

SECTION 00 9113 – ADDENDUM NO. 5

**Central Middle School
Greenwich, Connecticut**

S/L/A/M Project No. 22367.00

This Addendum, dated November 5, 2024, forms a part of the Contract Documents, and modifies the original Bidding Documents dated September 30, 2024, Addendum No. 1 dated October 16, 2024, Addendum No. 2, dated October 22, 2024, Addendum No. 3, dated October 25, 2024, and Addendum No. 4, dated October 31, 2024. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum is comprised of Page Nos. 1 of 3, and the following attachments:

1.2 00 4000 – Turner Construction: Phase 2 of 3 Procurement Manual

- A. 01 – Updated Drawings & Specifications List.
- B. 03b – Updated BP#09 – Scope of Work - SITEWORK

1.3 PROJECT MANUAL

- C. REPLACE the follow specification section, previously dated September 30, 2024 with the revised section dated October 30, 2024

- 1. 02 3000 SUBSURFACE INVESTIGATIONS
- 2. 02 4113 SITE-UTILITY-ABANDONMENT
- 3. 31 1200 SITE UTILITY PREPARATION
- 4. 31 2300 EXCAVATION, BACKFILL, COMPACTION AND DEWATERING
- 5. 31 2316.26 ROCK REMOVAL
- 6. 31 2323 BORROW MATERIAL
- 7. 31 2333 TRENCHING AND BACKFILLING
- 8. 31 6616 AGGREGATE PIERS
- 9. 33 1113 DUCTILE-IRON-PIPE-AND-FITTINGS
- 10. 33 3113 POLYVINYL-CHLORIDE-(PVC)-PIPE-AND-FITTINGS
- 11. 33 4100 STORM DRAINAGE
- 12. 33 4113 HIGH-DENSITY-POLYETHYLENE-PIPE-AND-FITTINGS
- 13. 33 4419 STORMWATER TREATMENT SYSTEM

1.3 Additional Reports Issued for reference only, these Appendices to be Added to Vol 4 of 4

**CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114 N
PHASE 2 OF 3 - BUILDING CONSTRUCTION,
DEMOLITION, AND SITEWORK**

**S/L/A/M PROJECT NO. 22367.00
ADDENDUM NO.5
00 9113 - 1**

- 1. Appendix F – Report entitled “Greenwich Central Middle School Construction-Vibration and Controls Durring Construction” (CVC), by GAP Mountain Consulting Engineers, PLLC, dated November 1, 2024. This report is provided to outline the requirements for monitoring and protecting the Existing School Building from structural damage while it is occupied.**

END OF DOCUMENT 00 9113 - ADDENDUM No. 5

END OF SECTION 01 09113

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LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum #5	Comments
<u>SPECIFICATIONS</u>								
<u>Volume 1 - Division 00</u>								
<u>DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS</u>								
00 0110	TABLE OF CONTENTS	9/30/2024						
00 3132	GEOTECHNICAL DATA	9/30/2024		10/16/2024		10/30/2024		Addendum #2, Addendum #4
00 4000	TURNER CONSTRUCTION: PHASE 2 OF 3 PROCUREMENT MANUAL	9/30/2024						
<u>Volume 2 - Divisions 01-14</u>								
<u>DIVISION 01 - GENERAL REQUIREMENTS</u>								
01 1000	SUMMARY	9/30/2024						
01 2000	PRICE AND PAYMENT PROCEDURES	9/30/2024						
01 2000A	SUPPLEMENTAL INSTRUCTIONS FORM	9/30/2024						
01 2000B	PROPOSAL REQUEST FORM	9/30/2024						
01 2000C	CONSTRUCTION CHANGE DIRECTIVE FORM	9/30/2024						
01 2100	ALLOWANCES	9/30/2024						
01 2201	UNIT PRICES	9/30/2024						
01 2300	ALTERNATES	9/30/2024						
	SUBSTITUTION PROCEDURES ATTACHMENT – CSI FORM 1.5C	9/30/2024						
01 2500	ATTACHMENT – CSI FORM 13.1A	9/30/2024						
01 3000	ADMINISTRATIVE REQUIREMENTS	9/30/2024						
01 3302	FORM B CADD EFT FORM REV'D	9/30/2024						
01 3303	FORM C BIM ACCESS LICENSE AGREEMENT	9/30/2024						
	SUSTAINABILITY COMPLIANCE PROCEDURES – CTHPB WORKING	9/30/2024						
01 3566.42	COMPLIANCE CHECKLIST W/ LEED	9/30/2024						
01 3566.43	CTHPB SUBMITTAL COVER	9/30/2024						
01 3566.44	CTHPB MATERIAL CALCULATOR	9/30/2024						
01 3566.45	CTHPB VOC FORM	9/30/2024						
01 3566.46	IAQ FIELD REPORT FORM	9/30/2024						
01 3573	DELEGATED DESIGN PROCEDURES	9/30/2024						
01 4000	QUALITY REQUIREMENTS	9/30/2024						
01 4219	REFERENCE STANDARDS	9/30/2024						
01 4339	MOCK-UPS	9/30/2024						
01 4533	CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES	9/30/2024						
	TEMPORARY FACILITIES AND CONTROLS – ATTACHMENT FORM SCG-3021	9/30/2024						
01 5000	PROJECT SIGN	9/30/2024						
01 5639	TEMPORARY TREE AND PLANT PROTECTION	9/30/2024						
01 5719	TEMPORARY ENVIRONMENTAL CONTROLS	9/30/2024						
01 6000	PRODUCT REQUIREMENTS	9/30/2024						
01 6116	VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS	9/30/2024						
01 7000	EXECUTION AND CLOSEOUT REQUIREMENTS	9/30/2024						
01 7419	CONSTRUCTION WASTE AND MANAGEMENT DISPOSAL	9/30/2024						
01 7419A	ATTACHMENT: CW&MD CONSTRUCTION WASTE MANAGEMENT FORM	9/30/2024						
01 7800	CLOSEOUT SUBMITTALS	9/30/2024						
01 7900	DEMONSTRATION AND TRAINING	9/30/2024						
01 9113	GENERAL COMMISSIONING REQUIREMENTS	9/30/2024						
	ATTACHMENT: COMMISSIONING PLAN	9/30/2024						
<u>DIVISION 02 - EXISTING CONDITIONS</u>								
02 3000	SUBSURFACE INVESTIGATIONS	9/30/2024						11/1/2024 Addendum #5
02 4100	DEMOLITION	9/30/2024						
02 4113	SITE UTILITY ABANDONMENT	9/30/2024						11/1/2024 Addendum #5
02 8200	SELECTIVE HAZARDOUS BUILDING MATERIALS ABATEMENT DEMOLITION	9/30/2024						
02 8213	ASBESTOS ABATEMENT	9/30/2024						
	ATTACHMENT: FORM SCG-3011 – ASBESTOS CHECKLIST – CENTRAL	9/30/2024						
	MIDDLE SCHOOL	9/30/2024						
02 8313	LEAD-BASED PAINT AWARENESS	9/30/2024						
02 8416	UNIVERSAL WASTE REMOVAL AND RECYCLING	9/30/2024						
02 8432	PCBS GREATER THAN 50PPM REMEDIATION	9/30/2024						
	ATTACHMENT: FORM SCG-3012 PCB CHECKLIST – CENTRAL MIDDLE	9/30/2024						
	SCHOOL	9/30/2024						
	ATTACHMENT: FORM SCG-9008 PCB I CAULK - CENTRAL MIDDLE SCHOOL	9/30/2024						
<u>DIVISION 03 - CONCRETE</u>								
03 0516	UNDER-SLAB VAPOR RETARDER	9/30/2024						
03 1000	CONCRETE FORMING AND ACCESSORIES	9/30/2024						
03 2000	CONCRETE REINFORCING	9/30/2024						
03 3000	CAST-IN-PLACE CONCRETE	9/30/2024						
03 3250	CONCRETE POST-INSTALLED ANCHORS	9/30/2024						
03 3511	CONCRETE FLOOR FINISHES	9/30/2024						
03 6213	NON-METALLIC NON-SHRINK GROUTING	9/30/2024						
<u>DIVISION 04 - MASONRY</u>								
04 2000	UNIT MASONRY	9/30/2024						
04 4313	STONE MASONRY VENEER					10/30/2024		Addendum #4
04 7323	MANUFACTURED BUILDING STONE MASONRY	9/30/2024						
<u>DIVISION 05 - METALS</u>								
05 0805	FACTORY-APPLIED COATINGS FOR METAL	9/30/2024						
05 1200	STRUCTURAL STEEL FRAMING	9/30/2024						
05 2100	STEEL JOIST FRAMING	9/30/2024						
05 3100	STEEL DECKING	9/30/2024						
05 4000	COLD-FORMED METAL FRAMING	9/30/2024						
05 5000	METAL FABRICATIONS	9/30/2024		10/16/2024				Addendum #2
05 5100	METAL STAIRS	9/30/2024						

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum	Comments
#5								
05 7000	DECORATIVE METAL RAILINGS	9/30/2024						
05 7100	MONUMENTAL METAL STAIRS	9/30/2024						
<u>DIVISION 06 - WOOD, PLASTICS AND COMPOSITES</u>								
06 1000	ROUGH CARPENTRY	9/30/2024						
06 2000	FINISH CARPENTRY	9/30/2024						
06 4100	ARCHITECTURAL WOOD CASEWORK	9/30/2024						
06 4200	WOOD PANELING	9/30/2024						
06 6116	SOLID SURFACING FABRICATIONS	9/30/2024						
06 8316	FIBERGLASS REINFORCED PANELING	9/30/2024						
<u>DIVISION 07 - THERMAL AND MOISTURE PROTECTION</u>								
07 1400	FLUID-APPLIED WATERPROOFING	9/30/2024						
07 2100	THERMAL INSULATION	9/30/2024						
07 2119	FOAMED-IN-PLACE INSULATION	9/30/2024						
07 2163	FLUID-APPLIED INSULATIVE COATING	9/30/2024						
07 2410	DIRECT-APPLIED EXTERIOR FINISH SYSTEMS	9/30/2024						
07 2726	FLUID-APPLIED MEMBRANE AIR BARRIERS	9/30/2024						
07 4213.23	METAL COMPOSITE MATERIAL WALL PANELS	9/30/2024						
07 4646	FIBER-CEMENT WALL PANELS	9/30/2024						
07 5423	THERMOPLASTIC POLYOLEFIN (TPO) ROOFING	9/30/2024						
07 6200	SHEET METAL FLASHING AND TRIM	9/30/2024						
07 7100	ROOF SPECIALTIES	9/30/2024			10/23/2024		Addendum #3	
07 7200	ROOF ACCESSORIES	9/30/2024						
07 8100	APPLIED FIRE PROTECTION	9/30/2024						
07 8123	INTUMESCENT FIRE PROTECTION	9/30/2024						
07 8400	FIRESTOPPING	9/30/2024						
07 9200	JOINT SEALANTS	9/30/2024						
07 9513	EXPANSION JOINT COVER ASSEMBLIES	9/30/2024						
<u>DIVISION 08 - OPENINGS</u>								
08 1113	HOLLOW METAL DOORS AND FRAMES	9/30/2024						
08 1416	FLUSH WOOD DOORS	9/30/2024						
08 3323	OVERHEAD COILING DOORS	9/30/2024						
08 3326	OVERHEAD COILING GRILLES	9/30/2024						
08 4313	ALUMINUM-FRAMED STOREFRONTS	9/30/2024			10/23/2024		Addendum #3	
08 4413	GLAZED ALUMINUM CURTAIN WALLS	9/30/2024				10/30/2024	Addendum #4	
08 5653	SECURITY AND SERVICE WINDOWS	N/A		10/16/2024			Addendum #2	
08 6300	METAL-FRAMED SKYLIGHTS	9/30/2024						
08 7100	DOOR HARDWARE	9/30/2024		10/16/2024			Addendum #2	
08 7101	DOOR HARDWARE SCHEDULE	9/30/2024						
08 8000	GLAZING	9/30/2024						
08 8300	MIRRORS	9/30/2024						
08 9100	LOUVERS	9/30/2024						
08 9200	LOUVERED EQUIPMENT ENCLOSURE	9/30/2024						
<u>DIVISION 09 - FINISHES</u>								
09 0561	COMMON WORK RESULTS FOR FLOORING PREPARATION	9/30/2024						
09 2116	GYPSON BOARD ASSEMBLIES	9/30/2024						
09 2216	NON-STRUCTURAL METAL FRAMING	9/30/2024						
09 3000	TILING	9/30/2024						
09 5100	ACOUSTICAL CEILINGS	9/30/2024						
09 6429	WOOD STRIP AND PLANK FLOORING	9/30/2024						
09 6466	WOOD ATHLETIC FLOORING	9/30/2024						
09 6500	RESILIENT FLOORING	9/30/2024						
09 6566	RESILIENT ATHLETIC FLOORING	9/30/2024						
09 6700	FLUID-APPLIED FLOORING	9/30/2024						
09 6813	TILE CARPETING	9/30/2024						
09 7200	WALL COVERINGS	9/30/2024						
09 7800	INTERIOR WALL PANELING	9/30/2024						
09 8300	ACOUSTIC FINISHES	9/30/2024						
09 8416	FIXED SOUND REFLECTIVE PANELS	9/30/2024						
09 8430	SOUND-ABSORBING WALL AND CEILING UNITS	9/30/2024						
09 9123	INTERIOR PAINTING	9/30/2024						
<u>DIVISION 10 - SPECIALTIES</u>								
10 1100	VISUAL DISPLAY UNITS	9/30/2024						
10 1416	PLAQUES	9/30/2024						
10 1419	DIMENSIONAL LETTER SIGNAGE	9/30/2024						
10 1423	PANEL SIGNAGE	9/30/2024						
10 1453	TRAFFIC SIGNAGE (LANDSCAPE)	9/30/2024						
10 1453	TRAFFIC SIGNAGE (CIVIL)	9/30/2024						
10 1454	TRAFFIC SIGNAGE REMOVAL AND RELOCATION	9/30/2024						
10 1473	PAINTED SIGNAGE	9/30/2024						
10 2113.19	PLASTIC TOILET COMPARTMENTS	9/30/2024						
10 2123	CUBICLE CURTAINS AND TRACK	9/30/2024						
10 2800	TOILET ACCESSORIES	9/30/2024				10/30/2024	Addendum #4	
10 4400	FIRE PROTECTION SPECIALTIES	9/30/2024						
10 5113	METAL LOCKERS	9/30/2024				10/30/2024	Addendum #4	
10 5502	MAIL SORTER	9/30/2024						
10 7516	GROUND-SET FLAGPOLES	9/30/2024						

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum #5	Comments
<u>DIVISION 11 - EQUIPMENT</u>								
11 0610	STAGE RIGGING AND CURTAINS	9/30/2024						
11 3013	APPLIANCES	9/30/2024						
11 4000	FOODSERVICE EQUIPMENT	9/30/2024						
11 5400	ART EQUIPMENT	9/30/2024						
11 5410	TECHNICAL EDUCATION EQUIPMENT	9/30/2024						
11 6623	GYMNASIUM EQUIPMENT	9/30/2024						
11 6643	INTERIOR ELECTRONIC SCOREBOARD	9/30/2024						
11 6833	ATHLETIC FIELD EQUIPMENT	9/30/2024						
11 7300	PATIENT CARE EQUIPMENT	9/30/2024						
<u>DIVISION 12 - FURNISHINGS</u>								
12 2401	WINDOW SHADES	9/30/2024						
12 3553.19	WOOD LABORATORY CASEWORK	9/30/2024		10/16/2024				Addendum #2
12 3600	COUNTERTOPS	9/30/2024						
12 6100	FIXED AUDIENCE SEATING	9/30/2024			10/23/2024			Addendum #3
12 6613	TELESCOPING BLEACHERS	9/30/2024				10/30/2024		Addendum #4
12 9300	SITE FURNISHINGS	9/30/2024						
<u>DIVISION 13 - SPECIAL CONSTRUCTION [Not Used]</u>								
<u>DIVISION 14 - Conveying Equipment</u>								
14 2100	ELECTRIC TRACTION ELEVATORS	9/30/2024		10/16/2024				Addendum #2
<u>Volume 3 - Divisions 21-26</u>								
<u>DIVISION 21 - FIRE SUPPRESSION</u>								
21 0400	GENERAL CONDITIONS FOR FIRE PROTECTION TRADES	9/30/2024						
21 0433	HEAT TRACE FOR FIRE SUPPRESSION PIPING	N/A			10/23/2024			Addendum #3
21 0516	EXPANSION FITTINGS AND LOOPS FOR FIRE SUPPRESSION PIPING	9/30/2024						
21 0533	HEAT TRACE FOR PLUMBING PIPING	N/A			10/23/2024			Addendum #3
21 0548	VIBRATION AND SEISMIC CONTROLS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT	9/30/2024						
21 1313	WET PIPE SPRINKLER SYSTEMS	9/30/2024						
21 3000	FIRE PUMPS	9/30/2024						
<u>DIVISION 22 - PLUMBING</u>								
22 0400	GENERAL CONDITIONS FOR PLUMBING TRADES	9/30/2024						
22 0516	EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING	9/30/2024						
22 0517	SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING	9/30/2024						
22 0519	METERS AND GAUGES FOR PLUMBING PIPING	9/30/2024						
22 0523	GENERAL DUTY VALVES FOR PLUMBING PIPING	9/30/2024						
22 0529	HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT	9/30/2024						
22 0548	VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT	9/30/2024						
22 0548	EQUIPMENT	9/30/2024						
22 0553	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT	9/30/2024						
22 0700	PLUMBING INSULATION	9/30/2024						
22 1005	PLUMBING PIPING	9/30/2024						
22 1123	FUEL GAS PIPING	9/30/2024						
22 1124	DOMESTIC WATER PUMPS	9/30/2024						
22 1500	GENERAL SERVICE COMPRESSED-AIR SYSTEMS	9/30/2024						
22 3000	PLUMBING EQUIPMENT	9/30/2024						
22 4000	PLUMBING FIXTURES AND SPECIALTIES	9/30/2024						
<u>DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING (HVAC)</u>								
23 0400	GENERAL CONDITIONS FOR MECHANICAL TRADES	9/30/2024						
23 0516	EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING	9/30/2024						
23 0517	SLEEVES AND SLEEVE SEALS FOR HVAC PIPING	9/30/2024						
23 0523	GENERAL DUTY VALVES FOR HVAC PIPING	9/30/2024						
23 0529	HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK, AND EQUIPMENT	9/30/2024						
23 0548	VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT	9/30/2024						
23 0553	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT	9/30/2024						
23 0593	TESTING, ADJUSTING, AND BALANCING FOR HVAC	9/30/2024						
23 0700	HVAC INSULATION	9/30/2024						
23 0900	INSTRUMENTATION AND CONTROLS FOR HVAC	9/30/2024				10/30/2024		Addendum #4
23 0993	SEQUENCE OF OPERATIONS	9/30/2024			10/23/2024	10/30/2024		Addendum #3, Addendum #4
23 2113	HYDRONIC PIPING	9/30/2024						
23 2114	HYDRONIC SPECIALTIES	9/30/2024						

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum #5	Comments
<u>DIVISION 26 - ELECTRICAL</u>								
26 0400	GENERAL CONDITIONS FOR ELECTRICAL TRADES	9/30/2024						
26 0503	EQUIPMENT WIRING CONNECTIONS	9/30/2024						
26 0519	ELECTRICAL POWER CONDUCTORS AND CABLES	9/30/2024						
26 0526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS	9/30/2024						
26 0529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS	9/30/2024						
26 0533	RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS	9/30/2024						
26 0534	FLOOR BOXES FOR ELECTRICAL SYSTEMS	9/30/2024						
26 0536	CABLE TRAYS FOR ELECTRICAL SYSTEMS	9/30/2024						
26 0553	IDENTIFICATION FOR ELECTRICAL SYSTEMS	9/30/2024						
26 0573	OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY	9/30/2024						
26 0923	LIGHTING CONTROL DEVICES	9/30/2024						
26 2200	LOW-VOLTAGE TRANSFORMERS	9/30/2024						
26 2413	SWITCHBOARDS	9/30/2024						
26 2416	PANELBOARDS	9/30/2024						
26 2653	ELECTRIC VEHICLE CHARGING EQUIPMENT	9/30/2024						
26 2716	ELECTRICAL CABINETS AND ENCLOSURES	9/30/2024						
26 2726	WIRING DEVICES	9/30/2024		10/16/2024				Addendum #2
26 2813	FUSES	9/30/2024						
26 2819	ENCLOSED SWITCHES	9/30/2024						
26 2823	ENCLOSED CIRCUIT BREAKERS	9/30/2024						
26 2826	ENCLOSED TRANSFER SWITCHES	9/30/2024						
26 3213	ENGINE GENERATORS	9/30/2024						
26 4113	LIGHTNING PROTECTION FOR STRUCTURES	9/30/2024						
26 5100	LIGHTING	9/30/2024						
26 5561	THEATRICAL LIGHTING	9/30/2024						
<u>Volume 4 - Divisions 27-34</u>								
<u>DIVISION 27 - COMMUNICATIONS</u>								
27 0536	CABLE TRAYS FOR COMMUNICATION SYSTEMS	9/30/2024						
27 1000	STRUCTURED CABLING	9/30/2024						
27 4100	AUDIO VIDEO SYSTEMS	9/30/2024						
27 5116	PUBLIC ADDRESS SYSTEM	9/30/2024						
27 5313	CLOCK SYSTEM	9/30/2024						
27 6010	EMERGENCY RESPONDER RADIO COVERAGE SYSTEM	9/30/2024						
<u>DIVISION 28 - ELECTRONIC SAFETY AND SECURITY</u>								
28 0500	SECURITY CONDUCTOR CABLES	9/30/2024						
28 0528	PATHWAYS FOR SECURITY SYSTEMS	9/30/2024						
28 1300	ACCESS CONTROL SYSTEM	9/30/2024						
28 1600	INTRUSION DETECTION	9/30/2024						
28 2300	VIDEO SURVEILLANCE SYSTEM	9/30/2024						
28 3100	FIRE DETECTION AND ALARM	9/30/2024						
<u>DIVISION 31 - EARTHWORK</u>								
31 1000	SITE CLEARING	9/30/2024						
31 1000	SELECTIVE CLEARING AND THINNING [CIVIL]	9/30/2024						
31 1005	ATHLETIC FIELD SITE PREPARATION	9/30/2024						
31 1006	SOIL STRIPPING AND STOCKPILING	9/30/2024						
31 1200	SITE UTILITY PREPARATION	9/30/2024					11/1/2024	Addendum #5
31 2200	GRADING	9/30/2024						
31 2300	EXCAVATION, BACKFILL, COMPACTION AND DEWATERING	9/30/2024					11/1/2024	Addendum #5
31 2316.26	ROCK REMOVAL	9/30/2024					11/1/2024	Addendum #5
31 2323	BORROW MATERIAL	9/30/2024					11/1/2024	Addendum #5
31 2333	TRENCHING AND BACKFILLING	9/30/2024					11/1/2024	Addendum #5
31 2500	SOIL EROSION AND SEDIMENT CONTROLS	9/30/2024						
31 6616	AGGREGATE PIERS	9/30/2024					11/1/2024	Addendum #5
<u>DIVISION 32 - EXTERIOR IMPROVEMENTS</u>								
32 0529	GLACIAL BOULDERS FOR EXTERIOR IMPROVEMENTS	9/30/2024		10/16/2024		10/30/2024		Addendum #2, Addendum #4
32 1216	ASPHALT PAVING	9/30/2024						
32 1313	CONCRETE PAVING	9/30/2024						
32 1373	CONCRETE PAVING JOINT SEALANTS	9/30/2024						
32 1400	UNIT PAVERS	9/30/2024				10/30/2024		Addendum #4
32 150								

APPENDICES - see below

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum	Comments
#5								
DRAWINGS								
VOLUME 1								
[01] GENERAL								
C1	COVER SHEET (VOLUME 1)	9/30/2024						
GI01.1	DRAWING LIST	9/30/2024						
GI02.1	GENERAL INFORMATION	9/30/2024						
GC0A	CODE INFORMATION	9/30/2024						
GC0B	BUILDING AREA PLANS	9/30/2024						
GC01	FIRST FLOOR FIRE SAFETY PLAN	9/30/2024						
GC02	SECOND FLOOR FIRE SAFETY PLAN	9/30/2024						
GC11	FIRST FLOOR FIRE PROOFING AND STEEL TREATMENT PLAN	9/30/2024						
GC12	SECOND FLOOR FIRE PROOFING AND STEEL TREATMENT PLAN	9/30/2024						
GC13	ROOF LEVEL FIRE PROOFING AND STEEL TREATMENT PLAN	9/30/2024						
[02] HAZARDOUS MATERIALS								
HBM-01	HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - FIRST FLOOR	9/30/2024						
HBM-02	HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - SECOND FLOOR	9/30/2024						
HBM-03	HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - ROOF	9/30/2024						
[03] SURVEY								
23-011	PROPERTY/BOUNDARY AND TOPOGRAPHIC SURVEY 1 OF 5	9/30/2024						
23-012	PROPERTY/BOUNDARY AND TOPOGRAPHIC SURVEY 2 OF 5	9/30/2024						
23-013	PROPERTY/BOUNDARY AND TOPOGRAPHIC SURVEY 3 OF 5	9/30/2024						
23-014	PROPERTY/BOUNDARY AND TOPOGRAPHIC SURVEY 4 OF 5	9/30/2024						
23-015	PROPERTY/BOUNDARY AND TOPOGRAPHIC SURVEY 5 OF 5	9/30/2024						
[04] CIVIL								
C001	GENERAL NOTES, ABBREVIATIONS, AND LEGEND	9/30/2024						
C101	OVERALL SITE STORMWATER MANAGEMEN PLAN	9/30/2024		10/16/2024				Addendum #2
C102	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024						
C103	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024						
C104	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024		10/16/2024				Addendum #2
C105	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024						
C106	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024						
C107	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024						
C201	OVERALL SITE LOW IMPACT DEVELOPMENT PLAN	9/30/2024						
C202	SITE LOW IMPACT DEVELOPMENT PART PLAN	9/30/2024				10/30/2024		Addendum #4
C203	SITE LOW IMPACT DEVELOPMENT PART PLAN	9/30/2024				10/30/2024		Addendum #4
C204	SITE LOW IMPACT DEVELOPMENT PART PLAN	9/30/2024						
C205	SITE LOW IMPACT DEVELOPMENT PART PLAN	9/30/2024				10/30/2024		Addendum #4
C206	OVERALL SOIL TEST LOCATIONS PLAN	9/30/2024				10/30/2024		Addendum #4
C301	OVERALL SITE UTILITY PLAN	9/30/2024		10/16/2024		10/30/2024		Addendum #2, Addendum #4
C302	SITE UTILITY PART PLAN	9/30/2024				10/30/2024		Addendum #4
C303	SITE UTILITY PART PLAN	9/30/2024				10/30/2024		Addendum #4
C304	SITE UTILITY PART PLAN	9/30/2024				10/30/2024		Addendum #4
C305	SITE UTILITY PART PLAN	9/30/2024				10/30/2024		Addendum #4
C306	SANITARY SEWER EXISTING PLAN AND PROFILE	9/30/2024						
C307	SANITARY SEWER PROPOSED PLAN AND PROFILE	9/30/2024				10/30/2024		Addendum #4
C308	SITE UTILITY PROFILES	9/30/2024						
C401	OVERALL PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PLAN	9/30/2024						
C402	PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C403	PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C404	PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C405	PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C406	PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PLAN	9/30/2024						
C407	PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C408	PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C409	PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C410	PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C411	PHASE 2 DEMOLITION SOIL EROSION AND SEDIMENTATION CONTROL PLAN	9/30/2024						
C412	PHASE 2 DEMOLITION SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C413	PHASE 2 DEMOLITION SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C414	PHASE 2 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PLAN	9/30/2024						
C415	PHASE 2 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C416	PHASE 2 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024						
C417	SOIL EROSION AND SEDIMENTATION CONTROL NOTES, CONSTRUCTION SEQUENCE AND DETAILS - 1	9/30/2024						
C418	SEQUENCE AND DETAILS - 2	9/30/2024						
C501	SITE STORMWATER MANAGMENT DETAILS - 1	9/30/2024			10/23/2024			Addendum #3
C502	SITE STORMWATER MANAGMENT DETAILS - 2	9/30/2024						
C503	SITE STORMWATER MANAGMENT DETAILS - 3	9/30/2024						
C504	SITE STORMWATER MANAGMENT DETAILS - 4	9/30/2024						
C505	SITE STORMWATER MANAGMENT DETAILS - 5	9/30/2024						
C506	SANITARY SEWER DETAILS	9/30/2024				10/30/2024		Addendum #4
C507	SITE UTILITY DETAILS - 1	9/30/2024						
C508	SITE UTILITY DETAILS - 2	9/30/2024						
C601	PARENT DRIVEWAY PROFILE 01	9/30/2024						
C602	PARENT DRIVEWAY PROFILE 02	9/30/2024						
C603	EMERGENCY PATH PROFILE 01	9/30/2024						
C604	EMERGENCY PATH PROFILE 02	9/30/2024						
C605	BUS DRIVEWAY PROFILE	9/30/2024						
C605A	SIGHT LINE PROFILES	9/30/2024						
C606	SIGHT LINE PROFILES	9/30/2024						
C607	BUS TURNING MOVEMENT PLAN	9/30/2024						
C608	FIRE TRUCK TURNING MOVEMENT PLAN	9/30/2024						
C609	SU-30 TURNING MOVEMENT PLAN	9/30/2024						
C610	WB-50 TURNING MOVEMENT PLAN	9/30/2024						
TC101	TRAFFIC CONTROL SIGNAL PLAN	9/30/2024						
TC101A	TRAFFIC CONTROL SIGNAL PLAN	9/30/2024						
TC102	TRAFFIC CONTROL SIGNAL PLAN	9/30/2024						
TC201	SIGNAGE AND PAVEMENT MARKING PLAN	9/30/2024						
TC202	SIGNAGE AND PAVEMENT MARKING PLAN	9/30/2024			10/23/2024			Addendum #3

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum #5	Comments
TC203	OVERALL ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PLAN	9/30/2024						
TC204	ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN	9/30/2024						
TC205	ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN	9/30/2024						
TC206	ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN	9/30/2024						
TC207	ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN	9/30/2024						
TC301	TRAFFIC DETAIL PLAN	9/30/2024						
TC302	TRAFFIC DETAIL PLAN	9/30/2024						
TC303	TRAFFIC DETAIL PLAN	9/30/2024						
TC304	TRAFFIC DETAIL PLAN	9/30/2024						
TC305	TRAFFIC DETAIL PLAN	9/30/2024						
TC306	TRAFFIC DETAIL PLAN	9/30/2024						
TC307	TRAFFIC DETAIL PLAN	9/30/2024						
TC308	TRAFFIC DETAIL PLAN	9/30/2024						
TC309	TRAFFIC DETAIL PLAN	9/30/2024						
TC310	TRAFFIC DETAIL PLAN	9/30/2024						
TC311	TRAFFIC DETAIL PLAN	9/30/2024						
TC312	TRAFFIC DETAIL PLAN	9/30/2024						

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum #5	Comments
[06] SITE UTILITIES								
SU100	MEP SITE UTILITY PLAN	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
SU500	MEP SITE UTILITY PLAN - DETAILS & SCHEDULES	9/30/2024						
SU501	MEP SITE UTILITY PLAN - DETAILS & SCHEDULES	9/30/2024			10/23/2024			Addendum #3
PSU001	PLUMBING SITE UTILITY PLAN	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
[10] LANDSCAPE								
L001	GENERAL SITE INFORMATION	9/30/2024						
L002	VICINITY MAP	9/30/2024						
L101	SITE DEMOLITION AND PREPARATION OVERALL	9/30/2024						
L101A	SITE DEMOLITION AND PREPARATION NORTHEAST	9/30/2024						
L101B	SITE DEMOLITION AND PREPARATION SOUTHEAST	9/30/2024		10/16/2024				Addendum #2
L101C	SITE DEMOLITION AND PREPARATION SOUTHWEST	9/30/2024						
L101D	SITE DEMOLITION AND PREPARATION NORTHWEST	9/30/2024						
L201	SITE LAYOUT OVERALL	9/30/2024						
L201A	SITE LAYOUT NORTHEAST	9/30/2024						
L201B	SITE LAYOUT SOUTHEAST	9/30/2024						
L201C	SITE LAYOUT SOUTHWEST	9/30/2024						
L201D	SITE LAYOUT NORTHWEST	9/30/2024						
L202	SITE MATERIALS OVERALL	9/30/2024						
L202A	SITE MATERIALS NORTHEAST	9/30/2024		10/16/2024		10/30/2024		Addendum #2, Addendum #4
L202B	SITE MATERIALS SOUTHEAST	9/30/2024				10/30/2024		Addendum #4
L202C	SITE MATERIALS SOUTHWEST	9/30/2024		10/16/2024		10/30/2024		Addendum #2, Addendum #4
L202D	SITE MATERIALS NORTHWEST	9/30/2024						
L301	SITE GRADING	9/30/2024						
L301A	SITE GRADING NORTHEAST	9/30/2024						
L301B	SITE GRADING SOUTHEAST	9/30/2024						
L301C	SITE GRADING SOUTHWEST	9/30/2024		10/16/2024				Addendum #2
L301D	SITE GRADING NORTHWEST	9/30/2024						
L401	SITE PLANTING OVERALL	9/30/2024						
L401A	SITE PLANTING PLAN NORTHEAST	9/30/2024						
L401B	SITE PLANTING PLAN SOUTHEAST	9/30/2024						
L401C	SITE PLANTING PLAN SOUTHWEST	9/30/2024						
L401D	SITE PLANTING PLAN NORTHWEST	9/30/2024						
L402	PLANT MATERIAL LIST	9/30/2024						
L403	PLANTING DETAILS	9/30/2024						
L404	SITE IRRIGATION PLAN	9/30/2024		10/16/2024				Addendum #2
L501	SITE DETAILS	9/30/2024				10/30/2024		Addendum #4
L502	SITE DETAILS	9/30/2024						
L503	SITE DETAILS	9/30/2024						
L504	SITE DETAILS	9/30/2024						
L601	ATHLETIC FIELD SITE DETAILS	9/30/2024				10/30/2024		Addendum #4
L602	ATHLETIC FIELD SITE DETAILS	9/30/2024						
STRUCTURAL								
S001	GENERAL NOTES AND ABBREVIATIONS	9/30/2024						
S002	SCHEDULES AND DETAILS	9/30/2024						
S101A	FOUNDATION PLAN - PART A	9/30/2024		10/16/2024				Addendum #2
S101B	FOUNDATION PLAN - PART B	9/30/2024						
S101C	FOUNDATION PLAN - PART C	9/30/2024		10/16/2024				Addendum #2
S101D	FOUNDATION PLAN - PART D	9/30/2024						
S101E	FOUNDATION PLAN - PART E	9/30/2024		10/16/2024				Addendum #2
S101F	FOUNDATION PLAN - PART F	9/30/2024						
S200	TYPICAL FOUNDATION DETAILS	9/30/2024						
S201	TYPICAL FOUNDATION DETAILS	9/30/2024						
S210	FOUNDATION DETAILS	9/30/2024						
S211	FOUNDATION DETAILS	9/30/2024		10/16/2024				Addendum #2
S212	FOUNDATION DETAILS	9/30/2024						
S301A	SECOND FLOOR FRAMING PLAN - PART A	9/30/2024						
S301B	LOW ROOF FRAMING PLAN - PART B	9/30/2024						
S301C	SECOND FLOOR FRAMING PLAN - PART C	9/30/2024						
S301D	LOW ROOF FRAMING PLAN - PART D	9/30/2024				10/30/2024		Addendum #4
S301E	SECOND FLOOR FRAMING PLAN - PART E	9/30/2024						
S301F	LOW ROOF FRAMING PLAN - PART F	9/30/2024						
S302A	ROOF FRAMING PLAN - PART A	9/30/2024						
S302B	HIGH ROOF FRAMING PLAN - PART B	9/30/2024						
S302C	ROOF FRAMING PLAN - PART C	9/30/2024						
S302D	HIGH ROOF FRAMING PLAN - PART D	9/30/2024						
S302E	ROOF FRAMING PLAN - PART E	9/30/2024						
S400	TYPICAL FRAMING DETAILS	9/30/2024						
S401	BUILDING SECTIONS	9/30/2024						
S402	BUILDING SECTIONS	9/30/2024						
S403	BUILDING SECTIONS	9/30/2024						
S410	FRAMING DETAILS	9/30/2024				10/30/2024		Addendum #4
S411	FRAMING DETAILS	9/30/2024				10/30/2024		Addendum #4
S420	FRAMING DETAILS	9/30/2024						
S421	FRAMING DETAILS	9/30/2024						
S430	FRAMING DETAILS	9/30/2024						
S500	LATERAL FRAME ELEVATIONS	9/30/2024						
S501	LATERAL FRAME ELEVATIONS AND DETAILS	9/30/2024						
S502	SHEAR WALL ELEVATIONS AND DETAILS	9/30/2024						
S600	COLUMN SCHEDULE	9/30/2024						
S601	COLUMN SCHEDULE	9/30/2024						
S700	SNOW DRIFT LOADING PLAN	9/30/2024						
S701	WALL & ROOF WIND PRESSURE PLANS	9/30/2024						

