

- 5) Total Over Current Amps (TOCA).
 - 6) Fan Motor: HP.
 - j. Maximum Lift of Built-in Condensate Pump.
 - k. Weight and Dimensions.
 - l. Control Options.
- 3. Control Panels: Complete description of options, control points, zones/groups.
- E. Specimen Warranty: Copy of manufacturer's warranties.
- F. Shop Drawings: Installation drawings custom-made for this project; include as-designed HVAC layouts, locations of equipment items, refrigerant piping sizes and locations, condensate piping sizes and locations, remote sensing devices, control components, electrical connections, control wiring connections. Include:
 - 1. Detailed piping diagrams, with branch balancing devices.
 - 2. Condensate piping routing, size, and pump connections.
 - 3. Detailed power wiring diagrams.
 - 4. Detailed control wiring diagrams.
 - 5. Locations of required access through fixed construction.
 - 6. Drawings required by manufacturer.
- G. Operating and Maintenance Data:
 - 1. Manufacturer's complete standard instructions for each unit of equipment and control panel.
 - 2. Custom-prepared system operation, troubleshooting, and maintenance instructions and recommendations.
 - 3. Identification of replaceable parts and local source of supply.
- H. Project Record Documents: Record the following:
 - 1. As-installed routing of refrigerant piping and condensate piping.
 - 2. Locations of access panels.
 - 3. Locations of control panels.
- I. Warranty: Executed warranty, made out in Owner's name.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Company that has been manufacturing variable refrigerant volume heat pump equipment for at least 5 years.
 - 2. Company that provides system design software to installers.
- B. Installer Qualifications: Trained and approved by manufacturer of equipment.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle equipment and refrigerant piping according to manufacturer's recommendations.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Compressors: Provide manufacturer's warranty for six (6) years from date of installation. During the stated period, should any part fail due to defects in material and workmanship, it shall be repaired or replaced by the manufacturer. All warranty service work shall be preformed by a Daikin factory trained service professional.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: The system design shown in the contract documents is based on equipment and system designed by Mitsubishi Electric: www.mitsubishipro.com.
- B. Additional acceptable manufacturers:
 - 1. Daikin AC: www.daikinac.com
 - 2. LG Industries: www.lg-vrf.com
 - 3. Samsung: www.samsungaccentre.com
 - 4. Trane Corporation: www.trane.com
- C. For systems proposed by other manufacturers, all required modifications to the design and installation shall be the responsibility of the contractor and supplier for both costs and coordination with all other contractors and designers. These changes include, but are not limited to:
 - 1. Changes in refrigerant piping sizes, legnhts, and locations.
 - 2. Changes in branch selector quantities, locations, and accessibility.
 - 3. Changes in electrical requirements, including all power wiring, terminations, breakers, disconnects, and control wiring.
 - 4. Changes in heat-pump unit locations and quantities.
 - 5. Changes in structural supports, vibration isolation, and hangers.
 - 6. Changes to the drawings to reflect the new system parameters.

2.02 HVAC SYSTEM DESIGN

- A. System Operation: Heating and cooling, simultaneously.
 - 1. Zoning: Provide capability for temperature control for each individual indoor/evaporator unit independently of all other units.
 - 2. Zoning: Provide heating/cooling selection for each individual indoor/evaporator unit independently of all other units.
 - 3. Provide a complete functional system that achieves the specified performance based on the specified design conditions and that is designed and constructed according to the equipment manufacturer's requirements.
 - 4. Conditioned spaces are shown on the drawings.
 - 5. Branch selector unit locations are shown on the drawings for reference only. Final design locations shall be corrdinated in the field to ensure optimized line lengths and maintenance access.
 - 6. Required equipment unit capacities are shown on the drawings.
 - 7. Refrigerant piping sizes shown on the drawings are for general reference only. Final line sizing shall be the responsibility of the successful contractor and manufacturer.
 - 8. Connect equipment to condensate piping; condensate piping is shown on the drawings.
- B. Cooling Mode Interior Design Performance:
 - 1. Daytime Setpoint: 74 degrees F, plus or minus 2 degrees F.
 - 2. Setpoint Range: 57 degrees F to 80 degrees F.
 - 3. Night Setback: 78 degrees F.
 - 4. Interior Relative Humidity: 50 percent, maximum.
- C. Heating Mode Interior Design Performance:
 - 1. Daytime Setpoint: 70 degrees F, plus or minus 2 degrees F.
 - 2. Setpoint Range: 59 degrees F to 76 degrees F.
 - 3. Night Setback: 60 degrees F.
 - 4. Interior Relative Humidity: 20 percent, minimum.

- D. Outside Air Design Conditions:
 - 1. Summer Outside Air Design Temperature: 0.4 percent cooling design condition listed in ASHRAE Fundamentals Handbook.
- E. Operating Temperature Ranges:
 - 1. Simultaneous Heating and Cooling Operating Range: minus 4 degrees F to 60 degrees F dry bulb.
 - 2. Cooling Mode Operating Range: minus 4 degrees F to 110 degrees F dry bulb.
 - 3. Heating Mode Operating Range: 0 degrees F to 77 degrees F dry bulb; minus 4 degrees F to 60 degrees F wet bulb; without low ambient controls or auxiliary heat source.
- F. Refrigerant Piping Lengths: Provide equipment capable of serving system with following piping lengths without any oil traps:
 - 1. Minimum Piping Length from Outdoor/Central Unit(s) to Furthest Terminal Unit: 540 feet, actual; 620 feet, equivalent.
 - 2. Total Combined Liquid Line Length: 3280 feet, minimum.
 - 3. Minimum Piping Length Between Indoor Units: 49 feet.
- G. Controls: Provide the following control interfaces:
 - 1. For Each Indoor/Evaporator Unit: One wall-mounted wired "local" controller, with temperature sensor; locate where directed, in each space.
 - 2. One central remote control panel for entire system; locate where indicated.
 - 3. BACNet gateways sufficient to connect all units to building automation system by others; include wiring to gateways. Unit shall be BTL certified.
 - 4. Building automation system by HVAC system manufacturer; provide one user stations located where indicated.
- H. Local Controllers: Wall-mounted, wired, containing temperature sensor, setpoint adjustment (with central control override, maximum temperature adjustment +1/-1 degree, adjustable), and temperature display.

2.03 EQUIPMENT

- A. All Units: Factory assembled, wired, and piped and factory tested for function and safety.
 - 1. Refrigerant: R-410A.
 - 2. Performance Certification: AHRI Certified; www.ahrinet.org.
 - 3. Safety Certification: Tested to UL 1995 by UL or Intertek-ETL and bearing the certification label.
 - 4. Provide outdoor/condensing units capable of serving indoor unit capacity up to 200 percent of the capacity of the outdoor/condensing unit.
 - 5. Provide units capable of serving the zones indicated.
 - 6. Thermal Performance: Provide heating and cooling capacity as indicated, based on the following nominal operating conditions:
 - 7. Energy Efficiency: Report EER and COP based on tests conducted at "full load" in accordance with AHRI 210/240 or alternate test method approved by U.S. Department of Energy.
- B. Electrical Characteristics:
 - 1. See drawings.
- C. System Controls:
 - 1. Include self diagnostic, auto-check functions to detect malfunctions and display the type and location.

- D. Unit Controls: As required to perform input functions necessary to operate system; provided by manufacturer of units.
 - 1. Provide interfaces to remote control and building automation systems in BACNET native format.
- E. Wiring:
 - 1. Control Wiring: 18 AWG, 2-conductor, non-shielded, non-polarized, stranded cable.
 - 2. Control Wiring Configuration: Daisy chain.
 - 3. **All control wiring for the VRF system in it's entirety is the responsibility of the installing contractor, including, but not limited to: Wiring between the condensing unit(s) and system controller, wiring between the branch selector boxes and system controller, wiring from the terminal units to the system controllers, wiring from the thermostats to the terminal units.** The BAS contractor shall only be required to provide communications wiring to the BACnet interface from the nearest BAS controller.
- F. Refrigerant Piping:
 - 1. Refrigerant Flow Balancing: Provide refrigerant piping joints and headers specifically designed to ensure proper refrigerant balance and flow for optimum system capacity and performance.
 - 2. Insulate each refrigerant line individually between the condensing and indoor units.

