Site Plan

SCALE: 1"= 30'

GENERAL INSTALLATION NOTES:

1. CONFIRM EXACT LOCATION AND ELEVATION OF ALL BUILDING SANITARY LINES PRIOR TO STARTING WORK.
2. COORDINATE PRIVATE UTILITY MARK-OUT OF ALL SITE UTILITIES PRIOR TO ANY EXCAVATION WORK.
3. COORDINATE EXACT LOCATION OF GRINDER PUMP STATIONS WITH OWNER PRIOR TO EXCAVATION.
4. COORDINATE WITH SCDPW FOR CONNECTION TO EXISTING LPS STUB. CONNECTION MUST BE MADE BY SCDPW APPROVED CONTRACTOR. NO FLOW CAN BE INTRODUCED TO SEWER PRIOR TO SCDPW APPROVAL
5. MAINTAIN SANITARY SERVICE TO ALL BUILDINGS FOR DURATION OF WORK. CONTRACTOR IS RESPONSIBLE FOR ANY SANITARY BYPASS REQUIRED TO COMPLETE INSTALLATION
6. ALL PRESSURE SEWER SHALL BE BUTT-FUSED HDPE DR-11. ALL GRAVITY PIPING SHALL BE PVC DR-18.
7. PRESSURE SEWER MAY BE INSTALLED VIA DIRECTIONAL DRILLING AT CONTRACTOR'S DISCRETION.
8. ALL BENDS SHOWN TO BE SWEPT, HDPE FITTINGS MAY BE USED AT CONTRACTORS DISCRETION. ALL SWEPTS IN PIPE SHALL BE ACCOMMODATED WITHIN MANUFACTURER'S BEND RADIUS TOLERANCE OF HDPW DR-11 PIPE..
9. APPLY, OBTAIN, AND PAY FOR PERMITS REQUIRED BY REGULATORY AGENCIES FOR DEWATERING. ALL ASSOCIATED COSTS INCLUDING REPORTS, PLAN, APPLICATIONS, AND ENGINEERING FEES SHALL BE INCLUDED IN THE PRICE BID.
10. PROVIDE MEANS FOR CONTROL OF SEDIMENTS FROM DEWATERING ACTIVITIES. NO SEDIMENTS SHALL BE PERMITTED TO ACCUMULATE ON GROUND SURFACES, ROADWAY, OR CATCH BASINS.

SITE REMOVAL NOTES:

1. REPORT ANY DISCREPANCIES BETWEEN ACTUAL FIELD CONDITIONS AND THE PLANS TO THE ENGINEER IN WRITING IMMEDIATELY.
2. UNDERGROUND UTILITY INFORMATION SHOWN ON THESE PLANS WAS OBTAINED FOR DESIGN PURPOSES ONLY. PROVIDE FOR CONSTRUCTION MARKOUT AND LOCATE EXISTING UNDERGROUND UTILITIES. NO EXCAVATION CAN COMMENCE UNTIL UTILITY DOCUMENTATION HAS BEEN COMPLETED.
3. AFTER MARKOUT AND PRIOR TO DISTURBING THE SITE, UNCOVER ALL SUBSURFACE UTILITIES AND STRUCTURES WITHIN LIMITS OF DISTURBANCE TO CONFIRM THEIR LOCATION AND DEPTH.
4. NO COMPENSATION WILL BE MADE FOR ANY INCONVENIENCE CAUSED BY ENCOUNTERING UTILITIES AND STRUCTURES WHICH ARE NOT SHOWN, OR ARE INACCURATELY SHOWN ON THE PLANS.
5. REPAIR ANY DAMAGE TO EXISTING UTILITIES, INCLUDING BUT NOT LIMITED TO SITE LIGHTING AND SITE IRRIGATION RESULTING FROM CONTRACTOR OPERATIONS IMMEDIATELY AT NO COST TO OWNER.
6. REPAIR ANY DAMAGE TO EXISTING SITE FEATURES SCHEDULED TO REMAIN RESULTING FROM CONTRACTOR OPERATIONS AT NO COST TO OWNER.
7. LOCATE ALL COMPONENTS OF ANY EXISTING IRRIGATION SYSTEMS PRIOR TO CONSTRUCTION AND PROTECT THROUGHOUT THE DURATION OF THE CONTRACT. REPAIR ALL DAMAGED COMPONENTS AT NO ADDITIONAL COST TO THE OWNER.
8. SAWCUT CONCRETE PAVEMENT BACK TO NEAREST EXPANSION/CONTROL JOINT.
9. PROVIDE TEMPORARY FENCING TO PROTECT WORK AREAS.
10. DELINEATE THE LIMITS OF CLEARING AND REVIEW WITH THE OWNER PRIOR TO COMMENCING WORK.
11. NOTIFY OWNER AND ENGINEER IMMEDIATELY IN WRITING WHEN UNKNOWN STRUCTURES OR SUSPECTED HAZARDOUS OR CONTAMINATED MATERIALS ARE ENCOUNTERED PRIOR TO REMOVAL OR DISTURBANCE.
12. TAKE APPROPRIATE MEASURES TO PROTECT PEDESTRIANS AND VEHICULAR TRAFFIC DURING REMOVAL ACTIVITIES, AND PROVIDE TEMPORARY MEASURES FOR THE PROTECTION AND SAFETY OF THE PUBLIC UNTIL FINAL ACCEPTANCE BY THE OWNER.
13. BACKFILL ALL VOIDS RESULTING FROM THE REMOVAL OF EXISTING SITE FEATURES. BACKFILL TO BE SOIL, FREE OF ORGANIC MATERIAL, DEBRIS, TRASH, CLAY AND STONES LARGER THAN 4 INCHES.
14. PROVIDE TEMPORARY ASPHALT PAVED WALKWAYS TO ALL UNITS WHEN EXISTING WALKWAYS ARE IMPACTED BY WORK. CRUSHED STONE OR COMPACTED EARTH SURFACES WILL NOT BE ACCEPTED FOR TEMPORARY WALKWAY USE.

GRADING AND DRAINAGE NOTES:

1. FOR NEW CONSTRUCTION THAT MEETS EXISTING CONDITIONS, ABUTTING SURFACES SHALL BE FLUSH AND ALIGNED.
2. ADJUST ALL EXISTING CASTINGS AND VALVE COVERS TO MEET PROPOSED GRADE.
3. CONSTRUCTION DEBRIS AND EXCESS SOIL SHALL BE REMOVED AND LEGALLY DISPOSED OFF SITE.
4. UNSUITABLE SOILS ENCOUNTERED DURING CONSTRUCTION SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER AND ENGINEER IMMEDIATELY IN WRITING BEFORE REMOVAL OR DISTURBANCE.

SITE PLAN NOTES:

1. INSPECT THE SITE PRIOR TO SUBMISSION OF BIDS AND SHALL MAKE NO ADDITIONAL CLAIMS REGARDING SITE CONDITIONS THEREAFTER.
2. NOTIFY THE OWNER AT LEAST 48 HOURS PRIOR TO THE COMMENCEMENT OF THE WORK. THE SAME NOTICE SHALL BE REQUIRED WHEN RESUMING WORK AFTER ANY STOPPAGE OR DELAY.
3. COMPLETE ALL SURVEY AND STAKEOUT AS REQUIRED TO PROPERLY COMPLETE THE WORK.
4. PERFORM DAILY CLEANUP OPERATIONS INCLUDING REMOVAL OF DEBRIS AND EXCESS CONSTRUCTION MATERIAL, AND DRIVEWAY/STREET CLEANING TO THE SATISFACTION OF THE OWNER.
5. DURING ALL NON-WORKING HOURS, STORE ALL EQUIPMENT AND MATERIALS WITHIN AN AREA DESIGNATED BY THE OWNER AT THE PROJECT SITE IN ACCORDANCE WITH THE REQUIRED STORAGE SPECIFICATIONS STIPULATED BY EQUIPMENT AND MATERIAL MANUFACTURERS TO NOT VOID WARRANTY COVERAGE. STAGING AREA TO BE APPROVED BY OWNER PRIOR TO MOBILIZATION TO SITE.
6. ALL CURB DIMENSIONS SHOWN REFER TO THE FACE OF CURB.
7. ALL CONSTRUCTION TO CONFORM WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODE REQUIREMENTS.
8. COORDINATE CONSTRUCTION ACTIVITIES WITH OWNER TO MINIMIZE INTERRUPTION TO THE OWNER'S OPERATIONS.
9. RESTORE SURROUNDING AREAS DAMAGED OR DISTURBED DURING CONSTRUCTION. RESTORE TO NEW CONDITIONS AT NO ADDITIONAL COST TO THE OWNER.
10. RESTORE ALL DISTURBED GRASS AREAS AND ALL AREAS NOT SPECIFICALLY IDENTIFIED FOR OTHER IMPROVEMENTS WITH 4 INCHES OF TOPSOIL AND SEED.
11. REMOVE ALL ASPHALT FROM EXISTING CASTINGS.
12. SEAL ALL JOINTS BETWEEN NEW ASPHALT AND EXISTING ASPHALT WITH HOT ASPHALT CEMENT.
13. THE FINAL LOCATION OF ALL SIGNS SHALL BE APPROVED BY THE ENGINEER PRIOR TO PLACEMENT.

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GRAPHIC SCALE
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CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK
NICHOLAS F. BONNO
088951
LICENSED PROFESSIONAL ENGINEER

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
SJD/AV	SJD	JMV	NFB

PROJECT No.:	DATE:	SCALE:
WHHH 2101	JUNE 2023	AS SHOWN

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Westhampton Beach Harbour House Sanitary System Plan

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SHEET TITLE
LOW PRESSURE SEWER SANITARY SITE PLAN

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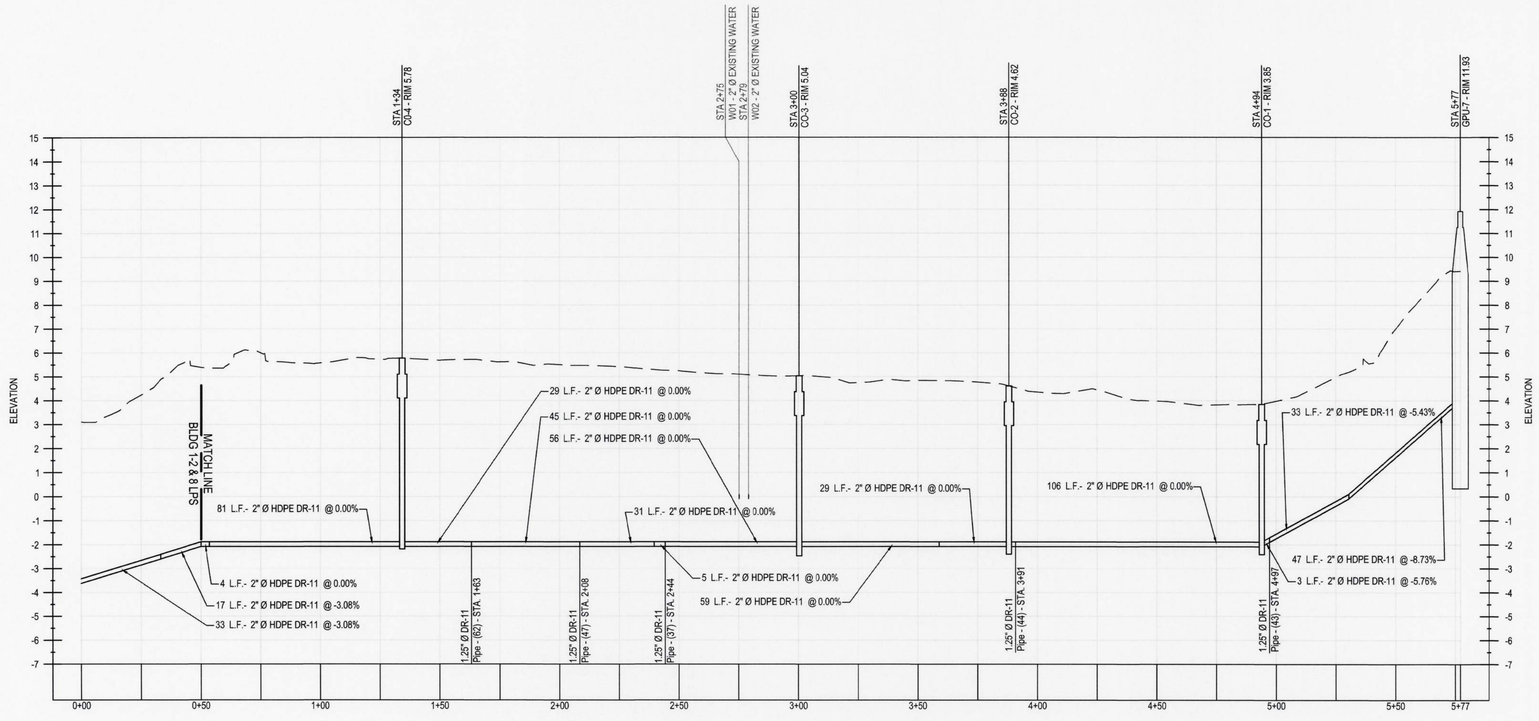
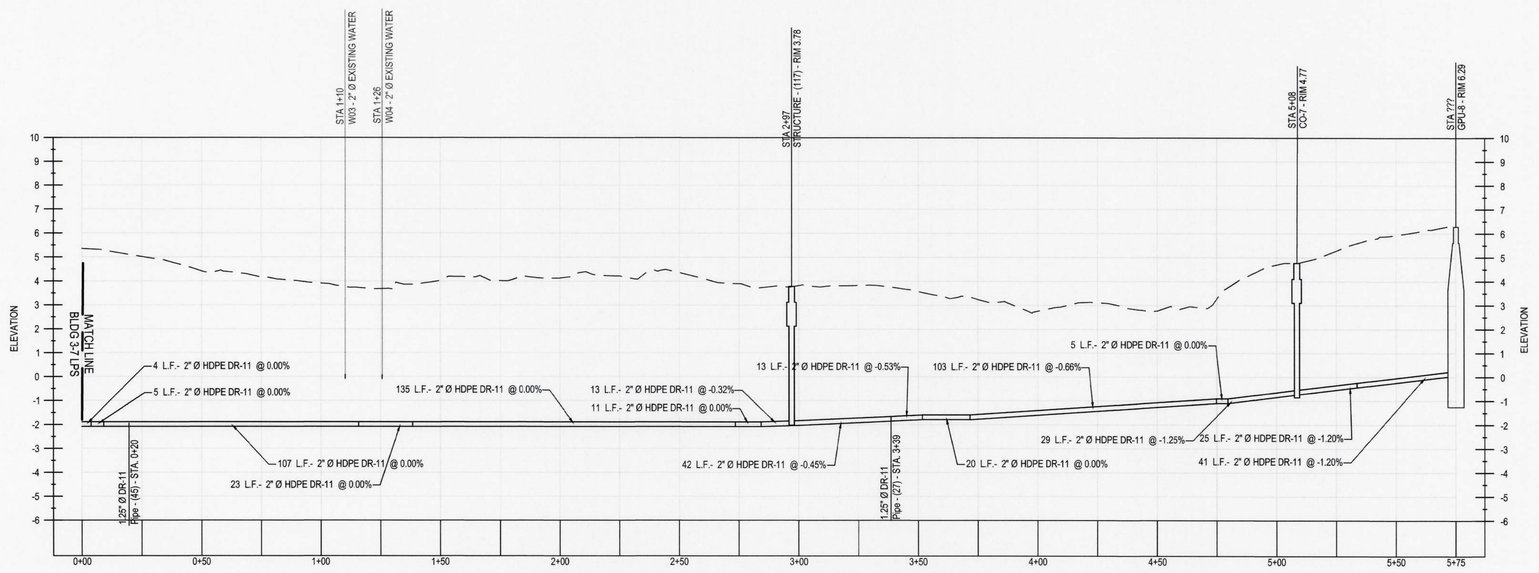
CS 110



Profile - BLDG 3-7 LPS (STA 0+00 to 5+77)

VERTICAL SCALE: 1"=2'
HORIZONTAL SCALE: 1"=20'



Profile - BLDGS 1-2 & 8 (STA 0+00 to 5+75)

VERTICAL SCALE: 1"=2'
HORIZONTAL SCALE: 1"=20'

GRAPHIC SCALE
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NOTES:

1. PROFILES SHOW ONE POSSIBLE INSTALLATION FOR LOW PRESSURE SEWER. CONTRACTOR MAY PROPOSE ALTERNATIVE PROFILE MEETING ALL SEPARATION DISTANCES AND MINIMUM COVER OF 4.5'.
2. ONSITE LIGHTING, IRRIGATION GAS AND TELEPHONE UTILITIES NOT SHOWN FOR CLARITY. MAINTAIN MINIMUM 18" VERTICAL SEPARATION BETWEEN LPS AND ALL ONSITE UTILITIES AT CROSSINGS.
3. SIZE AND DEPTH OF UTILITIES SHOWN IS APPROXIMATE. CONTRACTOR TO VERIFY ACTUAL DEPTH AND SIZE IN FIELD.

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Melville, NY 11747
631.756.8000 • www.h2m.com

CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK NICHOLAS F. BONO 088951 LICENSED PROFESSIONAL ENGINEER

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
SJD/AV	SJD	JMV	NFB

PROJECT No.:	DATE:	SCALE:
WHHH 2101	JUNE 2023	AS SHOWN

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Westhampton Beach Harbour House Sanitary System Plan

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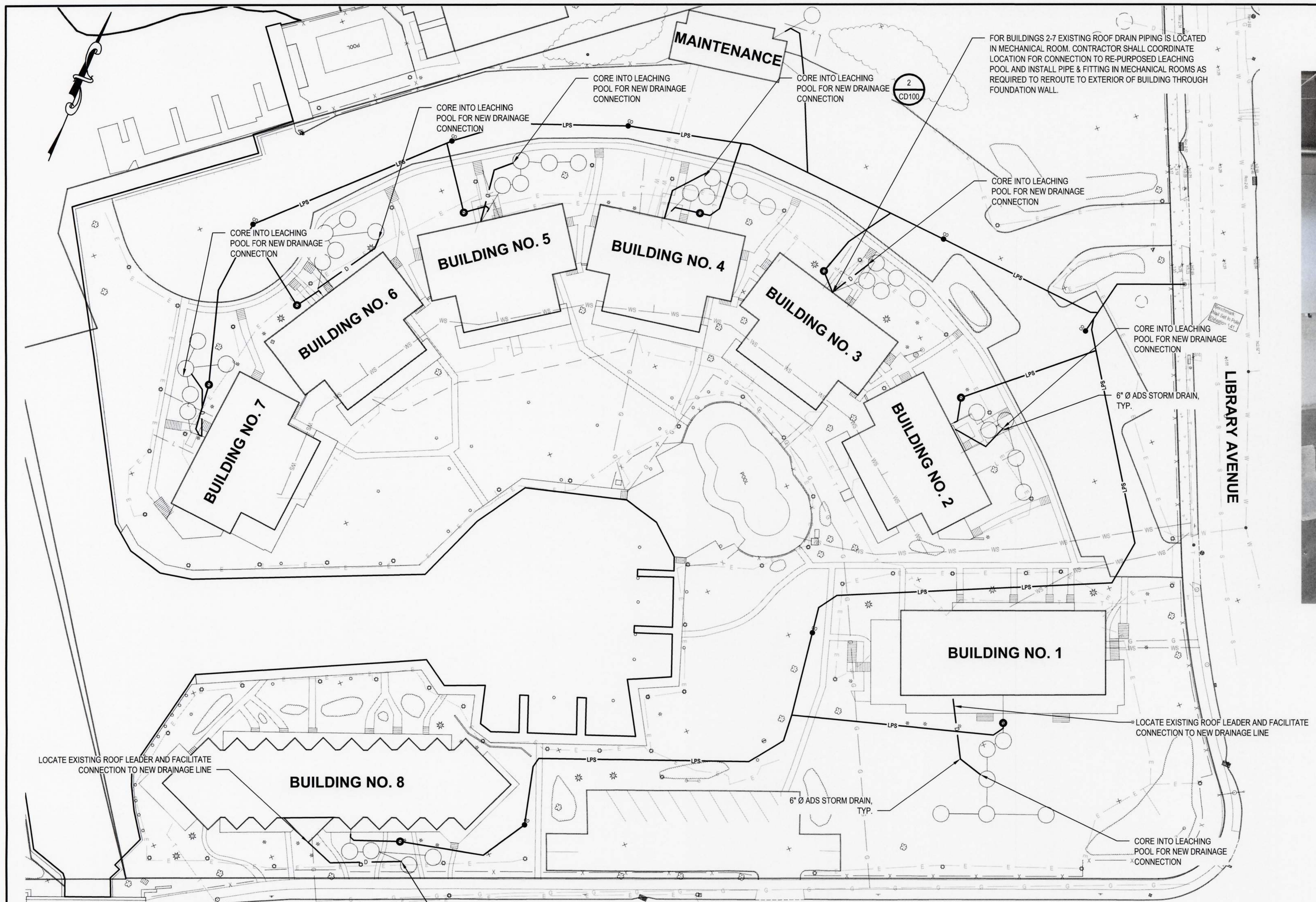
CONTRACT
CONTRACT S SEWERS

STATUS
FINAL BID DOCUMENT

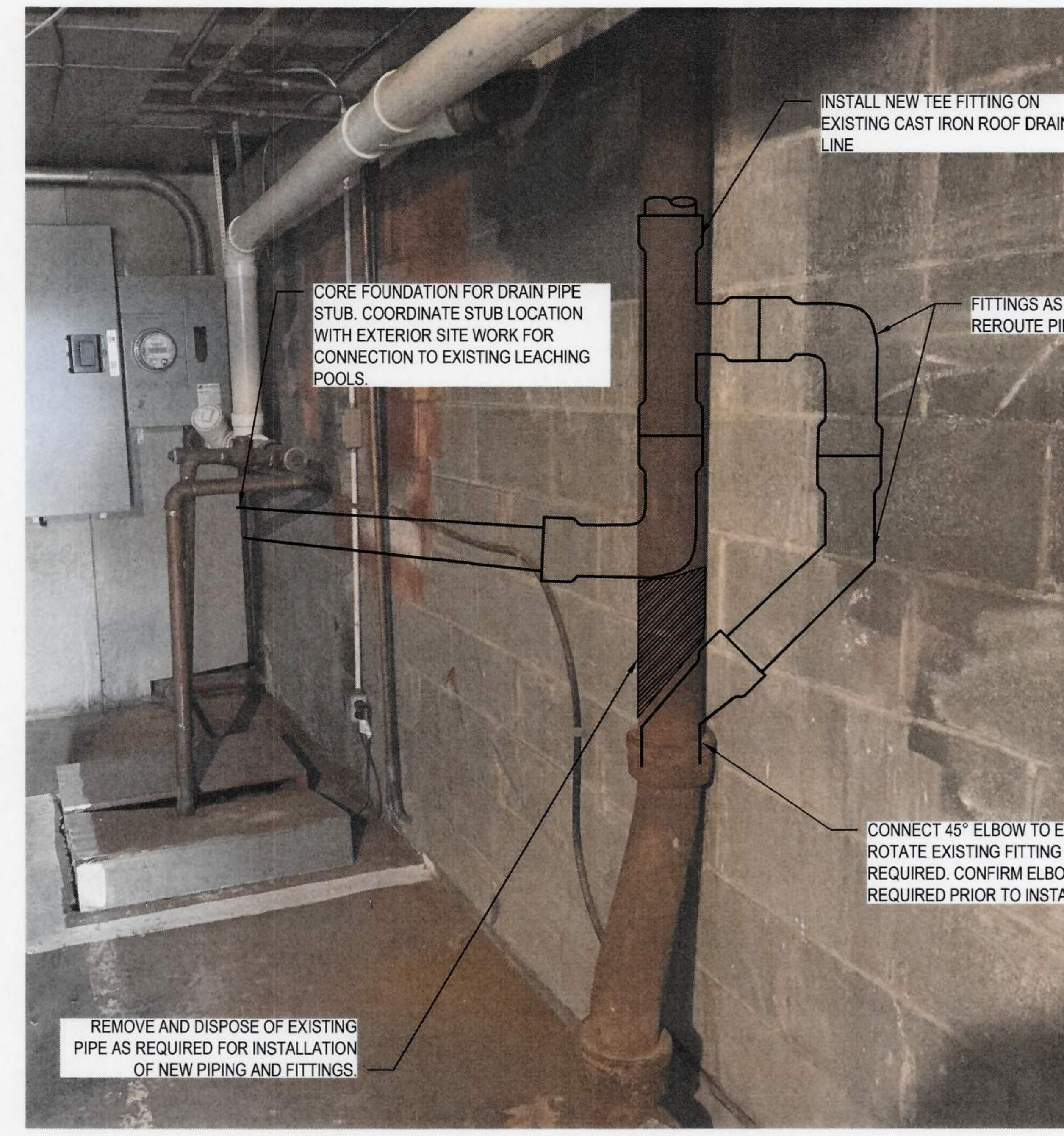
SHEET TITLE
LOW PRESSURE SEWER SANITARY PROFILE

DRAWING No.
CS 120



Roof Drain Connection Plan

SCALE: 1"= 30'



(1) Typical Roof Drain Piping Configuration Schematic

SCALE: NTS

NOTES:

1. THE ABOVE DETAIL REPRESENT ONE POSSIBLE CONFIGURATION FOR REROUTING ROOF DRAIN TO RE-PURPOSED LEACHING POOLS. CONTRACTOR SHALL COORDINATE WITH OWNER FOR ACCESS TO MECHANICAL ROOMS PRIOR TO BID.
2. SEAL ALL FOUNDATION PENETRATIONS WITH POLY URETHANE SEALANT APPROVED FOR USE BELOW GRADE. SEALS SHALL BE WATERTIGHT.
3. ALL NEW PIPE AND FITTINGS SHALL BE C.I. INSIDE MECHANICAL ROOM. TRANSITION TO SDR 35 3' OUTSIDE FACE OF FOUNDATION. SUPPORT PIPE AND FITTINGS AS REQUIRED WITH STAINLESS STEEL STRAPPING.

CESSPOOL REPURPOSING CALCULATIONS:

SANITARY SYSTEM #1 - BUILDINGS #2 THRU #7
PER BUILDING: 4 UNITS AT 601 - 1200 SQ. FT.
2 UNITS AT > 1200 SQ. FT.
DENSITY LOAD:
HOUSING UNIT > 1,200 SQ. FT 300 GPD/UNIT
601 - 1200 SQ. FT. HOUSING UNIT 225 GPD/UNIT
SANITARY FLOW (4 UNITS) x 225 GPD/UNIT + (2 UNITS) x 300 GPD/UNIT = 1,500 GPD
LEACHING POOL VOLUME: 1,500 GPD / 1.5 GPD/SF = 1,000 SF
10 FT Ø POOLS x pi x 1 VERTICAL FOOT = 31.4 SF/VERTICAL FOOT
1,000 SF / 31.4 SF/VERTICAL FOOT = 31.847 VERTICAL FEET OF LEACHING POOLS
pi x RADIUS^2 x VERTICAL FEET = 2,501 CF
2,501CF x 7.48 GALLONS/CF = **18,707 GALLONS OF CAPACITY**
STORMWATER STORAGE:
ASSUME 2-INCH STORM EVENT AND 0.3 COEFFICIENT FOR UNPAVED TRIBUTARY AREAS PER VILLAGE CODE.
ASSUME ROOF FOOTPRINT OF BUILDING AREA SERVICED.
ROOF AREA:
BUILDING #2 THRU #7 = (73 FT x 33 FT) + (49 FT x 18 FT) = 3,291 SF
3,291 SF x 2-INCH RAIN EVENT = 548.5 CF
548.5 CF x 7.48 GALLONS/CF = **4,103 GALLONS OF STORMWATER**

RE-PURPOSING OF EXISTING SANITARY LEACHING POOLS IN SYSTEM #1 CAN ACCOMMODATE STORMWATER CONNECTION. 18,505 GALLONS OF CAPACITY > 4,103 GALLONS OF STORMWATER

CESSPOOL REPURPOSING CALCULATIONS:

SANITARY SYSTEM #2 - BUILDING #1
PER BUILDING: 7 UNITS AT 601 - 1200 SQ. FT.
1 UNITS AT > 1200 SQ. FT.
DENSITY LOAD:
HOUSING UNIT > 1,200 SQ. FT 300 GPD/UNIT
601 - 1200 SQ. FT. HOUSING UNIT 225 GPD/UNIT
SANITARY FLOW (7 UNITS) x 225 GPD/UNIT + (1 UNITS) x 300 GPD/UNIT = 1,875 GPD
LEACHING POOL VOLUME: 1,875 GPD / 1.5 GPD/SF = 1,250 SF
10 FT Ø POOLS x pi x 1 VERTICAL FOOT = 31.4 SF/VERTICAL FOOT
1,250 SF / 31.4 SF/VERTICAL FOOT = 39.809 VERTICAL FEET OF LEACHING POOLS
pi x RADIUS^2 x VERTICAL FEET = 3,127 CF
3,127 CF x 7.48 GALLONS/CF = **23,390 GALLONS OF CAPACITY**
STORMWATER STORAGE:
ASSUME 2-INCH STORM EVENT AND 0.3 COEFFICIENT FOR UNPAVED TRIBUTARY AREAS PER VILLAGE CODE.
ASSUME ROOF FOOTPRINT OF BUILDING AREA SERVICED.
ROOF AREA:
BUILDING #1 = 101 FT x 42 FT = 4,242 SF
4,242 SF x 2-INCH RAIN EVENT = 707 CF
707 CF x 7.48 GALLONS/CF = **5,288 GALLONS OF STORMWATER**

RE-PURPOSING OF EXISTING SANITARY LEACHING POOLS IN SYSTEM #2 CAN ACCOMMODATE STORMWATER CONNECTION. 23,390 GALLONS OF CAPACITY > 5,288 GALLONS OF STORMWATER

CESSPOOL REPURPOSING CALCULATIONS:

SANITARY SYSTEM #3 - BUILDING #8
PER BUILDING: 6 UNITS AT 601 - 1200 SQ. FT.
DENSITY LOAD:
601 - 1200 SQ. FT. HOUSING UNIT 225 GPD/UNIT
SANITARY FLOW (6 UNITS) x 225 GPD/UNIT = 1,350 GPD
LEACHING POOL VOLUME: 1,350 GPD / 1.5 GPD/SF = 900 SF
10 FT Ø POOLS x pi x 1 VERTICAL FOOT = 31.4 SF/VERTICAL FOOT
900 SF / 31.4 SF/VERTICAL FOOT = 28.662 VERTICAL FEET OF LEACHING POOLS
pi x RADIUS^2 x VERTICAL FEET = 2,251 CF
2,251 CF x 7.48 GALLONS/CF = **16,837 GALLONS OF CAPACITY**
STORMWATER STORAGE:
ASSUME 2-INCH STORM EVENT AND 0.3 COEFFICIENT FOR UNPAVED TRIBUTARY AREAS PER VILLAGE CODE.
ASSUME ROOF FOOTPRINT OF BUILDING AREA SERVICED.
ROOF AREA:
BUILDING #1 = 5,888 SF
5,888 SF x 2-INCH RAIN EVENT = 981 CF
981 CF x 7.48 GALLONS/CF = **7,338 GALLONS OF STORMWATER**

RE-PURPOSING OF EXISTING SANITARY LEACHING POOLS IN SYSTEM #3 CAN ACCOMMODATE STORMWATER CONNECTION. 16,837 GALLONS OF CAPACITY > 7,338 GALLONS OF STORMWATER

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GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

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CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK · NICHOLAS F. BONO · 088951 · LICENSED PROFESSIONAL ENGINEER

"ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL"

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
SJD/AV	SJD	JMV	NFB
PROJECT No.: WHHH 2101	DATE: JUNE 2023	SCALE: AS SHOWN	