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum	Comments
#5								
VOLUME 2								
[28] GENERAL								
C2	COVER SHEET (VOLUME 2)	9/30/2024						
G101.2	DRAWING LIST	9/30/2024						
G102.2	GENERAL INFORMATION	9/30/2024						
[29] ARCHITECTURAL DEMOLITION								
AD101A	FIRST FLOOR DEMOLITION PLAN PART A	9/30/2024						
AD102A	SECOND FLOOR DEMOLITION PLAN PART A	9/30/2024						
AD102B	SECOND FLOOR DEMOLITION PLAN PART B	9/30/2024						
AD103A	ROOF DEMOLITION PLAN PART A	9/30/2024						
AD103B	ROOF DEMOLITION PLAN PART B	9/30/2024						
AD301	DEMOLITION ELEVATIONS	9/30/2024						
AD401	DEMO BUILDING SECTIONS	9/30/2024						
[30] ARCHITECTURAL								
A091	FIRST FLOOR SLAB EDGE PLAN	9/30/2024						
A092	SECOND FLOOR & LOWER ROOF SLAB EDGE PLAN	9/30/2024				10/30/2024		Addendum #4
A093	ROOF SLAB EDGE PLAN	9/30/2024						
AL000	GEOMETRY LAYOUT PLAN	9/30/2024						
A101	OVERALL FIRST FLOOR PLAN	9/30/2024						
AL101A	FIRST FLOOR LAYOUT PLAN - PART A	9/30/2024				10/30/2024		Addendum #4
A101A	FIRST FLOOR PLAN - PART A	9/30/2024						
AL101B	FIRST FLOOR LAYOUT PLAN - PART B	9/30/2024						
A101B	FIRST FLOOR PLAN - PART B	9/30/2024						
AL101C	FIRST FLOOR LAYOUT PLAN - PART C	9/30/2024						
A101C	FIRST FLOOR PLAN - PART C	9/30/2024						
AL101D	FIRST FLOOR LAYOUT PLAN - PART D	9/30/2024						
A101D	FIRST FLOOR PLAN - PART D	9/30/2024						
AL101E	FIRST FLOOR LAYOUT PLAN - PART E	9/30/2024						
A101E	FIRST FLOOR PLAN - PART E	9/30/2024						
AL101F	FIRST FLOOR LAYOUT PLAN - PART F	9/30/2024						
A101F	FIRST FLOOR PLAN - PART F	9/30/2024						
A102	OVERALL SECOND FLOOR PLAN	9/30/2024						
AL102A	SECOND FLOOR LAYOUT PLAN - PART A	9/30/2024						
A102A	SECOND FLOOR PLAN - PART A	9/30/2024			10/23/2024			Addendum #3
AL102B	SECOND FLOOR LAYOUT PLAN - PART B	9/30/2024						
A102B	SECOND FLOOR PLAN - PART B	9/30/2024						
AL102C	SECOND FLOOR LAYOUT PLAN - PART C	9/30/2024						
A102C	SECOND FLOOR PLAN - PART C	9/30/2024			10/23/2024	10/30/2024		Addendum #3, Addendum #4
AL102D	SECOND FLOOR LAYOUT PLAN - PART D	9/30/2024						
A102D	SECOND FLOOR PLAN - PART D	9/30/2024						
AL102E	SECOND FLOOR LAYOUT PLAN - PART E	9/30/2024						
A102E	SECOND FLOOR PLAN - PART E	9/30/2024			10/23/2024	10/30/2024		Addendum #3, Addendum #4
A103	OVERALL ROOF PLAN	9/30/2024						
A103A	ROOF PLAN - PART A	9/30/2024			10/23/2024			Addendum #3
A103B	ROOF PLAN - PART B	9/30/2024						
A103C	ROOF PLAN - PART C	9/30/2024			10/23/2024			Addendum #3
A103D	ROOF PLAN - PART D	9/30/2024						
A103E	ROOF PLAN - PART E	9/30/2024			10/23/2024			Addendum #3
A103F	ROOF PLAN - PART F	9/30/2024						
A104	ROOF SCREEN LAYOUT PLAN	9/30/2024						
A111.1	ENLARGED PLAN & ELEVATIONS - CAFETERIA	9/30/2024						
A111.2	ENLARGED CEILING PLAN & DETAILS - CAFETERIA	9/30/2024						
A111.3	ENLARGED PLAN & ELEVATION - GYMNASIUM	9/30/2024						
A111.4	ENLARGED PLAN & ELEVATIONS - GYMNASIUM	9/30/2024				10/30/2024		Addendum #4
A111.5	ENLARGED PLAN - AUDITORIUM	9/30/2024						
A111.6	ENLARGED PLAN & ELEVATIONS - AUDITORIUM	9/30/2024						
A111.7	ENLARGED PLAN & DETAILS - AUDITORIUM	9/30/2024						
A111.8	ENLARGED CEILING PLAN - AUDITORIUM	9/30/2024						
A111.9	ENLARGED PLAN & ELEVATIONS - MEDIA CENTER	9/30/2024				10/30/2024		Addendum #4
A111.10	ENLARGED PLAN, ELEVATIONS & CEILING PLAN - MEDIA CENTER & OT/PT	9/30/2024						
A111.11	ENLARGED PLAN & ELEVATIONS - ORCHESTRA & FITNESS	9/30/2024						
A111.12	ENLARGED PLAN & ELEVATIONS - BAND & CHORAL	9/30/2024						
A111.13	ENLARGED PLAN & ELEVATIONS - ART ROOM & LIFE SKILLS	9/30/2024						
A111.14	ENLARGED PLAN & ELEVATIONS - INNOVATION / ROBOTICS / WOODSHOP	9/30/2024						
A111.15	ENLARGED PLAN & ELEVATIONS - FAMILY CONSUMER SCIENCE	9/30/2024						
A111.16	ENLARGED PLAN & ELEVATIONS - ADMIN SUITE, HEALTH SUITE & GUIDANCE SUITE	9/30/2024				10/30/2024		Addendum #4
A112.1	ENLARGED PLAN & ELEVATIONS - TYPICAL SCIENCE CLASSROOMS & PREP	9/30/2024						
A112.2	ENLARGED PLAN & ELEVATIONS - TYPICAL CLASSROOM, COMMONS	9/30/2024						
A120	ENLARGED STAIR PLANS AND SECTIONS	9/30/2024						
A121	ENLARGED STAIR PLANS AND SECTIONS	9/30/2024						
A122	ENLARGED STAIR AND ELEVATOR PLAN AND SECTIONS	9/30/2024						
A123	ENLARGED STAIR PLANS AND SECTIONS	9/30/2024						
A124	STAIR DETAILS	9/30/2024						
A125	STAIR DETAILS	9/30/2024						
A126	ELEVATOR DETAILS	9/30/2024						
A130	ENLARGED TOILET ROOM PLANS AND ELEVATIONS	9/30/2024				10/30/2024		Addendum #4
A131	ENLARGED TOILET ROOM PLANS AND ELEVATIONS	9/30/2024				10/30/2024		Addendum #4
A132	ENLARGED TOILET ROOM PLANS AND ELEVATIONS COPY 1	9/30/2024				10/30/2024		Addendum #4
A150	GYM PRACTICE COURT LAYOUT & TYPICAL COURT LINE LAYOUT	9/30/2024						
A201A	FIRST FLOOR REFLECTED CEILING PLAN - PART A	9/30/2024						
A201B	FIRST FLOOR REFLECTED CEILING PLAN - PART B	9/30/2024				10/30/2024		Addendum #4
A201C	FIRST FLOOR REFLECTED CEILING PLAN - PART C	9/30/2024						
A201D	FIRST FLOOR REFLECTED CEILING PLAN - PART D	9/30/2024						
A201E	FIRST FLOOR REFLECTED CEILING PLAN - PART E	9/30/2024						
A201F	FIRST FLOOR REFLECTED CEILING PLAN - PART F	9/30/2024						
A202A	SECOND FLOOR REFLECTED CEILING PLAN - PART A	9/30/2024						
A202B	SECOND FLOOR REFLECTED CEILING PLAN - PART B	9/30/2024						
A202C	SECOND FLOOR REFLECTED CEILING PLAN - PART C	9/30/2024						
A202D	SECOND FLOOR REFLECTED CEILING PLAN - PART D	9/30/2024						
A202E	SECOND FLOOR REFLECTED CEILING PLAN - PART E	9/30/2024						
A210	CEILING DETAILS	9/30/2024						
A211	CEILING DETAILS	9/30/2024						
A212	CEILING DETAILS - SHAFT WALL	9/30/2024						
A300	BUILDING ELEVATIONS	9/30/2024						
A301	AXON 3D VIEWS	9/30/2024						
A302	AXON 3D VIEWS	9/30/2024						
A310	EXTERIOR ELEVATIONS	9/30/2024						
A311	EXTERIOR ELEVATIONS	9/30/2024						
A312	EXTERIOR ELEVATIONS	9/30/2024						
A313	EXTERIOR ELEVATIONS	9/30/2024						
A314	EXTERIOR ELEVATIONS	9/30/2024						
A315	EXTERIOR STAND ALONE MOCK-UP	9/30/2024						
A400	BUILDING SECTIONS	9/30/2024						
A401	BUILDING SECTIONS	9/30/2024						
A402	BUILDING SECTIONS	9/30/2024						
A403	BUILDING SECTIONS	9/30/2024						

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum #5	Comments
A410	EXTERIOR WALL SECTIONS	9/30/2024						
A411	EXTERIOR WALL SECTIONS	9/30/2024						
A412	EXTERIOR WALL SECTIONS	9/30/2024						
A413	EXTERIOR WALL SECTIONS	9/30/2024						
A414	EXTERIOR WALL SECTIONS	9/30/2024						
A415	EXTERIOR WALL SECTIONS	9/30/2024						
A416	EXTERIOR WALL SECTIONS	9/30/2024						
A417	EXTERIOR WALL SECTIONS	9/30/2024						
A418	EXTERIOR WALL SECTIONS	9/30/2024						
A420	INTERIOR WALL SECTIONS	9/30/2024						
A421	INTERIOR WALL SECTIONS	9/30/2024						
A500	TYPICAL EXTERIOR ASSEMBLIES	9/30/2024						
A501	TYPICAL EXTERIOR DETAILS	9/30/2024						
	EXTERIOR SECTION DETAILS OF NON-PROJECTED THROUGH WALL	9/30/2024						
A502	FLASHINGS	9/30/2024				10/30/2024		Addendum #4
A510	EXTERIOR PLAN DETAILS	9/30/2024						
A511	EXTERIOR PLAN DETAILS	9/30/2024				10/30/2024		Addendum #4
A512	EXTERIOR PLAN DETAILS	9/30/2024						
A513	EXTERIOR PLAN DETAILS	9/30/2024						
A514	EXTERIOR PLAN DETAILS	9/30/2024			10/23/2024			Addendum #3
A515	EXTERIOR PLAN DETAILS	9/30/2024			10/23/2024			Addendum #3
A516	EXTERIOR PLAN DETAILS	9/30/2024						
A520	EXTERIOR SECTION DETAILS	9/30/2024			10/23/2024	10/30/2024		Addendum #3, Addendum #4
A521	EXTERIOR SECTION DETAILS	9/30/2024				10/30/2024		Addendum #4
A522	EXTERIOR SECTION DETAILS	9/30/2024				10/30/2024		Addendum #4
A530	TYPICAL MEMBRANE ROOFING DETAILS	9/30/2024				10/30/2024		Addendum #4
A531	TYPICAL MEMBRANE ROOFING DETAILS	9/30/2024				10/30/2024		Addendum #4
A540	INTERIOR PLAN DETAILS	9/30/2024						
A541	INTERIOR PLAN DETAILS	9/30/2024						
A600	TYPICAL FRAMED PARTITION TYPES AND DETAILS	9/30/2024						
A601	METAL STUD PARTITION FRAMING - TYPICAL DETAILS	9/30/2024						
A602	SPECIALTY PARTITION DETAILS	9/30/2024						
A605	TYPICAL MASONRY PARTITION TYPES AND DETAILS	9/30/2024						
A606	TYPICAL MASONRY PARTITION DETAILS	9/30/2024						
A610	DOOR AND FRAME TYPES	9/30/2024						
A611	DOOR SCHEDULE	9/30/2024				10/30/2024		Addendum #4
A620	TYPICAL HOLLOW METAL DOOR FRAME DETAILS	9/30/2024						
A621	TYPICAL HOLLOW METAL DOOR & FRAME DETAILS	9/30/2024						
A622	TYPICAL HOLLOW METAL DOOR & FRAME DETAILS	9/30/2024						
A630	ALUMINUM FRAME ELEVATIONS - CURTAIN WALLS	9/30/2024						
A631	ALUMINUM FRAME ELEVATIONS - STOREFRONTS	9/30/2024						
A632	ALUMINUM FRAME ELEVATIONS - CURTAIN WALLS AND STOREFRONTS	9/30/2024				10/30/2024		Addendum #4
A640	TYPICAL ALUMINUM FRAME DETAILS	9/30/2024				10/30/2024		Addendum #4
A641	ALUMINUM FRAME WINDOW DETAILS	9/30/2024	10/10/2024					Addendum #1
A642	ALUMINUM FRAME SECTION DETAILS	9/30/2024						
A701	TYPICAL MOUNTING HEIGHTS	9/30/2024						
A702	INTERIOR ELEVATIONS - PUBLIC LOBBY	9/30/2024						
A703	INTERIOR ELEVATIONS - FIRST FLOOR	9/30/2024						
A704	INTERIOR ELEVATIONS - MAIN CONCOURSE	9/30/2024						
A705	INTERIOR ELEVATIONS - MAIN CONCOURSE	9/30/2024						
A706	2ND FLOOR ELEVATIONS - CORRIDORS	9/30/2024						
A707	INTERIOR ELEVATIONS	9/30/2024						
A708	INTERIOR ELEVATIONS - GYMNASIUM - CUSTOM GRAPHIC DESIGN	9/30/2024						
A801	CASEWORK - TYPICAL DETAILS & GENERAL NOTES	9/30/2024						
A802	CASEWORK - TYPICAL DETAILS	9/30/2024						
A803	CASEWORK - TYPICAL DETAILS	9/30/2024						
A804	INTERIOR DETAILS	9/30/2024						
A805	INTERIOR DETAILS	9/30/2024		10/16/2024		10/31/2024		Addendum #2, Addendum #4
A806	INTERIOR DETAILS	9/30/2024						
A901A	FIRST FLOOR FINISH PLAN - PART A	9/30/2024						
A901B	FIRST FLOOR FINISH PLAN - PART B	9/30/2024						
A901C	FIRST FLOOR FINISH PLAN - PART C	9/30/2024						
A901D	FIRST FLOOR FINISH PLAN - PART D	9/30/2024						
A901E	FIRST FLOOR FINISH PLAN - PART E	9/30/2024						
A901F	FIRST FLOOR FINISH PLAN - PART F	9/30/2024						
A902A	SECOND FLOOR FINISH PLAN - PART A	9/30/2024						
A902C	SECOND FLOOR FINISH PLAN - PART C	9/30/2024						
A902E	SECOND FLOOR FINISH PLAN - PART E	9/30/2024						
A903	FLOOR PATTERN DETAILS	9/30/2024						
A910	FINISH PRODUCT LIST - PART A	9/30/2024						
A911	FINISH PRODUCT LIST -PART B AND FINISH NOTES	9/30/2024		10/16/2024				Addendum #2
A912	SPECIALTY EQUIPMENT LIST	9/30/2024						
A920	SIGNAGE SCHEDULE AND NOTES	9/30/2024						
A921A	FIRST FLOOR SIGNAGE PLAN - PART A	9/30/2024						
A921B	FIRST FLOOR SIGNAGE PLAN - PART B	9/30/2024						
A921C	FIRST FLOOR SIGNAGE PLAN - PART C	9/30/2024						
A921D	FIRST FLOOR SIGNAGE PLAN - PART D	9/30/2024						
A921E	FIRST FLOOR SIGNAGE PLAN - PART E	9/30/2024						
A921F	FIRST FLOOR SIGNAGE PLAN - PART F	9/30/2024						
A922A	SECOND FLOOR SIGNAGE PLAN - PART A	9/30/2024						
A922C	SECOND FLOOR SIGNAGE PLAN - PART C	9/30/2024						
A922E	SECOND FLOOR SIGNAGE PLAN - PART E	9/30/2024						
A923	SIGN TYPES	9/30/2024						
A924	EXTERIOR SIGN TYPES	9/30/2024						
<u>[31] FURNITURE</u>								
I101	OVERALL FIRST FLOOR FURNITURE PLAN	9/30/2024						
I101A	FIRST FLOOR FURNITURE PLAN - PART A	9/30/2024						
I101B	FIRST FLOOR FURNITURE PLAN - PART B	9/30/2024						
I101C	FIRST FLOOR FURNITURE PLAN - PART C	9/30/2024						
I101D	FIRST FLOOR FURNITURE - PART D	9/30/2024						
I101E	FIRST FLOOR FURNITURE PLAN - PART E	9/30/2024						
I101F	FIRST FLOOR FURNITURE PLAN - PART F	9/30/2024						
I102	OVERALL 2ND FLOOR FURNITURE PLAN	9/30/2024						
I102A	2ND FLOOR FURNITURE PLAN - PART A	9/30/2024						
I102C	2ND FLOOR FURNITURE PLAN - PART C	9/30/2024						
I102E	2ND FLOOR FURNITURE PLAN - PART E	9/30/2024						
<u>[32] FOOD SERVICE</u>								
FS001	FOODSERVICE EQUIPMENT SCHEDULE	9/30/2024						
FS101A	FIRST FLOOR - PART A - FOODSERVICE EQUIPMENT PLAN	9/30/2024						
FS111	FOODSERVICE EQUIPMENT PLAN	9/30/2024						
FS121	FOODSERVICE EQUIPMENT ROUGH-IN PLAN	9/30/2024						
FS131	FOODSERVICE EQUIPMENT VENTILATION ROUGH-IN PLAN	9/30/2024						
FS141	FOODSERVICE EQUIPMENT SPECIAL CONDITIONS PLAN	9/30/2024						
FS201	FOODSERVICE EQUIPMENT ELEVATIONS	9/30/2024						
FS301	FOODSERVICE EQUIPMENT DETAILS	9/30/2024						
<u>[38] THEATRICAL</u>								
TR1	THEATRICAL RIGGING	9/30/2024						
TR2	THEATRICAL RIGGING RISER AND SCHEDULES	9/30/2024						

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum #5	Comments
VOLUME 3								
[39] GENERAL								
C3	COVER SHEET (VOLUME 3)	9/30/2024						
G101.3	DRAWING LIST	9/30/2024						
G102.3	GENERAL INFORMATION	9/30/2024						
FIRE PROTECTION								
FP000	FIRE PROTECTION ABBREVIATIONS, NOTES AND SYMBOLS	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
FP001	FIRE PROTECTION ZONING PLAN	9/30/2024			10/23/2024			Addendum #3
FP101A	FIRE PROTECTION FIRST FLOOR PLAN - PART A	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
FP101B	FIRE PROTECTION FIRST FLOOR PLAN - PART B	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
FP101C	FIRE PROTECTION FIRST FLOOR PLAN - PART C	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
FP101D	FIRE PROTECTION FIRST FLOOR PLAN - PART D	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
FP101E	FIRE PROTECTION FIRST FLOOR PLAN PART - E	9/30/2024						
FP101F	FIRE PROTECTION FIRST FLOOR PLAN - PART F	9/30/2024		10/16/2024				Addendum #2
FP102A	FIRE PROTECTION SECOND FLOOR PLAN - PART A	9/30/2024		10/16/2024				Addendum #2
FP102B	FIRE PROTECTION SECOND FLOOR PLAN - PART B	9/30/2024						
FP102C	FIRE PROTECTION SECOND FLOOR PLAN - PART C	9/30/2024		10/16/2024				Addendum #2
FP102D	FIRE PROTECTION SECOND FLOOR PLAN - PART D	9/30/2024						
FP102E	FIRE PROTECTION SECOND FLOOR PLAN - PART E	9/30/2024		10/16/2024				Addendum #2
FP400	FIRE PROTECTION ENLARGED PLANS	9/30/2024						
FP500	FIRE PROTECTION DETAILS	9/30/2024						
[50] PLUMBING								
P000	PLUMBING ABBREVIATIONS, NOTES AND SYMBOLS	9/30/2024						
P100A	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART A	9/30/2024		10/16/2024				Addendum #2
P100B	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART B	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
P100C	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART C	9/30/2024						
P100D	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART D	9/30/2024			10/23/2024			Addendum #3
P100E	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART E	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
P100F	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART F	9/30/2024			10/23/2024			Addendum #3
P001	PLUMBING FIRST FLOOR OVERALL PLAN	9/30/2024						
P101A	PLUMBING FIRST FLOOR PLAN - PART A	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
P101B	PLUMBING FIRST FLOOR PLAN - PART B	9/30/2024		10/16/2024				Addendum #2
P101C	PLUMBING FIRST FLOOR PLAN - PART C	9/30/2024						
P101D	PLUMBING FIRST FLOOR PLAN - PART D	9/30/2024		10/16/2024				Addendum #2
P101E	PLUMBING FIRST FLOOR PLAN - PART E	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
P101F	PLUMBING FIRST FLOOR PLAN - PART F	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
P002	PLUMBING SECOND FLOOR OVERALL PLAN	9/30/2024						
P102A	PLUMBING SECOND FLOOR PLAN - PART A	9/30/2024		10/16/2024				Addendum #2
P102C	PLUMBING SECOND FLOOR PLAN - PART C	9/30/2024						
P102E	PLUMBING SECOND FLOOR PLAN - PART E	9/30/2024						
P003	PLUMBING ROOF OVERALL PLAN	9/30/2024						
P103A	PLUMBING ROOF PLAN - PART A	9/30/2024		10/16/2024				Addendum #2
P103B	PLUMBING ROOF PLAN - PART B	9/30/2024						
P103C	PLUMBING ROOF PLAN - PART C	9/30/2024						
P103D	PLUMBING ROOF PLAN - PART D	9/30/2024						
P103E	PLUMBING ROOF PLAN - PART E	9/30/2024						
P103F	PLUMBING ROOF PLAN - PART F	9/30/2024		10/16/2024				Addendum #2
P400	PLUMBING ENLARGED VIEWS - KITCHEN	9/30/2024						
P401	PLUMBING ENLARGED VIEWS	9/30/2024		10/16/2024				Addendum #2
P402	PLUMBING ENLARGED VIEWS	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
P403	PLUMBING ENLARGED VIEWS	9/30/2024						
P404	PLUMBING ENLARGED VIEWS	9/30/2024						
P405	PLUMBING ENLARGED VIEWS	9/30/2024		10/16/2024				Addendum #2
P500	PLUMBING DETAILS	9/30/2024						
P501	PLUMBING DETAILS	9/30/2024		10/16/2024				Addendum #2
P600	PLUMBING SCHEDULES AND DIAGRAM	9/30/2024						
P601	PLUMBING SCHEDULES AND DIAGRAMS	9/30/2024		10/16/2024				Addendum #2
[60] MECHANICAL								
MEPD000	MEP DEMOLITION ABBREVIATIONS, NOTES, AND SYMBOLS	9/30/2024						
MEPD001	MEP DEMO PLAN VIEW	9/30/2024						
M0.00	MECHANICAL ABBREVIATIONS, NOTES AND SYMBOLS	9/30/2024						
M001	OVERALL MECHANICAL FIRST FLOOR PLAN	9/30/2024						
M101A	MECHANICAL FIRST FLOOR PLAN - PART A	9/30/2024						
M101B	MECHANICAL FIRST FLOOR PLAN - PART B	9/30/2024		10/16/2024				Addendum #2
M101C	MECHANICAL FIRST FLOOR PLAN - PART C	9/30/2024		10/16/2024				Addendum #2
M101D	MECHANICAL FIRST FLOOR PLAN - PART D	9/30/2024			10/23/2024			Addendum #3
M101E	MECHANICAL FIRST FLOOR PLAN - PART E	9/30/2024		10/16/2024				Addendum #2
M101F	MECHANICAL FIRST FLOOR PLAN - PART F	9/30/2024						
M002	OVERALL MECHANICAL SECOND FLOOR PLAN	9/30/2024						
M102A	MECHANICAL SECOND FLOOR PLAN - PART A	9/30/2024			10/23/2024			Addendum #3
M102B	MECHANICAL SECOND FLOOR PLAN - PART B	9/30/2024						
M102C	MECHANICAL SECOND FLOOR PLAN - PART C	9/30/2024						
M102D	MECHANICAL SECOND FLOOR PLAN - PART D	9/30/2024						
M102E	MECHANICAL SECOND FLOOR PLAN - PART E	9/30/2024						
M003	OVERALL MECHANICAL ROOF PLAN	9/30/2024						
M103A	MECHANICAL ROOF PLAN - PART A	9/30/2024				10/30/2024		Addendum #4
M103B	MECHANICAL ROOF PLAN - PART B	9/30/2024				10/30/2024		Addendum #4
M103C	MECHANICAL ROOF PLAN - PART C	9/30/2024				10/30/2024		Addendum #4
M103D	MECHANICAL ROOF PLAN - PART D	9/30/2024				10/30/2024		Addendum #4
M103E	MECHANICAL ROOF PLAN - PART E	9/30/2024				10/30/2024		Addendum #4
M103F	MECHANICAL ROOF PLAN - PART F	9/30/2024						
MP101A	MECHANICAL PIPING FIRST FLOOR PLAN - PART A	9/30/2024		10/16/2024				Addendum #2
MP101B	MECHANICAL PIPING FIRST FLOOR PLAN - PART B	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
MP101C	MECHANICAL PIPING FIRST FLOOR PLAN - PART C	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
MP101D	MECHANICAL PIPING FIRST FLOOR PLAN - PART D	9/30/2024		10/16/2024				Addendum #2
MP101E	MECHANICAL PIPING FIRST FLOOR PLAN - PART E	9/30/2024		10/16/2024				Addendum #2
MP101F	MECHANICAL PIPING FIRST FLOOR PLAN - PART F	9/30/2024						
MP102A	MECHANICAL PIPING SECOND FLOOR PLAN - PART A	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
MP102B	MECHANICAL PIPING SECOND FLOOR PLAN - PART B	9/30/2024						
MP102C	MECHANICAL PIPING SECOND FLOOR PLAN - PART C	9/30/2024		10/16/2024				Addendum #2
MP102D	MECHANICAL PIPING SECOND FLOOR PLAN - PART D	9/30/2024						
MP102E	MECHANICAL PIPING SECOND FLOOR PLAN - PART E	9/30/2024		10/16/2024				Addendum #2
M500	MECHANICAL DETAILS	9/30/2024				10/30/2024		Addendum #4
M501	MECHANICAL DETAILS	9/30/2024				10/30/2024		Addendum #4
M502	MECHANICAL DETAILS	9/30/2024			10/23/2024			Addendum #3
M503	MECHANICAL DETAILS	9/30/2024						
M504	MECHANICAL DETAILS	9/30/2024						
M505	MECHANICAL DETAILS	9/30/2024						
M600	MECHANICAL SCHEDULES	9/30/2024						
M601	MECHANICAL SCHEDULES	9/30/2024		10/16/2024				Addendum #2
M602	MECHANICAL SCHEDULES	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
M700	MECHANICAL CONTROLS DIAGRAMS	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
M701	MECHANICAL CONTROLS DIAGRAMS	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
[70] ELECTRICAL								
E000	ELECTRICAL ABBREVIATIONS, NOTES AND SYMBOLS	9/30/2024		10/16/2024		10/30/2024		Addendum #2, Addendum #4
EL001	ELECTRICAL LIGHTING FIRST FLOOR OVERALL PLAN	9/30/2024						
EL101A	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART A	9/30/2024		10/16/2024				Addendum #2

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum #5	Comments
EL101B	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART B	9/30/2024		10/16/2024				Addendum #2
EL101C	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART C	9/30/2024		10/16/2024				Addendum #2
EL101D	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART D	9/30/2024		10/16/2024				Addendum #2
EL101E	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART E	9/30/2024			10/23/2024			Addendum #3
EL101F	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART F	9/30/2024		10/16/2024				Addendum #2
EL002	ELECTRICAL LIGHTING SECOND FLOOR OVERALL PLAN	9/30/2024						
EL102A	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART A	9/30/2024		10/16/2024				Addendum #2
EL102B	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART B	9/30/2024		10/16/2024				Addendum #2
EL102C	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART C	9/30/2024		10/16/2024				Addendum #2
EL102D	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART D	9/30/2024						
EL102E	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART E	9/30/2024		10/16/2024				Addendum #2
EP001	ELECTRICAL POWER FIRST FLOOR OVERALL PLAN	9/30/2024						
EP101A	ELECTRICAL POWER FIRST FLOOR PLAN - PART A	9/30/2024		10/16/2024		10/30/2024		Addendum #2, Addendum #4
EP101B	ELECTRICAL POWER FIRST FLOOR PLAN - PART B	9/30/2024			10/23/2024			Addendum #3
EP101C	ELECTRICAL POWER FIRST FLOOR PLAN - PART C	9/30/2024		10/16/2024				Addendum #2
EP101D	ELECTRICAL POWER FIRST FLOOR PLAN - PART D	9/30/2024			10/23/2024	10/30/2024		Addendum #3, Addendum #4
EP101E	ELECTRICAL POWER FIRST FLOOR PLAN - PART E	9/30/2024		10/16/2024	10/23/2024			Addendum #2, Addendum #3
EP101F	ELECTRICAL POWER FIRST FLOOR PLAN - PART F	9/30/2024						
EP002	ELECTRICAL POWER SECOND FLOOR OVERALL PLAN	9/30/2024						
EP102A	ELECTRICAL POWER SECOND FLOOR PLAN - PART A	9/30/2024						
EP102B	ELECTRICAL POWER SECOND FLOOR PLAN - PART B	9/30/2024						
EP102C	ELECTRICAL POWER SECOND FLOOR PLAN - PART C	9/30/2024						
EP102D	ELECTRICAL POWER SECOND FLOOR PLAN - PART D	9/30/2024						
EP102E	ELECTRICAL POWER SECOND FLOOR PLAN - PART E	9/30/2024						
EP003	ELECTRICAL POWER ROOF OVERALL PLAN	9/30/2024						
EP103A	ELECTRICAL POWER ROOF PLAN - PART A	9/30/2024			10/23/2024			Addendum #3
EP103B	ELECTRICAL POWER ROOF PLAN - PART B	9/30/2024			10/23/2024			Addendum #3
EP103C	ELECTRICAL POWER ROOF PLAN - PART C	9/30/2024						
EP103D	ELECTRICAL POWER ROOF PLAN - PART D	9/30/2024						
EP103E	ELECTRICAL POWER ROOF PLAN - PART E	9/30/2024						
EP103F	ELECTRICAL POWER ROOF PLAN - PART F	9/30/2024						
E400	ELECTRICAL ENLARGED PLANS - KITCHEN	9/30/2024		10/16/2024	10/23/2024	10/30/2024		Addendum #2, Addendum #3, Addendum #4
E401	ELECTRICAL ENLARGED PLANS - AUDITORIUM	9/30/2024		10/16/2024				Addendum #2
E402	ELECTRICAL ENLARGED PLANS - ELEVATORS	9/30/2024						
E500	ELECTRICAL DETAILS	9/30/2024						
E501	ELECTRICAL DETAILS	9/30/2024		10/16/2024				Addendum #2
E502	ELECTRICAL DETAILS	9/30/2024			10/23/2024			Addendum #3
E503	ELECTRICAL DETAILS	9/30/2024						
E504	ELECTRICAL DETAILS	9/30/2024						
E505	ELECTRICAL DETAILS	N/A			10/23/2024			Addendum #3
E600	ELECTRICAL SCHEDULES AND DIAGRAMS	9/30/2024			10/23/2024			Addendum #3
E601	ELECTRICAL SCHEDULES AND DIAGRAMS	9/30/2024						
E602	ELECTRICAL PANEL SCHEDULES	9/30/2024						
E603	ELECTRICAL PANEL SCHEDULES	9/30/2024		10/16/2024				Addendum #2
E604	ELECTRICAL PANEL SCHEDULES	9/30/2024			10/23/2024			Addendum #3
E605	ELECTRICAL PANEL SCHEDULES	9/30/2024						
E606	ELECTRICAL PANEL SCHEDULES	9/30/2024						
E607	ELECTRICAL PANEL SCHEDULES	9/30/2024						
E700	ELECTRICAL RISER DIAGRAM	9/30/2024			10/23/2024	10/30/2024		Addendum #4
E701	FIRE ALARM RISER DIAGRAM	9/30/2024		10/16/2024		10/30/2024		Addendum #3, Addendum #4
								Addendum #2, Addendum #4
<u>[80] TECHNOLOGY</u>								
T000	TECHNOLOGY SYMBOL LEGEND & GENERAL NOTES	9/30/2024		10/16/2024				Addendum #2
T001	TECHNOLOGY OVERALL FIRST FLOOR PLAN CABLING DELINIATION PLAN	9/30/2024						
T002	TECHNOLOGY OVERALL SECOND FLOOR PLAN CABLE DELINIATION PLAN	9/30/2024						
T101A	TECHNOLOGY FIRST FLOOR PLAN A	9/30/2024		10/16/2024				Addendum #2
T101B	TECHNOLOGY FIRST FLOOR PLAN B	9/30/2024		10/16/2024				Addendum #2
T101C	TECHNOLOGY FIRST FLOOR PLAN C	9/30/2024		10/16/2024				Addendum #2
T101D	TECHNOLOGY FIRST FLOOR PLAN D	9/30/2024		10/16/2024				Addendum #2
T101E	TECHNOLOGY FIRST FLOOR PLAN E	9/30/2024		10/16/2024				Addendum #2
T101F	TECHNOLOGY FIRST FLOOR PLAN F	9/30/2024		10/16/2024				Addendum #2
T102A	TECHNOLOGY SECOND FLOOR PLAN A	9/30/2024						
T102B	TECHNOLOGY SECOND FLOOR PLAN B	9/30/2024						
T102C	TECHNOLOGY SECOND FLOOR PLAN C	9/30/2024		10/16/2024				Addendum #2
T102D	TECHNOLOGY SECOND FLOOR PLAN D	9/30/2024						
T102E	TECHNOLOGY SECOND FLOOR PLAN E	9/30/2024		10/16/2024				Addendum #2
T201	TECHNOLOGY MDF 1066 DETAILS	9/30/2024						
T202	TECHNOLOGY IDF 1046 & 1023 DETAILS	9/30/2024						
T301	TECHNOLOGY DETAILS	9/30/2024						
T302	TECHNOLOGY DETAILS	9/30/2024						
T400	TECHNOLOGY WIRING DIAGRAM	9/30/2024						
<u>[81] AUDIO VISUAL</u>								
TA000	AUDIO VISUAL SYMBOL LEGEND & GENERAL NOTES	9/30/2024		10/16/2024				Addendum #2
TA101A	AUDIO VISUAL FIRST FLOOR PLAN A	9/30/2024						
TA101B	AUDIO VISUAL FIRST FLOOR PLAN B	9/30/2024						
TA101C	AUDIO VISUAL FIRST FLOOR PLAN C	9/30/2024						
TA101D	AUDIO VISUAL FIRST FLOOR PLAN D	9/30/2024						
TA101E	AUDIO VISUAL FIRST FLOOR PLAN E	9/30/2024						
TA101F	AUDIO VISUAL FIRST FLOOR PLAN F	9/30/2024						
TA102A	AUDIO VISUAL SECOND FLOOR PLAN A	9/30/2024						
TA102B	AUDIO VISUAL SECOND FLOOR PLAN B	9/30/2024						
TA102C	AUDIO VISUAL SECOND FLOOR PLAN C	9/30/2024						
TA102D	AUDIO VISUAL SECOND FLOOR PLAN D	9/30/2024						
TA102E	AUDIO VISUAL SECOND FLOOR PLAN E	9/30/2024						
TA201	AUDIO VISUAL DETAILS	9/30/2024						
TA300	AUDIO VISUAL SIGNAL FLOW	9/30/2024						
TA301	AUDIO VISUAL AUDITORIUM SIGNAL FLOW	9/30/2024						
TA400	AUDIO VISUAL AUDITORIUM ELEVATIONS	9/30/2024						
TA401	AUDIO VISUAL ELEVATIONS	9/30/2024						
<u>[82] SECURITY</u>								
TY000	SECURITY SYMBOL LEGEND & GENERAL NOTES	9/30/2024		10/16/2024				Addendum #2
TY100	SECURITY SITE PLAN	9/30/2024						
TY101A	SECURITY FIRST FLOOR PLAN A	9/30/2024		10/16/2024				Addendum #2
TY101B	SECURITY FIRST FLOOR PLAN B	9/30/2024						
TY101C	SECURITY FIRST FLOOR PLAN C	9/30/2024		10/16/2024				Addendum #2
TY101D	SECURITY FIRST FLOOR PLAN D	9/30/2024						
TY101E	SECURITY FIRST FLOOR PLAN E	9/30/2024						
TY101F	SECURITY FIRST FLOOR PLAN F	9/30/2024						
TY102A	SECURITY SECOND FLOOR PLAN A	9/30/2024						
TY102B	SECURITY SECOND FLOOR PLAN B	9/30/2024						
TY102C	SECURITY SECOND FLOOR PLAN C	9/30/2024						
TY102D	SECURITY SECOND FLOOR PLAN D	9/30/2024						
TY102E	SECURITY SECOND FLOOR PLAN E	9/30/2024						
TY301	SECURITY DETAILS	9/30/2024						
TY302	SECURITY DETAILS	9/30/2024						
TY401	SECURITY WIRING DIAGRAMS	9/30/2024						

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Addendum #4	Addendum #5	Comments
ADDITIONAL DOCUMENTS AND SKETCHES								
1651	Plan and Profile of Sewer in Stanwich Road & Fairfield Road (Greenwich, Conn) -- Issued to address Bidder RFI #91			9/6/1961				Addendum #2: Provided as a for-reference-only document
00 9113-1	Appendix A -- Phase 1 Environmental Site Assessment. Dated May 30, 2023, authored by Langan Engineering			5/30/2023				Addendum #2
00 9113-2	Appendix B -- Underground Storage Tank Investigation Report, Dated November 16, 2023, authored by Langan Engineering			11/16/2023				Addendum #2
00 9113-3	Appendix C -- Limited In-Situ Soil Sampling, Dated April 1, 2024			4/1/2024				Addendum #2
00 9113-4	Appendix D -- Stormwater Pollution Control Plan for Greenwich Central Middle School (Issued in response to Bidder RFI #93), authored by Tighe & Bond			10/16/2024				Addendum #2
00 9113-1	Appendix E - Greenwich Test Pit Field Log Forms (TP101-TP120) - New Per BQ RFI #233 - Reports Dated 11/17/2023					11/17/2023		Addendum #4
	Appendix F - GCMS Construction-Vibration and Controls During Construction (CVC), By Gap Mountain Consulting Engineers, PLLC.						11/1/2024	Addendum #5

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C.1 Specific Scope of Work

Without the intent of limiting the Scope of Work to be performed by the Subcontractor, included is the furnishing and installing of the **Sitework** in accordance with the contract documents and as further enumerated within these Additional Provisions. The items listed herein are NOT intended to be a complete list of work items to be performed under this agreement. Furthermore, detail references are included for convenience but are not intended to identify all applicable details.

1. Includes performing all of the **Sitework** in accordance with the Contract Documents and as established in the Project Specifications and Document List. This includes the following Specification Sections specifically but does not limit the Subcontractor from the responsibility of the entire Project Documents Scope of Work:

Exclusive Specifications

Specification Sections listed below as 'Exclusive' shall be considered the sole responsibility of this Subcontractor. This Subcontractor shall furnish and install all products listed within these specification sections in conformance with all requirements and as indicated in the Contract Documents, including coordination with other related sections as listed within these specification sections and in reference to the entire Contract Specifications and Drawings. This Subcontractor shall be responsible for performing a complete and thorough review of the Contract Documents and include in their lump sum bid amount all costs to complete the entire scope of work for products listed within these specification sections. This includes, but is not limited to, the review of all drawings, details, notes, keys, keynotes, legends, symbols, abbreviations, schedules, callouts, and all applications of the products listed within these exclusive specification sections for a complete system which are reasonably inferable (i.e. similar detail/symbol/illustration, adjacent construction, means & methods, etc.) from the Contract Documents. No additional costs will be considered without clear and definitive substantiation.

02 3000 – Subsurface Investigations
02 4113 – Site Utility Abandonment
10 1453 – Traffic Signage [Landscape]
10 1453 – Traffic Signage [Civil]
10 1454 – Traffic Signage Removal and Relocation
10 7516 – Ground-Set Flagpoles
12 9300 – Site Furnishings
31 1000 – Site Clearing
31 1000 – Selective Clearing and Thinning [Civil]
31 1005 – Athletic Field Site Preparation electric
31 1006 – Soil Striping and Stocking
31 1200 – Site Utility Preparation
31 2200 - Grading
31 2300 - Excavation, Backfill, Compaction and Dewatering
31 2316.26 – Rock Removal
31 2323 – Borrow Material
31 2333 – Trenching and Backfilling
31 2500 - Soil Erosion and Sediment Controls
31 6616 – Aggregate Piers
32 0529 – Granite Boulders
32 1216 – Asphalt Paving
32 1400 – Unit Pavers
32 1500 – Aggregate Surfacing
32 1613.23 – Precast Concrete Curb
32 1640 – Granite Curbing

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32 1823.17 – Natural Infield and Warning Track Surfacing
32 3113 – Chain Link Fences and Gates
32 3118 – Metal Fences and Gates
32 3120 – Vehicle Barrier Gate
32 3223 – Segmental Retaining Walls
32 8415 – Sitework Sleeves
33 0513 - Manholes and Catchbasins
33 0514 - Breaking Into Existing Manholes and Catch Basins
33 1113 – Ductile Iron Pipe and Fittings
33 1300 - Disinfection of Water Distribution Systems
33 1400 - Testing of Water Distribution Systems
33 3113 - Polyvinyl Chloride (PVC) Pipe and Fittings
33 3114 - Testing of Sanitary Sewer and Storm Drainage Systems
33 3115 – Television Inspection of Pipeline
33 4100 – Storm Drainage
33 4113 - High Density Polyethylene Pipe and Fittings
33 4114 - Underground Warning Tape
33 4419 - Stormwater Treatment System
34 0000 – Transportation
34 4114 – Rectangular Rapid Flashing Beacon
34 4115 – LED School Radar Speed Display with Flashing Beacons
34 4117 – Pedestrian Push Button
34 7001 - Traffic Person
34 7002 – Maintenance and Protection of Traffic

Shared Specifications

Specification Sections listed below as ‘Shared’ shall be considered the mutual responsibility of two (2) or more Subcontractors. This Subcontractor shall furnish and install products listed within these specification sections in conformance with all requirements and as indicated in the Contract Documents, including coordination with other related sections as listed within these specification sections and in reference to the entire Contract Specifications and Drawings. This Subcontractor shall be responsible to perform a complete and thorough review of the Contract Documents and include in their lump sum bid amount all costs to complete the specific scope, as defined below, for products listed within these specification sections. This includes, but is not limited to, the review of all drawings, details, notes, keys, keynotes, legends, symbols, abbreviations, schedules, callouts, and all applications of the products listed within these shared specification sections for a complete system which are reasonably inferable (i.e. similar detail/symbol/illustration, adjacent construction, means & methods, etc.) from the Contract Documents. No additional costs will be considered without clear and definitive substantiation.

