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The following previously issued Bid Package documentation is included by reference:
BPB Sitework and Utilities dated 25 May 23
BPB Addendum #1 dated 1 Aug 23
BPB Addendum #2 dated 7 Aug 23
BPB Addendum #3 dated 10 Aug 23
BPC Foundations and Structures 31 Aug 23
BPC Addendum #1 dated 29 Sept 23
BPC Addendum #2 dated 11 Oct 23
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BPC Addendum #4 dated 20 oct 23
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|---|---|---|---|---|
| General | | | | |
| G001 | Cover Sheet – Volume 1 | D | 12/28/23 | |
| G002 | Drawing List | D | 12/28/23 | |
| G003 | Code Review | D | 12/28/23 | |
| G004 | Code Review Plan First Floor | D | 12/28/23 | **1/12/24** |
| G005 | Code Review Plan Second Floor | D | 12/28/23 | |
| G007 | School Safety Review – Overall Plans | D | 12/28/23 | |
| G008 | Dema – Main Office Security Plan, Elevations, and Details | D | 12/28/23 | |
| G009 | Keyplans | D | 12/28/23 | |
| G010 | Exterior Wall Mockup | D | 12/28/23 | |
| | | | | |
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| S001 | Cover Sheet | D | 12/28/23 | |
| S002 | General Notes | D | 12/28/23 | |
| S003 | General Notes and Special Inspections | D | 12/28/23 | |
| S004 | Project Schedules | D | 12/28/23 | |
| S101 | Overall Foundation Plan | D | 12/28/23 | |
| S102 | Overall Second Floor Framing Plan | D | 12/28/23 | |
| S103 | Overall Roof Framing Plan | D | 12/28/23 | |
| S111 | Keyplan 1 - Foundation Plan | D | 12/28/23 | |
| S112 | Keyplan 2 - Foundation Plan | D | 12/28/23 | |
| S113 | Keyplan 3 - Foundation Plan | D | 12/28/23 | |
| S114 | Keyplan 4 - Foundation Plan | D | 12/28/23 | |
| S115 | Keyplan 5 - Foundation Plan | D | 12/28/23 | |
| S116 | Keyplan 6 - Foundation Plan | D | 12/28/23 | |
| S116A | Keyplan 6 - Alternate Foundation Plan | D | 12/28/23 | |
| S117 | Keyplan 7 - Foundation Plan | D | 12/28/23 | |
| S118 | Keyplan 8 - Foundation Plan | D | 12/28/23 | |
| S119 | Keyplan 9 - Foundation Plan | D | 12/28/23 | |
| S120 | Keyplan 10 - Foundation Plan | D | 12/28/23 | |
| S121 | Keyplan 11 - Foundation Plan | D | 12/28/23 | |
| S131 | Keyplan 1 - Second Floor Framing Plan | D | 12/28/23 | |
| S132 | Keyplan 2 - Second Floor Low Roof Framing Plan | D | 12/28/23 | |
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| S135 | Keyplan 5 - Second Floor Framing Plan | D | 12/28/23 | |
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| S138 | Keyplan 8 - Second Floor Framing Plan | D | 12/28/23 | |
| S139 | Keyplan 9 - Second Floor Framing Plan | D | 12/28/23 | |
| S140 | Keyplan 10 - Second Floor Framing Plan | D | 12/28/23 | |
| S141 | Keyplan 11 - Second Floor Framing Plan | D | 12/28/23 | |
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| S160 | Keyplan 10 - Roof Framing Plan | D | 12/28/23 | |
| S161 | Keyplan 11 - Roof Framing Plan | D | 12/28/23 | |
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| S401 | Enlarged Plans | D | 12/28/23 | |
| S501 | Typical Foundation Details | D | 12/28/23 | |
| S502 | Typical Foundation Details | D | 12/28/23 | |
| S503 | Typical Foundation Details | D | 12/28/23 | |
| S504 | Foundation Sections and Details | D | 12/28/23 | |
| S505 | Foundation Sections and Details | D | 12/28/23 | |
| S506 | Foundation Sections and Details | D | 12/28/23 | |
| S511 | Typical Framing Details | D | 12/28/23 | |
| S512 | Typical Framing Details | D | 12/28/23 | |
| S513 | Typical Framing Details | D | 12/28/23 | |
| S514 | Framing Sections and Details | D | 12/28/23 | |
| S515 | Framing Sections and Details | D | 12/28/23 | |
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| S518 | Framing Sections and Details | D | 12/28/23 | |
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| S523 | Framing Sections and Details | D | 12/28/23 | |
| S524 | Framing Sections and Details | D | 12/28/23 | |
| S601 | Live Load Diagrams | D | 12/28/23 | |
| S602 | Live Load Diagrams | D | 12/28/23 | |
| S603 | Live Load Diagrams | D | 12/28/23 | |

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|---|---|---|---|---|
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| | | | | |
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| A002 | Accessible Restroom Details | D | 12/28/23 | |
| A003 | Exterior Wall Assemblies | D | 12/28/23 | |
| A004 | Partition Types | D | 12/28/23 | **1/12/24** |
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| A102 | Overall Second Floor Plan - Base Bid | D | 12/28/23 | |
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| A104 | Overall First Floor Plan – Add Alternate #3 | D | 12/28/23 | |
| A105 | Overall Second Floor Plan – Add Alternate #3 | D | 12/28/23 | |
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| A132 | Second Floor Plan- Keyplan 5 | D | 12/28/23 | **1/12/24** |
| A133 | Second Floor Plan - Keyplan 7 | D | 12/28/23 | **1/12/24** |
| A134 | Second Floor Plan - Keyplan 8 | D | 12/28/23 | **1/12/24** |
| A135 | Second Floor Plan - Keyplan 9 | D | 12/28/23 | **1/12/24** |
| A136 | Second Floor Plan - Keyplan 10 | D | 12/28/23 | **1/12/24** |
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| A139 | Overall RCP – First Floor | D | 12/28/23 | |
| A140 | Overall RCP – Second Floor | D | 12/28/23 | |
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| A147 | First Floor Reflected Ceiling Plan - Keyplan 7 | D | 12/28/23 | **1/12/24** |
| A148 | First Floor Reflected Ceiling Plan - Keyplan 8 | D | 12/28/23 | **1/12/24** |
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| A156 | Second Floor RCP - Keyplan 8 | D | 12/28/23 | |
| A157 | Second Floor RCP - Keyplan 9 | D | 12/28/23 | **1/12/24** |
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| A164 | Enlarged RCP - Cafeteria | D | 12/28/23 | |
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| A192 | Roof Plan - Areas 1 & 2 | D | 12/28/23 | |
| A193 | Roof Plan - Areas 3 & 6 | D | 12/28/23 | |
| A194 | Roof Plan - Areas 6, 8, & 11 | D | 12/28/23 | |
| A195 | Roof Plan - Areas 4, 5, 7, 8, 9, 10 | D | 12/28/23 | |
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| A202 | Exterior Building Elevations | D | 12/28/23 | |
| A203 | Exterior Building Elevations | D | 12/28/23 | |
| A204 | Exterior Building Elevations | D | 12/28/23 | |
| A205 | Exterior Building Elevations | D | 12/28/23 | |
| A206 | Exterior Building Elevations | D | 12/28/23 | |
| A207 | Exterior Building Elevations | D | 12/28/23 | |
| A208 | Exterior Building Elevations - Alternate #3 | D | 12/28/23 | |
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| A302 | Building Sections | D | 12/28/23 | |
| A303 | Building Sections | D | 12/28/23 | |
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| A305 | Building Sections | D | 12/28/23 | |
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| A312 | Wall Sections – Area 1 | D | 12/28/23 | |
| A313 | Wall Sections – Area 1 | D | 12/28/23 | |
| A314 | Wall Sections – Area 2 | D | 12/28/23 | |
| A315 | Wall Sections – Area 2 | D | 12/28/23 | |
| A316 | Wall Sections – Area 2 (Fire Walls) | D | 12/28/23 | |
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| A320 | Wall Sections– Area 4 | D | 12/28/23 | |
| A321 | Wall Sections – Area 4 | D | 12/28/23 | |
| A322 | Wall Sections – Area 4 | D | 12/28/23 | |
| A323 | Wall Sections – Area 4 | D | 12/28/23 | |
| A324 | Wall Sections – Area 5 | D | 12/28/23 | |
| A325 | Wall Sections – Area 6 | D | 12/28/23 | |
| A326 | Wall Sections – Area 6 | D | 12/28/23 | |
| A327 | Wall Sections – Area 7 | D | 12/28/23 | |
| A328 | Wall Sections – Area 7 & 8 | D | 12/28/23 | |
| A329 | Wall Sections – Area 8 | D | 12/28/23 | |
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| A402 | Enlarged Plans - Toilet Rooms | D | 12/28/23 | |
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| A405 | Enlarged Plan Auditorium | D | 12/28/23 | |
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| A420 | Enlarged Plan - PTMA | D | 12/28/23 | **1/12/24** |
| A421 | Enlarged Plan - Nurse Tech | D | 12/28/23 | **1/12/24** |
| A422 | Enlarged Plan - Technical Drafting | D | 12/28/23 | **1/12/24** |
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| A425 | Enlarged Plan - Masonry Shop | D | 12/28/23 | **1/12/24** |
| A426 | Enlarged Plan - Plumbing Shop | D | 12/28/23 | **1/12/24** |
| A427 | Enlarged Plan - Carpentry Shop | D | 12/28/23 | **1/12/24** |

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| A429 | Enlarged Plan - Dental Assisting | D | 12/28/23 | **1/12/24** |
| A430 | Enlarged Plan - Industrial Millwright | D | 12/28/23 | **1/12/24** |
| A431 | Enlarged Plan - Auto Body | D | 12/28/23 | **1/12/24** |
| A432 | Enlarged Plan - Auto Tech | D | 12/28/23 | **1/12/24** |
| A433 | Enlarged Plans - Typical Classrooms | D | 12/28/23 | **1/12/24** |
| A434 | Enlarged Plans - Science Classrooms | D | 12/28/23 | **1/12/24** |
| A435 | Enlarged Plans - Administration & Guidance Suites | D | 12/28/23 | **1/12/24** |
| A436 | Enlarged Plans - Administration & Guidance Suites | D | 12/28/23 | **1/12/24** |
| A437 | Enlarged Plans - Nurse & Special Education Suites | D | 12/28/23 | **1/12/24** |
| A438 | Enlarged Plans - Media Center | D | 12/28/23 | **1/12/24** |
| A439 | Enlarged Plans – Teaching Academy | D | 12/28/23 | **1/12/24** |
| A441 | Int. Elevations - Auditorium | D | 12/28/23 | |
| A442 | Int. Elevations – Auditorium & Details | D | 12/28/23 | **1/12/24** |
| A443 | Int. Elevations - Multi-Purpose Rooms | D | 12/28/23 | |
| A444 | Int. Elevations Cafeteria | D | 12/28/23 | |
| A445 | Int. Elevations - Cafeteria | D | 12/28/23 | |
| A446 | Int. Elevations - Gym | D | 12/28/23 | |
| A447 | Int. Elevations - Gym | D | 12/28/23 | |
| A448 | Int. Elevations- Elevator and Shop Lobbies | D | 12/28/23 | **1/12/24** |
| A449 | Int. Elevations - Lobby E101 and Misc | D | 12/28/23 | **1/12/24** |
| A450 | Int. Elevations – Wrestling Room | D | 12/28/23 | |
| A451 | Casework Elevations | D | 12/28/23 | **1/12/24** |
| A452 | Casework Elevations | D | 12/28/23 | **1/12/24** |
| A453 | Casework Elevations | D | 12/28/23 | |
| A454 | Casework Elevations | D | 12/28/23 | |
| A456 | Casework Elevations – Science Rooms | D | 12/28/23 | |
| A461 | Casework Sections & Details | D | 12/28/23 | **1/12/24** |
| A470 | Millwork Details | D | 12/28/23 | **1/12/24** |
| A500 | Custom Masonry Shapes | D | 12/28/23 | |
| A501A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A502A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A503A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A504 | Exterior Plan Details – Upper Gymnasium | D | 12/28/23 | |
| A504A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A505A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A505B | Exterior Plan Details – Upper Gymnasium | D | 12/28/23 | |
| A510A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A510B | Exterior Plan Details – Second Floor | D | 12/28/23 | |
| A511 | Plan Details - Interior | D | 12/28/23 | |
| A512 | Plan Details - Interior | D | 12/28/23 | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| A512A | Plan Details – Interior | D | 12/28/23 | |
| A513A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A513B | Exterior Plan Details – Second Floor | D | 12/28/23 | |
| A514A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A514B | Exterior Plan Details – Second Floor | D | 12/28/23 | |
| A515A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A515B | Exterior Plan Details – Second Floor | D | 12/28/23 | |
| A516A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A516B | Exterior Plan Details – Second Floor | D | 12/28/23 | |
| A517A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A517B | Exterior Plan Details – Second Floor | D | 12/28/23 | |
| A518A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A518B | Exterior Plan Details – Second Floor | D | 12/28/23 | |
| A519A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A519B | Exterior Plan Details – Second Floor | D | 12/28/23 | |
| A520A | Exterior Plan Details - First Floor | D | 12/28/23 | |
| A520B | Exterior Plan Details – Second Floor | D | 12/28/23 | |
| A521 | Ceiling Details | D | 12/28/23 | **1/12/24** |
| A522 | Ceiling Section Details | D | 12/28/23 | |
| A523 | Ceiling Section Details | D | 12/28/23 | |
| A531 | Railing Details | D | 12/28/23 | |
| A532 | Railing Details | D | 12/28/23 | |
| A541 | Door Details - Interiors | D | 12/28/23 | |
| A542 | Door Details - Interior | D | 12/28/23 | |
| A551 | Section Details | D | 12/28/23 | |
| A560 | Architectural Site Details | D | 12/28/23 | |
| A561 | Architectural Site Details | D | 12/28/23 | |
| A562 | Architectural Site Details | D | 12/28/23 | |
| A563 | Architectural Site Details | D | 12/28/23 | |
| A564 | Architectural Site Details | D | 12/28/23 | |
| A565 | Architectural Site Details | D | 12/28/23 | |
| A590 | Roofing Details | D | 12/28/23 | |
| A591 | Roofing Details | D | 12/28/23 | |
| A601 | Door Schedule | D | 12/28/23 | **1/12/24** |
| A602 | Door Schedule | D | 12/28/23 | **1/12/24** |
| A603 | Door Schedule - Exterior | D | 12/28/23 | |
| A604 | Door and Frame Types | D | 12/28/23 | **1/12/24** |
| A610 | Exterior Storefront Types | D | 12/28/23 | |
| A611 | Exterior Storefront Details | D | 12/28/23 | |
| A612 | Exterior Storefront Details | D | 12/28/23 | |
| A613 | Exterior Storefront Details | D | 12/28/23 | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| A614 | Interior Storefront Types | D | 12/28/23 | **1/12/24** |
| A621 | Curtain Wall Types | D | 12/28/23 | |
| A631 | Translucent Wall Panel Types & Louver Types | D | 12/28/23 | |
| A632 | Translucent Wall Panel Types | D | 12/28/23 | |
| A633 | Translucent Wall Panel Types | D | 12/28/23 | |
| A634 | Translucent Wall Panel Types | D | 12/28/23 | |
| A641 | Glazing Details - Interior | D | 12/28/23 | |
| A651 | Exterior MCM Panel Schedule | D | 12/28/23 | |
| A701 | Stair #1 & 8 - Plans and Sections | D | 12/28/23 | **1/12/24** |
| A702 | Stair #2 & 3 & 6 - Plans and Sections | D | 12/28/23 | **1/12/24** |
| A703 | Stair #4 & 7 - Plans and Sections | D | 12/28/23 | **1/12/24** |
| A704 | Monumental Stair in Lobby A102– Plans and Sections | D | 12/28/23 | **1/12/24** |
| A705 | Monumental Stair #5 – Plans and Sections (Add Alternate #7-BP-D) | D | 12/28/23 | |
| A706 | Misc. Stairs, Ramps, and Details | D | 12/28/23 | **1/12/24** |
| A707 | Elevator #1 – Plans and Sections | D | 12/28/23 | |
| | | | | |
| Interiors | | | | |
| I-001 | Finish Legend | D | 12/28/23 | |
| I-002 | Overall First Floor Plan – Flooring Alternate | D | 12/28/23 | |
| I-111 | First Floor Finish Plan - Keyplan 1 | D | 12/28/23 | |
| I-112 | First Floor Finish Plan - Keyplan 2 | D | 12/28/23 | |
| I-113 | First Floor Finish Plan - Keyplan 3 | D | 12/28/23 | |
| I-114 | First Floor Finish Plan - Keyplan 4 | D | 12/28/23 | |
| I-115 | First Floor Finish Plan - Keyplan 5 | D | 12/28/23 | |
| I-116 | First Floor Finish Plan - Keyplan 6 | D | 12/28/23 | |
| I-116A | First Floor Finish Plan – Keyplan 6 – Alternate #3 | D | 12/28/23 | |
| I-117 | First Floor Finish Plan - Keyplan 7 | D | 12/28/23 | |
| I-118 | First Floor Finish Plan - Keyplan 8 | D | 12/28/23 | |
| I-119 | First Floor Finish Plan - Keyplan 9 | D | 12/28/23 | |
| I-120 | First Floor Finish Plan - Keyplan 10 | D | 12/28/23 | |
| I-121 | First Floor Finish Plan - Keyplan 11 | D | 12/28/23 | |
| I-131 | Second Floor Finish Plan – Keyplan 4 | D | 12/28/23 | |
| I-132 | Second Floor Finish Plan - Keyplan 5 | D | 12/28/23 | |
| I-133 | Second Floor Finish Plan - Keyplan 7 | D | 12/28/23 | |
| I-134 | Second Floor Finish Plan - Keyplan 8 | D | 12/28/23 | |
| I-135 | Second Floor Finish Plan - Keyplan 9 | D | 12/28/23 | |
| I-136 | Second Floor Finish Plan - Keyplan 10 | D | 12/28/23 | |
| I-211 | First Floor Furniture Plan - Keyplan 1 | D | 12/28/23 | |
| I-212 | First Floor Furniture Plan - Keyplan 2 | D | 12/28/23 | |
| I-213 | First Floor Furniture Plan - Keyplan 3 | D | 12/28/23 | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| I-214 | First Floor Furniture Plan - Keyplan4 | D | 12/28/23 | |
| I-215 | First Floor Furniture Plan - Keyplan 5 | D | 12/28/23 | |
| I-216 | First Floor Furniture Plan - Keyplan 6 | D | 12/28/23 | |
| I-217 | First Floor Furniture Plan - Keyplan 7 | D | 12/28/23 | |
| I-218 | First Floor Furniture Plan - Keyplan 8 | D | 12/28/23 | |
| I-219 | First Floor Furniture Plan - Keyplan 9 | D | 12/28/23 | |
| I-220 | First Floor Furniture Plan - Keyplan 10 | D | 12/28/23 | |
| I-221 | First Floor Furniture Plan - Keyplan 11 | D | 12/28/23 | |
| I-231 | Second Floor Furniture Plan - Keyplan 4 | D | 12/28/23 | |
| I-232 | Second Floor Furniture Plan - Keyplan 5 | D | 12/28/23 | |
| I-233 | Second Floor Furniture Plan - Keyplan 7 | D | 12/28/23 | |
| I-234 | Second Floor Furniture Plan - Keyplan 8 | D | 12/28/23 | |
| I-235 | Second Floor Furniture Plan - Keyplan 9 | D | 12/28/23 | |
| I-236 | Second Floor Furniture Plan - Keyplan 10 | D | 12/28/23 | |
| | | | | |
| Mechanical | | | | |
| G001 | Cover Sheet – Volume 3 | D | 12/28/23 | |
| G002 | Drawing List | D | 12/28/23 | |
| M001 | Legend And Abbreviations - HVAC | D | 12/28/23 | |
| M111 | First Floor – Keyplan 1 – HVAC | D | 12/28/23 | |
| M112 | First Floor – Keyplan 2 – HVAC | D | 12/28/23 | |
| M113 | First Floor – Keyplan 3 – HVAC | D | 12/28/23 | |
| M114 | First Floor – Keyplan 4 – HVAC | D | 12/28/23 | |
| M115 | First Floor – Keyplan 5 – HVAC | D | 12/28/23 | |
| M116 | First Floor – Keyplan 6 – HVAC | D | 12/28/23 | |
| M117 | First Floor – Keyplan 7 – HVAC | D | 12/28/23 | |
| M118 | First Floor – Keyplan 8 – HVAC | D | 12/28/23 | |
| M119 | First Floor – Keyplan 9 – HVAC | D | 12/28/23 | |
| M120 | First Floor – Keyplan 10 – HVAC | D | 12/28/23 | |
| M121 | First Floor – Keyplan 11 – HVAC | D | 12/28/23 | |
| M131 | Second Floor – Keyplan 1 – HVAC | D | 12/28/23 | |
| M132 | Second Floor – Keyplan 2 – HVAC | D | 12/28/23 | |
| M133 | Second Floor – Keyplan 3 – HVAC | D | 12/28/23 | |
| M134 | Second Floor – Keyplan 4 – HVAC | D | 12/28/23 | |
| M135 | Second Floor – Keyplan 5 – HVAC | D | 12/28/23 | |
| M136 | Second Floor – Keyplan 6 – HVAC | D | 12/28/23 | |
| M137 | Second Floor – Keyplan 7 – HVAC | D | 12/28/23 | |
| M138 | Second Floor – Keyplan 8 – HVAC | D | 12/28/23 | |
| M139 | Second Floor – Keyplan 9 – HVAC | D | 12/28/23 | |
| M140 | Second Floor – Keyplan 10 – HVAC | D | 12/28/23 | |
| M141 | Second Floor – Keyplan 11 – HVAC | D | 12/28/23 | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| MP111 | First Floor – Keyplan 1 – Mechanical Piping | D | 12/28/23 | |
| MP112 | First Floor – Keyplan 2 – Mechanical Piping | D | 12/28/23 | |
| MP113 | First Floor – Keyplan 3 – Mechanical Piping | D | 12/28/23 | |
| MP114 | First Floor – Keyplan 4 – Mechanical Piping | D | 12/28/23 | **1/12/24** |
| MP115 | First Floor – Keyplan 5 – Mechanical Piping | D | 12/28/23 | **1/12/24** |
| MP116 | First Floor – Keyplan 6 – Mechanical Piping | D | 12/28/23 | |
| MP116A | First Floor – Keyplan 6 – Alternate - Mechanical Piping | D | 12/28/23 | |
| MP117 | First Floor – Keyplan 7 – Mechanical Piping | D | 12/28/23 | |
| MP118 | First Floor – Keyplan 8 – Mechanical Piping | D | 12/28/23 | |
| MP119 | First Floor – Keyplan 9 – Mechanical Piping | D | 12/28/23 | |
| MP120 | First Floor – Keyplan 10 – Mechanical Piping | D | 12/28/23 | |
| MP121 | First Floor – Keyplan 11 – Mechanical Piping | D | 12/28/23 | |
| MP131 | Second Floor – Keyplan 1 – Mechanical Piping | D | 12/28/23 | |
| MP132 | Second Floor – Keyplan 2 – Mechanical Piping | D | 12/28/23 | |
| MP133 | Second Floor – Keyplan 3 – Mechanical Piping | D | 12/28/23 | |
| MP134 | Second Floor – Keyplan 4 – Mechanical Piping | D | 12/28/23 | **1/12/24** |
| MP135 | Second Floor – Keyplan 5 – Mechanical Piping | D | 12/28/23 | |
| MP136 | Second Floor – Keyplan 6 – Mechanical Piping | D | 12/28/23 | |
| MP137 | Second Floor – Keyplan 7 – Mechanical Piping | D | 12/28/23 | **1/12/24** |
| MP138 | Second Floor – Keyplan 8 – Mechanical Piping | D | 12/28/23 | **1/12/24** |
| MP139 | Second Floor – Keyplan 9 – Mechanical Piping | D | 12/28/23 | |
| MP140 | Second Floor – Keyplan 10 – Mechanical Piping | D | 12/28/23 | |
| MP141 | Second Floor – Keyplan 11 – Mechanical Piping | D | 12/28/23 | |
| M151 | Roof **Plan** – Areas 1 **& 2** – HVAC | D | 12/28/23 | |
| M152 | Roof **Plan** – Areas ~~2~~ **3 & 6** – HVAC | D | 12/28/23 | |
| M153 | Roof **Plan** – Areas ~~3~~ **6, 8 & 11** – HVAC | D | 12/28/23 | |
| M154 | Roof **Plan** – Areas 4**, 5, 7, 8, 9 & 20** – HVAC | D | 12/28/23 | **1/12/24** |
| M201 | Part Plans – HVAC | D | 12/28/23 | |
| M202 | Part Plans – HVAC | D | 12/28/23 | |
| M203 | Part Plans – HVAC | D | 12/28/23 | |
| M204 | Part Plans – HVAC | D | 12/28/23 | |
| M205 | Part Plans – HVAC | D | 12/28/23 | |
| M301 | Details - HVAC | D | 12/28/23 | |
| M302 | Details - HVAC | D | 12/28/23 | |
| M303 | Details - HVAC | D | 12/28/23 | |
| M304 | Details - HVAC | D | 12/28/23 | |
| M305 | Details - HVAC | D | 12/28/23 | |
| M306 | Details - HVAC | D | 12/28/23 | |
| M307 | Details - HVAC | D | 12/28/23 | |
| M308 | Details - HVAC | D | 12/28/23 | |
| M309 | Details - HVAC | D | 12/28/23 | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| M310 | Details - HVAC | D | 12/28/23 | |
| M311 | Details - HVAC | D | 12/28/23 | |
| M312 | Details - HVAC | D | 12/28/23 | |
| M313 | Details - HVAC | D | 12/28/23 | |
| M314 | Details - HVAC | D | 12/28/23 | |
| M315 | Details - HVAC | D | 12/28/23 | |
| M316 | Details - HVAC | D | 12/28/23 | |
| M319 | Details – HVAC | D | 12/28/23 | |
| M401 | Automatic Temperature Controls | D | 12/28/23 | |
| M402 | Automatic Temperature Controls | D | 12/28/23 | |
| M403 | Automatic Temperature Controls | D | 12/28/23 | |
| M404 | Automatic Temperature Controls | D | 12/28/23 | |
| M405 | Automatic Temperature Controls | D | 12/28/23 | |
| M406 | Automatic Temperature Controls | D | 12/28/23 | |
| M407 | Automatic Temperature Controls | D | 12/28/23 | |
| M408 | Automatic Temperature Controls | D | 12/28/23 | |
| M409 | Automatic Temperature Controls | D | 12/28/23 | |
| M410 | Automatic Temperature Controls | D | 12/28/23 | |
| M411 | Automatic Temperature Controls | D | 12/28/23 | |
| M412 | Automatic Temperature Controls | D | 12/28/23 | |
| M413 | Automatic Temperature Controls | D | 12/28/23 | |
| M414 | Automatic Temperature Controls | D | 12/28/23 | |
| M415 | Automatic Temperature Controls | D | 12/28/23 | |
| M416 | Automatic Temperature Controls | D | 12/28/23 | |
| M417 | Automatic Temperature Controls | D | 12/28/23 | |
| M418 | Automatic Temperature Controls | D | 12/28/23 | |
| M419 | Automatic Temperature Controls | D | 12/28/23 | |
| M420 | Automatic Temperature Controls | D | 12/28/23 | |
| M501 | Schedules - HVAC | D | 12/28/23 | |
| M502 | Schedules - HVAC | D | 12/28/23 | |
| M503 | Schedules - HVAC | D | 12/28/23 | |
| M504 | Schedules - HVAC | D | 12/28/23 | |
| M505 | Schedules - HVAC | D | 12/28/23 | |
| M506 | Schedules - HVAC | D | 12/28/23 | |
| M507 | Schedules - HVAC | D | 12/28/23 | |
| M508 | Schedules - HVAC | D | 12/28/23 | |
| M509 | Schedules - HVAC | D | 12/28/23 | |
| M510 | Schedules - HVAC | D | 12/28/23 | |
| M601 | Site Plan – HVAC | D | 12/28/23 | |
| | | | | |
| | | | | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| Fire Protection | | | | |
| F101 | Fire Protection Zoning Plan – First Floor | D | 12/28/23 | |
| F102 | Fire Protection Zoning Plan – Second Floor | D | 12/28/23 | |
| F111 | First Floor - Keyplan 1 - Fire Protection | D | 12/28/23 | |
| F112 | First Floor - Keyplan 2 - Fire Protection | D | 12/28/23 | |
| F113 | First Floor - Keyplan 3 - Fire Protection | D | 12/28/23 | |
| F114 | First Floor - Keyplan 4 - Fire Protection | D | 12/28/23 | |
| F115 | First Floor - Keyplan 5 - Fire Protection | D | 12/28/23 | |
| F116 | First Floor - Keyplan 6 - Fire Protection | D | 12/28/23 | |
| F117 | First Floor - Keyplan 7 - Fire Protection | D | 12/28/23 | |
| F118 | First Floor - Keyplan 8 - Fire Protection | D | 12/28/23 | |
| F119 | First Floor - Keyplan 9 - Fire Protection | D | 12/28/23 | |
| F120 | First Floor - Keyplan 10 - Fire Protection | D | 12/28/23 | |
| F121 | First Floor - Keyplan 11 - Fire Protection | D | 12/28/23 | |
| F131 | Second Floor Plan - Keyplan 1 - Fire Protection | D | 12/28/23 | |
| F132 | Second Floor Plan - Keyplan 2 – Fire Protection | D | 12/28/23 | |
| F133 | Second Floor Plan - Keyplan 3 - Fire Protection | D | 12/28/23 | |
| F134 | Second Floor Plan - Keyplan 4 - Fire Protection | D | 12/28/23 | |
| F135 | Second Floor Plan - Keyplan 5 - Fire Protection | D | 12/28/23 | |
| F136 | Second Floor Plan - Keyplan 6 - Fire Protection | D | 12/28/23 | |
| F137 | Second Floor Plan - Keyplan 7 - Fire Protection | D | 12/28/23 | |
| F138 | Second Floor Plan - Keyplan 8 - Fire Protection | D | 12/28/23 | |
| F139 | Second Floor Plan - Keyplan 9 - Fire Protection | D | 12/28/23 | |
| F140 | Second Floor Plan - Keyplan 10 - Fire Protection | D | 12/28/23 | |
| F141 | Second Floor Plan - Keyplan 11 - Fire Protection | D | 12/28/23 | |
| F301 | Details – Fire Protection | D | 12/28/23 | |
| F302 | Details & Schedules - Fire Protection | D | 12/28/23 | |
| | | | | |
| Plumbing | | | | |
| P001 | Legend & Abbreviations – Plumbing | D | 12/28/23 | **1/12/24** |
| P111 | First Floor – Keyplan 1 – Plumbing | D | 12/28/23 | **1/12/24** |
| P112 | First Floor – Keyplan 2 – Plumbing | D | 12/28/23 | **1/12/24** |
| P113 | First Floor – Keyplan 3 – Plumbing | D | 12/28/23 | **1/12/24** |
| P114 | First Floor – Keyplan 4 – Plumbing | D | 12/28/23 | **1/12/24** |
| P115 | First Floor – Keyplan 5 – Plumbing | D | 12/28/23 | **1/12/24** |
| P116 | First Floor – Keyplan 6 – Plumbing | D | 12/28/23 | **1/12/24** |
| P116A | First Floor – Keyplan 6 – Plumbing – Alternate - Plumbing | D | 12/28/23 | **1/12/24** |
| P117 | First Floor – Keyplan 7 – Plumbing | D | 12/28/23 | **1/12/24** |
| P118 | First Floor – Keyplan 8 – Plumbing | D | 12/28/23 | **1/12/24** |
| P119 | First Floor – Keyplan 9 – Plumbing | D | 12/28/23 | **1/12/24** |
| P120 | First Floor – Keyplan 10 – Plumbing | D | 12/28/23 | **1/12/24** |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| P121 | First Floor – Keyplan 11 – Plumbing | D | 12/28/23 | **1/12/24** |
| P131 | Second Floor – Keyplan 1 – Plumbing | D | 12/28/23 | **1/12/24** |
| P132 | Second Floor – Keyplan 2 – Plumbing | D | 12/28/23 | **1/12/24** |
| P133 | Second Floor – Keyplan 3 – Plumbing | D | 12/28/23 | **1/12/24** |
| P134 | Second Floor – Keyplan 4 – Plumbing | D | 12/28/23 | **1/12/24** |
| P135 | Second Floor – Keyplan 5 – Plumbing | D | 12/28/23 | **1/12/24** |
| P136 | Second Floor – Keyplan 6 – Plumbing | D | 12/28/23 | **1/12/24** |
| P137 | Second Floor – Keyplan 7 – Plumbing | D | 12/28/23 | **1/12/24** |
| P138 | Second Floor – Keyplan 8 – Plumbing | D | 12/28/23 | **1/12/24** |
| P139 | Second Floor – Keyplan 9 – Plumbing | D | 12/28/23 | **1/12/24** |
| P140 | Second Floor – Keyplan 10 – Plumbing | D | 12/28/23 | **1/12/24** |
| P141 | Second Floor – Keyplan 11 – Plumbing | D | 12/28/23 | **1/12/24** |
| P151 | Roof - Areas 1 & 2 - Plumbing | D | 12/28/23 | **1/12/24** |
| P152 | Roof - Areas 3 & 6 - Plumbing | D | 12/28/23 | **1/12/24** |
| P153 | Roof - Areas 6, 8 & 11 - Plumbing | D | 12/28/23 | **1/12/24** |
| P154 | Roof - Areas 4, 5, 7, 8, 9 & 10 - Plumbing | D | 12/28/23 | **1/12/24** |
| P201 | Part Plans - Plumbing | D | 12/28/23 | **1/12/24** |
| P202 | Part Plans – Plumbing | D | 12/28/23 | **1/12/24** |
| P203 | Part Plans - Plumbing | D | 12/28/23 | **1/12/24** |
| P204 | Part Plan - Plumbing | D | 12/28/23 | **1/12/24** |
| P205 | Part Plans - Plumbing | D | 12/28/23 | **1/12/24** |
| P206 | Part Plans - Plumbing | D | 12/28/23 | **1/12/24** |
| P207 | Part Plans - Plumbing | D | 12/28/23 | **1/12/24** |
| **P208** | **Part Plans - Plumbing** | **D** | **1/12/24** | |
| P301 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P302 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P303 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P304 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P305 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P306 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P307 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P308 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P309 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P310 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P311 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P312 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P313 | Details – Plumbing | D | 12/28/23 | **1/12/24** |
| P314 | Details – Plumbing | D | 12/28/23 | |
| P315 | Details – Plumbing | D | 12/28/23 | |
| P316 | Details - Plumbing | D | 12/28/23 | |
| P317 | Details - Plumbing | D | 12/28/23 | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| P401 | Schedules – Plumbing | D | 12/28/23 | **1/12/24** |
| P402 | Schedules - Plumbing | D | 12/28/23 | |
| P501 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P502 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P503 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P504 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P505 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P506 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P507 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P508 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P509 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P510 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P511 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P512 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P513 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P514 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P515 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P516 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P517 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P518 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P519 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P520 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P521 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P522 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P523 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P524 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P525 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P526 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P527 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P528 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P529 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P530 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P531 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P532 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P533 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P534 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P535 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P536 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| P537 | Risers – Plumbing | D | 12/28/23 | **1/12/24** |
| | | | | |
| | | | | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| Electrical | | | | |
| G001 | Cover Sheet – Volume 4 | D | 12/28/23 | |
| G002 | Drawing List | D | 12/28/23 | |
| E001 | Electrical Legend, Schedules & Abbreviations | D | 12/28/23 | **1/12/24** |
| E002 | Lighting Fixture Schedule | D | 12/28/23 | **1/12/24** |
| E003 | Lighting Fixture Schedule | D | 12/28/23 | |
| E004 | Site Plan Electrical | D | 12/28/23 | **1/12/24** |
| E005 | Site Plan Electrical | D | 12/28/23 | |
| E006 | Site Plan Electrical | D | 12/28/23 | **1/12/24** |
| E101 | First Floor - Keyplan 1 - Power | D | 12/28/23 | **1/12/24** |
| E102 | First Floor - Keyplan 2 - Power | D | 12/28/23 | **1/12/24** |
| E103 | First Floor - Keyplan 3 - Power | D | 12/28/23 | **1/12/24** |
| E104 | First Floor - Keyplan 4 - Power | D | 12/28/23 | |
| E105 | First Floor - Keyplan 5 - Power | D | 12/28/23 | **1/12/24** |
| E106 | First Floor - Keyplan 6 - Power | D | 12/28/23 | |
| E106A | First Floor - Keyplan 6A – Alternate #3 - Power | D | 12/28/23 | |
| E107 | First Floor - Keyplan 7 - Power | D | 12/28/23 | **1/12/24** |
| E108 | First Floor - Keyplan 8 - Power | D | 12/28/23 | **1/12/24** |
| E109 | First Floor - Keyplan 9 - Power | D | 12/28/23 | **1/12/24** |
| E110 | First Floor - Keyplan 10 - Power | D | 12/28/23 | |
| E111 | First Floor - Keyplan 11 - Power | D | 12/28/23 | **1/12/24** |
| E121 | Second Floor - Keyplan 4 - Power | D | 12/28/23 | |
| E122 | Second Floor - Keyplan 5 - Power | D | 12/28/23 | **1/12/24** |
| E123 | Second Floor - Keyplan 6 - Power | D | 12/28/23 | |
| E124 | Second Floor - Keyplan 7 - Power | D | 12/28/23 | **1/12/24** |
| E125 | Second Floor - Keyplan 8 - Power | D | 12/28/23 | **1/12/24** |
| E126 | Second Floor - Keyplan 9 - Power | D | 12/28/23 | |
| E127 | Second Floor - Keyplan 10 - Power | D | 12/28/23 | **1/12/24** |
| E128 | Second Floor - Keyplan 11 - Power | D | 12/28/23 | |
| E129 | Roof Plan - Overall - Power | D | 12/28/23 | |
| E201 | First Floor - Keyplan 1 - Lighting | D | 12/28/23 | **1/12/24** |
| E202 | First Floor - Keyplan 2 - Lighting | D | 12/28/23 | **1/12/24** |
| E203 | First Floor - Keyplan 3 - Lighting | D | 12/28/23 | **1/12/24** |
| E204 | First Floor - Keyplan 4 - Lighting | D | 12/28/23 | |
| E205 | First Floor - Keyplan 5 - Lighting | D | 12/28/23 | **1/12/24** |
| E206 | First Floor - Keyplan 6 - Lighting | D | 12/28/23 | **1/12/24** |
| E206A | First Floor – Keyplan 6A – Alternate #3 Lighting | D | 12/28/23 | |
| E207 | First Floor - Keyplan 7 - Lighting | D | 12/28/23 | **1/12/24** |
| E208 | First Floor - Keyplan 8 - Lighting | D | 12/28/23 | **1/12/24** |
| E209 | First Floor - Keyplan 9 - Lighting | D | 12/28/23 | **1/12/24** |
| E210 | First Floor - Keyplan 10 - Lighting | D | 12/28/23 | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| E211 | First Floor - Keyplan 11 - Lighting | D | 12/28/23 | |
| E221 | Second Floor - Keyplan 4 - Lighting | D | 12/28/23 | |
| E222 | Second Floor - Keyplan 5 - Lighting | D | 12/28/23 | |
| E223 | Second Floor - Keyplan 6 - Lighting | D | 12/28/23 | |
| E224 | Second Floor - Keyplan 7 - Lighting | D | 12/28/23 | |
| E225 | Second Floor - Keyplan 8 - Lighting | D | 12/28/23 | |
| E226 | Second Floor - Keyplan 9 - Lighting | D | 12/28/23 | |
| E227 | Second Floor - Keyplan 10 - Lighting | D | 12/28/23 | |
| E228 | Second Floor - Keyplan 11 - Lighting | D | 12/28/23 | **1/12/24** |
| E301 | First Floor - Keyplan 1 - Fire Alarm | D | 12/28/23 | **1/12/24** |
| E302 | First Floor - Keyplan 2 - Fire Alarm | D | 12/28/23 | |
| E303 | First Floor - Keyplan 3 - Fire Alarm | D | 12/28/23 | |
| E304 | First Floor - Keyplan 4 - Fire Alarm | D | 12/28/23 | **1/12/24** |
| E305 | First Floor - Keyplan 5 - Fire Alarm | D | 12/28/23 | **1/12/24** |
| E306 | First Floor - Keyplan 6 - Fire Alarm | D | 12/28/23 | |
| E306A | Firs Floor – Keyplan 6A – Alternate #3 – Fire Alarm | D | 12/28/23 | |
| E307 | First Floor - Keyplan 7 - Fire Alarm | D | 12/28/23 | |
| E308 | First Floor - Keyplan 8 - Fire Alarm | D | 12/28/23 | |
| E309 | First Floor - Keyplan 9 - Fire Alarm | D | 12/28/23 | |
| E310 | First Floor - Keyplan 10 - Fire Alarm | D | 12/28/23 | **1/12/24** |
| E311 | First Floor - Keyplan 11 - Fire Alarm | D | 12/28/23 | **1/12/24** |
| E321 | Second Floor - Keyplan 4 - Fire Alarm | D | 12/28/23 | |
| E322 | Second Floor - Keyplan 5 - Fire Alarm | D | 12/28/23 | |
| E323 | Second Floor - Keyplan 6 - Fire Alarm | D | 12/28/23 | |
| E324 | Second Floor - Keyplan 7 - Fire Alarm | D | 12/28/23 | **1/12/24** |
| E325 | Second Floor - Keyplan 8 - Fire Alarm | D | 12/28/23 | |
| E326 | Second Floor - Keyplan 9 - Fire Alarm | D | 12/28/23 | |
| E327 | Second Floor - Keyplan 10 - Fire Alarm | D | 12/28/23 | |
| E328 | Second Floor - Keyplan 11 - Fire Alarm | D | 12/28/23 | |
| E401 | Part Plan - Main Electrical/Mechanical Room | D | 12/28/23 | **1/12/24** |
| E402 | Electrical Part Plans | D | 12/28/23 | |
| E403 | Electrical Part Plans | D | 12/28/23 | |
| E404 | Part Plan - Kitchen E105 | D | 12/28/23 | **1/12/24** |
| E405 | Part Plan - Culinary Lab D101 | D | 12/28/23 | **1/12/24** |
| E406 | Part Plan - Electrical Shop D110 | D | 12/28/23 | |
| E407 | Part Plan - Masonry Shop - D114 | D | 12/28/23 | |
| E408 | Part Plan - Plumbing Shop D116 | D | 12/28/23 | **1/12/24** |
| E409 | Part Plan - Carpentry Shop C101 | D | 12/28/23 | **1/12/24** |
| E410 | Part Plan - Cosmetology Lab C102B & C102K | D | 12/28/23 | **1/12/24** |
| E411 | Part Plan - Industrial Millwright C118 | D | 12/28/23 | **1/12/24** |
| E412 | Part Plan - Autobody Shop C120 | D | 12/28/23 | **1/12/24** |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| E413 | Part Plan - Auto Tech Shop C124 | D | 12/28/23 | **1/12/24** |
| E414 | Part Plans - Mezzanine | D | 12/28/23 | |
| E415 | Part Plans - Mezzanine | D | 12/28/23 | |
| E416 | Part Plans - Mezzanine | D | 12/28/23 | |
| E417 | Part Plan – Auditorium Theater Equipment Rough-Ins | D | 12/28/23 | **1/12/24** |
| E418 | Part Plan – Auditorium Theater Equipment Lighting Rough-Ins | D | 12/28/23 | **1/12/24** |
| E419 | Part Plan – Auditorium Theater Elevations | D | 12/28/23 | |
| E501 | Schematic Power Riser Diagram | D | 12/28/23 | |
| E502 | Schematic Power Riser Diagram | D | 12/28/23 | |
| E503 | Schematic Power Riser Diagram | D | 12/28/23 | |
| E504 | Schematic Power Riser Diagram | D | 12/28/23 | |
| E505 | Schematic Power Riser Diagram | D | 12/28/23 | |
| E506 | Schematic Fire Alarm Riser Diagram | D | 12/28/23 | **1/12/24** |
| E507 | Fire Alarm Static Graphic Annunciator | D | 12/28/23 | |
| E601 | Panel Schedules | D | 12/28/23 | **1/12/24** |
| E602 | Panel Schedules | D | 12/28/23 | |
| E603 | Panel Schedules | D | 12/28/23 | |
| E604 | Panel Schedules | D | 12/28/23 | |
| E605 | Panel Schedules | D | 12/28/23 | **1/12/24** |
| E606 | Panel Schedules | D | 12/28/23 | **1/12/24** |
| E607 | Panel Schedules | D | 12/28/23 | |
| E608 | Panel Schedules | D | 12/28/23 | |
| E609 | Panel Schedules | D | 12/28/23 | |
| E610 | Panel Schedules | D | 12/28/23 | |
| E611 | Panel Schedules | D | 12/28/23 | **1/12/24** |
| E612 | Panel Schedules | D | 12/28/23 | **1/12/24** |
| E613 | Panel Schedules | D | 12/28/23 | **1/12/24** |
| E614 | Panel Schedules | D | 12/28/23 | **1/12/24** |
| E615 | Panel Schedules | D | 12/28/23 | **1/12/24** |
| E616 | Panel Schedules | D | 12/28/23 | |
| E617 | Panel Schedules | D | 12/28/23 | |
| E618 | Panel Schedules | D | 12/28/23 | |
| E619 | Panel Schedules | D | 12/28/23 | |
| E620 | Mechanical Equipment Connection Schedule | D | 12/28/23 | |
| E621 | Mechanical Equipment Connection Schedule | D | 12/28/23 | **1/12/24** |
| E622 | Mechanical Equipment Connection Schedule | D | 12/28/23 | |
| E623 | Mechanical Equipment Connection Schedule | D | 12/28/23 | |
| E624 | Mechanical Equipment Connection Schedule | D | 12/28/23 | |
| E625 | Mechanical Equipment Connection Schedule | D | 12/28/23 | |
| E626 | Kitchen Equipment Connection Schedule | D | 12/28/23 | **1/12/24** |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| E701 | Electrical Details | D | 12/28/23 | |
| E702 | Electrical Details | D | 12/28/23 | |
| E703 | Electrical Details | D | 12/28/23 | |
| E704 | Electrical Details | D | 12/28/23 | |
| E705 | Electrical Details | D | 12/28/23 | |
| E706 | Electrical Details | D | 12/28/23 | |
| E707 | Electrical Details | D | 12/28/23 | |
| E708 | Electrical Details | D | 12/28/23 | |
| E709 | Electrical Details | D | 12/28/23 | |
| E710 | Electrical Details | D | 12/28/23 | |
| E711 | Electrical Details | D | 12/28/23 | **1/12/24** |
| E712 | Electrical Details | D | 12/28/23 | |
| E713 | Electrical Details | D | 12/28/23 | |
| E714 | Electrical Details | D | 12/28/23 | |
| E715 | Electrical Details | D | 12/28/23 | |
| E716 | Corridor Lighting Control Zones | D | 12/28/23 | |
| E717 | Switched Receptacle Control Zones | D | 12/28/23 | |
| | | | | |
| Theater | | | | |
| G001 | Cover Sheet – Volume 5 | D | 12/28/23 | |
| G002 | Drawing List | D | 12/28/23 | |
| AV-001 | AV Systems - Schedules | D | 12/28/23 | |
| AV-002 | AV Systems - Technical Power Concept | D | 12/28/23 | |
| AV-101 | AV Systems - Level 1 Plan | D | 12/28/23 | |
| AV-201 | AV Systems - Loudspeaker & Projection Centerline | D | 12/28/23 | |
| AV-301 | AV Systems - Combo Panel Details | D | 12/28/23 | |
| AV-302 | AV Systems - SVC Device Details | D | 12/28/23 | |
| AV-303 | AV Systems - Rack Panel Details | D | 12/28/23 | |
| AV-304 | AV Systems - Rack Elevations | D | 12/28/23 | |
| AV-401 | AV Systems – Signal Flows 1 | D | 12/28/23 | |
| AV-402 | AV Systems – Signal Flows 2 | D | 12/28/23 | |
| TE-110 | Performance Lighting Systems | D | 12/28/23 | |
| TE-120 | Performance Lighting Systems | D | 12/28/23 | |
| TE-130 | Performance Lighting Systems | D | 12/28/23 | |
| TE-140 | Performance Lighting Systems | D | 12/28/23 | |
| TE-150 | Performance Lighting Systems | D | 12/28/23 | |
| TE-160 | Performance Lighting Systems | D | 12/28/23 | |
| TR-101 | Keyplan 2 – Stage Rigging Plan | D | 12/28/23 | |
| TR-201 | Keyplan 2 – Stage Rigging Section | D | 12/28/23 | |
| TR-301 | Keyplan 2 – Stage Rigging Elevations | D | 12/28/23 | |
| TR-302 | Keyplan 2 – Stage Rigging Elevations | D | 12/28/23 | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| TR-401 | Keyplan 2 – Stage Rigging Details | D | 12/28/23 | |
| TR-402 | Keyplan 2 - Stage Rigging Details | D | 12/28/23 | |
| TS-101 | Keyplan 2 – Auditorium Seating Plan | D | 12/28/23 | |
| TS-102 | Keyplan 2 – Auditorium Seating Centerline Section | D | 12/28/23 | |
| | | | | |
| Kitchen | | | | |
| FS-1.0 | Foodservice Equipment Plan - Overall | D | 12/28/23 | |
| FS-1.1 | Foodservice Equipment Plan - Cafeteria | D | 12/28/23 | |
| FS-1.2 | Foodservice Equipment Plan - Food Lab | D | 12/28/23 | |
| FS-1.3 | Foodservice Equipment Schedule | D | 12/28/23 | |
| FS-1.4 | Foodservice Electrical Schedule | D | 12/28/23 | |
| FS-1.5 | Foodservice Plumbing Schedule | D | 12/28/23 | |
| FS-1.6 | Foodservice Details | D | 12/28/23 | |
| FS-1.7 | Foodservice Plumbing Plan - Cafeteria | D | 12/28/23 | |
| FS-1.8 | Foodservice Plumbing Plan - Food Lab | D | 12/28/23 | |
| FS-1.9 | Foodservice Plumbing Schedule | D | 12/28/23 | |
| FS-1.10 | Foodservice Details | D | 12/28/23 | |
| FS-2.0 | Foodservice Exhaust Hood Details | D | 12/28/23 | |
| FS-2.1 | Foodservice Exhaust Hood Details | D | 12/28/23 | |
| FS-2.2 | Foodservice Exhaust Hood Details | D | 12/28/23 | |
| FS-2.3 | Foodservice Exhaust Hood Details | D | 12/28/23 | |
| FS-2.4 | Foodservice Exhaust Hood Details | D | 12/28/23 | |
| FS-2.5 | Foodservice Exhaust Hood Details | D | 12/28/23 | |
| FS-2.6 | Foodservice Exhaust Hood Details | D | 12/28/23 | |
| FS-2.7 | Foodservice Exhaust Hood Details | D | 12/28/23 | |
| FS-2.8 | Foodservice Utility Distribution System Details | D | 12/28/23 | |
| FS-2.9 | Foodservice Utility Distribution System Details | D | 12/28/23 | |
| FS-2.10 | Foodservice Utility Distribution System Details | D | 12/28/23 | |
| FS-2.11 | Foodservice Utility Distribution System Details | D | 12/28/23 | |
| FS-3.0 | Foodservice Walk-In Details | D | 12/28/23 | |
| FS-3.1 | Foodservice Walk-In Details | D | 12/28/23 | |
| FS-3.2 | Foodservice Walk-In Details | D | 12/28/23 | |
| FS-3.3 | Foodservice Walk-In Details | D | 12/28/23 | |
| FS-4.0 | Foodservice Equipment Plan – Support Kitchen | D | 12/28/23 | |
| | | | | |
| Technology | | | | |
| T000 | Symbols And Notes | D | 12/28/23 | |
| T100 | Site Plan | D | 12/28/23 | |
| T101 | Overall First Floor Plan | D | 12/28/23 | |
| T102 | Overall Second Floor Plan | D | 12/28/23 | |
| T103 | Floor Plan - Shops - Mezzanine Level | D | 12/28/23 | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| T111 | First Floor Plan - Keyplan 1 | D | 12/28/23 | |
| T112 | First Floor Plan - Keyplan 2 | D | 12/28/23 | |
| T113 | First Floor Plan - Keyplan 3 | D | 12/28/23 | |
| T114 | First Floor Plan - Keyplan 4 | D | 12/28/23 | |
| T115 | First Floor Plan - Keyplan 5 | D | 12/28/23 | |
| T116 | First Floor Plan - Keyplan 6 | D | 12/28/23 | |
| T116A | First Floor Plan - Keyplan 6 Alternate | D | 12/28/23 | |
| T117 | First Floor Plan - Keyplan 7 | D | 12/28/23 | |
| T118 | First Floor Plan - Keyplan 8 | D | 12/28/23 | |
| T119 | First Floor Plan - Keyplan 9 | D | 12/28/23 | |
| T120 | First Floor Plan - Keyplan 10 | D | 12/28/23 | |
| T121 | First Floor Plan - Keyplan 11 | D | 12/28/23 | |
| T131 | Second Floor Plan - Keyplan 4 | D | 12/28/23 | |
| T132 | Second Floor Plan - Keyplan 5 | D | 12/28/23 | |
| T133 | Second Floor Plan - Keyplan 7 | D | 12/28/23 | |
| T134 | Second Floor Plan - Keyplan 8 | D | 12/28/23 | |
| T135 | Second Floor Plan - Keyplan 9 | D | 12/28/23 | |
| T136 | Second Floor Plan - Keyplan 10 | D | 12/28/23 | |
| T500 | Main Telecom Room Details | D | 12/28/23 | |
| T501 | Telecom Rooms First Floor 1 | D | 12/28/23 | |
| T502 | Telecom Rooms First Floor 2 | D | 12/28/23 | |
| T503 | Telecom Rooms Second Floor 1 | D | 12/28/23 | |
| T504 | Pathways | D | 12/28/23 | |
| T505 | Faceplates | D | 12/28/23 | |
| T507 | Intercom & Clock System | D | 12/28/23 | |
| T508 | Cafeteria Audio System | D | 12/28/23 | |
| T509 | Gymnasium Audio System | D | 12/28/23 | |
| T510 | Demo Camera System | D | 12/28/23 | |
| | | | | |
| Security | | | | |
| TY000 | Security Symbols and Notes | D | 12/28/23 | |
| TY100 | Site Security Plan | D | 12/28/23 | |
| TY101 | Overall First Floor Security Plan | D | 12/28/23 | |
| TY102 | Overall Second Floor Security Plan | D | 12/28/23 | |
| TY103 | Floor Plan - Shops - Mezzanine Level Security | D | 12/28/23 | |
| TY111 | First Floor Security Plan - Keyplan 1 | D | 12/28/23 | |
| TY112 | First Floor Security Plan - Keyplan 2 | D | 12/28/23 | |
| TY113 | First Floor Security Plan - Keyplan 3 | D | 12/28/23 | |
| TY114 | First Floor Security Plan - Keyplan 4 | D | 12/28/23 | |
| TY115 | First Floor Security Plan - Keyplan 5 | D | 12/28/23 | |
| TY116 | First Floor Security Plan - Keyplan 6 | D | 12/28/23 | |

| DRWG NO. | DRAWING NAME | BID PACKS | ISSUE DATE | LATEST REV. DATE |
|---|---|---|---|---|
| TY116A | First Floor Security Plan - Keyplan 6 Alternate | D | 12/28/23 | |
| TY117 | First Floor Security Plan - Keyplan 7 | D | 12/28/23 | |
| TY118 | First Floor Security Plan - Keyplan 8 | D | 12/28/23 | |
| TY119 | First Floor Security Plan - Keyplan 9 | D | 12/28/23 | |
| TY120 | First Floor Security Plan - Keyplan 10 | D | 12/28/23 | |
| TY121 | First Floor Security Plan - Keyplan 11 | D | 12/28/23 | |
| TY131 | Second Floor Security Plan - Keyplan 4 | D | 12/28/23 | |
| TY132 | Second Floor Security Plan - Keyplan 5 | D | 12/28/23 | |
| TY133 | Second Floor Security Plan - Keyplan 7 | D | 12/28/23 | |
| TY134 | Second Floor Security Plan - Keyplan 8 | D | 12/28/23 | |
| TY135 | Second Floor Security Plan - Keyplan 9 | D | 12/28/23 | |
| TY136 | Second Floor Security Plan - Keyplan 10 | D | 12/28/23 | |
| TY500 | Intrusion Detection System | D | 12/28/23 | |
| TY501 | Access Control System | D | 12/28/23 | |
| TY502 | Video Surveillance System | D | 12/28/23 | |

END OF SECTION

SECTION 001116 - INVITATION TO BID

Receipt of Bids

Public notice is hereby given that sealed bids for the following prime contracts will be received for the construction of New Castle County Vocational Technical School District Hodgson Vo-Tech High School ~~Sitework and Utilities~~ **Building Envelope and Fitout** located in Wilmington, Delaware. Bids will be received at the office of New Castle County Vo-Tech School District, 1417 Newport Road, Wilmington, DE 19804 until 3:00 local time on Wednesday January ~~17~~ **24**, 2024, at which time they will be publicly opened and read aloud. The outer envelope should clearly indicate: "NEW CASTLE COUNTY VOCATIONAL TECHNICAL SCHOOL DISTRICT - HODGSON VO-TECH HIGH SCHOOL- BUILDING ENVELOPE AND FITOUT BP-D CONTRACT #_____ SEALED BID-DO NOT OPEN." ***Bidder bears the risk of late delivery. Any bids received after the stated time will be returned unopened.***

Contract D-01: Unit Masonry
Contract D-02: Miscellaneous Metals, Stairs, and Rails
Contract D-03: Exterior Structural Stud Assembly
Contract D-04: Carpentry and General Work
Contract D-05: Exterior Metal Panels
Contract D-06: Drywall and Interior Metal Framing
Contract D-07: General Labor and Clean-up
Contract D-08: Roofing
Contract D-09: Fireproofing
Contract D-10: Joint Sealants and Preformed Joint Assemblies
Contract D-11: Hollow Metal, Wood Doors, and Finish Hardware
Contract D-12: Overhead Coiling Doors
Contract D-13: Curtainwall/Glazing/Storefronts
Contract D-14: Tiling
Contract D-15: Acoustical and Specialty Ceilings
Contract D-16: Flooring
Contract D-17: Resilient Athletic Flooring
Contract D-18: Resinous Matrix Terrazzo Flooring
Contract D-19: Fluid Applied Flooring
Contract D-20: Paint and VWC
Contract D-21: Wood Strip Flooring-Gym Flooring
Contract D-22: Specialties
Contract D-23: Food Service Equipment
Contract D-24: Window Shades and Roller Shades
Contract D-25: Laminate Clad Casework, Countertops, and Sills
Contract D-26: Stage Rigging, Lighting, and Accessories
Contract D-27: Fixed Auditorium Seating
Contract D-28: Telescoping Bleachers and Platforms
Contract D-29: Hydraulic Holeless Passenger Elevator
Contract D-30: Fire Protection
Contract D-31: Plumbing
Contract D-32: Mechanical Piping - HVAC
Contract D-33: Testing, Adjusting, and Balancing

Contract D-34: Electrical, Lighting and Fire Alarm Systems
Contract D-35: Special Systems
Contract D-36: Vertical Retracting Walls
Contract D-37: Miscellaneous Concrete and Grouting

This project is a pilot project authorized by SB 160, Section 34, in which seven percent (7%) of the contractors for the project are DBEs. Non-DBE contractors may achieve the seven percent (7%) by hiring DBE firms as subcontractors or having their subcontractors hire DBE firms. All DBE firms must be registered with either the Delaware Department of Transportation or the Delaware Office of Supplier Diversity. The percentage requirement and the registration requirements will remain in place for the length of the project.

The selected project, New Castle County Vocational Technical School District's Hodgson Vo-Tech, includes a cooperative program in which students from Vocational Technical schools will work on the project in compliance with 19 Del. C. ch. 5.

Bids will be evaluated based on a best value process that is described in the Instruction to Bidders.

Bidding Documents

1. It is the responsibility of each bidder to review and coordinate all Project Documents. This includes plans, specifications, and addendums.
2. Documents, for review only, may be examined on or after December 19, 2023 on the State of Delaware Online Bid Solicitation Directory, http://bids.delaware.gov, or at the office of the Construction Manager, EDIS Company, 110 S. Poplar Street, Suite 400, Wilmington, Delaware 19801;.
3. Bid documents will be available on the EDiS FTP site. In order to obtain access to biddable documents on the EDiS FTP site, bidders must download and complete the Plans Request form from http://bids.delaware.gov, and submit to: planrequests@delaware.gov for approval. Once the plans request is approved and you want to receive the biddable plans submit your request for access to the FTP site via email to Jackie McKee at jmckee@ediscompany.com. Your request should include the following information: your company name, contact name, email address, phone number, fax number, and postal mailing address.

Bid Security

A bid security in the amount of ten percent (10%) of the bid, plus a consent of surety must accompany each bid. Bid Security shall specify the Owner as the obligee. Owner: New Castle County Vo-Tech School District, 1417 Newport Road, Wilmington, DE 19804.

Pre-Bid Meeting

A NON-mandatory pre-bid meeting will be held at the New Castle County Vocational Technical School District Hodgson Vo-Tech, 2575 Glasgow Ave, Newark, DE 19702 on Wednesday, December 27, 2023 at 9:00 AM local time. A site visit will be conducted immediately following the pre-bid meeting. This site visit will be the only opportunity for the bidders to visit the existing building and review existing conditions affecting the work. Attendance is highly suggested but not mandatory.

Questions

Please contact EDiS Company, Kevin Lucas at klucas@ediscompany.com, and copy Jackie McKee at jmckee@ediscompany.com (302) 420-3083 with questions and RFI submissions. All bid questions must be submitted electronically. All bid questions must be submitted by Wednesday January 10, 2023.

Conformance to the Delaware Architectural Accessibility Act and the standards of the Architectural Accessibility Board is required on the Project.

Prevailing Wage Rates

Prevailing Wage Rates, as directed by Delaware Law, must be adhered to where applicable. Davis-Bacon Act wages, in accordance with Subchapter IV of Chapter 31 of Title 40USC, must be adhered to. Contractors must pay the higher of the two rates.

Drug Testing Requirements

Pursuant to the Office of Management and Budget (OMB) "4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects" required that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds implement a Mandatory Drug Testing Program. The latest regulation can be downloaded from the following website: http://regulations.delaware.gov/AdminCode/title19/4000/4100/4104.pdf

Craft Training for Public Works Procurement

In accordance with Delaware Code, Title 29, Chapter 69, Section 6962, requires: A public works contract must include a requirement that the contractor provide craft training for journeyman and apprentice levels if all of the following apply:

A. The project requires prevailing wages and,
B. The contractor or subcontractor employs 10 or more people and,
C. It is not a federal highway project.

The craft training may be provided by any of the following:

A. The contractor, or
B. The subcontractor, or
C. A program registered pursuant under Section 1101-4.0 of Title 19 of the Delaware Administrative Code.

Subsection 6902 defines "Craft Training" as "an apprenticeship program approved by and registered with any state apprenticeship agency or the United States Department of Labor. The Secretary of the Department of Labor shall maintain a list of crafts for which there are approved and registered training programs."

Delaware's Contractor Registration Act Is Effective July 1, 2021

https://labor.delaware.gov/divisions/industrial-affairs/labor-law/contractor-registration-act/

Bidders will not be subject to discrimination on the basis of race, creed, color, sex, sexual orientation, gender

identity or national origin in consideration of this award, and Minority Business Enterprises, Disadvantaged Business Enterprises, Women-Owned Business Enterprises and Veteran-Owned Business Enterprises will be afforded full opportunity to submit bids on this contract. Each bid must be accompanied by a bid security equivalent to ten percent of the bid amount and all additive alternates. The successful bidder must post a performance bond and payment bond in a sum equal to 100 percent of the contract price upon execution of the contract. The Owner reserves the right to reject any or all bids and to waive any informalities therein. The Owner may extend the time and place for the opening of the bids from that described in the advertisement, with not less than two calendar days' notice by certified delivery, facsimile machine, or other electronic means to those bidders receiving plans.

END OF SECTION

CONTRACT NO: D-01 UNIT MASONRY

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $40,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

Alternate No. 7: Provide monument stair #5 complete.

Add/Deduct _____($_____)

Alternate No. 9: Provide ground Face CMU at exterior watertable.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Masonry | | | |
| 2. Sprayed Insulation | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

6. NO ADDITIONAL ENTRIES REQUIRED

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-02 MISCELLANEOUS METALS, STAIRS, AND RAILS

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $20,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

Alternate No. 7: Provide monument stair #5 complete.

Add/Deduct _____($_____)

Alternate No. 8: Provide vertically retractable partition between room MP1 & MP2.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Miscellaneous Metals | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-03 EXTERIOR STRUCTURAL STUD ASSEMBLY

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $40,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion..

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|
| 1. Ext. Metal Framing/Sheathing | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-04 CARPENTRY AND GENERAL WORK

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $40,000.00 **and $100,000.00** have been included in the Base Bid price listed above. ~~This allowance is~~ **These allowances are** to be used at the Owner and Construction Manager's discretion **and for temporary window opening protection**. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

Alternate No. 6: Provide 380 Salto wireless handle sets in lieu of manual locksets.

Add/Deduct _____($_____)

Alternate No. 7: Provide monument stair #5 complete.

Add/Deduct _____($_____)

Alternate No. 8: Provide vertically retractable partition between room MP1 & MP2.

Add/Deduct _____($_____)

Alternate No. 13: Provide lightning protection system.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Carpentry | | | |
| 2. | Metal Fencing | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-05 EXTERIOR METAL PANELS

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $30,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

Alternate No. 15A: Provide custom color for window brows.

Add/Deduct _____($_____)

Alternate No. 15B: Provide custom color for main canopies.

Add/Deduct _____($_____)

Alternate No. 15C: Provide custom color for accent wall/exterior column wraps.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|---|
| 1. | Metal Panels | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-06 DRYWALL AND INTERIOR METAL FRAMING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that Allowances in the amount of $175,000.00 and $30,000 have been included in the Base Bid price listed above. These allowances are to be used for scaffolding and at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 7: Provide monument stair #5 complete.

Add/Deduct _____($_____)

Alternate No. 8: Provide vertically retractable partition between room MP1 & MP2.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|
| 1. Metal Framing | | | |
| 2. Drywall | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

6. NO ADDITIONAL ENTRIES REQUIRED

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-07 GENERAL LABOR AND CLEAN-UP

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

**ALLOWANCES**

**We/I confirm that an Allowances in the amount of $7,500.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.**

UNIT PRICES

Unit prices conform to applicable project specification section. Refer to the specifications for a complete description of the following Unit Prices:

| | Add | Deduct | Add | Deduct |
|---|---|---|---|---|
| 1. Addition or deletion of manhours from base contract. | _____ | _____ | _____ | _____ |

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (10%).

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | General Labor | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-08 ROOFING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $35,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Add exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

Alternate No. 13: Provide lightning protection system.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Roofing | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-09 FIREPROOFING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $20,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 5: Provide Acoustical Sprayed insulation in rooms as indicated.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|
| 1. Fireproofing | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-10 JOINT SEALANTS AND PREFORMED JOINT ASSEMBLIES

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that Allowances in the amount of $15,000.00 and $7,500 have been included in the Base Bid price listed above. These allowances are to be used for materials to be utilized for misc. fire safing and fire sealants and the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

Alternate No. 7: Provide monument stair #5 complete.

Add/Deduct _____($_____)

~~Alternate No. 8: Provide vertically retractable partition between room MP1 & MP2.~~

~~Add/Deduct _____($_____)~~

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Caulking & Sealants | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-11 HOLLOW METAL, WOOD DOORS, AND FINISH HARDWARE

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

**Alternate No. Provide 380 Salto wireless handle sets in lieu of manual locksets.**

**Add/Deduct _____($_____)**

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).
The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|
| 1. Doors/Frames/Hardware | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-12 OVERHEAD COILING DOORS

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $10,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL) _____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|---|
| 1. | Overhead Doors | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-13 CURTAIN WALL/GLAZING/STOREFRONTS

BID FORM

For Bids Due: _____ To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES
We/I confirm that an Allowances in the amount of $35,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES
Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL) _____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Glass/Framing/Glazing | | | |
| 2. Joint Sealants | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

6. NO ADDITIONAL ENTRIES REQUIRED

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-14 TILING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $15,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Tiling | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-15 ACOUSTICAL AND SPECIALTY CEILINGS

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $20,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 8: Provide vertically retractable partition between room MP1 & MP2

Add/Deduct _____($_____)

Alternate No. 16: Provide 2′ x 2′ beveled tegular acoustical ceiling tile in lieu of 2′ x 2′ square lay-in where ACT -1 is indicated

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | ACT Ceilings & Grid | | | |
| 2. | Acoustical Panels | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____**.**

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-16 FLOORING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES
We/I confirm that an Allowances in the amount of ~~$15,000.00~~ **$25,000.00** have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES
Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 4A: Provide terrazzo and base in the following spaces: Lobby A102, Lobby E101, and Dining E103. Delete quartz tile and resilient base in the following spaces: Lobby A102, Lobby E101, and Dining E103.

Add/Deduct _____($_____)

Alternate No. 4B: Provide terrazzo and base in the following spaces: Corridors A100, B100A, C100B, C100A, D100A, D100B, and Lobby D117. Delete Quartz tile and resilient base in the following spaces: Corridors A100, B100A, C100B, C100A, D100A, D100B, and Lobby D117.

Add/Deduct _____($_____)

Alternate No. 7: Provide monument stair #5 complete.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____

(Authorized Signature)

(SEAL)

_____

(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|---|
| 1. | Flooring | | | |
| 2. | Access Flooring | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-17 RESILIENT ATHLETIC FLOORING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $15,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Resilient Athletic Flooring | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____**.**

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-18 RESILIENT MATRIX TERRAZZO FLOORING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES
We/I confirm that an Allowances in the amount of $10,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES
Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 4A: Provide terrazzo and base in the following spaces: Lobby A102, Lobby E101, and Dining E103. Delete quartz tile and resilient base in the following spaces: Lobby A102, Lobby E101, and Dining E103.

Add/Deduct _____($_____)

Alternate No. 4B: Provide terrazzo and base in the following spaces: Corridors A100, B100A, C100B, C100A, D100A, D100B, and Lobby D117. Delete Quartz tile and resilient base in the following spaces: Corridors A100, B100A, C100B, C100A, D100A, D100B, and Lobby D117.

Add/Deduct _____($_____)

Alternate No. 7: Provide monument stair #5 complete.

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|---|
| 1. | Resinous Terrazzo | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |

6. NO ADDITIONAL ENTRIES REQUIRED

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-19 FLUID APPLIED FLOORING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $10,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Resinous Flooring | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-20 PAINT AND VWC

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $20,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 7: Provide monument stair #5 complete.

Add/Deduct _____($_____)

Alternate No. 8: Provide vertically retractable partition between room MP1 & MP2

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Painting | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |

6. NO ADDITIONAL ENTRIES REQUIRED

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-21 WOOD STRIP FLOORING – GYM FLOORING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $10,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Wood Gym Flooring | | | |
| 2. Wood Stage Flooring | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

6. NO ADDITIONAL ENTRIES REQUIRED

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-22 SPECIALTIES

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $20,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

~~ALTERNATES~~

~~Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.~~

~~Alternate No. 15A: Provide custom color for window brows.~~

~~Add/Deduct _____($_____)~~

~~Alternate No. 15B: Provide custom color for main canopies.~~

~~Add/Deduct _____ ($_____)~~

~~Alternate No. 15C: Provide custom color for accent wall/exterior column wraps.~~

~~Add/Deduct _____ ($_____)~~

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Misc Specialty Div 10 | | | |
| 2. | Metal Canopies | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-23 FOOD SERVICE EQUIPMENT

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $15,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Food Service | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-24 WINDOW SHADES AND ROLLER SHADES

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|---|
| 1. | Window Shades | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____**.**

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-25 LAMINATE CLAD CASEWORK, COUNTERTOPS, AND SILLS

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $15,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Laminate Clad Casework | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____**.**

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

CONTRACT NO: D-26 STAGE RIGGING, DRAPERIES AND LIGHTING ACCESSORIES

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $10,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL) _____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Stage Rigging, Draperies and Lighting | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

CONTRACT NO: D-27 FIXED AUDITORIUM SEATING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $10,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|
| 1. Fixed Auditorium Seating | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____**.**

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

CONTRACT NO: D-28 TELESCOPING BLEACHERS AND PLATFORMS

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $10,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|
| 1. Telescoping Bleachers/Platforms | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____**.**

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

CONTRACT NO: D-29 HYDRAULIC HOLELESS PASSENGER ELEVATOR

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $10,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Elevators | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

6. NO ADDITIONAL ENTRIES REQUIRED

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____**.**

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

CONTRACT NO: D-30 FIRE PROTECTION

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____ E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $20,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

**Alternate No. 8: Provide vertically retractable partition between room MP1 & MP2.**

**Add/Deduct _____($_____)**

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Fire Sprinkler | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

CONTRACT NO: D-31 PLUMBING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $75,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

~~Alternate No. 11: Provide freeze protection pumps on (FPP-1-32, 34, 35, 37, 38, 40, 42, 44, 46, 49-61.)~~

~~Add/Deduct _____ ($_____)~~

Alternate No. 12: Provide rotary screw compressors and tanks for all shop compressed air systems.

Add/Deduct _____ ($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Plumbing | | | |
| 2. Insulation | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

6. NO ADDITIONAL ENTRIES REQUIRED

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-32 MECHANICAL PIPING - HVAC

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that Allowances in the amount of $75,000.00 and $200,000 have been included in the Base Bid price listed above. These allowances are to be used to provide temporary heating equipment and maintenance and to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

Alternate No. 10: Provide additional costs, if any, to provide ATC system by Modern Controls.

Add/Deduct _____($_____)

Alternate No. 11: Provide freeze protection pumps on (FPP-1-32, 34, 35, 37, 38, 40, 42, 44, 46, 49-61.)

Add/Deduct _____($_____)

~~Alternate No. 12: Provide rotary screw compressors and tanks for all shop compressed air systems.~~

~~Add/Deduct _____($_____)~~

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Mechanical Piping | | | |
| 2. HVAC Ductwork | | | |
| 3. Insulation | | | |
| 4. ATC | | | |
| 5. | | | |

6. NO ADDITIONAL ENTRIES REQUIRED

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
|---|---|---|---|---|---|---|
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Total DBEs on project: _____

END OF SECTION

CONTRACT NO: D-33 TESTING, ADJUSTING, AND BALANCING

BID FORM

For Bids Due: _____ To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name:_____E-Mail Address: _____

Delaware Business License No.:_____Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____)_____-_____ Fax No.: (_____)_____- _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____($_____)

ALTERNATES
Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct_____($_____)

I/We acknowledge Addendums numbered_____and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By_____Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness:_____By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Testing, Adjusting, Balancing | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date_____.

All the terms and conditions of Contract:_____have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this_____day of_____20_____.

My Commission expires_____. NOTARY PUBLIC_____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this_____day of_____20_____.

My Commission expires_____. NOTARY PUBLIC_____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this_____day of_____20____.

My Commission expires_____. NOTARY PUBLIC_____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

CONTRACT NO: D-34 ELECTRICAL, LIGHTING, AND FIRE ALARM SYSTEMS

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of $75,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

~~Alternate No. 6: Provide 380 Salto wireless handle sets in lieu of manual locksets.~~

~~Add/Deduct _____ ($_____)~~

Alternate No. 7: Provide monument stair #5 complete.

Add/Deduct _____ ($_____)

Alternate No. 11: Provide freeze protection pumps on (FPP-1-32, 34, 35, 37, 38, 40, 42, 44, 46, 49-61.)

Add/Deduct _____ ($_____)

~~Alternate No. 12: Provide rotary screw compressors and tanks for all shop compressed air systems.~~

~~Add/Deduct _____ ($_____)~~

Alternate No. 13: Provide lightning protection system.

Add/Deduct _____ ($_____)

Alternate No. 14: Provide additional costs, if any, for fire alarm system by Simplex.

Add/Deduct _____ ($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Electrical | | | |
| 2. Lighting Protection | | | |
| 3. Fire Alarm System | | | |
| 4. | | | |
| 5. | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

CONTRACT NO: D-35 SPECIAL SYSTEMS

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES

We/I confirm that an Allowances in the amount of ~~$30,000.00~~ **$20,000.00** have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 3: Provide exterior shell of future tech and shop expansion.

Add/Deduct _____($_____)

Alternate No. 6: Provide 380 Salto wireless handle sets in lieu of manual locksets.

Add/Deduct _____ ($_____)

~~Alternate No. 12: Provide rotary screw compressors and tanks for all shop compressed air systems.~~

~~Add/Deduct _____ ($_____)~~

~~Alternate No. 14: Provide additional costs, if any, for fire alarm system by Simplex.~~

~~Add/Deduct _____ ($_____)~~

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| Subcontractor Category | Subcontractor | Address (City & State) | Subcontractors tax-payer ID # or Delaware Business license # |
|---|---|---|---|
| 1. Structured Cable | | | |
| 2. Audio Video Systems | | | |
| 3. Intrusion Detection System | | | |
| 4. Access Control Systems | | | |
| 5. Video Surveillance Systems | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____**.**

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

## AFFIDAVIT
## OF
## EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

CONTRACT NO: D-36 VERTICAL RETRACTABLE WALLS

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed-out part that does not apply.

Alternate No. 8: Provide vertically retractable partition between room MP1 & MP2

Add/Deduct _____($_____)

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|
| 1. Vertical Retractable Wall Sys | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

CONTRACT NO: D-37 MISCELLANEOUS CONCRETE AND GROUTING

BID FORM

For Bids Due: _____

To: NCCVT School District
1417 Newport Road
Wilmington, DE 19804

Name of Bidder:_____

Bidder Address:_____

_____

Contact Name: _____E-Mail Address: _____

Delaware Business License No.:_____ Taxpayer ID No.: _____

(Other License Nos.): _____
**(A copy of Bidder's Licenses must be attached to this form.)**

Phone No.: (_____ ) _____ - _____ Fax No.: (_____ ) _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

$_____ ($_____ )

ALLOWANCES
We/I confirm that an Allowances in the amount of $15,000.00 have been included in the Base Bid price listed above. This allowance is to be used at the Owner and Construction Manager's discretion. All remaining allowance shall be returned to the Owner at completion.

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid (if required).

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within the durations included in the BP-D bid schedule provided and Section 013216 Const. Schedule.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am/We are an Individual/a Partnership/a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS
Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
DBE Subcontractor List
New Castle County Contractor License
(Others as Required by Project Manuals)

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

| | **Subcontractor Category** | **Subcontractor** | **Address (City & State)** | **Subcontractors tax-payer ID # or Delaware Business license #** |
|---|---|---|---|---|
| 1. | Concrete | | | |
| 2. | Reinforcing Steel | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | NO ADDITIONAL ENTRIES REQUIRED | | | |

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date _____.

All the terms and conditions of Contract: _____ have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

CONSENT OF SURETY

DATE_____

To: NCC Vocational Technical School District
1417 Newport Road
Wilmington, DE 19804

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

**AFFIDAVIT**
**OF**
**EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

**Contractor/Subcontractor Name:** _____

**Contractor/Subcontractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title**: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**AFFIDAVIT**
**OF**
**CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

**Contractor Name:** _____

**Contractor Address:** _____

_____

_____

**Authorized Representative (typed or printed):** _____

**Authorized Representative (signature):** _____

**Title:** _____

Sworn to and Subscribed before me this _____day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

# DBE SUBCONTRACTOR LIST

| DBE Name | DBE Address | DBE Phone Number | DBE Email address | DelDOT or OSD Registration Number | DBE % of Contract | Description of Work |
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Total DBEs on project: _____

STATE OF DELAWARE
OFFICE OF MANAGEMENT AND BUDGET

## BID BOND

KNOW ALL MEN BY THESE PRESENTS That: _____ _____of _____ in the County of _____ and State of _____as **Principal**, and _____ of _____ in the County of _____ and State of _____ as **Surety**, legally authorized to do business in the State of Delaware ("**State**"), are held and firmly unto the **State** in the sum of _____ Dollars ($_____ _____), or _____ percent not to exceed _____ _____ Dollars ($_____) of amount of bid on Contract No. _____ _____, to be paid to the **State** for the use and benefit of New Castle County Vocation Technical School District, 1417 Newport Road, Wilmington, DE 19804 for which payment well and truly to be made, we do bind ourselves, our and each of our heirs, executors, administrators, and successors, jointly and severally for and in the whole firmly by these presents.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH That if the above bonded **Principal** who has submitted to the New Castle County Vocation Technical School District, 1417 Newport Road, Wilmington, DE 19804 a certain proposal to enter into this contract for the furnishing of certain material and/or services within the **State**, shall be awarded this Contract, and if said **Principal** shall well and truly enter into and execute this Contract as may be required by the terms of this Contract and approved by the New Castle County Vocation Technical School District, 1417 Newport Road, Wilmington, DE 19804 this Contract to be entered into within twenty days after the date of official notice of the award thereof in accordance with the terms of said proposal, then this obligation shall be void or else to be and remain in full force and virtue.

Sealed with _____ seal and dated this _____day of _____ in the year of our Lord two thousand and _____ (20____).

SEALED, AND DELIVERED IN THE
Presence of

_____
Name of Bidder (Organization)

Corporate Seal

By: _____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness:_____ By: _____

_____
Title

SECTION 011100 - SUMMARY OF WORK

1. RELATED DOCUMENTS

   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Sections, apply to work of this Section.

2. CONTRACTS

   A. The work will be performed under separate prime contracts managed by the Construction Manager.

3. ALTERATIONS & COORDINATION

   A. Contractor shall be responsible to coordinate their work with the work of others, including, but not limited to, the preparation of general coordination drawings, diagrams and schedules, and control of site utilization, from the beginning of activity, through project close-out and warranty periods.

4. KNOWLEDGE OF CONTRACT REQUIREMENTS

   A. The Contractor and his Subcontractors, Sub-subcontractors and material men shall consult in detail the Contract Documents for instructions and requirements pertaining to the Work, and at his and their cost, shall provide all labor, materials, equipment and services necessary to furnish, install and complete the work in strict conformance with all provisions thereof.

   B. The Contractor will be held to have examined the site of the Work prior to submitting his proposal and informed himself, his Subcontractors, Sub-subcontractors and material men of all existing conditions affecting the execution of the Work.

   C. The Contractor will be held to have examined the Contract Documents and modifications thereto, as they may affect subdivisions of the Work and informed himself, his Subcontractors, Sub-subcontractors and material men of all conditions thereof affecting the execution of the Work.

   D. The Scope of Work for the Contract is not necessarily limited to the description of each section of the Specifications and the illustrations shown on the Drawings. Include all minor items not expressly indicated in the Contract Documents, or as might be found necessary as a result of field conditions, in order to complete the Work as it is intended, without any gaps between the various subdivisions of work.

   E. The Contractor will be held to be thoroughly familiar with all conditions affecting labor in the area of the Project including, but not limited to, Unions, incentive pay, procurements, living, parking and commuting conditions and to have informed his Subcontractors and Sub-subcontractors thereof.

5. CONTRACT DOCUMENTS INFORMATION

   A. The Contract Documents are prepared in accordance with available information as to existing

conditions and locations. If, during construction, conditions are revealed at variance with the Contract Documents, notify the Construction Manager immediately, but no more than three (3) days from the day the variance is first known. Failure to give timely notice shall operate to waive any claim Contractor might otherwise have for an adjustment to Contract Time or Sum as a consequence of such variance.

B. The Specifications determine the kinds and methods of installation of the various materials, the Drawings establish the quantities, dimensions and details of materials, the schedules on the Drawings give the location, type and extent of the materials.

C. Dimensions given on the Drawings govern scale measurements and large scale drawings govern small scale drawings, except as to anything omitted unless such omission is expressly noted on the large scale drawings.

D. The techniques or methods of specifying to record requirements varies throughout text, and may include “prescriptive”, “open generic/descriptive”, “compliance with standards”, “performance”, “proprietary”, or a combination of these. The methods used for specifying one unit of work has no bearing on requirements for another unit of work.

E. Whenever a material, article or piece of equipment is referred to in the singular number in the Contract Documents, it shall be the same as referring to it in the plural. As many such materials, articles or pieces of equipment shall be provided as are required to complete the Work.

F. Whenever a material, article or piece of equipment is specified by reference to a governmental, trade association of similar standard, it shall comply with the requirements of the latest publication thereof and amendments thereto in effect on the bid date.

G. In addition to the requirements of the Contract Documents, Contractor’s work shall also comply with applicable standards of the construction industry and those industry standards are made a part of Contract Documents by reference, as if copied directly into Contract Documents, or as if published copies were bound herein.

H. Where compliance with two (2) or more industry standards, contract requirements, or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, then the most stringent requirements, which are generally recognized to be also the most costly, is intended and will be enforced, unless specifically detailed language written into the Contract Documents clearly indicates that a less stringent requirement is to be fulfilled. Refer apparently equal but different requirements, and uncertainties as to which level of quality is more stringent, to Architect for decision before proceeding.

I. Reference standards referenced directly in Contract Documents or by governing regulations have precedence over non-reference standards which are recognized in industry for applicability of work.

J. Contractor’s bid is based on the complete set of Contract Documents including documents not specifically issued as part of the bid pack but referenced in same.

6. SCOPE OF WORK/GENERAL INFORMATION

A. A Scope of Work for each contract to be awarded on the project follows in this section. When a Contract has been awarded to a Contractor, the successful Contractor will be listed after the title of the Contract. When no Contract has yet been awarded, no Contractor's name will be listed. Previous Scopes of Work include addendum changes.

B. Contractor is responsible for performing the work listed in the Summary of Work for his contract. Contractor is also responsible for knowing the work that has been assigned to preceding contracts. No additional compensation or extension of time will be allowed a Contractor due to his ignorance of the work assigned to his Contract or to other contracts which may affect his work. The Contractor is responsible, however, for all items which are covered in the Specifications and Drawings relating to their Contract if not specifically mentioned in the Summary of Work.

C. The Construction Manager will provide on-site a source for temporary electric, temporary water and portable sanitation facilities only. It is each Contractor's responsibility to make the necessary connections, including all material for temporary electric and water. Please note that utility charges for office trailers will be the responsibility of the individual Contractors.

D. A dumpster will be provided on site for free use by Contractors to dispose of non-hazardous, common, work-related refuse. Clean-up is the responsibility of each Contractor. Clean up shall be performed on a daily basis. Contractors not complying will be advised in writing and back charged for all costs associated with the cleanup of their work.

E. Contractors are reminded that there are limited storage areas available on site. Off-site storage will be the responsibility of each individual Contractor.

F. Office trailer permits off site will be the responsibility of each individual Contractor. On site Contractor’s field offices, one (1) per Contractor, if required, will be located as directed by the Construction Manager.

G. Contractor will be prepared to discuss and submit a detailed project schedule seven (7) days after receipt of Notice to Proceed and to begin its submittal process. The Project Schedule is an integral part of this contract. Certain construction sequences and priorities must take place in order to meet the target dates. Concentrated work periods will occur and each Contractor is responsible to staff the project as required by the current Construction Schedule or as directed by the Construction Manager. Contractor will cooperate with the Construction Manager in planning and meeting the required sequences of work and Project Schedule as periodically updated by the Construction Manager.

H. All bids must include insurance limits in accordance with Article 11 of the Section 007300 SUPPLEMENTARY CONDITIONS.

I. Hoisting, scaffolding and material handling is the responsibility of each Contractor, unless otherwise noted.

J. Contractor will be responsible for layout of its own work. The Construction Manager will provide benchmark and layout of the building line.

K. Contractor will be responsible to keep clean public roadways soiled by construction traffic on a daily basis. If cleaning is not done, the Construction Manager may perform the cleaning on an overtime basis and backcharge the Contractor responsible.

L. Contractor Scopes of Work and Schedule are interrelated. Familiarity with each is required.

M. The Construction Manager will provide testing services for soil, concrete and steel. Other testing as required by the Contract Documents will be in accordance with the technical specifications and/or the individual scope of work. Refer to Specification Section 004500 - QUALITY CONTROL.

N. Safety is the responsibility of each individual Contractor. The project will be governed under the guidelines of OSHA.

O. Inter-Contractor shop drawing distribution will be performed by the Construction Manager. Contractor is individually responsible for either coordinating his work with these distributed drawings or notifying the Construction Manager, in writing, of any discrepancies.

P. Coordination with other trades will be required. The Contractor will be required to attend periodic coordination meetings with other trades where requirements, conflicts and coordination issues will be discussed and resolved. Attendance when requested will be mandatory. If inter-Contractor coordination is not satisfactorily performed, the conflicting Contractors shall mutually share the cost to relocate and/or reinstall their work.

Q. Contractor shall submit a schedule of values to the Construction Manager prior to the submission of their first invoice for approval through Building Blok.

R. Contractor is expected to review and coordinate its Work with the complete set of Contract Documents, including all items noted as by his trade whether or not shown on that particular set of drawings. Documents are available at the site for review.

S. Contractor is responsible for obtaining all necessary permits required for his work, including street permits. Unless otherwise noted, building permit shall be secured by the Construction Manager. Any subcontractor who will be restricting access to street, right of way or adjacent property must notify the Construction Manager 48 hours in advance.

T. Contractor's License: Submit a copy of all business licenses required by local and state agencies.

U. Contractor shall absorb, without additional compensation, any and all costs of working beyond normal hours to maintain job progress in accordance with the current construction schedule.

V. No asbestos or PCB's in or on any material or equipment will be accepted or allowed on this project. All hazardous materials will be treated in accordance with all State and Federal regulations.

W. Daily cleanup of the work is the responsibility of each individual Contractor which includes broom cleaning of their debris as required. Contractor will be individually back charged by the

Construction Manager for cleanup not satisfactorily performed by the Contractor.

X. In the event asbestos is uncovered, the Contractor shall notify the Construction Manager of the areas requiring removal of asbestos. The Construction Manager shall then coordinate the removal with the Owner.

Y. This project is to be constructed adjacent to existing buildings. Contractor shall exercise all due precautions to minimize noise, air pollution and any other construction hazards which in any way would cause discomfort or danger to the occupants of the existing building in the area.

Z. The Safety Cable System shall not be altered or removed without a written request submitted to the Project Manager with a copy to the Field Manager. It shall be the responsibility of each and every Contractor that is removing or altering the Safety Cable System to maintain the fall protection safety provided by the safety cable and not leave the area unprotected. Each and every Contractor shall be responsible to re-install the Safety Cable System immediately after work is completed. Each and every Contractor shall be responsible to re-install the Safety Cable System in accordance to OSHA standards.

AA. Normal work hours for this project are from 7:00 a.m. to 3:30 p.m. Any work to be performed outside of these hours must receive prior approval from the Construction Manager. Requests to work beyond normal work hours shall be submitted at least 48 hours prior.

AB. Contractor is responsible for having a competent project superintendent/foreman on-site during all work performed under its contract.

AC. In the event the Contractor has non-English speaking employees or subcontractors on the project, they shall have a superintendent or foreman on site, at all times, who speaks English and can communicate with Contractor's employees. Should the Contractor fail to meet this requirement, at any time, Construction Manager may direct all Work to stop until the proper supervision is on site. The Contractor will be responsible for maintaining the project work schedule and make up at its own expense, any delay to the Schedule resulting from the work stoppage.

AD. Punch List Procedures: Contractor shall be given a copy of the punch list with his appropriate work identified. Contractor shall have nine (9) calendar work days to complete its punch list work. On the 10th day or as determined by the Construction Manager, the Construction Manager shall employ other contractors, as required, to complete any incomplete punch list work and retain from the appropriate Contractors retainage all costs incurred.

AE. Contractor shall provide the necessary safety barricades and railings required to complete their work and comply with all OSHA, local code and contract specifications.

AF. **Prohibition of Using Photographs on EDiS Projects**: The Contractor and all associated subcontractors agrees to not issue any news release or advertising pertaining to the Work or the Project, including references to the Project on the Contractor's/subcontractor website or other social media outlets, without obtaining EDiS' prior written approval, in each instance. The Contractor, for itself, its employees, vendors and subcontractors, agrees to not use the name of the Owner, the Project, EDiS or any photographs, videos, or other images of the Project in connection with any of

Contractor's business promotion activities, advertising, website, social media outlets, or operations, without EDiS' prior written approval in each instance.

AG. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

AH. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

AI. All contractors must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented into the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

AJ. All contractors shall be responsible to protect all non-metallic piping within the building envelope from overspray of the Applied Fireproofing, intumescent coatings, fire caulking and fire safing as it pertains to the scope of your course of work. The contractor shall be familiar with and comply with the NFPA regulations, including but not limited to the following 6.3.7.5 Firestopping materials intended for use on nonmetallic piping penetrations shall be investigated for compatibility with the nonmetallic pipe materials. 6.3.7.5 Protection plan shall be submitted and reviewed with the CM prior to implementation.

AK. For all contracts which include allocations for COOP hours with NCCVT students, any unutilized COOP hours shall be returned to the district at the rates published in the documents, as a credit change order.

CONTRACT NO. D-01 - UNIT MASONRY

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 033000 | Concrete (coordination) |
| Section 042000 | Unit Masonry |
| Section 047200 | Cast Stone Masonry |
| Section 321413.13 | Interlocking Concrete Unit Paving |
| Section 070553 | Fire and Smoke Assembly Identification |
| Section 072100 | Insulation |
| Section 072640 | Sprayed Polyurethane Foam Insulating Air Barrier |
| Section 072500 | Weather Barriers |
| Section 076200 | Sheet Metal Flashing and Trim |
| Section 078400 | Firestopping |
| Section 079100 | Preformed Joint Sealers |
| Section 007900 | Joint Sealers |

This contract provides and includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide masonry units, cast stone, reinforcing, accessories and related work. This contract includes all masonry work except the work provided by BP-C Foundation Masonry contract. This contractor owns coordination with the BP-C contractor and must review and understand the BP-C scope of work.

2. Provide all concrete interlocking pavers, grading, subbase, concrete substrate, grouting and cleaning as required to provide a complete brick pavers system.