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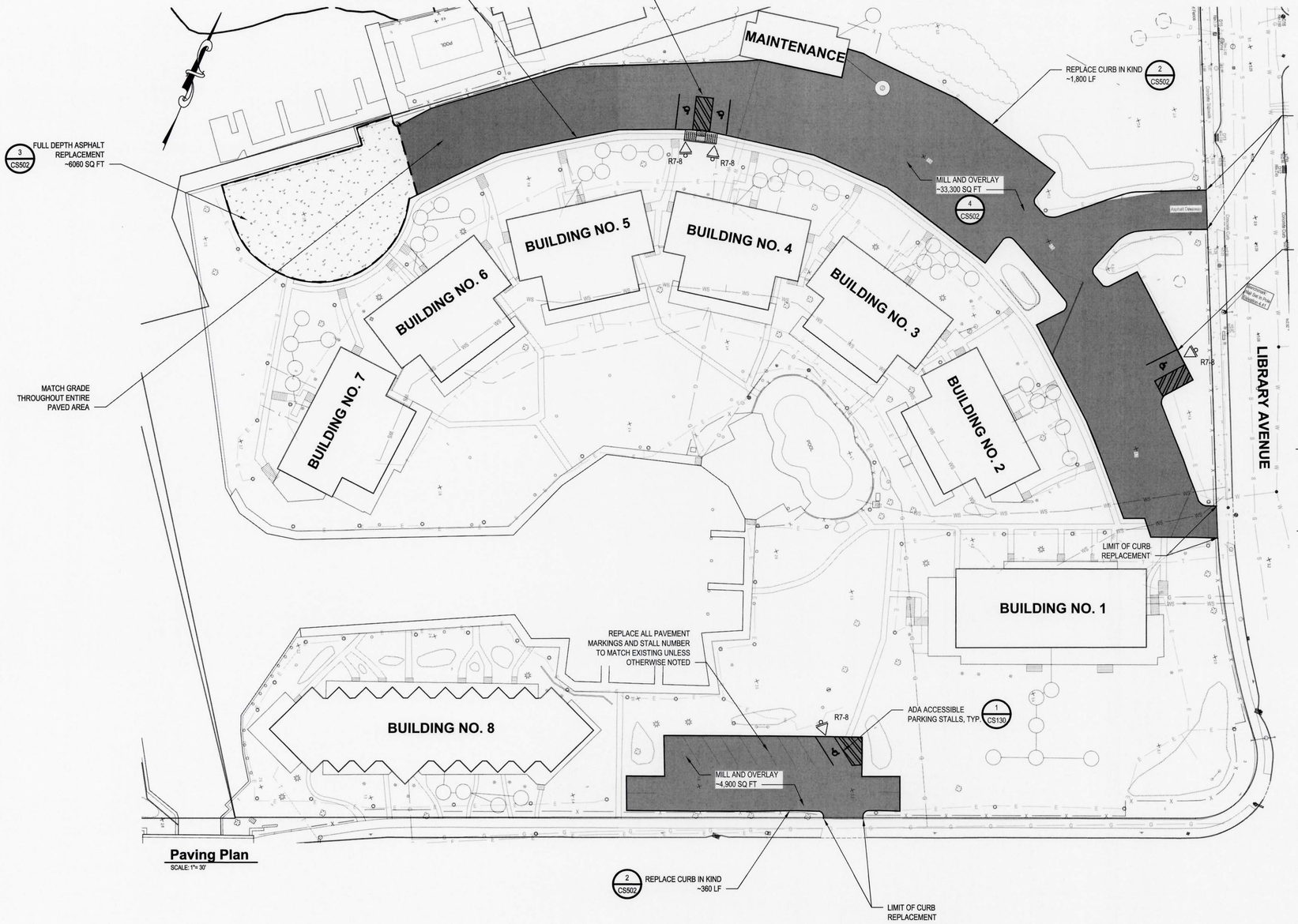
FINAL BID DOCUMENT

SHEET TITLE
ROOF DRAINAGE PLAN

DRAWING No.
CS 130



Paving Plan
SCALE: 1"= 30'

FULL DEPTH RESTORATION AREA

MILL AND OVERLAY AREA

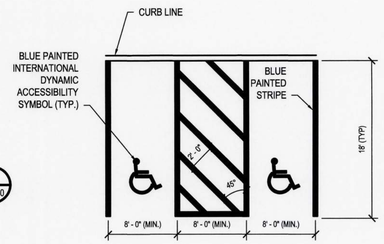
NEW SIGN R7-1

GENERAL PAVEMENT NOTES:

1. RESTORE ANY CONCRETE AND/OR PAVER WALKWAYS AND STAIRWAYS IMPACTED BY WORK IN-KIND.

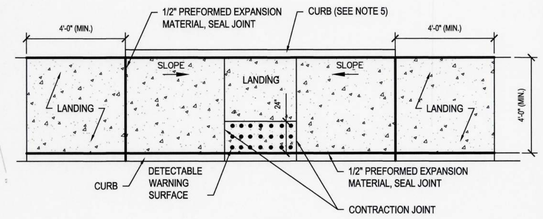
SIGN LEGEND

DESCRIPTION	SYMBOL
R7-8 (12x18)	RESERVED PARKING

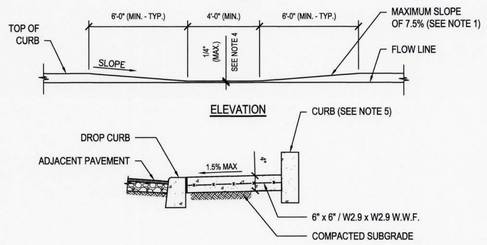


NOTES:
1. ALL STRIPING TO BE 4" WIDE.

1 ADA Accesible Stall Layout
SCALE: NTS (321799.00 H2MX1) - U



PLAN



ELEVATION

SECTION

NOTES:
1. DIMENSIONS SHOWN ARE APPLICABLE FOR INSTALLATION WITH 6" CURB REVEAL. DIMENSIONS OF FLARE AND RAMP LENGTH FOR INSTALLATION WITH ALTERNATE CURB REVEALS MAY BE MODIFIED TO MAINTAIN A RAMP SLOPE NOT TO EXCEED 7.5%.
2. THE SIZE OF THE DETECTABLE WARNING FIELD SHALL BE 24" IN THE DIRECTION OF TRAVEL AND SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP EXCLUSIVE OF SIDE FLARES.
3. MAXIMUM SLOPE OF LANDING IS 1.5% IN ANY DIRECTION.
4. RAMP TRANSITIONS BETWEEN WALKS, GUTTERS, OR STREETS SHALL BE FLUSH AND FREE OF ABRUPT VERTICAL CHANGES (1/4" MAX)
5. OMIT CURB FOR INSTALLATIONS ADJACENT TO BUILDING FOUNDATIONS.
6. CONCRETE 4,000 P.S.I. MINIMUM STRENGTH AT 28 DAYS.
7. COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D1557 AND/OR COMPACT SUBGRADE TO 95% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D698.
8. APPLY BRUSH FINISH PERPENDICULAR TO DIRECTION OF SLOPE.
9. REFER TO CONCRETE SIDEWALK DETAIL FOR INFORMATION REGARDING CONTRACTION AND EXPANSION JOINTS.

2 Concrete Handicap Ramp - Mid Block - Parallel
SCALE: NTS (321313.36 H2MX3) - U

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GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
SJD/AV	SJD	JMV	NFB

PROJECT No.:	DATE:	SCALE:
WHHH 2101	JUNE 2023	AS SHOWN

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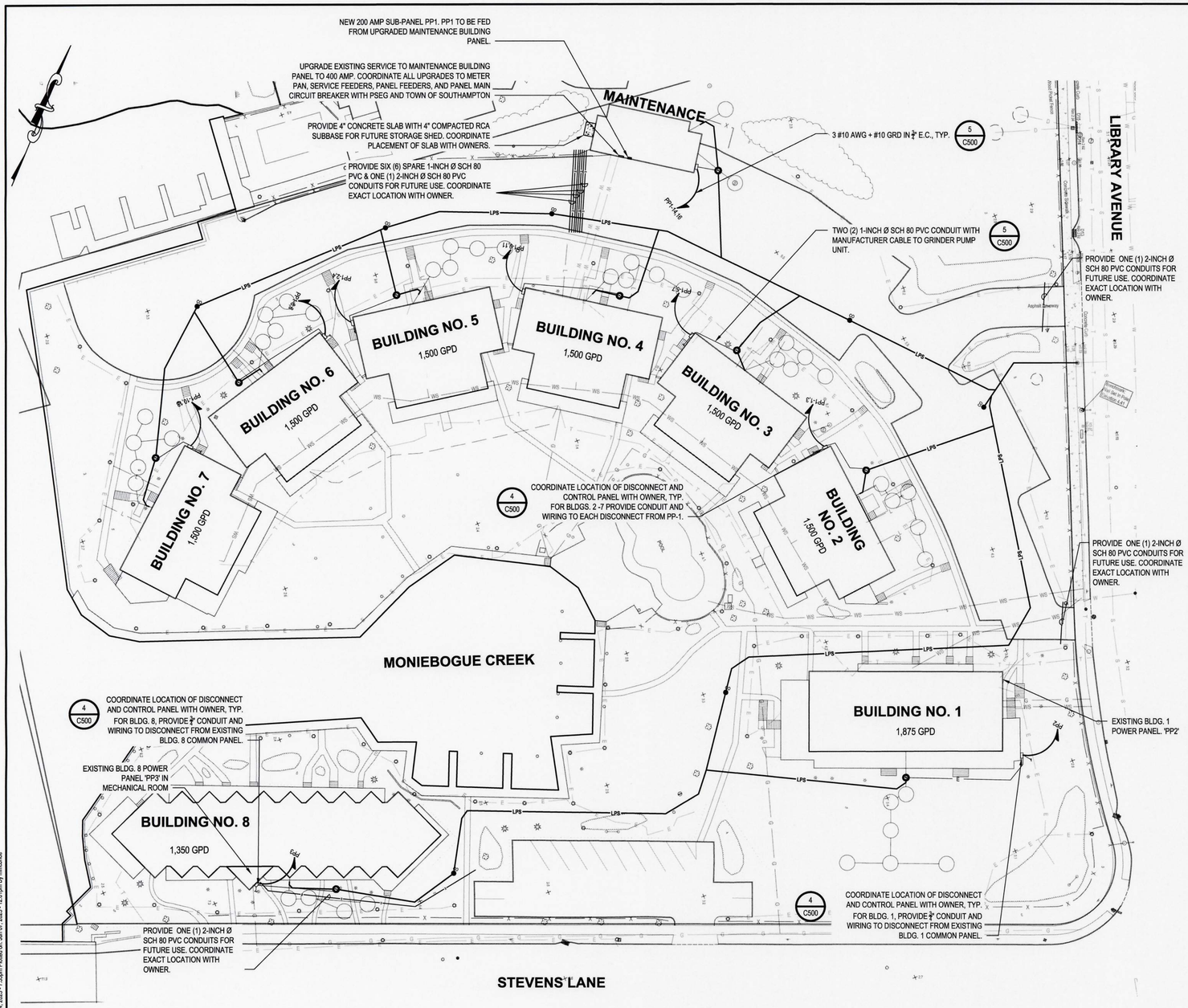
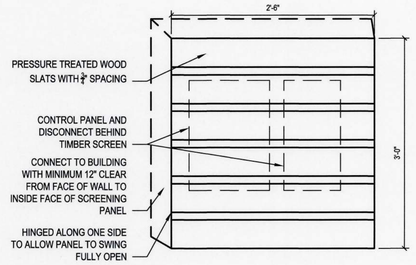
SHEET TITLE
SITE PAVING PLAN

DRAWING No.
CS 140



Proposed Electrical Site Plan

SCALE: 1"= 30'



1 Timber Control Panel Screening

SCALE: N.T.S.

NOTES:

1. COORDINATE FINISH/PAINT OF WOOD TO MATCH EXISTING SIDING.
2. ALL HARDWARE SHALL BE STAINLESS STEEL
3. PROVIDE LATCH TO SECURE SCREENING WHEN CLOSED

GRAPHIC SCALE

30 0 15 30

(IN FEET)

1 inch = 30 ft.

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ELECTRICAL SITE PLAN NOTES:

1. COORDINATE INSTALLATION WITH PSEGLI. PROVIDE ALL EQUIPMENT AND ACCESSORIES AS REQUIRED TO INSTALL. UTILITY AND ALL ASSOCIATED SERVICE RISERS AND EQUIPMENT.
2. COORDINATE APPROVAL, INSTALLATION, AND UL INSPECTION OF PROPOSED PANEL "PP1" AND NEW 400 AMP SERVICE UPGRADE WITH PSEGLI.
3. COORDINATE PROPOSED CONDUIT ROUTING WITH OWNER'S CONSTRUCTION REPRESENTATIVE. RESTORE ALL SURFACES IN-KIND.
4. ROUTE ALL CONDUIT IN ACCORDANCE WITH NEC STANDARDS. INSTALL PULL POXES WHENEVER ALLOWABLE CONDUIT BENDS ARE EXCEEDED.
5. ALL ELECTRICAL WORK SHALL BE COMPLETED BY AN ELECTRICIAN LICENSED IN TOWN OF SOUTHAMPTON.
6. COMPLETE AND COORDINATE ALL APPLICATION DOCUMENTS AND SUBMIT TO PSEGLI FOR APPROVAL OF PROPOSED 400 AMP SERVICE.
7. PRIOR TO BID ARRANGE FOR SITE VISIT TO REVIEW EXISTING CONDITIONS AND INSPECT EXISTING ELECTRICAL PANELS.
8. PRIOR TO START OF ANY ELECTRICAL WORK APPLY FOR TOWN OF SOUTHAMPTON ELECTRICAL PERMIT AND COORDINATE INSPECTIONS WITH TOWN AS REQUIRED. ALL COSTS ASSOCIATED WITH PERMIT AND INSPECTIONS SHALL BE INCLUDED IN BID.

Panel Wiring Schedule (3-Phase)

Panelboard: PP1 (SUBPANEL) | Voltage: 120/208V | Phase: 3 | Wire: 4 | AIC Rating: 22,000
Manufacturer: SQUARE D | Mains: MLO | Mains Rating: 200A
Panel Type: NQ | Mounting: SURFACE (H-FRAME) | Options: - | Note:
NEMA Type Enclosure: 3R

LOAD DESCRIPTION	BREAKER OPTION	TRIP AMPS AND POLES	CONNECTED LOAD VOLT AMPERES ØA	ØB	ØC	CIRC. No.	A	B	C	CIRC. No.	CONNECTED LOAD VOLT AMPERES ØA	ØB	ØC	TRIP AMPS AND POLES	BREAKER OPTION	LOAD DESCRIPTION
BUILDING 2 GPU		30A/2P	1920			1				2	1920			30A/2P		BUILDING 5 GPU
				1920		3				4		1920				
BUILDING 3 GPU		30A/2P			1920	5				6			1920	30A/2P		BUILDING 6 GPU
			1920			7				8	1920					
BUILDING 4 GPU		30A/2P		1920		9				10		1920		30A/2P		BUILDING 7 GPU
					1920	11				12			1920			
SPACE			-			13				14	1920			30A/2P		MAINTENANCE BUILDING GPU
SPACE				-		15				16		1920				
SPACE					-	17				18			-			SPACE

Connected Totals: ØA 9.6 KVA; ØB 9.6 KVA; ØC 7.68 KVA; Total 26.88 KVA; 112 Amperes

(All Phases to be balanced to within 7% using Actual Load Totals.)

Breaker Options:
AFCI - Arc Fault Circuit Interrupter
AS - Powerlink AS Breaker
AUX - Auxiliary Contacts
GFCI - Ground Fault Circuit Interrupter
HACR - Heating, A/C & Refrigeration
LO - Handle lock-off device
PA - Handle Padlock Attachment
SF - Subfeed
ST - Shunt Trip Type
TC - Time Clock Control

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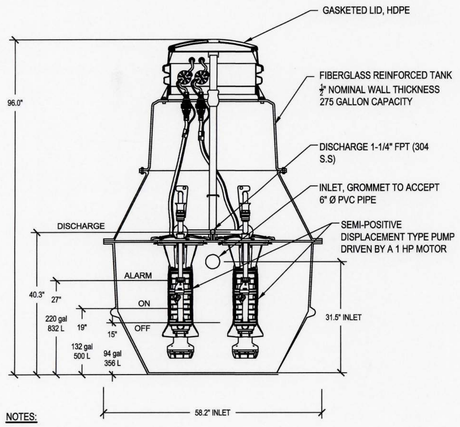
SHEET TITLE
ELECTRICAL SITE PLAN

DRAWING No.
ES 100



NOTES:

1. 61" INVERT DEPTH
2. 50" COVER OVER DISCHARGE

EONE D272 DUPLEX GPU BUOYANCY FORCE CALCULATIONS:

BUOYANCY FORCE

BUOYANCY FORCE:	(DENSITY OF WATER) X (GPU VOLUME)
DENSITY OF WATER:	62.4 LB/CU FT.
GPU VOLUME:	78 CU.FT.
BUOYANCY FORCE:	4,867.2 LB

BUOYANCY FORCE - NET:	BUOYANCY FORCE - WEIGHT OF GPU
WEIGHT OF GPU:	705 LB
BUOYANCY FORCE - NET:	4,162.2 LB

BALLAST FORCE

AREA OF SOIL ACTING ON GPU: (HEIGHT) X (WIDTH) + (TRAPEZOIDAL AREA) + (TOP AREA)	
HEIGHT:	41.5 IN.
WIDTH:	3.74 IN.
TRAPEZOIDAL AREA:	287.8 SQ. IN.
TOP AREA:	233.2 SQ. IN.
AREA OF SOIL:	676.2 SQ. IN.
VOLUME OF SOIL: (AREA OF SOIL) X (AVG PERIMETER)	
AVG PERIMETER:	138.9 SQ. IN.
VOLUME OF SOIL:	54.3 CU. FT.

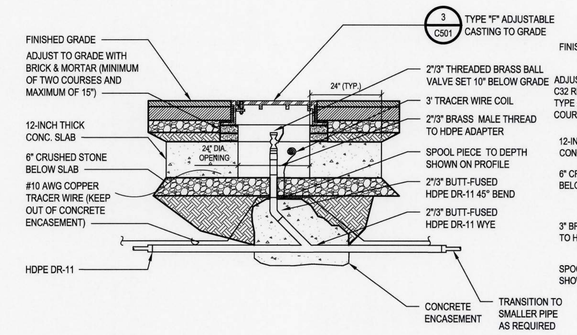
BALLAST SOIL: (VOLUME OF SOIL) X (DENSITY OF SATURATED SOIL)	
DENSITY OF SATURATED SOIL:	70 LB/CU.FT.
BALLAST SOIL:	3,801 LB

FINAL BUOYANCY FORCE: (BALLAST FORCE) - (BUOYANCY FORCE - NET)
FINAL BUOYANCY FORCE: -361.2 LB *STRUCTURE WILL FLOAT

CONCRETE BALLAST REQUIREMENT
GOAL FOR FS: 1.25
FS = 1.25= (3,801 LBS + 705 LBS + WEIGHT OF CONCRETE)/4867.2LB
WEIGHT OF CONCRETE: (1,578 LBS) / (87.6 LB/CU.F.T) = 18 CU.F.T = 0.67 CU.YD.

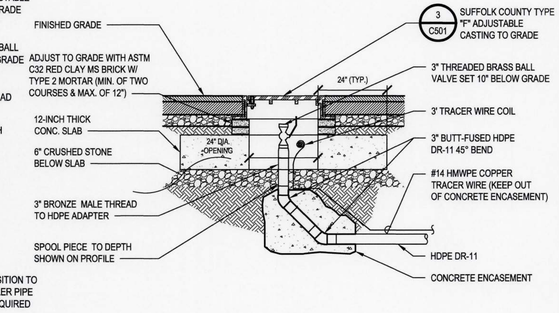
E/One Model DH272 Duplex Grinder Pump Station Section

1 SCALE: No Scale



2-3 Inch Ø Inline Flushing Cleanout Schematic for Low Pressure Sewer

2 SCALE: NTS



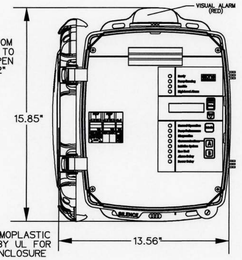
Terminal Flushing Cleanout for Low Pressure Sewer

3 SCALE: NTS

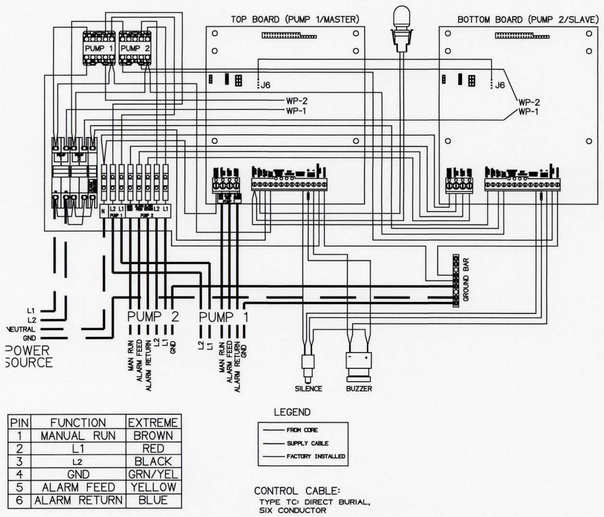
SENTRY PROTECT PLUS DUPLEX

EXTERNAL VISUAL & AUDIBLE ALARM
REMOTE SENTRY DRY CONTACTS FOR
OPTIONAL POWER LOSS HIGH LEVEL ALARM (POWER LOSS ALARM FOR WIRELESS)
MANUAL ALARM SILENCE
MANUAL RUN
STATUS LED'S: NORMAL, PUMP RUNNING, HIGH LEVEL
TROUBLE INDICATIONS: RUN DRY, OVERPRESSURE, BROWNOUT, VOLTAGE, EXTENDED RUN TIME
DRY CONTACTS
CONFORMAL COATED CIRCUIT BOARD (BOTH SIDES)
PADLOCK
DEAD FRONT
PREDICTIVE ALARMS
REAL TIME PUMP PERFORMANCE
ADJUSTABLE ALARM DELAY
ADJUSTABLE RUN TIME DELAY
HOUR/CYCLE COUNTER
NEMA 4X ENCLOSURE ASSEMBLY

DIMENSION FROM BACK PANEL TO FRONT OF OPEN DOOR = 18.02"



ENCLOSURE:
CORROSION PROOF THERMOPLASTIC POLYESTER APPROVED BY UL FOR ELECTRICAL CONTROL ENCLOSURE



PIN	FUNCTION	EXTREME
1	MANUAL RUN	BROWN
2	L1	RED
3	L2	BLACK
4	GND	GRN/YEL
5	ALARM FEED	YELLOW
6	ALARM RETURN	BLUE

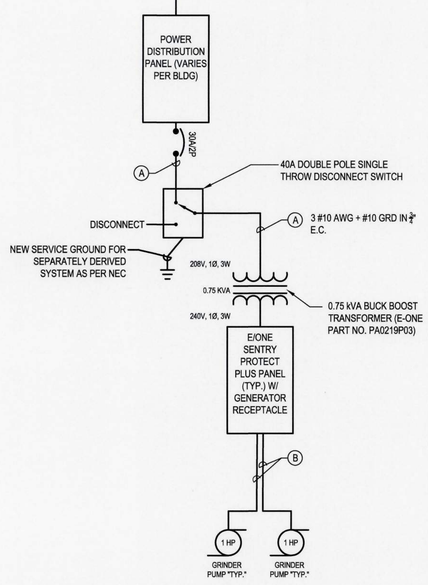
LEGEND
FROM CORE
SUPPLY CABLE
FACTORY INSTALLED

CONTROL CABLE:
TYPE TC- DIRECT BURIAL, SIX CONDUCTOR

E/One Sentry Protect Plus Panel Duplex 240V, 60 Hz Double Pole

4 SCALE: No Scale

NOTE:
1. PROVIDE GENERATOR RECEPTACLE OPTION (NEMA L14-20P) FOR ALL CONTROL PANELS

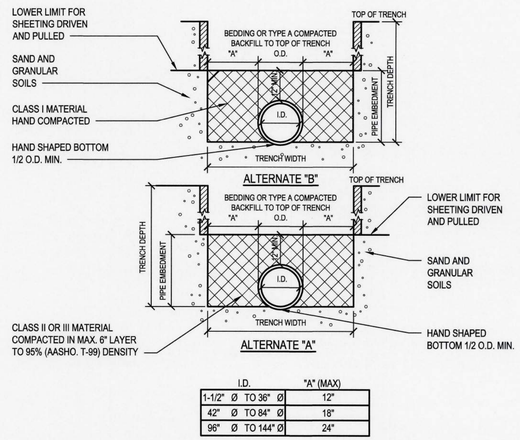


FEEDER SCHEDULE	
FEEDER	CONDUTOR AND CONDUITS FEEDER SCHEDULE
A	3 #10 AWG + #10 GRND IN ¾" CONDUIT
B	MANUFACTURER CABLE IN 1" SCH 80 PVC CONDUIT

* A & B LENGTHS TO BE CONFIRMED IN FIELD BY CONTRACTOR

Typical Single Line Diagram

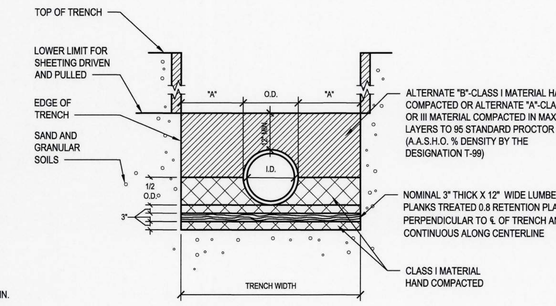
5 SCALE: NO SCALE



I.D.	"A" (MAX)
1-1/2" Ø TO 36" Ø	12"
42" Ø TO 84" Ø	18"
96" Ø TO 144" Ø	24"

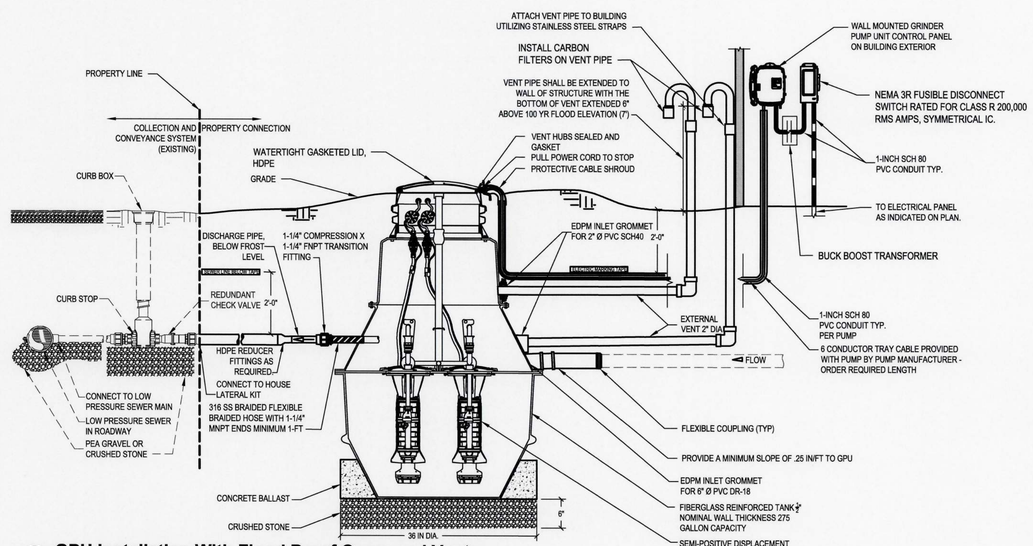
Sewer Foundation in Granular Soils All Trench Depths

6 SCALE: NTS



Sewer Foundation in Organic Soils

7 SCALE: NTS



GPU Installation With Flood Proof Cover and Vents

8 SCALE: NTS

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CONSULTANTS:

MARK	DATE	DESCRIPTION

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
SJD/AV	SJD	JMV	NFB
PROJECT No.:	DATE:	SCALE:	
WHHH 2101	JUNE 2023	AS SHOWN	

CLIENT
Westhampton Beach Harbour House HOA

Westhampton Beach Harbour House Sanitary System Plan

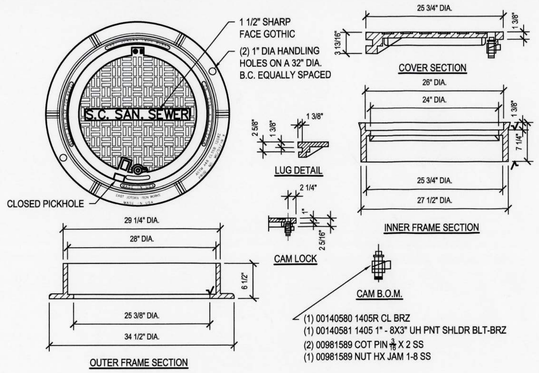
35 Library Avenue Westhampton Beach, NY 11978

CONTRACT
CONTRACT S SEWERS

STATUS
FINAL BID DOCUMENT

SHEET TITLE
DETAILS 1 OF 3

DRAWING No.
C500

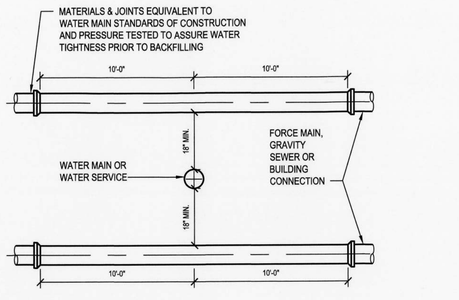


NOTES:

1. MATERIALS: GRAY CAST IRON IN ACCORDANCE WITH ASTM A-48 CLASS 35B
2. DESIGN LOAD: HEAVY DUTY. CONFORMING TO AASHTO M306
3. COATING MILL FINISH (√ : DENOTES MACHINED SURFACE)
4. COUNTRY OF ORIGIN: USA
5. PROVIDE INFILTRATION AND INFLOW REDUCING MANHOLE COVER INSERTS

1 Suffolk County Type "F" Adjustable Manhole Castings

SCALE: NTS

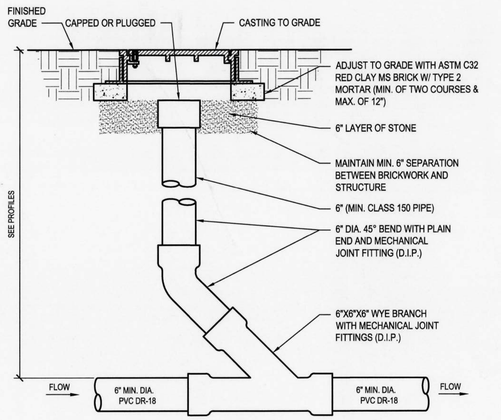


NOTES:

1. HORIZONTAL SEPARATION BETWEEN SANITARY FORCEMAIN, GRAVITY SEWER, OR BUILDING CONNECTION AND WATER LINES SHALL BE 10 FOOT MINIMUM

2 Water Crossing Detail

SCALE: NTS

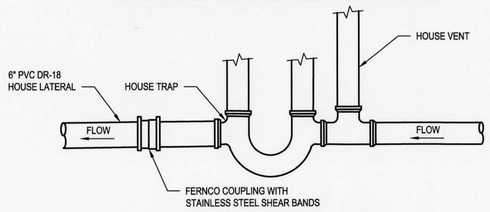


3 Gravity House Connection Paved Area Cleanout Detail

SCALE: NTS

NOTE:

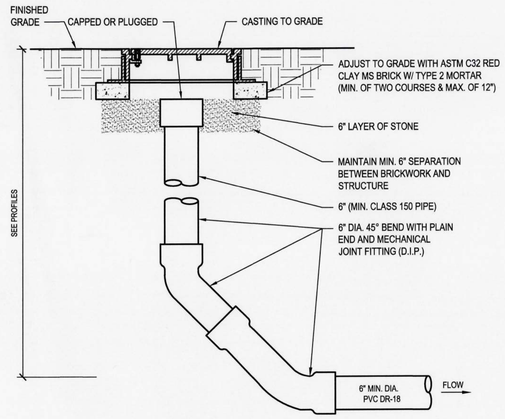
1. PROVIDE CLEANOUT WHENEVER BENDS EXCEED A COMBINED 90-DEGREES. MAXIMUM BEND ALLOWED FOR SINGLE FITTING ON GRAVITY HOUSE CONNECTION IS 45-DEGREES.