Division 00 - Procurement and Contracting Requirements

Division 01 – General Requirements

07 1400 – Fluid-Applied Waterproofing

07 2100 - Thermal Insulation

07 9200 - Joint Sealants

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General Items

2. This Subcontractor has reviewed the Logistics & Phasing Plans and the Construction Schedule and has included all associated costs as relevant to this scope of work. It is extremely important to coordinate your work with the other adjacent Subcontractors during the various phases and perform the work as required by these documents. No come back costs will be entertained.
3. This Subcontractor will provide all pricing for changes within five (5) calendar days of notice of change (without exception). If subcontractor does not submit pricing within these terms, it will be assumed a ZERO cost change. The change orders shall include man-hours, material costs, tax (if applicable) and mark-ups as line items broken out separately.
4. Intent of the project Lean initiative is that all items that are to be installed are to prefabricated, arranged and shipped to project for ease of installation. Deliveries are to be packaged and labeled by room/area for ease of installation (kit-of-parts).
5. This Subcontractor shall be responsible to provide out of sequence work at no additional costs when required in coordination with other trades.
6. This Subcontractor shall include consistent and complete scheduling and coordination with all other trades to properly sequence the work and for the complete scope under this agreement.
7. This Subcontractor's Project Manager/Foreman shall participate in Pull Planning Sessions which affect their scope of work. This Project Manager/Foreman shall provide input to further develop the accurate sequence and timing for completion of the work.
8. This Subcontractor shall examine the layout and installation of all adjacent work performed by others at weekly intervals leading up to the date of installation and shall report to Turner in writing any discrepancies that may affect the installation or operation of the scope provided under this agreement to avoid any delay in starting work as scheduled.
9. This Subcontractor shall include multiple mobilizations as required by the latest issuance of the project schedule.
10. This Subcontractor shall organize and neatly place all materials, tools, etc.. This Subcontractor shall remove all debris resulting from their work on a daily basis to a trash Rubbermaid tilt truck provided by Others while working inside the building. This Subcontractor shall be responsible for all debris removal and disposal outside of the building. No trash or debris will remain in the work areas at the end of the shift. If debris is left in the work areas, it will be removed to the dumpster by others, and the labor expense back-charged to the responsible Subcontractor. Large sections of debris shall be disposed of to a dumpster provided by others by this Subcontractor.
11. For any materials stored inside the building, this Subcontractor shall be required to store all onsite material on racks, carts or pallets capable of being easily moved and shall coordinate the delivery of and location of stored material with the Turner Superintendent. If material is stored on pallets, this Subcontractor is responsible to have a pallet jack onsite at all times. This Subcontractor shall include relocation and consolidation of materials as directed by Turner.
12. This Subcontractor shall review, conform to, and furnish and install all requirements included in the Safety Additional Provisions included in this Agreement. This Subcontractor understands that this document is project specific and all provisions must be included in this Subcontractors' bid.
13. This Subcontractor must meet the latest issuance of the project schedule. To this end, this Subcontractor understands that all adjacent work may not be 100% complete at the time of field dimension verification

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and this Subcontractor shall coordinate with other trades and accept reasonable hold-to dimensions which may be required to meet the delivery and installation dates.

14. This Subcontractor shall clean all items installed by this Subcontractor and install, secure and maintain appropriate protection to prohibit damage from subsequent work. Protection must be approved by Turner.
15. This Subcontractor shall be responsible for the removal and proper legal disposal of all rubbish and/or materials associated with the site demolition (exterior of the buildings) and all other work performed by this subcontractor.
16. This Subcontractor will make every effort possible to ensure that their waste is properly sorted and disposed of to divert as much waste as possible from disposal in a landfill. This Subcontractor will track this recycling effort using the Online Waste Tracking System established by Turner Construction Company. Each dumpster ticket is to be logged into this system and its recycled content reported as a means of tracking the total percentage of construction and demolition debris diverted from landfills. There is a \$50 per month fee for use of this website and this Subcontractor shall include all costs in his bid for use of this service. Refer to the attached User's Manual for more information about this system. Refer to the Turner Tracker Manual in the referenced "Forms and Policies," dated January 2015, in Turner's Project Manual.
17. This Subcontractor shall furnish, remove, and dispose of the contents of 150 ea. thirty cubic yard dumpsters for the entire duration of the project above and beyond that of which is required by this subcontractor for the Sitework scope of work. This Subcontractor shall remove and replace dumpsters per the direction of Turner's Superintendent and shall have Turner sign the hauler's ticket for each load. Unsigned tickets will not be charged against this allowance and any unused portion of these allowances will be credited to the project upon the completion of each phase. Additional dumpsters in excess of the defined allowances for general debris will be reimbursed per the unit cost included with this bid proposal. This Subcontractor shall provide their own dumpsters for the sitework debris, which are not included as part of this allowance.
18. Any and all excavations or trenching outside the construction fence MUST be covered up and protected each night and work coordinated with Turner to ensure that no unnecessary hardships are imposed on the school or the community.
19. This Subcontractor shall include all casual dewatering of all excavations, trenches, or footings from the start of the foundations to project completion. Water discharged from the dewatering operation shall be discharged into the dewatering basin or unless otherwise indicated.
20. This Subcontractor shall assume that temporary electric will not be available for this Subcontractor's use during the various stages of Sitework. This Subcontractor shall include the use of generators as required for the duration of their Work.

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21. This Subcontractor shall include an Initial Baseline Survey (with Control Points for lay-out) for the Project and line and grade layout for the building provided by a licensed surveyor. Prior to beginning construction of the new foundation work, a review meeting on site of these layout points must be held. Subsequent to this initial survey control and the provision of two X axis and four Y axis and 3 benchmark elevations for each phase of the project, this Subcontractor shall provide five (5) additional days for each phase (1,2, and 3 equals 15 additional days and 18 days total) for the installation of control in the building for use by Turner. The control points shall be established on a monument or a permanent surface that will protected and not be lost or altered. These point locations shall also be transferred and memorialized on a drawing to be submitted to Turner. This Subcontractor shall be responsible for all of their own surveying and layout using Total Station or a licensed surveyor after the initial control is established.
22. This Subcontractor shall include an underground utility survey with ground penetrating radar at the complete scope area to locate the existing utilities and immediately document same on the site utility drawings. This survey shall include the entire construction zone and shall be performed prior to the installation of the construction fence. This Subcontractor shall also contact "Call Before You Dig" for each phase, prior to beginning excavation.
23. This Subcontractor's work shall be tested and inspected by an independent testing agency hired by the Owner, in accordance with the specifications. Such testing agency shall be selected by the Owner and all compensation for the testing agency shall be borne by Owner. This Subcontractor shall schedule all inspections 72 hours in advance of the time of the inspection.
24. This Subcontractor shall include furnishing, installing, and removing orange temporary construction fencing around any open trench within or outside of the construction fence at the end of each day or when work at the trench is suspended and the manpower and equipment is removed from the work zone. This Subcontractor shall install hard barriers for excavations deeper than 5'. For example, but not limited to temporary protection for the new sanitary line schedule for the summer of 2025, refer to page #3 of the Turner Logistics Plan as well as contract documents.
25. This Subcontractor shall provide steel plating over all utility trenching in the parking lots or roadways, outside the construction fence, at the end of each day or when the work is suspended and the manpower or equipment is removed from the work zone. **Include provisions including but not limited to road plates, trench boxes, and/or sequence of work, etc, to allow for vehicle and personal access to parking areas, building footprint, site bathroom and Turner trailers during excavation for site utilities.**
26. This Subcontractor shall be responsible for all site snow removal, including but not limited to Subcontractor access to the building, Subcontractor parking areas and trailer / tent entrances/exits and general construction circulation within the construction fence and at the Center School satellite parking lot for all phases of the project, as directed and to the satisfaction of Turner, on the day of each clean-up event. This Subcontractor shall also furnish and maintain three 5 gallon buckets of ice melt at the entryways to the building under construction over the course of the project, include spreading as required during snow/ice events. This Subcontractor shall remove all snow from excavated trenches and protect the trenches until formwork is installed, at which point the concrete Subcontractor shall protect his work. The Municipality will be responsible for all driveways, parking lots, and walkways outside the construction fence. This subcontractor shall provide breakout pricing for Weather Protection by phase in Application for Payment.
27. This Subcontractor shall include the furnishing, maintaining, and the removal of the temporary toilets as defined below and per the site logistics scope of work and as required for durations per the Project Schedule.

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- a. This subcontractor shall provide, for the duration of the project schedule, self-contained temporary toilet trailer consisting of a minimum of 8 stall bathroom trailer – 2 women stall, 6 men stall, and 4 urinal restroom trailer (with flushable toilets) and hot water handwash stations similar to those provided by United Site Services, Bonavita Luxury Lavatories, WILLSCOTT (or approved equal) including delivery, set up, rental and removal at the completion of the project.
 - b. This subcontractor shall provide excavation and backfill for temporary power.
 - c. Trailer to include sanitary tanks that allow for pumpout and domestic water tank for self-contained toilet trailer complex. Include domestic water tank until this subcontractor furnish and installs tie in of a temporary water line from the onsite temp hydrant – include heat trace as required for water line to prevent freezing. Include sanitary tanks & pumpout until the sanitary line can be tied in along Indian Rock Lane in June 2025, this subcontractor shall then tie in toilet trailer by furnish and installing temporary sanitary line from toilet trailer to new sanitary manhole. Once these temp tie ins are in place domestic water tank and regular tank pumping are no longer required. This subcontractor shall include required hand soap refill, toilet tissue and paper towels at toilet trailer, and cleaning services at a minimum of 3 times per week. Include cap and remain in place the temporary sewer connection piping when toilet trailer is removed at the end of the project.
28. This Subcontractor shall include the furnishing, maintaining, and the removal of the Turner's Site Trailer(s) and as required for durations per the Project Schedule and per below.
- a. This Subcontractor shall furnish, install, maintain and remove temporary trailer for Turner similar or equal to WILLSCOTT Redi-plex, triple 60x36 trailer (56x36 box), min 8' ceiling height, metal clad insulated panel exterior walls, combination through wall heating and cooling unit(s). All lighting and data to be included with unit. See plans for required layout and furniture requirements. Include window/door security bundle, 3 data hubs, 15 manager chairs, 38 stackable side chairs with arms, 31 standard desks (5ftx2.5ft), 15 Pedestal filing cabinets (3 drawer), 5 small white boards (3ft x 4ft), 9 large white boards (4ftx6ft), 13 L-desk privacy shields.
 - b. This Subcontractor shall furnish, install and maintain 4 stairs and platforms at Turner's office trailer with Canopy. Include all required support and rails to meet the requirements of the local AHJ. Include complex anchor setup and associated anchors, and complex vinyl skirting.
 - c. This Subcontractor shall provide and maintain a 4 CY closed top dumpster at the Turner Office Trailer.
 - d. This subcontractor shall provide excavation and backfill for temporary power and internet to trailer complex including the excavation/backfill as required for eventual removal of temp power. Include furnish and install of 4" pvc conduit for power service and 2" pvc conduit for internet to the jobsite from Orchard Street or Stanwich Road (tbd by utility). In addition, This subcontractor shall excavate and backfill as required for a 2" below grade conduit (F&I by electrical) to bring internet cable from Turner Trailer to the media center room 1055. Assume all conduits to be 3' below finish grade.
 - e. This Subcontractor shall include 3 - ten person conference tables and 1 – 4 person conference table.
 - f. This Subcontractor shall include cleaning the construction manager's construction trailer once per week by a professional cleaning company. Cleaning shall include vacuum and/or sweep, wet mop, trash removal, cleaning of all exposed surfaces and toilets and sinks.

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- g. This Subcontractor shall include relocation of Turner Trailer to Demolition area – Phase 2 per logistics plans in July 2026 until the completion of the project. Include single 36ft trailer for Phase 2 portion of the project with similar layout to WILLSCOTT Redi-Plex per Phase 1 requirements.

- 29. This Subcontractor shall furnish, install and continuously maintain the anti-tracking pads indicated on the Logistics Plans in conformance with the details included in the contract documents, including a wheel wash station and water hook-ups at the Main Exit. This subcontractor shall furnish, install and continuously maintain the 15' wide crushed stone drive, crushed stone Subcontractor parking area, and weed-block/crushed stone at Turner's Office Trailer at the sizes/depths/coverage areas indicated. This Subcontractor shall include continuous maintenance of the anti-tracking pads, wheel wash station, and crushed stone for the duration of this Phase of Work. This subcontractor to provide high pressure washers at each exit location for tire washing purposes. This subcontractor is to provide all materials necessary to hook up and retrieve water and a water truck must be provided by this subcontractor if water is not available on site. This subcontractor shall be responsible for street sweeping to maintain clear roadways around the site as directed by Turner. It is the intent of this scope that the sitework subcontractor manages the site to limit the amount of mud to exit the site on any truck or vehicle. Include removal and disposal of stone and anti-tracking pad at the time, and as required, for new work to be put in place.
- 30. This Subcontractor is responsible for all the Sitework scope clarified in the final Bidder's Question Log, which includes, but is not limited to, the items identified for the Sitework Bid Package #9.
- 31. This Subcontractor shall provide the final A-2 Site Survey at the completion of each phase, and provide the comprehensive survey at the completion of the entire project.
- 32. This Subcontractor shall furnish and install 2 each worker break heavy duty outdoor event tents inclusive of tables and seating for the duration of the project. Tents shall allow 50 workers each a place to eat lunch and take breaks.
 - a. Include required tie down points to prevent damage to tent and to properly hold in place.
 - b. Include 1 – microwave at each tent for use by workers.
 - c. Include outdoor picnic tables with integral benches capable of seating 50 workers per tent.
 - d. Include retractable sidewalls (or walls cable of being tied to vertical posts when not required for use) with entrances at two ends.
 - e. In lieu of 2 tents, this subcontractor can install an Allshelter between the 40' connex provided under this agreement plus 1 additional as required for support and use by this subcontractor. All shelter to be fully enclosed and include full Endwall at one end and doorway endwall & doors at the other.
- 33. This Subcontractor shall follow and include all Town of Greenwich Standard Construction Notes including but not limited to soil tilling 12-16 inches and amended used for all construction equipment and used for contractor parking per note #10 on drawing C001.

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34. This Subcontractor shall be responsible for the demolition, removal, and disposal of all existing site demolition as indicated on the contract documents. This includes, but is not limited to, the removal of existing concrete pads, benches, flagpoles, athletic/sports equipment, sheds, posts, concrete stairs, ramps, handrails, retaining walls, fencing, trees, paving, sidewalks, curbs, storm water structures and associated piping, sanitary structure and associated piping, water systems, piping, electrical systems as indicated in the contract documents. This Subcontractor shall coordinate any service suspensions with the utility company and pay for any associated permits or fees.
35. Given the limited space for storage on the site, this Subcontractor shall export from the site all topsoil compiled as part of the clearing and grubbing process in accordance with the contract documents.
36. This Subcontractor shall be responsible for the protection of any underground or above ground utilities or structures within construction area or adjacent to new construction affected by this subcontractors scope.
37. This Subcontractor shall remove paving, walks and curbing as required to install site utilities and replace/restore in kind.
38. This Subcontractor shall salvage items as indicated on the contract documents including but not limited to plaque and bolder and plaque and bench, per drawing L101B. This Subcontractor shall also survey any memorial plaques that are not identified on the drawings, and turn them over to the Owner.
39. This Subcontractor shall provide the tree protection identified on the contract document.
40. This Subcontractor shall be responsible for removing any preexisting materials from the athletic field area as indicated on the contract documents including but not limited to the 32 9119.29 Athletic Field Root Zone.
41. This Subcontractor shall not store, clean or service equipment within 100' of the wetlands. This Subcontractor shall create a fueling area with a liner or pavement in a location that is coordinated with Turner's site logistics plan and this scope of work.
42. Any work performed by this Subcontractor for curb cuts, street work, all work outside property line, our outside of the construction temporary fence will require temporary fence protection installed, maintained and eventually removed by this Subcontractor.
43. This Subcontractor shall prepare the subgrade at the slabs on grade to accommodate the requirements for the haunches for the slab on grade indicated on the structural drawings.
44. This Subcontractor shall furnish, install and maintain wood framed platform and stairs at Turner's office trailer. Include all required support and rails to meet the requirements of the local AHJ.
45. This Subcontractor shall include 1 laborer per 10-person workforce while working on site but no less than 1 person for a composite cleanup crew. The composite cleanup crew will be required for 2 hours each Friday from 12:30-2:30 p.m. while the subcontractor is performing work on site. Composite crew is intended to cleanup general debris not necessarily associated with particular subcontractor (*cardboard, plastic bottles, misc. trash item, general sweeping, etc.*)
46. This Subcontractor shall examine the layout and installation of all adjacent work performed by others at weekly intervals leading up to the date of installation and shall report to Turner in writing any discrepancies that may affect the installation or operation of the scope provided under this agreement to avoid any delay in starting work as scheduled.
47. This Subcontractor shall include multiple mobilizations as required by the latest issuance of the project schedule.

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48. This Subcontractor must meet the latest issuance of the project schedule. To this end, this Subcontractor understands that all adjacent work may not be 100% complete at the time of field dimension verification and this Subcontractor shall coordinate with other trades and accept reasonable hold-to dimensions which may be required to meet the delivery and installation dates.
49. This Subcontractor shall clean all items installed by this Subcontractor and install, secure and maintain appropriate protection to prohibit damage from subsequent work. Protection must be approved by Turner.
50. This Subcontractor shall examine the layout and installation of all adjacent work performed by others at weekly intervals leading up to the date of installation and shall report to Turner in writing any discrepancies that may affect the installation or operation of the scope provided under this agreement to avoid any delay in starting work as scheduled.
51. This Subcontractor shall include multiple mobilizations as required by the latest issuance of the project schedule.
52. This Subcontractor must meet the latest issuance of the project schedule. To this end, this Subcontractor understands that all adjacent work may not be 100% complete at the time of field dimension verification and this Subcontractor shall coordinate with other trades and accept reasonable hold-to dimensions which may be required to meet the delivery and installation dates.
53. This Subcontractor shall clean all items installed by this Subcontractor and install, secure and maintain appropriate protection to prohibit damage from subsequent work. Protection must be approved by Turner.
54. This Subcontractor shall furnish and install the project sign for the Department of Administrative Services as noted in spec section 01 5000. The location and details of the sign shall be coordinated with TCCO.

Site Logistics

55. This Subcontractor shall include the rental of a 40 ft connex box for Turner use to the site scope with the dates Phase 1, from January 2025 to March 2026 or at a minimum 15 months.
56. This Subcontractor shall furnish and install 2 ea. color, exterior grade project sign approx. 48'x96" (Graphics will be provided by others) including posts set into concrete and relocated 2 additional times for phasing. Include furnish and install of an additional 16 aluminum signs for use at vehicle gate locations and as directed by Turner (Graphics will be provided-include provisions for fence mounting).
57. This Subcontractor furnish, install and maintain **8-Foot-High** temporary construction fence with full height blue scrim per the Turner Logistics Plans. The post shall be driven posts and this subcontractor shall include GPR or other non-destructive testing to scan for underground utilities prior to install driven posts. Temp fence details shall include but not be limited to the details on drawing C418. Additionally, beyond the details on the contract documents, this Subcontractor shall include top and bottom rails on temporary fence and include providing scrim with graphics that includes Greenwich BOE & CMS name and logo repeated on the scrim.
58. This Subcontractor shall furnish and install 20-foot slide style construction gates at locations designated by the Turner Logistics Plans. Construction Entrance/Anti Tracking Pads shall be installed and maintain at construction entrance gates. All Sliding gate posts shall be cast into below grade 3' deep concrete sonotube base for support.
 - a. This subcontractor shall furnish (10) – 5' length stainless steel chain link for locking gates and (10) – 2" Master Combination outdoor lock, shakel, resettable.

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59. This Subcontractor shall furnish and install 1 ea. pedestrian gate and pedestrian entry portal at each temporary fence vehicular slide gate unless otherwise shown on the logistics plans. This subcontractor shall include 2 additional pedestrian gates at upper portion of the site opposite of the entrance gates to be located by Turner Construction. Include hardware for latching and locking of gates.
60. This Subcontractor shall furnish install and maintain temporary construction drives as indicated on the contract documents and the Turner Logistics Plans, drives shall consist of a minimum of 6 inches of crushed stone or unless otherwise noted.
61. Per the Turner Logistics Plans, at emergency egress from existing building, this Subcontractor shall provide and maintain overhead protection. Temporary overhead protection shall maintain minimum 15' distance from new building for construction vehicles and allow for egress from the existing building. Include ¾" minimum plywood barrier at Construction side of overhead protection locations.
62. This Subcontractor shall provide post driven temporary wood poles for the site security cameras to be mounted at locations identified on the Turner Logistics Plans. (Cameras by others) This subcontractor shall include GPR or other non-destructive testing to scan for underground utilities prior to install driven posts.
63. This Subcontractor shall furnish and maintain grading and temporary crushed stone at 6-inch minimum depth as required for contractor parking area per the Turner Logistics Plans.
64. This Subcontractor shall furnish, install and maintain a minimum of 6 crane pads per the Turner Logistics Plans, crane pads shall include compaction of subgrade and minimum of 12" of crushed stone and measure 40ft by 40ft.
65. This Subcontractor shall include the removal and relocation of all temp fence, gates, construction entrances, security camera posts, construction drives, construction gates, anti-tracking pads, crane pads, contractor parking areas and relocation of temporary trailer and temp trailer bathroom complexes or proving new as required for the phasing, refer to the Turner Logistics Plans for specifics.
66. This Subcontractor shall include eventual removals of all temporary sitework logistics scope and temporary erosion controls at the completion of the project and restoration as required.
67. This Subcontractor shall furnish and install Metered Yard Hydrant with hose bib manifold at approx. location per the Logistics Plans, 100 lf of buried HDPE pipe for pathways of hoses for Phase 1. At phase 2 include relocating yard hydrant into out construction space to help facilitate demolition and furnish and install (2ea) 300 Gallon HDPE Containers with ball valves for distribution around site for other trade use.
68. This Subcontractor shall furnish and install the expansion of the heavy-duty concrete to accommodate temporary road access including but not limited to as shown on page 5 of the Turner Logistics Plans.
69. This Subcontractor shall include the creation of a temporary sidewalk including but not limited to as shown on page 5 of the Turner Logistics Plans. This Subcontractor shall also include the removal at the completion of the phase and removal/restoration.
70. This Subcontractor shall furnish, install and maintain asphalt millings, including removal for 50' around perimeter of building post foundations in phase 1 including but not limited to as shown on page 4 of the Turner Logistics Plans. Intent is that this Subcontractor shall be responsible for providing a uniform and level compacted grade around the building perimeter suitable for the support of scaffolding and lifts.

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71. This Subcontractor shall furnish, install and maintain temporary 4-foot-wide stone walkways from Turner trailers, toilet trailer and parking area locations to the two entrances located each side of the Auditorium. Coordinate final layout with Turner superintendent. Assume 6" depth of $\frac{3}{4}$ " stone. This Subcontractor shall remove all temporary sidewalks at the direction of Turner.
72. This Subcontractor to furnish, install and remove (4) Jersey barriers for protection against vehicular traffic at any and all O2, Flammable Gas and LPG storage tanks within the construction area, location tbd.
73. This Subcontractor will provide 30 traffic cones with telescoping cone bars to be used in areas designated at the direction of Turner.
74. This Subcontractor shall furnish, install, relocate and remove (6) additional jersey barriers in locations directed by Turner.
75. This Subcontractor shall furnish to the jobsite a Stihl Kombi system KM 131 R with Power Sweep, Bristle Bush and FS-KM Line Head Trimmer. Unit to be run-ready and include a 5.0-gallon safety gas can filled with mixed gas.
76. This Subcontractor shall furnish to the jobsite one Stihl BR 800 C-e Magnum backpack blower. Blower shall be run-ready.
77. This Subcontractor shall furnish to the jobsite one Toro Power Clear 721 R Snow Blower. Snow blowers shall be run-ready.

Erosion Control and Stormwater Management

78. This Subcontractor shall provide grading as required to create and maintain temporary swales as indicated on the contract documents.
79. This Subcontractor shall furnish install and maintain temporary water bars on construction drives as indicated on the contract documents.
80. This Subcontractor shall furnish and install all temporary sediment basins including but not limited to stone, drainage pipe/structures, dams, and connections to existing drainage systems as indicated on the contract documents.
81. This Subcontractor shall include cleaning / mechanical sweeping of any soil or debris from the construction site on the adjacent streets and the school's driveways and parking lot areas as required or within 24 hours of a request by Turner during the entire duration of the project.
82. This Subcontractor shall include dust control as required per the contract documents for duration of the Project. This Subcontractor shall provide a water truck, buffalo misters, or other means of dust control as needed to control the dust on site.
83. This Subcontractor shall tarp the stockpiles of onsite material, as required, to protect it from saturation during a rain event and to control dust migration on windy days with wind speeds over 10 mph.
84. This Subcontractor shall furnish, install and maintain all geotextile silt fence, inlet protection, silt sacks, hay bales/hay bale barriers, erosion control blankets and temporary sediment traps as indicated on the contract documents. Any stockpiled areas shall be surrounded in additional silt fencing.

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85. This Subcontractor shall furnish, install and continuously maintain Erosion Control Measures required per the contract documents. This Subcontractor shall include all costs to remove and dispose of Erosion Control Measures at the end of the Project. Note that the quantity of anti-tracking pads shall be installed per Turner's site logistics plan and not the civil drawings.
86. This Subcontractor shall coordinate/cooperate with the Greenwich authorities and the independent inspector, as necessary, to ensure proper erosion control methods/practices are in place at all times. This Subcontractor shall inspect the erosion control measures on a weekly basis and as required per the SWPPP. This Subcontractor shall maintain a log book documenting the condition and/or repairs implemented following each inspection. This Subcontractor shall also provide a rain gauge and maintain a daily log documenting the actual rainfall on site on a daily basis.
87. This Subcontractor shall furnish and install all storm water management structures, chambers, isolators, drains, inlets/outlets, manholes, manhole accessories, cleanouts, hydrodynamic separator(s) and accessories including but not limited to excavate and backfill required for installation, bedding materials, piping and connections to existing piping as indicated on the contract documents.
88. This Subcontractor shall furnish and install all Rain Gardens and Swales including but not limited to filter fabric, pipe, crushed stone, bedding materials, subgrade, grading, soils and scarifying and tilling soil beneath gardens. Refer to Rain Garden Typical Cross Section and 5' Wide Stone Swale With 6" Underdrain details on drawing C504.
89. This Subcontractor shall furnish and install all below grade under drainage piping, roof leader drain piping and the above grade downspout boots between roof leaders and drain piping. Building mounted roof leaders are by others. Refer to drawing C504.
90. This Subcontractor shall furnish and install the below Second floor slab storm piping from 5' outside of the foundation (retaining) wall. Reference multiple locations as shown on PSU001 and associated scope shown on the Civil drawings.
91. This Subcontractor shall provide Greenwich soil mix as indicated on the contract documents including but not limited to where shown on drawing C504 beneath rain garden(s).

Excavation, Backfill and Trenching

92. This Subcontractor shall furnish and install fill materials as required by the contract documents to fill excavation at demolished building(s). Coordinate with Demolition Subcontractor and specification section 024100 3.1.
93. This Subcontractor shall include all of the excavation and backfill for the foundation system per the contract documents. With the use of the geotechnical information, the excavation is considered to be unclassified and this Subcontractor shall be responsible for all rock removal and the removal and replacement of unsuitable soils necessary for the installation of the new structures and the associated site utilities. No additional compensation will be made to complete work as shown on the Contract Documents
 - a. This subcontractor shall assume line drilling of rock along the Emergency Path rock face (at the rear of the new building). Intent would be to achieve a clean wall of rock where visible.
94. This Subcontractor shall provide the fill material necessary to achieve the designated grades on site, as well as the fill material identified inside the building including as required by the contract documents.
95. This Subcontractor shall include all trench excavation, bedding and backfill for removal of existing and installation of all new underground utilities beneath slabs-on-grade (see Fire Protection, Plumbing, Mechanical, & Electrical drawings) in accordance with the contract documents.

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96. This Subcontractor shall furnish and install the bedding material, filter fabric, and crushed stone required per the contract documents for all installations performed by this Subcontractor. Under-slab vapor barrier will be furnished and installed by the Concrete Subcontractor after this Subcontractor shall furnish and install the crushed stone under slab as indicated on the contract documents.
97. This Subcontractor shall ensure that all excavations are properly sloped or laid back per OSHA regulations to avoid any collapses or cave-ins. Shoring will be required for all trenches over 5' deep. Materials shall not be stockpiled within 4' of an open excavation edge. This Subcontractor to provide trench boxes as required for any excavation requiring workers to enter the trench(es).

Site Utilities

98. This Subcontractor shall furnish and install all drainage, water, gas, sewer, and fire protection services outside of the building foundation walls and extend to 5 feet from foundation walls. These site utilities 5 feet from the building and closer shall be by respective MEP trades. This Subcontractor shall include any these site utilities shown under slabs but outside of the foundations walls that are shown on civil drawings for example: drainage piping on drawings C102 from grid 2 to 3, D to E.
99. This Subcontractor shall demolish and dispose of all existing site utilities as indicated on the contract documents including but not limited to drainage/drainage structures, sewer, light pole bases, overhead electrical/telecom poles, gas, water and fire services and components.
100. This Subcontractor shall provide excavation and back fill to expose any electrical / communications conduits / services scheduled for demolition. Removal of conduit in soil shall be by this subcontractor, any concrete encased ductback scheduled for demolition shall be removed by this Subcontractor after the electrical subcontractor cuts and makes safes.
101. This Subcontractor shall abandon existing utilities including but not limited to plugging piping, filling piping with pumpable controlled low strength materials, removing portions of manholes, removing manhole frames and covers, breaking existing structures and filling with material as indicated on the contract documents.
102. This Subcontractor shall provide warning tapes for all underground utilities as indicated on the contract documents.
103. This Subcontractor shall saw cut / patch and restore any existing finish including but not limited to lawn, concrete sidewalk/curb or bituminous pavement/curb scheduled to remain as required to demolish, provide or otherwise access trenches for all proposed underground utilities.
104. This Subcontractor shall furnish and install all gas piping up to and including meter and manifold, connection to existing main, excavate and back fill and provide bedding materials for all gas piping as indicated on the contract documents. This Scope shall include contacting and coordinating with local utility and providing any gas connection fees.
105. This Subcontractor shall furnish and install all the site utilities including but not limited to Sanitary Sewer piping, manholes, structures, connections to existing, trenching and backfilling, and bedding materials as indicated on the contract documents. Include any sewer connection fees to local utility/municipality. Additionally, this scope shall include coring / patching existing sanitary structures as required for connections, refer to E303 for example. **This subcontractor shall include and submit a MOP for review and approval by design team and the Town of Greenwich Sanitary sewer department of the new sanitary work, including any by-pass of existing for the work at Indian Rock Lane and Stanwich Road.**

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106. This Subcontractor shall provide all concrete encasement for sanitary sewers as indicated on the contract documents including but not limited to what is shown on drawing C303.
107. This Subcontractor shall furnish and install all fire protection and water service piping, connections to existing, taps, valves, trust blocks, air vents, blow off boxes/covers, piping restraints, providing trenching and backfilling, and bedding materials as indicated on the contract documents.
108. This Subcontractor shall flush and chlorinate the water lines prior to putting them into service. This Subcontractor shall coordinate with the plumber and the fire protection contractors prior to performing this work.
109. This Subcontractor shall coordinate with Aquarion for the installation of new and removal of existing water service and the tapping of all new water lines to the project. This Subcontractor shall provide all fees associated with this work and shall perform the taps or hire an approved subcontractors to perform this work. This Subcontractor shall furnish and install all vaults/water meter pits per Aquarion's requirements for the new water connections to the buildings. This Subcontractor shall install the domestic water service lines to within 5' of the foundation wall, all fire protection piping shall be extended through the foundation wall by this Subcontractor. The fire protection line shall have a flanged connections or otherwise coordinated with fire protection Subcontractor.
110. This Subcontractor shall provide excavation and backfill, including furnishing and install bedding materials for the fire protection service and any new hydrants as indicated on the contract documents. Coordinate with the local fire department for the thread connection requirements for these hydrants. This subcontractor shall furnish and install all piping, automatic ball drip and Siamese connection scope at the exterior of the building, reference detail 8/FP500.
111. This Subcontractor shall coordinate with the Gas Company for the installation of the new or relocated services to the buildings including any underground gas piping scheduled for removal. This Subcontractor shall excavate and backfill per the gas company's specifications for the primary piping to be installed by the gas company. ~~This subcontractor shall furnish and install the gas meter pads per the Gas Company's specifications.~~
112. This Subcontractor shall excavate and backfill for temporary 4" x 4" x 20' power poles to be installed by the electrician as defined in the logistics plan and scope of work. At the end of the project, this Subcontractor shall remove these poles, backfill the hole, and grade the area in preparation for the site improvements and landscaping for this area.
113. This Subcontractor shall coordinate with the various utility companies (power, telephone, cable) regarding the installation of new utility poles, the relocation of existing utility poles, and the removal of utility poles as defined in the contract documents. This Subcontractor shall include all fees associated with this work.
114. This Subcontractor shall obtain the proper permits for all utility work and provide the police for traffic control at any street opening as required by Greenwich.
115. This Subcontractor shall hand dig around existing utilities to ensure that they are not damaged or broken by excavating equipment.
116. This Subcontractor shall excavate and backfill all electrical, security, and communication conduits including but not limited to the primary and secondary electric services as indicated the contract documents.
117. This Subcontractor shall coordinate with the power company ~~and shall furnish and install the concrete transformer pad(s) in accordance with the power company's specifications.~~ The electrical contractor shall furnish and install all underground conduits.

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118. This Subcontractor shall furnish and install all electrical manholes including the primary electrical manhole and include patching around the knockouts once the EC runs the conduits/ductbank.
119. This Subcontractor shall encase all underground conduits in concrete as indicated on the contract documents and install warning tape in accordance with the contract documents.
120. This Subcontractor shall excavate and backfill all the electrical conduits between the building and the emergency generator. The electrical subcontractor shall furnish and install all conduits/ductbanks. ~~This Subcontractor shall furnish and install the concrete pad(s) for the generator(s).~~
121. This Subcontractor shall excavate and backfill for all the telecom ductbanks between the utility poles and the buildings. The electrical subcontractor shall furnish and install all conduits/ductbanks. This Subcontractor shall encase these conduits and install a warning tape in accordance with the contract documents.
122. This Subcontractor shall excavate and backfill for the site power, EV charging, lighting conduits and the traffic control gates / motorized gate controller conduits as indicated on the contract documents, including but not limited to what is indicated on drawing SU100.
123. This Subcontractor shall also furnish and install the concrete light pole bases, blue light concrete bases, and site entrance sign (A924) as indicated on the contractor documents. This Subcontractor shall coordinate with the electrical contractor (or Vendor) for the anchor bolts layouts and the installation of the conduit, prior to pouring the concrete.
124. This Subcontractor shall furnish and install all anchor bolt for concrete bases that are indicated to be "by Site Contractor" including but not limited to site lighting concrete bases, refer to details on SU501, EV charging station concrete base anchor bolts, refer to detail 3/SU500 for example and blue light concrete base anchor bolts per 7/SU500.
125. This Subcontractor shall excavate, backfill, rig and set electrical/telecom vaults / hand-holes and electrical / telecom manholes provided by the electrical subcontractor or utility as indicated on the contract documents. This scope shall also include preparing subgrade and bedding materials for vaults/hand holes/manholes as required by the contract documents.
126. This Subcontractor shall excavate and backfill, provide bedding materials for and furnish and install all grease waste, connections, structures, grease traps and oil/water separators, and inspections as indicated by the contract documents.
127. This Subcontractor shall furnish and install all exterior grease traps as indicated on the contract documents.
128. This Subcontractor shall furnish and install the footing underdrain system and the defined enclosure (filter fabric and crushed stone) around these pipes at all the new foundations, and as indicated on the contract documents. These drains shall connect to the storm system as indicated on the contract documents.

Site Paving, Curbing, and Pavement Marking

129. This Subcontractor shall furnish and install all bituminous concrete pavements and walks shown on the Contract Documents. This scope includes all pavement patching associated with the installation of all utilities. See Turner's Sitework/Hardscape & Utility Phasing Plan, dated 3/22/17, for out of sequence utility work and paving requirements.

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130. This Subcontractor will be responsible for all new or replacement Pavement Markings required for roadways, walkways and parking lots. This Subcontractor shall also furnish and install the transverse rumble strips and the speed humps with pavement markings, as indicated in the contract documents.

Site Concrete

131. This Subcontractor shall be responsible for the site concrete including but is not limited to; fence and gate footings, light pole bases, thrust blocks, encasement of ductbanks. This Subcontractor shall include sub-grade preparation for the concrete Subcontractor. This Subcontractor shall coordinate with the concrete Subcontractor for the connections of the sitework walkways to the concrete contractor's step and walkways.
132. This Subcontractor shall furnish and install rigid insulation between frost pads and adjacent construction including but not limited to detail 5 on drawing S200.
133. This Subcontractor shall furnish and install vertical rigid insulation and required protection board on interior & exterior side of foundation walls as indicated on the contract documents including but not limited to details 1D, 2D, 3D/A410, 3E, 1E, 1C, 2C/A412, all details on A413 and A418, 4D, 5D, 6D, 3E, 2E/A414, 2D, 3D/A415, 1E, 3E, 4E, 5E/A417, 1E, 2E, 3E, 4E/A416 and 1D, 2D, 5D, 4E/A411. Include per typical foundation wall vertical insulation, ref A501.
134. This Subcontractor shall furnish and install decorative boulder selected from the site coordinate with Owner, Architect and Landscape Architect and furnish and install all concrete for signage including the foundation/footing for Street Front Signage. Refer to drawing A924
135. This Subcontractor shall furnish and install a 15' x 20' x 5" concrete pad for a free-standing mock in a location to follow. The removal of the mock-up and the pad will be by the demolition contractor. This scope of work shall also include but not be limited to subsurface prep of gravel below the slab as reference of drawing A315 and furnishing and installing a mockup of the louver screen wall.

Site Improvements

136. This Subcontractor shall remove, store and re-install existing batting cage scheduled for re-use as indicated on the contract documents.
137. This Subcontractor shall furnish and install the dumpster enclosures as indicated on the contract documents including but not limited to all slab(s) walls, fencing and doors/gates and associated hardware at dumpster enclosure. Reference drawing L504.
138. This Subcontractor shall furnish and install all metal screen fencing as indicated on the contract documents including but not limited to fencing per details 3A, 3D, 1D on drawing L503.
139. This Subcontractor shall furnish and install the site and traffic signage, wayfinding and parking signage, and pavement markings as indicated in the contract documents including but not limited to demolishing, relocating any existing traffic signage and/or eradicating any existing conflicting pavement markings.
140. This Subcontractor shall furnish and install all unit pavers on sand bed with metal edge restraint and the flagpole(s) per the contract documents.
141. This subcontractor shall provide a value for Alternate #3 as defined in the form of proposal.