2.04 OUTDOOR/CONDENSING UNITS

- A. Outdoor/Condensing Units: Air-cooled DX refrigeration units, designed specifically for use with indoor/evaporator units; factory assembled and wired with all necessary electronic and refrigerant controls; modular design for ganging multiple units.
 - 1. Refrigeration Circuit: Scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports and refrigerant regulator.
 - 2. Refrigerant: Factory charged.
 - 3. Variable Volume Control: Modulate compressor capacity automatically to maintain constant suction and condensing pressures while varying refrigerant volume to suit heating/cooling loads.
 - 4. Capable of being installed with wiring and piping to the left, right, rear or bottom.
 - 5. Capable of heating operation at low end of operating range as specified, without additional low ambient controls or auxiliary heat source; during heating operation, reverse cycle (cooling mode) oil return or defrost is not permitted, due to potential reduction in space temperature.
 - 6. Sound Pressure Level: As specified, measured at 3 feet from front of unit; provide night setback sound control as a standard feature; three selectable sound level steps of 55 dB, 50 dB, and 45 dB, maximum.
 - 7. Power Failure Mode: Automatically restart operation after power failure without loss of programmed settings.
 - 8. Safety Devices: High pressure sensor and switch, low pressure sensor/switch, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
 - 9. Provide refrigerant sub-cooling to ensure the liquid refrigerant does not flash when supplying to us indoor units.
 - 10. Oil Recovery Cycle: Automatic, occurring 2 hours after start of operation and then every 8 hours of operation; maintain continuous heating during oil return operation.
 - 11. Controls: Provide contacts for electrical demand shedding.

- B. Unit Cabinet: Weatherproof and corrosion resistant; rust-proofed mild steel panels coated with baked enamel finish.
 - 1. Designed to allow side-by-side installation with minimum spacing.
- C. Fans: One or more direct-drive propeller type, vertical discharge, with multiple speed operation via DC (digitally commutating) inverter.
 - 1. Provide minimum of 2 fans for each condensing unit.
 - 2. External Static Pressure: Factory set at 0.12 in WG, minimum.
 - 3. Indoor Mounted Air-Cooled Units: External static pressure field set at 0.32 in WG, minimum; provide for mounting of field-installed ducts.
 - 4. Fan Airflow: As indicated for specific equipment.
 - 5. Fan Motors: Factory installed; permanently lubricated bearings; inherent protection; fan guard; output as indicated for specific equipment.
- D. Condenser Coils: Copper tubes expanded into aluminum fins to form mechanical bond; waffle louver fin and rifled bore tube design to ensure high efficiency performance.
- E. Compressors: Scroll type, hermetically sealed, variable speed inverter-driven and fixed speed in combination to suit total capacity; minimum of one variable speed, inverter driven compressor per condenser unit; minimum of two compressors per condenser unit; capable of controlling capacity within range of 6 percent to 100 percent of total capacity.
 - 1. Multiple Condenser Modules: Balance total operation hours of compressors by means of duty cycling function, providing for sequential starting of each module at each start/stop cycle, completion of oil return, and completion of defrost, or every 8 hours. Provide twinning kits where required.
 - 2. Failure Mode: In the event of compressor failure, operate remaining compressor(s) at proportionally reduced capacity; provide microprocessor and associated controls specifically designed to address this condition.
 - 3. Provide each compressor with crankcase heater, high pressure safety switch, and internal thermal overload protector.
 - 4. Provide oil separators and intelligent oil management system.
 - 5. Provide spring mounted vibration isolators.

2.05 BRANCH SELECTOR UNITS

- A. Branch Selector Units: Concealed boxes designed specifically for this type of system to control heating/cooling mode selection of downstream units; consisting of electronic expansion valves, subcooling heat exchanger, refrigerant control piping and electronics to facilitate communications between unit and main processor and between branch unit and indoor/evaporator units.
 - 1. Provide one electronic expansion valve for each downstream unit served, except multiple indoor/evaporator units may be connected, provided balancing joints are used in downstream piping and total capacity is within capacity range of the branch selector.
 - 2. When branch unit is simultaneously heating and cooling, energize subcooling heat exchanger.
 - 3. Casing: Galvanized steel sheet; with flame and heat resistant foamed polyethylene sound and thermal insulation.
 - 4. Refrigerant Connections: Braze type.
 - 5. Condensate Drainage: Provide condensate drain tap where required.

2.06 INDOOR/EVAPORATOR UNITS

- A. All Indoor/Evaporator Units: Factory assembled and tested DX fan-coil units, with electronic proportional expansion valve, control circuit board, factory wiring and piping, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
 - 1. Refrigerant: Refrigerant circuits factory-charged with dehydrated air, for field charging.
 - 2. Temperature Control Mechanism: Return air thermistor and computerized Proportional-Integral-Derivative (PID) control of superheat.
 - 3. Coils: Direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond; waffle louver fin and high heat exchange, rifled bore tube design; factory tested.
 - a. Provide thermistor on liquid and gas lines.
 - 4. Fans: Direct-drive, with statically and dynamically balanced impellers; high and low speeds unless otherwise indicated; motor thermally protected.
 - 5. Return Air Filter: Washable long-life net filter with mildew proof resin, unless otherwise indicated.
 - 6. Condensate Drainage: Built-in condensate drain pan with PVC drain connection.
 - 7. Cabinet Insulation: Sound absorbing foamed polystyrene and polyethylene insulation.
- B. Recessed Ceiling Units: Four-way airflow cassette with central return air grille, for installation in a fixed ceiling.
 - 1. Cabinet Height: Maximum of 10 inches above face of ceiling.
 - 2. Exposed Housing: White, impact resistant, with washable decoration panel.
 - 3. Supply Airflow Adjustment:
 - a. Via motorized louvers which can be horizontally and vertically adjusted from 0 to 90 degrees.
 - b. Field-modifiable to 3-way and 2-way airflow.
 - c. Three auto-swing positions, including standard, draft prevention and ceiling stain prevention.
 - 4. Return Air Filter: High efficiency, MERV 8.
 - 5. Minimum Capacity: As indicated on the drawings.
 - 6. Sound Pressure Range: Between 28 dB(A) to 33 dB(A) at low speed measured at 5 feet below the unit.
 - 7. Fan: Direct-drive turbo type, with motor output range of 0.06 to 0.12 HP.
 - 8. Condensate Pump: Built-in, with lift of 21 inches, minimum.
 - 9. Provide side-mounted fresh air intake duct connection.
- C. Concealed-In-Ceiling Units: Ducted horizontal discharge and return; galvanized steel cabinet.
 - 1. Return Air Filter: MERV 11.
 - 2. Sound Pressure: Measured at low speed at 5 feet below unit.
 - 3. Provide external static pressure switch adjustable for high efficiency filter operation
 - 4. Condensate Pump: Built-in, with lift of 9 inches, minimum.
 - 5. Switch box accessible from side or bottom.
- D. Wall Surface-Mounted Units: Finished white casing, with removable front grille; foamed polystyrene and polyethylene sound insulation; wall mounting plate; polystyrene condensate drain pan.
 - 1. Airflow Control: Auto-swing louver that closes automatically when unit stops; five (5) steps of discharge angle, set using remote controller; upon restart, discharge angle defaulting to same angle as previous operation.
 - 2. Sound Pressure Range: Measured at low speed at 3.3 feet below and away from unit.

3. Condensate Drain Connection: Side (end), not concealed in wall.
4. Fan: Direct-drive cross-flow type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that required electrical services have been installed and are in the proper locations prior to starting installation.
- B. Verify that condensate piping has been installed and is in the proper location prior to starting installation.
- C. Notify Architect if conditions for installation are unsatisfactory.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install refrigerant piping in accordance with equipment manufacturer's instructions.
- C. Perform wiring in accordance with NFPA 70, National Electric Code (NEC).
- D. Coordinate with installers of systems and equipment connecting to this system.