3. **This contractor to provide Detail F2 sheet A106 complete for all areas. Including concrete subbase and 8" thick concrete slab section. (Addendum No. 2)**

4. **This contractor to provide the colored concrete medallion in the courtyard complete. (Addendum No. 2)**

5. Provide all special shape, cast stone masonry and custom masonry units as defined in the construction documents.

6. This contract shall provide all Sprayed Polyurethane Foam Insulating Air Barrier with intumescent coatings, special paint layer per NFPA 285, and all "Self-Adhering Flashing Tape" at all locations (vertical and horizontal) behind vertical brick, block, metal panels, canopies and overhangs. The Flashing tape shall be applied to seal all exterior openings, including but not limited to doors, louvers, windows, curtain walls, storefronts etc. This includes all exterior sheathed areas, and block back up areas, whether behind masonry or not. Include spray insulation termination angles as needed for the spray foam insulation installation Coordination of work with other trades shall be required and final

installation work to be coordinated with project schedule and CM. Provide a "complete system" in its entirety for this project.

7. This contractor shall include multiple mobilizations within their base bid amount to accommodate the exposure time recommendation for the sprayed insulation, special coatings and self-adhering flashing tape in all areas per the construction schedule and project phasing.

8. This contractor shall provide installation and coordination of sleeves required to go through any masonry walls above finished floor elev. 0.00. Coordinate with the MEP contractors for sleeves (to be provided by MEP contractor) and coordinated/installed by the Masonry contractor.

9. Provide Fire and Smoke Identify markings on all masonry walls that require marking per governing jurisdictions. Coordinate marking walls with pant.\/stencils with the CM on site.

10. Provide all caulking and sealants for masonry to masonry conditions. Masonry to dissimilar materials provided by Caulking contractor.

11. Integral masonry flashings, expansion joints, insulation and other related items as required.

12. Mock up as required. Provide a complete mockup of all masonry items within a sample wall to be coordinated by the CM. This contractor to provide and install the concrete footing required for the mock up. Include demolition, removal and clean up of the mock up area.

13. This contractor shall include within their bid the incorporation of **2000 hours of COOP participation** by a NCCVT student. Contractor to comply with project documents and requirements set forth in 19 del. C.ch.5.

14. Grouting of door frames at all masonry openings. Include grouting of HM vision panels in CMU and grouting of after-set frames in stair towers built by BP-C masonry contractor.

15. Weather protection and temporary heat as required to perform the work and maintain the project schedule. This would include tenting, tarping, heating (providing fuel and equipment), installation, maintenance and removal. Kerosene is not an acceptable fuel for work within the interior spaces.

16. Layout of the work including responsibility for all elevations and dimensions as they affect other Contractor's work.

17. Lintels either required by this Contract or install loose lintels furnished by others. Include bolting or welding of lintels as per details.

18. Provide mixing stations as required to perform your work. The station locations shall be coordinated with the CM (include 5 separate locations and the remobilization of the station 5 times) The mixing area shall be protect as required by DNREC and it shall be this contractors responsibility to maintain the station area at all times. Remove all components and restore area when work of this contract complete.

19. Concrete fill/grout at all masonry units as identified.

20. Purchasing and installing reinforcing steel in block walls.

21. Provide all fire safing/fire stopping, and continuous fire sealant at top and bottom of masonry walls as shown on the contract documents. Also include these sealants at all steel penetrations through the provided masonry.

22. Silicone waterproofing/sealant if specified.

23. This contractor shall provide the required firewall/smoke wall assembly identification for work of this contract. (labelling of the walls with fire rating)

24. Interior exposed masonry walls shall be cleaned and scraped thoroughly; a second pass of scraping and refining the cleaning shall be included in the base bid. CM to review and coordinate second pass with the masonry foreman in the field.

25. Temporary protection for final wash down/cleaning of masonry. This includes covering and protecting the curtain wall, storefronts, Kalwall and all door window openings.

26. This contractor shall supply and install straw at the base of wall when work of this contract has been completed to stop splashing of mud and water on completed walls.

27. Flashing at locations indicated on drawings for your work.

    a) Thru wall and cavity flashing below the roof line shall be by the Masonry Contractor.
    b) Thru wall and cavity flashing above the roof line shall be by the Roofing Contractor.
    c) Flashings at rising wall conditions shall be provided by this contractor.

28. Cutting, fitting and building into masonry work, embedments provided by others. Coordinate all work with other trades as required.

29. Provide all firesafing and fire caulking as required for your course of work.

30. Provide masonry veneer anchors as required for your course of work.

31. Bond beams including supplying and installing reinforcing and fill.

32. Elevator shaft masonry block in BP-C contractors scope. All veneer and finish masonry shall be provided by this contractor. Include the final infill toothing of the block around the elevator door frames at each level in this contract. Include sealing and fire safing as required at top of shaft wall.

33. Furnish and install all masonry veneer anchors where required. Welding of anchors that are not shown to be fabricated with the structural steel shall be welded in place as needed by this contractor.

34. Masonry contractor shall supply and manage dumpsters for use in removal of masonry debris. The project dumpsters may not be used for masonry debris.

35. Mock up as required. Provide your portion of a complete mock-up of the exterior wall assembly for areas of masonry, metal panel, translucent panels and others as detailed. within a sample wall to be coordinated by the CM.

36. Provide generators and services as required to provide temp power, water etc. as needed for your course of work.

37. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

38. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

39. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.

40. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented into the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

41. Include within this contracts base bid an allocation of $40,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-02 - MISCELLANEOUS METALS, STAIRS, AND RAILS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 055000 | Metal Fabrications |
| Section 055100 | Metal Stairs |
| Section 055133 | Metal Ladders |
| Section 055213 | Pipe and Tube Railings |
| Section 057300 | Decorative Metal Railing |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide stairs, loose lintels, misc. metal angles, plates, handrails, railings, metal ladders and accessories.

2. Furnish loose steel lintels, angles, plates and embedded items to the Concrete and Masonry contractors.

3. Review Alternates as per the Bid Form and Alternate section for work related to Stair #5.

4. **This contractor will be required to coordinate work of this contract with the Structural Steel, Joist and Deck contract which is part of BP-C. Review and understand the BP-C contract as it relates to your work. (Addendum No. 2)**

5. This is not a secure site. All contractors are responsible for concealing , locking and/or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

6. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

7. Provide miscellaneous rough hardware, iron shapes, framing and support angles.

8. Provide pipe bollards and specified covers per spec section 055000-11.

9. Provide powder coated downspout boots per section 055000-10.

10. Provide stair nosing's.

11. Provide gratings.

12. Overhead door frames, furnished and installed.

13. Elevator hoist beams, provide and coordinate installation with BP-C masonry contractor.

14. Elevator sill angles, provide and coordinate anchoring systems, bolts etc. and installation with other trades.

15. Toilet partition supports, if not part of the manufactured toilet partition frame shall be supplied by this contractor.

16. Dock bumpers and loading dock equipment. Provide (furnish and install.)

17. Provide ships ladder, access ladders and related fastening devices and accessories.

18. Galvanizing and other special coatings as required.

19. Anchoring devices, fasteners, inserts and other related items associated with the installation of the above items.

20. Field touch-up paint.

21. No electrical power for welders will be provided.

22. Verify all field dimensions prior to fabrication.

23. No electrical power for this contractors equipment or welders will be provided. Electrical power to be provided as needed by this contractor.

24. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

25. Include within this contracts base bid an allocation of $20,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-03 - EXTERIOR STRUCTURAL STUD ASSEMBLY

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 054000 | Cold-Formed Metal Framing |
| Section 070553 | Fire and Smoke Assembly Identification |
| Section 072100 | Thermal Insulation |
| Section 072129 | Sprayed Acoustical Insulation (coordination) |
| Section 072640 | Spray Polyurethane Foam Insulating Air barrier (coordination) |
| Section 072500 | Weather Barriers (coordination with mason contractor) |
| Section 079100 | Preformed Joint Sealants |
| Section 079200 | Joint Sealants |
| Section 078400 | Firestopping |
| Section 092116 | Gypsum Board Assemblies |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide structural stud assembly for the exterior skin of the building. Including but not limited to Metal Studs, gyp sheathing, Fire safing and delegated design on the exterior wall assembly.

2. Provide rock wool thermal insulation at area where exterior walls create parapets and at edge of floor slab connections.

3. This contractor shall be responsible to coordinate with the masonry contractor as related to the exterior wall assembly and the installation of the spray foam insulation system.

4. Steel stud construction as related to the roof parapet construction.

5. Steel stud construction related to framing out for openings in exterior walls.

6. Provide secondary support framing as required.

7. Clips, anchors, supports and other accessories that interface between steel framing and steel studding and steel studding with masonry interaction.

8. Expansion systems as required for performance of your course of work.

9. Scaffolding, lifts, and all necessary equipment required for your contract's course of work.

10. Provide engineered drawings (delegated design requirements.)

11. This contractor shall be responsible for coordinating with other trades for exterior openings and layout of design features.

12. Comebacks and out-of-sequence work may be required and as such should be included in your base bid proposal.

13. No power for welding equipment will be provided. This contractor shall provide portable generators, fuel, etc.to power equipment required for their scope of work.

14. Coordinate Self Sealing Flashing installation at base of wall assemblies and flashed areas. with Masonry contractor who is providing. This contract (D-30 Ext Wall ) to provide any required metal flashings for your course of work.

15. This contractor shall supply and install any access panels in the exterior wall assembly that are required by the contract documents. In addition the contractor shall install (40) 2'X2' Access panels provided by other. (exterior walls only)

16. Provide fire resistant joint sealants, fire safing, fire stopping, as it relates the work of your contract.

17. Bidders are advised to pay particular attention to top of wall conditions, fire and smoke safing of slabs and acoustical sealants.

18. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

19. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented into the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

20. Layout of the work including responsibility for all elevations and dimensions as they affect other Contractor's work.

21. Mock up as required. Provide your portion of a complete mock-up of the exterior wall assembly for areas of masonry, metal panel, translucent panels and others as detailed. within a sample wall to be coordinated by the CM.

22. This contractor shall include within their bid the incorporation of **750 hours of COOP participation** by a NCCVT student. Contractor to comply with project documents and requirements set forth in 19 del. C.ch.5.

23. This contract shall include in their bid the necessary crews to complete the work as per the project schedule. Provide additional crews as required to maintain schedule at no additional cost to the project.

24. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

25. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

26. Include within this contracts base bid an allocation of $40,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-04 - CARPENTRY AND GENERAL WORK

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 055800 | Architectural Metal Column Covers |
| Section 06100 | Rough Carpentry |
| Section 06200 | Finish Carpentry |
| ~~Section 062023 Interior Finish Carpentry~~ | **(Addendum No. 2)** |
| Section 079200 | Joint Sealants |
| Section 081113 | Hollow Metal Doors and Frames (coordination, handing, installation) |
| Section 081416 | Flush Wood Doors (coordination, handing, installation) |
| Section 081613 | Integrated Door Opening Assemblies |
| Section 083100 | Access Doors and Panels |
| Section 087100 | Door Hardware (coordination, handing, installation) |
| Section 087106 | Door Hardware Schedule (coordination, handing, installation) |
| Section 089100 | Louvers |
| Section 101101 | Visual Display Boards and Display Cases (coordinate blocking and supports) |
| Section 102113 | Plastic Toilet Compartments (coordinate blocking and supports) |
| Section 102123 | Cubicle Curtains and Track (coordinate blocking and supports) |
| Section 102601 | Door and Wall Protection (coordinate blocking and supports) |
| Section 102800 | Toilet Accessories (coordinate blocking and supports) |
| Section 104400 | Fire Protection Specialties (coordinate blocking and supports) |
| Section 129300 | Site Furnishings |
| Section 116625 | Gymnasium Equipment |
| Section 116653 | Gymnasium Dividers |
| Section 323119 | Decorative Metal Fences and Gates |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide labor and materials to perform the work related to all carpentry and general work.

2. All rough carpentry related to the exterior skin of the building and roof areas, including wood nailers and blocking, roof blocking, curb blocking, MEP blocking coordinated with MEP trade, fire shutter blocking etc. as required. Include blocking for roller shades.

3. All rough carpentry related to the interior of the building including blocking, wood nailers, etc. for the installation of fire extinguishers, doors, windows, toilet accessories, cabinets, toilet partitions, casework, millwork, AED's, gas and air cabinets, rollup doors, coiling doors, kitchen equipment and accessory blocking, etc. including fire treating as required.

4. Provide interior architectural metal column covers as required. (Note the MCM exterior column enclosures are provided by the Metal Panel contractor)

5. Provide all decorative metal fencing and gates as per contract documents. Include complete installation and coordination with electrical and special systems contractor for the locking interface and card access.

6. Provide and install plywood back boards on all wall areas, floor to ceiling in all electric, MDF and IDF rooms. Backboards to be ¾ inch plywood, painted one side with white Fire Proof paint and fire caulked to the walls tightly.

7. This contractor shall include the installation of the key box system and all required blocking and anchoring systems.

8. Provide blocking and anchoring for all roof ladders, TV and monitor mounts, Smart Board displays, Visual display boards, chalk, tack and white board assemblies. Coordinate with other trades for locations and installation direction.

9. Provide blocking for door hold opens, wall mounted closers, and wall door stops.

10. Provide all Gymnasium equipment and Gymnasium dividers as part of this contract.

11. Install metal and wood doors and frames, including receipt of doors and frames at the curb side. Contractor shall receive the doors, frames and hardware and inventory immediately. This contractor responsible for safe keeping of all materials and shall provide written documentation that all materials were received. All hardware shall be secured in a fully locked and protected area. By this contractor.

12. Install finish hardware related to all doors (hollow metal, wood and coordinate keying with aluminum hardware) including receipt of hardware at the curb side. This contractor is responsible for coordinating door hardware with their work to ensure each opening is properly prepped for hardware being supplied by others. All low voltage wiring within the doors and frames to be installed by this contractor. Conduits and raceways will be provided by the electrical contractor, as well as installation of the electrical supply power and the final power connections to equipment. Final connections of low voltage wiring to hardware to be provided by the Special Systems contractor. This contractor to work with the electrical contractor and Special Systems contractor to provide a complete installation.

13. This contractor shall advise the hardware supply contractor of any deficiencies or missing item immediately after initial inventory (in writing) as installation takes place. Reporting and tracking is the responsibility of this contractor.

14. All field trimming required to adjust to the existing in place conditions shall be part of this contractors scope of work. Field measuring and verification is to be included.

15. Anchoring devices, fasteners, inserts and other related items associated with the installation of the above items.

16. Provide all architectural louvers, including insulated panels etc. All louvers are to be included within this contract, they are shown on the architectural drawings and specs and referenced by MEP documents. Provide ‘custom” color costs in the base bid. Coordinate the louvers provided within the Kalwall System for custom color, sizing, design or other integrated features. This contractor shall coordinate with other trades for integration of the louvers into their course of work. All material

handling and on site protection of the louvers is this contractors responsibility.

17. Provide blocking and support for the Visual Display Boards and Display Cases.

18. Provide all blocking as required for Toilet Partitions, Cubicle Curtains, Door and Wall Protection, Toilet Accessories and Fire Protection Specialties. Coordinate with the BP-D contract for "Specialties" on all required blocking. Volleyball sleeves and installation shall be coordinated and installed by this contractor,

19. This contractor shall provide and install all Gymnasium Equipment a per contract documents, to include blocking, supports, material handling etc. 100% protection of the gym floor while performing your work is required by this contract. Floor protection shall be as provided by the wood floor manufacturers recommendations.

20. This contractor shall provide al Gymnasium scoreboards as indicated on A-111 (3 scoreboards in total)

21. This contractor shall provide and install all Site Furnishings as detailed in the contract documents. Include all work related to this course of work, concrete pads, anchoring, touch up paint etc.

22. This contractor to coordinate all card reader blocking requirements with Special Systems contractor.

23. Provide protection at Elevator door openings at each floor. Include the required mesh protection fabric and the necessary wooden framing that allow easy access by other trades. Include maintenance for a period of 30 months from initial installation. Once elevator is installed, provide ¾" blue board foam insulation on all surfaces taped and secured so as not to damage finishes of elevator. Provide maintenance of this protection until substantial completion of project.

24. Provide and maintain temporary wood railings and handrails at stairs. Provide wood infill of stair pans and landing pans. Each tread to have abrasive edge tape applied immediately after installation of infill.

25. This Contractor shall include in the base bid 600 hours of Journeyman carpenter time and 250 hours of common labor time for work to be directed by the Construction Manager.

26. This Subcontractor shall at a minimum provided, maintained, and inspect for the length of the project, one temporary fire extinguisher for each 3,000 sq. ft of the protected building area. Travel distance from any point of the protected area to the nearest fire extinguisher shall not exceed 100 feet. In multistory buildings, at least one fire extinguisher shall be located adjacent to stairway. Fire extinguishers shall be at least 10lb, Multi-Purpose (ABC) dry chemical, UL labeled, with a rating of 3a:40bc. Maintain for the duration of the project until substantial completion to insure coverage and compliance.

27. Coordinate electrical requirements with any automatic door operations. This contractor owns all controls, switches and wiring as required for a complete system. Power to be supplied by Electrical contractor.

28. Gate hardware provided by others shall be installed and completed by this contract.

29. Provide three Knox Boxes coordinated with the local fire company for installation at locations identified

by the owner/CM.

30. Coordinate and install hold open closers with fire alarm interface. Power wiring by Electrical Contractor. Fire alarm ties in by Electrical Contractor.

31. This contractor will work with the Special Systems contract to allow the installation of harnesses, whips and connections while installing frames, doors, hardware and access controls.

32. Provide (2) separate scaffold stairways, each must be erected to accommodate access to the roof area from the exterior of the building. The scaffold must provide a landing with stairs at the roof area. Each scaffold leg should have adjustable base plates to accommodate the installation of roofing material without the disassembly of the unit. An 8 foot plywood "wall" must surround the bottom of the stairway with a hinged plywood door installed with a hasp to accept a lock. The scaffold must be installed per OSHA regulations, inspected and tagged for use.

33. Provide and maintain perimeter netting at each floor level including all floor openings. Perimeter rail or cable to be provided by the steel contractor. This work shall include toe boards at all location. **Netting to be included as detailed on the "Perimeter Safety Netting at Leading Edge Conditions" sketch included as part of this scope of work.**

34. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

35. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented into the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

36. Layout of the work including responsibility for all elevations and dimensions as they affect other Contractor's work.

37. Provide all work related to the building mock up, blocking, installation of door frame, doors, hardware, flashings, fasteners etc. as it relates to mocking up of the systems included in the Carpentry Scope.

38. This contractor shall include within their bid the incorporation of **2000 hours of COOP participation** by a NCCVT student. Contractor to comply with project documents and requirements set forth in 19 del. C.ch.5.

39. Provide and maintain temporary handrails per OSHA standards at all stair assemblies. The below section is a guideline and doesn't replace the OSHA regulations Stairs having two or more risers or rising more than 30 inches (76 cm), whichever is less, shall be equipped with: At least one handrail; and one stairrail system along each unprotected side or edge. The height of stairrails shall be not less than 36 inches from the upper surface of the stairrail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread. Handrails shall provide an adequate handhold for employees grasping them to avoid falling. Handrails that will not be a permanent part of the structure being built shall have a minimum clearance of 3 inches (8 cm) between the handrail and walls, stairrail

systems, and other objects. Midrails, and intermediate vertical members, or equivalent intermediate structural members, shall be provided between the top rail of the stairrail system and the stairway steps. Midrails, when used, shall be located at a height midway between the top edge of the stairrail system and the stairway steps. When intermediate vertical members, such as balusters, are used between posts, they shall not be more than 19 inches (48 cm) apart.

40. This contractor shall provide temporary rails at all exterior opening on the building until permanent window/doors/curtainwall etc. installed.

41. This contractor shall include protective wooden covers and marking for any floor openings, holes, shafts etc. Include labelling of the covers with clear ad readable markings or stickers.

42. Provide temporary protective handrails at stage front, steps, stairs and ramp locations.

43. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

44. Provide **fall** protection at Elevator door openings at each floor. Include the required mesh protection fabric and the necessary wooden framing that allow easy access by other trades. Include maintenance for a period of 30 months from initial installation. Meeting the minimum requirements provided by the elevator vendor.

45. This contractor shall provide within the base bid, (8) sets of exterior steps to be constructed to create safe and easy access to the building first floor from the exterior grade. The step assemblies shall be figured to manage a 24" rise from grade to the first floor elevation, be 40" wide and shall have no-slip tread tape applied to each tread.

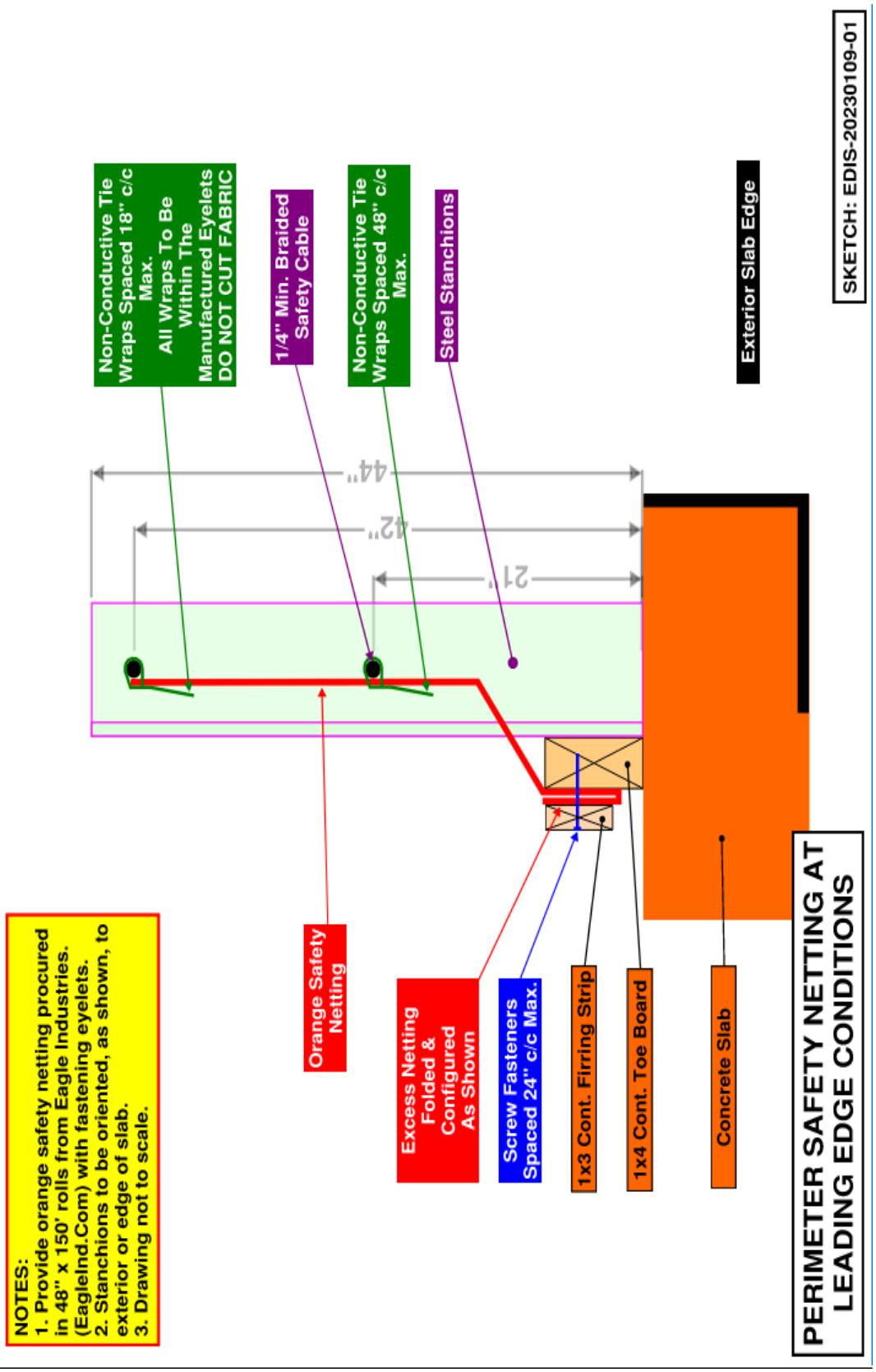
46. Provide, maintain and remove a prefabricated manufactured trash chute from the second floor to the dumpster below for a period of 24 months. This chute shall be maintained and all safety barriers, restraints etc. managed until substantial completion of the project.

47. This contractor shall provide and include all costs associated with installing temporary doors at the exterior of the building (all openings) and a cattle chute on the 2nd floor for accepting deliveries to the second floor. Safety equipment, gates, railings and tie-offs as required by OSHA safety standards shall be included.

48. **This contractor shall include within their base bid an allowance of $100,000 for work relate to temporary enclosures at window, storefront and curtainwall areas as directed by the Owner and CM. (Addendum No. 2)**

49. Provide wood safety barricades to extend top of roof parapets to OSHA required height during construction. Coordinate removal and replacement of wood safety barricades with metal wall cap installation.

50. Provide within this contracts base bid an allocation of $40,000 for work to be directed by the owner and CM. Unused portions of the allocation shall be returned to the owner.


SKETCH: EDIS-20230109-01
Non-Conductive Tie Wraps Spaced 18" c/c Max. All Wraps To Be Within The Manufactured Eyelets DO NOT CUT FABRIC
1/4" Min. Braided Safety Cable
Non-Conductive Tie Wraps Spaced 48" c/c Max.
Steel Stanchions
Exterior Slab Edge
44"
42"
21"
Orange Safety Netting
Excess Netting Folded & Configured As Shown
Screw Fasteners Spaced 24" c/c Max.
1x3 Cont. Firring Strip
1x4 Cont. Toe Board
Concrete Slab
NOTES:
1. Provide orange safety netting procured in 48" x 150' rolls from Eagle Industries. (EagleInd.Com) with fastening eyelets.
2. Stanchions to be oriented, as shown, to exterior or edge of slab.
3. Drawing not to scale.
PERIMETER SAFETY NETTING AT LEADING EDGE CONDITIONS

CONTRACT NO. D-05 - EXTERIOR METAL PANELS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 054000 | Cold-Formed Metal Framing |
| Section 050500 | Metal Fabrications |
| Section 074213.13 | Metal Wall Panels |
| Section 074213.23 | Metal Composite Material Wall Panels |
| Section 076200 | Flashing and Sheet Metal |
| Section 079100 | Preformed Joint Sealants |
| Section 079000 | Joint Sealants |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide all metal panels, framing, sub girts, Z furring, insulation and all other components to provide a complete metal panel system.

2. Provide Flashing and complete "engineered and sealed" (Delegated Design) as shown in detail D1/A612. Include all flashing, closures, jamb reveal detail, self-adhered flashing tape etc. to provide a complete system at all locations. This contractor must work with and in conjunction with the spray foam system installation and sealing.

3. This contractor shall provide the MCM metal column enclosures color 2 as indicated on A-202, A-203 and A-207. Provide a complete and sealed systems.

4. The spray installation system will be provided by the Masonry contractor, however this contractor is responsible to coordination. Specifically for installation durations and the completeness of the installation of the Z furring system this contract is providing. Timely installation to not impact the spray foam installation is required by this scope of work.

5. Provide all composite metal panel return systems as identified in detail A1/A612, A7/A612 and similar details as indicated. Jamb return needs to be coordinated with the window installation.

6. Provide all fascia's, soffits, overhangs etc. as required for a complete system.

7. Flashing of panels integral with the panel system.

8. Coordinating, cutting and fitting around the work of other trades is required by this contract and should be part of your base bid work.

9. Caulking of panels as required to provide a complete system. Vertical joints where metal panels meet adjacent materials shall be caulked by the Caulking and Salant contractor.

10. Miscellaneous metal items necessary to support panels other than required structural steel.

11. Furnish anchorage items for embedding into other construction for support of panels.

12. Touch up of all welding.

13. Galvanized, epoxy or stainless steel, etc. anchors as specified.

14. Metal fascia's and copings related to the panel system.

15. This Contractor shall coordinate his shop drawings with the Window Contractor's shop drawings and the overall construction schedule.

16. Coordinate all work of this contract with the Carpentry contractor for the installation, flashing and complete installation of the louvers into the metal panel system. Close coordination of shop drawings is required by these two contracts.

17. All material handling, lifts, cranes etc. are the responsibility of this contractor.

18. Verification of field dimensions is the responsibility of this Contractor. Coordination and review window openings, door openings and others during the shop drawing process is required so materials can be ordered to accommodate schedule. Material may be required to be ordered in advance of the ability to field measure. This coordination is the responsibility of this contractor.

19. Provide all flashing as identified with the metal panel installation. Provide all hat channels and sub-girts for the panel installation. Coordinate with the work of other contractors related to the spry foam installation.

20. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

21. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

22. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

23. Include within this contracts base bid an allocation of $30,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-06 – DRYWALL AND INTERIOR METAL FRAMING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 051200 | Structural Steel (related work) |
| Section 055000 | Metal Fabrications (related work) |
| Section 054000 | Cold-Formed Metal Framing |
| Section 061000 | Rough Carpentry |
| Section 070553 | Fire and Smoke Assembly |
| Section 072100 | Thermal Insulation |
| Section 078400 | Firestopping |
| Section 079200 | Joint Sealers |
| Section 092116 | Gypsum Board Assemblies |
| Division 15 | Mechanical (coordination) |
| Division 16 | Electrical (coordination) |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide metal studs, framing, insulation, gypsum wallboard, taping, spackling and specified wall finishes. (Level 5 where identified) Include all trims and finish pieces for a complete installation.

2. This contract shall provide all insulation in the exterior walls of the building system. Coordinate all insulation work and interior drywall work with the exterior Metal Framing contractor.

3. Provide secondary support framing and fastening devices as required. If Misc. metals are required by your installation and not identified in the documents this contractor shall provide and install.

4. Provide Fireproofing at the exterior wall and the edge of slab as shown in the typical wall sections. (A1/A312 example and all related details) Sealants required to complete this system shall be provided by this contractor.

5. Provide all interior metal framing at required for back up of other materials.

6. Provide batt insulation, both thermal and acoustical and related work.

7. Include molded shapes if specified.

8. Acoustical sealants, fire safing and fire caulking as required for penetrations and top of wall conditions.

9. Removal of spray fireproofing to expose points of attachment to structural steel is to be performed in a workmanlike manner. Removal of spray fireproofing in excess of 3" greater than the attached item will require repatching which will be back charged to this Contractor.

10. This contractor shall coordinate with the other trades for all box outs, penetrations, framed openings etc. as required.

11. This contractor shall provide cleaning of the floor areas of all drywall spackle, mud, finishes etc. that are used by this contractor. Review and acceptance by the CM will be required.

12. Access panel installation (assume 100 total). Assume panels to be 30"x 30" for framing purposes.

13. Coordinate work of this contract with the Carpentry contract for wood blocking and support installation.

14. Coordination of door and interior framed openings with the Carpentry contractor who will install the door and lite frames.

15. Coordinate interior louver extensions and incorporation of louver installation with Carpentry contractor as necessary.

16. Include fire taping and sealing at perimeter edge and as shown or indicated in the contract documents.

17. Provide architectural expansion joint systems, including joint covers materials at concrete slab, drywall and masonry construction (interior only).

18. Scaffolding, lifts and material handling equipment for the course of your work.

19. Comebacks and out-of-sequence work may be required and as such should be included. Include (4) additional mobilization/return trips for touch up and repairs. Each trip shall include 16 hours of carpenter/finisher time as well as materials required for general patching.

20. Include all necessary field measurements.

21. Include three (3) passes per floor to "touch-up" mechanical penetrations to ensure ratings required. The first pass will be required prior to ceiling grid installation and the second pass will be required prior to final inspection for Certificate of Occupancy.

22. Bidders are advised to pay particular attention to top of wall conditions, fire and smoke safing of slabs and acoustical sealants. This work is include within the scope of this contract.

23. This contractor to provide caulking at the base and top of drywall partitions, furred walls and all drywall conditions.

24. This contractor shall work with other trades to install openings that are in wall assemblies being constructed.

25. Provide metal furring as required.

26. Provide all glass fiber reinforced gypsum work including materials, taping (interior only.)

27. Provide all backing board (cement board) for tile areas and as directed by the contract documents. Coordinate with the Tiling contractor for requirements of this work.

28. Engineered shop and installation drawings. (delegated design)

29. This Contractor shall include a $175,000 allocation in his contract to supply, install, inspect and maintain a complete scaffold system to accommodate the construction of the Auditorium framing, ceiling systems, clouds, MEP installation etc. This contractor shall be the responsible contractor for this scaffolding system throughout construction until all work is completed and the CM authorized the removal of the system. All contractors shall provide signed waiver forms to the controlling contractor (this contractor) before they may access the scaffold system.

30. This contractor shall include within their bid the incorporation of **1000 hours of COOP participation** by an NCCVT student. Contractor to comply with project documents and requirements set forth in 19 del. C.ch.5

31. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

32. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

33. Provide trash and debris removal daily. This means everything leaves the building and goes to the dumpsters. No piling of trash inside building will be permitted.

34. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

35. Include within this contracts base bid an allocation of $30,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-07 – GENERAL LABOR AND CLEAN-UP

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Procurement and Contract Requirements |
| Division 1 | General Requirements |

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. This contractor shall provide General labor to the project the direction of the owner and project manager.

2. Include within the Base Bid for this contract $7,500 worth of material handling tools. To include but not limited to, wheeled bins for trash removal, shovels, brooms, trash bags etc. purchased materials shall be tracked with receipts and verified. Any funds left unspent will be returned to the owner via credit change order. (all tools purchased under this allocation shall be organized and turned over to the owner at completion of the work)

3. The contract shall include a total of 6,000 manhours of general labor to be scheduled by the Construction Manager. The work will start Feb 15 2024 and the duration of the coverage could extend to 15 May 2026. This work may be scheduled anytime within the scheduled date range without penalty or additional costs to NCCVT or the CM.

4. A unit price will be provided by this contractor that will pertain to any hours that may be deducted or added to this contract.

5. Pay Applications each month will be backed up with daily tickets and a complete accounting of the monthly hours utilized. Field Superintendent or hid designated representative shall sign all daily tickets.

6. The owner and CM have the right to request replacement of any personnel provide to service this contract, without out obligation or explanation.

7. **Include within this contracts base bid an allocation of $7,500 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order. (Addendum No. 2)**

CONTRACT NO. D-08 - ROOFING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 072100 | Thermal Insulation |
| Section 075300 | Elastomeric Membrane Roofing |
| Section 076200 | Sheet Metal Flashing and Trim |
| Section 077100 | Roof Specialties |
| Section 077123 | Manufactured Gutters and Downspouts |
| Section 077200 | Roof Accessories |
| Section 079100 | Preformed Joint Sealants |
| Section 07900 | Joint Sealants |
| Division 23 | HVAC (controls coordination) |
| Division 26 | Electrical (power, fire alarm, lightning protection) |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide single ply flexible roofing system, including rigid and tapered insulation and all related accessories.

2. This contractor shall carefully review the edge of roof details to determine if the roof can be placed before the exterior wall assembly is complete. This contractor shall include all costs associated with returning to the jobsite to complete the roof perimeter after wall assembly is complete.

3. Provide caulking and joint assemblies related to roofing, flashing and roof accessories.

4. Roof drains and associated plumbing shall be provided by the Mechanical Contractor. Flashing of the roof drains shall be by the Roofing Contractor. Openings for the roof drains in the roofing materials shall be cut by the Roofing Contractor. Openings in the metal deck shall be cut by others. This contractor shall be responsible to coordinate the roof drain locations as needed by the steel contractor and plumbing contractor so reinforcing of the decking and roof support frames may be installed in accordance with the sequence of work.

5. Metal parapet coping, receiver system and all components required for a complete coping assembly. Caulking and sealing of all copings is the responsibility of this contractor.

6. Provide boot for piping and conduits that penetrate the roofing assembly. Coordinate with other trades.

7. Coordinate the roofing installation and flashing required for line sets, piping, electric and control penetrations. Coordinate with MEP contractors.

8. Roof hatches, smoke vents, smoke hatches, access covers etc. are to be provided by this contractor.

Coordination of this work with other trades and the MEP vendors are required by this contract. Rail systems and curbs to be provided by this contract. The smoke hatches are not accessible shall be provided with remote controllers to test and re-set.

9. Walk pads and walk pad layout shop drawings are required by this contract.

10. ~~Perform cutting, patching and maintenance of temporary patch for work performed by others on existing roofs intended to be re-roofed as part of this work.~~ **(Addendum No. 2)**

11. Metal drip edges, complete including all caulking and sealants.

12. Gravel stops, complete including all caulking and sealants.

13. Roof curbs to be installed by this contractor, provided by the MEP trades as identified in the contract documents. Coordination with the Carpentry contractor on the roof blocking thickness is required by this contractor. Provide detail shop drawings identifying the insulation thickness so blocking can be installed accordingly.

14. This contactor shall coordinate with the carpentry contractor on location of wood blocking, curbing, etc. to facilitate the installation of the tapered insulation, crickets etc.

15. Provide expansion joints that are integral to the roof. Including but not limited to edge of wall Details E3/A590 and B1/A590.

16. Gutters, downspouts, splash pans, splash blocks. This contractor shall be responsible to coordinate with the plumbing contractor for the connection to the RW system. Provide membrane flashing, metal flashings, sealants, drip edge, gutters , drain covers etc. as related the gutter systems for this course of work.

17. Metal scuppers, over flows, drains etc. as required by the contract documents are this contractors responsibility.

18. Provide a means to lift materials to the roof for materials not stored on the roof at initial time of delivery. All costs shall be the responsibility of the roofing contractor.

19. This contractor shall manage, handle, lift and install the insulation materials supplied by the steel contractor for the areas of acoustical decking. Lifting of these materials to the roof when needed is the responsibility of the roofing contractor. At areas of Acoustical Decking below, fasteners for the first layer of roof insulation shall be installed so they “do not “penetrate the bottom surface of the decking. All layers of insulation above are to be imbedded into full bed od adhesive in accordance with roofing and insulation manufacturer’s instructions.

20. This contractor shall provide waterproof seals around lightning protection system as required by roof manufacturer requirements. If location of lightning protection conduits are not clearly shown on the roof plan, include within your base bid an additional; cost to seal one penetration for every 1000 sf of roof area.

21. This contractor shall review the schedule for the roofing scope of work and include within the base bid

considerations (costs) for cold weather roofing installations. This shall include but is not limited to providing a warming hut/enclosure to keep material warm and allow the roof installation to continue in cold temperatures. All costs related to cold weather roof installation shall be the responsibility of this contractor.

22. The owner may at any time select to have a third party roof inspector review and inspect the roofing installation and finished roof system. This contractor shall work with and allow access to this third party inspector as needed.

23. All trach shall be removed from this contractors work area daily to the dumpsters. No trash may be stored on the roof area.

24. Flashing and sheet metal systems related to the scope of this contract work.

25. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

26. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

27. This contractor shall include within the base bid proposal (2) additional roofing inspections of the entire roofing assembly to facilitate any damage or overuse repairs that may be required. These inspections will be schedule by the CM within the duration of the construction schedule. These inspections do not in any way take the place of the final warranty inspections as required by the contract documents.

21. Flashing Summary:
    a. Thru wall and cavity flashing below the roof line shall be by the Masonry Contractor.
    b. Thru wall and cavity flashing above the roof line shall be by the Roofing Contractor.

22. Include within this contracts base bid an allocation of $35,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of credit change order.

CONTRACT NO. D-09 - FIREPROOFING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 072129 | Sprayed Acoustical Insulation |
| Section 078100 | Applied Fireproofing |
| Section 078400 | Firestopping |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide all fireproofing, both exposed and concealed as required by the contract documents.

2. Provide all intumescent and special coatings required by the code documents, identified in contract drawings, plans and details.

3. Provide Sprayed Acoustical Insulation as required by the contract documents. The Alternates apply to this area of work.

4. Clean up on a daily basis, all over spray materials. Remove all excessive water from spraying operation.

5. This contractor shall be responsible to protect all non-metallic piping within the building envelope from over spray of the Applied Fireproofing, intumescent coatings, fire caulking and fire safing as it pertains to the scope of your course of work. The contractor shall be familiar with and comply with the NFPA regulations, including but not limited to the following
   6.3.7.5 Firestopping materials intended for use on nonmetallic piping penetrations shall be investigated for compatibility with the nonmetallic pipe materials.
   6.3.7.5
   Protection plan shall be submitted and reviewed with the CM prior to implementation.

6. Inspection of the fireproofing for compliance will be provided by a third party inspector provided by the owner.

7. Protect fireproofing according to advice of fireproofing manufacturer and installer from damage resulting from construction operations or other causes so that fireproofing will be without damage or deterioration at time of Substantial Completion.

8. Coordinate installation of fireproofing with other work in order to minimize the need for other trades to cut or remove fireproofing. As other trades successively complete installation of their work, maintain protection of structure afforded by fireproofing by patching any areas which have been removed or damaged prior to concealment of fireproofing by other work.

9. This contractor to include and submit as a shop drawing for review a detailed mshop drawing of all

areas of fireproofing and the required coatings on floor plans and elevations, to clearly illustrate where the fireproofing materials and special coatings will be applied.

10. This shop drawing will be shared with the Steel contractor for review and incorporation into their steel and joist preparation plan. (no primer, coatings, primers etc.)

11. Repair or replace work which has not been successfully protected.

12. Prepare all surfaces including priming of substrate if required.

13. Provide all required steel frame fireproofing whether clearly shown or not on the drawings. Do not include concrete fire proofing.

14. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

15. Provide Alternate pricing as required by the contract documents. (k-12 Sprayed Insulation at Shop Areas)

16. Include within you base bid 80 hours of labor and ~~$15,000~~ **$20,000** **(Addendum No. 2)** of materials required to touch up fireproofing systems as required by the governing agencies (FM) or the construction manager.

CONTRACT NO. D-10 – JOINT SEALANTS AND PREFORMED JOINT ASSEMBLIES

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 078400 | Firestopping |
| Section 079100 | Preformed Joint sealants |
| Section 079200 | Joint Sealants |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide required caulking at control and construction joints.
2. Provide all preformed joint sealant products including but not limited to Emseal expansion joint as required.
3. Provide caulking of masonry to masonry ~~and to dissimilar materials~~. **(Addendum No. 2)**
4. Provide within your Base Bid proposal (240) man hours and $7,500 in materials to be utilized for Misc. fire safing and Fire sealants that may be required due to agency walk throughs and inspections. This work shall only be authorized by NCCVT or EDiS. Any remaining funds shall be returned to the owner via credit change order.
5. Provide caulking of vertical joints on exterior metal panels to adjacent materials ( Metal Panel contractor to provide sealants and caulking between panels and as required to seal their assembly, including where metal panels sit on masonry.)

~~6.~~ Provide caulking related to interior glazing. Caulking of interior perimeter of new aluminum windows, storefront and curtainwall to finished surfaces to be provided by this contract. ~~To include all rated sealants and Ballistic sealants at required areas.~~ **(Addendum No. 2)**

7. ~~Provide all caulking and sealants for of kitchen equipment and laboratory furniture to adjacent surfaces~~. **(Addendum No. 2)**
8. Provide caulking of exterior perimeter of hollow metal door frames. **(including overhead doors) (Addendum No. 2)**
9. Provide caulking of interior perimeter of hollow metal door frames to masonry. (HM frames to drywall shall be provided by the Painting contractor)
10. Provide caulking of all hollow metal frames to the floor. Coordinate caulking with flooring materials.
11. Provide caulking of all interior exposed drywall to masonry and metal wall panels.

12. Provide caulking at the tops and bottoms of all exterior and interior column covers.

13. Provide caulking of all interior exposed concrete slab control joints, expansion joints and perimeter slab to walls.

14. Provide caulking for interior perimeter of sinks, urinals, toilets, bath accessories, toilet partitions, fire extinguisher cabinets, hose reel cabinets, gas cabinets and any other accessories identified on the contract documents. **(work as indicated on contract documents)** **(Addendum No. 2)**

15. Provide caulking of joints in ceramic tile areas, including ~~inside corners, floors~~ **(Addendum No. 2)** and ceilings.

16. Provide caulking of the top and sides of all finished stair stringers to adjacent materials. Include caulking of all stair stringers and bottom riser to floor.

~~17. Provide caulking for penetrations through wall, floors, etc. including cutting, patching, sleeves, angle rings, and fire safing.~~ **(Addendum No. 2)**

18. Examine areas and conditions where joint sealers are to be installed and correct any conditions detrimental to the proper and timely completion of this scope of work. Do not proceed with work until unsatisfactory conditions are corrected to permit proper installation.

19. Provide mock ups of all products and adhesion tests for exterior caulking.

20. Provide custom colors or all caulks and sealants.

21. Protection and cleaning of adjacent surfaces to be the responsibility of this contractor.

22. This contractor shall include the Pollution Insurance coverage as specified in the contract documents.

23. This is not a secure site, the contractor is responsible for the safe storage of all of their materials. NCCVT and EDiS will not be responsible for lost or stolen materials

24. All subbase preparation, priming etc. to be performed before caulking is applied.

~~25. Include caulking and preparation of all painted materials prior to painting~~ **(Addendum No. 2)**

26. Include within this contracts base bid an allocation of $15,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-11 - HOLLOW METAL, WOOD DOORS, AND FINISH HARDWARE

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 081113 | Hollow Metal Doors and Frames |
| Section 081416 | Flush Wood Doors |
| Section 081700 | Integrated Door Opening Assemblies |
| Section 087100 | Door Hardware |
| Section 080671 | Door Hardware Schedule |
| Section 088000 | Glass and Glazing (coordinate with glazing contractor) |
| Section 084313 | Aluminum Framed Storefronts (coordination of keying) |
| Section 089100 | Louvers (as related to doors) |
| Division 26 | Electrical (coordination) |
| Division 27 | Communications (coordination) |
| Division 28 | Electronic Safety and Security (Coordination) |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Furnish only hollow metal doors, frames, vision panels, wood doors and finish hardware.

2. Keying for Aluminum Entrance doors to be coordinated and provided by this contract.

3. Keying. All lock sets. Provide Owner with a complete schedule of all keying and pin schedules as required.

4. Provide hex keys or flat keys for hardware not keyed to building hardware.

5. Provide cylinders and keying for elevator, light switches, panic bar dogging and door openers.

6. Construction door cylinders shall be provided by this contractor to the Carpentry contractor for use during construction. Plan and include the cost of providing (3) three separate levels of cylinders (green, red, blue) to allow areas to be secured separately as required by the CM. Provide (25) keys per color system.

7. All exterior Hollow Metal frames shall include a box and raceway built into the door frame for locations at the latch and hinge as required. Provide a box and raceway at the head of the frames for door contact access and installation.

8. This contractor shall pay close attention to the Alternate section of the specifications as they relate to the scope of this contracts scope of work. (Access Control System- Salto Alternate)

9. This contractor shall coordinate the hardware and door materials with the Carpentry contractor prior

to ordering materials. Including but not limited to all coordination meetings with the Owner, CM Carpentry contractor and Special Systems contractor as required to properly coordinate all doors, frames, hardware and connections, prior to ordering of materials.

10. This contractor shall deliver all materials as coordinated with the installer to the project site in an orderly organized manner. Deliveries will not be received unless the Carpentry contractor is notified and the delivery is coordinated. The Owner and EDiS will receive any materials. Additionally provide 48 hour notice prior to delivery. All deliveries are to be between 7:00 AM and 3:30 PM (allow time for check in of all hardware when scheduling)

11. Provide field assistance to Electrical and Carpentry Contractor as required to facilitate the installation of the materials supplied by your course of work.

12. This contractor to coordinate with the Special Systems contractor and Electrical contractor to ensure that all cut outs, plates, receiver etc. that are required to be built into your doors and frames are fully coordinated. In person attendance at review and coordination meetings for the doors, hardware, special systems, raceway and electrical connections shall be the responsibility of this contractor.

13. As changes are made to the hardware schedule, whether due to issued ASI's, RFI's, architectural changes etc., this contractor shall make updates to the hardware schedule and re-issue so the schedule is always updated and submitted to EDiS.

14. Coordinate electrical requirements with any automatic door operations.

15. Provide harness lengths to reach above accessible ceilings. Coordination of this work and the lengths required is the responsibility of this contractor. Provide any harness adapters and connectors required allow hardware to have a splice free system.

16. This contractor shall provide all magnetic hold open hardware, including extensions as required.

17. Provide a key box system to hold up to 25% over the amount of keys being supplied.

18. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

CONTRACT NO. D-12: OVERHEAD COILING DOORS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 055000 | Metal Fabrications |
| **Section 083313** | **Overhead Counter Doors (Addendum No. 2)** |
| Section 083323 | Overhead Coiling Doors |
| Division 26 | Electrical (coordination) |
| Division 28 | Electronic Safety and Security (coordination) |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide all overhead coiling doors as required by the contract documents. To include but not limited to exterior and interior coiling doors systems. Hardware, openers, buttons and controllers required for a complete system shall be provided by this contractor.

2. Provide all overhead coiling grilles.

3. **Provide all overhead counter doors. (Addendum No. 2)**

4. Include all wall framed openings and openings including trims, flashings, and sealants as required to perform your course of work.

5. Provide additional supports for overhead coiling doors. Structural members identified on the structural drawings are not part of this contract scope. Provide ancillary steel, connectors, all thread and other misc. items as required. Coordinate all electrical and special systems requirements for work of this contract with the appropriate contractors. Provide keyed switches for both electric and low voltage to match building keying.

6. Keying coordination for all lock sets. (coordinate with same hardware system as Dor Hardware supply contract..

7. Coordinate electrical requirements with any automatic overhead door operations.

8. Provide low-voltage wiring required for overhead doors automatic door operations. Include all raceways, boxes and switches required for a complete installation.

9. Ensure that all garage doors fully open the entire height of the door opening and close with the bottom edge touching the ground. Garage doors will fit square in the openings with no gaps along the top, bottom or sides when the door is closed.

10. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

11. Provide all sensing and safety devices as specified for each assembly to provide a complete assembly.

12. Exterior overhead doors and grilles shall have the appropriate specified seals, and weatherstripping at all edges. Top, sides and bottom. Seals shall maintain water tightness when installed.

13. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

14. Include within this contracts base bid an allocation of $10,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-13 - CURTAIN WALL/GLAZING/STOREFRONTS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 054000 | Cold Formed Metal Framing (coordination) |
| Section 055000 | Metal Fabrication (as required for work) |
| Section 072500 | Weather Barriers |
| Section 079100 | Preformed Joint Sealants |
| Section 079200 | Joint Sealers |
| Section 089100 | Louvers |
| Section 084313 | Aluminum Framed Storefronts |
| Section 084333 | Folding Glass Storefronts |
| Section 084413 | Glazed Aluminum Curtain Walls |
| Section 084523 | Translucent Wall Assemblies |
| Section 008710 | Door Hardware |
| Section 088000 | Glazing |
| Section 088723 | Safety and Security Films |
| Division 26 | Electrical (coordination) |
| Division 28 | Electronic Safety and Security (coordination) |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide curtain wall, storefront, glass and glazing systems, Fiberglass Sandwich Panel Systems, complete.

2. Provide all Safety and Security Films required by Section 088723 and the contract documents.

3. Provide aluminum door systems and handling.

4. Provide automatic aluminum door systems, including hardware, low voltage wiring, coordination of power and all hardware. Coordinate with Division 26 and Division 28 for access of their work in to your framing system.

5. All work of this contract shall be coordinated thoroughly with Division 26 Electrical and Division 28 Electronic Safety and Security.

6. Curtain wall systems complete, including all Delegated Design requirements required to provide a complete system. Coordinate your work with the envelope systems and contractors to insure sealing of the units for a tight seal. (pressure caps and Blueskin seals)

7. Furnish hardware for aluminum doors only. (all other finish hardware by Door and Hardware contract. (coordinate the keying and keying systems, including card reader systems)

8. All glass and glazing at exterior of building.

9. Caulking related to storefront doors and curtain wall systems.

10. Mock-ups as required by the Drawings and Specifications.

11. Custom breakmetal trim and infill.

12. Hoisting/scaffolding/cranes and all other material handling or access equipment. This contractor owns all material and manpower handling.

13. Coordinate edge of slab tolerances and field verify all rough openings. Field verification of edge of slab details is required by this contractor.

14. Provide all caulking and sealants, including any Preformed Sealants, required for your systems. All exterior caulking of your system and caulking to adjacent exterior surfaces by this contractor. The caulking and Sealant contractor shall caulk interior surfaces to your Alum frames.

15. Provide interior glass and glazing systems. Coordinate with the door and frame contractor and carpentry contractor.

16. Interior door, partition, vision panel and window glass.

17. Caulking and sealants related to interior glazing.

18. Do not provide interior hollow metal or hardware. These items will be provided by the Door and Hardware contractor.

19. Any openings that are missing glass ( due to this contractors issues) during construction shall have plywood installed to secure and weatherproof the building by this contractor.

20. Clean up of all trash and debris related to this contract shall performed daily and removed to the dumpsters. All material shall always be stored neatly and orderly.

21. Coordinate glass types with partition and door fire ratings. Contact Construction Manager with any discrepancies. Shop drawings, samples and product data must be submitted within 3 weeks after award of contract.

22. This contract shall coordinate and work with the Special Systems contractor to allow the installation of harnesses, whips and connections while installing frames and hardware.

23. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

24. Include within this contracts base bid an allocation of $35,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-14 – TILING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 090561 | Common Work Results for Flooring Preparation |
| Section 093000 | Tiling |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide ceramic tile, marble tile, quarry tile, base material and thresholds as required by the contract documents, complete.

2. Provide all mortar bed installations as directed by the specifications and drawings.

3. Grout, including Epoxy grout and custom colors as specified.

4. Cutting and fitting around work installed by others.

5. Provide waterproofing and crack-isolation systems as required by contract documents.

6. **Precast mop receptors as per contract documents.** **(Addendum No. 2)**

7. Patching and leveling of "new" concrete system to be included in this contracts base bid. Contractor to review concrete floor installations and report any deficiencies in tolerance prior to mobilizing for any tile installation. Float inconsistent defects as needed to bridge tile for wall assemblies receiving wall tile.

8. Provide protection of finished products until acceptance by Construction Manager. This contract shall include the material and labor to cover all ceramic tile areas with Ramboard panels (not roll material or corrugated plastic panels. Seams to be taped and sealed for effective protection.

9. Attic stock, delivered and unloaded into owner storage room.

10. Provide crack suppression membrane for this set tile installation.

11. This contractor to coordinate work of this contract with contractor installing cement backer boards to receive your tile.

12. Provide metal strips and Schluter strips installed as part of the tile installation.

13. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or

equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

14. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

15. Include within this contracts base bid an allocation of $15,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-15 - ACOUSTICAL CEILINGS AND SPECIALTY CEILINGS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 072100 | Thermal Insulation |
| Section 079200 | Joint Sealants |
| Section 095100 | Acoustical Ceilings |
| Section 095420 | Specialty Ceiling Systems |
| Section 098400 | Acoustical Room Components |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide complete acoustical ceiling systems to include suspension system, hangers and all required components for a complete system.

2. Provide specialty ceiling systems complete, including framing, supports and necessary components.

3. Provide acoustical wall treatments and acoustical room components complete.

4. This contract includes all Sound Reflecting Tiles, Sound Diffusing tiles, Suspension grids, struts, metal panel ceiling systems and architectural metal wall panel systems. Provide cutting, fitting and coordination with MEP trades for outlets, grilles, cable access etc.

5. Acoustical lay in insulation blankets and rigid panels above ceilings and behind wall grid systems as identified in the contract documents.

6. Supplemental suspension hangers at large ducts above ceilings and at openings for lighting fixtures shall be provided and coordinated to minimize exposed clips, anchors, and wires.

7. Continuous acoustical sealant on back of vertical leg before installing moldings as indicated.

8. Furnish and install hold down clips where required by governing regulations for fire resistant ratings.

9. Provide all material handling, scaffolds, lifts, Spyder cranes, access to work etc. as required for the scope of this contracts work.

10. Expansion joints for all acoustical ceilings, specialty ceilings and acoustical systems.

11. Provide ceiling grid layout on floor for cassette and duct placement in ceiling grid system.

12. This contractor shall review all documents, shop drawings, plans, and drawing model for ceiling height issues. All issues shall be reported to the EDiS prior to installing wall angles.

13. Reflected ceiling layout plans and shop drawings for approval and installation must be provided for all ceiling systems, clouds, acoustical panels, metal wall systems, etc.

14. This Contractor shall cut openings in ceilings for sprinkler heads, lights, mechanical diffusers and grilles, etc. Coordinate work with other trades.

15. Coordinate with other trades for layout and install of their materials into the grid system provided by this contract.

16. Attic stock as per the contract documents, delivered, inventoried, and moved to a storage area within the building at the owner's direction.

17. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

18. Include within this contracts base bid an allocation of $20,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner via credit change order.

CONTRACT NO. D-16 - FLOORING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 090561 | Common Work Results for Flooring Preparation |
| Section 096500 | Resilient Flooring |
| Section 096813 | Tile Carpeting |
| Section 096816 | Sheet Carpeting |
| Section 096933 | Low-Profile Fixed Height Access Flooring |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide flooring in accordance with the contract documents.

2. Prepare subfloor for finished flooring including leveling and patching. Base bid shall include all flashing patching and surface preparation required to perform the work of this Contractor.

3. Provide all Resilient flooring, LVT, Sheet vinyl, rubber tile, rubber treads, rubber base, resilient base, carpeting, carpet tile complete.

4. Provide Low-Profile fixed height access flooring system, complete.

5. Provide all moldings, transitions and edge strips as required.

6. Provide recessed flooring systems at specified areas, to include a shop drawings for approval, recessed floor system, carpet inset and required attic stock materials.

7. Resilient transition and reducer strips at edges of resilient flooring and at edges of carpeting.

8. Cleaning and protection of floors after installation shall be required by the cope of this contract.

9. Seaming diagrams are required to be submitted for approval.

10. Provide mock up's as defined by the contract documents.

11. Attic stock to be delivered to the site, inventoried and then moved to a storge are within the building at the direction of the owner.

12. This contractor shall own all material handling and means to unload, move and lift materials to second floor locations.

13. Provide entrance mat systems complete.

14. Provide finish floor material in elevator cab as specified.

15. Provide cutting and fitting around work of others.

16. This contractor shall protect the adjacent work of other trades while performing the scope of this contract.

17. Include within this contracts base bid an allocation of ~~$15,000~~ **$25,000** **(Addendum No. 2)** for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-17: RESILIENT ATHLETIC FLOORING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 090561 | Common Work Results for Flooring Preparation |
| Section 096566 | Resilient Athletic Flooring |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide flooring in accordance with the finish schedule and specifications.

2. Provide resilient athletic flooring, base, and associated striping, logos, sealants etc.

3. Provide moisture level testing and reporting as part of this contract scope.

4. This contract includes removal of curing and sealing coatings that may be incompatible with the flooring adhesives of your product. Shot blasting, grinding or any required floor preparation is the responsibility of this contractor.

5. Prepare subfloor for finished flooring including leveling and patching. Base bid shall include all flashing patching and surface preparation required to perform the work of this Contractor. This shall include any moisture barriers that may be required.

6. Provide required flashing and transitions to adjacent materials. This include ramping of existing concrete floor if required for the fit and completeness of the Resilient Athletic Flooring system.

7. Provide cleaning, sealing and protection. Protection will be with Ramboard Pro panels with taped seams or Masonite with taped seams. Cover floor immediately after installation.

8. Seeming diagrams, and shop drawings for approval/installation.

9. Include within this contracts base bid an allocation of $15,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner via credit change order.

CONTRACT NO. D-18 - RESINOUS MATRIX TERRAZZO FLOORING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 090561 | Common Work Results for Flooring Preparation |
| Section 096623 | Resinous Matrix Terrazzo Flooring |
| **Section 096616** | **Precast Cement Terrazzo Treads and Landings (Addendum No. 2)** |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide vapor retarding sealer prior to terrazzo application' include required cost in this contracts base bid.

2. Provide all thresholds, reducers etc. as required to perform the work of this contract.

3. **Provide all Precast Cement Terrazzo Treads and landings as defined by the contract documents. (Addendum No. 2)**

4. Prepare subfloor for finished flooring including leveling and patching. Include in the base bid, leveling and patching as per the manufacturer's recommendations for the resinous terrazzo flooring. Include shot blasting, grinding, and moisture barriers as required for a complete installation.

5. Provide moisture vapor treatment on all slabs on grade.

6. Provide crack suppression membrane as required. Crack suppression, control joints and expansion joints shall be clearly identified in a shop drawing of all Terrazzo areas for design team approval.

7. Provide standard and custom samples for approval. Include three (3) in-field mock ups for final selection and approval.

8. Prep all floors for terrazzo application per manufacture and industry standard.

9. Cutting and fitting around work installed by others.

10. Provide protection of finished products until acceptance by Construction Manager. Protection shall RamBoard pro Sheets with Ram tape.

11. Attic stock, delivered, unloaded and moved to owners storage area within building.

12. Protection of surrounding surfaces and work of others.

13. Provide joint sealants required for Terrazzo installation.

14. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, etc.

15. Maintain temperature of storage area between 60 and 80 degrees F (15 and 26 degrees C).

16. Keep containers sealed until ready for use.

17. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with Resinous Terrazzo materials. Include all bead blasting required to perform the work of this contract.

18. Close spaces to traffic during Terrazzo application. Coordinate traffic on unpolished Terrazzo with CM and construction schedule.

19. Maintain proper ventilation of the area during application and curing time period.

20. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

21. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

22. This contractor must provide a silica exposure plan that meets or exceeds the new 2017 silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

23. Contractor must provide additional crews as needed to maintain the project schedule.

24. Provide pricing for all alternates as described in Section 012300-Alternates.

25. Include within this contracts base bid an allocation of $10,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-19 - FLUID-APPLIED FLOORING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 079200 | Joint Sealants |
| Section 090561 | Common Work Results for Flooring Preparation |
| Section 096700 | Fluid Applied Flooring |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide fluid-applied flooring and integral base.

2. Provide mock-ups as required by plans and specifications.

3. Provide standard and custom color samples for review and approval.

4. Provide vapor retarding sealer prior to resinous application, as required by specifications or manufacturer's installation instructions.

5. Provide protection of work of others as well as cutting and fitting around work installed by others.

6. Patching and leveling of areas to receive resinous flooring to be included in the base bid of this contract.

7. Provide cleaning, finishes and protection. Protection shall be RamBoard Pro sheets with Ram tape. Provide protection of finished products until acceptance by Construction Manager.

8. Provide crack suppression membrane required for the work of this contract. The submitted shop drawing for the Resinous Flooring areas shall reflect all control joints, expansion joints and crack suppression locations for review and approval.

9. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

10. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

11. This contractor must provide a silica exposure plan that meets or exceeds the new 2017 silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records

of exposure.

12. Contractor must provide additional crews as needed to maintain the project schedule.

13. Provide multiple out of sequence installations. Each area shall be considered a separate mobilization and all costs shall be included in the base bid.

14. Provide pricing for all alternates as described in Section 012300-Alternates.

15. Include within this contracts base bid an allocation of $10,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-20 - PAINT AND VWC

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 079200 | Joint Sealants |
| Section 099113 | Exterior Painting |
| Section 099123 | Interior Painting |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide all painting and vinyl or fabric wall covering (all walls and ceilings indicated on the finish schedule) include all preparation of surfaces, trims and finish wood locations.

2. Provide sealing of all interior joints between dissimilar materials that require sealants before painting.

3. This contractor shall provide "all" interior and exterior painting complete.

4. Paint all exposed block work and concrete work as shown on the room finish schedule and contract documents. Include painting of the elevator shaft from F.F. down to the bottom of pit (white)

5. Prime, stain or seal, all wood trim and doors as required by the contract documents.

6. Paint exposed piping (sprinkler, plumbing, gas piping, electrical) and ductwork in accordance with the contract documents. Include preparation work for all items specified. Review and coordinate any color requirements specified in the contract documents or as required by code. Pay close attention to MEP documents for specific locations of piping colors.

7. Provide supplementary ventilation as required in enclosed spaces.

8. Paint and caulk all hollow metal frames and doors as shown on the door schedule.

9. Paint metal stairs and railings.

10. Prefinished items will not be painted by this Contractor.

11. Paint all semi-exposed wood blocking as indicated on the drawing.

12. Include "preparation" of all surfaces and items required to be covered by the scope of this contract.

13. This contractor shall allow a touch up pass from drywall contractor/mason contractor between prime coat and first coat of finish.

14. Protection of adjacent surfaces required by this contractor.

15. Minor patching prior to application of finishes shall be included in the base bid.

16. This contractor shall provide sealing/hardener of concrete floors, including scraping, brushing, removal of markings, grease, foreign materials and thoroughly cleaning all the floors prior to installation of the sealer/hardener materials. Coordination with other finishes will require multiple mobilizations for the sealer/hardener preparation and installation. Include within your base bid a (6) additional mobilizations for this work.

17. Installation of rated wall identification to be provided by this contractor. Access, lifts, ladders etc. to be provided by this contractor.

18. Provide painting of all exterior bollards and gates that are not prefinished.

19. Paint gas lines at both the interior and exterior of the building.

20. All lintels shall be painted by this contractor.

21. Paint all railings and handrails that are not prefinished.

22. Provide cleanup of your work areas and storage areas on a daily basis. Removal of spent paint cans and buckets is the responsibility of this contractor.

23. This contractor shall protect all areas, materials and work of others from over-spray from the work of this contract.

24. This Contractor to allow 240 man hours and all required paint materials for these man hours to be used as directed by the Construction Manager.

25. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

26. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

27. This contractor must provide a silica exposure plan that meets or exceeds the new 2017 silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

28. Contractor must provide additional crews as needed to maintain the project schedule.

29. Provide pricing for all alternates as described in Section 012300-Alternates

30. Include within this contracts base bid an allocation of $20,000 for work to be determined by owner and

construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-21 - WOOD STRIP FLOORING - GYM FLOORING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 062000 | Finish Carpentry (coordination of work) |
| Section 079200 | Joint Sealants |
| Section 090561 | Common Work Results for Flooring Preparation |
| Section 096429 | Wood Strip Flooring |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide complete gymnasium floor system including sleepers, base, plywood, finishes, transitions, and striping (including logos). Flooring installation shall be coordinated and installed so the integrity of the concrete floor is not impacted. Include within your base bid a penetrating water/vapor sealer application prior to starting the Gym floor assembly.

2. Provide underfloor ventilation fan as required by the specification or manufacturer's requirements. Power connection provided by the electrical contractor, all interconnection wiring or low voltage work to complete work shall be provided by this contractor.

3. Provide wood strip flooring, hardboard floors in, and accessories at all areas indicated by the contract documents. This contract to provide all stage flooring and the required painting.

4. Provide wall base and trims associated with wood strip flooring.

5. Coordination with the bleacher contractor and other trades with the installation of the wood floor.

6. This contractor shall include patching and leveling of low areas identified after the slab floor analysis. The high areas will be reviewed and the concrete contractor will be responsible to adjust.

7. Sealants and caulking associated with your course of work shall be provided by this contractor.

8. Provide thresholds as required to finish your course of work. Threshold locations and types shall be submitted for Owner/Design Team approval.

9. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

10. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

11. This contractor must provide a silica exposure plan that meets or exceeds the new 2017 silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

12. Moisture and humidity readings are the responsibility of this contractor, monitoring and reporting results will be required. Results shall be provided each day in your daily reports, with photos of measuring device and reading. In addition provide the CM with a separate set of humidity sensors and a testing device for concrete floor moisture content.

13. All work to be coordinated with the carpentry contractor installing the gym equipment. Sequencing and timing shall be discussed and agreed to by this contractor.

14. Contractor must provide additional crews as needed to maintain the project schedule.

15. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

16. Provide pricing for all alternates as described in Section 012300-Alternates.

17. Include within this contracts base bid an allocation of $10,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-22 - SPECIALTIES

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 061000 | Rough Carpentry |
| Section 062000 | Finish Carpentry |
| Section 079200 | Joint Sealers |
| Section 101101 | Visual Display Boards and Display Cases |
| Section 102113.19 | Plastic Toilet Compartments |
| Section 102123 | Cubicle Curtains and Track |
| Section 102600 | Wall Protection |
| Section 102800 | Toilet Accessories |
| Section 104400 | Fire Protection Specialties |
| Section 105100 | Metal Lockers |
| Section 107316.13 | Metal Canopies |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following: (provide ad install)

1. Provide an install all specialties listed within this contract specification sections and scope.

2. Provide White boards, Markerboards (including glass markerboards), Chalk boards, tack boards, and tack strips.

3. Provide display boards and display cases.

4. This contractor shall own providing, engineering and installation of the Metal Canopies Section 107316.13. Coordinate all work with other trades.

5. Provide Projection screens if identified on documents. Electric service is the responsibility of the Electrical Contractor. All other control wiring, raceways and special boxes as specified will be the responsibility of this Contractor.

6. Provide Lockers including lockers bases that are not identified as “concrete bases”(concrete locker bases provided by the Misc. Concrete and Grouting contract.)

7. Provide Toilet partitions. Coordinate any structural requirements with the structural steel and blocking requirements with the Carpentry contractor.

8. Provide toilet and bath accessories, complete. This contract shall include installing all owner supplied toilet accessories and specialties.

9. Provide all accessories as indicated on the contract documents.

10. Provide Fire extinguishers, cabinets and accessories. Include labeling of extinguishers and cabinets. Coordinate with other trades for opening size and placement.

11. Provide Vertically Retractable Walls coordinate any structural requirements with the structural steel and carpentry contractors. Provide all supplementary steel as needed to hang partitions from structural support steel, provided by the Structural Steel Contractor. It is assumed, no additional steel will be required below structural support steel. If so, it will be provided by this contractor.

12. Provide all signage and plaques (interior and exterior.)

13. Provide wall and corner protection. Including FRP Paneling.

14. Provide Mirrors (both framed and frameless.)

15. Verification of field dimensions is the responsibility of this Contractor.

16. Anchoring devices, fasteners, inserts and other related items associated with the installation of the above items.

17. All blocking and bracing requirements for all work of this contract shall be coordinated with the Carpentry contractor for correct installation of blocking etc. Include any blocking not specified to be provided by the carpentry contractor.

18. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

19. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

20. This contractor must provide a silica exposure plan that meets or exceeds the new 2017 silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

21. Provide hand dryers and installation, electrical power connection by electrical contractor.

22. Contractor must provide additional crews as needed to maintain the project schedule.

23. This contractor shall include within their bid the incorporation of **500 hours of COOP participation** by a NCCVT student. Contractor to comply with project documents and requirements set forth in 19 del. C.ch.5

24. Provide pricing for all alternates as described in contract documents.

25. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the

company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

26. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

27. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.

28. This contractor shall be on site to coordinate when walls are being installed for penetrations and sleeve installations. If penetrations and sleeves are missed, this will be the responsibility of this contractor to cover associated costs of fixing.

29. Provide $20,000 allowance to be used as directed by the owner and CM. All funds not expended will be returned to the owner via a credit change order by means of a credit change order.

CONTRACT NO. D-23 - FOOD SERVICE EQUIPMENT

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 11400 | Food Service Equipment |
| Division 22 | Plumbing |
| Division 24 | HVAC |
| Division 26 | Electrical |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide food service equipment, hoods, connective ductwork and accessories All final connections shall be made by the Electrical and Mechanical Contractors.

2. Any discrepancies between the Drawings, Specifications and site conditions or ambiguities in the documents shall immediately be reported to the Construction Manager in writing. Inconsistencies shall be corrected in writing or by reissuing the drawings. If the Contract Documents disagree with the quality or quantity of work required, the better quality or greater quantity shall be supplied unless otherwise instructed in writing by the Construction Manager. Any work performed by the Contractor at locations in question after his discovery of discrepancies, inconsistencies, ambiguities, or errors, without securing resolution, shall be at the Contractor's risk.

3. This Contractor shall verify all measurements at the site and assume full responsibility for their correctness before proceeding with his work. No extra compensation will be allowed because of differences between site conditions and those indicated on the drawings.

4. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer and shall be protected from damage until acceptance. Prefinished products which are damaged before or after installation shall be replaced with new and perfect materials. Materials finished after installation which are damaged shall be refinished or replaced as the Construction Manager may direct. No additional charge will be honored by the Construction Manager for repair or replacement of finished materials.

5. Should this Contractor feel that the Contract Documents call for work which he cannot guarantee, he shall so state, in writing, prior to bidding. Proceeding with any operation shall be construed as acceptance of all guarantee conditions.

6. Secure certificates of inspection and occupancy required by authorities having jurisdiction. Deliver copies of certificates to the Construction Manager prior to filing application for final payment.

7. Supply and install any pedestals, curbs or doghouses required for equipment on the roof in this contract. This should be a finished product so the roofer can flash to the system complete.

8. Any penetrations for work of this contract are the responsibility of this contractor whether through walls, floors or roof areas. Sealing of all penetrations (sealant, fire sealant or otherwise) and coordination with others is part of this contract.

9. This contractor shall include any blocking requirements required on a drawing that shall be coordinate with the carpentry contractor for blocking installation.

10. This contractor is responsible to make field visits to review rough in of underground utilities/piping/electric conduit, for placement in relationship to equipment locations.

11. This contractor to provide complete hood assemblies, including the hood fire protection assembly (Ansul) complete.

12. This contractor shall coordinate and provide assistance to the electrical, fire alarm and controls contractor for interconnection into your hood assemblies and attached equipment.

13. Provide technicians on site to test all systems, hoods, equipment in advance of any required inspections.

14. This contractor is to accept delivery of their equipment and supplies, CM will not receive and unload equipment. Provide any and all material handling and unloading equipment and man power.

15. It is this Contractor's responsibility to make certain statutes, building codes, and regulations including those of the appropriate health agencies having jurisdiction over this type of facility are met.

16. Any items furnished as part of this Scope of Work that require mechanical or electrical rough ins or services that are different from those shown on the Contract Drawings shall be so noted at the time of bid. Failure to do so shall make this Contractor liable for costs of any changes required by same.

17. Provide all caulking and sealants for proper installation and in accordance with public health regulations. This contractor provides caulking and sealants for your own course of work.

18. Start, test and demonstrate all equipment installed under this category of work. Provide proposed schedule, including names and telephone numbers of attending representatives (3) three weeks in advance of demonstration.

19. Obtain approvals and permits and coordinate inspections and testing with governing local and state agencies.

20. This contractor shall provide factory start up of all equipment and the reports to document the start up's. CM to receive reports following start up.

21. (2) preliminary inspection or walk through of the project with the Health Department is to be include within this contracts scope.

22. This contractor to provide and install all low voltage capacitors, contactors etc. and requited connections to allow the kitchen hood system to communicate and interface with the fire alarm system and exhaust systems. Electrical contractor to provide power connection to units.

23. This Contractor shall verify all measurements at the site and assume full responsibility for their correctness before proceeding with his work. No extra compensation will be allowed because of differences between site conditions and those indicated on the drawings.

24. Provide protection of all equipment during and after installation has been completed.

25. Provide coordinated shop drawings that indicate all MEP requirements and accurately reflect the actual conditions and spacing of the area.

26. All foodservice components consist of those items identified in Section 114000 and the "K" Series drawings that identify the Food Service items. All items are to be included in the base bid of this contract to completely provide all systems in their entirety. This contractor shall pay particular attention to the "Standard Details" section of typical drawings within Specification section 114000.

27. Any items furnished as part of this Scope of Work that require mechanical or electrical rough ins or services that are different from those shown on the Contract Drawings shall be so noted at the time of bid. Failure to do so shall make this Contractor liable for costs of any changes required by same.

28. Provide licensed electrician to make all interconnections within equipment furnished by this contractor. This includes, but is not limited to, power and control wiring interconnecting the kitchen hoods and make-up air units provided by the mechanical contractors.

29. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

30. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.

31. Include within this contracts base bid an allocation of $15,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of credit change order.

CONTRACT NO. D-24 - WINDOW SHADES AND ROLLER SHADES

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 061000 | Rough Carpentry |
| Section 062000 | Finish Carpentry |
| Section 122400 | Window Shades |
| Section 122413 | Window Treatment – Roller Shades |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide window shades and rollers shades complete.

2. Do not fabricate shades until field dimensions for each opening have been taken.

3. Do not install shades until final surface finishes and painting are complete.

4. Provide manual window shades as indicated on the contract documents.

5. Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

6. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

7. Do not install shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

8. This contractor shall include any blocking not identified or specified in the Carpentry contractors scope.

9. Provide all material handling and access equipment required for your work. Including scaffolds and lifts as necessary. CM will not receive or unload an of this contracts materials.

CONTRACT NO. D-25 - LAMINATE CLAD CASEWORK, COUNTERTOPS, AND SILLS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 062000 | Finish Carpentry |
| Section 079200 | Joint Sealants |
| Section 123400 | Manufactured Plastic Laminate Casework |
| Section 123600 | Countertops, Backsplashes and Window Stools |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide labor and materials to perform the work related to all casework, millwork, counter tops, back splashes and window sills. Coordinate rubber base after installation with flooring contractor.

2. This contractor shall provide all plastic laminate and millwork required in the Auditorium. This shall include panels, sills, casework etc. as detailed in the contract documents.

3. Provide all SS Tops, trims and accessories as required by the contract documents.

4. Provide all field trimming required to adjust to conditions on site.

5. Coordinate power and data requirements and locations with the electrical contractor for locations and sizes of holes needed. Grommets provided by this contractor.

6. Include all venting of cabinets and casework as indicated in the contract documents.

7. Provide solid surface window stools, wood trim, aprons, wood veneer paneling, and plastic laminate veneer paneling.

8. Provide solid surface base.

9. Provide countertops and backsplashes

10. Coordinate cutting holes in casework with other trades, and provide grommets at all openings.

11. Coordinate blocking requirements with Carpentry contract.

12. Provide joint sealants integral to casework/millwork and to dissimilar materials.

13. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

14. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

15. This contractor shall include within their bid the incorporation of **1000 hours of COOP participation** by a NCCVT student. Contractor to comply with project documents and requirements set forth in 19 del. C.ch.5

16. This contractor must provide a silica exposure plan that meets or exceeds the new 2017 silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

17. Contractor must provide additional crews as needed to maintain the project schedule.

18. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

19. Provide pricing for all alternates as described in Section 012300-Alternates.

20. Include within this contracts base bid an allocation of $15,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

21. This contractor shall coordinate the installation of the Fume hood assembly with the HVAC contractor who is providing this work.

CONTRACT NO. D-26 - STAGE RIGGING, LIGHTING, AND ACCESSORIES

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 116133 | Rigging Systems and Draperies |
| Section 111663 | Loose Performance Lighting Fixtures |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide a complete theatrical rigging system as specified in Section 116133. Provide layout drawings and coordinate with electrical contractor for requirements of stage lighting and electric. This contract is responsible for any supplemental and miscellaneous steel/support required beyond the structural steel shown in the structural drawings to provide a complete and operational rigging system.

2. Provide theatrical draperies, operating systems, control wiring, motors etc. required to provide a complete system.

3. Provide Loose Lighting Fixtures and all low voltage wiring, motors, and controls to make system operational.

4. Provide (4) sets of any keys required to operate systems installed.

5. Provide specified warranties, attic stock, and as-builts. All attic stock to be delivered, inventoried, and delivered to a storage area on site directed by the owner.

6. Provide stage lighting systems including fixtures, controls, wiring, light grids, supports and attachments. Provide any Unistrut, support rods or other required anchoring devices for lighting support in theater. Coordinate work with electrical contractor for power connections.

7. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

8. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

9. This contractor must provide a silica exposure plan that meets or exceeds the new 2017 silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

10. Provide BIM services as detailed in spec section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

11. Contractor must provide additional crews as needed to maintain the project schedule.

12. Provide pricing for all alternates as described in Section 012300-Alternates.

13. Include within this contracts base bid an allocation of $10,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-27 - FIXED AUDITORIUM SEATING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 126113 | Fixed Audience Seating |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide seating layout, numbering, shop drawings, product data, samples, etc.

2. Provide Fixed, Removable, and loose audience seating as detailed in the drawings and section 126113. Coordinate finishes, coverings, colors, mounting, etc. between the fixed and loose audience seating.

3. This contractor responsible for their own layout and drilling of anchors for fixed seating. After installation, each day the area shall be cleaned of concrete dust, debris, boxes, packing materials etc. All materials must go to dumpster each day. Provide dimensioned layout drawings for lighting box layout for chairs.

4. Provide specified warranty, attic stock, and as-builts. Attic stock shall be delivered, inventoried and move to a storge location on site as directed by the owner.

5. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

6. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

7. This contractor must provide a silica exposure plan that meets or exceeds the new 2017 silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

8. Provide BIM services as detailed in spec section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

9. Contractor must provide additional crews as needed to maintain the project schedule.

10. Provide pricing for all alternates as described in Section 012300-Alternates.

11. Provide a final clean, vacuuming and wipe down of all seating and support brackets by this contractor. Coordinate scheduling of this work with CM.

12. Include within this contracts base bid an allocation of $10,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-28 - TELESCOPING BLEACHERS AND PLATFORMS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 061000 | Rough Carpentry |
| Section 079200 | Joint Sealers |
| Section 126613 | Telescoping Bleachers |
| Section 126623 | Telescoping Chair Platforms |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide all Telescoping Bleachers and Telescoping Chair Platforms as required by the contract documents.

2. Provide bleacher seating systems. Coordinate electrical requirements with electrical contractor. Low voltage wiring, motors and controls are to be provided and installed by this contractor. Power supply will be supplied by electrical contractor.

3. This contractor shall coordinate all work of this contract with the carpentry contractor and wood flooring installer.

4. Protection of the work of others including but not limited to protection of all finished flooring installed before your scope of work can be installed. Protection of the flooring shall be reviewed with the CM before installation.

5. Verification of field dimensions is the responsibility of this Contractor.

6. Anchoring devices, fasteners, inserts and other related items associated with the installation of the above items. Provide all material handling and access equipment required for the scope of your contract.

7. All material handling. Loading, moving, lifting of the materials of this contract shall be the responsibility of this contractor. The CM will not receive or unload your materials.

8. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

9. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

10. This contractor must provide a silica exposure plan that meets or exceeds the new 2017 silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

11. Provide BIM services as detailed in spec section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

12. Provide pricing for all alternates as described in Section 012300-Alternates

13. Include within this contracts base bid an allocation of $10,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-29 - HYDRAULIC HOLELESS PASSENGER ELEVATOR

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 142013 | Hydraulic Holeless Passenger Elevator |
| Division 26 | Electrical (power and communications) |
| Section 284621 | Addressable Fire Alarm Systems (coordination) |
| Section 281100 | Access Control Systems (coordinate elevator access controls) |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide hydraulic elevator system complete. Including all shaft anchoring, framing and Misc. steel required to install the elevator.

2. Grouting of all elevator sill angles will be the responsibility of the Misc. Concrete contractor Contract D-43.

3. Spyders for elevator shaft installation shall be delivered to the site when required by the BP-C Masonry contractor.

4. Coordinate and work directly with the fire alarm contractor to meet all local, state, fire marshal and elevator inspector requirements.

5. Before the owner accepts the elevator for substantial completion, the elevator contractor shall train the owners maintenance personnel on operation of the elevator and review the contact operation and protocol for elevator service, warranty claims, etc. The training shall be professionally videotaped as part of the warranty package.

6. Provide control wiring and telephone signal wiring to top of elevator shaft as required.

7. Provide (2) sets of elevator protection padding, in addition to all other attic stock specified by contract documents. Provide CM one of these sets for use during construction.

8. This Contractor to furnish and install all rough wiring, low voltage wiring and devices (phones) necessary for the installation of emergency telephones.

9. Electric service and disconnect switch for the elevator are the responsibility of the Electrical Contractor. (This contractor shall work with electrical to coordinate type of disconnect with Fire Marshal and Elevator Inspector before installation) All other control wiring as required will be the responsibility of this Contractor.

10. This Contractor to submit for approval the layout and detailed dimensions of the elevator pit area, sump pump area, etc.

11. Provide BIM services as detailed in spec section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

12. Provide and include warranty extensions to include 9 months of temporary construction use. This contractor to include within the base bid 600 hours of temporary elevator operator to be utilized at the discretion of the owner and CM.

13. Include the costs associated with the inspections required for "construction" use in your base bid.

14. This contractor will work with other trades to insure access is given as needed to complete all work for a complete installation. This includes lifting contractors to the top of the shaft to complete work required. This includes but is not limited to fire sealing, sprinkler heads, lighting, smoke detectors, disconnects etc. Include within the base bid 4 separate mobilizations and 8 hours of operator time to allow contractors to access the shaft for work that requires installation.

15. This contractor shall own fire sealing of all penetrations for work of this contract.

16. This contractor to owns coordinating the final keying to the owners keyed system.

17. Provide all temporary signage required for machine room or elevator I order to facilitate inspections, until completion and final signage is installed.

18. Provide (2) complete sets of tools and keys to the owner. Provide and install key cabinet in the machine room, keyed to the building system for use by the owner to store the elevator keys.

19. Provide full and complete coordination with other trades for installations within the elevator shaft and machine room.

20. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.

21. Include within this contractor's base bid an allocation of $10,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-30 - FIRE PROTECTION

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Division 22 | Plumbing |
| Division 26 | Electrical |
| Division 32 | Site Improvements |
| Section 312300 | Excavation and Backfill for pipelines and Structures |
| Section 03310 | Cast in Place Concrete |
| Section 210500 | Common Work Results for Fire protection |
| Section 210505 | Fire Suppression System Piping, Fittings and Valves |
| Section 211000 | Water Based Fire Suppression System- Fire Pump |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide piping, fittings, couplings, valves and sprinkler heads to provide a complete Fire Protection system.

2. The fire pump, and all related work shall be part if this contract.

3. Excavation and backfill related to fire protection work as detailed below is the responsibility of this Contractor. (Geo-Tech reports included for this contractors review)

4. Backfilling is the responsibility of this Contractor. Soil types shall be in accordance with project documents. Backfill materials shall be covered after excavation and protected. If materials become wet and unusable this contractor shall remove the material from site and provide stone dust (#10 stone dust) to backfill all piping trenches and remove unsuitable material off site.

5. Provide As-built drawings in both hard copy and BIM format.

6. Provide concrete equipment pads, curbs and thrust blocks related to the Fire Protection work (sprinkler system) and Fire Pump system.

7. Permits, testing, inspections required for the Fire Protection work are to be provided by this contractor.

8. Providing of sleeve assemblies for work of this contract that penetrates the foundation wall, interior footings or any concrete footings shall be provided to the masonry and concrete contractor for installation. This contractor shall coordinate and assist with the sleeving install. Sleeves are to be sealed per contract documents.

9. Firesafing of all penetration is a requirement of this contract.

10. Design of the system, submissions to the Fire Marshall, review with Fire Marshall and expediting the permit for the Fire Suppression system is a priority of this contract scope.

11. Flow and tamper switches to be supplied by this Contractor and wired by the Electrical Contractor. It is this Contractors responsibility to provide flow and tamper switches to meet applicable state and local codes as well coordinate with the MEP contract documents.

12. Fire pump, controller and related work. Wiring of pump and controller to be by the Electrical Contractor.

13. If a water meter is required when the review process and permitting is completed, this contractor shall purchase, pay for, install and coordinate all work with the required authorities.

14. This Contractor to coordinate the need for and compatibility of his system to the emergency generator, supplied by other.

15. Pipe identification and labelling is a requirement of this contract. Valve labels, etc. are required as per the contract documents.

16. Provide fire main from +/- 5 feet outside building including connection in the building. Final connection of your fire line and the line provided by the site contractor shall be the Fire Protection contractors responsibility. Provide a registered plumbing contractor licensed to perform the tie in as part of you base bid.

17. This contractor will flush the UG system with the assistance of the site contractor and provide written documentation to the CM.

18. All cored walls require sleeves and are required to be sealed per contract documents. Any mess from the coring operation shall be immediately cleaned up by this contractor and shall not affect any installed finishes. If this work is not performed efficiently, the work will be performed by the owner and back charged to this contractor.

19. This contractor shall be onsite while walls are being constructed for layout and installation of valve cabinets, concealed, piping, etc.

20. The work of this contract will require out of sequence installations. This should be considered and included in your base bid.

21. This contractor shall provide all access panels required for the work of this contract. They should be lockable, fire rated where required. Panels shall meet the requirements of the contract documents.

22. This contractor shall include within their bid the incorporation of **750 hours of COOP participation** by a NCCVT student. Contractor to comply with project documents and requirements set forth in 19 del. C.ch.5.

23. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

24. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

25. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

26. Provide the necessary coordination with trades to avoid interferences with other work and make corrections at no extra charge.

27. Include within this contracts base bid an allocation of $20,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-31 – PLUMBING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Division 21 | Fire Protection (coordination) |
| Division 22 | Plumbing |
| Division 23 | HVAC (coordination) |
| Division 26 | Electrical (coordination) |
| Division 32 | Site Improvements |
| Section 312300 | Excavation and Backfill for pipelines and Structures |
| Section 03310 | Cast in Place Concrete |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide a complete plumbing and piping system as indicated by the contract documents. All plumbing work/systems are to be fully coordinated with all other MEP trades as well as the other trades involved with the project.

2. This contractor shall provide all pipe insulation, insulation coverings, valve insulation, labelling, and identification of plumbing lines.

3. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.

4. Division 26 of the specifications should be reviewed as it relates to the power wiring to trap primers and controls within this contracts scope of work. Coordinate this work with the electrical contractor.

5. Permits, testing, inspections required for the Plumbing system work are to be provided by this contractor. This contractor shall pay all permit and inspection fees for the work of their contract.

6. This Contractor shall be responsible to designate an individual within his organization, intimately familiar with this project and assigned on site, to act as the System Start-up Coordinator. This individual must be pre-approved by the Construction Manager. This individual's responsibilities shall include, but not be limited to, coordinating the start-up of all mechanical equipment, including the coordination between the Electrical Contractor, the Controls Contractor, and all testing, adjusting and balancing work. This individual shall report on a weekly basis, in written form, to the Construction Manager. These reports shall include a summary of current conditions including manufacturers' start-ups, systems' deficiencies noted to date and the remediation of same, coordination issues between trades, system interfacing and forecasting, as necessary to project the completion of each individual system within the building.

7. Excavation and backfill for underground plumbing work as detailed below is the responsibility of this

Contractor. Soil types shall be in accordance with the contract documents Refer Section 312300 for requirements on soils. (Geo-Tech reports included for reference and use)

8. Backfilling is the responsibility of this Contractor. Soil types shall be in accordance with project documents. It is the intent to use on site material and not imported fill. The use of this on site material shall conform with the compaction requirements identified in Section 312300. Excavated materials shall be covered immediately and protected from moisture mitigation. If Materials become unusable, this contractor shall own purchasing #10 stone dust to utilize as backfill in all trench or structure locations. Excess unsuitable materials from plumbing excavations shall be removed from the site by this contractor. (includes water meter pit installation) it is not acceptable for anu UG piping to e in the stone layer installed by the concrete contractor, all UG piping must be installed in the subbase with adequate soil coverage.

9. The Concrete Contractor shall furnish, install and maintain stone fill under slab. The Sitework Contractor shall leave the building pad site at subgrade to the required tolerance in the contract documents to receive stone fill. The Plumbing, Mechanical and Electrical contractors shall complete their work under the slab on grade and shall be responsible to return the pad to the subgrade elevation left by the Sitework Contractor. The Concrete Contractor shall then adjust the select material to final subgrade, fine grade the slab and place the vapor barrier and stone fill. Note: while working on the building pad area this contractor shall utilize track drive equipment only. No rubber tire equipment will be allowed. Preservation of the building pad shall be the responsibility of this contractor. The onsite testing and inspection agency provided the owner will monitor the excavation, travel and backfilling operation.

10. The plumbing and concrete contractor and CM will me to review the building pad for turnover to the next trade. If not accepted correction will need to be made to correct concerns and sign off.

11. Equipment bases and housekeeping pads identified on the structural drawings are to be provided by the BP-C concrete contractor. Any required bads or bases for the scope of this contract not identified on the documents will be provided by this contractor.

12. Permits, testing, inspections required for the Plumbing system work is to be provided by this contractor.

13. Providing of sleeve assemblies for work of this contract that penetrates the foundation wall, interior footings or any concrete footings shall be provided to the masonry and concrete contractor for installation. This contractor shall coordinate and assist with the sleeving install. All sleeves must be provided with the appropriate seals, this contract owns sealing the sleeves related to this contracts work.

14. Pipe insulation, insulation coverings, valve insulation, labelling and identification of plumbing lines shall be provided by this contractor.

15. Valve tags, charts, and labelling shall be part of this contractor's responsibility.

16. **Provide Mop sinks and Receptors as indicated on the contract documents. (Addendum No. 2)**

17. Penetrations through wall, floors, etc. including cutting, patching and fire safing.

18. Testing and balancing shall be provide by a separate contract however the Plumbing contractor shall

coordinate and communicate with the testing and balancing contractor for all testing required on the plumbing system.

19. Clean up shall be provided daily, all trash, debris, crates, boxes etc. shall be moved out of the building to the dumpsters each day. No storage of trash will be allowed inside the building or courtyards.

20. All guarantees and warranties to begin at the substantial completion of the entire project. Maintain equipment prior to substantial completion.

21. This contractor shall provide all necessary material handling equipment, cranes, scaffolds, hoisting and rigging equipment and supplies for work associated with this contracts.

22. Coordination with the ATC contractor is required by this contractor.

23. Roof drains, pans, sumps and all related anchoring, support and adjustment elements that are required per the contract documents.

24. This contractor is responsible for providing, setting, bracing, anchoring, and aligning all floor drains, floor basins etc. required by the contract documents. The plumbing contractor shall have a plumber on site 100% of the time when the concrete contractor is pouring S.O.G. floors or elevated slabs. Drains that are misaligned will be demolished, removed, and replaced by this contractor. Including but not limited to replacing and re-engineering floor reinforcement and paying the concrete contractor to re-pour the slab areas.

25. Piping work associated with the emergency generator (including fuel piping, exhaust piping, regulators etc.). Include initial fill up of fuel tanks if Diesel and provide and coordinate the gas piping system is natural gas fueled. The DNREC permit submission will be provided by the Electrical contractor however this contractor must supply any required documentation for the permitting as well as coordinate all work with electrical contractor and other trades.

26. Fuel detection/monitoring system in accordance with local codes.

27. Gas piping, meter and pressure regulator valve. (proper sizing of the regulators is the responsibility of this contractor.) Include anchoring this equipment to the concrete pad provided by the concrete contractor ad anchoring the piping and stand to the exterior wall.

28. Trap priming system, including detailed submittals of the system and then provide as-builts of the location of the rack installations. Photos marked with locations to be provided by this contractor.

29. All utilities will be brought to within +/- 5 feet of the building line by others. The Plumbing Contractor is responsible for connecting the utilities from +/- 5 feet outside the building line and completing the system within the building. This contractor shall own the underground line with the assistance of the site contractor, including any chemical treatment required by NCCo, Artesian or any other regulatory agency. Reports shall be submitted to CM.

30. This contractor will flush the underground with the assistance of site contractor and provide documentation to CM.

31. Provide complete water sterilization, testing and reporting. Include within your proposal (4) additional testing mobilization for potential Phase utilization.