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142. This Subcontractor shall furnish and install all ADA traffic Control Bollards, Electronic ADA stanchions, site planters, site benches, bicycle racks, steppingstones, stone mulch and metal edging, seating and tables, live edge wood benches and boulders as indicated on the contract documents.
143. This Subcontractor shall furnish and install all gates including but not limited to vehicular double swing gate per detail 3B on drawing L502 and Cantilever chain-link fence sliding gate (if this alternate is accepted) per detail 3A on drawing L601. Include any required painting of gate per documents.
144. This Subcontractor shall furnish and install all combination sign/boards, steel concrete filled and removable type bollards (including the footings, concrete fill and painting), timber guiderails, vehicles access gates, automatic traffic control gates (along with the footing specified by the manufacturer) , and chain link fencing as indicated in the contract documents. This Subcontractor shall coordinate with the Landscaper for the installation of the timber rails relative to their access for the installation of the landscaping.
145. This subcontractor shall engineer, furnish and install the segmental block retaining walls indicated in the contract documents including but not limited to Diamond Pro PS Block – Victorian Face per detail 1D/L503 and Metal Screen Fence(s) including but not limited to details shown on L503.
146. This Subcontractor shall furnish and install all exterior litter receptacles as indicated in the contract documents.
147. This Subcontractor shall furnish and install all Safety Netting as indicated on the contract documents, reference detail 1A on drawing L601.
148. This Subcontractor furnish and install all baseball and softball backstop systems as indicated on the contract documents including but not limited to the details on drawing L602.
149. This Subcontractor furnish and install the baseball/softball shade enclosures including but not limited to the benches and corrugated roofing the as indicated on the contract documents including but not limited to the details on drawing L602.
150. This Subcontractor shall provide all metal fencing, metal screen fencing, shade enclosures, bollards, backstop assemblies, stanchions, safety netting support metal, dumpster enclosure gates, vehicle gates, and foul ball poles in a painted or factory applied finish. All finish painting or providing in factory finish shall be included for exposed metals supplied by this Subcontractor.
151. This Subcontractor shall furnish and install the raised planters as indicated on the contract documents including but not limited to raised concrete planters per detail 3E on drawing L501.
152. This Subcontractor shall include the follow **Trade Allowances**: 120 hours of machine time (assume small wheel loader similar to CAT 930) and 320 hours of a laborer for required site logistic modifications associated with phasing and restoration of areas. Laborer Time to be included as journeyman rate including any required supervision. This will be billed based on the final agreed contractual wage rates and may only be expended by written authorization of Turner Construction and any unspent portion of this unused scope hours will be credited at the end of your contract based on approved labor rate.

Additional Items

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153. This Subcontractor shall relocate the existing two (2) storage sheds on the property. Reference drawing L101A and Drawing L301A at grid line E & 1 for shaded rectangle intended to show existing sheds location. Please note – sheds will not be demolished, shed will be relocated per Owner's direction on the property.
154. This Subcontractor will not participate in the Contractor Controlled Insurance Program (CCIP). This subcontractor shall provide a General Liability Insurance program inclusive of a \$20 MM per occurrence and \$20MM per aggregate for Blasting Operations. Refer to CCIP Manual for additional information.
155. This Subcontractor shall provide to the jobsite, at start of construction activities, for use by the Turner Staff during the project and will be turned over and the property of the Town of Greenwich the following Utility Terrian Vehicle: POLARIS RANGER CREW XP 1000 NorthStar Edition Premium with Fixed Windshield, equipped with all the capabilities of RANGER CREW XP 1000, plus a factory-installed Pro Shield cab system, heating and air conditioning—with seating for 6 and doors. Include pedal-start feature to reduce unnecessary idling if available, and (3)-5 gallon gas cans for refueling. Assume refueling cans weekly for the course of the project.
156. This Subcontractor shall adhere to the included schedule specifically the duration on rock removal and sitework to allow for following activities. A minimum of two crews made up of the appropriate number of individuals shall be working on sitework and rock removal operations to adhere to the indicated durations and meet production levels necessary to complete as scheduled.
157. This subcontractor shall include all fill as needed based on the existing building elevation changes. The Sitework Subcontractor shall remove any existing gravel course or footing / slab-on-grade subgrade prep materials (assume 12" depth).
158. This Subcontractor shall remove any existing gravel course or footing / slab-on-grade subgrade prep materials (assume 12" depth).
159. This subcontractor shall backfill, slope, and excavated areas to achieve the correct final elevation and conditions.
160. This Subcontractor shall include the seismic requirements of the Gap Mountain Report issued as a part of Addendum 5 and included as attachment F within the project manual. Proper means and methods shall be included by this subcontractor to meet the requirements set forth for the seismic limits at the existing school building. Include Blasting provisions identified on page 5 of report, Item #5 (a-i).

D. Exclusions

1. Exclude fiber mulch. (by Landscape)
2. Exclude polymer Concrete handholes (by EC)
3. Exclude heat trace at exterior sanitary piping.
4. Exclude furnishing and installing under-slab sanitary piping (By Plumbing Bid Package)
5. Exclude Soil Preparation specification 32 9113 (By Landscape Bid Package)
6. This Subcontractor shall exclude the following flatwork concrete unless otherwise indicated above including frost pads, sidewalks, sidewalk ramps and curbing as indicted on the contract documents which shall include the detectable warning strips. Exclude spec sections 32 1313 – Concrete Paving and 32 1373 – Concrete Paving Joint Sealants.
7. Excludes concrete washout.
8. Exclude placing Concrete and Concrete Reinforcing for Transformer Pad(s), Gas Meter Pad(s), and Generator Pad(s).

Additional Provisions/Scope of Work

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BP#9 - Sitework

Dated: 07.08.2024

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9. Exclude the Independent testing agency requirements of the Gap Mountain Report issued as a part of Addendum 5 and included as attachment F within the project manual, identified on page 4 of report, Item #4 (a-g).

E. Safety

1. This Subcontractor shall excavate all trenches assuming all soil to be Type C. Meaning all excavations shall be continuously sloped at a 34-degree angle in accordance to the OSHA standards. Sloping cannot exceed 20 feet without verification by a PE. BENCHING NOT ALLOWED IN TYPE C SOIL. This Subcontractor shall provide a detailed sheeting and soil retention plan for the work to be undertaken. This requirement does not attempt to characterize soil suitability for the support of structures or equipment but is only recommended for the purposes of trench collapse prevention.
2. This Subcontractor to provide a fall protection plan for all excavations 6 feet or greater in depth. This Subcontractor shall ensure excavation fall exposures are guarded by a hard barrier that meets OSHA's definition of guard railing. Orange fencing, danger or caution tape will not be acceptable.
3. This Subcontractor shall furnish, install and maintain an OSHA compliant wire rope guardrail system atop ALL site perimeter H pile soil retention systems. This is to be installed before any mass excavation begins to eliminate fall hazards during its installation. This Subcontractor will furnish and install a 3x3 steel angle posts atop each H pile sized to accommodate a toprail cable at 42" inches above walking surface and a midrail cable at 21" above the walking surface, terminated by 3 appropriately sized and spaced forged steel wire rope clips (Crosby or equal) torqued to manufacturers specifications. All steel posts, cabling, hardware and turnbuckles are to be furnished and installed by this Subcontractor. The minimum allowable cable size will be 3/8ths only if aircraft rated cable is used. The perimeter cable system is to include turnbuckles spaced at no more than every 100 feet with terminations made at all corners. This Subcontractor to also furnish, install and maintain orange mesh secured to the top rail and terminated into the top piece of lagging. This Subcontractor is to inspect and maintain all guardrails and mesh on a daily basis until backfilling is complete and railing no longer necessary for fall protection. Daily inspections shall be documented by this Subcontractor and made available to Turner upon request. Removal of safety cabling systems will be by others. This Subcontractor to incorporate four (4) pedestrian access/material loading areas independent of perimeter protection with removable cables and tie-off points for three (3) workers. These material loading areas to be located by Turner's Superintendent. This subcontractor to use the top edge of the lagging as a toe board and means to secure orange mesh, it is important that this Subcontractor allow for the height of the H-pile to be at least 6 inches above the adjacent walking surface elevation.
4. This Subcontractor shall provide (prior to arriving on site) all tabulated data for shoring boxes utilized for soil retention, including soil retention at the site utilities. This Subcontractor must ensure that they furnish, install, maintain and remove guard railing (includes a continuous top rail at 42 inches above grade, a midrail at 21 inches above grade, a toe board 4 inches above grade) at all sheeting, soldier pile or trench box that terminates 6 feet or greater above a lower level. This Subcontractor to furnish, install, maintain and remove such guard railing as well as provide daily documented inspections.
5. This Subcontractor shall have a 40-hour Hazwoper trained employee on site at all times. (for projects with the requirement outlined in the soils management plan.)

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6. This Subcontractor to provide snow removal for the entire site including all areas identified within the Turner site logistics plan. Removal must be continuous throughout all areas within the site fencing and all access paths to all entries into the building including any areas in the building impacted by snow and ice. Snow removal is not allowed to free fall from upper levels of buildings, scaffolding or platforms. This Subcontractor shall sand and de-ice as required to maintain safe conditions on site including: egress from each building, trailers and to the Site Emergency Rally / Muster location per the Crisis Management Plan. The snow removal will be accomplished prior to commencement of the days work shift to allow for safe entry without delay into the jobsite. This subcontractor is required to maintain at all times roadways and foot paths in a safe traversable condition by plowing, shoveling and utilizing surface treatments.
7. This Subcontractor shall ensure the grade differential between any (concrete) surface and adjacent rough grade is no more than 10 inches below finish floor elevation during all phases of construction. This Subcontractor shall be responsible for providing a uniform and level compacted grade around the building perimeter suitable for the support of scaffolding and lifts.
8. This Subcontractor shall provide and maintain anti-tracking pads and tire wash stations per the Turner Site Logistics Plan or as required by Turner. Each anti-tracking pad shall be constructed as specified by the contract documents or Turner. Tracking pads as defined by the site logistics plan or site improvement plan will prevail if more stringent than this requirement or if the area is required to be greater in size. This subcontractor to provide high pressure washers at each location for tire washing purposes. This Subcontractor shall provide the appropriate manpower to ensure ALL vehicular traffic is washed at these locations before entering onto municipal streets. These areas must be isolated from coming in contact with any soil remediation areas where required. This subcontractor is to provide all materials necessary to hook up and retrieve water and a water truck must be provided by this subcontractor if water is not available on site. This subcontractor shall be responsible for street sweeping to maintain clear roadways around the site as directed by Turner.
9. This subcontractor shall perform inspections of the erosion/stormwater control measure for the project, this Subcontractor is responsible to furnish, install, repair and remove all stormwater/erosion control measures, devices, fixtures, etc. per the Project SWPPP (Stormwater Pollution Prevention Plan) and all terms and conditions associated with this work. This includes responsibility for all corrective action required to remediate the stormwater controls per the inspections by Turner and by all 3rd party inspectors and maintain a documentation log confirming all corrective actions. See Turner Construction Company Stormwater Compliance Program for additional requirements.
10. This Subcontractor will be required to maintain a lined concrete wash out for their concrete work and will be responsible for removing all surplus concrete from the job site in accordance with contract documents. Concrete surplus must be removed on a weekly basis or as directed by Turner.
11. This Subcontractor shall ensure safe access in and around all footings by providing ramps at every footing and every 25' along the foundation walls. If trenches are to be traversed ensure that walkways are at least 18 inches wide and are secured together when using two planks to make up the required width. If the height of the walkway exceeds 4 feet vertically this subcontractor will install guardrails to prevent falls from same walkway.
12. This subcontractor shall excavate around footings to allow for an unobstructed 2 foot wide clear path around all footings during wall construction, drainage and waterproofing installation activities. The adjacent footing grade must be maintained no lower than 16 inches below top of footing.
13. This Subcontractor shall coordinate with Turner Superintendent and backfill to within 2" the top of all footings, compacted and leveled prior to the commencement of wall forming operations.

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14. This Subcontractor shall verify the presence of all existing underground utilities that may be affected by their work. This includes the use of non-intrusive methods such as hand digging or vacuum excavation of pot holes every 15' to locate known utilities per the Surface Penetrating Request Permit. This includes areas where fence posts for site containment fences are to be driven. This Subcontractor will contact "Call before You Dig" for layout of existing utilities and coordinate with the facilities department. This subcontractor will be responsible for maintaining utility markings.
15. This Subcontractor shall hire an independent GPR Subcontractor approved by Turner to grid out, locate and mark all existing underground utilities in all areas of disturbance. This GPR Subcontractor shall provide subsurface utility profiles in plan and elevation as built by a licensed surveyor with dimensions off existing site benchmarks that will remain throughout the project and submit copies to Turner. This subcontractor will be responsible to maintain with updated as built and remark utilities for the duration of the project when needed. **This subcontractor shall utilize hand digging and/or vacuum excavation when excavating within 12' of existing utilities to identify their locations below grade.**
16. This Subcontractor shall ensure that the soil/ fill conditions under any equipment i.e. SCAFFOLDING/HYDROMOBILES/CRANES have been coordinated with the Subcontractor providing the equipment to ensure suitable soil bearing capacity.
17. All building and structure shoring/underpinning systems must be designed by a professional engineer. Plans and calculations must be submitted to the engineer of record for approval prior to undertaking the work. Inspections must be performed daily by a qualified party designated by the subcontractor and maintain a documentation log confirming any corrective actions required.
18. This subcontractor shall ensure that if self-supporting temporary fence is required tube bases that project into adjacent walkways will not be permitted. Temporary fencing must be supported by one sided fence bases (either steel and/or sand bagged) or low profile high-visibility bases shall be used to eliminate tripping hazards to the public side. In general, scrim shall be wind resistant scrim.
19. This Subcontractor shall ensure that all temporary fence panels are free from protruding wires or other components that could scratch, catch or snag pedestrians as the pass by the fence.
20. This subcontractor is to furnish, install, maintain and remove all fencing, scrim covering, and gates for the full duration of the project as outlined in the project schedule and layout defined by Turner's Site Logistics Plan. Fence must be inspected for integrity and this contractor will perform any necessary repairs identified.
21. All designated walking paths must be temporarily graveled and regularly maintained using ¾" stone maximum. A path must be furnished and maintained from the site entry gate to the building perimeter entry location at all times.
22. This Subcontractor must provide daily dust control for all sitework so that dust is controlled to the point that it is not visible. This subcontractor shall provide their own water connection.
23. Excavator cabs windshield must be protected with both a suitable cage covering and safety glass when the excavator is being used in conjunction with a hydraulic breaker, hoe ram and during clearing and grubbing operations.
24. This contractor will coordinate with Turner to determine the location of air intakes into other buildings that could be adversely affected by exhaust fumes from its machinery. This contractor will be expected to protect the fresh air intake of existing buildings from exhaust, mists or dusts generated by their work.
25. This Subcontractor will provide 80 traffic cones with telescoping cone bars to be used in areas designated at the direction of Turner.

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26. This subcontractor shall furnish, install, relocate and remove (10) additional jersey barriers in locations directed by Turner.
27. This subcontractor shall furnish, install, maintain, relocate as needed and remove jersey barriers or dead men along ramp excavation inclines as guardrail protection for motor vehicles and construction equipment.
28. This Subcontractor shall ensure all street plates have anti-skid surfaces with no open lift holes.
29. Blasting Operations to be governed OSHA and the Manual of Accident Prevention in Construction of the Associated General Contractors of America. This contractor will be required to submit blasting plans to be reviewed by a 3rd Party. A Pre-Blast Permit will be required to be completed for each blast sequence. Include all Town permits and associated cost as required for Blasting.
30. This Subcontractor shall develop, implement and maintain a road closure plan that follows MUTCD requirements for any road/lane closures or work adjacent to public roadways.
31. This subcontractor shall provide "Danger Construction Do Not Enter" on the exterior scrim of the site fence every 20'.
32. This Subcontractor to furnish, install and remove concrete barriers for protection against vehicular traffic at any and all O2, Flammable Gas and LPG storage tanks within the construction area as further defined by Turner's Site Logistics Plan. Also provide grading and 3/4" stone as a base for these enclosures.
33. ~~This Subcontractor shall relocate the existing two (2) storage sheds on the property. Reference drawing L101A and Drawing L301A at grid line E & 1 for shaded rectangle intended to show existing sheds location. Please note—sheds will not be demolished, shed will be relocated per Owner's direction on the property. See Above.~~

F. Logistics and Schedule

1. This subcontractor shall include the requirements of the Project Logistics Plan and Project Schedule.

G. Unit Prices

The following Unit Prices reflect the work of this bid package under which the bid proposal was submitted, and all unit prices shall remain valid for the life of the project and include all costs for a complete installation. Unit prices which do not affect the work of this bid package have been filled in "not applicable (n/a)". **UNIT PRICES ARE GOOD FOR BOTH ADDS AND DEDUCTS.**

Unit Prices:	Amount
Refer to Form of Proposal	

H. Alternate Prices

The following Alternate Prices reflect the work of this bid package under which the bid proposal was submitted, and these alternate shall remain valid for the life of the project and include all costs for a complete installation.

Alternates:	Amount
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Additional Provisions/Scope of Work

New Central Middle School Project

State Project No. 057-0114 N

Greenwich, CT

BP#9 - Sitework

Dated: 07.08.2024

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Refer to Form of Proposal	
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**APPENDIX F - GREENWICH CENTRAL MIDDLE SCHOOL
CONSTRUCTION-VIBRATION AND CONTROLS DURING
CONSTRUCTION (CVC), BY GAP MOUNTAIN CONSULTING
ENGINEERS, PLLC, DATED NOVEMBER 1, 2024.**

**CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114 N
PHASE 2 OF 3 - BUILDING CONSTRUCTION,
DEMOLITION, AND SITEWORK**

**S/L/A/M PROJECT NO. 22367.00
ADDENDUM NO.5
00 9113 - 1**



Gap Mountain Consulting Engineers, PLLC

November 1, 2024

Greenwich Public Schools
c/o Building Committee
(attn. Mr. Joseph Rossetti)
9 Indian Rock Lane
Greenwich, CT 06830

Subject: **GREENWICH CENTRAL MIDDLE SCHOOL
CONSTRUCTION-VIBRATION AND CONTROLS DURING CONSTRUCTION**

Dear Mr. Rossetti,

This provides you with our analysis, findings, and recommendations for control of construction-vibration at the existing middle school.

EXECUTIVE SUMMARY

The Town of Greenwich is constructing a new central middle school adjacent to its existing school. Greenwich plans to keep the existing school operational throughout construction. The Building Committee is concerned with the impact construction-vibration has on the existing building and has engaged our firm to evaluate the risk of structural damage and provide our opinion on safety of occupants.

We were provided with a site logistics plan, geotechnical report, master schedule for the new construction project, and a Division 2 specification for vibration monitoring and proposed vibration limits. These documents provide sufficient information with which to assess the nature and location of construction-vibration. We also have detailed records from our previously conducted physical condition assessments of the existing building. Collectively, this body of this information is sufficient for our analysis and findings.

Our engagement focuses on physical damage to structural elements. It is within our competencies and expertise to evaluate construction-vibration and specify engineered limits and controls that protect existing structural elements from damage. We set limits based on the mechanical properties of materials that are exposed to construction-vibration and their existing physical condition.

The weakest structural element in the existing building exposed to significant construction-vibration is the interior wythe of concrete masonry unit (CMU) block walls located in the sallyport connector to the library including abutting classrooms and stairwells. These walls are near construction activity, some CMU block is fatigued and cracked due to how the walls were constructed, long-term differential settlement, and a recent earthquake. The condition of these CMU block is the most vulnerable to damage from vibration. Our analysis sets control limits to the highest level of vibration that should be permitted for construction to protect the existing building from resulting structural damage while it is occupied.

The fundamental purpose of professional civil / structural engineering is to design structures that protect life safety. Our Codes and practices focus on design of structures that are safe for the public when natural forces are at play. These forces include vibration.

We are not designing a new building. We are analyzing and prescribing limits to construction-born vibration so that the existing building is not damaged while occupied. The limits that we specify are for other professionals, such as an explosives engineer, to design means / methods for heavy construction that do not exceed the vibration limits at the existing building. By keeping construction-vibration within these limits at the existing building, the existing building will not experience structural damage due to construction-vibration.

Enclosed is our analysis and required limits for construction-vibration. Our findings are that an appropriate control limit for impact vibration (blasting) is 0.75 inches per second at frequency ranges of 10 to 60 Hz. This is the measurable limit at the building and not elsewhere on the property or where construction-vibration activity is taking place. Sustained vibration should not exceed 0.50 inches per second in the same



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frequency range. We also provide the enclosed vibration monitoring specification which outlines the project's management team protocol for controlling construction-vibration within these limits. If incorporated in contract documents and enforced by the general contractor and Town, these specifications assure that the contractor exercises control over construction-vibration within these limits.

CONSTRUCTION-VIBRATION

Vibration is a mechanical phenomenon where an external source of energy causes a structure to oscillate or repeat a motion over time. Construction-vibration means the external source of energy is construction activity such as blasting and hammering of competent rock formations in the earth. The energy from construction-vibration is classified as: 1) steady state, such as sustained hammering of rock and equipment movements; and 2) impact or impulse from dynamic excavation activities, such as blasting.

The energy from construction-vibration travels through the earth and vibrates neighboring structures. The theory is physical law. Engineering is the application of theory. Applying the theory there are a vast number of variables involved with construction-vibration, particularly given the earth is not a homogeneous material and construction activity is not defined by physical laws. We use factors of safety and professional judgement to account for the many unknowns. There are empirically derived thresholds at which damage to certain materials is expected. Some of these materials are structural and there are empirical maximums.

Construction-vibration is measured in the field using seismic monitors that record velocity, frequency, and the axis of vibration in one of three dimensions including a composite. Modern seismic monitors continuously record and report readings and signal alarms. Some communicate through the internet. Construction-vibration's velocity is measured in inches per second (ips) and its frequency is measured in Hertz (Hz). Recordings are taken at the point of interest such as a neighboring building or structure.

Vibration retains more energy when traveling through certain soil conditions and dissipates more rapidly when traveling through others. The impact that construction-vibration has on neighboring buildings can be controlled using specialized techniques. For example, construction-vibration traveling along a horizontal axis (left and right) can be reduced or eliminated by creating physical buffers such as trenches. Construction-vibration traveling along a vertical axis (up and down) is more difficult to control.

ANALYSIS

The American Society of Engineers (ASCE) contains a body of knowledge from which we have developed engineering methods for estimating energy and, for practical application, equivalent lateral static forces. When studying construction-vibration we also look to a body of knowledge available from peer organizations that routinely deal with the topic. These include the U.S. Army Corps of Engineers (ERDC / CERL TR-08-19), Naval Facilities Engineering Command DM7-02, Federal Emergency Management Agency Seismic Safety Council, U.S. Department of Interior, U.S. Bureau of Mines, International Society of Soil Mechanics and Geotechnical Engineering, The Masonry Society, Concrete Masonry and Hardscapes Association, and scholarly studies from various accredited engineering colleges and universities.

State Building Codes focus on new construction and renovation. Associated engineering algorithms and engineering methods relate to vibration from earthquakes, harmonics from wind, vehicular traffic, ocean waves, machinery, etc. There are federal and State limits on construction-vibration but these are regulatory maximum limits applied generally to all cases.

Our analysis focuses on the weakest structural element in the existing building and exposed to significant construction-vibration. Our engineering philosophy is allowable stress design. The structure of the existing building is a composite of structural steel, CMU walls, and shallow concrete foundations. The weakest elements are the most prone to damage from construction-vibration. CMU walls of the sallyport connector are near where construction activity will generate significant vibration and they are CMU. Their structural



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purpose is support against wind, seismic, and roof loads. These CMU walls are constructed in (2) wythes¹. The exterior wythe is a free-standing CMU facade tied to the interior CMU wythe with structural steel mechanical fasteners called wall ties. The interior wythe is reinforced with steel and supports against wind, seismic, and roof loads. Some interior wythe CMU block is already cracked due to its construction, external forces, and their mechanical properties². Cracks in CMU decrease a wall's strength and requires deferred maintenance / repair. Continued cracking from construction-vibration may lead to structural concerns. We believe the CMU walls of the sallyport connector are the weakest structural element in the existing building and are exposed to significant construction-vibration. We selected these walls as a case study to set control limits on construction-vibration in the existing building when it is occupied.

We apply fundamental Newtonian physical laws and ASCE allowable stress design philosophy to study mechanical properties of the CMU in the walls in the sallyport connector to the library.

Internal forces or stress from construction-vibration acting on the CMU block are directly proportional to the mass of the wall and acceleration. We define these forces as a "base" shear. Metrics are velocity and frequency because these are the vibration readings used in practice to control vibration. Base shear acts in three dimensions. The relationship between energy, velocity and frequency are directly proportional. Greater velocities and frequencies result in greater base shear acting on the CMU block wall. Higher values of internal base shear increase internal stress on the CMU block. Base shear in the vertical axis accelerates and oscillates the entire weight of the wall and portions of the roof where horizontal vibration accelerates and oscillates just the foundation that supports the wall. We focus our analysis on vertical oscillation because vibration in the vertical axis generates the highest internal stress on the CMU block.

We studied internal stress acting on cracked CMU wall at the sallyport in the vertical axis in increments of 0.25 ips and frequencies ranging from 30 to 60 Hz. This represents impact construction-vibration which is an instantaneous impulse. We converted peak particle velocity and frequency to acceleration and calculated the corresponding base shear loads acting vertically and at each increment.

The seismic weight of the wall is its self-supporting dead load plus contributing roof dead and live loads. We assumed no other load combinations, such as wind and snow, and apply base shear in the vertical axis to the wall for each increment. The results are tabulated. Highlighted in red are velocities and frequencies that exceed the block's strength.

We then analyzed the wall under a controlled vertical load scenario using IES masonry wall design software and allowable stress design philosophy. The wall passes design criteria in accordance with a historic Code criteria applicable to its existing condition, and results are included with this report.

CONCLUSION

Maximum permissible impact vibration (blasting) at the existing building 0.75 ips for frequencies ranging from 10 to 60 Hz. Maximum permissible sustained vibration (hammering and equipment movement) is 0.50 inches per second for the same range of frequency. Higher readings from monitors of construction-vibration in or at the existing building are expected to damage the existing CMU block walls. These walls are structural and therefore control vibration limits³.

¹ A wythe is a horizontal row of block (1) block wide. A row of block is a course. The exterior and interior wythes of the central middle school form (2) wythes and they are tied together with retrofit structural steel mechanical fasteners called wall-ties.

² Separately we studied and reported the condition of the CMU block in the sallyport connector and adjoining connector. Some of this CMU block is damaged due to long-term differential settlement and a recent earthquake. These conditions require deferred maintenance and do not pose a life safety concern. Construction-vibration that exceeds certain limits could cause damage would could result in a life safety concern.

³ Structural steel, structural steel assemblies, structural slabs, slabs on metal decks, and cast-in-place concrete foundations. Non-structural elements such as glazing, tile, sheetrock, etc. may be damaged due to levels of vibration at or below 0.75 ips.

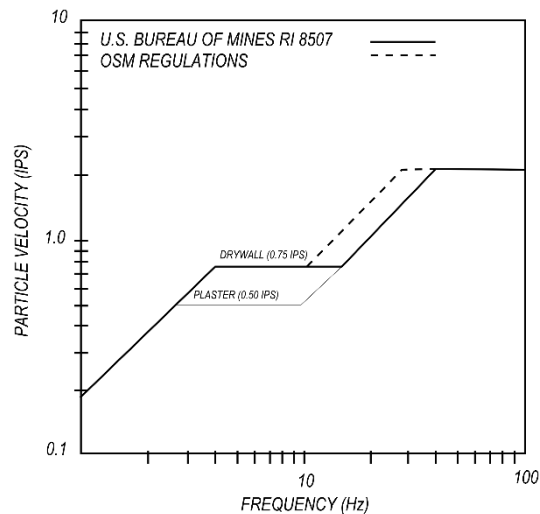


Gap Mountain Consulting Engineers, PLLC

REQUIREMENTS FOR PROTECTING THE EXISTING SCHOOL BUILDING FROM STRUCTURAL DAMAGE WHILE IT IS OCCUPIED

Following are technical, managerial, and operational requirements necessary to protect the existing middle school building from structural damage during those periods of time that heavy construction is producing vibration and the existing school middle school is occupied.

1. Restrict maximum permissible steady-state peak particle velocity to 0.50 inches per second at maximum frequency of 60 HZ measured at the existing building.
2. Restrict maximum permissible impact peak particle velocity to 0.75 inches per second at maximum frequency of 60 HZ measured at the existing building.
3. The accompanying figure gives reference to U.S. Bureau of Mines RI 8507 and Office of Surface Mining vibration limits on peak particle velocity levels at or above which damage to materials is expected.
4. Engage an independent testing agency to continuously monitor and report construction vibration while the existing middle school remains in operation.
 - a. Submit a vibration monitoring plan for review and approval. Coordinate the plan with the explosive engineer's blasting plan. Include equipment, technical specifications, calibration certificates, and operator qualifications. At least (1) monitor shall report readings over the internet, and at least (1) monitor shall be manned at the job site. Coordinate monitoring plan with blasting plan.
 - b. Submit technical data on vibration monitors including calibration certificates.
 - c. Provide baseline readings from test blast. Provide report to Contractor and Owner following completion of the test.
 - d. Conduct a pre-construction inspection of the existing building and document prior to start of heavy construction operations such as excavation, hammering, blasting, etc.
 - e. Routinely inspect and report movement in existing cracks in masonry units of the "sallyport" connector and abutting classrooms and library in the existing school building and as identified during the pre-construction conditions inspection. Provide readings to the DOR within (48) hours of an inspection.
 - f. Establish elevation controls on the existing building foundations, and inspect and report dynamically driven settlement during construction. Principle areas of concern are the library and sallyport connector.
 - g. Provide vibration alarms that are audible and visual to personnel responsible for controlling vibration at the site. Immediately report to the Owner, Contractor, and DOR when vibration that exceeds restrictions to Project Management Team.





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5. Engage a qualified blasting contractor and prepare engineered blasting plan(s) for Owner and DOR review and approval.
 - a. Submit a blasting plan signed and sealed by a CT professional engineer. Include engineering calculations, key assumptions, and a site plan that specifies the horizontal distance D from source of blast to existing building. Coordinate the blasting plan with the independent testing agencies preparation of its monitoring plan.
 - b. Establish horizontal control limits for blasting prior to and following test blast. Include any vibration control measures such as trenches between blast areas and the existing building.
 - c. Perform a test blast under controlled conditions to validate assumptions. Coordinate with Owner and testing agency to monitor and report vibration during the test.
 - d. Submit management protocols and call back procedures in the event vibration generating activities trip alarms. Protocols should include temporary suspension of activities causing particle vibration to exceed alarm limits protocols for adjust energy levels so not to continue tripping alarms.
 - e. Document the time and date of an alarm event(s), and coordinate with the Owner and Engineer to reduce energy levels prior to recommencing a definable feature of work tripping alarms
 - f. During construction adjust calculations and blasting plan as may be necessary from blast test results and activation of alarms.
 - g. Submit hammering plan and proposed equipment prior to hammering operations.
 - h. Submit dynamic soil compaction plan and proposed equipment prior to dynamic compaction.
 - i. Comply with Title 29, Section 29-349-206 of the Connecticut Regulations for protection of persons and property when storing, transporting, and using explosive and blasting agents. Other reference guidelines include but are not limited to the American Association of State Highway and Transportation Officials R 8-96, the American Society for Testing and Materials D5112, and U.S. Bureau of Mines RI 8507.

We would be pleased to meet with the Building Committee to discuss our analysis and findings, review our recommendations, and discuss case studies from our past work experience.

Please call me at 603-400-5455 if you have any questions or need more information.

Very truly yours,

GAP MOUNTAIN CONSULTING ENGINEERS, PLLC



B. Cory Attra, PE, MBA, SI, M.ASCE
Engineer in Responsible Charge

Encl: Calculations for Vibration Limits

CALCULATIONS FOR VIBRATION LIMITS

Given: $F = Ma$ where lbs = lb
 $a = V \times (2 \times 3.14 \times f)$

$f_c =$	1,800	psi
$f_b = f_c \times 0.25 =$	450	psi
Block dimensions = 8x8x12		
M per hollow core block =	35	lbs
M per solid core block =	55	lbs
Height of wall	240	in
Width of wall	192	in
Total number of block	480	ea
- hollow core block	360	ea
- solid core block	120	ea
DL roof	15	psf
DL = wall + roof	22,080	lbs
LL	3,840	lbs
W = DL + LL = seismic load	25,920	lbs



Find: Control limits to construction generated vibration required to prevent damage to cracked CMU block walls in sallyport connector based on mechanical properties of CMU block.

Assumptions: 1) Strength of cracked CMU block controls.
 2) Base excitation (impact) controls.
 3) Condition of CMU walls in sallyport and its proximity to construction controls.

Analysis: Assume loads transfer to largest uncracked surface area where F is constant.
 Net surface area of hollow core =

42.38 si

Calculate base shear in-plane, vertical axis (see IES finite analysis model for corresponding wall calcs):

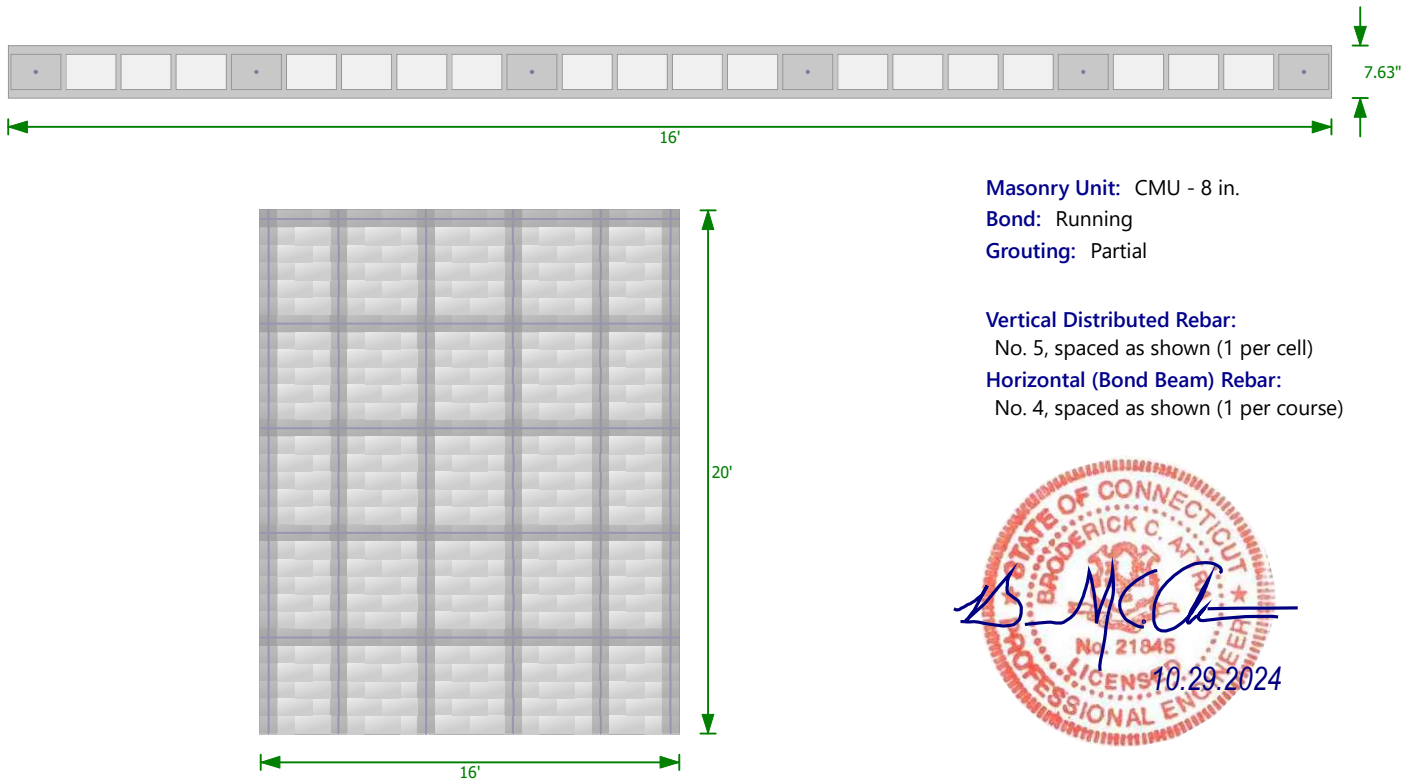
Seismic Weight W =	25,920	lbs
Try Peak Ground Acceleration (PGA) =	1.00	in / s ²
	31.40	ft / s ²
Base Shear = W x PGA =	813,888	lbs
Seismic Vertical Load In-Plane =	50,868	lbs / ft

Check f_b :

					Alarm Setting
V (ips)	f (Hz)	a (fps ²)	f_b (psi)		(ips)
0.50	30.00	7.85	132.47		0.40
0.50	40.00	10.47	176.63		0.40
0.50	50.00	13.08	220.78		0.40
0.50	60.00	15.70	264.94		0.40
0.75	30.00	11.78	198.70		0.60
0.75	40.00	15.70	264.94		0.60
0.75	50.00	19.63	331.17		0.60
0.75	60.00	23.55	397.41		0.60
1.00	30.00	15.70	264.94		0.80
1.00	40.00	20.93	353.25		0.80
1.00	50.00	26.17	441.56		0.80
1.00	60.00	31.40	529.88		0.80
1.25	30.00	19.63	331.17		1.00
1.25	40.00	26.17	441.56		1.00
1.25	50.00	32.71	551.95		1.00
1.25	60.00	39.25	662.34		1.00
1.50	30.00	23.55	397.41		1.20
1.50	40.00	31.40	529.88		1.20
1.50	50.00	39.25	662.34		1.20
1.50	60.00	47.10	794.81		1.20
1.75	30.00	27.48	463.64		1.40
1.75	40.00	36.63	618.19		1.40
1.75	50.00	45.79	772.73		1.40
1.75	60.00	54.95	927.28		1.40
2.00	30.00	31.40	529.88		1.60
2.00	40.00	41.87	706.50		1.60
2.00	50.00	52.33	883.13		1.60
2.00	60.00	62.80	1,059.75		1.60

Conclusions: Control limit for base excitation (impact or blasting) is 0.75 ips @ 60 Hz for alarm set to 0.60 ips. Vibration caused by blasting should not exceed 0.75 ips at sensors located at base of CMU walls of sallyport. Maintain sustained vibration limit to 0.50 ips @ 60 Hz for alarm set to 0.40 ips.