3.03 FIELD QUALITY CONTROL

- A. Provide manufacturer's field representative to inspect installation prior to startup.

3.04 SYSTEM STARTUP

- A. Provide manufacturer's field representative to perform system startup.
- B. Prepare and start equipment and system in accordance with manufacturer's instructions and recommendations.
- C. Adjust equipment for proper operation within manufacturer's published tolerances.

3.05 CLEANING

- A. Clean exposed components of dirt, finger marks, and other disfigurements.

3.06 CLOSEOUT ACTIVITIES

- A. Demonstrate proper operation of equipment to Red Clay Consolidated School District's designated representative.
- B. Demonstration: Demonstrate operation of system to Red Clay Consolidated School District's personnel.
 1. Use operation and maintenance data as reference during demonstration.
 2. Briefly describe function, operation, and maintenance of each component.
- C. Training: Train Red Clay Consolidated School District's personnel on operation and maintenance of system.
 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 2. Provide minimum of two hours of training.
 3. Instructor: Manufacturer's training personnel.
 4. Location: At project site.

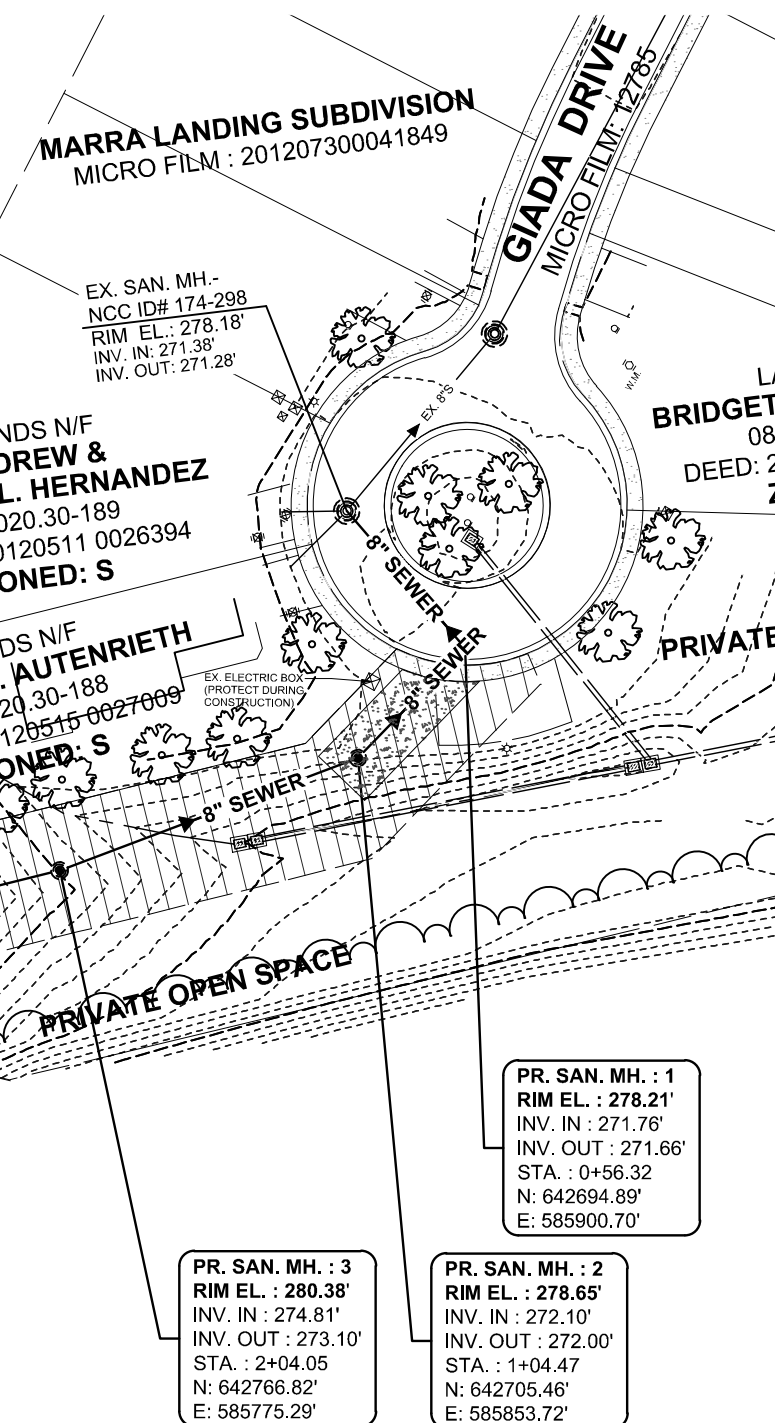
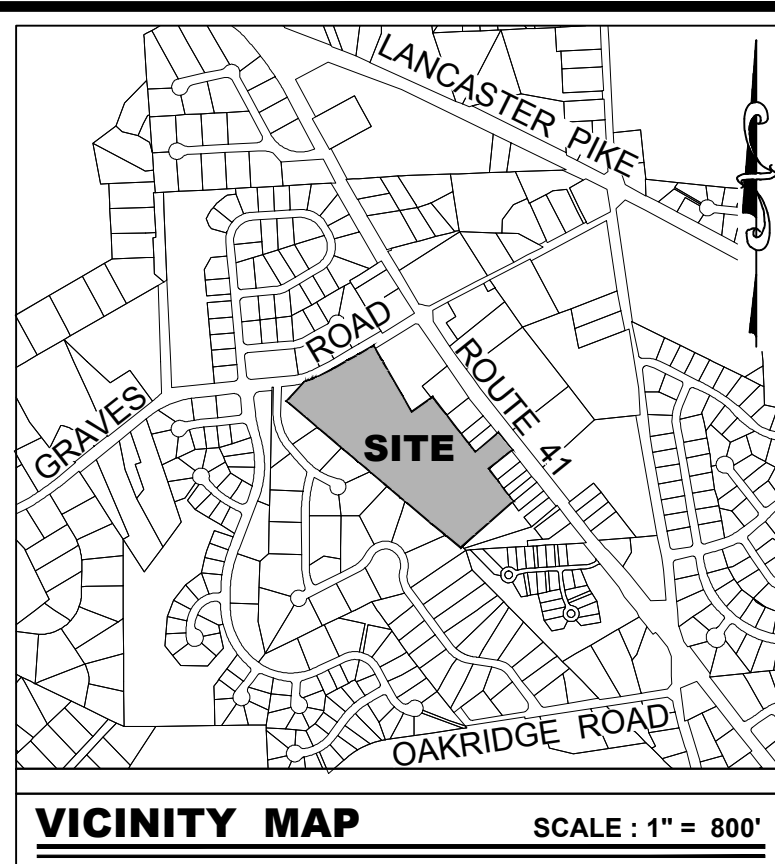
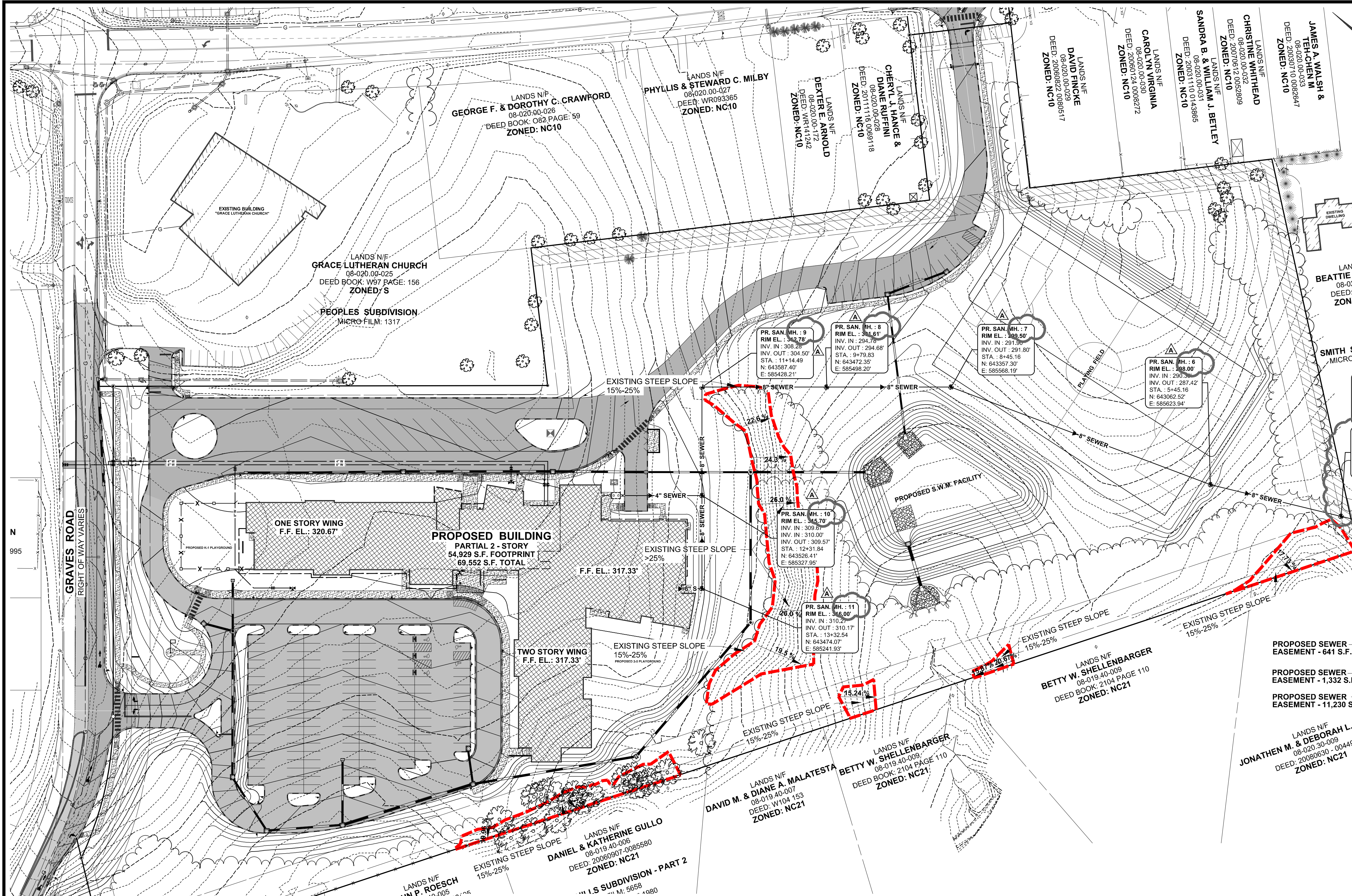
3.07 PROTECTION