32. Install Owner pre-purchased equipment, if identified within the contract documents.

33. Provide access panels to the drywall contractor for framing information and final installation.

34. This contractor shall be on site to coordinate when walls are being installed for penetrations and sleeve installations. If penetrations and sleeves are missed, this will be the responsibility of this contractor to cover associated costs of fixing.

35. Final connection of kitchen equipment and appliances is the responsibility of this contractor.

36. As-built drawings is both hard copy and BIM submission as part of the project closeout.

37. This contractor shall include within their bid the incorporation of **2500 hours of COOP participation** by a NCCVT student. Contractor to comply with project documents and requirements set forth in 19 del. C.ch.5

38. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

39. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

40. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

41. Provide the necessary coordination with trades to avoid interferences with other work and make corrections at no extra charge.

42. Include within this contracts base bid an allocation of $75,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

CONTRACT NO. D-32 – MECHANICAL PIPING - HVAC

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 089100 | Louvers |
| Division 21 | Fire Protection (coordination) |
| Division 22 | Plumbing |
| Division 23 | HVAC |
| Section 230900 | Instrumentation and Controls of HVAC system |
| Division 26 | Electrical (coordination) |
| Division 28 | Electronic Safety and Security (coordination of work) |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide a complete mechanical system as indicated on the Drawings and in the Specifications. Coordinate all work with associated trades, Plumbing, Fire Protection, Electrical and Electronic Safety and Security

2. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.

3. This contractor shall include all piping, fittings, and connections required for the installation of the complete HVAC system.

4. Provide all insulation, wraps, covers etc. for work of this contract. Include all labelling and identification markers as directed by the contract documents.

5. Provide all condensate piping and condensate pumps and installations. Backcheck valves shall be included as part of this contract.

6. Division 16 of the specifications should be reviewed as it relates to the power wiring and other requirements for HVAC equipment including the coordination of furnishing and installing motor starters as provided in the specifications.

7. This Contractor shall be responsible to designate an individual within his organization, intimately familiar with this project and assigned on site, to act as the System Start-up Coordinator. This individual must be pre-approved by the Construction Manager. This individual's responsibilities shall include, but not be limited to, coordinating the start-up of all mechanical equipment, including the coordination between the Electrical Contractor, the Controls Contractor, and all testing, adjusting and balancing work. This individual shall report on a weekly basis, in written form, to the Construction Manager. These reports shall include a summary of current conditions including manufacturers' start-ups, systems' deficiencies noted to date and the remediation of same, coordination issues between trades,

system interfacing and forecasting, as necessary to project the completion of each individual system within the building.

8. The Concrete Contractor shall furnish, install and maintain stone fill under slab. The Sitework Contractor shall leave the building pad site at subgrade as identified per the contract documents in preparation to receive stone fill. The Plumbing, Mechanical and Electrical contractors shall complete their work under the slab on grade and shall be responsible to return the pad to the subgrade elevation left by the Sitework Contractor. The Concrete Contractor shall then adjust the select material to final subgrade, fine grade the slab and place the vapor barrier and stone fill. Note: while working on the building pad area this contractor shall utilize track drive equipment only. No rubber tire equipment will be allowed. Preservation of the building pad shall be the responsibility of this contractor. The onsite testing and inspection agency provided the owner will monitor the excavation, travel and backfilling operation.

9. The HVAC, and concrete contractor and CM will me to review the building pad for turnover to the next trade. If not accepted correction will need to be made to correct concerns and sign off.

10. Equipment bases and housekeeping pads that are not included in BP-C and identified on the structural documents will be provided by the Misc. Concrete contract. This contract shall provide detailed shop drawings and field layout of the pads/bases for installation by the concrete contractor. Failure to properly coordinate this work will result in the Mechanical contractor installing the pads at no cost to the owner or any other contractor. Any bases or pads related to the scope of this contract, not identified on the drawings will be provided by this contractor (complete installation)

11. Permits, testing, inspections required for the mechanical piping and HVAC work are to be provided by this contractor.

12. Providing of sleeve assemblies for work of this contract that penetrates the foundation wall, interior footings or any concrete footings shall be provided to the masonry and concrete contractor for installation. Provide sealing of all sleeves as required. This contractor shall coordinate and assist with the sleeving install.

13. Pipe insulation, insulation coverings, valve insulation, labelling and identification of mechanical piping, ductwork, shafts, connections to systems etc. shall be provided by this contractor. (all insulation and sealing as it relates to the work of this contract)

14. Valve tags, charts, and labelling shall be part of this contractors responsibility.

15. Penetrations through wall, floors, etc. including cutting, patching and fire safing.

16. Testing and balancing shall be provided by this contract, Coordination of work with other trades is required.

17. Clean up shall be provided daily; all trash, debris, crates, boxes etc. shall be moved out of the building to the dumpsters each day. No storage of trash will be allowed inside the building or courtyards.

18. All guarantees and warranties begin at the substantial completion of the entire project. Maintain equipment prior to substantial completion.

19. This contractor shall provide all necessary material handling equipment, cranes, scaffolds, hoisting and rigging equipment and supplies for work associated with this contracts.

20. Provide pipe and duct insulation, coverings, wraps, supports and bridging for penetrations through wall, floors, etc. including cutting, patching and fire safing and fire caulking as required.

21. This contractor is responsible to coordinate the work of this contract with the Testing and balancing contractor. Coordination and assistance when the balancing is TAB is being performed is a requirement of this contract.

22. This contract should include man hours for season testing from heating to cooling or vice versa to work with the testing and balancing contractor.

23. Ductwork, flex duct, grilles, diffusers, including detailed layout for the drywall and ceiling contractor shall be provided by this contractor.

24. This contractor shall fully coordinate and verify all louver sizes, mounting details, flashing details, colors with the Carpntry and General Trades contract which will supply and install all louvers.

25. Coordinate damper size, location and type of damper with contract documents, pay special attention to architectural drawings and finish surfaces. Fire dampers are to be included as part of this contractors scope.

26. This contractor shall be on site to coordinate when walls are being installed for penetrations and sleeve installations. If penetrations and sleeves are missed, this will be the responsibility of this contractor to cover associated costs of fixing.

27. Temporary heat and ventilation installation, maintenance and removal. Refer to Division 1, Specification Section 015123 - TEMPORARY HEAT AND VENTILATION, for specific scope. This contractor shall include within the base bid an allocation of $200,000 for the fuel to power the temporary heating equipment if no other owner supplied source is available.

28. Electric baseboard heat shall furnished and installed by this contractor. Electrical connection by EC.

29. Roof curbs, rails, etc. to be provided and loaded to the roof by this contractor. Layout and installation by this contractor, coordinate with the carpentry contractor for blocking and the roofing contractor for flashing and roofing details. Include any doghouses or raceways for service lines, including coordination of flashing.

30. Provide access panels to the drywall contractor for framing information and final installation.

31. Final connection of kitchen equipment and appliances related to the mechanical piping and HVAC system provided by this contractor. Coordination with other trades (Special Systems, Electrical, Fire Alarm etc.) for final interconnections of these systems shall be provided by this contractor.

32. This contractor shall provide all required fire dampers, connections and remote controllers for the HVAC system.

33. Provide all VFD's complete for electrical contractor to install.

34. Provide (2) sets of filters for construction use. Include changing out the filters during the construction phase. Additionally include a complete change out of all filters prior to turn over to the owner (these filters shall be separate from the attic stock filters required) Providing a complete filter listing as part of the closeout documents is required.

35. As-built drawings. As-built drawings is both hard copy and BIM submission as part of the project closeout.

36. This contractor shall include within their bid the incorporation of **2000 hours of COOP participation** by a NCCVT student. Contractor to comply with project documents and requirements set forth in 19 del. C.ch.5

37. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

38. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

39. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

40. Provide the necessary coordination with trades to avoid interferences with other work and make corrections at no extra charge.

41. Include within this contracts base bid an allocation of $75,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner by means of a credit change order.

42. This contractor shall provide the work of Section 230900 Instrumentation and Controls of HVAC system in its entirety. Coordinate with all other trades as required. Provide all instrumentation, controls, coordination of work, testing as required to provide a complete ATC system for this project. This work shall include but not be limited to instrumentation and controls for: Provide all instrumentation, controls, coordination of work, testing as required to provide a complete ATC system for this project.

43. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.

44. Environmental controls.

45. Ventilation controls.

46. Kitchen Ventilation Controls

47. Carbon Monoxide System Controls

48. Air Flow Monitoring Controls

49. Cooling controls.

50. Humidification controls.

51. Refrigeration controls.

52. Motorized dampers when not specified as part of the factory packaged equipment supplied to job site for distribution and installation by others.

53. Controls air compressor complete with accessories and insulation.

54. Remote reading gauges, transmitters and recorders for automatic temperature controls.

55. Building centralization controls including centralized temperature, humidity, pressure and flow indication and recorders, centralization of air conditioning, heating, ventilation, humidification and refrigeration equipment operation.

56. Smoke hatches and relief vents that are not accessible shall have remote controllers to test and reset units.

57. This contract shall supply control valves per contract documents and drawings.

58. This contractor shall coordinate closely with the Kitchen Equipment contractor for controls to equipment.

59. Coordinate and provide controls required for the emergency generator.

60. Building life safety control and equipment safety control including: operators and controls for motorized smoke dampers, operators and controls for motorized fire dampers, firestats, freeze protection thermostats, shut down safety devices forming part of automatic temperature control.

61. Provide all permits required for the work of this contract, pay all fee's.

62. Inspections as required under this contract scope.

63. Electrical thermostats intended for automatic temperature controls complete with subbases or adapter plates to mount on standard electrical box.

64. Supply only of access doors when specifically required for access to automatic temperature control.

65. Control wiring and/or air piping required for all automatic temperature controls supplied under this contract scope.

66. Wiring for remote thermostats and remote prewired auxiliary control panels for packaged equipment.

67. Boiler feed water control wiring.

68. The magnetic starter coil and relay coils supplied under contract scope 16000 and intended for automatic temperature controls, including interlocking between starters and/or relays when controlled automatically.

69. Access panels directly associated with this work if not included by other division.

70. Exclude direct reading temperature and pressure gauges connected directly to non-potable water systems.

71. Exclude motorized dampers when specified as integral part of packaged equipment.

72. Exclude automatic temperature controls when specified as integral part of packaged equipment.

73. Exclude flow measuring and control devices.

74. Exclude direct reading temperature and pressure gauges connected directly to refrigeration systems.

75. Exclude filter gauges directly connected to duct systems.

76. Electrical wiring for thermostats and controls which directly switch the power line to the equipment (directly shall mean not through magnetic coil) is by Division 16000.

77. Power wiring is by Division 16000.

78. Control power supply outlets are by Division 16000.

79. Exclude fire alarm, fan shut-down, relays and wiring Section 16720.

80. This contractor shall provide all raceways, conduits, pull strings and boxes required for the complete ATC system.

81. Review Alternate section and provide Alternate #10 to utilize Modern Controls for the work of the scope.

82. Coordinate and work alongside the commissioning team until project is fully accepted. Include multiple trips to the site with testing equipment, ten (10.)

CONTRACT NO. D-33 - TESTING, ADJUSTING, AND BALANCING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Division 21 | Fire Protection |
| Division 22 | Plumbing |
| Division 23 | HVAC |
| Section 220500 | Common Work Results for Plumbing |
| Section 230900 | Instrumentation and Controls |
| Section 230950 | Testing & Balancing of Mechanical Systems |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide water and air testing and balancing.

2. Contractor shall prepare, at a minimum, a preliminary balance report for the New Castle County Final Inspection.

3. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.

4. Provide pricing for all alternates as described in Section 012300-Alternates.

5. Submissions will be reviewed once, and any resubmittals will be reviewed once. Any other submittals will be billed to the contractor at the Engineers standard rates. Please thoroughly review all submissions prior to forwarding to avoid these costs.

6. Provide complete signed and sealed testing report prior to substantial completion and final inspection as required by New Castle County.

7. This contractor has been allotted 30 days to complete all work and provide final, sealed balancing report by the Construction Manager. This contractor will need to work closely with the Construction Manager and all MEP trades to sequence work so that the completion of the balancing is completed in a manner that does not delay acceptance from New Castle County or owner.

8. Provide a pencil copy for submission to NCCo and have final official report within 30 days of the pencil copy.

9. Provide confirmation of duct testing completed by Mechanical Contractor.

10. This contractor must provide all lifts or scaffold means to access all elements.

11. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

12. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

13. Provide circulating water system test.

14. Include balancing and testing of all plumbing and heating lines installed to the future field house.

15. This contract should include seasonal testing from heating to cooling, until system has been fully commissioned and accepted.

CONTRACT NO. D-34 - ELECTRICAL, LIGHTING, AND FIRE ALARM SYSTEMS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Division 22 | Plumbing (coordination of work) |
| Division 21 | Fire Protection (coordination of work) |
| Division 23 | HVAC (coordination of work) |
| Division 26 | Electrical |
| Section 111663 | Loose Performance Lighting Fixtures (coordinate) |
| Division 27 | Communications |
| Division 28 | Electronic Safety and Security raceways and coordination) |
| Section 284621 | Addressable Fire Alarm Systems (complete) |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide a complete electrical system, lighting, addressable fire alarm system and infrastructure for all Division 21, Division 27 and Division 28 as indicated on the contract documents.

2. Provide Transformer and Generator system complete. Include all infrastructure, raceways, duct banks (including all excavation, backfill, identification systems, trace wiring, etc.) This contractor shall be fully responsible for preparing, submitting, paying all fees and coordinating the DNREC required permitting for the Generator. Coordinate with NCCVT as required.

3. Lightning protection shall be provided by this contract and coordinated with the Carpentry contractor and Roofing Installer.

4. This contractor to supply power to all areas of work in other trades requiring electrical power.

5. Provide complete infrastructure system for all Division 27 and Division 28 systems. Including all interior and exterior duct banks, raceways and sleeves for special systems.

6. This contractor shall include in the base bid temporary exterior lighting installed and maintained to accommodate a minimum of 3-foot candles for the exterior of the building for the purpose of site security. The lights must be installed to meet the requirements for exterior use and illuminated during low light hours. These lights will be utilized until permanent exterior lighting has been installed and powered. Supplying the temp power for this lighting is part of this contract. Include providing temporary power and lighting as needed for the entire duration of the project. This include the necessary power outlets required for all contractor use. Power must be available within a reasonable distance at all times.

7. Division 23 of the specifications should be reviewed as it relates to the power wiring and other requirements for HVAC equipment including the coordination of furnishing and installing motor

starters and controllers as detailed in the Specifications and on the Drawings.

8. This contractor shall provide all conduits, raceways and boxes required for thermostat and sensor installation.

9. The HVAC contractor will supply all VFD's to the electrical contractor for installation and powering.

10. Provide all smoke damper, power and remote controllers as required by the contract documents.

11. Excavation and backfill for underground electrical work as required below is the responsibility of this Contractor. Soil types shall be in accordance with project specifications and the Geo-Tech report. Geo-Tech reports included for review and acceptance.

12. Backfilling is the responsibility of this Contractor. Soil types shall be in accordance with project documents. It is the intent to use on site material and not imported fill. The use of this on site material shall conform to the compaction requirements identified in Section 312300. Excavated materials shall be covered immediately and protected from moisture mitigation. If Materials become unusable, this contractor shall own purchasing acceptable off site materials.

13. Provide all excavation, layout, concrete, reinforcing for duct banks, light standards, above ground conduit encasement, equipment bases and any other concrete work specifically related to the electrical work. This shall include services from the roadways and all communication duct banks as required. Include requirements of New Castle County, State and local codes for concrete encasement.

14. All runs in exposed ceilings are to be in conduit.

15. All exterior underground raceways and infrastructure are to be installed by this contractor as required by the contract documents. (Cameras, security, electric etc.)

16. Temporary electric installation, maintenance and removal. Refer to Division 1, Specification Section 015113 - TEMPORARY ELECTRIC, for additional information.

17. This contractor shall provide temporary transformers as required to provide electrical power generation until permanent service is installed by Delmarva power. Include all permits, cabling, switch gear, breakers etc.to provide a complete temporary power system capable of supplying the electrical loads required for the project. This contractor to coordinate and arrange for temporary power from the source, Delmarva Power.

18. Provide temporary power ~~for meter bank with transformer~~ **(Addendum No. 2)** including (8) individual electric meters with disconnects for contractors trailers. Coordinate all work with Delmara Power.

19. Rough in and final connection and related work for equipment provided under other contracts (i.e. kitchen, elevators, HVAC, sprinkler, motorized doors, vertical walls, etc.)

20. Provide all permits and inspections. Pay all fees associated with the permits and inspection.

21. Penetrations through walls, floors, etc. including cutting, patching and fire safing.

22. Testing of all systems, as related to the scope of work for this contract shall be provided. Reporting and verification documentation shall be supplied to NCCVT and EDiS.

23. This contractor shall provide all supplemental hangers and fasteners for lighting installation to the building structure.

24. All runs in exposed ceilings shall be installed in conduit.

25. Clean up on a daily basis shall be provided by this contractor. All work areas shall be organized and cleaned up to the dumpsters each day.

26. The Concrete Contractor shall furnish, install and maintain stone fill under slab. The Sitework Contractor shall leave the building pad site at subgrade required by the contract documents in preparation to receive stone fill. The Mechanical and Electrical Contractors shall complete their work under the slab on grade and shall be responsible to return the pad to the subgrade elevation left by the Sitework Contractor. The Concrete Contractor shall then adjust the select material to final subgrade, fine grade the slab and place the vapor barrier and stone fill. Note: while working on the building pad area this contractor shall utilize track drive equipment only. No rubber tire equipment will be allowed. Preservation of the building pad shall be the responsibility of this contractor. The onsite testing and inspection agency provided the owner will monitor the excavation, travel and backfilling operation.

27. The electrical, and concrete contractor and CM will me to review the building pad for turnover to the next trade. If not accepted correction will need to be made to correct concerns and sign off.

28. Note: all raceways are to be installed into the subgrade soils and shall have adequate cover for protection from traffic above. No raceways will be installed in the stone base provided by the concrete contractor.

29. All guarantees and warranties to begin at the substantial completion of the entire project. Maintain equipment prior to substantial completion.

30. Hoisting, rigging and scaffolding required to perform you scope of work shall be provided by this contractor.

31. Provide all primary service work, including all utility company related costs/fees for this work. Coordination with the utility company is the responsibility of this contractor.

32. Provide a complete fire alarm system. Water flow devices are supplied and installed by the Sprinkler Contractor and wired by this Contractor. Include tie-in to fire sprinkler flow and tamper switch. (fire dampers, smoke detectors, remote testing switches are all part of this contract)

33. Provide all heat tracing and insulation systems as required.

34. Coordinate closely with the work of the Special Systems contractor. This contract (electrical) provides all infrastructure, conduit and raceways required for the Special Systems work. Provide pull strings and boxes for all systems. (voice, data, communication, fire alarm, AV systems, Audio systems, and public address system, clock system etc.) Include all required sleeving, sealing and fire sealing for raceways and conduits through walls, floors, ceilings etc. for this work.

35. This contract shall provide and install wire mesh cable tray for low voltage distribution as shown on documents and specified. Cable tray shall be installed 3" above drop ceilings and have 3" clear above the top rim for access.

36. This contractor shall provide and install 4' conduits as shown for low voltage distribution.

37. This contractor shall provide and install 2' conduits into each space above the ceiling for low voltage distribution.

38. Coordinate, review and fully understand and integrate all cable tray, raceways and infrastructure interior or exterior that may be indicated on all contract documents including the T series drawings.

39. Lightning protection with master UL certification. Coordinate with the Carpentry and Roofing contractors.

40. Coordinate and provide a complete grounding system for the entire project. This includes but is not limited to the building columns, interior spaces, exterior wall assemblies, Electrical rooms, IDF and IDF rooms) and provide any testing and reports required.

41. As-built drawings in both hard copy, electronic and final BIM modelling per contract documents.

42. Provide rough-in and final connection and related work for equipment provided under other contracts (i.e. kitchen, elevators, HVAC, sprinkler, motorized doors, etc.). Provide power to automatic hardware. Low voltage wiring from the controller to hardware shall be provided by the Doors, Frames and Hardware Contractor. Include power panels and power supplies supplied by other trades.

43. Provide complete infrastructure for audio and audiovisual systems.

44. Provide rough-in and final connection of kitchen equipment and appliances. Refer to Specification Section 11400 Food Service Equipment for specifics. Coordinate power/plug requirements with rough in for equipment with the Kitchen Equipment Contractor.

45. Section 116163 Loose Performance Lighting shall be provided by the Stage Rigging contractor as follows; stage lighting systems including fixtures, controls, light grids, supports and attachments shall be provided. This contract (electrical) shall provide all power and power connections to the Loose Performance lighting. All other lighting in the Auditorium shall be supplied and installed by the electrical contractor. Coordination of work between trades is tis contractors responsibility.

46. This contractor shall include within their bid the incorporation of **2500 hours of COOP participation** by a NCCVT student. Contractor to comply with project documents and requirements set forth in 19 del. C.ch.5

47. Perform certification testing for all wiring and systems supplied by this contract scope.

48. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

49. Provide access doors and frames for all access to Structured Cable components or equipment that require routine or periodic maintenance. Installation of access doors and frames provided by the Metal Stud & Drywall Contractor.

50. Include within this contracts base bid an allocation of $75,000 for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-35 - SPECIAL SYSTEMS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Division 26 | Electrical (coordination of work) |
| Section 078400 | Firestopping |
| Section 079200 | Joint Sealants |
| Section 270500 | Telecommunications Pathways and Spaces |
| Section 271000 | Structured Cabling |
| Section 272000 | Network Equipment |
| Section 274000 | Classroom and Conference Room AV Equipment |
| Section 274100 | Specialized AV Systems |
| Section 274117 | Audio Video Systems |
| Section 275000 | Public Address and Clock |
| Section 280501 | Security Pathways and Spaces |
| Section 281000 | Intrusion Detection System |
| Section 281100 | Access Control System |
| Section 282000 | Video Surveillance System |
| Section 283112 | Public Safety – First Responder Radio Amplification System |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide a complete Special Syatem package as to include but not limited to, structured cabling, network equipment, AV systems, public address and clock system, intrusion detection, access controls, video surveillance and radio amplification system.

2. Provide wireless clock system including all equipment, cable, and accessories.

3. Telephone and voicemail system including telephone handsets and patch cables from device to jack will be provided by owner.

4. Provide intercom/public address system. Structured Cable Contractor will provide all network cabling including wiring, devices, and terminations at the source (MDF/IDF patch panel) and at the communication port (jack).

5. Provide complete cafeteria and Auditorium sound reinforcement audio/visual system. Projectors and mounts provided by the owner and installed by the Electrical Contractor.

6. The electrical contractor shall provide and install the fire alarm system, this contractor (Special Systems) will wire fire alarm terminations, and programming of electrified hold open hardware. Low voltage power to electrified hold open hardware provided by this contract. Hold open hardware provided by Carpentry and General Work Contractor.

7. Provide complete intrusion system.

8. Provide access control and security management system complete. Provide coordination with door and frame installation for a complete system. The contractor responsible for supplying the doors, frames, and hardware shall provide all wiring and accessories from the power supply (or junction box) to the door hardware. The contractor responsible for installation of doors and hardware shall provide terminations from door hardware to door whip, from door whip to power transfer, and from frame whip to power transfer. Frame whip shall be secured and protected by the door, frame, and hardware contractor(s) for the direct access of the Special Systems Contractor. Termination of the frame whip to the power supply (or junction box) shall be provided by the Special Systems Contractor. Power supply shall be furnished by the door, frame, and hardware contractor(s) and installed by the Special Systems Contractor. The Special Systems Contractor shall provide low-voltage wire from the card reader to the access controller, from the status switch (door contact) to the access controller, from access controller to the power supply(or junction box), and from power supply (or junction box) to power supply (or junction box) as necessary. The Electrical Contractor is responsible for providing 120v circuits to all power supplies and/or transformers as indicated in the documents. The Electrical Contractor shall provide conduits, device boxes, raceways, and pull strings for low-voltage wiring at doors receiving electronic, security, or access control hardware. Electrical contractor shall provide a junction box above each door scheduled to receive a card reader and a pathway & pull string. A mock-up shall be field installed and coordinated by all related Contractors for review prior to commencing work.

9. Provide a complete CCTV - Network Digital Video Management System. Owner shall provide server.

10. Provide all patch cords from communication port (jack) to each device included in this Contractor's scope. Patch cords at source (MDF/IDF) from patch panel to network switch provided by owner.

11. Provide all patch cords for switches.

12. Supply and install any fiber lines need for a complete installation including terminations.

13. Provide all testing of all installations.

14. Provide and install the racks, switches, uninterrupted power supplies etc. for a complete installation.

15. Coordinate all WAP's as per the specifications if supplied by the owner, install if not supplied provide and install under this contract.

16. This contractor shall own all notes as per the T series drawings unless note otherwise in the scope of this contract or the electrical contract. This includes but is not limited to the following series of notes. Note 6- Audio and Videa Systems, Note 7- Classroom/Conference Room AV Systems, Note 8-Demo Camera System and Note 9- Data Drop Allowance. These systems shall be provide as complete without any qualifications.

17. Provide coordination of the work of this contract with the Electrical including final equipment locations. This contractor must coordinate with Electrical Contractor as indicated on the drawings and as specified. The Electrical Contractor shall provide all device boxes, conduit and pull strings to circuits

for special systems as indicated and also to provide 120 Volt circuits for all Special Systems. This Contractor will be responsible for providing independent support systems, as indicated in the specifications, for all cable and wiring installed by this Contractor in locations where pathways and raceways are not required by the documents. All runs of cable/low voltage in open areas shall be installed in conduit. If raceways are required for the scope of this contract and they are not identified, this contractor shall provide.

18. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.

19. This contractor shall be on site to coordinate when walls are being installed for penetrations and sleeve installations. If penetrations and sleeves are missed, this will be the responsibility of this contractor to cover associated costs of fixing.

20. Interactive screens/displays and mounting brackets will be supplied by Owner and mounted by the Carpentry & General Works Contractor. The Carpentry and General Works Contractor will coordinate blocking with mounting hardware and install all necessary clips and blocking to the wall for hanging. Audio/visual interface and/or controls by Special Systems Contractor.

21. Hardware for permanent exterior gates will be provided by the other trades. Access control hardware/software and fire alarm integrations of gate hardware, including terminations, cabling, etc. will be provided by this contractor. The Electrical Contractors shall provide all pathways & electrical requirements to support installation.

22. Provide access doors and frames for all access to Special Systems components or equipment that require routine or periodic maintenance. Installation of access doors and frames provided by the Metal Stud & Drywall Contractor.

23. Provide all network cabling including wiring, devices, and terminations to communication devices identified in plans and referenced on "Communications Outlet Configuration" chart on Drawing E-501. Two (2) terminations should be provided (1) at the source (MDF/IDF patch panel) and (1) at the communication port (jack) in all instances.

24. This contract shall provide communication wiring from the (3) access control panels to the source (MDF/IDF patch panel) including terminations on both ends. Location of access control panels to be coordinated with the documents and the Construction Manager prior to installation.

25. This contractor shall provide communication wiring from the intrusion control headend to the source (MDF/IDF patch panel) including terminations on both ends. This communication wiring shall include (1) dedicated POTS line from the MDF room to the intrusion control dialer. Location of intrusion control headend to be coordinated with the documents and Construction Manager prior to installation.

26. This contractor shall provide communication wiring from the Fire Alarm Control Panel (FACP) to the source (MDF/IDF patch panel) including terminations on both ends. This communication wiring shall include (2) dedicated POTS line from the MDF room to the FACP dialer(s). Location of FACP to be coordinated with the documents and the Construction Manager prior to installation.

27. This contractor shall supply communication wiring from the intercom/public address amplifiers to the

source (MDF/IDF patch panel) including terminations on both ends. Location of amplifiers to be coordinated with the documents and the Construction Manager prior to installation. Contractor should assume (3) amplifiers, one located in each MDF/IDF.

28. This contractor shall provide communication wiring from the Building Management System headend to the source (MDF/IDF patch panel). Location of Building Management System headend to be coordinated with the documents, the Mechanical Contractor, and the Construction Manager prior to installation.

29. This contractor will install all network cable within the kitchen and kitchen hood identified on the Kitchen Equipment Drawings. Final location of network drops to be coordinated with the documents, the Kitchen Equipment Contractor, and the Construction Manager prior to installation.

30. This contractor will install communication wiring from the food management systems to the POS devices, menu display boards, and temperature monitoring systems, including terminations on both ends. Final location of the food management systems to be coordinated with the documents and the Construction Manager prior to installation.

31. Provide installation for all wireless access points furnished by owner. Patch cords from device to communication port (jack) provided by this Contractor.
32. Provide penetrations through walls, floors, etc., including cutting, patching and fire safing.

33. Provide all design and coordination necessary to provide complete systems.

34. Provide and coordinate for inspections and testing.

35. Provide fire resistive sealants for the work of this contract.

36. Provide pricing for all alternates as described in Section 012300-Alternates.

37. Provide video documentation of training on systems.

38. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

39. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

40. This contractor must provide a silica exposure plan that meets or exceeds the new 2017 silica OSHA requirements before any work can commence. At a minimum, it must be incorporated into the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

41. Contractor must provide additional crews as needed to maintain the project schedule.

42. This contractor shall include within their bid the incorporation of **1200 hours of COOP participation** by a NCCVT student. Contractor to comply with project documents and requirements set forth in 19

del. C.ch.5

43. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

44. This contractor must provide a silica exposure plan that meets or exceeds the new 2017silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

45. Include within this contracts base bid an allocation of ~~$30,000~~ **$20,000** **(Addendum No. 2)** for work to be determined by owner and construction manager. Unused allocation funds to be returned to the owner.

CONTRACT NO. D-36 - VERTICAL RETRACTABLE WALLS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Section 055000 | Metal Fabrications |
| Section 079200 | Joint Sealants |
| Section 102239 | Vertically Retractable Walls |
| Division 26 | Electrical |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide labor and materials to perform all work associated with the Vertically Retractable Walls System to provide a complete operating wall system.

2. Provide coordinated shop drawings that reflect all structural requirements with the structural steel, metal studs, ceilings, electrical power, lighting and communication systems, etc.

3. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.

4. Provide all trim components, hardware, hinges, and operators for electrical units, appropriate finishes, sensors, key switches and pocket doors for concealing doors when not in use.

5. Coordinate any structural requirements with the structural steel and carpentry contractors. Provide all supplementary steel as needed to hang partitions from structural support steel, provided by the Structural Steel Contractor. It is assumed, no additional steel will be required below structural support steel. If so, it will be provided by this contractor.

6. Electrical connections will be provided by Electrical Contractor. This contractor shall provide assistance to Electrical Contractor for coordination and installation of necessary connections. Low voltage wiring for devices, controls, raceways, boxes etc. to be provide by this contractor (not electrical contract)

7. Provide any required signage for safe operations.

8. Provide attic stock, warranty and demonstrations for all materials and types of panels.

9. Provide specified testing, adjusting, warranty and training demonstrations on the operation.

10. Provide (3) additional sets of keys for switch operating controls over and above the number of sets required by specifications.

11. Provide data and submittal information related to the Scope of this Contract signed and sealed by a Professional Engineer as required by the Contract Documents, including but not limited to delegated design requirements.

12. Provide all low voltage wiring, motors motor transformers and final connections to allow for a complete operating system. Electrical contractor shall supply the line voltage power connection. Include all raceways and boxes for your work.

13. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is $1,200 and shall be included in your base bid proposal.

14. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

CONTRACT NO. D-37 - MISCELLANEOUS CONCRETE AND GROUTING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

- Technical Specification Sections:

| | |
|---|---|
| Division 0 | Bidding and Contract Requirements |
| Division 1 | General Requirements |
| Division 03 | Concrete |
| Section 033000 | Concrete |
| Division 07 | Thermal and Moisture Protection |
| Section 072100 | Thermal Insulation |
| Section 072600 | Under-Slab Vapor Barrier |
| Section 312300 | Excavation and Backfill for pipeline and structures |
| Section 321313 | Concrete Paving |

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide Misc. concrete items and grouting as described in the Scope of Work and defined on the contract documents. Include all preparations and excavation, backfill, stone subbase, forms, and reinforcing required.
    - Provide footings and concrete piers as show on drawings A560-A565, include footings for dumpster pad.
    - Provide concrete locker bases as indicated in the contract documents.
    - Provide the electrical, mechanical and plumbing concrete pads as indicated on the contract documents. (Structural foundations and pads shown on Struct. Drawings excluded)
    - Provide all concrete slab on grade at the interior courtyard areas.
    - Provide all poured foundations for block walls, poured concrete walls at all areas outside of the main building foot print.
    - Provide all concrete excavation, footings and backfill as required for the masonry walls at the child care and playground areas.

2. This Contractor will be responsible for laying out all concrete work for this contract course of work.

3. This Contractor to furnish and install reinforcing steel, admixtures, curing compound, sealers, accessories, bolsters, ties and braces as required in the Contract Documents and for the performance of the work of this contract.

4. All work of this contract shall be considered “out of sequence” as such the contractor shall price each element of work as a mobilization and if required “short load” concrete delivery.

5. This contractor is responsible to provide material handling equipment, concrete pumps, etc. for work of this contract. NCCVT and EDiS will not be responsible for any additional material handling costs above the base bid proposal.

6. Provide sealants/caulking as required at grouted freezer and cooler box floors. Caulk all edges where

grout seals to box floor panels.

7. This contractor shall provide installation of sleeves required for MEP lines, under footings, below frost walls, under thickened slabs as related to this contractors course of work. This includes all excavation and backfill required for these installations. (sleeves will be supplied by the contractor installing the services, future BP-D) Coordinate with Arch and MEP documents for extent of this work.

8. Provide grouting of floor expansion joints once they are set and adjusted by installing contractors.

9. Grouting of all elevator sill angles will be the responsibility of this contractor.

10. Provide all door stoops, pads, entrance/exit concrete complete as provided for o the Architectural and MEP drawings. (if the concrete is shown on the structural drawings it shall be part of Contract C-01 Concrete and Reinforcing) This will be out of sequence work, contractor to include (5) re-mobilization to perform work out of sequence, this shall include premium costs for short load concrete pours as well.

11. Underslab vapor barrier, insulation, reglets, waterstops, control and construction joints. (Caulking by Joint and Sealants Contractor)

12. Provide foundation wall insulation and insulation under slabs. Include backfill of all foundation walls as detailed. Stone under slab to be provided by this contractor. Include re-dressing the stone after the MEP contractors have installed their UG work. As related to the work detailed for this contract.

13. Placement of related items furnished under other Specification Sections.

14. Anchor bolt assemblies to be placed with templates only.

15. All blockouts and embedment's required by plans and specifications.

16. This Contractor is responsible for grouting all structural steel base or leveling plates and elevator sill angles. As defined by the scope of this contract.

17. Include all weather, frost protection, and water pumping as required. This Contractor is also responsible for the premiums required for hot water, heated aggregate and admixtures for cold weather concrete.

18. Provide dewatering as it relates to the work of this contract.

19. All concrete testing will be completed by the Construction Manager, however, it will be the responsibility of this Contractor to furnish all samples.

20. This contractor shall include an allowance amount of $15,000 within the base bid for work to be identified by NCCVT and the CM. All unused portions of this allocation to be returned to the owner by means of a credit change order.

21. Provide all grout infill **inside the (Addendum No. 2)** walk-in freezers and refrigerators after freezers and refrigerators have been set in place. **Also grout the space between the freezers and refrigerator and the surrounding concrete. (Addendum No. 2)** Coordinate requirements with the architectural

drawings for BP-D and technical specifications.

22. This contractor owns coordinating all slab depressions identified on the documents with the products, flooring, insulation etc. shop drawings and layout drawings for each material that will be installed in the recess. A pre-install meeting will be held to review this information before each depressed pour.

23. Provide all means of transporting concrete including, but not limited to: pump trucks, cranes, ramps, chutes, buggies.

24. Provide at least 48 hours' notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

25. Provide and maintain a DNREC approved concrete dumpster for washout required by the scope of this contracts work.

26. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. NCCVT and EDiS will not be responsible for any lost tools, materials or equipment.

27. This contractor must provide a silica exposure plan that meets or exceeds the silica OSHA requirements before any work can commence. At a minimum, it must be implemented in to the company safety plan, include all monitoring, testing, limits exposure, provide respiratory plan and/or equipment modifications such as adding water to equipment during exposed work and keep records of exposure.

28. Provide daily fine cleanup of the work is the responsibility of each individual Contractor which includes broom cleaning of their debris as required. Daily Fine clean up, on a daily basis, shall be defined as those means/methods utilized to perform the daily cleaning tasks without producing dust, noise and stacking of stored materials. Furnish fine clean up on a daily basis. All debris must be removed from the work area at the end of each work day to the appropriate dumpster. Cleaning of roadways shall be included and performed daily while this contractor is on site performing work of this contract.

29. All materials excavated for installation of footings and foundations shall immediately be protected with appropriate moisture protection.

30. BIM coordination is "not" part of this contract scope.

END OF SECTION

SECTION 012100 - ALLOWANCES

1. RELATED DOCUMENTS

   A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

   B. Refer to provisions in AIA Document A232 – 2019 EDITION, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, CONSTRUCTION MANAGER AS ADVISOR EDITION, for requirements in addition to those specified in Division 1.

   C. Refer to Scope Information Sheets for all contracts bound in the Project Manual under Section 011100 - SUMMARY OF WORK. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.

   D. For work being constructed under separate prime contracts, provisions of this Section apply to each contract being bid.

   E. Include in the Contract Sum all lump sum and unit cost allowances stated in the Contract Documents.

   F. Designate in the construction progress schedule the delivery dates for products specified under each allowance.

   G. Designate in the Schedule of Values the quantities of materials required under each unit cost allowance.

2. ALLOWANCES FOR PRODUCTS

   A. The amount of each allowance includes:

      1. The cost of the product or labor to the Contractor or Subcontractor, less any applicable trade discounts.

      2. Delivery to the site.

      3. Labor required under the allowance, only when labor in specified to be included in the allowance. If labor is not specified to be included in the allowance, it shall be included in the Contractor's bid and in the resulting Contract Sum.

      4. Applicable taxes.

      5. Profit and overhead.

   B. In addition to the amount of each allowance, include in the Contract Sum the Contractor's costs for:

1. Handling at the site; including unloading, uncrating and storage.

2. Protection from the elements and from damage.

3. Labor for installation and finishing, except where labor is specified to be a part of the allowance.

4. Other expenses required to complete the installation.

5. Contractor's and Subcontractor's overhead and profit.

C. Refer to Scope Information Sheets under Section 011100 - SUMMARY OF WORK for the amount of each lump sum allowance and for work specified in the specification sections listed below.

1. Section 011100 Contract D-01: Unit Masonry: Provide a $40,000 allowance for work to be determined by Owner and Construction Manager.

2. Section 011100 Contract D-02: Miscellaneous Metals, Stairs, and Rails: Provide a $20,000 allowance for work to be determined by Owner and Construction Manager.

3. Section 011100 Contract D-03: Exterior Structural Stud Assembly: Provide a $40,000 allowance for work to be determined by Owner and Construction Manager.

4. Section 011100 Contract D-04: Carpentry and General Work:
   **a. Provide a $100,000 allowance for temporary window opening protection.**
   b. Provide a $40,000 allowance for work to be determined by Owner and Construction Manager.

5. Section 011100 Contract D-05: Exterior Metal Panels: Provide a $30,000 allowance for work to be determined by Owner and Construction Manager.

6. Section 011100 Contract D-06 Drywall and Interior Metal Framing:
   a. Provide a $30,000 allowance for work to be determined by Owner and Construction Manager.
   b. Provide $175,000 allowance to supply, install, and maintain a complete scaffold system for auditorium ceiling installation.

**7. Section 011100 Contract D-07: General Labor and Clean-up: Provide a $7,5000 allowance for work to be determined by Owner and Construction Manager.**

8. Section 011100 Contract D-08: Roofing: Provide a $35,000 allowance for work to be determined by Owner and Construction Manager.

9. Section 011100 Contract D-09: Fireproofing: Provide a ~~$15,000~~ **$20,000** allowance for work to be determined by Owner and Construction Manager.

10. Section 011100 Contract D-10: Joint Sealants and Preformed Joint Assemblies: Provide a $15,000 allowance for work to be determined by Owner and Construction Manager.

11. Section 011100 Contract D-12: Overhead Coiling Door and Grates: Provide a $10,000 allowance for work to be determined by Owner and Construction Manager.

12. Section 011100 Contract D-13: Curtainwall/Glazing/Storefronts: Provide a $35,000 allowance for work to be determined by Owner and Construction Manager.

13. Section 011100 Contract D-14: Tiling: Provide a $15,000 allowance for work to be determined by Owner and Construction Manager.

14. Section 011100 Contract D-15: Acoustical Ceilings and Specialty Ceilings: Provide a $20,000 allowance for work to be determined by Owner and Construction Manager.

15. Section 011100 Contract D-16: Flooring: Provide a ~~$15,000~~ **$25,000** allowance for work to be determined by Owner and Construction Manager.

16. Section 011100 Contract D-17: Resilient Athletic Flooring: Provide a $15,000 allowance for work to be determined by Owner and Construction Manager.

17. Section 011100 Contract D-18: Resinous Matrix Terrazzo Flooring: Provide a $10,000 allowance for work to be determined by Owner and Construction Manager.

18. Section 011100 Contract D-19: Fluid Applied Flooring: Provide a $10,000 allowance for work to be determined by Owner and Construction Manager.

19. Section 011100 Contract D-20: Paint and VWC: Provide a $20,000 allowance for work to be determined by Owner and Construction Manager.

20. Section 011100 Contract D-21: Wood Strip Flooring-Gym Flooring: Provide a $10,000 allowance for work to be determined by Owner and Construction Manager.

21. Section 011100 Contract D-22: Specialties: Provide a $20,000 allowance for work to be determined by Owner and Construction Manager.

22. Section 011100 Contract D-23: Food Service Equipment: Provide a $15,000 allowance for work to be determined by Owner and Construction Manager.

23. Section 011100 Contract D-25: Laminate Clad Casework, Countertops, and Sills: Provide a $15,000 allowance for work to be determined by Owner and Construction Manager.

24. Section 011100 Contract D-26: Stage Rigging, Lighting, and Accessories: Provide a $10,000 allowance for work to be determined by Owner and Construction Manager.

25. Section 011100 Contract D-27: Fixed Auditorium Seating: Provide a $10,000 allowance for work to be determined by Owner and Construction Manager.

~~26. Section 011100 Contract D-28: Wood Laboratory Furniture and Specialty Casework: Provide a $10,000 allowance for work to be determined by Owner and Construction Manager.~~

27. Section 011100 Contract D-~~29~~**28**: Telescoping Bleachers and Platforms: Provide a $10,000 allowance for work to be determined by Owner and Construction Manager.

28. Section 011100 Contract D-~~30~~**29**: Hydraulic Holeless Passenger Elevator: Provide a $10,000 allowance for work to be determined by Owner and Construction Manager.

29. Section 011100 Contract D-~~31~~**30**: Fire Protection: Provide a $20,000 allowance for work to be determined by Owner and Construction Manager.

30. Section 011100 Contract D-~~32~~**31**: Plumbing: Provide a $75,000 allowance for work to be determined by Owner and Construction Manager.

31. Section 011100 Contract D-~~33~~**32**: Mechanical Piping - HVAC:
    a. Provide a $75,000 allowance for work to be determined by Owner and Construction Manager.
    b. Provide $200,000 allowance to provide temporary heating fuel.

32. Section 011100 Contract D-~~35~~**34**: Electrical, Lighting and Fire Alarm Systems: Provide a $75,000 allowance for work to be determined by Owner and Construction Manager.

33. Section 011100 Contract D-~~36~~**35**: Special Systems: Provide a ~~$30,000~~ **$20,000** allowance for work to be determined by Owner and Construction Manager.

34. Section 011100 Contract D-~~38~~**37**: Miscellaneous Concrete and Grouting: Provide a $15,000 allowance for work to be determined by Owner and Construction Manager.

3. ADJUSTMENT OF COSTS

A. Should the net cost be more or less than the specified amount of the allowance, the Contract Sum will be adjusted accordingly by Change Order.

    1. For products and labor specified under a unit cost allowance, the unit cost shall apply to the quantities actually used with a nominal allowance for waste, as determined by receipted invoices, or by field measurement.

B. At Contract closeout, reflect all approved changes in Contract amounts in the final statement of accounting.

END OF SECTION

SECTION 012300 - ALTERNATES

1. GENERAL PROVISIONS

   A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

   B. Refer to provisions in AIA Document A232 – 2019 Edition, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, CONSTRUCTION MANAGER AS ADVISOR EDITION, for requirements in addition to those specified in Division 1.

   C. For work being constructed under separate prime contracts, provisions of this Section apply to each contract being bid.

2. BASE BID

   A. The Base Bid shall consist of all Work shown or specified in the Contract Documents, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids (if any are required to be stated in the bid).

   B. The Base Bid shall include all work in any Subtractive Alternates specified herein.

3. ALTERNATES

   A. State in the Bid Form, where applicable, the amount to be added to or deducted from the amount of the Base Bid for each Alternate specified.

   B. See Section 002113 - INSTRUCTIONS TO BIDDERS for related information.

   C. The description of Alternates contained herein is in summary form. Detailed requirements for materials and execution shall be as specified in other sections and as shown on drawings.

      Alternate No. 3: Add exterior shell of future tech and shop expansion.

      Base Bid: No future tech and shop expansion.
      Alternate: Provide exterior shell of future tech and shop expansion.

      Alternate No. 4A: Flooring – Floor Finishes

      Base Bid: No terrazzo provided.
      Alternate: Provide terrazzo and base in the following spaces: Lobby A102, Lobby E101, and Dining E103.
      Delete quartz tile and resilient base in the following spaces: Lobby A102, Lobby E101, and Dining E103.
      1. Floor pattern to match Base Bid design. Refer to terrazzo floor designations in the finish schedule for color selections.
      2. Refer to Drawings for floor pattern design.

3. See Section 06 66 23 for more information.

Alternate No. 4B: Flooring – Floor Finishes

Base Bid: No terrazzo provided.
Alternate: Provide terrazzo and base in the following spaces: Corridors A100, B100A, C100B, C100A, D100A, D100B, and Lobby D117.
Delete Quartz tile and resilient base in the following spaces: Corridors A100, B100A, C100B, C100A, D100A, D100B, and Lobby D117.

1. Floor pattern to match Base Bid design. Refer to terrazzo floor designations in the finish schedule for color selections.
2. Refer to Drawings for floor pattern design.
3. See Section 09 66 23 for more information.

Alternate No. 5: Sprayed Acoustical Insulation

Base Bid: No Sprayed Acoustical Insulation in rooms: Masonry Shop D114, Electrical Shop D110, Plumbing Shop D116, Carpentry Shop C101, Industrial Millwright C118, Auto Body Shop C120, Shared Bay C122, Auto Tech Shop C124, Mechanical Equipment Rooms D212, D214B, C201A, C201B, C220, C224B, and Mechanical Mezzanine C224A.
Alternate: Provide Sprayed Acoustical Insulation in rooms above.

Alternate No. 6: Door Access Control

Base Bid: Provide manual lock sets and hardware per schedule.
Alternate: Provide 380 Salto wireless handle sets in lieu of manual locksets.

Alternate No. 7: Monument stair #5

Base Bid: No monument stair #5.
Alternate: Provide monument stair #5 complete

Alternate No. 8: Vertically retractable partition

Base Bid: No vertically retractable partition required at MP1 & MP2.
Alternate: Provide vertically retractable partition between room MP1 & MP2

Alternate No. 9: Exterior Watertable

Base Bid: Provide split face CMU at Watertable. No ground face CMU at watertable
Alternate: Provide ground Face CMU at exterior watertable

Alternate No. 10: ATC system by Modern Control.

Base Bid: Provide ATC system and integration by any listed ATC system vendor.
Alternate: Provide additional costs, if any, to provide ATC system by Modern Controls.

Alternate No. 11: Freeze Protection Pumps

Base Bid: Do not provide freeze protection pumps listed here (FPP-1-32, 34, 35, 37, 38, 40, 42, 44, 46, 49-61) All other freeze protection pumps shall be included in the base bid.
Alternate: Provide freeze protection pumps listed here including all associated piping, valves, insulation, supports, power and controls. (FPP-1-32, 34, 35, 37, 38, 40, 42, 44, 46, 49-61)

Alternate No. 12: Rotary Screw Compressor Systems

Base Bid: No rotary screw compressors and tanks for all shop compressed air systems. Provide reciprocating type as per plans and specs.
Alternate: Provide rotary screw compressors and tanks for all shop compressed air systems.

Alternate No. 13: Lightning protection system

Base Bid: No lightning protection system
Alternate: Provide lightning protection system.

Alternate No. 14: Fire Alarm System by Simplex

Base Bid: Provide fire alarm system and integration by any listed fire alarm system vendor/manufacturer.
Alternate: Provide additional costs, if any, for fire alarm system by Simplex.

Alternate No. 15A: Composite Metal Panels – Custom Colors

Base Bid: No custom colors for exterior composite metal panels - window brows.
Alternate: Provide custom color for window brows.

Alternate No. 15B: Composite Metal Panels – Custom Colors

Base Bid: No custom colors for exterior composite metal panels - main canopies.
Alternate: Provide custom color for main canopies.

Alternate No. 15C: Composite Metal Panels – Custom Colors

Base Bid: No custom colors for exterior composite metal panels - accent wall/exterior column wraps.
Alternate: Provide custom color for accent wall/exterior column wraps.

Alternate No. 16: ACT Ceilings - Tile

Base Bid: Provide ACT-1 (2′ x 2″ square lay-in acoustical ceiling tile) where indicated.
Alternate: Provide 2′ x 2′ beveled tegular acoustical ceiling tile in lieu of 2′ x 2′ square lay-in where ACT -1 is indicated.

END OF SECTION

# SECTION 05 50 00 - METAL FABRICATIONS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
B. Division 01, Section 017419 – Construction Waste Management.

### 1.2 SUMMARY

A. Section Includes:
1. Steel framing and supports for countertops.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Loose bearing and leveling plates for applications where they are not specified in other Sections.
5. Metal Ladders & Ladder Safety Cages
6. Metal Downspout Boots
7. Metal Bollards

B. Products furnished, but not installed, under this Section:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Sections:

1. Division 03 Section "Cast-in-Place Concrete" and “Architectural Concrete” for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Division 04 Section "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
3. Division 05 Section "Structural Steel Framing."
4. Division 05 Section "Pipe and Tube Railings."

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Structural Performance of Aluminum Ladders: Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

1.4 SUBMITTALS

A. Product Data: For the following:
1. Paint products.
2. Grout.
3. Ladders
4. Bollards
5. Downspout Boots

B. Shop Drawings: Show fabrication and installation details for metal fabrications, including (but not limited to) ladders, bollards, steel framing and supports, etc.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Samples for Verification: For metal bollards, metal ladders, and downspout boots.

D. Delegated-Design Submittal: For installed products (including metal ladders) indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Qualification Data: For qualified professional engineer.

F. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.

G. Welding certificates.

H. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.

C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

D. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

E. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface or with abrasive material metallically bonded to steel.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. IKG Industries, a division of Harsco Corporation; Mebac.
b. SlipNOT Metal Safety Flooring, a W. S. Molnar company; SlipNOT.
c. Approved equal.

F. Steel Tubing: ASTM A 500, cold-formed steel tubing.

G. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

H. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B, with G90 (Z275) coating; 0.108-inch (2.8-mm) nominal thickness.

I. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

## 2.3 NONFERROUS METALS

A. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

E. Bronze Plate, Sheet, Strip, and Bars: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).

F. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).

G. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

H. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.

I. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
3. Provide stainless-steel fasteners for fastening nickel silver.
4. Provide bronze fasteners for fastening bronze.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3); and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1).

D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).

G. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).

H. Wood Screws: Flat head, ASME B18.6.1.

I. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

J. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

L. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

M. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594.

N. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

## 2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 09 painting Sections.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

G. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.

H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

I. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

## 2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

## 2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

3. Provide bearing plates welded to beams where indicated.
4. Drill or punch girders and plates for field-bolted connections where indicated.
5. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches (600 mm) o.c.

C. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
2. Unless otherwise indicated, provide 1/2-inch (12.7-mm) baseplates with four 5/8-inch (16-mm) anchor bolts and 1/4-inch (6.4-mm) top plates.

D. Galvanize miscellaneous framing and supports where indicated.

E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

F. Basis of Design: Countertop Bracket
1. Provide the following product, or approved equal:
   a. Centerline Steel LLC – Front Mounting Plus Bracket
   b. Mount as noted in drawings.
2. Properties:
   a. A36 Steel
   b. Cross Section: Min. 3/8” x 2-1/2”
   c. Finish / Color: TBD

## 2.8 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates.

C. Prime plates with zinc-rich primer.

## 2.9 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches (200 mm) unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

## 2.10 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

## 2.11 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

## 2.12 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Division 09 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

## 2.13 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

## 2.14 METAL ROOF LADDERS

A. Exterior Fixed Roof Ladders: Tubular Rail Low Parapet Access Ladder with Platform and Return.
   1. Basis of Design Product: As noted on drawings.
   2. Walk-Through Rail and Roof Rail Extension: Not less than 3 feet 6 inches (1067 mm) above the landing and shall be fitted with deeply serrated, square, tubular grab rails.
   3. Landing Platform: 1-1/2 inches (38 mm) or greater diameter, tubular aluminum guardrails and decks of serrated aluminum treads.
   4. Provide personal fall arrest system or a ladder safety system.

B. Ladder Materials
   1. Aluminum Sheet: Alloy 5005-H34 to comply with ASTM B209.
   2. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.

C. Ladder finish: Clear Anodic Finish: AA-M10C22A41 Mechanical finish as fabricated. Architectural Class I, clear coating 0.018 mm or thicker.

D. Rungs: Not less than 1-1/4 inches (32 mm) in section and 18-3/8 inches (467mm) long, formed from tubular aluminum extrusions. Squared and deeply serrated on all sides.
   1. Rungs shall withstand a 1,500 pound (454 kg) load without deformation or failure.
   2. Fit rungs in centerline of siderails; fasten by welding or with stainless-steel fasteners or brackets and aluminum rivets.

E. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted aluminum brackets.

F. Comply with ANSI A14.3

G. Provide intermediate brackets in order to keep maximum bracket spacing at 10 feet on center. For exterior roof ladders, provide mounting bracket to wall to keep ladder rails above roof.

H. Heavy Duty Tubular Side Rails: Assembled from two interlocking aluminum extrusions no less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.

## 2.15 DOWNSPOUT BOOTS

A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots, integral cleanout, cleanout cover, and tamper proof fasteners.
   1. Configuration: Offset.
   2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.

3. Finish: Manufacturer's standard factory applied powder coat finish.
4. Color: To be selected by Architect from manufacturer's standard range.
5. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, integral neoprene gaskets, and rubber coupling.
6. Available Manufacturers offering Basis of Design products that may be incorporated into the Work include, but are not limited to, the following:
   a. Downspoutboots.com, a division of J. R. Hoe & Sons; O Series
   b. Neenah Foundry, a division of Neenah Enterprises, Inc; Model R-4929-O6C

## 2.16 METAL BOLLARDS

A. Manufacturer (or Approved Equal):
   1. Reliance Foundry Co. Ltd.
   2. Phone: 604-547-0460 or 1-877-789-3245
   3. Fax: 604-590-8875
   4. Website: http://www.reliance-foundry.com/bollard
   5. Email: info@reliance-foundry.com

B. Bollard:
   1. Model: Reliance Foundry; **R-8902**.
   2. Height: 36 inches
   3. Diameter: 4-3/8 inches body; 7-1/2 inches base
   4. Design: Cylindrical with rounded top.
   5. Material: Stainless steel, ASTM A312, Grade TP 316.
   6. Installation Type:
      a. SSB1: Fixed Embedded Concrete Anchor.
      b. SSB2: Removable Receiver.
         1) Stainless Steel receiver with lid.
         2) Stainless Steel 5/16 inch Bollard Chain
            a) Stainless Steel Quick Link Connector – 2 per chain
         3) Stainless Steel 3/8 inch Chain Eye
            a) 2 per bollard
      c. SSB3: Flange Concrete Surface Mount.
         1) Anchor bolts and sleaves: as required by manufacturer

~~C. Fill with 3,000 psi concrete.~~
   1. ~~Slightly overfill top for drainage.~~

~~D. Bollard Cover:~~
   ~~1. High Density Polyethylene (HDPE) post cover~~
   2. ~~Color: Yellow~~

~~E. Fabricate bollards with stainless steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4 inch anchor bolts.~~

   ~~1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.~~

~~F. Fabricate sleeves for bollard anchorage from steel pipe or tubing with 1/4 inch (6.4 mm) thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) larger than OD of bollard.~~

## PART 3 - **EXECUTION**

### 3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

### 3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

## 3.3 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

## 3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

**END OF SECTION 05 50 00**

# SECTION 06 20 00 - FINISH CARPENTRY

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Finish carpentry items.
   1. Custom solid surfacing reception desk.
   2. Wood veneer paneling and trim at Stage and Proscenium, stained finish.
   3. Plastic laminate veneer paneling.
   4. Standing and running wood trim, stained finish.
   5. Hang doors, install hardware.

B. Hardware and attachment accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 12 36 00 - Countertops, Backsplashes and Window Stools: Solid Surface material.

### 1.03 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard 2016.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.

C. AWI (QCP) - Quality Certification Program Current Edition.

D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).

E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1 2017, with Errata (2019).

F. BHMA A156.9 - American National Standard for Cabinet Hardware 2015.

G. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2009.

H. NEMA LD 3 - High-Pressure Decorative Laminates 2005.

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

### 1.05 SUBMITTALS

A. Product Data:
   1. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units and scheduled products.
   2. Provide data on fire retardant treatment materials and application instructions.
   3. Provide instructions for attachment hardware and finish hardware.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
   2. Include certification program label.

C. Samples: Plastic laminate for finish selection.

D. Samples: Submit two samples of prefinished wood trim 12 inch long.

E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
   2. Single Source Responsibility: Provide and install this work from single fabricator.

B. Quality Certification:
   1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
   2. Provide labels or certificates indicating that the work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   3. Provide designated labels on shop drawings as required by certification program.
   4. Provide designated labels on installed products as required by certification program.
   5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.

B. Protect work from moisture damage.

C. Handle materials and products to prevent damage to edges, ends, or surfaces.

**PART 2 PRODUCTS**

2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

C. Interior Woodwork Items:
   1. Moldings, Bases, Casings, and Miscellaneous Wood Trim: White Maple; transparent finish.
   2. Wall Panels: Plastic Laminate on hardwood plywood with PVC on exposed edges.
   3. Window Stools and Aprons: Solid Surface Material, see Section 12 36 00.
   4. Custom Reception Desks: Vertical components: 5/16” bullet resistant sheathing (basis of design: ArmorCore by Waco Composites - see section 09 21 16), solid surface finish – see Section 12 36 00. Counters: solid surface - see Section 12 36 00.
   5. Custom solid surfacing locker surrounds: Vertical components and Counter: Solid Surface Material, see Section 12 36 00.
   6. Custom plastic laminate and solid surfacing benches at History Steps (Lobby 100), Grand Stair bench (Lobby 100,alternate #9) and Bench and Wall Protection at Upper Lobby 200: Vertical components: plastic laminate finish. Horizontal surface: solid surface - see Section 12 36 00.

2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.03 LUMBER MATERIALS

A. Hardwood Lumber: White Maple species, quarter sawn, maximum moisture content of 6 percent, of quality suitable for transparent finish.

B. Hardwood Lumber for Opaque finish: Poplar species, plain sawn, maximum moisture content of 6 percent, of quality suitable for opaque (painted) finish.

2.04 SHEET MATERIALS

A. Hardwood Plywood: Face species White Maple, quarter cut, book matched, medium density fiberboard core; HPVA HP-1 Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.

B. Particleboard: ANSI A208.1 Composed of wood chips, sawdust, or flakes of medium density, made with waterproof resin binders; of grade to suit application; sanded faces.

2.05 PLASTIC LAMINATE MATERIALS

A. Plastic Laminate: NEMA LD 3, HGS; color as selected by Architect; satin finish.

B. Laminate Backing Sheet: NEMA LD 3, BKL; undecorated plastic laminate.

C. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

2.06 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Concealed Joint Fasteners: Threaded steel.

2.07 SOLID SURFACE MATERIAL

A. See Section 12 36 00.

2.08 ACCESSORIES

A. Primer: as specified in Section 09 90 00.

B. Wood Filler: Solvent base, tinted to match surface finish color.

C. Reveals, metal trim and concealed hanging systems

1. Acceptable ManufacturerS
   a. Fry Reglet Architectural Metal Systems
   b. Gordon Architectural Engineering Systems
   c. Monarch Metal

2.09 HARDWARE

A. Hardware: Comply with BHMA A156.9.

2.10 WOOD TREATMENT

A. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

B. Shop pressure treat wood materials requiring fire rating to concealed wood blocking.

C. Provide identification on fire retardant treated material.

D. Redry wood after pressure treatment to maximum 10 percent moisture content.

2.11 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

C. Cap exposed plastic laminate finish edges with material of same finish and pattern.

D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

E. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
F. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.

2.12 SHOP FINISHING

A. Apply wood filler in exposed nail and screw indentations.
B. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
C. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
    1. Transparent:
        a. System - 11, Polyurethane, Catalyzed.
        b. Sheen: Satin.
D. Back prime woodwork items to be field finished, prior to installation.

**PART 3 EXECUTION**

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.
B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. Hang doors and install hardware.
B. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
C. Set and secure materials and components in place, plumb and level.
D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
E. Install interior wood trim with finish nails or finish screws, set for filler.
F. Install solid surface window stools.

3.03 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment in accordance with manufacturer's instructions.
B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.
C. Allow preservative to dry prior to erecting members.

3.04 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
B. Before installation, prime paint surfaces of wood items or assemblies to be in contact with cementitious materials.

3.05 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.
B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

**END OF SECTION**

## SECTION 08 33 13 - COILING COUNTER DOOR

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Overhead coiling counter door with integral frame and counter

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware: Cylinder cores and keys.

1.03 SUBMITTALS

A. Product Data: Provide general construction, electrical equipment, and component connections and details.

B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

C. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.

D. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Manufacturer approved Company specializing in performing work of type specified and with at least three years documented experience.

C. Cycle Life: Standard construction for normal use of up to 20 cycles per day

1.05 WARRANTY

A. Standard warranty: Two years from date of receipt

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

A. Basis of design: Cornell Iron Works, Inc,

1. Product: Rolling Counter door with frame and counter: ERC20
2. Manufacturers offering products that may meet the basis of design specification and design intent include, but are not limited to:
   a. Alpine Overhead Doors, Inc: www.alpinedoors.com/#sle.
   b. C.H.I. Overhead Doors: www.chiohd.com/#sle.
   c. Raynor Garage Doors: www.raynor.com/#sle.

3. Materials
   a. Curtain
      1) Slats: Stainless Steel No. 10 (1-1/4" high by 3/8" deep), interlocked flat-faced slats constructed of 22 gauge AISI type 304 #4 finish stainless steel with tubular stainless steel bottom bar measuring 2" high by 1-1/4" deep
      2) #4 brushed finish
   b. Endlocks:
      1) Fabricate continuous interlocking slat sections with high strength galvanized steel endlocks riveted to slat ends per UL requirements.
   c. Head and Jamb Frame
      1) Type 304 Stainless Steel
      2) 16 gage type 304 #4 finish
      3) Integral welded with guide groove incorporated into jamb design. Build to fit identified wall thickness
   d. Counter Top
      1) Stainless Steel
      2) 14 gage Type 304 #4 finish
   e. Counter Balance Shaft Assembly
      1) Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width
      2) Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs. (110 N). Provide wheel for applying and adjusting spring torque
   f. Brackets
      1) Fabricate from reinforced AISI 300 series stainless steel plate with bearings at rotating support points to support counterbalance shaft assembly and form end closures for hood
      2) #4 brushed finish
   g. Hood
      1) Stainless steel with reinforced top and bottom edges. Provide intermediate support brackets as required
      2) #4 brushed Finish
4. Operation
   a. Manual Crank Hoist
      1) Provide crank hoist operator including crank gear box, steel crank drive shaft and geared reduction unit. Fabricate gear box to completely enclose operating mechanism and be oil-tight.
5. Locking
   a. Masterkeyable cylinder lock: Operable from coil both sides of bottom bar.

## PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

3.03 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.
B. Maximum Variation From Plumb: 1/16 inch.
C. Maximum Variation From Level: 1/16 inch.
D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet straight edge.

3.04 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Clean installed components.
B. Remove labels and visible markings.

**END OF SECTION**

## SECTION 08 33 23 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electric operators and control stations.
B. Overhead coiling doors , operating hardware, non-fire-rated and exterior, electric operation.
C. Wiring from electric circuit disconnect to operators and control stations.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware: Cylinder cores and keys.
B. Section 26 05 83 - Wiring Connections: Power to disconnect.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
D. ITS (DIR) - Directory of Listed Products current edition.
E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2000, with Errata (2008).
G. NEMA MG 1 - Motors and Generators 2018.
H. UL (DIR) - Online Certifications Directory Current Edition.
I. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide general construction, electrical equipment, and component connections and details.
B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
C. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
D. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified.
D. Cycle Life: Standard construction for normal use of up to 20 cycles per day

## PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Overhead Coiling Doors: Basis of design: Cornell Iron Works, Inc, Product: Thermiser ESD20. Manufacturers offering products that may meet the basis of design specification and design intent include, but are not limited to:
   1. Alpine Overhead Doors, Inc: www.alpinedoors.com/#sle.
   2. C.H.I. Overhead Doors: www.chiohd.com/#sle.
   3. Raynor Garage Doors: www.raynor.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COILING DOORS

A. Coiling Doors: Steel slat curtain, insulated. Basis of Design Cornell
   1. Performance
      a. Capable of withstanding positive and negative wind loads of 20 psf without undue deflection or damage to components.
      b. Air infiltration rate of less than 0.3 CFM/FT2, as tested per ASTM E283 and validated by an independent testing agency.
      c. Insulated door slat Material Requirements:
         1) Flame Spread Index of 0 and a Smoke Developed Index of 10 as tested per ASTM E84.
         2) Minimum Sound Transmission Class (STC) rating of 32 as tested per ASTM E90.
         3) Minimum R-value of 8.0 (U-value of 0.125) as calculated using the ASHRAE Handbook of Fundamental
         4) Insulation to be CFC Free with an Ozone Depletion Potential (ODP) rating of zero.
   2. Materials and Configuration
      a. Slat Material: ASTM A 653/A 653M galvanized steel sheet, Grade 40, Minimum 20 gage.
         1) Galvanizing: Minimum G90 coating.
      b. Curtain Construction: Interlocking slats.
         1) Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
         2) Nominal Slat Size: 3 inches wide by required length.
         3) Exterior Slat Finish: ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation of a chemical bonding, baked-on polyester base coat and a baked-on polyester clear powder finish coat. 2.5-3.5 mils cured film thickness. ASTM D-3363 pencil hardness: 2H or better. Tested per ASTM B117.
            (a) Color: As selected by Architect from full range of RAL colors.
         4) Interior slat finish: Coating System and phosphate treatment followed by baked-on polyester powder coat, color as selected by Architect from manufacturer's standard color range, minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.
            (a) Color: As selected by Architect from manufacturers standard colors.
      c. Endlocks: Fabricate interlocking sections with high strength nylon endlocks on alternate slats. Provide windlocks to meet specified wind load.

d. Bottom Bar: Provide reinforced extruded aluminum interior face with full depth insulation and exterior skin slat to match curtain material and gauge. Minimum 4" tall.
e. Weatherstripping (exterior doors): Moisture and rot proof, resilient type.
   1) Bottom Bar, Motor Operated Doors: Sensing/weather edge with neoprene astragal extending full width of door bottom bar.
   2) Guides: Replaceable vinyl strip on guides sealing against fascia side of curtain.
   3) Lintel Seal: Nylon brush seal fitted at door header to impede air flow.
   4) Air Infiltration Certification Label: affix to bottom bar.
f. Guides
   1) Material: ASTM A36/A36M steel angles, primed.
   2) Construction: Continuous, of profile to retain door in place with snap-on trim.
   3) Finish: powder coat, color as selected from manufacturer's standard range.
   4) Provide thermal break at exterior doors.
g. Brackets:
   1) Material: ASTM A36/A36M steel plate, minimum 3/16 inch (5 mm), primed.
   2) Finish: Powder coat, color as selected from manufacturer's standard range.
   3) Permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.
h. Counterbalance shaft assembly:
   1) Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot of width.
   2) Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs. Provide wheel for applying and adjusting spring torque.
i. Hood Enclosure: .
   1) Material: Galvanized steel Minimum thickness; 24 gage, 0.0239 inch.
   2) Configuration: Internally reinforced to maintain rigidity and shape.
   3) Finish: ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation of a chemical bonding, baked-on polyester base coat and a baked-on polyester finish coat.
   4) Mounting: Surface mounted.
j. Locking:
   1) Cylindrical Locking Mechanism: Master-keyable cylinder. Coordinate with Owner's standard cylinder type.
   2) Location: Operable from coil side of bottom bar.
   3) For motor operated units, provide an integral motor-mounted interlock system to prevent damage to door and operator.

B. Coiling door, electric operated interior non-insulated Basis of Design Cornell Iron works ESD10
   1. Materials
      a. Curtain
         1) Slats: Type 304 Stainless Steel
         2) #4 brushed finish
      b. Endlocks:
         1) Alternate slats each secured with two ¼" (6.35 mm) rivets. Fabricate interlocking sections with high strength nylon.
      c. Bottom Bar
         1) Type 304 Stainless Steel Angles
         2) #4 brushed finish
      d. Guides
         1) Type 304 Structural Aluminum
         2) #4 brushed finish
      e. Counter Balance Shaft Assembly
         1) Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width
         2) Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs. (110 N). Provide wheel for applying and adjusting spring torque
      f. Brackets
         1) Fabricate from minimum 3/16 inch (5 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures
         2) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better
      g. Hood
         1) Stainless steel with reinforced top and bottom edges. Provide intermediate support brackets as required
         2) #4 brushed Finish
   2. Operation
      a. Electric
         1) Standard use Model MG operator

2.03 ELECTRIC OPERATION

A. Electric Operators:
   1. Mounting: Side mounted.
   2. Motor Enclosure:
   3. Motor Rating: 1/2 HP; continuous duty.
   4. Motor Voltage: 120 volts, single phase, 60 Hz.
   5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
   6. Controller Enclosure: NEMA 250, Type 4.
   7. Brake: Manufacturer's standard type, activated by motor controller.
   8. Manual override in case of power failure.
   9. See Section 26 05 83 for electrical connections.

B. Control Station: Provide standard key-operated (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
   1. 24 volt circuit.
   2. Recess mounted, at location as shown on Drawings.

3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
   a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
   b. Secondary Device: Provide electric sensing edge with wireless edge kit or non-monitored safety edge as an option along with continuous-constant control device.

C. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

## PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.
B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
E. Coordinate installation of electrical service with Section 26 05 83.
F. Complete wiring from disconnect to unit components.
G. Install enclosure and perimeter trim.

3.03 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.
B. Maximum Variation From Plumb: 1/16 inch.
C. Maximum Variation From Level: 1/16 inch.
D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet straight edge.

3.04 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Clean installed components.
B. Remove labels and visible markings.

**END OF SECTION**

# SECTION 11 40 00
# FOODSERVICE EQUIPMENT

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

### 1.2 SUMMARY

A. Provide all material, labor, equipment and services required to execute and complete all items of work relating to the food service equipment, both existing and new, all as required to make the resulting facility a fully functional and reliable operating unit in accordance with this Specification. All food service equipment shall be furnished as specified, delivered prepaid, unloaded and uncrated, assembled with all components and accessories connected within the equipment, set-in-place in proper location as indicated on the drawings, leveled and fastened to the wall, ceiling or floor as required, left ready for final utility connections. The work shall include:

1. To prevent extended warehousing of all food service equipment, no pre-ordering of equipment is permitted; schedule ordering of the equipment so that warehousing of the equipment shall not be required for longer than 60 days prior to delivery to the site for installation.
2. All food service equipment shall have a manufacturer extended warranty covering parts and labor for a period of two years which shall take effect only after acceptance and beneficial use by the District. All labor shall be performed by a factory authorized and qualified representative.
3. A “complete and thorough” demonstration and start-up for each item of equipment must be conducted by a qualified manufacturer representative in the use, sanitation and maintenance of the equipment.

B. Furnishing scheduled items of custom fabricated food service equipment as specified utilizing a food service equipment fabricator listed with the National Sanitation Foundation (NSF) for custom equipment fabrication.

C. Delivery of food service equipment in factory fabricated containers designed to protect equipment and finish until final installation. Delivery of food service equipment shall be coordinated with the construction schedule. If necessary, delivery of the food service equipment shall be by means other than common carrier to expedite delivery and to maintain project schedule.

D. Warehousing of the food service equipment in a bonded warehouse and re-delivery of the food service equipment from the storage facility to the project site or arrangement for secured storage at the project site to assure availability of the food service equipment to maintain project schedule.

E. Field installation of the food service equipment including buy out equipment at the project site including on site receiving and unloading, uncrating from packing containers, conveyance of the food service equipment from the receiving area to the installation location, erection and assembly of the food service equipment including field welding and polishing of sub assemblies and installation of fixtures and components and setting in place in final location.

F. Removal and disposal of discontinued items of food service equipment not to be reused including costs for transport and scrapping. This shall include pump-down and reclaim of refrigerant and fire system propellant and disposal costs of all refrigeration systems as required. Utility disconnection and termination of utility services shall be provided by the Plumbing, Electrical and Mechanical (HVAC) Trades.

G. Removal and disposal of discontinued items of food service equipment not to be reused including costs for transport and scrapping. This shall include pump-down and reclaim of refrigerant and disposal costs of all refrigeration systems as required. Utility disconnection and termination of utility services shall be provided by the Plumbing, Electrical and Mechanical (HVAC) Trades.

H. Removal, cleaning, servicing, reassemble and reinstallation of items of food service equipment to be reused including warehousing and transportation costs for scheduled items of food service equipment to be refurbished off-site or to be temporarily stored off-site. This shall include pump-down and reclaim of refrigerant and disposal costs of all refrigeration systems as required. Utility disconnection and termination of discontinued services and modification or preparation or relocated utility services shall be provided by the Plumbing, Electrical and Mechanical (HVAC) Trades.

I. Removal, cleaning, servicing, crating and delivery including costs for transport of items of food service equipment to be reused in an alternate location. This shall include pump-down and reclaim of refrigerant and disposal costs of all refrigeration systems as required. Utility disconnection and termination of utility services shall be provided by the Plumbing, Electrical and Mechanical (HVAC) Trades.

J. Removal and disposal of all packing material.

K. All costs for special tools, crane rental or usage cost or rigging as may be required for delivery or installation of the food service equipment.

L. All work is to be performed by skilled labor utilizing the proper Trades having respective jurisdiction thereto. All work shall be performed at hours required to maintain consistent work schedules with all other Trades without additional cost.

M. Preparation of dimensioned utility rough-in floor plans coordinated with the Contract Documents and site conditions and the food service equipment manufacturers' utility connection points for all food service equipment.

N. Assist in the preparation of "chalk-line" mark-up of utility rough-in locations on the building floor at the job site.

O. Take complete financial responsibility for any and all additional expenses resulting from incomplete or inaccurate rough-in drawings or instructions for the final rough-in dimensioning at the job site.

P. Provide complete manufacturers' and fabricator shop drawings of all related items of food service equipment.

Q. Provide competent on site supervision for the coordination of work and to assist and supervise the erection, assembly and installation of the food service equipment, this shall include any moving, shifting or disassembly of the food service equipment to enable work to be performed free of obstruction.

R. Attend all job conferences and meetings.

S. Maintaining coordination and control over the form, fit, function and utility requirements of all food service equipment, from placement of purchase orders through Final Acceptance

T. Provide competent on-site final testing, demonstration and instruction in the use and service of all items of food service equipment in the form of a qualified manufacturer's representative for each item of food service equipment.

U. Providing access to the custom equipment fabricator's shop for inspection of construction and materials used at any time during the progress of fabrication.

V. Field verification of all measurements at the project site prior to the fabrication of custom fabricated and buy-out equipment and correct any deviation from the dimensions indicated on any plans and shop drawing which may affect the final form or fit of any item of food service equipment as a result of final building conditions and actual field dimensions.

W. All food service equipment shall conform to field verified dimensions and to the finished building conditions with edges scribed and sealed to wall surfaces, fitting to and around building obstructions. All joints, seams or surfaces shall be fully sealed with General Electric or equivalent clear silicone sealer.

X. Field verification of delivery access into and through the building to the final equipment location including access and clearance through hallways, doorways and elevators (cab size and weight restrictions); furnish food service equipment in sections or sub-assemblies as required for access.

Y. Keeping the premise free from accumulation of waste material and rubbish caused by his work. At the completion of each workday all waste material and rubbish must be removed and all areas swept broom clean.

Z. Physical damage to equipment, building or previous work completed or in the process of completion shall be repaired or replaced.

AA. Furnish as part of and affixed to the food service equipment, accessories, components and fixtures furnished standard with the equipment as specified or listed as an option and shall include the following:

1. PLUMBING ACCESSORIES: Pop-up, lever or basket type waste outlets, tailpieces, standing or connected overflows, faucets and spray units, vacuum breakers, shut-off and control valves and fittings.

2. STEAM AND GAS ACCESSORIES: Steam supply valves, thermostats, pressure reducing and regulating valves, shut-off and control valves, temperature and pressure gauges, copper steam coils or injector assemblies, traps and fittings
3. ELECTRICAL ACCESSORIES: Terminal blocks, conduit, wiring, signal and pilot lamps, on-off and control switches, control panels, magnetic contactor assemblies, heating elements, junction boxes, outlet boxes and receptacles and cord and plug sets.
4. REFRIGERATION ACCESSORIES: Copper insulated refrigeration tubing, valves, fittings, hangers, high and low pressure control switches, solenoid valves, evaporator coils, expansion valves, condensing units and condensate evaporators.

BB. All built-in accessories, components and fixtures shall be factory installed at the time of fabrication and shall comply with all applicable codes and regulations.

CC. Furnish and install copper insulated refrigeration lines from compressor location to evaporator coils and expansion valves for all refrigeration units and ice makers with remote or refrigeration systems other than self-contained.

DD. Furnish and install flexible stainless steel gas flue tubing from exhaust collar on gas hot water booster heater terminating at the exhaust vent connection at the vent extension or condensate hood.

EE. Furnish 14 gauge galvanized steel welded roof curbs for all refrigeration condensing unit stands and exhaust fans and supply fan make-up air units including setting-in-place and securing to the building roof.

FF. Furnish and install in exhaust hood, plenum, duct and surface fire protection system. Entire system shall be furnished and installed in compliance with UL Standard 1254, UL Standard 300, NFPA 96 and any prevailing statutes or codes including automatic shut-down of all cooking appliances per code section 44 of NFPA 17A-27. The manufacturer of the fire suppression system shall be ISO 9001 registered. The entire installation must conform to ADA (American Disabilities Act) latest edition. The system shall be an automatic fire suppression system using a wet chemical agent for grease related fires. The system shall be the pre-engineered type having minimum and maximum guidelines established by the manufacturer and listed by Underwriters Laboratories (UL). The system shall be installed and serviced by certified personnel trained by the manufacturer. Provide as part of fire system, mechanically operated gas supply line shut-off valve to interrupt gas supply to all gas operated cooking appliances. Gas valve shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

GG. Furnish and install remote and self-contained refrigeration system complete with Copeland condensing unit and insulated copper refrigeration lines charged with R404A refrigerant. Condensing unit shall be interconnected to a low profile, high velocity evaporator coil. Refrigeration system shall include all fittings, valves, switches, controls and all related components to comprise a complete operating unit of sufficient BTU capacity to maintain automatic operation of 35 degree F product temperature in coolers and -10 degree F product temperature in freezers. Refrigeration system provided with outdoor remote air cooled condensing unit shall be provided with winterized controls (low ambient package) including crankcase heater, line dryers and head pressure control unless specified as part of a pre-assembled refrigeration rack system. Refrigeration lines to be run within any slab or floor shall be either hard copper or soft copper if run within conduit.

HH. All electrical wiring, plumbing lines, gas lines (except exposed threaded pipe gas manifolds at cooking appliances), steam lines and refrigeration lines shall be concealed in the floor, walls or above the finished ceiling in an acceptable manner and in compliance with all applicable codes. Where it is impractical to run lines within the floor, walls or above the finished ceiling, lines shall be enclosed in a stainless steel (or alternate "smooth and cleanable" approved material) with appropriate access for service or replacement. In situations of an island arrangement or where equipment is not situated with access to a wall surface, lines must be installed in the floor in an approved manner including in-ground conduit for refrigeration and beverage lines. In no case shall any lines be "exposed".

II. Furnish materials and install all interconnecting wiring as required for the food service equipment, except for exhaust ventilation and fire suppression systems. This shall include inter-wiring of control panels furnished as a part of a fixture or appliance, on-off switches for light fixtures furnished as a part of a fixture or appliance, inter-wiring of control devices to motors furnished as a part of a fixture or appliance, time clock circuits for freezers from remote condensing unit to evaporator coil, heated pressure relief ports in walk-in freezer, electrical receptacles furnished as a part of a fixture or appliance, light fixtures in exhaust hoods and walk-in refrigeration to on-off switches and conduit junction boxes, ceiling mounted heat lamps to remote wall switch and inter-wiring of food waste disposer from control device to disposer motor as required to complete the installation of the food service equipment.

JJ. Furnish materials and install heat tracing tape to all condensate lines within walk-in freezer; insulate entire heat tracing tape with foam pipe insulation.

KK. Furnish materials and install all interconnecting plumbing as required for the food service equipment, except for exhaust ventilation and fire suppression systems. This shall include faucets, drains, drains with connected overflow, shut-off valves, vacuum breakers, flow or pressure control valves, gauges, bleeder tubes, piping from disposer control devise to disposer cone and disposer body inlets and piping for steam operated equipment from boiler take-off valve at steam generator to steam inlet connection at appliance as required to complete the installation of the food service equipment.

LL. Furnish materials and install insulated copper interconnecting piping between the dishmachine and the hot water booster heater, this shall include the installation of pressure and temperature gauges, strainer and shock absorber in the hot water supply line to the booster heater.

MM. Furnish materials and install insulated copper interconnecting piping between the dishmachine and the hot water booster heater, this shall include the installation of pressure and temperature gauges, strainer and shock absorber in the hot water supply line to the booster heater.

NN. Furnish and install water filter assemblies, sized and of the proper type to accommodate the water flow rate and "particulate" requirement of the food service equipment; this shall include all combi and bake ovens, steam cookers, proofing cabinets, ice makers, coffee brewing equipment and soda and beverage dispensing equipment.

OO. Furnish and install copper condensate lines in walk-in refrigeration from evaporator coil to waste receptor.

PP. Furnish and install gas supply shut-off valve at each gas manifold connection and furnish and install flexible gas hose connectors to each shut-off valve and to each cooking appliance.

QQ. Furnish materials and install interconnecting chrome plated exposed piping for hose reel and hose bibs including installation of check valves and vacuum breaker in supply line; this shall include chrome plated bleeder outlet if required by local health department regulations or local plumbing codes.

1.3 WORK BY THE ELECTRICAL TRADE

A. Rough-in utility connections including proper voltage, phase and amperage required to satisfactorily operate all items of food service equipment.

B. Final connection of the food service equipment from the rough-in location to the connection point on all food service equipment and necessary connection points.

C. All electrical components for the exhaust and supply ventilation system (including condensate hoods and pant leg vent systems) including, electrical disconnects, starters, exhaust fan on-off switch with indicator lights located in kitchen and supply fan controller with indicator lights located in kitchen and dishroom.

D. Furnishing and installation of all accessories, components and fixtures other than those specified as part of the food service equipment, to include but not be limited to, electrical circuit breakers or fuses, electrical receptacles, disconnect switches, on-off switches or other fittings and appurtenances that are required to connect the food service equipment in accordance with manufacturer's instructions and result in proper operation.

E. Utility disconnection and termination of discontinued services of existing food service equipment to be terminated.

F. Furnishing and installing electrical plug and cord sets where not furnished as part of the appliance.

G. Electrical contractors or shunt-trip circuit breakers to interrupt electrical power to all electrically operated food service cooking appliances.

H. In-floor, flush mounted, waterproof electrical receptacles of type and capacity to match plug and cord sets for all mobile food service counter equipment.

I. Ceiling mounted, retractable drop cords to accommodate food service equipment in an island arrangement, of the type and capacity to match plug and cord sets of the food service appliances.

J. Furnishing materials and installation of all interconnecting wiring as required for the food service exhaust ventilation and fire suppression systems; this shall include wiring of electrically operated gas supply shut-off valves for fire suppression systems, fire suppression system wiring to building fire alarm, heat detector electrical detection device to automatically start supply and exhaust fans and exhaust hood light fixtures to remote wall switch.

1.4 WORK BY THE PLUMBING TRADE

A. Rough-in utility connections including gas, steam, hot and cold water and floor receptors and drains in proper sizes, pressures and quantities required to satisfactorily operate all items of food service equipment.

B. Final connection of the food service equipment from the rough-in location to the connection point on all food service equipment and necessary outlets.

C. Furnishing and installation of all accessories, components and fixtures other than those specified as part of the food service equipment, to include but not be limited to stop cocks, traps, pipe, shut-off valves, pressure reducing valves or other fittings and appurtenances that are required to connect the food service equipment in accordance with manufacturer's instructions and result in proper operation.

D. Furnishing and installing chrome plated indirect waste outlet piping for food service equipment, from the waste outlet connection on the food service equipment to the building waste receptacle (floor sink, etc.).

E. Flushing and sanitizing of lines before making final connections to the food service equipment.

F. Grease interceptors for food service equipment in capacity and size as required by code.

G. Furnish and install exposed threaded gas manifold piping for all cooking appliances and welded in-wall gas manifold piping.

H. Install gas shut-off valve supplied as part of the fire suppression system in the gas supply line in an exposed and accessible location.

1.5 WORK BY THE MECHANICAL TRADE

A. Supply and exhaust ventilation for indoor refrigeration condensing units based on 750 cfm for each air cooled compressor horsepower and 250 cfm for each water cooled compressor horsepower.

B. Exhaust ventilation for condensate applications including fully welded 18 gauge stainless steel or 12 gauge aluminum liquid tight ductwork pitched toward source to prevent leaking, fan and start-sop switch with indicator lights located in the dishroom.

C. Exhaust hood exhaust ventilation system including roof top mounted "utility set" type up-blast centrifugal fan with backward incline wheel, adjustable sheaves, vibration mounts and bird screen at discharge end; fan shall be rated at 14 sones or less and shall be UL 710 listed; roof curb, exhaust ductwork constructed of a minimum 16 gauge galvanized steel or 18 gauge stainless steel, fully welded liquid tight with clean-outs at every major bend and in 20 foot intervals; ductwork shall not exceed a three to one aspect ratio, connection to exhaust fan shall include a UL listed and rated vibration eliminator and ductwork shall be insulated with all prevailing codes.

D. Exhaust hood supply ventilation system including roof top mounted UL listed supply fan with vibration mounts, adjustable sheaves, roof curb, bird screen at intake end, maintainable filtration

system, and gas or electric heated supply air heater (supply air heater heat incoming supply air below a 65 degree F ambient temperature) and 22 gauge galvanized steel ductwork.

E. Disconnection and termination of discontinued ductwork of existing exhaust or condensate hoods to be terminated or relocated, and modification or preparation of exhaust system for existing exhaust or condensate hoods to be relocated at the new location.

## 1.6 WORK BY THE CONSTRUCTION TRADE

A. Masonry bases, floor curbs, structural pads, floor depressions, roof curbs, flues and fireproof duct shafts or enclosures.

B. Conduit for beverage lines (PVC if embedded in concrete or smooth aluminum if exposed) with 24" radius sweep bends and 24" x 24" pull boxes every 100 lineal feet or three turns including sleeves any through walls, floors and ceilings.

C. Sleeves and openings through wall, floors and ceilings for passage of refrigeration lines.

D. Wall blocking or reinforcing to adequately support wall mounted food service equipment or fixtures; provide 3/4" thick exterior grade plywood backing for wood stud applications and 16 gauge steel backing for metal stud applications.

E. Stainless steel or FPR wall paneling behind all mop receptors, dishtables and pot / utensil washing sinks.

F. Installation of floor pans in floor depression with floor pans set flush and finished watertight around entire perimeter at juncture with floor surface.

G. Conduit for refrigeration lines (PVC if embedded in concrete or smooth aluminum if exposed) with 24" radius sweep bends including sleeves any through walls, floors and ceiling.

## 1.7 WORK BY THE ROOFING TRADE

A. Roof penetrations properly sealed and flashed to prevent water penetration.

## 1.8 BIDDING INSTRUCTIONS AND QUALIFICATION OF BIDDER

A. The primary items of food service equipment described in this specification are considered the basis of the bid. Only “equal” items listed as part of this specification will be considered and must meet the conditions of the base bid item; this shall include all materials and material finishes, fabrication methods, electrical, plumbing, and mechanical components, electrical control devices, hardware, accessories and options, exactly as specified without exception. It will be the full and complete responsibility of the Food Service Equipment Contractor to pay any and all costs incurred in adapting any other “equal” item to the mechanical, electrical, exhaust ventilation or structural systems of the building including any other cost increase incurred as a result of engineering changes to the mechanical, electrical, exhaust ventilation, architectural, structural or food service drawings. The contract is to be awarded as follows:

1. The competence and responsibility of the bidder.

2. An itemized cost breakdown of each scheduled item of food service equipment is required, as specified, in order that the District may, at his option, delete any item or supply any portion thereof, or increase the quantity of any item without affecting the cost quoted for the remaining items. "Pre-approved" substituted items must be submitted as an add or deduct alternate in addition to the base bid.
3. The District is not obligated to accept the lowest or any other bid. The award of the contract and choice of the food service equipment Contractor shall be at the District's discretion.

B. Each bidder shall be responsible to visit the project site of the proposed work and fully acquaint himself with conditions as they exist.

C. Each bidder is responsible to attend any pre-bid meeting as required by the District.

D. Each bidder shall be responsible to examine and review the contract document drawings and specifications. Should the bidder find during examination of the drawings and specifications any discrepancies, omissions, ambiguities, or conflicts in or among the contract documents or shall be in doubt as to their meaning, the District shall be notified no later than four working days prior to bid opening for clarification.

E. The failure or omission by any bidder to receive or examine any form, instrument or document or to visit the project site shall in no way relieve him from obligation with respect to his bid. No claims for any extras will be allowed due to unintentional errors, conflicts, or omissions in the contract documents drawings or specifications.

## 1.9 SUBMITTALS

A. Product Data: For each buy-out item of food service equipment indicated. Include manufacturer's model number and accessories and requirements for access and maintenance clearances, water and drainage, power or fuel and service connections including roughing-in dimensions

B. Shop Drawings: For food service equipment not manufactured as standard production and catalog items by manufacturers. Shop drawings shall include the following information:

1. Dimensioned rough-in plans scaled at 1/4"=1'-0" accurately locating connection points and indicating utility data for all mechanical, electrical and supply and exhaust ventilation requirements.
2. Dimensioned plans scaled at ½"=1'-0" accurately locating and indicating the finished size of masonry bases, floor depressions in structural slabs, stub walls, curbs and finished openings for pass-thru equipment.
3. Dimensioned plans scaled at 1/4"=1'-0" accurately locating conduit and pull boxes for beverage and refrigeration lines including floor, wall and ceiling penetrations and termination points.
4. Dimensioned plans and detailed drawings of all custom fabricated food service equipment scaled at 3/4"-1'-0" for plan and elevation views and 1-½"=1'-0" for sectional views.

C. Copies of original maintenance and repair manuals including a list of all authorized service agencies responsible for each item of food service equipment.

## 1.10 QUALITY ASSURANCE

A. Manufacturer's qualifications shall include a firm that has regularly engaged in the manufacturing of food service equipment of the same type, capacity, performance and size as specified and whose products have been in similar service for not less than five years.

B. Custom fabricator qualifications for custom food service equipment shall include a skilled sheet metal shop with a minimum of five years' experience in custom sheet metal food service equipment fabrication of similar type as specified. All custom food service equipment shall be fabricated at the same shop.

C. Installer's qualifications shall include a firm with at least three years of successful installation experience on projects with a similar scope to that as required for this project.

D. Food service equipment dealers' qualifications shall include a firm which is regularly engaged in the purchasing of food service equipment as is a manufacturer authorized agent of the specified equipment for not less than five years. The dealer shall also employ a full time project management staff to oversee the purchase of the equipment in compliance with the specifications, coordinate the form and fit of the equipment to the project site conditions, attend all project meetings, coordinate shop drawing review, coordinate installation with the Trades, coordinate factory training and address all issues as they relate to the satisfactory completion of the facility in compliance with the specifications and related documentation.

E. Codes and Standards: All food service equipment furnished and installed under this specification shall be manufactured in strict compliance with the following publications or the current or revised related publication as well as all state, national and local codes and agencies having jurisdiction over same:

1. National Electrical Manufacturer Association NEMA
    a. ICS-77 Industrial Controls and Systems
2. National Electrical Manufacturer Association NEMA
    a. ICS-77 Industrial Controls and Systems
    b. 17.4 Local Application System
    c. 17.13 Water Sprinkler Systems
    d. 96-76 Installation of Equipment for the Removal of Smoke and Grease Laden Vapors for Commercial Cooking Equipment
3. National Sanitation Foundation NSF
    a. 11 76 Food Service Equipment
    b. 4 73 Commercial Cooking and Warming Equipment
    c. C-2-72 Special Equipment and/or Devices
4. National Electrical Manufacturer Association NEMA
    a. 57-78 Electric Lighting Fixtures
    b. 197-78 Commercial Electric Cooking Appliances
    c. 300 Fire Extinguishing Systems

F. All food service equipment shall be manufactured in strict compliance with standards as set forth by the National Sanitation Foundation (NSF) including fabrication of custom built

equipment and shall be listed with same and shall bear their seal. Any item of food service equipment lacking the NSF seal will be rejected.

G. All electrically operated food service equipment shall be constructed in strict compliance with standards as set forth by the Underwriters Laboratories (UL) and shall utilize approved components and assemblies and shall bear the label thereof.

H. Custom fabricated food service equipment shall be constructed to the standards as set forth by the National Association of Food Equipment Manufacturers (NAFEM).

I. All refrigeration equipment and all pressurized vessels shall be constructed, approved, inspected, registered and stamped and installed in strict compliance with the American Society of Mechanical Engineers (ASME), state and local codes for Unfired Pressure Vessels and all other agencies having jurisdiction thereof.