Masonry Wall Design Calculations



Design Criteria

Building Code: TMS 402-2016 (Allowable Stress Design)
Choose Load Combinations Manually: Yes
Strength Check Load Combinations: ASCE 7-16 ASD Combinations
Service Check Load Combinations: ASCE 7-16 ASD Combinations
Apply Sds to Seismic Combinations for Ev: No
f'm: 1800 psi
fy: 60000 psi
Mortar Type: Type M/S - PCL (Portland Cement/Lime)
Shear Wall Seismic Designation: Ordinary
Use R=1.5 for Shear Walls: No

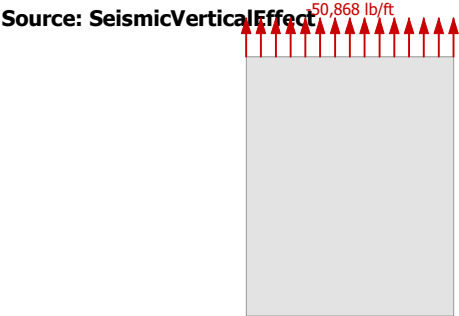
Material (CMU/Clay): Taken from Unit
Specify Wall Weight Manually: Yes
Average Unit Weight: 117 lb/ft³
Block Weight: Normal Weight
Built on Concrete with Rough Surface: Yes
Secondary Moment Approach: Moment Magnifier
Include Wall Self-Weight: Yes
Neglect Lateral Load on Parapet: No
Include Wall Wt In Virtual Eccentricity: Yes
Always use I-cracked: Yes
Amplify Axial Stress For Slenderness: No
End Bars Only For Shear Wall Flexural/Axial Analysis: No
Multiply Seismic Shear By 1.5 (ASD only): Yes

Checks Summary

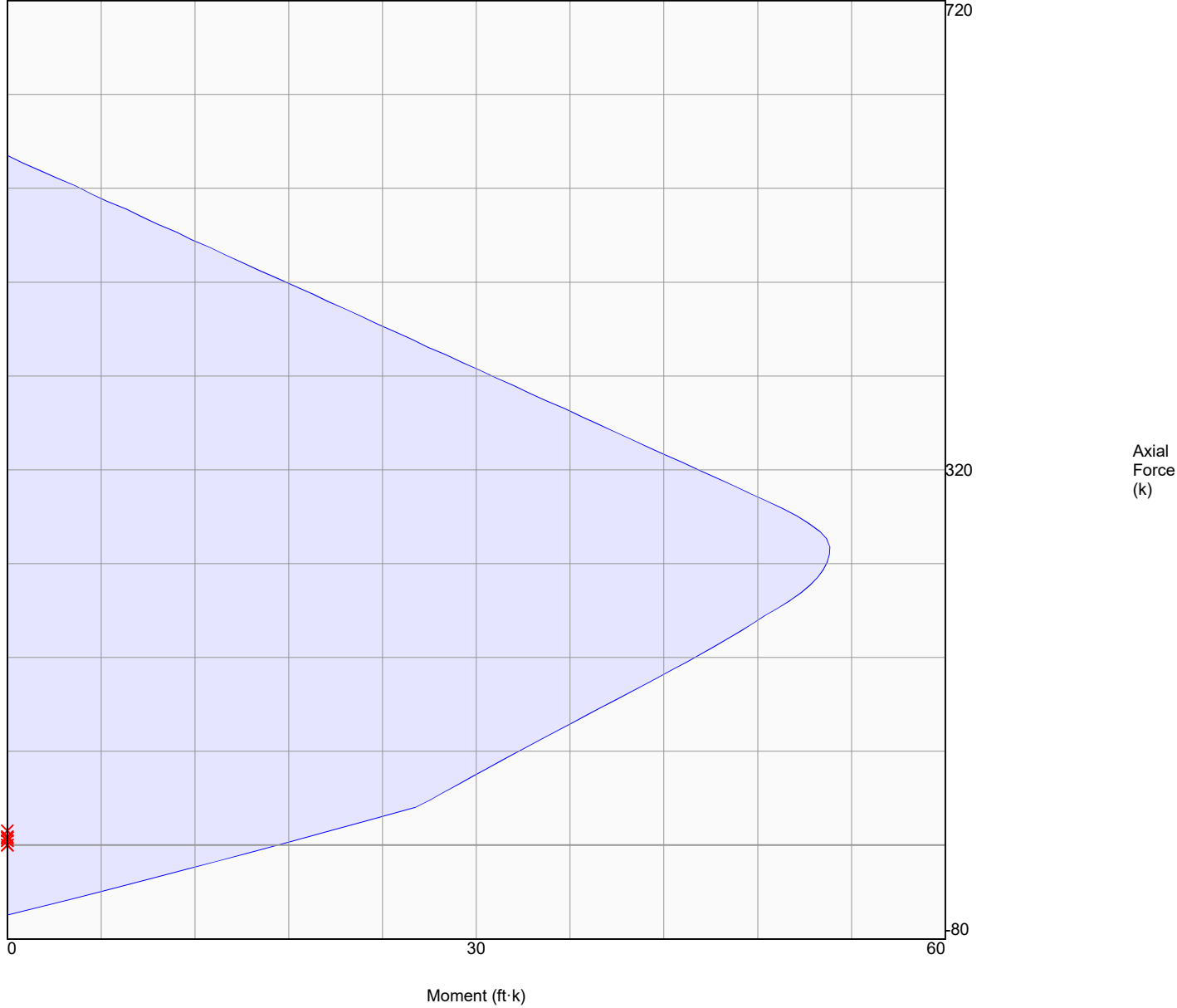
☐ Ratio	Check	Critical Combination
Out-Of-Plane Checks		
✓ 0.031	Axial Force	1D
✓ 0.000	Shear	1D
✓ 0.000	Flexural+Axial Interaction	1D
✓ 0.000	Deflection (IBC)	1D

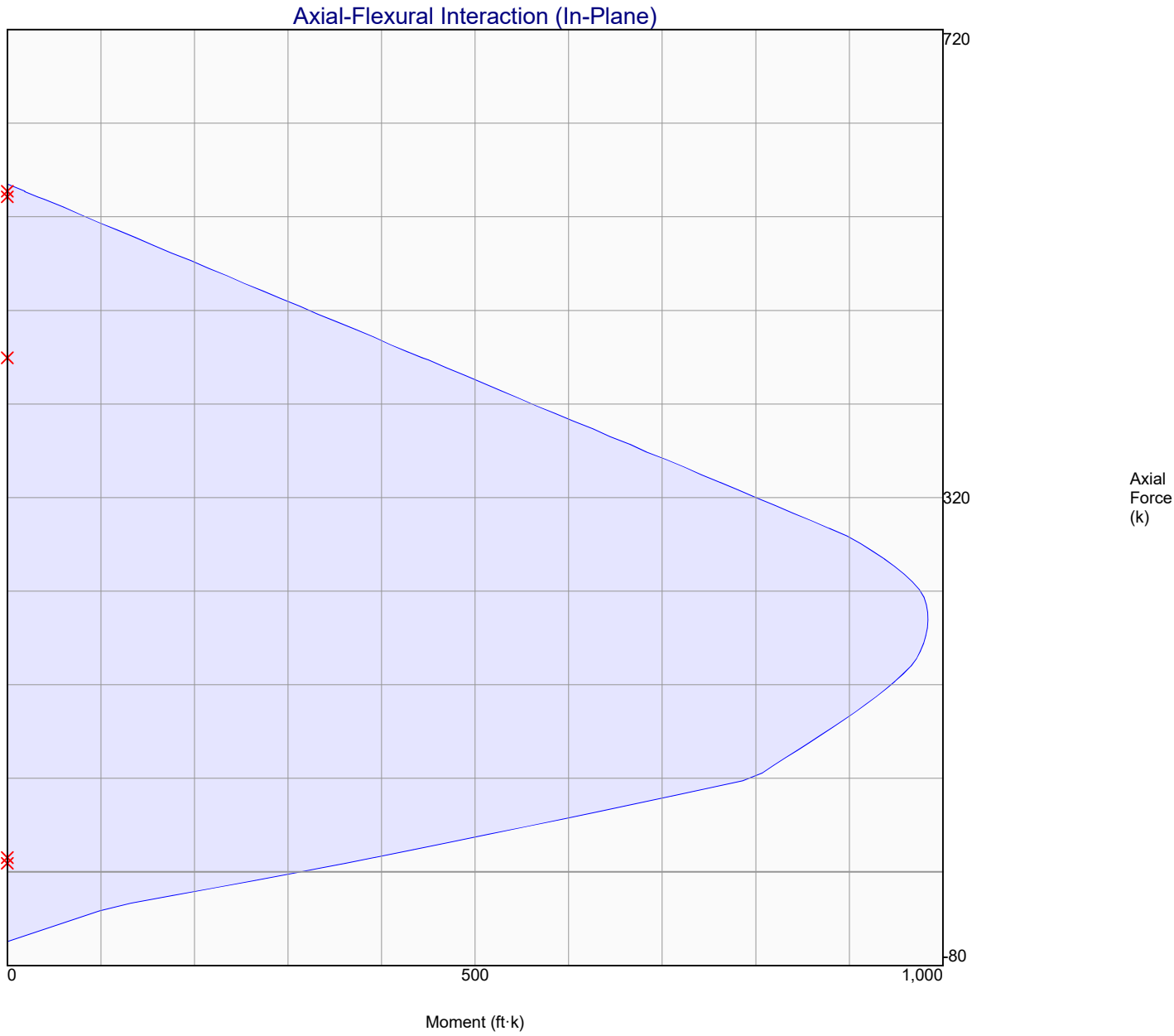
☐ Ratio	Check	Critical Combination
In-Plane Checks		
✓ 0.000	Flexural+Axial Interaction	1D
✓ 0.000	Shear	1D
✓ 0.000	Shear Friction	1D
✓ 0.000	Maximum Reinforcement	1D
✓ 0.000	Deflection (Drift)	1D
Prescriptive Checks		
✓ 0.645	Vert Area	N/A
✓ 0.400	Vert Spacing	N/A
✓ 1.000	Horz Area	N/A
✓ 0.400	Horz Spacing	N/A

Loads on the Wall



Axial-Flexural Interaction (Out-of-Plane)





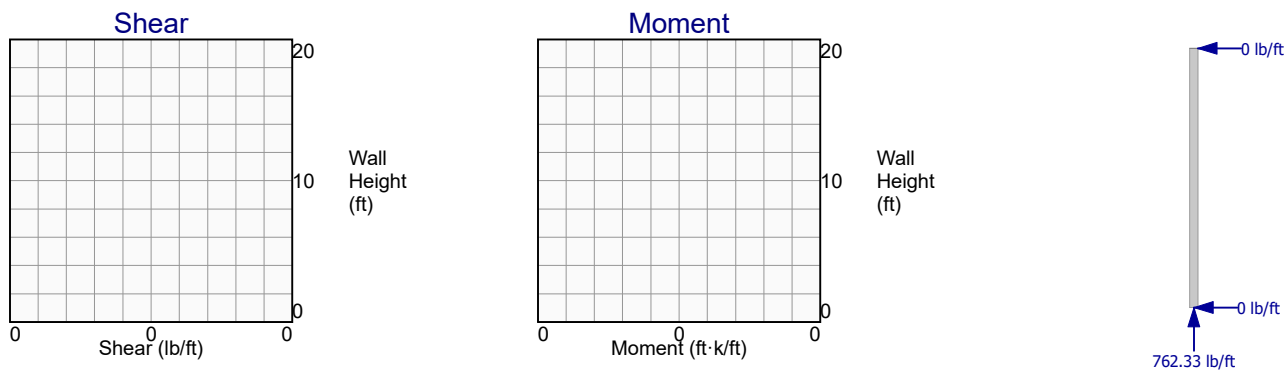
Out-of-Plane Design Calculations for Combination 1D

Load Combination: 1D

Wall weight: For this partially grouted wall, the average volume of masonry per cell is calculated as 250.2 in³ based on 40 in grout spacing. Given a masonry density of 117 lb/ft³, the average weight per face of wall is 38.12 psf and the weight per length for this wall is 762.33 lb/ft (all unfactored values).

Factored wall weight = 38.12 psf.

	Per-Length Axial Force (lb/ft)	Per-Length Out-of-Plane Shear (lb/ft)	Per-Length Out-of-Plane Moment (ft-k/ft)	Total Wall Axial Force (k)	Total Wall Out-of-Plane Shear (k)	Total Wall Out-of-Plane Moment (ft-k)	Total Wall Out-of-Plane P-δ Moment (ft-k)	Total Wall Out-of-Plane Mag. Moment (ft-k)
20 ft from base	0 lb/ft	0 lb/ft	0 ft-k/ft	0 k	0 k	0 ft-k	N/A	N/A
10 ft from base	381.16 lb/ft	0 lb/ft	0 ft-k/ft	6.1 k	0 k	0 ft-k	N/A	N/A
0 ft from base	762.33 lb/ft	0 lb/ft	0 ft-k/ft	12.2 k	0 k	0 ft-k	N/A	N/A



Note that secondary moments are not considered with Allowable Stress Design.

Out-of-Plane Strength Checks: Combination 1D

Design forces for this load combination:

- P @ top = 0 k
- P @ mid-span = 6.1 k
- P @ base = 12.2 k
- V = 0 k
- M @ top = 0 ft-k
- M @ mid-span = 0 ft-k

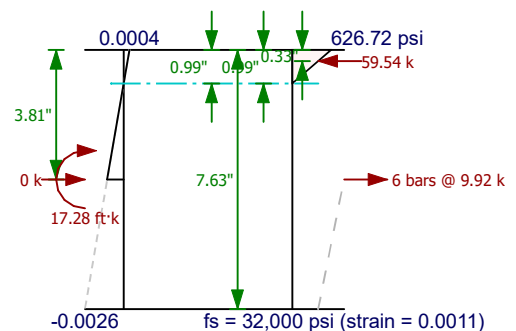
Moment Check @ Axial Load Application Point

The moment capacity is determined by considering the point on the interaction diagram where ϕP_n is equal to the axial load at this section (0 k) and thus $P_n = 0$ k. The associated M_n (17.28 ft-k) is multiplied by ϕ to obtain design moment capacity.

At an axial load of 0 k, the interaction diagram gives a moment capacity of 17.28 ft-k.

✓ $\phi M_n \geq M_u$...utilization ratio 0

Compression area = 1.32 ft². Depth of compression zone = 0.99 in.



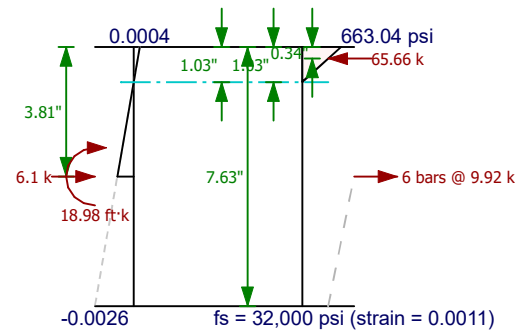
Moment Check @ Mid-span

The moment capacity is determined by considering the point on the interaction diagram where ϕP_n is equal to the axial load at this section (6.1 k) and thus $P_n = 6.1$ k. The associated M_n (18.98 ft·k) is multiplied by ϕ to obtain design moment capacity.

At an axial load of 6.1 k, the interaction diagram gives a moment capacity of 18.96 ft·k.

✓ $\phi M_n \geq M_u$...utilization ratio 0

Compression area = 1.38 ft². Depth of compression zone = 1.03 in.



Axial Force Check

$$\frac{h}{r} = \frac{(20 \text{ ft})}{(2.75 \text{ in})} = 87.37$$

$$P_a = \left(0.25f'_m A_n + 0.65A_{st} F_s \right) \left[1 - \left(\frac{h}{140r} \right)^2 \right] = \left(0.25(1,800 \text{ psi})(5.04 \text{ ft}^2) + 0.65(0 \text{ in}^2)(32,000 \text{ psi}) \right) \left(1 - \left(\frac{(20 \text{ ft})}{(140(2.75 \text{ in}))} \right)^2 \right) = 199.45 \text{ k}$$

[TMS 402-16 Section 8.3.4.2.1, Equation 8-18]

$$P = 6.1 \text{ k}$$

✓ $P_a \geq P$...utilization ratio 0.031

Shear Check

There is no applied shear force in this load combination; check passes.

✓ $\phi V_n \geq f_v$...utilization ratio 0

Out-of-Plane Service Checks for Combination 1D

Out-of-Plane Service Checks: Combination 1D

Design forces for this load combination:

- P @ mid-span = 6.1 k
- M @ mid-span = 0 ft·k

Deflection Check per IBC

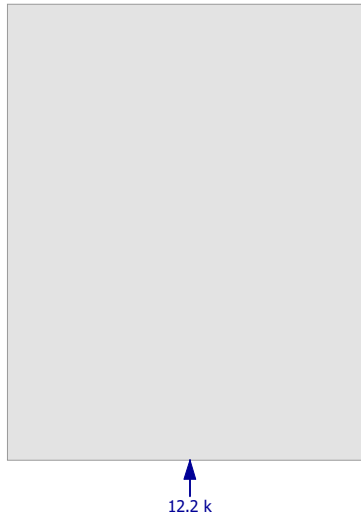
Load combination does not include Components & Cladding wind loads, hence this check does not apply.

✔ $\delta_{\max} \geq \delta_s$...utilization ratio 0

In-Plane Design Calculations for Combination 1D

Load Combination: 1D

Factored wall weight per height of wall = 609.86 lb/ft. Factored total wall weight = 12.2 k.



In-Plane Strength Checks: Combination 1D

Design forces for this load combination:

- $P = 12.2 \text{ k}$
- $V = 0 \text{ k}$
- $M = 0 \text{ ft}\cdot\text{k}$

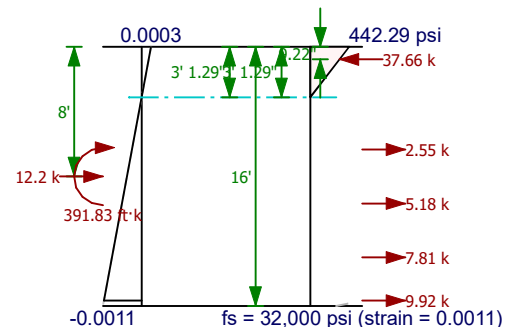
Moment Check

The moment capacity is determined by considering the point on the interaction diagram where ϕP_n is equal to the axial load at this section (12.2 k) and thus $P_n = 12.2 \text{ k}$. The associated M_n (391.83 ft·k) is multiplied by ϕ to obtain design moment capacity.

At an axial load of 12.2 k, the interaction diagram gives a moment capacity of 391.98 ft·k.

✓ $\phi M_n \geq M_u$...utilization ratio 0

Compression area = 1.12 ft². Depth of compression zone = 37.29 in.



Shear Check

There is no applied shear force in this load combination; check passes.

✓ $F_v \geq f_v$...utilization ratio 0

Shear Friction Check

There is no applied shear force in this load combination; check passes.

✓ $F_t \geq f_v$...utilization ratio 0

Maximum Reinforcement Check

Check is not required. Under Allowable Stress Design, only Special Reinforced Shear Walls are subject to the maximum reinforcement ratio check. See TMS 402-16 8.3.4.4

✓ $\rho_{\max} \geq \rho$...utilization ratio 0

Deflection (Drift) Check

Applying a factor to I_g to represent the effects of cracking:

$$I_g = t_{sp} l_w^3 / 12 = (7.63 \text{ in})(16 \text{ ft})^3 / 12 = 4,497,408 \text{ in}^4$$

$$I_{\text{eff}} = C_{cr} I_g = (0.4)(4,497,408 \text{ in}^4) = 1,798,963.2 \text{ in}^4$$

$$E_m = 900 f'_m = 900(1,800 \text{ psi}) = 1,620,000 \text{ psi}$$

Calculate elastic deflection:

$$A_g = 2 t_{fs} l_w = 2(1.25 \text{ in})(16 \text{ ft}) = 3.33 \text{ ft}^2$$

$$\delta_u = \frac{V_u h}{(5/6.0) A_g 0.4 E_m} + \frac{V_u h^3}{3 E_m I_{\text{eff}}} = \frac{((0 \text{ k})(20 \text{ ft}))}{((5/6.0)(3.33 \text{ ft}^2)0.4(1,620,000 \text{ psi}))} + \frac{((0 \text{ k})(20 \text{ ft})^3)}{(3(1,620,000 \text{ psi})(1,798,963.2 \text{ in}^4))} = 0 \text{ in}$$

[Masonry Designers Guide 2013, Eqn 7.4-1 (modified form)]

Calculate inelastic deflection, taking C_d from ASCE 7 Table 12.2-1:

$$\delta_{\text{inelastic}} = C_d \delta_u = (1.75)(0 \text{ in}) = 0 \text{ in}$$

Maximum allowable deflection:

$$\delta_{\max} = 0.01h = 0.01(20 \text{ ft}) = 2.4 \text{ in}$$

[ASCE 7-10 Table 12.12-1]

✓ $\delta_{\max} \geq \delta_{\text{inelastic}}$...utilization ratio 0

Prescriptive Checks

Maximum Vertical Steel Spacing

For this Ordinary Reinforced Shear Wall, the maximum spacing of vertical reinforcement is:

$$s_{\max} = 120 \text{ in}$$

[TMS 402-16 7.3.2.3.1]

The spacing of provided distributed vertical reinforcing bars is:

$$s = 48 \text{ in}$$

✓ $s_{\max} \geq s$...utilization ratio 0.4

Minimum Distributed Vertical Steel Area

For this Ordinary Reinforced Shear Wall, the minimum area of vertical reinforcement is:

$$A_{s_{\min}} = 0.2 \text{ in}^2$$

[TMS 402-16 7.3.2.3.1]

The area of provided distributed vertical reinforcing bars is:

$$A_s = 0.31 \text{ in}^2$$

✓ $A_{s_{\min}} \geq A_s$...utilization ratio 0.645

Maximum Horizontal Steel Spacing

For this Ordinary Reinforced Shear Wall, the maximum spacing of horizontal reinforcement is:

$$s_{\max} = 120 \text{ in}$$

[TMS 402-16 7.3.2.3.1]

The spacing of provided distributed horizontal reinforcement is:

$$s = 48 \text{ in}$$

✓ $s_{\max} \geq s$...utilization ratio 0.4

Minimum Distributed Horizontal Steel Area

For this Ordinary Reinforced Shear Wall, the minimum area of horizontal reinforcement is bond beam reinforcement of minimum area:

$$A_{s_{\min}} = 0.2 \text{ in}^2$$

[TMS 402-16 7.3.2.3.1]

The area of provided bond beam bar size is:

$$A_s = 0.2 \text{ in}^2$$

✓ $A_{s_{\min}} \geq A_s$...utilization ratio 1

- D. Prior to test pitting operations, delineate the general scope of the excavation or boring on the paved surface of the ground using white paint, or stakes or other suitable white markings on non-paved surfaces and coordinate with the appropriate agencies in accordance state regulations. Pre-marking will not be acceptable if such marks can interfere with traffic or pedestrian control or are misleading to the general public. Pre-marking will not be required of any continuous excavation that is over 500 feet in length
- E. Excavate test pits of an appropriate size with equipment suitable for the location and character of the pit to be excavated.
- F. All subsurface investigations shall be conducted in accordance 29 CFR Part 1926 Subpart P - OSHA Excavation Regulations 1926.650 through 1926.652 including Appendices A through F.
- G. After examination by the Engineer, backfill and compact the test pits in accordance with Section 312300.
- H. Repair paved surfaces in accordance with Landscape Architect Specification.
- I. Repair lawn areas or grass surfaces in accordance with Landscape Architect Specification

END OF SECTION 023000

SECTION 024113 - SITE UTILITY ABANDONMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including general and supplementary conditions and other Division 1 Specifications apply to this section.

1.2 SUMMARY

- A. This section specifies the work to be performed by Contractor for abandonment of utilities at the Project Site. This Section includes:
 - 1. Removal and abandonment of pipe, manholes, catch basins, conduit, duct bank, hand holes, wiring and pole bases, fixtures, poles.
 - 2. Abandonment of above- and below-grade utilities and related facilities including but not necessarily limited to electric, tel-data, catv, conduits, utility structures, sewerage, grease traps, drainage, gas, and water, fire protection on, or serving the Project Area as shown on the Drawings or indicated herein.
- B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.
- C. Contractor is responsible for the health and safety of all Subcontractor workers during progress of the work.
- D. Site utility removals and abandonments shall conform with the respective utility company standards to the extent required by the respective utility company.
- E. All sanitary sewer abandonments shall conform with the Town of Greenwich Sewer Division requirements and the contractor shall obtain all required permits and approvals from the Town of Greenwich Sewer Division prior to any demolition, removal, or abandonment operations.
- F. All water service abandonments and removals shall conform with the requirements of the Aquarion Water Company.
- G. All electric and gas service abandonments and removals shall conform with Eversource Electric and Eversource Gas requirements.

- H. All tel-data, cable tv, communications service abandonments and removals shall conform with Frontier Communications, Comcast and any other affected respective communications company affected by the demolition operations.
- I. The contractor shall contact all affected utility companies to coordinate the timing and exact abandonments and demolition requirements prior to any demolition operations.
- J. Related Sections
 - 1. Appendix F - Report entitled “Greenwich Central Middle School Construction-Vibration and Controls During Construction” by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 SUBMITTALS

- A. Abandonment procedures required by the owner of each utility prior to performing the work of utility termination/cutting/capping/plugging.
- B. Material specifications and shop drawings for all materials and equipment furnished under this section, prior to performing the work of utility abandonment.
- C. As-built drawings showing locations of all terminated/cut/capped/plugged utilities and service disconnections at or before project close-out.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Comply with the material specifications required by the owner of each utility. Where such material specifications may conflict with this Specification, utility owner’s requirements shall prevail.
- B. Borrow Material: Conform to applicable Specifications.
- C. Portland Cement: ASTM C 150, Type II.
- D. Mortar Aggregate: ASTM C 144, standard masonry type, clean, dry, free of deleterious materials.
- E. Concrete: Design of mix in accordance with ASTM C-94, ASTM C-150, Type II Portland Cement, washed and graded sand, and aggregate with maximum size of 1-inch; or pre-packaged concrete mix with maximum aggregate size of 1-inch, ASTM C 387. Minimum 28-day compressive strength of 4000 psi.

- F. Masonry Mix: Washed and graded mason sand, lime, and Portland Cement, ASTM C 270; or pre-packaged, dry, sand/lime/cement mortar mixture, ASTM C 387. Minimum 28-day compressive strength of 1200 psi.
- G. Water: Potable, free of deleterious materials.
- H. Solid Concrete Masonry Unit: ASTM C55, sized per pipe diameter to minimize requirements for cutting.
- I. Controlled Low Strength Material (CLSM) is a self-consolidating, rigid setting material to be used in backfills, fills, structural fills and elsewhere as indicated on the plans, or as directed by the Engineer. The flow and set time characteristics of CLSM shall be designed to meet the specific job conditions. All CLSM material covered by this specification shall be designed to be hand excavatable at any time after placement. It shall be composed of a mixture of portland cement, aggregate, and water with the option of using fly ash, slag cement, air-entraining agents, and other approved admixtures.
 - 1. Materials: All materials utilized in the CLSM mix design shall be in accordance with the applicable requirements of Article M.03.01
 - 2. Composition: The composition of the CLSM shall be in accordance with the requirements set forth in Article M.03.01-General Composition of Concrete Mixes, as well as the applicable sections of ACI 229R.
 - 3. The Contractor shall submit each proposed mix design, with all supporting data, to the Engineer for review and approval at least two weeks prior to its use. The setting time of CLSM materials shall be designed so as to achieve the strength necessary to comply with the time constraints called for under the Maintenance and Protection of Traffic requirements of the project specifications. The use of chloride accelerators is not permitted. The minimum compressive strength of the CLSM material shall be 30 pounds per square inch (psi) and the maximum compressive strength of the CLSM shall be 150 pounds per square inch (psi) when tested in accordance with ASTM D4832 after 56 days. The CLSM mix design shall utilize a nominal maximum size of No. 8 aggregate as specified in M.01.01. CLSM mixes shall have a minimum of 20% entrained air when tested in accordance with AASHTO T152.

PART 3 EXECUTION

3.1 GENERAL

- A. Notify Call Before You Dig (CBYD) 72 hours prior to any excavation operation and obtain CBYD tracking number.
- B. Notify utility owners in reasonable advance of the work and request the utility owner to stake out on the ground surface the underground facilities and structures. Notify the Engineer in writing of any refusal or failure to stake out such underground utilities after reasonable notice.

- C. Contractor is solely responsible for providing coordination and obtaining permits with owners of the various utilities serving, or present at, the Project Site as required to complete termination and demolition work. Coordinate as required for termination of service, temporary termination of service, relocation of facilities, abandonment of facilities, demolition of facilities, cutting, capping, and bracing. Comply at all times with the procedures for terminations of utility services as required by the owner of each utility serving, or present at, the Project Site.
- D. When utilities are encountered that are not indicated on the drawings, notify Engineer before proceeding with work in such area.

3.2 UTILITY TERMINATION

- A. Terminate utilities serving the Project Site as indicated on the Drawings. Terminate, cut, cap, or plug utilities in accordance with each utility owner's requirements, including, but not necessarily limited to, scheduling of inspections by utility company personnel, permits, licenses, approvals, insurance, or bonds.

3.3 DEMOLITION

- A. Do not demolish any utility until termination has been verified.
- B. Remove and dispose of all overhead and underground utilities and related systems and appurtenances on the Project Site, including but not necessarily limited to water, electric, sanitary sewer, storm sewer, miscellaneous drainage, heating and cooling facilities, communications, exterior lighting supplies; utility poles, light standards, utility foundations, supports and ancillary equipment; hydrants and other similar supply facilities, valves and meters; site drainage and catch basins and related structures; sanitary sewerage piping, manholes, pumps, and related facilities; and other miscellaneous plumbing, piping and conveyances if called out on the plans.

3.4 BACKFILL

- A. Replace soil material excavated for utility removal, termination, or abandonment in accordance with applicable Specifications.
 - 1. Backfilling to grade is required with satisfactory soils.
 - 2. Import satisfactory soils if none are available on site.
- B. Provide OSHA-compliant barriers or smooth edges of all excavations to produce a stable slope, with smooth grade transitions and no vertical cuts from top of slope to lower limits of the excavation in compliance with the requirements of OSHA. Maximum slope into any excavated area under ideal soil conditions shall be 1 to 1 ½, vertical: horizontal.

3.5 PROTECTION

- A. Subcontractor shall take measures to protect from damage those utilities, or portions thereof, which are designated to remain. Provide protection as required such as marking, blocking, bracing, stabilizing, supporting, and retaining.
- B. Utilities to remain damaged by Subcontractor shall be repaired/replaced to the satisfaction of the utility owner at Contractor's expense.

3.6 DOCUMENTATION

- A. Contractor shall provide as-built documentation for each utility termination, including location, depth, and method and material of construction for termination. Such as-built documentation shall be on the appropriate site plans.
- B. Contractor shall physically mark the location of each subsurface utility termination with a surveyor's stake, with such stake identifying the utility type and depth below grade. Where the use of stakes at a utility termination location may be inappropriate, Subcontractor shall provide staking at an adjacent location(s) and include appropriate offset dimensions or other suitable demarcation.

END OF SECTION

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SECTION 311200 - SITE UTILITY PREPARATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications apply to this section.

1.2 SUMMARY

- A. General: Perform site utility preparation in accordance with the Contract Documents.
- B. Related Sections
 - 1. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 COORDINATION

- A. Coordinate and schedule the work of this Section with all trades involved to prevent interference, and to allow adequate time at the proper stage of construction to properly perform all work of this Section.

1.4 PROJECT CONDITIONS

- A. Coordinate all street closings and/or obstructions, including pavement and curbing removals with all governing authorities and utility companies.
- B. The existing property lines and topographic contours noted on the drawings are given for the convenience purposes only. The Engineer and the Owner will not be responsible for interpretations or conclusions drawn from this information. Notify the Architect immediately of any discrepancies in the existing property lines or existing topographic elevations.
- C. Do not rely upon the location of existing structures, utilities, storm drainage structures, and piping shown on the drawings. Check and verify the location of all existing structures, utilities, and piping prior to commencing work.
- D. Call 1-800-922-4455 (Call Before You Dig) and register before beginning any excavation at least 72 hours prior to the start of construction.
- E. Locate and identify existing underground and overhead services and utilities within the Contract Limits. Provide adequate means of protection of utilities and services designated to remain. Repair utilities damaged during site work operations.

- F. When uncharted or incorrectly charted underground piping or other utilities and services are encountered during site work operations, notify the applicable utility company immediately to obtain procedural directions. Cooperate with the applicable utility companies in maintaining active services in operation.
- G. Perform site work operations and the removal of debris and waste materials to assure minimum interference with the streets and day-to-day operations of the Owner.
- H. Obtain written permission from governing authorities when required to obstruct the street. Provide alternate routes around obstructed traffic ways when required by governing authorities. Provide traffic control when and as required by the Town of Greenwich or the Connecticut Department of Transportation as applicable.
- I. Remove all encumbrances which interfere with the proper fulfillment of all work without additional cost to the Owner.
- J. Control dust caused by work operations. Dampen surfaces with water, as required to control all dust. Comply with air pollution control regulations of governing authorities. Exercise every reasonable precaution throughout the life of the contract to minimize dust arising from construction operations, hauling, storage, or demolition.
- K. Protect existing and adjacent buildings, structures, pavement, light fixtures, and utilities to remain from damage caused by work operations. Repair and/or restore of damage caused by construction operations at no additional expense to the Owner. Protect all benchmarks, control points, and engineering reference points; re-establish, if damaged or disturbed.

PART 2 PRODUCTS

2.1 MATERIALS

- A. None.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions where site preparation is to be provided. Notify the Owner, in writing, of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 SITE UTILITY LAYOUT, LINES, AND LEVELS

- A. Before removals, topsoil stripping, excavation, filling, or rough grading operations are started, stake out site areas for the work of this Contract. Provide layout for all site utility related items, including, but not limited to, access road limits crossing berm limits, and all miscellaneous site features.

Site utility layout is to be performed by a surveyor licensed by the State of Connecticut.

- B. Site utility layout, lines and levels may be subject to possible modifications, whether by inaccuracies in existing grades, or by other site conditions. Except in the case of substantial increases in material quantities, authorized in writing by the Owner, such modifications will not entitle General Contractor(s) to additional compensation.
- B. The drawings indicate existing grade elevations and contours. The existing elevations are given for the convenience purposes in arriving at the quantities of excavation, grading and backfilling. The Engineer and the Owner do not assume any responsibility for the correctness of the existing grade elevations.

3.4 SITE UTILITY DEMOLITION AND REMOVALS

- A. The work includes all other existing materials or work necessary to install new work as shown and/or specified and to connect same to existing structures or pavements in an approved manner. Completely remove all foundations, abandoned utilities, and all other items that interfere with new construction.
- B. Remove existing construction features as required for the execution of the contract work. Perform such work in a manner to avoid any damages to the construction and finishes scheduled to remain. Where new work is required to be built adjacent to or connected with existing construction, cut or remove the existing construction and replace with new construction to the extent required to solidly build and anchor the new work in place.
- C. Completely remove existing paving, including all base material, as required to accommodate new construction. Saw cut and remove existing roadway paving a sufficient distance to permit installation of new work, as required.

3.5 DISPOSALS

- A. Properly dispose of all materials and debris resulting from the demolition and removal operations; legally dispose of all materials as required by the project environmental consultant and at a location approved by the Owner.
- B. Maintain all disposal routes clear, clean, and free of debris. Keep all streets clean along the disposal routes.
- C. On-site burning of combustible materials is not permitted.
- D. Accumulation of materials for disposal is not permitted. Disposal is to be made as fast as materials accumulate.
- E. Obtain all required and necessary permits or approvals for off-site disposals.

3.6 EXISTING UTILITY AND STORM DRAINAGE ABANDONMENT

- A. Completely remove all existing utilities, underground tanks and storm drainage structures and piping that interfere with new construction or as noted on the drawings. Properly cut, cap, and abandon all other utilities or storm drainage structures or piping that does not interfere with construction. Maintain all utilities to the existing buildings until the time of demolition.
- C. Contact appropriate utility companies prior to abandonment and properly coordinate all work with the utility companies.
- D. At all times, maintain a positive outlet for storm drainage and sanitary sewers on site were encountered.
- E. Backfill removed buried utilities in accordance with project specifications, Town requirements or State requirements as applicable.

END OF SECTION

SECTION 312300 - EXCAVATION, BACKFILL, COMPACTION AND DEWATERING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Excavation, backfill and compaction for buildings, retaining walls and other structures
2. Excavation, backfill and compaction for subsurface utilities
3. Removal, handling and disposal of rock not covered under Section 312316.26
4. Earth retention systems
5. Excavation, backfill and compaction for the abandonment of existing pipe
6. Temporary dewatering systems

B. Related Sections

1. Section 003132 – Geotechnical data
2. Section 023000 – Subsurface Investigations
3. Section 312500 – Soil Erosion and Sediment Controls
4. Section 312323 – Borrow Materials
5. Section 312316.26 – Rock Removal
6. Section 316616 – Aggregate Piers
7. Appendix F - Report entitled “Greenwich Central Middle School Construction-Vibration and Controls During Construction” by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.2 REFERENCES

- A.** ASTM D1557-07 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- B.** Federal Register 40 CFR Part 122, United State Environmental Protection Agency (USEPA) Administered Permit Programs (National Pollution Discharge Elimination System or NPDES), Storm Water Discharge
- C.** ASTM D1556-07 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

- D. ASTM D2487-06e1 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- E. ASTM D6938-08a - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- F. 29 CFR Part 1926 Subpart P - OSHA Excavation Regulations 1926.650 through 1926.652 including Appendices A through F

1.3 DEFINITIONS

- A. Benching - A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
- B. Earth Retention Systems - Any structural system, such as sheeting and bracing or cofferdams, designed to retain in-situ soils in place and prevent the collapse of the sides of an excavation in order to protect employees and adjacent structures.
- C. Excavation - Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
- D. Protective System - A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include earth retention systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.
- E. Registered Professional Engineer - A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.
- F. Licensed Environmental Professional - A person who is registered by the State of Connecticut to render Hazardous Waste Site Cleanup Activity Opinions.
- G. Shield System - A structure that is designed to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 29 CFR 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."
- H. Sloping - A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

- I. Temporary Dewatering System – A system to lower and control water to maintain stable, undisturbed subgrades at the lowest excavation levels. Dewatering shall be provided for all pipelines, structures and for all other miscellaneous excavations.
- J. Trench - A narrow excavation (in relation to its length) made below the surface of the ground, of at least three feet in depth. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m).

1.4 SUBMITTALS

- A. Drawings and calculations for each Earth Retention System required in the Work. The submittal shall be in sufficient detail to disclose the method of operation for each of the various stages of construction required for the completion of the Earth Retention Systems.
 - 1. Submit calculations and drawings for Earth Retention Systems prepared, signed and stamped by a Professional Engineer registered in the state where the work is performed.
- B. Performance data for the compaction equipment to be utilized
- C. Construction methods that will be utilized for the removal of rock
- D. Dewatering plan for the excavation locations. Design shall include calculations and drawings stamped and signed by a Professional Engineer registered in the state where the work is performed.

1.5 QUALITY ASSURANCE

- A. All Excavation, Trenching, and related Earth Retention Systems shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926 Subpart P), and other State and local requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.
- B. The following test procedures will be performed by the Owner's inspection agency. Results will be submitted to the Engineer for review.
 - 1. Modified Proctor Test (ASTM D1557) results and soil classification (ASTM D2487) for all proposed backfill materials at the frequency specified below:
 - a. For suitable soil materials removed during excavation, perform one test for every 1,000 cubic yards of similar soil type. Similarity of soil types will be as determined by the Engineer.
 - b. For borrow materials; perform tests at frequency specified in Section 312323 - Borrow Materials.
 - 2. Compaction test results (i.e. ASTM D6938 or ASTM D1556) at a frequency of one test for every 100 cubic yards of material backfilled. The Engineer will determine the locations and lifts to be tested.

- a. The Engineer may specify additional compaction testing when there is evidence of a change in the quality of moisture control or the effectiveness of compaction.
 - b. If all compaction test results within the initial 25 % of the total anticipated number of tests indicate compacted field densities equal to or greater than 95 % of maximum dry density at optimum moisture content, the Engineer may reduce frequency of compaction testing. In no case will the frequency be reduced to less than one test for every 500 cubic yards of material backfilled.
 - c. The Contractor is cautioned that compaction testing by nuclear methods may not be effective where excavation sidewalls impact the attenuation of the gamma radiation or where oversize particles (i.e. large cobbles or coarse gravels) are present. In these cases, other field density testing methods may be required.
- C. Employ the services of a dewatering specialist or firm when well points, deep wells, recharge systems, or equal systems are required. Specialist shall have completed at least 5 successful dewatering projects of equal size and complexity and with equal systems.

1.6 PROJECT CONDITIONS

- A. Notify Call Before You Dig and obtain Call Before You Dig identification numbers.
- B. Notify utility owners in reasonable advance of the work and request the utility owner to stake out on the ground surface the underground facilities and structures. Notify the Engineer in writing of any refusal or failure to stake out such underground utilities after reasonable notice.
- C. Make explorations and Excavations to determine the location of existing underground structures, pipes, house connection services, and other underground facilities in accordance with Paragraph 3.2.D of this Section.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. Fill material is subject to the approval of the Engineer and may be either material removed from excavations or borrow from off site. Fill material, whether from the excavations or from borrow, shall be of such nature that after it has been placed and properly compacted, it will make a dense, stable fill.
- B. Satisfactory fill materials shall include materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, SW, and SP. Additional requirements are included in Section 02320.
- C. Fill type shall be as indicated below and/or as shown on the drawings:

Location	Acceptable Materials
Areas Beneath Footings, Floor Slabs, or Structures	Granular Fill, Gravel Borrow, Crushed Stone
Footing, Foundation and Structure Backfill	Granular Fill, Gravel Borrow, Crushed Stone
Areas within 10' of Existing or Proposed Building or Structure Footing or Slab	Granular Fill, Gravel Borrow, Crushed Stone
Landscaped Areas	Ordinary Fill, Granular Fill, Gravel Borrow, Crushed Stone

- D. Blast rock fill is suitable for use beyond 12 inches from building foundations, slabs and utilities, unless other materials are specified on the Drawings. A minimum of 12 inches of choke stone shall be placed over the blast rock fill. The blast rock fill and choke stone shall be placed in loose lift thickness not exceeding 18 inches. The blast rock fill and choke stone shall be thoroughly compacted with heavy compaction equipment to achieve a firm, stable and unyielding condition.
- E. Satisfactory fill materials shall not contain trash, refuse, vegetation, masses of roots, individual roots more than 18 inches long or more than 1/2 inch in diameter, or stones over 6 inches in diameter. Unless otherwise stated in the Contract Documents, organic matter shall not exceed minor quantities and shall be well distributed.
- F. Satisfactory fill materials shall not contain frozen materials nor shall backfill be placed on frozen material.
- G. Excavated surface and/or pavement materials such as gravel or trap rock that are salvaged may be used as a sub-grade material, if processed to the required gradation and compacted to the required degree of compaction. In no case shall salvaged materials be substituted for the required gravel base.