- A. Protect installed components from subsequent construction operations.
- B. Replace exposed components broken or otherwise damaged beyond repair.

3.08 MAINTENANCE

- A. See Section 01 70 00 - Execution Requirements, for additional requirements relating to maintenance service.

END OF SECTION



SEWER DETAIL TABLE						
ST. NAME	TOTAL NUMBER OF MANHOLES	NOMINAL DIAMETER OF SANITARY SEWER PIPE	TOTAL LINEAR FEET OF GRAVITY SANITARY SEWER PIPE	TOTAL LINEAR FEET OF FORCE MAIN	PIPE MATERIAL	
NA	11	8"	1,477	0	PVC SDR 26	

SEWER LATERAL TABLE						
LATERAL NUMBER	LATERAL INVERT AT CONNECTION POINT TO SANITARY SEWER MAIN	MINIMUM PLUMBING FIXTURE ELEVATION	ELEVATION OF LOWEST FLOOR SERVED BY GRAVITY	UPSTREAM MH NUMBER AND RIM ELEVATION	DOWNSTREAM MH NUMBER	DISTANCE OF LATERAL CONNECTION FROM UPSTREAM MANHOLE
LAT-1	309.27 (MH 9)	314.67"	317.33"	#9-315.70"	8	N/A
LAT-2	310.27 (MH 10)	315.27"	317.33"	#10-316.00"	9	N/A
LAT-3	285.08"	290.08"	FUTURE	#5-298.00"	4	N/A
LAT-4	285.39"	290.39"	FUTURE	#5-298.00"	4	N/A

LEGEND			
ITEM	EXISTING	ITEM	EXISTING
CONCRETE CURB & GUTTER		SANITARY GRAVITY SEWER LINE, SIZE & FLOW DIRECTION	→ EX. 10" S
CONCRETE SIDEWALK, SLAB / PAVING		SANITARY SEWER FORCE MAIN, SIZE & FLOW DIRECTION	→ EX. 10" F.M.
IMPERVIOUS SURFACED ROAD, DRIVE OR LOT		SANITARY SEWER MANHOLE (S.D.M.H.)	○
INDIVIDUAL TREE OR BUSH		SANITARY SEWER CLEANOUT	○
WIRE FENCE		WATER MAIN & SIZE	○
CHARLINA FENCE		FIRE HYDRANT	○
STOCKADE FENCE		WATER VALVE (W.V.) OR METER (W.M.)	○
STRUCTURE (CONCRETE, WOOD, METAL, ETC.)		STORM DRAIN MANHOLE (S.D.M.H.)	○
DRAINAGE DITCH OR SWALE		STORM DRAIN LINE (CMP OR RCP)	→
EMBANKMENT SIDESLOPES (DOWN)		CATCH BASIN	○
CONTOUR		UTILITY POLE W/ OVERHEAD SERVICE (TELEPHONE OR ELECTRIC OR BOTH)	○
ELEVATION SPOT SHOT		UNDERGROUND ELECTRIC	○
BENCHMARK		UNDERGROUND TELEPHONE	○
PROPERTY OR RIGHT-OF-WAY LINE		UNDERGROUND GAS MAIN	○
CENTERLINE		PAVEMENT TO BE REMOVED	○
LIGHT POLE			
CONSTRUCTION NOTE			

ENGINEERS CERTIFICATION

I, J. MICHAEL RIEMANN, P.E., HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF DELAWARE WITH A BACKGROUND IN CIVIL ENGINEERING AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, I CERTIFY THAT ALL OF THE INFORMATION ON THESE SANITARY SEWER DRAWINGS IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY ACCEPTED SURVEYING AND ENGINEERING STANDARDS AND PRACTICES AND BY THE NEW CASTLE COUNTY UNIFIED DEVELOPMENT CODE. ADDITIONALLY, THE SANITARY SEWER DESIGN HAS BEEN PREPARED IN ACCORDANCE WITH AND COMPLES WITH ALL APPLICABLE REGULATIONS, CODES, STANDARDS, GUIDELINES, LAWS AND POLICIES, INCLUDING BUT NOT LIMITED TO CHAPTER 38 OF THE NEW CASTLE COUNTY CODE, THE DEPARTMENT OF SPECIAL SERVICES POLICIES #6 AND #7, THE NEW CASTLE COUNTY STANDARD SPECIFICATIONS FOR CONSTRUCTION AND AMENDMENTS AND THE RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES.

J. MICHAEL RIEMANN P.E. NO. 13772 DATE

OWNERS CERTIFICATION

WE, RED CLAY CONSOLIDATED SCHOOL DISTRICT C/O MARCIN MICHALSKI, HEREBY CERTIFY THAT I AM THE CURRENT, LEGAL OWNER OF THE PROPERTY TO BE SEWERED AND THAT THE SANITARY SEWER WILL BE CONSTRUCTED IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS, CODES, STANDARDS, GUIDELINES, LAWS AND POLICIES, INCLUDING BUT NOT LIMITED TO CHAPTER 38 OF THE NEW CASTLE COUNTY CODE, THE DEPARTMENT OF SPECIAL SERVICES POLICIES #6 AND #7, THE NEW CASTLE COUNTY STANDARD SPECIFICATIONS FOR CONSTRUCTION AND AMENDMENTS AND THE RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES.