J. All gas operated food service equipment shall be fabricated in strict compliance with standards as set forth by the Underwriter Laboratory (UL) and shall be listed with same and shall bear their seal.

K. Steam operated equipment shall be fabricated and installed in accordance with Pennsylvania Department of Labor and Industry standards.

L. Product Options: Drawings indicate food service equipment based on the specific products indicated. Other manufacturers' equipment with equivalent size and performance characteristics may be considered.

M. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Review methods and procedures related to food service equipment including, but not limited to the following:

1. Review access requirements for equipment delivery.
2. Review equipment storage and security requirements.
3. Inspect and discuss condition of substrate and other preparatory work performed by other Trades.
4. Review structural loading limitations.
5. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.

## 1.11 DELIVERY, STORAGE AND HANDLING

A. Deliver food service equipment as factory-assembled units with protective crating and covering.

B. Store food service equipment in original protective crating and covering and in a dry location.

## 1.12 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of food service equipment installation areas by field measurements before equipment fabrication and indicate measurements on Shop Drawings and

Coordination Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.13 COORDINATION

A. Coordinate equipment layout and installation with other work including light fixtures, HVAC equipment and fire-suppression system components.

B. Coordinate location and requirements of service-utility connections.

C. Coordinate size, location and requirements of concrete bases, positive slopes to drains, floor depressions and insulated floors. Concrete, reinforcement and formwork requirements are specified in Division 3 Section “Cast-in-Place Concrete”.

D. Coordinate installation of roof curbs, equipment supports and roof penetrations, as specified in Division 7 Section “Roof Accessories”.

1.14 WARRANTIES

A. General Warranty: The special warranty specified in this Article shall not deprive the District of other rights the District may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. All buy-out food service equipment herein specified shall have all parts and labor warranted in writing, from the date of Final Acceptance by the District against defective parts, materials, workmanship and design for a period of time as stated within the manufacturers standard published warranty, but no less than two years.

C. All custom fabricated food service equipment shall be warranted as stated above except for a period of two years.

D. Refrigeration equipment shall include start-up and two year parts and labor warranty on the entire refrigeration system and manufacturers five year parts warranty on hermetic scroll and semi-hermetic sealed compressors.

E. Existing equipment refurbished for reuse shall be warranted in writing, against defective parts, materials and labor as stated above but for a period of 90 days.

**PART 2 - PRODUCTS**

2.1 MATERIALS AND WORKMANSHIP

A. Stainless steel shall be type 302 or type 304 extra low carbon non-magnetic austenitic 18% chrome, 8% nickel alloy steel. Gauges shall be U.S. Standard of Thickness set forth below:

| GAUGE | THICKNESS | GAUGE | THICKNESS |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 10 | .1346 | 16 | .0598 |
| 11 | .1196 | 18 | .0478 |
| 12 | .1046 | 20 | .0359 |
| 14 | .0747 | 22 | .0299 |

B. All sheets shall be of maximum length to permit fabrication from one sheet. All thickness must meet the above gauge thickness within tolerances set forth by the ANSI after polishing. Finished sheets exceeding these tolerances shall be rejected as not meeting this Specification.

C. Galvanealled steel shall be ARMCO steel or an approved grade of copper bearing steel shall be properly primed, degreased and finished with two coats of synthetic aluminum bronze.

D. Structural steel members used for framing, consisting of angles, bands, bars and channels shall be ductile in quality, free of hard spots, runs, checks, cracks and other surface defects and shall be smooth galvanized by the hot dip process with all surplus removed, free of runs, blisters, excess splatter and uncoated spots or patches.

E. White metal shall consist of corrosion resistant metal containing not less than 21% nickel. All castings shall be rough ground, polished and buffed to a bright luster and shall be free from pit marks, runs, checks, burrs and other imperfections.

F. Stainless steel pipe and tubing shall be seamless or welded of gauge specified and of true roundness. Seamless tubing shall be thoroughly and correctly annealed and ground smooth. Welded tubing shall be thoroughly heat treated and properly quenched to eliminate carbide precipitation, drawn true to size and roundness and polished to match stainless steel sheets.

G. Welding shall be of the electric submerged or concealed arc type, heliarc wherever practical. Where welding rods are required they shall be of the same composition as materials to be joined coated with a non-carbonaceous flux.

H. Plastic Laminate: Complying with NEMA LD 3 and NSF 35 requirements; NSF certified for end-use application indicated; 0.050 inch (1.27 mm) thick, smooth texture and easily cleanable.

1. Color: As selected by Architect from manufacturer’s full range of colors.

I. Plywood and Lumber: Close grain exterior grade mahogany or birch plywood.

J. Sealant: ASTM C 920; Type S, Grade NS, Class 25, Use NT. Provide elastomeric sealant NSF certified for end-use application indicated. Provide sealant that when cured and washed meets requirements of Food and Drug Administration’s 21 CFR, Section 177.2600 for use in areas that come in contact with food.

1. Color: As selected by Architect from manufacturer’s full range of colors.
2. Backer Rod: Closed-cell polyethylene in diameter larger than joint width.

K. Plastic: Except for plastic laminate, provide plastic materials and components complying with NSF 51.

L. Sound Dampening: NSF-certified, non-absorbent, hard drying, sound-deadening coating. Provide coating compounded for permanent adhesion to metal in 1/8-inch (3-mm) thickness that does not chip, flake or blister.

M. Gaskets: NSF certified for end-use application indicated; of resilient rubber, neoprene or PVC that is nontoxic, stable, odorless, nonabsorbent and unaffected by exposure to foods and cleaning compounds.

## 2.2 ACCESSORIES

A. Cabinet Hardware: Provide NSF-certified stainless steel hardware for equipment items as indicated.

B. Casters: NSF-certified standard-duty stainless-steel swivel stem casters with 5-inch (125-mm) diameter wheels, polyurethane tires with 1-inch (25-mm) tread width and 300-lb (90-kg) load capacity per caster. Provide brakes on 2 casters per unit.

## 2.3 FABRICATION, GENERAL

A. All welds shall be strong and ductile, nonporous, free of pits and cracks. Parts which are to be welded shall be homogeneous, of a like color and finish to adjoining material. Excess metal and carbide precipitation shall be ground off, finished smooth and polished. Unexposed welds shall be pacified to prevent attrition. Brazed or soldered joints are unacceptable. Where galvanizing has been damaged due to the welding or grinding process, these areas shall be galvawelded to replace finish

B. All exposed surfaces of the food service equipment shall be free from bolts, screws and rivet fastenings. Wherever bolts are required they shall be of similar composition and finish as the metal to which they are applied.

C. Wherever practical all food service equipment and fixtures shall be factory or shop fabricated of one-piece construction, shipped to the project site as one unit completely assembled.

D. Items of food service equipment or fixtures too large to enter or transverse the building to the installation location in one assembly shall be constructed in sections and shall be furnished with field joints. Where field joints are necessary, all adjoining exposed surfaces shall be field welded at the project site as specified above for welding. Where conditions make welded field joints impractical, each sub-assembly shall be fabricated with off-set draw angles welded to the underside of each adjoining top surface and drawn together to a “hairline” seam with 1/4"-20 stainless steel bolts with lock washers and chrome plated acorn nuts. Bolted field joints will be permitted only where specifically shown on Drawings or specified for a particular item.

E. Wherever shear edges occur they shall be free of burrs, fins or irregular projections and shall be finished to prevent cutting or laceration when the hand is drawn over such shear edges. Brake bends shall be free of undue and where such bends do mar the uniform surface appearance of

the material, such marks shall be removed by suitable grinding, polishing and finishing. In no case where miters or bullnose corners occur is overlapping materials acceptable.

## 2.4 GENERAL FRABRICATION STANDARDS

### A. TOPS:

1. Tops shall be fabricated of 14 gauge stainless steel unless otherwise specified. All edges shall be bullnose or formed as specified with all joints butt-edged and electrically welded, ground smooth and polished so no evidence of welding will appear. Soldered corners to achieve round corner construction will not be accepted.
2. Tops adjacent to walls, columns or other equipment shall be turned up integrally into a backsplash as specified. All interior corners shall be coved on a ¾" radius, both horizontally and vertically, forming spherical corners. Ends of backsplashes shall be fully enclosed to the low point of the top edge, fully welded, ground smooth and polished.

### B. SUPPORT FRAMING

1. Around the entire perimeter on the underside of all tops and set back 1" from the down-turned edge shall be a fully welded frame assembly fabricated of 1-1/2" x 1-1/2" x 1/8" stainless steel angle iron or material as specified. Provide intermediate cross bracing fabricated of the same material as the angle framing and fully weld to perimeter frame on centers not to exceed 24". Tack weld the entire frame assembly to the underside of the top surface.
2. Open base tables shall be provided with leg mounting channels for weld anchoring leg gussets and shall be fabricated of 1" x 4" x 1" 12 gauge stainless steel or material as specified fully welded at each end of frame and at intervals not to exceed 6'-0".
3. Cabinet base tables and counters shall be provided with triangular corner gusset plates for weld anchoring counter type legs and shall be fabricated of 12 gauge stainless steel fully welded at each corner of table or counter body and at intervals not to exceed 6'-0".
4. Freestanding sinks and Bain Maries shall be provided with triangular corner gusset plates for weld anchoring leg gussets and shall be fabricated of 12 gauge stainless steel, fully welded at each corner of sink or Bain Marie bottom and at intervals not to exceed 6'-0".

### C. LEGS AND ADJUSTABLE BULLET FEET

1. Legs shall be constructed of 1-5/8" diameter 16 gauge stainless steel tubing. Each leg shall be swaged and tapered at the bottom. Fasten each leg to a 3-1/2" high conical shaped die-formed stainless steel gusset equivalent to Component Hardware A20-0206. Provide each leg with stainless steel adjustable foot insert equivalent to Component Hardware A10-0852.
2. Cabinet base tables and counters shall be provided with 6" high conical shaped die-formed stainless steel equipment leg with stainless steel adjustable round foot insert equivalent to Component Hardware A72-0811.

### D. CROSSRAILS

1. Provide all open base tables and freestanding sinks and bain Maries with 1-1/4" diameter 16 gauge stainless steel tubular cross railing running between legs at a point 10" above

the finished floor. Cross railing shall be continuously welded to legs, filleted, ground smooth and polished to provide a smooth coved radius with leg surface.

2. Where cross railing abuts cabinet base fixtures, cross railing shall be concealed bolt anchored to same utilizing stainless steel hardware.

E. UNDERSHELVES

1. Provide solid fixed undershelf, constructed of 16 gauge stainless steel. Front edge shall be turned down 1" at 90 degrees and returned ½" at 45 degrees. Rear and ends shall be turned up 2" high on a 90 degree angle, interior corners coved on ¾" radius.

F. DRAWERS

1. Provide drawer pan constructed of 14 gauge stainless steel with inside corners coved on a 3/4" radius. Drawer front face shall be double pan type constructed of 16 gauge stainless steel with inner pan set into outer pan and welded in place. Drawer front shall be set into and shall be removable from a 14 gauge stainless steel, channel shaped drawer cradle. Drawer suspension slides shall be secured to drawer frame assembly and shall be Component Hardware S52 series full extension type with 14 gauge stainless steel slides with stainless steel ball bearing wheels having a load capacity of 200 pounds. Provide hard rubber bumper drawer stops. Drawer suspension guides shall be fastened to 18 gauge stainless steel housing which is suspended from the angle framing under the table top. Provide drawer fronts with full grip recessed stainless steel flush pull handles.
2. Stainless steel drawer enclosure cabinet with quantity of drawers as specified with cabinet body fabricated of 18 gauge stainless steel, wrap around construction. The backs of front stiles shall be closed with tight fitting channel sections of 18 gauge stainless steel, welded in place, and closed on top and bottom. Drawer suspension slides shall be secured to drawer frame assembly and shall be Component Hardware S52 series full extension type with 14 gauge stainless steel slides with stainless steel ball bearing wheels having a load capacity of 200 pounds. Provide hard rubber bumper drawer stops. Provide drawer fronts with full grip recessed stainless steel flush pull handles.

G. CABINET BASES

1. Cabinet body shall be fabricated of 18 gauge stainless steel wrap around construction. The backs of front stiles shall be closed with tight fitting channel sections of 18 gauge stainless steel, welded in place and closed on top and bottom.
2. Cabinet base shelves shall be fixed bottom and intermediate fabricated of 18 gauge stainless steel. Front edge shall be turned down 1 1/2" at 90 degrees, returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" at 90 degrees with interior corners coved on a ¾" radius. Shelf shall be weld anchored to cabinet body. Bottom shelf shall be fabricated flush with front mullions with fully welded facing junctures presenting seamless construction. Fixed intermediate shelves shall be designed similar to bottom shelf except front edge shall be set behind vertical mullions and fully welded thereto.

H. SLIDING DOORS

1. Sliding doors shall be double pan type constructed of 16 gauge stainless steel with inner pan set into outer pan and welded in place. Doors shall have welded internally 1" x 4" x 1" 14 gauge stainless steel hat type reinforcing channels. Doors shall be fitted with full grip, recessed type stainless steel flush pull handles. Provide 16 gauge stainless steel

angle door stops welded to door. Provide hard rubber door stops. Provide each door with two, 1 3/8" diameter stainless steel ball bearing sheaves fastened to 1" x 1/8" thick stainless steel bar stock hangers welded to top corners of each door for suspending on overhead door channel track. Provide hangers with stainless steel removable locks to prevent doors from jumping track during operation while permitting ease of removal. Fabricate overhead track of 14 gauge stainless steel and weld to cabinet body. Provide bottom of doors with nylon door guides secured to bottom shelf. Guides shall not interfere with door removal.

I. HINGED DOORS

1. Hinged doors shall be double pan type constructed of 16 gauge stainless steel with inner pan set into outer pan and welded in place. Hinges shall be stainless steel cam action pin type fastened by means of counter sunk flat head stainless steel screws staggered on centers and tapped into 1/4" thick stainless steel bar stock welded behind door jamb. Doors shall be removable from hinges without the use of tools. Doors shall be held closed by permanent magnet closure devices. Doors shall be fitted with a full grip recessed type stainless steel flush pull handles. Provide hard rubber door stop bumpers.

J. SINKS

1. Sinks shall be fabricated of 14 gauge stainless steel with all interior corners coved on a ¾” radius both horizontally and vertically forming spherical corners.
2. Exposed edges of sink shall be finished with a 1 ½" diameter 180 degree rolled edge, rear and sides adjacent to adjoining surfaces shall have a backsplash turned up 10" high at a 90 degree angle on a ¾” radius and turned back 2 ½" on a 45 degree angle, then down ½" at 90 degrees along back.
3. Multiple sink compartments shall be divided with double wall 14 gauge stainless steel partitions 1" wide rounded on top and all corners at a ¾” radius. Finish bottom, back and front with 14 gauge stainless steel to form one continuous sink with no overlapping joints or open spaces between sink compartments.
4. Integral drainboards shall be constructed of 14 gauge stainless steel. The front portion shall continue the 1 ½" diameter 180 degree rolled rim of the sink bowl on a continuous level horizontal plane. The surface of the drainboard shall be pitched from 2 ½" at the end away from the sink to 3" at the sink bowl. Sink and drainboard backsplash shall be continuous and level on the horizontal plane. All interior corners both vertical and horizontal shall be coved on a ¾” radius. Drainboards shall be reinforced with 1" x 4" x 1", 12 gauge stainless steel “hat” channels extending front to rear tack welded to underside of drainboard for weld anchoring leg gussets.
5. Provide crossrails extending front to rear between legs, crossrails shall not extend along rear at sink to prevent interference with plumbing.
6. Built-in sink compartments shall be fabricated as an integral part of fixture with sink fully welded with adjacent top, weld ground smooth and polished.

K. MILLWORK

1. Millwork fabricator shop shall be a certified participant in AWI’s Quality Certification Program (QCP) to standard “Premium” construction.
2. Tops shall be fabricated of 3/4" thick 5-7 ply BW marine grade plywood build up to a 1 ½” thickness. All plastic laminate finished edges shall be applied prior to the surface

laminate. Provide cross bracing around entire perimeter below tops and above all interior dividers to minimize deflection from equipment. Tops shall be fabricated in sections as large as possible to minimize field seams. Field seams shall be assembled utilizing TB-2 yellow glue. The bottom surfaces of all tops must be sealed with gray cabinet liner to comply with Board of Health requirements. Cut-outs for drop-in equipment shall be cut in the shop and with all edges sealed. All drop-in equipment shall be pre-fitted in top prior to delivery to the job site. All drop-in equipment shall be sealed with General Electric or equivalent clear silicon sealer after installation. Hardwood edges shall be applied prior to surface laminate. All hardwood to match for color and grain. Edges to be chamfered and finished as specified. Solid surface tops shall receive full plywood substrate with 3/4" x 3" batons for proper air space. All tops shall be prepared for installation of sneeze guards including additional blocking and / or cutouts.

3. All cabinet base and interiors shall be fabricated of 3/4" thick 5-7 ply marine grade plywood with high-pressure laminate finish. Recessed toe base shall be 6" high fabricated of 3/4" thick 5-7 ply marine grade plywood with 16 gauge stainless steel finish. Shelf pilasters to be recessed type 250WH with 253WH locking clips. Cabinet backs shall be fabricated of 1/4" thick MELA-MDF board. Cabinet ends to be dadoed for back and bottom and notched to receive aprons and kicks. Butt or dowel construction will not be acceptable. Cabinets shall be assembled with TB-2 yellow glue with screws and staples. Cabinets with finished backs shall be fabricated of 3/4" thick 5-7 marine grade plywood with high-pressure laminate finish. Cabinets over 48" in length shall have interior dividers. Dividers shall be dadoed into the bottom and notched for aprons. Dividers shall be notched as required for equipment. Aprons shall be large enough to conceal drop-in equipment and also to house control panels. Cabinet bases shall be fabricated in sections as large as possible to minimize field seams.
4. Doors shall be fabricated of 3/4" thick MDF board with high-pressure laminate finish and shall be furnished with three BLUM 75M5580 or 75M5680 European style concealed hinges. Door pulls shall be Hafele 116.39.437. Locks where required shall be cam style, keyed alike. Doors shall not exceed 27" in width and shall be of equal size.
5. Drawers shall be constructed of 3/8" thick birchwood with dove tail joinery. Drawer slides shall be Accuride 150 lb. full extension type with stainless steel ball bearing hardware.
6. Applied wood fascia panels and doors shall be stile and rail design. Panels to be recessed or raised as specified. All wood to be select for color and grain. Finish shall match stock color samples or custom to match furnished sample. All panels and doors to be equally sized per cabinet. Provide full wood louvered panels as required for equipment requiring air circulation. Finish all wood with stain followed by single coat of sealer. After sealer, apply one layer of Armourcote conversion varnish approved for use in food service with 55% gloss.

L. SOLID AND HARD SURFACE MATERIAL ("CORIAN" / "ZODIAK")

1. Provide counter top, tray slide, etc. of approved solid surface material. Material shall be fabricated and assembled per manufacturers approved methods utilizing a factory authorized and certified fabricator and installer. The edges of the top shall be formed as indicated on the food service and architectural detail drawings, routed and finished as directed. Openings shall have radius corners and shall be reinforced with additional material. Where drop-in appliances are to set on tops, the fixture shall be furnished with a ¾" thick marine grade plywood sub-top fabricated with a perimeter frame extending through the opening in the top preventing the appliance from setting directly on the solid surface material and allowing the sub-top to distribute the weight of the appliance.

Where heated appliances are to set on the top the sub-top is to be fabricated as above to prevent heat from being in direct contact with the solid surface top; additional fiberboard insulation material is to be provided where transfer of radiated heat will contact any solid surface material

M. PAINTING

1. Galvanized steel shall be cleaned and degreased with mineral spirits, primed with a minimum of two coats of primer and spray finished with a minimum of two coats of gray epoxy enamel paint

N. LAMINATED PLASTIC

1. All exposed surfaces shall be faced with 1/16" thick high pressure plastic laminate in color and pattern as specified.
2. All unexposed surfaces shall be faced with .020 or .030 gray thermoset decorative overlay.
3. Where the plastic laminate is to be bonded to removable or fixed panels the panels shall be fabricated of 3/4" thick close grain marine grade mahogany or birch plywood with surfaces bonded with waterproof glue.
4. Where the plastic laminate is to be bonded directly to the metal facing of a cabinet base table or counter, surfaces shall be bonded with contact adhesive.

O. CLOSURE TRIM

1. Provide closure trim pieces fabricated of 16 gauge stainless steel or of material and finish as specified, trim shall be one piece constructions furnished to seal both horizontal and vertical junctures and openings

2.5 STAINLESS STEEL FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal products" for recommendations relative to applying and designating finishes.

1. Remove or blend tool and die marks and stretch lines into finish.
2. Grind and polish surfaces to produce uniform directional textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

B. Concealed Surfaces: Minimum of 80 grit finish.

C. Exposed Surfaces: No. 4 finish (bright, directional polish) of 180 grit.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

E. Protect mechanical finishes on exposed surfaces from damage by applying a strippable temporary protective covering before shipment.

## 2.6 STANDARDS FOR EXISTING EQUIPMENT

A. The food service equipment contractor shall examine each item of food service equipment specified as existing to be reused prior to his submission of his bid to ascertain proper fit and alignment in its proposed location, inspect for any physical damage and to determine the present operational performance and condition of each item or any component thereof and submit to the Owner as part of his bid the extent of repairs or replacement parts, required to recondition the entire unit for satisfactory operation.

B. The food service equipment contractor shall disassemble each existing item to be reused, clean, service and recondition including any transport for reconditioning if required at any service agency or shop, redeliver or relocate at the project site to the new location, set-in-place, align and secure in its new location and assemble any fixtures, components and sub-assemblies, left ready for final utility connections by the Trades.

1. Cleaning of the food service equipment shall include a thorough scrapping and steam cleaning to remove scale and all foreign material.
2. Repainting of all fabricated and buy-out items having worn or scarred exposed surfaces that are not stainless steel materials. Repainting shall be a minimum of two coats of original paint or touched-up as required.
3. Repair any damage incurred during relocation or transit such as dents, cracks or broken welds.
4. Replacement of door gaskets and seals and realignment for proper operation.
5. Replace non-functioning condensate evaporators in refrigerators.
6. Replacement of broken door hinges, drawer slide assemblies, door and drawer handles, door pans or lock assemblies.
7. Servicing and cleaning of all condensing units, (vacuum and comb), evaporator coils, expansion valves, etc. setting and adjusting of all temperature controls to maintain normal operating temperature and charging of the refrigeration system with proper refrigerant. Refrigeration systems to be re-used shall be recharged with proper refrigerant or converted to an acceptable code compliant refrigerant.
8. Replace or repair all plumbing components as required including faucets and waste outlets with fixtures of similar type and manufacturer.
9. Pump-down of all refrigeration systems to be discontinued or relocated and re-claiming and disposal of all refrigerant and toxic materials as necessary.

C. The following work shall be included as part of this contract on specified items or as required by the Owner or as determined or recommended as necessary during the site inspection.

1. Repair or replacement of all materials or parts to correct any gas, steam or electrically operated cooking appliance including power generation devices such as boilers and related mechanical and electrical heating and control components and devices.
2. Remove, sharpen and reinstall all cutting blades on all cutting machinery including slicers, food cutters and food choppers.
3. Recondition and lubricate electric motors and transmission devices, replacing worn or damaged gears, drive belts, etc. and repacking or replacing oil with proper type as recommended by the manufacturer.
4. Inspecting, cleaning and upgrading of exhaust ventilation systems including fire protection systems and components. Exhaust hood shall be steam cleaned and chemically treated to remove all traces of grease and foreign material, painted exhaust hoods shall be primed and repainted with a minimum of two coats of primer and fire resistant paint,

filters shall be replaced with grease extractor type filters to match design air volume requirements and fusible links shall be replaced with proper heat values. Fire system shall be inspected and recharged to full operational condition. Fire system nozzles and related piping and fittings shall be relocated and reworked to accommodate the new equipment arrangement with nozzle heads replaced as required. All ductwork shall be inspected to assure compliance with present codes and statutes with all ductwork thoroughly cleaned. Air movement shall be measured for proper air quantities and velocities and conditions corrected to meet proper requirements. All conditions of the existing exhaust ventilation and fire protection system shall be in compliance with all current prevailing codes, statutes and NFPA requirements.

D. All nameplates are to be left completely legible.

E. Existing equipment to be reused shall have all utilities disconnected, terminated, or capped-off by the Plumbing, Electrical and Mechanical (HVAC) Trades.

F. Plumbing, Electrical and Mechanical (HVAC) Trades shall provide all mechanical, electrical and HVAC services as required and provide final connection to same at the new site location.

G. Final determination and verification of Plumbing, Electrical and Mechanical (HVAC) requirements for all existing food service equipment to be reused is the responsibility of the Mechanical and Electrical Engineer. Provisions for relocated utility requirements shall conform to current codes and statutes.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine areas and conditions with Installer for compliance with requirements for installation tolerances, service-utility connections and other conditions affecting installation and performance of food service equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Examine roughing-in for piping, mechanical and electrical systems to verify actual locations of connections before installation

### 3.2 INSTALLATION

A. Set each item of fixed food service equipment securely in place, level and adjust to correct height. Anchor to supporting surface where required for sustained operation and use without shifting or dislocation. Provide concealed anchoring where possible. Adjust work surfaces to a level tolerance of 1/16" maximum offset and slope drainage surfaces at 1/16" per foot.

B. Complete field assembly of field joints by welding or bolting utilizing the method as indicated with the fixture. Grind all field welds smooth and polish. Set and trim all gaskets to be installed as part of field assembly.

C. Treat enclosed spaces that are inaccessible after food service equipment installation by covering all horizontal surfaces with powdered borax at a rate of 4 ounces per square foot.

D. Provide closure trim pieces fabricated of 16 gauge stainless steel or of material and finish as specified, trim shall be one piece construction furnished to seal both horizontal and vertical junctures and openings where the conditions given below occur:

1. Food service equipment is installed into wall openings. Trim shall apply to both sides of wall opening with all corners fully welded, ground smooth and polished.
2. Two or more items of food service equipment are butted together.
3. Food service equipment is installed against wall, columns other equipment resulting in a gap or juncture exceeding 1/4" in width.
4. An open gap of any size between the juncture or joint between adjoining items of food service equipment, wall or column surfaces which might result in the penetration or collection of grease or vermin.

E. Provide cut-outs and openings in food service equipment as required to extend plumbing, electric, steam or gas lines through the food service equipment either for interconnection of utility lines or final connection.

F. Seal around each item of food service equipment with sealant for gaps or spaces less than 1/4" in width and with stainless steel trim for gaps or spaces exceeding 1/4" in width. Closure strips shall conform to the shape and size of the surfaces or juncture to be sealed and shall be neatly scribed for a tight fit.

## 3.3 PROTECTION AND CLEANING

A. Provide final protection and maintain conditions in a manner acceptable to District, Manufacturer and Installer that ensure food service equipment is without damage or deterioration at the time of Substantial Completion.

B. After completion of the food service equipment installation and completion of other major work in the food service area remove protective coverings and clean and sanitize all food service equipment both internally and externally. Restore exposed and semi-exposed finished to remove abrasions or other surface damage, polish exposed metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.

## 3.4 COMMISIONING

A. Delay start-up of the food service equipment until utility services have been installed, completed and tested, balanced and adjusted for pressure and voltage, and until water and steam lines have been treated and cleaned for sanitation. Before start-up of the food service equipment lubricate in accordance with manufacturer’s instructions.

1. Coordinate food service equipment startup with service-utility testing, balancing and adjustments. Do not operate steam lines before they have been cleaned and sanitized.

B. Provide on-site demonstration and formal technical training by the manufacturer's technical representative for each item of food service equipment as required to instruct the District and its personnel in the safe operation and sanitation and maintenance of the food service equipment.

C. Test each item of food service equipment for proper operation.

1. Repair or replace equipment that is defective in operation including units that operate below required capacity or that operate with excessive noise or vibration.
2. Test refrigeration equipment's ability to maintain specified operating temperature under heavy-use conditions. Repair or replace equipment that does not maintain specified operating temperature.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
4. Test motors and rotating equipment for proper rotation and lubricate moving parts according to manufacturer's written instructions.
5. Test water, drain, gas, steam, oil, refrigerant and liquid-carrying components for leaks. Repair or replace leaking components.
6. Train District's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing and preventive maintenance for each food service equipment item.
7. Review data in the operation and maintenance manuals. Refer to Division 1 Section "Contract Closeout".
8. Review data in the operation and maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data".
9. Schedule training with District through Construction Manager with at least seven days advance notice.

## 3.5 SCHEDULE OF EQUIPMENT

A. Equipment Schedule: Refer to all Contract Documents pertaining to the food service areas. Equipment itemized along with brands and model numbers and salient features establish the standard for construction, operation and engineering criteria.

B. Equipment indicated below is intended to establish the standard of quality of the food service equipment. Alternate "Equal" products by other manufacturers may be considered if equivalent in design, performance, durability and function.

C. This document is the intellectual property of Corsi Associates and as such use by any other entity is prohibited.

| | |
|---|---|
| ITEM #01 | WALK-IN COOLER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | Size and shape as per plan |
| Construction: | Furnish and erect, compartment, sectional, urethane insulated walk-in cooler assembly. |

Walk-in assembly shall bear the UL label and NSF and Factory Mutual seals and shall meet 2009 Federal Regulations.

Ceiling and wall panels shall be constructed of 4" thick urethane insulation, assembly to be accomplished by the use of integral cam type locking device, secured in place during the foaming process. Seams between panels shall be insulated with vinyl foamed in place gasket material.

Ceiling and wall panels shall be finished of 18 gauge embossed aluminum on interior and exterior surfaces.

Walk-in assembly shall be provided with 1/8" thick aluminum diamond tread plate floor with NSF approved coved corners, insulated with 4" thick urethane insulation and reinforced with ¾" thick 5-7 ply marine grade plywood underlayment. Floor installation shall be in accordance with manufacturer's recommended practice and shall sit in a depression. Building floor finish shall be flush and smooth to allow a level installation.

Construction Trade shall furnish and install floor depression and finished floor within walk-in assembly. Pitch floor within walk-in towards entrance door at 1/8" per foot minimum.

Walk-in assembly shall be furnished with in-fitting type door and frame assemblies constructed of 16 gauge stainless steel provided with three self-closing cam action chrome plated hinge assemblies, handles and hardware.

Provide door with 2" dial type flush mount thermometer with chrome plated bezel mounted in door frame.

Provide door with triple pane observation and 36" high 3/16" thick aluminum diamond tread kick plate on both interior and exterior side.

Provide door with UL listed, vapor proof LED light fixture complete with toggle switch and pilot light and full perimeter frame condensation heater.

Provide a total of four (4) U.L. listed, vapor proof LED ceiling mounted light fixture complete with stainless steel mounting hardware.

Foodservice Equipment Contractor shall install ceiling mounted light fixtures and furnish materials and inter-wire light fixtures and switch.

Furnish and install 18 gauge embossed aluminum vertical trim angles and ceiling closure panels.

Furnish and install entire refrigeration system complete with Copeland semi-hermetic condensing units and insulated copper refrigeration lines charged with R404A refrigerant. Each condensing unit shall be interconnected to a low profile, high velocity evaporator coil in each walk-in compartment. Refrigeration system shall include all fittings, valves, switches, controls and all related components to comprise a complete operating unit of sufficient BTU capacity to maintain automatic operation of 35 degree F product temperature in cooler.

Refrigeration system shall be provided with outdoor remote air cooled condensing units with each condensing unit to be located on the building roof.

Condensing units shall be provided with winterized controls (low ambient package), including crankcase heater, line dryer, head pressure control and galvanized steel stand with stainless steel weather hood.

Provide all hangers and brackets as required to install refrigeration lines.

Construction Trade shall furnish all sleeves and openings through walls, ceiling and floor for passage of refrigeration lines. Furnish galvanized steel stand.

Mechanical (HVAC) Trade shall provide exhaust ventilation for indoor condensing units based on 750 CFM exhaust for compressor horsepower for air cooled condensing units.

Foodservice Equipment Contractor shall furnish and install copper tubing and extend evaporator coil condensate line to floor receptacle.

Set and adjust all temperature and defrost cycles.

Provide start-up and two year material and labor warranty on entire refrigeration system, and five years manufacturer's warranty on compressor.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #02 | EVAPORATOR, WALK-IN COOLER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | BEL0105BS6AM |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #03 | CONDENSING UNIT, WALK-IN COOLER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | FFAM-A17Z-TFC-075 |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #04 | WIRE SHELVING |
| Quantity: | Fifty-One (51) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2454NK3 (204) |
| Options: | 70UPK3 Posts (204)<br>5MP Casters (102)<br>5MPB Casters (102) |
| Sup Info: | Assemble into four tier shelving units, locate bottom shelf 12" above floor. |

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| ITEM #05 | WIRE SHELVING |
| Quantity: | Twenty (20) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2430NK3 (80) |
| Options: | 70UPK3 Posts (80) |
| | 5MP Casters (40) |
| | 5MPB Casters (40) |
| Sup Info: | Assemble into four tier shelving units, locate bottom shelf 12” above floor. |

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| ITEM #06 | WIRE SHELVING |
| Quantity: | Three (3) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2454NK3 (15) |
| Options: | 74UPK3 Posts (12) |
| | 5MP Casters (16) |
| | 5MPB Casters (16) |
| Sup Info: | Assemble into five tier shelving units, locate bottom shelf 12” above floor. |

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| ITEM #07 | WIRE SHELVING |
| Quantity: | Four (4) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2442NK3 (20) |
| Options: | 74UPK3 Posts (16) |
| | 5MP Casters (8) |
| | 5MPB Casters (8) |
| Sup Info: | Assemble into five tier shelving units, locate bottom shelf 12” above floor. |

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| ITEM #08 | WIRE SHELVING |
| Quantity: | Twelve (12) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2460NK3 (60) |
| Options: | 74UPK3 Posts (48) |
| | 5MP Casters (24) |
| | 5MPB Casters (24) |
| Sup Info: | Assemble into five tier shelving units, locate bottom shelf 12” above floor. |

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| ITEM #09 | WIRE SHELVING |
| Quantity: | Nine (9) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2448NK3 (45) |
| Options: | 74UPK3 Posts (36) |
| | 5MP Casters (18) |
| | 5MPB Casters (18) |
| Sup Info: | Assemble into five tier shelving units, locate bottom shelf 12” above floor. |

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| ITEM #10 | COMMERCIAL WASTE CONTAINER |
| Quantity: | Eleven (11) |
| Manufacturer: | Rubbermaid |
| Model: | FG265500GRAY |
| | FG265400GRAY Lid (11) |

FG264000BLA Dolly (11)

ITEM #11 CLEAN DISHTABLE
Quantity: One (1)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: CDTR-72-14/3
E120 Table limit switch

ITEM #12 GLASS RACK, WALL MOUNT
Quantity: Two (2)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: 606642
Sup Info: Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.

Construction Trade shall provide wall blocking as required for mounting.

ITEM #13 DISHWASHER, CONVEYOR TYPE
Quantity: One (1)
Manufacturer: Hobart / Champion / Stero
Model: CLPS86eN+BUILDUP
Options: CLPS86EN-ADVHTE15K Electric tank heat 15kW
CLPS86EN-ADVERH30K 30kW electric booster
CLPS86EN-ADVELE0AX 208/60/3-ph
SGLPT-KIT3-CLE Single point electrical connection
HOBINST-SGLPT-CLE Accessory installation
CLPS86EN-ADVHGTSTD Standard height
CLPS86EN-ADVDIR0LR Left to right operation
CLPS86EN-ADVFETSTD Standard feet
1/2INSHK-ABSRBR Water shock absorber kit
CLE/TBL-SWITCH Table limit switch CLE-Series
PRESREG-1/20BR pressure regulator
Exhaust fan activation switch

ITEM #14 CONDENSATE HOOD
Quantity: One (1)
Manufacturer: Captive Aire / Caddy / Avtec
Model: Size and shape per plan
Construction: Furnish and install condensate hood.

Entire condensate ventilation system shall be constructed in compliance with UL, NSF and any prevailing statutes and codes.

Fabricate entire hood of 18 gauge 304 stainless steel fully welded watertight construction.

Provide stainless steel welded hanger mounting clips with threaded stainless steel hanger and structural ceiling providing necessary angles and channels and utilizing stainless steel mounting hardware.

Mechanical (HVAC) Trade shall provide stainless steel welded ductwork (horizontal duct runs shall be pitched back toward condensate hood) and fan to comprise a complete condensate exhaust system.

Electrical Trade shall install fan switch with indicator lights located on dish machine and inter-wire to fan.

Furnish and install plastic drain tubing from nipple on bleeder drain outlet to soiled dishtable top surface.

Furnish and install 18 gauge stainless steel ceiling closure panels extending from the top of the exhaust ventilator to the finished ceiling. Panels shall be removable without the use of tools for access.

Furnish and install 18 gauge 304 stainless steel wall panels extending from the bottom of the rear of the exhaust hood to the upper edge of the baseboard molding and extending along the full length of all wall surfaces. Wall panel sections shall be fitted with ½" wide off-set seams at intermediate joints to allow panel sections to fit tightly against the wall and to result in watertight seams. Secure wall panels to building wall with wall panel adhesive of proper type for wall construction. Seal end seams with General Electric or equivalent clear silicone sealer.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #15 | FOOD WASTE DISPOSER |
| Quantity: | Three (3) |
| Manufacturer: | Salvajor / In-sinkerator / Red Goat |
| Model: | 300-CA-ARSS-LD |
| Options: | 18CC Stainless steel cone cover (3)<br>PP PP-type control panel with mounted solenoid valve, flow control & pressure switch for all controls (3)<br>980105 Mounting bracket (3)<br>DP Dejamming prong (3) |
| Sup Info: | Foodservice Equipment Contractor shall furnish and install interconnecting piping and all components or parts as required by disposer manufacturer or as supplied as part of disposer in accordance with the manufacturer instructions. |

Foodservice Equipment Contractor shall furnish and install all interconnecting wiring as required between disposer motor and control device.

Mount to control panel to wall or mounting bracket with stainless steel mounting hardware of proper type for application.

Construction Trade shall reinforce wall as required to support weight of control panel while in use.

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| ITEM #16 | SOILED DISHTABLE |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | SDTCL-60-14/4 |

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| Options: | Pre-rinse spray unit, splash mount<br>301190 Pre-rinse wall bracket<br>-SRP Dishtable kit includes scrap basket, rack slide<br>Disposal provision package |
| ITEM #17 | HAND SINK |
| Quantity: | Sixteen (16) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | HSA-10-FAW |
| Options: | 318496 Paper towel dispenser (16)<br>300602 Soap dispenser (16)<br>-LRS Left and right side splashes (16) |
| Sup Info: | Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.<br><br>Construction Trade shall provide wall blocking as required for mounting.<br><br>Foodservice Equipment Contractor to verify soap dispenser and paper towel dispenser type with the District. |
| ITEM #18 | TRASH CAN, SLIM |
| Quantity: | Twenty (20) |
| Manufacturer: | Rubbermaid |
| Model: | FG354060GRAY |
| Options: | FG267360GRAY Lid (20) |
| ITEM #19 | DUNNAGE RACK |
| Quantity: | Nine (9) |
| Manufacturer: | Cambro / Metro / Eagle group |
| Model: | DRS480131 |
| ITEM #20 | WIRE SHELVING |
| Quantity: | Six (6) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2436NK3 (30) |
| Options: | 74UPK3 Posts (24)<br>5MP Casters (12)<br>5MPB Casters (12) |
| Sup Info: | Assemble into five tier shelving units, locate bottom shelf 12” above floor. |
| ITEM #21 | WIRE SHELVING |
| Quantity: | One (1) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2430NK3 (5) |
| Options: | 74UPK3 Posts (4)<br>5MP Casters (2)<br>5MPB Casters (2) |
| Sup Info: | Assemble into five tier shelving units, locate bottom shelf 12” above floor. |
| ITEM #22 | WALK-IN COOLER/FREEZER COMBINATION |

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| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | Size and shape per plan |
| Construction: | Furnish and erect four (4) compartment sectional urethane insulated walk-in cooler assembly. |

Walk-in assembly shall bear the UL label and NSF and Factory Mutual seals and meet 2015 Federal Regulations.

Ceiling and wall panels shall be constructed of 4" thick urethane insulation, assembly to be accomplished by the use of integral cam type locking device secured in place during the foaming process. Seams between panels shall be fully insulated with vinyl foamed-in-place gasket material.

Ceiling and wall panels shall be finished of 18 gauge embossed aluminum on interior and exterior surfaces.

Walk-in assembly shall be provided with 1/8" thick aluminum diamond tread plate floor with NSF approved coved corners, insulated with 4" thick urethane insulation and reinforced with ¾" thick 5-7 ply marine grade plywood underlayment. Floor installation shall be in accordance with manufacturer's recommended practice and shall sit in a depression. Building floor finish shall be flush and smooth to allow a level installation.

Construction Trade shall furnish and install floor depression and finished floor within walk-in assembly. Pitch floor within walk-in towards entrance door at 1/8" per foot minimum.

Walk-in assembly shall be furnished with in-fitting type door and frame assemblies constructed of 16 gauge stainless steel provided with three self-closing cam action chrome plated hinge assemblies, handles and hardware.

Provide each door with 2" dial type flush mount thermometer with chrome plated bezel mounted in door frame.

Provide each door with triple pane observation and 36" high x 1/8" thick aluminum diamond tread kick plates on both interior and exterior side.

Provide each door with UL listed vapor-proof LED light fixture complete with glass globe, toggle switch and pilot light and full perimeter frame condensation heater.

Provide twenty-four (24) additional UL listed vapor-proof LED ceiling mounted light fixtures (six in each compartment) complete with stainless steel mounting hardware.

Food Service Equipment Contractor shall install ceiling mounted light fixtures and furnish materials and inter-wire light fixtures and switch.

Walk-in freezer assembly shall be furnished with heated pressure relief port.

Furnish and install 18 gauge embossed aluminum vertical trim angles and ceiling closure panels.

Furnish and install entire refrigeration system complete with hermetic condensing units and insulated copper refrigeration lines charged with R448A refrigerant. Each condensing unit shall be interconnected to a low profile, high velocity evaporator coil in each walk-in compartment. Refrigeration system shall include all fittings, valves, switches, controls and all related components to comprise a complete operating unit of sufficient BTU capacity to maintain automatic operation of 35 degree F product temperature in cooler and -10 degree F product temperature in freezer.

Refrigeration system shall be provided with outdoor remote air cooled condensing units located outdoors on building roof.

Condensing units shall be provided with winterized controls (low ambient package) including crankcase heater, line dryer, head pressure control, and galvanized steel stand with stainless steel weather hood.

Provide all hangers and brackets as required to install refrigeration lines.

Construction Trade shall furnish all sleeves and openings through walls for passage of refrigeration lines.

Roofing Trade shall provide waterproof roof opening for passage of refrigeration lines.

Foodservice Equipment Contractor shall furnish materials and inter-wire defrost time clock circuit for walk-in freezer, from condensing unit to evaporator coil.

Foodservice Equipment Contractor shall furnish materials and install (wrap and insulate with foam pipe insulation) heat tracing tape to evaporator coil condensate line in walk-in freezer.

Food Service Equipment Contractor shall furnish and install copper tubing and extend evaporator coil condensate line to floor receptacle.

Set and adjust all temperature and defrost cycles.

Provide start-up and two year material and labor warranty on entire refrigeration system and five years manufacturer’s warranty on compressor.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

ITEM #23 SPARE NUMBER

ITEM #24 SPARE NUMBER

ITEM #25 EVAPORATOR, WALK-IN COOLER
Quantity: One (1)
Manufacturer: American Panel / Norbec / Arctic
Model: BEL0115BS6AM

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| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #26 | CONDENSING UNIT, WALK-IN COOLER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | FFAP-A20Z-TFC-075 |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #27 | EVAPORATOR, WALK-IN COOLER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | BEL0115BS6AM |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #28 | CONDENSING UNIT, WALK-IN COOLER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | FFAP-A20Z-TFC-075 |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #29 | EVAPORATOR, WALK-IN FREEZER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | BEL0130BS6EE |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #30 | CONDENSING UNIT, WALK-IN FREEZER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | FFAL-A30Z-TFC-075 |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #31 | EVAPORATOR, WALK-IN FREEZER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | BEL0130BS6EE |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #32 | CONDENSING UNIT, WALK-IN FREEZER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | FFAL-A30Z-TFC-075 |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #33 | WIRE SHELVING |
| Quantity: | Two (2) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2448NK3 (8) |
| Options: | 70UPK3 Posts (8) |
| | 5MP Casters (4) |
| | 5MPB Casters (4) |
| Sup Info: | Assemble into four tier shelving units, locate bottom shelf 12” above floor. |

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| ITEM #34 | WIRE SHELVING |
| Quantity: | Eight (8) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2436NK3 (32) |
| Options: | 70UPK3 Posts (32) |
| | 5MP Casters (16) |
| | 5MPB Casters (16) |
| Sup Info: | Assemble into four tier shelving units, locate bottom shelf 12” above floor. |

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| ITEM #35 | WORK TABLE, STAINLESS STEEL TOP W/ PREP SINK |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T30144SE |
| Options: | E36A Welded base |
| | E59 Undershelf upgrade |
| | E22 Sink bowl, weld in |
| | 341189 Twist handle drain |
| | -TB bracket |
| | 351585 Sink cover |
| | E47 Sink cover holder |
| | YCORSI-502971-MOD Drawer (2) |
| | DOS10132-14/3 Double overshelf |

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| ITEM #36 | WORK TABLE, STAINLESS STEEL |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T30144SE |
| Options: | E36A Welded base |
| | E59 Undershelf upgrade |
| | YCORSI-502971-MOD Drawer (3) |

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| ITEM #37 | BUN PAN RACK |
| Quantity: | Eight (8) |
| Manufacturer: | Channel Manufacturing / Metro / Nexel |
| Model: | 404A |
| Options: | /022 Corner bumper (8) |
| | /011 Casters with brakes (8) |

ITEM #38 BLAST CHILLER, ROLL-IN

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|---|---|
| Quantity: | One (1) |
| Manufacturer: | American Panel / Irinox / Victory |
| Model: | AP20BCF200-3 |
| Options: | (4) probes total<br>Wi-Fi communication |

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| ITEM #39 | ICE BIN |
| Quantity: | One (1) |
| Manufacturer: | Hoshizaki / Manitowoc / Ice-o-Matic |
| Model: | B-500SF |
| Options: | LP-6 LEG Leg package<br>HS-5607 Scoop holder kit |

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| ITEM #40 | ICE MAKER |
| Quantity: | Two (2) |
| Manufacturer: | Hoshizaki / Manitowoc / Ice-o-Matic |
| Model: | KM-515MAJ |

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| ITEM #40F | WATER FILTRATION SYSTEM FOR ICE CUBER |
| Quantity: | Two (2) |
| Manufacturer: | Everpure / 3M / Optipure |
| Model: | QC7I SINGLE 4FC-S |
| Remarks: | EV969221 Replacement cartridge (2) |
| Sup Info: | Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.<br><br>General contractor shall provide wall blocking as required for mounting.<br><br>Food Service Equipment Contractor shall install ice maker filter system in water supply line and furnish and install interconnecting piping between water filter and ice maker water inlet. |

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| ITEM #41 | REVERSE OSMOSIS SYSTEM |
| Quantity: | Three (3) |
| Manufacturer: | Everpure / 3M / Optipure |
| Model: | EZ-RO 200/16G-BL |
| Remarks: | EV969331 Replacement cartridge (3)<br>EZ-200 Replacement cartridge (3)<br>RO SYSTEM INSTALL - LEVEL I Installation<br>TEMP VALVE INSTALL (W/RO INSTALL) Installation of Thermostatic Mixing Valve (3) |
| Sup Info: | Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.<br><br>General contractor shall provide wall blocking as required for mounting.<br><br>Food Service Equipment Contractor shall install RO system in water supply line and furnish and install interconnecting piping between Ro system and combi oven water inlet. |

Food Service Equipment Contractor shall install RO system in water supply line and furnish and install interconnecting piping between Ro system and convection oven water inlet.

Food Service Equipment Contractor shall install RO system in water supply line and furnish and install interconnecting piping between Ro system and hydrovection oven(s) water inlet.

ITEM #42 UTILITY DISTRIBUTION SYSTEM
Quantity: One (1)
Manufacturer: Captive Aire / Caddy / Avtec
Model: Size and shape per plan
Construction: Furnish and install utility distribution system.

Utility distribution system shall be fabricated in accordance with UL, NSF, NEC, IMC 2015.

Utility distribution system shall be fabricated of a minimum of 18 gauge 304 stainless steel consisting of two utility compartments and fabricated in sections as required with factory pre-assembled field connections and furnished with one primary end riser with single point connection for all utilities and one secondary end riser.

Primary riser shall be furnished with built-in exhaust hood controls, including push button fan control switches with status lights, individual and shunt-trip main circuit breaker and emergency “kill” button with guard.

Provide as part of raceway exhaust hood interlock device to prevent all electrically and gas operated cooking appliances from operating unless the supply and exhaust fans of the exhaust hood is operating as required by all local and prevailing codes including IMC 2015.

Provide raceway with splash proof electrical chase with copper wire-way wired to a circuit breaker panel box with ground fault protection for each appliance in the primary end riser, and UL listed power cords and matching electrical receptacles as required.

Provide raceway with gas supply (looped) service with shut-off valves for each disconnect hose or connection and safety retainer cables for each mobile appliance. Provide as part of utility distribution system, mechanically operated gas supply line shut-off valves to interrupt gas supply to all gas operated cooking appliances. Gas valves shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide raceway with hot and cold water service with shut-off valves for each disconnect hose or connection and safety retainer cables for each mobile appliance.

Provide each riser with ventilator connecting collars for positive connection to the exhaust hood.

Provide secondary end riser with hinged access door for mounting of gas supply line shut-

off valve (looped gas service).

Furnish and install labor and material to assemble all internal interconnecting gas piping, water piping and electrical wiring to install the utility distribution system. Test all connections for leaks.

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| ITEM #43 | POWER WASH SINK |
| Quantity: | One (1) |
| Manufacturer: | Champion |
| Model: | PP3-STD-4TNK 156” L-R |
| Options: | Right to left configuration<br>Left to right configuration<br>“ soiled drainboard<br>“ scrapper table<br>“ power wash sink<br>“ rinse sink<br>“ sanitizing sink<br>“ clean drainboard<br>“ overall length<br>Thermostat controlled electric wash tank heater with low water shut-off<br>Automatic shut-down timer<br>Rear discharge agitator with stainless steel pump and impeller<br>Stainless steel perforated utensil basket<br>Pre-rinse spray above scrapper table<br>Factory installation of disposer cone in soiled drainboard<br>Stainless steel disposer control panel<br>Two faucet<br>Lever drains with connected overflow |

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| ITEM #44 | INGREDIENT BINS |
| Quantity: | Six (6) |
| Manufacturer: | Cambro / Carlisle |
| Model: | IBS20148 |
| Options: | SCP24CW135 Scoop (6) |

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| ITEM #45 | MIXER, FLOOR |
| Quantity: | One (1) |
| Manufacturer: | Hobart / Varimixer / Globe |
| Model: | HL800-1STD |
| Options: | BOWL-HL80P Mixer bowl<br>DWHIP-HL80 wire whip |
| Sup Info: | Accessories include but not limited to power bowl lift, stainless steel bowl guard, stainless steel bowl, "B" beater, "ED" dough hook, bowl truck. |

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| ITEM #46 | FOOD CUTTER |
| Quantity: | One (1) |
| Manufacturer: | Hobart / Varimixer / Globe |
| Model: | 84145-18 |
| Options: | VS9-12 Vegetable slicer |

ITEM #47 WORK TABLE, STAINLESS STEEL TOP W/ DBL PREP SINK

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|---|---|
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T30144SE |
| Options: | E36A Welded base<br>E59 Undershelf upgrade<br>E22 Sink bowl, weld in (2)<br>341189 Twist handle drain (2)<br>-TB bracket<br>351585 Sink cover (2)<br>E47 Sink cover holder<br>YCORSI-502971-MOD Drawer (2)<br>DOS10132-14/3 Double overshelf |

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| ITEM #48 | CONVECTION STEAMER |
| Quantity: | Two (2) |
| Manufacturer: | Cleveland / Groen / Vulcan |
| Model: | 24-CGA-10.2 |
| Options: | Gas pressure regulator (2)<br>11000115898 Installation of unit (2)<br>11000115830 Pre installation site survey (2)<br>INSKITCGA6 Installation kit (2)<br>DISSOLVE Descaling solution (2)<br>BDPK1 Boiler descaling pump kit (2)<br>LGDCK Drain cooling kit (2)<br>Dormont 1675KITCF2S48 Gas hose kit (2)<br>Dormont W75BP2Q48 Water hose kit (4) |
| Sup Info: | Foodservice Equipment Contractor shall install disconnect at wall connection and to cooking appliance per manufacturer's instructions.<br><br>Foodservice Equipment Contractor shall provide and secure restraining cable between wall and equipment. |

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| ITEM #49 | WORK TABLE, STAINLESS STEEL TOP |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T3030SE-BS |
| Options: | E36A Welded base<br>E59 Undershelf upgrade |

| | |
|---|---|
| ITEM #50 | REACH-IN REFRIGERATOR |
| Quantity: | One (1) |
| Manufacturer: | Continental / Victory / True |
| Model: | SW60N24M |
| Options: | Stainless steel interior<br>Stainless steel exterior<br>Stainless steel case back<br>Field reversible door<br>Exterior mounted digital thermometer<br>Automatic condensate evaporator<br>Swivel casters with polyurethane tires and front locking brakes |

Plug and cord set
Flat lid with vision panel with hinges
DOS60 Double overshelf

ITEM #51 REACH-IN REFRIGERATOR
Quantity: One (1)
Manufacturer: Continental / Victory / True
Model: 3RNSS
Options: Stainless steel interior
Stainless steel exterior
Stainless steel case back
Left Door hinged on left, center & right doors hinged on right, standard
Exterior mounted digital thermometer
Automatic condensate evaporator
Swivel casters with polyurethane tires and front locking brakes
Plug and cord set

ITEM #52 REACH-IN FREEZER
Quantity: One (1)
Manufacturer: Continental / Victory / True
Model: 1FNSS
Options: Stainless steel interior
Stainless steel exterior
Stainless steel case back
Door hinged on right, standard
Exterior mounted digital thermometer
Automatic condensate evaporator
Swivel casters with polyurethane tires and front locking brakes
Plug and cord set

ITEM #53 EXHAUST HOOD
Quantity: One (1)
Manufacturer: Captive Aire / Caddy / Avtec
Model: Size and shape as per plan
Construction: Furnish and install exhaust hood with integral plenum box make-air system.

Entire exhaust ventilation system shall be constructed in compliance with UL, NSF, NFPA, IMC 2018 (including automatic start-up of the exhaust and supply ventilation upon activation of any cooking appliance) and any prevailing statutes and codes.

Hood shall be 15’-9” long constructed in one equal sections of 18 gauge 304 stainless steel with all seams continuously welded, ground smooth and polished. Hood mounted utility cabinet is 1’. Provide a full compliment of stainless steel “high efficiency” Captrate Solo baffle type grease extractors.

Furnish remote bulb thermostat with watertight hardware and install in either the exhaust plenum of the hood or in the exhaust duct. Provide NEMA 3 control panel box with hinged front cover complete with supply and exhaust fan contactors wired to an adjustable thermostat control, field wiring terminal strip and on-off switch.

Provide 18 gauge 304 stainless steel supply and exhaust duct collar.

Provide 18 gauge 304 stainless steel insulated supply air plenum box assembly with internal air volume control damper integral along the face of the hood. Mount in finished ceiling along face of hood and furnish full length stainless steel perforated removable panels for discharge of supply air along entire face of hood.

Provide stainless steel threaded hanger rods complete with stainless steel mounting hardware for securing to structural ceiling.

Mechanical (HVAC) Trade shall furnish and install a complete exhaust air handling system including exhaust fan and controller, fan start-stop switch with status lights, 16 gauge insulated welded ductwork from exhaust collar on exhaust hood to fan, hinged roof curb with grease trough and removable grease container.

Mechanical (HVAC) Trade shall install exhaust hood heat detector(s) in exhaust hoods with multiple exhaust collars in the exhaust duct just after the point of the pant leg juncture; this includes punching of the required hole in the duct and installation of the heat detector and fitting.

Mechanical (HVAC) Trade shall furnish and install a complete supply air handling system including supply fan and controller (with maintainable filter system) and supply air heater with thermostat control (to temper incoming supply air below 65 degree F ambient), fan start-stop switch with indicator lights, galvanized steel ductwork from supply collar on exhaust hood to fan and roof curb.

Electrical Trade shall furnish and install interconnecting wiring between fan motors, controllers and switches.

Electrical Trade shall furnish and install inter-wiring of cooking appliance start-up inter-lock device and the supply and exhaust ventilation system and wire per the manufacturer’s instructions and per applicable codes.

Furnish four (4) UL listed vapor-proof recessed LED light fixtures wired to a common on-off switch with stainless steel cover plate located in hood mounted utility cabinet.

Electrical Trade shall furnish materials and inter-wire light fixtures to hood mounted utility cabinet.

Mechanical (HVAC) Trade shall furnish and install INVERTER DUTY THREE PHASE exhaust fan and controller.

Mechanical (HVAC) Trade shall furnish fans set compatible with variable frequency drive specification.

Electrical Trade shall furnish and install Interconnecting wiring of the system between the exhaust hood sensors, remote frequency drive unit and exhaust and supply fan motors.

Furnish and install 18 gauge stainless steel ceiling closure panels extending from the top of the exhaust ventilator to the finished ceiling. Panels shall be removable without the use of tools for access.

Furnish and install 18 gauge 304 stainless steel wall panels extending from the bottom of the rear of the exhaust hood to the upper edge of the baseboard molding and extending along the full length of all wall surfaces. Wall panel sections shall be fitted with ½" wide off-set seams at intermediate joints to allow panel sections to fit tightly against the wall and to result in watertight seams. Secure wall panels to building wall with wall panel adhesive of proper type for wall construction. Seal end seams with General Electric or equivalent clear silicone sealer.

Electrical Trade shall provide the inter-wiring between the control enclosure, fire system, supply and exhaust fans and variable frequency drives and duct riser temperature switch.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

| | |
|---|---|
| ITEM #53.1 | HOOD CONTROL PANEL |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape per plan |
| Sup Info: | Furnish 18 gauge stainless steel utility and fire system enclosure cabinet with hinged access doors for both hood and fire system controls and fire suppression tanks. System shall be listed by ETL (UL 508A) NSF, NFPA, IMC 2018 and any prevailing statutes or codes including automatic shut-down of all cooking appliances per code section 44 of NFPA 17-27. Cabinet may be freestanding wall type or integral with exhaust hood as shown on the contract drawings. Furnish stainless steel mounting hardware of proper type for wall construction for wall mounted cabinet. |

Furnish and install variable volume motor control center with variable frequency drive, input / output processor and keypad enclosed within a stainless steel utility cabinet for remote mounting. System shall include, but not be limited to, electronic variable volume motor starters with thermal overload, input / output processors, control keypad, temperature and optic sensors and plug and play cables. Temperature sensor shall be mounted in the exhaust duct collar; optic sensor shall be mounted inside the ends of the hood with air purge units mounted on top.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

| | |
|---|---|
| ITEM #53.2 | FIRE PROTECTION SYSTEM |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire |
| Model: | TANK |
| Sup Info: | Furnish and install in exhaust hood, plenum and surface fire protection system. |

TANK Fire Suppression is a pre-engineered, stored-pressure wet chemical solutionextinguishing system.

TANK Fire Suppression System shall be UL & ULC listed in accordance with UL300,UL1254, ULCORD-C1254.6.

Microprocessor-based control board shall be ETL Listed to UL Standard 864 and CAN/ULC-S527-11.

TANK Fire Suppression System intended for installation and for use in accordance withthe National Fire Protection Association Standards:

1. Wet Chemical Extinguishing Systems, NFPA 17A
2. National Electrical Code, NFPA 70
3. National Fire Alarm & Signaling Code, NFPA 72

New York City and FDNY approved under COA# 5870.

California State Fire Marshal (CFSM), Listing No. 7085-2199:0502.

A pre-engineered, fixed pipe, automatic wet chemical agent fire suppression system forprotection of all hazard areas associated with cooking operations, including exhaust hoods, plenums, ductwork, and cooking appliances.

Exhaust hood fire system components to be factory installed.

**Cylinder and Valve Assembly**

1. The cylinders shall have a tin-nickel alloy plated brass valve with pressure gauge.
2. Wet chemical agent shall be contained in one or more stored pressure DOT/TC ratedsteel cylinder and valve assemblies.
3. Each cylinder is factory-filled with liquid fire suppressant and pressurized to 200 PSIGat 70°F.

**Distribution Nozzles**

4. Nozzles shall be located to protect the exhaust ducts, plenums, and all cookingappliances requiring protection.
5. All nozzles shall be equipped with a metal blow off cap. The cap prevents contamination from entering the pipe network and is designed to pop-off upon system discharge, allowing agent to flow to the protected hazard area.
6. All nozzles shall incorporate a stamped part number to easily identify nozzle type.

Distribution System

7. The distribution system shall consist of Copper, Schedule 40 black iron, chrome-plated or stainless-steel pipe and fittings. All exposed piping and fittings must be chrome-plated or stainless steel.
8. Fittings shall be minimum class 150. Galvanized fittings shall not be used.

Suppression System

9. The system control equipment shall be capable of all functions associated with automatically and manually discharging the wet chemical agent from all cylinder

andvalve assemblies, including automatic shutdown of the heat source or fuel and electrical power to all protected areas upon system discharge.

10. Liquid Fire Suppressant shall be Aqueous Potassium Carbonate (APC).

11. All mechanical components of the actuator kit shall be enclosed.

12. The actuator kit shall be capable of automatic or manual activation means.

13. Supervisory Pressure Switch added to monitor operating system pressure.

14. For manual activation, an electrically operated manual release shall be used toactuate the system manually.

15. For automatic activation, the system will be activated by a Firestat (heat) detector.

**Electrical**

16. Electrical Division to provide shunt trip breakers at main power panel, or disconnects,as designated by the Electrical Engineer; interconnection provided at hood control panel for the signal to shut down all electricity in and under the exhaust hood. Shunt trips/disconnects to accomplish shut off of electricity in the event of fire system activation by others.

17. Printed circuit board with microprocessor-based controller that provides all the necessary monitoring, timing, and supervision functions required for the reliableoperation of the fire system.

18. Independent supervised loops incorporate redundancy and fault detection.

19. Real-time cloud-based monitoring connection provided with system by ownership.

20. Primary power supply, with battery backup for power loss.

21. All wiring must be in accordance to NFPA 70 and the Authority Having Jurisdiction(AHJ).

22. Electric gas valve provided for equipment below exhaust hood. Coordinate size andinstallation with Plumbing Division.

23. All wiring is to be in accordance with the applicable manufacturer's instructions for thefire alarm control panel, gas shut-off valve, manual reset relay, and contractor supplied shut-off devices.

As part of this item, provide wall mounted type K handheld portable fire extinguisher, placard, and mounting bracket as required in the immediate vicinity of each cooking area,per NFPA-96 and NFPA-10. Additional fire extinguishers as required in the kitchen area are to be specified by the Architect and provided by the General Contractor.

Inter-wiring of the fire system to the exhaust hood shall be furnished and installed by the Electrical Trade.

Provide as part of fire system, electrically operated gas supply line shut-off valve (two required for "loop" gas service) to interrupt gas supply to all gas operated cooking appliances. Gas valve shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide one remote manual pull station to actuate fire system in the event of a fire.

Plumbing Trade shall install gas shut-off valve(s) in gas supply line.

Electrical Trade shall inter-wire gas shut-off valve(s) to fire system.

Electrical Trade shall furnish and install electric shunt-trip circuit breakers or electric shut-off contactors to interrupt electric power to all electrically operated cooking appliances.

Provide dry contacts in fire system to interface with building fire alarm system as required, electrical tie-in shall be the responsibility of the Electrical Trade.

Provide as part of fire system, start-up testing of the fire system as required by local fire codes. Subsequent testing of the fire system for a period of one year after start-up shall be included as part of this contract.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

Install in accordance with manufacturer's instructions, drawings, written specifications,manufacturer’s installation manual, and all applicable building codes.

Six-month and twelve-month inspections, servicing, and replacement of components asper NFPA 96 to be provided by the General Contractor or Owner.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

| | |
|---|---|
| ITEM #54 | TILT SKILLET |
| Quantity: | One (1) |
| Manufacturer: | Cleveland / Groen / Vulcan |
| Model: | SGL-30-T1 |
| Options: | DPK-13 Double pantry faucet<br>TDDC Drain cup assembly<br>Pan carrier<br>PT-2 power tilt with manual override<br>TD2SK 2” tangent draw-off<br>FSSK food strainer<br>CST-1 casters<br>Gas pressure regulator<br>Dormont 1675KITCF2S-48PS gas hose kit<br>W50BP48 Water hose kit (2) |
| Sup Info: | Foodservice Equipment Contractor shall install disconnect at wall connection and to cooking appliance per manufacturer’s instructions. |

Foodservice Equipment Contractor shall provide and secure restraining cable be-

tween wall and equipment.

| | |
|---|---|
| ITEM #55 | FLOOR TROUGH |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | FT-2496-SG |
| Sup Info: | Construction Trade shall provide floor recess and install floor pan in recess flush with adjacent kitchen floor in a watertight manner. |

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| ITEM #56 | KETTLE, STEAM JACKETED |
| Quantity: | Two (2) |
| Manufacturer: | Cleveland / Groen / Vulcan |
| Model: | KGL-40-T |
| Options: | TD2 2" tangent draw-off valve with strainer<br>TDDC Drain cup assembly<br>KM2G Kettle Markings, 5 gallon increments<br>CHS40 Spring assisted cover<br>DKFK Double pantry kettle filler with 60” hose<br>KAK Kettle Accessory Kit<br>Gas pressure regulator<br>Dormont 1675KITCF2S-48 gas hose kit (2)<br>Dormont W50BP48 Water hose kit (4) |
| Sup Info: | Foodservice Equipment Contractor shall install disconnect at wall connection and to cooking appliance per manufacturer’s instructions.<br><br>Foodservice Equipment Contractor shall provide and secure restraining cable between wall and equipment. |

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| ITEM #57 | EXHAUST HOOD |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape as per plan |
| Construction: | Furnish and install exhaust hood with integral plenum box make-air system.<br><br>Entire exhaust ventilation system shall be constructed in compliance with UL, NSF, NFPA, IMC 2018 (including automatic start-up of the exhaust and supply ventilation upon activation of any cooking appliance) and any prevailing statutes and codes.<br><br>Hood shall be 14’-6” long constructed in one equal sections of 18 gauge 304 stainless steel with all seams continuously welded, ground smooth and polished. Hood mounted utility cabinet is 1’. Provide a full compliment of stainless steel “high efficiency” Captrate Solo baffle type grease extractors.<br><br>Furnish remote bulb thermostat with watertight hardware and install in either the exhaust plenum of the hood or in the exhaust duct. Provide NEMA 3 control panel box with hinged front cover complete with supply and exhaust fan contactors wired to an adjustable thermostat control, field wiring terminal strip and on-off switch.<br><br>Provide 18 gauge 304 stainless steel supply and exhaust duct collar. |

Provide 18 gauge 304 stainless steel insulated supply air plenum box assembly with internal air volume control damper integral along the face of the hood. Mount in finished ceiling along face of hood and furnish full length stainless steel perforated removable panels for discharge of supply air along entire face of hood.

Provide stainless steel threaded hanger rods complete with stainless steel mounting hardware for securing to structural ceiling.

Mechanical (HVAC) Trade shall furnish and install a complete exhaust air handling system including exhaust fan and controller, fan start-stop switch with status lights, 16 gauge insulated welded ductwork from exhaust collar on exhaust hood to fan, hinged roof curb with grease trough and removable grease container.

Mechanical (HVAC) Trade shall install exhaust hood heat detector(s) in exhaust hoods with multiple exhaust collars in the exhaust duct just after the point of the pant leg juncture; this includes punching of the required hole in the duct and installation of the heat detector and fitting.

Mechanical (HVAC) Trade shall furnish and install a complete supply air handling system including supply fan and controller (with maintainable filter system) and supply air heater with thermostat control (to temper incoming supply air below 65 degree F ambient), fan start-stop switch with indicator lights, galvanized steel ductwork from supply collar on exhaust hood to fan and roof curb.

Electrical Trade shall furnish and install interconnecting wiring between fan motors, controllers and switches.

Electrical Trade shall furnish and install inter-wiring of cooking appliance start-up inter-lock device and the supply and exhaust ventilation system and wire per the manufacturer’s instructions and per applicable codes.

Furnish four (4) UL listed vapor-proof recessed LED light fixtures wired to a common on-off switch with stainless steel cover plate located in hood mounted utility cabinet.

Electrical Trade shall furnish materials and inter-wire light fixtures to hood mounted utility cabinet.

Mechanical (HVAC) Trade shall furnish and install INVERTER DUTY THREE PHASE exhaust fan and controller.

Mechanical (HVAC) Trade shall furnish fans set compatible with variable frequency drive specification.

Electrical Trade shall furnish and install Interconnecting wiring of the system between the exhaust hood sensors, remote frequency drive unit and exhaust and supply fan motors.

Furnish and install 18 gauge stainless steel ceiling closure panels extending from the top of the exhaust ventilator to the finished ceiling. Panels shall be removable without the use of tools for access.

Furnish and install 18 gauge 304 stainless steel wall panels extending from the bottom of the rear of the exhaust hood to the upper edge of the baseboard molding and extending along the full length of all wall surfaces. Wall panel sections shall be fitted with ½" wide off-set seams at intermediate joints to allow panel sections to fit tightly against the wall and to result in watertight seams. Secure wall panels to building wall with wall panel adhesive of proper type for wall construction. Seal end seams with General Electric or equivalent clear silicone sealer.

Electrical Trade shall provide the inter-wiring between the control enclosure, fire system, supply and exhaust fans and variable frequency drives and duct riser temperature switch.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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|---|---|
| ITEM #57.1 | HOOD CONTROL PANEL |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape per plan |
| Sup Info: | Furnish 18 gauge stainless steel utility and fire system enclosure cabinet with hinged access doors for both hood and fire system controls and fire suppression tanks. System shall be listed by ETL (UL 508A) NSF, NFPA, IMC 2018 and any prevailing statutes or codes including automatic shut-down of all cooking appliances per code section 44 of NFPA 17-27. Cabinet may be freestanding wall type or integral with exhaust hood as shown on the contract drawings. Furnish stainless steel mounting hardware of proper type for wall construction for wall mounted cabinet. |

Furnish and install variable volume motor control center with variable frequency drive, input / output processor and keypad enclosed within a stainless steel utility cabinet for remote mounting. System shall include, but not be limited to, electronic variable volume motor starters with thermal overload, input / output processors, control keypad, temperature and optic sensors and plug and play cables. Temperature sensor shall be mounted in the exhaust duct collar; optic sensor shall be mounted inside the ends of the hood with air purge units mounted on top.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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|---|---|
| ITEM #57.2 | FIRE PROTECTION SYSTEM |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire |
| Model: | TANK |
| Sup Info: | Furnish and install in exhaust hood, plenum and surface fire protection system. |

TANK Fire Suppression is a pre-engineered, stored-pressure wet chemical solutionextinguishing system.

TANK Fire Suppression System shall be UL & ULC listed in accordance with UL300,UL1254, ULCORD-C1254.6.

Microprocessor-based control board shall be ETL Listed to UL Standard 864 and CAN/ULC-S527-11.

TANK Fire Suppression System intended for installation and for use in accordance withthe National Fire Protection Association Standards:

4. Wet Chemical Extinguishing Systems, NFPA 17A
5. National Electrical Code, NFPA 70
6. National Fire Alarm & Signaling Code, NFPA 72

New York City and FDNY approved under COA# 5870.

California State Fire Marshal (CFSM), Listing No. 7085-2199:0502.

A pre-engineered, fixed pipe, automatic wet chemical agent fire suppression system forprotection of all hazard areas associated with cooking operations, including exhaust hoods, plenums, ductwork, and cooking appliances.

Exhaust hood fire system components to be factory installed.

**Cylinder and Valve Assembly**

24. The cylinders shall have a tin-nickel alloy plated brass valve with pressure gauge.
25. Wet chemical agent shall be contained in one or more stored pressure DOT/TC ratedsteel cylinder and valve assemblies.
26. Each cylinder is factory-filled with liquid fire suppressant and pressurized to 200 PSIGat 70°F.

**Distribution Nozzles**

27. Nozzles shall be located to protect the exhaust ducts, plenums, and all cookingappliances requiring protection.
28. All nozzles shall be equipped with a metal blow off cap. The cap prevents contamination from entering the pipe network and is designed to pop-off upon system discharge, allowing agent to flow to the protected hazard area.
29. All nozzles shall incorporate a stamped part number to easily identify nozzle type.

Distribution System

30. The distribution system shall consist of Copper, Schedule 40 black iron, chrome-plated or stainless-steel pipe and fittings. All exposed piping and fittings must be chrome-plated or stainless steel.
31. Fittings shall be minimum class 150. Galvanized fittings shall not be used.

Suppression System

32. The system control equipment shall be capable of all functions associated with automatically and manually discharging the wet chemical agent from all cylinder

andvalve assemblies, including automatic shutdown of the heat source or fuel and electrical power to all protected areas upon system discharge.

33. Liquid Fire Suppressant shall be Aqueous Potassium Carbonate (APC).

34. All mechanical components of the actuator kit shall be enclosed.

35. The actuator kit shall be capable of automatic or manual activation means.

36. Supervisory Pressure Switch added to monitor operating system pressure.

37. For manual activation, an electrically operated manual release shall be used toactuate the system manually.

38. For automatic activation, the system will be activated by a Firestat (heat) detector.

**Electrical**

39. Electrical Division to provide shunt trip breakers at main power panel, or disconnects,as designated by the Electrical Engineer; interconnection provided at hood control panel for the signal to shut down all electricity in and under the exhaust hood. Shunt trips/disconnects to accomplish shut off of electricity in the event of fire system activation by others.

40. Printed circuit board with microprocessor-based controller that provides all the necessary monitoring, timing, and supervision functions required for the reliableoperation of the fire system.

41. Independent supervised loops incorporate redundancy and fault detection.

42. Real-time cloud-based monitoring connection provided with system by ownership.

43. Primary power supply, with battery backup for power loss.

44. All wiring must be in accordance to NFPA 70 and the Authority Having Jurisdiction(AHJ).

45. Electric gas valve provided for equipment below exhaust hood. Coordinate size andinstallation with Plumbing Division.

46. All wiring is to be in accordance with the applicable manufacturer's instructions for thefire alarm control panel, gas shut-off valve, manual reset relay, and contractor supplied shut-off devices.

As part of this item, provide wall mounted type K handheld portable fire extinguisher, placard, and mounting bracket as required in the immediate vicinity of each cooking area,per NFPA-96 and NFPA-10. Additional fire extinguishers as required in the kitchen area are to be specified by the Architect and provided by the General Contractor.

Inter-wiring of the fire system to the exhaust hood shall be furnished and installed by the Electrical Trade.

Provide as part of fire system, electrically operated gas supply line shut-off valve (two required for "loop" gas service) to interrupt gas supply to all gas operated cooking appliances. Gas valve shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide one remote manual pull station to actuate fire system in the event of a fire.

Plumbing Trade shall install gas shut-off valve(s) in gas supply line.

Electrical Trade shall inter-wire gas shut-off valve(s) to fire system.

Electrical Trade shall furnish and install electric shunt-trip circuit breakers or electric shut-off contactors to interrupt electric power to all electrically operated cooking appliances.

Provide dry contacts in fire system to interface with building fire alarm system as required, electrical tie-in shall be the responsibility of the Electrical Trade.

Provide as part of fire system, start-up testing of the fire system as required by local fire codes. Subsequent testing of the fire system for a period of one year after start-up shall be included as part of this contract.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

Install in accordance with manufacturer's instructions, drawings, written specifications,manufacturer’s installation manual, and all applicable building codes.

Six-month and twelve-month inspections, servicing, and replacement of components asper NFPA 96 to be provided by the General Contractor or Owner.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #58 | CONVECTION OVEN |
| Quantity: | Two (2) |
| Manufacturer: | Garland / Blodgett / Vulcan |
| Model: | DFG-200 DBL<br>Solid state thermostat<br>Mechanical timer<br>Stainless steel draft diverter<br>4 ¼” low profile swivel casters with polyurethane tires and front locking brakes<br>Stainless steel solid back panel<br>Stainless steel solid doors with view window<br>Gas manifold<br>Gas pressure regulator<br>Dormont 1675KITCF2S48 Gas hose kit |
| Sup Info: | Foodservice Equipment Contractor shall install disconnect at wall connection and to cooking appliance per manufacturer’s instructions. |

Foodservice Equipment Contractor shall provide and secure restraining cable between wall and equipment.

| | |
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| ITEM #59 | HEAVY DUTY RANGE |
| Quantity: | One (1) |
| Manufacturer: | Garland / Vulcan / Impererial |
| Model: | M43R |
| Options: | 3/4" Rear gas connection, including "Tee" in manifold, end cap & cover<br>Stainless steel main back<br>Swivel Casters, with Polyurethane wheels (non-marking)<br>M34SD Single High Shelf<br>Gas pressure regulator<br>Dormont 1675KITCF2S-48 gas hose kit |
| Sup Info: | Foodservice Equipment Contractor shall install disconnect at wall connection and to cooking appliance per manufacturer's instructions.<br><br>Foodservice Equipment Contractor shall provide and secure restraining cable between wall and equipment. |

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|---|---|
| ITEM #60 | WORK TABLE, STAINLESS STEEL TOP W/ PREP SINK |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T30144SE |
| Options: | E36A Welded base<br>E59 Undershelf upgrade<br>E24A Sink bowl, weld in<br>341189 Twist handle drain<br>-TB bracket<br>351585 Sink cover<br>E47 Sink cover holder<br>YCORSI-502971-MOD Drawer (2)<br>E41A Disposal provision package |

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|---|---|
| ITEM #61 | HEATED CABINET, PASS THRU |
| Quantity: | Five (5) |
| Manufacturer: | Continental / Victory / True |
| Model: | DL1WE-SS-PT |
| Options: | Stainless steel interior (5)<br>Stainless steel exterior (5)<br>• Door hinged on right, control side (2 most southern boxes on FS 1.1)<br>• Door hinged on left, rear side (2 most southern boxes on FS 1.1)<br>• Door hinged on left, control side, Door hinged on right, rear side (second box down from north on FS 1.1)<br>• Door hinged on right, control side, door hinged on right, rear side (northern most box on FS 1.1)<br>• Door hinged on left, control side, door hinged on left, rear side (box on FS 1.2)<br>Exterior mounted digital thermometer (5)<br>Swivel casters with polyurethane tires and front locking brakes (5 sets)<br>Plug and cord set (5)<br>50-P008A-E Pan slide assembly (5) |

ITEM #62 REFRIGERATOR, PASS THRU
Quantity: Five (5)
Manufacturer: Continental / Victory / True
Model: 1RENPT
Options: Stainless steel interior (5)
Stainless steel exterior (5)
- Door hinged on right, control side (2 most southern boxes on FS 1.1)
- Door hinged on left, rear side (2 most southern boxes on FS 1.1)
- Door hinged on left, control side, Door hinged on right, rear side (second box down from north on FS 1.1)
- Door hinged on right, control side, door hinged on right, rear side (northern most box on FS 1.1)
- Door hinged on left, control side, door hinged on right, rear side (box on FS 1.2)

Exterior mounted digital thermometer (5)
Swivel casters with polyurethane tires and front locking brakes (5 sets)
Plug and cord set (5)
50-P008A-E Pan slide assembly (5)

ITEM #63 HYDROVECTION OVEN
Quantity: One (1)
Manufacturer: Blodgett / Garland / Vulcan
Model: HV-100G ADDL
Stainless steel front, top sides and back
Natural gas
58412 Platinum Professional Installation
Side heat shield, per section
Water pressure regulator (per section)
Multi-purpose fry pan
Gas pressure regulator
Stacking kit included, stack onto #X-02
Dormont 1675KITCF2S48 Gas hose kit
W75BP48 Water hose connector kit
Sup Info: Foodservice Equipment Contractor shall install disconnect at wall connection and to cooking appliance per manufacturer's instructions.

Foodservice Equipment Contractor shall provide and secure restraining cable between wall and equipment.

ITEM #64 SHELF, MOP
Quantity: Two (2)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: US0824-16/3
Sup Info: Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.

Construction Trade shall provide wall blocking as required for mounting.

ITEM #65 MOP SINK
Quantity: One (1)

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| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | F1916 |
| Options: | 321561 Mop broom holder |
| | 312690 Service faucet |
| | 503096 Splash kit |
| Sup Info: | All seams sealed with General Electric or equivalent silicone sealer. |

| | |
|---|---|
| ITEM #66 | WORK TABLE, STAINLESS STEEL TOP |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T3084SE-BS |
| Options: | E36A Welded base |
| | E59 Undershelf upgrade |
| | YCORSI-502971-MOD Drawer |

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|---|---|
| ITEM #67 | REACH-IN REFRIGERATOR |
| Quantity: | One (1) |
| Manufacturer: | Continental / True / Victory |
| Model: | 1RNSS |
| Options: | Stainless steel interior |
| | Stainless steel exterior |
| | Stainless steel case back |
| | Door hinged on left |
| | Exterior mounted digital thermometer |
| | Automatic condensate evaporator |
| | Swivel casters with polyurethane tires and front locking brakes |
| | Plug and cord set |
| | 50-P008A Pan slide assembly |
| | Three (3) additional shelves on bottom section |

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| ITEM #68 | P.O.S. SYSTEM |
| Quantity: | Five (5) |
| Sup Info: | Not in Foodservice Equipment contract, furnished by the Owner. |

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| ITEM #69 | CASHIER COUNTER |
| Quantity: | Four (4) |
| Manufacturer: | Duke/ Multiteria / Delfield |
| Model: | TCS-30SS |
| Options: | Owner/Architect to select laminate finish (4) |
| | Custom size 60”W |
| | CS-DR-LK Stainless steel drawer with lock (4) |
| | SOLID-HD-2OC Tray slide, opposite cashier (4) |
| | MOD-2S-2OC Kickplate, opposite cashier (4) |

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|---|---|
| ITEM #70 | MILK COOLER |
| Quantity: | Four (4) |
| Manufacturer: | Beverage Air / Continental / True |
| Model: | NC28-1-W |

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| ITEM #71 | SOLID TOP UNIT |
| Quantity: | Eight (8) |

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|---|---|
| Manufacturer: | Duke/ Multiteria / Delfield |
| Model: | TST-32SS |
| Options: | Owner/Architect to select laminate finish (8)<br>SOLID-HD-2CU Tray slide, customer side (8)<br>MOD-2S-2CU Kick plate, customer side (8) |

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|---|---|
| ITEM #72 | DROP-IN, HOT/COLD/FREEZE |
| Quantity: | One (1) |
| Manufacturer: | Duke/ Multiteria / Delfield |
| Model: | HCF-4 |
| Options: | HCF-4-120 120v/60/1-ph, 21.0 amps, NEMA 5L-30P<br>Fill faucet |

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|---|---|
| ITEM #73 | TRIANGLE CORNER UNIT |
| Quantity: | Four (4) |
| Manufacturer: | Duke/ Multiteria / Delfield |
| Model: | TTU-90SS |
| Options: | Owner/Architect to select laminate finish (4) |

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|---|---|
| ITEM #74 | FOOD WASTE DISPOSER |
| Quantity: | One (1) |
| Manufacturer: | Salvajor / In-sinkerator / Red Goat |
| Model: | 300-SA-3-ARSS-LD |
| Options: | 980105 Mounting bracket<br>DP Dejamming prong<br>SLE6SS Seismic flange for leg support |
| Sup Info: | Foodservice Equipment Contractor shall furnish and install interconnecting piping and all components or parts as required by disposer manufacturer or as supplied as part of disposer in accordance with the manufacturer instructions.<br><br>Foodservice Equipment Contractor shall furnish and install all interconnecting wiring as required between disposer motor and control device.<br><br>Mount to control panel to wall or mounting bracket with stainless steel mounting hardware of proper type for application.<br><br>Construction Trade shall reinforce wall as required to support weight of control panel while in use. |

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| ITEM #75 | DROP-IN, HOT/COLD/FREEZE |
| Quantity: | Eight (8) |
| Manufacturer: | Duke/ Multiteria / Delfield |
| Model: | HCF-3 |
| Options: | HCF-3-120 120v/60/1-ph, 16.0 amps, NEMA 5-20P (8)<br>Fill Faucet (8) |

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|---|---|
| ITEM #76 | WALK-IN COOLER/FREEZER COMBINATION |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | Size and shape per plan |

Construction: Furnish and erect two (2) compartment sectional urethane insulated walk-in cooler assembly.

Walk-in assembly shall bear the UL label and NSF and Factory Mutual seals and meet 2015 Federal Regulations.

Ceiling and wall panels shall be constructed of 4" thick urethane insulation, assembly to be accomplished by the use of integral cam type locking device secured in place during the foaming process. Seams between panels shall be fully insulated with vinyl foamed-in-place gasket material.

Ceiling and wall panels shall be finished of 18 gauge embossed aluminum on interior and exterior surfaces.

Walk-in assembly shall be provided with 1/8" thick aluminum diamond tread plate floor with NSF approved coved corners, insulated with 4" thick urethane insulation and reinforced with ¾" thick 5-7 ply marine grade plywood underlayment. Floor installation shall be in accordance with manufacturer's recommended practice and shall sit in a depression. Building floor finish shall be flush and smooth to allow a level installation.

Construction Trade shall furnish and install floor depression and finished floor within walk-in assembly. Pitch floor within walk-in towards entrance door at 1/8" per foot minimum.

Walk-in assembly shall be furnished with in-fitting type door and frame assemblies constructed of 16 gauge stainless steel provided with three self-closing cam action chrome plated hinge assemblies, handles and hardware.

Provide each door with 2" dial type flush mount thermometer with chrome plated bezel mounted in door frame.

Provide each door with triple pane observation and 36" high x 1/8" thick aluminum diamond tread kick plates on both interior and exterior side.

Provide each door with UL listed vapor-proof LED light fixture complete with glass globe, toggle switch and pilot light and full perimeter frame condensation heater.

Provide eight (8) additional UL listed vapor-proof LED ceiling mounted light fixtures (four in each compartment) complete with stainless steel mounting hardware.

Food Service Equipment Contractor shall install ceiling mounted light fixtures and furnish materials and inter-wire light fixtures and switch.

Walk-in freezer assembly shall be furnished with heated pressure relief port.

Furnish and install 18 gauge embossed aluminum vertical trim angles and ceiling closure panels.

Furnish and install entire refrigeration system complete with hermetic condensing units and insulated copper refrigeration lines charged with R448A refrigerant. Each

condensing unit shall be interconnected to a low profile, high velocity evaporator coil in each walk-in compartment. Refrigeration system shall include all fittings, valves, switches, controls and all related components to comprise a complete operating unit of sufficient BTU capacity to maintain automatic operation of 35 degree F product temperature in cooler and -10 degree F product temperature in freezer.

Refrigeration system shall be provided with outdoor remote air cooled condensing units located outdoors on building roof.

Condensing units shall be provided with winterized controls (low ambient package) including crankcase heater, line dryer, head pressure control, and galvanized steel stand with stainless steel weather hood.

Provide all hangers and brackets as required to install refrigeration lines.

Construction Trade shall furnish all sleeves and openings through walls for passage of refrigeration lines.

Roofing Trade shall provide waterproof roof opening for passage of refrigeration lines.

Foodservice Equipment Contractor shall furnish materials and inter-wire defrost time clock circuit for walk-in freezer, from condensing unit to evaporator coil.

Foodservice Equipment Contractor shall furnish materials and install (wrap and insulate with foam pipe insulation) heat tracing tape to evaporator coil condensate line in walk-in freezer.

Food Service Equipment Contractor shall furnish and install copper tubing and extend evaporator coil condensate line to floor receptacle.

Set and adjust all temperature and defrost cycles.

Provide start-up and two year material and labor warranty on entire refrigeration system and five years manufacturer’s warranty on compressor.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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|---|---|
| ITEM #77 | EVAPORATOR, WALK-IN COOLER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | BEL0115BS6AM |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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|---|---|
| ITEM #78 | CONDENSING UNIT, WALK-IN COOLER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | FFAP-A20Z-TFC-075 |

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| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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|---|---|
| ITEM #79 | EVAPORATOR, WALK-IN FREEZER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | BEL0130BS6EE |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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|---|---|
| ITEM #80 | CONDENSING UNIT, WALK-IN FREEZER |
| Quantity: | One (1) |
| Manufacturer: | American Panel / Norbec / Arctic |
| Model: | FFAL-A30Z-TFC-075 |
| Remarks: | Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification. |

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| ITEM #81 | WORK TABLE, STAINLESS STEEL TOP W/ PREP SINK |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T30144STE |
| Options: | E36A Welded base<br>E22 Sink bowl, weld in<br>341189 Twist handle drain<br>-TB bracket<br>351585 Sink cover<br>E47 Sink cover holder<br>YCORSI-502971-MOD Drawer<br>DOS10132-14/3 Double overshelf |

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|---|---|
| ITEM #82 | WORK TABLE, STAINLESS STEEL TOP |
| Quantity: | Two (2) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T3054SE |
| Options: | E36A Welded base (2)<br>E59 Undershelf upgrade (2)<br>DOS1048-14/3 Double overshelf (2) |

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|---|---|
| ITEM #83 | EXHAUST HOOD |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape as per plan |
| Construction: | Furnish and install exhaust hood with integral plenum box make-air system. |

Entire exhaust ventilation system shall be constructed in compliance with UL, NSF, NFPA, IMC 2018 (including automatic start-up of the exhaust and supply ventilation upon activation of any cooking appliance) and any prevailing statutes and codes.

Hood shall be 20’-11” long constructed in two sections of 18 gauge 304 stainless steel with all seams continuously welded, ground smooth and polished. First section is 10’, second section is 10’-11”. Hood mounted utility cabinet is 1’. Provide a full

compliment of stainless steel “high efficiency” Captrate Solo baffle type grease extractors.

Furnish remote bulb thermostat with watertight hardware and install in either the exhaust plenum of the hood or in the exhaust duct. Provide NEMA 3 control panel box with hinged front cover complete with supply and exhaust fan contactors wired to an adjustable thermostat control, field wiring terminal strip and on-off switch.

Provide 18 gauge 304 stainless steel supply and exhaust duct collar.

Provide 18 gauge 304 stainless steel insulated supply air plenum box assembly with internal air volume control damper integral along the face of the hood. Mount in finished ceiling along face of hood and furnish full length stainless steel perforated removable panels for discharge of supply air along entire face of hood.

Provide stainless steel threaded hanger rods complete with stainless steel mounting hardware for securing to structural ceiling.

Mechanical (HVAC) Trade shall furnish and install a complete exhaust air handling system including exhaust fan and controller, fan start-stop switch with status lights, 16 gauge insulated welded ductwork from exhaust collar on exhaust hood to fan, hinged roof curb with grease trough and removable grease container.

Mechanical (HVAC) Trade shall install exhaust hood heat detector(s) in exhaust hoods with multiple exhaust collars in the exhaust duct just after the point of the pant leg juncture; this includes punching of the required hole in the duct and installation of the heat detector and fitting.

Mechanical (HVAC) Trade shall furnish and install a complete supply air handling system including supply fan and controller (with maintainable filter system) and supply air heater with thermostat control (to temper incoming supply air below 65 degree F ambient), fan start-stop switch with indicator lights, galvanized steel ductwork from supply collar on exhaust hood to fan and roof curb.

Electrical Trade shall furnish and install interconnecting wiring between fan motors, controllers and switches.

Electrical Trade shall furnish and install inter-wiring of cooking appliance start-up inter-lock device and the supply and exhaust ventilation system and wire per the manufacturer’s instructions and per applicable codes.

Furnish four (4) UL listed vapor-proof recessed LED light fixtures wired to a common on-off switch with stainless steel cover plate located in hood mounted utility cabinet.

Electrical Trade shall furnish materials and inter-wire light fixtures to hood mounted utility cabinet.

Mechanical (HVAC) Trade shall furnish and install INVERTER DUTY THREE PHASE exhaust fan and controller.

Mechanical (HVAC) Trade shall furnish fans set compatible with variable frequency drive specification.

Electrical Trade shall furnish and install Interconnecting wiring of the system between the exhaust hood sensors, remote frequency drive unit and exhaust and supply fan motors.

Furnish and install 18 gauge stainless steel ceiling closure panels extending from the top of the exhaust ventilator to the finished ceiling. Panels shall be removable without the use of tools for access.

Furnish and install 18 gauge 304 stainless steel wall panels extending from the bottom of the rear of the exhaust hood to the upper edge of the baseboard molding and extending along the full length of all wall surfaces. Wall panel sections shall be fitted with ½" wide off-set seams at intermediate joints to allow panel sections to fit tightly against the wall and to result in watertight seams. Secure wall panels to building wall with wall panel adhesive of proper type for wall construction. Seal end seams with General Electric or equivalent clear silicone sealer.

Electrical Trade shall provide the inter-wiring between the control enclosure, fire system, supply and exhaust fans and variable frequency drives and duct riser temperature switch.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

ITEM #83.1 HOOD CONTROL PANEL
Quantity: One (1)
Manufacturer: Captive Aire / Caddy / Avtec
Model: Size and shape per plan
Sup Info: Furnish 18 gauge stainless steel utility and fire system enclosure cabinet with hinged access doors for both hood and fire system controls and fire suppression tanks. System shall be listed by ETL (UL 508A) NSF, NFPA, IMC 2018 and any prevailing statutes or codes including automatic shut-down of all cooking appliances per code section 44 of NFPA 17-27. Cabinet may be freestanding wall type or integral with exhaust hood as shown on the contract drawings. Furnish stainless steel mounting hardware of proper type for wall construction for wall mounted cabinet.

Furnish and install variable volume motor control center with variable frequency drive, input / output processor and keypad enclosed within a stainless steel utility cabinet for remote mounting. System shall include, but not be limited to, electronic variable volume motor starters with thermal overload, input / output processors, control keypad, temperature and optic sensors and plug and play cables. Temperature sensor shall be mounted in the exhaust duct collar; optic sensor shall be mounted inside the ends of the hood with air purge units mounted on top.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

ITEM #83.2 FIRE PROTECTION SYSTEM

Quantity: One (1)
Manufacturer: Captive Aire
Model: TANK
Sup Info: Furnish and install in exhaust hood, plenum and surface fire protection system.