COUPLING PART NO.	I.D.	MATERIAL
1051-44	4"Ø TO 4"Ø	AC TO PVC DI TO PVC
1051-54	5"Ø TO 4"Ø	AC TO PVC DI TO PVC
1051-64	6"Ø TO 4"Ø	AC TO PVC DI TO PVC
1056-44	4"Ø TO 4"Ø	PVC TO PVC CI TO PVC
1056-54	5"Ø TO 4"Ø	PVC TO PVC CI TO PVC
1056-64	6"Ø TO 4"Ø	PVC TO PVC CI TO PVC

5 Gravity House Connection Transition Detail

SCALE: NTS

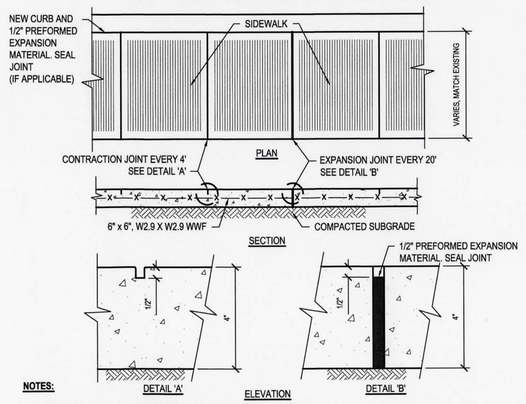


4 Gravity House Connection Paved Area Terminal Cleanout Detail

SCALE: NTS

NOTE:

1. PROVIDE CLEANOUT WHENEVER BENDS EXCEED A COMBINED 90-DEGREES. MAXIMUM BEND ALLOWED FOR SINGLE FITTING ON GRAVITY HOUSE CONNECTION IS 45-DEGREES.



NOTES:

1. CONCRETE 4000 PSI MINIMUM STRENGTH AT 28 DAYS
2. COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D1557 AND/OR COMPACT SUBGRADE TO 95% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D698.
3. APPLY BROOM FINISH PERPENDICULAR TO DIRECTION OF TRAVEL.
4. WHERE A CHANGE IN SIDEWALK WIDTH OCCURS, PLACE A CONSTRUCTION JOINT PERPENDICULAR TO THE ROADWAY.

6 Concrete Sidewalk

NTS

H2M architects + engineers
538 Broad Hollow Road, 4th Floor East
Melville, NY 11747
631.756.8000 • www.h2m.com

CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK NICHOLAS F. BOSCO 088951 LICENSED PROFESSIONAL ENGINEER

"ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL"

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
SJD/AV	SJD	JMV	NFB

PROJECT No.:	DATE:	SCALE:
WHHH 2101	JUNE 2023	AS SHOWN

CLIENT
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Westhampton Beach Harbour House Sanitary System Plan

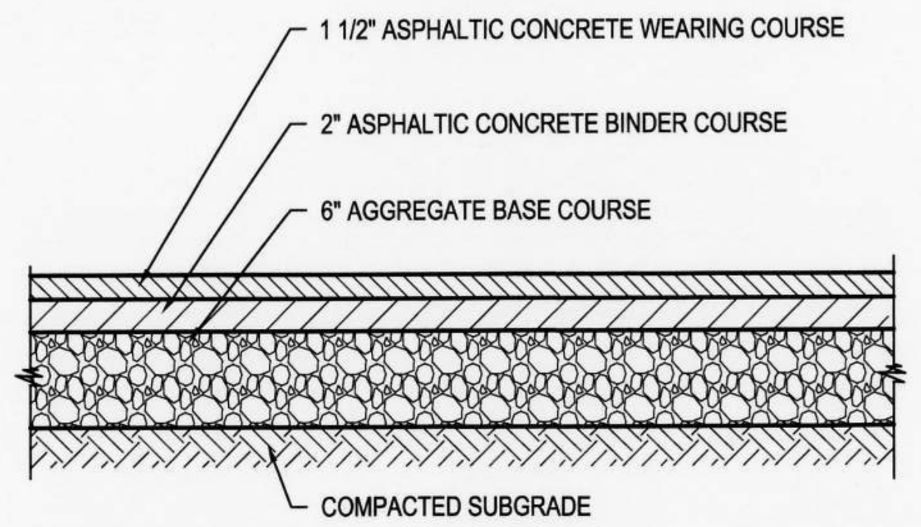
35 Library Avenue Westhampton Beach, NY 11978

CONTRACT
CONTRACT S SEWERS

STATUS
FINAL BID DOCUMENT

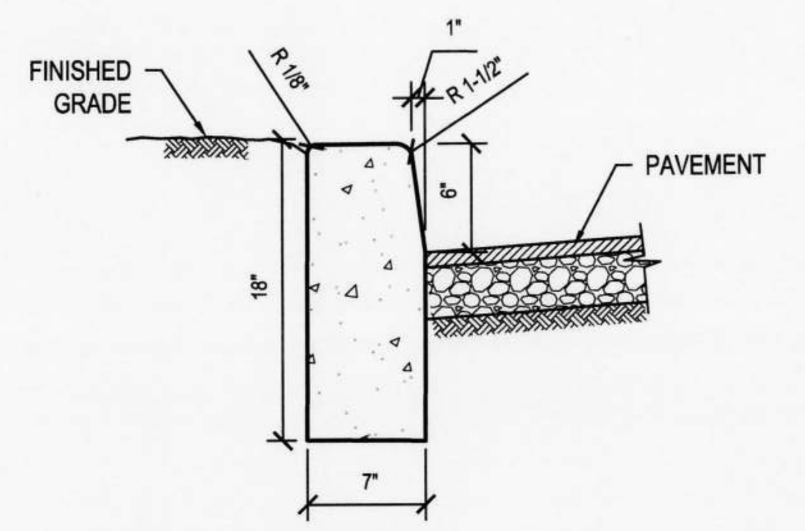
SHEET TITLE
DETAILS 2 OF 3

DRAWING No.
C501



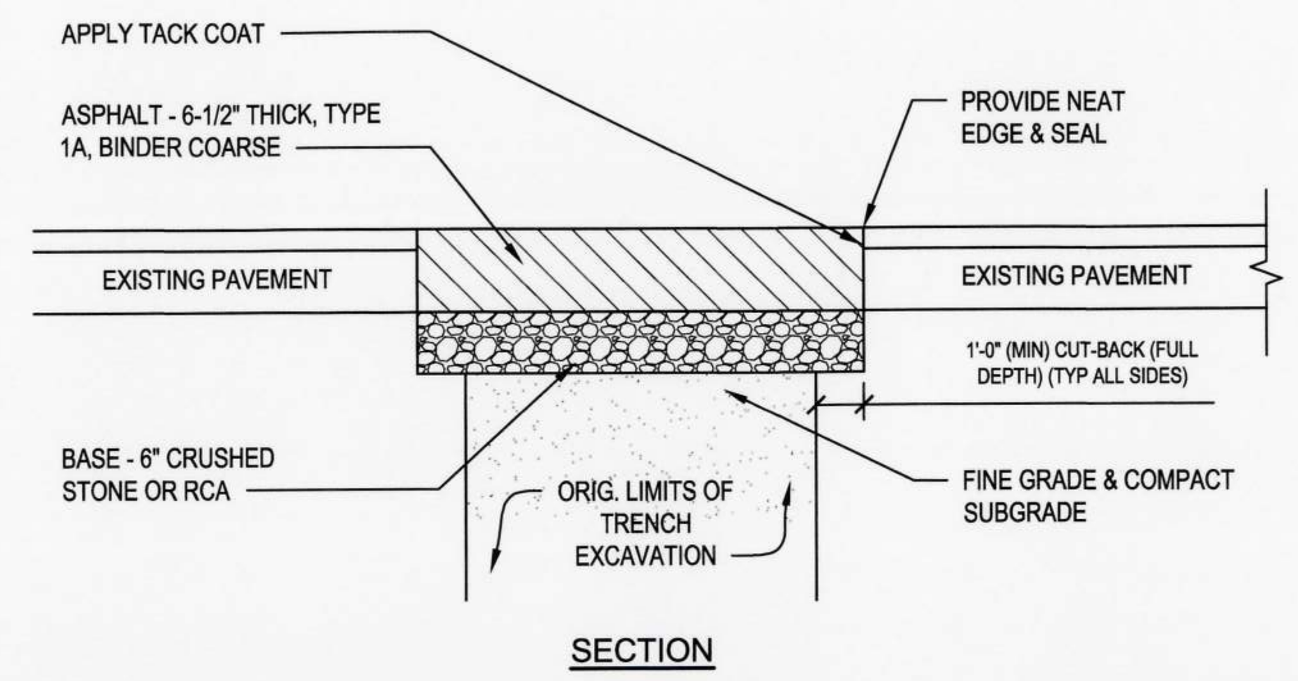
NOTE:
COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D1557 AND/OR COMPACT SUBGRADE TO 95% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D698

(1) **Asphalt Pavement - Parking Lot**
SCALE: NTS



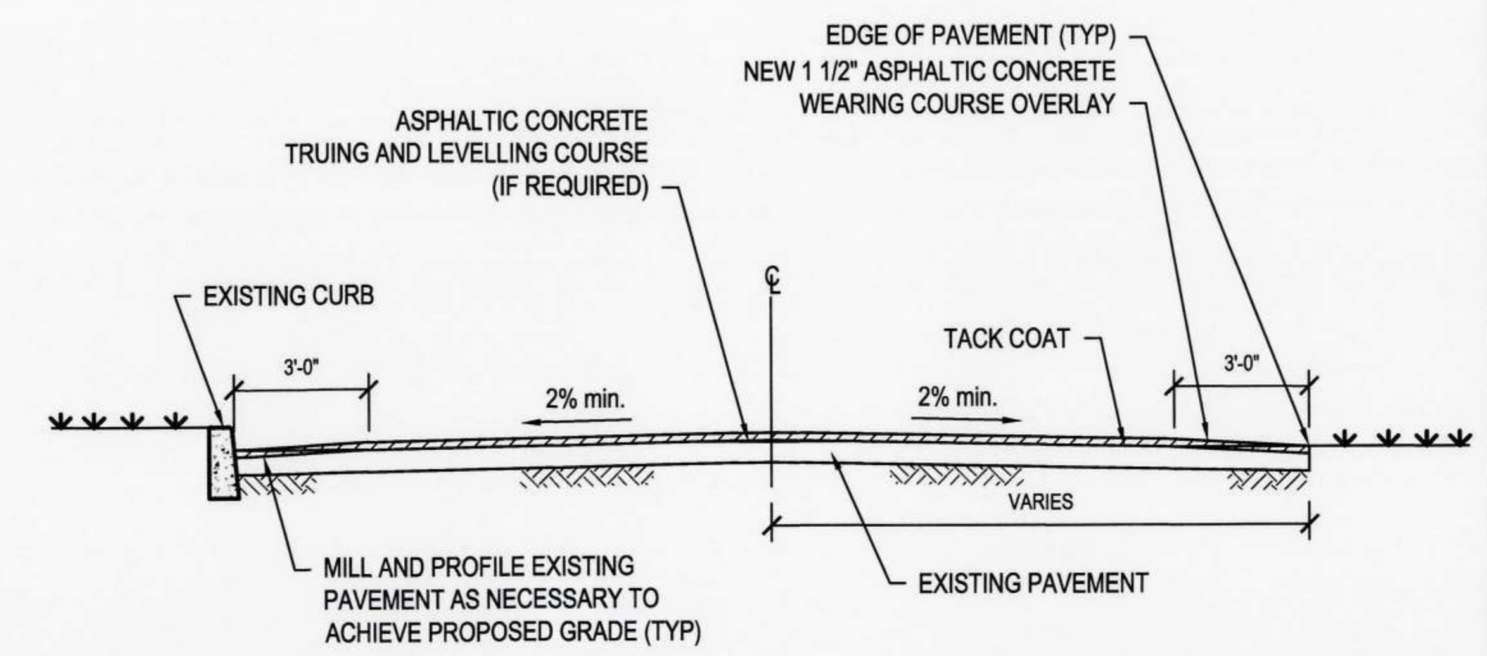
NOTES:
1. WOOD FLOAT AND BRUSH FINISH ON ALL SURFACES ABOVE GRADE.
2. AT ALL CURB ENDINGS, PROVIDE SMOOTH TRANSITION DOWN TO PAVED SURFACE.
3. PROVIDE 1/2" PREFORMED EXPANSION MATERIAL AT 20' ON CENTER AND AT ALL CORNERS. SET EXPANSION MATERIAL 1/2" BELOW EXPOSED SURFACES AND SEAL JOINT.
4. CONCRETE SHALL ACHIEVE 4000 PSI MINIMUM STRENGTH AT 28 DAYS.

(2) **Concrete Curb - Type A**
SCALE: NTS

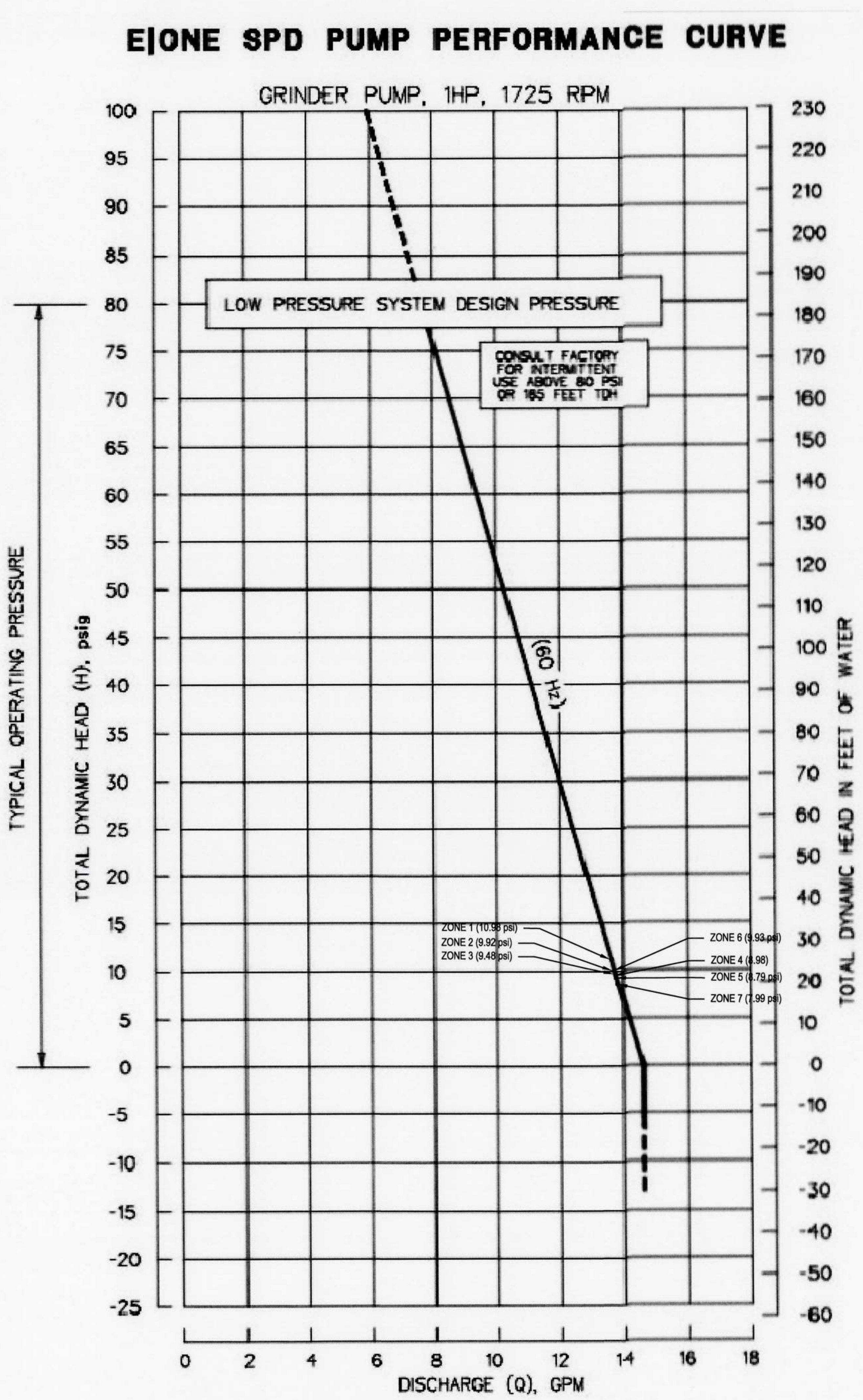


* SCOPE OF RESTORATION TO BE INCLUDED AS ALTERNATE BID ITEM *

(3) **Asphalt Pavement - Trench Restoration**
SCALE: NTS



(4) **Asphalt Pavement - Milling and Overlay**
SCALE: NTS



(5) **E-ONE PUMP PERFORMANCE CURVE**
SCALE: NTS

H 2 M architects + engineers

538 Broad Hollow Road, 4th Floor East
Melville, NY 11747
631.756.8000 • www.h2m.com

CONSULTANTS:

MARK	DATE	DESCRIPTION

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
SJD/AV	SJD	JMV	NFB

PROJECT No.:	DATE:	SCALE:
WHHH 2101	JUNE 2023	AS SHOWN

CLIENT
Westhampton Beach Harbour House HOA

Westhampton Beach Harbour House Sanitary System Plan

35 Library Avenue
Westhampton Beach, NY 11978

CONTRACT
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STATUS
FINAL BID DOCUMENT

SHEET TITLE
DETAILS 3 OF 3

DRAWING No.
C502

H 2 M architects + engineers

CONTRACT

Harbour House HOA
WESTHAMPTON BEACH, NEW YORK

Westhampton Beach Harbour House Co-Op Low-Pressure Sewer Connection and On-Site Sanitary Disposal System Abandonment

H2M Project No.: WHHH 2101

JUNE 2023

Prepared for:

Harbour House HOA
35 Library Avenue
Westhampton Beach, NY 11978

Prepared by:

H2M architects + engineers
538 Broad Hollow Road, 4th Floor East
Melville, NY 11747
tel 631.756.8000 fax 631.694.4122

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DETAILED TECHNICAL SPECIFICATIONS

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END OF TABLE OF CONTENTS

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Abandonment of existing wastewater disposal systems and leaching pools.

1.02 - SYSTEM DESCRIPTION

A. Abandon existing wastewater disposal systems in accordance with Suffolk County Department of Health Services requirements.

1.03 - SUBMITTALS

A. Submit copy of 6NYCRR Part 364 Scavenger Waste Hauler license for waste hauler.

1.04 - SEQUENCING AND SCHEDULING

A. Conduct work to abandon existing wastewater disposal systems after sanitary sewer connection is in service.

PART 2 – PRODUCTS

2.01 - MATERIALS

A. Type A - Coarse Stone: Angular, washed natural stone; free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing
2-inch (50 mm)	100%
1-inch (25 mm)	95%
3/4-inch (19 mm)	75 - 90%
5/8-inch (16 mm)	35 - 60%
3/8-inch (9.5 mm)	15 - 35%
No. 4 (4.75 mm)	< 5%

B. Type B - Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following:

1. Minimum Size: 1/4-inch (6.4 mm).
2. Maximum Size: 5/8-inch (16 mm).

PART 3 EXECUTION

3.01 - NOTICE

A. The Village shall be notified at least five (5) business days in advance of any field activities or sampling so the work can be witnessed by Village personnel. The septic tank and leaching pools that are part of the existing wastewater disposal systems shall be abandoned.

3.02 - INSTALLATION

A. The septic tank, cesspools and leaching pools that are part of the existing wastewater disposal systems shall be abandoned. The structures to be abandoned shall first be pumped empty and the collected wastewater disposed of at the local scavenger waste treatment facility. Provide Owner with a copy of the receipt from the scavenger waste treatment facility.

B. Structures that are part of the existing wastewater disposal system shall be abandoned as detailed on the contract documents. Backfill to grade and restore site as required.

C. The void shall be filled with clean select material, free of organic matter and frozen lumps. Backfill material shall be compacted to a minimum of 95% of maximum density at optimum moisture, as determined by ASTM D1557, Method C.

D. Soil testing has been completed as part of Suffolk County Office of Pollution Control Commercial Sanitary Pool Closure Application. Refer to attached permit for additional abandonment requirements.

END OF SECTION

PART 1 - GENERAL

1.01 UTILITY LOCATION

A. Retain an independent utility locator service company with a minimum of five (5) years experience to field locate, mark, and stakeout existing underground utilities and service connections. The company shall be equipped with the latest state-of-the-art equipment.

1. If required determine the exact location of utilities by hand excavated test pits or through vacuum methods. Support and protect all utilities to remain in place.

2. Field locate, mark, and stakeout underground utilities prior to excavation.

3. Use different colored markers for each separate utility run. Follow APWA uniform color code (ANSI Z535.1). Immediately take digital photographs to document the mapped utilities and provide same to the Engineer.

4. Locate all utilities within areas of excavation, and be responsible for the costs associated with the repair of utilities hit/damaged during construction.

1.02 SUBMITTALS

A. Submit detailed experience and qualifications description of underground utility locator service. Experience and qualifications package should include a description of the types of utility locator equipment and experience that can be provided.

1.03 DELIVERABLES

A. At the conclusion of this project, provide one (1) set of paper and one (1) copy of electronic plans documenting all utilities located and identified. All documentation shall be referenced to existing data (horizontal and vertical) previously established.

1.04 COORDINATION AND SCHEDULING

A. General Location: Within areas of excavations all utilities shall be field located and their locations marked at least one (1) day prior to the performance of the required excavation.

B. The performance of hand excavated test pits or vacuum excavations to determine the utilities exact location shall be performed just prior to performing the work to minimize the time that excavated areas will be exposed to erosive conditions.

C. Coordinate work with the Engineer to minimize utility disruptions and facility operations. The Engineer shall be notified at least three (3) working days prior to performing the work, and should be provided a schedule for the works progression.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 EXAMINATION

A. Test holes shall be performed by air vacuum excavation key-hole technology or other non-destructive techniques on existing utilities. One call notification and obtaining permits shall be made prior to test hole excavation as necessary.

B. Stake test holes at the site by contractor personnel utilizing a tape or survey instrument as deemed necessary. Test hole openings shall be a minimum 8” x 8” and typically not larger than 12” x 12”. Excavate to expose the utility in a careful manner with the utmost concern for the safety of personnel, the public and surrounding property. Complete a field test hole form for each excavation that indicates at a minimum parameters required by the ASCE/CI Standard 38-02, which includes: depth to the utility, outside diameter, height of conduits or encasement, utility material, pavement type/ thickness and general soil type.

C. Place permanent marker over a reference point on the utility flush with grade. Typically this reference point is the centerline of pipes or the edge of concrete structures. A minimum of three (3) ties shall be taken to the permanent marker. The depth to the reference point on the utility shall also be measured plumb to the permanent marker.

D. Backfill excavation utilizing excavated materials or a self-compacting aggregate. Restore pavement in accordance with temporary pavement requirement on the Contract Drawings.

E. Locate test hole permanent markers using conventional or GPS survey equipment. Directly locate test hole markers to provide horizontal and vertical coordinates for each location relative to the project coordinate system.

F. Do not backfill test holes until directed by the Engineer. Take photographs of exposed piping and keep on file for the duration of the project. Duplicate prints shall be provided to the Engineer. Annotate on the back of each print the location of the photograph, the name of the exposed line, and the date it was taken. All photographs shall be taken using a digital camera. Provide digital file to the Engineer. All prints shall be 4 inches by 6 inches. Trenching for new buried pipelines shall not be started until the locations of existing pipes and utilities are verified.

3.02 FIELD QUALITY CONTROL

A. The Engineer may limit or restrict scheduling of the utility locator service based upon project progress.

B. Notify the Engineer in writing when conflicts are found between the work and existing utility.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Remove and dispose of surface debris as required.

B. Remove and dispose of paving, sidewalk, curbs, etc.

C. Clear site or designated areas of the site of plant life and grass as required and dispose of as required.

D. Remove and dispose of trees and shrubs as required.

E. Remove and dispose of stumps and root system of trees and shrubs as required.

F. Removal and storage of topsoil.

1.02 - RELATED SECTIONS

A. Section 02315 - Excavation.

B. Section 02915 – Landscape Grading and Topsoil.

1.03 - REGULATORY REQUIREMENTS

A. Conform to applicable local code(s) for disposal of debris.

B. Burning of materials on site is prohibited.

C. Coordinate clearing work with utility companies.

PART 2 – PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 - PREPARATION

A. Verify existing conditions.

B. Identify existing plant life designated to be removed. Verify with Owner and Engineer prior to removal.

C. Verify limits of clearing.

3.02 - PROTECTION

A. Locate, identify and protect utilities that are to remain from damage.

B. Protect trees, plant growth and features designated to remain as final landscaping.

C. Protect benchmarks and existing structures from damage or displacement. Any damage to existing structures is to be promptly repaired at no additional cost to the Owner.

3.03 - APPLICATION

A. Clear areas required for access to site and execution of work.

B. Remove paving, curbs, debris and sidewalks as required.

C. Remove trees and shrubs designated to be removed. Remove stumps, main root ball, surface rock and perishable debris.

D. Clear undergrowth and dead wood without disturbing subsoil.

E. Remove paving, debris, rock and extracted plant life from site and dispose of in accordance with State and local ordinances.

F. Excavate topsoil from areas to be further excavated, re-landscaped or regraded. Do not excavate wet topsoil.

G. Stockpile topsoil in area designated on site to a height not exceeding 8 feet. Protect from erosion. Remove excess topsoil not being reused from site. Do not remove any topsoil from the site prior to obtaining the approval of the Engineer.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Work of this Section includes wood and steel sheeting, sheeting box, and steel H-Section (soldier) piles, and lagging. The method of sheeting shall be at the sole discretion of the Contractor.

B. The cost to install, remove, and/or leave sheeting in place shall be included in the bid price.

1.02 - RELATED SECTIONS

A. Section 02315 - Excavation.

B. Section 02316 - Backfilling.

C. Section 02317 - Trenching.

1.03 - REFERENCES

A. The Contractor shall comply with Occupational Safety and Health Standards - Excavations; Final Rule (29 CFR Part 1926) - OSHA Standards.

1.04 - SUBMITTALS

A. Provide details of proposed sheeting for information only.

B. Design and supporting calculations shall be prepared by or under the supervision of a Professional Engineer licensed in the State of New York. These documents shall bear the seal and signature of the professional engineer.

1.05 - QUALITY ASSURANCE

A. Perform all work of this Section in accordance with OSHA Standards.

B. Sheeting shall be installed by persons regularly engaged in sheeting installation and who have a minimum of five (5) years of experience with the type of system being installed.

C. Sheeting shall be installed under the direct supervision of the professional engineer who designed the sheeting system. This does not require the professional engineer to be present during all phases of its installation but does require him/her to inspect the work as the work progresses on a part time basis sufficient to adequately certify the system. He/she shall certify, in writing, that sheeting was installed in accordance with the supporting calculations and that the installer complied with recognized procedures, methods, and techniques.

D. The Engineer shall withhold partial payment for that portion of the sheeting work until the certification has been provided for record purposes only.

1.06 - COORDINATION

A. Coordinate work under provisions of Section 01310.

B. Coordinate work with all other Sections requiring temporary sheeting and bracing.

PART 2 - PRODUCTS

2.01 - MATERIALS

A. Wood Sheeting: Hardwood species of size and dimensions capable of being driven to the required depths and capable of supporting excavation sides and soil pressures when braced; free from wormholes, wind shakes, loose knots, decayed or unsound portions or defects which would impair its strength or tightness; 3 inches thick minimum.

B. Steel Sheeting: Corrugated "Z" shape cross-section; of size and dimensions capable of being driven to the required depths and capable of supporting excavation sides and soil pressures when braced; structurally sound; special shapes for corner construction and transition points.

C. Sheeting Boxes: Steel, of size and dimensions capable of supporting excavation sides and soil pressures; structurally sound.

D. Structural Steel: ASTM A36.

E. Tiebacks: ASTM A722, ASTM A416

PART 3 - EXECUTION

3.01 - EXAMINATION

A. Verify that the installation of the sheeting will not fall within the restricted boundary line as may be delineated on the Contract Drawings.

B. Verify that the existing soil substrate, site conditions, and elevations are as indicated on the plans.

C. Verify proposed locations of excavations are as indicated on the plans.

3.02 - PREPARATION

A. Erosion control methods shall be in place prior to beginning the installation of sheeting.

B. Excavate to a depth no greater than 4 feet from existing grade.

C. Assemble and drive the sheeting in accordance with shop drawings prepared by the Contractor’s engineer.

D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage or other evidence of movement to ensure that systems are stable.

E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.03 - INSTALLATION - SHEETING

A. Drive sheeting in place to thoroughly support both sides of the excavation using a sheeting hammer. Use a steam or pneumatic hammer for steel sheeting.

B. Water jetting of sheeting will not be permitted. Do not loosen adjacent ground that might result in collapse.

C. Install wales and braces or shores tight and in accordance with shop drawings.

3.04 - INSTALLATION - SHEETING BOX

A. Place box in trench utilizing a means that will not damage structural integrity of the box.

B. Excavate ahead of the sheeting box only enough to advance the sheeting box and only immediately prior to moving the sheeting box.

C. Backfill on both sides of the sheeting box as it is moved.

3.05 - REMOVAL OF SHEETING

A. Remove sheeting only as backfilling progresses.

B. Carefully remove sheeting such that compacted backfill is not displaced. Remove sheeting in stages to avoid disturbing underlying soils or damaging structures, pavement, facilities, and utilities. Add additional backfill to the areas vacated by the sheeting.

C. All sheeting shall be removed from the site once its use is no longer required.

D. The Contractor may request permission to leave sheeting or bracing in place. The Engineer may grant permission on the condition that the cost of sheeting and bracing is borne by the Contractor.

E. Sheeting to be left in place, where shown on plans, shall be cut and removed to a minimum depth of 5 feet (1.2 m) below finished grade elevation. Where additional depth of sheeting removal is needed to facilitate contract work in advance of establishing finished grade, the sheeting will be cut and removed to that required additional depth as approved by the Engineer. Cost of sheeting and bracing to be left in place shall be borne by the Contractor.

END OF SECTION – 02260

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Removal and storage of subsoil.

B. Cutting, grading, filling and rough contouring the site prior to placement of topsoil or aggregate base for final grading.

1.02 - RELATED SECTIONS

A. Section 02230 - Site Clearing.

1.03 - REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 kg) Rammer and 18 inch (457 mm) Drop.

1.04 - SUBMITTALS

A. Submit under provisions of Section 01330.

B. Sieve Analysis: Submit a sieve analysis of all types of fill material to be used.

1.05 - PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of utilities remaining, by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 - PRODUCTS

2.01 - MATERIALS

A. Subsoil: Reused excavated material, graded, free of lumps, rocks and gravel larger than 3 inches (75 mm) in size, debris and contaminants.

PART 3 - EXECUTION

3.01 - EXAMINATION

A. Verify that existing conduits, pipelines and buried structures do not exist in the line of the Work.

B. Verify that survey benchmark and intended elevations for the Work are as required.

3.02 - PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known underground, aboveground and aerial utilities. Stake and flag locations.

C. Coordinate the removal or relocation of utilities with the necessary utility companies.

D. Protect above and below-grade utilities which are to remain.

E. Protect plant life, lawns, rock outcropping, and other features remaining as a portion of final landscaping.

F. Protect benchmarks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.

3.03 - APPLICATION

A. Excavate subsoil from areas to be further excavated, re-landscaped or re-graded. Do not excavate wet subsoil.

B. Stockpile in area designated on site. Remove excess subsoil not being reused from site.

C. Stockpile subsoil to a height not exceeding 8 feet. Cover to protect from erosion.

D. When excavation through roots is necessary, perform work by hand and cut roots with sharp saw.

E. Fill areas to contours and elevations with unfrozen subsoil material with allowances made for topsoil, aggregate base course or paving.

F. Place and compact subsoil fill material in continuous layers not exceeding 6 inches compacted depth, compacted to 95 percent maximum dry density in accordance with ANSI/ASTM D1557.

G. Maintain optimum moisture content of fill materials to attain required compaction density.

H. Make grade changes gradual. Blend slope into level areas.

I. Remove surplus fill materials from site.

3.04 - TOLERANCES

A. Maximum Variation from Top Surface of Subgrade: 1 inch (25 mm).

3.05 - FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01450.

B. Perform tests and analysis of fill material in accordance with ANSI/ASTM D1557.

END OF SECTION – 02312

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Excavation for building and tank foundations.

B. Excavation for slabs-on-grade, paving and landscaping.

C. Excavation for site structures.

1.02 - RELATED SECTIONS

A. Section 02260 – Excavation Support and Protection

B. Section 02316 - Backfilling

C. Section 02317 - Trenching

1.03 - QUALITY ASSURANCE

A. Do not excavate wet or frozen materials without written approval from the Engineer.

B. If excavation exceeds a depth of four feet (1.2 m), place temporary sheeting. Refer to Section 02260.

C. Provide safety barricades around all open excavations as specified in Division 1 specifications.

1.04 - FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated.