SIGNATURE DATE

SHEET INDEX	
C-300 (1 OF 8)	UTILITY COVER SHEET
C-301 (2 OF 8)	UTILITY PLAN
C-302 (3 OF 8)	OFF SITE UTILITY PLAN
C-303 (4 OF 8)	SANITARY SEWER PROFILES
C-701 (5 OF 8)	SANITARY SEWER PROFILES
C-702 (6 OF 8)	SEWER CONSTRUCTION DETAILS
C-901 (7 OF 8)	SEWER CONSTRUCTION DETAILS
C-902 (8 OF 8)	SEWER CONSTRUCTION DETAILS

FOR USE BY DEPARTMENT OF SPECIAL SERVICES

PURPOSE NOTE:
THE PURPOSE OF THIS PLAN IS TO CONSTRUCT A NEW ELEMENTARY SCHOOL FOR RED CLAY CONSOLIDATED SCHOOL DISTRICT.

SITE DATA	
1. OWNER OF RECORD:	RED CLAY CREEK CONSOLIDATED SCHOOL DISTRICT AKA - RED CLAY CONSOLIDATED SCHOOL DISTRICT 1502 SPRUCE AVE WILMINGTON, DELAWARE 19805
2. ENGINEER / SURVEYOR:	BECKER MORGAN GROUP INC. 309 SOUTH GOVERNORS AVE. DOVER, DELAWARE 19904 (302) 734-7950
3. PROPERTY MAP NUMBER:	08-019-00-067
4. TOTAL LOTS:	ONE
5. ZONING CLASSIFICATION:	EXISTING: S (SUBURBAN/ SCHOOL) PROPOSED: S (SUBURBAN/ SCHOOL)
6. DEED SUMMARY:	DEED BOOK: H115 PAGE: 146 DEED BOOK: R82 PAGE: 839
7. PRESENT USE:	OPEN FARM LAND
8. PROPOSED USE:	ELEMENTARY SCHOOL
9. TOTAL SITE AREA:	EXISTING: 17.1063 ACRES ± (745,150 S.F.) PROPOSED: 16.6406 ACRES ± (724,864 S.F.) (AFTER DEDICATION)
10. TOTAL DISTURBED AREA:	13.80 ± ACRES (600,952 S.F.)
11. BUILDING:	EXISTING: 0 S.F. PROPOSED: 69,552 ± S.F.
12. SOURCE OF WATER:	ARTESIAN WATER COMPANY
13. SOURCE OF SEWER:	NEW CASTLE DEPARTMENT OF SPECIAL SERVICES
14. SOURCE OF GAS:	DELMARVA POWER AND GAS
15. SOURCE OF ELECTRIC:	DELMARVA POWER
16. SURVEY BENCHMARK:	NGS MONUMENT - NC3A (GRASS DISK) VERTICAL: NAVD83 HORIZONTAL: NAD83
17. MONUMENTATION:	EXISTING: 20 FOUND PROPOSED: 6 TO BE SET
18. ROADWAY CLASSIFICATION:	GRAVES ROAD (CO. RD. 30) - MAJOR COLLECTOR NEWPORT GAP PIKE (U.S. ROUTE 41) - OTHER PRINCIPAL ARTERIALS
19. SANITARY SEWER FLOW:	AVERAGE DAILY FLOW: 5,213 GPD PEAK DAILY FLOW: 20,852 GPD
20. ADC MAP NO.	PAGE: 11 GRID: H5

- GENERAL NOTES :**
- SANITARY SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE MOST RECENT NEW CASTLE COUNTY STANDARD SPECIFICATIONS FOR CONSTRUCTION, SPECIAL PROVISIONS, SUPPLEMENTAL SPECIFICATIONS, STANDARD DETAILS, AND THE RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES OR STRICTER STANDARDS IDENTIFIED BY THE ENGINEER.
 - THE CONTRACTOR'S SHALL BE RESPONSIBLE TO OBTAIN APPROVAL AND ACCEPTANCE OF THE SANITARY SEWER SYSTEM BY NEW CASTLE COUNTY UPON COMPLETION OF CONSTRUCTION. AS-BUILT PLANS, SIGNED AND SEALED BY A PROFESSIONAL LAND SURVEYOR OR PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF DELAWARE MUST BE SUBMITTED TO NEW CASTLE COUNTY BEFORE ACCEPTANCE.
 - DURING CONSTRUCTION, THE CONTRACTOR MUST HAVE IN HIS POSSESSION ON SITE, A SET OF CONSTRUCTION PLANS BEARING NEW CASTLE COUNTY'S STAMP OF APPROVAL.
 - THE CONTRACTOR SHALL NOT PLACE, PLANT, PUT OR SET ANY STRUCTURE WITHIN THE SANITARY SEWER EASEMENT.
 - A CONSTRUCTION PERMIT ISSUED BY THE STATE OF DELAWARE, DEPARTMENT OF TRANSPORTATION (DELDOT) IS REQUIRED BEFORE ANY WORK IS PERFORMED WITHIN A DELDOT RIGHT OF WAY. ALL WORK PERFORMED WITHIN DELDOT'S RIGHT OF WAY OR PROPERTY OWNED BY THE STATE OF DELAWARE SHALL BE PERFORMED IN ACCORDANCE WITH THE MOST RECENT DELDOT STANDARD SPECIFICATIONS AND UTILITY MANUAL.
 - SANITARY SEWER IS TO BE PUBLICLY OWNED AND MAINTAINED. SEE PLAN FOR DEMARCATION OF OWNERSHIP.
 - CONSTRUCTION SHALL NOT DEVIATE FROM THE PLANS AND SPECIFICATIONS APPROVED BY NEW CASTLE COUNTY WITHOUT WRITTEN PERMISSION FROM NEW CASTLE COUNTY'S DEPARTMENT OF SPECIAL SERVICES.
 - EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE DELAWARE SEDIMENT AND STORMWATER REGULATIONS. DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK AND THE NEW CASTLE COUNTY DRAINAGE CODE, AS AMENDED.
 - TYPICAL SEQUENCE OF CONSTRUCTION:
 - CONTACT NEW CASTLE COUNTY DEPARTMENT OF SPECIAL SERVICES (48 HOURS NOTICE AT 395-5756) PRIOR TO ANY EXCAVATION OR ACTIVITY INVOLVING SANITARY SEWER CONSTRUCTION, PUMP STATION OR LATERAL TIE-INS TO EXISTING LINES.
 - CONSTRUCT PROPOSED SANITARY SEWER SYSTEM AS APPROVED BY NEW CASTLE COUNTY.
 - BACKFILL AND RE-GRADE AS REQUIRED.
 - PERFORM AIR TEST, IF REQUIRED, IN ACCORDANCE WITH SECTION 32.01-3 OF THE NEW CASTLE COUNTY STANDARD SPECIFICATIONS FOR CONSTRUCTION, IN THE PRESENCE OF A NEW CASTLE COUNTY INSPECTOR.
 - FOLLOWING A PASSING AIR TEST (IF APPLICABLE), A FINAL VISUAL INSPECTION (LAMP TEST) MUST BE PERFORMED PRIOR TO ACCEPTANCE BY NEW CASTLE COUNTY.
 - BASED UPON THE RESULTS OF THE VISUAL INSPECTION, A MANHOLE TEST MAY BE REQUIRED FOLLOWING THE VISUAL INSPECTION.
 - LATERAL CONNECTIONS FROM THE PROPOSED SCHOLO INTO THE SEWER LINES WILL NOT BE PERMITTED UNTIL AFTER FINAL ACCEPTANCE.
 - PRIOR TO NEW CASTLE COUNTY MAKING A FINAL INSPECTION, THE FOLLOWING ITEMS MUST BE COMPLETED:
 - ALL MANHOLES MUST BE BROUGHT TO GRADE AND HAVE CONCRETE COLLARS INSTALLED.
 - CHANNELS MUST BE COMPLETED IN ALL MANHOLES.
 - ALL MANHOLES AND SEWER PIPES MUST BE CLEANED AND FLUSHED.
 - AS-BUILT DRAWINGS (SIGNED AND SEALED BY A REGISTERED LAND SURVEYOR OR PROFESSIONAL ENGINEER IN DELAWARE) WITH ONE (1) MYLAR AND THREE (3) SETS OF PRINTS MUST BE SUBMITTED TO NEW CASTLE COUNTY.
 - TURF TRAIL IS CONSTRUCTED IN ACCORDANCE WITH NCC DETAIL, SS-MSC-2, OR IF PIPE AND MANHOLES ARE WITHIN A PROPOSED ROADWAY, STABILIZED ROADWAY ACCESS IS CONSTRUCTED FOR THE PURPOSE OF MAINTAINING THE CONSTRUCTED SANITARY SEWER SYSTEM UNTIL FINAL PAVING IS COMPLETED.
 - CERTIFICATES OF OCCUPANCY WILL NOT BE ISSUED UNTIL THE AS-BUILT DRAWINGS HAVE BEEN RECEIVED, REVIEWED AND APPROVED AND THE SANITARY SEWER CONSTRUCTION (INCLUDING ALL APPURTENANCES) HAS BEEN ACCEPTED BY NEW CASTLE COUNTY.
 - MANHOLE COVERS ON PRIVATELY OWNED AND MAINTAINED SEWER SYSTEMS SHALL NOT BE LABELED 'NEW CASTLE COUNTY.'
 - THE SANITARY SEWER WILL BE PRIVATELY OWNED AND MAINTAINED.
 - THE SANITARY SEWER SYSTEM TIE-IN MANHOLE LOCATED IN MARRA LANDING IS IDENTIFIED AS N.C.C. MANHOLE # 174-298
 - GREASE TRAP SIZING CALCULATION:
 - A 4" PIPE, HALF-FULL AT 1% SLOPE WILL YIELD 45 GPM. MULTIPLIED BY 30 MIN. RETENTION TIME = 1,350 GALLONS.
 - PER THE UPC, A 1,500 GALLON GREASE INTERCEPTOR (172 DFGS).