TANK Fire Suppression is a pre-engineered, stored-pressure wet chemical solutionextinguishing system.

TANK Fire Suppression System shall be UL & ULC listed in accordance with UL300,UL1254, ULCORD-C1254.6.

Microprocessor-based control board shall be ETL Listed to UL Standard 864 and CAN/ULC-S527-11.

TANK Fire Suppression System intended for installation and for use in accordance withthe National Fire Protection Association Standards:

7. Wet Chemical Extinguishing Systems, NFPA 17A
8. National Electrical Code, NFPA 70
9. National Fire Alarm & Signaling Code, NFPA 72

New York City and FDNY approved under COA# 5870.

California State Fire Marshal (CFSM), Listing No. 7085-2199:0502.

A pre-engineered, fixed pipe, automatic wet chemical agent fire suppression system forprotection of all hazard areas associated with cooking operations, including exhaust hoods, plenums, ductwork, and cooking appliances.

Exhaust hood fire system components to be factory installed.

**Cylinder and Valve Assembly**

47. The cylinders shall have a tin-nickel alloy plated brass valve with pressure gauge.
48. Wet chemical agent shall be contained in one or more stored pressure DOT/TC ratedsteel cylinder and valve assemblies.
49. Each cylinder is factory-filled with liquid fire suppressant and pressurized to 200 PSIGat 70°F.

**Distribution Nozzles**

50. Nozzles shall be located to protect the exhaust ducts, plenums, and all cookingappliances requiring protection.
51. All nozzles shall be equipped with a metal blow off cap. The cap prevents contamination from entering the pipe network and is designed to pop-off upon system discharge, allowing agent to flow to the protected hazard area.
52. All nozzles shall incorporate a stamped part number to easily identify nozzle type.

Distribution System

53. The distribution system shall consist of Copper, Schedule 40 black iron, chrome-plated or stainless-steel pipe and fittings. All exposed piping and fittings must be chrome-plated or stainless steel.

54. Fittings shall be minimum class 150. Galvanized fittings shall not be used.

Suppression System

55. The system control equipment shall be capable of all functions associated with automatically and manually discharging the wet chemical agent from all cylinder andvalve assemblies, including automatic shutdown of the heat source or fuel and electrical power to all protected areas upon system discharge.

56. Liquid Fire Suppressant shall be Aqueous Potassium Carbonate (APC).

57. All mechanical components of the actuator kit shall be enclosed.

58. The actuator kit shall be capable of automatic or manual activation means.

59. Supervisory Pressure Switch added to monitor operating system pressure.

60. For manual activation, an electrically operated manual release shall be used toactuate the system manually.

61. For automatic activation, the system will be activated by a Firestat (heat) detector.

**Electrical**

62. Electrical Division to provide shunt trip breakers at main power panel, or disconnects,as designated by the Electrical Engineer; interconnection provided at hood control panel for the signal to shut down all electricity in and under the exhaust hood. Shunt trips/disconnects to accomplish shut off of electricity in the event of fire system activation by others.

63. Printed circuit board with microprocessor-based controller that provides all the necessary monitoring, timing, and supervision functions required for the reliableoperation of the fire system.

64. Independent supervised loops incorporate redundancy and fault detection.

65. Real-time cloud-based monitoring connection provided with system by ownership.

66. Primary power supply, with battery backup for power loss.

67. All wiring must be in accordance to NFPA 70 and the Authority Having Jurisdiction(AHJ).

68. Electric gas valve provided for equipment below exhaust hood. Coordinate size andinstallation with Plumbing Division.

69. All wiring is to be in accordance with the applicable manufacturer's instructions for thefire alarm control panel, gas shut-off valve, manual reset relay, and contractor supplied shut-off devices.

As part of this item, provide wall mounted type K handheld portable fire extinguisher, placard, and mounting bracket as required in the immediate vicinity of each cooking area,per NFPA-96 and NFPA-10. Additional fire extinguishers as required in the kitchen area are to be specified by the Architect and provided by the General Contractor.

Inter-wiring of the fire system to the exhaust hood shall be furnished and installed by the Electrical Trade.

Provide as part of fire system, electrically operated gas supply line shut-off valve (two required for “loop” gas service) to interrupt gas supply to all gas operated cooking appliances. Gas valve shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide one remote manual pull station to actuate fire system in the event of a fire.

Plumbing Trade shall install gas shut-off valve(s) in gas supply line.

Electrical Trade shall inter-wire gas shut-off valve(s) to fire system.

Electrical Trade shall furnish and install electric shunt-trip circuit breakers or electric shut-off contactors to interrupt electric power to all electrically operated cooking appliances.

Provide dry contacts in fire system to interface with building fire alarm system as required, electrical tie-in shall be the responsibility of the Electrical Trade.

Provide as part of fire system, start-up testing of the fire system as required by local fire codes. Subsequent testing of the fire system for a period of one year after start-up shall be included as part of this contract.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

Install in accordance with manufacturer's instructions, drawings, written specifications,manufacturer’s installation manual, and all applicable building codes.

Six-month and twelve-month inspections, servicing, and replacement of components asper NFPA 96 to be provided by the General Contractor or Owner.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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|---|---|
| ITEM #84 | OVEN, DECK TYPE |
| Quantity: | One (1) |
| Manufacturer: | Doyon / Revent / Baxter |
| Model: | 2T2 |
| Options: | Built as modular, per deck<br>High: 8" high interior, for bottom deck<br>High: 8" high interior, for top deck<br>1" refractory stone deck, standard<br>ARTISANBRUSH Cleaning brush |

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|---|---|
| ITEM #85 | WORK TABLE, STAINLESS STEEL |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T30144SE |
| Options: | E36A Welded base<br>E59 Undershelf upgrade<br>YCORSI-502971-MOD Drawer (3) |

| | |
|---|---|
| ITEM #86 | SHELF, WALL MOUNT |
| Quantity: | Two (2) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | WSP1284-14/3 |
| Sup Info: | Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.<br><br>Construction Trade shall provide wall blocking as required for mounting. |

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|---|---|
| ITEM #87 | POT RACK, WALL MOUNT |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | WM72PR |
| Sup Info: | Includes (12) double pronged pot hooks.<br><br>Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.<br><br>Construction Trade shall provide wall blocking as required for mounting. |

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|---|---|
| ITEM #88 | THREE COMPARTMENT SINK |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | FN2860-3-30-14/3 |
| Options: | 313296 Pre-rinse faucet<br>313297 Add-a-faucet<br>301190 Pre-rinse wall bracket<br>313294 Splash mount faucet<br>341189 Twist handle drain (3)<br>-TB Twist bracket (3)<br>326271 Sink cover (3)<br>E47 Sink cover holder<br>E41A Disposal provision package |

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| ITEM #89 | POT RACK, WALL MOUNT |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | WM36PR |
| Sup Info: | Includes (6) double pronged pot hooks.<br><br>Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use. |

Construction Trade shall provide wall blocking as required for mounting.

ITEM #90 EXHAUST HOOD
Quantity: One (1)
Manufacturer: Captive Aire / Caddy / Avtec
Model: Size and shape as per plan
Construction: Furnish and install exhaust hood with integral plenum box make-air system.

Entire exhaust ventilation system shall be constructed in compliance with UL, NSF, NFPA, IMC 2018 (including automatic start-up of the exhaust and supply ventilation upon activation of any cooking appliance) and any prevailing statutes and codes.

Hood shall be 9'-6" long constructed in one equal sections of 18 gauge 304 stainless steel with all seams continuously welded, ground smooth and polished. Hood mounted utility cabinet is 1'. Provide a full compliment of stainless steel "high efficiency" Captrate Solo baffle type grease extractors.

Furnish remote bulb thermostat with watertight hardware and install in either the exhaust plenum of the hood or in the exhaust duct. Provide NEMA 3 control panel box with hinged front cover complete with supply and exhaust fan contactors wired to an adjustable thermostat control, field wiring terminal strip and on-off switch.

Provide 18 gauge 304 stainless steel supply and exhaust duct collar.

Provide 18 gauge 304 stainless steel insulated supply air plenum box assembly with internal air volume control damper integral along the face of the hood. Mount in finished ceiling along face of hood and furnish full length stainless steel perforated removable panels for discharge of supply air along entire face of hood.

Provide stainless steel threaded hanger rods complete with stainless steel mounting hardware for securing to structural ceiling.

Mechanical (HVAC) Trade shall furnish and install a complete exhaust air handling system including exhaust fan and controller, fan start-stop switch with status lights, 16 gauge insulated welded ductwork from exhaust collar on exhaust hood to fan, hinged roof curb with grease trough and removable grease container.

Mechanical (HVAC) Trade shall install exhaust hood heat detector(s) in exhaust hoods with multiple exhaust collars in the exhaust duct just after the point of the pant leg juncture; this includes punching of the required hole in the duct and installation of the heat detector and fitting.

Mechanical (HVAC) Trade shall furnish and install a complete supply air handling system including supply fan and controller (with maintainable filter system) and supply air heater with thermostat control (to temper incoming supply air below 65 degree F ambient), fan start-stop switch with indicator lights, galvanized steel ductwork from supply collar on exhaust hood to fan and roof curb.

Electrical Trade shall furnish and install interconnecting wiring between fan motors, controllers and switches.

Electrical Trade shall furnish and install inter-wiring of cooking appliance start-up inter-lock device and the supply and exhaust ventilation system and wire per the manufacturer's instructions and per applicable codes.

Furnish three (3) UL listed vapor-proof recessed LED light fixtures wired to a common on-off switch with stainless steel cover plate located in hood mounted utility cabinet.

Electrical Trade shall furnish materials and inter-wire light fixtures to hood mounted utility cabinet.

Mechanical (HVAC) Trade shall furnish and install INVERTER DUTY THREE PHASE exhaust fan and controller.

Mechanical (HVAC) Trade shall furnish fans set compatible with variable frequency drive specification.

Electrical Trade shall furnish and install Interconnecting wiring of the system between the exhaust hood sensors, remote frequency drive unit and exhaust and supply fan motors.

Furnish and install 18 gauge stainless steel ceiling closure panels extending from the top of the exhaust ventilator to the finished ceiling. Panels shall be removable without the use of tools for access.

Furnish and install 18 gauge 304 stainless steel wall panels extending from the bottom of the rear of the exhaust hood to the upper edge of the baseboard molding and extending along the full length of all wall surfaces. Wall panel sections shall be fitted with ½" wide off-set seams at intermediate joints to allow panel sections to fit tightly against the wall and to result in watertight seams. Secure wall panels to building wall with wall panel adhesive of proper type for wall construction. Seal end seams with General Electric or equivalent clear silicone sealer.

Electrical Trade shall provide the inter-wiring between the control enclosure, fire system, supply and exhaust fans and variable frequency drives and duct riser temperature switch.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #90.1 | HOOD CONTROL PANEL |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape per plan |
| Sup Info: | Furnish 18 gauge stainless steel utility and fire system enclosure cabinet with hinged access doors for both hood and fire system controls and fire suppression tanks. System shall be listed by ETL (UL 508A) NSF, NFPA, IMC 2018 and any prevailing statutes or codes including automatic shut-down of all cooking appliances per code section 44 of NFPA 17-27. Cabinet may be freestanding wall type or integral with |

exhaust hood as shown on the contract drawings. Furnish stainless steel mounting hardware of proper type for wall construction for wall mounted cabinet.

Furnish and install variable volume motor control center with variable frequency drive, input / output processor and keypad enclosed within a stainless steel utility cabinet for remote mounting. System shall include, but not be limited to, electronic variable volume motor starters with thermal overload, input / output processors, control keypad, temperature and optic sensors and plug and play cables. Temperature sensor shall be mounted in the exhaust duct collar; optic sensor shall be mounted inside the ends of the hood with air purge units mounted on top.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

ITEM #90.2 FIRE PROTECTION SYSTEM
Quantity: One (1)
Manufacturer: Captive Aire
Model: TANK
Sup Info: Furnish and install in exhaust hood, plenum and surface fire protection system.

TANK Fire Suppression is a pre-engineered, stored-pressure wet chemical solutionextinguishing system.

TANK Fire Suppression System shall be UL & ULC listed in accordance with UL300,UL1254, ULCORD-C1254.6.

Microprocessor-based control board shall be ETL Listed to UL Standard 864 and CAN/ULC-S527-11.

TANK Fire Suppression System intended for installation and for use in accordance withthe National Fire Protection Association Standards:

10. Wet Chemical Extinguishing Systems, NFPA 17A
11. National Electrical Code, NFPA 70
12. National Fire Alarm & Signaling Code, NFPA 72

New York City and FDNY approved under COA# 5870.

California State Fire Marshal (CFSM), Listing No. 7085-2199:0502.

A pre-engineered, fixed pipe, automatic wet chemical agent fire suppression system forprotection of all hazard areas associated with cooking operations, including exhaust hoods, plenums, ductwork, and cooking appliances.

Exhaust hood fire system components to be factory installed.

**Cylinder and Valve Assembly**

70. The cylinders shall have a tin-nickel alloy plated brass valve with pressure gauge.

71. Wet chemical agent shall be contained in one or more stored pressure DOT/TC ratedsteel cylinder and valve assemblies.

72. Each cylinder is factory-filled with liquid fire suppressant and pressurized to 200 PSIGat 70°F.

**Distribution Nozzles**

73. Nozzles shall be located to protect the exhaust ducts, plenums, and all cookingappliances requiring protection.

74. All nozzles shall be equipped with a metal blow off cap. The cap prevents contamination from entering the pipe network and is designed to pop-off upon system discharge, allowing agent to flow to the protected hazard area.

75. All nozzles shall incorporate a stamped part number to easily identify nozzle type.

Distribution System

76. The distribution system shall consist of Copper, Schedule 40 black iron, chrome-plated or stainless-steel pipe and fittings. All exposed piping and fittings must be chrome-plated or stainless steel.

77. Fittings shall be minimum class 150. Galvanized fittings shall not be used.

Suppression System

78. The system control equipment shall be capable of all functions associated with automatically and manually discharging the wet chemical agent from all cylinder andvalve assemblies, including automatic shutdown of the heat source or fuel and electrical power to all protected areas upon system discharge.

79. Liquid Fire Suppressant shall be Aqueous Potassium Carbonate (APC).

80. All mechanical components of the actuator kit shall be enclosed.

81. The actuator kit shall be capable of automatic or manual activation means.

82. Supervisory Pressure Switch added to monitor operating system pressure.

83. For manual activation, an electrically operated manual release shall be used toactuate the system manually.

84. For automatic activation, the system will be activated by a Firestat (heat) detector.

**Electrical**

85. Electrical Division to provide shunt trip breakers at main power panel, or disconnects,as designated by the Electrical Engineer; interconnection provided at hood control panel for the signal to shut down all electricity in and under the exhaust hood. Shunt trips/disconnects to accomplish shut off of electricity in the event of fire system activation by others.

86. Printed circuit board with microprocessor-based controller that provides all the necessary monitoring, timing, and supervision functions required for the reliableoperation of the fire system.

87. Independent supervised loops incorporate redundancy and fault detection.

88. Real-time cloud-based monitoring connection provided with system by ownership.

89. Primary power supply, with battery backup for power loss.

90. All wiring must be in accordance to NFPA 70 and the Authority Having Jurisdiction(AHJ).

91. Electric gas valve provided for equipment below exhaust hood. Coordinate

size andinstallation with Plumbing Division.

92. All wiring is to be in accordance with the applicable manufacturer's instructions for thefire alarm control panel, gas shut-off valve, manual reset relay, and contractor supplied shut-off devices.

As part of this item, provide wall mounted type K handheld portable fire extinguisher, placard, and mounting bracket as required in the immediate vicinity of each cooking area,per NFPA-96 and NFPA-10. Additional fire extinguishers as required in the kitchen area are to be specified by the Architect and provided by the General Contractor.

Inter-wiring of the fire system to the exhaust hood shall be furnished and installed by the Electrical Trade.

Provide as part of fire system, electrically operated gas supply line shut-off valve (two required for "loop" gas service) to interrupt gas supply to all gas operated cooking appliances. Gas valve shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide one remote manual pull station to actuate fire system in the event of a fire.

Plumbing Trade shall install gas shut-off valve(s) in gas supply line.

Electrical Trade shall inter-wire gas shut-off valve(s) to fire system.

Electrical Trade shall furnish and install electric shunt-trip circuit breakers or electric shut-off contactors to interrupt electric power to all electrically operated cooking appliances.

Provide dry contacts in fire system to interface with building fire alarm system as required, electrical tie-in shall be the responsibility of the Electrical Trade.

Provide as part of fire system, start-up testing of the fire system as required by local fire codes. Subsequent testing of the fire system for a period of one year after start-up shall be included as part of this contract.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

Install in accordance with manufacturer's instructions, drawings, written specifications,manufacturer's installation manual, and all applicable building codes.

Six-month and twelve-month inspections, servicing, and replacement of components asper NFPA 96 to be provided by the General Contractor or Owner.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #91 | FRYER |
| Quantity: | One (1) |
| Manufacturer: | Frymaster / Pitco / Vulcan |
| Model: | FPPH255 |
| Options: | 8030002 Filter powder<br>8030170 Filter paper<br>8239116 Sediment filter screen<br>8030103 Sediment tray<br>8030197 Clean-out rod<br>8236559 Splash shield<br>8030429 Fryer brush<br>8239416 Frypot cover<br>8233938 Crumb scoop<br>CM3.5 Controller, standard<br>6” casters<br>Gas pressure regulator<br>Rear gas manifold<br>FWH-1A French fry warmer and holding station (with heat lamp)<br>Spreader cabinet with cutout in top<br>Holding pan with screen for spreader cabinet<br>Natural gas<br>Dormont 16100KITCF2S-48 gas hose kit |
| Sup Info: | Foodservice Equipment Contractor shall install disconnect at wall and to cooking appliance per manufacturer’s instructions.<br><br>Foodservice Equipment Contractor shall provide and secure restraining cable between wall and equipment. |

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|---|---|
| ITEM #92 | GRIDDLE, COUNTERTOP |
| Quantity: | One (1) |
| Manufacturer: | Garland / Vulcan / Imperial |
| Model: | GTGG36-GT36M |
| Options: | Gas pressure regulator<br>Dormont 1675KITCF2S48 Gas hose kit |
| Sup Info: | Foodservice Equipment Contractor shall install disconnect at wall connection and to cooking appliance per manufacturer’s instructions.<br><br>Foodservice Equipment Contractor shall provide and secure restraining cable between wall and equipment. |

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| ITEM #93 | REFRIGERATED EQUIPMENT STAND |
| Quantity: | One (1) |
| Manufacturer: | Continental / Victory / True |
| Model: | D36GN |
| Options: | Flat top<br>Stainless steel interior<br>Stainless steel exterior |

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| | Stainless steel case back<br>Exterior mounted digital thermometer<br>Automatic condensate evaporator<br>Swivel casters with polyurethane tires and front locking brakes<br>Plug and cord set |
| ITEM #94 | FOUR OPEN BURNER RANGE |
| Quantity: | Two (2) |
| Manufacturer: | Garland / Vulcan / Imperial |
| Model: | G24-4L |
| Options: | Stainless steel sides (2)<br>Stainless steel back (2)<br>Rear gas connection (2)<br>Stainless steel manifold covers (2)<br>Manifold end caps (2)<br>Swivel casters with polyurethane tires and front locking brakes (2 sets)<br>Gas pressure regulator (2)<br>Dormont 1675KIT48PS gas hose kit (2) |
| Sup Info: | Foodservice Equipment Contractor shall install disconnect at wall connection and to cooking appliance per manufacturer's instructions.<br><br>Foodservice Equipment Contractor shall provide and secure restraining cable between wall and equipment. |
| ITEM #95 | COMBI-OVEN |
| Quantity: | Two (2) |
| Manufacturer: | Alto-Shaam / Convotherm / Angelo Po |
| Model: | CTP7-20G OVER CTP7-20G |
| Options: | 5021522 Installation kit (2)<br>Natural gas (4)<br>Removeable single-point temperature probe (4)<br>Doors hinged right, standard (2)<br>COMBILIQUICLEAN Automatic liquid cleaning system (2)<br>CE-36457 Liquid cleaner (2)<br>CE-27889 Deliming product (2)<br>BH-38059 Cleanoutbrush (2)<br>SC-47403 Oven scraper (2)<br>BS-26730 Fry basket (4)<br>5016707 Stacking hardware (2)<br>5017391 Mobile stacking base (2)<br>Gas pressure regulator (4)<br>5015711 Mobile oven stand (2)<br>1675KITCF2S48PS Dormont gas hose kit (4)<br>W50BP2Q48 Dormont water hose kit (8) |
| Sup Info: | Kitchen Equipment Contractor shall install disconnect at wall and to cooking appliance per manufacturer's instructions.<br><br>Kitchen Equipment Contractor shall provide and secure restraining cable between wall and equipment. |

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| ITEM #96 | FLOOR TROUGH |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | ASFT-2430-SG |
| Sup Info: | Construction Trade shall provide floor recess and install floor pan in recess flush with adjacent kitchen floor in a watertight manner. |

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| ITEM #97 | REFRIGERATOR, UNDERCOUNTER |
| Quantity: | One (1) |
| Manufacturer: | Continental / Victory / True |
| Model: | SW60N24M-FB |
| Options: | Stainless steel interior<br>Stainless steel exterior<br>Stainless steel case back<br>Field reversible doors<br>Exterior mounted digital thermometer<br>Automatic condensate evaporator<br>Swivel casters with polyurethane tires and front locking brakes<br>Plug and cord set |

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| ITEM #98 | CHEF'S COUNTER |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | Custom |
| Construction: | Furnish and install chef's counter assembly with 14 gauge stainless steel top with 2" diameter rolled edges with bullnosed corners. |

Counter base shall be fabricated of 18 gauge stainless steel wrap around type construction. Provide stainless steel fully welded channel frame around the entire perimeter of the counter top with intermediate cross bracing extending front to rear on centers not to exceed 24" to support top. Provide interior of counter base with solid fixed open bottom and intermediate shelves constructed of 16 gauge stainless steel unless specified otherwise. The front edge of each shelf shall be turned down 2" at 90 degrees and returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" high on a 90 degree angle, interior corners coved on 3/4" radius.

Sink section shall be furnished with one 12" x 15" x 8" deep stainless steel sink fabricated of 14 gauge stainless steel with all interior corners coved on a 3/4" radius, both horizontally and vertically, forming spherical corners. Sink shall be fabricated as an integral part of fixture with sink fully welded with adjacent top, welds ground smooth and polished.

Provide and install Component Hardware E38-1012 basket type drain assembly with stainless steel crumb cup stopper.

Punch top and provide T&S Brass & Bronze Works B-222 faucet with aerator.

Provide counter base below sink with 18 gauge stainless steel hinged apron. Below apron provide 16 gauge stainless steel double pan hinged access door with stainless steel recessed handle. Base below sink shall have bottom and rear open for passage of plumbing lines.

Chefs counter shall be provided with open plate storage cabinet along counter front. Plate cabinet shelves shall be fixed bottom and intermediate fabricated of 18 gauge stainless steel. Front edge shall be turned down 1-1/2" at 90 degrees, returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" at 90 degrees with interior corners coved on a 1/2" radius. Shelf shall be weld anchored to cabinet body. Bottom shelf shall be fabricated flush with front mullions with fully welded facing junctures presenting seamless construction. Fixed intermediate shelves shall be designed similar to bottom shelf except front edge shall be set behind vertical mullions and fully welded thereto. Top of plate storage cabinet shall be 34" high overall with top of chefs counter turned down 2" at 90 degrees into top of plate storage cabinet.

Provide full length 16” wide two tier overshelf constructed of 18 gauge stainless steel with 1-1/2" diameter rolled edges with bullnose corners. Lower shelf shall be 16" above table surface, upper shelf shall be 12" above lower shelf. Shelf shall be mounted on 1-1/4" diameter 16 gauge stainless steel tubular uprights, fully welded, ground smooth and polished to equipment top. Along bottom of shelf, uprights shall be fully welded to 1" X 4" X 1"; 14 gauge stainless steel "hat" type mounting channels. Tack weld mounting channel front to rear along underside of shelf on centers not to exceed 48". Provide longitudinal reinforcing channels constructed identical to mounting channels, weld to same and extend full length along center of shelf between mounting channels. Furnish and factory install to underside of upper shelf, Hatco GRH infra-red heat lamps with built-in infinite control and pilot light.

Provide provisions for Item #72 drop-in hot/cold/freeze.

Provide provisions for Item #97 refrigerated sandwich unit.

Provide provisions for Item #138 heat lamp.

Provide working side of cabinet base with stainless steel NEMA 4 electrical panel box with main and individual circuit breakers for all related electrical appliances and components. The panel box shall be provided with shunt-trip circuit breakers for all electrically operated cooking appliances. All appliances and components to be furnished as built-in equipment as part of the counter shall be factory installed per the manufacturers instructions, all electrical wiring and components shall conform to UL and shall be installed in accordance with the National Electric Code. The entire counter assembly shall bear the UL seal.

Mount counter assembly on 12 gauge stainless steel triangular leg gusset mounting channels on centers not to exceed 48" in length and fully welded to the cabinet body. Mount counter assembly on 6” high 1 5/8” diameter 16 gauge stainless steel tubular legs with stainless steel adjustable bullet feet fully weld legs to mounting gussets.

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| ITEM #99 | ICE BIN |
| Quantity: | One (1) |
| Manufacturer: | Follet / Hoshizaki / Manitowoc |
| Model: | DEV1080SG-60 |
| Options: | ABICEPADDL46 Ice paddle |
| | 00146365 Guardian scoop system |

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| ITEM #100 | ICE MAKER |
| Quantity: | One (1) |
| Manufacturer: | Hoshizaki / Manitowoc / Ice-O-Matic |
| Model: | KM-1100MAH |
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| ITEM #100F | ICE MAKER WATER FILTER |
| Quantity: | One (1) |
| Manufacturer: | Everpure / 3M / Optipure |
| Model: | QC7I TWIN 7FC5-S<br>EV969371 Replacement cartridge |
| Sup Info: | Foodservice Equipment Contractor shall install ice maker filter system in water supply line and furnish and install interconnecting piping between water filter and ice maker water inlet. |
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| ITEM #101 | WORK TABLE, STAINLESS STEEL TOP W/ DOUBLE PREP SINK |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T3084S-BS |
| Options: | E36A Welded base<br>E59 Undershelf upgrade<br>E22 Sink bowl, weld in (2)<br>341189 Twist handle drain (2)<br>-TB bracket (2)<br>351585 Sink cover (2)<br>E47 Sink cover holder<br>YCORSI-502971-MOD Drawer |
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| ITEM #102 | ICE CADDY |
| Quantity: | One (1) |
| Manufacturer: | Cambro / Carlisle |
| Model: | ICS125L110 |
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| ITEM #103 | SODA SYSTEM |
| Quantity: | One (1) |
| Sup Info: | Not in Foodservice Equipment contract, furnished by the Owner. |
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| ITEM #104 | SODA/ICE DISPENSER |
| Quantity: | One (1) |
| Sup Info: | Not in Foodservice Equipment contract, furnished by the Owner. |
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| ITEM #105 | WORK TABLE, STAINLESS STEEL TOP W/ DOUBLE PREP SINK |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | BEV30120SE-10BS/L |
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| ITEM #106 | TEA BREWER |
| Quantity: | One (1) |
| Manufacturer: | Bunn-O-Matic |
| Model: | 36700.0009 |
| Options: | 34100.0002 Dispenser |

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| ITEM #106F | TEA BREWER WATER FILTER |
| Quantity: | One (1) |
| Manufacturer: | Everpure / 3M / Optipure |
| Model: | QC7I SINGLE 4FC-S<br>EV969231 Replacement cartridge (primary filter) |
| Sup Info: | Foodservice Equipment Contractor shall install tea brewer filter system in water supply line and furnish and install interconnecting piping between water filter and tea brewer water inlet. |

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| ITEM #107 | COFFEE BREWER |
| Quantity: | One (1) |
| Manufacturer: | Bunn-O-Matic |
| Model: | 39200.0000 |
| Options: | 39400.0001 Thermal server |

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| ITEM #107F | COFFEE BREWER WATER FILTER |
| Quantity: | One (1) |
| Manufacturer: | Everpure / 3M / Optipure |
| Model: | QC7I SINGLE 7FC5-S<br>EV969371 Replacement cartridge (primary filter)<br>EV953426 Replacement cartridge (prefilter) |
| Sup Info: | Foodservice Equipment Contractor shall install tea brewer filter system in water supply line and furnish and install interconnecting piping between water filter and tea brewer water inlet. |

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| ITEM #108 | REFRIGERATOR, UNDERCOUNTER |
| Quantity: | Sixteen (16) |
| Manufacturer: | Continental / Victory / True |
| Model: | SW27N-U |
| Options: | Stainless steel interior (16)<br>Stainless steel exterior (16)<br>Stainless steel case back (16)<br>Field reversible doors (16)<br>Exterior mounted digital thermometer (16)<br>Automatic condensate evaporator (16)<br>Swivel casters with polyurethane tires and front locking brakes (16)<br>Plug and cord set (16) |

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| ITEM #109 | CAN RACK |
| Quantity: | Two (2) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | CRC4 |

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| ITEM #110 | UTILITY DISTRIBUTION SYSTEM |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape per plan |
| Construction: | Furnish and install utility distribution system. |

Utility distribution system shall be fabricated in accordance with UL, NSF, NEC, IMC 2015.

Utility distribution system shall be fabricated of a minimum of 18 gauge 304 stainless steel consisting of two utility compartments and fabricated in sections as required with factory pre-assembled field connections and furnished with one primary end riser with single point connection for all utilities and one secondary end riser.

Primary riser shall be furnished with built-in exhaust hood controls, including push button fan control switches with status lights, individual and shunt-trip main circuit breaker and emergency "kill" button with guard.

Provide as part of raceway exhaust hood interlock device to prevent all electrically and gas operated cooking appliances from operating unless the supply and exhaust fans of the exhaust hood is operating as required by all local and prevailing codes including IMC 2015.

Provide raceway with splash proof electrical chase with copper wire-way wired to a circuit breaker panel box with ground fault protection for each appliance in the primary end riser, and UL listed power cords and matching electrical receptacles as required.

Provide raceway with gas supply (looped) service with shut-off valves for each disconnect hose or connection and safety retainer cables for each mobile appliance. Provide as part of utility distribution system, mechanically operated gas supply line shut-off valves to interrupt gas supply to all gas operated cooking appliances. Gas valves shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide raceway with hot and cold water service with shut-off valves for each disconnect hose or connection and safety retainer cables for each mobile appliance.

Provide each riser with ventilator connecting collars for positive connection to the exhaust hood.

Provide secondary end riser with hinged access door for mounting of gas supply line shut-off valve (looped gas service).

Furnish and install labor and material to assemble all internal interconnecting gas piping, water piping and electrical wiring to install the utility distribution system. Test all connections for leaks.

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| ITEM #111 | WORK TABLE, ENCLOSED BASE |
| Quantity: | Seven (7) |
| Manufacturer: | Eagle group / John Boos / Advance Tabco |
| Model: | Size and shape per plan |
| Construction: | Top shall be fabricated of 14 gauge stainless steel. Exposed edges shall be rolled down 2" diameter at 180 degrees. Provide backsplash along adjoining surfaces with top turned up integrally 6" high on a 3/4" radius at a 90 degree angle, turned back 1" on a 90 degree angle and down 1/2" on a 90 degree angle. |

Cabinet body shall be fabricated of 18 gauge stainless steel wrap around construction. The backs of front stiles shall be closed with tight fitting channel sections of 18 gauge stainless steel, welded in place and closed on top and bottom.

Provide sink section(s) with 14" x 16" x 10" deep sink fabricated of 14 gauge stainless steel with all interior corners coved on a 3/4" radius, both horizontally and vertically, forming spherical corners. Sink shall be fabricated as an integral part of fixture with sink fully welded with adjacent top, welds ground smooth and polished. Sinks shall be facing in towards ranges on each side.

Punch top and provide T&S Brass & Bronze Works B-300 double pantry faucet(s) with gooseneck nozzle and aerator.

Furnish and install Component Hardware D50-7215 lever type drain assemblies with connected overflow and stainless steel flat strainer plate.

Provide counter base below sink with stainless steel apron with recess for lever waste handle. Below apron provide stainless steel, double pan hinged access door with stainless steel recessed handle. Access doors shall be behind the undercounter refrigerators on both sides. Base below sink shall have bottom and rear open for passage of plumbing lines.

Provide provisions for Item #108 undercounter refrigerators on each side of the table, facing opposite of each other.

Provide cutout/provisions for Item #132 2-range burners (qty 4 for each table).

Provide remainder of cabinet base with open fixed bottom and intermediate fabricated shelves fabricated of 18 gauge stainless steel. Front edge shall be turned down 1-1/2" at 90 degrees, returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" at 90 degrees with interior corners coved on a 3/4" radius. Shelf shall be weld anchored to cabinet body. Bottom shelf shall be fabricated flush with front mullions with fully welded facing junctures presenting seamless construction. Fixed intermediate shelves shall be designed similar to bottom shelf except front edge shall be set behind vertical mullions and fully welded thereto.

Mount on counter type stainless steel conical shaped die-formed legs with stainless steel, bullet shaped adjustable foot fully welded to leg mounting channel.

Refer to elevations on FS-1.2 for detail.

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| ITEM #112 | SOILED DISHTABLE |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | SDTL-96-14/3 |
| Options | -SRP Dishtable kit, includes scrap basket, rack slide and T&S pre-rinse |
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| ITEM #113 | DISHWASHER, CONVEYOR TYPE |
| Quantity: | One (1) |

Manufacturer: Hobart / Champion / Stero
Model: CL44EN-ADV4+BUILDUP
Options: CL44EN-ADVHTE15K Electric tank heat 15kW
CL44EN-ADVERH30K 30kW electric booster
CL44EN-ADVELE0AX 208v/60/3-ph
SGLPT-KIT4-CLE Single point electrical connection
HOBINST-SGLPT-CLE Accessory installation
CL44EN-ADVHGTSTD Standard height
CL44EN-ADVDIR0RL Right to left operation
CL44EN-ADVFETSTD Standard feet
PRESREG-1/20BR Brass pressure regulator
1/2INSHK-ABSRBR Water shock absorber kit
CLE/TBL-SWITCH Table limit switch CLE-Series
Exhaust fan activation switch

ITEM #114 CONDENSATE HOOD
Quantity: One (1)
Manufacturer: Captive Aire / Caddy / Avtec
Model: Size and shape per plan
Construction: Furnish and install condensate hood.

Entire condensate ventilation system shall be constructed in compliance with UL, NSF and any prevailing statutes and codes.

Fabricate entire hood of 18 gauge 304 stainless steel fully welded watertight construction.

Provide stainless steel welded hanger mounting clips with threaded stainless steel hanger and structural ceiling providing necessary angles and channels and utilizing stainless steel mounting hardware.

Mechanical (HVAC) Trade shall provide stainless steel welded ductwork (horizontal duct runs shall be pitched back toward condensate hood) and fan to comprise a complete condensate exhaust system.

Electrical Trade shall install fan switch with indicator lights located on dish machine and inter-wire to fan.

Furnish and install plastic drain tubing from nipple on bleeder drain outlet to soiled dishtable top surface.

Furnish and install 18 gauge stainless steel ceiling closure panels extending from the top of the exhaust ventilator to the finished ceiling. Panels shall be removable without the use of tools for access.

Furnish and install 18 gauge 304 stainless steel wall panels extending from the bottom of the rear of the exhaust hood to the upper edge of the baseboard molding and extending along the full length of all wall surfaces. Wall panel sections shall be fitted with ½" wide off-set seams at intermediate joints to allow panel sections to fit tightly against the wall and to result in watertight seams. Secure wall panels to building wall with wall panel adhesive of proper type for wall construction. Seal end

seams with General Electric or equivalent clear silicone sealer.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #115 | CLEAN DISHTABLE |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | CDTR-60-14/3 |
| Options: | E120 Table limit switch provision |

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| ITEM #116 | HAND SINK, DROP-IN |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | SR10-14-9.5-1 |
| Options: | Standard faucet<br>Faucet hole punched on 4” centers, standard<br>DP-10 Wall mounted Eagle paper towel and soap dispenser |

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| ITEM #117 | WORK TABLE, STAINLESS STEEL TOP |
| Quantity: | One (1) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | T36144SE |
| Options: | E36A Welded base<br>E59 Undershelf upgrade<br>YCORSI-502971-MOD Drawer (3)<br>DOS10132-14/3 Double overshelf (center) |

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| ITEM #118 | AIRPOT |
| Quantity: | Four (4) |
| Manufacturer: | Bunn-O-Matic |
| Model: | 32125.0000 |
| ITEM #119 | DISPLAY, NON-REFRIGERATED |
| Quantity: | One (1) |
| Manufacturer: | Equipex / Structural Concepts / Federal |
| Model: | TN583 |

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| ITEM #120 | FRONT COUNTER |
| Quantity: | One (1) |
| Manufacturer: | Duke / Multiteria / Delfield |
| Model: | Size and shape per plan |
| Construction: | Fabricate counter top of solid surface material. Material shall be fabricated and assembled per manufacturers approved methods utilizing a factory authorized and certified fabricator and installer. The edges of the top shall be formed as indicated. Openings shall have radius corners and shall be reinforced with additional material.<br><br>Counter base shall be fabricated of 18 gauge stainless steel wrap around type construction. Provide stainless steel fully welded channel frame around the entire perimeter of the counter top with intermediate cross bracing extending front to rear on centers not to exceed 24” to support top. Provide interior of counter base with solid |

fixed open bottom and intermediate shelves constructed of 16 gauge stainless steel unless specified otherwise. The front edge of each shelf shall be turned down 2" at 90 degrees and returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" high on a 90 degree angle, interior corners coved on 3/4" radius.

Hinged doors shall be fabricated of ¾" thick MDF board and shall be furnished with three BLUM 75M5580 or 75M5680 European style concealed hinges. Door pulls shall be Hafele 116.39.437. Finish doors with laminated plastic on all edges and interior and exterior face. Doors shall not exceed 27" in width and shall be of equal size. Provide each door with chrome plated cylinder locks keyed alike.

All appliances and components to be furnished as built-in equipment as part of the counter shall be factory installed per the manufacturer's instructions, all electrical wiring and components shall conform to UL and shall be installed in accordance with the National Electric Code with all wiring extended to a junction box connection point in counter base with all wires tagged and identified.

Provide provisions for Item #108 undercounter refrigerator.

Provide provisions for Item #116 drop-in sink.

Provide provisions for Item #123 undercounter refrigerator.

Furnish utility chases through counter body and die-raised openings in counter top for passage of plumbing and utility lines.

Provide 12 gauge stainless steel 1" x 5" x 1" "hat" type leg mounting channels extending full width of counter on centers not to exceed 48" in length and fully welded to the angle iron frame. Mount counter assembly on 6" high stainless steel counter type conical legs with stainless steel adjustable bullet feet fully welded to leg mounting channels.

Counter front and exposed ends shall be provided with high pressure laminated plastic faced panels close fitted with hairline joints and secured in position in a concealed manner and removable without the use of tools. Laminate selection to be made by the Architect/Owner.

Provide 6" high recessed toe base on customers side and exposed ends fabricated of 18 gauge 304 stainless steel and secured to counter base for removal without tools.

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| ITEM #121 | CONDIMENT COUNTER |
| Quantity: | Two (2) |
| Manufacturer: | Duke / Multiteria / Delfield |
| Model: | Size and shape per plan |
| Construction: | Fabricate counter top of solid surface material. Material shall be fabricated and assembled per manufacturers approved methods utilizing a factory authorized and certified fabricator and installer. The edges of the top shall be formed as indicated. Openings shall have radius corners and shall be reinforced with additional material. |

Counter base shall be fabricated of 18 gauge stainless steel wrap around type construction. Provide stainless steel fully welded channel frame around the entire perim-

eter of the counter top with intermediate cross bracing extending front to rear on centers not to exceed 24" to support top. Provide interior of counter base with solid fixed open bottom and intermediate shelves constructed of 16 gauge stainless steel unless specified otherwise. The front edge of each shelf shall be turned down 2" at 90 degrees and returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" high on a 90 degree angle, interior corners coved on 3/4" radius.

Hinged doors shall be fabricated of ¾" thick MDF board and shall be furnished with three BLUM 75M5580 or 75M5680 European style concealed hinges. Door pulls shall be Hafele 116.39.437. Finish doors with laminated plastic on all edges and interior and exterior face. Doors shall not exceed 27" in width and shall be of equal size. Provide each door with chrome plated cylinder locks keyed alike.

Furnish one 20" hole in countertop for trash as shown on plans. Line the entire opening perimeter with laminated plastic in finish as the counter top and furnish hole with an 18 gauge type 304 stainless steel removable sleeve to line opening. Each sleeve shall have a 1/2" flange around the perimeter of the top and shall be 1-1/2" high overall.

Furnish utility chases through counter body and die-raised openings in counter top for passage of plumbing and utility lines.

Provide 12 gauge stainless steel 1" x 5" x 1" "hat" type leg mounting channels extending full width of counter on centers not to exceed 48" in length and fully welded to the angle iron frame. Mount counter assembly on 6" high stainless steel counter type conical legs with stainless steel adjustable bullet feet fully welded to leg mounting channels.

Counter front and exposed ends shall be provided with high pressure laminated plastic faced panels close fitted with hairline joints and secured in position in a concealed manner and removable without the use of tools. Laminate selection to be made by the Architect/Owner.

Provide 6" high recessed toe base on customers side and exposed ends fabricated of 18 gauge 304 stainless steel and secured to counter base for removal without tools.

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| ITEM #122 | COMMERCIAL WASTE CONTAINER |
| Quantity: | Two (2) |
| Manufacturer: | Rubbermaid |
| Model: | FG263200GRAY |
| | FG263100GRAY Lid (2) |
| | FG264000BLA Dolly (2) |

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| ITEM #123 | REFRIGERATOR, UNDERCOUNTER |
| Quantity: | One (1) |
| Manufacturer: | Continental / Victory / True |
| Model: | SW36N-U |
| Options: | Stainless steel interior |
| | Stainless steel exterior |
| | Stainless steel case back |

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| | Field reversible doors<br>Exterior mounted digital thermometer<br>Automatic condensate evaporator<br>Swivel casters with polyurethane tires and front locking brakes<br>Plug and cord set |
| ITEM #124 | SOLID TOP UNIT |
| Quantity: | Four (4) |
| Manufacturer: | Duke/ Multiteria / Delfield |
| Model: | TST-32SS |
| Options: | Owner/Architect to select laminate finish (4)<br>MOD-12-32 Extend top – Custom size 38” (4)<br>TDST-X-2 Recessed top (4)<br>SOLID-HD-2CU Tray slide, customer side (4)<br>MOD-2S-2CU Kick plate, customer side (4) |
| ITEM #125 | SIDE LOADER |
| Quantity: | One (1) |
| Manufacturer: | Hobart / Champion / Stero |
| Model: | SL23/E-NOHDLR |
| ITEM #126 | WIRE SHELVING |
| Quantity: | Three (3) |
| Manufacturer: | Metro / Eagle group / Quantum |
| Model: | PR2442NK3 (12) |
| Options: | 70UPK3 Posts (12)<br>5MP Casters (6)<br>5MPB Casters (6) |
| Sup Info: | Assemble into four tier shelving units, locate bottom shelf 12” above floor. |
| ITEM #127 | SNEEZE GUARD, STATIONARY |
| Quantity: | Eight (8) |
| Manufacturer: | BSI / Premier Brass / English |
| Model: | ZG9930<br>Stainless steel tubing, posts and framing (8)<br>3/8" Tempered glass (8)<br>End panels (8)<br>705 Stealth Warmer & Light Combo (8)<br>Remote Infinite (8)<br>SSU5-N Stainless steel undercounter mount (8) |
| ITEM #128 | EXHAUST HOOD |
| Quantity: | Seven (7) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape as per plan |
| Construction: | Furnish and install exhaust hood with integral plenum box make-air system.<br><br>Entire exhaust ventilation system shall be constructed in compliance with UL, NSF, NFPA, IMC 2018 (including automatic start-up of the exhaust and supply ventilation upon activation of any cooking appliance) and any prevailing statutes and codes. |

Hood shall be 6' long island configuration constructed in one equal sections of 18 gauge 304 stainless steel with all seams continuously welded, ground smooth and polished. Provide a full compliment of stainless steel "high efficiency" Captrate Solo baffle type grease extractors.

Furnish remote bulb thermostat with watertight hardware and install in either the exhaust plenum of the hood or in the exhaust duct. Provide NEMA 3 control panel box with hinged front cover complete with supply and exhaust fan contactors wired to an adjustable thermostat control, field wiring terminal strip and on-off switch.

Provide 18 gauge 304 stainless steel supply and exhaust duct collar.

Provide 18 gauge 304 stainless steel insulated supply air plenum box assembly with internal air volume control damper integral along the face of the hood. Mount in finished ceiling along face of hood and furnish full length stainless steel perforated removable panels for discharge of supply air along entire face of hood.

Provide stainless steel threaded hanger rods complete with stainless steel mounting hardware for securing to structural ceiling.

Mechanical (HVAC) Trade shall furnish and install a complete exhaust air handling system including exhaust fan and controller, fan start-stop switch with status lights, 16 gauge insulated welded ductwork from exhaust collar on exhaust hood to fan, hinged roof curb with grease trough and removable grease container.

Mechanical (HVAC) Trade shall install exhaust hood heat detector(s) in exhaust hoods with multiple exhaust collars in the exhaust duct just after the point of the pant leg juncture; this includes punching of the required hole in the duct and installation of the heat detector and fitting.

Mechanical (HVAC) Trade shall furnish and install a complete supply air handling system including supply fan and controller (with maintainable filter system) and supply air heater with thermostat control (to temper incoming supply air below 65 degree F ambient), fan start-stop switch with indicator lights, galvanized steel ductwork from supply collar on exhaust hood to fan and roof curb.

Electrical Trade shall furnish and install interconnecting wiring between fan motors, controllers and switches.

Electrical Trade shall furnish and install inter-wiring of cooking appliance start-up inter-lock device and the supply and exhaust ventilation system and wire per the manufacturer's instructions and per applicable codes.

Furnish three (3) UL listed vapor-proof recessed LED light fixtures wired to a common on-off switch with stainless steel cover plate located in control box..

Electrical Trade shall furnish materials and inter-wire light fixtures to wall mounted control panel.

Mechanical (HVAC) Trade shall furnish and install INVERTER DUTY THREE PHASE exhaust fan and controller.

Mechanical (HVAC) Trade shall furnish fans set compatible with variable frequency drive specification.

Electrical Trade shall furnish and install Interconnecting wiring of the system between the exhaust hood sensors, remote frequency drive unit and exhaust and supply fan motors.

Furnish and install 18 gauge stainless steel ceiling closure panels extending from the top of the exhaust ventilator to the finished ceiling. Panels shall be removable without the use of tools for access.

Electrical Trade shall provide the inter-wiring between the control enclosure, fire system, supply and exhaust fans and variable frequency drives and duct riser temperature switch.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #128.1 | HOOD CONTROL PANEL |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape per plan |
| Sup Info: | Furnish 18 gauge stainless steel utility and fire system enclosure cabinet with hinged access doors for both hood and fire system controls and fire suppression tanks. System shall be listed by ETL (UL 508A) NSF, NFPA, IMC 2018 and any prevailing statutes or codes including automatic shut-down of all cooking appliances per code section 44 of NFPA 17-27. Cabinet may be freestanding wall type or integral with exhaust hood as shown on the contract drawings. Furnish stainless steel mounting hardware of proper type for wall construction for wall mounted cabinet. |

Furnish and install variable volume motor control center with variable frequency drive, input / output processor and keypad enclosed within a stainless steel utility cabinet for remote mounting. System shall include, but not be limited to, electronic variable volume motor starters with thermal overload, input / output processors, control keypad, temperature and optic sensors and plug and play cables. Temperature sensor shall be mounted in the exhaust duct collar; optic sensor shall be mounted inside the ends of the hood with air purge units mounted on top.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #128.2 | FIRE PROTECTION SYSTEM |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire |
| Model: | TANK |
| Sup Info: | Furnish and install in exhaust hood, plenum and surface fire protection system. |

TANK Fire Suppression is a pre-engineered, stored-pressure wet chemical solutionextinguishing system.

TANK Fire Suppression System shall be UL & ULC listed in accordance with UL300,UL1254, ULCORD-C1254.6.

Microprocessor-based control board shall be ETL Listed to UL Standard 864 and CAN/ULC-S527-11.

TANK Fire Suppression System intended for installation and for use in accordance withthe National Fire Protection Association Standards:

13. Wet Chemical Extinguishing Systems, NFPA 17A
14. National Electrical Code, NFPA 70
15. National Fire Alarm & Signaling Code, NFPA 72

New York City and FDNY approved under COA# 5870.

California State Fire Marshal (CFSM), Listing No. 7085-2199:0502.

A pre-engineered, fixed pipe, automatic wet chemical agent fire suppression system forprotection of all hazard areas associated with cooking operations, including exhaust hoods, plenums, ductwork, and cooking appliances.

Exhaust hood fire system components to be factory installed.

**Cylinder and Valve Assembly**

93. The cylinders shall have a tin-nickel alloy plated brass valve with pressure gauge.

94. Wet chemical agent shall be contained in one or more stored pressure DOT/TC ratedsteel cylinder and valve assemblies.

95. Each cylinder is factory-filled with liquid fire suppressant and pressurized to 200 PSIGat 70°F.

**Distribution Nozzles**

96. Nozzles shall be located to protect the exhaust ducts, plenums, and all cookingappliances requiring protection.

97. All nozzles shall be equipped with a metal blow off cap. The cap prevents contamination from entering the pipe network and is designed to pop-off upon system discharge, allowing agent to flow to the protected hazard area.

98. All nozzles shall incorporate a stamped part number to easily identify nozzle type.

Distribution System

99. The distribution system shall consist of Copper, Schedule 40 black iron, chrome-plated or stainless-steel pipe and fittings. All exposed piping and fittings must be chrome-plated or stainless steel.

100. Fittings shall be minimum class 150. Galvanized fittings shall not be used.

Suppression System

101. The system control equipment shall be capable of all functions associated with automatically and manually discharging the wet chemical agent from all cylinder andvalve assemblies, including automatic shutdown of the heat source or fuel and electrical power to all protected areas upon system discharge.

102. Liquid Fire Suppressant shall be Aqueous Potassium Carbonate (APC).

103. All mechanical components of the actuator kit shall be enclosed.

104. The actuator kit shall be capable of automatic or manual activation means.

105. Supervisory Pressure Switch added to monitor operating system pressure.

106. For manual activation, an electrically operated manual release shall be used toactuate the system manually.

107. For automatic activation, the system will be activated by a Firestat (heat) detector.

**Electrical**

108. Electrical Division to provide shunt trip breakers at main power panel, or disconnects,as designated by the Electrical Engineer; interconnection provided at hood control panel for the signal to shut down all electricity in and under the exhaust hood. Shunt trips/disconnects to accomplish shut off of electricity in the event of fire system activation by others.

109. Printed circuit board with microprocessor-based controller that provides all the necessary monitoring, timing, and supervision functions required for the reliableoperation of the fire system.

110. Independent supervised loops incorporate redundancy and fault detection.

111. Real-time cloud-based monitoring connection provided with system by ownership.

112. Primary power supply, with battery backup for power loss.

113. All wiring must be in accordance to NFPA 70 and the Authority Having Jurisdiction(AHJ).

114. Electric gas valve provided for equipment below exhaust hood. Coordinate size andinstallation with Plumbing Division.

115. All wiring is to be in accordance with the applicable manufacturer's instructions for thefire alarm control panel, gas shut-off valve, manual reset relay, and contractor supplied shut-off devices.

As part of this item, provide wall mounted type K handheld portable fire extinguisher, placard, and mounting bracket as required in the immediate vicinity of each cooking area,per NFPA-96 and NFPA-10. Additional fire extinguishers as required in the kitchen area are to be specified by the Architect and provided by the General Contractor.

Inter-wiring of the fire system to the exhaust hood shall be furnished and installed by the Electrical Trade.

Provide as part of fire system, electrically operated gas supply line shut-off valve (two required for "loop" gas service) to interrupt gas supply to all gas operated cooking appliances. Gas valve shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide one remote manual pull station to actuate fire system in the event of a fire.

Plumbing Trade shall install gas shut-off valve(s) in gas supply line.

Electrical Trade shall inter-wire gas shut-off valve(s) to fire system.

Electrical Trade shall furnish and install electric shunt-trip circuit breakers or electric shut-off contactors to interrupt electric power to all electrically operated cooking appliances.

Provide dry contacts in fire system to interface with building fire alarm system as required, electrical tie-in shall be the responsibility of the Electrical Trade.

Provide as part of fire system, start-up testing of the fire system as required by local fire codes. Subsequent testing of the fire system for a period of one year after start-up shall be included as part of this contract.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

Install in accordance with manufacturer's instructions, drawings, written specifications,manufacturer’s installation manual, and all applicable building codes.

Six-month and twelve-month inspections, servicing, and replacement of components asper NFPA 96 to be provided by the General Contractor or Owner.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

ITEM #129 WORK TABLE, ENCLOSED BASE
Quantity: Seven (7)
Manufacturer: Eagle group / John Boos / Advance Tabco
Model: Size and shape per plan
Construction: Top shall be fabricated of 14 gauge stainless steel. Exposed edges shall be rolled down 2" diameter at 180 degrees. Provide backsplash along adjoining surfaces with top turned up integrally 6" high on a 3/4" radius at a 90 degree angle, turned back 1" on a 90 degree angle and down 1/2" on a 90 degree angle.

Cabinet body shall be fabricated of 18 gauge stainless steel wrap around construction. The backs of front stiles shall be closed with tight fitting channel sections of 18 gauge stainless steel, welded in place and closed on top and bottom.

Provide sink section with 16" x 20" x 8" deep sink fabricated of 14 gauge stainless steel with all interior corners coved on a 3/4" radius, both horizontally and vertically,

forming spherical corners. Sink shall be fabricated as an integral part of fixture with sink fully welded with adjacent top, welds ground smooth and polished.

Punch top and provide T&S Brass & Bronze Works B-300 double pantry faucet with gooseneck nozzle and aerator.

Furnish and install Component Hardware D50-7215 lever type drain assembly with connected overflow and stainless steel flat strainer plate.

Provide counter base below sink with stainless steel apron with recess for lever waste handle. Below apron provide stainless steel, double pan hinged access door with stainless steel recessed handle. Base below sink shall have bottom and rear open for passage of plumbing lines.

Provide provisions for Item #108 undercounter refrigerator.

Provide cutout/provisions for Item #94 4-range burner.

Provide remainder of cabinet base with open fixed bottom and intermediate fabricated shelves fabricated of 18 gauge stainless steel. Front edge shall be turned down 1-1/2" at 90 degrees, returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" at 90 degrees with interior corners coved on a 3/4" radius. Shelf shall be weld anchored to cabinet body. Bottom shelf shall be fabricated flush with front mullions with fully welded facing junctures presenting seamless construction. Fixed intermediate shelves shall be designed similar to bottom shelf except front edge shall be set behind vertical mullions and fully welded thereto.

Mount on counter type stainless steel conical shaped die-formed legs with stainless steel, bullet shaped adjustable foot fully welded to leg mounting channel.

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| ITEM #130 | REACH-IN REFRIGERATOR |
| Quantity: | Two (2) |
| Manufacturer: | Continental / Victory / True |
| Model: | 2RNSS |
| Options: | Stainless steel interior (2)<br>Stainless steel exterior (2)<br>Stainless steel case back (2)<br>Field reversible doors (2)<br>Exterior mounted digital thermometer (2)<br>Automatic condensate evaporator (2)<br>Swivel casters with polyurethane tires and front locking brakes (2 sets)<br>Plug and cord set (2)<br>Pan slides on top sections (2)<br>Shelves on bottom sections (2) |

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| ITEM #131 | EXHAUST HOOD |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape as per plan |
| Construction: | Furnish and install exhaust hood with integral plenum box make-air system. |

Entire exhaust ventilation system shall be constructed in compliance with UL, NSF, NFPA, IMC 2018 (including automatic start-up of the exhaust and supply ventilation upon activation of any cooking appliance) and any prevailing statutes and codes.

Hood shall be 5' long island configuration constructed in one equal sections of 18 gauge 304 stainless steel with all seams continuously welded, ground smooth and polished. Provide a full compliment of stainless steel "high efficiency" Captrate Solo baffle type grease extractors.

Furnish remote bulb thermostat with watertight hardware and install in either the exhaust plenum of the hood or in the exhaust duct. Provide NEMA 3 control panel box with hinged front cover complete with supply and exhaust fan contactors wired to an adjustable thermostat control, field wiring terminal strip and on-off switch.

Provide 18 gauge 304 stainless steel supply and exhaust duct collar.

Provide 18 gauge 304 stainless steel insulated supply air plenum box assembly with internal air volume control damper integral along the face of the hood. Mount in finished ceiling along face of hood and furnish full length stainless steel perforated removable panels for discharge of supply air along entire face of hood.

Provide stainless steel threaded hanger rods complete with stainless steel mounting hardware for securing to structural ceiling.

Mechanical (HVAC) Trade shall furnish and install a complete exhaust air handling system including exhaust fan and controller, fan start-stop switch with status lights, 16 gauge insulated welded ductwork from exhaust collar on exhaust hood to fan, hinged roof curb with grease trough and removable grease container.

Mechanical (HVAC) Trade shall install exhaust hood heat detector(s) in exhaust hoods with multiple exhaust collars in the exhaust duct just after the point of the pant leg juncture; this includes punching of the required hole in the duct and installation of the heat detector and fitting.

Mechanical (HVAC) Trade shall furnish and install a complete supply air handling system including supply fan and controller (with maintainable filter system) and supply air heater with thermostat control (to temper incoming supply air below 65 degree F ambient), fan start-stop switch with indicator lights, galvanized steel ductwork from supply collar on exhaust hood to fan and roof curb.

Electrical Trade shall furnish and install interconnecting wiring between fan motors, controllers and switches.

Electrical Trade shall furnish and install inter-wiring of cooking appliance start-up inter-lock device and the supply and exhaust ventilation system and wire per the manufacturer's instructions and per applicable codes.

Furnish three (3) UL listed vapor-proof recessed LED light fixtures wired to a common on-off switch with stainless steel cover plate located in control box..

Electrical Trade shall furnish materials and inter-wire light fixtures to wall mounted control panel.

Mechanical (HVAC) Trade shall furnish and install INVERTER DUTY THREE PHASE exhaust fan and controller.

Mechanical (HVAC) Trade shall furnish fans set compatible with variable frequency drive specification.

Electrical Trade shall furnish and install Interconnecting wiring of the system between the exhaust hood sensors, remote frequency drive unit and exhaust and supply fan motors.

Furnish and install 18 gauge stainless steel ceiling closure panels extending from the top of the exhaust ventilator to the finished ceiling. Panels shall be removable without the use of tools for access.

Electrical Trade shall provide the inter-wiring between the control enclosure, fire system, supply and exhaust fans and variable frequency drives and duct riser temperature switch.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #131.1 | HOOD CONTROL PANEL |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape per plan |
| Sup Info: | Furnish 18 gauge stainless steel utility and fire system enclosure cabinet with hinged access doors for both hood and fire system controls and fire suppression tanks. System shall be listed by ETL (UL 508A) NSF, NFPA, IMC 2018 and any prevailing statutes or codes including automatic shut-down of all cooking appliances per code section 44 of NFPA 17-27. Cabinet may be freestanding wall type or integral with exhaust hood as shown on the contract drawings. Furnish stainless steel mounting hardware of proper type for wall construction for wall mounted cabinet. |

Furnish and install variable volume motor control center with variable frequency drive, input / output processor and keypad enclosed within a stainless steel utility cabinet for remote mounting. System shall include, but not be limited to, electronic variable volume motor starters with thermal overload, input / output processors, control keypad, temperature and optic sensors and plug and play cables. Temperature sensor shall be mounted in the exhaust duct collar; optic sensor shall be mounted inside the ends of the hood with air purge units mounted on top.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #131.2 | FIRE PROTECTION SYSTEM |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire |
| Model: | TANK |

Sup Info: Furnish and install in exhaust hood, plenum and surface fire protection system.

TANK Fire Suppression is a pre-engineered, stored-pressure wet chemical solutionextinguishing system.

TANK Fire Suppression System shall be UL & ULC listed in accordance with UL300,UL1254, ULCORD-C1254.6.

Microprocessor-based control board shall be ETL Listed to UL Standard 864 and CAN/ULC-S527-11.

TANK Fire Suppression System intended for installation and for use in accordance withthe National Fire Protection Association Standards:

16. Wet Chemical Extinguishing Systems, NFPA 17A
17. National Electrical Code, NFPA 70
18. National Fire Alarm & Signaling Code, NFPA 72

New York City and FDNY approved under COA# 5870.

California State Fire Marshal (CFSM), Listing No. 7085-2199:0502.

A pre-engineered, fixed pipe, automatic wet chemical agent fire suppression system forprotection of all hazard areas associated with cooking operations, including exhaust hoods, plenums, ductwork, and cooking appliances.

Exhaust hood fire system components to be factory installed.

**Cylinder and Valve Assembly**

116. The cylinders shall have a tin-nickel alloy plated brass valve with pressure gauge.

117. Wet chemical agent shall be contained in one or more stored pressure DOT/TC ratedsteel cylinder and valve assemblies.

118. Each cylinder is factory-filled with liquid fire suppressant and pressurized to 200 PSIGat 70°F.

**Distribution Nozzles**

119. Nozzles shall be located to protect the exhaust ducts, plenums, and all cookingappliances requiring protection.

120. All nozzles shall be equipped with a metal blow off cap. The cap prevents contamination from entering the pipe network and is designed to pop-off upon system discharge, allowing agent to flow to the protected hazard area.

121. All nozzles shall incorporate a stamped part number to easily identify nozzle type.

Distribution System

122. The distribution system shall consist of Copper, Schedule 40 black iron, chrome-plated or stainless-steel pipe and fittings. All exposed piping and fittings must be chrome-plated or stainless steel.

123. Fittings shall be minimum class 150. Galvanized fittings shall not be used.

Suppression System

124. The system control equipment shall be capable of all functions associated with automatically and manually discharging the wet chemical agent from all cylinder andvalve assemblies, including automatic shutdown of the heat source or fuel and electrical power to all protected areas upon system discharge.

125. Liquid Fire Suppressant shall be Aqueous Potassium Carbonate (APC).

126. All mechanical components of the actuator kit shall be enclosed.

127. The actuator kit shall be capable of automatic or manual activation means.

128. Supervisory Pressure Switch added to monitor operating system pressure.

129. For manual activation, an electrically operated manual release shall be used toactuate the system manually.

130. For automatic activation, the system will be activated by a Firestat (heat) detector.

**Electrical**

131. Electrical Division to provide shunt trip breakers at main power panel, or disconnects,as designated by the Electrical Engineer; interconnection provided at hood control panel for the signal to shut down all electricity in and under the exhaust hood. Shunt trips/disconnects to accomplish shut off of electricity in the event of fire system activation by others.

132. Printed circuit board with microprocessor-based controller that provides all the necessary monitoring, timing, and supervision functions required for the reliableoperation of the fire system.

133. Independent supervised loops incorporate redundancy and fault detection.

134. Real-time cloud-based monitoring connection provided with system by ownership.

135. Primary power supply, with battery backup for power loss.

136. All wiring must be in accordance to NFPA 70 and the Authority Having Jurisdiction(AHJ).

137. Electric gas valve provided for equipment below exhaust hood. Coordinate size andinstallation with Plumbing Division.

138. All wiring is to be in accordance with the applicable manufacturer's instructions for thefire alarm control panel, gas shut-off valve, manual reset relay, and contractor supplied shut-off devices.

As part of this item, provide wall mounted type K handheld portable fire extinguisher, placard, and mounting bracket as required in the immediate vicinity of each cooking area,per NFPA-96 and NFPA-10. Additional fire extinguishers as required in the kitchen area are to be specified by the Architect and provided by the General Contractor.

Inter-wiring of the fire system to the exhaust hood shall be furnished and installed by the Electrical Trade.

Provide as part of fire system, electrically operated gas supply line shut-off valve (two required for "loop" gas service) to interrupt gas supply to all gas operated

cooking appliances. Gas valve shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide one remote manual pull station to actuate fire system in the event of a fire.

Plumbing Trade shall install gas shut-off valve(s) in gas supply line.

Electrical Trade shall inter-wire gas shut-off valve(s) to fire system.

Electrical Trade shall furnish and install electric shunt-trip circuit breakers or electric shut-off contactors to interrupt electric power to all electrically operated cooking appliances.

Provide dry contacts in fire system to interface with building fire alarm system as required, electrical tie-in shall be the responsibility of the Electrical Trade.

Provide as part of fire system, start-up testing of the fire system as required by local fire codes. Subsequent testing of the fire system for a period of one year after start-up shall be included as part of this contract.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

Install in accordance with manufacturer's instructions, drawings, written specifications,manufacturer’s installation manual, and all applicable building codes.

Six-month and twelve-month inspections, servicing, and replacement of components asper NFPA 96 to be provided by the General Contractor or Owner.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

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| ITEM #132 | 2-BURNER, GAS |
| Quantity: | Twenty-Eight (28) |
| Manufacturer: | Electrolux / Garland / Vulcan |
| Model: | 169101 |
| Options: | Natural gas<br>1675KITCF2S48PS |
| Sup Info: | Foodservice Equipment Contractor shall install disconnect at point of gas connection and to cooking appliance per manufacturer’s instructions. |

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| ITEM #133 | COMBI-OVEN, VENTLESS |
| Quantity: | Two (2) |
| Manufacturer: | Alto-Shaam / Convotherm / Angelo Po |
| Model: | CTP6-10E/CTP10-10E W/ VENT HOOD |

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| Options: | 5021519 Installation kit (4)<br>6-10EVH PLUS Ventech PLUS Type 1 hood (2)<br>FI-24114 Charcoal filter for hood (2)<br>FI-24113 Washable grease filter (2)<br>FI-46923 Front condensing coil (2)<br>Wifi standard (4)<br>Removable "T" style temperature probe, standard (4)<br>COMBILIQUICLEAN Automatic liquid cleaning system (2)<br>CE-46869 Oven cleaner, liquid soap injection cleaner (2)<br>CP-46870 Liquid dispensing cap (2)<br>CE-46991 Concentrated oven cleaner (2)<br>CE-46829 Non caustic cleaner (2)<br>BH-38059 Clean out brush (2)<br>SC-47403 Oven scraper (2)<br>5030719 Stacking hardware (2)<br>5017404 Mobile stacking base (2)<br>Polyurethane tires and front locking brakes (2 sets)<br>Dormont W50BP48 Water hose kit (4) |
| Sup Info: | Foodservice Equipment Contractor shall install disconnect at wall connection and to cooking appliance per manufacturer's instructions.<br><br>Foodservice Equipment Contractor shall provide and secure restraining cable between wall and equipment. |
| ITEM #134 | DROP-IN REFRIGERATED DISPLAY CASE, SELF CONTAINED |
| Quantity: | Four (4) |
| Manufacturer: | Federal Industries / Structural Concepts / RPI |
| Model: | ITR3634-SC |
| Options: | Stainless steel shelving, per tier (4)<br>Reflective ends (pair) (4)<br>Removable sliding rear doors, standard (4) |
| ITEM #135 | POT RACK, CEILING MOUNTED |
| Quantity: | Two (2) |
| Manufacturer: | Eagle Group / John Boos / Advance Tabco |
| Model: | CM144PR |
| Sup Info: | Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.<br><br>Construction Trade shall provide wall blocking as required for mounting. |
| ITEM #136 | UTILITY DISTRIBUTION SYSTEM |
| Quantity: | One (1) |
| Manufacturer: | Captive Aire / Caddy / Avtec |
| Model: | Size and shape per plan |
| Construction: | Furnish and install utility distribution system.<br><br>Utility distribution system shall be fabricated in accordance with UL, NSF, NEC, IMC 2015.<br><br>Utility distribution system shall be fabricated of a minimum of 18 gauge 304 stainless |

steel consisting of two utility compartments and fabricated in sections as required with factory pre-assembled field connections and furnished with one primary end riser with single point connection for all utilities and one secondary end riser.

Primary riser shall be furnished with built-in exhaust hood controls, including push button fan control switches with status lights, individual and shunt-trip main circuit breaker and emergency "kill" button with guard.

Provide as part of raceway exhaust hood interlock device to prevent all electrically and gas operated cooking appliances from operating unless the supply and exhaust fans of the exhaust hood is operating as required by all local and prevailing codes including IMC 2015.

Provide raceway with splash proof electrical chase with copper wire-way wired to a circuit breaker panel box with ground fault protection for each appliance in the primary end riser, and UL listed power cords and matching electrical receptacles as required.

Provide raceway with gas supply (looped) service with shut-off valves for each disconnect hose or connection and safety retainer cables for each mobile appliance. Provide as part of utility distribution system, mechanically operated gas supply line shut-off valves to interrupt gas supply to all gas operated cooking appliances. Gas valves shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide raceway with hot and cold water service with shut-off valves for each disconnect hose or connection and safety retainer cables for each mobile appliance.

Provide each riser with ventilator connecting collars for positive connection to the exhaust hood.

Provide secondary end riser with hinged access door for mounting of gas supply line shut-off valve (looped gas service).

Furnish and install labor and material to assemble all internal interconnecting gas piping, water piping and electrical wiring to install the utility distribution system. Test all connections for leaks.

ITEM #137 UTILITY DISTRIBUTION SYSTEM
Quantity: One (1)
Manufacturer: Captive Aire / Caddy / Avtec
Model: Size and shape per plan
Construction: Furnish and install utility distribution system.

Utility distribution system shall be fabricated in accordance with UL, NSF, NEC, IMC 2015.

Utility distribution system shall be fabricated of a minimum of 18 gauge 304 stainless steel consisting of two utility compartments and fabricated in sections as required with factory pre-assembled field connections and furnished with one primary end ris-

er with single point connection for all utilities and one secondary end riser.

Primary riser shall be furnished with built-in exhaust hood controls, including push button fan control switches with status lights, individual and shunt-trip main circuit breaker and emergency “kill” button with guard.

Provide as part of raceway exhaust hood interlock device to prevent all electrically and gas operated cooking appliances from operating unless the supply and exhaust fans of the exhaust hood is operating as required by all local and prevailing codes including IMC 2015.

Provide raceway with splash proof electrical chase with copper wire-way wired to a circuit breaker panel box with ground fault protection for each appliance in the primary end riser, and UL listed power cords and matching electrical receptacles as required.

Provide raceway with gas supply (looped) service with shut-off valves for each disconnect hose or connection and safety retainer cables for each mobile appliance. Provide as part of utility distribution system, mechanically operated gas supply line shut-off valves to interrupt gas supply to all gas operated cooking appliances. Gas valves shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide raceway with hot and cold water service with shut-off valves for each disconnect hose or connection and safety retainer cables for each mobile appliance.

Provide each riser with ventilator connecting collars for positive connection to the exhaust hood.

Provide secondary end riser with hinged access door for mounting of gas supply line shut-off valve (looped gas service).

Furnish and install labor and material to assemble all internal interconnecting gas piping, water piping and electrical wiring to install the utility distribution system. Test all connections for leaks.

| | |
|---|---|
| ITEM #138 | WARMER, FOOD OVERHEAD |
| Quantity: | Two (2) |
| Manufacturer: | Hatco / Merco / APW Wyott |
| Model: | GRAHL-96 |
| Options: | BLT INF 2 Built in infinite controls (2) |
| | TANDEM-SINGLE Tandem elements (2) |
| | STANDARD Clear anodized aluminum housing (2) |
| | ADJ ANGLE 7 Adjustable angle bracket (2) |

| | |
|---|---|
| ITEM #139 | SOLID TOP UNIT |
| Quantity: | Two (2) |
| Manufacturer: | Duke/ Multiteria / Delfield |
| Model: | TST-18SS |
| Options: | Owner/Architect to select laminate finish (2) |
| | SOLID-HD-1CU Tray slide, customer side (2) |

MOD-2S-1CU Kick plate, customer side (2)
ILD Interlocking device (2)

ITEM #140 SOLID TOP UNIT
Quantity: Four (4)
Manufacturer: Duke/ Multiteria / Delfield
Model: TST-60SS
Options: Owner/Architect to select laminate finish (4)
SOLID-HD-4CU Tray slide, customer side (4)
MOD-2S-4CU Kick plate, customer side (4)
329-4SS-LK (4)
ILD Interlocking device (4)

ITEM #141 SOLID TOP UNIT
Quantity: Eight (8)
Manufacturer: Duke/ Multiteria / Delfield
Model: TST-60SS
Options: Owner/Architect to select laminate finish (8)
SOLID-HD-4CU Tray slide, customer side (8)
CUT-OP4 Rectangular cutout (8)
445-4S-HD-OP Cutting board, shelf, operator's side (8)
MOD-2S-4CU Kick plate, customer side (8)
ILD Interlocking device (8)

ITEM #142 INDUCTION COOKING SYSTEM
Quantity: One (1)
Manufacturer: Spring USA / Cooktek / Electrolux
Model: ICB234-26
Options: AF98710 Cell filter
AF98711 Carbon filter
AF9879 Baffle prefilter

ITEM #143 WORK TABLE, STAINLESS STEEL, ENCLOSED BASE
Quantity: One (1)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: CBH30120SEM
Options: E27A Top cutout & reinforcement, for heavy drop-in equipment (Item #142 Spring USA ICB234-26)

ITEM #144 WIRE SHELVING
Quantity: One (1)
Manufacturer: Metro / Eagle group / Quantum
Model: PR2460NK3 (4)
Options: 70UPK3 Posts (4)
5MP Casters (2)
5MPB Casters (2)
Sup Info: Assemble into four tier shelving units, locate bottom shelf 12" above floor.

ITEM #X-01 EXISTING COMBI-OVEN
Quantity: One (1)

| | |
|---|---|
| Sup Info: | Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order. |
| ITEM #X-02 | EXISTING HYDROVECTION OVEN |
| Quantity: | One (1) |
| Sup Info: | Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order. |
| ITEM #X-03 | EXISTING FOOD SLICER |
| Quantity: | One (1) |
| Sup Info: | Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order. |
| ITEM #S-01 | RESIDENTIAL MICROWAVE |
| Quantity: | One (1) |
| Sup Info: | Not in foodservice equipment contract, furnished by others. |
| ITEM #S-02 | RESIDENTIAL RANGE |
| Quantity: | One (1) |
| Sup Info: | Not in foodservice equipment contract, furnished by others. |
| ITEM #S-03 | RESIDENTIAL HOOD |
| Quantity: | One (1) |
| Manufacturer: | Denlar |
| Model: | D1036-D-WF-NFPA |
| Construction: | The Fire Suppression Range Hood shall be installed in accordance with the manufacturer's instructions and applicable codes. |

Unit shall be of 304 stainless steel construction with no sharp edges and brushed finish, having a fire suppression system pre-engineered into the design of the hood.

Hood shall be wall mounted so that the bottom of the mounting bracket sits 24” to 30” above the cooktop. Dimensions are 30”L x 19.38” D.

Unit shall have top ducted wall mount fan. Dimensions are 13.2” side to side, 17” top to bottom, and 4.4” front to back. CFM + 2.5% 172-522 with Electronic Control Module with fan speed controller being infinitely variable.

Unit shall include a fuel shut-off device for gas and electric appliances, activated at suppression system discharge.

Unit shall also automatically disconnect range element once certain pre-set temperature is reached.

Unit shall have multiple alarm contacts pre-installed (local, remote & trouble alarms) and an audible buzzer.

Lighting shall be by 60w shatter-proof bulb.

D1000-Tank is integral to all D1000 hood models. Self-contained fire suppression system, UL-1995 compliance, stainless steel, chemical type Amerex 660, volume 1300 mL. Tank is equipped with a pressure switch opens on discharge. Discharge hose with quick fitting attached.

The Manual Pull Station is design to discharge the D1000 Model when a user pulls the tab from the Manual Pull Station Face Plate. The D1000-MPK is provided with 25 ft stainless steel cable and with three 90 degree corner pulleys. It is required to have 7-10 inches extra of the stainless steel cable at the pull station box. The manual pull station comes equipped with 1x enclosure 4" x 1.5" octagon metal box, 1x manual pull station face plate, 1x ½" ENT conduit connector, 3x 90 degree corner pulleys, 1x 25' stainless steel cable with clevis pin.

Provide with Clockbox standard. Clockbox shall be surface mount or flush. Includes two hour timer, is password protected, and has adjustable timer.

| | |
|---|---|
| ITEM #S-04 | 3-COMPARTMENT SINK, DROP-IN |
| Quantity: | One (1) |
| Manufacturer: | Eagle group / John Boos / Advance Tabco |
| Model: | SR12-14-9.5-3 |
| Options: | Standard faucet |

| | |
|---|---|
| ITEM #S-05 | RESIDENTIAL DISHWASHER |
| Quantity: | One (1) |
| Sup Info: | Not in foodservice equipment contract, furnished by others. |

| | |
|---|---|
| ITEM #S-07 | RESIDENTIAL REFRIGERATOR |
| Quantity: | One (1) |
| Sup Info: | Not in foodservice equipment contract, furnished by others. |

END OF SECTION 114000

# SECTION 11 66 25 - GYMNASIUM EQUIPMENT

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Basketball equipment, including backstop assemblies, backboards, and goals.
B. Wall-mounted protection pads.
C. Volleyball nets and posts.
D. Floor sleeves for net and goal posts
E. Wrestling mats, storage, and accessories
F. Gym Equipment Group Control System

### 1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete for outdoor backstop foundations.
B. Section 05 12 00 - Structural Steel Framing: Structural members supporting basketball systems.
C. Section 05 50 00 - Metal Fabrications: Secondary structural members supporting gymnasium equipment.
D. Section 11 66 53 – Gymnasium Dividers: Divider specified therein shall be connected to and operated from control switch specified herein.
E. Section 09 64 29 - Wood Strip Flooring: Gymnasium flooring.
F. Section 26 05 83 - Wiring Connections

### 1.03 REFERENCE STANDARDS

A. ASTM D412 - 06 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
B. ASTM D1056 - 07 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.
D. ASTM F-355-01 - Test Method for Shock Absorbing Properties of Playing Surface Systems and Materials.
E. ASTM F-1081-03 - Standard Specification for Competition Wrestling Mats.
F. ASTM F1292 - 09 Standard Specification for Impact Attenuation of Surfacing Materials within the Use Zone of Playground Equipment
G. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
H. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth 2019.

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.
B. Electrically Operated Equipment: Coordinate location and electrical characteristics of service connection

1.05 SUBMITTALS

A. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, and accessories; include:
   1. Electrical characteristics and connection locations.
   2. Fire rating certifications.
   3. Manufacturer's installation instructions.
B. Shop Drawings: For custom fabricated equipment indicate, in large scale detail, construction methods; method of attachment or installation; type and gauge of metal, hardware, and fittings; plan front elevation; elevations and dimensions; minimum one cross section; utility requirements as to types, sizes, and locations.
C. Samples: Submit samples of wall pad coverings in manufacturer's available range of colors.
D. Operating and maintenance data for each operating equipment item.
E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified with minimum three years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.
B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.
C. Store products in accordance with manufacturer's instructions; protect from extremes of weather, temperature, moisture, and other damage.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

A. Gymnasium Equipment and Volleyball Equipment
   1. Draper, Inc: www.draperinc.com/sle.
   2. Performance Sports Systems: www.perfsports.com.
   3. Porter Athletic Equipment Company: www.porterathletic.com.
B. Where a basis-of-design product is listed below, approved equal products by manufacturers listed herein shall be acceptable subject to meeting the requirements of this section.
C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GENERAL REQUIREMENTS

A. See drawings for sizes and locations, unless noted otherwise.
B. Where mounting dimensions or sizes are not indicated, comply with applicable requirements of the following:
   1. National Federation of State High School Associations (NFHS) sports rules.
C. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment to building structure; comply with requirements of Contract Documents.
D. Hardware: Heavy duty steel hardware, as recommended by the manufacturer.
E. Electrical Wiring and Components: Comply with NFPA 70; provide UL-listed equipment.

F. Structural Steel Fabrications: Welded in accordance with AWS D1.1/D1.1M, using certified welders.

2.03 BASKETBALL EQUIPMENT

A. Indoor Backstop Assemblies
   a. Ceiling – suspended Backstop Assemblies:
   b. Location: Gym room #F101
   c. Basis of Design: Porter
      1) Ceiling suspended, Forward-folding, forward-braced: 900 series.
      2) ~~Side-folding, side-braced: EZ Fold TBS-26-B.~~
   2. Features
      a. Capable of mounting both rectangular and fan-shaped backboards.
      b. Framing
         1) Material: Steel.
         2) Configuration: Center strut, ceiling-suspended, ceiling-braced.
         3) Fabrication: Bolt-together or welded.
         4) Color: As selected from manufacturer's standard selection.
      c. Height Adjuster
         1) Raises or lowers assembly by 2 feet to adjust goal height.
         2) Manually operated.
      d. Height Control System
         1) Motorized winch with safety strap.
         2) Control switch: Seven-gang gymnasium equipment key switch.
      e.

B. Backboards
   1. Basis of Design
      a. Porter 208 “Center strut” Backboard
      b. To meet NCAA, NFHA and professional requirements.
   2. Features
      a. Material: ½” thick Tempered glass.
      b. Configuration: Rectangular, 72 inches wide by 42 inches high.
      c. Markings: 2” White border and shooting target.
      d. Provide manufacturer’s backboard safety padding.
      e. Provide shot clock support

C. Goals
   1. Basis of Design
      a. Porter 240180 “Torq Flex Competition goal.
      b. NCAA Division 2/3 and NFHS compliant
   2. Features
      a. Design to allow the goal to flex in a complete 180 radius as players hang on the front or sides of the rim. Spring mechanism shall be easily adjustable to meet rebound/elasticity needs. Non-adjustable goals, goals pivoting in only one plane, or goals incorporating shock absorber type mechanisms shall not be considered as equal.
      b. Rim: 5/8" diameter cold drawn alloy steel, round formed to an 18" inside diameter ring. Inside diameter of ring shall be positioned 6" from face of backboard by a heavy formed steel housing with a removable bottom cover to conceal spring mechanisms of goal, and also protect against finger entrapment.
      c. Net attachment: T-style slots.
      d. Provide nylon net and mounting hardware.
      e. Finish: Powder coat orange.

2.04 WALL PADDING

A. Wall Padding: Foam filling bonded to backing board, wrapped in covering; each panel fabricated in one piece.
   1. Surface Burning Characteristics: Flame spread index (FSI) of 25 or less, smoke developed index (SDI) of 450 or less, Class A, when tested in accordance with ASTM E84 as a complete panel.
   2. Flammability: Comply with NFPA 286.
   3. Covering: Vinyl-coated polyester fabric, mildew, and rot resistant; stapled to back of board.
      a. Color: As selected from manufacturer's standard range.
      b. Texture: Embossed leather-look.
      c. Fabric Weight: 14 oz/sq yd, minimum.
   4. Foam, Fire-Rated: Open cell polychloroprene (Neoprene), with 5.5 pcf nominal density.
   5. Foam Thickness: 2 inches.
   6. Backing Board: Plywood.
   7. Panel heigh: 72 inches.
   8. Fastening Margins: 1 inch wide, covered by fabric covering.
   9. Mounting: Permanent; using screws.
   10. Manufacturers:
      a. Draper, Inc: www.draperinc.com/#sle or approved equal.
      b. Performance Sport Systems: www.perfsports.com or approved equal.
      c. Porter Athletic Equipment Company: www.porterathletic.com or approved equal.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 VOLLEYBALL EQUIPMENT

A. Standards:
   1. Powr-Trak Universal Sleeve-Type Volleyball standards, No. 01951-000 manufactured by Porter Athletic Equipment Company, Basis of Design. Alternate manufacturers:
      a. Volleyball System, No. PVS 500001 manufactured by Draper, Inc.
      b. Performance Sports Systems: Product No. 6100.
   2. Quantity: 1 set

B. Net:
   1. No. 02255-000 with Boundary Marker with Antenna No. 00546-000 manufactured by Porter Athletic Equipment Company, Basis of Design. Alternate manufacturers:
      a. Volleyball System, No. PVS 500001 manufactured by Draper, Inc.
      b. Performance Sports Systems: Product No. 6100.
   2. Quantity: 1

C. C. Protective Pads:
   1. No. 00717-003 manufactured by Porter Athletic Equipment Company, Basis of Design. Alternate manufacturers:
      a. No. 5011XX manufactured by Draper, Inc.
      b. Performance Sports Systems: Product No. 6100.
   2. Quantity: 1 set

D. Judge's Stand:
   1. Folding Stand No. 00540-100 with protective pads No. 00547-003 manufactured by Porter Athletic Equipment Company, Basis of Design. Alternate manufacturers:
      a. No. 5013XX manufactured by Draper, Inc.
      b. Performance Sports Systems: Product No. 6446/6040.
   2. Quantity: 1

E. Storage Rack and Transporter:
   1. No. 00956-100 manufactured by Porter Athletic Equipment Company, Basis of Design. Alternate manufacturers:
      a. No. 501016 manufactured by Draper, Inc.
      b. Performance Sports Systems: Product No. 6295.
   2. Quantity: 1

2.06 WRESTLING

A. Wrestling mat:
   1. Fire-retardant continuous 1.25" thick rubber nitrile foam core
   2. ASTM F-1081-03: The foam core shall have received a PASS rating of less than 100 maximum Gmax when tested in accordance with Procedure A of ASTM F-355-01.
   3. ASTM F-1292-09: Wrestling Mat shall be tested for impact protection. The wrestling mat shall have a Gmax reading of less than 200 and a HIC score (Head Injury Criterion) of less than 1,000 from a four foot (4') drop height.
   4. ASTM D-1056: Foam core shall have a compression / deflation of 5.5 - 7.5 psi.
   5. ASTM D-412: Foam core shall have a tensile (tension) strength of 75 psi or greater and an elongation property of 100 percent.
   6. Provide mats with a built-in antimicrobial product, providing protection against bacteria, mold, and mildew.
   7. Wrestling Room: Provide custom mat sizes and configurations as shown on the Drawings.
      a. Provide filler and transition pieces as necessary for wall-to-wall installation.
   8. Competition Mat: Provide regulation size competition mat for main gymnasium, in addition to Wrestling Room mats.
   9. Provide full-color, computer renderings of wrestling mats with graphics for review for layout, design, and placement.
   10. Provide two-sided wrestling and/or practice areas on both sides of the mat.
   11. Provide mat storage tubes and straps.
   12. Foam shall be coated on all sides and edges with hot-spray polyvinyl coating.
   13. Manufacturer shall be able to provide 3rd party, independent test results upon request.
   14. Manufacturer shall provide a 3-year warranty from the date of shipment.
   15. Wrestling Mat to be able to be reconditioned in the future.
   16. Quantity: 2 in wrestling room 1 in main gym.

B. Mat Hoist: Capacity: Three (3) 15’x45’ wrestling mats (1,800 lb maximum)
   1. Stationary Mat Hoist: Mini Mat Mover, No 91105-100, manufacturer by Porter Athletic Equipment Company, Basis of Design. Alternate manufacturers:
      a. Triple Mat Lifter: Product: Sectional M.L. 502019 manufacturerd by Draper, Inc.
      b. Performance Sport Systems: Product No. 4091
   2. Electrical: 2HP, 208V, 3 PH, 60HZ
   3. Operation: Keyswitch.
   4. Quantity: 2

C. Mat Edge Transition.
   1. Material: Durable PVC.
   2. Dimensions 6 ¼” wide x 1 ½” high x 6’ long. 2” extended lip to cover the mat edge.
   3. Tape to secure the transition lip to the mat surface.

2.07 MISCELLANEOUS

A. Gym Equipment Group Control System:
   1. Product Smart Gym Control Systems manufactured by Draper, Inc.

2. Processor assembly in surface mounted 8 x15 x2 inch enclosure, quantity as required for controlling all gym equipment.
3. Color Touchscreens in recessed 3.5 x 5.5 x 2.5 inch box, locations and quantity as shown on drawings.
4. Gym Up/Down control:
   a. Basketball Goals, Main Courts
   b. Basketball Goals, Side Courts
   c. Basketball Goal, side Courts Height Adjustment
5. On/Off Control:
   a. Scoreboards
   b. Shock Clocks

2.08 SCOREBOARDS

A. Wall mounted Scoreboards: Interior, electronic basketball scoreboard with two integral horns and LED displays for time, scores, period, number for player fouling with personal fouls, team fouls, timeout left, bonus and double indicators and next possession arrows. Team Name and intelligent Captions™ 100% electronics.
   1. Product: Model BB-2155 by Daktronics.
      a. Dimension: 6’-0” (1.83m) high, 10’-0” (3.05 m) wide, 0’-6” (152 mm) deep
      b. Scoreboard Back, face, and perimeter:0.063” (1.60 mm) thick aluminum.
      c. Decorative accents: Indoor Non-Backlit Ad Panel: 2’ x 10’ horizontal.
   2. Locker Room Clocks: Daktronics TI -2031 wall mounted locker room clocks.
      a. Displays time in synchronization with scoreboard clocks.
      b. Provide one (1) per locker room.
   3. Shot Clock: Daktronics Model BB-2115.
      a. Displays game time and shot times up to a value of 99 seconds.
      b. Dimensions: 2’-4” (711 mm) high, 2’-5” (737 mm) wide, 0’-6” (152mm) deep
      c. Quantity: 2. Mount to main court backstops with brackets by basketball backstop manufacturer.
   4. Control Console: Wireless, microprocessor based, operator’s control center with receiver unit mounted as scoreboard and designed to operate different models of scoreboard by interchange of keyboard overlay.
      a. Product: Model #AS-5000 as manufactured by Daktronics.

2.09 FLOOR MOUNTED EQUIPMENT

A. Floor Sleeves for Posts: Metal sleeve, with latch cover, cast into concrete subfloor to hold poles for nets and goals; installed flush with finish floor surface.
   1. Latch Cover: Brass, round, tamper resistant lock with key.
   2. Sleeve: Aluminum.
   3. Depth of Sleeve: 9 inches from floor surface to bottom, including latch cover.

## PART 3 EXECUTION

3.01 EXAMINATION

A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.
B. Inspect areas and conditions before installation. Notify Architect in writing of unsatisfactory or detrimental conditions.
C. Do not proceed with this work until conditions have been corrected; commencing installation constitutes acceptance of work site conditions.

3.02 INSTALLATION

A. General
   1. Install in accordance with Contract Documents and manufacturer's instructions.
   2. Install equipment rigid, straight, plumb, and level.
   3. Secure equipment with manufacturer's recommended anchoring devices.
   4. Install wall padding securely, with edges tight to wall and without wrinkles in fabric covering.
   5. Separate dissimilar metals to prevent electrolytic corrosion.

B. Control switch location
   1. Requirements
      a. Switch shall be located where switch operator can see and monitor raising and lowering of backstop assemblies and of gymnasium divider curtain while telescoping bleachers are fully extended.
      b. Switch location and mounting height shall comply with accessibility requirements for maneuvering clearances, forward-reach ranges, and side-reach ranges.
   2. Approval: Obtain Owner’s approval of switch location prior to installation.

3.03 ADJUSTING

A. Verify proper placement of equipment.

B. Verify proper placement of equipment anchors and sleeves and use actual movable equipment to be anchored if available.

C. Adjust operating equipment for proper operation; remove and replace equipment causing noise or vibration; lubricate equipment as recommended by manufacturer.

3.04 CLEANING

A. Remove masking or protective covering from finished surfaces.

B. Clean equipment in accordance with manufacturer's recommendations.

3.05 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Replace damaged products before Date of Substantial Completion.

**END OF SECTION**

## SECTION 11 66 53 - GYMNASIUM DIVIDERS

### PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrically operated fabric gymnasium divider in Gymnasium F101.

1.02 RELATED REQUIREMENTS

A. See structural drawings and specs for divider support.

B. See electrical drawings and specs for electrical supply, conduit, and wiring for motorized winch and controls.

C. Control switch: Motorized winch to be operated from key switch provided under Section 11 66 25, Gymnasium Equipment.

1.03 REFERENCES

A. American Welding Society (AWS)
   1. AWS Certified Welder Program.

B. Underwriters Laboratories (UL)
   1. UL 2818 GreenGuard Standard for Building Materials, Finishes and Furnishings.
   2. UL 2821 GreenGuard Test Method for Building Materials, Finishes and Furnishings.

C. State of California
   1. California Code of Regulations, Title 19
      a. Section 1237, Fire Resistance (Small Scale Test)
      b. Section 1237.1, Test Method (Small Scale Test)
      c. Section 1237.2, Fire Resistance (Large Scale)
      d. Section 1237.3, Test Method (Large Scale Test)
   2. American Society of Testing and Materials (ASTM)
      a. ASTM D5116, Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
   3. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
      a. ASHRAE 62.1, Ventilation for Acceptable Indoor Air Quality.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, and accessories. Include:
   1. Loads to be transmitted to building structural members and requirements for supplementary bracing and structural support members.
   2. Manufacturer’s calculations and reports of tests performed by an independent testing laboratory accredited by the American Association of Laboratory Accreditation (A2LA) that demonstrate compliance with minimum safety factors included in product specifications.
   3. Certificates for Divider Curtain Vinyl and Mesh demonstrating compliance with the requirements of GreenGuard Gold.

B. Shop Drawings: Showing layout, elevations, dimensions, fabrication details, methods of attachment, and electrical wiring diagrams.

C. Color submittals

1. Physical color cards showing manufacturer's standard range for Architect's preliminary selection of up to four colors.
2. Samples for approval: Physical samples of curtain fabric, two (2) in each preliminary color selected by Architect.

D. Operating and maintenance data for each operating equipment item.
E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
F. Manufacturer's installation instructions.

1.05 WARRANTY

A. Five-year limited warranty on motorized winch.

1.06 QUALITY ASSURANCE

A. Source limitation: All components including curtain, suspension system, motorized winches, and controls for divider shall be products of a single manufacturer.
B. Welder qualifications: All welding to be performed by personnel having passed Welder Qualification testing in accordance with American Welding Society (AWS) code D1.1 or higher. Manufacturer to provide certification and test results upon request.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver divider until building is enclosed and other construction within gymnasium is substantially complete.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

A. Draper, Inc: www.draperinc.com/sle.
B. Porter Athletic Equipment Company: www.porterathletic.com.
C. Performance Sports Systems: www.perfsports.com.
D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GYMNASIUM DIVIDER

A. Basis of Design: Top-Roll Gym Divider Curtain by Draper, Inc.
B. Type: Electrically operated, top-roll gymnasium divider including motor, controls, clamps for attachment to building structure, threaded rod supports, and other components required for complete functional installation.
C. Operation: Curtain moves by rolling directly onto drive tube without the use of belts or cables.
D. Configuration: Rectangular shape with straight bottom, extending across room in widths and locations indicated on Drawings.
   1. Maximum dimension of stored divider: 14 inches from bottom of structural support to bottom of rolled curtain.
   2. Required clearances between vertical curtain edges and adjacent fixed objects as indicated on Drawings.
   3. Passage space between curtain ends and walls as indicated on Drawings.
E. Attachment: Attach to structural support with beam clamps, hanger brackets, and 1/2 inch diameter threaded rods. Attachment clamps designed to be capable of supporting a minimum of 5,000 lbs. each and provided in sufficient number to provide a combined minimum 45:1 attachment point safety factor.