2.2 DEWATERING MATERIALS

- A. Provide haybales and silt fence in accordance with Section 312500.
- B. Provide silt filter bags (Dandy Dewatering Bag, Dirtbag, JMP Environ-Protection Filter Bag, or equal) of adequate size to match flow rate.
- C. Provide dewatering equipment and materials for engineered dewatering systems.

PART 3 EXECUTION

3.1 PREPARATION

- A. Public Safety and Convenience
 - 1. Adhere to the requirements of the latest revision of the CTDOT Standard Specifications for Roads, Bridges, and Incidental Construction, 'Form 818', for all excavation work.

2. Take precautions for preventing injuries to persons or damage to property in or about the Work.
3. Provide safe access for the Owner and Engineer at site during construction.
4. Do not obstruct site drainage, natural watercourses or other provisions made for drainage.

3.2 CONSTRUCTION

A. Earth Retention Systems

1. Provide Earth Retention Systems necessary for safety of personnel and protection of the Work, adjacent work, utilities and structures.
2. Maintain Earth Retention Systems for the duration of the Work.
3. Sheeting
 - a. Systems shall be constructed using interlocking corner pieces at the four corners. Running sheet piles by at the corners, in lieu of fabricated corner pieces, will not be allowed.
 - b. Drive sheeting ahead of and below the advancing excavation to avoid loss of materials from below and from in front of the sheeting.
 - c. Sheeting is to be driven to at least the depth specified by the designer of the earth retention system, but no less than 2 feet below the bottom of the Excavation.
4. Soldier piles with lagging
 - a. Provide soldier piles or H-piles of sizes required to contain lagging, sheeting, or planking in accordance with the approved Earth Retention System Submittal.
 - b. Provide heavy timber boards or planking of sizes indicated on approved Earth Retention System Submittal. Lagging boards or planking shall be secured and contained in place by H- piles (soldier piles), with boards inserted in the recesses between the H-flanges.
 - c. Soldier piles are to be driven to at least the depth specified by the designer of the Earth Retention System, but no less than 2 feet below the bottom of the Excavation.
 - d. Install lagging members as indicated and in a manner which will prevent loss of soil. Wedge lagging members against undisturbed earth or place compacted fill or slurry fill into voids behind lagging.
5. Remove earth retention system, unless designated to be left in place, in a manner that will not endanger the construction or other structures. Backfill and properly compact all voids left or caused by the withdrawal of sheeting.

- a. Remove earth retention systems, which have been designated by the Engineer to be left in place, to a depth of 3 feet below the established grade.

B. Excavation

1. Perform excavation to the lines and grades indicated on the Drawings. Backfill unauthorized over-excavation in accordance with the provisions of this Section, at no additional cost to the Owner.
2. Excavate with equipment selected to prevent damage to existing utilities or other facilities. Hand excavate as necessary to locate utilities or avoid damage.
3. Sawcut the existing pavement in the vicinity of the excavation prior to the start of excavation in paved areas, so as to prevent damage to the paving outside the requirements of construction. The sawcut shall be neat in appearance with no ragged lines; trim pavement as necessary.
4. Perform excavation in such a manner as to prevent disturbance of the final subgrade. The Engineer or Owner may require the final six inches of excavation be performed by hand, with the use of a smooth-faced bucket, or other means acceptable to the Engineer or Owner, at no additional cost if subgrade disturbance is considered excessive as judged by the Engineer or Owner.
5. During excavation, material satisfactory for backfill shall be stockpiled in an orderly manner at a distance from the sides of the excavation equal to at least one half the depth of the excavation, but in no case closer than 2 feet.
 - a. Excavated material not required or not suitable for backfill shall be removed from the site and disposed of in accordance with local, State and Federal laws and regulations.
 - b. Perform grading to prevent surface water from flowing into the excavation.
 - c. Pile excavated material in a manner that will endanger neither the safety of personnel in the excavation nor the Work itself. Avoid obstructing sidewalks and driveways.
 - d. Hydrants under pressure, valve pit covers, valve boxes, manholes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the Work is completed.
6. Grade or create berms or swales to direct surface water from excavations to appropriate structures designed to accommodate storm water. If no structures exist, direct water to areas that minimize impacts to adjacent structures and properties.

7. Make pipe trenches as narrow as practicable and keep the sides of the trenches undisturbed until backfilling has been completed. Provide a clear distance of 12 inches on each side of the pipe.
8. Perform the excavation in such a manner as to prevent disturbance of the final subgrade. If excessive subgrade disturbance is occurring, as judged by the Owner or Engineer, then the final 6 inches of the excavation shall be performed by hand, with the use of a smooth-faced bucket, or other means acceptable to the Engineer or Owner, at no additional cost to the Owner.
 - a. Grade the excavation bottom to provide uniform bearing and support for the bottom quadrant of each section of pipe.
 - b. Excavate bell holes at each joint to prevent point bearing.
 - c. Remove stones greater than 6 inches in any dimension from the bottom of the trench to prevent point bearing.
9. If satisfactory materials are not encountered at the design subgrade level, excavate unsatisfactory materials to the depth directed by the Engineer and properly dispose of the material. Backfill the resulting depth of excavation with satisfactory fill materials and compact in accordance with the provisions of this Section.
10. Satisfactory materials below building structures (foundations or slabs) consist of undisturbed native inorganic soils (native granular soil or native sandy clay) or bedrock, or compacted borrow placed above these materials. Existing fill or buried organic-containing materials are not suitable to remain in place below building structures and shall be completely removed from within the building footprint and footing bearing zones (defined as the 1 horizontal to 1 vertical plane extending downward and outward from one foot beyond the edge of footings) and replaced with suitable compacted backfill.
 - a. An aggregate pier ground improvement alternate to complete removal and replacement of existing fill or buried organic-containing materials from below building structures shall be provided in accordance with Section 316616 – Aggregate Piers. The Owner will elect either removal and replacement or the aggregate pier alternate.

C. Backfill and Compaction

1. Unless otherwise specified or indicated on the Drawings, use satisfactory material removed during excavation for backfilling trenches. The Engineer may require stockpiling, drying, blending and reuse of materials from sources on the Project.
2. Spread and compact the material promptly after it has been deposited. When, in the Engineer's judgment, equipment is inadequate to spread and compact the material properly, reduce the rate of placing of the fill or employ additional equipment.

3. Prior to backfilling or placement of structures, excavated subgrades shall be proof compacted with either 10 passes of a 10-ton vibratory drum roller for open excavations or 6 passes of a large, reversible, walk behind vibratory compactor capable of exerting a minimum force of 2,000 pounds in trench or pit excavations. Soft or weak spots shall be over-excavated and replaced with compacted Granular Fill or compacted Crushed Stone wrapped in a non-woven geotextile, as directed by the Owner or their representative. If proof compaction will prove detrimental to the subgrade due to the presence of groundwater, static rolling may be allowed at the discretion of the Engineer or Owner.
 - a. Where aggregate piers are installed in accordance with Section 316616 – Aggregate Piers, prepare subgrades in accordance with requirements of that section and those of the aggregate pier designer.
4. Soil bearing surfaces shall be protected against freezing and the elements before and after concrete placement. If construction is performed during freezing weather, structures shall be backfilled as soon as possible after they are constructed. Insulating blankets or other means shall be used for protection against freezing at the discretion of the Engineer or Owner.
5. When excavated material is specified for backfill and there is an insufficient amount of this material at a particular location on the Project due to rejection of a portion thereof, consideration will be given to the use of excess material from one portion of the Project to make up the deficiency existing on other portions of the Project.
 - a. Use borrow material if there is no excess of excavated material available at other portions of the Project.
6. Backfilling and compaction methods shall attain at least 95% of maximum dry density at optimum moisture content as determined in accordance with ASTM D1557. All backfill shall be firm and stable after compaction.
 - a. In areas outside the building footprint where structures are not supported (landscaped areas), backfilling and compaction methods shall attain at least 90% of maximum dry density at optimum moisture content as determined in accordance with ASTM D1557.
 - b. In areas outside the building footprint where pavements or sidewalks are to be supported, backfilling and compaction methods shall attain at least 90% of maximum dry density at optimum moisture content as determined in accordance with ASTM D1557, except the final 2 feet below pavement or sidewalk section subgrades shall attain at least 95% of maximum dry density at optimum moisture content as determined in accordance with ASTM D1557. The section subgrade shall be defined as the elevation of the bottom of the aggregate base/subbase, whichever is lower.

7. Do not place stone or rock fragments larger than six inches in greatest dimension in the backfill.
8. Maximum loose lift height for backfilling existing or borrow material shall be 12 inches, unless satisfactory compaction is demonstrated otherwise to the Engineer through field-testing. In no case shall loose lift height for backfilling exceed 2 feet.
9. Do not drop large masses of backfill material into the trench endangering the pipe or adjacent utilities.
10. Install pipe in rock excavated trenches on a 3/4" crushed stone bedding with a minimum depth of 6 inches. Shape the stone bedding at the pipe bells to provide uniform support. Encase the pipe in the 3/4" crushed stone bedding to a grade 6 inches over the top of the pipe and the full width of the trench.
11. Backfill from the bottom of the trench to the centerline of the pipe with the specified material. This initial backfill is to be placed in layers of no more than 6 inches and thoroughly tamped under and around the pipe. This initial backfilling shall be deposited in the trench for its full width on both sides of the pipe, fittings and appurtenances simultaneously.
12. Electrical conduit not encased in concrete, shall be backfilled with sand borrow conforming to the requirements of Section 312323. The backfill shall be placed in the trench for its full width and shall extend to 12 inches over the conduit.
13. Where excavation is made through permanent pavements, curbs, paved driveways, or paved sidewalks, or where such structures are undercut by the excavation, place the entire backfill to sub-grade with granular materials and compact in 6 inch layers, unless satisfactory compaction is demonstrated otherwise to the Engineer through field-testing. Use approved mechanical tampers for the full depth of the trench. If required, sprinkle the backfill material with water before tamping so as to improve compaction. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to the depth required to correct the problem, and shall then be refilled and properly compacted with the surface restored to required grade at no additional expense.
14. The Contractor shall not place backfill against or on structures until they have attained sufficient strengths to support the loads to which they will be subjected, without distortion, cracking, or other damage. As soon as possible after the structures are adequate, they shall be backfilled with suitable backfill material.
15. Place and compact backfill around manholes, vaults, pumping stations, gate boxes or other structures in six inch layers unless satisfactory compaction is demonstrated otherwise to the Engineer through field-testing, from a point one foot over the pipe. Exercise care to protect and prevent damage to the structures.

D. Test Pit Excavation

1. General requirements of test pits are specified in Section 023000 Subsurface Investigations and Section 316616 Aggregate Piers.

E. Dewatering

1. Obtain the following construction dewatering permits, as required:
 - a. US EPA Dewatering General Permit
 - b. CT DEEP permit titled “General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities” (DEEP-WPED-GP-015)
2. Provide, operate and maintain adequate pumping, diversion and drainage facilities in accordance with the approved dewatering plan to maintain the excavated area sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground. Locate dewatering system components so that they do not interfere with construction under this or other contracts.
3. Conduct operations so as to prevent at all times the accumulation of water, ice and snow in excavations or in the vicinity of excavated areas so as to prevent water from interfering with the progress or quality of the work.
4. Take actions necessary to ensure that dewatering discharges comply with permits applicable to the Project. Dispose of water from the trenches and excavations in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress.
5. Repair any damage resulting from the failure of the dewatering operations and any damage resulting from the failure to maintain all the areas of work in a suitable dry condition, at no additional cost to the Owner.
6. Exercise care to ensure that water does not collect in the bell or collar holes to sufficient depth to wet the bell or collar of pipes waiting to be jointed.
7. Take precautions to protect new work from flooding during storms or from other causes. Control the grading in the areas surrounding all excavations so that the surface of the ground will be properly sloped to prevent water from running into the excavated area. Where required, provide temporary ditches for drainage. Upon completion of the work, all areas shall be restored to original condition.
8. Brace or otherwise protect pipelines and structures not stable against uplift during construction.
9. Do not excavate until the dewatering system is operational and the excavation may proceed without disturbance to the final subgrade.

10. Unless otherwise specified, continue dewatering uninterrupted until the structures, pipes, and appurtenances to be installed have been completed such that they will not float or be otherwise damaged by an increase in groundwater elevation.
11. Temporarily lower the groundwater level at least two feet below excavations to limit potential “boils”, loss of fines, or softening of the ground. If any of these conditions are observed, submit a modified dewatering plan to the Engineer within 48 hours. Implement the approved modified plan and repair any damage incurred at no additional cost to the Owner.
12. When subgrades are soft, weak, or unstable due to improper dewatering techniques, remove and replace the materials in accordance with Section 312323 at no additional cost to the Owner.
13. Notify the Engineer immediately if any settlement or movement is detected of survey points adjacent to excavations being dewatered. If settlement is deemed by the Engineer to be related to the dewatering, submit a modified dewatering plan to the Engineer within 24 hours. Implement the approved modified plan and repair any damage incurred to the adjacent structure at no additional cost to the Owner.
14. Dewatering discharge:
 - a. Install sand and gravel, or crushed stone, filters in conjunction with sumps, well points, and/or deep wells to prevent the migration of fines from the existing soil during the dewatering operation.
 - b. Transport pumped or drained water without interference to other work, damage to pavement, other surfaces, or property. Pump water through a silt filter bag or other approved sedimentation device prior to discharge to grade of drainage system.
 - c. Do not discharge water into any sanitary sewer system.
 - d. Provide separately controllable pumping lines.
 - e. The Engineer reserves the right to sample discharge water at any time.
15. Install erosion/sedimentation controls for velocity dissipation at point discharges onto non-paved surfaces.
16. Removal
 - a. Do not remove dewatering system without written approval from the Engineer.
 - b. Backfill and compact sumps or ditches with screened gravel or crushed stone in accordance with Section 312323.

- c. Remove well points and deep wells. Backfill abandoned well holes with cement grout having a water cement ratio of 1 to 1 by volume.

3.3 PROTECTION

A. Protection of Existing Structures

1. All existing foundations, conduits, wall, pipes, wires, poles, fences, property line markers and other items which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the Contractor. Should such items be damaged, they shall be restored by the Contractor to at least as good condition as that in which they were found immediately before the Work began.

B. Accommodation of Traffic

1. Streets and drives shall not be unnecessarily obstructed. The Contractor shall take such measures at his own expense to keep the street or road open and safe for two-way traffic unless otherwise indicated.
2. Construct and maintain such adequate and proper bridges over excavations as may be necessary or as directed for the safe accommodation of pedestrians and vehicles. Provide substantial barricades at crossings of trenches, or along the trench to protect the traveling public.
3. Where deemed necessary, such additional passageways as may be directed shall be maintained free of such obstructions. All material piles, open excavations, equipment, and pipe which may serve as obstructions to traffic shall be protected by proper lights, signage, or guards as necessary.
4. All traffic controls shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways, latest edition.

C. Erosion and Sedimentation Control

1. Take all necessary steps to prevent soil erosion.
2. Plan the sequence of construction so that only the smallest practical area of land is exposed at any one time during construction.
3. Temporary vegetation and/or mulching shall be used to protect critical areas exposed during construction as judged by the Engineer.

END OF SECTION

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SECTION 312316.26 – ROCK REMOVAL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Rock excavation for trenches and structures.
- B. Related Sections
 - 1. Section 312300 – Excavation, Backfill, Compaction and Dewatering
 - 2. Appendix F - Report entitled “Greenwich Central Middle School Construction-Vibration and Controls During Construction” by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.2 DESCRIPTION

- A. Removal of boulders greater than 1 cubic yard in volume is included under this Section of work. Removal of boulders under 1 cubic yard in volume is not considered part of this work and is considered a part of the work specified under Section 312300.
- B. Rock excavation shall mean solid ledge rock or solid concrete which in the opinion of the Engineer requires for its removal, drilling and blasting, wedging, sledging, firing, or breaking up with power operated hand tools.
- C. Material removed solely with a power-operated excavator or loose, previously blasted ledge, broken stone, weathered rock, cemented gravel, hardpan, or glacial till which may be encountered during excavation operations is not considered rock excavation.

1.3 SUBMITTALS

- A. Construction methods that will be utilized for the removal of rock on the project.
- B. Qualifications of professional blasting Consultant and a pre-blast survey.
- C. A description of the proposed method for blasting, prior to beginning any blasting operations, detailing the proposed methods of blasting including the type of information to be included in the blasting monitoring seismograph reports.
 - 1. Seismograph reports shall include plan of drilling, amount and type of loadings, kind and distribution of blasting caps, delays used and amount of explosive per day, order of firing, distance and direction of recording station from blast area, type of ground at recording station, time of readings displacements and frequency, copy or record, and brief discussion on vibratory effects.
- D. Conduct pre-blast structure survey prior to start of blasting.

1. Conduct pre-blast structure survey on structures within areas affected by work that may be damaged by blasting. Include aboveground structures within at least 500 feet of areas to be blasted.
 2. The purpose of the survey is to document existing conditions of structures prior to blasting. The survey is intended to be used as evidence in ascertaining whether and to what extent damage may have occurred as a result of blasting.
 3. Record information for each structure surveyed:
 - a. Age and type of construction
 - b. Location and character of cracks
 - c. Evidence of settlement and leakage
 - d. Other pertinent information
 4. Record pre-blast survey information on forms prepared specifically for pre-blast surveys.
 5. Supplement written records with photographs or videotape recording.
 6. Submit copies of written records and photographs or videotapes to respective property owner, as well as to the Engineer with the property owner's permission, prior to the start of blasting.
- E. Blasting records - For each blast, document the following:
1. Location of blast in relation to Project Stationing or coordinate systems and elevation.
 2. Date and times of loading and detonation of blast.
 3. Name of person in responsible charge of loading and firing.
 4. Details of blast design, as previously specified.
 5. Vibration records including location and distance of seismograph geophones to blast and to nearest structure and measured peak particle velocity. Report peak particle velocity in units of inches per second.
 6. Air-blast records. Report peak air blast values in units of pounds per square inch overpressure above atmospheric or in decibels at linear response.
 7. Comments by blaster in charge regarding damage to existing facilities, adjacent property, or completed work, misfires, fly rock occurrences, unusual results, or unusual effects.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 BLASTING

- A. Comply with OSHA, State and Local regulations when blasting and handling explosives.
 - 1. The Town of Greenwich Fire Department approval is required for all blasting operations. A pre-blast survey must be completed. The Fire Chief or his designated representative must witness the survey.
- B. Assume full responsibility for the safety of the blasting operations and perform the work in a manner that will ensure the safety of personnel and that of existing structures, adjacent buildings, and completed new construction. The Contractor will be held responsible for claims for damage to property and underground structures. Repair in kind utilities, pipelines or house services damaged while conducting pre-drilling and blasting activities. Repair and maintain roadway and paved surfaces that are cracked or damaged during the course of pre-drilling and blasting.
- C. Comply with current OSHA regulations as well as engage the services of a qualified, professional blasting Consultant who will design, review, evaluate and modify the blasting operations. Design the initial blasts and conduct test blasts (minimum four tests) until regular production-controlled blast patterns are developed that produce the desired rate of excavation while meeting the requirements for vibration and air blast control specified. Periodically, or when requested by the Engineer, review the blasting operations and make such changes in the blasting operations as are required to produce a controlled blasting operation meeting the requirements of these specifications. Review by the Engineer of the Contractor's blast design shall not relieve the responsibility for obtaining adequate rock breakage.
- D. Provide adequate notice to residents that may be affected by the use of explosives. In residential areas, provide the following:
 - 1. Certificate of Insurance to cover a blasting operation.
 - 2. Evidence that residential homes have been reviewed to satisfy all parties that pre-construction conditions are well documented.
- E. Blasting Design Criteria
 - 1. Exercise care in the drilling and blasting operations so that the remaining rock remains stable and to reduce overbreak to a minimum.
 - 2. Control blasting by limiting the charge per delay to that which produces limited levels of ground vibrations as herein specified. Hire a qualified testing agency to measure the radial particle velocities using a seismograph. Peak radial particle velocity shall be the measure of the level of vibration.

3. The charge weight per delay used in blasting, measured on the foundation material, rock, or overburden at the nearest residential structure, shall be such the peak radial particle velocity and frequency relationship criteria shown below on Figure 1 – “New U.S. Bureau of Mines Criteria from Report RI-8501, dated November 1980” is not exceeded. The Contractor shall modify the size and type of explosives used to meet this criteria or other limiting criteria.

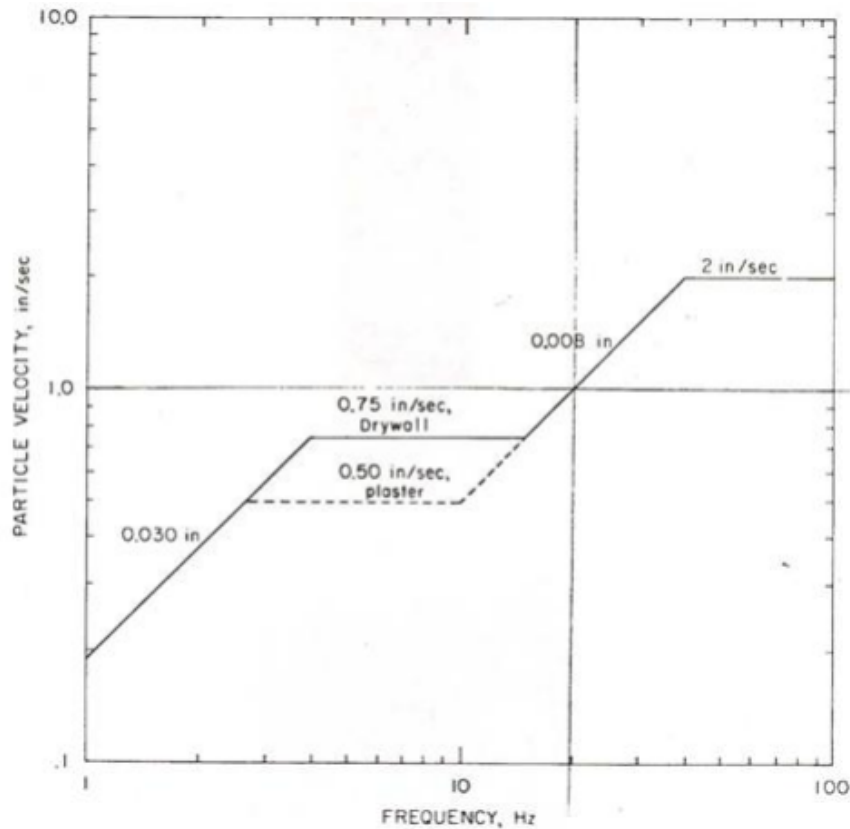


Figure 1

4. The charge weight per delay used in blasting, measured at the foundation of the existing middle school building, shall be such that the peak particle velocity and frequency relationship criteria detailed in the CVC report is not exceeded.
5. ~~For areas where controlled blasting is required, the charge weight per delay shall be such that the peak radial particle velocity shall not exceed 1.0 inch per second.~~
6. Air blast overpressures from blasting operations shall not exceed 0.02 psi.
7. The maximum depth of lift to be removed at any one time shall not exceed 6 feet.

8. Use blasting mats, chained logs, warning signs, guards, etc., in accordance with the best practice.
 9. All blasting operations shall be done by electronic or non-electric detonation.
 10. Restrict blasting to daylight hours. In no case will blasting operations be permitted before 8:00 AM or after 5:00 PM.
 11. These criteria may be adjusted by the Owner, if the blasting procedures based on monitoring results or in the opinion of the Owner are likely to be disruptive to nearby businesses, people, or to cause damage to structures. These changes may require the Contractor to revise blast design and reduce the size of charges.
- F. In areas where the Contractor is allowed to pre-drill and blast ledge or rock formations without first removing the over-burden, the Contractor shall be required to firmly establish a profile of the solid ledge or rock that cannot be ripped free by the excavating machine. The actual pay quantities will be based on the inspector's determination of the actual profile and extent of the rock formations drilled and blasted by the Contractor and his verification of the rock formations once the excavation has been opened.
- G. Minimum excavation and clearance within rock trenches shall be per Section 312300.
- H. The use of perchlorate containing explosives is prohibited.

3.2 BACKFILL

- A. Backfill must be with material from the excavation or where the excavated material is considered unsuitable for backfill, with material wasted from other area of the job or, when directed by the Engineer in writing, with ordinary borrow. No stones, rocks, or boulders shall be used as backfill.
- B. Minimum pipe bedding requirements shall be per Section 312300.

END OF SECTION

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SECTION 312323 - BORROW MATERIALS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Gravel Borrow
 - 2. Processed Aggregate Base
 - 3. Granular Fill
 - 4. Sand Borrow
 - 5. Stone Borrow
 - 6. Ordinary Borrow
 - 7. Blast Rock Fill & Choke Stone
- B. Related Sections
 - 1. Section 312300 – Excavation, Backfill, Compaction and Dewatering
 - 2. Appendix F - Report entitled “Greenwich Central Middle School Construction-Vibration and Controls During Construction” by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.2 REFERENCES

- A. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- B. ASTM C117 - Standard Test Method for Materials Finer than 75 μ m (No. 200) Sieve in Mineral Aggregates by Washing
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
- D. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb./ft³)
- E. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- F. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114 N
PHASE 2 OF 3 – BUILDING CONSTRUCTION,
DEMOLITION, AND SITEWORK

S/L/A/M PROJECT NO. 22367.00
BORROW MATERIALS
312323 - 1

- G. AASHTO – Standard Specification for Transportation Materials and Methods of Sampling and Testing, 1986 Edition as amended
- H. Connecticut Department of Transportation, Form 818, Specifications for Roads, Bridges, Facilities and Incidental Construction, latest edition

1.3 SUBMITTALS

- A. Representative Samples of borrow materials taken from the source. Tag, label, and package the Samples as requested by Engineer. Provide access to the borrow site for field evaluation and inspection.
- B. Provide sieve analysis (ASTM C136) from certified soils testing laboratory for all borrow materials. Take and test a sample, at no additional cost to the Owner for each 1,500 c.y. of borrow material placed.
- C. Provide modified proctor analysis (ASTM D1557) from certified soils testing laboratory for all borrow materials.
 - 1. Take and test a sample of borrow material once unless more frequent testing is deemed necessary by the Engineer or Owner due to material variation, or as directed by the Engineer.
- D. The Engineer reserves the right to require more frequent testing than that which is specified above should the borrow characteristics change.

1.4 QUALITY ASSURANCE

- A. No borrow shall be placed prior to the approval of Samples by the Engineer.

1.5 PROJECT/SITE CONDITIONS

- A. Existing Conditions
 - 1. Comply with any environmental requirements and restrictions.
 - 2. Keep all public and private roadway surfaces clean during hauling operations and promptly and thoroughly remove any borrow or other debris that may be brought upon the surface before it becomes compacted by traffic. Frequently clean and keep clean the wheels of all vehicles used for hauling to avoid bringing any dirt upon the paved surfaces.

PART 2 PRODUCTS

2.1 GRAVEL BORROW

- A. Gravel Borrow shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings, and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.

Gradation requirements for Gravel Borrow shall be determined by AASHTO-T11 and T27 and shall conform to the following:

Sieve	Percent by Weight Passing
½ inch	50 – 85
No. 4	40 – 75
No. 50	8 – 28
No. 200	0 - 10

Maximum size of stone in Gravel Borrow shall be 2 inches.

2.2 PROCESSED AGGREGATE BASE

- A. The compacted Processed Aggregate Base to be used for gravel access roads and pavement base, or other area where a firm, free-draining subgrade is needed shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.
- B. Gradation requirements shall conform to the following:

Sieve	Percent by Weight Passing
2 ½"	100
2"	95 – 100
¾"	50 – 75
¼"	25 – 45
No. 40	5 – 20
No. 200	2 - 12

- C. Stockpile the processed materials in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

2.3 GRANULAR FILL

- A. Granular Fill to be used as fill material to achieve gravel base grade beneath structures, pavement, or other area requiring structural fill shall consist of inert material that is hard, durable stone and sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.
- B. Gradation requirements for Granular Fill shall conform to the following:

Sieve Size	Percent by Weight Passing	
	Minimum	Maximum
2/3rds loose lift thickness	100	--
No. 10	30	95
No. 40	10	70
No. 200	0	15

- C. Existing subsurface materials may be re-used as Granular Fill, regardless of its gradation, provided it is environmentally appropriate, free of organics, debris, stones greater than two thirds the lift thickness in diameter, or other unsuitable material, and they are placed to the required degree of compaction and to a stable condition. Brick or concrete shall be crushed to smaller than 2 inches in its longest dimension, mixed thoroughly with the soil to create a homogeneous backfill material, and shall not compose more than 20 percent of the backfill volume. Existing cobbles and boulders, if present, shall be removed from the material prior to reuse.

However, site soils which contain greater than 15% fines (material passing the No. 200 sieve) shall not be used in locations that require free draining materials such as immediately beneath slabs or pavement, or behind retaining walls. It should be noted that some of the existing site soils have a relatively high fine-grained content, which will likely make them difficult to place and compact to the required degree of compaction and to a stable condition when excessively wet, and therefore would not be suitable for use.

2.4 SAND BORROW

- A. Sand Borrow material shall be supplied from an off-site borrow area approved by the Engineer. Testing of the off-site Sand Borrow shall be at the Contractor's expense.
- B. Sand Borrow shall consist of clean, inert, hard, durable grains of quartz or other hard, durable, rock, free from loam or clay, surface coatings and deleterious materials. The allowable amount of material passing a No. 200 sieve as determined by ASTM-C117 shall not exceed 10% by weight.
- C. Material shall consist of a clean, non-plastic, granular material conforming to the requirements of a SW, SP or SM under the Unified Soil Classification System (USCS) (ASTM D2487).
- D. The material shall have the characteristics that when placed and compacted, the soil particles will bind together so as to form a solid, stable surface capable of supporting rubber-tired vehicular traffic during wet weather periods as well as extended dry weather periods. The borrow material shall not contain fines to the extent that the surface layer becomes "greasy" when wet.
- E. The material shall not contain stones larger than 3/8 inch in diameter.

- F. Material consisting of frozen clogs, ice and snow will be rejected.
- G. All sand borrow material to be used shall be subject to approval by Engineer, and Engineer reserves the right to reject any borrow material from the job that does not meet the above requirements.

2.5 STONE BORROW

A. Crushed Stone Borrow

1. Crushed stone borrow shall consist of one of the following materials:
 - a. Durable crushed rock consisting of the angular fragments obtained by breaking and crushing solid or shattered natural rock, and free from a detrimental quantity of thin, flat, elongated or other objectionable pieces. A detrimental quantity will be considered as any amount in excess of 15% of the total weight. Thin stones shall be considered to be such stones whose average width exceeds 4 times their average thickness. Elongated stones shall be considered to be stones whose average length exceeds 4 times their average width.
 - b. Durable crushed gravel stone obtained by artificial crushing of gravel boulders or fieldstone with a minimum diameter before crushing of 8 inches.
2. The crushed stone shall be free from clay, loam or deleterious material and not more than 1.0% of satisfactory material passing a No. 200 sieve will be allowed to adhere to the crushed stone.
3. The crushed stone shall have a maximum percentage of wear as determined by the Los Angeles Abrasion Test (AASHTO-T-96) as follows:
 - a. For Class 1 Bit. Conc. 30%**
 - b. For Cement Concrete Aggregate 45%***
 - c. Crushed Stone for Subbase 45%

**Crushed stone for this use shall consist of crushed or shattered natural rock only. Crushed gravel stone will not be permitted.

***Except for 5000 psi or greater cement concrete and prestressed concrete which shall be 30%.
4. Crushed stone placed in total thickness greater than 6 inches shall be wrapped in a non-woven geotextile filter fabric, such as Mirafi 140N or approved equal, with the exception of where placed in rock trenches, geotextile filter fabric is not required to separate the stone from rock.

5. The crushed stone shall conform to the grading requirements shown in the following grading Table.

Sieve Size	Percent by Weight Passing	
	Minimum	Maximum
1 ½" Crushed Stone		
2"	100	--
1 ½"	95	100
1"	35	70
¾"	0	25
¾" Crushed Stone		
1"	100	--
¾"	90	100
½"	10	50
3/8"	0	20
No. 4	0	5
3/8" Crushed Stone		
3/8"	100	--
No. 4	85	100
No. 8	10	40
No. 16	0	10
No. 50	0	5

B. Dense Graded Stone Borrow

1. The crushed stone used for backfill shall be a dense graded mixture and conform to the following gradation requirements.

Sieve Size (Square Openings)	Percent by Weight Passing	
	Minimum	Maximum
5/8"	100	--
½"	85	100

3/8"	15	45
#4	0	15
#8	0	5

2.6 ORDINARY BORROW

- A. Ordinary borrow shall have the physical characteristics of soils designated as type GW, GP, GM, SW, SP or SM, under USCS and shall not be specified as gravel borrow, sand borrow, special borrow material or other particular kind of borrow. It shall have properties such that it may be readily spread and compacted for the formation of embankments. The borrow shall not include rocks with a major dimension greater than 8 inches.

2.7 BLAST ROCK FILL & CHOKES STONE

- A. Blast rock fill and choke stone shall be free from litter and foreign materials.
- B. Blast rock fill shall be material generated from on-site rock removal.
- C. Choke stone shall be a well-graded mixture of blast rock fill less than 6 inches in major dimension and granular fill.
- D. Blast rock fill shall conform to the following gradation requirements:

Sieve Size	Percent by Weight Passing	
	Minimum	Maximum
12"	100	-
4"	0	25
3/4"	0	10

PART 3 EXECUTION

3.1 INSTALLATION

- A. Prior to the placement of borrow material, site preparation shall be completed as required by the Contract Documents, and approved by the Engineer.
- B. Ensure that all materials are properly stockpiled on site to prevent contamination by other materials.
- C. Place borrow material over the entire area in uniform lifts and compact in accordance with Section 322300.
- D. Utilize on-site soils prior to using off-site borrow provided on-site soils meet the requirements of the specifications.

- E. Utilize gravel borrow in all locations where a surface treatment has not been specified but requires a firm finish surface.
- F. Processed aggregate base is intended to provide a stable foundation for driveways, sidewalk and roadway repair where a gravel base has been specified.
- G. Borrow shall be used as a replacement for unsuitable materials where poor soil conditions are encountered during the progress of the work, where approved by the Engineer. Borrow type will be determined by the Engineer. Borrow material used as a replacement for unsuitable soil is not intended to be an aid to dewatering.
- H. Shape borrow used for pipe foundation material so that it supports the pipe properly and will not damage the pipe, bells, collars, or the pipe fittings.
- I. Place all borrow to keep it free of other materials and to prevent segregation.

END OF SECTION

SECTION 312333 - TRENCHING AND BACKFILLING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 Specifications, apply to this section.

1.2 SUMMARY

- A. General: Perform trench excavation and backfill in accordance with the Contract Documents. The Work includes but is not limited to trench excavation and backfill to within five (5) feet of proposed building for the following:
 - 1. Storm drainage, stormwater management, sanitary sewers, water distribution and site utility services construction.
- B. Stanwich Road, Orchard Street and Indian Rock Lane are Town Streets and trenching and backfill requirements shall comply with Town requirements. Contractor shall obtain all necessary permits prior to any excavation within Town streets.
- C. Related Sections include the following:
 - 1. Section 312500 – Soil Erosion and Sediment Controls
 - 2. Section 333113 – Poly Vinyl Pipe (PVC) Pipe and Fittings
 - 3. Section 334113 – High Density Polyethylene Pipe and Fittings
 - 4. Section 334100 – Storm Drainage
 - 5. Section 312300 - Excavation, Backfill, Compaction and Dewatering
 - 6. Appendix F - Report entitled “Greenwich Central Middle School Construction-Vibration and Controls During Construction” by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 COORDINATION

- A. Coordinate and schedule the work of this Section with all trades involved to prevent interference, and in order to allow adequate time at the proper stage of construction to properly perform all work of this Section.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Materials shall comply with CTDOT Form 818, “Standard Specifications for Road, Bridges, and Incidental Construction” latest revision.
- B. Roadway materials installed within Town of Greenwich Roadway Right-of-Way shall conform with the Town of Greenwich Department of Public Works standards and requirements.
- C. Drainage materials installed within the Town of Greenwich Roadway Right-of-Way shall conform with the Town of Greenwich Engineering Division standards, details, and requirements.
- D. Sanitary Sewer installations shall conform with the Town of Greenwich Roadway Right-of-Way shall conform with the Town of Greenwich Sewer Division standards, details, and requirements.

PART 3 EXECUTION

3.1 EXCAVATION, TRENCHING AND BACKFILL

- A. General: Perform excavation to the depths shown or specified.
- B. During excavation, pile material suitable for backfilling in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins.
- C. Remove all excavated materials not required or suitable for backfill per the site environmental consultant’s requirements and the Owner.
- D. Grade as necessary to prevent surface water from flowing into trenches or other excavations. Remove any water accumulating therein by pumping or by other approved method.
- E. Install sheeting and shoring as necessary for the protection of the Work and for the safety of personnel.
- F. Unless otherwise indicated, excavation to be open cut.
- G. Excavation is classified as earth excavation and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered, pavements, and other obstructions visible on ground surface, underground structures, utilities, and other items indicated to be demolished and removed, together with earth and other materials, excluding rock.
- H. Rock, for the purposes of classification shall consist of rock material in beds, ledges, unstratified masses, conglomerate deposits and boulders of rock material that exceed 1 cubic yard that cannot be removed by rock excavating equipment without systematic drilling, ram hammering, ripping, or blasting. Rock excavating equipment is defined as a late-model, track-mounted, hydraulic excavator equipped with a 42-inch wide, maximum, short-tip radius rock bucket, rated at not less

than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf; measured according to SAE J-1179.

- I. Backfill and surface excavations for utilities occurring in or across streets or sidewalks with temporary paving or crushed stone as soon as possible after Work is completed.
- J. Maintain temporary paving or surfacing in a condition acceptable to the Owner until permanent pavement can be installed.

3.2 SIZES OF TRENCHES

- A. Ensure trenches are the necessary width for the proper laying of the pipe and ensure the banks areas nearly vertical as practicable.
- B. Accurately grade the bottom of the trenches to provide uniform bearing and support for each section of the pipe on undisturbed soil at every point along its entire length.
- C. Except where rock is encountered, take care not to excavate below the depths indicated or specified.
- D. Where rock excavations are required, excavate the rock to a minimum overdepth of 6 inches below the trench depths indicated on the drawings or specified.
- E. Backfill overdepths in the rock excavation and unauthorized overdepths with thoroughly compacted sand or gravel as specified.
- F. Whenever wet or otherwise unstable soil that is incapable of properly supporting the pipe, as determined by the Owner's Geotechnical Consultant, is encountered in the bottom of the trench, remove such soil to the depth required and backfill the trench to the proper grade with coarse sand, fine gravel, or other suitable material.
- G. Ensure trenches for utilities are of a depth that will provide the following minimum depths of cover from existing grade or from indicated finished grade, whichever is lower, unless otherwise specifically shown:
 - 1. Four feet - six inches minimum cover for water and fire protection lines,
 - 2. Thirty inches minimum cover for electrical and telephone conduit.
 - 3. Three feet minimum cover over storm and sanitary sewer.
 - 4. Three feet minimum cover of gas services per utility company standards.
- H. For bedding of piping, ensure the width of the trench at and below the top of the pipe is such that the clear space between the barrel of the pipe and the trench wall is between 6 and 12 inches on either side of the pipe.
- I. Ensure the width of the trench above the pipe crown is as wide as necessary for sheeting and bracing and the proper performance of the Work.