BECKER MORGAN GROUP

ARCHITECTURE
ENGINEERING

Dover, DE

309 S. Governors Ave.
Dover, DE 19904
Ph. 302.734.7950
Fax 302.734.7965

Salisbury, MD

312 West Main St. Suite 300
Salisbury, MD 21801
Ph. 410.546.9100
Fax 410.546.5824

Wilmington, NC

3205 Randall Parkway, Suite 211
Wilmington, North Carolina 28403
Ph. 910.341.7600
Fax 910.341.7506

www.beckermorgan.com



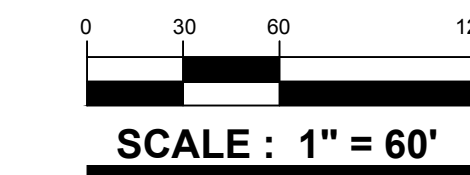
PROJECT TITLE

**NCC APP #: 2012-0736
RED CLAY
CONSOLIDATED
SCHOOL DISTRICT
WILLIAM F. COOKE, JR.
ELEMENTARY SCHOOL**

2025 GRAVES ROAD
HOCKESSIN, DELAWARE 19707
MILLCREEK HUNDRED
NEW CASTLE COUNTY, DE

SHEET TITLE

**UTILITY COVER
SHEET**



ISSUE BLOCK		
13	7-16-13	ADDENDUM - 01
12	7-11-13	SPECIAL SERVICES RESUBMISSIONS
11	7-2-13	DNREC, DELDOT RESUBMISSIONS
10	7-1-13	BIDDING DOCUMENTS N.C.C. SPEC. SERVICES RESUBMISSION
9	6-24-13	DFM SUBMISSION
8	6-10-13	CD RESUBMISSION DNREC, ARTESIAN
7	5-15-13	CD SUBMISSION
6	4-22-13	CD PRICING SET / FIRE MARSHAL DNREC, PUB. HEALTH, NCC SUBMISSION
5	4-16-13	CD CD SUBMISSION #2
4	3-21-13	CD SUBMISSION
3	2-18-13	DD PRICING SET / DELDOT CD SUBMISSION
2	1-10-13	N.C.C. EXPLORATORY PLAN RESUBMISSION
1	12-6-12	SD SUBMISSION
MARK	DATE	DESCRIPTION
LAYER STATE: C-300		

PROJECT NO.: 2012080-00

DATE: 10-31-12

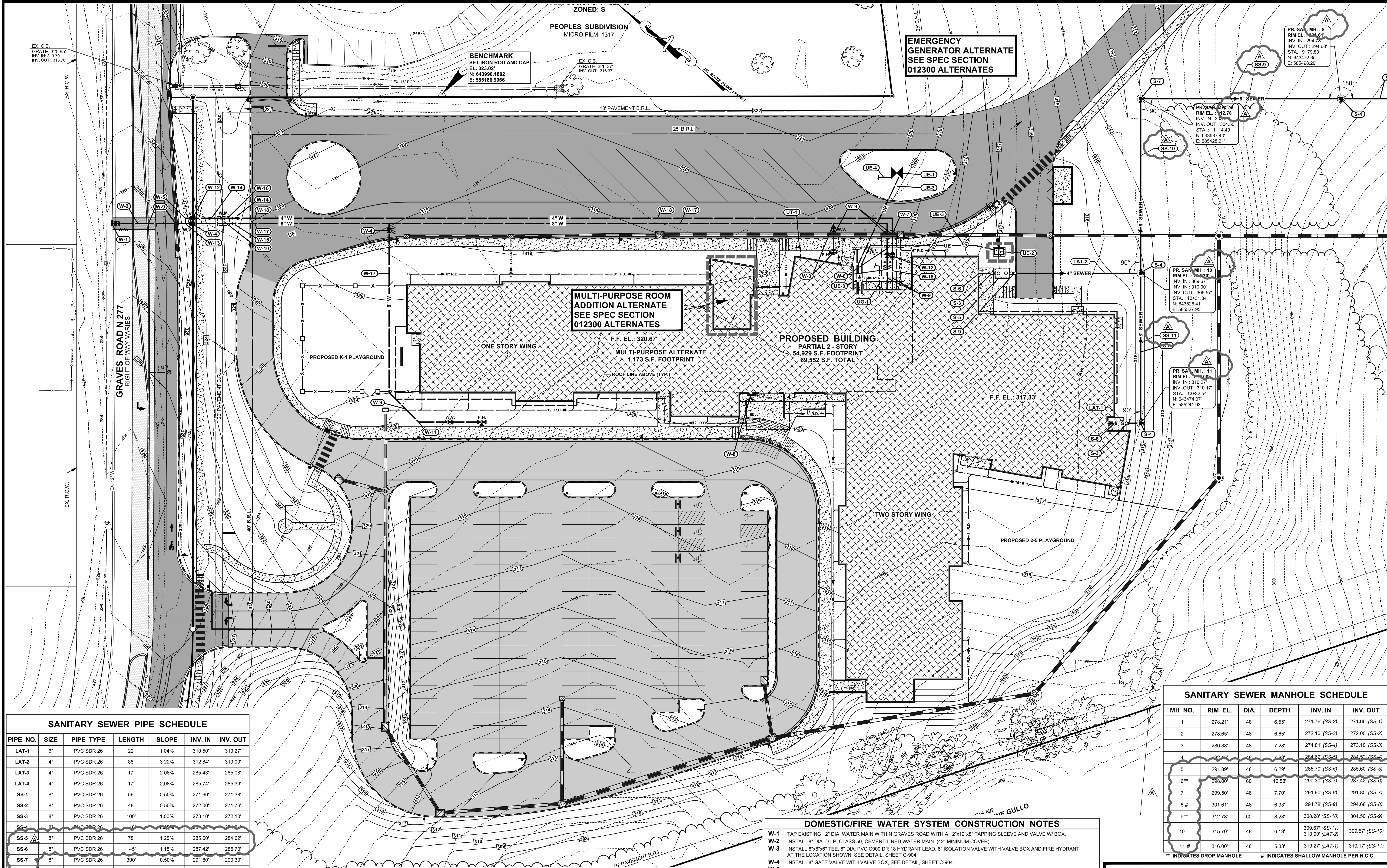
SCALE: 1" = 60'

DRAWN BY: M.J.H. PROJ. MGR.: J.M.R.