1.05 - COORDINATION

A. Coordinate excavation with installation of sheeting and pile work (if required).

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 - PREPARATION

A. Comply with the requirements contained in Section 02317 – Trenching regarding the location, verification, and mapping of underground utilities (pipelines, water, gas, electrical conduit, electricity, etc.) prior to starting any excavation required under this project.

B. Identify required lines, levels, contours, and datum.

C. Identify known underground, above ground and aerial utilities. Stake and flag locations.

D. Notify utility company to remove or relocate utilities, if required.

E. Protect above and below grade utilities that are to remain.

F. Protect plant life, lawns and other features remaining as a portion of final landscaping.

G. Protect benchmarks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.

H. Notify the Engineer prior to commencement of excavation.

3.02 - EXCAVATION

A. Underpin adjacent structures that may be damaged by excavation work, including utilities and pipe chases.

B. Excavate for structures, building foundations, slabs-on-grade, paving, drainage or sanitary structures, sidewalks, landscaping to the limits as indicated on the plans and extend a sufficient distance from walls, piers, footings and curbs to provide adequate clearances for construction operations, including sheeting and bracing, if required, and for inspection purposes.

C. Trim approximately the last four (4) inches of excavation subgrade in earth with a smooth edged bucket or by hand just prior to placement of concrete or concrete reinforcement.

D. Machine slope banks to angle of repose or less, until shored.

E. Excavation cut not to interfere with normal 45 degree bearing splay of foundations.

F. Grade top perimeter of excavation to prevent surface water from draining into excavation.

G. Hand trim excavation. Remove loose matter.

H. Remove lumped subsoil, boulders, and rock.

I. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

J. Stockpile excavated material in area designated on site.

3.03 - FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01450.

B. Provide for visual inspection of bearing surfaces.

3.04 - PROTECTION

A. Protect work under provisions of Section 01500.

B. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

C. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

3.05 - DISPOSAL OF MATERIALS

A. All suitable excavated material shall be utilized for backfill and embankment or for Owner selected stockpiling. Stockpile on-site or transport suitable material off site and bring back when conditions allow the stockpiling or filling operations to begin.

B. All excess suitable excavated material shall become the property of the Contractor and be disposed of by the Contractor in accordance with governing regulations and laws. The cost for hauling and disposal of excess suitable excavated material shall be included in the price as bid.

C. All unsuitable excavated material that cannot be used for backfill shall become the property of the Contractor and be hauled and disposed of off-site in accordance with governing regulations and laws. The cost for hauling and disposal of unsuitable material shall be included in the price as bid.

3.06 - MATERIALS

Remove unsuitable materials in excavations, which are incapable of supporting structures, as determined by an independent soil-testing laboratory, to the extent and depth directed by the Engineer. Refill and compact the excavation with Type C - Sand fill as defined in Section 02316. If required and directed by the Engineer, import Type C – Sand.

END OF SECTION – 02315

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Building perimeter and site structure backfilling to sub-grade elevations.

B. Site filling and backfilling.

C. Fill under slabs-on-grade and paving.

D. Consolidation and compaction.

E. Fill for over-excavation.

1.02 - RELATED SECTIONS

A. Section 02260 - Excavation Support and Protection

B. Section 02312 - Rough Grading

C. Section 02315 - Excavation

D. Section 02915 - Landscape Grading and Topsoil

E. Section 03300 - Concrete

1.03 - REFERENCES

A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 kg) Rammer and 18-inch (457-mm) Drop.

C. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.04 - SUBMITTALS

A. Submit under provisions of Section 01330. Submit the following:

1. Sieve analysis for each type fill to be used.

2. Compaction reports

3. Flowable Fill Mix Design

1.05 - QUALITY ASSURANCE

A. Do not backfill over or with wet or frozen materials.

B. Field quality control laboratory tests will be paid for out of the cash allowance for testing services. Coordination with the testing lab shall be the Contractor's responsibility and be included in the price as bid.

1.06 - COORDINATION

A. Coordinate work under provisions of Section 01310.

B. Coordinate and make all arrangements to have the testing laboratory present so that tests can be made. The Engineer may stop backfilling operations until such time as the testing laboratory is on-site to make tests or take required samples.

PART 2 - PRODUCTS

2.01 - MATERIALS

A. Type A - Coarse Stone: Angular, washed natural stone; free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing
2-inch (50 mm)	100%
1-inch (25 mm)	95%
3/4-inch (19 mm)	75 - 90%
5/8-inch (16 mm)	35 - 60%
3/8-inch (9.5 mm)	15 - 35%
No. 4 (4.75 mm)	< 5%

B. Type B - Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following:

1. Minimum Size: 1/4-inch (6.4 mm).

2. Maximum Size: 5/8-inch (16 mm).

C. Type C - Sand: (Structural Fill) Natural river or bank sand; washed, free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits:

Sieve Size	Percent Passing
No. 4 (4.75 mm)	100%
No. 14 (1.18 mm)	10 – 100%
No. 50 (0.30 mm)	5 – 90 %
No. 100 (0.15 mm)	4 - 30%
No. 200 (0.075 mm)	0 - 1%

D. Type D - Subsoil: Reused excavated material, graded, free of lumps, rocks and gravel larger than 3 inches (75 mm) in size, debris and contaminants.

E. Type E - ¾ inch Crushed Blue Stone Surfacing: Angular, washed blue stone; free of shale, clay, friable material, sand, and debris.

PART 3 - EXECUTION

3.01 - EXAMINATION

A. Verify existing conditions and substrate.

B. Verify fill materials to be reused are acceptable.

C. Verify items to be buried during backfilling process have been inspected prior to backfilling.

3.02 - PREPARATION

A. Compact subgrade to 95 percent maximum dry density in accordance with ANSI/ASTM D1557 or ASTM D2922.

B. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with Type C fill and compact to density equal to or greater than requirements for subsequent backfill material.

3.03 - BACKFILLING

A. Backfill areas to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy materials.

C. Place and compact materials in continuous layers not exceeding 6 inches (150 mm) compacted density.

D. All backfilled materials shall be compacted to 95 percent maximum dry density in accordance with ANSI/ASTM D1557 or ASTM D2922. Maintain optimum moisture content to attain required density.

E. Employ a placement method that does not disturb or damage structures or other items against which material is backfilled.

F. Backfill only against supported structures. Do not backfill against unsupported structures.

G. Backfill simultaneously on each side of structure.

H. Make grade changes gradual. Blend slope into level areas.

I. Immediately remove surplus materials from the site.

J. Immediately remove suitable backfill material from the site if stockpiling the material is not possible due to site restraints such as: insufficient area to store the material in a safe and secure manner, stockpiling the material would present interference with the operations of the facility, stockpiling the material hinders the operations of other contractors, stockpiling the material does not comply with the adopted Site Utilization Plan specified to be provided in Section 01140 – Work Restrictions. Truck suitable backfill material back to the site as soon as conditions are amenable to continuing the backfilling operations.

K. Leave fill material stockpile areas completely free of excess fill materials.

L. Remove temporary sheeting, as backfilling progresses, under provisions of Section 02260.

3.04 - TOLERANCES

A. Maximum Variation From Top Surface of Backfilling: 1 inch (25 mm).

B. Maximum Variation From Top Surface of Backfilling Under Paved Areas: $^1/_4$ inch (6 mm) from required elevations.

3.05 - FIELD QUALITY CONTROL

A. Perform testing under provisions of Section 01450.

B. Perform tests and analysis of fill material in accordance with ANSI/ASTM D1557 or ASTM D2922.

C. If tests indicate work does not meet specified requirements, remove work, replace and re-test at no cost to Owner.

D. Compaction tests shall be taken in accordance with Section 01450.

E. It is the Contractor's responsibility to coordinate the efforts of the testing laboratory and to have a technician present from the laboratory so those tests can be made.

3.06 - PROTECTION

A. Protect finished work under provisions of Section 01500.

B. Re-compact fills subjected to vehicular traffic.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. All below grade piping shall be installed in accordance with work of this Section.

B. The work of this Section also includes backfilling and compaction requirements, excavation for trenches for below grade piping and utilities.

1.02 - RELATED SECTIONS

A. Section 02210 - Subsurface Investigation

B. Section 02260 - Excavation Support and Protection

C. Section 02312 - Rough Grading for topsoil removal from site surface.

D. Section 02315 - Excavation

1.03 - REFERENCES

A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 kg) Rammer and 18-inch (457 mm) Drop.

C. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.04 - SUBMITTALS

A. Sieve analysis for imported bedding material.

1.05 - QUALITY ASSURANCE

A. Do not excavate wet or frozen materials without written approval from the Engineer.

B. Do not backfill over or with wet or frozen materials.

C. When an excavation exceeds a depth of 4 feet (1.2 m), the Contractor shall place temporary sheeting. Comply with the requirements contained in Section 02260 and all OSHA standards.

D. Field quality control laboratory tests will be paid for out of the cash allowance for testing services. Coordination with the testing lab shall be the Contractor's responsibility and be included in the price as bid.

1.06 – FIELD MEASUREMENTS

A. Verify that survey benchmark and elevations for the work are as shown on plans.

1.07 - COORDINATION

A. Coordinate all the work under the provisions of Section 01310.

B. Coordinate and make all arrangements to have the testing laboratory present so that tests can be made. The Engineer may stop trenching operations until such time as the testing laboratory is on-site to make tests or take required samples.

PART 2 - PRODUCTS

2.01 - MATERIALS

A. Bedding: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ANSI/ASTM C136; within the following limits:

Sieve Size	Percent Passing
No. 4 (4.75 mm)	100
No. 16 (1.18 mm)	10-100
No. 50 (0.30 mm)	5-90
No. 100 (0.15 mm)	4-30
No. 200 (0.075 mm)	0-1

B. Type A – Gravel Fill: Refer to Section 02316 for gradation requirements.

C. Subsoil: Reused, excavated material, graded, free of lumps, rocks and gravel larger than 3 inches (75 mm) in size, debris and contaminants.

PART 3 - EXECUTION

3.01 - EXAMINATION

A. Verify that existing site conditions are suitable for trenching operations to take place in that existing structures, piping, and utilities have been located as not being in conflict with the new work.

B. Verify, with the Engineer, that excavated material is acceptable for fill. If directed by the Engineer, send soil samples to the testing laboratory to determine its ability to support intended loads.

C. Test piping prior to backfilling in accordance with the requirements contained in Section 01755.

D. Do not backfill any item until the Engineer has fully inspected the work. Expose the work that was not inspected by the Engineer, when so directed by the Engineer.

3.02 - PREPARATION

A. Identify and confirm the location of all underground piping shown on the Contract Drawings prior to excavating for pipe or structures. Dig test holes and employ the underground utility mapping company to determine the existence and location of underground utilities prior to starting any underground work.

B. Identify required lines, levels, contours, and datum.

C. Maintain and protect existing utilities remaining which pass through the work area.

D. Protect plant life, lawns, rock outcropping, and other features remaining as a portion of final landscaping.

E. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic. Any item damaged by the Contractor shall be promptly repaired at the Contractor's expense.

F. Protect above and below grade utilities that are to remain.

G. Excavate unsuitable material in accordance with the requirements contained in Section 02315 and import suitable material.

3.03 - EXCAVATION

A. Excavate subsoil required for piping.

B. Excavate trenches to the dimensions shown on the plans, or if not shown, to the dimensions required to properly install the work.

C. Excavation shall not interfere with normal 45 degree bearing splay of foundations.

D. Hand trim excavation. Hand trim for bell and spigot pipe joints, if necessary. Remove loose matter.

E. Remove lumped subsoil, boulders, and rock.

F. For trenches made in solid rock, excavate to a depth of 1 foot (300 mm) below the proposed pipe invert.

G. Stockpile excavated material in area designated on site and remove excess as specified in Section 02315.

H. Install sheeting if trench depth exceeds 4 feet (1.2 m). Refer to Section 02260.

3.04 - INSTALLATION - BEDDING

A. Support pipe and conduit during placement and compaction of bedding fill.

B. For trenches made in solid rock, place an additional 1-foot (300 mm) of bedding under pipe or conduit.

C. Place bedding to the dimensions and limits as shown on the plans.

D. Place bedding material against and to 1 foot (300 mm) over the top of the pipe or conduit in 6 inch (150 mm) compacted layers.

E. Compact bedding material to 95 percent maximum dry density in accordance with ANSI/ASTM D1557 or ASTM D2922. Maintain optimum moisture content to attain required density.

F. Place bedding simultaneously on both sides of the pipe or conduit.

3.05- BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen materials.

B. Backfill to the dimensions and limits shown on the plans.

C. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

D. Place and compact material in continuous layers not exceeding 6 inches (150 mm) compacted depth.

E. Employ a placement method that does not disturb or damage conduit or pipe.

F. Compact backfilled materials to 95 percent of maximum dry density in accordance with ANSI/ASTM D1557 or ASTM D2922. Maintain optimum moisture content to attain required density.

G. Import suitable material as specified in Section 02315 if directed by the Engineer.

3.07 - TOLERANCES

A. Maximum variation from top surface of backfilling under paved areas: 1/4 inch (13 mm).

B. Maximum variation from top surface of general backfilling: 1 inch (25 mm).

3.08- FIELD QUALITY CONTROL

A. Perform testing under provisions of Section 01450.

B. Perform tests and analysis of fill material will be performed in accordance with ANSI/ASTM D1557 or ASTM D2922.

C. If tests indicate work does not meet specified requirements, remove work, replace and re- test at no cost to Owner.

END OF SECTION

PART 1 - GENERAL

1.01 - DESCRIPTION

A. Work covered by this Section includes the restoration of surfaces damaged or disturbed because of the Contractor's operations and installation of the work.

B. The Contractor's cost associated with work of this Section shall be included in the unit price items as bid.

1.02 - RELATED SECTIONS

A. Related Sections shall include all applicable technical specification sections.

1.03 - QUALITY ASSURANCE

A. Provide at least one person who shall be present at all times during this portion of Work and who is thoroughly familiar with the types of materials being installed, the best methods for their installation and who shall direct all work performed under this Section.

B. Grades and surfaces shall be restored so as to be equal to or better than the original conditions which existed at the time they were damaged or disturbed, except as otherwise specified or shown on the Drawings.

C. Restoration of surfaces under the jurisdiction of public authorities or public utilities shall be in accordance with the requirements of such authorities. Ascertain these requirements, procure necessary permits, arrange for required inspections, and pay all fees, deposits, and other charges that may be required by the authorities.

D. Existing pavements, curbs, and walks to be restored shall be replaced with new pavement equivalent to or superior to the existing in quality, thickness, bearing capacity and surface finish, except where otherwise specified.

E. Replaced pavement shall be free from all noticeable sags, settlements, bumps, humps, cracks or other defects. Other than possibly color, the replaced pavement shall be unnoticeable from the existing pavement.

1.04 - SUBMITTALS

A. See Section 01330.

B. Submittals required are identical to those required under other Sections. If submittals have been made and approved under the other Sections, and is applicable to this Section, then a notification to this effect will be sufficient.

C. At the completion of the Work under this Section, submit copies of letters of approval from all authorities having jurisdiction over the areas that were restored.

1.05 - SCHEDULING

A. It is the intent of this Section to restore all surfaces as soon as possible to cause the least amount of inconvenience to the Owner and public.

B. Replace all pavements as specified elsewhere in these specifications.

C. Replace all items as soon as possible after the installation of the work, with special attention directed at those that control traffic, protect property and lives, create hazards when not in place or are otherwise deemed essential.

D. The phrase “after installation of the work” means after the installation of the work that necessitated the removal of an item or items.

1.06 - MAINTENANCE AND GUARANTEE

A. The maintenance and guarantee requirements of other applicable Sections are required under this Section.

B. Maintain and care for all restoration work.

C. Continually maintain all areas where pavement has been removed to provide a smooth, dust-free surface by adding fill and dust control materials and grading daily, or more frequently when required.

PART 2 - PRODUCTS

2.01 - REUSE OF EXISTING MATERIALS

A. Curbs, walks, roads, fences, walls, signs and other items which have been removed, knocked down, or displaced shall be replaced with existing materials when, in the opinion of Engineer, such materials are in acceptable condition. Where such materials have been damaged, marred, broken, or are otherwise in an unacceptable condition, provide replacements of equal or better quality, appearance, size and type, at the Contractor’s expense.

PART 3 - EXECUTION

3.01 - INSPECTION

A. Carefully inspect the work installed under other Sections and verify that all such work is complete to the point where restoration of surfaces may properly commence and to insure the unnecessary disturbance of restored surfaces at a later date.

B. Verify schedule of work for conformance to allowable planting times.

C. Do not begin restoration work until conditions are satisfactory.

3.02 - PLANTS AND REPLANTING

A. As soon as possible after construction operations have moved to another portion of the site, replant plants, shrubs, trees and other vegetation that was taken up in their original locations, provided that they survived and show indications of continued life.

B. Replace with the same kind and size, any plantings, trees, shrubs or other vegetation that fail to survive the moving operation.

3.03 - SIDEWALKS

A. Portland Cement Concrete - Replace walks after backfill has been brought up to proper subgrade elevation and compacted. Damaged sidewalk flags shall be replace to the nearest expansion joint.

3.04 – CURBS

A. Portland Cement Concrete Curb - Replace curb after backfill has been brought up to proper subgrade elevation and compacted. Damaged curb shall be replace to the nearest expansion joint.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Reinforced concrete curb.

B. Formwork.

1.02 - RELATED SECTIONS

A. Section 02312 - Rough Grading

1.03 - REFERENCES

A. ACI 301 Structural Concrete for Buildings.

B. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

C. ASTM C33 - Concrete Aggregates.

D. ASTM C94 - Ready Mix Concrete.

E. ASTM C150 - Portland Cement

F. ASTM C260 - Air-Entraining Admixtures for Concrete.

G. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

H. ASTM C494 - Chemical Admixtures for Concrete.

1.04 - SUBMITTALS

A. Submit under provisions of Section 01330.

B. Product Data: Provide data on joint filler, admixtures, and curing compounds.

C. Supplier: Submit name of concrete supplier prior to the placement of any concrete on the project.

D. Design Data: Provide a design mix for each type of concrete to be used on the project.

E. Certificates: Submit receipts of all concrete deliveries, indicating source, date, contractor, amount of concrete, concrete strength, truck number and time truck left plant.

1.05 - PROJECT RECORD DOCUMENTS

A. Accurately record locations of each day's concrete pour.

1.06 - QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain concrete only from approved suppliers and maintain the same source throughout the project.

1.07 - DELIVERY, STORAGE AND HANDLING

A. Deliver concrete in accordance with ASTM C94, Alternative No. 2.

B. Place all concrete within 90 minutes of time truck leaves batching plant.

1.08 - ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or if surface is wet or frozen.

PART 2 - PRODUCTS

2.01 - MATERIALS

A. Cement: ASTM C150, air entraining, Type 1A Portland, gray color.

B. Aggregates: ASTM C33.

C. Water: Potable and not detrimental to concrete.

D. Reinforcement: ASTM A1064 plain welded steel wire fabric; in flat sheets; uncoated finish.

2.02 - ACCESSORIES

A. Forms: Douglas Fir plywood type; solid, sound, undamaged sheets.

B. Joint Filler: ANSI/ASTM D1751; $^1/_2$ inch thick.

C. Joint Sealer: Sonneborne SL-2 or equal.

D. Air Entraining Admixture: ASTM C260.

E. Chemical Admixture: ASTM C494, type as required.

F. Curing Compound: ASTM C209, Type 1, Class A.

G. Form Release Agent: Colorless materials, which will not stain concrete or absorb moisture.

2.03 - MIXES

A. Mix and prepare concrete in accordance with the approved mix design and ASTM C94, Alternative No. 2.

B. The mix shall be such that the concrete shall attain the following characteristics:

1. Compressive Strength (28 days): 4000 psi.

2. Slump: 2-1/2 to 3-1/2 inches.

3. Air Entrainment: 6% ±1 percent.

C. Use chemical admixtures only when approved by the Engineer. Use of admixtures will not relax placement requirements.

PART 3 - EXECUTION

3.01 - EXAMINATION

A. Verify existing conditions and substrate under provisions of Section 01310.

B. Verify compacted granular subbase has been properly prepared and is ready to receive work of this Section.

C. Verify gradients and elevations of base are correct.

D. Beginning of installation means installer accepts existing conditions.

3.02 - PREPARATION

A. Compact base to minimum 95 percent maximum dry density in accordance with ANSI/ASTM D1557.

B. Moisten base to a minimum depth of 1/2 inch to minimize absorption of water from fresh concrete.

C. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.

D. Place and secure forms to correct location, dimension and profile.

E. Assemble formwork to permit easy stripping and dismantling without damaging concrete. Coat forms with form release agent.

3.03 - INSTALLATION

A. Place joint filler vertical in position in straight lines. Secure to formwork during concrete placement.

B. Place reinforcement as indicated on the plans. Interrupt reinforcement at expansion joints.

C. Place concrete in accordance with ACI 301.

D. Ensure reinforcement and formed joints are not disturbed during concrete placement.

E. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

F. Vibrate concrete adjacent to forms.

G. Place concrete with flag pattern with smooth sides.

H. Place expansion joints with joint filler at 20-foot intervals.

I. Place scored construction joints at 4-foot intervals.

J. Place joint filler between paving components and building or other appurtenances and in expansion joints.

K. Apply a light broom finish perpendicular to traffic.

L. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.04 - FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01450.

B. Cure test cylinders on site under same conditions as concrete curb.

C. Take one slump test for each set of test cylinders taken. Concrete not meeting slump requirements will be rejected. Concrete represented by cylinders that do not meet required strength will be removed and replaced at no additional cost to the Owner.

3.05 - PROTECTION

A. Protect finished work under provisions of Section 01500.

B. Immediately after placement, protect sidewalk from premature drying, excessive temperatures and mechanical injury.

C. Protect curb from damage until the sidewalk is accepted by the Owner, but shall not be before the point of Substantial Completion and release of retainage for this payment item. The date that the Owner signed the Certificate of Substantial Completion shall establish the limit of this protection requirement.

D. Repair all damage to all new curb installed under the Contract regardless of the party who damaged it as stipulated above. It is the Contractor's responsibility to protect all sidewalks and to employ whatever means he/she deems necessary.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Pipe fittings for low-pressure sewer main.

B. Lock joint flexible sleeves.

C. Manholes.

D. Non-shrink grout.

E. Cast iron frames and covers.

F. Accessories

1.02 - RELATED SECTIONS

A. Section 01722 - Surveying

B. Section 02315 - Excavation.

C. Section 02316 – Backfilling.

D. Section 02317 – Trenching.

1.03 - REFERENCES

A. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.

B. ANSI/AWWA C110 - Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids.

C. ANSI/AWWA C111- Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.

D. ANSI/AWWA C150/A21.50 - American National Standard for Thickness Design of Ductile Iron Pipe.

E. ASTM A48 - Gray Iron Castings.

F. ASTM A743 - Castings, Iron-Chromium, Iron-Chromium Nickel, Corrosion Resistant for General Application.

G. ASTM C32 – Sewer and Manhole Brick (Made From Clay or Shale)

H. ASTM C33 - Concrete Aggregates.

I. ASTM C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars Using 2-inch or 50-mm Cube Specimens.

J. ASTM C150 - Portland Cement.

K. ASTM C191 - Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.

L. ASTM C478 - Precast Reinforced Concrete Manhole Sections.

M. AWWA C507 - Ball Valves 6-inch through 48-inch.

N. Great Lakes-Upper Mississippi River Board of State Sanitary Engineers - Recommended Standards for Sewage Works (Ten State Standards).

1.04 - SUBMITTALS

A. Submit under provisions of Section 01330.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, cleanouts, accessories and detectable marking tape.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install products.

D. Foundry Records and Tests for ductile iron pipe and fittings: Written transcripts of the test results shall be delivered directly to the Engineer within one week of the shipment of pipe with the date of the tests as close to the date of manufacture as practical. For ductile iron pipe, written transcripts shall be furnished directly to the Engineer in accordance with applicable sections of AWWA C151 and ANSI A21.51:

Transcripts & Certification: 51-5.2

Group Tests Required: Hydrostatic Test (51-9)
Tensile Test (51-12.1)
Impact Test (51-12.2)
Low Temperature Impact Test (51-13)

Number of Specific Group Tests Required in Addition to General Certification: One (1) per pipe size per 2,000 linear feet of pipe.

1.05 - PROJECT RECORD DOCUMENTS

A. Submit under provisions of Sections 01722 and 01785.

B. Accurately record actual locations of piping mains, fittings, valves, cleanouts, accessories, and invert elevations.

C. Identify and describe discovery of uncharted utilities.

1.06 - OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views, maintenance procedures and maintenance schedules.

1.07 - QUALITY ASSURANCE

A. Perform work in accordance with the following: Suffolk County Code Chapter 24 - Sewers and Ten State Standards.

B. Pipe: Manufacturer's name, classification or nominal thickness, weight and letters.

C. Valves: Manufacturer's name and pressure rating marked on valve body.

1.08 - DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products in accordance with manufacturer's instructions to prevent soiling, disfigurement or damage.

B. Deliver and store valves in shipping containers with labeling in place.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of work and isolating parts of completed systems.

1.09 - ENVIRONMENTAL REQUIREMENTS

A. Do not install underground piping when bedding is wet or frozen.

B. Do not backfill over or with frozen materials.

1.10 - EXTRA MATERIALS

A. Provide one box of each type of stuffing box packing for valves furnished.

PART 2 - PRODUCTS

2.01 - PIPE

A. Low-Pressure Sewer Pipe:

1. 2-inches and Smaller:

a. Pipe shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350 with a cell classification of PE: 445574C. Pipe shall have a manufacturing standard of ASTM D2737 (CTS).

b. Pipe shall be DR 11 (200 psi WPR @ 73F). The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. The pipe shall be permanently coded with green stripes to provide service identification. Green stripes along the entire outside length of the pipe, 120-degrees apart, shall be made by co-extrusion or impregnation.

c. All pipes shall be suitable for use as pressure conduits, and per AWWA C901, have nominal burst values of three times the Working Pressure Rating (WPR) of the pipe. Pipe shall be NSF 61 listed.

2. 3 Inches and Larger:

a. Pipe shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350 with a cell classification of PE: 445474C. Pipe shall have a manufacturing standard of ASTM F714.

b. Pipe shall be DR 11 (200psi WPR). The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure conduits, and per AWWA C901 or AWWA C906, have nominal burst values of three times the Working Pressure Rating (WPR) of the pipe. Pipe shall be NSF 61 listed. The pipe shall be permanently coded with green stripes to provide service identification. Green stripes along the entire outside length of the pipe, 120-degrees apart, shall be made by co-extrusion or impregnation.

B. Low-Pressure Sewer Fittings:

1. Butt Fusion Fittings:

a. Fittings shall be PE 4710 HDPE, Cell Classification of 445474C as determined by ASTM D3350, and approved for AWWA use. Butt Fusion Fittings shall have a manufacturing standard of ASTM D3261.

b. Molded and fabricated fittings shall have a pressure rating equal to the pipe. Fabricated fittings are to be manufactured using Data Loggers. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records.

c. All fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half times the Working Pressure Rating (WPR) of the fitting.

2. Flanged and Mechanical Joint Adapters:

a. Flanged and Mechanical Joint Adapters shall be PE 4710 HDPE, Cell Classification of 445474C as determined by ASTM D3350. Flanged and Mechanical Joint Adapters shall have a manufacturing standard of ASTM D3261.

b. Fittings shall have a pressure rating equal to the pipe.

3. Pressure Rated Electrofusion Branch Saddle Tap:

a. Saddles shall be PE4710 HDPE, Cell Classification of 445474C as determined by ASTM D3350.

b. Electrofusion fittings shall be supplied with a 24 digit ISO compliant barcode label which facilitates the fusion of the electrofusion fitting with other manufacturer's processors.

c. Electrofusion saddle taps shall be Model ElPRES as manufactured by NUPI Americas or Equal.

2.02 – MANHOLES AND VALUTS

A. Precast Concrete Manufacturers: AFCO PRECAST, INC., CARLSON PRECAST, INC., COASTAL PIPELINE PRODUCTS, or equal.

B. Manhole Sections: ASTM C478 reinforced precast concrete tongue and groove joint, cylindrical shaped, conforming to AASHTO H-20 load rating; of the following materials:

1. Cement: ASTM C150, Portland cement Type II

2. Fine and Coarse Aggregates: ASTM C33.

3. Water: ASTM C94/C94M, Clean and not detrimental to concrete.

4. Mix concrete with a minimum 28-day compressive strength of 4000 psi.

C. Reinforcing Steel:

1. Rebar: ASTM A615 reinforcing bars, Grade 60, Fs = 60,000 PSI

2. Welded Wire Mesh: ASTM 1064, Fs = 65,000 PSI

3. Tie Wire: Minimum 16 gauge, annealed type.

D. Manhole Frame and Cover: ASTM A48 cast iron construction manufactured by EJ USA or approved equal, with epic pickholes or approved equal to be provided, date of cast on underside of cover, “SANITARY SEWER" inscription on cover, painted with one coat asphaltum. Frame and cover required to be manufactured in the U.S.A AASHTO M306 rated.

E. Non-Shrink Grout:

1. Cement-Based Grout: Pre-measured, prepackaged materials supplied by the manufacturer, requiring only the addition of water, with the manufacturer's instructions printed on the outside of each bag.

2. Water: Potable, not detrimental to concrete.

3. Use the minimum water necessary for proper installation.

4. Grout Characteristics:

a. Non-Shrink: No shrinkage (0.0%) and a maximum 4.0% expansion when tested in accordance with ASTM C827. No shrinkage (0.0%) and a maximum of 0.2% expansion in the hardened state when tested in accordance with CRD-C-621.

b. Compressive Strength: A minimum 28-day compressive strength of 5,000 psi when tested in accordance with ASTM C109.

c. Setting Time: A minimum initial set time of 60 minutes when tested in accordance with ASTM C191.

Composition: Shall not contain metallic particles such as aluminum powders or iron filings, or expansive cement.

F. Lock Joint Flexible Sleeves: ASTM C923 - Resilient Connector between manhole and piping.

G. Manhole Steps: Copolymer polypropylene plastic steel reinforced manhole steps, M.A. INDUSTRIES, Model PS2-PF or equal, set into manhole wall.

H. Red Brick Units: ASTM C32, Grade MS, solid, shale red brick – moisture-controlled normal weight.

I. Mortar: ASTM C270, Type M, consisting of a 1:1:5 ratio of Portland cement, masonry cement, and well graded masonry sand, respectively.

a. Portland Cement: ASTM C150, type II

b. Masonry Cement: ASTM 270, Type M

c. Sand: ASTM C144

d. Water: ASTM C94/C94M, clean and not detrimental to concrete

2.03 - CLEANOUTS

A. Lid and Frame: ASTM A48, cast iron construction, manufactured by CAMPBELL FOUNDRY COMPANY, Pattern No. 1736, or approved equal; painted with one coat asphaltum.

B. Shaft Construction: Cement-lined ductile iron sewer pipe sections, rubber compression gasket joint, main pipe nominal shaft diameter to match. Mechanical joint restraint shall be provided and be Megalug series by Ebaa Iron or equal. The restraint device shall have a working pressure of at least 250 psi with a minimum factor of safety of 2:1.

C. Concrete Casing: In accordance with Section 03300 - Concrete.

D. Ball Valves: Apollo Model 70-200 Series, MSS SP-110, Class 150, 600 psi (4140 kPa) CWP, bronze, two piece body, chrome plated brass ball, regular port, TFE seats and stuffing box ring, blow-out proof stem, lever handle, threaded ends.

2.04 - ACCESSORIES

A. Concrete for Thrust Blocks: 4,000 psi.

B. Marking Tape: Solid plastic tape with a minimum thickness of 4.5 mil. Tape resistant to alkalis, acids and other destructive elements; of sufficient strength that layers cannot be separated by hand or by exposure to boiling water for a period of three hours. Green in color, minimum 3 inches wide with the words "Caution - Sanitary Sewer" repeated every 16-36 inches, conforming to APWA uniform color code and in accordance with SCDPW requirements.

C. Tracer Wire: Two (2) #10 AWG solid tracer wire shall be installed along with open cut or directionally drilled HDPE and PVC pipe and be protected against damage or breakage during installation. Jacket color: G-Green. HDPE insulation: 30 mil. Comply with ASTM-D-1248, 30 volt rating. The tracer wire shall be continuous through the installation. Upon testing, if both tracer wires are found not to be continuous, the contractor shall furnish and install new tracer wire at no expense to the Owner.