- J. Round the bottom of the trench so that at least the bottom quadrant of the pipe rests firmly on undisturbed soil for as nearly as the full length of the barrel as proper joining operations will permit.
- K. Ensure the part of the excavation described in subsection J above is performed manually only a few feet in advance of the pipe laying by men skilled in this type of Work.

3.3 EXISTING UTILITY LINES

- A. Contact "Call Before You Dig" at 1-800-922-4455 72 hours in advance of any construction to verify the location of utilities.
- B. Protect existing utility lines to be retained that are shown on the drawings or the locations of which are made known to the General Contractor prior to excavation operations from damage during excavation and backfilling. If such lines are damaged, the Contractor will repair at his expense.

3.4 BACKFILL RESTRICTIONS AND REQUIREMENTS

- A. Do not backfill trenches until all required pressure and other tests have been performed and until the utilities systems as installed conform to the requirements of the drawings and specification.
- B. Carefully backfill the trenches with the excavated materials approved for backfilling consisting of earth, loam, sand, sand and gravel, soft shale, or other approved materials, free from large clods of earth, stones over 2-1/2 inches maximum dimension, or other undesirable material as specified in Section 31 2300. Deposit backfill in 6 inch layers then thoroughly and carefully tamp until the pipe has a cover of not less than one (1) foot.
- C. Carefully place the remainder of the backfill material in the trench in one-foot layers and tamp. Settling the backfill with water is not permitted.
- D. Grade the surface to a reasonable uniformity and leave the mounding over trenches in a uniform and neat condition.
- E. The Owner's Geotechnical Consultant may reject any on-site or borrow materials which he considers unsuitable for intended backfill or fill usage.
- F. Under all paved areas, compact the fill and/or backfill to 95% of the maximum density at optimum moisture when tested in accordance with ASTM Designation D1557.
- G. Perform field density tests by the approved Soil Testing Laboratory at locations and elevations as directed.
- H. Backfill trenches excavated under footings and within 18 inches of bottom of footings with compacted select backfill; fill with concrete to elevation of bottom of footings.

3.5 TRAFFIC CONTROL

- A. Maintain access for vehicular and pedestrian traffic required for other construction activities and for public when working in roadway right-of-way.
- B. Provide public flagmen, barricades, warning signs and warning lights as required. Obtain required Town Street opening permits before start of work.

END OF SECTION

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SECTION 316616 - AGGREGATE PIERS

PART 1 GENERAL

1.1 SUMMARY

- A. This work shall consist of designing, furnishing, installing, and testing aggregate piers in accordance with these specifications and as shown on the Drawings. Refer to Drawing sheets C-206 and S-101A through S-101F.
- B. Design and installation of the aggregate piers shall be in accordance with the criteria provided herein and good engineering practice.
- C. Aggregate pier ground improvement shall be provided as an alternate to complete removal and replacement of existing fill or buried organic-containing materials from below building structures. The Owner will elect to accept or reject the aggregate pier alternate. Work associated with this specification shall not be initiated without written acceptance of the aggregate pier alternate by the Owner.
- D. The Contractor shall provide the cost and associated units for the aggregate pier alternate in accordance with Section 01 2201 – Unit Prices.
- E. Aggregate pier ground improvement is required for improving existing fill and buried organics for support of building foundations and the slab on grade ground floor within the unsuitable soil limits shown on the Drawings, and as verified by the Contractor.
- F. Aggregate piers shall be designed and installed to account for presence of cobbles, boulders, or other obstructions within the subsurface and within pier installation depths at each pier location. The Contractor's base bid shall include installation of aggregate piers, including pre-augering each pier location prior to installation of the pier aggregate. Additionally, for 50% of the Contractor's designed piers, the Contractor's base bid shall include pre-drill of each pier using a down-hole hammer or pre-excavating each pier location and backfill of the pre-excavated pier location with excavated soil after removal of cobbles, boulders or other materials that would otherwise obstruct the installation of the pier using displacement installation methods. Unit costs for pre-drill using a down-hole hammer, and unit costs for pre-excavating each pier location and backfill of the pre-excavated pier location with excavated soil after removal of cobbles, boulders or other materials that would otherwise obstruct the installation of the pier using displacement installation methods, shall be provided. The Contractor will be paid for pre-augering each pier location and for the actual quantity of pre-drill or pre-excavate. The Contractor will be paid for only one of the pre-drill or pre-excavate installation methods employed, whichever is the method used to achieve the final installed pier tip elevation.
- G. Related Sections
 - 1. Section 003132 – Geotechnical Data
 - 2. Section 312316 – Excavation, Backfill, Compaction and Dewatering
 - 3. Section 312323 – Borrow Material
 - 4. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and

protection the existing school building from structural damage while it is occupied.

- H. Where reference is made herein to the Owner, the Owner may delegate responsibilities to the Owner's Engineer or the Architect.

1.2 REFERENCES

- A. Connecticut State Building Code, latest edition
- B. ASTM D1143 – Standard Test Methods for Deep Foundations Under Static Axial Compressive Load
- C. ASTM D6913 - Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

1.3 QUALIFICATIONS

- A. The contractor performing the work described in the specification shall have installed aggregate piers of similar size and complexity for a minimum of five years, and shall include at last ten projects completed in New England on which the contractor has installed aggregate piers of similar size and complexity to this project, with at least two projects that included use of down-hole hammer techniques for installing aggregate piers.
- B. The contractor shall engage their own engineer who shall have at least five years of experience in the design and construction of aggregate piers, and shall include at last ten projects completed in New England using aggregate piers of similar size and complexity to this project. Rig operators and on-site supervisors shall have a minimum of one year experience installing aggregate piers with the contractor's organization.
- C. The Owner will approve or reject the contractor's qualifications and staff within 14 calendar days after receipt of the submission. Work shall not be started on any aggregate pier nor any materials ordered until approval of the contractor's qualifications is given. The Owner may suspend the aggregate pier work if the contractor substitutes unqualified personnel for approved personnel. The contractor shall be fully liable for additional costs resulting from the suspension of work and no adjustment in contract time resulting from the suspension of work will be allowed.

1.4 DESIGN REQUIREMENTS

- A. The Contractor shall be responsible for the design and construction of the aggregate pier system. The aggregate pier system shall be properly designed by a Professional Engineer registered in the State of Connecticut, who practices in a discipline applicable to work and has more than five years of experience in the design of aggregate pier systems of similar size and complexity as this project.
- B. The design of the aggregate pier system shall be based on the minimum required allowable bearing pressure shown on the Contract Drawings and herein, and the allowable total and differential settlement criteria indicated herein. The aggregate pier system shall be designed in accordance with generally accepted engineering practice.
- C. The aggregate pier elements shall be constructed by compacting aggregate using special high-energy impact densification equipment. Aggregate piers shall be installed by pre-augering the pier cavity or use of down-hole hammer drilling techniques, unless existing fill at the pier location is pre-excavated to remove obstructions which may otherwise refuse the aggregate pier installation equipment. It specifically shall not be assumed that piers can be installed using displacement methods without the use of pre-augering, down-hole hammer pre-drilling, or pre-excavation of existing fill.

- D. The aggregate piers shall be in a columnar-type configuration and shall be used to reinforce soils for the support of foundations and the first floor building slabs within the limits shown on the Drawings, and as verified by the Contractor. Refer to Drawing sheets C-206 and S-101A through S-101F.
- E. The aggregate piers shall be laid out in a logical manner such that piers are generally evenly spaced, to the extent practical, and slab-support piers align with slab joints.
- F. The aggregate pier layout shall consider the elevation of the working grade, elevations of bottom of footing or foundation element subgrades, and the corresponding excavation slope angles for excavation to footing or foundation subgrades such that piers are laid out to avoid the ground improvement designer's designated "no dig zone" around installed piers, to the extent practicable.
- G. Ground improvement shall be designed for any loads imposed by proposed raises in grade, as applicable.
- H. Aggregate piers shall fully penetrate existing fill and buried organics and shall terminate in the inorganic native soils. The actual depths / elevations of the bottom of the piers shall satisfy the minimum penetrations referenced above, and meet the performance criteria specified herein.
- I. The ground improvement designer shall coordinate with the Contractor to determine the ground elevation that will exist at the time of aggregate pier installation. The ground improvement design shall include consideration of any fill placed over the aggregate piers to achieve final elevations.
- J. All underground utility lines shall be identified, located, and protected from damage or displacement. Utility companies and other responsible authorities shall be contacted to locate and mark the locations and, if they so desire, direct or assist with protecting the underground installation.
- K. The aggregate pier design shall meet the following criteria:
 - 1. Footings:
 - a. Minimum allowable bearing pressure: 4 kips per square foot
 - b. Total settlement: ≤ 1.0 inch
 - c. Differential settlement between footings: ≤ 0.5 inch (over 30 feet)
 - 2. Slab on Grade: Maximum total settlement: ≤ 0.5 inch
- L. The ground improvement design shall assume footings supported on non-aggregate pier improved soils, beyond the extent of the aggregate pier improvement area, have estimated settlement of 0.75 inch for the purposes of differential settlements. The ground improvement design shall be required to satisfy differential settlement performance requirements between the aggregate pier and non-aggregate pier supported areas.
- M. The ground improvement system shall be designed to preclude plastic bulging deformations at the top-of-pier design stress. The results of the modulus tests shall be used to verify the design assumptions. The requirement for performance of a successful modulus test shall not be waived without authorization by the Owner.
- N. The aggregate piers shall be designed using an aggregate pier stiffness modulus to be verified by the results of the modulus test described in Part 3 of these specifications.
- O. In addition to improvement of unsuitable soils for support of foundations and slabs, the intent of the aggregate piers is to minimize import and export of soil from the site. Therefore, if pre-excavate is employed, the design and construction of aggregate piers shall be such that excavated soils can be used to backfill the pre-excavated locations after removal of obstructions within the excavated material.

1.5 SUBMITTALS

A. Qualifications

1. At time of the bid, submit a list containing at least ten projects completed in New England within the past five years on which the contractor and engineer have installed aggregate piers of similar size and complexity to this project. Include at least two projects for which the contractor utilized down-hole hammer techniques for installing aggregate piers. A brief description of each project and a reference shall be included for each project listed. At a minimum, the reference shall include an individual's name, current email address, and current phone number.
2. Prior to the start of work, the Contractor shall submit a list identifying the engineer, equipment operators and on-site supervisors who will be assigned to the project. The list shall contain a summary of each individual's experience, and it shall be complete enough for the Owner's review. The list shall contain a summary of each individual's experience. Should the Contractor elect to change any of these intended personnel prior to or during construction of the aggregate piers, this same approval process is required for the new personnel prior to their starting work on the Project. The Contractor shall not be compensated for any delays resulting from such changes of personnel.

B. Submit a detailed narrative describing the construction method to be employed and encompassing all aspects of the site operation.

C. Submit a detailed narrative describing the means and methods to be employed for installation of aggregate piers through soils containing frequent occurrences of cobbles, boulders and/or obstructions.

D. Submit working drawings and a Design Submittal describing the ground improvement system intended for use. The working drawings and design submission, stamped/sealed by a Professional Engineer licensed in the State of Connecticut, shall be submitted at least 21 calendar days prior to the desired commencement of ground improvement work. The working drawings and Design Submittal shall include the following:

1. A written summary report which describes the overall ground improvement design.
2. Applicable code requirements and design references and methodology.
3. Design criteria including but not limited to soil strength properties, consolidation properties, unit weights, design groundwater elevation(s), and aggregate pier properties.
 - a. Include references and basis for selection of matrix soil properties, including stiffness/compressibility and ratio of pier to matrix soil stiffness.
 - b. Include at least five (5) modulus test results for similar aggregate piers installed in similar soil conditions to provide basis for selected ground improvement pier properties.
4. Design information including but not limited to bearing capacity analysis, settlement analysis, and details and design of load transfer pad (if required).
5. Installation means and methods, including general notes for constructing the aggregate piers and other special construction requirements.
6. Layout plan of aggregate piers, on the foundation drawing, with pier number/identification. The layout plan shall identify any piers that are expected to be located within the ground

- improvement designer's designated "no dig zone" around installed piers with consideration to the working elevation and bottom of footing or foundation element subgrade elevations.
7. Table listing all aggregate piers by number/identification with corresponding design pier diameter, length, top of pier elevation, tip of pier elevation, and other relevant information.
 8. Requirements for repair of aggregate piers that are impacted by adjacent excavations such as to not void the aggregate pier contractor's warrantee.
 9. Requirements to ensure adequate confinement of the piers between completion of installation and completion of sitework and foundation construction, including identification of piers that are expected to be impacted by adjacent construction/excavations.
 10. If pre-excavation is to be performed, provide details for required excavation slope angles to avoid loss of confining stress to nearby already-installed piers, as applicable.
 11. Requirements or limitations for use of excavation support systems in proximity to aggregate piers.
- E. Submit requirements for backfill of locations where pre-excavation is to be performed prior to aggregate pier installation, including material composition/gradation requirements, backfilling requirements, minimum installed density, requirements for density testing, etc., as applicable.
- F. Submit modulus test load test reaction piles and frame design, including diameter, type, reinforcement, depth as well as the reaction frame and beams. All details and supporting calculations shall be submitted for review.
- G. Submit calibration records load cells, hydraulic jacks, pumps and pressure gauges shall be submitted at least 7 calendar days prior to performing the modulus testing.
- H. The Owner will acknowledge and respond to the Contractor's working drawings and design submission within 14 calendar days after receipt of the submission.
- I. Modulus Test Data – The Contractor shall furnish a description of the installation equipment, installation records, complete test data, analysis of test data, and recommended design parameter values for the aggregate piers based on the modulus test results. The report shall be stamped/sealed by a Professional Engineer licensed in the State of Connecticut.
- J. Daily Progress Reports – The Contractor shall furnish a complete and accurate record of aggregate pier installation. The record shall indicate the pier location, verticality, identification number, diameter, length, volume of aggregate, and final elevations or depths of the base and top of each pier. The record shall also indicate the type and size of the installation equipment used, and the use of pre-augering, pre-drilling, or pre-excavation for installation of the pier. The Contractor shall immediately report any unusual conditions encountered during installation to the Owner.
- K. As-built plans for the installed aggregate piers based on actual locations and tip elevations. The surveyed locations shall be sealed and signed by a licensed surveyor and tip elevations shall be certified by the Contractor's Professional Engineer.

1.6 QUALITY CONTROL

- A. Contractor's Quality Control Representative
1. The Contractor shall have a full-time Quality Control Representative to verify and document all installation procedures. The Quality Control Representative shall immediately report any unusual conditions encountered during installation to the Owner. The quality procedures

shall include the preparation of aggregate pier installation reports completed during each day of installation and containing the following information, as applicable:

- a. Aggregate pier location.
 - b. Pre-auger or pre-drill diameter and depth, or pre-excavate depth, and description of soils encountered.
 - c. Volume of aggregate introduced.
 - d. Aggregate pier installation depth.
 - e. Number of lifts.
 - f. Procedure to construct each lift.
 - g. Base diameter and height of the remaining aggregate cone formed after constructing each pier and extracting the tooling out of the ground.
 - h. Volume of aggregate used for each pier construction.
 - i. Planned and actual aggregate pier elevations at the top and bottom of the element, and explanation of deviations.
 - j. Type and size of hammer equipment used.
 - k. Aggregate description.
 - l. Record of flow rates of water or compressed air pressure (if applicable).
 - m. Documentation of any unusual conditions encountered.
- B. Allow the Owner to access the work, observe, and document pier installations as required.

1.7 QUALITY ASSURANCE

- A. Perform work in accordance with the Connecticut State Building Code.
- B. Field Monitoring and Testing
1. Install all aggregate piers in the presence of an authorized representative of the Owner, unless otherwise notified in writing that aggregate piers can be installed without presence of the Owner.

1.8 PROJECT/SITE CONDITIONS

- A. Existing Conditions
1. A geotechnical report (Geotechnical Evaluation – Greenwich Central Middle School, Greenwich, CT, by Tighe & Bond and dated January 26, 2024) has been prepared for this Project and is available for information only. The opinions expressed in this report are those of the Owner's geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by Owner's geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this information by the Contractor.
 2. Subsurface conditions at the site include frequent occurrence of cobbles, boulders, and/or other obstructions. The Contractor is notified that SPT blow counts shown on the boring logs are indicative of relatively high density soils as well as soils containing materials

that will obstruct penetration of direct-push displacement mandrel installation methods and possibly augers. The use of down-hole hammer or pre-excavation shall be expected in order to install the aggregate piers to the required depths.

3. The subsurface exploration information is considered to represent the conditions at the locations of the subsurface explorations at the time the subsurface explorations were made. Variations from the conditions disclosed by the subsurface explorations shall be anticipated in planning and estimating the Work.
4. Contractor shall perform test pits at the time of construction, prior to the Design Submittal, to verify the extents of unsuitable soils shown on the Drawings. Refer to Section 3.1 of this specification.

1.9 ALLOWABLE TOLERANCES

- A. Centerline of aggregate piers shall not be more than 6 inches from indicated plan location.
- B. Top elevation of aggregate pier shall be within +/- 1 inch of the design vertical elevation.
- C. Pier tip elevation shall be within 6 inches of the design vertical elevation.

1.10 COORDINATION

- A. Coordinate work with that of other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.
- B. The Contractor shall coordinate all excavations made subsequent to aggregate pier installations so that excavations do not encroach on the aggregate piers as shown in the approved shop drawings and design submission. Protection of completed aggregate piers is the responsibility of the Contractor. Piers that are impacted by excavations made subsequent to aggregate pier installations shall be repaired as detailed in the Design Submittal.

1.11 SEQUENCING AND SCHEDULING

- A. Provide a fully equipped aggregate pier installation rig in full-time operation at the site during the Work and mobilize additional equipment, if necessary, to complete the Work on schedule.
- B. Aggregate piers located in areas to be excavated or demolished, shall not be installed until the excavation has been completed.
- C. Commence installing the initial aggregate piers for selection of the modulus test element immediately upon mobilizing to the site.
- D. Once the test element has been installed, tested and approved, commence installation of production aggregate piers. Contractor may proceed with production aggregate pier installation prior to completion of the test at his own risk, with approval from the Owner.

1.12 DELIVERY, STORAGE AND HANDLING

- A. Stockpile materials only in indicated staging areas within the property limits. Keep public ways and areas clean and clear of all spillages from construction operations and from trucks hauling materials to or from the project site.
- B. Take special care in promptly and legally disposing of material from the work area, including all drill spoils. Disposal of drill spoils on-site or in the sewer system shall not be permitted. No temporary collecting ponds or lagoons shall be allowed.

PART 2 PRODUCTS

2.1 AGGREGATE

- A. Aggregate used for aggregate pier construction shall be Type 1 Grade B in accordance with ASTM D1241-68, No. 57 stone. Aggregate shall demonstrate suitable performance during modulus testing.
- B. Potable or other suitable water shall be used to increase aggregate moisture content where required. The Contractor shall provide all water needed for aggregate pier construction.

PART 3 EXECUTION

3.1 SUBSURFACE INVESTIGATIONS

- A. Contractor shall perform test pits at the perimeter of the limits of unsuitable soils shown on the Drawings to verify the extents (lateral and vertical) of unsuitable for aggregate pier design and installation. Test pits shall be performed at maximum 50-foot increments along the perimeter of the limits of unsuitable soils shown on the Drawings, where that perimeter is within the interior of the building footprint. Where unsuitable soils are observed to be present at the limits of unsuitable soils shown on the Drawings, excavate additional test pit(s) at 15-foot distances perpendicular to the limits of unsuitable soils shown on the Drawings to delineate the extents of unsuitable soils.
- B. Coordinate with the Owner for performing test pits of this section. The Owner will record subsurface conditions at the test pits, including composition of soils encountered and determination of depth to top of inorganic native soils.

3.2 GENERAL REQUIREMENTS

- A. The Contractor shall protect existing adjacent property, utilities and structures, and completed work from damage associated with the aggregate pier installation operation. Damage due to aggregate pier installation shall be repaired by the Contractor at their own expense.
- B. The Contractor shall determine the aggregate pier locations in the field and establish all elevations required.
- C. The Contractor shall employ a licensed Connecticut Professional Land Surveyor or a Connecticut Professional Civil Engineer, familiar with aggregate pier installation, who shall establish lines and levels. The Contractor shall be responsible for the correct location of aggregate piers, and establishing actual aggregate pier locations.
- D. Install all aggregate piers at the proper locations shown in the Design Submittal, unless superseded by revised plan provided by the ground improvement designer and approved by the Owner. Aggregate pier locations shall be checked during installation and appropriate measures taken, as necessary to maintain the correct aggregate pier location.
- E. Prior to installation of the aggregate pier elements, each pier location shall be prepared by pre-augering a cavity to the design pier depth.
- F. If cobbles, boulders, or other obstructions are encountered that prevent pre-augering of the cavity to the design pier depth, the use of (an) additional method(s) below shall be employed to achieve the design pier depth:
 - 1. Use of a down-hole hammer to pre-drill/pre-bore the aggregate pier cavity such that obstructions will not prevent installation of the aggregate pier to the design depth; or

- a. The down-hole hammer shall be of sufficient diameter such that the aggregate pier tooling can be installed through the pre-bored cavity without being obstructed by buried obstructions.
2. Pre-excavating the existing fill, removing any obstructions that would otherwise refuse the pier installation equipment, and then backfilling the excavation with excavated materials after removal of obstructions from the soil matrix.

3.3 INSTALLATION

- A. The following are general criteria for the construction of the aggregate piers. Unless otherwise approved by the Owner, the installation method used for ground improvement construction shall be that as used in the construction of the successful modulus test pier(s).
- B. Use machines or combinations of machines and equipment that are in good working condition, are safe to operate and will produce the results specified herein.
- C. Use equipment that is capable of advancing the aggregate piers through the subsurface materials efficiently and timely to meet the project schedule.
- D. The equipment shall be of sufficient size and capacity, and be capable of installing aggregate piers to the minimum depths required by the design.
- E. The equipment shall be capable of installing aggregate piers in the presence of very dense granular soils and obstructions, where encountered.
- F. Aggregate Pier Systems
 1. After pre-augering, pre-drilling or pre-excavation, aggregate pier systems shall be constructed by advancing a specially designed mandrel with a minimum 15-ton static force augmented by dynamic vertical ramming energy to the full design depth. The hollow-shaft mandrel, filled with aggregate, is incrementally raised, permitting the aggregate to be released into the cavity, and then lowered by vertically advancing and/or ramming to densify the aggregate and force it laterally into the adjacent soil. The cycle of raising and lowering the mandrel is repeated to the top of pier elevation. The cycle distance shall be determined by the aggregate pier designer.
 2. A high-energy impact densification apparatus shall be employed to vertically densify the aggregate pier elements during installation of each constructed lift of aggregate.
 3. Densification shall be performed using a mandrel/tamper. The mandrel/tamper foot is required to adequately increase the lateral earth pressure in the matrix soil during installation. Compaction equipment that induces horizontal vibratory energy shall not be permitted.
 4. Downward crowd pressure shall be applied to the mandrel during installation.
- G. Obstructions
 1. Obstructions, such as rocks, cobbles, boulders, and/or gravel shall be anticipated within the fill and native soils. The Contractor shall have sufficient capacity, equipment, and tooling necessary to allow for aggregate piers to achieve the design tip elevations, including penetrating obstructions, unless obstructions are otherwise pre-excavated. Piers terminating in existing fill shall be rejected.
- H. Modulus Test

1. A modulus test shall be performed to verify the parameter values selected for the design of the aggregate piers. The test pier shall be agreed upon by the ground improvement designer and the Owner. The modulus test shall include the following:
 - a. The test element shall be tested to a load equal to the element area times at least 150 percent of the aggregate pier maximum design stress (not allowable bearing pressure for footings) to demonstrate that the element exhibits safe response during service loading.
 - b. The top of the pier shall be exposed and a test plate/cap having the same diameter as the test aggregate pier shall be placed/constructed. The test plate/cap shall not extend beyond the edge of the aggregate pier.
 - c. General test procedures, including load increments, load increment duration, and load decrements shall be in accordance with ASTM D1143 and ASTM D1194.
 - d. A telltale shall be installed at the bottom of the test aggregate pier so that bottom-of-aggregate pier deflections can be determined.
 - e. With the exception of the load increment representing approximately 117% of the design maximum stress at the top of the aggregate pier, all load increments shall be held for a minimum of 15 minutes, a maximum of 1 hour, and until the rate of deflections reduces to 0.01 inches per hour or less.
 - f. The load increment that represents approximately 117% of the design maximum stress on the aggregate pier shall be held for a minimum of 15 minutes, a maximum of 4 hours, and until the rate of deflection reduces to 0.01 inches per hour or less.
 - g. A seating load equal to 5% of the maximum load shall be applied to the test place/cap prior to application of load increments and prior to measurement of deflections to compensate for surficial disturbance.
 - h. Modulus testing shall be performed in accordance with the requirements outlined in the Design Submittal.
 - i. The location of the modulus test shall be approved by the Owner.
 - j. The modulus test pier shall be installed in a manner that will be consistently used throughout aggregate pier installation. The details of the installation procedure shall be recorded by the Contractor's quality control representative.

3.4 SITE SUBGRADE PREPARATION

- A. Subgrades shall be prepared in accordance with Section 312316 Excavation, Backfill, and Compaction and the following paragraphs.
- B. Prior to placing fill on the aggregate pier subgrade, the exposed subgrade soils shall be thoroughly compacted with a hand-operator vibratory compactor or vibratory roller. Static compaction may be allowed if acceptable to the Owner. Compaction shall be performed on the same day that fill is to be placed and shall extend over the entire subgrade to compact any loose surficial soil.
- C. Excavation and compaction of all subgrades shall be the responsibility of the Contractor.
- D. Excavations to expose the tops of aggregate piers shall be made carefully to prevent disturbance of the piers. Excavations shall be protected until concrete placement to prevent softening of the matrix soil between and around the aggregate piers before placing concrete.

3.5 REJECTED AGGREGATE PIERS

- A. Aggregate piers improperly located or installed beyond the maximum allowable tolerances shall be abandoned and replaced with new piers unless the Designer and Owner approve other remedial measures. Aggregate piers terminating above the inorganic native soils shall be rejected. All material and labor required to replace rejected piers shall be provided at no additional cost to the Owner.

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SECTION 331113 - DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Ductile iron pipe and fittings, direct buried or in below grade vaults
2. Restrained joints and fittings
3. Cast-in-place concrete thrust blocks

B. Related Sections

1. Section 31 2333 – Trenching and Backfilling
2. Section 33 4114 – Underground Warning Tape
3. Appendix F - Report entitled “Greenwich Central Middle School Construction-Vibration and Controls During Construction” by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.2 REFERENCES

A. Pipe and fittings shall conform to the latest edition of the following standards unless otherwise specified:

1. ANSI/AWWA C104/A21.4, Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water.
2. ANSI/AWWA C110/A21.10, Ductile Iron and Grey Iron Fittings 3” through 48” for Water and Other Liquids.
3. ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
4. ANSI/AWWA C150/A21.50, Thickness Design of Ductile Iron Pipe.
5. ANSI/AWWA C151/A21.51, Ductile Iron Pipe, Centrifugally Cast, for Water.
6. ANSI/AWWA-C153/A21.53, Ductile Iron Compact Fittings Water Service.
7. ANSI/AWWA C600, Installation of Ductile Iron Water Mains and their Appurtenances.
8. ANSI/AWWA C800, Underground Service Line Valves and Fittings.
9. ANSI/AWWA C651, Disinfecting Water Mains.
10. ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

11. Ductile Iron Pipe Research Association, “Thrust Restraint Design for Ductile Iron Pipe” (Third Edition).

1.3 SUBMITTALS

A. Administrative Submittals

1. Detailed description of proposed pipe handling and installation methods along with the manufacturer’s approval.
2. Construction details and schedule of operation for each connection to existing piping at least 30 days prior to beginning the Work. Approval must be received before commencement of Work on-site.

B. Shop Drawings

1. Manufacturer’s scale drawings, cuts or catalogs including descriptive literature and complete characteristics and specifications and code requirements. Submit shop drawings for ductile iron pipe, types of joint, fittings, couplings, filling rings, lining, and coating.

C. Quality Control Submittals

1. Certificates of compliance on pipe materials.
2. Prior to first shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM and ANSI/AWWA Standards specified herein.
3. Manufacturers of pipe on the project shall have an established, annually audited, and certified, quality control procedure for manufacturing of pipe. Each manufacturer shall be certified by an independent, third-party auditor for compliance with all requirements of the AWWA standards. The manufacturer shall submit a current certificate of compliance for the plant facility where the pipe is to be made. Certificate of compliance shall be submitted for each additional year of pipe manufacturing during the duration of the Project. The manufacturer shall not change the plant manufacturing the pipe during the duration of the Work.

1.4 QUALITY ASSURANCE

- A. Ductile iron pipe shall be from a single manufacturer. Fittings shall be from a single manufacturer, not necessarily the pipe manufacturer.
- B. Shop Inspection - Materials are subject to inspection and approval at the manufacturing plant by the Engineer.
- C. The Engineer will inspect the pipe and fittings after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements. Pipe rejected after delivery or at any point during the progress of the Work, shall be marked for identification and shall immediately be removed from the job site and replaced at no additional cost to the Owner.
- D. Test pipe under pressure for defects and leakage in accordance with Section 33 1400 – Testing of Water Distribution Systems.
- E. All pipe and fittings shall be manufactured in North America.

1.5 PROJECT CONDITIONS

- A. Secure permits and pay fees required to carry out the piping work. Comply with laws, ordinances, codes, rules, and regulations of the local and state authorities having jurisdiction over the Work. Where provisions of the Contract Documents are in conflict with the codes, the code shall govern. The Contract Documents shall govern when in excess of the required or minimum regulations or codes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. American Cast Iron Pipe Company
- B. Griffin Pipe Products
- C. U.S. Pipe
- D. or approved equal

2.2 PIPE AND FITTINGS - GENERAL

- A. Ductile iron pipe shall be designed in accordance with AWWA C150 and shall be manufactured in accordance with AWWA C151. Fittings and other materials referenced in this section shall conform to the latest edition of the references listed in Paragraph 1.2 of this section.
- B. Unless otherwise indicated or specified in the Contract Documents, direct buried ductile iron pipe shall be Class 52 with push on joints and shall meet the Aquarion Water Company standards and requirements.
- C. Unless otherwise indicated or specified in the Contract Documents, ductile iron flanged pipe for vault or above ground service, or for installation in buried vaults, shall be Class 53 with flanged joints
- D. Unless otherwise indicated or specified in the Contract Documents, direct buried fittings shall be ductile iron or gray iron with mechanical joints.
- E. Pipe and fittings for water, sewage, or sludge service, except where specified, shall have a bituminous outside coating in accordance with AWWA C110, C151 or C153, as applicable.
- F. Obtain from the manufacturer sufficient gauged pipe sections in accordance with AWWA C151 to ensure the availability of each pipe diameter required on the Project.
- G. Pipe and fittings shall be cement mortar lined and seal coated on the interior in accordance with AWWA C104. Cement mortar lining shall be twice the standard thickness; tolerance shall be minus 0 inches, plus 1/8 inch.

2.3 PIPE AND FITTING JOINTS

- A. Push-on-joints and mechanical joints shall conform to ANSI/AWWA C111/A21.11.

- B. Where indicated on the Drawings, provide restrained joints suitable for a 250-psi working pressure and fabricated of heavy section cast iron casting. Gaskets shall meet the material requirements of ANSI/AWWA A21.11/C111 for mechanical joint gaskets.

2.4 FITTINGS

- A. Fittings shall be ductile iron.
- B. Fittings less than or equal to 12 inches in size shall conform to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 and shall have a 350-psi pressure rating.
- C. Fittings greater than 12 inches in size shall conform to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 and shall have the following pressure ratings:
 - 1. Fittings greater than 12 inches and less than or equal to 24 inches - 350 psi
 - 2. Fittings greater than 24 inches - 250 psi
- D. Mechanical joint retainer glands shall be installed on all mechanical joints, except where rodding is used. Retainer glands shall be specifically designed to fit standard mechanical joint bells with corrosion resistant, high strength, low-alloy T-head bolts conforming to ANSI/AWWA A21.11/C-111 and ANSI/AWWA A21.53/C-153. Retainer glands shall be manufactured of ductile iron conforming to ASTM A536-80 grade 60-42-10. Wedges shall be of hardened ductile iron and require the same torque in all sizes. These devices shall have a minimum 250 psi pressure rating with a minimum safety factor of 2:1 and shall be EBAA IRON, Inc., series 1100 or approved equal. Glands shall be listed with Underwriters Laboratories and/or approved by Factory Mutual and shall meet the Aquarion Water Company standards and requirements.
- E. Cast-in-place concrete thrust blocks are required at all fittings and will be used in conjunction with retainer glands, as specified in Paragraph 3.12 of this section. Thrust blocks, solid concrete blocks with oak wedges, are to be installed at all bends, tees, hydrants or A.O.B.E. against undisturbed earth.
- F. Anchoring tees shall have main run ends as indicated on the Drawings or as required for the installation. The branch shall have a plain end with an integral gland and rotating mechanical joint gland to provide a restrained connection with the adjacent valve or fitting.

2.5 COUPLINGS

- A. Couplings and transitional couplings for pipe less than or equal to 12 inches in diameter shall consist of a long body cast iron sleeve and shall have gaskets suitable for the pipe being joined. The bolts and nuts shall be corrosion resistant high strength, low alloy steel such as Cor-Ten steel or an approved equal. Couplings shall be Romac style 501, Dresser style 153, Rockwell type 441, or approved equal. Transition couplings for pipe less than or equal to 12 inches in diameter shall be Dresser Style 162, Rockwell Type 441, Smith Blair Omni Style 442, or approved equal.
- B. Couplings and transitional couplings for pipe greater than 12 inches in diameter shall consist of a steel sleeve and with gaskets suitable for the pipe being joined. The bolts and nuts shall be corrosion resistant high strength, low alloy steel such as Cor-Ten steel or an approved equal. Couplings shall be Dresser style 38, Smith Blair Style 311, Romac Style 400, or approved equal. Transition couplings for pipe greater than 12 inches in diameter shall be Dresser Style 62, Smith Blair Style 413, Romac Style TC400, or approved equal.

- C. Provide couplings with an exterior epoxy coating.
- D. Solid sleeves shall have long body type (12 inches min.) and mechanical joints with retainer glands.

2.6 GASKETS, GLANDS, NUTS, AND BOLTS

- A. Gaskets, glands, nuts, bolts and accessories shall conform to ANSI/AWWA C111/A21.11 or C153/A21.53, as appropriate.
- B. Gaskets shall be of plain tipped rubber, suitable for exposure to the liquid within the pipe.
- C. Lubricants must be suitable for the type of fluid to be carried by the pipeline, and shall be NSF approved for water service, where applicable.
- D. Glands shall be ductile or cast iron.
- E. Bolts shall be high strength, low alloy.
- F. Requirements for flanged joints:
 - 1. Gaskets for flanged joints shall be full faced red rubber, 1/8 inches thick. Gaskets shall conform to the dimensions of Table A.1 of ANSI/AWWA C115/A21.15. Ring gaskets shall be utilized for joints 14 inches in diameter and larger.
 - 2. Assemble flanged joints with bolts and nuts, bolt studs with nut on each end, or studs with nuts in tapped flanges. Bolts and nuts shall be of low carbon steel conforming to the chemical and mechanical requirements of ASTM A307, 60,000 psi tensile strength, Grade B. Bolts, nuts and studs shall be cadmium plated.

2.7 TEST CONNECTIONS

- A. Install air release, test connections, and blow offs in the piping for pressure testing and disinfection at locations to be determined by the Contractor and approved by the Engineer.
 - 1. Corporation cocks shall be in accordance with ANSI/AWWA C800 and shall be $\frac{3}{4}$ inch diameter with CC thread on inlet by iron pipe thread flare on outlet as manufactured by Mueller, Ford, McDonald or approved equal.
 - 2. Copper tubing shall be annealed Type K soft tubing and shall conform to the requirements of ASTM B88.
 - 3. Upon completion of testing and disinfection, remove the corporation cock and replace with a brass plug and the copper tubing removed. Field swab the brass plug for disinfection in accordance with AWWA C651.

PART 3 EXECUTION

3.1 GENERAL

- A. Deliver, handle, store and install ductile iron pipe in accordance with ANSI/AWWA C600.

3.2 DELIVERY, STORAGE AND HANDLING

- A. Delivery of Pipe and Fittings

1. Coordinate delivery of pipe and fittings with installation and unload along the line of work outside the trench near as practicable to the point of final placement, facing in the specified direction and properly wedged secure. Give minimum 24 hour notice to the Engineer prior to pipe deliveries. Notice shall include the method of unloading.
2. Unload and handle pipe and fittings with a crane or backhoe of proper capacity outfitted with a steel cable sling, belt sling or other specially designed attachment to protect the pipe coating.
3. At the end of each work week, no more than the amount of pipe to be installed the following work week shall remain along the construction route. All pipes remaining at the construction route are to be properly wedged to prevent movement and not interfere with traffic or pedestrian movement. All excess pipes are to be stockpiled at an approved staging yard in accordance with AWWA C600.

B. Storage of Materials

1. Store pipe in a manner to keep pipe interior free from dirt and foreign matter. Store pipe on wood blocking, rails or other suitable materials. Pipe shall not be stored on stones.
2. Pipe may be stored on top of each other to the maximum stacking height specified by AWWA C600.
3. Protect materials subject to corrosion in accordance with manufacturer's recommendations.
4. If pipe or project materials are stored at the Contractor's approved staging yard, the Engineer shall be permitted reasonable access to the staging yard for inspection of the pipe and materials.
5. Pipe ends shall be sealed tight using polyethylene bags and tape immediately after unloading, regardless of the storage time length, in order to keep foreign matter and wind blown debris out.
6. All vales, hydrant and fittings are to be stored off of the ground on wooden pallets.

C. Handling Materials

1. Handle materials in such a manner so as to prevent damage to the concrete or mortar coating or lining.
2. Materials are to be handled using methods approved by the pipe manufacturer.
3. Materials damaged during handling will be rejected and shall be replaced at the Contractor's expense.
4. Ensure that no foreign materials enter the materials during handling.

3.3 COORDINATION

- A. Existing mains may have to be shut down to complete the connections as shown on the Drawings and as specified herein.
1. Existing valves will only be operated by the Owner.

2. Submit requests for shutdown of existing piping to the Engineer at least 5 working days prior to the operations and reschedule operations to prevent conflicts with the Owner's operations.
3. The Owner reserves the right to cancel the shut-down at any time without penalty if system conditions exist in which it would be a matter of public health or safety to do so.
4. The Owner does not guarantee complete shut down of valves. Make necessary provisions to do work under existing conditions.

3.4 DEFECTIVE PIPE

- A. Defective pipe or fittings will be rejected for use on this project. Defective pipe is classified as follows:
 1. Damage to interior cement-mortar lining
 2. Insufficient cement-mortar lining thickness
 3. Pipe out of round
 4. Damaged pipe barrel area
 5. Damaged pipe bells or spigots
 6. Missing, misplaced or illegible marking and identification
 7. Outside pipe diameter shall not exceed allowable tolerance
- B. If defective pipe is discovered after it has been installed, it shall be removed and replace with sound pipe, at no additional cost to the Owner.

3.5 JOB CONDITIONS

- A. Environmental Requirements
 1. Do not lay pipe when weather conditions are unsuitable, as determined by the Engineer, for pipe laying work.
 2. Equipment for pipe laying shall be maintained in good operating order.
 3. Job site shall be kept clean of debris and organized.
- B. Protection
 1. At all times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug. This provision shall apply at all times when pipe laying operations are suspended.
- C. Work Affecting Existing Pipelines
 1. Work on Existing Pipelines:
 - a. Prior to any work on existing pipelines, remove soils, rust, and other debris from the exterior wall of the pipe a minimum of 12 inches beyond the work area.
 - b. Cut pipes as shown or required with machines specifically designed for this work.