SHEET

C-300

COPYRIGHT 2012



SANITARY SEWER PIPE SCHEDULE						
PIPE NO.	SIZE	PIPE TYPE	LENGTH	SLOPE	INV. IN	INV. OUT
LAT-1	6"	PVC SDR 26	22'	1.04%	310.50'	310.27'
LAT-2	4"	PVC SDR 26	88'	3.22%	312.84'	310.00'
LAT-3	4"	PVC SDR 26	17'	2.08%	285.43'	285.08'
LAT-4	4"	PVC SDR 26	17'	2.08%	285.74'	285.39'
SS-1	8"	PVC SDR 26	56'	0.50%	271.66'	271.38'
SS-2	8"	PVC SDR 26	48'	0.50%	272.00'	271.76'
SS-3	8"	PVC SDR 26	100'	1.00%	273.10'	272.10'
SS-4	8"	PVC SDR 26	149'	0.96%	285.60'	284.62'
SS-5	8"	PVC SDR 26	78'	1.25%	285.60'	284.62'
SS-6	8"	PVC SDR 26	145'	1.18%	287.42'	285.70'
SS-7	8"	PVC SDR 26	300'	0.50%	291.80'	290.30'
SS-8	8"	PVC SDR 26	135'	2.06%	294.68'	291.90'
SS-9	8"	PVC SDR 26	135'	7.22%	304.50'	294.78'
SS-10	8"	PVC SDR 26	117'	1.10%	309.57'	308.28'
SS-11	8"	PVC SDR 26	101'	0.50%	310.17'	309.67'

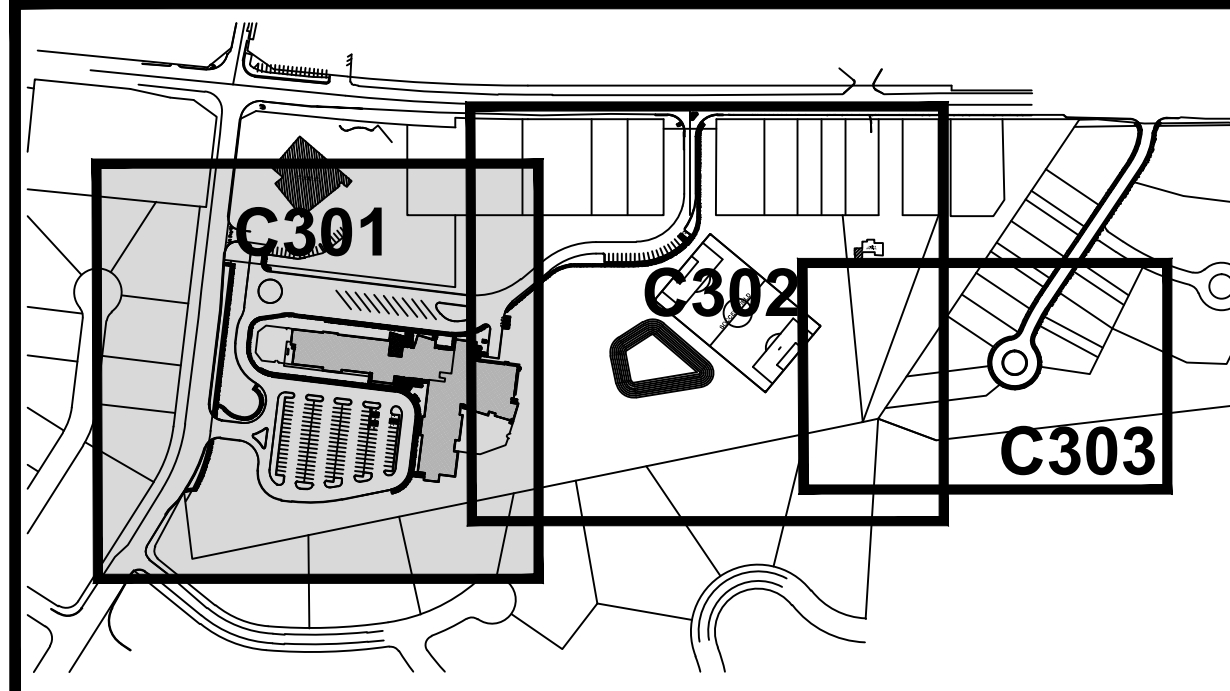
- ELECTRIC CONSTRUCTION NOTES**
 - UE-1 PROPOSED TRANSFORMER LOCATION. SEE ELECTRICAL DRAWINGS FOR DETAILS.
 - UE-2 PROPOSED EMERGENCY GENERATOR ON 8'x8' THICK CONCRETE PAD. SEE ELECTRICAL DRAWINGS FOR DETAILS. SEE SHEET C-906 FOR GENERATOR PAD DETAIL.
 - UE-3 PROPOSED ELECTRIC CONDUITS. SEE ELECTRICAL DRAWINGS FOR DETAIL, NUMBER AND SIZES.
 - UE-4 TWO (2) 4" CONDUITS FROM UTILITY COMPANY DEMARCATION POINT. ROUTING AND INSTALLATION BY UTILITY COMPANY.
- GAS CONSTRUCTION NOTES**
 - UG-1 3" DIA. GAS SERVICE LOCATION TO BUILDING FROM UTILITY COMPANY DEMARCATION POINT. ROUTING AND INSTALLATION BY UTILITY COMPANY. SEE PLUMBING DRAWINGS FOR METER AND BUILDING ENTRANCE DETAILS.
- TELEPHONE / FIBER OPTIC CONSTRUCTION NOTES**
 - UT-1 THREE (3) 4" CONDUITS FOR COMMUNICATIONS SERVICE FROM UTILITY COMPANY DEMARCATION POINT. ROUTING AND INSTALLATION BY UTILITY COMPANY. SEE COMMUNICATIONS DRAWINGS FOR BUILDING ENTRANCE DETAILS.

- SANITARY SEWER CONSTRUCTION NOTES**
 - S-1 CORE DRILL EXISTING SANITARY SEWER MANHOLE (NC 174-298) AND CONNECT PROPOSED 8" SEWER AT INVERT 271.38". USING APPROVED PIPE TO MANHOLE CONNECTOR AND INTERIOR DROP CONNECTION. SEE DETAILS, SHEET C-901.
 - S-2 INSTALL PVC SDR 26 SANITARY SEWER SERVICE. SEE SANITARY SEWER PIPE SCHEDULE.
 - S-3 INSTALL CLEANOUT WITH CAST IRON FRAME AND COVER. SEE DETAIL, SHEET C-902. SIZE TO MATCH LATERAL SIZE. SEE DETAIL, SHEET C-901.
 - S-4 INSTALL PRECAST CONCRETE MANHOLE WITH HEAVY DUTY FRAME AND COVER. FRAME AND COVERS IN NONPAVED AREAS ARE SET ABOVE PROPOSED GRADE AND SHALL HAVE BERM PER N.C.C. STANDARD. SEE DETAIL, SHEET C-902.
 - S-5 INSTALL STAINLESS STEEL GREASE INTERCEPTOR WITH HEAVY DUTY FRAMES/COVERS OVER OPENINGS AND 12"x18"x12" CONCRETE DEADMAN ANCHORS AND STRAPS. SEE DETAILS, SHEET C-902.
 - S-6 TRANSITION FROM DUCTILE IRON CLASS 50 PIPE TO PVC C900 DR 18 PIPE AFTER METER PIT USING TRANSITION COUPLING. SEE DETAIL, SHEET C-904.
 - S-7 INSTALL PRECAST CONCRETE DROP MANHOLE WITH HEAVY DUTY FRAME AND COVER. FRAME AND COVERS IN NONPAVED AREAS ARE SET ABOVE PROPOSED GRADE AND SHALL HAVE BERM PER N.C.C. STANDARD. SEE DETAIL, SHEET C-902.
 - S-8 HAVE N.C.C. STANDARD MANHOLE FRAME AND COVER. ALL OTHERS SHALL HAVE MANHOLE FRAME AND COVER FOR PRIVATE SYSTEM. SEE DETAIL, SHEET C-901.
 - S-9 INSTALL TURF TRAIL PER N.C.C. STANDARD. SHIFT TRAIL AS NECESSARY TO REMAIN IN EASEMENT. SEE DETAIL, SHEET C-902.
 - S-10 INSTALL DUAL CLEANOUT ASSEMBLY. SEE SHEET C-901 AND C-902 FOR SANITARY SEWER DETAILS.