D. Non-Woven Geotextile: Marafli N-Series nonwoven polypropylene geotextile or approved equal.

E. Flexible Pipe to Manhole Connector: NPC, INC. KOR-N-SEAL I which meets or exceeds the requirements of ASTM C923. Installation band to secure to opening in manhole wall and pipe clamp shall be Series 304 stainless steel. Connector to be toggle style, wedge style not acceptable.

F. Plug Valves:

1. Plug valves: DEZURIK, Sartell, MN, Series 100, Fig. 118., or approved equal.

2. ASTM A126, Grade B cast iron valve body and plug, permanently lubricated Type 316, ASTM A743 stainless steel bearings, Nitrile-Butadiene packing, neoprene or hycar plug facing, 175 psi rating, zinc-plated exposed hardware, 100 psi pressure differential across valve. Plug shall not contact seat until in fully closed position. Replaceable sleeve type bearings, corrosion resistant seats and valve shaft seals shall be in accordance with AWWA C507. All plug valves shall have 100% port area opening.

   a. Buried: Mechanical joint, buried/submerged construction actuator, stainless steel bolts.

G. Ductile Iron Ball Valve: Ball valves shall be rated at 150# WSP/300# WOG. Bodies shall be ductile iron per ASTM A536 with ANSI Class 150 raised-face flanges. The interior and exterior of the body shall be epoxy-coated. The ball shall be PTFE infused with stainless steel, with a 304 stainless steel blowout-proof stem. The seats and body seals shall be PTFE. The stem seal shall be PTFE, externally adjustable chevron type. Valves shall be equipped with locking handles as standard.

Valves shall be equipped with 2-inch square operating nuts. Valves shall be the Series 4000D as manufactured by American Valve, Inc., or an approved equal.

H. Brass Ball Valves: Ball valves shall be rated at 150# WSP/400# WOG. Bodies shall be forged brass and meet ANSI/NSF 61-8. The body shall have female threaded ends with forged brass (chrome plated) ball and PTFE seats and packing. Valve stems shall be brass per ASTM B-16, with PVC coated steel handle and steel handle nut. Valves shall be Model M100 as manufactured by American Valve, or equal.

I. Quick Connect: Dixon G200 aluminum Type B coupler, or approved equal.

J. Low Pressure Sewer Lateral Assembly:

1. STAINLESS STEEL UNI-LATERAL CURB STOP/CHECK VALVE ASSEMBLY: The Uni-Lateral shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions. The curb stop/check valve assembly shall be designed to withstand a working pressure of 235 psi. Accessories:

a. Adjustable valve box for each lateral assembly.

b. Valve box cover marked with “Sewer” with locking lid by MUELLER COMPANY; Tyler Pipe. Adapter Flanges: Series 400 Uniflange.

2.07 - SEWAGE AIR VALVES

A. Manufacturers: A.R.I. Flow Control Accessories, Berwick, PA. Model. No. D-025, or approved equal.

B. Consists of one sewage air relief valve with backwash accessories.

C. Sewage air relief valve: 2-inch inlet, 1/2 inch outlet with 1/4 inch orifice, maximum working pressure of 150 psi, viton resilient seat, stainless steel float and leakage and inlet shutoff valve. Automatic releases of air, gas and vapor under pressure during system operation shall be provided.

D. Service clamp: MUELLER CO. Cat No. BR 2 S 1522 IP 200, stainless steel double strap, 2-inch tap, or approved equal.

PART 3 - EXECUTION

3.01 - EXAMINATION

A. Verify that excavations are to required grade, dry and not overexcavated.

3.02 - PREPARATION

A. Remove scale and dirt, on inside and outside, before assembly.

B. Prepare pipe connections to equipment with flanges or unions.

3.03 - BEDDING

A. Excavate pipe trench in accordance with Section 02317. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. The subbase of the pipe in any rock excavation shall be a minimum of 4 inches thick and consist of sand, gravel and crushed stone.

C. Backfill around sides and to top of pipe with fill, tamped in place and compacted to 95% of Standard Proctor Density in accordance with ASTM D698 and Section 02317.

D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.04 - INSTALLATION - PIPE

A. Maintain separation of sanitary sewer force main from water piping in accordance with regulations of SCDPW, SCDHS, the New York State Department of Environmental Conservation and the Recommended Standards for Wastewater Facilities. When it is impossible to achieve the required separation distances, immediately notify the Engineer who may order the construction of the sewer with ductile mechanical joint pipe, the reconstruction of the existing water line, or other measures as necessary.

B. Install plastic pipe, fittings, and accessories in accordance with ASTM D2321 and manufacturer's instructions. Install ductile iron piping and fittings to ANSI/AWWA C600 and manufacturer's instructions. Seal joints watertight. Select pipe and fittings so that there will be as small a deviation as possible at the joints and so those inverts present a smooth surface. Pipe and fittings that do not fit together to form a tight-fitting joint are not permitted.

C. Route pipe in straight line.

D. Install pipe to allow for expansion and contraction without stressing pipe or joints.

E. Form and place concrete for thrust blocks at each tee, plug or bend which is deflecting 22½ degrees or more. Place blocking so pipe and joint fittings will be accessible for repair.

F. Establish elevations of buried piping to ensure not less than 4 feet of cover.

G. Backfill and compact trench in accordance with Section 02317.

H. Plug or close every open pipe end before leaving work at night.

I. Do not exceed 5 degree joint deflection.

J. Install pipes to the lines and grades as given on the drawings. Engineer reserves the right to disapprove a method of control, including those previously accepted, if, in the Engineer's opinion, the method of control is not providing the accuracy required under the Contract.

K. Make connections between pipes of different materials with approved adapters. The encasement of adapter made connections with concrete is not permitted. Commence pipe laying at the lowest point, with the spigot ends pointing in the direction of flow.

L. All adjustments to the line and grade of pipe laid on earth foundation shall be done by scraping away or filling in the earth under the barrel of the pipe, and not be blocking or wedging. Where excavation has been carried too deep but not in excess of six (6) inches, the Contractor may replace with suitable earth and hand tamp same to provide a firm foundation. Wherever the contractor has excavated to a depth in excess of six (6) inches, the Engineer may order broken stone or gravel fill without additional compensation to the Contractor. In all cases the trench under the joint shall be excavated to permit an even bearing for the barrel of the pipe.

M. After partially backfilling, install marking tape 18 inches to 24 inches above crown of pipe. Place as straight as possible. Hold tape in place by adding backfill with shovel before using mechanical equipment to finish backfill.

3.05 - INSTALLATION - VALVES

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

3.06 - INSTALLATION - PRECAST STRUCTURES

A. Install precast concrete base, shaft, and slab top of precast plumb and level. Establish elevations and pipe inverts for inlets and outlets as indicated. Locate manhole rungs as directed by the Engineer relative to the top slab opening.

B. Adjust lock joint flexible sleeve or install non-shrink grout to provide water-tight pipe penetration. Mount lid and frame level in grout, secured to top section to elevation indicated.

C. Perform all mixing, surface preparation and grouting in accordance with manufacturer's recommendations.

D. Maximum variation from proposed rim elevation shall be ¼ inch.

3.07 - INSTALLATION - CLEANOUTS

A. Establish elevations and pipe inverts for inlets and outlets as indicated.

B. Mix, transport and place concrete in accordance with Section 03300 - Concrete.

C. Set lid and frame in concrete slab, secured to top pipe section, at elevation indicated.

3.08 - INSTALLATION – MANHOLE INSERT

A. Install manhole insert in accordance with the manufacturers installation instructions when the force main will be placed into service.

3.09 - PRESSURE TESTING

A. Expel all air from piping system, including pipe, valves and appurtenances. Pretest system in lengths up to 1,000 feet or more frequently at the Owner’s discretion. Perform system pressure test in accordance with Section 01755.

B. Remove and replace defective pipe, fittings, valves, and appurtenances. Repeat pressure test until satisfactory to Engineer.

3.10 - LEAKAGE TESTING

A. Perform leakage test in accordance with AWWA C600 and Section 01755. Verify barrel is of constant cross section, free of dents and marked in one-gallon intervals. In the event force main pipe does not pass leakage test, locate, repair and retest the pipe until leakage is within specified limit. Leakage shall be defined as the quantity of water that must be supplied into the pipe or any valved section thereof to maintain the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time.

3.11 - FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 01450.

B. Request inspection prior to and immediately after placing backfill. Perform compaction testing in accordance with ASTM D2922. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no cost to Owner.

3.12 - TOLERANCES

A. Variance of individual pipe sections from established line and grade shall not be greater than those listed in the table below, providing that such variance does not result in a level, reversing, slope less than minimum required.

Diameter	Allowable Tolerance
(Inches)	(Feet)
<8	0.03
10	0.03
12	0.03
14	0.04
16	0.04
>18	0.05

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Recycled concrete aggregate base course.

1.02 - RELATED SECTIONS

A. Section 02312 - Rough Grading: Preparation of site for base course.

B. Section 02316 - Backfilling: Compacted fill under base course.

C. Section 02317 - Trenching: Compacted fill under base course.

D. Section 02740 - Asphaltic Concrete Paving: Placing asphalt over aggregate base course.

1.03 - REFERENCES

A. ANSI/ASTM C88 - Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

B. ANSI/ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates.

C. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb. Rammer and 18-inch Drop.

D. ASTM D2922 - Test Methods for Density of Soil and Soil Aggregate Mixtures in Place by Nuclear Methods (Shallow Depth).

E. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.04 - SUBMITTALS

A. Submit under provisions of Section 01330 - Submittals.

B. Submit a sieve analysis for the aggregate base course used.

1.05 - DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products to the site under provisions of Section 01650.

B. Do not handle aggregate in any manner that will cause segregation of large or fine particles.

PART 2 - PRODUCTS

2.01 - MATERIALS

A. Aggregate Base Course: Angular, crushed, recycled concrete; free of organic matter and deleterious material; containing less than 5% weight asphalt pavement and/or brick; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing
2 inches	90-100
1/4-inch	30-65
No. 40	5-40
No. 200	0-10

B. Material retained on the $^1/_2$-inch sieve is coarse aggregate.

C. Coarse aggregate shall not have more than 10 percent by weight of flat or elongated pieces. A flat or elongated piece is defined as being three times greater in the largest dimension as compared to its least dimension.

D. The portion of the aggregate base course which passes the No. 40 screen shall have a plasticity index of one as tested in accordance with ASTM D4318.

PART 3 - EXECUTION

3.01 - EXAMINATION

A. Verify existing conditions and substrate.

B. Verify elevations of subgrade are as indicated on the plans.

C. Verify that subgrade is properly compacted and ready to receive work of this section.

D. Beginning work of this section means acceptance of existing conditions.

3.02 - PREPARATION

A. Fine grade and compact subgrade to 95 percent maximum dry density in accordance with ANSI/ASTM D1557.

3.03 - AGGREGATE PLACEMENT

A. Spread aggregate base course over prepared subgrade to a total compacted thickness as indicated on the plans.

B. Place aggregate in 3-inch layers and compact by roller.

C. Level and contour surfaces to elevations and gradients indicated on Drawings.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Compact placed aggregate materials to achieve 95% maximum dry density when compacted in accordance with ANSI/ASTM D1557.

F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

G. Use mechanical vibrating tamping in areas inaccessible to compaction equipment.

H. Place new pavement on the properly compacted aggregate base course within 24 hours of final compaction. If aggregate base course is left open for more than 24 hours, re-compact and re-test in accordance with ANSI/ASTM D1557 or ASTM D2922.

3.04 - TOLERANCES

A. Maximum Variation From Flatness: $^1/_4$ inch measured with 10-foot straight edge.

B. Maximum Variation From Scheduled Compacted Thickness: $^1/_4$ inch.

C. Maximum Variation from True Elevation: $^1/_4$ inch.

3.05 - FIELD QUALITY CONTROL

A. Perform field-testing under provisions of Section 01450.

B. Perform compaction testing in accordance with ANSI/ASTM D1557 or ASTM D2922.

C. If tests indicate work does not meet specified requirements, remove work, replace, and re-test at no cost to the Owner.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Asphaltic concrete paving, including the wearing and binder courses.

1.02 - RELATED SECTIONS

A. Section 02312 - Rough Grading: Preparation of site for paving and base.

B. Section 02721 - Recycled Concrete Aggregate Base Course.

1.03 - REFERENCES

A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.

B. AI MS-8 - Asphalt Paving Manual.

C. ASTM D242 - Mineral Filler for Bituminous Paving Mixtures.

D. ASTM D546 - Test Method for Sieve Analysis of Mineral Filler for Road and Paving Materials.

1.04 - SUBMITTALS

A. Submit under provisions of Section 01330.

B. Supplier: Submit name of asphalt supplier to be used on the project prior to placement of any asphalt on the project.

C. Design Data: Submit asphalt mix design for each asphalt type to be used.

1.05 - DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products to the site under provisions of Section 01650.

B. Deliver asphalt in sealed metal containers covered with suitable material to protect the asphalt from the elements.

C. Lightly lubricate the inside surface of the container with a thin oil or soap solution before loading asphalt.

D. All containers must be cleaned of all foreign materials prior to loading.

1.06 - ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when base surface temperature is less than 40 degrees F (4 degrees C), or if surface is wet or frozen.

B. Do not place asphalt when precipitation is occurring.

PART 2 - PRODUCTS

2.01 - MATERIALS

A. Asphalt Cement: AC-20; homogeneous, and shall not foam when heated to 347º F.

B. Fine Aggregate: Material passing the 1/8 inch sieve; natural sand of hard, strong, durable particles which are free from coatings or injurious amounts of clay, loam or other deleterious substances.

C. Coarse Aggregate: Material retained on the 1/8-inch sieve; crushed stone or gravel; clean, durable, sharp angled fragments of rock of uniform quality.

D. Mineral Filler: ASTM D242, finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter; 100 percent shall pass the No. 30 sieve; a minimum of 85 percent shall pass the No. 80 sieve; and a minimum of 65 percent shall pass the No. 200 sieve as measured in accordance with ASTM D546.

2.02 - EQUIPMENT

A. Pavers: Equipped with a vibratory device.

B. Rollers: Minimum weight of 10 tons (89 kN) equipped with lubricating devices for the roller wheels.

2.03 - ACCESSORIES

A. Tack Coat: Homogeneous, medium curing, liquid asphalt.

B. Wheel Lubricant: Oil-water mixture containing maximum 10 percent lubricating oil.

2.04 - MIXES

A. Use dry material to avoid foaming. Mix uniformly.

B. Base Course: NYSDOT Type 1; 4.0 to 6.0 percent of asphalt cement by weight in mixture in accordance with the following gradation:

Sieve Size	Percent Passing
2 inches	100
1-1/2 inches	90-100
1 inch	78-95
1/2 inch	57-84
1/4 inch	40-72
1/8 inch	26-57
No. 20	12-36
No. 40	8-25
No. 80	4-16
No. 200	2-8

C. Binder Course: NYSDOT Type 3; 4.5 to 6.5 percent of asphalt cement by weight in mixture in accordance with the following gradation:

Sieve Size	Percent Passing
1-1/2 inches	100
1 inch	95-100
1/2 inch	70-90
1/4 inch	48-74
1/8 inch	32-62
No. 20	15-39
No. 40	8-27
No. 80	4-16
No. 200	2-8

D. Wearing Course: NYSDOT Type 6; 5.8 to 7.0 percent of asphalt cement by weight in mixture in accordance with the following gradation:

Sieve Size	Percent Passing
1 inch	100
1/2 inch	95-100
1/4 inch	65-85
1/8 inch	36-65
No. 20	15-39
No. 40	8-27
No. 80	4-16
No. 200	3-6

2.05 - SOURCE QUALITY CONTROL

A. Obtain asphalt materials from same source throughout the project.

B. Provide asphalt in accordance with the approved mix design for each type of asphalt.

C. Test samples in accordance with AI MS-2.

PART 3 - EXECUTION

3.01 - EXAMINATION

A. Verify existing substrate and conditions.

B. Verify that compacted subbase is dry and ready to receive work of this Section.

C. Verify gradients and elevations of base are correct.

D. Verify that all castings are properly installed and are at the correct elevations.

E. Beginning of installation means installer accepts existing conditions.

3.02 - PREPARATION

A. Apply tack coat at uniform rate of 0.03 to 0.07 gal/sq yd to contact surfaces of curbs, gutters and any asphalt or concrete material.

B. Do not apply tack coat to wet or frozen surfaces.

C. Coat surfaces of manhole and catch basin frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.03 - INSTALLATION

A. Install work in accordance with AI MS-8.

B. Maintain asphalt temperature between 250 and 325 degrees F during placement.

C. Place asphalt within 24 hours of applying tack coat.

D. Place asphalt to compacted thickness as identified on plans. If a multiple course pavement is to be used, place top course within 24 hours of placing bottom course. If more than 24 hours elapse, a tack coat will be required to be placed over the entire surface of the bottom course prior to any additional paving.

E. Utilize the vibratory device on the paver at all times.

F. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

G. Compact pavement to a minimum of 94% maximum density.

H. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.

I. Seal all joints between new pavement and existing pavement with asphalt cement.

3.04 - TOLERANCES

A. Maximum Variation From Flatness: $^1/_8$ inch measured with 10-foot straight edge.

B. Maximum Variation From Scheduled Compacted Thickness: $^1/_8$ inch.

C. Maximum Variation from True Elevation: $^1/_4$ inch.

3.05 - FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 01450.

B. Take samples and perform tests in accordance with AI MS-2.

C. Testing to include percent compaction, graduation and asphalt content.

D. Provide an asphalt thermometer for determining the asphalt temperature during paving operations.

E. Frequency of Tests: One test for every 1,000 square feet of each pavement course.

F. Field quality control laboratory tests will be paid for out of the cash allowance for testing services. Coordination with the testing lab shall be the Contractor's responsibility and be included in the price as bid.

3.06 - PROTECTION

A. Protect finished work under provisions of Section 01650.

B. Immediately after placement, protect pavement from mechanical injury until date of substantial completion.

END OF SECTION – 02740

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Concrete sidewalks including subgrade preparation.

B. Replace concrete sidewalks at the elevation that existed prior to the construction unless otherwise shown.

1.02 - RELATED SECTIONS

A. Section 02312 - Rough Grading

1.03 - REFERENCES

A. ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

B. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

C. ASTM C33 - Concrete Aggregates.

D. ASTM C94 - Ready Mix Concrete.

E. ASTM C150 - Portland Cement

F. ASTM C260 - Air-Entraining Admixtures for Concrete.

G. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

H. ASTM C494 - Chemical Admixtures for Concrete.

1.04 - SUBMITTALS

A. Submit under provisions of Section 01330.

B. Product Data: Provide data on joint filler, admixtures, and curing compounds.

C. Supplier: Submit name of concrete supplier prior to the placement of any concrete on the project.

D. Design Data: Provide a design mix for each type of concrete to be used on the project.

E. Certificates: Submit receipts of all concrete deliveries, indicating source, date, contractor, amount of concrete, concrete strength, truck number and time truck left plant.

1.05 - PROJECT RECORD DOCUMENTS

A. Accurately record locations of each day's concrete pour.

1.06 - QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain concrete only from approved suppliers and maintain the same source throughout the project.

1.07 - DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle products to the site under provisions of Section 01650.

B. Deliver concrete in accordance with ASTM C94, Alternative No. 2.

C. Place all concrete within 2 hours of time truck leaves batching plant.

1.08 - ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or if surface is wet or frozen.

PART 2 - PRODUCTS

2.01 - MATERIALS

A. Cement: ASTM C150, air entraining, Type 1A Portland, gray color.

B. Aggregates: ASTM C33.

C. Water: Potable and not detrimental to concrete.

D. Reinforcement: ASTM A1064 plain welded steel wire fabric; in flat sheets; uncoated finish.

2.02 - ACCESSORIES

A. Forms: Douglas Fir plywood type; solid, sound, undamaged sheets.

B. Joint Filler: ANSI/ASTM D1751; $^1/_2$ inch thick.

C. Joint Sealer: Sonneborne SL-2 or equal.

D. Air Entraining Admixture: ASTM C260.

E. Chemical Admixture: ASTM C494, type as required.

F. Curing Compound: ASTM C209, Type 1, Class A.

G. Form Release Agent: Colorless materials, which will not stain concrete or absorb moisture.

2.03 - MIXES

A. Mix and prepare concrete in accordance with the approved mix design and ASTM C94, Alternative No. 2.

B. The mix shall be such that the concrete shall attain the following characteristics:

1. Compressive Strength (28 days): 4000 psi.

2. Slump: 2-1/2 to 3-1/2 inches.

3. Air Entrainment: 4 to 8 percent.

C. Use chemical admixtures only when approved by the Engineer. Use of admixtures will not relax placement requirements.

PART 3 - EXECUTION

3.01 - EXAMINATION

A. Verify existing conditions and substrate under provisions of Section 01310.

B. Verify compacted granular subbase has been properly prepared and is ready to receive work of this Section.

C. Verify gradients and elevations of base are correct.

D. Beginning of installation means installer accepts existing conditions.

3.02 - PREPARATION

A. Compact base to minimum 95 percent maximum dry density in accordance with ANSI/ASTM D1557.

B. Moisten base to a minimum depth of 1/2 inch to minimize absorption of water from fresh concrete.

C. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.

D. Place and secure forms to correct location, dimension and profile.

E. Assemble formwork to permit easy stripping and dismantling without damaging concrete. Coat forms with form release agent.

3.03 - INSTALLATION

A. Place joint filler vertical in position in straight lines. Secure to formwork during concrete placement.

B. Place reinforcement as indicated on the plans. Interrupt reinforcement at expansion joints.

C. Place concrete in accordance with ACI 301.

D. Ensure reinforcement and formed joints are not disturbed during concrete placement.

E. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

F. Vibrate concrete adjacent to forms.

G. Place concrete with flag pattern with smooth sides.

H. Place expansion joints with joint filler at 20-foot intervals.

I. Place scored construction joints at 4-foot intervals.

J. Place joint filler between paving components and building or other appurtenances and in expansion joints.

K. Apply a light broom finish perpendicular to traffic.

L. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.04 - FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01450.

B. Cure test cylinders on site under same conditions as concrete sidewalk.

C. Take one slump test for each set of test cylinders taken. Concrete not meeting slump requirements will be rejected. Concrete represented by cylinders that do not meet required strength will be removed and replaced at no additional cost to the Owner.

3.05 - PROTECTION

A. Protect finished work under provisions of Section 01500.

B. Immediately after placement, protect sidewalk from premature drying, excessive temperatures and mechanical injury.

C. Protect sidewalk from damage until the sidewalk is accepted by the Owner, but shall not be before the point of Substantial Completion and release of retainage for this payment item. The date that the Owner signed the Certificate of Substantial Completion shall establish the limit of this protection requirement.

D. Repair all damage to all new sidewalk installed under the Contract regardless of the party who damaged it as stipulated above. It is the Contractor's responsibility to protect all sidewalks and to employ whatever means he/she deems necessary.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Finish grade subsoil.

B. Place, level and compact topsoil.

1.02 - RELATED SECTIONS

A. Section 02230 - Site Clearing

B. Section 02312 - Rough Grading

1.03 - DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle products to the site under provisions of Section 01650.

B. Deliver topsoil to the site in uncontaminated containers.

C. Place a tarp over stockpiled topsoil to protect from precipitation, erosion, and contamination. Also, comply with the erosion control measures specified in Section 02230 and Section 01568.

D. Stockpile topsoil in accordance with the requirements contained herein and in Section 02230.

1.04 - ENVIRONMENTAL REQUIREMENTS

A. Do not place wet or frozen topsoil.

B. Do not place topsoil on wet or frozen ground or when precipitation is occurring.

1.05 - COORDINATION

A. Coordinate with all adjacent work and work within areas to receive topsoil.

B. Coordinate the storage of topsoil with the placement of topsoil in this Section.

PART 2 - PRODUCTS

2.01 - MATERIALS

A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; friable loam; free of subsoil, clay or impurities, plants, weeds, roots, grass, stone and foreign matter; acidity range (pH) of 5.8 to 6.5; containing a minimum of 2.75 percent and a maximum of 25 percent organic matter. Topsoil may be reused from on-site if it meets these requirements.

PART 3 - EXECUTION

3.01 - EXAMINATION

A. Verify existing substrate and conditions.

B. Verify site conditions and note irregularities affecting work of this Section.

3.02 - PREPARATION

A. Prepare subsoil in accordance with Section 02312.

B. Eliminate uneven areas and low spots. Remove and dispose of debris, roots, branches and stones in excess of $^1/_2$ inch in size. Remove and dispose of subsoil contaminated with petroleum products.

C. Scarify subsoil to depth of 3 inches where topsoil is scheduled to be placed. Scarify all areas where heavy equipment was used and where the subgrade (subsoil) became compacted.

3.03 - INSTALLATION

A. Place topsoil in areas where seeding or planting is scheduled or where shown on the plans.

B. Place topsoil to the depth of 4 inches or as indicated on the plans.

C. Use topsoil in relatively dry state. Place during dry weather.

D. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.

E. Remove and dispose stone, roots, grass, weeds, debris, and foreign material while spreading.

F. Manually spread topsoil around trees, plants, and buildings to prevent damage.

G. Lightly roll placed topsoil.

H. Remove surplus subsoil and topsoil from site. Do not remove surplus topsoil from the site prior to obtaining approval of the Engineer.

I. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.04 - TOLERANCES

A. Maximum Variation from Proposed Elevation: $^1/_2$ inch.

3.05 - PROTECTION

A. Protect landscaping and other features remaining as final work.

B. Protect existing structures, fences, roads, sidewalks, paving, and curbs. Restore all damaged surfaces as specified elsewhere.

END OF SECTION

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Provide factory-built explosion proof grinder pump units including pumps, tank, controls and appurtenances.

B. Grinder pump units shall be controlled via the control panel furnished as products of this Section.

1.02 REFERENCES

A. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

1. American National Standards Institute:
    a. ANSI B2.1, Pipe Threads.
    b. ANSI B16.3, Malleable-Iron Screwed Fittings, 150 and 300 lb.
    c. ANSI C2, National Electrical Safety Code.
2. American Society for Testing and Materials:
    a. ASTM A 48, Specification for Gray Iron Castings.
    b. ASTM A 536, Specification for Ductile Iron Castings.
    c. ASTM B 62, Specification for Composition Bronze or Ounce Metal Castings.
    d. ASTM B 371, Specification for Copper-Zinc-Silicon Alloy Rod.
    e. ASTM B 584, Specification for Copper Alloy Sand Castings for General Applications.
    f. ASTM C 581, Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass Fiber Reinforced Structures, Intended for Liquid Service.
    g. ASTM C 582, Specification for Contact-Molded Reinforced Thermosetting Plastic (RTP) Laminates for Corrosion Resistant Equipment.
    h. ASTM D 1784, Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
    i. ASTM D 1785, Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Schedules 40, 80 and 120.
    j. ASTM D 2241, Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series).
    k. ASTM D 2466, Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

l. ASTM D 3139, Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

m. ASTM D 3299, Specification for Filament-Wound Glass Fiber Reinforced Polyester Chemical-Resistant Tanks.

n. ASTM F 477, Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

3. Federal Specifications:

a. Fed. Spec. WW-C-581D, Conduit, Metal, Rigid and Coupling Elbow and Nipple, Electrical Conduit, Zinc-Coated.

4. Institute of Electrical and Electronics Engineers.

5. National Bureau of Standards: Product Standard PS 15-69, Custom Molded Reinforced Polyester Chemical Resistant Process Equipment.

6. National Electrical Code (NEC).

7. National Electric Manufacturer's Association (NEMA) Standards of Construction.

8. National Fire Protection Association (NFPA): NFPA 70; National Electrical Code, and current amendments.

9. Underwriters' Laboratories (UL) Listings and Approvals on specified Products.

1.03 SYSTEM DESCRIPTION

A. The standards of the Hydraulic Institute shall define “pumping” and other terms.

B. All motors shall be completely non-overloading throughout the entire operating range of the pump.

C. Pumps shall be rated and have tests performed utilizing a water temperature of 68F.

D. All components of the station shall be designed for continuous duty.

E. Provisions shall be made for lubrication, adjustments, or replacement of all parts. Corresponding parts of multiple units shall be interchangeable.

F. Stainless steel nameplates shall be attached to each pump station giving pertinent design data, horsepower, voltage, phase, running amps, model, serial numbers, and manufacturer’s name.

G. The pump shall be of a semi-positive displacement type and be capable of delivering 7.8 gpm against a rated total dynamic head of 185 feet (80 psig). At zero head, the output shall be 15 gpm minimum. Each pump shall be capable of intermittent (3 minutes minimum) operation at negative total dynamic head without overloading the motor. The electrical rating of each pump shall be 1 Phase, 240 Volt, 60 Hertz and shall not exceed 30 amperes.

1.04 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Shop Drawings and Product Data: Submit integrated shop drawings for illustrating the mechanical and electrical equipment and components specified herein.

1. Product Data: For each mechanical and electrical component, include manufacturer's descriptive literature, product specifications, published details, technical bulletins, charts, and schedules, catalog data sheets, and other submittal materials as required to verify that the proposed products conform to the quality and function of the specified.
2. Identification: Clearly indicate by an arrow on submissions covering more than one product type or style exactly which product is being submitted for approval.
3. Manufacturer: Include the catalog name, company name, address, and telephone number for each product submitted.
4. Equipment Drawings: Submit completely dimensioned plan, elevations, and cross-sections of system equipment and sub-assemblies.
5. Layout Drawing: Submit completely dimensioned drawings of cover assembly that includes foundation details, anchor bolt size and patterns, supports, installation notes, and other pertinent setting details.
6. Product List: Provide a list of equipment and components on each drawing with each product identified by legend reference. Include product name, manufacturer, and model number.
7. Wiring Diagrams: Submit complete interconnecting wiring diagrams and schedules for electrical apparatus showing numbered wiring terminals in the control panels conforming to NEMA ICS-1-101. Identify field device terminals, wire number, wire sizes, control and power wire types, and interfaced elements.
8. Submit evidence of Underwriters' Laboratories (UL) Listings and Approvals on the electrical control panel and grinder pump.
9. Operations and Maintenance (O&M) Manuals identified in Paragraph 1.07.
10. The product of a manufacturer who does not maintain an adequate nearby service center and a sufficient stock of spare parts is subject to rejection by Engineer solely on that basis. With each submission, submit information on manufacturer's facilities and give complete details of his service policies and capabilities, and a general idea of the stock of spare parts available. Submit this information in the form of a certification. Also include names, addresses and telephone numbers of at least three of the service center's present customers who are in the area of the project.

11. Printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
12. Performance and Testing Procedures: Submit a complete outline and sequence of proposed testing procedure including at least the following information.
    a. Testing schedule of proposed dates and times for testing.
    b. Outline specific assignment of the responsibilities of the Contractor and manufacturers' factory representatives or field service personnel.
    c. Detailed description of step-by-step testing requirements, with reference to appropriate standardized testing procedures and laboratory analyses by established technical organizations (e.g., ASTM, WPCF Standard Methods, etc).
    d. Samples of forms to be used to collect and record test data and to present tabulated test results.

C. Submit the following as specified in each section below:
1. Certificates:
    a. Submit certified records or reports of results of shop tests for each Unit. Such records or reports shall contain a sworn statement that shop tests have been made as specified.
    b. Submit manufacturer's sworn certification that components and products will be manufactured in accordance with specified reference standards for components.
2. Certified Testing Reports: Prior to shipment of the equipment from the manufacturer's facility, submit the following certified test reports to the Engineer for approval:
    a. Factory run pump performance tests in accordance with the standards in the Hydraulic Institute. Characteristics of pumps may have a tolerance of plus 10 percent of rated capacity at rated head or plus 5 percent of rated head at rated capacity. No minus tolerance will be acceptable. Give the Engineer seven days advance notice of performance test date.
    b. Factory run short commercial motor test. Perform the following tests to determine that motor is free from electrical or mechanical defects and to provide assurance that it meets design specifications:
        (1) No load current
        (2) Locked-rotor current
        (3) Winding resistance
        (4) High potential
        (5) Bearing inspection
3. Installation Certificate: Submit a certificate from the pump manufacturer, or from the manufacturer's qualified, factory-authorized representative, stating that the installed

equipment has been inspected, adjusted, approved, and certified to be satisfactory prior to Initial Mechanical Performance Testing.

4. Warranty Certificate in the form specified herein.
5. Manufacturer Startup Reports (MSR's) for the pump station and panel.