- c. Install temporary plugs to keep out all mud, dirt, water, and debris.
- d. Provide necessary adapters, fittings, pipe, and appurtenances required.
- e. Cut or tap existing mains at the mid span of a pipe barrel. In no case shall a pipe be cut or tapped within 24 inches of a pipe joint.

3.6 CLEANING PIPE AND FITTINGS

- A. Clean and remove foreign matter from the interior of each pipe and fitting before placing in the trench. Remove pipe and fittings whose interior has been contaminated with oil, gasoline or kerosene and replace at no additional cost to the Owner. Remove pipe and fittings whose interior has been contaminated with any material which is a regulated drinking water contaminate or which damages the cement and replace at no additional cost to the Owner. Should foreign material or contaminants be observed in previously installed pipe, cease work until foreign material or contaminated pipe is decontaminated or removed.
- B. Remove all lumps, blisters, and excess coal-tar coating from the bell and spigot ends of each pipe or fitting. The outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean and be dry and free from oil and grease before the pipe or fitting is laid.
- C. On all ductile iron pipe or fittings, the bell of the pipe and the spigot of the adjacent pipe or fitting shall be wire-brushed and cleaned of rust and dirt. The bell of the pipe or fitting and the spigot of the adjacent pipe shall then be lubricated with the joint lubricant furnished with the pipe, and used in accordance with the manufacturer's directions.

3.7 ALIGNMENT AND GRADE

- A. Lay and maintain the pipe at the required lines and grades as shown on the Drawings. Fittings shall be at the locations indicated on the Drawings and as required to construct the pipeline with joints centered, and spigots properly fitted. No deviation shall be made from the line and grade indicated on the drawings, except with the approval of the Engineer.
- B. Joint Openings and Deflection:
 - 1. The maximum allowable joint openings and deflection for push-on joint pipe and restrained joint pipe shall be one-half the manufacturer's maximum allowable opening and deflection.
- C. Line or Grade Conflicts with Other Structures
 - 1. Wherever obstructions not shown on the Drawings are encountered during the progress of the Work and interfere to such an extent that an alteration in the Drawing is required, the Engineer will order a deviation from the line and grade at locations where obstructions such as culverts, ducts, wire and/or pipes are encountered. The pipe shall be laid over or under such obstacles with a clearance of 6 inches. The choice of "over" or "under" is shown on the Drawings, but the Engineer reserves the right to make any alterations at the time of construction.
- D. Where underground conditions indicate a change of alignment or grade, such change shall be made only with the written consent of the Engineer.
- E. Except at locations indicated on the Drawings by the profile, do not establish high points where air can accumulate.

3.8 PIPE INSTALLATION

A. General Requirements

1. Prepare the pipe trench in accordance with Section 312333 Trenching and Backfilling.
2. Keep trenches dewatered while installing pipe until all required pipe joints have been made and the trench has been backfilled above the water table to a point where pipe uplift will not occur when the pipe is empty.
3. Carefully lower pipe and fittings into the trench piece by piece by means of a crane, ropes or other tools or equipment, in such a manner as to prevent damage to pipeline materials and protective coatings and linings. Under no circumstances shall pipeline materials be dropped or dumped into the trench.
4. Carefully inspect pipe and fittings for cleanliness and defects prior to placing them in the trench.
5. Install underground warning tape over the pipe in accordance with Section 334114 Underground Warning Tape.

B. Laying Pipe

1. Install pipe with a minimum of 4.5 feet of cover, unless indicated otherwise on the Drawings or directed by the Regional Water Authority.
2. Prevent foreign material from entering the pipe while it is being placed in the line. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe.
3. When laying pipe, the spigot end shall be centered in the bell, the pipe forced home and the joint completely assembled. The pipe shall be adjusted to correct line and grade and secured in place with approved backfill material, properly tamped under and around the pipeline.
4. When laying the pipe, remove and replace fittings that do not allow a sufficient and uniform space for joints at no additional cost to the Owner.

C. Cutting Pipe

1. Furnish pipe in full lengths. Cut ductile iron pipe without damage to the pipe or cement lining. The cutting shall be done to leave a smooth end at right angles to the axis of the pipe.
2. Cut ductile iron pipe either by the use of compression-type chain cutters which exert an even continuous force on the wall of the pipe or by power driven abrasive wheels.
3. On ductile iron pipe using rubber joints, the outside edge of the cut end must be tapered back approximately $\frac{1}{4}$ inch at an angle of about 30 degrees so as to provide for the proper assembly of this joint.

D. Permissible Deflection at Joints

1. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or where long-radius curves are permitted, the amount of deflection allowed shall not exceed one-half of the manufacturer's maximum allowable joint deflection and shall be approved by the Engineer.

2. Radius curves indicated on the Drawings or approved during Shop Drawing review shall be made using full lengths of pipe. The use of short lengths of pipe and extra joint in order to make a smaller radius turn will not be allowed without the written approval of the Engineer.

3.9 PUSH-ON JOINTS

- A. Push-on joints shall be made in accordance with the manufacturer's instructions. Install gaskets in the pipe bell after lowering the pipe into the trench for installation. Thoroughly clean the bell and spigot of dirt and tar blisters in the trench utilizing a wire brush or bristle brush. Insert rubber gasket in the groove of the bell end of the pipe beginning at the bottom of the bell and working to the top of the bell. Apply lubricant per the manufacturer's recommendations utilizing a paint brush to the pipe gasket and the pipe spigot to be joined. Place a clean rag under the joint to protect the joint from dirt caused by unintentional grounding of the pipe during jointing. Upon completion, remove the rag. Align the plain end of the pipe to be laid and insert in the bell of the pipe to which it is to be joined and push home with a jack or by other means. After joining the pipe use a metal feeler to make certain that the rubber gasket is correctly located.

3.10 MECHANICAL JOINTS

- A. Mechanical joints shall be made in accordance with Appendix A of ANSI A21.11/AWWA C111 and the manufacturer's instructions. Thoroughly clean and lubricate the joint surfaces and rubber gasket before assembly. Tighten bolts to the specified torques. Under no conditions shall extension wrenches or an extended handle ratchet wrench be used to secure greater leverage.

3.11 RESTRAINED JOINTS

- A. Install restrained joints on all fittings, bends, tees and at a minimum of two pipe lengths either side of a fitting. Make the joint assemblies in accordance with the manufacturer's recommendations.

3.12 CONCRETE THRUST BLOCKS

- A. Concrete thrust blocks shall be used in conjunction with retainer glands or other restraining methods at all tees, bends, offsets, hydrants, caps and plugs. Concrete shall be 3,000 psi.
- B. Place cast-in-place concrete thrust blocks at all bends (regardless of the angle of deflection or direction), caps, offsets, hydrants, and tees, as well as in locations shown on the Drawings or directed by the Engineer. Cast-in-place thrust blocks shall be formed with wood forms; rough earth forms are not acceptable. Protect pipeline materials and fittings from direct adherence of the concrete thrust block by wrapping in plastic, roofing felt, reinforced manila paper or similar material. The thrust block shall not bear directly on the joint and shall not interfere with future adjustments, tightening, or removal of the joint. Thrust blocks shall bear against undisturbed soil at the side or end of the trench and this undisturbed surface shall be carefully cleaned off so as to be vertical. The thrust blocks shall have a minimum horizontal thickness of 2 feet and shall have the minimum bearing area listed on the Drawings, measured perpendicular to the direction of thrust.

3.13 DISINFECTION

- A. Disinfect pipe, fittings, and valves in accordance with Section 33 1300 – Disinfection of Water Distribution Systems, before placing into service.

3.14 TESTING

- A. Pipe, fittings, and valves installed under this contract shall be tested in accordance with Section 33 1400 – Testing of Water Distribution Systems, before being placed into service.

3.15 INFORMATION

- A. Provide “as-built” survey made by a licensed surveyor registered in the State of Connecticut, paid for by the Site Contractor, showing all actual locations, inverts, grades of structures and piping. Furnish one set to the owner and one set to the Site Engineer. As-builts shall meet the Aquarion Water Company requirements

END OF SECTION

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SECTION 333113 - POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

- A. Section Includes
 - 1. PVC Gravity Pipe and Fittings
 - 2. Perforated PVC Drain Pipe
- B. Related Sections
 - 1. Section 31 2300 - Excavation, Backfill, Compaction and Dewatering
 - 2. Section 31 2333 – Trenching and Backfilling
 - 3. Section 33 3114 – Testing of Sanitary Sewer and Storm Drainage Systems
 - 4. Appendix F - Report entitled “Greenwich Central Middle School Construction-Vibration and Controls During Construction” by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 REFERENCES

- A. ASTM D2412 - Standard Test Method for External Loading Properties of Plastic Pipe by Parallel-Plate Loading.
- B. ASTM D2444 - Standard Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).
- C. ASTM D3034 - Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
- D. ASTM D3212 - Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

- E. ASTM F477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.4 SUBMITTALS

- A. Submit specifications and shop drawings for materials and equipment furnished under this Section.
- B. Prior to first shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM Standards specified herein.

1.5 QUALITY ASSURANCE

- A. Each type of PVC pipe and fittings shall be from a single manufacturer and shall conform with the Town of Greenwich Department of Public Works Sewer & Engineering Division standards, materials, and requirements.
- B. Inspection of the pipe will also be made by the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements. Pipe rejected after delivery shall be marked for identification and shall immediately be removed from the job site.
- C. No recycled pipe will be accepted.

1.6 SPARE PARTS

- A. Supply 4 tee handle wrench operators suitable to operate the curb stops installed under this section.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Gravity Pipe
 - 1. Polyvinyl chloride (PVC) pipe shall be of the size indicated on the Drawings or as specified and shall conform to the latest revision of ASTM D3034, Type SDR 35 for diameters less than or equal to 15-inch diameter and ASTM F679 for pipe greater than 15-inch diameter. Standard laying lengths shall not exceed 14.0 feet.
 - 2. Joints shall be elastomeric gasket joints and shall provide a watertight seal. Assembly of joints shall be in accordance with ASTM D3212.
 - 3. The minimum "pipe stiffness" (load divided by change in inside diameter in direction of load application) at 5% deflection shall be at least 46 psi for pipe tested in accordance with ASTM D2412.

4. No shattering or splitting shall be evident when 150 ft.-lbs. and 210 ft.-lbs. is impacted on 4 inch and 6-inch diameter pipe, respectively, in accordance with ASTM Method of Test D2444.
5. Pipe lengths and fittings to be used on the project shall be clearly marked on the outside in bold type with the name of the manufacturer, pipe size, pipe material, pipe class, and ASTM designation.
6. Gravity Pipe Lateral Connections.
 - a. Gravity pipe lateral connection wyes and tees are to be laid in the run of the main pipeline. The wyes and tees shall be the same material as the main line and shall conform in material, joints, and class with the line into which they are to be laid.
 - b. Eighth and sixteenth bends and end plugs are to be of the same material and class or strength designation as the pipe for the house connection.
 - c. Unless noted on the Drawings, house service piping shall use the same diameter tees, WYEs and lateral pipes as existing to connect existing laterals to new mainline sewer and shall be of the same material as the main line pipe.
7. Lateral Service Chimneys
 - a. Pipe and fittings shall use the same diameter tees, WYEs and lateral pipes as existing to connect existing laterals to new mainline sewer and be of the same material as the main line pipe.
 - b. Construct service chimneys with precast concrete sections. Cast-in-place chimneys will not be acceptable.
 - c. Concrete chimneys shall be designed so that the weight of the chimney is not transferred onto the main line pipe or tee.
 - d. Concrete used for construction of chimneys shall be 5,000 psi at 28 days.

B. Perforated Pipe

1. Perforated polyvinyl chloride pipe shall be Type PS-46 PVC and conform to ASTM F758. Perforated pipe shall be furnished in lengths of not more than 20 feet.
2. Alternately, perforated polyvinyl chloride pipe shall conform to ASTM D3034 in sizes 4 through 15 inch. Perforations shall be two rows of ½ inch diameter holes spread longitudinally, 6 inches (maximum) apart and shall be oriented 120 degrees apart (60

degrees either side of the pipe bottom). A maximum tolerance of 1/4-inch on hole spacing and size will be allowed. The top of pipe shall be marked for ease of installation.

PART 3 EXECUTION

3.1 HANDLING PIPE AND FITTINGS

- A. Take care in loading, transporting, and unloading to prevent injury to the pipe. Do not drop pipe or fittings. Examine pipe and fittings before installing, and no piece shall be installed that is found to be defective.
- B. If any defective pipe is discovered after it has been installed, remove, and replace it with a sound pipe in a satisfactory manner. Thoroughly clean pipe and fittings before installing, keep clean until they are used in the work, and conform to the lines, grades and dimensions required when installed.
- C. Pipe ends requiring cutting shall be cut square without damage to the remaining pipe. Bevel cut pipe ends 1/8 inch at approximately 30 degrees to provide proper assembly of the joint. Beveling can be done with a coarse file or portable grinder.
- D. Support stored pipe from below at not more than 3-foot intervals to prevent deformation. Do not stack pipe higher than 6 feet. Store pipe and fittings in a manner which will keep them at ambient outdoor temperatures. Provide temporary shading as required to meet this requirement. Simply covering of the pipe and fittings which allows temperature buildup when exposed to direct sunlight will not be permitted.

3.2 INSTALLATION

- A. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length. If a piece of pipe fails to meet this required check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.
- B. Install piping and fittings true to alignment and grade. If necessary, each length of pipe shall be cleaned out before installation.
- C. Excavation, trenching and back filling procedures shall be in accordance with Section 31 2333.
- D. All PVC gravity pipe shall be installed on a bed of 3/4-inch crushed stone borrow meeting the requirements of Section 31 2000 and have a minimum depth of 6 inches. The 3/4-inch crushed stone borrow shall also completely encase the pipe and cover the pipe to a grade 6 inches over the top of the pipe for the entire width of the trench. Bell holes shall be made in the 3/4-inch crushed stone borrow bedding such that the pipe shall be uniformly supported throughout the entire length of the barrel section.

- E. All sections of gravity sewer pipe will be low pressure air tested in accordance with Section 33 3114.
- F. All PVC force main pipe shall be installed with proper bedding using compacted native materials which provide uniform longitudinal support under the pipe. When an unstable subgrade material is encountered which will provide inadequate pipe support, additional trench depth should be excavated and refilled with suitable material. Initial backfill material should be placed to a minimum one foot over the top of the pipe. Pipe backfill material should be selected and placed carefully, avoiding stones, frozen lumps, and debris.
- G. Deflections in Pipe Alignment.
 - 1. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that required for satisfactory making of the joint and shall be approved by the Engineer.
 - 2. Prior to deflecting the pipeline, the spigot of the pipeline should be marked flush with the bell end to assure that the spigot is not withdrawn excessively as the result of the deflection. After the pipe is deflected, an adequate depth of jointing material must remain on the side where the spigot is away from home and an adequate width of caulking space must remain on the opposite side of the pipe at the face of the bell.
 - 3. The maximum deflection recommended by the manufacturer when using any pipe system must be observed when deflecting a pipeline.
 - 4. In general, all radius curves called for on the Drawings or permitted at the time of construction are to be made using full lengths of pipe. The use of short lengths of pipe and extra joints in order to make a smaller radius turn will not be allowed without the written approval of Engineer.
- H. Unsuitable Laying Conditions
 - 1. No pipe shall be laid in water, in an unsuitable trench or during unsuitable weather conditions.
- I. “As-Built” Information
 - 1. Provide “as-built” survey made by a licensed surveyor registered in the State of Connecticut, paid for by the Site Contractor, showing all actual locations, inverts, grades of structures and piping. Furnish one set to the owner and one set to the Site Engineer. As-builts shall meet the Town of Greenwich Public Works Sewer & Engineering Division requirements.

END OF SECTION

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SECTION 334100 - STORM DRAINAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

- A. General: Provide storm drainage systems in accordance with the Contract Documents.
- B. Related Sections include the following:
 - 1. Section 31 2500 – Soil Erosion and Sediment Controls
 - 2. Section 31 2300 - Excavation, Backfill, Compaction and Dewatering
 - 3. Section 31 2333 – Trenching and Backfilling
 - 4. Section 33 0514 – Breaking into Existing Manholes and Catch Basins
 - 5. Section 33 4419 – Stormwater Treatment System
 - 6. Appendix F - Report entitled “Greenwich Central Middle School Construction-Vibration and Controls During Construction” by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 COORDINATION

- A. Coordinate and schedule the work of this Section with all trades involved to prevent interference, and in order to allow adequate time at the proper stage of construction to properly perform all work of this Section.

1.4 REQUIREMENTS AND RESTRICTIONS

- A. Requirements given herein may be affected by other related requirements of the project specifications. Correlation of all contract requirements is the responsibility of the Contractor.
- B. Connect to storm drain lines at a point five (5) feet outside the building lines. All drain lines within a point five (5) feet outside the building lines are specified in the Plumbing Division.

- C. Work to comply with all applicable codes and regulations. Furnish all bonds necessary to get a permit for cuts and connections to sewer.
- D. The term "Local Standards" as used herein, means the standards of design and construction of the Town of Greenwich, or State of Connecticut, whichever is applicable.
- E. Maintain in operating condition all active utilities, sewers, gutters, and other drains encountered in the utility installation. Repair to the satisfaction of the Owner any surface or subsurface improvements damaged during the course of the Work (unless such improvement is shown to be abandoned or removed), whether or not such improvement is shown on the Drawings.

1.5 APPLICABLE STANDARDS

- A. Town of Greenwich applicable standards for roadway standards.
- B. Standard Specifications for Roads, Bridges and Incidental Construction Form 818 as issued by the State of Connecticut Department of Transportation, 2020 edition with all latest amendments thereto.
- C. The Town of Greenwich Public Works standards, materials, and requirements.

1.6 SUBMITTALS

- A. Structure details for manholes, catch basins, trench drains, oil interceptors, vortex swirl separators, rims, frames, grates, etc.
- B. Certification of Specification Compliance for drainage structures including catch basins and manholes.
- C. All piping certifications, casting data and the like as may be required by the Owner.
- D. Product data for geotextile fabric for riprap aprons, if substitution is requested.
- E. Product data for erosion control blanket, if substitution is requested.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Pipe:
 - 1. Polyvinyl Chloride (PVC) Pipe: Pipe and fittings to conform to ASTM D 3034 "Type PSM Polyvinyl Chloride (PVC) Sewer pipe and fittings, Class SDR-35." The minimum modulus of elasticity shall be 400,000 psi.
 - 2. Corrugated Exterior / Smooth Interior HDPE Pipe and Fittings: Pipe and fittings to conform to ASTM D3350 minimum cell classification 324420C (4"-10") or

325420C (12”-60”). The polyethylene pipe and fittings shall comply with AASHTO M294, Type S (smooth wall interior)

B. Structures and Miscellaneous:

1. Concrete – Class “A” Concrete conforming to ConnDOT Form 818, Article M.03.01, 3,000 p.s.i. to comply with requirements and workmanship set forth in the referenced standards.
2. Ensure precast structures are yard manufactured of 5,000 p.s.i. material and are in accordance with standard details as shown on the drawings - ASTM C-478 and in compliance with Section M.08.02.4 of the reference standard.
3. Concrete block for drainage structures shall conform to the requirements of ASTM C 55, Grade S II.
4. Masonry concrete units for drainage structures shall conform to the requirements of ASTM C139.
5. Brick for adjustment – AASHTO M 91, Grade SM, except that the depth shall be 2-1/4 inches, the width 3-5/8 inches and the length 8 inches, and except that the maximum water-absorption by 5-hour boiling shall not exceed 15% for an average of five bricks, or 18% for an individual brick.
6. Ensure frames and covers or gratings are provided where indicated on the drawings of cast iron conforming to ASTM A-48, Class 30 and are similar and equal to Campbell Foundry Company as required by drawing details. Machine casting frame and grating seats to prevent rocking. Unit assemblies to comply with Section M.08.02-5 of the reference standard.
7. Catch basin bell traps are to be constructed of cast iron for pipe sizes up to 24 inches, and galvanized fabricated steel for pipe sizes 24 inches and over. Hanger plates to be constructed of same metal.
8. Aluminum Steps for Manholes: Aluminum conforming to AASHTO M199 (ASTM C478), with ends in concrete walls coated with zinc chromate paint conforming to Federal Specification TT-P645.

C. Backfill and Bedding Material:

1. The backfill envelope of select material, consisting of crushed stone and sand, for storm drain piping shall meet the following gradation:

- a. 100% passing 1/4-inch sieve; not more than 35% passing the No. 50 sieve; not more than 10% passing the No. 100 sieve.
 - b. All percentages are by weight and shall be determined in accordance with ASTM D422.
- 2. Bedding Material shall be as follows:
 - a. For structures, crushed stone conforming to ConnDOT Form 818, Article M.02.06-1.
- D. Riprap Aprons:
 - 1. Riprap for riprap aprons shall be sound, tough, durable and angular rock, free from decomposed stones or other defects impairing its durability and shall conform to the gradation of Modified Riprap as specified in ConnDOT Form 818, Article M.12.02-3.
 - 2. Granular fill beneath riprap aprons shall conform to ConnDOT Form 818, Article M.02.01-2.
 - 3. Geotextile for riprap aprons shall be Mirafi 140N, or approved equal.
- E. Drainage Swales:
 - 1. Erosion Control Blanket for turf establishment in swales shall be North American Green S75, or approved equivalent.
 - 2. Seeding for grass swales in wetland areas shall be “New England Wetmix”, by New England Wetland Plants, Amherst, Massachusetts, or approved equal.
- F. Biofiltration Swales:
 - 1. Seeding for biofiltration swale slopes and bottoms shall be “New England Control/Restoration Mix”, by New England Wetland Plants, Amherst, Massachusetts, or approved equal.
 - 2. Permeable soil shall be a mixture of 60% sand conforming to ConnDOT Form 818, Article M.08.01-21, 20% Topsoil conforming to Section 02900, and 20% Leaf Compost.
 - 3. Crushed Stone: ConnDOT Grading No. 6, conforming to ConnDOT Form 818, Article M.02.01-1.
 - 4. Separation Geotextile: Mirafi 140N or approved equal.
- F. Balance of materials shall be as indicated on the Drawings and/or specified elsewhere in this Section.

PART 3 EXECUTION

3.1 INSPECTION

- A. Provide adequate survey controls to construct the utility lines and structures as shown on the Drawings. Deviations from the plans will be permitted only with the approval of the Owner. Provide an "as-built" record made by a licensed surveyor registered in the State of Connecticut, and paid for by the Site Contractor, showing all actual locations, inverts, grades, etc. Furnish one set furnished to the Owner and one set to the Site Engineer.
- B. Examine the areas and conditions under which the site storm drainage system is to be installed. Notify the Owner and Site Contractor in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.
- C. Dig test pits at the locations shown on the Drawings or ordered by the Owner before installation of storm drainage systems. Notify Engineer 48 hours before start of test pits. Test pit excavations shall have neat, clean cut and vertical sides. Provide Engineer with survey of utilities within the hole showing horizontal and vertical location of top and bottom of all pipes, ducts and structures and a description of size and type of material. Backfill, compaction and surfacing to be in accordance with Section 31 2333 – Trenching and Backfilling.

3.2 TRAFFIC CONTROL

- A. Maintain access for vehicular and pedestrian traffic as required for other construction activities and for public when working in road rights-of-way.
- B. Provide flagmen, barricades, warning signs and warning lights as required. Obtain required opening permits before start of Work.

3.3 INSTALLATION

- A. Lay out all drainage systems, starting from the downstream end, true to line and grade to provide positive pitch, and place "in-the-dry".
- B. Length of piping shown is approximate. Provide all piping required to complete system.
- C. Lay pipe true to the lines and grades shown on the Drawings or ordered by the Engineer.
- D. Before laying pipe, wipe the insides of sockets and outside of spigots clean of all dirt, grease, sand or water.
- E. The pipe should not be dropped from the delivery truck into an open trench or onto uneven surface, it should not be dragged or struck against another pipe or object, the pipe should not be dragged across the ground.

- F. Where soft foundation is encountered in the progress of the Work, Site Contractor to remove such soft foundations as unsuitable material and material as described in the excavation of unsuitable material or as ordered by the Owner's Geotechnical Consultant. Place crushed stone not less than six inches in depth in wet trenches as bedding to support pipe and structures, on the order of the Owner's Geotechnical Consultant. Ensure stone is of a quality acceptable to the Owner's Geotechnical Consultant and not larger than will pass through a one (1) inch ring.
- G. Conduct backfilling so that no stone having a dimension larger than five (5) inches shall be placed within six (6) inches of completed sewer line and none larger than nine (9) inches in diameter shall be placed less than fifteen (15) inches above the pipe.
- H. Install gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements.
- I. At the point where the proposed sewer construction meets a live or exiting sewer, the new sewer shall be securely plugged with brick and mortar until the entire new sewer construction is completed and ready for final inspection. No deviations from this provision will be allowed.
- J. Plastic Pipe: Install plastic piping in accordance with pipe manufacturer's instructions. Use joint adhesives as recommended by manufacturer to suit basic pipe materials. Where standards herein conflict, the more stringent shall apply.

3.4 CLEANING CONDUIT

- A. Clean interior of conduit of dirt and other superfluous material as Work progresses. Maintain swab or drag in line and pull past each joint as it is completed.
- B. In large, accessible conduit, brushes and brooms may be used for cleaning.
- C. Place plugs in ends of uncompleted conduit at end of day or whenever Work stops.
- D. Flush lines between manholes if required to remove collected debris.

3.5 JOINT ADAPTERS

- A. Make joints between cast iron pipe and other types of pipe with standard manufactured cast iron adapters and fitting.

3.6 ROOF DRAIN CONNECTIONS

- A. Connect roof drains to storm drainage system with standard adapters. Grout joints between PVC pipe, cast iron pipe and concrete pipes thoroughly with cement mortar to make watertight joints.

3.7 CLOSING ABANDONED UTILITIES

- A. Close open ends of abandoned underground utilities in accordance with Drawings. Provide sufficiently strong closures to withstand hydrostatic or earth pressure that may result after ends of abandoned utilities have been closed.

3.8 INTERIOR INSPECTION

- A. Inspect conduit to determine whether line displacement or other damage has occurred.
- B. Perform inspections after lines between manholes or catch basin locations have been installed and approximately two feet of backfill is in place and at completion of Project.
- C. If inspection indicates poor alignment, debris displaced pipe, infiltration, or other defects, correct such defects to the satisfaction of the Engineer. Debris to be disposed off-site at Construction Manager's expense.

3.9 DRAINAGE STRUCTURES (REFER TO DETAILS)

- A. Inspect conduit to determine whether line displacement or other damage has occurred.
- B. Set brick and/or block in mortar with joints full and fill all joints.
- C. In manholes form invert channel of concrete, fill, smooth and accurately shape to conform to outside of adjoining pipe. Change direction of channel with true curve of as large as radius as possible.
- D. Where structures are constructed of solid concrete catch basin block, set block in cement mortar and fill all cross joints.
- E. Set frames and grates to proper elevations and in bed of mortar.

3.10 EXISTING UTILITIES

- A. Utility locations shown are approximate. Contractor shall determine exact locations before submitting bid.
- B. When encountered in Work or as indicated, protect existing active sewer, water, gas, electric, other utility services, structures; where required for proper execution of Work, relocate them as directed by the Utility Company responsible for the service. If existing active services are not indicated but are encountered, requiring protection or relocation, determine with utility company providing said service the appropriate action required to provide protection or method of relocation; advise Owner of all changes and manner of same.

END OF SECTION

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SECTION 334113 - HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

- A. Section Includes

- 1. High density polyethylene (HDPE) pipe for:
 - a. On-site storm drainage lines.
- 2. Types of HDPE piping specified in this section include:
 - a. Corrugated exterior, smooth interior, solid wall HDPE pipe.
 - b. Corrugated exterior, smooth interior, perforated HDPE pipe

- B. Related Sections

- 1. Section 31 2300 – Excavation, Backfill, Compaction and Dewatering
- 2. Section 31 2333 – Trenching and Backfilling
- 3. Section 33 3114 – Testing of Sanitary Sewer and Storm Drainage Systems
- 4. Appendix F - Report entitled “Greenwich Central Middle School Construction-Vibration and Controls During Construction” by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 REFERENCES

- A. AASHTO M252 –Corrugated Polyethylene Drainage Pipe
- B. ASSHTO M294 – Corrugated Polyethylene Pipe, 300- to 1200-mm Diameter

- C. AASHTO MP7 – Corrugated Polyethylene Pipe, 1300- to 1500-mm Diameter
- D. ASTM D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable
- E. ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- F. ASTM D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- G. ASTM D2683 – Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
- H. ASTM D2737 – Standard Specification for Polyethylene (PE) Plastic Tubing
- I. ASTM D2774 – Standard Practice for Underground Installation of Thermoplastic Pressure Piping
- J. ASTM D2837 – Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
- K. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- L. ASTM D3261 – Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
- M. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- N. ASTM F405 – Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings
- O. ASTM F667 – Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings
- P. ASTM F1417 – Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

1.4 SUBMITTALS

- A. Submit product data on the pipe, fittings, and accessories.
- B. Prior to first shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the appropriate ASTM standards specified herein.

- C. All on-site storm sewers shall conform to Advance Drainage Systems ADS N12 WT IB pipe or approved equal.

1.5 DELIVERY, STORAGE AND HANDLING

- A. When lifting with slings, only wide fabric choker slings capable of safely carrying the load shall be used. Wire rope or chain shall not be used to handle pipe.

PART 2 PRODUCTS

2.1 MANUFACTURER – GENERAL

- A. The manufacturer shall have manufacturing and quality assurance facilities capable of producing and assuring the quality of the pipe and fittings required by these specifications.
- B. Pipe and fittings from different manufacturers shall not be interchanged for the same type of pipe and application.

2.2 PIPE IDENTIFICATION

- A. The following shall be continuously indent printed on the pipe or spaced at intervals not exceeding five-feet:
 - 1. Name and/or trademark of the pipe manufacturer.
 - 2. Nominal pipe size.
 - 3. Dimension ratio.
 - 4. The letters “PE” followed by the polyethylene grade in accordance with the ASTM designation, followed by the hydrostatic design basis in PSI.
 - 5. A production code from which the date and place of manufacture can be determined.

2.3 CORRUGATED EXTERIOR / SMOOTH INTERIOR HDPE PIPE AND FITTINGS

- A. General
 - 1. The polyethylene pipe and fittings shall comply with AASHTO M294, Type S (smooth wall interior).
 - 2. Piping shall be manufactured by Advanced Drainage Systems, Inc., or approved equal.

3. Pipe material and fittings shall be high density polyethylene meeting ASTM D3350 minimum cell classification 324420C (4"-10") or 325420C (12"-60").
4. Installation shall be in accordance with ASTM D2321.
5. Pipe shall be joined with the bell-and-spigot joint. Gaskets and joint lubricant shall be utilized. On-site storm sewer pipe shall be ADS N12 WT IB type pipe or approved equal.
6. Minimum parallel plate pipe stiffness shall be as recommended for each specified diameter pipe per ASTM Test Method D2412.
7. The pipe and fittings shall be free of foreign inclusions and visible defects. The ends of the pipe shall be cut squarely and cleanly so as not to adversely effect joining.
8. The nominal size of the pipe and fittings is based on the nominal inside diameter of the pipe. Corrugated fittings may be either molded or fabricated by the manufacturer. Fittings and gaskets supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Engineer.

2.4 JOINTS FOR CORRUGATED PIPING

A. General

1. Joints of corrugated pipe sections and fittings other than smooth interior, shall be made with split couplings, corrugated to engage the pipe corrugations, and shall engage a minimum of 4 corrugations, 2 on each side of the pipe joint. Where required by the Engineer, a neoprene gasket shall be utilized with the coupling to provide a soil tight joint.
2. Joints of smooth interior, corrugated pipe sections shall be as per manufacturer's instructions utilizing gasketed PVC or HDPE joints meeting ASTM D-3212.
3. Installation shall be in accordance with ASTM Recommended Practice D-2321 or as specified by the Engineer or local approving agency.

B. Watertight Pipe

1. Provides superior watertight performance.
2. Meets ASTM D3212 requirements of 10.8 PSI for 10 minutes with no leakage.
3. Shall be ADS, N-12 IB WT (watertight joint type) piping or approved equal.

C. Manhole Boot Connection

1. Watertight seal made with rubber manhole boot as manufactured by Press Seal, or approved equal.
 2. Alternatively, watertight seal made by Alok, or approved equal, in which case maximum insertion angle is 7 degrees.
- D. Watertight Seals for Corrugated HDPE Pipe - Shall be NPC Corrugated Pipe Adapter compatible with Kor-N-Seal manhole connector.

2.5 CORRUGATED INTERIOR/SMOOTH EXTERIOR SLOTTED HDPE PIPE

- A. Corrugated, slotted, HDPE tubing shall meet AASHTO M-252. Slotted tubing shall be supplied factory wrapped in a polyester geotextile filter sock. The filter sock shall have a minimum weight of 3.0 oz/square yard, a minimum burst strength of 100 psi, and an apparent opening size of 35.
- B. A manufacturers' certification that the product was manufactured, tested, and supplied in accordance with this specification shall be furnished to the Engineer upon request.
- C. There shall be a minimum soil cover of 12 inches, as measured from the top of the pipe, for H-20 loading conditions.
- D. Filter Fabric Wraps
 1. Extra strong synthetic materials are to be used with perforated drainage pipe to prevent infiltration of fine soil particles while allowing water to flow freely.
 2. Material shall be ADS Sock, as manufactured by Advanced Drainage Systems or approved equal.

PART 3 EXECUTION

3.1 PREPARATION

- A. The Contractor shall verify that the surface has been prepared to the proper line and grade by shooting invert elevation grades.

3.2 INSTALLATION

- A. Open-Cut Installations
 1. Polyethylene pipe and fittings shall be installed in accordance with ASTM Standards, and the manufacturers recommendations.

2. Pipe is to be lifted or rolled into position, not dragged over the prepared bedding.
3. The pipe is to be set at the slope and grades indicated on the plans. Ensure pipe remains at proper grades by shoring it.
4. All HDPE piping shall be bedded in 6" of crushed stone unless noted otherwise.
5. Crushed stone shall be used as backfill to a point of 6" above the top of the pipe unless noted otherwise.
6. Clay dams shall be installed in the stone backfill as directed by the Engineer to prevent groundwater migration. Spacing shall be 50 ft. maximum.
7. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.
8. Install piping and fittings true to alignment and grade. If necessary, each length of pipe shall be cleaned out before installation.

B. Joint Couplings

1. Joint couplings shall be installed in accordance with manufacturer's recommendations.
2. Remove the protective paper and wrap the collar around the pipe with the mastic side to the pipe. The overlap shall be at the top of the pipe.
3. Secure the steel straps. The closing flap shall cover the exposed straps.
4. Encase the entire joint with a minimum of 8 inches of concrete on all sides. The concrete encasement shall extend along the pipe 12 inches on each side of the joint.

3.3 TESTING

A. Pressure Testing

1. All sections of polyethylene drain and sewer pipe shall be tested in accordance with Section 33 3114.

3.4 "AS-BUILT" INFORMATION

1. Provide “as-built” survey made by a licensed surveyor registered in the State of Connecticut, paid for by the Site Contractor, showing all actual locations, inverts, grades of structures and piping. Furnish one set to the owner and one set to the Site Engineer. As-Built plans shall conform with the Town of Greenwich Public Works requirements.

END OF SECTION

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SECTION 334419 - STORMWATER TREATMENT SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplemental Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

- A. General: Provide precast concrete stormwater treatment systems and appurtenances and stormwater management systems in accordance with the Contract Documents.
- B. Related Sections include the following:
 - 1. Section 31 2500 – Soil Erosion and Sediment Controls
 - 2. Section 31 2300 - Excavation, Backfill, Compaction and Dewatering
 - 3. Section 31 2333 – Trenching and Backfilling
 - 4. Section 33 4100 – Storm Drainage
 - 5. Appendix F - Report entitled “Greenwich Central Middle School Construction-Vibration and Controls During Construction” by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 QUALITY CONTROL INSPECTION

- A. The quality of materials, the process of manufacture, and the finished sections are subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections are subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Mark sections rejected after delivery to the site and remove from the site at once. Reject all sections that have been damaged beyond repair during delivery and, if already installed, repair acceptably, if permitted, or remove and replace, at no additional expense to the Owner.
- B. Inspect all sections for general appearance, dimensions, soundness, etc. Ensure the surface is dense, close textured and free of blisters, cracks, roughness, and exposure of reinforcement.

1.4 SUBMITTALS

- A. Annotate shop drawings to indicate all materials to be used and all applicable standards for materials, required tests of materials and design assumptions for structural analysis. Design calculations and shop drawings to be certified by a Professional Engineer retained by the system manufacturer and licensed in the State of Connecticut.

PART 2 PRODUCTS AND MATERIALS

2.1 MATERIALS

- A. Stormwater management infiltrators shall be StormTech MC-3500 manufactured by Advanced Drainage Systems or approved equal.
- B. The stormwater treatment system manufacturer to furnish documentation which supports all product performance claims and details storage capacities and maintenance requirements.
 - 1. Stormwater Treatment System shall be a CDS hydrodynamic separator by ConnTech Engineered Solutions, LLC. The model shall be as shown on the contract drawings or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Stormwater Treatment System – CDS Hydrodynamic Separator
 - 1. Construct each Stormwater Treatment System per the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise directed by the Engineer. In general, install per manufacturer's recommendations.
 - 2. Place the precast base unit on a $\frac{3}{4}$ " crushed stone bed of minimum thickness of six inches after compaction or of greater thickness and compaction if specified elsewhere. Crushed stone bed shall be level prior to setting the structure base and check the precast base section of the trap for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5%, remove the base section and re-level the granular subbase material.
 - 3. Prior to setting subsequent sections, place butyl mastic sealant equal to ASTM C990 along the construction joint in the section that is already in place.
 - 4. Prior to setting the precast roof section, install the circular swirl chamber wall by bolting the swirl chamber to the side walls at the three (3) tangent points and at the 3-

inch-wide inlet tab using HILTI brand concrete anchors or equivalent 1/2-inch diameter by 3-inch minimum length at heights of approximately three inches (3 ") off the floor and at the mid-height of the completed trap (at locations of pre-drilled holes in 7aluminum components). Seal the bottom edge of the swirl chamber to the trap sidewalls to the outside of the swirl chamber from the floor to the same height as the inlet pipe invert using a butyl mastic or approved equal sealant.

5. Prior to setting the precast roof section, place butyl mastic sealant equal to ASTM C990 along the top of the baffle wall, using more than one layer of mastic if necessary, to a thickness at least one inch (1") greater than the nominal gap between the top of the baffle and the roof section.

Determine the nominal gap either by field measurement or the shop drawings. After placement of the roof section has compressed the butyl mastic sealant in the gap, finish sealing the gap with an approved non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout. Also apply non-shrink grout to the joints at the side edges of the baffle wall.

6. After setting the precast roof section of the stormwater treatment system, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a 1/4 inch maximum tolerance allowed. Fill the outside and inside joint with a comparatively dry mortar (one part cement and two parts sand) and finish flush with the adjoining surfaces. Backfill carefully, bringing the fill up evenly on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint.
7. Plug holes in the concrete sections made for handling or other purposes with a non-shrink grout or by grout in combination with concrete plugs.
8. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections are in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.

3.2 FIELD TESTING

A. Stormwater Treatment Systems

1. Fill all stormwater treatment systems with water up to the lowest pipe invert and test for ex-filtration. Any loss of water constitutes a system that is not watertight. Find the leak and correct.
2. Test all stormwater treatment systems for leakage around the grit chamber while leaving water in the rest of the trap up to the bottom of the lowest opening in the grit chamber. If water flows into the grit chamber, find the leak and correct.

3.3 CLEANING TREATMENT SYSTEM

- A. At the end of the construction phase, once the storm drainage system has been accepted and approved by the Owner and Engineer, the Stormwater Treatment System and Stormwater Management Systems shall be pumped out and cleaned by a licensed hauler and the sediment and liquid disposed of off-site.
- B. Once the system is cleaned and accepted by the Engineer, fill the Stormwater System with water up to the lowest pipe invert.

END OF SECTION