- DOMESTIC/FIRE WATER SYSTEM CONSTRUCTION NOTES**
 - W-1 TAP EXISTING 12" DIA. WATER MAIN WITHIN GRAVES ROAD WITH A 12"x12"x8" TAPPING SLEEVE AND VALVE W/ BOX.
 - W-2 INSTALL 8" DIA. D.I.P. CLASS 50, CEMENT LINED WATER MAIN, (42" MINIMUM COVER).
 - W-3 INSTALL 8"x8"x6" TEE, 6" DIA. PVC C900 DR 18 HYDRANT LEAD, 6" ISOLATION VALVE WITH VALVE BOX AND FIRE HYDRANT AT THE LOCATION SHOWN. SEE DETAIL, SHEET C-904.
 - W-4 INSTALL 8" GATE VALVE WITH VALVE BOX. SEE DETAIL, SHEET C-904.
 - W-5 INSTALL 4" DIA. D.I.P. CLASS 50, CEMENT LINED WATER MAIN WITH 4" GATE VALVE AND BOX (42" MIN. COVER).
 - W-6 INSTALL 8"x6" REDUCER, 6" DIA. PVC C900 DR 18, WATER MAIN FOR FIRE SERVICE WITH 6" GATE VALVE AND BOX, (42" MIN. COVER). SEE DOMESTIC/FIRE WATER SERVICE ENTRANCE. SEE DETAIL, SHEET C-904.
 - W-7 DOMESTIC/FIRE WATER SERVICE ENTRANCE AREA. SEE DETAIL, SHEET C-904.
 - W-8 FIRE DEPARTMENT CONNECTION LOCATION WITH "FIRE DEPARTMENT CONNECTION" SIGN PER DELAWARE STATE FIRE PREVENTION REGULATIONS. SEE SIGN DETAIL, SHEET 300.
 - W-9 DEFLECT WATER MAIN UNDER OTHER UTILITIES WHERE IN CONFLICT OR IN ORDER TO MAINTAIN MINIMUM 42" COVER AND 18" VERTICAL SEPARATION BETWEEN WATER AND SANITARY AND MINIMUM 12" VERTICAL SEPARATION BETWEEN WATER AND OTHER UTILITIES AT ALL CROSSINGS. SEE DETAIL, SHEET C-904.
 - W-10 INSTALL 6"x6" PRECAST VAULT FOR WATER METER AND DETECTOR CHECK VALVE ASSEMBLY PER ARTESIAN WATER COMPANY STANDARDS. WATER METER TO BE 2" WITH BYPASS. DETECTOR CHECK VALVE TO BE 8" WITH BYPASS. SEE DETAIL, SHEET C-904.
 - W-11 INSTALL 8"x6" REDUCING ELBOW, INSTALL 6" DIA. PVC C900 DR 18 HYDRANT LEAD, 6" ISOLATION VALVE WITH VALVE BOX AND FIRE HYDRANT AT THE LOCATION SHOWN. SEE DETAIL, SHEET C-904.
 - W-12 INSTALL 4" GATE VALVE WITH VALVE BOX. SEE DETAIL, SHEET C-904.
 - W-13 INSTALL 8"x8"x4" REDUCING TEE FITTING.
 - W-14 INSTALL 4"x2" REDUCING FITTING.
 - W-15 TRANSITION FROM DUCTILE IRON CLASS 50 PIPE TO PVC C900 DR 18 PIPE AFTER METER PIT USING TRANSITION COUPLING.
 - W-16 INSTALL 2" TYPE K COPPER PIPE FOR ALL DOMESTIC PIPING BETWEEN THE 4"x2" REDUCERS AND WITHIN THE METER PIT.
 - W-17 INSTALL 8" DIA. PVC C900 DR 18 FIRE SERVICE MAIN FROM TRANSITION COUPLING AT METER PIT. (42" MINIMUM COVER).
 - W-18 INSTALL 4" DIA. PVC C900 DR 18 DOMESTIC SERVICE MAIN FROM 4"x2" REDUCER AT METER PIT. (42" MIN. COVER).
- NOTE: ALL VALVES AND FITTINGS 4" AND ABOVE IN SIZE TO BE D.I.M.J.

SANITARY SEWER MANHOLE SCHEDULE						
MH NO.	RIM EL.	DIA.	DEPTH	INV. IN	INV. OUT	
1	278.21'	48"	6.55'	271.76' (SS-2)	271.66' (SS-1)	
2	278.65'	48"	6.65'	272.10' (SS-3)	272.00' (SS-2)	
3	280.38'	48"	7.28'	274.81' (SS-4)	273.10' (SS-3)	
4	292.45'	48"	7.93'	284.62' (SS-5)	284.52' (SS-4)	
5	291.89'	48"	6.29'	285.70' (SS-6)	285.60' (SS-5)	
6**	298.00'	60"	10.58'	290.30' (SS-7)	287.42' (SS-6)	
7	299.50'	48"	7.70'	291.90' (SS-8)	291.80' (SS-7)	
8**	301.61'	48"	6.93'	294.78' (SS-9)	294.68' (SS-8)	
9**	312.78'	60"	8.28'	308.28' (SS-10)	304.50' (SS-9)	
10	315.70'	48"	6.13'	309.67' (SS-11)	310.00' (LAT-2)	
11 #	316.00'	48"	5.83'	310.27' (LAT-1)	310.17' (SS-11)	

** INDICATES DROP MANHOLE # INDICATES SHALLOW MANHOLE PER N.C.C.



BECKER MORGAN GROUP

ARCHITECTURE
ENGINEERING

Dover, DE
309 S. Governors Ave.
Dover, DE 19904
Ph. 302.734.7950
Fax 302.734.7965

Salisbury, MD
312 West Main St. Suite 300
Salisbury, MD 21801
Ph. 410.546.9100
Fax 410.546.5824

Wilmington, NC
3205 Randall Parkway, Suite 211
Wilmington, North Carolina 28403
Ph. 910.341.7600
Fax 910.341.7506

www.beckermorgan.com

RED CLAY CONSOLIDATED SCHOOL DISTRICT
1981

PROJECT TITLE

NCC APP #: 2012-0736
RED CLAY CONSOLIDATED SCHOOL DISTRICT
WILLIAM F. COOKE, JR. ELEMENTARY SCHOOL

2025 GRAVES ROAD
HOCKESSIN, DELAWARE 19707
MILLCREEK HUNDRED
NEW CASTLE COUNTY, DE

SHEET TITLE

UTILITY PLAN

SCALE : 1" = 30'

ISSUE BLOCK		
13	7-16-13	ADDENDUM - 01
12	7-11-13	SPECIAL SERVICES RESUBMISSIONS
11	7-2-13	DNREC, DELDOT RESUBMISSIONS
10	7-1-13	BIDDING DOCUMENTS
9	6-24-13	N.C.C. SPEC. SERVICES RESUBMISSION
8	6-24-13	DFM SUBMISSION
7	6-10-13	CD RESUBMISSION DNREC, ARTESIAN
6	6-10-13	CD SUBMISSION
5	4-16-13	CD PRICING SET / FIRE MARSHAL, DNREC, PUB. HEALTH, NCC SUBMISSION
4	4-16-13	DELDOT CD SUBMISSION #2
3	4-16-13	CD SUBMISSION
2	3-21-13	CD PRICING SET / FIRE MARSHAL, DNREC, PUB. HEALTH, NCC SUBMISSION
1	2-18-13	DELDOT CD SUBMISSION
1	1-10-13	CD PRICING SET / FIRE MARSHAL, DNREC, PUB. HEALTH, NCC SUBMISSION
1	12-6-12	SD SUBMISSION
MARK	DATE	DESCRIPTION
LAYER	STATE	C-301
PROJECT NO.: 2012080.00		
DATE: 10-31-12		
SCALE: 1" = 30'		
DRAWN BY: M.J.H. PROJ. MGR.: J.M.R.		
SHEET		
C-301		
COPYRIGHT 2012		