F. Drive pipe: 5 inches diameter steel pipe. Drive pipe shall roll in precision laser cut and formed support assemblies. Assemblies spaced at a maximum of 10 feet on center.
G. Divider bottom: 1-5/8 inches diameter steel pipe batten in 6 inches wide curtain pocket.

2.03 CURTAIN

A. Fabric
1. Opaque solid vinyl coated polyester.
2. Weight: 18 ounces per SY.
3. Resistant to rot, mildew, and ultraviolet light.
4. Flammability: Fabric shall comply with the fire resistance requirements set forth in the sections of the California Code of Regulations, Title 19 specified below when tested per the corresponding sections specified.
a. Section 1237, Fire Resistance (Small Scale Test), when tested per Section 1237.1, Test Method (Small Scale Test).
b. Section 1237.2, Fire Resistance (Large Scale), when tested per Section 1237.3, Test Method (Large Scale Test)
5. Color
a. Selected by Architect from manufacturer's standard range.
b. Provide separate colors in Auditorium and Gymnasium if so selected.
6. VOC Emission
a. Divider Curtain Vinyl to be low emitting and certified to meet the requirements of the GREENGUARD Gold certification program.
b. Manufacturer to provide certificate and/or test results upon request.

B. Construction
1. Full height curtain.
a. Seams: Horizontal, electronically welded with 1 inch full contact weld.
b. Outer edge hems: Turned with double welds.
c. Top edge: Solid fabric, cut square for attachment to roller tube and of sufficient length to allow at least two complete wraps on roller tube at all times.
d. Bottom edge: Padded pocket housing bottom pipe batten.

2.04 CURTAIN SAFETY DEVICE

A. Safety locking device directly speed-sensitive to lock divider curtain automatically in position at any time during storage or operation.
B. In the event of an over-speed situation (greater than 1.5 feet per second) caused by malfunction of the hoisting apparatus, whether sudden or gradual, device will immediately activate.

2.05 MOTORIZED WINCH

A. Motor
1. Power: 3/4 HP.
2. Torque: Minimum 1,500 inch-pounds while running at 13.5 RPM.
3. Operation: Instantly reversing.

B. Gear Case
1. High-strength metal alloy.
2. Oil-filled.

C. Gears: Hardened steel.

## PART 3 EXECUTION

3.01 PREPARATION

A. Provide protection and exercise care not to damage gymnasium flooring installed before beginning of gymnasium divider installation.
B. Coordinate support of gymnasium divider with roof structure to ensure proper distribution of loads and adequacy of attachment points. Ensure that building structure has been designed for loads of specific gymnasium divider to be provided. Provide additional structural framing members as required.
C. Coordinate configuration, size, and installation of gymnasium divider with height, slope, and type of building structure and with lighting fixtures, mechanical equipment, ductwork, fire-suppression system, bleachers, athletic equipment, and other potential obstructions.
D. Field-verify dimensions prior to fabrication.
E. Coordinate electrical requirements for motorized operating mechanism to ensure proper power source, conduit, wiring, and boxes for keyed switches. Verify type and location of power supply prior to installation,

3.02 INSTALLATION

A. Install in accordance with manufacturer's written instructions and shop drawings.
B. Install even and level with curtain hanging 2 inches above floor in down position.
C. Connect motorized winch to control switch provided under Section 11 66 25, Gymnasium Equipment.
D. Adjust motorized winch limit switches to ensure accurate position in both stored and lowered positions.

3.03 TESTING AND DEMONSTRATION

A. Operate divider curtains to ensure proper lifting and lowering. Adjust as required to ensure smooth operation and accurate positioning.
B. Demonstrate to Owner's designated representative complete operation and required maintenance.

**END OF SECTION**

**SECTION 12 93 00 - SITE FURNISHINGS**

PART 1 - GENERAL

1.01 SECTION INCLUDES
- A. Bicycle racks.
- B. Removable bollards.

1.02 RELATED REQUIREMENTS
- A. Section 033000 - Cast-in-Place Concrete: Mounting surface for bicycle racks.
- B. REFERENCE STANDARDS
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2020.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.

1.03 SUBMITTALS
- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.
- C. Shop Drawings: Indicate size, shape, and dimensions, including clearances from adjacent walls, doors, and obstructions.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

1.04 DELIVERY, STORAGE, AND HANDLING
- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Handle racks with sufficient care to prevent scratches and other damage to the finish.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
- A. Outdoor Bicycle Racks
  1. Victory Stanly Products https://www.victorystanley.com
  2. Substitutions: See Section 016000 - Product Requirements.
- B. Decorative Removable Bollards
  1. Landscape Forms, Inc.: http://www.landscapeforms.com
  2. Substitutions: See Section 016000 - Product Requirements.

2.02 BICYCLE RACKS
- A. Outdoor Bicycle Racks
  1. Product Victory Stanley BRCS-109.
  2. Description: Nine loop bike rack 11 bike capacity
     a. 2.375 O.D. tubular steel
     b. Provide quantity of 3 to be field located.
  3. Mounting, Ground: In-ground anchor.
  4. Finish: Powder coat, maintenance-free and weather-resistant.

5. Color: As selected by Architect from manufacturer's complete range.
6. Accessories: In-ground grout cover.

B. Materials
1. Pipe: Carbon steel, ASTM A53/A53M, Schedule 40.
2. Tube: Carbon steel, ASTM A500/A500M.
3. Bar, Round and Flat, Carbon Steel: ASTM A36/A36M.

2.03 ~~DECORATIVE REMOVABLE BOLLARDS~~

A. ~~Decorative Removable Bollards~~
1. ~~Product: Landscape Forms "Annapolis" Bollard~~
2. ~~Size: 6 inch nominal diameter~~
a. ~~Outer Diameter Pipe Size: 6.625 inches.~~
b. ~~Wall Thickness: 0.280 inches.~~
3. ~~Mounting: Removable with embedded socket.~~

B. ~~Materials~~
1. ~~Bollard Tube: Structural steel tube, ASTM A 500, Grade B.~~
2. ~~Bollard Top: Aluminum casting.~~
3. ~~Cover Ring: Spun aluminum, type 5052 H32, 0.160 thickness.~~
4. ~~Removable Bollard Socket: All socket components except the bottom cap are hot dip galvanized.~~
a. ~~Tube:~~
1) ~~Structural steel tube, ASTM A 500, Grade B.~~
2) ~~Nominal Pipe Size: 8 inches (8.625 inch outside diameter by 0.322 inch wall thickness).~~
b. ~~Cover Plate: 2 piece, 1/4 inch carbon steel plate, stores in socket.~~
5. ~~Removable Bollard Latching Mechanism:~~
a. ~~Latch: 1/8 inch, Type 304 stainless steel.~~
b. ~~Latch Pin: 1/4 inch diameter by 1/2 inch stainless steel clevis pin with cotter ring.~~
c. ~~Latch Mounting Bracket: 3/16 inch thick by 1.00 inch, Type 304 stainless steel bar.~~
d. ~~Lock:~~
1) ~~CompX Fort Lock #MFWDS23078 221 keyed alike.~~
2) ~~Keys: 2, brass.~~
6. ~~Finish on Metal, Except Removable Bollard Socket:~~
a. ~~Primer: Rust inhibitor.~~
b. ~~Topcoat: Thermosetting polyester powder coat. UV, chip, and flake resistant.~~
c. ~~Color: As selected by Architect from manufacturers full range.~~

PART 3 - EXECUTION

3.01 EXAMINATION
A. Examine surfaces to receive site accessories.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
C. Do not begin installation until unsatisfactory substrates have been properly repaired.

3.02 PREPARATION
A. Ensure surfaces to receive site accessories are clean, flat, and level.

3.03 INSTALLATION - BICYCLE RACKS
A. Install in accordance with manufacturer's instructions.
B. Install bicycle racks level, plumb, square, and correctly located as indicated on drawings.

C. In-Ground Anchor Installation:
   1. Prepare holes in size according to manufacturer’s instructions.
   2. Place anchoring bolts through the holes in the pipe.
   3. Lower rack into holes, ensuring the bottom of lower bends are at least 1-1/2 inch from the ground.
   4. Pour concrete and level rack.
   5. Support until dry.

3.04 INSTALLATION - BOLLARDS

A. Install in accordance with manufacturer's instructions.
B. Install bollards plumb.
C. Embed sockets for removable bollards securely in concrete.

3.05 CLEANING

A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

3.06 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

DIVISION 22 SECTION 22 05 00
COMMON WORK RESULTS FOR PLUMBING
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**SECTION 220500**
**COMMON WORK RESULTS FOR PLUMBING**

## PART 1. GENERAL

### 1.1. SUMMARY

A. All work under Division 22 is subject to the Division 01, General Requirements, the General Conditions and Supplementary Conditions.

B. Provide all labor, materials, equipment, and services necessary for and incidental to the complete installation and operation of all plumbing work.

C. Unless otherwise specified, all submissions shall be made to, and acceptances and approvals made by the Architect and the Engineer.

D. Contract Drawings are generally diagrammatic and all offsets, fittings, transitions and accessories are not necessarily shown. Furnish and install all such items as may be required to fit the work to the conditions encountered. Arrange piping, equipment, and other work generally as shown on the contract drawings, providing proper clearance and access. Where departures are proposed because of field conditions or other causes, prepare and submit detailed shop drawings for approval in accordance with Submittals specified below. The right is reserved to make reasonable changes in location of equipment, piping, up to the time of rough-in or fabrication.

E. Conform to the requirements of all rules, regulations and codes of local, state and federal authorities having jurisdiction.

F. Coordinate the work under Division 22 with the work of all other construction trades.

G. Be responsible for all construction means, methods, techniques, procedures, and phasing sequences used in the work. Furnish all tools, equipment and materials necessary to properly perform the work in first class, substantial, and workmanlike manner, in accordance with the full intent and meaning of the contract documents.

### 1.2. PERMITS AND FEES

A. Obtain all permits and pay taxes, fees and other costs in connection with the work. File necessary plans, prepare documents, give proper notices and obtain necessary approvals. Deliver inspection and approval certificates to Owner prior to final acceptance of the work.

B. Permits and fees shall comply with the Division 01, General Requirements of the specification.

### 1.3. EXAMINATION OF SITE

A. Examine the site, determine all conditions and circumstances under which the work must be done, and make all necessary allowances for same. No additional cost to the Owner will be permitted for contractors failure to do so.

B. Examine and verify specific conditions described in individual specifications sections.

C. Verify that utility services are available, of the correct characteristics, and in the correct locations.

1.4. CONTRACTOR QUALIFICATION

A. Any Contractor or Subcontractor performing work under Division 22 shall be fully qualified and acceptable to the Architect and Owner. Submit the following evidence when requested:

1. A list of not less than five comparable projects which the Contractor completed.

2. Letter of reference from not less than three registered professional engineers, general contractors or building owners.

3. Local and/or State License, where required.

4. Membership in trade or professional organizations where required.

B. A Contractor is any individual, partnership, or corporation, performing work by contract or subcontract on this project.

C. Acceptance of a Contractor or Subcontractor will not relieve the Contractor or subcontractor of any contractual requirements or his responsibility to supervise and coordinate the work, of various trades.

1.5. MATERIALS AND EQUIPMENT

A. Materials and equipment installed as a permanent part of the project shall be new, unless otherwise indicated or specified, and of the specified type and quality.

B. Where material or equipment is identified by proprietary name, model number and/or manufacturer, furnish named item, or its equal, subject to approval by Engineer. Substituted items shall be equal or better in quality and performance and must be suitable for available space, required arrangement, and application. Submit all data necessary to determine suitability of substituted items, for approval.

C. The suitability of named item only has been verified. Where more than one item is named, only the first named item has been verified as suitable. Substituted items, including items other than first named shall be equal or better in quality and performance to that of specified items, and must be suitable for available space, required arrangement and application. Contractor, by providing other than the first named manufacturer, assumes responsibility for all necessary adjustments and modifications necessary for a satisfactory installation. Adjustments and modifications shall include but not be limited to electrical, structural, support, and architectural work.

D. Substitution will not be permitted for specified items of material or equipment where noted.

E. All items of equipment furnished shall have a service record of at least five (5) years.

1.6. FIRE SAFE MATERIALS

A. Unless otherwise indicated, materials and equipment shall conform to UL, NFPA and ASTM standards for fire safety with smoke and fire hazard rating not exceeding flame spread of 25 and smoke developed of 50.

1.7. REFERENCED STANDARDS, CODES AND SPECIFICATIONS

A. Specifications, Codes and Standards listed below are included as part of this specification, latest edition.

| | | | |
|---|---|---|---|
| B. | ASHRAE | - | American Society of Heating, Refrigerating and Air Conditioning Engineers |
| C. | ASME | - | American Society of Mechanical Engineers |
| D. | ASPE | - | American Society of Plumbing Engineers |
| E. | ASTM | - | American Society for Testing and Materials |
| F. | AWWA | - | American Water Works Association |
| G. | ASME CSD-1 | - | American Society of Mechanical Engineers Controls and Safety Devices for Automatically Fired Boilers |
| H. | CAGI | - | Compressed Air and Gas Institute |
| I. | CS | - | Commercial Standard |
| J. | CSD | | Control and Safety Devices |
| K. | DNREC | - | Delaware Department of Natural Resources and Environmental Control |
| L. | FM | - | Factory Mutual |
| M. | IBC | - | International Building Code |
| N. | IEEE | - | Institute of Electrical and Electronics Engineers |
| O. | MSSP | - | Manufacturers Standards Society of the Valve and Fittings Industry |
| P. | NEC | - | National Electrical Code |
| Q. | NEMA | - | National Electrical Manufacturers Association |
| R. | NSF | - | National Sanitation Foundation |
| S. | UL | - | Underwriters' Laboratories |

T. All plumbing equipment and materials shall comply with the codes and standards listed in the latest edition of ASHRAE HVAC Applications Handbook, Chapter entitled Codes and Standards.

1.8. SUBMITTALS, REVIEW AND ACCEPTANCE

A. Equipment, materials, installation, workmanship and arrangement of work are subject to review and acceptance. No substitution will be permitted after acceptance of equipment or materials except where such substitution is considered by the Architect to be in best interest of Owner.

B. After acceptance of Material and Equipment List, submit six (6) copies or more as required under General Conditions of complete descriptive data for all items. Data shall consist of specifications, data sheets, samples, capacity ratings, performance curves, operating characteristics, catalog cuts, dimensional drawings, wiring diagrams, installation instructions, and any other information necessary to indicate complete compliance with Contract Documents. Edit submittal data specifically for application to this project.

C. Thoroughly review and stamp all submittals to indicate compliance with contract requirements prior to submission. Coordinate installation requirements and any electrical requirements for equipment submitted. Contractor shall be responsible for correctness of all submittals.

D. Submittals will be reviewed for general compliance with design concept in accordance with contract documents, but dimensions, quantities, or other details will not be verified.

E. Identify submittals, indicating intended application, location and service of submitted items. Refer to specification sections or paragraphs and drawings where applicable. Clearly indicate exact type, model number, style, size and special features of proposed item. Submittals of a general nature will not be acceptable. For substituted items, clearly list on the first page of the submittal all differences between the specified item and the proposed item. The contractor shall be responsible for corrective action and maintaining the specification requirements if differences have not been clearly indicated in the submittal.

F. Submit actual operating conditions or characteristics for all equipment where required capacities are indicated. Factory order forms showing only required capacities will not be acceptable. Call attention, in writing, to deviation from contract requirements.

G. Acceptance will not constitute waiver of contract requirements unless deviations are specifically indicated and clearly noted. Use only final or corrected submittals and data prior to fabrication and/or installation.

H. For any submittal requiring more than two (2) reviews by the Engineer (including those caused by a change in subcontractor or supplier) the Owner will withhold contractor's funds by a change order to the contract to cover the cost of additional reviews. One review is counted for each action including rejection or return of any reason.

I. For resubmissions, the Contractor must address in writing all of the Engineer’s comments on the original submission to verify compliance.

1.9. SHOP DRAWINGS

A. Prepare and submit shop drawings for all plumbing equipment, specially fabricated items, modifications to standard items, specially designed systems where detailed design is not shown on the contract drawings, or where the proposed installation differs from that shown on contract drawings.

B. Submit data and shop drawings including but not limited to the list below, in addition to provisions of the paragraph above. Identify all shop drawings by the name of the item and system and the applicable specification paragraph number and drawing number.

C. Every submittal including, but not limited to the list below, shall be forwarded with its own transmittal as a separate, distinct shop drawing. Grouping of items/systems that are not related shall be unacceptable.

D. Items and Systems

1. Access Doors/Panels including layout and location
2. Air Compressors
3. Automatic Temperature Control System and Equipment as it relates to plumbing system
4. Sink Plaster Traps
5. Backflow Preventers
6. Backwater Valves
7. Compressed Air Filters
8. Compressed Air Regulators
9. Compressed Air Drain Traps
10. Compressed Air Solenoid Valves and Valve Boxes
11. Compressed Air Quick Disconnects
12. Compressed Air Hose Reels
13. Coordinated Drawings
14. Condensate Neutralizers
15. Dental Equipment and Piping
16. Direct Buried Piping
17. Domestic Booster Pumps

18. Domestic Water Expansion Tanks
19. Drain Valves
20. Drip Pans
21. Elevator Sump Pumps
22. Emergency Fixtures & Thermostatic Mixing Valves
23. Equipment Rails
24. Exterior Equipment/Piping Supports
25. Exterior Pipe Roller Support
26. Fire Stopping - Methods and Materials
27. Floor and Roof Drains
28. Gas Fired Domestic Water Heaters
29. Gas Flexible Hoses
30. Gas Pressure Regulating Valves
31. Gas Quick Disconnect Valves
32. Gas Solenoid Valves and Valve Boxes
33. High/low Mixing Valves
34. Hose Bibbs and Wall Hydrants
35. Identification System
36. In-Line Circulators
37. Interceptors
38. Makeup Water Meters
39. Material and Equipment List
40. Operations and Maintenance Manuals
41. Pipe Enclosures
42. Pipe Guides and Anchors.
43. Pipe Materials Including Itemized Schedule

44. Plumbing Fixtures & Trim
45. Preliminary Testing and Balancing Report
46. Pre-Pressurized Hydro-Pneumatic Tanks
47. Pressure/Temperature Relief Valves
48. Pressure Regulating Valves
49. Pumps
50. Refrigerated Air Dryers (for compressed air systems)
51. Roof Curbs
52. Roof Drains
53. Roof Hydrants
54. Screenshots of ATC System Graphics
55. Section Valves - Lab Utilities
56. Shock Absorbers
57. Solenoid Valves
58. Strainers
59. Test Certificates
60. Thermal Insulation Materials Include Table Summary
61. Thermometers and Gauges
62. Thermostatic Mixing Valves
63. Trap Priming Station/Valves/Mini Primer
64. Underground Pre-Fabricated Piping Systems
65. Vacuum Breakers
66. Valves
67. Variable Frequency Drive Motor Bearing Protective Rings
68. Variable Speed Drives
69. Vibration Isolation Materials

70. Water Meters

71. Weatherproof Assembly Components

72. Water Filters

73. Wiring Diagrams, Flow Diagrams and Operating Instructions

E. Contractor, additionally, shall submit for review any other shop drawings as required by the Architect. No item shall be delivered to the site, or installed, until the Contractor has received a submittal from the Engineer marked Reviewed or Comments Noted. After the proposed materials have been reviewed, no substitution will be permitted except where approved by the Architect.

1.10. SUPERVISION AND COORDINATION

A. Provide complete supervision, direction, scheduling, and coordination of all work under the Contract, including that of subcontractors.

B. Coordinate rough-in of all work and installation of sleeves, anchors, and supports for piping, equipment, and other work performed under Division 22.

C. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

D. Coordinate electrical work required under Division 22 with that under Division 26. Coordinate all work under Division 22 with work under all other Divisions.

E. Supply services of an experienced (10 years minimum) and competent Project Manager to be in constant charge of work at site.

F. Where a discrepancy exists within the specifications or drawings or between the specifications and drawings, the more stringent (or costly) requirement shall apply until clarification can be obtained from the Engineer. Failure to clarify such discrepancies with the Engineer will not relieve the Contractor of the responsibility of conforming to the requirements of the Contract.

G. Failure of contractor to obtain a full and complete set of contract documents (either before or after bidding) will not relieve the contractor of the responsibility of complying with the intent of the contract documents.

H. Coordinate installation of large equipment requiring positioning before closing in building.

1.11. CUTTING AND PATCHING

A. Accomplish all cutting and patching necessary for the installation of work under Division 22. Damage resulting from this work to other work already in place, shall be repaired at Contractor's expense. Where cutting is required, perform work in neat and work¬manlike manner. Restore disturbed work to match and blend with existing construction and finish, using materials compatible with the original. Use mechanics skilled in the particular trades required.

B. Do not cut structural members without approval from the Architect or Engineer.

1.12. PENETRATION OF WATERPROOF CONSTRUCTION

A. Coordinate the work to minimize penetration of waterproof construction, including roofs, exterior walls, and interior waterproof construction. Where such penetrations are necessary, furnish and install all necessary curbs, sleeves, flashings, fittings and caulking to make penetrations absolutely watertight.

B. Where plumbing vents or other pipes penetrate roofs, flash pipe with Stoneman Stormtite, Pate or approved equal, roof flashing assemblies with skirt and caulked counter flashing sleeve.

C. Furnish and install pitch pockets or weather tight curb assemblies where required.

D. Furnish and install roof drains, curbs, and vent assemblies specifically designed for application to the particular roof construction, and install in accordance with the manufacturer's instructions. The Contractor shall be responsible for sleeve sizes and locations. All roof penetrations shall be installed in accordance with manufacturer’s instructions, the National Roofing Contractors Association, SMACNA, and as required by other divisions of these specifications.

1.13. CONCRETE AND MASONRY WORK

A. Furnish and install concrete and masonry work for equipment founda¬tions, supports, pads, and other items required under Division 22. Perform work in accordance with requirements of other applicable Divisions of these specifications.

B. Concrete shall test not less than 3,000 psi compressive strength after 28 days.

C. Grout shall be non-shrink, high strength mortar, free of iron of chlorides and suitable for use in contact with all metals, without caps or other protective finishes. Apply in accordance with manufacturer's instructions and standard grouting practices.

1.14. CONNECTIONS AND ALTERATIONS TO EXISTING WORK

A. Unless otherwise noted on the drawings, where existing plumbing work is removed all pipes, valves, etc., shall be removed, including hangers, to a point below finished floors or behind finished walls and capped. Such point shall be far enough behind finished surfaces to allow for installation of normal thickness of required finish material.

B. Where work specified in Division 22 connects to existing equipment, piping, etc., Contractor shall perform all necessary alterations, cuttings, fittings, etc., of existing work as may be necessary to make satisfactory connections between new and existing work, and to leave completed work in a finished and workmanlike condition.

C. Where the work specified under Division 22, or under other Divisions, requires relocation of existing equipment, piping, etc., Contractor shall perform all work and make necessary changes to existing work as may be required to leave completed work in a finished and workmanlike condition. Where existing insulation is disturbed, replace insulation where removed or damaged equal to existing, in type, thickness, density, finish and thermal

resistance (R-value) value.

D. Where the relocation of existing equipment is required for access or the installation of new equipment, the contractor shall temporarily remove and/or relocate and re-install as required to leave the existing and new work in a finished and workman like condition.

1.15. EXCAVATION AND BACKFILLING

A. GENERAL

1. Perform all necessary excavation, or installation of work under Division 22, in whatever materials or conditions encountered, using suitable methods and equipment.

2. Accurately establish required lines and grades and properly locate the work.

3. Determine the locations of all existing utilities before commencing the work.

B. Excavation: (Refer also to other portions of the specifications)

1. Excavate only the required elevations. If excavation is carried below the foundation lines or other required limits, backfill the excess with concrete.

2. Keep banks of trenches as nearly vertical as possible, and provide sheeting and/or shoring as required for protection of work and safety of personnel. Follow local, State, and OSHA Guidelines.

3. Keep excavations dry. Protect excavations from freezing.

C. Backfilling: (Refer also to other portions of the specifications)

1. Backfill excavations to the required elevations and restore surfaces to their original or required conditions.

2. Backfill shall be similar material, free from objectionable matter such as rubbish, roots, stumps, brush, rocks and other sharp objects. Unless otherwise indicated, suitable material from the excavation may be used for backfill.

3. Carefully place and mechanically tamp backfill in layers not exceeding 12 inches loose thickness. Compact to 95 percent minimum.

4. Do not backfill against frozen material. Do not use frozen material for backfill.

1.16. DRIVE GUARDS

A. Provide safety guards on all exposed belt drives, motor couplings, and other rotating machinery. Provide fully enclosed guards where machinery is exposed from more than one direction.

B. When available, guards shall be factory fabricated and furnished with the equipment. Otherwise fabricate guards of heavy gauge steel, rigidly braced, removable, and finish to

match equipment served. Provide openings for tachometers. Guards shall meet local, State and O.S.H.A. requirements.

1.17. VIBRATION ISOLATION

A. Furnish and install vibration isolators, flexible connections, supports, anchors and/or foundations required to prevent transmission of vibration from equipment, or piping to building structure. See Division 23 Section, Vibration Controls for HVAC, Plumbing and Fire Protection.

1.18. ALTERNATES

A. Refer to Division 01 Section, "Alternates" for description of work under this section affected by alternates.

1.19. DEFINITIONS

A. Approve - to permit use of material, equipment or methods conditional upon compliance with contract documents requirements.

B. Furnish and install or provide means to supply, erect, install, and connect to complete for readiness for regular operation, the particular work referred to.

C. Contractor means the mechanical contractor and any of his subcontractors, vendors, suppliers, or fabricators.

D. Piping includes pipe, all fittings, valves, hangers, insulation, identification, and other accessories relative to such piping.

E. Concealed means hidden from sight in chases, formed spaces, shafts, hung ceilings, embedded in construction.

F. Exposed means not installed underground or concealed as defined above.

G. Invert Elevation means the elevation of the inside bottom of pipe.

H. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceiling, unexcavated spaces, crawl spaces, and tunnels.

I. Review - limited observation or checking to ascertain general conformance with design concept of the work and with information given in contract documents. Such action does not constitute a waiver or alteration of the contract requirements.

J. ECM: Electronically Commutating Motor.

K. Building Line: Exterior wall of building.

1.20. MINIMUM EFFICIENCY REQUIREMENTS

A. All plumbing equipment shall be manufactured to provide the minimum efficiency

requirements as specified in ASHRAE Standard 90.1, latest edition.

B. All piping and equipment insulation shall comply with ASHRAE Standard 90.1, latest edition.

C. All service water/heating equipment shall be manufactured to provide the minimum efficiency requirements as specified in ASHRAE Standard 90.1, latest edition.

D. All plumbing devices, controls, accessories, and components shall be manufactured to provide the minimum efficiency requirements as specified in ASHRAE Standard 90.1, latest edition.

E. Department of Energy (DOE) compliance: Pump manufacturers shall comply with US Department of Energy (DOE) energy conservation standard for "clean water pumps" 1-200 horse power, less than 459 feet of head and greater than 25 gpm. These pumps shall be evaluated using the Pump Energy Index (PEI) of equal to or lesser than 1.0. The PEI number shall appear on the pump name plate and available for the record at http://er.pumps.org.

F. Where Energy Star certification exists for equipment utilized on this project, the equipment must be Energy Star certified. Provide Energy Star certification with submittals.

1.21. FUTURE ADDITIONS

A. Where future additions are indicated, install all piping to account for future additions. Furnish and install shut-off valve in ceiling adjacent to future additions. Provide cap at the end of the piping. Arrange so that in the future the cap can be removed and shut-off valve opened to serve future addition without draining system. Install bypass with balance valve and shut-off valve on domestic recirc system. Balance to future flow rate and then shut the bypass balance valve.

1.22. SYSTEM INTEGRATION

A. For all plumbing equipment specified to be provided with packaged controls and interfaced with the automatic temperature control system, provide system integration between the equipment manufacturer and the automatic temperature control subcontractor.

B. Plumbing equipment submittals requiring system integration as defined above must identify all required system integration points.

C. Plumbing equipment manufacturers must coordinate with ATC subcontractor regarding system integration prior to submitting on the equipment.

D. A system integration meeting must be arranged by the Mechanical Contractor and include, but not be limited to the systems integrator for the plumbing equipment manufacturer and the ATC Subcontractor. This portion of systems integration must occur prior to plumbing equipment being delivered to the project.

E. Once the plumbing equipment is on site, a second systems integration meeting must be arranged by the Mechanical Contractor to coordinate the packaged controls with the ATC system. The plumbing equipment manufacturer's representative familiar with system

integration and the ATC subcontractor familiar with programming must be present.

F. A final system integrations meeting shall occur once all equipment is in place and ready for operation. The Mechanical Contractor, the plumbing equipment systems' integrator, and the ATC Subcontractor shall meet on site to jointly program, schedule, verify points, interlock devices, and fully set up all systems integration components.

G. All systems integration coordination, programming, and graphics must be completed prior to requesting commissioning and/or inspections by the Engineer of Record.

1.23. LEAD FREE REQUIREMENTS

A. All plumbing fixtures, equipment, and devices that contact potable water must be lead free per the State requirements. Potable water systems shall also comply with NSF 61 – Annex G and NSF-372.

1.24. COORDINATION WITH NEW CASTLE COUNTY VOCATIONAL TECHNICAL SCHOOL DISTRICT I.T. DEPARTMENT

A. All equipment that interfaces with the internet shall be coordinated with the New Castle County Vocational Technical School District I.T. Department to verify that the same is suitable for use on the New Castle County Vocational Technical School District IT infrastructure. Coordinate with the New Castle County Vocational Technical School District I.T. Department regarding the allowable frequency bands to avoid interference with the New Castle County Vocational Technical School District I.T. infrastructure.

1.25. EXTRA MATERIALS

A. Provide one set of seals for each type and model of pump provided on the project.

## PART 2. ELECTRICAL REQUIREMENTS

2.1. GENERAL MOTOR AND ELECTRICAL REQUIREMENTS

A. Furnish and install control and interlock wiring for the equipment furnished. In general, power wiring and motor starting equipment will be provided under Division 26. Carefully review the contract documents to coordinate the electrical work under Division 22 with the work under Division 26. Where the electrical requirements of the equipment furnished differ from the provisions made under Division 26, make the necessary allowances under Division 22. Where no electrical provisions are made under Division 26, include all necessary electrical work under Division 22.

B. All electrical work performed under Division 22 shall conform to the applicable requirements of Division 26 and conforming to the National Electrical Code. All wiring, conduit, etc., installed in ceiling plenums must be plenum rated per NFPA & International Building Code.

C. Provide wiring diagrams with electrical characteristics and connection requirements.

D. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than five (5) horsepower.

E. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weatherproof covering. For extended outdoor storage, remove motors from equipment and store separately.

F. All motors shall be furnished with visible nameplate indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor and efficiency.

G. Motors located in exterior locations, wet air streams and outdoors shall be totally enclosed weatherproof epoxy-treated type.

H. Nominal efficiency and power factor shall be as scheduled at full load and rated voltage when tested in accordance with IEEE 112.

I. Brake horsepower load requirement at specified duty shall not exceed 85 percent of nameplate horsepower times NEMA service factor for motors with 1.0 and 1.15 service factors.

J. All single phase motors shall be provided with thermal protection: Internal protection shall automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature ratings of motor insulation. Thermal protection device shall automatically reset when motor temperature returns to normal range, unless otherwise indicated.

K. Where a motor disconnect is indicated downstream of a variable frequency drive (VFD) provide interlock wiring from the auxiliary contacts on the disconnect to the VFD to de-energize when the disconnect is turned "off".

L. Where equipment under this Division is specified with integral disconnecting means, the same shall be a single disconnecting means for disconnecting all ungrounded main power supply conductors that is capable of being locked in the open ("off") position in accordance with the National Electrical Code and the local electrical inspector.

2.2. MOTORS AND CONTROLS

A. Motors and controls shall conform to the latest requirements of IEEE, NEMA, NFPA-70 and shall be UL listed. Motor sizes are specified with the driven equipment. Motor starting and control equipment is specified either with the motor which is controlled or in an electrical specification section. The Contractor is advised to consult all specification sections to determine responsibility for motors and controls.

B. Motors shall be designed, built and tested in accordance with the latest revision of NEMA Standard MG l.

C. Motors used with variable-frequency controllers shall have ratings, characteristics, and features coordinated with and approved by the variable frequency controller (drive) manufacturer. As a minimum the following shall apply to variable frequency controlled motors:

1. Motors shall be manufactured to withstand peak voltages of 1600 volts with .1 microsecond rise time per NEMA MG-1.

2. Critical vibration frequencies of motor shall not be within operating range of variable frequency controller output.

3. Temperature rise: Match rating for Class B insulation.

4. Insulation: Class F.

5. Thermal Protection: Conform to MG1 requirements for thermally protected motors.

D. Motors shall be suitable for use under the conditions and with the equipment to which applied, and designed for operation on the electrical systems specified or indicated.

1. Motor capacities shall be such that the horsepower rating and the rated full-load current will not be exceeded while operating under the specified operating conditions. Under no condition shall the motor current exceed that indicated on the nameplates.

2. Motor sizes noted in the individual equipment specifications are minimum requirements only. It is the responsibility of the equipment manufacturers and of the Contractor to furnish motors, electrical circuits and equipment of ample capacity to operate the equipment without overloading, exceeding the rated full-load current, or overheating at full-load capacity under the most severe operating service of this equipment. Motors shall have sufficient torque to accelerate the total WR2 of the driven equipment to operating speed.

3. Motors shall be continuous duty type and shall operate quietly at all speeds and loads.

4. Motors shall be designed for operation on 60 hertz power service. Unless otherwise specified or shown, motors less than ½ horsepower shall be single phase, and motors ½ horsepower and larger shall be 3 phase unless otherwise noted.

5. Motors shall be mounted so that the motor can be removed without removing the entire driven unit.

E. Single phase motors, smaller than 1/20 horsepower shall be ball or sleeve bearing; drip-proof, totally enclosed or explosion proof, as specified; 120 volts; permanent-split capacitor or shaded pole type. These motors shall not be used for general power purposes, and shall only be provided as built-in components of plumbing equipment. When approved by the Engineer, deviations from the specifications will be permitted as follows:

1. Open motors may be installed as part of an assembly where enclosure within a cabinet provides protection against moisture.

2. Motors used in conjunction with low voltage control systems may have a voltage rating less than 115 volts.

F. Single phase motors, greater than 1/20 horsepower and less than ½ horsepower shall be ball bearing; drip-proof, totally enclosed or explosion proof, as specified, with Class A or B insulation, as standard with the motor manufacturer; 115 or 120/208/240 volts as

required; capacitor start-induction run, permanent split capacitor, or repulsion start-induction run type with minimum efficiency of 70 percent and a minimum full load power of 77 percent.

G. Except as otherwise specified in the various specification sections, 3 phase motors 60 horsepower and smaller shall be NEMA design B squirrel cage induction type meeting the requirements of this paragraph. Motors shall be drip-proof, totally enclosed or explosion proof, as specified or indicated. Insulation shall be Class B or F, at 40 degrees C ambient temperature. Drip-proof motors shall have a 1.15 service factor and totally enclosed and explosion proof motors shall have a service factor of 1.00 or higher. Motors specified for operation at 480, 240, and 208 volts shall be nameplated 460, 230, 200 volts, respectively. Efficiencies and percent power factor at full load for three phase motors shall be not less than the values listed below for premium efficiency motors:

| MOTOR NAMEPLATE | MINIMUM PERCENT EFFICIENCY AT NOMINAL SPEED AND RATED LOAD | MINIMUM PERCENT POWER FACTOR |
|---|---|---|
| 1HP and above to | 85.5 percent | 84 percent |
| 1-½ HP | 86.5 percent | 85 percent |
| 2HP | 86.5 percent | 85 percent |
| 3HP | 89.5 percent | 86 percent |
| 5HP | 89.5 percent | 87 percent |
| 7½ HP | 91 percent | 86 percent |
| 10HP | 91.7 percent | 85 percent |
| 15HP | 93.0 percent | 85 percent |
| 20HP | 93.0 percent | 86 percent |
| 25HP | 93.6 percent | 85 percent |
| 50HP | 94.5 percent | 88 percent |

H. Three phase motors ½ HP or greater shall be the Duty Master XE by Reliance Electric Company, Super-E Premium Efficiency of Baldor Motor and Drives, E-plus Efficient Standard Duty Motor of the Electric Motor Division of Gould, Inc., the MAC II High Efficiency motor of Westinghouse Electric Corp., the equivalent product of General Electric, or approved equal.

I. For motors serving equipment being controlled by a variable speed drive, motor shall be premium efficiency inverter duty rated.

J. Motor frames shall be NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast-iron or aluminum with steel inserts.

K. Control of each motor shall be manual or automatic as specified for each in the various

mechanical sections. In general, and unless otherwise specified for a particular item in the various mechanical sections of the specifications, motor starters and controls shall be specified and provided under the various electrical sections of these specifications.

2.3. MOTOR INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install securely on firm foundation. Mount ball bearing motors to support shaft regardless of shaft position.

C. Check line voltage and phase and ensure agreement with nameplate. Check that proper thermal overloads have been installed prior to operating motors.

2.4. WIRING DIAGRAMS

A. The Contractor is responsible for obtaining and submitting wiring diagrams for all major items of equipment.

B. Wiring diagrams shall be provided with shop drawings for all equipment requiring electric power.

C. Provide wiring diagrams for all major plumbing items of equipment to electrical contractor and ATC subcontractor for coordination.

2.5. VARIABLE FREQUENCY DRIVE MOTOR BEARING PROTECTIVE RINGS:

A. For all motors driven by a variable frequency PWM drive include a maintenance free, circumferential, conductive micro fiber shaft grounding ring to discharge shaft currents. Grounding rings shall be manufactured by AEGIS SGR or approved equal.

B. Furnish units with one year warranty.

C. Size and select Bearing Protective Rings per the manufacturer requirements based on the motor size, shaft diameter, and shaft shoulder length. For motors with slingers furnish and install NEMA /IEC kit as required.

D. Furnish and apply Colloidal silver shaft coating to all shafts with Bearing Protective Rings to improve shaft voltage discharge capability.

2.6. ENCLOSURES

A. Electrical enclosures including factory provided enclosures, field provided and installed enclosures, and automatic temperature control system enclosures shall be as follows:

1. Dry Interior Locations: NEMA 1.

2. Damp/Wet Locations, Including Exterior Locations: NEMA 3R.

3. Corrosive Locations, Including Indoor Laboratories, Chemical Storage Rooms and Similar Space = NEMA 4X.

## PART 3. EXECUTION

### 3.1. EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.

B. Install equipment according to approved submittal data. Portions of the work are shown only in diagrammatic form. Refer conflicts to the Architect.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope.

F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

G. Do not install equipment or piping over electrical gear, electrical panels, motor controllers, and similar electrical equipment. Install equipment and piping to maintain clear space above and in front of all electrical components per the National Electric Code.

### 3.2. SUPPORTS, HANGERS AND FOUNDATIONS

A. Provide supports, hangers, braces, attachments and foundations required for the work. Support and set the work in a thoroughly substantial and workmanlike manner without placing strains on materials, equipment, or building structure, submit shop drawings for approval. Coordinate all work with the requirements of the structural division.

B. Supports, hangers, braces, and attachments shall be standard manufactured items or fabricated structural steel shapes. All interior hangers shall be galvanized or steel with rust inhibiting paint. For un-insulated copper piping provide copper hanger to prevent contact of dissimilar metals. All exterior hangers shall be constructed of stainless steel utilizing stainless steel rods, nuts, washers, bolts, etc.

C. Concrete housekeeping pads and foundations shall be not less than 4 inches high and shall extend a minimum of 6 inches beyond equipment bases. Provide wire-mesh reinforcement; chamfer exposed edges and corners; and finish exposed surfaces smooth.

### 3.3. DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Record demonstration and training video recordings. Record each training module separately.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Engineer

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

D. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

E. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

3.4. PROVISIONS FOR ACCESS

A. The contractor shall provide access panels and doors for all concealed equipment, valves, strainers, dampers, filters, controls, control devices, cleanouts, traps, and other devices requiring maintenance, service, adjustment, balancing or manual operation.

B. Where access doors are necessary, furnish and install manufactured painted steel door assemblies consisting of hinged door, key locks, and frame designed for the particular wall or ceiling construction. Properly locate each door. Door sizes shall be a minimum of 12 inches x 12 inches for hand access, 18 inches x 18 inches for shoulder access and 20 inches x 30 inches for full body access where required. Review locations and sizes with Architect prior to fabrication. Provide U.L. approved and labeled access doors where installed in fire rated walls or ceilings. Doors shall be Milcor Metal Access Doors as manufactured by Inland-Ryerson, Mifab, Acudor Products, Babcock-Davis, Nystrom, or approved equal.

1. Acoustical or Cement Plaster: Style B

2. Hard Finish Plaster: Style K or L

3. Masonry or Dry Wall: Style M

C. Where access is by means of liftout ceiling tiles or panels, mark each ceiling grid using small color-coded and numbered tabs. Provide a chart or index for identification. Place markers within ceiling grid not on ceiling tiles.

D. Access panels, doors, etc. described herein shall be furnished under the section of specifications providing the particular service and to be turned over to the pertinent trade for installation. Coordinate installation with installing contractor. All access doors shall be painted in baked enamel finish to match ceiling or wall finish.

E. Submit shop drawings indicating the proposed location of all access panels/doors. Access doors in finished spaces shall be coordinated with air devices, lighting and sprinklers to provide a neat and symmetrical appearance.

F. Where access doors are installed in wet locations (i.e. shower rooms, toilet rooms, kitchen rooms, kitchens, dishwasher rooms, can wash rooms, and similar spaces, etc.) provide aluminum access doors/frame.

3.5. PAINTING AND FINISHES

A. Provide protective finishes on all materials and equipment. Use coated or corrosion-resistant materials, hardware and fittings throughout the work. Paint bare, untreated ferrous surfaces with rust-inhibiting paint. All exterior components including supports, hangers, nuts, bolts, washers, vibration isolators, etc. shall be stainless steel.

B. Clean surfaces prior to application of insulation, adhesives, coatings, paint, or other finishes.

C. Provide factory-applied finishes where specified. Unless otherwise indicated factory-applied paints shall be baked enamel with proper pretreatment.

D. Protect all finishes and restore any finishes damaged as a result of work under Division 22 to their original condition.

E. The preceding requirements apply to all work, whether exposed or concealed.

F. Remove all construction marking and writing from exposed equipment, piping and building surfaces. Do not paint manufacturer's labels or tags.

G. All exposed piping, equipment, etc. shall be painted. Colors shall be as stated in this division or as selected by the Architect and conform to ANSI Standards.

H. All exterior roof mounted equipment, piping and vents shall be painted to match roof in color as selected by Architect.

I. All exposed piping, equipment, etc. in finished spaces shall be painted. Colors shall be as selected by the Architect and conform to ANSI Standards.

J. All exposed piping, equipment, etc., in Mechanical Rooms, Penthouses, Fire Pump Rooms, Mezzanines, and Storage where PVC jacketed shall not require painting. Label and identify and color code as specified.

3.6. CLEANING OF SYSTEMS

A. Thoroughly clean systems after satisfactory completion of pressure tests and before permanently connecting fixtures, equipment, traps, strainers, and other accessory items. Blow out and flush piping until interior surfaces are free of foreign matter.

B. Flush piping in re-circulating water systems to remove cutting oil, excess pipe joint compound, solder slag and other foreign materials. Do not use system pumps until after cleaning and flushing has been accomplished to the satisfaction of the Engineer. Employ chemical cleaners, including a non-foaming detergent, not harmful to system components. After cleaning operation, final flushing and refilling, the residual alkalinity shall not exceed 300 parts per million. Submit a certificate of completion to Engineer stating name of Service Company used.

C. Maintain strainers and dirt pockets in clean condition.

D. Pay for labor and materials required to locate and remove obstructions from systems that are clogged with construction refuse after acceptance. Replace and repair work disturbed during removal of obstructions.

E. Leave systems clean, and in complete running order.

3.7. COLOR SELECTION

A. Color of finishes shall be as selected by the Architect.

B. Submit color of factory-finished equipment for acceptance prior to ordering.

3.8. PROTECTION OF WORK

A. Protect work, material and equipment from weather and construction operations before and after installation. Properly store and handle all materials and equipment.

B. Cover temporary openings in piping and equipment to prevent the entrance of water, dirt, debris, or other foreign matter. Deliver pipes and tubes with factory applied end caps.

C. Cover or otherwise protect all finishes.

D. Replace damaged materials, devices, finishes and equipment.

E. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, where stored inside.

3.9. OPERATION OF EQUIPMENT

A. Clean all systems and equipment prior to initial operation for testing, balancing, or other purposes. Lubricate, adjust, and test all equipment in accordance with manufacturer's instructions. Do not operate equipment unless all proper safety devices or controls are operational. Provide all maintenance and service for equipment that is authorized for operation during construction.

B. Where specified, or otherwise required, provide the services of the manufacturer's factory-trained servicemen or technicians to start up the equipment. Where factory start-up of equipment is not specified, provide field start-up by qualified technician.

C. Submit factory start-up sheets or field start-ups sheets for all equipment prior to the commencement of testing and balancing work. Testing and balancing work shall not commence until start-up reports have been completed, reviewed by Engineer and forwarded to Testing and Balancing Agency.

D. Do not use plumbing systems for temporary services or temporary conditioning during construction. Refer to Division 01 section "Temporary Facilities and Controls" for temporary plumbing during construction.

E. Upon completion of work, clean and restore all equipment to new conditions; replace expendable items such as filters.

3.10. IDENTIFICATIONS, FLOW DIAGRAMS, ELECTRICAL DIAGRAMS AND OPERATING INSTRUCTIONS

A. Contractor shall submit for approval schematic piping diagrams of each piping system

installed in the building. Diagrams shall indicate the location and the identification number of each valve in the particular system. Following approval by all authorities, the diagrams shall be framed, mounted under safety glass and hung in each Mechanical Room where directed. Contractor shall deliver the tracing or sepia from which the diagrams were reproduced to the Owner.

B. All valves shall be plainly tagged. For any bypass valves, install sign indicating valve position as "Normally Open" or "Normally Closed" as required.

C. All items of equipment, including motor starters and disconnects shall be furnished with white on black plastic permanent identification cards. Lettering shall be a minimum of ¼ inch high. Identification plates shall be secured, affixed to each piece of equipment, starters, disconnects, panels by screw or adhesive (tuff bond #TB2 or as approved equal). Equipment identification and room name or area served shall be on each panel.

D. Provide six (6) copies of operating and maintenance instructions for all principal items of equipment furnished. This material shall be bound as a volume of the Operations and Maintenance Manuals as hereinafter specified.

E. All lines piping installed under this contract shall be stenciled with direction of flow arrows and with stenciled letters naming each pipe and service. Refer to Division 22 Section, Plumbing Piping, Fittings, Valves, Etc. Color code all direction of flow arrows and labels. In finished spaces omit labeling and direction of flow arrows. Paint in color as selected by Architect.

F. Submit list of wording, symbols, letter size, and color coding for plumbing identification. Submit samples of equipment identification cards, piping labels, labels, and valve tags to Engineer for review prior to installation.

G. Provide at least 24 hours of straight time instruction to the operating personnel. Time of instruction shall be designated by the Owner. Additional instruction time for the automatic temperature control (ATC) system is specified in Division 23 Section, Instrumentation and Controls of HVAC and Plumbing Systems.

H. Contractor shall demonstrate Sequences of Operation of all plumbing equipment in presence of Owner's representative, Engineer, and ATC subcontractor.

3.11. WALL AND FLOOR PENETRATION

A. All penetrations of partitions, ceilings, roofs and floors by piping or conduit under Division 22 shall be sleeved, sealed, and caulked airtight for sound and air transfer control. Penetrations of mechanical room partitions, ceilings, and floors shall be as specified in Division 07 Section, "Fire Protection, HVAC and Plumbing Penetration Firestopping".

B. All penetration of fire rated assemblies shall be sleeved, sealed, caulked and protected to maintain the rating of the wall, roof, or floor. Fire Marshal approved U.L. assemblies shall be utilized. See Division 07 Section, "Fire Protection, HVAC and Plumbing Penetration Firestopping".

C. Where piping extends through exterior walls or below grade, provide waterproof pipe penetration seals, as specified in another division of these specifications.

D. Provide pipe escutcheons for sleeved pipes in finished areas.

E. Piping sleeves:

1. Galvanized steel pipe, standard weight where pipes are exposed and roofs and concrete and masonry walls. On exterior walls provide anchor flange welded to perimeter.

2. Twenty-two (22) gauge galvanized steel elsewhere.

F. Extend all floor sleeves through floor at least 2-inches above finished floor, caulk sleeve the entire depth and furnish and install floor plate.

G. Sleeves for penetrations in culinary labs, kitchen, and food service areas shall finish .375 inches above floor or flush with wall surfaces and be neatly pointed up to fit snuggly against floor or wall material.

3.12. RECORD DRAWINGS

A. Upon completion of the mechanical installations, the Contractor shall deliver to the Architect one complete set of prints of the mechanical contract drawings which shall be legibly marked in red pencil to show all changes and departures of the installation as compared with the original design. They shall be suitable for use in preparation of Record Drawings.

B. Contractor shall incorporate all sketches, addendums, value engineering, change orders, etc., into record drawings prior to delivering to Architect.

3.13. WARRANTY

A. Contractor's attention is directed to warranty obligations contained in the General Conditions and Supplementary Conditions.

B. The above shall not in any way void or abrogate equipment manufacturer's guarantee or warranty. Certificates of equipment manufacturer’s warranties shall be included in the operations and maintenance manuals.

C. The contractor guarantees for a two (2) year period from the time of final acceptance by the Owner.

1. That the work contains no faulty or imperfect material or equipment or any imperfect, careless, or unskilled workmanship.

2. That all work, equipment, machines, devices, etc. shall be adequate for the use to which they are intended, and shall operate with ordinary care and attention in a satisfactory and efficient manner.

3. That the contractor will re-execute, correct, repair, or remove and replace with proper work, without cost to the Owner, any work found to be deficient. The contractor shall also make good all damages caused to their work or materials in the process of complying with this section.

4. That the entire work shall be water-tight and leak-proof.

3.14. LUBRICATION

A. All bearings, motors, and all equipment requiring lubrication shall be provided with accessible fittings for same. Before turning over the equipment to the Owner, the Contractor shall fully lubricate each item of equipment, shall provide one year's supply of lubricant for each, and shall provide Owner with complete written lubricating instructions, together with diagram locating the points requiring lubrication. Include this information in the Operations and Maintenance Manuals.

B. In general, all motors and equipment shall be provided with grease lubricated roller or ball bearings with Alemite or equal accessible or extended grease fittings and drain plugs.

3.15. OPERATIONS AND MAINTENANCE MANUALS

A. The Contractor shall have prepared six (6) hardcopies and one (1) electronic copy of the Operations and Maintenance Manuals and deliver these copies of the manuals to the Owner. The manuals shall be as specified herein. The manuals must be approved and will not be accepted as final until so stamped.

B. The manuals shall be bound in a three ring loose-leaf binder similar to National No. 3881 with the following title lettered on the front: Operations and Maintenance Manual New Hodgson Vocational Technical High School – Plumbing Systems. No sheets larger than 8-1/2 inches x 11 inches shall be used, except sheets that are neatly folded to 8-1/2 inches x 11 inches and used as a pull-out. Provide divider tabs and table of contents for organizing and separating information.

C. Electronic copies of the manual shall be saved on USB flash drives, and shall be in searchable PDF format with interactive index tabs. Approved electronic copies shall be stored in flash drive zipper cases in front of Volume 1 (if applicable) of hard copies of the manual.

D. Provide the following data in the booklet:

1. As first entry, an approved letter indicating the starting/ending time of Contractor’s warranty period.

2. Catalog data on each piece of plumbing equipment furnished.

3. Maintenance operation and lubrication instructions on each piece of plumbing equipment furnished.

4. Complete catalog data on each piece of plumbing equipment furnished including approved shop drawing.

5. Manufacturer's extended limited warranties on equipment.

6. Chart form indicating frequency and type of routine maintenance for all plumbing equipment. The chart shall also indicate model number of equipment, location and service.

7. Provide sales and authorized service representatives names, address, and phone numbers of all equipment and subcontractors.

8. Provide supplier and subcontractor's names, address, and phone number.

9. Catalog data of all equipment, valves, etc. shall include wiring diagrams, parts list and assembly drawing.

10. Provide and install in locations as directed by the Owner, valve charts including valve tag number, valve type, valve model number, valve manufacturer, style, service and location. Each valve chart shall be enclosed in a durable polymer based frame with a cover safety glass. .

11. Copy of the approved balancing report for plumbing equipment/system.

12. Access panel charts with index illustrating the location and purpose of access panels.

13. Approved Health and Plumbing and Electrical Certificates.

14. Start-up reports for equipment.

15. Insert color graphic with embedded parameters for ATC system into Record and Information Booklet.

E. Electronic copies of the manual shall be saved on USB flash drives, and shall be in searchable PDF format with interactive index tabs. Approved electronic copies shall be stored in flash drive zipper cases in front of volume 1 (if applicable) of hard copies of the manual.

F. Submit Operations and Maintenance Manuals prior to the anticipated date of substantial completion for Engineer review and approval. Substantial completion requires that Operations and Maintenance Manuals are reviewed and approved.

3.16. INSTALLATION AND COORDINATION DRAWINGS

A. Prepare, submit, and use composite installation and coordination drawings to assure proper coordination and installation of work. Drawings shall include, but not be limited, to the following:

1. Complete Plumbing, Sprinkler and HVAC Piping Drawings showing coordination with lights, electrical equipment, HVAC equipment and structural amenities.

B. Draw plans to a scale not less than 3/8-inch equals one foot. Include plans, sections, and elevations of proposed work, showing all equipment, and piping in areas involved. Fully dimension all work including lighting fixtures, conduits, pullboxes, panelboards, and other electrical work, walls, doors, ceilings, columns, beams, joists and other architectural and structural work.

C. Identify all equipment and devices on wiring diagrams and schematics. Where field connections are shown to factory-wired terminals, include manu¬facturer's literature

showing internal wiring.

3.17. PIPING SYSTEMS TESTING

A. The entire new plumbing piping systems shall be tested hydrostatically before insulation covering is applied and proven tight under the following gauge pressures for a duration of twenty-four (24) hours. Testing to be witnessed by Owner's representative and documented in writing.

| **SYSTEM** | **TEST PRESSURE** |
|---|---|
| Domestic Water & Coil Drain Piping | 100 psig |
| Sanitary & Storm Water Piping | As specified below |
| Shop Compressed Air Piping | 175 psig |
| Laboratory Compressed Air Piping | 150 psig |
| Dental Piping | Refer to Division 22 Section Dental Piping Devices |
| Chemical Treatment Piping | 50 psig |
| Emergency Fixtures, Tempered Water | 100 psig |

B. All gas piping shall be pressure tested in accordance with NFPA-54, and NFPA-58. Gas piping systems shall be proven tight under the following gauge pressures for a duration of four (4) hours:

| **SYSTEM** | **TEST PRESSURE** |
|---|---|
| Gas Piping | 100 psig |

C. All storm, waste, vent and water piping shall be tested by the Contractor and approved by the Engineer before acceptance. All storm, soil, and waste piping, located underground, shall be tested before backfilling. The costs of all equipment required for tests are to be included in the contract price.

D. The entire new drainage system and venting system shall have all necessary openings plugged and filled with water to the level of the highest stack above or at the roof. The system shall hold this water for thirty (30) minutes without showing a drop greater than 1inch. Where a portion of the system is to be tested, the test shall be conducted in the same manner as described for the entire system, except a vertical stack 10 feet above the highest horizontal line to be tested may be installed and filled with water to maintain sufficient pressure, or a pump may be used to supply the required pressure. The pressure shall be maintained for thirty (30) minutes. All testing shall be in accordance with the local Plumbing Code and witnessed by the Plumbing Inspector or authority having jurisdiction.

E. Upon completion of roughing-in and before setting equipment and fixtures, the entire new water piping system shall be tested at a hydrostatic pressure of not less than one hundred (100) pounds per square inch gauge and proven tight at this pressure. Where a portion of the water piping system is to be concealed before completion, this portion shall be tested

separately in a manner described for the entire system.

F. Testing and acceptance thereof shall be in accordance with local requirements and shall meet approval of authority having jurisdiction. Submit certificates and approved permits and insert one (1) copy in the Operations and Maintenance Manuals.

3.18. EQUIPMENT BY OTHERS

A. This Contractor shall make all system connections required to equipment furnished and installed under other divisions or furnished by the Owner. Connections shall be complete in all respects to render this equipment functional to its fullest intent.

B. It shall be the responsibility of the supplier of this equipment to furnish complete instructions for connections. Failure to do so will not relieve this contractor of any responsibility for improper equipment operation.

3.19. OUTAGES

A. Provide a minimum of fourteen (14) days' notice to schedule outages. The Contractor shall include in their bid outages and/or work in occupied areas to occur on weekends, holidays, or at night. Coordinate and get approval of all outages with the Owner.

B. Submit Outage Request form, attached at end of this Section, to Owner for approval.

**END OF SECTION**

**OUTAGE REQUEST**

DATE APPLIED: _____ BY: _____

DATE FOR OUTAGE: _____ FIRM: _____

START OUTAGE-TIME: _____ DATE: _____

END OUTAGE -- TIME: _____ DATE: _____

AREAS AND ROOMS: _____

FLOOR(S): _____

AREA(S): _____

ROOM(S): _____

WORK TO BE PERFORMED: _____

SYSTEM(S): _____

REQUEST APPROVED BY: _____

(FOREMAN OR OTHER PERSON IN CHARGE)

**(FOR OWNER'S USE ONLY):**

APPROVED: _____

YES ____ NO ___ BY: _____ DATE: _____

DATE/TIME-AS REQUESTED: _____ OTHER : _____

OWNER'S PRESENCE REQUIRED: _____

YES: ____ NO: ___ NAME: _____

DIVISION 22 SECTION 22 05 05
PLUMBING PIPING, FITTINGS & VALVES
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**SECTION 22 05 05**
**PLUMBING PIPING, FITTINGS AND VALVES**

## PART 1. GENERAL

1.1. SUMMARY

A. The conditions of the contract and other general requirements apply to the work specified in this section. All work under this section shall also be subject to the requirements of Division 22 Section, Common Work Results for Plumbing and Division 01, General Requirements.

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2. SYSTEM DESCRIPTION CONDITIONS

A. Provide all labor and materials necessary to furnish and install all piping systems on this project as herein specified and/or shown on the drawings. Final connections to equipment furnished in other sections of the specifications shall be included under this section.

B. All piping and insulation installed in ceiling plenums must be plenum rated and comply with NFPA and International Building Code (IBC).

C. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

D. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.

E. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.

F. Provide pipe hangers and supports in accordance with ASTM B31.9 and MSS SP69 unless indicated otherwise.

G. Use spring loaded "silent" check valves on discharge of all pumps.

H. Use 3/4 inch (20 mm) ball valves with cap and chain for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest floor drain.

I. At all runout piping serving equipment, use swing joints with elbows to prevent excessive movement of piping due to expansion.

1.3. QUALITY ASSURANCE

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

B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulation. Provide certificate of compliance from authority having jurisdiction indicating approval of welders.

C. Welders Certification: In accordance with ASME Section 9.

D. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

E. All castings used for coupling housings, fittings, and valve bodies shall be date stamped for quality assurance and traceability.

F. Maintain one copy of each document on site.

1.4. DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to site under as hereinbefore specified.

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

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

1.5. ENVIRONMENTAL REQUIREMENTS

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

1.6. EXTRA MATERIALS

A. Provide one (1) repacking kit for each size valve.

1.7. ALTERNATES

A. Refer to Division 01 Section, “Alternates” for description of work under this section affected by alternates.

1.8. LEAD FREE REQUIREMENTS

A. All plumbing fixtures, equipment, and devices that contact potable water must be lead free per the State requirements.

1.9. PLASTIC PIPE PENETRATIONS

A. Install UL listed collars, sealing methods, and firestopping at all plastic pipe penetrations of smoke walls and fire rated walls per NFPA.

## PART 2. PRODUCTS

2.1. PIPE MATERIALS

A. All materials, unless otherwise specified, shall be new and of the best quality of their respective kinds, and shall conform to the requirements and ordinances of local, state and insurance authorities having jurisdiction.

1. Sanitary Underground - Within Building to 5 Feet Outside of Foundation Wall:

   a. PVC Pipe: Schedule 40 DWV or cellular core. Fittings: Schedule 40 PVC, ASTM D 2665 or ASTM F891 socket fittings. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

2. Sanitary and Vents Above Floor Inside Building:

   a. PVC Pipe: Schedule 40 DWV or cellular core. Fittings: Schedule 40 PVC, ASTM D 2665 or ASTM F891 socket fittings. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

3. Indirect Waste Piping:

   a. Pipe & Fittings: Hard drawn Type L copper tubing with cast brass drainage fittings. ASTM B88-78 and ANSI B16.1877. All exposed indirect waste piping shall be chrome plated or primed and painted with silver paint.

4. Storm Water Below Grade or Under Building to Point 5 Feet from Building Line:

   a. PVC Pipe: Schedule 40 DWV or cellular core. Fittings: Schedule 40 PVC, ASTM D 2665 or ASTM F891 socket fittings. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

5. Storm Water Above Floor Inside Building:

   a. PVC Pipe: Schedule 40 DWV or cellular core. Fittings: Schedule 40 PVC, ASTM D 2665 or ASTM F891 socket fittings. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

6. Domestic Cold Water Outside of Building Below Ground or Under Building to Point 5 Feet from Building Line:

   a. Pipe: 2-1/2 inches & smaller, soft temper type K. ASTM B88 - No joints below grade except as approved by the Engineer.
   3 inches & larger, ductile iron pipe for water, ANSI 21.50 & 21.51 with double thickness cement mortar lining, ANSI 21.4.

   b. Fittings & Joints: wrought copper solder joint fittings, ANSI B16.22. Joints for copper piping shall be ASTM B32, SOLDER, grade 95TA.
   Cast iron pressure fittings, ANSI 21.10, Class 250. Mechanical specification for mechanical joint for cast iron pressure pipe & fittings

ANSI A21.11. Joints for ductile iron pipe shall be AWWA C111, rubber gasket with 3/4 inch diameter rods.

7. Domestic Hot, Cold, and Recirculating Water, Emergency Fixture Tempered Water, Piping Inside Buildings, Above Grade:

   a. Pipe or Tubing: 2 inches & smaller, all water lines soft temper Type K copper tubing below ground, hard temper Type L copper tubing above ground, ASTM B88, or Type 304/304L, Schedule 10S, stainless steel to ASTM A312.
   2-1/2 inches & larger, hot dipped galvanized steel A120, ASTM A53, Grade B, Schedule 40 steel, or hard copper tube, Type L with copper-tube dimensioned grooved ends; copper ground - end fittings; copper tubing, keyed couplings; and grooved joints. (Flaring of tube or fitting ends to accommodate alternate sized couplings is not permitted.)
   Provide dielectric fittings between steel and copper. Victaulic Style 47 or approved equal.

   b. Fittings & Joints: Copper tubing fittings and joints shall be solder type wrought copper - 95-5 silver solder or braze (lead and antimony based solders are prohibited). Galvanized steel pipe fittings and joints shall be ANSI B16.12 hot dipped galvanized threaded ends and 125 lb. galvanized cast iron fittings or 150 lb. galvanized malleable iron.
      i. Stainless steel fittings shall be Vic-Press or approved equal for Schedule 10S pipe. Fittings shall be precision, cold drawn, stainless steel with EPDM O-ring seals. (Seals shall be UL classified in accordance with ANSI/NSF61 for Potable Water service.) Fittings rated for working pressures to 500-psi.
      ii. Grooved joint couplings shall consist of two ductile iron housing segments cast with offsetting angle pattern bolt pads, FlushSeal elastomer gasket, and ASTM A449 electroplated steel bolts and nuts. (Gasket shall be UL classified in accordance with ASNI/NSF61 for Potable Water service, and shall meet the lead content requirements of NSF-372.) Installation-Ready, for direct stab installation without field disassembly. Victaulic Style 807N or approved equal. Couplings shall be coated blue enamel.
      iii. Installation-Ready™ fittings for grooved end copper tubing shall be manufactured to copper-tube dimensions. Fittings shall be ductile iron conforming to ASTM A-536, Grade 65-45-12, with Installation-Ready™ ends, complete with PVDF (Poly Vinylidene Fluoride) and Grade “EHP” EPDM-HP (Grade ‘T’ Nitrile) gasket; and ASTM A449 electroplated steel bolts and nuts. System shall be rated to 300 psi (2065 kPa) with Type K or L Copper Tubing.
         1) UL classified in accordance with NSF-61 for potable water service. The system shall meet the low-lead requirements of NSF-372.
      iv. For copper/stainless steel/CPVC pipe the gasket shall be potable water grade P compound with a red and blue stripe color code for operating temperatures from 0°F to 180°F.
         1) Reference shall always be made to the latest published

Victaulic selection guide for gaskets for proper gasket selection for the intended purpose.

c. Gate Valves: 2-1/2 inches & larger - OS&Y, IBBM flanged, 125 lb. standard solid wedge.
   i. 2 inches & smaller - bronze solder end, bronze body, solid wedge, rising stem, 200 lb. w.o.g. non-shock. However, use brass valves only on all copper pipe.

d. Butterfly Valves: Cast brass body to UNS C87850, elastomer pressure responsive seat, aluminum-bronze disc with stainless steel stem. Stem shall be offset from the disc centerline to provide complete 360-degree circumferential seating. Copper-tube dimensioned grooved ends, suitable for working pressures to 300-psig CWP Victaulic Style 608N or approved equal.

e. Ball Valves: Shut-off valves 2-inches and smaller shall be ball valves. Ball valves shall be 150 lbs, brass or bronze body, standard port, 2 piece body, TFE seats with bronze trim. Ball valves shall be threaded end or solder end, or Vic-Press end as required to accommodate piping. Ball valves shall be as manufactured by Victaulic, Conbraco, Crane, Apollo, Nibco, Watts or engineer approved equal.

f. Unions: 2-1/2 inches & larger - 150 lb. brass companion flanges.
   i. 2 inches & smaller - wrought copper, ground joint solder ends; threaded hexagonal stainless steel union with Vic-Press ends, Victaulic P589 or approved equal.

g. Check Valves: 2-1/2 inches & larger - IBBM, 125 lb. std. flanged bronze swing check, with metal disc; 2-inches and smaller - 125 lb. std. screwed or solder ends.

h. Globe Valves: 2 inches and smaller, bronze body, bronze trim, rising stem, hand wheel, inside screw, renewable composition disc, solder ends, 150 lb, with back seating capacity.
   i. 2 inches & larger: IBBM, 150 lb, bronze trim, rising stem, handwheel OS&Y, plug type disc, flanged ends, renewable seat and disc.
   ii. Globe valves shall be Conbraco, Crane, Nibco, Milwaukee, Watts or approved equal.

i. Combination Shut-off/Balancing Valves:
   i. Victaulic/TA Hydronics, Taco Circuit Setter, Bell & Gossett Circuit Setter Plus, Flowset Accuset, Gerand, or engineer approved equal, ½ inch-3 inches 300 psi rated globe type or ball valve with DZR brass Ametal (copper-alloy) or bronze body/brass ball construction with glass and carbon filled TFE seats, in-line flow meter and balancing and shut-off valve with built in ball valve for flow adjustment. Valve shall have memory stop, calibrated nameplate, Schrader valve connections and preformed molded insulation. Valves shall be leaktight at full rated working pressure. Balance valve size shall be selected based on manufacturer's acceptable flow range and design flow rate. Pressure drop through combination shut off balance valves shall not exceed 5 feet of head at design flow rate. Where required for flow rates below 0.6 GPM, provide "reduced flow" combination shut-off balance valves sized so that the flow rate is within the

manufacturer's recommended flow range.

j. Extended Valve Stems: Provide and install round collar type extended valve stems on all valves installed in insulated piping. Valve stem and collar shall be selected to suit insulation thickness and maintain valve handles outside of insulation.

k. (Alternate): At contractor's option, Viega ProPress pressure seal mechanical fittings may be utilized.

i. Viega ProPress, Mueller Streamline PRS or approved equal, Pressure Seal Fittings: Bronze, or copper shall conform to ASME B16.51, ICC LC 1002, IAPMO PS 117, NSF 61, and NSF 61-G or NSF 372. Pressure Seal fittings ½-inch thru 4-inch for use with ASTM B88 copper tube type L and ½-inch up to 1-1/4-inch annealed copper tube. Pressure Seal fittings shall have an EPDM sealing element grip ring, PBT separator ring, EPDM sealing element and Smart Connect (SC) or Sure PS Leak Detection.

8. Gas Piping:

a. Pipe: Inside Building Above Ground: Schedule 40 uncoated black steel pipe, ASTMA 53 or A120.

b. Outside Building, Below Ground: Copper type L tubing, ASTM B88 Below Ground.

c. Outside building above grade/roof: Schedule 40 black steel pipe, ASTM A53 or A120.

d. Fittings & Joints: 150 lb. screwed malleable iron ASTM B16.3 with joints sealed with litharge and glycerin. Piping 2 ½ inches and larger and any concealed piping within walls must be welded, ASTM A24 forged steel welded type joints shall be threaded or welded to ANSI B31.1 or ASME Sec. 1.

e. Plug Valves: 2- ½ inches & larger ASME B16.38 and MSS SP-78 cast iron lubricated plug valves with 125 psig pressure rating, 3 turn type. Gas valves are prohibited above ceilings.

f. Cocks: 2 inches& smaller - bronze, Crane 270. AGA certified bronze body, plug type with bronze plug, ball type with chrome plated brass ball, for 5 psig or less gas. Include AGA stamp, flat or square head or lever handle, and threaded ends conforming to ASME B1.20.1

g. Ball Valves: Full flow, double seal, ball type with bronze body, Buna-N seals and O-ring packing, chrome plated brass ball and designed for working pressures up to 175 psig. Valves shall be 3 turn type. MSS SP-78, class 175 WOG.

h. Gas Vents: Install vent piping for gas pressure regulators and gas trains, extend outside building to a non-hazardous location away from any potential source of ignition, and vent to atmosphere. Pipe material shall be identical to gas piping here-in before specified. Terminate vents with turned down, reducing elbow fittings with corrosion-resistant insect screen in large end.

i. Finish: All gas piping downstream of regulator, installed exposed in a kitchen, or piping installed on a roof shall be primed and finished with two coats of rust resistant paint with pewter gray finish. Paint shall be two part epoxy-exterior paint as manufactured by Pittsburgh Paint, Themeco, or

approved equal. Painting shall be provided under another Section of these Specifications.

9. Reverse Osmosis Water Piping

   a. Pipe or Tubing: Enfield, Enpure, or approved equal polypropylene piping, suitable for reverse osmosis water service. Refer to kitchen equipment schedule for equipment served by reverse osmosis piping.
   b. Fittings & Joints: Polypropylene with socket fusion joints, suitable for reverse osmosis water service.
   c. Ball Valves: Union type with socket ends.

10. Shop Compressed Air:

   a. Pipe: Standard weight steel pipe, Schedule 40, black, ASTMA A53 or A120; or Schedule 10S stainless steel, ASTM A312, with plain ends.
   b. Fittings & Joints: 250 lb ASME B16.3 malleable iron fittings or ASTM A234, forged steel welding type. Joints shall be threaded or welded to ANSI B31.1 or ASME Section 1 requirements.
   c. Stainless steel fittings shall be Vic-Press or approved equal for Schedule 10S pipe. Fittings shall be precision, cold drawn, stainless steel with HNBR O-ring seals. Fittings rated for working pressure to 500-psi.
   d. Ball Valve: Victaulic Series P569, Worcester ball valve Type X-411T, approved equal.

11. Dental Compressed Air and Vacuum Piping: Refer to Division 22 Sections 226113 Compressed Air Piping for Dental Systems and 226213 Vacuum Piping for Dental Systems.

12. Elevator Sump Pump Discharge Piping:

   a. Piping: Schedule 40 A53 grade A galvanized steel pipe with cast iron plain galvanized pressure fittings.
   b. Fittings and Joints: Galvanized ductile iron grooved end fittings or malleable iron fittings conforming to ANSI B16.3 Class 150 threaded. 3 inch and larger shall be flanged cast iron.
   c. Basis of Design: Victaulic Series 318 Sump Ejector
   d. Shut-off Valves: 150 psig working pressure, 150 degree F maximum operating temperature, full port design 2 piece body design.

13. Gas Fired Condensing Water Heating Condensate Piping

   a. Piping shall be PVC pipe, ASTM D1785 schedule 40 with ASTM D2466 socket fittings for schedule 40. Join PVC pipe/fittings utilizing solvent cement ASTM D2564 with ASTM F 656 primer.
   b. Provide backwater valve (ball float type) at connections of condensate piping to stormwater piping and air gap fitting. Backwater valve shall be Model Z1099 as manufactured by Zurn or approved equal. Backwater valve shall have drain coated cast iron body, plastic ball float, bronze backwater bushing and replaceable neoprene seat.

B. Steel pipe shall be similar and equal to National Tube Company, Grinnell, Republic, or Bethlehem black or zinc-coated (galvanized) as hereinafter specified. Pipe shall be free from all defects which may affect the durability for the intended use. Each length of pipe shall be stamped with the manufacturer's name.

C. Copper pipe shall be Revere, Anaconda or Chase with approved solder fittings.

D. Welding fittings for steel pipe shall meet the requirements of ASTM Standard A-23 and shall be standard catalog products. Fittings fabricated by metering and notching pipe will not be accepted.

2.2. PIPE HANGERS, ROLLER SUPPORTS, ANCHORS, GUIDES, AND SADDLES

A. All hangers for metallic piping shall be adjustable, wrought clevis type, or adjustable malleable split ring swivel type, having rods with machine threads. Hangers shall be Grinnell Company's Figure 260, Carpenter and Patterson, or approved equal for pipe ¾-inch and larger, and Figure 65 for pipe 2-inches and smaller, or approved equal. Adjustable pipe stanchion with U-bolt shall be Grinnell Company's Figure 191. Pipe roller supports shall be Grinnell's Figure 181 or Figure 271. Exterior pipe hangers shall be galvanized or stainless steel construction. For copper piping in direct contact with the hanger, hanger construction shall be copper coated to prevent contact of dissimilar metals similar to Grinnell's Figure CT-65. Hanger spacing and rod sizes for steel and copper pipe shall not be less than the following:

| NOMINAL PIPE SIZE IN | STD. STEEL PIPE | MAXIMUM SPAN FT. COPPER TUBE | MINIMUM ROD DIAMETER INCHES OF ASTM A36 STEEL THREADED RODS |
|---|---|---|---|
| 3/4 & 1 | 6 | 5 | 3/8 |
| 1 - ½ | 6 | 8 | 3/8 |
| 2 | 8 | 8 | 3/8 |
| 2 – ½ | 10 | 9 | ½ |
| | | | |

| NOMINAL PIPE SIZE IN | STD. STEEL PIPE | MAXIMUM SPAN FT. COPPER TUBE | MINIMUM ROD DIAMETER INCHES OF ASTM A36 STEEL THREADED RODS |
|---|---|---|---|
| 3 | 12 | 10 | ½ |
| 4 | 14 | 12 | 5/8 |
| 5 | 14 | 12 | 5/8 |
| 6 | 16 | 14 | 3/4 |
| 8 | 18 | 16 | 7/8 |
| 10 | 20 | 18 | 7/8 |
| 12 | 20 | 18 | 7/8 |

B. Install hangers for storm water and soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.

2. NPS 3 (DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.

3. PS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.

4. NPS 6 (DN 150): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.

5. NPS 8 to NPS 12 (DN 200 to DN 300): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.

6. NPS 15 (DN 375): 48 inches (1200 mm) with 1-inch (25-mm) rod.

7. Spacing for 10-foot (3-m) lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm).

C. Install supports for vertical soil piping every 4 feet (1200 mm).

D. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters.

E. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 ½ and NPS 2 (DN and DN 50): 48 inches (1200 mm) with 3/8 inch (10-mm) rod.

2. NPS 3 (DN 80): 48 inches (1200 mm) with ½ inch (13 mm) rod.

3. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8 inch (16 mm) rod.

4. NPS 6 (DN 150): 48 inches (1200 mm) with 3/4 inch (19 mm) rod.

5. NPS 8 to NPS 12 (DN 200 to DN 300): 48 inches (1200 mm) with 7/8 inch (22 mm) rod

F. Install supports for vertical PVC piping every 48 inches (1200 mm).

G. Spacing of hangers for polypropylene pipe (where specified) shall be as follows:

1. 2-inches & smaller - every 2 feet

2. Larger than 2-inches - every 3 feet

3. Plastic piping shall not be installed in ceiling plenums per NFPA.

H. Anchors, guides, and roller supports shall be installed in accordance with the contract drawings and manufacturer's recommendations to provide pipe support and control pipe movement for all piping systems. Anchors and guides shall be securely attached to the pipe support structure. Submit shop drawing for proposed pipe support structure for guides and anchors for approval of the Structural Engineer. Pipe alignment guides shall be Fig. 255 Grinnell, or as approved equal. Guides shall be sized to accommodate the pipe with insulation. Guides shall be steel factory, fabricated, with bolted two section outer cylinder and base for alignment of piping and two section guiding spider for bolting to pipe.

I. Hangers for pipe sizes ½ to 1 ½ inch (13 to 38 mm): Carbon steel, adjustable swivel, split ring.

J. Hangers for cold pipe sizes 2 inches (50 mm) and over: Carbon steel, adjustable, clevis.

K. Hangers for cold pipe sizes 2 to 4 inches (50 to 100 mm): Carbon steel, adjustable, clevis.

L. Hangers for cold pipe sizes 6 inches (150 mm) and over: adjustable steel yoke, cast iron roll, double hanger.

M. Multiple or Trapeze hangers: Steel channels with welded spacers and hanger rods.

N. Multiple or Trapeze hangers for hot pipe sizes 6 inches (150 mm) and over: Steel channels with welded spacers and hanger rod, cast iron roll.

O. Wall support for pipe sizes to 3 inches (76 mm): cast iron hook

P. Wall support for pipe sizes 4 inches (100 mm) and over: Welded steel bracket and wrought steel clamp.

Q. Wall support for hot pipe sizes 6 inches (150 mm) and over: welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.

R. Vertical Support: Steel riser clamp.

S. Floor support for cold pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

T. Floor support for hot pipe sizes to 4 inches (100 mm): Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

U. Floor support for hot pipe sizes 6 inches (150 mm) and over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

V. Copper pipe support: Carbon steel ring, adjustable, copper plated.

W. Hanger rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

X. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

Y. For Pipe Hangers installed in corrosive environments such as, chemical storage rooms…etc. the same shall (including hardware) shall be finished with on Electro-Galvanized Finish such as Galv-Krom® or approved equal.

2.3. VALVES

A. Provide parts list and assembly drawings (exploded view) for all valves in shop drawing submittals. Provide valves of the same type by the same manufacturer.

B. Check valves in base mounted pump discharges shall be of the vertical type and shall be Miller "non-slam" check valves or approved equal suitable for service intended. Check valves in circulator discharges shall be horizontal type.

C. Provide at each base mounted pump a suction diffuser of size and type shown on drawings. Units shall consist of a cast iron angle type body with inlet vanes, magnetic insert, and blowdown connection tapped gauge post, 125 psi ANSI flange and a combination stainless

steel diffuser strainer with 3/16-inch diameter opening for pump protection. Unit shall be equipped with a disposable fine mesh start up strainer which shall be removable after 30 days. Flow direction shall be from inside the strainer to outside for ease of service and cleaning. The body shall fit the pump and connecting pipe size. The unit shall be provided with an adjustable support foot to relieve piping strains from the pump suction. Suction diffuser shall be Taco "SD" Series Catalog 300-4.1, Bell and Gossett Model FLG, Armstrong, or approved equal.

D. Multi-purpose valve (non-slam check valve, throttling valve, shut-off valves and calibrated balancing valve) shall be provided at discharge side of each constant speed pump. The valve shall be of heavy-duty cast iron construction with standard ANSI flanged connections and rated for a maximum working pressure of 175 psig at 240°F. The valve shall be fitted with a stainless steel stem or stem sleeve and brass seat with "O" ring seal. Valve shall be Taco "Plus One" Number 300-4.2, Bell and Gossett 3DS Triple Duty Valve, Armstrong, or as approved equal, and shall have check and plug valve features plus a memory stop with pointer and scale. Provide additional shut-off valve to allow servicing of check valve if a multipurpose valve is utilized in lieu of separate check, shut-off, and balance valve. Provide additional shut-off valve downstream of multi-purpose valve to allow servicing of multi-purpose check valve feature. Provide pre-manufactured, removable insulation covers for all multipurpose valves.

E. For variable speed pumps do not utilize multipurpose valves. For variable speed pumps install separate shut-off valve and check valve.

2.4. STRAINERS

A. Strainers shall be of the basket or "Y" type and shall be heavy and durable, constructed of best grade gray iron with the bottoms drilled and plugged. Bodies shall have arrows clearly cast on the sides to show flow direction. Strainers shall be equipped with easily removable covers and brass sediment baskets made of brass not less than #22 gauge in thickness. Total area of basket perforations shall be not less than four times the cross section of the entering pipe. Flow shall be into basket, and then out through the perforations. Strainers shall be suitable for water or the intended fluid. Strainers 2 inches and smaller shall have threaded or solder ends, 2 inches and larger shall have flanged ends.

B. Strainer screens shall be stainless steel with perforations and shall be 1/16-inch for pipe sizes 5 inches and less, 1/8-inch (40 percent open area) perforations for pipe sizes 6-inch and greater.

C. Provide valved and capped (with chain) blowdowns in each strainer. Blowdown valves shall be Appolo 78-100/200 series or as approved equal.

D. Strainers shall be manufactured by Watts, Mueller, Armstrong, Yarway, Spirax/Sarco or as approved equal.

2.5. UNIONS, FLANGES, AND COUPLINGS

A. Unions in steel pipe 2-inches and smaller shall be malleable iron with brass inserted seats designed for a working pressure of 150 psig.

B. Unions in copper pipe 2-inches and smaller shall be sweat fittings with bronze seats

designed for a working pressure of 125 psig.

C. Flanges for steel pipe over 2 inches shall be 150 psig, forged steel, and slip on type. Gaskets shall be 1/16 inch thick pre-formed neoprene.

D. Flanges for copper pipe over 2 inches shall be bronze. Gaskets shall be 1/16 inch thick preformed neoprene.

2.6. MANUAL AIR VENTS

A. Manual air vents shall be similar to the hereinafter specified gauge valves. Provide 1/4-inch size on ¾-inch pipe and smaller, ½ -inch size on 1-inch pipe and larger. Install at all high points of piping. Valves shall be Crane No. 88, Honeywell or as approved equal, with threaded ends, bronze body, bronze or brass bonnet and bronze stem.

2.7. THERMOMETERS

A. Unless otherwise indicated, thermometers shall be ASTM E1, in a glass type, organic filled, 9-inch scale size, corrosion-resistant metal case, with "any-angle" mounting with positive locking device. Trerice Industrial Thermometers, Weksler Instruments, Ernst Gage Co., Miljoco, or approved equal. Insertion stem length shall suite the pipe size and configuration. Thermometer wells shall be brass with brass union hubs in copper and in ferrous piping. Where piping is insulated or otherwise covered, use wells with lagging extension. Where wells are installed in pipe tees at turns, increase pipe size so that well does not restrict flow. Accuracy shall be 2 percent.

B. Unless otherwise indicated, thermometer ranges shall be as follows:

1. Tepid water, Tempered water, Domestic cold water: 0 degrees F to 100 degrees F, 1 degrees F Division.

2. Domestic hot and hot water recirculating: 30 degrees F to 180 degrees F, 2 degrees F Division.

3. Tempered Water: 30 degrees F to 100 degrees F, 2 degrees F Division.

C. Provide heat conducting compound in wells.

2.8. PRESSURE GAUGES

A. Unless otherwise indicated, pressure gauges shall be the bronze bourdon tube type, 4-1/2-inch dial, stem mounting, cast aluminum adjustable pointer, 1 percent accuracy over middle half of scale range, 1-1/2 percent over balance: Trerice Model 600C; Weksler Instruments, Ernst Gage Co., Miljoco, or as approved equal.

B. Gauges shall have pressure, vacuum, compound, or retard ranges as required, select ranges so that the normal readings are at the approximate midpoint and maximum system pressures do not exceed full scale.

C. Furnish and install a gauge valve at each pressure gauge. Gauge valves shall be Crane Model No. 88, Needle Valve, Ernst Gage Co. FLG 200, Wexler Instrument Corp. Type

BBV4, or approved equal, rated for pressure intended.

D. Gauge connections for pressure gauges, thermometers, or control instruments shall be made using tee fittings, except that gauge connections up to 1-inch size in steel may be using threaded extra heavy pipe couplings welded directly to the main, provided that the main is at least 2-inch size for 2-inch connections, 3-inch size for 3/4-inch connections, and 4-inch size for 1-inch connections. Minimum gauge connection shall be 2-inch ips.

E. Provide snubbers on all gauges. Snubbers shall be No. 872 by Trerice, RS1/RS6 by Wexler Instruments, Miljoco or as approved equal.

2.9. PIPING SPECIALTIES

A. Furnish and install flexible pipe connections, as specified and/or shown on the drawings, at suction and discharge connections of all base mounted and vertical in-line pumps, connections to air compressors, connections to vacuum pumps, connections to booster pumps, all vibrating equipment and elsewhere as shown. Refer to Division 23 Section, Vibration Control for HVAC, Plumbing and Fire Protection Equipment for specifications.

B. Pressure relief valves shall be provided in the number and sizes required to relieve 110 percent of the full input to the systems. Valves shall be rated; and installed in accordance with ASME, and CSD-1 including all amendments. Pipe discharge full size to floor drain, (with union) and support discharge pipe to prevent exerting any strain on relief valve body, piping to be Type-L copper. Water safety relief valves shall be Watts Series 740, Conbraco, Series 154A, Bell and Gossett, or approved equal. Provide pressure gauge adjacent to all safety relief valves.

C. Gas relief valve piping shall be sized and installed in accordance with the latest edition of ASME Boiler & Pressure Vessel Code, CSD-1 including amendments. Pipe material shall be as specified for gas piping. Gas relief valve piping material shall be the same as hereinbefore specified for gas piping. Install stainless steel mesh screen and turndown on all gas relief valve/vent piping terminations.

2.10. ESCUTCHEONS

A. Provide chromium plated escutcheons properly fitted and secured with set screws on all exposed piping which passes through walls, floors or ceilings of finished spaces.

B. All escutcheon plates shall be chrome plated spun brass of plain pattern, and shall be set tight on the pipe and to the building surface. Plastic escutcheon plates will not be accepted.

2.11. DIELECTRIC CONNECTIONS (BRASS FITTINGS)

A. Furnish and install brass fittings, unions, waterway fittings, or flanges, at the following locations:

1. Where steel piping systems join copper piping.

2. Where copper tube connects to domestic water storage tanks, water heaters, heat exchangers, expansion tanks, and other steel vessels.

3. Avoid the installation of steel nipples, cast iron or steel valves and specialties, or other ferrous components in predominately copper piping systems. Where such installation is necessary, isolate the component with brass fitting connections. Do not mix steel pipe and copper tube in the same run of pipe or in the same section of a piping system.

2.12. SLEEVES

A. Sleeves shall be provided around all pipes through walls, floors, ceilings, partitions, roof structure members or other building parts. Sleeves shall be standard weight galvanized iron pipe two sizes larger than the pipe or insulation so that pipe or insulation shall pass through masonry or concrete walls or floors. Provide 20 gauge galvanized steel sheet or galvanized pipe sleeves for all piping passing through frame walls.

B. Sleeves through floors shall be flush with the floor except for sleeves passing through Equipment Rooms which shall extend ¾-inch above the floor. Refer to Division 23 Section, Vibration Controls for HVAC, Plumbing and Fire Protection Equipment for mechanical equipment room penetrations additional requirements. Space between the pipe and sleeve shall be caulked. Escutcheon plates shall be constructed to conceal the ends of sleeves. Each trade shall be responsible for drilling existing floors and walls for necessary sleeve holes. Drilling methods and tools shall be as hereinbefore specified.

C. Sleeves through walls and floors shall be sealed with a waterproof caulking compound.

D. Firestop at sleeves that penetrate smoke barriers smoke partitions and/or rated walls/floors.

2.13. PRESSURE REDUCING VALVES

A. Provide pressure reducing valves as indicated, of size and capacity selected by the installer to maintain operating pressure on the system. Body shall be cast-iron or bronze construction, renewable stainless steel seat, non-corrosive disc, water tight cage assembly, adjustable pressure ranges and inlet strainer Watts Regulator Model 223-S, Armstrong, Bell and Gossett or as approved equal. Maximum working pressure shall be 300 psig.

B. Provide pressure gauge adjacent to all pressure reducing valves to verify proper set point.

2.14. WATER PROOF PIPE PENETRATION SEALS

A. Provide and install waterproof pipe penetration seals at all pipes that enter the building below grade or through exterior wall.

B. Link seals are to be Metraflex Metraseals, Model MS, Linkseal, or approved equal, black EPDM seal material, glass reinforced plastic pressure plates, zinc plated nuts and bolts, seals are to be resistant to sunlight and ozone, pressure rated to make a hydrostatic seal of up to 20 psig and up to 40 feet of head, temperature rated from –40 degrees F to 250 degrees F.

2.15. GAS PRESSURE REGULATORS

A. Gas pressure regulators shall be as manufactured by Equimeter, Inc., Maxitrol Co., Rockwell, Fisher Controls, American Meter Co., Pietro Fiorentini, or approved equal. Gas

pressure regulators shall maintain a constant downstream pressure with a variable inlet pressure.

B. Gas pressure regulators shall comply with ANSI Z21.18 and shall be single stage, steel jacketed, corrosion-resistant type. Include atmospheric vent, elevation compensator, with threaded ends conforming to ASME B1.20.1 for 2 inch NPS and smaller and flanged ends for 2 ½ inch NPS and larger.

C. Gas pressure regulator shall be a positive lock-up type regulator where required by equipment manufacturer.

D. Each pressure regulator shall have an identification stamped on diaphragm cover and shall be painted AGA grey. Regulator inlet and outlet pressures, and flow volume in cubic feet per hour of specified gas are as indicated on the contract drawings.

E. Install water heater gas pressure regulators a minimum of 3 feet and no more than 8 feet from the water heaters per the manufacturer's requirements.

F. Install paint spray booth gas regulators a minimum of 10 feet away from the paint spray booth gas valve train.

2.16. TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.

2. Pressure rating at least equal to pipes to be joined.

3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Plastic-to-Metal Transition Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Charlotte Pipe and Foundry Company.
b. Harvel Plastics, Inc.
c. Spears Manufacturing Company.

2. Description: PVC or CPVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert and one solvent-cement-socket end.

D. Plastic-to-Metal Transition Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Colonial Engineering, Inc.
b. NIBCO INC.
c. Spears Manufacturing Company.

2. Description: PVC or CPVC four-part union. Include brass threaded end, solvent-cement-joint plastic end, rubber O-ring, and union nut.

## PART 3. EXECUTION

### 3.1. GENERAL PIPING INSTALLATION REQUIREMENTS

A. All pipes shall be cut accurately to measurements established at the building, and shall be worked into place without springing or forcing, properly clearing all windows, doors and other openings. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted. All pipes shall be so installed as to permit free expansion and contraction without causing damage. All open ends of pipe lines, equipment, etc., shall be properly capped or plugged during installation to keep dirt or other foreign material out of the system. All pipes shall be run parallel with the lines of the building and as close to walls, columns and ceilings as may be practical, with proper pitch. All piping shall be arranged so as not to interfere with removal of other equipment on devices not to block access to doors, windows, manholes, or other access openings. Flanges or unions, as applicable for the type of piping specified, shall be provided in the piping at connections to all items of equipment, coils, etc., and installed so that there will be no interference with the installation of the equipment, ducts, etc. All valves and specialties shall be placed to permit easy operation and access and all valves shall be regulated, packed and glands adjusted at the completion of the work before final acceptance. All piping shall be installed so as to avoid air or liquid pockets throughout the work. Ends of pipe shall be reamed so as to remove all burrs.

B. All piping shall be graded to convey entrained air to high points where automatic air vents shall be provided. The size of supply and return pipes for each piece of equipment shall in no case be smaller than the outlets in the equipment.

C. All piping shall be run to provide a minimum clearance of 2-inches between finished covering on such piping and all adjacent work. Group piping wherever practical at common elevations.

D. All valves, strainers, caps, and other fittings shall be readily accessible.

E. Rough-in and final connections are required to all equipment and fixtures provided under this Contract.

F. Drain valves with hose connections shall be provided at low points for drainage of piping systems. Blow down valves shall be provided at the ends of all mains and branches so as to properly clean by blowing down the lines throughout in the direction of normal flow.

G. Discharge lines from all relief valves shall be piped to within 4-inches of floor and extend to floor drains wherever floors are not pitched to drains. Pitch the relief valve piping away from the relief valve to issue that no fluid can be trapped in valve discharge. Support all relief valve piping to prevent exerting strain on the relief valve body. The end of the relief valve discharge piping shall not be threaded to prevent capping or plugging.

H. All branches from water mains shall be taken from the top of the supply mains at an angle of forty-five (45) degrees above the horizontal, unless otherwise directed. Branches feeding down shall be taken from the side or bottom of the main on water mains only. All connections shall be carefully made to insure unrestricted circulation, eliminate air pockets or trapped condensate, and permit the complete drainage of the system.

I. Cutoff valves shall be provided on each branch line from the mains on all plumbing lines.

J. Shut-off valves shall be installed at the inlet and outlet of each piece of equipment to permit isolation for maintenance and repair.

K. Balancing valves shall be installed in all domestic re-circulating systems and at all pumps, and where indicated on the drawings.