1.05 QUALITY ASSURANCE

A. Grinder pump unit, control panel and accessories specified herein shall be furnished by one single supplier. This requires the supplier to be responsible for the development, design, fabrication, assembly, delivery, and proper sustained operation of the residential grinder pump systems.

B. Consideration will only be given to manufacturers who can demonstrate that their equipment complies with these Specifications having had successful and documented experience of the size, quality, performance and reliability to that specified, and who can successfully demonstrate this criteria to the Engineer and meet the following qualifications:

1. Twenty (20) years minimum experience producing semi-positive displacement grinder pump units of equal quality and quantity to the type specified herein.
2. Twenty (20) years minimum experience of in-service, satisfactorily operating semi-positive displacement grinder pump units of the type specified herein.
3. Experience with a minimum 1,000-pump semi-positive displacement grinder pump system operating at least ten (10) years on similar terrain.
4. Manufactured grinder pump units shall have been tested to certify capability to perform, as specified herein, in either individual or low-pressure sewer system applications.
5. Submit historical and certified data and related maintenance records substantiating the above qualifications.
6. Submission of a third-party certification indicating that the manufacturer's hydraulic model and engineering report has been calibrated and examined relative to accuracy.

C. The system shall be designed, furnished, and installed to achieve the conditions of service specified herein.

1.06 OPERATION AND MAINTENANCE MANUALS

A. Submit Operations and Maintenance Manuals under provisions of Section 01782.

1.07 DELIVERY, STORAGE AND HANDLING

A. All equipment shall be delivered and stored in accordance with the manufacturer's recommendations.

B. All equipment deliveries shall be accompanied with a parts list listing the part description and its corresponding parts number. All parts shall be packaged and listed separately. The part number(s) shall be written on the package or container.

C. Spare parts shall be packaged in a separate box, envelope or crate with the words "SPARE PART" printed on all sides of the container. Also, write the name of the facility on the container.

D. The equipment shall be unloaded by the supplier and stored at the location selected by the Contractor. Deliveries will not be accepted on weekends.

E. Do not use tape on equipment components.

F. All pump stations shall be delivered 100% completely assembled, including testing, ready for installation.

G. Ship all equipment with installation instructions contained in a watertight, plastic and zippered envelope. Installation instructions shall be furnished with each unit delivered.

H. Control panels shall be shipped with the wiring diagram. The diagram shall be waterproof, plastic type; pressure sensitive decals attached to the inside of the panel door.

1.08 WARRANTY

Provide a Warranty Certificate typed on company letterhead and signed by an authorized officer of the manufacturer. The certificate shall be witnessed by a notary public in the state in which the company headquarters is located. The Warranty Certificate shall be submitted, verbatim and without exception, as follows:

"*(Name of Manufacturer)* guarantees all components of the station to be free from defects in design, materials and workmanship for a period of five (5) years commencing on the date the system was delivered.

During the guarantee period, if any part or equipment component is defective or fails to perform when operating at design conditions and if the equipment has been installed and is being operated and maintained in accordance with the written instructions we provided, then we shall repair or exchange such defective part(s).

The replacement or repair of parts normally consumed in service shall include lubrication. Only lubrication shall be considered as part of routine maintenance and upkeep and shall not be considered eligible for exchange free of charge under this Warranty.

Agreed upon this _____ day
(date)
by _____ of
(name of authorized agent)
_____, who,
(name of manufacturer)

by signing this document, affirms that he/she is legally authorized to submit this warranty on behalf of the supplier.

_____ _____
AUTHORIZED SIGNATURE DATE

_____
NOTARY

1.09 FIELD SERVICES

A. The following field services shall be provided as a minimum:

1. One (1) day totaling one (1) trip to review procedures to install the sewer system. Topics discussed shall include locating sewer systems, tank installation, concrete anchor installation, inlet and discharge pipe installation, backfill requirements, venting, electrical connections, debris removal and test procedure.
2. One (1) day, one (1) trip, for each installed system to check the completed installation, make all necessary adjustments and otherwise place the system into permanent operation. During the site visit, and before substantial completion, provide operation and maintenance instruction to the Owner. A complete review of the operations and maintenance manual shall be presented at this time. The Contractor shall coordinate all startup activities. The wiring between the control panel and the GPU work shall be verified by the representative.

1.10 SPARE PARTS

A. Spare parts shall be furnished under this contract as follows:
   1. One (1) Pump/Core
   2. One (1) kit containing key components of the pump assembly to include as a minimum: impeller, grinder assembly, shaft seal(s), motor and all necessary gaskets.
   3. One year's supply of lubrication.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Environment One Corporation

B. Or approved equal

2.02 MANUFACTURED UNITS

A. Pump
   1. The explosion proof pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with a single mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. All pump castings shall be cast iron, fully epoxy coated to 8-10 mil nominal dry thickness, wet applied. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.

B. Grinder
   1. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft. The grinder impeller assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. The grinder impeller shall be a one-piece, 4140 cutter wheel of the rotating type with inductively hardened cutter teeth. The cutter teeth shall be inductively hardened to Rockwell 55 – 58c for abrasion resistance. The shredder ring shall be of the

stationary type and the material shall be white cast iron. The teeth shall be ground into the material to achieve effective grinding. The shredder ring shall have a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque.

2. The grinder assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to minimize clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:
   a. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.
   b. The maximum flow rate through the cutting mechanism must not exceed 4 feet per second.
   c. The inlet shroud shall have a diameter of no less than 5 inches. Inlet shrouds that are less than 5 inches in diameter will not be accepted due to their inability to maintain the specified 4 feet per second maximum inlet velocity which by design prevents unnecessary jamming of the cutter mechanism and minimizes blinding of the pump by large objects that block the inlet shroud.
   d. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.
3. The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of “foreign objects,” such as paper, wood, plastic, glass, wipes, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter stainless steel discharge piping.

C. Electric Motor: As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt, 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F installation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. The motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted because of their reduced starting torque and consequent diminished grinding capability. The wet portion of the motor armature shall be 300 Series stainless. To reduce the potential of environmental concerns, the expense of handling and disposing of oil, and the associated maintenance costs, oil- filled motors will not be accepted

D. Mechanical Seal: The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring

E. Tank and Integral Accessway

1. The tank shall be a Wetwell/Drywell design made of fiberglass reinforced polyester resin with a high density polyethylene accessway. Accessway corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. The corrugations of the outside wall are to be a minimum amplitude of 1-1/2" to provide necessary transverse stiffness. Any incidental sections of a single wall construction are to be 0.250” thick (minimum). All polyethylene seams created during tank construction are to be thermally welded and factory tested for leak tightness. The tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure.
2. The tank shall be furnished with one EPDM grommet fitting to accept a 4.50" OD DWV or Schedule 40 pipe.
3. The Drywell access way shall be an integral extension of the wetwell assembly and shall include a watertight lockable cover assembly providing low profile mounting rated for 2.5 feet of water. The cover shall be high density polyethylene, green in color, with a load rating of 150 lbs per square foot. The unit shall be furnished with factory installed EPDM grommet fitting to accept 2-inch PVC lateral vent (vent piping by Contractor).
4. The station shall have all necessary penetrations molded in and factory sealed. No field penetrations shall be acceptable.
5. All discharge piping shall be constructed of 304 stainless steel. The discharge shall terminate outside the access way bulkhead with a stainless steel, 1-1/4” Female NPT fitting. The discharge piping shall include a stainless steel ball valve rated for 235 psi WOG. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.
6. The capacity of the tank from the invert to the connection elevation to the structure shall not be less than the size indicated on the drawings.
7. The access way shall include a single NEMA 6P Electrical Quick Disconnect (EQD) for all power and control functions, factory installed with access way penetrations warranted by the manufacturer to be watertight. The EQD will be supplied with 50 feet of Electrical Supply Cable (ESC) to connect to the control panel. The ESC shall be installed in the basin by the manufacturer. Field assembly of the ESC into the basin is not acceptable because of potential workmanship issues. The EQD shall require no tools for connecting, seal against water before the electrical connection is made, and include radial seals to assure a

watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. A junction box shall not be permitted in the access way due to the large number of potential leak points. The EQD shall be so designed to be conducive to field wiring as required. The access way shall also include an integral 2-inch vent to prevent sewage gases from accumulating in the tank.

F. Check Valve: The pump discharge shall be equipped with a factory installed, gravity operated, flapper- type integral check valve built into the stainless steel discharge piping. The check valve shall provide a full-ported passageway when open and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 Series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low backpressure. The valve body shall be an injection molded part made of an engineered thermoplastic resin. The valve shall be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.

G. Anti-Siphon Valve: The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper- type integral anti-siphon valve built into the stainless steel discharge piping. Moving parts shall be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. The valve body shall be injection-molded from an engineered thermoplastic resin. Holes or ports in the discharge piping are not acceptable anti-siphon devices due to their tendency to clog from the solids in the slurry being pumped. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping

H. Core Unit: The grinder pump station shall have a cartridge type, easily removable core assembly consisting of pump, motor, grinder, all motor controls, check valve, anti-siphon valve, level controls, electrical quick disconnect and wiring. The core unit shall be installed in the basin by the manufacturer. Field assembly of the pump and controls into the basin is not acceptable because of potential workmanship issues and increased installation time. In some cases, stations taller than 96” may be shipped on their side without the cores assembled in the basin for freight purposes but this is the only exception. The core unit shall seal to the tank deck with a stainless steel latch assembly. The latch assembly must be actuated utilizing a single quick release mechanism requiring no more than a half turn of a wrench. The watertight integrity of each core unit shall be established by a 100 percent factory test at a minimum of 5 PSIG.

I. Controls

1. All necessary motor starting controls shall be located in the cast iron enclosure of the core unit secured by stainless steel fasteners. The wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. The level sensor housing must be sealed via a radial type seal. The level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. The level sensing housing must be a high-impact thermoplastic copolymer over-molded with a thermo plastic elastomer. The use of PVC for the level sensing housing is not acceptable.
2. Non-fouling wastewater level controls for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be integrally molded from a thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be sealed radially with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be integral to the pump core assembly in a single, readily-exchanged unit.
3. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump.
4. All fasteners throughout the assembly shall be 300 Series stainless steel. High-level sensing will be accomplished in the manner detailed above by a separate air column sensor and pressure switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted due to the periodic need to maintain (rinsing, cleaning) such devices and their tendency to malfunction because of incorrect wiring, tangling, grease buildup, and mechanical cord fatigue. To assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes. Tube or piping runs outside of the station tank or into tank-mounted junction boxes providing pressure switch equalization will not be permitted due to their susceptibility to condensation, kinking, pinching, and insect infestation. The grinder pump will be furnished with a 6 conductor 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a factory installed NEMA 6P EQD half attached to it.

J. Control Panel

1. Each grinder pump station shall include a NEMA 4X, UL-listed Sentry Duplex Protect Plus alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic to ensure corrosion resistance with the door gasket shall be a seamless foam-in-place type. The enclosure shall be light gray color and include a hinged, lockable cover keyed alike for Owner access, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The enclosure shall have back plate mounting studs, door latches and continuous hinge, all of stainless steel. The duplex control panel shall include a red alarm light, H-O-A switch, audible alarm with push to silence switch, and LED pump run light.
2. All components shall be securely mounted to the back plate with stainless steel screws through machine thread tapped holes in the back plate. The screws shall be of adequate size for the device being secured.
3. The panel shall contain one 15-amp single pole circuit breaker for the alarm circuit and one 15-amp double pole circuit breaker per core for the power circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.
4. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump.
5. Generator receptacle with automatic transfer relay. Control panel shall incorporate a gasketed type, 4 pole, 30 amp receptacle with NEMA L 14-30 configuration and a 30 amp transfer relay. When the receptacle is energized the relay will transfer power from the main supply to emergency mode automatically with no need for personnel to open the control panel door. When the generator is disconnected from the control panel the power feed will automatically transfer back to the main supply.
6. The visual alarm lamp shall be red. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).
7. The high-level alarm system shall operate as follows:
    a. The panel will go into alarm mode if either pump’s alarm switch closes. During the initial alarm mode both pumps will run and the alarm light and buzzer will be delayed for a period of time based on user settings (default is 3.5 minutes). If the station is still in high-level alarm after the delay, the light and buzzer with be activated.

b. The audible alarm may be silenced by means of the externally mounted push-to-silence button.

c. The visual alarm remains illuminated until the sewage level in the wet well drops below the “off” setting of the alarm switch for both pumps.

8. The control panel shall include a 15-amp breaker with 120V ground fault receptacle.

9. The entire alarm panel shall be listed by Underwriters Laboratories, Inc.

10. Contains the following features:

a. Alarm Activated Dry Contacts – Normally open relay contact closes upon alarm activation

b. Alarm Activated Contacts for Remote Indoor Alarm Module – will work with or without power to the alarm panel and is designed to work with E/One’s Remote Sentry.

c. Includes Inner Door Dead Front

d. Separate LED’s for each condition

11. Low Voltage (Brownout) Protection

a. A lockout cycle shall prevent the motor from operating and shall illuminate the Trouble LED if

(1) the incoming AC Mains voltage drops below a predetermined minimum, typically 12% of nameplate voltage for 2 to 3 seconds, regardless of whether the motor is running.

(2) The lockout cycle will end if the incoming AC Mains voltage returns to the predetermined value, typically 10% of the nameplate voltage.

b. The system continues to retest the voltage every second indefinitely. If the lockout cycle has been initiated and the voltage comes back above the predetermined starting voltage, the system will function normally. The Trouble LED remains illuminated during a Brownout condition and a corresponding Brownout message will be displayed on the LCD screen. The LED will turn off when the Brownout condition ends and the LCD message remains latched until the panel is reset. The audible and visual alarm will not be activated unless there is a high wastewater level in the tank.

12. Run dry protection

a. A 20-minute lockout cycle shall prevent the motor from operating and shall illuminate the Trouble LED when the wastewater level in the tank is below the pump inlet shroud. A corresponding Run Dry message shall be displayed on the LCD screen. The condition is rechecked every 20 minutes and the LCD message remains latched. If the condition is satisfied, the pump is allowed to cycle normally and the Trouble LED shall go out, but the LCD message remains latched. The LCD

message shall remain latched until the panel is reset. If the condition is not satisfied after 3 consecutive attempts, the visual alarm will be activated until the panel is reset or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle shall be activated.

13. High system pressure protection

    a. A 20-minute lockout cycle shall prevent the motor from operating and shall illuminate the Trouble LED when the pressure in the discharge line is atypically high (closed valve or abnormal line plug). A corresponding Overpressure message shall be displayed on the LCD screen. The condition shall be rechecked every 20 minutes. If the condition is satisfied, the pump shall be allowed to cycle normally and the Trouble LED shall turn off, but the LCD message remains latched. The LCD message shall remain latched until the panel is reset. If the condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely and the audible and visual alarm will be activated. The LCD message and alarms shall remain latched until the condition is removed and the panel is reset.

14. Additional Features

    a. The Control Panel shall include the following features for all pumps:

        (1) High/Low Voltage monitoring with Trouble indication
        (2) High/Low Wattage monitoring with Trouble indication
        (3) Extended Run Time monitoring with Trouble indication
        (4) Cycle/Event Counter
        (5) Run Time Counter (Hour Meter)
        (6) Run Time Limit — time adjustable, user-selected options: 10 minutes (default) to 120 minutes in 1-minute intervals
        (7) Power-up Delay — time adjustable, user-selected options: None (default), to 300 minutes in 1-minute intervals
        (8) Alarm Delay — time adjustable, user-selected options: zero to 10 minutes in 30- second increments; 4 minutes is default
        (9) Duplex Mode Selection shall have an alternation duration of 24 to 72 hours with lead / lag alternation on demand.
        (10) System self-test diagnostic
        (11) User-selectable Alarm latch
        (12) User-selectable Protect Mode disable
        (13) User-selectable buzzer timer
        (14) Ready LED to indicate AC power to the station is satisfactory
        (15) Pump Run LED to indicate pump is operating

(16) Trouble LED indicator and predictive Visual Alarm notification (“blinking” alarm lamp; clears on Normal cycle)

(17) High Level Alarm LED indicator

(18) Manual Run switch to manually activate pump

(19) Menu-driven programmable controller with navigation overlay-type buttons (Enter, Scroll, Up, Down)

(20) Normal Operation LED and Mode button for Mode status

(21) Pump Performance menu LED with LCD Display of the following pump performance statistics:

- Real-time Voltage
- Real-time Amperage
- Real-time Wattage
- Minimum/Maximum/Average Voltage
- Minimum/Maximum/Average Amperage
- Minimum/Maximum/Average Wattage
- Minimum/Maximum Run-time
- Average Run-time
- Last Run-time
- Cycle/Event Counter
- Run Time Counter (Hour Meter)

(22) Diagnostics Menu LED

(23) Initialize System Menu LED

(24) Run Limit Menu LED

(25) Alarm Delay Menu LED

(26) Power Delay Menu LED

K. Serviceability: The grinder pump core, including level sensor assembly, shall have two lifting hooks complete with lift-out harness connected to its top housing to facilitate easy core removal when necessary. The level sensor assembly must be easily removed from the pump assembly for service or replacement. All mechanical and electrical connections must provide easy disconnect capability for core unit removal and installation. Each EQD half must include a water-tight cover to protect the internal electrical pins while the EQD is unplugged. A pump push-to-run feature will be provided for field trouble shooting. The push-to-run feature must operate the pump even if the level sensor assembly has been removed from the pump assembly. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

L. Safety

1. The grinder pump shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled and wired grinder pump station shall be listed by Underwriters Laboratories, Inc. to be safe and appropriate for the intended use. UL listing of components of the station, or third-party testing to UL standard are not acceptable.
2. The grinder pump shall meet accepted standards for plumbing equipment for use in or near residences, shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low-pressure sewer system applications. As evidence of compliance with this requirement, the grinder pump shall bear the seal of NSF International.

2.09 ACCESSORIES

A. Lateral Assembly Kit
1. Each pump unit shall be equipped with an integrated check valve, ball valve and cleanout assembly installed between the pump station and sewer main. The assembly shall be constructed of Type 304 stainless steel and designed for use with HDPE and PVC pressure sewer piping. The lateral assembly shall be field serviceable with a top-access service port to check valve and hinge pin.
2. The assembly kit shall prevent backflow from the sewer main into the grinder pump station and be supplied with 1-1/4” female NPT fittings on each end.
3. All lateral kits shall be designed and tested by the equipment manufacturer to handle 235 psi of service pressure, minimum.

2.10 SOURCE QUALITY CONTROL

A. General: Each grinder pump shall be submerged and operated for five (5) minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge assembly, and each unit’s dedicated level controls and motor. All factory tests shall incorporate each of the above listed items.
1. Actual appurtenances and controls, which will be installed in the field, shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps will not be acceptable.
2. Certified test results shall be available upon request showing the operation of each grinder pump at two (2) different points on its curve, with the maximum pressure no less than 80 psi.
3. All completed stations shall be factory leak tested to assure the integrity of all joints, seams and penetrations. All necessary penetrations such as inlets, discharge fittings and cable

connectors shall be included in this test along with their respective sealing means (grommets, gaskets etc.).

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install grinder pump units as specified herein and as detailed on the drawings.

3.02 FIELD QUALITY CONTROL

A. Test each electric motor and record operating voltage and amperage. Record megohm of insulation. Record pump on and pump off elevations. Check operation of high-level alarm light, audible alarm and silence switch. Confirm leak free discharge connection. Verify there is no unusual noise and vibration during pump operation. Have the representative of GPU manufacturers record this information on the manufacturer's startup report (MSR).

B. Submit the MSR for each GPU startup for record purposes. Record the model number, serial number, and nameplate data on each MSR. Separate MSR's shall be provided for each GPU.

C. Coordinate checking pump rotation in the presence of the GPU manufacturer's representative.

D. Performance Test: Demonstrate to the satisfaction of the Engineer, the mechanical performance of each unit when operated in accordance with the design intent indicated by the Drawings and described in this Section of the Specifications.

1. Connect 120V temporary power source to the alarm circuit at the control panel.
2. Provide water to fill the tank to test the high level audible and visual alarms at the control panel. Verify that the alarm event is properly received and sent by the telemetry system.
3. Connect 240V temporary power source utilizing a minimum 6500 watt generator to the emergency generator receptacle at the control panel and run the unit through a minimum of three operation cycles to check pump operation and shut-off. Verify that the run events are properly received by the telemetry system.
4. If the demonstrations are satisfactory to the Engineer, the test will be considered concluded. If deficiencies are found, correct as follows and repeat test until the Engineer determines that the unit has performed satisfactorily.
    a. GPU manufacturer to correct pump, internal piping and control panel deficiencies.
    b. Contractor shall correct installation deficiencies.

E. Electrical Systems Test: Perform tests and trials in the presence of a duly authorized representative of the Engineer. When the presence of such representative is so waived, furnish to the Engineer sworn statements, in duplicate, of the tests made and the results thereof.

1. Testing: Test materials, supplies and parts and assemblies thereof in conformity with the best currently approved method for the particular type and class of work.
2. Render the entire installation free from short circuits and improper grounds. Test feeders cable disconnected from the power source. Then test the entire power circuit and the panel with the pumping equipment operating. In no case, shall the insulation resistance be less than one hundred thousand ohms.
3. Perform initial electrical system tests using meggers, ammeters, voltmeters, insulation resistance testers, and high-pot testers prior to placing electrical systems into complete operation.
    a. Use meggers with an adjustable 2.5/5.0 KV range which will permit reading of 0.05 to 100,000 Megohms. The minimum testing voltage obtained by adding 1000 volts to twice the rated voltage of the cable, device, apparatus or equipment. In no case shall the insulation resistance be less than one Megohm, however the recommended insulation resistance measurements of each test shall conform to IEEE and ANSI Standards.
4. Correct failures in a manner satisfactory to the Engineer or his authorized representative.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. General:

1. Provide a complete electrical installation including all labor, equipment, materials, machinery, tools, transportation, procurement of all necessary permits, certificates, and other incidental services, whether described in these Contract Documents or not, to provide a satisfactorily operating electrical installation.

2. Perform all operations necessary to install, equip, adjust, and place into satisfactory operation all electrical equipment. Connect the various elements of the project to form a complete and properly operating system.

B. The principal items of electrical work include, but are not necessarily limited to the following:

1. Furnishing and pulling all cables, furnishing and installing all conduit grounding and related fittings for completing the installation of all electrically operated equipment.

2. Furnishing and installing all switches, conduit, grounding and related fittings as well as certain cables for completing the installation of all electrically operated equipment, controls, safety devices, alarms, instrumentation,.

3. Short circuit and relay coordination study and adjustment of all protective and metering devices for the electrical system.

1.02 - RELATED WORK

A. Concrete slabs, foundations, pads, and miscellaneous metal work required for equipment furnished under this contract.

B. Flashing and sealing of conduits through outside and interior walls.

1.03 - QUALITY ASSURANCE

A. It is understood that the rights and benefits given the Owner by the guarantees found in the technical specifications are in addition to and not in derogation of any rights or benefits found in the general conditions of the Contract.

B. Electrical equipment provided under this Contract shall be turned over in a sustained and proper operating condition. Instruction on further operation and maintenance shall be included in the

operating and maintenance instructions.

1.04 - REFERENCES

A. Perform work in accordance with standards listed below. Where these specifications are more stringent, they take precedence. In case of conflict, obtain a decision from the Engineer.

1. NFPA-70: National Electrical Code
2. NFPA-101: Life Safety Code
3. NFPA-820: Fire Protection in Wastewater Treatment and Collection Facilities
4. New York State Energy Code
5. New York State Building Code
6. Applicable New York State Administrative Code
7. Applicable Town Ordinances.
8. Long Island Power Authority rules and regulations.
9. I.S.A.: Instrument Society of America
10. U.L.: Underwriters Laboratories.
11. N.E.M.A.: National Electrical Manufacturers Association
12. O.S.H.A.: Occupational Safety and Health Administration
13. A.N.S.I.: American National Standards Institute
14. J.I.C.: Joint Industrial Council
15. I.E.E.E.: Institute of Electrical and Electronic Engineers.
16. F.M.: Factory Mutual.
17. Telephone Utility Company

1.05 - EXISTING CONDITIONS AND RELOCATIONS

A. The bidder, before submitting his proposal, shall visit the site and shall be responsible for having

ascertained local conditions, such as location, accessibility and general character of the site, the character and extent of any existing work within or adjacent to the site, and any other work being performed on the site at the time of submitting his proposal.

B. The bidder shall also fully examine all the drawings, including drawings of other contracts related to this project and relating to the work and shall become completely informed as to the extent and character of the new work required and prevailing existing conditions. No consideration or allowance will be made for the Contractor's failure to avail himself of such information.

PART 2 - PRODUCTS

2.01 - MATERIALS AND EQUIPMENT

A. All materials and equipment used in carrying out these specifications shall be new and be UL listed and labeled.

PART 3 - EXECUTION

3.01 - COORDINATION

A. Examine specifications, Contract Drawings, drawings prepared for other contracts, specifications of other contracts, the project site, and existing electrical system to become thoroughly familiar with items that require electrical connections and coordination. Electrical drawings are diagrammatic and shall not be scaled.

B. Notify other contractors of any deviations or special conditions necessary for the installation of work. The Engineer prior to installation will resolve interferences between work of various contractors. Work installed not in compliance with specifications and drawings and without properly checking and coordinating as specified above shall, if necessary, be removed and properly reinstalled without additional cost to the Owner.

C. Equipment shall be installed in accordance with manufacturer's recommendation. Where conflicts occur between Contract Documents and these recommendations, a clarification shall be requested of the Engineer for decision before proceeding with such work.

D. Insofar as it is possible to determine in advance, advise masonry tradesmen to leave proper chases and openings. Place all outlets, anchors, sleeves, and supports prior to pouring concrete or installation of masonry work. Should the Contractor neglect doing this, any cutting and/or patching required to be done is at this Contractor's expense.

3.02 - CUTTING AND PATCHING

A. Repair or replace routine damage caused by cutting in performance of work under this contract.

B. Correct unnecessary damage caused due to installation of electrical work, brought about through carelessness or lack of coordination.

C. Holes cut through floor slabs shall be core drilled with drill designed for this purpose. All openings, sleeves, and holes in slabs shall be properly sealed, fire proofed and waterproofed.

D. Repairs shall be performed with materials that match existing materials and to be installed in accordance with appropriate sections of these specifications.

3.03 - TESTS

A. On completion of work, installation shall be completely operational and entirely free from ground, short circuits, and open circuits. Perform a thorough operational test in presence of the Engineer. Balance all circuits so that feeders to panels are not more than 10% out of balance between phases with all available load energized and operating. Furnish all labor, materials, and instruments for above tests.

B. Furnish Engineer with a copy of such tests including identification of each circuit and readings recorded, also the main service ground resistance test as described in Section 16060 – Grounding and Bonding of these specifications. Test information to include ampere readings of all panel circuit breakers, and isolation resistance reading of motors and transformers.

3.04 - IDENTIFICATION OF EQUIPMENT

A. Properly identify the following in accordance with the details on the Drawings and the requirements contained in Section 16075 – Electrical Identification:

1. Circuit breaker panels and individually mounted circuit breakers

2. Disconnect switches

3. Telephone pull boxes

4. Power / Control pull stations

3.05 - INSTALLATION

A. Carefully move and replace equipment, appliances and all related items, as required to conduct proposed work.

B. Install and conduct all work per applicable NEC, State and local codes.

C. Mounting of equipment to handrails shall not be permitted. All local devices, such as disconnect switches, receptacles, transmitters, and local control stations shall be frame mounted and be self-supporting.

D. Conduits for power and controls shall be run in masonry walls or embedded in or below concrete slabs and foundation walls where such work is inside a new building. Exposed conduits in process type areas will only be allowed for joist mounted lighting distribution and unit heaters. Exposed conduits in pipe trenches may be allowed with the prior approval of the Engineer.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.02 - REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

1.03 - REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 - COMPONENTS

A. Ground clamps: OZ ELECTRICAL MANUFACTURING COMPANY, Type "CG", or equal by STEEL CITY or APPLETON.

B. Raceways, conductors, outlet boxes, pull and junction boxes to be furnished in accordance with applicable sections of these specifications.

C. Rod Electrode: Copper, 3/4-inch diameter, 10 feet long.

D. Wire: Copper, sized to meet NFPA 70 requirements.

PART 3 - EXECUTION

3.01 - INSTALLATION

A. General:

1. Clean all conductive surfaces on equipment to be grounded, to assure good electrical continuity.

2. Effectively bond all grounding conductors to grounding rod electrodes, equipment enclosures and ground busses.

3. Locate all grounding attachments away from areas subject to physical damage. Provide protective covering as required.

4. Install service entrance building ground in accordance with NEC and electric utility requirements.

5. Service entrance shall be bonded to street side of first flange or coupling of incoming main water line with heavy duty ground clamp. Bonding conductor to be sized in accordance with NFPA 70.

B. Feeder/Branch Circuits:

1. All circuits shall have a separate green grounding conductor in conduit sized in accordance with NFPA 70. Minimum size of conductor shall be No. 12 AWG.

2. Flexible conduit will not be approved as achieving continuity of ground. All flexible conduit to have a jumper wire sized to ampacity of branch breaker and to be connected to conduit system on both ends; this applies to fixtures, motors, controls, etc.

3.02 - TEST

A. Test ground on main service. Ground system resistance shall be no greater than 10 ohms using test equipment similar to a "Biddle" test. Test data to be submitted to the Engineer for approval and such approved test data to become a part of the Record Documents.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. System of supporting devices and hangers for support or bracing for conduit, electrical equipment, fixtures, panelboards, outlet boxes, junction boxes and cabinets.

B. All exposed hardware, hangers, supports, rods, frames, angles, channels, brackets, and any other system, regardless of application, location, or purpose shall be stainless steel.

C. Mounting of electrical devices to handrailing shall not be permitted. All local disconnect switches, pull boxes, transmitters, panels, and junction boxes shall be frame mounted.

D. Hardware used to anchor supports to concrete or masonry shall be stainless steel.

E. Conduit sleeves set in concrete shall be carbon steel with bitumastic coating, inside and outside.

F. Minimum size of threaded rod shall be ¼-inch diameter. All threaded rod shall be type 316 stainless steel.

G. Definitions:

1. Exterior locations shall be locations defined as exposed to outside conditions, located outdoors, located within process tanks, channels, wells, pits and the like.

2. Interior locations shall be areas located within buildings, lean-to structures or the like.

3. Exposed locations are locations that are not concealed within walls and slabs.

H. Provide all labor, equipment and material necessary to furnish, and install supporting devices complete, in place, as shown on the Contract Drawings, specified herein and approved by the Engineer.

I. In general, the supporting devices included under this Section shall include, but not be limited to the following:

1. Channels, fittings, and brackets

2. Conduit supports

3. Concrete inserts

4. Beam clamps and hanger rod or threaded rod supports

1.02 - RELATED SECTIONS

A. Section 16132 – Boxes and Troughs

B. Section 16134 - Conduit

1.03 - REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

1.04 - SUBMITTALS

A. Submit product catalog cuts in accordance with the requirements contained in Section 01330 – Submittals.

PART 2 – PRODUCTS

2.01 - GENERAL

A. The following sections describe typical supporting devices such as channels, fittings, and brackets. Not all possible components are listed. Furnish and install all required items based on the specification of products listed below.

2.02 - MATERIALS

A. Channels shall be type 316 stainless steel. Channels shall have a minimum thickness of 12 gauge. The cross sectional width dimension shall be 1-1/2" minimum. The depth shall be as required to satisfy load requirements.

B. Attachment holes, when required, shall be factory punched on hole centers approximately equal to the cross sectional width and shall be 9/16" in diameter.

C. Fittings and brackets shall have 9/16" diameter holes on centers identical to the channel or as required to align with the channel holes. Fittings and brackets shall have the same width as the channel and shall be 1/4" thick minimum. All fittings and brackets shall be type 316 stainless steel. Fittings and brackets shall mate properly with the channel.

D. All conduit supports shall securely attach the conduit to the structure or to the channel as required.

E. Concrete insert finish shall have an electro-plated zinc finish in accordance with ASTM B633.

F. Hardware and threaded components shall include all miscellaneous items to complete the assembly of the support system. This includes nuts, bolts, springs, washers, etc.

G. All hardware, regardless of the location, shall be type 316 stainless steel.

2.03 - MANUFACTURERS

A. The equipment described in the proceeding paragraphs is to form a complete support system associated with a single manufacturer, as different manufacturers have slight variations in dimensions, parts, etc. It is the intention of these specifications that all required parts be furnished and installed for a complete support system.

B. Manufacturers for the supporting devices shall be as follows: ALSTRUT, B-LINE, or KINDORF.

PART 3 - EXECUTION

3.01 - INSTALLATION

A. General:

1. Furnish and install all required supporting devices required to properly mount and secure all electrical equipment furnished under this Contract.

2. All supporting devices shall be installed level, parallel and perpendicular to building walls and floors, such that the support system is installed in a neat and professional manner.

3. Actual designs of the support system shall be the responsibility of the Contractor. The Contractor shall submit support design details to the Engineer for approval before proceeding with fabrication if requested by the Engineer.

4. Wherever equipment to be supported exceeds 50 pounds in weight, a Professional Engineer registered in the State of New York shall prepare a design for the proposed support system for Engineer’s receipt.

5. In all instances, furnish and install the proper sized rods, channels, fittings, brackets, etc. necessary to adequately support the equipment. Minimum support equipment sizes shall be as specified in PART 2 - PRODUCTS of this Section.

6. All holes in hung ceilings for support rods and other equipment shall be made adjacent to bars where possible, to facilitate removal of ceiling panels.

B. Channels, Fittings and Brackets Support System:

1. Furnish and install channels, fittings, brackets and related hardware for mounting, supporting and installing all electrical equipment furnished under this Contract and for devices furnished by others for installation under this Contract.

2. The support system shall be rigidly bolted together and braced to make a substantial supporting framework.

3. All frameworks that support operator devices, such as control stations, shall be fabricated such that the top of the equipment to be mounted is four (4) feet above finished floor.

4. Final mounting heights shall be as approved by the Engineer.

C. Conduit Supports: All exposed conduits shall be supported with a conduit support system consisting of channels, nuts, bolts and screws, threaded rod, conduit straps and anchors, as required. Each conduit shall be properly supported every six (6) feet, maximum.

D. Concrete and Masonry Inserts:

1. Furnish and install all anchor bolts, masonry inserts and similar devices, as required, for proper installation of support equipment furnished under this Contract.

2. Where motor control centers, switchgear, unit substations and other electrical equipment is being installed on concrete pads, install leveling channels.

3. Install leveling channels in concrete housekeeping pads.

E. Beam Clamps and Hanger Rod Support:

1. All equipment fastenings to steel columns, beams and trusses shall be by beam clamps.

2. In lieu of beam clamps, equipment may be welded to steel structures, subject to Engineer approval.

3. No holes shall be drilled in any steel columns, beams, and trusses.

4. Hanger rod supports shall be installed such that threaded rod is parallel and perpendicular to building walls and floors.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Nameplates and labels

B. Wire and cable markers

C. Conduit markers

D. Underground warning tape

1.02 - REFERENCES

A. ANSI/NFPA 70 - National Electrical Code

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.03 - SUBMITTALS

A. Submit under provisions of Section 01330 - Submittals.

B. Product Data: Provide catalog data for nameplates, labels, markers, and warning tape.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Underwriters Laboratories, Inc. Include instructions for storage, handling, protection, examination, preparation and installation of product.

PART 2 - PRODUCTS

2.01 - EQUIPMENT NAMEPLATES

A. Electrical equipment nameplates shall be laminated plastic with black letters on a white background. Nameplates shall be 2-inches by 6-inches, unless a larger size is required to adequately display the required information. The Engineer shall approve all nameplates. Nameplates for electrical equipment such as panelboards, control panels, etc. shall have the following information:

1. Equipment name and number

2. Voltage

3. Phases and number of wires

B. Typical nameplate is as follows: "MCC No. 2A - 480Y/277V - 3 PH, 4W"

C. All control pullboxes and junction boxes shall have a nameplate similar to the following: "PUMP STATION CONTROL CONDUITS PULL STATION"

D. Nameplates for all electrical equipment shall have similar and additional information as required for proper identification.

E. Nameplate mounting screws shall be stainless steel. Adhesives shall not be used.

2.02 - WIRE MARKERS

A. Manufacturers:

1. 3M ELECTRICAL SPECIALTY DIV., Product Scotch Code.

2. THOMAS & BETTS CORP., Product E-Z Code.

B. Description: Epoxy film tape type wire markers.

C. Locations: Each conductor at panelboards, auxiliary gutters, pull boxes, outlet and junction boxes, circuit breakers and each load connection.

D. Tag all wires as follows:

1. Power and Lighting Circuits: Branch circuit or feeder number as indicated on the Contract Drawings.

2. Control Circuits: Control wire number as indicated on the interconnection point-to-point diagrams required to be furnished as work of Section 16010 – General Electrical Requirements.

2.03 - CONDUIT MARKERS

A. Manufacturers: THOMAS & BETTS CORP or equal.

B. Description: Self-sticking vinyl; black letters on orange background.

C. Location: Furnish markers for each conduit longer than 6 feet (1.8 m).

D. Spacing: 20 feet (6 m) on center.

2.04 – UNDERGROUND WARNING TAPE

A. Metal detectable type with APWA color-coding. Heavy-duty polyethylene with a minimum total thickness of 5-mil. Tape resistant to alkalis, acids and other destructive elements.

B. For buried electric lines, red in color, minimum 6 inches wide with the words "Caution – Electric Line Buried Below" repeated every 16-36 inches.

C. For buried telephone lines, orange in color, minimum 6 inches wide with the words "Caution – Telephone Line Buried Below" repeated every 16-36 inches.

D. Conform to OSHA regulation 1926.956 (c)(1).

E. Manufacturers: Lab Safety Supply

PART 3 - EXECUTION

3.01 - PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.02 - INSTALLATION

A. Install all nameplate and labels parallel to equipment lines. Center labels on door front.

B. Secure nameplates to all equipment using stainless steel screws.

C. Secure nameplate to inside surface of door on every panelboard that is recessed in finished locations.

D. Apply conduit markers at 20-foot (6 m) intervals.

E. Install underground warning tape 6 inches below grade located above every underground conduit, ductbank, and direct burial line.

F. Install conduit markers immediately after conduit has been installed. Conduit markers shall be installed on all exposed and buried conduits. Conduits in duct banks or embedded in concrete shall not be marked.

G. Wire and cable markers shall be installed immediately after the wire has been pulled through the conduit and before termination.

H. The conduit and wire installation shall not be considered complete until the conduit and wire/cable

has been properly identified. An amount equal to 50% of the scheduled value for the conduit and/or cable installation shall be withheld until the identification has been installed.

I. Furnish and install nameplates for equipment furnished and installed as work of this Contract.

3.03 - ELECTRICAL EQUIPMENT IDENTIFICATION

A. Identify every existing circuit in all existing and new distribution panels, switchboards and disconnect switches.

B. Label all circuits identifying the load served including all individual circuit breakers.

C. Label all new and existing circuit breakers and switches used for new and existing feeder and branch circuits. Label all equipment as “spare” for removed electrical equipment.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Under this Section, provide all labor, equipment and material necessary to furnish, install, and test the wires and cables complete, in place, as shown on the Contract Drawings, specified herein and approved by the Engineer.

B. In general, the wires and cables included under this Section shall include, but not be limited to, the following:

1. 600V power and control cable

2. 600V lighting and receptacle cable

3. Instrumentation wires

C. All conductors to be continuous from origin to panel or equipment termination without splices. Where splices and taps are necessary or are required, notify the Engineer prior to installation.

D. All splices shall be in made in stainless steel terminal boxes unless otherwise indicated.

1.02 - RELATED SECTIONS

A. Section 16075 – Electrical Identification

B. Section 16132 – Boxes and Troughs

C. Section 16134 - Conduit

D. Section 16136 - Flexible Liquid-Tight Metal Conduit

1.03 – QUALITY ASSURANCE

A. Qualifications of Manufacturers:

1. Products used in the work of this Section shall be produced by manufacturers regularly engaged in the manufacturing, installing and servicing of similar items with a history of successful production acceptable to the Engineer as specified herein and in accordance with the General Conditions.

2. Field Testing:

   a. Test wires and cables before connecting to motors, devices or terminal blocks.

   b. If tests reveal defects or deficiencies, make the necessary repairs or replace the cable as directed by the Engineer, without additional cost to the Owner.

   c. All tests shall be made by and at the expense of the Contractor who shall supply all testing equipment.

3. Continuity Tests: All cables, wires and shields shall be tested for continuity. Testing for continuity shall be by test light or buzzer.

4. Insulation-Resistance Tests:

   a. Test 600V power and control cables and wires for insulation-resistance values. Test shall utilize a megohmeter with applied voltage to be 1000VDC for one (1) minute. Perform insulation-resistance test on each conductor with all other conductors grounded. The resistance value shall be 20 megohms or greater.

   b. Test 300V instrumentation signal cable from conductor to conductor, conductor to ground, and conductor to shield using a digital volt-ohm meter. The resistance valve shall be 10 megohms or greater.

1.04 - REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NECA Standard of Installations.

1.05 - SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Submit the following information pertaining to the manufacturer(s):

1. Complete literature, performance, and technical data describing the proposed equipment and listing of items made by the manufacturer.

2. Location of closest service office from which this equipment shall be serviced.

3. Location of closest parts inventory for item installation.

1.06 - COORDINATION

A. Coordination:

1. Coordinate wire and cable required with the equipment being furnished by others for the satisfactory operation of the equipment or system.

2. Review installation procedures under other sections and contracts and coordinate them with the work specified herein.

3. Notify other prime contractors in advance of the installation of the work included to provide them with sufficient time for installation and coordination of interrelated items that are included in their contracts and that must be installed in conjunction with the work included in this Section.

1.07 - PROJECT CONDITIONS

A. Verify that embedded conduit, in masonry and concrete, is installed as shown on the Drawings prior to the work being enclosed by others.

B. The Contractor shall be present at all concrete pours.

C. Conductor sizes are based on copper at 75°C.

D. Wire and cable routing shown on Drawings is approximate unless dimensioned or specifically called for such as where conduit is to be embedded in concrete or masonry. Route wire and cable as required to meet project conditions and shall be routed above ceilings, directly under joists, in pipe trenches, where available, and in masonry. Where exposed conduit is permitted, it shall be run to maximize wall space.

E. Field verify destination location to determine cable routing.

F. Where wire and cable routing is not shown for proposed destination, determine exact routing and lengths required. Routing shall be reviewed with the Engineer.

PART 2 - PRODUCTS

2.01 - CONDUCTORS

A. Install products in accordance with manufacturer's recommendations.

B. Single copper conductors with 600-volt insulation.

C. Minimum size of feeder conductors and grounds shall be No. 12 AWG.

D. Insulation: No. 12 AWG and No. 10 AWG, provide ANSI/NFPA 70, Type THWN. For all conductors No. 8 AWG and larger, provide ANSI/NFPA 70, Type THW, or THWN.

E. Use solid conductor for feeder and branch circuits, 10 AWG and smaller.

F. All conductors shall include complete set of manufacturer's markings for insulation and conductor size.

G. Manufacturers shall be ANACONDA, TRIANGLE, ROME, or approved equal.

H. Provide white colored neutral conductors; provide black, color coded phase conductors; provide green colored ground conductors.

2.02 - 300 VOLT INSTRUMENTATION SIGNAL CABLE - FOR INDOOR USE

A. Indoor Application:

1. The 300-volt instrumentation signal cable for indoor use shall consist of single or multiple twisted pairs or triads of coated, stranded copper conductors with polyvinyl chloride (PVC) insulation and nylon jacket. Each individual pair or triad of wires shall have an aluminum/polyester tape shield with a tinned copper drain wire. For multiple pair or triad cables, an overall aluminum/polyester tape shield with a tinned copper drain wire shall enclose the individual wire assemblies. The overall jacket shall be PVC. Cables shall have a 105C rating.

2. The conductors shall be annealed, tin-coated copper with Class B stranding per ASTM B-8. Minimum size conductor shall be AWG No. 16.

3. The insulation shall be PVC. The insulation thickness shall be 15 mils.

4. Individual Conductor Insulation: The jacket over each individual wire shall be nylon and shall have a thickness of 4 mils.

5. The shield for each individual pair or triad shall be an aluminum/polyester tape. The shield shall be 1.35 mils thick and shall be overlapped to provide 100% coverage. The shield shall also contain a 7-strand tinned copper drain wire which shall be a maximum of two sizes smaller than the conductors. All individual shields shall be completely isolated from each other.

6. The overall shield for multiple pair or triad cables shall be an aluminum/polyester tape.

The shield shall be 2.35 mils thick and shall be overlapped to provide 100% coverage. The shield shall also contain a 7-strand tinned copper drain wire which shall be the same size as the conductors.

7. The overall jacket shall be PVC and shall meet the requirements of UL 13.

8. The jacket thickness shall be as follows:

Wire Size	No. of Pairs	No. of Triads	Jacket Thickness
16 AWG	1	--	35 Mils
16 AWG	2,4	--	50 Mils
16 AWG	8,10,12	--	60 Mils
16 AWG	--	1	35 Mils
16 AWG	--	2,4	50 Mils
16 AWG	--	8	60 Mils
16 AWG	--	12	70 Mils

9. Manufacturers and their products shall be equal to:

   a. Cablec APVIC

   b. Okonite A Type P-OS and Type SP-OS

   c. Belden

B. In Underground Ducts and Outdoor Use in Conduits:

1. The 300-volt instrumentation signal cable for outdoor use in conduits shall consist of single or multiple twisted pairs or triads of coated, stranded copper conductors with polyvinyl chloride (PVC) insulation and nylon jacket. Each individual pair or triad of wires shall have an aluminum/polyester tape shield with a tinned copper drain wire. For multiple pair or triad cables, an overall aluminum/polyester tape shield with a tinned copper drain wire shall enclose the individual wire assemblies. The overall jacket shall be chlorinated polyethylene (CPE). Cables shall have a 105C rating.

2. The conductors shall be annealed, tin-coated copper with Class B stranding per ASTM B-8. Minimum size conductor shall be AWG No. 16.

3. The insulation shall be PVC. The insulation thickness shall be 15 mils.

4. The jacket over each individual wire shall be nylon and shall have a thickness of 4 mils.

5. The shield for each individual pair or triad shall be an aluminum/polyester tape. The shield shall be 1.35 mils thick and shall be overlapped to provide 100% coverage. The shield shall also contain a 7-strand tinned copper drain wire which shall be a maximum of two sizes smaller than the conductors. All individual shields shall be completely isolated from each other.

6. The overall shield for multiple pair or triad cables shall be an aluminum/polyester tape. The shield shall be 2.35 mils thick and shall be overlapped to provide 100% coverage. The shield shall also contain a 7-strand tinned copper drain wire which shall be the same size as the conductors.

7. The overall jacket shall be CPE and shall meet the requirements of UL 13.

8. The jacket thickness shall be as follows:

Wire Size	No. of Pairs	No. of Triads	Jacket Thickness
16 AWG	1,2	--	35 Mils
16 AWG	4	--	50 Mils
16 AWG	8,10,12	--	60 Mils
16 AWG	--	1	35 Mils
16 AWG	--	2,4	50 Mils
16 AWG	--	8	60 Mils
16 AWG	--	12	70 Mils

9. Manufacturers and their products shall be as follows:

   a. Cablec APZIC

   b. Okonite AOkobon Type P-OS and Type SP-OS

2.03 - 4-PAIR CATEGORY 6E UNSHIELDED TWISTED PAIR CABLE

A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:

1. Avaya, Basking Ridge, NJ (800) 344-02232.
2. Belden Corporation, Carmel, IN (800) 246-2673.
3. Berk-Tek, Incorporated, New Holland, PA (800) 237-5835.
4. CommScope, Hickory, NC (800) 982-1708.
5. Draka Comteq, Franklin, MA (888) 541-7100.
6. General Cable, Highland Heights, KY (800) 424-5666.
7. Mohawk/CDT Leominster, MA (978) 537 9961.
8. NORDX/CDT, Worcester, MA (800) 331-0779.
9. Superior Essex, Atlanta, GA. (800) 685-4887.
10. Tyco Electronics, Harrisburg, PA (800) 522-6752.

B. Conductors: 4 twisted pair - 24 AWG, solid copper w/ RJ-45 connector ends

1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
2. Complies with individual characteristics established in ANSI/TIA/EIA-568-B, and all addendums for Category 5E cable performance specification.
3. Nominal Impedance: 100 ohms plus or minus 15 percent.
4. Certified capable of performing to minimum 350 MHz.

2.04 - MECHANICAL CONNECTORS

A. Conductor tapping connectors shall be BURNDY Servit split bolt, Series KS and KS3, or approved equal.

B. Split bolt connectors shall use BURNDY Type SC Servit cover on indoor applications.

C. Terminal lugs shall be BURNDY Universal Terminal Series. Terminal lugs shall be sized for proper ampacity and proper number of conductor holes. Each conductor shall occupy only one hole on a terminal lug.

D. Conductor tapping connectors for multiple conductors shall be BURNDY Series V-Tap with V-Tap covers, and V-Blok mounting platforms.

PART 3 - EXECUTION

3.01 - INSTALLATION

A. General:

1. The cables and wires shall be installed as shown on the Contract Drawings. Make terminations in accordance with cable manufacturers instructions for the particular type of wire and cable.

2. Splices are not allowed in the underground duct, manhole and handhole systems. If splices are required, obtain approval in writing from the Engineer prior to splicing.

3. All low voltage cable shall be installed in metallic conduit.

B. Wire and Cable Sizes: The sizes of wire and cable shall be as shown on the Contract Drawings, or if not shown, as approved by the Engineer. Minimum size wire shall be No. 12 AWG for all power, lighting and receptacle circuits. Wires for control circuits shall be No. 14 AWG minimum. Wire for instrumentation circuits shall not be smaller than No. 16 AWG. If due to field routing the voltage drop exceeds 2.5%, the size of conductors shall be increased such that 2.5% is the maximum voltage drop incurred.

C. Number of Wires: The number of wires indicated on the Contract Drawings for the various control, indications, and metering circuits were determined for general schemes of control and for particular indication and metering systems. The actual number of wires installed for each circuit shall, in no case, be less than the number required; however, add as many wires as may be required for control and indication of the actual equipment selected for installation at no additional cost to the Owner.

D. Wiring Identification: All wiring shall have a unique wire number and be labeled at both ends. Wire numbers shall correspond with the equipment terminal wire numbers. Where no wire numbers are indicated, assign wire numbers. Wire numbers shall not be duplicated.

E. Cable Identification Tags: Furnish all labor and materials and affix in a permanent way to each cable in manholes, cable compartments and vaults, junction boxes, pull boxes and points of termination, a laminated plastic tag, bearing clearly printed, the cable number indicated on the Contract Drawings or some other approved identification number or symbol. Temporarily tag all cables with full ID number immediately after it has been pulled.

F. Cable Installation: All interior cable shall be run in conduit.

G. Wiring Supplies: Only electrical wiring supplies manufactured under high standards of production and meeting the approval of the Engineer shall be used. Friction tape shall be in accordance with ASTM D69.

H. Training of Cable: Furnish all labor and material required to train cables around cable vaults within buildings and in manholes in any outdoor underground duct system. Sufficient length of cable shall be provided in each manhole and vault so that the cable can be trained and racked in an approved manner. In training or racking, the radius of bend of any cable shall be not less than the manufacturer's recommendation. All manhole cables shall be arc and fireproofed.

I. Connections at Control Panels, Limit Switches and Similar Devices:

1. Where stranded wires are terminated at panels, and/or devices connections shall be made by solderless lug, crimp type ferrule or solder dipped.

2. Where enclosure sizes and sizes of terminals at limit switches, solenoid valves, float switches, pressure switches, temperature switches, and other devices make 7-strand, No. 12 AWG, wire terminations impractical, terminate external circuits in an adjacent junction box of proper size and shall install No. 14 AWG stranded wires to the junction box in a conduit.

J. Pulling Temperature: Cable shall not be flexed or pulled when the temperature of the insulation or of the jacket is such that damage will occur due to low temperature embrittlement. When cable will be pulled with an ambient temperature within a three day period prior to pulling of 40F or lower, cable reels shall be stored during the three day period prior to pulling in a protected storage with an ambient temperature not lower than 55F and pulling shall be completed during the work day for which the cable is removed from the protected storage.

K. Color Coding:

1. Conductor jacket shall be color coded as follows:

AC Power

480V/277 and above	208Y/120V System
Phase A - Brown	Phase A - Blue
Phase B - Orange	Phase B - Black
Phase C - Yellow	Phase C - Red
Neutral - White	Neutral – White

2. Control (Per ICEA Method 1, K-2):

Wire Number	Color
1	Black
2	Red
3	Blue
4	Orange
5	Yellow
6	Brown
7	Red With Black
8	Blue With Black
9	Orange With Black
10	Yellow With Black
11	Brown With Black
12	Black With Red
13	Blue With Red

Wire Number	Color
12	Black With Red
13	Blue With Red
14	Orange With Red
15	Yellow With Red
16	Brown With Red
17	Black With Blue
18	Red With Blue
19	Orange With Blue

3. DC Power

   a. Positive Lead - RED

   b. Negative Lead - BLACK

4. Instrumentation Signal

Pairs	Triads
Black and White	Black, Red and White

5. Equipment Ground - GREEN

L. Instrumentation Cable Installation:

1. Install all cable or conductors used for instrumentation wiring (4-20 madc, etc.) in a grounded metal raceway.

2. The use of asbestos cement or plastic conduit will not be permitted.

3. Analog signal wires shall exclusively occupy these conduits.

4. Where instrumentation cables are installed in panels, etc., the Contractor shall arrange wiring to provide maximum clearance between cables and other conductors.

5. Instrumentation cables shall not be installed in same bundle with conductors of other circuits.

6. Grounding of cable shield shall be accomplished at one point only, unless otherwise required by instrumentation systems manufacturer.

7. Special instrument cable shall be as specified or recommended by the vendor of the equipment or instruments requiring such wiring.

8. Installation, storage, terminations, etc., shall be per manufacturer's recommendations.

3.02 - IDENTIFICATION

A. Identify wire and cable under provisions of Section 16075.

B. Identify each conductor with its circuit number.

3.03 - FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 01450.

B. Inspect wire and cable for physical damage and proper connection.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

D. Verify continuity of each branch circuit conductor.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Provide all labor, equipment and material necessary to furnish and install electrical boxes complete, in place, as shown on the Contract Drawings, specified herein and approved by the Engineer.

B. Refer to the Schedule at the end of this Section for locations of box classes.

C. In general, the boxes included under this Section shall include, but not be limited to the following:

1. Outlet, switch, and device boxes

2. Junction boxes (with and without terminals)

3. Pull boxes

1.02 - RELATED SECTIONS

A. Section 16070 – Supporting Devices

B. Section 16134 - Conduit

1.03 - REFERENCES

A. NECA - Standard of Installation.

B. ANSI/NEMA OS1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports

C. NEMA FB1 - Fittings and Supports for Conduit and Cable Assemblies

D. ANSI/NFPA 70 - National Electric Code

E. NEMA 250 - Enclosures for Electrical Equipment (1000 volts maximum)

PART 2 - PRODUCTS

2.01 - BOXES

A. General Purpose:

1. General purpose outlet, switch and device boxes shall be constructed of stamped sheet steel. Minimum box size shall be 4" x 4" x 2-1/8".

2. Box sizes shall have standard industry and manufacturer dimensions. Gangable boxes are not allowed. Conduit knockouts are allowed on these boxes.

3. Box covers, partitions, screws, etc. shall be of the same material as the box, and shall be furnished and installed as required for a complete installation.

4. General purpose outlet, switch and device boxes shall be as manufactured by: Appleton Electric Company, Raco, Steel City, or approved equal

5. Masonry boxes shall be as in paragraph 2.01 (A) (1) but shall be constructed specifically for installation in masonry block or tile walls.

B. Cast Boxes (Non-Explosion Proof):

1. Cast outlet, switch and device boxes shall be constructed of copper-free aluminum or malleable iron, shall have an epoxy powder or zinc electroplate with aluminum enamel coat finish, threaded hubs and integral mounting lugs.

   a. Covers shall be malleable iron or aluminum. Screws shall be stainless steel. Neoprene or rubber gaskets shall be provided for all boxes.

2. PVC coated cast outlet, switch and device boxes shall be constructed as in 1. above except boxes and covers shall be PVC coated.

   a. Cast box manufacturers and their particular products shall be as follows:

      1) Appleton Electric Company, "Type FS & FD"

      2) Crouse-Hinds, "Type FS & FD"

      3) O-Z/Gedney, "Type FS & FD"

      4) Or approved equal

3. Covers for cast boxes shall mate with the device installed as required and shall match the environment, that is, PVC coated, non-corrosive, weatherproof, etc.

   a. Cover manufacturers and their particular products shall be as follows:

      1) Appleton Electric Company, "Type FSK"

      2) Crouse-Hinds, "Type DS, S and WLR"

3) O-Z/Gedney, "Type FS-1 and FS-2"

4) Or approved equal

4. Above model types do not exclude cover types not shown, but in general will be the types used in the majority of applications. Special applications may require covers not shown above.

C. Explosion Proof Boxes:

1. Explosion proof outlet, switch, and device boxes shall be cast type with threaded hubs. Bodies and covers shall be iron with zinc electroplate finish or copper-free aluminum with epoxy powder coat finish. Screws shall be stainless steel. Boxes shall be PVC coated where required.

2. Boxes, covers and devices in explosion proof areas are many times provided by manufacturers as a complete unit in either factory sealed or non-sealed models. The quantity and type required shall be as shown on the Contract Drawings and as needed for a complete installation.

3. The switches, receptacles and devices mounted within these boxes shall be as specified in other sections of this Specification.

4. The box/cover/device manufacturers shall be as follows:

a. Appleton Electric Co.; "EDS, EFS, EPS and GUSC Series"

b. Crouse-Hinds; "EDS, EFD, EFS, FSPC and GUSC Series"

c. O-Z/Gedney; "EFS and EFD Series"

2.02 - JUNCTION AND PULL BOXES

A. General Purpose:

1. General-purpose junction and pull boxes shall be constructed of stamped sheet steel. Minimum box size shall be 4" x 4" x 2-1/8". Box sizes shall have standard industry and manufacturer dimensions. Gangable boxes are not allowed. Conduit knockouts are allowed on these boxes.

a. Box covers, partitions, screws, etc. shall be of the same material as the box and shall be furnished and installed as required for a complete installation.

b. General purpose junction, pull and terminal boxes shall be as manufactured by: Appleton Electric Company, Raco, Steel City, or equal.

2. Masonry boxes shall be as specified above, but shall be constructed specifically for installation in masonry block walls.

B. NEMA 1 Boxes:

1. NEMA 1 boxes shall be used when stamped steel boxes are not available in the sizes required. NEMA 1 boxes shall be sized as shown on the Contract Drawings or, if not specifically dimensioned, as required per NEC requirements.

2. Boxes shall be constructed of steel without conduit knockouts. Boxes shall be constructed as follows:

Maximum Dimension	USS Gauge
Up to 24 inches	No. 16
Greater than 24 up to 36 inches	No. 14
Greater than 36 inches	No. 12

3. Box covers with weights of 10 pounds or greater shall have two (2) handles welded to the cover. Boxes may also be furnished with a door instead of a cover. If provided with a door, box door shall open 180 degrees and shall have quarter turn or flush handle latches.

4. Box covers, doors, screws, partitions, etc., shall be of the same material as the box and shall be furnished and installed as required for a complete installation.

5. Boxes shall have ANSI 61 gray polyester powder finish inside and out.

C. NEMA 12 Boxes:

1. NEMA 12 boxes shall be sized as shown on the Contract Drawings or, if not specifically dimensioned, as required per NEC requirements.

2. Boxes shall be constructed of steel without conduit knockouts and shall be gasketed.

3. Boxes shall be constructed as follows:

Maximum Dimension	USS Gauge
Up to 24 inches	No. 16
Greater than 24 up to 36 inches	No. 14
Greater than 36 inches	No. 12

4. Box covers with weights of 10 pounds or greater shall have two (2) handles welded to the cover. Boxes may also be furnished with a door instead of a cover. If provided with a door, box door shall open 180 degrees and shall have door clamps. Door shall be continuously hinged.

5. Boxes shall have ANSI 61 gray polyester powder finish inside and out.

D. NEMA 4 Boxes:

1. Cast junction and pull boxes shall be malleable iron or copper free aluminum with threaded hubs and integral mounting lugs. Copper-free aluminum boxes shall have an aluminum enamel finish. Malleable iron boxes shall have a zinc electroplate and aluminum enamel finish or epoxy powder coat. Finishes shall be applied after all machining.

   a. Covers shall be of the same material and finish as the box. All screws shall be stainless steel. All covers shall come with rubber or neoprene gasket. PVC coated boxes and covers shall be provided where required.

   b. Manufacturers and their particular products shall be as follows:

      1) Appleton Electric Co.; "GS, JB and SEH Series"

      2) Crouse-Hinds; "ARB, GRF, GS, VGR and VXF Series"

   c. It is the intention of these specifications to limit the use of cast junction and pull boxes to the types listed above. These types of boxes are generally used for lighting, receptacle, fire alarms, etc. type of circuits which usually have a conduit size of 1" or smaller. Where larger size pull or junction boxes are required in NEMA 4 areas, boxes as described below shall be used.

2. Non-Cast type NEMA 4 junction and pull boxes shall be sized as shown on the Contract Drawings or, if not specifically dimensioned, as required for NEC requirements.

a. Boxes shall be constructed of steel without conduit knockouts and shall be gasketed. Boxes shall be continuously welded.

b. Boxes shall have doors which open 180 degrees, have stainless steel clamps and stainless steel continuous hinge.

E. NEMA 4X Boxes:

1. 304 Stainless Steel-

a. NEMA 4X junction and pull boxes shall be constructed of 304 stainless steel.

b. Boxes shall be continuously welded with no holes or knockouts. Boxes shall have seamless foam-in-place gasket, body stiffeners where required, stainless steel door clamps and continuous hinge.

c. Box doors and all exterior hardware shall be 304 stainless steel.

d. Boxes shall be unpainted. Boxes shall have smooth brushed finish.

2. Fiberglass-

a. Junction and pull boxes shall be fiberglass reinforced with sealed seams and no knockouts. Boxes shall have seamless foam-in-place gasket.

b. Box doors shall be fiberglass-reinforced with fiberglass-reinforced polyester hinges and quick-release latches.

c. Fiberglass boxes shall have gray exteriors and gray or white interiors.

d. Fiberglass junction and pull boxes shall be Hoffman, Type GQRLP or approved equal.

F. Explosion Proof Boxes:

1. Explosion proof junction and pull boxes shall be constructed of cast iron or cast aluminum with covers or doors of same material. Screws and bolts shall be stainless steel. Boxes shall be PVC coated where required.

a. Boxes shall be rated for use in the hazardous area it is to be installed in

b. Boxes shall be sized as shown on the Contract Drawings or, if not specifically dimensioned, as required per NEC requirements.

c. Boxes, covers and doors shall have a polymer enamel finish.

2. PVC coated cast explosion proof boxes shall be as specified above except boxes, covers and doors shall be PVC coated. All boxes shall contain a neoprene gasket.

a. Cast explosion proof box manufacturers shall be as follows:

1) Appleton Electric Co.; "DER, EJB, EXB, GUB and JBE Series"

2) Crouse-Hinds; "DHE, EJB, EJH, and GU Series"

3) O-Z Gedney; "IG, OFB and YG Series"

G. Terminal Boxes:

1. Terminal boxes shall be identical to junction and pull boxes specified above for the following: NEMA 1 Boxes, NEMA 12 Boxes, NEMA 4 Boxes, NEMA 4X Boxes, Explosion Proof Boxes, or approved equal

2. In addition to the above description, each terminal box shall have a steel panel with terminal blocks installed on mounting studs within the box.

3. The steel panel shall be painted with white enamel and shall be at least one USS gauge size thicker than the box thickness.

4. The terminal blocks shall be screw type, rated 600V, 20A minimum. Terminal blocks shall be phenolic, accept up to a #10 AWG wire and have a marking strip.