L. Unions shall be installed on all bypasses, at all connections to equipment, where shown on drawings or where required to facilitate removal of equipment whether shown or not.

M. Spring clamp plates (escutcheons) shall be provided where pipes are exposed in the building and run through walls, floors, or ceilings. Plates shall be chrome plated spun brass of plain pattern, and shall be set tight on the pipe and to the building surface.

N. If the size of any piping is not clearly evident in the drawings, the Contractor shall request instructions for the Engineer as to the proper sizing. Any changes resulting from the Contractor's failure to request clarification shall be at his expense. Where pipe size discrepancies or conflicts exist in the drawings, the larger pipe size shall govern.

O. Install all valves with stem upright or horizontal, not inverted.

P. Where pipe support members are welded to structural building framing, scrape, brush clean, weld and apply one coat of zinc rich primer.

Q. Provide clearance for installation of insulation and access to valves and fittings.

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

S. All water containing pipes shall be routed clear of combustion air dampers and louvers to prevent freezing condition when dampers are open.

T. Provide manual air vents at top of piping systems.

U. Where access doors are required, install piping so that valves can be grouped together to minimize the quantity of access doors.

V. Install manufactured U.L. listed firestop collars at all floor/wall penetrations for all PVC pipe penetrations.

3.2. THERMOMETER AND PRESSURE GAGE INSTALLATION REQUIREMENTS.

A. Install thermometers and adjust vertical and tilted positions.

B. Install separable sockets in vertical position in piping tees where fixed thermometers are indicated.

1. Install with socket extending to one-third diameter of pipe.

2. Fill sockets with oil or graphite and secure caps.

C. Install pressure gages in piping tees with pressure-gage valve located on a pipe at most readable location.

D. Adjust faces of thermometer and gages to proper angle for best visibility.

E. Clean windows of thermometer and gauges and clean factory-finished surfaces. Replace cracked and broken window, and repair scratched and marred surfaces with manufacturer's touch up paint.

3.3. VALVE INSTALLATION REQUIREMENTS

A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

C. Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.

D. Examine threads on valve and mating pipe for form and cleanliness.

E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

F. Examine grooved ends for form and cleanliness. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.

G. Do not attempt to repair defective valves; replace with new valves.

H. Install valves as indicated, according to manufacturer's written instructions.

I. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.

J. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.

K. Locate valves for easy access and provide separate support where necessary.

L. Install valves in horizontal piping with stem at or above the center of the pipe.

M. Install valves in a position to allow full stem movement.

N. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

3.4. COMPRESSED AIR PIPING INSTALLATION REQUIREMENTS

A. Compressed air piping shall be installed in accordance with the American Society of Plumbing Engineers recommendations. To prevent build-up of moisture, all compressed air piping shall be pitched in the direction of flow, with drain valves installed at low points. Slope piping a minimum of one inch per 40 Ft., and provide manual shut-off valve.

B. Install take-offs to outlets from top of main, with shut-off valve after take-off. Slope take-off piping to outlets. Provide drain leg and drain trap at end of each main, branch, and low point in piping.

C. Install compressed air couplings, female quick connectors, regulators and pressure gauges where outlets are indicated.

D. Install tees instead of elbow at changes in direction of piping. Fit open end of each tee with plug.

E. Connect condensate drains to nearest floor drain. Unless otherwise noted all condensate drain piping shall be copper type "L".

F. Install eccentric reducers where pipe is reduced in size in direction of airflow, with bottoms of both pipes and reducer flush.

3.5. WASTE AND VENT PIPING INSTALLATION REQUIREMENTS

A. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line. All pipe when laid shall rest on the full length of the barrel and bell holes shall be dug in trench bottoms to make joints. Pipe shall not be adjusted to grade by use of block or wedges. Where rock or old foundations are encountered, trenches shall be excavated 6-inches below grade and crusher run limestone shall be used as a bedding material to support barrel of pipe.

B. As the work progresses, the interior of the sewer shall be cleared of all dirt and superfluous materials of every description.

C. Trenches shall be kept free from water until the pipe jointing material has set and pipe shall not be laid when the conditions of the trench or the weather is unsuitable for such work. At all times, when work is not in progress, all open ends of pipe and fittings shall be securely closed to the satisfaction of the Engineer, so that no trench water, earth or other substance will enter the pipe or fittings.

D. Slip joints will be permitted only in trap seals or on the inlet side of the trap. Unions on the sewer side of the trap shall be ground faced, and shall not be concealed or enclosed. Install bell and spigot pipe with bell end upstream.

E. Threaded joints shall be American Standard taper screw threads with permacel joint compound applied to the male thread. Connections between threaded pipe and cast iron pipe shall have a ring or half coupling screwed on to form a spigot end on the threaded pipe.

F. Establish invert elevations, slopes for drainage to 1/8 inch per foot. Maintain gradients.

3.6. PIPE JOINTS INSTALLATION REQUIREMENTS

A. Welded Joints: Joints in piping 2-1/2-inches and larger shall be fusion welded. Welding shall be in accordance with recommendations of the American Welding Society. Welding fittings shall conform in physical and chemical properties to the latest revisions of the American Society for Testing Materials.

B. Qualify welding procedures, welders and operators in accordance with ASME B31.1, or ASME B31.9 as applicable, for shop and project site welding of piping work. Certify welding of piping work using Standard Procedure Specifications by, and welders tested under supervision of, National Certified Pipe Welding Bureau (NCPWB). Submit welders qualifications for approval.

C. Grooved Joints: Grooved joint shall be installed in accordance with the manufacturer's written recommendations. Grooved ends shall be clean and free from indentations, projections, or roll marks. The gasket shall be molded and produced by the coupling manufacturer of an elastomer suitable for the intended service. The coupling manufacturer's factory trained representative shall provide on-site training for the contractor's field personnel in the use of grooving tools and installation of product. The representative shall periodically visit the job site to ensure best practices in grooved product installation are being followed. (A distributor's representative is not considered qualified to conduct the training.)

D. Screwed Joints: All screwed joints shall be made with tapered threads properly cut. Screwed joints shall be made perfectly tight with a stiff mixture of graphite and oil, applied with a brush to the male threads on the fittings.

E. Soldered Joints and Copper Piping: Joints in copper piping shall conform to the following minimum standards.

1. The pipes shall be cut to a length making certain that the ends are square, using a fins hacksaw blade or tube cutter. The ends of all pipes shall be reamed and all burrs removed.

2. The outside end of the pipe and the cut end of the fitting shall be cleaned with steel wool, sand cloth, or steel wire brush. All dark spots shall be removed.

3. The flux shall be applied evenly and sparingly to the outside end of the pipe and the inside of the outer end of the fitting until all surfaces to be jointed are completely covered. The piping and fitting shall be slipped together and reworked several times to insure an even distribution of the flux.

4. The correct amount of solder per joint for each size pipe shall be used in accordance with the manufacturer's recommendations.

5. Solder joints shall be made by using a direct flame from a torch.

6. On pipe sizes larger than ¼-inch, the fittings and valves in the pipe shall be moved or tapped with a hammer when the solder starts to melt to insure an even distribution of the solder.

7. The excess solder shall be removed while it is still in the plastic state leaving a fillet around the cup of the fitting.

8. Solder joints shall be suitable for working pressure of 100 psig and for working temperature of not less than 250 degrees F. The type of solder and flux used will be submitted for approval. Type 95-5 shall be the minimum standard.

9. Lead and antimony-based solders shall not be used for potable water systems. Brazing and silver solders are acceptable.

F. Where copper piping joins steel piping, approved bronze adapters shall be used.

G. Prohibited Connections: No direct weld, soldered, or brazed connections, without unions or flanges, shall be made to valves, strainers, apparatus, or related equipment. Right and left couplings, long threads, or caulking of pipe threads or gasket joints will not be permitted.

H. When installing gas piping which is to be concealed (i.e., in walls), unions, tube fittings, running threads, right- and left-hand couplings, bushings, and swing joints made by combination of fittings shall not be used. All concealed piping within walls shall be welded.

1. Gas Piping

2. Final Gas Connections: Unless otherwise specified herein, final connections shall be made with rigid metallic pipe and fittings.

3. Pipe Joints:

a. Pipe joints shall be designed and installed to effectively sustain the longitudinal pull-out forces caused by contraction of the piping or superimposed loads.
b. Threaded Metallic Joints: Threaded joints in metallic pipe shall have tapered threads evenly cut and shall be made with UL approved graphite joint sealing compound for gas service. After cutting and before threading, pipe shall be reamed and burrs shall be removed. Caulking of threaded joints to stop or prevent leaks shall not be permitted.
c. Welded Metallic Joints: Beveling, alignment, heat treatment, and inspection of welds shall conform to ASME B31.2. Weld defects shall be removed and repairs made to the weld, or the weld joints shall be entirely removed and rewelded. After filler metal has been removed from its original package, it shall be protected or stores so that its characteristics or welding properties are not affected adversely. Electrodes that have been wetted or have lost any of their coating shall not be used.
d. Thermoplastic Joints: Jointing procedures shall conform to AGA 01. Solvent cement or heat of fusion joints shall not be made between different

kinds of plastics.

e. Joining Thermoplastic to Metallic Piping: When compression-type mechanical joints are used, the gasket material in the fittings shall be compatible with the plastic piping and with the gas in the system. An internal tubular rigid stiffener shall be used in conjunction with the fitting, and the stiffener shall be flush with the end of the pipe or tubing and shall extend at least to the outside end of the compression fitting when installed. The stiffener shall be free of rough or sharp edges and shall not be a force fit in the plastic. A split tubular stiffener shall not be used.

f. Special Requirements; Drips, grading of the lines, freeze protection, and branch outlet locations shall be as shown and shall comply with NFPA 54.

g. Install containment conduits for gas piping below slabs, within building, in gastight conduits extending minimum of 4 inches (100mm) outside building, and vented to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end. Prepare and paint outside of conduits with coal-tar epoxy-polyamide paint according to SSPC-Paint 16.

h. Install gas meter per manufacturer's requirements.

i. Install metal shut-off valves upstream and downstream of gas meter with full size normally closed bypass valve.

j. Install strainer on inlet of gas meter.

4. Install concrete filled, steel, schedule 40, painted pipe bollards around gas meter regulator and gas regulators serving generator.

5. Gas pressure regulators shall be installed and located per the manufacturer's requirements for water heaters the gas regulators shall not be installed less than 3 feet nor more than 8 feet from the water heaters unless the manufacturer require otherwise. For boilers and paint spray booths, the gas regulators shall not be installed closer than 10 feet from the boilers, unless the manufacturer requires otherwise. Vent all gas regulator vent pipes to the building exterior prior NFPA-54 and CSD-1 requirements.

I. Plastic piping solvent cement joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe handling practice of cleaners, primers, and solvent cements. Apply primer.

2. PVC Piping: Join according to ASTM D2855.

## 3.7. HANGERS AND SUPPORTS INSTALLATION REQUIREMENTS

A. General: All hangers shall be of an approved type arranged to maintain the required grading and pitching of lines to prevent vibration and to provide for expansion and contraction. Provide protection saddles between hangers and insulation on heating water insulated pipe. Saddles shall be Victaulic, Grinnells Figure 173/273, Sure-Joint, or approved equal. Provide approved spacers between saddles and pipe where flexible insulation is specified. Provide insulation protection shields for insulated piping without saddles. Shields shall be Carpenter Patterson, Grinnell Figure 167 or as approved equal.

B. Spacing: Regardless of spacing, hangers shall be provided at or near all changes in direction, both vertical and horizontal, for all piping. For cast iron soil pipe, one hanger shall be placed at each hub or bell.

C. Pipes to be supported off every joist/beam in the perpendicular direction or at 6 feet on center in the parallel direction. Piping 6 inches or greater shall have their own individual hangers.

D. Vertical Lines: Shall be supported at their bases, using either a suitable hanger placed in a horizontal line near the riser, or a base type fitting set on a pedestal, foundation or support. All vertical lines extending through more than one floor level shall be supported at each floor with a riser clamp. Riser clamp shall be Carpenter Patterson, Grinnell Co.'s Figure 261, or approved equal. All vertical drops to pump suction elbows shall be supported by floor posts.

E. Racks and Brackets: All horizontal piping on vertical walls shall be properly supported by suitable racks securely anchored into the wall construction. Where not practical to obtain ceiling anchorage, all piping near walls shall be supported by approved brackets securely anchored into the wall construction. Washer plates (Fib. 60, 60L) and other miscellaneous attachments, fasteners, etc., shall be Carpenter Patterson, Grinnell or as approved equal. All exterior hanger and bracket systems in their entirety shall be galvanized.

F. Pipe Hangers and supports shall be attached to the panel point at the top chord of bar joist or at a location approved by the structural engineer.

G. Select hangers and components for loads imposed. Secure rods with double nuts.

H. Support of horizontal piping shall allow for vertical adjustment after installation of piping.

I. Support overhead piping with clevis hangers.

J. Do not support all parallel piping from the same joist. Stagger all supports in accordance with the structural engineer's recommendations.

K. Refer to structural documents for appropriate connection/attachment materials to building.

3.8. AIR VENTING INSTALLATION REQUIREMENTS

A. The top of each plumbing piping system and other points as indicated or where necessary for the removal of air from the system or equipment, shall be vented using an approved type of manual air vent.

B. In addition to manual air vents at high points of system, each item of water heat transfer equipment shall be manually vented using an approved type manual air vent. All air vents shall be accessible.

3.9. DIRT POCKETS INSTALLATION REQUIREMENTS

A. Dirt pockets shall be installed at the base of all risers, upstream of gas regulators, and ahead of all gas equipment and as indicated on the drawings.

3.10. EXPANSION LOOPS AND SWING CONNECTION INSTALLATION REQUIREMENTS

A. Install expansion fittings according to manufacturer's written instructions.

B. Install expansion fittings in sizes matching pipe size in which they are installed.

C. Align expansion fittings to avoid end loading and torsional stress.

D. Install pipe bends and loops cold sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

E. Attach pipe bends and loops to anchors.

1. Steel Anchors: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

2. Concrete Anchors: Attach by fasteners. Follow fastener manufacturer's written instructions.

F. Connect risers and branch connections to mains with at least five pipe fittings, including tee in main.

G. Connect risers and branch connections to plumbing equipment with at least four pipe fittings, including tee in riser.

H. Connect mains and branch connections to plumbing equipment with at least four pipe fittings, including tee in main.

I. Install expansion loops, guides, and anchors on all CPVC domestic water piping as required per manufacturer’s instructions.

3.11. PIPING IDENTIFICATION REQUIREMENTS

A. All piping shall be identified with painted background marked with the name of the service with arrows to indicate flow direction. Color code and system identification shall comply with ANSI Standards and piping identification system shall comply with ASME A13.1-81., scheme for the identification of piping systems and ASHRAE Fundamentals Handbook, latest edition.

B. Markings shall be plain block letters, stenciled on pipes, and shall be located near each branch connection, near each valve, and at least every 10 feet on straight runs of pipe. Where pipes are adjacent to each other, markings shall be neatly lined up. All markings shall be located in such manner as to be easily legible from the floor. Pipe identification schedule shall be as follows:

| OUTSIDE DIAMETER OF PIPE OR COVERING (INCHES) | LENGTH OF COLOR FIELD (INCHES) | SIZE OF LETTERS (INCHES) |
|---|---|---|
| | | |

| | | |
|---|---|---|
| ½ to 1 ¼ | 8 | ½ |
| 1-½ to 2 | 8 | ¾ |
| 2 ½ to 6 | 12 | 1 ¼ |
| 8 to 10 | 24 | 2 ½ |
| Over 10 | 32 | 3 ½ |

3.12. VALVE IDENTIFICATION REQUIREMENTS

A. All valves shall be tagged with a numbered tag.

B. The tags shall be made of 1-inch diameter brass tags fastened to the valve by means of brass chains. Numbers shall agree with valve numbers on diagrammatic herein before specified.

C. Provide a minimum of six (6) valve charts with valve numbers indicating valve type, size, manufacturer and service.

D. Additional valve charts shall be mounted behind glazed wooden frames and be hung in each mechanical equipment room including each air handling unit mechanical equipment room. Additional copies shall be provided in each copy of the O&M manuals.

3.13. CLEANING PIPING AND EQUIPMENT REQUIREMENTS

A. All water, plumbing piping, and pumped condensate systems shall be cleaned by filling with a solution of one (1) pound of trisodium phosphate to each 50 gallons of water and circulating this solution for a period of six (6) hours during which time the system shall reach operating temperature. The systems shall then be flushed with fresh water and refilled with fresh water purged of all air.

B. All water, plumbing, and pumped condensate piping system shall be flushed clean with fresh water. See Division 22 Sections, Plumbing Fixture and Plumbing Equipment for domestic potable water cleaning and sterilization.

3.14. BACKWATER VALVE INSTALLATION REQUIREMENTS

A. Install backwater valve with access door to allow service and cleaning of ball check valve.

B. Access door shall be adequate size to allow full clearance to backwater valves. Paint exterior of access door to match existing wall finish.

C. Backwater valve size shall be as indicated on floor plans.

3.15. PRESSURE SEAL FITTING INSTALLATION REQUIREMENTS

A. Viega, ProPress Pressure Seal bronze, Mueller Streamline, or approved equal or copper fittings: Sealing element shall be verified for the intended use. Tube ends shall be cut on

a right angle (square) to the tube. Tube ends shall be reamed and chamfered, all grease oil or dirt shall be removed from the tube end with a clean rag. Visually examine the fitting sealing element to ensure there is no damage, and it is properly seated into the fitting. Utilizing a Viega Insertion Depth Inspection Gauge mark the tube wall, with a felt tip pen, at the appropriate location, or insert the tube fully into the fitting and mark the tube wall at the face of the fitting. Always examine the tube to ensure it is fully inserted into the fitting prior to pressing the joint. ProPress fittings shall be installed according to the most current edition of the Viega installation guidelines. Installers shall attend a Viega ProPress installation training class.

B. After ProPress, Mueller Streamline, or approved equal. Pressure seal fittings have been installed a "two step test" shall be followed. Pressurize the system with application appropriate test medium, water between 15 and 85 psi, or air/dry nitrogen between .5 and 45 psi. Check the pressure gauge for pressure loss. If the system does not hold pressure, walk the system and check for un-pressed fittings. Should you identify an un-pressed fitting ensure the tube is fully inserted into the fitting and properly marked, prior to pressing the joint. After appropriate repairs have been made, retest the system per local code, or specification requirements, not to exceed 600 psi with water or 200 psi when using air fitting.

**END OF SECTION**

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DIVISION 22 SECTION 22 07 01
PLUMBING INSULATION
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**SECTION 22 07 01**
**PLUMBING INSULATION**

## PART 1. GENERAL

1.1. REFERENCE

A. The Conditions of the Contract and other General Requirements apply to the work specified in this Section. All work under this Section shall be subject to the requirements of Division 22 Section, Common Work Results for Plumbing.

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2. DESCRIPTION

A. All piping and equipment installed under this Contract shall be covered as specified.

1.3. SCOPE

A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct fabrication and installation of thermal insulation applied to all piping, equipment, and systems, in accordance with applicable project specifications and drawings, subject to the terms and conditions of the contract.

1.4. STANDARDS

A. Thermal insulation materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or use:

1. American Society for Testing of Materials Specifications:

a. ASTM C 547, “Standard Specification for Mineral Fiber Preformed Pipe Insulation”.
b. ASTM C 533, “Standard Specification for Calcium Silicate Pipe & Block Insulation”.
c. ASTM C 55, “Standard Specification for Mineral Fiber Blanket and Felt Insulation”.
d. ASTM E 96, “Standard Test Methods for Water Vapor Transmission of Materials”.
e. ASTM C 585, “Recommended Practice for Inner and Outer Diameters of Rigid Pipe Insulation for Nominal Sizes of Pipe and Tubing (NPS System)”.
f. ASTM C 612, “Standard Specification for Mineral Fiber Block and Board Thermal Insulation”.
g. ASTM C 1136, “Standard Specification for Barrier Material, Vapor, “Type 1 or 2 (Jacket only).
h. ASHRAE 90.1 “Energy efficient design of new buildings except low-rise residential buildings”, latest edition.

B. Insulation materials, including all weather and vapor barrier materials, closures, hangers, supports, fitting covers, and other accessories, shall be furnished and installed in strict accordance with project drawings, plans, and specifications.

1.5. SYSTEM PERFORMANCE

A. Insulation materials furnished and installed hereunder should meet the minimum economic insulation thickness requirements of the North American Insulation Manufacturers' Association (NAIMA) (formerly known as TIMA), to ensure cost-effective energy conservation performance. Alternatively, materials should meet the minimum thickness requirements of National Voluntary Consensus Standard 90.1, (latest edition) and "Energy Efficient Design of New Buildings," of the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE), latest edition. However, if other factors such as condensation control or personnel protection are to be considered, the selection of the thickness of insulation should satisfy the controlling factor. As minimum, all insulation thicknesses shall be as hereinafter specified.

B. Insulation materials furnished and installed hereunder shall meet the fire hazard requirements of any one of the following specifications:

| | | |
|---|---|---|
| 1. | American Society for Testing of Materials | ASTM E 84 |
| 2. | Underwriters' Laboratories, Inc. | UL 723 |
| 3. | National Fire Protection Association | NFPA 255 |

C. Calcium silicate products shall include a visual identification system to permit positive field determination of their asbestos-free characteristics.

1.6. QUALITY ASSURANCE

A. Insulation materials and accessories furnished and installed hereunder shall, where required, be accompanied by manufacturers' current submittal or data sheets showing compliance with applicable specifications listed in Section 1.4 above.

B. Insulation materials and accessories shall be installed in a workmanlike manner by skilled and experienced workers who are regularly engaged in commercial insulation work.

1.7. DELIVERY AND STORAGE OF MATERIALS

A. All of the insulation materials and accessories covered by this specification shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identification.

B. The Contractor shall use whatever means are necessary to protect the insulation materials and accessories before, during, and after installation. No insulation material shall be installed that has become damaged in any way. The Contractor shall also use all means necessary to protect work and materials installed by other trades.

C. If any insulation material has become wet because of transit or job site exposure to moisture or water, the Contractor shall not install such material, and shall remove it from the job

site. An exception may be allowed in cases where the Contractor is able to demonstrate that wet insulation when fully dried out (either before installation, or afterward following exposure to system operating temperatures) will provide installed performance that is equivalent in all respects to new, completely dry insulation. In such cases, consult the insulation manufacturer in writing for technical assistance.

D. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements. Protect all insulation from water, construction traffic, dirt, chemical and mechanical damage.

1.8. ALTERNATES

A. Refer to Division 01 Section, Alternates for description of work under this section affected by alternates.

## PART 2. PRODUCTS

2.1. GENERAL

A. All materials to be insulated shall be thoroughly cleaned, after completion of successful tests, and shall be covered as specified below. Fiberglass insulation shall be Owens-Corning, Manville, Armstrong, or P.P.G, or as approved equal.

2.2. PIPE INSULATION MATERIALS

A. Unless otherwise noted, insulation shall be one piece or half sectional molded fibrous glass with "K" rating of .23 at 75 degrees F mean temperature, for service temperatures between -60 degrees F and +450 degrees F with all service poly-encapsulated jacket. Pipe insulation shall be fiberglass ASJmax SSL II with double closure system as manufactured by Owens Corning, Johns Manville, Knauf or approved equal.

B. Unless otherwise noted, pipe insulation jacket shall be factory-applied vinyl coated, embossed and reinforced vapor barrier laminate, with a perm rating of not more than 0.02 perms. All hot and cold, concealed, and exposed butt strips shall be of the same material as the jacket. Jacket and butt strips shall be sealed with field-applied Foster 85-20/85-50 or Childers CP-82 (5 gallon cans only) adhesive. Jacket and butt strips shall be off-white color and shall be equivalent to Owens-Corning Fiberglass 25-ASJ, Johns Manville, Knauf, or approved equal.

C. For fittings on all piping, valves, and flanges, apply fiberglass molded or segmented insulation equal in thickness to the adjoining insulation and securely fasten in place using wire. Cold piping: Apply a tack coat of vapor barrier coating and reinforcing mesh. After ½ hour, apply second coat of same vapor barrier coating, UL labeled, Type C, for cold water piping. Hot piping, Type H for hot water piping: Apply tack of breather mastic. Wrap fitting with fiberglass reinforcing cloth overlapping adjoining sections of pipe insulation by 2-inches. Apply a second coat of breather mastic over the reinforcing cloth, working it to a smooth finish. As an option to the above hot fittings, a polyvinyl chloride fitting cover may be supplied.

D. All pipe insulation, jackets, or facings, and adhesives used to adhere jacket or facing to the insulation, including fittings and butt strips, shall have non-combustible fire and smoke

hazard system rating and label as tested by ASTM E-84, NFPA 225, and UL 73, not exceeding Flame Spread 25, Fuel Contributed 50, Smoke Developed 50. Accessories such as adhesives, mastic cements, tapes and cloth for fittings shall have the same ratings as listed above. All products or their shipping cartons shall bear the Underwriter's label indicating that flame and smoke ratings do not exceed the above criteria.

E. For piping having a vapor barrier insulation and for all insulated piping requiring supports, hangers and supports shall be installed outside the insulation. Wherever hangers and supports are installed outside the insulation, pipe insulation protecting shields shall be provided. Where insulation is a load bearing material, of sufficient strength to support the weight of the piping, pipe shields one-third the circumference of the insulation and of a length not less than three times the diameter of the insulation (maximum length 24-inches) shall be provided. Insulation of 7-1/4 pound or greater density will be considered as load bearing for pipe sizes up to and including 2-inches. Where insulation is not of sufficient strength to support the weight of the piping, a half section of high density fiberglass or foam inserts, shall be provided. Vapor barrier and finish shall be applied as required to match adjoining insulation. In addition, shields shall be furnished as specified above.

F. For piping located outside of the building, a corrugated aluminum weatherproof jacketing system shall be provided. This system shall be Micro-Lot ML as manufactured by Manville, Polyweld by Pabco Metals Corp., Childers, or as approved equal, and installed per the manufacturer's recommendations. Where outdoor piping is receiving electric heat tape, the insulation shall be oversized so that the heat tape is not compressed tightly to the pipe. Pipe jacketing shall be corrugated (3/16-inch) deep aluminum, .016-inch thickness of H-14 temper with aluminum strapping of .75-inch width and .020 inch thickness with moisture barrier. Aluminum jacketing elbows shall be smooth, .016-inch thickness and 1100 alloy. All jacketing shall have an integrally bonded moisture barrier over the entire surface in contact with the insulation. Longitudinal joints shall be applied so they will shed water and shall be sealed completely and shall be sealed completely with metal jacketing sealant. Sealant shall be Foster 95-44 or Childers CP-76. Circumferential joints shall be closed using preformed butt strips following manufacturer's recommendations for securement. Jacket seams shall be located on the bottom side of the horizontal piping.

G. On cold systems such as domestic cold water, rainleaders, vapor barrier performance is extremely important. All penetrations and seams of the ASJ and exposed ends of insulation must be sealed with vapor barrier coating. The ASJ must be protected with either a vapor barrier coating or a suitable vapor retarding outer jacket. Vapor seals at butt joints shall be applied at every fourth pipe section joint and at each fitting to provide isolation of water incursion. Vapor Barrier Coating: Foster 30-65; Childers CP-34 or Vimasco 749. Permeance shall be 0.03 perms or less at 45 mils dry at test by ASTM E96.

H. Fittings and valves shall be insulated with pre-formed fiberglass fittings, fabricated sections of Fiberglass pipe insulation, Fiberglass pipe and tank insulation, Fiberglass blanket insulation, or insulating cement. Thickness shall be equal to adjacent pipe insulation. Finish shall be with pre-formed PVC fitting covers or as otherwise specified on contract drawings. Where applicable, grooved joint PVC fitting valve and coupling covers shall be utilized. Grooved joint PVC covers shall be installed with matching pipe insulation jacketing material, vinyl tape, solvent weld adhesive and appropriate fasteners.

1. Flanges, couplings and valve bonnets shall be covered with an oversized pipe insulation section sized to provide the same insulation thickness as on the main

pipe section. An oversized insulation section shall be used to form a collar between the two insulation sections with low density blanket insulation being used to fill gaps. Jacketing shall match that used on straight pipe sections. Rough cut ends shall be coated with a suitable weather or vapor-resistant mastic as dictated by the system location and service. Finish valve installation with a Tyvac jacket with ends that secure to adjacent piping.

2. On hot systems where fittings are to be left exposed, insulation ends should be beveled away from bolts for easy access.

3. On cold systems, particular care must be given to vapor sealing the fitting cover or finish to the pipe insulation vapor barrier. All valve stems must be sealed with caulking which allows free movement of the stem but provides a seal against moisture incursion. All gauge and thermometer penetrations and extensions shall be correctly sealed and insulated to prevent surface condensation.

I. All piping shall be supported in such a manner that neither the insulation or the vapor/weather barrier is compromised by the hanger or the effects of the hanger. In all cases, hanger spacing must be such that the circumferential joint may be made outside the hanger. On cold systems, vapor barrier must be continuous, including material covered by the hanger saddle.

1. Piping systems 3-inches (7.5cm) in diameter or less, insulated with Fiberglass insulation, may be supported by placing saddles of the proper length and spacing, as designated in Owens-Corning Pub. 1-IN-12534, under the insulation. Hangers saddles shall be minimum 16 gauge with a saddle arc of 120 degrees minimum.

2. For hot or cold piping systems larger than 3-inches (7.5 cm) in diameter, operating at temperatures less than +200 degrees F (93 degrees C) and insulated with fiber glass, high density inserts such as foam with sufficient compressive strength shall be used to support the weight of the piping system. At temperatures exceeding +_200 degrees F (93 degrees C), Owens-Corning Pink or IIG, Calcium Silicate pipe insulation shall be used for high density inserts.

3. Owens-Corning Pink Calcium Silicate pipe insulation may be used to support the entire weight of the piping system provided the hanger saddle is designed so the maximum compressive load does not exceed 100 psi (7kg/cm).

4. Where pipe shoes and roller supports are required, insulation shall be inserted in the pipe shoe to minimize pipe heat loss. Where possible, the pipe shoe shall be sized to be flush with the outer pipe insulation diameter.

5. Thermal expansion and contraction of the piping and insulation system shall generally be taken care of by utilizing double layers of insulation and staggering both longitudinal and circumferential joints. Where long runs are encountered, expansion joints may be required where single layers of insulation are being used and should be so noted on the contract drawings.

6. On vertical runs, insulation support rings shall be used.

2.3. PIPING INSULATION THICKNESSES SCHEDULE

A. All piping shall be insulated with pipe insulation of the thicknesses indicted below:

| PIPING INSULATION THICKNESS SCHEDULE SERVICES | THICKNESS |
|---|---|
| Above Grade Trap Priming Lines | ½ -inch thickness |
| All Above Grade Floor Drain Piping Serving AHU Condensate Drains include Drain Sumps and Auxiliary Drain Pipes from Auxiliary Pans | 1-inch thickness |
| All Domestic Hot and Cold Water Piping, including Re-circulating Piping | 1-inch thickness |
| All Drain Piping from Cooling Coils/Evaporators | ½-inch thickness |
| All Horizontal Roof Drain Piping Including Roof Drain Sumps | 1-inch thickness |
| Electric Water Cooler Drains, Kitchen Equipment Drains | 1-inch thickness |
| Reverse Osmosis Piping | 1-inch thickness |
| Floor Drain or Stormwater Piping that collects condensate | 1-inch thickness |
| Tepid Water for Emergency Fixtures | 1-inch thickness |
| Dental Vacuum Pump Exhaust Piping | 1-inch thickness |
| Vertical and horizontal roof drain piping where the same handles A/C condensate. | 1-inch thickness |

2.4. EQUIPMENT INSULATION MATERIALS AND THICKNESSES

A. The following equipment shall be insulated with Fiberglass Rigid Board Insulation or Foam Plastic Insulation:

1. All piping within emergency and high-low mixing valve cabinets.

2. All Pump Volutes and Strainers.

3. Backflow Preventer Valve Bodies.

4. Domestic Booster Pump Suction and Discharge Headers.

5. Domestic Water Meters.

6. Expansion Tanks.

7. Hydro Pneumatic Tanks.

8. Make-up Water Valve Bodies.

9. Make-Up Water Meters.

10. Plumbing Pumps.

11. Pressure Reducing Valve Bodies.

B. Insulation for cold surfaces shall be 1-1/2-inch thickness, 6 lb. density, 705 FRK with a "K" rating of .23 at 75 degrees F mean temperature. Insulation for hot surfaces except as otherwise noted shall be 1-1/2-inch thickness, 6 lb. density, 705 with a "K" rating of .23 at 75 degrees F mean temperature. Insulation shall be applied with staggered joints firmly butted and joined. The insulation shall be held in place by steel bands. Bands shall be 1-inch by 25 gauge galvanized steel spaced on not over 12-inch centers. All joints and voids shall be filled with Owens-Corning #110 cement, well troweled into openings. For 705 FRK insulation, all joints and voids shall be FRK taped and vapor sealed. There shall be applied over the insulation surface 1-inch galvanized wire netting laced together at all edges and wired to the steel bands with 16 gauge soft annealed wire. Over this shall be applied 2-inch thick layer of Owens-Corning #110 cement applied in two layers. Install metal corner beads at all corners and edges in order to provide a permanent installation. Onto the dry cement surface apply a brush coat of Foster Sealfas 30-36 or Childers CP-50AMV1 lagging adhesive at the rate of 60-70 square feet per gallon. Cleanouts, nameplates, and manholes shall not be insulated, and the insulation on surrounding surfaces shall be neatly beveled off at such openings.

C. Insulation Installation on Pumps:

1. Fabricate metal boxes lined with insulation. Fit boxes around pumps and coincide box joints with splits in pump casings. Fabricate joints with outward bolted flanges. Bolt flanges on 6-inch (150-mm) centers, starting at corners. Install 3/8-inch- (10-mm-) diameter fasteners with wing nuts. Alternatively, secure the box sections together using a latching mechanism.

2. Fabricate boxes from aluminum at least 0.040 inch (1.0 mm) thick.

3. For below ambient services, install a vapor barrier coating at seams, joints, and penetrations. Seal between flanges with replaceable gasket material to form a vapor barrier.

D. Mechanical fasteners shall be utilized to hold insulation to surface with bands as required to hold the curvature of the material.

E. Support rings shall be provided to support the top head insulation where required.

F. Outdoor installations require a weather barrier mastic for protection of the insulation jacketing.

G. Insulation types materials shall be suitable for temperatures encountered by each item of equipment.

H. Install removable insulation sections at all cleanouts, test ports, and items that must be

periodically tested.

2.5. ACCESSORY MATERIALS

A. Accessory materials installed as part of insulation work under this section shall include, but not be limited to:

1. Closure Materials - Butt strips, bands, wires, staples, mastics, adhesives; pressure-sensitive tapes.

2. Field-applied jacketing materials - sheet metal, plastic, canvas, fiber glass cloth, insulating cement; PVC fitting covers, PVC jacketing.

3. Support Materials - Hanger straps, hanger rods, saddles.

4. Fasteners, weld pins/studs, speed clips, insulation washers.

5. Metal mesh or expanded metal lagging.

B. All accessory materials shall be installed in accordance with project drawings and specifications, manufacturer's instructions, and/or in conformance with the current edition of the Midwest Insulation Contractors Association (MICA) "Commercial & Industrial Insulation Standards."

2.6. FIELD-APPLIED JACKET

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Johns Manville; Zeston.
b. P.I.C. Plastics, Inc.; FG Series.
c. Proto PVC Corporation; LoSmoke.
d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer. VOC content not to exceed 250 g/L.

3. Color: High Gloss White

4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

5. Factory-fabricated tank heads and tank side panels.

## PART 3. EXECUTION

3.1. WORKMANSHIP

A. The Contractor shall take special care to prevent soiling equipment below or adjacent to areas being insulated. He shall be completely responsible for removing insulation cement splashes and smears and all surfaces that he mars or otherwise soils or defaces, and he will be totally responsible for restoring these damaged surfaces to their like-new condition when delivered to the site.

3.2. SITE INSPECTION

A. Before starting work under this section, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.

B. Verify that all materials and accessories can be installed in accordance with project drawings and specifications and material manufacturers' recommendations.

C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

3.3. PREPARATION

A. Ensure that all pipe and equipment surfaces over which insulation is to be installed are clean and dry.

B. Ensure that insulation is clean, dry, and in good mechanical condition with all factory-applied vapor or weather barriers intact and undamaged. Wet, dirty, or damaged insulation shall not be acceptable for installation.

C. Ensure that pressure testing of piping systems has been completed prior to installing insulation.

3.4. INSTALLATION

A. Piping Systems

1. General:

a. Install all insulation materials and accessories in accordance with manufacturer's published instructions and recognized industry practices to ensure that it will serve its intended purpose.
b. Install insulation on piping subsequent to installation of heat tracing, painting, testing, and acceptance tests.
c. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single

cut piece to complete run. Do not use cut pieces or scraps abutting each other. Butt insulation joints firmly to ensure complete, tight fit over all piping surfaces.

d. Maintain the integrity of factory-applied vapor barrier jacketing on all pipe insulation, protecting it against puncture, tear or other damage. Seal all tears, punctures and other penetrations of the pipe insulation vapor barrier coating.

e. On exposed piping, locate insulation and cover seams in least visible location.

2. Fittings: Cover valves, fittings, unions, flanges, strainers, flexible connections, expansion joints, pump bodies, strainers, blowdowns, backflow preventers, autoflow valves and similar items in each piping system using one of the following:

a. Mitered sections of insulation equivalent in thickness and composition to that installed on straight pipe runs.

b. Insulation cement equal in thickness to the adjoining insulation.

c. PVC fitting covers insulated with material equal in thickness and composition to adjoining insulation.

3. Penetrations: Extend piping insulation without interruption through walls, floors, and similar piping penetrations, except where otherwise specified.

4. Joints:

a. Butt pipe insulation against hanger inserts. For hot pipes, apply 3-inch (7.5cm) wide vapor barrier tape or bank over butt joints. For cold piping, apply wet coat of vapor barrier lap cement on butt joints, and seal joints with 3-inch (7.5cm) wide vapor barrier tape or band.

b. All pipe insulation ends shall be tapered and sealed, regardless of service.

5. For heat traced piping, insulate fittings, joints, and valves with insulation of like material, thickness and finish as adjoining pipe. Size insulation large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

B. Equipment Insulation:

1. General:

a. Install insulation in accordance with manufacturer's published instructions and recognized industry practices to ensure that it will serve its intended purpose.

b. Install insulation on equipment after installation of heat tracing, painting, testing, and acceptance tests.

c. Install insulation materials with smooth, even surfaces. Rework poorly fitted joints. Do not use joint sealer or mastic as filler for joint gaps and excessive voids resulting from poor workmanship. Apply insulation using staggered joint method for both single and double layer installation, applying each layer of insulation separately.

d. Coat insulated surfaces where specified on contract drawings with layer of

insulating cement, troweled in a workmanlike manner, leaving a smooth and continuous surface. Fill in seams, broken edges, and depressions. Cover over wire mesh and joints with cement sufficiently thick to remove surface irregularities.

e. Maintain the integrity of factory-applied vapor barrier jacketing on all insulation, protecting it against puncture, tears or other damage. Seal all tears, punctures and other penetrations of equipment insulation facing.

f. Where specification calls for field-applied all-service vapor barrier jacketing, it shall be neatly fitted and tightly secured. Lap seams 2-inches (5cm) (min.). Seal all joints with adhesive. Tape with 3-inches (7.5cm) matching pressure-sensitive tape or 3-inch (7.5cm) glass fabric and vapor barrier coating.

g. On exposed equipment, locate insulation and cover seams in least visible location.

2. Removable Insulation: Provide removable insulation sections to cover parts of equipment which must be opened periodically for maintenance, such as vessel covers, fasteners, flanges, frames accessories, manholes, handholes, cleanouts ASME stamp, and manufacturer nameplates.

3. Areas Left Uninsulated: Items such as manholes, handholes, clean-outs, ASME stamp, and manufacturers' nameplates should be left uninsulated unless omitting insulation would cause a condensation problem. When such is the case, provide removable insulation and appropriate tagging to identify the presence of these items. Provide neatly beveled edges at interruptions of insulation.

4. Equipment Exposed to Weather: Protect outdoor insulation from weather by installation of weather barrier mastic protective finish or jacketing as recommended by the jacketing manufacturer.

## 3.5. FIELD QUALITY ASSURANCE

A. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to assure compliance with requirements herein to cover and protect insulation materials during installation.

## 3.6. PROTECTION

A. Replace damaged insulation which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.

B. The insulation contractor shall advise the general and/or the mechanical contractor as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.

## 3.7. SAFETY PRECAUTIONS

A. Insulation contractor's employees shall be properly protected during installation of all insulation. Protection shall include proper attire when handling and applying insulation materials, and shall include (but not be limited to) disposable dust respirators, gloves, hard

hats, and eye protection.

B. The insulation contractor shall conduct all job site operations in compliance with applicable provisions of the Occupational Safety and Health Act, as well as with all state and/or local safety and health codes and regulations that may apply to the work.

3.8. INSULATION COVERING

A. Unless otherwise noted, all exposed equipment insulation shall have a field applied PVC jacket cover neatly cut and pasted over equipment insulation. PVC shall be high gloss white and shall be 20 mils thick. Exposed areas include, but are not limited to, all mechanical equipment rooms/fan rooms, above architectural ceiling clouds, mezzanines, penthouses, boiler rooms, janitor's closets, kitchens, electric rooms, and piping and ductwork exposed in an occupied space.

B. Unless otherwise noted, all exposed pipe insulation required to be insulated shall be jacketed with a PVC Jacketing with fitting covers. PVC jacket shall be color fade resistant, white high gloss, U.S.D.A. authorized as manufactured by Proto Corporation or approved equal. PVC jacketing shall be high impact, ultraviolet resistant PVC. Minimum thickness shall be 20 mils, roll stock ready for shop or field cutting and forming.

C. Where PVC jackets are indicated, install with 1 inch overlap at longitudinal seams and end joints, for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturers recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

**END OF SECTION**

DIVISION 22 SECTION 22 40 00
PLUMBING FIXTURES

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**SECTION 22 40 00**
**PLUMBING FIXTURES**

## PART 1. GENERAL

1.1. GENERAL

A. For General Mechanical Requirements, see Division 22 Section, Common Work Results for Plumbing & Division 01, General Requirements.

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 specifications apply to this Section.

C. All exposed bolts, screws, etc., shall be vandal proof.

D. All plumbing materials, equipment and fixtures shall be new and of best grade, free of defects and complete with all required appurtenances and accessories.

E. Piping and insulation are specified under other sections.

F. Use "Sani-Sett" setting compound for fixtures.

G. Provide all materials, equipment and perform all labor required to install plumbing system complete as specified, as drawings indicated and as required by the following:

1. State of Delaware
2. International Plumbing Code
3. County of New Castle
4. City of Newark Code
5. All other authorities have jurisdiction.

H. Comply with the current lead-free laws per the requirements of the state in which the project is being constructed.

I. Provide stops for all plumbing fixtures and equipment. Stops are to be accessible.

J. Provide P traps on fixtures for which traps have not been included as part of furnished equipment. Trap size to equal size of fixture tailpiece.

K. All exposed metal parts of fixtures shall be chromium plated brass. Piping, fittings, valves, traps and accessories including escutcheons for piping shall be chromium plated where exposed in finished areas.

L. All faucets for the following list shall be listed for drinking-water or commercial applications by the National Sanitation Foundation (NSF) or Underwriters Laboratory (U.L.). All required faucets shall comply with NSF Standard 61 for both lead content and leaching rate. Submit documentation indicating compliance for all required faucets.

1. Residential kitchen sinks
2. Lavatories
3. Commercial kitchen sinks
4. Drinking fountains
5. Bubblers
6. Ice makers

M. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:

1. American Gas Association (AGA).
2. National Sanitation Foundation (NSF).
3. American Society of Mechanical Engineers (ASME).
4. National Electrical Manufacturers' Association (NEMA).
5. Underwriters Laboratories (UL).

1.2. REFERENCES

A. ANSI/ASME A112.6.1 - Supports for Off-the-floor Plumbing Fixtures for Public Use

B. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.

C. ANSI/ASME A112.19.1 - Enameled Cast Iron Plumbing Fixtures.

D. ANSI/ASMI A112.19.2 - Vitreous China Plumbing Fixtures.

E. ANSI/ASME A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).

F. ANSI/ASME A112.19.4 - Porcelain Enameled Formed Steel Plumbing Fixtures.

G. ANSI/ASME A112.19.5 -Trim for Water-Closet Bowl, Tanks, and Urinals (Dimensional Standards).

H. IAPMO/ANSI Z124.2 - Plastic Shower Receptors and Shower Stalls.

I. ANSI Z358.1 - Emergency Eyewash and Shower Equipment.

J. ANSI/ARI 1010 - Drinking-Fountains and Self- Contained, Mechanically Refrigerated Drinking Water Coolers.

K. ANSI/NFPA 70 - National Electrical Code.

L. IBC - International Building Code

1.3. DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 01, Section General Requirements.

B. Accept fixtures on site in factory packaging. Inspect for damage.

C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.4. FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings and per the manufacturer.

B. Confirm that millwork is constructed with adequate provisions for the installation of counter top lavatories and sinks.

1.5. EXTRA MATERIALS

A. Provide two sets of faucet washers and flush valve service kits to the Owner. Provide correspondence to Engineer that extra materials have been turned over to the Owner.

B. For science room fixtures, furnish to Owner in a suitable container spare quantity of lime chips for each bottle trap of the project.

C. For battery operated plumbing fixtures, furnish to Owner in a suitable container a spare set of batteries for each fixture.

1.6. GRAB BAR COORDINATION

A. For handicapped plumbing fixtures coordinate location of flush valves with grab bars prior to installation.

1.7. ALTERNATES

A. Refer to Division 01 Section, Alternates for description of work under this section affected by alternates.

**PART 2. PRODUCTS**

2.1. WALL-MOUNTED WATER CLOSETS

A. WC-2 Wall Hung, Exposed, Battery Operated, Infrared Sensor Flush Valve with Manual Override Button

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kohler Model K-4325 Kingston
b. American Standard

c. Crane
d. Sloan
e. Zurn

2. Bowl:

| | | |
|---|---|---|
| a. | Material: | Vitreous china |
| b. | Type: | Siphon Jet |
| c. | Style: | Flushometer Valve |
| d. | Height: | Standard |
| e. | Rim Contour: | Elongated |
| f. | Spud Size; Location: | NPS 1-1/2; Top |

3. Flushometer Valve:

a. Diaphragm Type: Sloan Model #8111, Delany, Zurn or approved equal.
b. Chrome plated brass.
c. ADA compliant battery powered infrared sensor for automatic “no hands” operation.
d. Courtesy flush override button
e. Low Battery flashing LED
f. Infrared sensor range adjustment.
g. Initial set-up range indicator light.
h. Four (4) size AA batteries.
i. 1-inch I.P.S. screwdriver back check angle stop.
j. Spud coupling and flange.
k. Locking vandal resistant stop cap.
l. Adjustable tail piece.
m. High back pressure vacuum breaker flush connection with one-piece bottom hex coupling nut.
n. Sweat solder adapter with cover tube and cast set screw wall flange.
o. Split Ring Wall Support: Sloan Model J-312-A.
p. Provide 3-year limited Manufacturer's warranty.

4. Seat: Kohler Model K-4670-C, American Standard 5901.100, solid plastic white seat with open front and check hinge.

5. Carrier: Zurn, Josam, or Watts cast iron watercloset Carrier with fittings as required. ANSI/ASME A112.6.1 adjustable cast iron frame integral drain hub and vent, adjustable speed, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

B. WC-2A Wall Hung, Exposed, Battery Operated, Infrared Sensor Flush Valve with Manual Override Button, Handicapped

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kohler Model K-4325 Kingston
b. American Standard
c. Crane

d. Sloan
e. Zurn

2. Bowl:

| | | |
|---|---|---|
| a. | Material: | Vitreous china |
| b. | Type: | Siphon Jet |
| c. | Style: | Flushometer Valve |
| d. | Height: | A.D.A. Compliant |
| e. | Rim Contour: | Elongated |
| f. | Spud Size; Location: | NPS 1-1/2; Top |

3. Flushometer Valve:

a. Diaphragm Type: Sloan Model #8111, Delany, Zurn or approved equal.
b. Chrome plated brass.
c. ADA compliant battery powered infrared sensor for automatic “no hands” operation.
d. Courtesy flush override button
e. Low Battery flashing LED
f. Infrared sensor range adjustment.
g. Initial set-up range indicator light.
h. Four (4) size AA batteries.
i. 1-inch I.P.S. screwdriver back check angle stop.
j. Spud coupling and flange.
k. Locking vandal resistant stop cap.
l. Adjustable tail piece.
m. High back pressure vacuum breaker flush connection with one-piece bottom hex coupling nut.
n. Sweat solder adapter with cover tube and cast set screw wall flange.
o. Split Ring Wall Support: Sloan Model J-312-A.
p. Provide 3-year limited Manufacturer's warranty.

4. Seat: Kohler Model K-4670-C, American Standard 5901.100, solid plastic white seat with open front and check hinge.

5. Carrier: Zurn, Josam, or Watts cast iron watercloset Carrier with fittings as required. ANSI/ASME A112.6.1 adjustable cast iron frame integral drain hub and vent, adjustable speed, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.2. FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS

A. WC-14 Floor Mounted, Exposed, Battery Operated, Infrared Sensor Flush Valve with Manual Override Button, Child Height

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kohler Model K-96064-SS Primary
b. American Standard

c. Crane
d. Sloan
e. Zurn

2. Bowl:

| | | |
|---|---|---|
| a. | Material: | Vitreous china |
| b. | Type: | Siphon Jet |
| c. | Style: | Flushometer Valve |
| d. | Height: | Standard |
| e. | Rim Contour: | Elongated |
| f. | Spud Size; Location: | NPS 1-1/2; Top |

3. Flushometer Valve:

a. Diaphragm Type: Sloan Model Optima Plus #8111, Delany, Zurn or approved equal.
b. Chrome plated brass.
c. ADA compliant battery powered infrared sensor for automatic “no hands” operation.
d. Courtesy flush override button
e. Low Battery flashing LED
f. Infrared sensor range adjustment.
g. Initial set-up range indicator light.
h. Four (4) size AA batteries.
i. 1-inch I.P.S. screwdriver back check angle stop.
j. Spud coupling and flange.
k. Locking vandal resistant stop cap.
l. Adjustable tail piece.
m. High back pressure vacuum breaker flush connection with one-piece bottom hex coupling nut.
n. Sweat solder adapter with cover tube and cast set screw wall flange.
o. Split Ring Wall Support: Sloan Model J-312-A.
p. Provide 3-year limited Manufacturer's warranty.

4. Toilet Seat: Kohler Model K-4686-A, American Standard 5001G.055, solid plastic white seat with open front and check hinge.

2.3. WALL-HUNG URINALS

A. U-2 Wall Hung, Exposed, Battery Operated, Infrared Sensor Flush Valve with Manual Override Button

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kohler Model K-4991-ET Bardon
b. American Standard
c. Sloan
d. Zurn

2. Fixture:

| | | |
|---|---|---|
| a. | Material: | Vitreous china |
| b. | Type: | Washout |
| c. | Rim Height: | Standard |
| d. | Spud Size; Location: | NPS 3/4; Top |
| e. | Outlet Size; Location: | NPS 2; Back |

3. Flushometer Valve:

a. Diaphragm Type: Sloan Model Optima Plus #8186, Delany, Zurn or approved equal.
b. Chrome plated brass.
c. ADA compliant battery powered infrared sensor for automatic “no hands” operation.
d. Courtesy flush override button
e. Low Battery flashing LED
f. Infrared sensor range adjustment.
g. Initial set-up range indicator light.
h. Four (4) size AA batteries.
i. 3/4-inch I.P.S. screwdriver back check angle stop.
j. Spud coupling and flange.
k. Locking vandal resistant stop cap.
l. Adjustable tail piece.
m. High back pressure vacuum breaker flush connection with one-piece bottom hex coupling nut.
n. Sweat solder adapter with cover tube and cast set screw wall flange.
o. Split Ring Wall Support: Sloan Model J-312-A.
p. Provide 3-year limited Manufacturer's warranty.

4. Carrier: Zurn, Josam or Watts cast iron urinal carrier with fittings as required. ANSI/ASME A112.6.1A; cast iron and steel frame with tubular legs, legs for floor and wall attachment, threaded fixtures studs for fixture hanger, bearing studs.

B. U-2A Wall Hung, Exposed, Battery Operated, Infrared Sensor Flush Valve with Manual Override Button, Handicapped

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kohler Model K-4991-ET Bardon
b. American Standard
c. Sloan
d. Zurn

2. Fixture:

| | | |
|---|---|---|
| a. | Material: | Vitreous china |
| b. | Type: | Washout |
| c. | Rim Height: | A.D.A. Compliant |
| d. | Spud Size; Location: | NPS 3/4; Top |

e. Outlet Size; Location: NPS 2; Back

3. Flushometer Valve:

a. Diaphragm Type: Sloan Model Optima Plus #8186, Delany, Zurn or approved equal.
b. Chrome plated brass.
c. ADA compliant battery powered infrared sensor for automatic “no hands” operation.
d. Courtesy flush override button
e. Low Battery flashing LED
f. Infrared sensor range adjustment.
g. Initial set-up range indicator light.
h. Four (4) size AA batteries.
i. 3/4-inch I.P.S. screwdriver back check angle stop.
j. Spud coupling and flange.
k. Locking vandal resistant stop cap.
l. Adjustable tail piece.
m. High back pressure vacuum breaker flush connection with one-piece bottom hex coupling nut.
n. Sweat solder adapter with cover tube and cast set screw wall flange.
o. Split Ring Wall Support: Sloan Model J-312-A.
p. Provide 3-year limited Manufacturer's warranty.

4. Carrier: Zurn, Josam or Watts cast iron urinal carrier with fittings as required. ANSI/ASME A112.6.1A; cast iron and steel frame with tubular legs, legs for floor and wall attachment, threaded fixtures studs for fixture hanger, bearing studs.

## 2.4. WALL-MOUNTED LAVATORIES

A. LAV-2 Wall-Hung, Deck Mounted, Battery Operated, Infrared Sensor Faucet

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kohler Model K-2032 Greenwich
b. American Standard Lucerne
c. Crane
d. Zurn

2. Fixture:

| | | |
|---|---|---|
| a. | Material: | Vitreous china |
| b. | Type: | Wall-Hung |
| c. | Rim Mounting Height: | Standard |
| d. | Nominal Size: | 20-3/4”L x 18-1/4”W |
| e. | Faucet-Hole Punching: | Three Holes, 4-inch centers |
| f. | Faucet-Hole Location: | Top |
| g. | Color: | White |
| h. | Mounting Material: | Concealed Arm Carrier |

3. Faucet:

   a. Chicago Faucet 116.221.AB.4 (0.35 GPM), Sloan, American Standard
   b. Deck Mounted
   c. Sensor and Solenoid above deck within faucet
   d. Low-Flow, vandal-proof outlet
   e. Polished Chrome Finish
   f. 4-inch Spout
   g. Integral check cartridges
   h. Unit shall be A.D.A. Compliant
   i. 6 Volt Lithium CRP2 Battery (included)

4. Strainer:

   a. Chicago Faucet Model 327A, American Standard
   b. 1-1/4-inch tailpiece
   c. Non-removable brass strainer
   d. Grid strainer waste
   e. Chrome plated finished.

5. P-Trap:

   a. Cast Brass 1-1/4-inch "P" trap

6. Stops:

   a. Chicago Faucet Model l005-ABCP valve stops.
   b. 3/8-inch loose key cap
   c. Removable tee handle
   d. Wall flange
   e. Chrome plated finished.

7. Thermostatic Mixing Valves:

   a. Provide and install below fixture.
   b. See Part 2 “Thermostatic Mixing Valves”.

8. Carrier:

   a. Zurn, Josam, or Watts cast iron and steel carrier.
   b. ANSI/ASME A112.6.1
   c. Cast iron and steel frame with tubular legs.
   d. Lugs for floor and wall attachment.
   e. Concealed arm supports.
   f. Bearing plate and studs.

B. LAV-2A Wall-Hung, Deck Mounted, Battery Operated, Infrared Sensor Faucet, Handicapped

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kohler Model K-2032 Greenwich
b. American Standard Lucerne
c. Crane
d. Zurn

2. Fixture:

| | | |
|---|---|---|
| a. | Material: | Vitreous china |
| b. | Type: | Wall-Hung |
| c. | Rim Mounting Height: | A.D.A. Compliant |
| d. | Nominal Size: | 20-3/4”L x 18-1/4”W |
| e. | Faucet-Hole Punching: | Three Holes, 4-inch centers |
| f. | Faucet-Hole Location: | Top |
| g. | Color: | White |
| h. | Mounting Material: | Concealed Arm Carrier |

3. Faucet:

a. Chicago Faucet 116.221.AB.4 (0.35 GPM), Sloan, American Standard
b. Deck Mounted
c. Sensor and Solenoid above deck within faucet
d. Low-Flow, vandal-proof outlet
e. Polished Chrome Finish
f. 4-inch Spout
g. Integral check cartridges
h. Unit shall be A.D.A. Compliant
i. 6 Volt Lithium CRP2 Battery (included)

4. Strainer:

a. Chicago Faucet Model 327A, American Standard
b. 1-1/4-inch tailpiece
c. Non-removable brass strainer
d. Grid strainer waste
e. Chrome plated finished.

5. P-Trap:

a. Cast Brass 1-1/4-inch "P" trap

6. Stops:

a. Chicago Faucet Model l005-ABCP valve stops.
b. 3/8-inch loose key cap
c. Removable tee handle
d. Wall flange
e. Chrome plated finished.

7. Thermostatic Mixing Valves:

a. Provide and install below fixture.

b. See Part 2 “Thermostatic Mixing Valves”.

8. Carrier:

a. Zurn, Josam, or Watts cast iron and steel carrier.
b. ANSI/ASME A112.6.1
c. Cast iron and steel frame with tubular legs.
d. Lugs for floor and wall attachment.
e. Concealed arm supports.
f. Bearing plate and studs.

9. Lavatory Protective Enclosure:

a. Provide and install Truebro Model # 2018 lav shield lavatory enclosure on all lavatories with sensor operated faucets. Protective enclosure shall be ADA conforming, 20-inch x 18-inch wheelchair accessible. Unit shall have white finish, be constructed of high impact, stain resistant vinyl, and include seven (7) wall anchors.

2.5. MULTI-STATION LAVATORIES

A. LAV-18A Two (2) Station, Hard-wired, Infrared Sensor Faucet, Handicapped

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bradley Express SS-2N/IR
b. Sloan ELS-42000

2. Station:

a. Double hand washing station
b. Wall Mounted
c. Infrared type faucets with concealed vandal-resistant stream formers.
d. Provide timing turn-off delay of 2-3 seconds.
e. 110/24 VAC plug-in transformer
f. Low-Flow Outlet of 0.5 GPM
g. Lavatory system shall include all waste and supply connections to wall, and thermostatic mixing valve with stop, strainer, and check valves.
h. Bowl material for each station shall be a cast polyester resin complying with ANSI Z124.3 and ANSI Z124.6. Bowl finish shall be decorative stone.
i. Lavatory system shall be secured to a rigid base concealing all supply and waste connections.
j. Unit shall operate at less than 5 lbs. push at 80 psi water pressure.
k. Certification to comply with ADA shall be furnished.

B. LAV-18B Three (3) Station, Hard-wired, Infrared Sensor Faucet, Handicapped

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bradley Express SS-3N/IR
b. Sloan ELS-43000

2. Station:

a. Triple hand washing station
b. Wall Mounted
c. Infrared type faucets with concealed vandal-resistant stream formers.
d. Provide timing turn-off delay of 2-3 seconds.
e. 110/24 VAC plug-in transformer
f. Low-Flow Outlet of 0.5 GPM
g. Lavatory system shall include all waste and supply connections to wall, and thermostatic mixing valve with stop, strainer, and check valves.
h. Bowl material for each station shall be a cast polyester resin complying with ANSI Z124.3 and ANSI Z124.6. Bowl finish shall be decorative stone.
i. Lavatory system shall be secured to a rigid base concealing all supply and waste connections.
j. Unit shall operate at less than 5 lbs. push at 80 psi water pressure.
k. Certification to comply with ADA shall be furnished.

2.6. CHILD-HEIGHT LAVATORIES

LAV-20 Wall-Hung, Child Height, Deck Mounted, Battery Operated, Infrared Sensor Faucet

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kohler Model K-2032 Greenwich
b. American Standard Lucerne
c. Crane
d. Zurn

2. Fixture:

| | | |
|---|---|---|
| a. | Material: | Vitreous china |
| b. | Type: | Wall-Hung |
| c. | Rim Mounting Height: | Child Height (27-inches a.f.f.) |
| d. | Nominal Size: | 20-3/4”L x 18-1/4”W |
| e. | Faucet-Hole Punching: | Three Holes, 4-inch centers |
| f. | Faucet-Hole Location: | Top |
| g. | Color: | White |
| h. | Mounting Material: | Concealed Arm Carrier |

3. Faucet:

a. Chicago Faucet 116.221.AB.4 (0.35 GPM), Sloan, American Standard
b. Deck Mounted
c. Sensor and Solenoid above deck within faucet
d. Low-Flow, vandal-proof outlet

e. Polished Chrome Finish
f. 4-inch Spout
g. Integral check cartridges
h. Unit shall be A.D.A. Compliant
i. 6 Volt Lithium CRP2 Battery (included)

4. Strainer:

a. Chicago Faucet Model 327A, American Standard
b. 1-1/4-inch tailpiece
c. Non-removable brass strainer
d. Grid strainer waste
e. Chrome plated finished.

5. P-Trap:

a. Cast Brass 1-1/4-inch "P" trap

6. Stops:

a. Chicago Faucet Model l005-ABCP valve stops.
b. 3/8-inch loose key cap
c. Removable tee handle
d. Wall flange
e. Chrome plated finished.

7. Thermostatic Mixing Valves:

a. Provide and install below fixture.
b. See Part 2 “Thermostatic Mixing Valves”.

8. Carrier:

a. Zurn, Josam, or Watts cast iron and steel carrier.
b. ANSI/ASME A112.6.1
c. Cast iron and steel frame with tubular legs.
d. Lugs for floor and wall attachment.
e. Concealed arm supports.
f. Bearing plate and studs.

2.7. MOP SINKS – SERVICE SINKS

A. JS-1 Mop Sink, Corner Unit

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Stern Williams Model Corlow-SBC

2. Fixture:

a. Material: Terrazzo
b. Type: Corner, Floor-mounted
c. Receptor composed of pearl grey marble chips and white Portland unit, ground smooth, grouted, and sealed to resist stains.
d. Stainless steel cap of one piece 20 gauge, 302 stainless steel cast integral on threshold.
e. Provide and install stainless steel BP splash Catcher panels on adjacent walls.

3. Faucet:

a. Chicago Faucet 897-RCF, Speakman, American Standard
b. Rough Chrome Finish
c. Vacuum breaker spout
d. Stop in arms
e. 3/4-inch hose thread outlet.
f. Pail Hook
g. Wall Brace
h. Stern-Williams T-35 hose, bracket and mop hanger.

B. JS-7 Service Sink (Stainless Steel)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Elkay Model B1C Dependabilt
b. Kohler
c. Just

2. Fixture:

a. Material: Stainless Steel – 18-gauge
b. Type: Wall Mounted w/ stainless steel legs
c. Nominal Basin Size: 24”x24”x12”
d. Rim Guard: Stainless Steel
e. Wall Hanger Supports

3. Faucet:

a. T&S Model B-0674-BSTR, Chicago Faucet 305-VBRCF
b. Rough Chrome Finish
c. Vacuum breaker spout
d. Adjustable Stop supply arms
e. 3/4-inch hose thread outlet.
f. Pail Hook
g. Vandal Proof Lever Handles

4. Strainer:

a. Jomar Model SS-306 Snap-N-Loc basket strainer with brass locknut and tailnut.

b. Deep cup body and basket shall be 300 series stainless steel

5. P-Trap:

a. Cast Brass 3-inch "P" trap

6. Thermostatic Mixing Valves:

a. Provide and install below fixture.
b. See Part 2 “Thermostatic Mixing Valves”

2.8. WATER COOLERS – FOUNTAINS

A. EWC-2 Electric Water Cooler, Single Height, Surface Mounted, Handicapped, Bottle Filling Station

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Elkay Model LZS8WS
b. Halsey Taylor
c. Haws
d. Oasis PG8EBF

2. Fixture:

a. Barrier Free
b. Single Height with mounting frame
c. 8 GPH at 90°F ambient
d. 50°F outlet drinking water with 80°F inlet water
e. Top shall be stainless steel
f. Bubbler valve electronically controlled
g. Bubbler shall be vandal resistant
h. Activated by touch pads on sides and front for electronically timed period of flow.
i. Cabinet shall be powder coated on heavy gauge steel, color to be selected by Architect.
j. Supplied with plug-in, 3-wire grounding type service
k. Operation on 120 VAC, Single Phase, 60Hz
l. Spout Outlet shall be mounted 36-inches maximum above floor.
m. Water cooler and installation shall conform to all requirements of American Disabilities Act Guidelines and ANSI A117.l.

3. Bottle Filling Station:

a. Electronic Sensor for No-Touch activation
b. Automatic 20 second shut-off timer
c. 1.1 GPM flow rate with laminar flow
d. Water Sentry® Plus, 3,000 gallon capacity filter
e. Certified to NSF/ANSI 61, UL 399 and CAN/CSA 22.2 No. 120.
f. Provide replacement filter pack (3 filters per pack) and turn over to Owner.

4. Refrigerant shall be R-134a or equivalent environmentally friendly refrigerant.

5. Provide Carrier as manufactured by Elkay or approved equal.

6. Provide cane apron for water cooler (required where water coolers project more than 4 inches into the corridor).

B. EWC-4 Electric Water Cooler, Dual Height, Surface Mounted, Handicapped, Bottle Filling Station

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Elkay Model LZSTL8WS
   b. Halsey Taylor
   c. Haws
   d. Oasis PG8EBFSL

2. Fixture:

   a. Barrier Free
   b. Dual Height with mounting frame
   c. 8 GPH at 90°F ambient
   d. 50°F outlet drinking water with 80°F inlet water
   e. Top shall be stainless steel
   f. Bubbler valve electronically controlled
   g. Bubbler shall be vandal resistant
   h. Activated by touch pads on sides and front for electronically timed period of flow.
   i. Cabinet shall be powder coated on heavy gauge steel, color to be selected by Architect.
   j. Supplied with plug-in, 3-wire grounding type service
   k. Operation on 120 VAC, Single Phase, 60Hz
   l. Lower Spout Outlet shall be mounted 36-inches maximum above floor.
   m. Upper Spout Outlet shall be mounted 42-inches maximum above floor.
   n. Water cooler and installation shall conform to all requirements of American Disabilities Act Guidelines and ANSI A117.l.

3. Bottle Filling Station:

   a. Electronic Sensor for No-Touch activation
   b. Automatic 20 second shut-off timer
   c. 1.1 GPM flow rate with laminar flow
   d. Water Sentry® Plus, 3,000 gallon capacity filter
   e. Certified to NSF/ANSI 61, UL 399 and CAN/CSA 22.2 No. 120.
   f. Provide replacement filter pack (3 filters per pack) and turn over to Owner.

4. Refrigerant shall be R-134a or equivalent environmentally friendly refrigerant.

5. Provide Carrier as manufactured by Elkay or approved equal.

6. Provide cane apron for water cooler (required where water coolers project more than 4 inches into the corridor).

2.9. COUNTER SINKS

A. S-1 Counter Sink – Single Bowl (Handicapped)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Elkay Manufacturing Co. – Lustertone LRAD Series
   b. Just Manufacturing Co.

2. Fixture:

   a. Type: Single Bowl, Counter Mounted, Self-Rimming.
   b. Overall Dimensions (L x W x D) inches:

      31 x 22 x 5.5

   c. Material: 302 Stainless Steel, 18 gauge, fully coated underside.

3. Faucet:

   a. Standard: ASME A112.18/CSA B125.1
   b. General: Include hot and cold water indicators; coordinate faucet inlets with supplies and fixture hold punchings; coordinate outlet with spout and sink receptor.
   c. Model: Chicago Faucet Model 201-AGN8AE3-317ABCP
   d. Body Type: Centerset, 8” fixed centers
   e. Finish: Chrome Plated
   f. Handle(s): Model 317 Wrist Blade Handles, A.D.A. Compliant
   g. Mounting Type: Deck, concealed.
   h. Spout Type: Swivel gooseneck.
   i. Spout Outlet: E3 Aerator

4. Strainer: Jomar Model SS-306 Snap-N-Loc, or Just J-35 basket strainer and brass locknut and tailnut. Deep cup body and basket shall be 300 series stainless steel. Provide 1 ½-inch tailpiece.

5. P-Trap: Cast Brass 1 ½ -inch "P" trap.

6. Stops: Chicago Faucets Model 1005ABCP valve stops with riser supply, 3/8-inch loose key cap and removable tee handle, wall flange, chrome plated finish.

B. S-2 Counter Sink – Single Bowl

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Elkay Manufacturing Co. – Lustertone LR Series

b. Just Manufacturing Co.

2. Fixture:

a. Type: Single Bowl, Counter Mounted, Self-Rimming.
b. Overall Dimensions (L x W x D) inches:

22 x 22 x 7-1/2

c. Material: 302 Stainless Steel, 18 gauge, fully coated underside.

3. Faucet:

a. Standard: ASME A112.18/CSA B125.1
b. General: Include hot and cold water indicators; coordinate faucet inlets with supplies and fixture hold punchings; coordinate outlet with spout and sink receptor.
c. Model: Chicago Faucet Model 201-AGN8AE3-317ABCP
d. Body Type: Centerset, 8” fixed centers
e. Finish: Chrome Plated
f. Handle(s): Model 317 Wrist Blade Handles, A.D.A. Compliant
g. Mounting Type: Deck, concealed.
h. Spout Type: Swivel gooseneck.
i. Spout Outlet: E3 Aerator

4. Strainer: Jomar Model SS-306 Snap-N-Loc, or Just J-35 basket strainer and brass locknut and tailnut. Deep cup body and basket shall be 300 series stainless steel. Provide 1 ½-inch tailpiece.

5. P-Trap: Cast Brass 1 ½ -inch "P" trap.

6. Stops: Chicago Faucets Model 1005ABCP valve stops with riser supply, 3/8-inch loose key cap and removable tee handle, wall flange, chrome plated finish.

C. S-2A Counter Sink – Single Bowl (Handicapped)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Elkay Manufacturing Co. – Lustertone LRAD Series
b. Just Manufacturing Co.

2. Fixture:

a. Type: Single Bowl, Counter Mounted, Self-Rimming.
b. Overall Dimensions (L x W x D) inches:

22 x 22 x 5-1/2

c. Material: 302 Stainless Steel, 18 gauge, fully coated underside.

3. Faucet:

   a. Standard: ASME A112.18/CSA B125.1
   b. General: Include hot and cold water indicators; coordinate faucet inlets with supplies and fixture hold punchings; coordinate outlet with spout and sink receptor.
   c. Model: Chicago Faucet Model 201-AGN8AE3-317ABCP
   d. Body Type: Centerset, 8” fixed centers
   e. Finish: Chrome Plated
   f. Handle(s): Model 317 Wrist Blade Handles, A.D.A. Compliant
   g. Mounting Type: Deck, concealed.
   h. Spout Type: Swivel gooseneck.
   i. Spout Outlet: E3 Aerator

4. Strainer: Jomar Model SS-306 Snap-N-Loc, or Just J-35 basket strainer and brass locknut and tailnut. Deep cup body and basket shall be 300 series stainless steel. Provide 1 ½-inch tailpiece.

5. P-Trap: Cast Brass 1 ½ -inch "P" trap.

6. Stops: Chicago Faucets Model 1005ABCP valve stops with riser supply, 3/8-inch loose key cap and removable tee handle, wall flange, chrome plated finish.

D. S-3 Counter Sink – Single Bowl

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Elkay Manufacturing Co. – Lustertone LR Series
   b. Just Manufacturing Co.

2. Fixture:

   a. Type: Single Bowl, Counter Mounted, Self-Rimming.
   b. Overall Dimensions (L x W x D) inches:

      15 x 17.5 x 7-1/2

   c. Material: 302 Stainless Steel, 18 gauge, fully coated underside.

3. Faucet:

   a. Standard: ASME A112.18/CSA B125.1
   b. General: Include hot and cold water indicators; coordinate faucet inlets with supplies and fixture hold punchings; coordinate outlet with spout and sink receptor.
   c. Model: Chicago Faucet Model 786-E3ABCP
   d. Body Type: Centerset, 8” fixed centers
   e. Finish: Chrome Plated
   f. Handle(s): Model 317 Wrist Blade Handles, A.D.A. Compliant
   g. Mounting Type: Deck, concealed.

h. Spout Type: Swivel gooseneck.
i. Spout Outlet: E3 Aerator

4. Strainer: Jomar Model SS-306 Snap-N-Loc, or Just J-35 basket strainer and brass locknut and tailnut. Deep cup body and basket shall be 300 series stainless steel. Provide 1 ½-inch tailpiece.

5. P-Trap: Cast Brass 1 ½ -inch "P" trap.

6. Stops: Chicago Faucets Model 1005ABCP valve stops with riser supply, 3/8-inch loose key cap and removable tee handle, wall flange, chrome plated finish.

E. S-3A Counter Sink – Single Bowl (Handicapped)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Elkay Manufacturing Co. – Lustertone LRAD Series
b. Just Manufacturing Co.

2. Fixture:

a. Type: Single Bowl, Counter Mounted, Self-Rimming.
b. Overall Dimensions (L x W x D) inches:

15 x 17.5 x 5-1/2

c. Material: 302 Stainless Steel, 18 gauge, fully coated underside.

3. Faucet:

a. Standard: ASME A112.18/CSA B125.1
b. General: Include hot and cold water indicators; coordinate faucet inlets with supplies and fixture hold punchings; coordinate outlet with spout and sink receptor.
c. Model: Chicago Faucet Model 786-E3ABCP
d. Body Type: Centerset, 8” fixed centers
e. Finish: Chrome Plated
f. Handle(s): Model 317 Wrist Blade Handles, A.D.A. Compliant
g. Mounting Type: Deck, concealed.
h. Spout Type: Swivel gooseneck.
i. Spout Outlet: E3 Aerator

4. Strainer: Jomar Model SS-306 Snap-N-Loc, or Just J-35 basket strainer and brass locknut and tailnut. Deep cup body and basket shall be 300 series stainless steel. Provide 1 ½-inch tailpiece.

5. P-Trap: Cast Brass 1 ½ -inch "P" trap.

6. Stops: Chicago Faucets Model 1005ABCP valve stops with riser supply, 3/8-inch loose key cap and removable tee handle, wall flange, chrome plated finish.

F. S-4 Dental Sink

1. Provided under another division of these specifications. Under this Division provide rough-in and final connection. Install fixture shut-off valves for each utility.

2.10. TECH/MULTI-STATION SINKS

A. S-7 Wash Fountain

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bradley Model #WF2803
b. Acorn Engineering Company

2. Wash Fountain:

a. Description: Semi-Circular, freestanding-design, wash-up fixture.
b. Arrangement: Wash-up stations facing central spray head.
c. Receptor Material: Precast terrazzo on base.
d. Receptor Color: As selected by Architect .
e. Size: 36-inch (1370-mm) diameter.
f. Number of Stations: Three
g. Control: Infra-red actuation with thermostatic valve and check stops or field-installed check valves.
h. Liquid Soap Dispensers: Manual, for each station.
i. Mounting: Floor. Standard Height
j. Supplies: NPS3/4 (DN20) copper tubing with ball, gate, or globe valves from bottom.
k. Shroud: Stainless steel of size to cover supplies and vent piping.
l. Drain: Grid with NPS2 (DN50) tailpiece.
m. Trap Fitting: NPS2 (DN50) trap with waste and vent connections.
n. Drain Piping: NPS2 (DN50), waste to floor.
o. Vent Piping: Off line vent, NPS1-1/2 (DN40) to ceiling.
p. Bowl depth: 9 inch (228mm)

2.11. SHAMPOO SINKS

A. S-8 Shampoo Sink

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Belvedere 3100 Cameo
b. Collins CB81
c. Approved Equal

2. Fixture:

a. Type: Single Bowl, Countertop Mounted.

b. Overall Dimensions: 22 inches wide x 10 inches deep x 19 inches front-to-back.
c. Material: Porcelain enamel cast iron.
d. Neck Rest: Belvedere Model 5001684 Rubber neck rest or approved equal.

3. Faucet:

a. Model: Belvedere Model 622T-228, Collins Model #570.
b. Body Type: Single Handed Faucet. Clear single handle control with lifting type diverter to direct flow.
c. Finish: Chrome Plated
d. Mounting Type: Deck, concealed.
e. Provide vacuum breaker.
f. Provide 42-inch whiz spray with screw on connector.
g. Spout: Swinging type with tailpiece.

4. P-Trap: Hair Interceptor (see below)

5. Stops: Chicago Faucets Model 1005ABCP valve stops with riser supply, 3/8-inch loose key cap and removable tee handle, wall flange, chrome plated finish.

6. Hair Interceptor: Zurn Z-1175, Watts, dura coated cast iron hair and solids interceptor in lieu of fixture "P" trap, with 1 ½ -inch slip joint elbow inlet and 1 ½-inch threaded side outlet, perforated stainless steel basket removable from bottom, with flanged and gasketed slotted cleanout cover. Provide chrome plated finish, interior and exterior.

7. Thermostatic Mixing Valve:

a. Provide and install below fixture.

b. See Part 2 “Thermostatic Mixing Valves.”

B. S-9 Pedicure Station

1. Provided under another division of these specifications. Under this Division provide rough-in and final connection. Install fixture shut-off valves for each utility.

2. Thermostatic Mixing Valve:

a. Provide and install below fixture.

b. See Part 2 “Thermostatic Mixing Valves.”

2.12. SCIENCE ROOM SINKS - EQUIPMENT

A. SE-1 Science Room Sink

1. Provided under another division of these specifications. Under this Division provide rough-in and final connection including 1 quart polypropylene bottle trap

with 1 ½ -inch side inlet of polypropylene pipe. Provide each bottle trap with limestone of calcium carbonate-concentrate of at least 90 percent. Install fixture shut-off valves for each utility.

B. SE-1A Science Room Sink (Handicapped)

1. Provided under another division of these specifications. Under this Division provide rough-in and final connection including 1 quart polypropylene bottle trap with 1 ½ -inch side inlet of polypropylene pipe. Provide each bottle trap with limestone of calcium carbonate-concentrate of at least 90 percent. Unit and installation shall be handicapped accessible. Sink Depth shall not exceed 6 ½-inches. Provide under counter insulation or skirt as required to cover piping. Install fixture shut-off valves for each utility.

C. SE-1 Science Sink - Island

1. Provided under another division of these specifications. Under this Division provide rough-in and final connection including 1 quart polypropylene bottle trap with 1 ½ -inch side inlet of polypropylene pipe. Provide each bottle trap with limestone of calcium carbonate-concentrate of at least 90 percent. Install fixture shut-off valves for each utility.

D. SE-7 Fume Hood

1. Provided under another division of these specifications. Under this Division provide rough-in and final connection including 1 quart polypropylene bottle trap with 1 ½ -inch side inlet of polypropylene pipe. Provide each bottle trap with limestone of calcium carbonate-concentrate of at least 90 percent. Install fixture shut-off valves for each utility.

E. SE-9A Dual Gas Cock (90°)

1. Provided under another division of these specifications. Under this Division provide rough-in and final connection.

F. SE-9A Dual Gas Cock (180°)

1. Provided under another division of these specifications. Under this Division provide rough-in and final connection.

2.13. EMERGENCY FIXTURES

A. EM-1 Emergency Eyewash (Wall Mounted) (Handicapped)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Guardian GBF1721-T
b. Bradley S19-220BF
c. Approved Equal

2. Fixture:

   a. Unit and installation shall comply with ANSI Z358.1, ANSI A117.1 and ADA latest edition.
   b. 10-inch diameter stainless steel eyewash bowl.
   c. Chrome plated brass spray head assembly.
   d. Twin soft flow eye wash heads with dust covers.
   e. Provide l/2-inch brass stay-open eyewash valve operated by plastic push handle.
   f. Furnish each unit with tailpiece and trap for connection to sanitary system per the Plumbing Code
   g. Wraparound skirt shall be corrosion resistant stainless steel.
   h. Provide wall mount support brackets, 1-1/2-inch trap, stop valves.
   i. Mount top of unit at 36-inches above finished floor.
   j. Provide and mount universal identification sign.

3. Units shall be tested per ANSI Z358.1 prior to turning over to Owner. Contractor shall train Owner in proper usage per Manufacturer's Instructions and ANSI requirements.

4. Furnish each unit with all equipment necessary for field testing of emergency fixtures per ANSI Z358.1 requirements.

5. Refer to Part 2 “Products” of this section for Emergency Mixing Valve.

B. EM-4 Combination Emergency Eyewash / Shower (Handicapped)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Guardian GBF1909
   b. Bradley S19314TT
   c. Approved Equal

2. Fixture:

   a. Unit and installation shall comply with ANSI Z358.1, ANSI A117.1 latest edition and ADA requirements.
   b. Shower Head: 10” diameter ABS plastic with 20 GPM flow control.
   c. Shower Valve: 1” IPS chrome plated brass stay-open ball valve. Furnish with stainless steel actuating arm and 47” stainless steel pull rod.
   d. Eye/Face Wash Bowl: 11” diameter stainless steel.
   e. Spray head assembly: Chrome plated brass eyewash spray head assembly.
   f. Twin soft flow eye wash heads with dust covers, internal flow control and filter to remove impurities from water flow.
   g. Eye/Face Wash Valve: Provide l/2-inch brass stay-open eyewash valve operated by plastic push handle.
   h. Unit to be floor mounted. Provide floor mount flange.
   i. Supply: 1-1/4” NPT female top or side inlet.
   j. Waste: 1-1/4” NPT female outlet. Outlet can be positioned at either 9” of 19” above finished floor.

k. Provide and install wrap around modesty curtain with each unit.
l. Provide and mount universal identification sign.

3. Units shall be tested per ANSI Z358.1 prior to turning over to Owner. Contractor shall train Owner in proper usage per Manufacturer's Instructions and ANSI requirements.

4. Furnish each unit with all equipment necessary for field testing of emergency fixtures per ANSI Z358.1 requirements.

5. Refer to Part 2 “Products” of this section for Emergency Mixing Valve.

2.14. SHOWERS

A. SH-1 Shower (Handicapped):

1. Enclosure:

a. Enclosure and surrounding shower walls are provided under the Architectural Division.
b. Provide Rough-in and Final connection of cold, hot water, vent and waste.
c. Provide floor drain as specified on contract drawings.

2. Shower Valve:

a. Manufacturer: Powers Model P910H, Bradley WS-1X
b. Type: Manually Operated Shower Valve
c. Unit shall include showerhead, arm and flange.
d. Provide round face plate with red/blue indication inset.
e. Escutcheon shall be chrome plated stainless steel.
f. Provide 60-inch hose and in-line vacuum breaker with slide for use as a hand held shower to showerhead.
g. Shower and installation shall conform to all requirements of American Disabilities Act Guidelines and ANSI A117.1

3. Shower head:

a. Manufacturer: Bradley, Bricor, Speakman or approved equal.
b. Low-Flow Outlet.
c. 1.5 GPM at 30 psig.
d. Water conserving pressure compensating autodevice.
e. Polished Chrome Finish.
f. Provide 60-inch hose and in-line vacuum breaker with slide for use as a hand held shower to showerhead.
g. Provide and install Powers 141-600B three (3) port, in-line diverter valve to provide smooth transfer of water from hand held shower to showerhead.
h. Unit shall be ADA compliant and be finished with a stainless steel faceplate.

4. Shower Mixing Valve:

a. ASSE 1016 rated.
b. Combination pressure balancing/thermostatic mixing type.

2.15. CLOTHES WASHER - DRYER

A. LY-1 Residential Clothes Washer

1. Clothes washer provided by others. Provide rough-in, Outlet box(es) and final connections under this Division.

2. Sioux Chief: Model No. 696-R2313MF with 2-inch drain pipe, top supply, and shut-off valves with water hammer arresters. Provide flexible hose (3/4-inch) between Clothes washer and outlet box. Provide vacuum breakers on threaded outlets to prevent back siphonage. Unit shall be 16 gauge steel with white epoxy finish.

3. Inlet Hoses: Two, 60 inch long, ASTM D 3571, clothes washer inlet hoses with female hose-thread couplings.

4. Drain Hose: One, 48 inch long, ASTM D 3 3572 clothes washer drain hose with hooked end.

5. Auxiliary drain pans (for clothes washer): Plastic formed to slope from all directions to the drain connection.

2.16. OUTLET BOXES – WATER SUPPLY

B. OB-1 Refrigerator

1. Refrigerator provided in another Division of Specifications. Provide rough-in, Outlet box and final connections under this Division.

2. Sioux Chief: Model No. 696-RG1010MF with top supply and shut-off valve with water hammer arrester. Provide flexible hose (1/2-inch) between Refrigerator and outlet box. Provide vacuum breaker on threaded outlets to prevent back siphonage. Unit shall be 16-gauge steel with white epoxy finish.

3. Provide sufficient copper tubing to allow movement of refrigerator for cleaning.

2.17. DISHWASHERS

A. DW-2 Residential Dishwasher (Outlet Box)

1. Dishwasher provided in another Division of Specifications. Provide rough-in, Outlet box and final connections under this Division.

2. Outlet Box: Sioux Chief Model No. 696-2313MF with top supply and shut-off valve with water hammer arrester and Drain Box. Provide flexible supply hose (1/2-inch) and 2-inch Drain hose between Dishwasher and outlet box. Provide vacuum breaker on threaded outlets to prevent back siphonage. Unit shall be 16-gauge steel with white epoxy finish.

1. Provide sufficient length of supply and drain hose to allow movement of dishwasher for cleaning.

2.18. HOSE REELS

A. HR-1 Hose Reel (Retractable)

1. Hose Reel: Chicago Faucets Model 537-WC hose reel suitable for concealed installation. Unit shall include retractable hose reel with painted cover, spring valves, vacuum breaker for complete installation. Provide each unit with Watts No. 800 MCQT (chrome finished) pressure type vacuum breaker. Provide each unit with No. 770 shut-off valve, No. 767-8-VOC concealed two valve fitting, and No. 1771-C loose key check valves. Hose reel shall include 35 feet of 3/8-inch I.D. hose. Provide standard spray valve. Provide high velocity spray valve on units where located in can wash area. Provide chrome plated piping, unions and escutcheons.

2.19. HOSE BIBBS - HYDRANTS

A. HB-1 Hose Bibb

1. Chicago Faucet No. 952 or approved equal hose and faucet. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose threaded spout, polished chrome plated where exposed in finished areas, with hand wheel and removable key, integral vacuum breaker in conformance with ANSI/ASSE 1011.

2. Hose bibbs in finished areas shall be polished chrome finish.

3. Approved Manufacturers: Chicago Faucet, American Standard, Crane, T&S Brass, or Watts.

B. HYD-1 Wall Hydrant (Exterior)

1. Provide and install recessed anti-siphon wall hydrant, 3/4-inch non-freeze, key operated wall hydrant with hinged locking cover, polished bronze box and cover and bronze casing and integral vacuum breaker. Non-Freeze, exterior wall hydrants shall be Zurn Model Z-1320-XL, Josam, Wade, J.R. Smith, Mifab, Watts or approved equal.

2. Seat and disc shall be removable from front of the hydrant. Wall thickness; see architectural drawings. Wall hydrants shall conform to ANSI/ASSE 1019 with wall plate, lock shield and removable key.

C. HYD-2 Wall Hydrant (Interior)

1. Provide and install recessed wall hydrants where indicated on the contract drawings. Recessed wall hydrants shall be Zurn Model Z-1330, Josam, Ancon, Mifab, Watts or approved equal.

2. Units shall be encased Ecolotrol “anti-siphon" wall hydrant for interior wall installation. Unit shall be suitable for hot or cold water as indicated on Contract

Drawings.

3. Each unit shall be complete with integral backflow preventer, all bronze interior parts, non-turning operating coupling with hemispherical neoprene plunger and 3/4-inch solder inlet.

4. Furnish each unit mounted in a stainless steel box and hinged cover with operating key lock and "water" stamped on cover.

5. Furnish each unit with the following accessories:

   a. 3/4 inch – 90 degrees inlet elbow with union nut
   b. Cylinder lock
   c. Key operator

D. HYD-3 Wall Hydrant - Combination Hot & Cold Water (Exterior)

1. ZURN Z-1325 "Vari-Temp", Mifab, Watts, or approved equal, combination hot and cold water, non-freeze, encased wall hydrant for flush installation. Complete with bronze casing, all bronze interior parts, non-turning operating rods with free-floating compression closure valves, replaceable bronze seat and seat washer, and combination 3/4-inch female straight IP inlet. Polished bronze box and hinged cover with operating key lock and "water" cast on cover. Furnish unit with 3/4-inch IP 90 degrees F inlet elbow with union nut, cylinder lock, 3/4-inch adapter vacuum breaker, solder female inlet adapter and wall clamp.

E. HYD-4 Wall Hydrant - Combination Hot & Cold Water (Interior)

1. ZURN Z-1327, Mifab, Watts, or approved equal, combination hot and cold water, encased wall hydrant for flush installation. Complete with bronze casing, all bronze interior parts, non-turning operating rods with free-floating compression closure valves, replaceable bronze seat and seat washer, and 3/4-inch female straight IP inlets. Polished bronze box and hinged cover with operating key lock and "water" cast on cover. Furnish unit with 3/4-inch IP 90 degrees F inlet elbow with union nut, cylinder lock, 3/4-inch adapter vacuum breaker, solder female inlet adapters and wall clamp.

F. HYD-6 Hydrant – Roof

1. Roof hydrant shall be exposed, non-freeze roof hydrant with Dura-coated cast iron head and lift handle with lock option, bronze interior parts, galvanized steel casing, and bronze valve housing with 1/8 inch IP drain port in housing. Provide Dura-coated cast iron support sleeve with wide anchoring flange and clamp collar.

2. Approved Manufacturers: Zurn or approved equal.

2.20. STORM DRAINS

A. General Requirements

1. Provide Josam 26200, Watts, or Zurn vertical expansion joint in each rain leader

that does not have 90 degrees offset downstream of the roof drain. The expansion sleeve shall be bronze and shall conduct the rainwater beyond the packing. Install expansion joints in accessible locations for repacking.

B. SD-3 Storm Drain – Combination Primary/Overflow Drain

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn Z-163
   b. MIFAB R1270

2. 15-inch diameter roof drain and overflow drain, Dura-Coated cast iron bodies with combination membrane flashing clamp/gravel guards, double Top-Set deck plate and low silhouette aluminum locking domes. Provide with support rings, adjustable tops with wide roof flanges, 24”x42” large, galvanized sump receiver with anchor flange, bottom outlets inside caulk connections and deck clamps. Provide Overflow Drain with 2” high internal water dam.

C. SD-7 Downspout Nozzle

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn Z-199
   b. MIFAB
   c. Watts

2. Downspout Nozzle, all nickel bronze body, threaded inlet and decorative face of wall flange and outlet nozzle. Provide removable stainless steel screen. Size to match overflow drain pipe size. Color to be selected by Architect.

## 2.21. FLOOR DRAINS

A. General Requirements

1. Provide Nikaloy strainers on all floor drains unless specified otherwise.

2. Provide flashing clamps on all drains penetrating waterproofing membrane.

3. Provide suitable flashing material and clamping collar for drains which are not set in place when slab is poured.

4. Provide backwater valves for all floor drains connecting directly to the storm water system. Depending on conditions of the particular installation, backwater valves may be an integral part of the drains or a separate device. Accessibility to valves must be maintained for maintenance. Provide an adequately sized extension sleeve up to floor or grade as required.

5. Backwater valves are normally closed, flapper type with bronze or brass seat and disc and stainless steel pin.

6. Provide traps for all floor drains connected to the sanitary system.

7. Provide E & S, Sioux Chief, or PPP primer valve (one valve per trap, per floor drain) on all remote floor drains. When installed on fixture in finished area, primer valve shall be concealed behind a Josam 58650, Watts, or Zurn access door. In Mechanical Rooms, mezzanines, penthouses, and all other locations indicated on the contract drawing, priming lines shall be connected to automatic trap primer.

8. In lieu of joints specified in piping section, neoprene gaskets may be used if designed for use with the drains and cleanouts employed and if approved by the local plumbing authority.

9. Where applicable, for floor drains utilized for washing machines, provide a stainless steel lint screen/strainer.

10. When floor drains collect condensate from a neutralizer kit, the floor drains shall be provided with epoxy coating.

11. Approved Manufacturers: Josam, J.R. Smith, Zurn, Wade, Ancon, Mifab, Watts.

B. FD-1 Floor Drain – Round – Nickel Bronze Strainer

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn ZN-415B
   b. Watts FD-100-A

2. Floor and shower drain, dura coated cast iron body with bottom outlet, combination invertible membrane clamp and adjustable collar with seepage slots and Type "B" polished nickel bronze strainer. Provide with ½ -inch trap primer connection.

2.22. FLOOR SINKS

A. FS-1 Floor Sink (8”x8”x6”)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn Z-1910
   a. Watts

2. Sani-Flor receptor, 8-inch x 8-inch x 6-inch deep cast iron body and square slotted medium duty grate, with white acid resisting coated interior and top, complete with aluminum anti splash interior bottom dome strainer.

   a. Two (2) removable ½ grates with each unit.
   b. ½ -inch trap primer connection.
   c. Stainless steel mesh bucket screen.

B. FS-2 Floor Sink (12”x12”x6”)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn Z-1900
   b. Watts FS-730

2. Sani-Flor receptor, 12-inch x12-inch x 6-inch deep cast iron body and square, slotted grate with white acid resisting coated interior and top, complete with aluminum anti splash interior bottom dome strainer.

   a. Two (2) removable ½ grates with each unit.
   b. ½ -inch trap primer connection.
   c. Stainless steel mesh bucket screen.

C. FS-3 Floor Sink (12”x12”x8”)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn Z-1901
   b. Watts FS-740

2. Sani-Flor receptor, 12-inch x12-inch x 8-inch deep cast iron body and square, slotted grate with white acid resisting coated interior and top, complete with aluminum anti splash interior bottom dome strainer.

   a. Two (2) removable ½ grates with each unit.
   b. ½ -inch trap primer connection.
   c. Stainless steel mesh bucket screen.