H. Pull/Splice Box: Outdoor

1. Outdoor pull/splice boxes shall be Nema 4X stainless steel as manufactured by Hoffman or approved equal.

2. Free-standing site pull/splice boxes above ground shall be mounted on a concrete pad.

3. Pull/Splice boxes shall have stainless steel support and accessories.

4. Where splice box size is not indicated, size to permit pulling, racking, and splicing of cables as per NEC.

2.03 - WIRE TROUGH

A. Wire trough shall be manufactured by SQUARE D or equal.

B. Wire trough shall be completely enclosed with removable sealed front cover.

C. Construction: Less than 8-inch square shall not be used. All wire troughs shall be 14-gauge.

D. Finish: ANSI-49 epoxy paint applied by cathodic electro-deposition paint process over a corrosion resistant phosphate preparation or stainless steel, as indicated in the schedule.

E. UL listed.

PART 3 - EXECUTION

3.01 - INSTALLATION

A. General:

1. Mount all boxes rigidly and securely to the building structure or to supporting devices, which are rigidly and securely supported to the building structure. Boxes shall not be supported from suspended ceiling systems.

2. All boxes and supports, regardless of the location, shall be fastened with 304 stainless steel bolts and expansion shields on concrete or brick, with 304 stainless steel toggle bolts on hollow masonry units, and with stainless steel machine screws or welded studs on steelwork.

3. Mount boxes with sides parallel or perpendicular to walls or equipment, such that the box is installed in a neat and professional manner.

4. Install all boxes such that wiring within them is accessible.

5. Install blanking devices or threaded plugs in all unused holes.

6. Install all boxes concealed in finished walls when possible.

7. Set boxes so that front edges are flush with finished surfaces.

B. Locations and Sizes:

1. Box locations shown on the Contract Drawings are approximate. Box sizes shall be as dimensioned on the Contract Drawings, or, if not specifically dimensioned, as required by

the NEC. Additional boxes required but not specifically shown shall be furnished and installed under this Contract.

2. The equivalent number of 90 degree bends in a single conduit run is limited to the following:

   a. Runs in excess of 300 feet: 0

   b. Runs of 300 feet to 201 feet : 1

   c. Runs of 200 feet to 101 feet : 2

   d. Runs of 100 feet and less: 3

3. Boxes shall be furnished and installed wherever necessary to satisfy the above criteria.

4. All box sizes and locations shall be confirmed by the Contractor with the Engineer prior to installation.

C. Grounding:

1. All boxes shall be grounded in accordance with NEC requirements.

2. The use of two (2) locknuts and a grounding bushing will be required at all conduit terminations where hub type fittings are not required. Conduit grounding bushings within boxes shall be bonded together with jumper cables where box size or number of conduits warrants their use per NEC requirements.

D. Terminal Boxes: In addition to all box requirements described above, terminal boxes shall have terminal blocks for boxes that contain control or signal wires which must be interconnected. Approximately 20 percent space terminals shall be provided (minimum of two [2]). Terminals shall be lettered or numbered to conform to the wiring diagrams.

3.02 - SCHEDULE

A. Box Classification:

1. General Purpose: Masonry walls.

2. Cast: Masonry walls.

3. NEMA 1: The following areas fall under this classification: Control Building.

4. NEMA 12: Not used.

5. NEMA 4: Not used.

6. NEMA 4X Stainless Steel: Used in areas subject to weather, sunlight, humidity, moisture, or other areas defined by the Engineer. The following areas fall under this classification: All other interior and exterior locations, not specifically specified elsewhere in this paragraph.

7. NEMA 4X Fiberglass: Not Used.

8. PVC Coated Boxes: Where PVC is preferred over stainless steel by the Engineer.

B. Identification: All pull boxes, junction boxes, and terminal boxes shall have a nameplate attached, which properly identifies the box. Nameplates shall be installed as specified in Section 16075 - Identification.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Conduit.

B. In general, the conduit system included under this Section shall include, but not be limited to the following:

1. Rigid hot dipped galvanized steel (RGS) conduits

2. PVC coated rigid hot dipped galvanized steel conduits

3. PVC conduits

C. Conduit fittings: Conduits to be mechanically and electrically continuous from one electrical device to another.

1.02 - RELATED SECTIONS

A. Section 16060 – Grounding and Bonding

B. Section 16070 – Supporting Devices

C. Section 16075 - Electrical Identification

D. Section 16121 – Low Voltage Cable

E. Section 16136 – Flexible Liquid – Tight Metal Conduit

1.03 - REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ANSI/NFPA 70 - National Electric Code.

C. NECA Standard of Installation.

D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

E. NEMA RN 1 – Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

F. NEMA TC 2 – Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

G. NEMA TC 3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.04 - SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Manufacturers specifications and other data required demonstrating compliance with the specific requirements.

C. Materials list showing all items to be furnished and installed under this Section.

D. Complete shop drawings of all work of this Section showing dimensions and locations of all items including supporting structures and clearance requirements.

E. Submit two (2) samples of each type conduit, 2 feet in length.

F. Submit sample of expansion/deflection fitting.

1.05 - DELIVERY, STORAGE AND HANDLING

A. Deliver and store all products in accordance with the manufacturers recommendation, as approved by the Engineer, with all labels and seals intact and legible.

B. Provide off-site storage and protection when site does not permit on-site storage or protection.

C. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

D. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

E. In case of damage to a product during transportation, handling or storage, the Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

F. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

G. Each length of conduit shall be shipped with one coupling on one end, a threaded protector at the other end.

1.06 - PROJECT CONDITIONS

A. Verify all conduit routings by field measurements.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system. Provide all required sweeps, boxes, and fittings.

PART 2 - PRODUCTS

2.01 - RIGID GALVANIZED CONDUIT

A. Rigid conduit shall be hot dipped, galvanized, or electro-galvanized steel by Wheatland, Triangle, Republic or approved equal.

B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO., EFCOR or approved equal. Catalog numbers used below are those of THOMAS & BETTS CORP. based on 3/4-inch size and are considered standards by which equivalents are to be judged.

C. ERICKSON couplings, Series 676 or approved equal, shall be used where neither length of conduit can be rotated.

D. Conduit connectors shall be threaded type. Set screw and compression type connections ARE NOT acceptable.

E. Sealing fitting locknuts shall be Series 142SL.

F. Steel or malleable iron insulated bullet hub, Series 370-379, complete with sealing "O" ring. DO NOT use "die cast" material.

G. Entrance ells shall be Series 1491 or approved equal.

H. Combination coupling shall be Series 531 for connecting rigid galvanized conduit to electrical metallic tubing.

I. Provide explosion proof fittings and equipment for Class 1 Division 1 locations.

2.02 – PVC COATED STEEL CONDUIT

A. Plastic coated steel conduits and fittings shall consist of rigid galvanized steel conduit as described above except covered with bonded 40 mil nominal thickness PVC jacket in accordance

with NEMA Standard RN-1 and a 2 mil urethane interior coating. Conduit shall be Robroy Industries "Plasti-Bond", Occidental Coating Company "OCAL-BLUE", or Perma-Cote Industries "Supreme".

B. The conduit shall be coated on the interior and exterior.

2.03 - PVC CONDUIT

A. PVC Conduit shall be manufactured by Wheatland, Triangle Republic or approved equal.

B. Description: NEMA TC 2; Schedule 80 PVC.

C. Fittings and conduit bodies: NEMA TC 3.

D. PVC conduit shall be used for secondary service power feeds from LIPA transformers, Duct Banks, and Telephone Service only.

2.04 – HAZARDOUS LOCATION FITTINGS CLASS I, DIV. I

A. Conduit Unions: Class 1, Div. 1 Types UNF and UNY as manufactured by O-Z/Gedney or approved equal.

B. Sealing Fittings: Class 1, Div. 1 types EYA and EYAM as manufactured by O-Z or approved equal.

C. Sealing Hub: Class 1, Div. 1 type EYHSG with Sealing Gasket and Locknut as manufactured by O-Z/Gedney or approved equal.

D. Explosion proof sealing compound systems for fittings and hubs shall consist of a fiber material (to form a dam for the sealing material) and the sealing compound itself. Both the fiber and sealing compound shall be rated for use in the classified area and shall be compatible with the fitting or hub being sealed.

1. Manufacturers and their particular products shall be as follows:

a. Appleton Electric Co., "Kwiko Sealing Cement & Fiber Filler"

b. Crouse-Hinds, "Chico A Sealing Compound & Chico X Fiber"

c. O-Z/Gedney, "Type EYC and Type EYF"

E. Conduit Fittings:

1. Conduit fittings shall be furnished and installed as required and shall include unions, threaded hubs, nipples, enlargers, reducers, couplings, locknuts, bushings, etc. All fittings shall be steel with zinc electroplate finish or malleable iron with zinc electroplate finish. All fittings shall have insulated throats (where applicable).

2. Conduit fittings shall be manufactured by the following: Appleton Electric Company, Crouse-Hinds, O-Z/Gedney

F. Expansion couplings for use in conduit runs shall be the expansion/deflection type. Expansion couplings shall have iron or bronze ends, neoprene sleeves, stainless steel bands and tinned flexible copper braid bonding jumper. Couplings shall be watertight, corrosion resistant and concrete tight.

1. Manufacturers and their particular products shall be as follows: Appleton Electric Company; "Type DF", Crouse-Hinds; "Type XD", O-Z/Gedney; "Type DX".

2. For explosive areas, expansion unions shall be utilized. Expansion unions shall be steel with zinc electroplate finish and have copper or bronze grounding spring or jumper.

a. Manufacturers and their particular products shall be as follows:

1) Appleton Electric Company; "Type UN"

2) Crouse-Hinds; "Type UN"

3) O-Z/Gedney; "Type UN"

G. Grounding Bushings: Grounding bushings shall be insulated, shall be constructed of malleable iron or steel with zinc plated finish, and shall have a tin plated copper saddle. Insulating material shall have a 150E rating. Grounding bushing shall be O-Z/Gedney, "Type BLG", or approved equal.

H. Liquid-tight Fittings: Liquid-tight fittings shall be furnished and installed wherever liquid-tight conduit is used. Liquid-tight fittings shall be constructed of steel or malleable iron. Fittings shall be zinc coated. Fittings shall be liquid, rain and oil tight. Sealing rings shall be neoprene. All throats shall be insulated. Liquid-tight fittings shall be Appleton Electric Company, "Type ST"; O-Z/Gedney "Type 4Q", or approved equal.

I. Explosion-Proof Fittings: Explosion-proof fittings shall be constructed as described above except fittings shall be listed for use in classified areas.

1. Manufacturers and their particular products shall be as follows:

a. Appleton Electric Co., "Types BR, EC, EL, ES, EX, EY, and PLG"

b. Crouse-Hinds, "Types EC, EL, ES, EY, PLG and RE"

c. O-Z/Gedney, "Types EC, EL, EY, PLG, RB and RE"

d. The above products are meant as a guide and products from the above manufacturers not specifically mentioned do not exclude their use, if they comply with these specifications.

J. PVC Coated Fittings: PVC coated fittings shall be as described in the paragraphs above except the fittings shall be PVC coated.

K. Conductive Compound: Conductive compound shall be a grease metallic type and shall be Thomas & Betts, "KOPR-SHIELD", or equal.

L. Conduit Bodies:

1. Conduit bodies shall be cast type with threaded hubs and shall be made of copper-free aluminum or malleable iron. Copper-free aluminum bodies shall have an aluminum enamel finish. Malleable iron bodies shall have a zinc electroplate and aluminum enamel finish. Finishes shall be applied after all machining has been completed.

2. Conduit body covers shall be of the same material and finish as the conduit body. All screws shall be stainless steel. All covers shall come with rubber or neoprene gaskets.

3. Manufacturers and their particular products shall be as follows:

a. Appleton Electric Company; "Form 35 and Form 85"

b. Crouse-Hinds; "Mark 9"

c. O-Z/Gedney; "Malleable iron/copper-free aluminum conduit bodies"

M. Mogul Conduit Bodies:

1. All conduit bodies 2" and larger and where physically necessary, shall be of the "mogul" type. Mogul type conduit bodies shall conform to the specifications above as to materials, finish, covers, etc.

2. Manufacturers and their particular products shall be as follows:

a. Appleton Electric Company; "Mogul Unilets"

b. Crouse-Hinds; "Mogul Conduit Outlet Bodies"

N. Explosion-Proof Conduit Bodies:

1. Explosion-proof conduit bodies shall be constructed as indicated, except the conduit bodies shall be listed for use in the particular classified area.

2. Manufacturers and their particular products shall be as follows:

a. Appleton Electric Company; "CPU, ELB, ER, GU and GR Series"

b. Crouse-Hinds; "CPS, EAB, GU and OE Series"

c. O-Z/Gedney; "GU and LBH Series"

d. The above products are meant as a guide and products from the above manufacturers not specifically mentioned do not exclude their use, if they comply with these specifications.

PART 3 - EXECUTION

3.01 - INSTALLATION

A. Except as shown on the Contract Drawings, the minimum size conduit permitted is $^{3}/_{4}$ inch.

1. Each length of conduit installed shall be free from blisters and other defects. Each piece installed shall be cut square, taper reamed, and a coat of sealing compound applied to threads. Threads on conduits shall be painted with a conducting compound prior to assembly. Conduit connections shall be screwed tight with only incomplete threads exposed. All conduit joints shall be made with standard couplings and the ends of the conduit shall butt tightly into the couplings. In exposed work only, where standard couplings cannot be used, only Erickson couplings are permitted, or as otherwise acceptable to the Engineer.

2. Conduit threaded in the field shall have standard sizes and lengths. Conduit joints shall be cut square, threaded, reamed smooth, and drawn up tight so conduit ends will butt in couplings, connectors, and fittings.

3. Secure conduits to all boxes and cabinets with double locknuts and bushings so system will be electrically continuous from service to all outlets.

4. Install conduit in accordance with NECA Standard of Installation.

5. Cap ends of conduits to prevent entrance of water and other foreign material during construction.

6. Complete all conduit systems before pulling conductors.

B. Support conduits under provisions of Section 16070, unless specifically described herein.

1. Provide cable supports in conduits rising vertically in accordance with the National Electric Code.

2. Provide No. 12 AWG copper pull wires or 250-lb tested polyethylene line in all empty conduits. Steel wire not acceptable as pull wire. Provide two foot slack at each end.

3. Install conduit to preserve fire resistance rating of partitions and other elements.

C. Ground and bond conduit under provisions of Section 16060.

D. Where neither length of conduit can be rotated, ERICKSON couplings Series 676 shall be used.

E. Provide steel, or malleable iron nylon insulated bullet hub, Series 370-379, complete with recessed sealing "O" ring, in areas:

1. Where enclosed and gasketed fixtures and weatherproof devices are specified;

2. Where rigid conduit enters a sheet metal enclosure, junction box and outlet box, and not terminated in a threaded hub.

3. Do not use die cast material.

F. Where exposed conduits running overhead pass through building expansion joints, install flexible liquid tight conduit of same size with sufficient slack to allow conduits on either side of expansion joint to move a minimum of 3-inches in any direction. Provide supports as required on each side of expansion joint, all in accordance with seismic requirements of specific area.

1. Failure to route conduit through building without interfering with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit and fixtures shall fit into available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure. Equipment requiring servicing shall be readily accessible.

2. Factory bent elbows or field bent elbows with approved tools may be used. Heating of conduit to facilitate bending is prohibited.

3. Install exposed conduit either parallel or perpendicular to structural members, unless impractical. Group conduit wherever possible. Conduit shall be attached to structural components with approved supports spaced a maximum of six (6) feet apart and shall form a neat rigid installation. Conduit supported from building walls shall be installed with at least $^1/_4$-inch clearance from the walls to prevent the accumulation of dirt and moisture behind the conduit.

G. Conduit and/or conduit fittings shall not be welded together or to any steel structure; however, conduit supports may be welded to flanges of steel beams and columns in accordance with approved welding techniques and engineering practice in locations acceptable to the Owner.

H. All conduits extending through the floor behind panels or into control centers or similar equipment shall extend a minimum of 6 inches above the floor elevations, with no couplings at floor elevation.

I. All exposed conduits rising above finished floor elevation, excluding those encompassed by an equipment pad, shall be provided with a 4-inch high curb. Three (3) inches of cover shall be provided horizontally around the conduit.

1. Conduit installed in concrete or masonry walls shall be so arranged that a minimum of 3-inches of covering be obtained. Spacings between conduits shall be sufficient to permit a complete filling with concrete or mortar without voids.

2. Install conduit runs in such location as to avoid steam or hot water pipes. Provide a minimum separation of 12 inches where conduit crosses or parallels hot water or steam pipes.

J. Install conduits containing instrumentation cable to provide the following clearances: Conduits installed parallel to conductors energized at 480 volts shall have a clearance of 18 inches and 208/120 volts shall have a clearance of 12 inches.

K. Conduits installed at right angles to conductors energized at 480 Volts or 120/208 Volts shall have a clearance of six (6) inches.

L. Where practicable, conduits containing instrumentation cable shall cross raceway-containing conductors of other systems at right angles.

M. The cutting of walls or floors for conduit shall be kept to a minimum. Where such cutting is necessary, care shall be taken so as not to weaken the walls or floor involved. Beams or other structural supports shall not be cut under any condition.

N. Protect conduit immediately after installation by installing flat non-corrosive metallic discs and steel

bushings, designed for this purpose, at each end. Discs shall not be removed until it is necessary to clean the conduit and pull wire and cable. Before wire or cable is pulled, insulated bushings shall be installed at each end of the conduit.

O. Conduit installation shall be arranged to minimize cleaning. No horizontal runs of conduit will be permitted on brick or masonry walls.

P. When installing PVC coated rigid galvanized steel conduit use only a vise approved for PVC coated conduit. The use of a chain vise will not be permitted. Where PVC coated rigid galvanized steel conduit and fittings are specified, PVC coating damaged during transportation, loading, installation, etc. or cut during threading shall be repaired with the same type of covering obtained from and in accordance with the manufacturers recommendations.

Q. Connections from rigid conduit to motors, limit switches, solenoid valves, level controls, etc. and all devices subject to vibration shall be made with short lengths of flexible metal conduit. These lengths shall be provided with appropriate connectors with devices that will provide an excellent electrical connection between equipment and the rigid conduit for the flow of ground current.

R. Conduit Bodies and Fittings:

1. Install conduit bodies and fittings as necessary and where required, to complete the electrical conduit system. Conduit bodies and fittings shall also be installed wherever a pull point is necessary to keep the number of 90° bends in a conduit run to the maximum specified previously.

2. Paint the threads of all conduit bodies and fittings with a conductive compound prior to assembly.

3. Where all-thread nipples are used between fittings and electrical equipment, install nipples such that no threads are exposed.

4. All conduit bodies and fittings shall be compatible in the environment installed.

5. Seal fittings in explosion-proof areas where required in accordance with the NEC.

6. The use of two (2) locknuts and a grounding bushing will be required at all conduit terminations where hub type fittings are not required.

7. Provide weatherproof insulated throat Meyers hubs on all conduit entries to boxes and devices without integral hubs.

S. Expansion Fittings: Install Expansion fittings in conduit runs wherever conduit crosses structural

expansion joints, wherever conduits are attached between the two (2) separate structures, and wherever a conduit run is 100 feet or more in a single straight length.

T. Grounding Bushings: Install grounding bushings wherever conduits enter equipment or enclosures without integral hubs. All grounding bushings within an enclosure or piece of equipment shall be bonded together with a ground cable.

U. Support conduit using lay-in adjustable hangers, clevis hangers, and split hangers.

1. Group related conduits and support using conduit rack. Provide space on each rack for 25 percent additional conduits.

2. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

3. Do not attach conduit to ceiling support wires.

4. Arrange conduit to maintain headroom and present neat appearance.

5. Avoid moisture traps; provide junction box with drain fitting or breather at low points in conduit system.

V. Conduits for submersible pump seal leak and motor overtemperature control wires shall be installed in separate conduits than the power conductors for the pump.

W. Accurately record actual routing of all conduits.

X. Do not use dissimilar strap or clamp support. Provide dielectric tape, fittings, straps, and bushings where dissimilar metals are used.

CONDUIT SCHEDULE (UNLESS SHOWN OTHERWISE)	
Environment/Location	**Conduit System Type**
Embedded in Concrete or Masonry	PVC - Schedule 80
Utility Secondary Service	RGS
Class I, Group D locations	PVC – Schedule 80
Penetrations entering / exiting concrete slabs (up the J-Box) and concrete walls	PVC coated RGS
Exposed on Wet Well	PVC - Schedule 80
Telephone service	PVC - Schedule 80
Direct buried	PVC – Schedule 80
All other exposed not Class I, Group D	PVC – Schedule 80

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Flexible liquid-tight conduit system for the termination points at equipment that may possibly vibrate, such as motors and mechanical equipment.

B. Conduit Use - Flexible Liquid-tight Conduit:

1. Connecting motors and other equipment subject to vibration, maximum length - 2 feet.

2. Passing through building expansion joints.

1.02 - RELATED SECTIONS

A. Section 16070 – Supporting Devices

B. Section 16121 – Low Voltage Cable

C. Section 16134 - Conduit

1.03 - REFERENCES

A. ANSI/NFPA 70 - National Electric Code

B. NECA Standard of Installation

C. ANSI/NEMA FB 1 - Fittings

1.04 - SUBMITTALS

A. Submit product data under provisions of Section 01330.

1.05 - REGULATORY REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 - FLEXIBLE LIQUID-TIGHT CONDUITS AND FITTINGS

A. Liquid-tight flexible metal conduit shall be ANACONDA or approved equal.

B. Description: Interlocked steel construction with PVC jacket.

C. Provide flexible liquid-tight conduits and fittings as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO. or approved equal. Catalog numbers used below are those of the THOMAS & BETTS CORP., based on 3/4" size and are to be considered as standards by which equivalents are to be judged. All conduit shall be liquid-tight flexible type, UL type UA, or suitable for exposure to continuous or intermittent moisture.

D. Flexible liquid-tight connectors shall be Series 5333 or equal.

PART 3 - EXECUTION

3.01 - INSTALLATION

A. Conduits shall be 3/4-inch minimum size.

B. Where fittings for liquid-tight flexible conduit are brought into an enclosure with a knockout, a gasket assembly, consisting of one piece "O" ring, with a BUNA-R sealing material, Series 5200, shall be installed on outside of box. Fittings shall be made of either steel or malleable iron only, and shall have insulated throats or insulated bushings.

C. A copper ground wire sized in accordance with NEC shall be installed on the inside of the conduit as a jumper around flexible conduit to assure a continuity of ground.

D. Install a copper jumper across all flexible conduit including motors, fixtures, controls and other utilization equipment.

E. Install liquid-tight flexible conduit in such a manner as to prevent liquids from running on surface toward fittings.

F. Allow sufficient slack conduit to reduce the effect of vibration.

G. Complete all conduit systems before pulling the conductors.

H. Support in accordance with requirements of National Electric Code.

END OF SECTION

PART 1 - GENERAL

1.01 - SECTION INCLUDES

A. Under this Section, provide all labor, equipment and material necessary to furnish, install and test wiring devices, complete, in place, as shown on the Contract Drawings, specified herein and approved by the Engineer.

B. In general, the wiring devices included under this Section shall include, but not be limited to receptacles and lighting switches.

1.02 - RELATED SECTIONS

A. Section 16060 – Grounding and Bonding

B. Section 16132 – Boxes & Troughs

C. Section 16134 – Conduit

1.03 - REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NEMA WD1 - General Purpose Wiring Devices.

1.04 - SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Provide manufacturer's catalog information showing dimensions, colors and configuration.

PART 2 - PRODUCTS

2.01 – SWITCHES

A. Due to the large number of possible combinations of devices available, only the most frequently used devices are detailed in the following sections. Where devices are required which are not specified here, the device shall be specified on the Contract Drawings.

B. Devices shall be furnished with all necessary auxiliary items, as required, for a proper installation and operation. This shall include items such as screws, gaskets, protective boots, explosion proof seals, etc. These items shall be furnished and installed if specified or not.

2.02 - RECEPTACLES – GENERAL PURPOSE

A. Receptacles shall be heavy duty, specification grade, duplex type, 125V, 20A, NEMA WD-1, 2 poles and 3 wires grounding type, unless shown otherwise on the Contract Drawings.

B. Receptacles shall be back and side wired, have a green ground screw terminal, automatic ground clip, fully enclosed in composition case and nylon face. Receptacles shall also have a wrap around bridge with integral ground contacts and heat resistant base for dimensional stability.

C. Receptacles shall be brown unless shown otherwise on the Contract Drawings. Where brown receptacles are not available for a particular type, the Contractor shall receive Engineer's approval for alternate color.

D. All receptacles shall be corrosion resistant, have an isolated ground, and ground fault interrupter.

E. The receptacles shall be equal to Hubbell, "5362 Series", or approved equal.

F. Specialty receptacles that have either high amperage or voltage rating, or other configuration, shall be as identified on the Contract Drawings.

2.03 - SWITCHES

A. Switches shall be heavy duty, specification grade, toggle type, 120/277V, NEMA WD-1, 20A, single pole, unless shown otherwise on the Contract Drawings.

B. Switches shall be back and side wired, fully enclosed in composition case and shall have rivetless spring contact arm to eliminate stress and weak points. Contacts shall be silver cadmium oxide to eliminate welding. Switches shall have a #8 brass, green ground screw and stainless steel automatic grounding clip.

C. Switches shall be brown unless shown otherwise on the Contract Drawings. Where brown switches are not available for a particular type, Contractor shall receive Engineer approval for alternate color.

D. Where indicated on the Contract Drawings, provide switches that are double pole, 3-way, 4-way, key operated, illuminated, etc.

E. The switches shall be equal to Hubbell, "HBL 1220 Series".

F. Where 15A and 30A switches are shown, they shall be equal to Hubbell, "HBL 1200 Series" and Hubbell, "HBL 3030 Series".

G. Specialty switches with other configurations shall be as identified on the Contract Drawings.

H. Switches - Explosion Proof:

1. Switches shall be 125V, 20A, 120/277V, single pole unless shown otherwise on the Contract Drawings.

2. Switches shall be installed in an aluminum-sealing chamber (when factory sealed) and shall have a malleable iron cover with a front operated handle. The handle shall be lockable in either the "on" or "off" position. The cover shall be compatible with the back box finish, such as epoxy powder coated, as specified in Section 16132.

3. The switch housing shall mount onto an appropriate black box with four (4) stainless steel screws.

4. Where indicated on the Contract Drawings, provide switches that are 2-pole, 3-way or 4-way.

5. The switches shall be equal to Appleton Electric Co., "Types EDS and EFS".

2.04 - DEVICE PLATES - FLUSH MOUNTED

A. Device plates for flush mounted devices shall be smooth metal, 302 stainless steel type. Edges shall be contoured with satin finish. Device plates shall be 0.040 inches thick. Screws shall be stainless steel.

B. Device plate manufacturers and their particular products shall be as follows: General Electric, "93000 Series", Hubbell, "97000 Series".

C. Device plates for surface mounted devices shall be sheet steel, aluminum, or malleable iron for non-corrosive/weatherproof devices, and shall be die cast aluminum or malleable iron, with gasketed covers for corrosive/weatherproof devices.

D. All screws shall be stainless steel.

E. Corrosive/weatherproof device plates shall match the finish of the device box, such as epoxy powder coated, etc., as specified in Section 16132, "Boxes and Troughs".

F. Device plates shall be as manufactured by the following: Appleton Electric Co., "Type FSK", Crouse-Hinds, "Types DS and WLR".

G. Device plates for explosion proof devices are an integral part of the device. The device plate shall be as described in the explosion-proof receptacle and switch paragraphs above.

2.05 – SPECIAL DEVICES

A. Manufacturers: Hubbel or approved equal.

B. 30 Amp, 480 Volt, 3 pole, 4 Wire Pin & Sleeve Mechanical Interlocks Model No. 430SMI7W with mating plug Model No. 430P7W.

C. 20 Amp, 125 Volt, 2 Pole, 3 Wire Watertight Pin & Sleeve Model No. 320R4W with mating plug Model No. 320P4W.

D. 20 Amp, 250 Volt, 2 Pole, 3 Wire Watertight Pin & Sleeve Model No. 320R6W with mating plug Model No. 320P6W

PART 3 - EXECUTION

3.01 - INSTALLATION

A. All wiring device locations are approximate. Determine the proper location of wiring devices based on field conditions and equipment requirements. Review wiring device locations with Engineer.

B. General-purpose receptacles shall be mounted 1'-6" above finished floors (to centerline of receptacle) unless shown otherwise.

C. Lighting switches shall be mounted 4'-6" above finished floor (to centerline of switch) unless shown otherwise.

D. Receptacles and switches shall be mounted at different heights, where necessary, due to field conditions or where required by specific equipment (such as a kitchen stove, water cooler, etc.).

E. Polarity: Properly wire all receptacles so that the hot wire, the neutral wire and the ground wire connect to the proper terminal on all receptacles.

F. Grounding: Install all receptacles in boxes specified under Section 16132 and install a No. 12 green ground wire from device grounding terminal to the outlet box in accordance with the National Electric Code.

3.02 - BOXES

A. Boxes used for the wiring devices shall conform to the requirements of Section 16132.

3.03 - CIRCUITING

A. Wiring devices shall be circuited as shown on the Contract Drawings and shall comply with the requirements of the NEC.

B. All receptacles shall be pigtailed to the supply circuit with #12 AWG wires. Pigtails shall be stranded copper. Pigtail wire colors shall match supply circuit colors. Connection to the supply circuit shall be with UL listed, properly sized wire nuts.

3.04 - DEVICE PLATES

A. Device plates shall be installed wherever a wiring device is installed. All device plates shall be set true and plumb and shall fit tightly against the finished wall surfaces and device boxes.

B. Where multiple devices are mounted in a box, gang plates shall be used. Gang plates shall be one (1) piece. Assembled gang plates shall not be allowed.

C. Where plugs are being furnished with receptacles, connect the plugs to the flexible cords of equipment as directed by the Engineer. Furnish and install all necessary devices for proper connection of plug to flexible cord.

3.05 - FIELD QUALITY CONTROL

A. Inspect each wiring device for defects. Operate each wall switch with circuit energized and verify proper operation. Verify that each receptacle device is energized. Test each receptacle device for proper polarity. Test each GFCI receptacle device for proper operation.

END OF SECTION

PART 1 - GENERAL

1.01 - RELATED SECTION

A. Section 16075 - Electrical Identification.

B. Section 16132 – Boxes & Troughs

1.02 - REFERENCES

A. NEMA KS-1 - Enclosed Switches.

B. ANSI/UL 198C - High Intensity Capacity Fuses, Current Limiting Types.

C. ANSI/UL 198E - Class R Fuses.

D. FS W-S 865 - Switch, Box (Enclosed), Surface Mounted.

1.03 - SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Submit drawings with dimensions and equipment ratings for voltage, capacity, horsepower, and short circuit current ratings.

1.04 – EXTRA MATERIALS

A. Provide one complete set of spare fuses based on number of poles of fuses for each fused disconnect switch.

PART 2 - PRODUCTS

2.01 - DISCONNECT SWITCHES

A. Disconnect switches shall be GENERAL ELECTRIC, heavy-duty Type TH, SIEMENS, or approved equal.

B. 75^{O}C conductor ratings.

C. Quick-break, quick-make, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF and ON position.

D. Suitable for use as service entrance equipment where required.

E. UL listed for Class R 200,000 RMS amps, symmetrical IC.

F. Class R fusing kit.

G. Enclosures: Refer to Drawings.

2.02 - FUSES

A. Fuses shall be Littlefuse KLNR Class RK1 or equal.

B. Fuses shall be rated for 250 volts AC.

C. Interrupting Rating: 200,000 RMS amps.

2.03 – EXTRA MATERIALS

A. Provide one complete set based on number of poles of spare fuses for each fused disconnect switch. Provide to Owner.

PART 3 - EXECUTION

3.01 - INSTALLATION REQUIREMENTS

A. General:

1. Mount equipment rigidly and securely to the building structure or to supporting devices, which are rigidly and securely supported to the building structure.

2. All equipment shall be fastened with bolts and expansion shields on concrete or brick, with toggle bolts or hollow masonry units, and with machine screws or welded studs on steel rack.

3. All mounting hardware shall be stainless steel.

4. Mount equipment with sides parallel or perpendicular to walls or equipment, such that the local control station is installed in a neat and professional manner.

5. Install all equipment such that door swing is not hampered.

B. Grounding:

1. Ground disconnect switches in accordance with NEC requirements.

2. The use of two (2) locknuts and a grounding bushing will be required at all conduit terminations where hub type fittings are not required.

C. Wires:

1. The wires within the equipment shall be neatly harnessed to prevent the door damaging the wires and to prevent the wires hampering the door operation.

2. All wires shall have identification markers on each end.

3. Marker numbers shall match the terminal block numbers.

END OF SECTION