D. FS-5 Floor Sink (16”x16”x12”)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn Z-1926
   b. Watts FS-850

2. Sani-Flor receptor, 16-inch x 16-inch x 12-inch deep cast iron body and square, slotted grate with white acid resisting coated interior and top, complete with aluminum anti splash interior bottom dome strainer.

   a. Two (2) removable ½ grates with each unit.
   b. ½ -inch trap primer connection.
   c. Stainless steel mesh bucket screen.

2.23. TRENCH DRAINS

A. TD-4 Trench Drains

1. Zurn-882 12"-inch wide pre-sloped trench drainage system. Glass-filled polyester fiberglass drain channel with 1/8 -inch per foot bottom slope. All sections modular 8-foot length with interlocking ends. Complete with heavy duty, dura-coated steel frame at surface, combination anchor tabs/leveling devices at appropriate locations, and heavy duty galvanized steel grate suitable for automotive traffic. Install trench drain and all accessories per local codes and Zurn Industries, Inc. Instructions. A minimum of 4-inches of concrete must surround each trench segment.

1. Catch Basins (Trench Drain Systems): Provide Zurn Z-817 catch basins in the quantity as indicated on the contract drawings. Catch basins shall be 12-inches x 24 -inches with external trench adapter supplied to make transition between the trench and basin. Catch basins shall be polyester glass-filled fiberglass reinforced body, complete with heavy duty, dura-coated steel frame and heavy duty galvanized steel grate suitable for automatic traffic. Provide sediment bucket with each catch basin and 2-inch trap primer connection in trap.

## 2.24. THERMOSTATIC MIXING VALVES (INDIVIDUAL FIXTURE TYPE)

A. Furnish and install thermostatic mixing valves where indicated at public lavatories, and below all lavatories, hand sinks, and kitchen hand sinks that are provided with hot water temperatures above 109 degrees F.

B. Thermostatic mixing valves shall be Bradley S59-4000A, Watts, Moen, Leonard Ecobix, Acorn, or approved equal for installation under lavatories. Provide in-line check valves, lead free body, escutcheon plates, inlet filters, and insulation as required. Thermostatic mixing valves shall be adjusted to deliver 105 degrees Fahrenheit hot water when supplied with 140 degrees Fahrenheit delivering hot water. Furnish with adjusting cap with locking feature.

C. The thermostatic mixing valves shall be listed for use at the scheduled flow rate of the equipment served.

D. The thermostatic mixing valves shall be ASSE standard 1070 listed.

## 2.25. PLUMBING FIXTURE SUPPORTS

A. Wall mounted urinal supports, Josam 17810 plate type with cast iron headers, box steel stanchions, block type cast iron feet with bearing plate.

B. Support for wall mounted urinals, lavatories, sinks, drinking fountains, etc.:

C. Where fixtures are supported from concrete or cinder block walls, install No.10 USSG Steel plate on the opposite side of the wall and bolt hangers or supports through plate. Where opposite side of wall is exposed to view, place bolts in core of blocks and fill core with cement.

D. Where lavatories with wall hangers have been specified and fixtures are supported from metal stud frame partitions, fixture brackets or mounting lugs shall be through bolted to steel channel crosspieces not less than 1-1/2-inch wide anchored to studs. Bolt heads shall be welded to channel web.

E. Concealed arm type lavatory supports, Josam 17100 with cast iron headers, box steel stanchions, block type cast iron feet and header; and chrome plated cast brass threaded escutcheons for slab type lavatories.

F. Flush mounted drinking water cooler supports, Josam 17550 plate type, box steel stanchions, block type cast iron feet.

G. Water closet chair carriers, Josam 12000 Series for horizontal and vertical installations.

2.26. HANDICAPPED LAVATORY/SINK INSULATION

A. All handicapped lavatories and sinks shall be provided with under counter pipe and trim insulation.

B. Insulation shall be fully molded "P" trap and angle valve insulated Hand-I-Lav Guard, Truebro, Pro-Extreme Model #101, 102, and 105 to suit.

C. Insulation to meet ADA #4 19.4, ANSI A117.1, ASTM C1822, Type III and International Plumbing Code.

D. Self-extinguishing ASTM D635 burn characteristics, thermal conductivity ASTM C177 K-Value ' 1.17.

E. Insulation thickness to be minimum 2 inch.

F. Where lav. Guards are provided insulation may be omitted.

2.27. EMERGENCY EYEWASH MIXING VALVES

A. Furnish and install factory fabricated, hot-and cold-water-tempering equipment with thermostatic mixing valve. Units shall be manufactured by Guardian Equipment, Power's, Speakman, Leonard or approved equal.

B. Thermostatic mixing valve: Designed to provide 85 degree F (29 degree C) tepid, potable water at emergency eyewash stations to maintain temperature at plus or minus 5 degree F (3 degree C) throughout required 15-minute test period, and in case of unit failure to continue cold-water flow with Union connections, controls, integral strainer, metal piping adjustable high temperature unit, outlet and inlet, thermometers, check stops and where indicated a corrosion resistant enclosure.

C. Capacity Range: As scheduled on Contract Drawings.

D. Furnish each unit with painted, heavy duty mounting bracket from securing valve to panel on wall. Cabinet shall be stainless steel, lockable type.

E. Units shall be provided such that inlets can be rotated 360 degrees for top or bottom supply.

F. Where installed exposed in finish spaces units shall be chrome plated finish.

G. Comply with ANSI requirements and lead free law per the requirements of the state in

which the project is being constructed.

H. Emergency fixture mixing valves shall be ASSE 1071 compliant.

2.28. EMERGENCY COMBINATION EYEWASH/SHOWER MIXING VALVES

A. Furnish and install factory fabricated, hot-and-cold-water-tempering equipment with dual manifold thermostatic mixing valves. Units shall be manufactured by Guardian Equipment, Power's, Speakman, Leonard, or approved equal.

B. Thermostatic Mixing Valves: Designed to provide 85 degree F (29 degree C) tepid, potable water at emergency combination eyewash/shower stations to maintain temperature at plus or minus 5 degrees Fahrenheit (3 degrees C) throughout required 15 minute test period, and in case of unit failure to continue cold-water flow with union connections, controls, integral strainer, metal piping, adjustable high temperature limit, outlet and inlet thermometers, check stops, and where indicated a corrosion resistant enclosure.

C. Capacity Range: As scheduled on Contract Drawings.

D. Furnish each unit with painted, heavy duty mounting bracket from serving valve to panel on wall. Cabinet shall be fully recessed, stainless steel, and lockable.

E. Units shall be provided such that inlets can be rotated 360 degrees for top or bottom supply.

F. Where installed exposed in finish spaces units shall be chrome plated finish.

G. Comply with ANSI Z 358-1 2009 and shall comply with the lead free laws per the requirements of the state in which the project is being constructed.

H. Emergency fixture mixing valves shall be ASSE 1071 compliant.

2.29. FIXTURE STOPS/SUPPLIES

A. For all lavatories/sinks stops and supplies shall be Chicago Faucets No. 1017-CR43829, Angle Stop Fitting with Supply Tube and Loose Key, Chrome plated solid brass construction. 2-1/4" Metal tee handles with tapered square. Slow compression check cartridge that shall open and close 360º for fine adjustment, valves shall close with water pressure, furnish with square tapered stem. ½" NPT female thread inlet 3/8" O.D. female compression outlet. Slip wall flange. 3/8" O.D. x 12" bullnose flexible supply riser. ECAST construction with less than 0.25% lead content by weighted average. This product shall be tested and certified to industry standards: ASME A112.18.1/CSA B125.1, Certified to NSF/ANSI 61, Section 9 by CSA, California Health and Safety Code 116875 (AB1953-2006), Vermont Bill S. 152, and NSF/ANSI 372 Low Lead Content.

## PART 3. EXECUTION

3.1. GENERAL INSTALLATION REQUIREMENTS

A. Install all equipment in accordance with manufacturer's instructions.

B. Setting heights of lavatories, drinking fountains, etc., shall be as directed prior to installation and shall be coordinated with Architectural Contract Documents.

C. Install floor mounted fixtures only after finished floor has been installed.

D. Provide rubber concussion washers between vitreous china fixtures and supporting brackets.

E. Protect chromium plated trim from corrosive solutions used to clean tile work.

F. Provide white, silicone caulking where fixtures come in contact with walls and floors. Sealant shall be mildew resistant type in accordance with ANSI A-136.1.

G. Install components plumb and level.

H. Unless otherwise noted, drains are to be installed at the low point of floors. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

I. Install floor drains in low points so the top of grates are at or below the finished floor level.

J. Drains not functioning properly shall be removed and re-installed properly at the expense of the contractor.

K. Coordinate cutting and forming of roof and floor construction to receive drains to required invert elevations.

L. Install and secure fixtures in place with wall supports, wall carriers and bolts.

M. Solidly attach water closets to floor with lug screws. Lead flashing is not intended to hold fixture in place.

N. Install flush valve handles on the open side of all ADA waterclosets in accordance with ANSI requirements.

O. Fixtures shall be vitreous china unless otherwise noted. Cast iron fixtures shall have acid resisting enamel finish unless noted otherwise, color shall be white.

P. Flush valves shall be self-closing, non-hold open type with vacuum breaker and perform satisfactorily when subject to inlet water pressure varying from 15 to 75 psi. Flush valves shall be as specified, Sloan, Delaney, Zurn, Toto, or approved equal.

Q. Provide flexible risers and loose key stops for all lavatories and sinks. Provide 17 ga. chrome plated brass tail piece and trap with cleanout for all lavatories and sinks.

R. Fittings for fixtures supplied by others, such as science sinks and kitchen equipment are provided under another division of these specifications. Connections of these fixtures to the plumbing system are provided under this section.

S. Coordinate with plumbing piping and related fuel piping, gas venting and electrical work

to achieve a complete operating system.

T. Field test all emergency eyewash units and combination eyewash/shower units per ANSI Z358.1 latest edition.

U. All plumbing vents within a 10'-0" radius of exhaust vents shall be extended to a height of 3'-0" above exhaust vent crown.

V. All plumbing vents within a 10'-0" radius of any rooftop unit or intake louver shall be extended to a height of 3'-0" above fresh air intake.

W. Slopes and invert elevations of all interior piping shall be established before any piping is installed in order that proper slopes will be maintained. All piping shall be located and determined where to be run to avoid conflict with other trades.

X. Unless otherwise noted, all plumbing piping shall be routed as high as possible between bottom of roof joists and above ceiling to allow proper installation of ductwork, fire protection piping, conduits, etc.

Y. Coordinate with Architectural Drawings before roughing in plumbing.

Z. All openings in ceilings and plenum walls for plumbing shall be sealed air tight and protected with fire stop.

AA. See site plan for extent of all piping leaving and entering building.

BB. See domestic water riser diagrams for location of valves, shock absorbers, etc.

CC. Make proper HW, CW, hot water recirculating, waste, and vent connections to all fixtures and equipment even though all branch main, elbows and connections are not shown.

DD. Unless otherwise noted, sanitary waste piping shown is below floor and all other piping is overhead, above ceiling. Domestic hot, cold and recirculating water piping shall be installed between ceiling and attic insulation.

EE. Unless otherwise noted, horizontal sanitary piping shall be pitched 1 percent.

FF. Unless otherwise noted, all domestic water piping and fire protection piping shall be installed on heated side of ceiling insulation.

GG. All piping and installation shall comply with all local and national plumbing codes. Test piping as required by plumbing code and authority having jurisdiction.

HH. For sizes of all domestic water piping see plumbing fixture schedule and domestic water riser diagrams.

II. For sizes of all sanitary and vent piping see plumbing fixture schedule and sanitary/vent riser diagrams.

3.2. PLUMBING SPECIALTY INSTALLATION REQUIREMENTS

A. General: Install plumbing specialty components, connections, and devices according to manufacturer's written instructions.

B. Fasten recessed, wall-mounting plumbing specialties to reinforcement built into walls.

C. Secure supplies to supports or substrate.

D. Install individual stop valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve as appropriate is not indicated.

E. Install water-supply stop valves in accessible locations.

F. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

G. Include wood-blocking reinforcement for recessed and wall-mounting plumbing specialties.

3.3. FITTINGS FOR FIXTURES SUPPLIED BY OTHERS

A. Fixtures such as built-in-sink in counters and kitchen equipment may be provided under other divisions of the specifications and are complete with strainer and tailpiece. Fittings, accessories and connection of these fixtures to the plumbing system are provided under this section.

B. Rough-in and final connection includes but is not limited to all domestic water, waste, vent, gas and compressed air systems. Furnish stops, strainers, vacuum breakers, and under counter insulation where not furnished under another Division of these specifications.

3.4. TESTING

A. After plumbing fixtures are connected, all piping and fixtures shall be tested for operation and a smoke or peppermint test shall be made on all soil, waste and vent piping.

B. After the building has been occupied and the various equipment is in actual use, the Contractor shall make an operating test of all equipment at a time directed by the Engineer to determine that all contract requirements are met.

3.5. CLEANING AND STERILIZATION

A. After final testing for leaks, all potable water lines shall be thoroughly flushed, by plumbing contractor, to remove foreign material. Before placing the systems in service, sterilize the new water lines in accordance with local health department codes and at a minimum according to the following procedure:

B. Through a 3/4-inch hose connection in each branch main and building main, pump in sufficient sodium hypochlorite to produce a free available chlorine residual of not less

than 200 ppm. Plumbing Contractor shall provide plumbing connections and power for pumping chlorine into system.

C. Proceed upstream from the point of chlorine application opening all faucets and taps until chlorine is detected. Close faucets and taps when chlorine is evident.

D. When chlorinated water has been brought to every faucet and tap with a minimum concentration of 200 ppm chlorine, retain this water in the system for at least three (3) hours.

E. CAUTION: Over-concentration of chlorine and more than three (3) hours of retention may result in damage to piping system. It is not necessary to retain chlorine in any system for twenty-four hours to achieve sterilization. AWWA states that 200 ppm chlorine for three hours is sufficient.

F. At the end of the retention period, no less than 100 ppm of chlorine shall be present at the extreme end of the system.

G. Proceed to open all faucets and taps and thoroughly flush all new lines until the chlorine residual in the water is less than 1.0 ppm.

H. Obtain representative water sample from the system for analysis by an independent and recognized bacteriological laboratory.

I. If the sample tested for coliform organisms is negative, a letter and laboratory report shall be submitted by the service organization to the Contractor, certifying successful completion of the sterilization. Additionally, this report shall be forwarded to the Owner as well as be included in the O&M Manual.

J. If any samples tested indicate the presence of coliform organisms, the entire sterilization procedure shall be repeated.

K. Take precautions to avoid use of plumbing fixtures and domestic water systems during sterilization period. Place signs on all plumbing fixtures and outlets during sterilization period.

3.6. EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

3.7. PREPARATION

A. Review the Kitchen Equipment Consultant's equipment cut sheets. Confirm rough-in location and size of fixtures and openings prior to commencing work.

B. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.8. INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.9. ADJUSTING

A. Adjust stops, valves, infrared fixtures for intended water flow rate to fixtures without splashing, noise, or overflow.

3.10. CLEANING

A. At completion, clean plumbing fixtures and equipment. Polish all chrome plated faucets, accessories, equipment, and piping.

B. All electric water cooler coils shall be cleaned of all construction dust and debris prior to building occupation by Owner.

3.11. FIXTURE HEIGHTS

A. Install fixtures to heights above finished floor as required by local Plumbing Code, Americans with Disabilities Act (A.D.A.), Authority Having Jurisdiction, and Architectural Contract Drawings. In the absence of a local code requirements, install fixtures to heights above finished floor as follows.

B. Water Closet

a. Standard 15 inches to top of bowl rim.
b. Handicapped 18 inches to top of seat.
c. Child height 10 inches to top of bowl rim.

C. Urinal

a. Standard 22 inches to top of bowl rim.
b. Handicapped 17 inches to top of bowl rim.

D. Lavatory

a. Standard 31 inches to top of basin rim.
b. Handicapped 34 inches to top of basin rim.
c. Child Height 27 inches to top of basin rim.

E. Drinking Fountain

a. Standard 36 inches to top of basin rim.
b. Handicapped 34 inches to top of basin rim.

F. Water Closet Flush Valves

a. Standard 11 inches min above bowl rim.
b. Recessed 10 inches min. above bowl rim.

G. Shower Heads

a. Adult male 80 inches to bottom of head.
b. Adult female 76 inches to bottom of head.
c. Handicapped (unisex) with handheld 76 inches to top of head arm.
d. Handicapped (unisex) without handheld 48 inches to top of head arm.

H. Emergency Eye Wash

a. Handicapped 38-inches to receptor rim.

I. Combination Emergency Shower/Eye Wash

a. Handicapped 84 inches to bottom of shower head and 38 inches to eye wash receptor rim.

J. Residential Clothes Washer

a. Guy Gray box 42 inches above finished floor.

**END OF SECTION**

DIVISION 22 SECTION 22 40 05
PLUMBING EQUIPMENT
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**SECTION 22 40 05**
**PLUMBING EQUIPMENT**

## PART 1. GENERAL

1.1. GENERAL

A. For General Mechanical Requirements, see Division 22 Section, Common Work Results for Plumbing & Division 01, General Requirements.

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 specifications apply to this Section.

C. All exposed bolts, screws, etc., shall be vandal proof.

D. All plumbing materials and equipment shall be new and of best grade, free of defects and complete with all required appurtenances and accessories.

E. Piping and insulation are specified under other sections.

F. Provide all materials, equipment and perform all labor required to install plumbing system complete as specified, as drawings indicated and as required by the State of Delaware, National Standard Plumbing Code , International Plumbing Code, City of Newark Code, the local code, and all other authorities have jurisdiction.

G. Provide stops for all plumbing equipment. Stops are to be accessible.

H. Provide pumps with manufacturer's name, model number, and rating/capacity identified.

I. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:

1. American Gas Association (AGA).

2. National Sanitation Foundation (NSF).

3. American Society of Mechanical Engineers (ASME).

4. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).

5. National Electrical Manufacturers' Association (NEMA).

6. Underwriters Laboratories (UL).

J. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitations, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.2. REFERENCES

A. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.

B. ANSI/ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.

C. ANSI/ASE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.

D. ANSI A112.21.1 - Floor Drains.

E. ANSI A112.21.2 - Roof Drains.

F. ANSI A112.26.1 - Water Hammer Arrestors.

G. AWWA C506 - Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.

H. PDI WH-201 Water Hammer Arresters.

I. ANSI/ASHRAE 90A - Energy Conservation in New Building Design.

J. ASME Section VIIID - Pressure Vessels; Boiler and Pressure Vessel Codes.

K. ANSI/NFPA 54 - National Fuel Gas Code.

L. ANSI/NFPA 70 - National Electrical Code.

M. ANSI/NEMA 250 - Enclosure for Electrical Equipment (1000 Volts Maximum).

N. IBC - International Building Code

1.3. DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of General Requirements.

B. Accept equipment on site in factory packaging. Inspect for damage.

C. Protect installed equipment from damage by securing areas and by leaving factory packaging in place to protect equipment and prevent use.

1.4. FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings and per the manufacturer.

1.5. ALTERNATES

A. Refer to Division 01 Section, Alternates for description of work under this section affected by alternates.

1.6. EXTRA MATERIALS

A. Provide one set of pump seals for each type of model of pump provided on this project.

B. For all condensing water heaters, provide spare set of lime chips for all condensate

neutralizers.

## PART 2. PRODUCTS

2.1. CLEANOUTS

A. Provide cleanouts in sanitary and storm drainage systems at ends of runs, at changes in direction, near the base of stacks, every 50 feet in horizontal runs, of 4-inch diameter or less, every 100 feet in horizontal runs over 4-inches, and where indicated.

B. Cleanouts shall be full size of pipe up to 4-inches and shall be 4-inches for larger sizes. Where installed in finished floors inserts shall match adjacent floor construction.

C. Materials and Approved Manufacturers: Josam, J.R. Smith, Zurn, Wade or Ancon, Mifab, Watts, equal to Josam numbers given below:

| | | |
|---|---|---|
| 1. | Concealed Piping | C.I. Pipe |
| 2. | Unfinished Areas | |
| 3. | Floors | 57000-Z-CI |
| 4. | Walls | 58600-PLG |
| 5. | Finished Areas Floors | |
| 6. | Terrazzo | 56040-13 |
| 7. | Composition Tile | 57000-X-12 |
| 8. | Ceramic Tile | 57000-X |
| 9. | Carpet | 56070-14 |
| 10. | Carpet insert to match adjacent carpet in type, color and grade. | |
| 11. | Finished Areas Walls | |
| 12. | Plaster/Dry Wall | 58640-COT |
| 13. | Tile/CMU | 58600-COT |

2.2. SHOCK ABSORBERS

A. Provide shock absorbers equal to Josam Shokstops at all fast closing valves, at the top of all cold water risers, at each flush valve or battery of flush valves, and where indicated. Sizes and locations shall be in accordance with PDI Standard WH 201.

B. Shock absorbers shall conform to ANSI A112.26.1, precharged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psig working pressure.

C. Approved Manufacturers: Josam, Wade, Zurn, J.R. Smith, Sioux Chief, Watts, or approved equal.

2.3. VACUUM BREAKERS

A. Provide vacuum breakers on water connections to fixtures and equipment where minimum air gaps required by Plumbing Code are not possible and on hose bibbs and other outlets to which hoses can be attached.

B. Vacuum breakers not subject to back pressure, Watts No. 288A; vacuum breakers subject to back pressure, Watts Series 9D or for hose threads, Watts Series 8A.

C. Provide atmosphere vacuum breakers at all water connections to garbage disposers, hose spray units as required by Plumbing Code.

D. Provide pressure type vacuum breakers with chrome finish at all water connections to hose reels, Watts Model 800 MCQT or equal.

E. Hose connection backflow preventers shall be ASSE 1052, suitable for at least 5 gpm flow and applications with up to 10 foot head back pressure. Include two (2) check valves, intermediate atmospheric vent, and non-removable, ASME B1.20.7 garden-hose thread on outlet.

F. Hose connection vacuum breakers shall be ASSE 1011, nickel plated, with nonremovable and manual drain features, and ASME B1.20.7 garden-hose threads on outlet. Units attached to rough-bronze finish hose connections may be rough bronze.

G. Approved manufacturers: Watts, Beeco, B&K Industries, Zurn, Sparco, Conbraco or approved equal.

2.4. VACUUM RELIEF VALVES

A. Provide vacuum relief valves on cold water supply to water heaters, where indicated on the contract drawings, or where required by the authority having jurisdiction.

B. Vacuum relief valves shall be Watts Regulator Co. Series 36A, Josam, or approved equal.

2.5. DOMESTIC WATER RECIRCULATING PUMPS

A. Provide and install domestic water re-circulating pumps of the size, capacity and electrical characteristics as indicated on the contract drawings. Pumps shall be in-line circulators Model 113B as manufactured by TACO, Bell and Gossett, Thrush, Armstrong, Patterson, or approved equal.

B. Pumps shall be non-overloading throughout the range of the curves. Pumps shall have center line discharge for positive venting, flanged bodies, and same size suction and discharge.

C. Motors shall be resilient mounted, split phase motor with built-in overload protector and equipped with sleeve bearings for quite operation. Impeller shall be one piece dynamically balanced with stainless steel shaft, bronze sleeve bearing, two piece carbon/ceramic seal

assembly and one piece spring coupling.

D. All circulators utilized for domestic water service shall be stainless steel or all bronze construction.

2.6. BACKWATER VALVES

A. Backwater valves shall be provided at all connections of floor drains or area drains to stormwater piping systems and where indicated on contract drawings.

B. Backwater valves shall be ANSI A112.21.2, coated cast iron body and cover, brass valve, access cover, extension sleeve and cover.

C. Backwater valves shall be equal to Josam 67360-15.

D. Extend access cover to finished floor and terminate in cleanout.

E. Approved Manufacturers: Josam, Zurn, Wade, Smith, Ancon or approved equal.

2.7. GAS FIRED DOMESTIC WATER HEATERS

A. Water Heater(s) shall be model BTH as manufactured by A. O. Smith, Lochinvar, State, Bradford White, Bock, PVI, or approved equal. Water heater(s) shall be of the seamless glass lined steel tank construction in which the glass coating is applied to the water side surfaces of the tank after the tank has been assembled and welded. The condensing flue coil shall be coated on the flue gas side with A. O. Smith's proprietary or equal acid resistant glass lining designed for use in condensing heaters.

B. The heater shall be suitable for sealed combustion direct venting using PVC air intake pipe and PVC exhaust pipe for a total distance of (50') equivalent feet of vent and 50' equivalent feet of intake. The heater shall be factory assembled and tested. The power burner shall be of a design that requires no special calibrations or start up. The heater(s) shall be approved for 0-inch clearances to combustibles.

C. The control shall be an integrated solid state temperature and ignition control device with integral diagnostics, LED fault display capability and a digital display of temperature settings.

D. The tanks shall be foam insulated and equipped with a ASME rated temperature pressure relief valve. The water heater shall be UL listed and exceed the minimum efficiency requirements of ASHRAE/IES 90.1b-1992.

E. The heater shall be listed by SCAQMD Rule 1146.2 Low NOx. Water Heater shall comply with Delaware Pressure Vessel Code and ASME CSD-1.

F. Provide unit with brass drain valve and install on 4-inch high housekeeping pad as detailed on the contract drawings.

G. The water heater shall be tested at start-up by a qualified representative of the manufacturer. Provide a check list outlining start-up procedures to Engineer for review. A start-up report as provided by the manufacturer shall be completed and submitted before

final acceptance of the domestic hot water heater system. Include copy of start-up report in O&M Manuals.

H. Conduct flue gas analysis on unit as required by water heater manufacturer.

I. Where multiple units are indicated furnish manifold kits to balance water flow through each heater.

J. Furnish units with electronic temperature control with LED readout.

K. Accessories: Air proving switch, housekeeping pad, low water cut-off, condensate neutralization kit, temperature and pressure relief valve. The temperature and pressure relief valve must be visible and accessible not hidden behind jacket.

L. Warranty: Total unit warranty of five (5) years.

M. A properly sized gas pressure regulator to be provided by the manufacturer and installed by the contractor.

2.8. BACKFLOW PREVENTER (REDUCED PRESSURE PRINCIPAL TYPE)

A. Furnish and install reduced pressure principal backflow preventers at all cold water make-up connections to HVAC water systems and where indicated on contract drawings.

B. Backflow preventers shall be of bronze body construction, inlet and discharge OS&Y gate valves, stainless steel check and relief valve seats, stainless steel relief valve shafts and flange bolts. Ball valve test cocks shall be bronze body.

C. Pressure ratings shall be up to 175 psi and temperature ratings shall be up to 210 degrees F continuous.

D. Install unit per local code requirements and authorities having jurisdiction. Unless otherwise noted, install backflow preventers between 12 inches and 60 inches above finished floor.

E. Units shall be approved by ASSE 1013, UPC, UL, and shall be No. 909 with air gap fitting and inlet/outlet gate valves as manufactured by Watts Regulator, Conbraco, Wilkens, or as approved equal. Pipe discharge to nearest floor drain/floor sink. Provide minimum 18-inch clearance for servicing and testing.

F. Pipe discharge of backflow preventer full size to closest floor drain utilizing type "L" copper.

G. Furnish test kit for field testing units. Watts Model TK-9A Analog Differential Gauge or approved equal.

2.9. BACKFLOW PREVENTER (DOUBLE CHECK VALVE ASSEMBLY TYPE)

A. Furnish and install double check valve assembly backflow preventers at all cold water make-up connections to kitchen waste coolers, dishwashers, and where else indicated on contract documents.

B. The assembly shall consist of two positive seating check modules with captured springs and rubber seat discs. The check module sets and seat discs shall be replaceable.

C. Service of all internal components shall be through a single access cover secured with stainless steel bolts. The assembly shall include two resilient seated isolation valves and four top mounted, resilient seated test cocks.

1. Furnish each backflow preventer with the following accessories and options:

a. bronze strainer
b. quarter turn, full port, resilient seated ball valve shut-off
c. union connections

D. Provide minimum 18-inch clearance for servicing and testing.

E. The assembly shall meet the requirement of ASSE Std 1015 and AMCA Std C510.

F. Double check valve backflow preventers shall be Watts No. 007, Conbraco, Wilkens, Ancon, or approved equal.

G. Furnish test kit for field testing units. Watts Model TK-9A Analog Differential Gauge or approved equal.

2.10. BACKFLOW PREVENTER (DOUBLE CHECK VALVE ASSEMBLY TYPE) (VERTICAL TYPE)

A. Furnish and install vertical double check valve assembly backflow preventers at incoming water services and where else indicated on contract documents. Backflow preventers shall be suitable and listed for vertical installation.

B. The assembly shall consist of two positive seating check modules with captured springs and rubber seat discs. The check module sets and seat discs shall be replaceable.

C. Service of all internal components shall be through a single access cover secured with stainless steel bolts. The assembly shall include two resilient seated isolation valves and four top mounted, resilient seated test cocks.

D. Furnish each backflow preventer with the following accessories and options:

1. OS & Y Gate Valves.

2. Ball Valve Test Cocks.

3. Approval for vertical up flow installation.

E. Provide minimum 18-inch clearance for servicing and testing.

F. The assembly shall meet the requirement of ASSE Std 1012 and AMCA Std C510.

G. Double check valve backflow preventers shall be Watts No. 757, Conbraco, Wilkens, Ancon, or approved equal.

2.11. TRAP SEAL PRIMER VALVES (DIRECT CONNECT TO DOMESTIC WATER)

A. Supply type, Trap-Seal primer Valves

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. MIFAB, Inc.
b. PPP, Inc.
c. Sioux Chief Manufacturing Company, Inc.
d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
e. Watts Industries, Inc.; Water Products Div.

2. Standard: ASSE 1018.

3. Pressure Rating: 125 psig minimum

4. Body: Bronze.

5. Inlet and Outlet Connections: NPS ½ (DN15) threaded union, or solder joint.

6. Gravity Drain Outlet connection: NPS ½ (dn 15) threated or solder joint.

7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

8. Distribution Unit: Outlet quantities required.

9. Backflow Preventer: Atmospheric vented drain chamber.

2.12. TRAP PRIMING STATION-AUTOMATIC TRAP PRIMER

A. Trap priming stations shall be Precision Plumbing Products, Inc., Electronic Trap Priming manifold Model PT, MIFAB, Sioux Chief, Watts, or approved equal. The manifold shall supply a minimum of 2 ounces of potable water per opening at 20 PSIG once in each 24 hour period. The Electronic Trap Priming Manifold must be capable of equally priming from 4 through 30 individual floor drain traps. Utilize where four (4) or more floor drains require priming pipes.

B. The unit shall be factory assembled and prepiped, and shall include a bronze body 3/4-inch female NPT WOG rated ball valve 3/4-inch, Water Hammer Arrestor, copper barrel with brass piston and type "L" copper sweat connection, electronic brass body 3/4-inch solenoid valve, and type "L" copper manifold with brass 2-inch compression fitting and orifice opening for precision water distribution to each floor drain trap. Unit shall be pre-piped with atmospheric vacuum breaker.

C. Electronic components shall include single point power connection at 120 volt 1 phase 60 hertz, manual over-ride switch, minimum 5 amp breaker, 24 hour geared timer with relay and 5 second dwell function. Separate water hammer arrestor can be provided outside station if integral arrestor is not available.

D. All components shall be factory assembled, tested and supplied in a 16 gauge steel NEMA 1 enclosure suitable for surface or recess mounting, as indicated on contract drawings. In addition, all components must comply with nationally recognized standards. The Precision Plumbing Products Electronic Trap Priming Manifold shall be fully warranted for the life of the plumbing system.

E. When only a single trap primer is required, as in the case of a restroom with one floor drain in a toilet (or similar) the contractor may submit, in lieu of an electronic multiple station, a single station for review by the Engineer. The fixture serving the trap primer must be within 10' of the trap. Components shall be brass, bronze, and chrome, of the highest quality.

F. Access door shall be finished with a prime coat and fire rated where installed in a rated wall. Access door latch shall be Allen key type.

2.13. TRAP PRIMING STATION MINI-AUTOMATIC TRAP PRIMER

A. The mini trap priming stations shall be Precision Plumbing Products, Inc., Electronic Trap Priming manifold Model MPB, MIFAB, Sioux Chief, Watts, or approved equal. The manifold shall supply a minimum of 8 ounces of potable water per opening at 60 PSIG once in each 24 hour period. The Mini Trap Priming Manifold must be capable of equally priming from 1 to 4 individual floor drain traps. Utilize where three (3) or less floor drains require priming pipes.

B. The unit shall be factory assembled and prepiped, and shall include a bronze body 3/4-inch female NPT WOG rated ball valve 3/4-inch, Water Hammer Arrestor, copper barrel with brass piston and type "L" copper sweat connection, electronic brass body 3/4-inch solenoid valve, and type "L" copper manifold with brass 2-inch compression fitting and orifice opening for precision water distribution to each floor drain trap. Unit shall be pre-piped with atmospheric vacuum breaker.

C. Electronic components shall include single point power connection at 120 volt 1 phase 60 hertz, manual over-ride switch, minimum 2 amp breaker, 24 hour geared timer with relay and 12 second dwell function. Separate water hammer arrestor and can be provided outside station if integral arrestor is not available.

D. All components shall be factory assembled, tested and supplied in a 16 gauge steel NEMA 1 enclosure suitable for surface or recess mounting, as indicated on contract drawings. In addition, all components must comply with nationally recognized standards. The Precision Plumbing Products Electronic Mini Trap Priming Manifold shall be fully warranted for the life of the plumbing system.

E. When only a single trap primer is required, as in the case of a restroom with one floor drain in a toilet (or similar) the contractor may submit, in lieu of an electronic multiple station, a single station for review by the Engineer. The fixture serving the trap primer must be within 10' of the trap. Components shall be brass, bronze, and chrome, of the highest quality.

F. Access door shall be finished with a prime coat and fire rated where installed in a rated wall. Access door latch shall be Allen key type. Furnish with distribution units as required.

2.14. DOMESTIC WATER METER WITH ATC INTERLOCK CAPABILITIES

A. Furnish and install a bronze magnetic drive flanged turbo-water meter on incoming water service to building, an domestic hot water system cold water pipe, and where indicated. The water meter shall be Model WPX-211 as manufactured by Niagara, Rockwell, Hersey, or approved equal. Unit shall be sized and selected so as not to exceed the scheduled maximum pressure drop at design flow.

B. Main cases for all sizes shall be cast Water Works bronze. Size, model and direction of flow shall be cast, in raised characters, on both sides of the Main cases.

| Operating Characteristics | | |
|---|---|---|
| Meter Size | Low Flow (95 percent minimum) | Normal Range (100.0 +/- 1.5 percent) |
| 2-inch | 3 | 4 to 160 |
| 3-inch | 4 | 5 to 350 |
| 4-inch | 10 | 15 to 1000 |
| 6-inch | 20 | 30 to 2000 |
| 10-inch | 55 | 55 to 5500 |

C. Meters shall have performance capabilities of continuous operation up to the rated maximum flows as outlined above without affecting long term meter accuracy or causing undue wear. Meters shall also have a 25 percent flow capacity in excess of the maximum flows listed for intermittent flow demands.

D. The measuring chamber shall be of unitized construction (i.e., complete with measuring element, calibration device and register in one assembly). The measuring chamber shall be capable of operating within above listed accuracy limits without recalibration when transferred from one main case to another. The measuring element shall be mounted on a horizontal stationary shaft with sleeve bearings and be essentially weightless in water.

E. The register shall be permanently hermetically sealed; all registers of similar size and registration to have a standard ratio gear reduction so as to permit interchange ability. The register shall be assembled to measuring chamber in a tamper proof manner so removal can be made only after measuring chamber is removed from the maincase. Sweep hand reading and odometer wheel details will conform to American Water Works Standard C-701, as most recently revised.

F. All reduction gearing shall be enclosed in the permanently hermetically sealed register. The drive magnet shall be located in the measuring element, and the follower magnet shall be located inside the permanently hermetically sealed register. An intermediate magnetically active material shall be required to distribute the magnetic flux uniformly to the follower magnet, thereby improving the service life of the register's rotating components.

G. All meters shall operate without leakage, damage or malfunction up to a maximum operating pressure of 150 pounds per square inch.

H. The 6-inch and 10-inch size meters shall have external strainers as part of the meter package. Strainers shall have cover plate for inspection and removal of debris from the

bronze screen without disturbing the pipeline.

I. Flanges on 2-inch size meters shall be oval faced and drilled on the horizontal axis with a bolt circle diameter of 4 ½ -inch. Thickness shall be as required for Class 125 round flanges. Flanges for 3-inch, 4-inch, 6-inch and 10-inch size meters shall be of the Class 125 round type, flat faced, and shall conform to ANSI 16.1 for specified diameter, drilling and thickness. Companion flanges, if required with the meters, shall consist of one standard cast iron flange, tapped with American Standard internal taper pipe threads, and one flanged coupling adapter. The type and outside diameter of connecting pipe shall be provided for appropriate gasket sizing. All bolts, nuts and gaskets shall be provided.

J. Turbine meters of similar design concept must be available for purchase in all of the sizes specified above. The turbine meters must have a minimum of five (5) years of satisfactory operating experience as marketable products. Limited experimental history is not acceptable. The meter manufacturer shall submit, in writing, a price schedule of its factory maintenance program for the measuring chambers.

K. The water meter shall be fully field insulated and jacketed to prevent condensation.

L. The water meter shall be provided with a high frequency pulse output device for interface with Automatic Temperature Control System. The Infrared Pulser shall be Model 860 as manufactured by Hersey or approved equal.

M. A Pulse to DC converter shall be supplied with the Infrared Pulser. The device shall convert pulses from a variety of liquid flow sensing devices to a 4-20mA output signal which is proportional to the flow rate. This output shall transmit flow rate data over long distances with no loss of accuracy. The converter shall be Model 1005 as manufactured by Hersey or approved equal.

N. At contractor's option a water meter provided by the ATC subcontractor may be utilized.

2.15. NATURAL GAS ZONE VALVE BOX

A. The Zone Valve Box shall be constructed of 18 gauge steel with a white, baked enamel finish, and provided with two steel brackets to anchor the box to the wall. Anchor brackets shall be so designed to permit boxes to ganged together in a vertical stack. Single valve boxes require a rough wall opening of: 8-1/2-inch wide x 7-1/4-inch high and 4-inch deep.

B. The valve shall be full flow, double seal, ball type with: bronze body, buna-N seals and O-ring packing, chrome plated brass ball and designed for working pressures up to 300 P.S.I.G. Only 1/4 turn of the handle shall be required to operate the valve from full "ON" to "OFF" position. In the "OFF" position, the valve handle shall protrude from the box to prevent the door from being shut. The valve shall be securely attached to the back of the box and provided with type L or K copper tube extensions for making connection to concealed piping outside of the box.

C. The zone valve box assembly shall have a sliding, transparent door with a pull handle and release button which retains the door in the "OPEN" and "CLOSED" positions. In an emergency, the door shall "SNAP-OUT" without exposing sharp edges. The release button shall incorporate a locking device which prevents the valve from being operated by unauthorized persons. A molded plastic cover shall trim the box to the rough wall opening.

The top and bottom of the cover shall have interlocking edges for vertical, gang mounting, installations. The front of the cover shall be trimmed with brushed finish stainless steel.

D. Zone Valve Box shall be Puritan-Bennet, Medaes or approved equal.

2.16. DOMESTIC WATER EXPANSION TANKS

A. Provide and install domestic water expansion tanks of size, capacity and as indicated on contract drawings. Domestic water expansion tanks shall be Therm-X-TROL as manufactured by AMTROL Inc., Flexcon, Wessels, Taco, Armstrong, or approved equal. Mount tank as detailed on the drawings.

B. Domestic water expansion tanks shall be specifically designed for use in potable water systems. Tanks shall be pre-charged to require pressure at the factory. The maximum working pressure shall be 150 psig. The maximum operating temperature shall be 200 degrees F. Expansion tanks shall contain removable FDA approved butyl bladder.

C. Before installation, Contractor shall adjust the tank air pre-charge pressures to equal city water pressure.

D. The tank must be constructed in accordance with Section VIII of the A.S.M.E. boiler and pressure vessel code and stamped 150 psig working pressure.

E. Accessories: Pressure gauge and air charging fitting, tank drain, pre-charge as indicated on contract drawings and factory installed clip angles.

2.17. DOMESTIC WATER BOOSTER PUMP SYSTEM (VARIABLE SPEED)

A. Product(s) Supplied

1. The authorized factory trained representative shall provide one prefabricated, completely integrated, variable speed pumping station designed to provide constant pressure, at required flow rates with automatic lead/lag capability. The pumping station shall be the AquaForce™ variable speed pumping station by Goulds Pumps, G&L Pumps, Grundfos, Bell and Gossett, Syncroflow "Iron Heart", Armstrong, QuantumFlo, Flopak, Hydronics Modules, VC Systems and Controls, or approved equal. The pumping station shall include complete duplex or triplex stainless steel pumps, with appropriate variable speed (pump specific) variable speed controllers. It is the successful vendor’s responsibility to include all necessary appurtenances to provide for a complete, automatic, smooth operating and reliable pumping system. The manufacturer shall supply a complete set of general arrangement drawings, electrical power schematics and control schematics in the operations and service manual, to include the complete pump and variable speed controller instruction manuals. All equipment shall be supplied by a single supplier (unitary source) to ensure system component compatibility.

B. References:

1. American Water Works Association (AWWA)

2. American National Standards Institute (ANSI)

3. American Standards for Testing Materials (ASTM)

4. Hydraulic Institute (HI)

5. American Society of Mechanical Engineers (ASME)

6. Underwriters Laboratories (UL)

7. International Standards Organization (ISO)

C. System Description

1. The pump station shall utilize 2 (duplex) stainless steel G&L Pumps, end suction or vertical multistage in conjunction with the Aquavar® variable speed pump controller as manufactured by G&L Pumps, A Goulds Pumps Company or equivalent products such a Grundfos, Bell and Gossett, Syncroflow "Iron Heart", Armstrong, or approved equal. Appropriate check and shutoff valves, pressure transducers, suction/discharge piping, pump and electrical protection shall be integrated into the pump controller package. Provide the following options: Input line reactors, lightning protection, phase loss protection, low suction pressure switch, temperature relief, flexible suction/discharge flanged connection, and flow meter.

D. Conditions of Service

1. Refer to schedules on Contract Drawings for condition of service and performance criteria.

2. Total pumping station system friction loss shall not exceed 5 psig.

E. Sequence of Operation

1. The station shall receive a 4-20mA signal from each pressure transducer, as provided by the pumping station manufacturer. A pressure transducer shall be provided for each pump controller. This shall provide a complete lead/ lag system coupled with a true back-up control. The pressure transducer shall monitor system discharge pressure and provide an analog signal (4- 20mA) to the pump control software, and allow the variable speed pump controller, to provide a variable Volts/ Hz output to the motor. Pressure transducer shall be remote mounted at the end of the distribution piping or logic shall be employed that adjusts the pressure setpoint to simulate the operation of a remote sensor. Once the pressure drops below the set system pressure, the pump shall start and provide system pressure (as determined by the station operator), if this pressure cannot be maintained by one pump, the next pump in sequence shall operate in a lead/lag capacity to provide the extra flow and pressure automatically without the use of additional panels or alternators. The sequence of the pumps shall be field adjustable, and completely automatic without additional panels or alternator controls. The variable speed pump controller shall be completely integrated with the VFD. Special type motors will not be allowed (see motor section). Pumps shall alternate based on elapsed run time. All program settings shall be based on centrifugal pump language and centrifugal pumps. Program settings must be field adjustable to provide on site

adjustments. When the system experiences low demand, the variable speed pump controllers will reduce the speed of each pump, until demand has stopped. Pump controllers will stop each pump at zero demand, without the use of external switches or controls.

2. An additional high pressure sensor shall be provided to monitor discharge pressure at booster pump system discharge header. If discharge pressure at discharge header exceeds 80 psig (adjustable) booster pump shall de-energize and alarm sound.

3. During low demand the system shall automatically enter "sleep mode", which will increase the system pressure to 5 psig above normal set point to force water into hydropneumatic tank to allow storage and complete system shut-down.

F. Submittals

1. Submit three copies of the following for approval:

a. General elevation drawings, wiring diagram, pump curves, operating and maintenance manuals and parts list.
b. Written certifications for listing with Nationally Recognized Testing Laboratory (NRTL) for the complete pumping system
c. Operation and Maintenance Manuals for pumps, controllers and complete pumping station.

G. Quality Assurance

1. The pump station shall be furnished by a single supplier entity, who shall have responsibility for the complete pumping station.

H. Qualifications

1. Manufacturer shall demonstrate proof of financial responsibility with respect to pump station delivery and performance.

2. Upon request from the engineer the manufacturer shall provide proof or evidence of facilities, equipment and capabilities required to produce the specified station.

3. Provide pumping station certified testing as an option.

I. Scheduling

1. The pump station manufacturer shall provide the following:

a. Estimated FOB delivery
b. Estimated NET weights
c. Unloading instructions
d. Acceptance at site procedures
e. Onsite storage and protection information and complete instruction manuals.

J. Warranty:

1. The manufacturer shall warrant the water pumping system to be free of defects in material and workmanship for one year (12 months) from date of authorized start-up, not to exceed eighteen (18) months from date of manufacturer's invoice. Complete terms and conditions shall be provided upon request.

K. Start-Up Service

1. When discharge piping, electrical connections, and electrical inspection have been completed, the pump station representative shall be contacted for start-up. A minimum one-week notice shall be given to manufacturer representative prior to scheduled start-up date. During start up, the complete pumping system shall be given a running test of normal start and stop, and fully loaded operating conditions. During this test, each pump shall demonstrate its ability to operate without undue vibration, or overheating, and shall demonstrate its general fitness for service. All defects shall be corrected and adjustments shall be made to the pumping station for satisfactory operation. System problems or concerns shall be corrected by the contractor or site station staff, in conjunction with the appropriate factory representative. Testing shall be repeated until satisfactory results are obtained, as determined by the engineer. Start-up assistance shall be provided and shall be at least one 8-hour day.

L. Station Manufacturer

1. The pumping system shall be manufactured by G&L Pumps, A Goulds Pumps, ITT Industries Company, Grundfos, Syncroflow "Iron Heart", Armstrong, Flopak, or approved equal. All systems shall be approved by the engineer prior to bid opening. The station shall be of the capacities as shown on the contract drawings. For consideration of a proposed equal system, the contractor shall furnish the following data to the engineer at least 10 days prior to the date of the bid opening:

   a. A complete specification for the pumping system proposed as an equal.
   b. A statement of full conformance to the following specifications signed by a corporate officer of the manufacturer.
   c. A general arrangement drawing showing overall dimensions and all piping layouts.
   d. Complete submittal data for all major equipment (pumps, motors, valves, electrical controls, etc.).
   e. An electrical schematic, that provides power and control wiring.
   f. A copy of the appropriate Instruction Operation Manual (IOM) for the pump, pump controller and pumping station.
   g. Location of closest factory trained service centers.
   h. Manufacturer's system UL (or equal) file number.

M. Station Components

1. Pumps

   a. Pumps shall be constructed of 304 or 316L stainless steel and be of centrifugal, vertical multi-stage or end suction design. Pumps shall be the

manufactured product of a US manufacturer, producing and selling pumps for a minimum of 10 years. Pump case, impellers, diffusers, seal spring, inner bowls, seal spring, shaft sleeve and retainer clip shall all be manufactured from stainless steel. Shaft bushing shall be from ceramic. Mechanical seal assembly shall be constructed of Carbon/ Silicon Carbide/ Viton as standard. Seat elastomers and casing o-rings shall be from Viton. Shaft sleeve shall be from stainless steel. Tie rods and nuts shall be from zinc coated steel. Pump curve shall rise continuously to shut off head. Best efficiency point of pump shall lie between 70% and 80% of maximum flow capacity of the pump. Pump connections shall be NPT or ANSI flanged, either class 150 or class 300. Maximum pressure rating for class 150 flanges shall be 200 psi and for class 300 shall be 360 psi. Pump shall accept a standard NEMA C-face motor, or JM frame and shall not require a specialty motor with special thrust bearings or integrated VFD. Vertical multistage pumps shall have thrust balanced within the pump. All pumps used shall have a standard NEMA frame motor, and be readily available from manufacturer.

2. Station Base

   a. The pump station base shall be designed and fabricated to provide proper structural support for all attached equipment, and provide anchor bolt support. The base shall supply sufficient rigidity to withstand the stresses of reasonable and competent transportation to site, offloading, installation, and operation. Main structural members shall be constructed from heavy weight ¼ inch or 3/8 inch flat steel with a reinforcing channel for larger stations. Steel base shall be shot blasted, primed, and then painted as per paint specification. Provisions shall be made in the station base for off-loading and handling the station at the site of installation. Base shall include steel plate mounted under pump and motor and shall be of compact design for most standard doorways.

3. Piping

   a. All piping shall be constructed from 304 stainless steel, schedule 40 type or heavier pipe as required to maintain a 3 to 1 pressure safety factor (including 1/16 inch corrosion allowance). All piping shall be hydrostatically tested to a minimum 150% of maximum shutoff pressure generated by the pumping station. Suction and Discharge manifolds shall be designed and constructed for minimal friction loss and compact design for most standard doorways.

4. Valves

   a. Pump isolation valves 2” and below shall be full-port ball valves. Full-port ball valves shall have a brass body, ball shall be chrome plated brass with brass stem. Valves shall be pressure rated to 600 psi WOG. Valves shall conform to MSS-SP-110. Ball valves shall be Watts® model FBV-3.
   b. Valves 2½” and above shall be either lug-type butterfly valves or grooved-end butterfly or ball valves. Butterfly valves body shall be constructed of ductile iron with a polyphenylene sulfide coating. Butterfly valves disc

shall be aluminum bronze with a 416SS shaft. Butterfly valves shall have lever operators. Butterfly valve face-to-face dimensions shall comply with MSS-SP-67. Butterfly valves shall be pressure rated to 200 psi. Butterfly valves shall be Watts model BF-03. Grooved-end butterfly valves shall be constructed of ductile iron with an elastomer coated ductile iron disc. Grooved-end butterfly valves shall be pressure rated to 300 psi. Grooved-end butterfly valves shall be Victaulic® model VIC-300. Grooved-end ball valves shall be constructed of ductile iron with a nickel-plated ball and stem. Grooved-end ball valves shall be pressure rated to 1000 psi for sizes 2½" - 3" and 800 psi for sizes 4" - 6". Grooved-end ball valves shall have lever operators and shall be Victaulic Series 721.

5. Pump Check Valves

   a. Each pump discharge shall be equipped with a spring-loaded non-slam silent check valve, appropriately sized to allow no greater than 5 psi of head loss at full station rated capacity. Check valves 2" and below shall have a brass body and PTFE Teflon seat. Check valves 2" and below shall be pressure rated to 400 psi WOG. Check valves 2" and below shall be WATTS Series 600. Wafer style valves shall be provided in sizes from 2½ to 10" for installation between ANSI B16.5 class 150 or class 300 steel flanges. Wafer check valves shall be Val-Matic® Series 1440 or 1800 and conform to AWWA standard C508 for leakage rates. The operation of the valve shall not be affected by the position of installation. When pump is retired, valve shall function to close tightly before flow is reversed, and reducing the possibility of water hammer or shock.

6. Pressure Gauges

   a. Pressure gauges shall be liquid filled, bourdon tube type. Gauges shall be supplied for both the suction and discharge manifolds. All gauges shall be bottom mounted and shall be glycerin filled to reduce wear due to vibration. Accuracy shall be within ±1.5%. Gauge diameter shall be 2½". Range shall be at least 30% higher than the highest pressure attainable from the pumps at shutoff head conditions. Gauges shall include stainless steel back and copper alloy internals. Pressure gauges shall be manufactured by WIKA® or Equal.

7. Bolts

   a. All bolts used in the assembly of the pumping system shall be zinc plated to retard corrosion and shall be the proper size and gauge for rigid construction.

8. Motors

   a. Motor(s) for the main pump(s) shall be of United States manufacture, C-face or JM frame type open drip proof or TEFC enclosures 1.15 service factor, Min class F insulation. Motors shall be wound for the starting configuration as called out in the technical data sheet. Design pump brake horsepower shall not exceed 100% of motor horsepower exclusive of

service factor. The motor shaft shall be high-strength steel. Motors shall be as manufactured by Baldor®, or approved equal. Motors shall be wound with ISR (Inverter Spike Resistant) wire for use with VFD's. Motor manufacturer must provide letter of compatibility of motor with another type of variable frequency or variable speed drive.

b. Motor efficiencies shall be premium efficiency per NEMA standards.

N. Electrical Scope

1. Provide complete main fusible disconnect, variable speed pump controllers, pressure transducers, NEMA motors, instrumentation and controls to automatically start, stop and modulate pump speeds. To smoothly, efficiently and reliably provide pump variable flow rates at a constant discharge pressure. Pumping station shall provide full pump, motor and drive safety features needed to protect the equipment and piping system.

2. Main Fusible Disconnect Enclosure

a. Individual fusible disconnects shall be provided to completely isolate individual motors starting equipment from incoming power. Individual disconnects shall have a through door operator, and shall be sized as shown in the technical data sheet. Motor fusible disconnect panel shall be housed in a NEMA 4 enclosure with integral latches. The control enclosure shall be constructed of 12-gauge steel and the back plate assembly shall be constructed of 12-gauge steel. All indicating lights, reset buttons, individual selector switches and the operator interface device shall be mounted on enclosure door and also be rated NEMA 4. All internal components shall be mounted and secured to the removable back plate assembly with rigid steel brackets. Disconnects shall be manufactured by ABB Control Inc., Allen Bradley, A/C Tech, or approved equal.

3. The proposed booster pump electrical ampacity requirements cannot exceed scheduled values due to limitations of existing electrical supply.

O. Lightning and Surge Arrester Option

1. Individual fusible disconnects shall be provided to completely isolate individual motors starting equipment from incoming power. Individual disconnects shall have a through door operator, and shall be sized as shown in the technical data sheet. Motor fusible disconnect panel shall be housed in a NEMA 4 enclosure with integral latches. The control enclosure shall be constructed of 12-gauge steel and the back plate assembly shall be constructed of 12-gauge steel. All indicating lights, reset buttons, individual selector switches and the operator interface device shall be mounted on enclosure door and also be rated NEMA 4. All internal components shall be mounted and secured to the removable back plate assembly with rigid steel brackets. Disconnects shall be manufactured by ABB Control Inc, Allen Bradley, A/C Tech, or approved equal.

P. Variable Frequency Drive

1. The pump controller shall be the Goulds Pumps Aquavar® or Aquavar CPC

variable speed pump controller or approved equal. The Aquavar shall provide an adjustable carrier frequency with IGBT power switching, and utilize PWM technology. The drive shall provide noiseless operation of the driving motor, short circuit and ground protection, phase loss protection and work with controlled sinusoidal current synthesis and dynamic over current limitations. The Aquavar controller shall be one complete integrated unit including the variable frequency drive, programmable phase loss protection, pump control logic, and include a NEMA 1 (CPC) or NEMA 4 (motor mount version) enclosure. Additional control panels, PLC's or other external devices, shall NOT be necessary to accomplish complete pump programming and variable speed control of pump and motor. Standard variable frequency drives that do not incorporate pump control logic as the primary control software; programming and features directly applicable to centrifugal pump applications shall not be considered equal.

2. The pumping station controller shall provide a LCD two line display with 16 characters per line and programming keypad for data entry. Unit(s) shall utilize user-friendly front panel programming in three languages that displays pump and motor language in clear text. Three colored LED's shall signal 'power on', 'pump running' and 'fault'. Program settings shall be changeable and stored in nonvolatile memory. Program settings shall be retained in memory in the event of loss of power to the controller, without the use of a backup battery. System operating pressure shall be clearly displayed in PSI or feet of head for ease of use and to provide an operator friendly interface. Additional parameters, where applicable, shall be displayed in units consistent with pumping systems. Generic control systems adapted from other applications shall not be considered equal.

3. The settings and program in whole or part may be locked out with the use of an operator selectable password. Standard system hydraulic settings shall include at a minimum the following functions: loss of suction, lack of NPSHa, pump run-out protection, "dead-head" protection, constant pressure setting with variable flow capability, constant flow with variable TDH (pressure) capability, quadratic differential flow calculation, system curve compensation, multiple pump operation with alternation, pump starting point with allowable adjustable pressure drop, minimum speed with time delay, pressure of flow sensor error, overpressure shutdown, and low flow shutdown.

Q. Pressure Transducer

1. Pressure transducer shall be utilized for providing all pressure signals for the pump control logic. Pressure transducer shall be a solid-state bonded strain gage type with an accuracy of plus/minus 0.20% and constructed of 17-4 pH stainless steel. Transducer shall be rated for station discharge pressure as scheduled and shall provide gauge pressure output, rather than an absolute. Pressure transducer constructed of plastic is not acceptable. Pressure transducer shall be 4-20mA analog type with 7- 33 VDC supply range and utilize a packard type connector to prevent moisture intrusion. Transducer shall be manufactured by Texas Instruments. Pressure transducer shall be remote mounted. Refer to Contract Drawings for locations.

R. Controls and Enclosure

1. The control panel with controls shall be built in accordance with the NEC, and shall comply with UL standards. Pump station manufacturer shall be authorized under UL508A to manufacture its own control panels, and the control panel shall be manufactured by the pump station manufacturer. All equipment and wiring shall be mounted within the enclosure and each device shall be labeled for proper identification. All adjustments and maintenance shall be accessible from the front of the control enclosure. A complete wiring circuit diagram and legend with terminals, components, and wiring completely identified shall be provided. Main disconnect shall be interlocked with door.

    a. Panel face switches and lights:
        i. Reset—Acknowledges pump station alarms.
        ii. Individual pump disconnects.
        iii. Individual pump run and alarm lights.
        iv. Alarm horn.
        v. Low suction pressure reset.
    b. The pump station, including electrical components and enclosure, shall be UL labeled as a completed assembly with manufacturer's UL label applied to the pump station.
    c. Refer to Division 23 Section, "Instrumentation and Controls for HVAC and Plumbing Systems" for additional interlock requirements with ATC system.

S. Finishes: Paint

1. Steel base and main disconnect panel stand shall be grit-blasted with #50 steel grit per SSPC-10 to a near white metal condition. The cleaned steel surfaces shall immediately thereafter be primed with an industrial grade primer to a thickness of 2½ to 3 mils epoxy primer. The finish coat shall be acrylic enamel to a thickness of no less than 3 mils. The control panel shall be dip cleaned, acid etched and neutralized, iron phosphate coated and painted with a finish coat of 1½ to 2 mils of polyurethane.

T. Start up and Training

1. After the station startup has been completed, but before the technician leaves the job site, a training session shall be given to the owner or to the owner's representative, familiarizing that person (operator) with the pumping system operation, maintenance and adjustments.

U. Warranty Requirements

1. Provided that proper maintenance has been performed by the operator or user during warranty period, and a component failure occurs, the manufacturer shall provide the replacement part or component. Repairs done at manufacturer's expense must be pre-authorized. The start-up certificate must be on file with manufacturer to activate warranty. Manufacturer shall support a wide network of

## 2.18. PRE-PRESSURIZED DOMESTIC BOOSTER PUMP HYDROPNEUMATIC BLADDER TANKS

A. Provide and install pre-pressurized domestic booster pump hydropneumatic bladder tanks of size, capacity and arrangement as indicated on contract drawings. Pre-pressurized domestic booster pump hydropneumatic bladder tanks shall be FXA as manufactured by Wessels, Flexcon, Hydrocumulator, Taco, Bell & Gossett or approved equal. Mount tank as detailed on the drawings.

B. Pre-pressurized domestic booster pump hydropneumatic bladder tanks shall be specifically designed for use in potable domestic water booster pump systems. Tanks shall be pre-charged to required pressure at the factory. The minimum working pressure shall be rated for maximum suction pressure plus booster pump shut-off pressure. The maximum operating temperature shall be 240 degrees F. Pre-pressurized domestic booster pump hydropneumatic bladder tanks shall contain removable FDA approved butyl bladder. No water should come in contact with the walls of the tank.

C. Before installation, Contractor shall adjust the tank air pre-charge pressure to schedule valve.

D. The tank must be constructed in accordance with Section VIII of the A.S.M.E. boiler and pressure vessel code and stamped to scheduled working pressure.

E. Accessories: Pressure gauge and air charging fitting with guard, tank drain, precharge as indicated on contract drawing and ASME nameplate.

2.19. GAS SOLENOID SHUT-OFF VALVES

A. Furnish and install gas solenoid shut-off valves where indicated on the contract drawings. Valve sizes shall be identical to pipe size that solenoid valve is installed within. Gas solenoid valves shall be ASCO 8215G Series or approved equal.

B. Solenoid enclosures shall have "red-hat" metal solenoid enclosure. Solenoid valves shall be normally closed type, suitable for operation on electrical characteristics as indicated on the contract drawings. Valve body shall be aluminum with Buna "N" seating.

C. Valves shall be suitable for operating with an operating differential pressure of 50 psig. Valves shall be suitable for operation at maximum fluid temperatures of 125 degrees F.

D. Gas solenoid valves shall be U.L. listed and F.M. approved.

E. Install gas solenoid valves above ceilings or in valve boxes as detailed on the contract drawings. Power and control wiring shall be provided and installed by Electrical Contractor.

2.20. COMPRESSED AIR SYSTEMS

A. Furnish and install all components, piping, fittings, gauges, relief valves, flexible connectors, valves, drains, filters, air dryer, regulators, lubricators, hose reels necessary to form a complete and operating a shop compressed air systems to the extent indicated on the contract drawings utilizing new air compressor(s) and tank. This contractor is responsible for all equipment, rough-in and final connections as detailed on the contract drawings/specifications.

B. Contractor shall mount air compressor/receiver on vibration isolation material and bolt to concrete housekeeping pad. Flexible piping shall be provided between receiver and piping systems. Contractor shall provide and install piping from each compressors tank drain and refrigerated air dryer drain to adjacent floor drain. Compressed air piping shall be pitched to drain at suitable locations in the system. Refer to Division 22 Section, Plumbing Piping, Fittings, & Valves for pipe material and installation requirements.

C. Air compressors: Furnish and install lubricated, reciprocating air compressors of the size, capacity, arrangement, and electrical characteristics as detailed on the contract drawings. Air compressors shall be Champion, Gardner Denver, Quincy, Ingersol Rand, Kaeser or approved equal. Air compressors shall include the following performance features:

1. Provide factory assembled and tested, duplex, packaged and assembled, 100 percent continuous duty rated, belt driven, splash or pressure lubricated, two stage reciprocating, piston type, centrifugal air compressors as indicated, of capacities and electrical characteristics indicated on contract drawings.

2. Compressors shall be cast iron construction with multi-finned cylinders for maximum cooling, gasket free integral cylinder/head, ductile iron crankshaft, aluminum or cast iron pistons and connecting rods, Swedish steel disc type valves, balanced flywheel with fan cooling blades, large diameter, finned inter-coolers, positive acting centrifugal un-loader, tapered roller bearings, inter-stage pressure relief valves, heavy duty 5 micron inlet filter/mufflers, oil sight gauge and drain, low oil shutdown switch, enclosed OSHA belt guards, EPACT '92 energy efficient open drip proof motor, and U.L. listing.

3. Air compressors shall be tank mounted. Tank mounted compressors shall include ASME code 200 PSIG horizontal air receiver. Air receiver shall include 0-300 PSIG liquid filled pressure gauge with snubber and needle valve, bucket high drain valve, ASME code bronze pressure relief valve, hand operated ball valve, factory set pressure switch. The receiver shall have base ring or support legs for mounting to concrete housekeeping pad. Vibration isolators shall be provided for the receiver. Receiver shall include automatic timed solenoid drain as specified. Tank shall be fully primed and finished in manufacturer's standard finish.

4. Air compressor shall be arranged for automatic start-stop control. Each compressors shall be supplied with pressure switch to control each compressor. Each pressure switch shall have adjustable differential control.

5. Each air compressors shall be supplied with an air cooled after-cooler. After cooler shall bring compressed air discharge temperature to within 20 degrees F of ambient air temperature. Unit shall be finned radiator type and packaged directly on compressor. A packaged moisture separator and trap shall be provided to remove all condensate removed from compressed air.

6. Compressed air systems shall be supplied with unit mounted and wired control panel as follows:

    a. Control panel shall be NEMA 1 general purpose indoor enclosure
    b. Combination Magnetic motor starters with individual thru-the-door disconnects, motor overloads and external reset buttons

c. Hand-Off-Automatic Selector Switches
d. Control voltage transformers - Primary & Secondary
e. Low oil monitor with shutdown
f. Power on light
g. Compressor run light
h. Automatic alternator timed rotation alternator
i. Phase loss protection

7. Compressor package shall have one year parts warranty from date of start-up, or (18) months from date of shipment. Compressed air end shall have (60) month warranty from date of start-up or (66) months from date of shipment. This shall include parts and labor on compressor air end.

D. Refrigerated Air Dryer: Furnish and install a cycling refrigerator air cooled dryer with the capacity and electrical characteristics as scheduled on the contract drawings. Refrigerated air dryer shall be Heatsink Model HSE as manufactured by Zeks, Arrow Pneumatics, Ingersoll-Rand or approved equal. Furnish refrigerated air dryer with the following performance features:

1. Unit shall be heat sink type and consist of a mechanical refrigeration system, equipped with automatic temperature control that will cycle the refrigerated system to match variable loads from 0 percent to 100 percent capacity.

2. Specially formulated heat sink material shall surround a smooth bore copper tube on tube evaporative section. The heat sink material shall be cooled by the refrigeration system which in turn shall cool the tubes to cool the dry compressed air. Refrigeration compressor horsepower shall be as specified on contract documents and shall be hermetic type equipped with automatic start-stop capacity control.

3. Moisture separator shall be low velocity centrifugal type.

4. Unit shall be controlled by micro-processor controller including exchanger temperature, % savings digital display, dew point temperature, adjustable dew point setting, automatic solenoid drain with drain open/closed adjustment, drain test switch, anti-rapid cycle timer, high temperature alarm light with relay for remote, low temperature alarm light with relay for remote, Fahrenheit and Centigrade temperature display, refrigerant suction pressure gauge, installed drain trap, on/off switch with power on light.

5. Unit shall be U.L. listed and furnished with packaged automatic solenoid drain. Pipe condensate trap to floor drain and install dryer on a 4-inch high housekeeping pad.

E. Compressed Air filters: Furnish and install particulate and coalescing filters of capacity and quantity as indicated on the contract drawings. Filters shall be as follows:

1. 3-Micron Particulate filters - Units shall have corrosion resistant cast aluminum ally head and aluminum alloy bowl. Bowl assembly shall have threaded connections with "O"ring seal for easy access for cartridge replacement. Unit shall have durable enamel finish. Filter shall have pressure drop indicator to indicate

filter replacement and installed internal automatic drain. Unit shall have 3-micron absolute removal. Unit shall be Zeks "PT" series, Arrow, Ingersoll-Rand, Kaeser or approved equal.

2. 0.3 Micron Coalescing Filter - Unit shall have corrosion resistant cast aluminum alloy head and aluminum alloy bowl. Bowl assembly shall have threaded connections with "O" ring seal for easy access for cartridge replacement. Unit shall have durable enamel finish. Filter shall have pressure drop indicator to indicate filter replacement and installed internal automatic drain. Unit shall have 0.3-micron absolute removal. Unit shall be Zeks "LT" series, Arrow, Ingersoll-Rand, Kaeser or approved equal.

3. All filters and housings shall be constructed to withstand 250 psig maximum working pressure.

F. Compressed Air Pressure Regulators: Provide and install pressure regulator where indicated with built-in safety relief valve. Outlet pressure is to be set as specified and to remain constant regardless of inlet air pressure and changes in downstream flow requirements. Unit to be provided with high pressure gauge on outlet and high pressure gauge on inlet. Provide three (3) valve bypass around pressure reducing station as detailed on contract drawings. Pressure regulator shall be constructed of aluminum alloy or Zinc, diaphragm operated, direct acting, spring loaded design with manual adjustment knob and rated 300 psig maximum. Unit shall be relieving type with balanced valve design. Main pressure regulator shall be Arrow, Hankison, Kaeser, Wilkerson or approved equal.

G. Compressed Air Combination Pressure Regulator/Filter/Lubricator: Furnish and install combination pressure regulator/filters/ lubricators of the capacity and quantity as indicated on the contract drawings. Units shall be provided with built-in safety relief valve. Outlet pressure to be maintained at scheduled value regardless of inlet air pressure and changes in downstream flow requirements. Unit to be provided with high pressure gauge on outlet and inlet. Valve body shall be constructed of zinc. Assembly shall be diaphragm operated, direct acting, spring loaded design with balanced valve design. Filter shall be constructed of sintered polypopylene. Lubricator shall be equipped with drip chamber and sight dome for observing oil drop entering airstream, with a oil-feed adjustment screw and quick-release collar for easy bowl removal. Lubricant shall be non-detergent, petroleum base oil no heavier than SAE 10. The maximum oil droplet flow rate shall be one drop of oil for every SCFM air delivered at 80 psig. Combination units shall be Model C as manufactured by Wilkerson, Arrow, Hankison, Kaeser, Mastercraft, or approved equal.

H. Each compressed air system shall be equipped with a main safety relief valve. Safety relief valves shall be ASME BPVC Section VIII DI and ASME BPVC Section IX Code stamped safety valve, for unfired pressure vessels, bronze, with threaded or flanged connectors; factory set and sealed.

I. Provide and install pressure gauges at all locations shown on contract drawings. Pressure gauges shall be ANSI/ASME B40.1 rated, Accuracy Grade A, for air, with steel or brass case, and nonshatterable safety glass, and a pressure blowout back to prevent glass from flying out in case of an explosion. Gauges shall have a 3 1/2-inch minimum diameter dial and a dial range of approximately twice working pressure.

J. Furnish and install as indicated on drawings, timed automatic condensate drain. Unit shall

be 200 PSIG working pressure. Unit shall consist of condensate reservoir, timer operated solenoid drain. Unit shall have fully adjustable drain cycle time, fully adjustable valve open duration, power on light, valve open light, NEMA 4 UL/CSA approved housing, solid state timer, and eight foot, three prong power cord. Units shall be as manufactured by Arrow Pneumatics, Hankison, Zeks, Sparten or approved equal.

K. Furnish and install adjustable pressure regulators at each compressed air drop, hose reel and equipment as detailed on the contract drawings. Pressure regulators shall include balanced valve design, spring loaded diaphragm, adjustment knob, built-in pressure gauge, drain plug and zinc body. Units shall be selected and constructed to withstand a maximum working pressure of 250 psig. Units shall be as manufactured by Arrow Pneumatic, Hankison, Zeks, Sparten, Vanguard or approved equal.

L. Provide and install quick disconnect couplings at all drops and wherever indicated on contract drawing. Quick disconnect coupling shall be all brass and suitable for a working pressure of not less than 200 psig. Female side of coupling shall (fixed end) have male thread connection with automatic shutoff. Provide male side of coupling with hose stem and ball check to bleed pressure from hose and prevent hose whipping. Provide two (2) quick disconnects at compressed air drops where indicated on contract drawings. Quick connect/disconnect hose couplings shall be as manufactured by Aero-Quip, Champion, Hansen, Schrader or approved equal.

M. Provide and install compressed air hose reel assemblies at all locations shown on the contract drawings. Hose reel assemblies shall be Model HRL 35-35 as manufactured by Appleton, Reelcraft, or approved equal. Each hose reel shall be complete with 35 Ft of ½-inch diameter hose rated for a minimum of 250 psig. Hose reels shall include ball stop, locking ratchet, four roller hose guides with adjustable arms, orange epoxy/polyester finish, and Model SHRL-A swivel base for full 360° rotation. Hose reels shall be mounted as approved by Structural Engineer. Provide structural support extension steel so as to not exceed manufacturer’s maximum mounting height.

N. Where indicated on contract drawings, contractor shall provide rough-in and final connection to equipment provided by owner or under another Division of these specifications.

O. Factory start-up shall be provided by manufacturer's representative. Start-up shall include a minimum (4) hours and should include complete operational check of compressed air system, pressure switch adjustments, motor amp draw, and correct operation of all system components. Manufacturer's representative shall also instruct owner's personnel on operation and maintenance of the compressed air system components.

2.21. HIGH/LOW MIXING VALVES WITH CABINET

A. Furnish and install high/low thermostatic controller valves of the size, capacity and arrangement as scheduled on the contract drawings. Units shall be pre-piped and installed within a surface mounted cabinet.

B. Each unit shall consist of two (2) thermostatic controllers with swivel action check stops, removable cartridge with strainer, stainless steel piston and liquid fill thermal motor with bellows element mounted out of water, inlet manifold piping, pressure reducing valve (PRV), two (2) pressure gauges, two (2) ball valves, bi-metal dial thermometer (3-inch

face, range 201 – 240 degrees F), wall bracket, connecting piping and fittings to cabinet limit.

C. All equipment and piping shall be finished in rough bronze and/or copper. Bottom supplies and top outlet. Field insulate all piping within the cabinet as specified in Division 22 Section, Plumbing Insulation.

D. Cabinet shall be surface mounted with 16 gauges body, white baked enamel finish, 12 gauge left hinged door with cylinder lock and key.

E. Complete unit shall be factory assembled and tested. Field insulate all piping within enclosure.

F. High/low mixing valves shall be Symmons, Lawler, Powers, Acorn, or approved equal.

G. High/low mixing valves must be piped per the manufacturer's recommendations.

H. High/low mixing valves shall be ASSE 1017 rated.

2.22. GAS/COMPRESSED AIR ZONE VALVE BOX

A. The Zone Valve Box shall be constructed of 18 gauge steel with a white, baked enamel finish, and provided with two steel brackets to anchor the box to the wall. Anchor brackets shall be so designed to permit boxes to ganged together in a vertical stack. Size and select valve boxes to accommodate quantity of pipes and valves as indicated on the Contract Drawings.

B. Manual valves, where indicated shall be full flow, double seal, ball type with: bronze body, buna-N seals and O-ring packing, chrome plated brass ball and designed for working pressures up to 300 P.S.I.G. Only 3 turn of the handle shall be required to operate the valve from full "ON" to "OFF" position. In the "OFF" position, the valve handle shall protrude from the box to prevent the door from being shut. The valve shall be securely attached to the back of the box and provided with type L or K copper tube extensions for making connection to concealed piping outside of the box. Electric solenoid valves shall be as herein specified.

C. The zone valve box assembly shall have a sliding, transparent door with a pull handle and release button which retains the door in the "OPEN" and "CLOSED" positions. In an emergency, the door shall "SNAP-OUT" without exposing sharp edges. The release button shall incorporate a locking device which prevents the valve from being operated by unauthorized persons. A molded plastic cover shall trim the box to the rough wall opening. The top and bottom of the cover shall have interlocking edges for vertical, gang mounting, installations. The front of the cover shall be trimmed with brushed finish stainless steel.

D. Zone valve boxes shall be selected to accommodate the type, size and quantity of valves as indicated on the contract drawings. Zone valve box shall be Puritan-Bennet, Medaes, Potter Rhoemer, or approved equal.

2.23. THERMOSTATIC MIXING VALVES (INDIVIDUAL FIXTURE TYPE)

A. Furnish and install thermostatic mixing valves at all lavatories, shampoo sinks, pedicure

sinks, and kitchen hand sinks that are provided with hot water temperatures above 109 degrees F.

B. Thermostatic mixing valves shall be Bradley S59-4000A, Watts, Acorn, Sloan, Caleffi, or approved equal for installation under lavs. Provide in-line check valves, lead free body, escutcheon plates, inlet filters, and insulation as required. Thermostatic mixing valves shall be adjusted to deliver 105 degrees Fahrenheit hot water when supplied with 140 degrees Fahrenheit delivering hot water. Furnish with adjusting cap with locking feature.

C. The thermostatic mixing valves shall be ASSE standard 1070 listed.

2.24. ICE MAKER COLD WATER INLET FILTER

A. Provide and install a cartridge type water filter on the cold water inlet to the kitchen ice maker as detailed on the contract drawings. Housing shall be constructed of PVC with 3/4-inch NPT connections. Heads shall be cast bronze nickel plated with nickel plated "T" handle cap nut. Unit shall have pet cock bottom drain. Housing shall contain two (2) 20 micron cartridge filters. The entire filter assembly shall be rated for 150 psig. Unit shall be capable of handling a minimum 6 gpm. Housing shall be as manufactured by Keystone or approved equal.

B. Install filter housing to allow access for service and filter replacement.

2.25. ELEVATOR PIT SUMP PUMP

A. Furnish and install an elevator pit submersible sump pump of the size, capacity and electrical characteristics as shown on the drawings. System shall include submersible pump, 2-inch discharge flange/piping, grate with cover, float switches, oil sensor, remote mounted control panel and control system. Pumps and accessories shall be by Stancor Oil Minder, Zoeller, Liberty, Bell & Gossett, or approved equal.

B. Pumps:

1. Pump Design: The pump shall be capable of handling clean water waste. The pump(s) shall be capable of handling liquids with temperatures to 104 degrees F continuous, 160 degrees F intermittent, and shall be capable of running dry for extended periods. Pump shall include thermal and overload protection.

C. Pump Construction:

1. The volute, seal plates, impeller and motor housing shall be constructed of high quality #304 stainless steel. The pump(s) shall be painted with a water based air dry enamel of 2.0 mil minimum thickness. All exposed hardware shall be 300 series stainless steel. The pump construction shall contain no points of critical clearance nor require periodic adjustment or replacement to maintain operating efficiency. Discharge connection shall be a standard 2-inch NPT in the vertical position. All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements.

2. The impeller shall be of the non-clog design with pump out vanes on the back side.

The impeller shall be dynamically balanced to ISO G6.3 specifications.

3. The unit shall utilize a single mechanical shaft seal which shall operate in an oil atmosphere. The materials of construction shall be carbon for the rotating face and ceramic for the stationary face, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The seal shall be commercially available and not a proprietary design of the manufacture.

4. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability. Motor designs incorporating shrink or press fit assembly between the stator and motor housing shall not be acceptable. The motor shall be constructed with the windings operating in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated. Air-filled motors shall not be acceptable. The motor windings shall be of Class "F" insulation. The motor shall meet the standard NEMA design L for single phase and NEMA design B for three phase. The motor shaft shall be of 416 stainless steel. The lower bearing shall be of the single ball type to accept radial and thrust loads, and the upper bearing of the sleeve or ball design, for radial loads. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.

5. Thermal sensors shall be used on three phase units to monitor stator temperatures. The stator shall be equipped with a thermal switch embedded in the end coil of the stator winding. This shall be used in conjunction with external motor overload protection and wired to the control panel. Single phase shall have an overload switch on the motor windings and do not require any external protection. Three (3) phase motors shall include phase loss protection.

6. The pump shall be equipped with type neoprene jacketed power cable and connected to the motor via quick disconnect spade terminals length as required. Crimp connected cords are not acceptable. Heat shrink tubes shall be used to connect power cord leads with motor leads. A master heat shrink tube shall be provided and filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. A secondary rubber pressure groment shall be provided as an additional sealing point and strain relief at the point of cable entry. Cable entry designs utilizing terminal boards to connect power cord leads with motor leads shall not be acceptable.

7. The sump grate shall be custom sized to accommodate the dimensions of the sump. Grate shall be galvanized steel and have openings for all pipes/conduits as required.

D. Pump Test:

1. The pump manufacturer shall perform the following inspections and tests in accordance with Hydraulic Institute type B standards before shipment from the factory.

2. A check of the motor voltage and frequency shall be made as shown on the name plate.

3. A motor and cable insulation test for moisture contents or insulation defects shall be made per UL criteria.

4. The pump shall be completely submerged and run to determine that the unit meets three pre-determined hydraulic performance points.

5. A written report shall be available showing the aforementioned tests have been performed in accordance with the specifications.

E. Start-Up:

1. The pump(s) shall be tested at start-up by a qualified representative of the manufacturer. A start-up report as provided by the manufacturer shall be completed before final acceptance of the pump(s).

2. Warranty: Two (2) years from substantial completion.

F. Float Level Controls:

1. Provide and install three (3) level controls as detailed on the drawings. Two (2) level controls shall be utilized for the pump operation and the remaining level control shall be utilized for high water level alarm. Level controls shall be provided in a pipe mounted configuration with 25 feet of cable. Level controls shall be pilot duty devices which shall control the function of motor load devices, contactors, motor starters and power relays, to automatically cycle pumps. Switches shall be rated at 4.5 Amps at 115 VAC RES, Provide pole and stainless steel clamps and hardware.

2. Where required, provide custom length of cables to accommodate distance between sumps and control panels where the minimum 25 feet length is insufficient.

G. Valves:

1. Provide and install discharge valves on the pump as detailed on the drawings. Ball check valves shall be provided with removable threaded plug and natural rubber ball. Valve body shall be ASTM class 30. Cast iron valve shall be able to withstand 150 psig.

2. Ball Valves:

a. Ball valves shall be True Union Type manufactured of Type 1 Schedule 80 PVC with EPDM O-rings for superior chemical and corrosion resistance. Valves shall be quick disconnect type for ease of maintenance. Ball valves shall be suitable for pressures up to 150 psig.

H. Control Panel:

1. The pump manufacturer shall supply a completely self-contained motor control panel. The control panel shall be provide with short circuit and overload protection for the pump. Furnish control panel with 8 pin twist lock receptacle, dual solid state oil sensor relays with reliable sensitivity settings, over current relay, sensor probe, horn, alarm silencing switch, terminal board and remote monitoring contacts. Furnish sufficient cable between pump and control panel. Furnish sufficient cable and plug for the control panel.

2. The motor controls shall be housed in a NEMA 4X enclosure. The enclosure shall be formed of 16 or 14 gauge, G-90 galvanized steel, with all surfaces phophatized then finished inside and out with ANSI 61 gray polyester powder finish. The door shall be equipped with two galvanized hinges with stainless steel hinge pins. The enclosure shall have external mounting tabs for wall mounting.

3. A magnetic starter shall be provided for each pump motor. The starter shall be equipped with a three (3) pole bimetalic overload relay with ambient compensation and Class 10, quick trip heaters. Heaters must be properly sized for motor load. The overload relay shall provide the terminals for connection of the pump motor cable.

4. A control transformer shall be provided to supply low voltage as required for the control circuit. The transformer shall be continuous duty machine tool type, size to meet the load requirements of the control circuit. The transformer primary shall be connected to the load side of the circuit breaker. One side of the secondary winding shall be grounded to the component mounting panel.

5. A terminal block shall be provided for connection of level controls, oil sensor, alarms, remote monitoring and other control wiring as required for proper pump installation.

6. Control panel shall be interlocked with floats and oil sensor to allow pumping of water while containing oil. Control panel shall be fully automatic and shall provide for an alarm and LED lights in the event of any of the following:

    a. Presence of oil in the sump.
    b. High water level.
    c. High amps.
    d. Locked rotor.

7. Furnish additional contacts/relays for remote monitoring of high water alarm and oil presence alarm on facility automatic temperature control system. Coordinate with Division 23 Section, Instrumentation and Controls of HVAC and Plumbing Systems.

8. The control panel shall be wired in accordance with all applicable requirements of the National Electrical Code. Control wiring shall be sixteen (16) AWG red for control circuits and white for neutral grounded conductors. Power wiring shall be a minimum of 14 AWG black. Each conductor shall be numbered. The ends of all wires shall be tinned with 60/40 lead tin alloy sold. All wiring shall be performed in a neat and orderly manner.

2.26. IN-LINE COLD WATER INLET FILTER

A. Provide and install a cartridge type water filter on the cold water inlet to the water heaters as detailed on the contract drawings. Housing shall be constructed of PVC with 3/4-inch or 1 inch NPT connections. Heads shall be white talc reinforced polypro head. Housing shall contain one (1) 10 micron cartridge filters. The entire filter assembly shall be rated for 150 psig with maximum 5 psig pressure drop. Unit shall be capable of handling a minimum 15 gpm. Cartridge shall be nominal 4" diameter, 20" long pleated polypropylene, pleated polyester or other NSF safe material as required to meet specified performance. Provide filter with wall mounting bracket. Housing shall be as manufactured by Keystone, AMTROL, Watts, ITT Water Equipment, Culligan, International, or approved equal.

B. Install filter housing to allow access for service and filter replacement.

C. Provide 5 spare cartridges. Document in writing that cartridges have been turned over to Owner and forward copy to the Architect.

2.27. OPEN HUB DRAIN

A. Furnish and install open hub drain valves with integral ball float valve as detailed on the Contract Drawings. Open hub drains shall be Josam model 67100A series, Zurn, Mifab, Watts, or approved equal.

B. Open hub drain shall be coated cast iron backwater valve, plastic ball float, elastomer seat, bronze cage, and bottom outlet spigot connection. Size shall be as indicated on Contract Drawings.

C. Connect to stormwater system or as indicated on the Contract Drawings.

D. Insulate and jacket all piping/equipment to prevent condensation.

2.28. GREASE INTERCEPTORS (HIGH DENSITY POLYETHYLENE)

A. Requirements: Grease Interceptors shall meet requirements specified in ASTM F2649. Grease Interceptors shall have a smooth interior and annular exterior corrugations using pipe that meets AASHTO M252 Type S, AASHTO M294 Type S or ASTM F2306. The inlet and outlet of the unit shall utilize SDR 32.5 HDPE pipe. A weir plate shall be installed with an orifice centrally located to control flow into the last chamber. At the weir plate a vertical half-round pipe shall be installed to minimize contaminants through the orifice. Provide and install risers, manholes, and manhole covers. Manhole covers shall be suitable for anticipated traffic.

B. Joint Performance: Connections to the inlet and outlet shall utilize couplers with the same joint performance as the main sewer pipe.

C. Material Properties: Virgin material for pipe & fittings used to produce the Grease Interceptor shall be high density polyethylene conforming with the minimum requirements of cell classification 424420C for 4- through 10-inch (100-to 250-mm) diameters, and 435400C for 12- through 60-inch diameters as defined and described in the latest version of ASTM D3350.

D. Installation: Installation shall be in accordance with the manufactures installation guidelines, utilizing a class 1 (ASTM D2321) structural backfill material or flow able fill (CLSM-Controlled Low Strength Material).

2.29. INDUSTRIAL RETRACTABLE WATER HOSE REEL

A. Industrial Retractable Water Hose Reel shall be Model 7850 OLPSW57 as manufactured by ReelCraft or approved equal.

B. Unit shall be capable of mounting to structural steel. Include applicable mounting bracket.

C. The reel's base and guide arm shall be formed from high-grade steel and engineered with structural forms and gussets to yield the greatest amount of strength. Reel shall be used for water.

D. Unit shall come with full flow, stress free swivel to insure maximum service life. Hose shall be plumbed into the base to eliminate the risk of undue stress on the swivel.

E. Hose reel shall have a long life drive spring. De-clutching arbor shall be provided to eliminate possibility of spring damage due to reverse winding.

F. All components of Hose Reel shall have individually powder coated components to prevent corrosion.

G. Inlets: 1/2-inch NPT cold water. Hose Outlet: 3/4-inch NPT.

H. Pressure: 300 psi max. Temperature: 150°F max.

I. Hose Nozzle: Industrial application type nozzle suitable for 180 degrees F with finger touch spring control, self-closing automatic shut-off, stainless steel body and stainless steel internal parts.

J. Accessories: Vacuum breaker hose connection, powder coated finish, stainless steel hose rack, 3/4-inch EPDM hose with 50 Ft length, couplings, stainless steel spring protector.

## PART 3. EXECUTION

3.1. GENERAL INSTALLATION REQUIREMENTS

A. Install all equipment in accordance with manufacturer's instructions.

B. Install components plumb and level.

C. Cleanouts in vertical pipes shall be installed in tees near floor. Cleanouts in horizontal pipes shall be installed with wyes on long sweep quarter beds. Cleanouts punching water proofing membranes shall have flashing clamps. Cleanout access covers in dry wall or gypsum board shall be painted to match walls.

D. Extend cleanouts to finish floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage

system.

E. Encase exterior cleanouts in concrete flush with grade.

F. Install water heaters in accordance with manufacturer's instructions and to AGA, NSF, ANSI/NFPA 54, UL requirements and Delaware Boiler and Pressure Vessel Safety Act and Regulations. For gas fired water heaters, conduct a combustion flue gas analysis. Submit flue gas analysis report to Engineer for review. Record and submit design and actual draft at appliance vent connection.

G. Coordinate with plumbing piping and related fuel piping, gas venting and electrical work to achieve a complete operating system.

H. Install domestic water storage tanks in accordance with manufacturer's instructions.

I. Provide painted steel pipe support for tanks independent of building structural framing members.

J. Clean and flush domestic water heater tanks after installation. Seal until pipe connections are made.

K. Support piping adjacent to all pumps such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inches (100 mm) and over.

L. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitations, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

M. Align and verify alignment of base mounted pumps prior to start-up.

N. For sump pumps ensure shaft length allows sump pumps or ejector to be located minimum 24 inches (600 mm) below lowest invert into sump pit and minimum 6 inches (150) clearance from bottom of sump pit.

O. All plumbing, vents in exterior walls shall be offset a minimum of 3'-0" in ceiling at roof before penetration.

P. All plumbing vents within a 10'-0" radius of exhaust vents shall be extended to a height of 3'-0" above exhaust vent crown.

Q. All plumbing vents within a 10'-0" radius of any rooftop unit or intake louver shall be extended to a height of 3'-0" above fresh air intake.

R. Slopes and invert elevations of all interior piping shall be established before any piping is installed in order that proper slopes will be maintained. All piping shall be located and determined where to be run to avoid conflict with other trades.

S. Unless otherwise noted, all plumbing piping shall be routed as high as possible between bottom of roof joists and above ceiling to allow proper installation of ductwork, fire protection piping, conduits, etc.

T. Coordinate with Architectural Drawings before roughing in plumbing.

U. All openings in ceilings and plenum walls for plumbing shall be sealed air tight and protected with fire stop.

V. See site plan for extent of all piping leaving and entering building.

W. See domestic water riser diagrams for location of valves, shock absorbers, balance valves, etc.

X. Make proper HW, CW, hot water recirculating, waste, and vent connections to all equipment even though all branch main, elbows and connections are not shown.

Y. Cleanouts shall be provided near base of each vertical waste or solid stack. Provide 18" minimum clearance for access.

Z. Domestic hot, cold and recirculating water piping shall be installed between ceiling and roof insulation.

AA. Unless otherwise noted, horizontal sanitary piping pitches shall be 1 percent.

BB. Unless otherwise noted, all domestic water piping and fire protection piping shall be installed on heated side of ceiling insulation.

CC. All piping and installation shall comply with all local and national plumbing codes. Test piping as required by plumbing code and authority having jurisdiction.

DD. For sizes of all domestic water piping see plumbing fixture schedule and domestic water riser diagrams.

EE. For sizes of all sanitary and vent piping see plumbing fixture schedule and sanitary/vent riser diagrams.

FF. Set fill pressure on airside of 36ydropneumatics tanks to the pressure required by the booster pump manufacturer to allow shut-down of booster pump set during periods of no flow.

3.2. DOMESTIC WATER HEATER INSTALLATION REQUIREMENTS

A. Install units on concrete bases, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

B. Anchor units to substrate.

C. Install combustion air and flue vents as detailed on contract drawings. Terminate and install combustion air and flue vent piping per manufacturer's requirements.

D. Install condensate hose below exhaust elbow per manufacturer's requirements. Extend condensate hose continuous downward pitch and discharge into condensate neutralizer. Install lime chips in condensate neutralizer.

E. Install temperature and pressure relief valves in top portion of storage tank shells of units with storage. Use relief valves with sensing elements that extend into shells. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain. Install union on relief valve discharge piping. Install automatic air vent at top of hot water supply piping with union ball valve.

F. Install pressure relief valves in water piping for units without storage. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

G. Install vacuum relief valves in cold water inlet piping.

H. Install unit drain piping as indirect waste to spill into open drains or over floor drains. Install hose end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 22 Section, Plumbing Piping, Fittings and Valves for drain valves.

I. Install thermometers on unit inlet and outlet piping. Refer to Division 22 Section, Plumbing Piping, Fitting and Valves for thermometers. Install pressure gages on unit piping.

J. Fill unit with water. Install domestic water expansion tank and charge with air. Install piping adjacent to units to allow service and maintenance.

K. Connect hot and cold water piping with shutoff valves and unions. Connect hot water circulating piping with shutoff valve, check valve, and union.

L. Make connections with dielectric fittings where piping is made of dissimilar metal.

M. Electrical Connections: Power wiring is specified in Division 26 Sections. Arrange wiring to allow unit servicing.

N. Ground equipment

1. Tighten electrical connectors and terminals according to manufacturers published torque tightening values. If manufacturer’s torque values are not indicated, use those specified in UL 486A and UL 486B.Engage a factory authorized service representative to perform startup service.

O. In addition to manufacturer’s written installation and startup checks, perform the following:

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment and retest until satisfactory results are achieved.

2. Verify that piping system tests are complete.

3. Check for piping connection leaks.

4. Check for clear relief valve inlets, outlets, and drain piping. Check operation of circulators.

5. Test operation of safety controls, relief valves, and devices. Energize electric circuits.

6. Adjust operating controls.

7. Adjust hot water outlet temperature settings. Do not set above 140 deg F 60 deg C unless piping system application requires higher temperature.

3.3. PLUMBING SPECIALTY INSTALLATION REQUIREMENTS

A. General: Install plumbing specialty components, connections, and devices according to manufacturer's written instructions.

B. Install backflow preventers of type, size, and capacity indicated, at each water supply connection to mechanical equipment and systems, and to other equipment and water systems as indicated. Comply with authorities having jurisdiction. Locate backflow preventers in same room as connected equipment. Install air gap fitting on units with atmospheric vent connection and pipe relief outlet drain to nearest floor drain. Do not install bypass around backflow preventer. Label all piping downstream of backflow preventers as "non-potable" water.

C. Field test all backflow preventers and submit test reports to Engineer. Furnish test kits as required for field testing.

D. Install pressure regulators with inlet and outlet shutoff valves and balance valve bypass. Install pressure gages on inlet and outlet.

E. Install strainers on supply side of each control valve, pressure regulator, and solenoid valve, and where indicated.

F. Install hose bibbs with integral or field installed vacuum breaker.

G. Install wall hydrants with integral or field installed vacuum breaker.

H. All hose bibs shall be mounted 18" above finished floor, unless otherwise specified.

I. All wall hydrants shall be mounted 24" above finished grade unless otherwise specified.

J. Install roof hydrants 41 inches above finished roof.

K. Install trap seal primer valves with valve outlet piping pitched down toward drain trap a minimum of one percent and connect to floor drain body, trap, or inlet fitting. Adjust valve for proper flow. Install trap priming stations plumb and level with adequate access for servicing and maintenance.

L. For all trap primer pipes label the same as to the location of the floor drain served.

M. For floor drains located in toilet rooms and similar spaces where flush valves are utilized. Contractor may utilize trap primer line from flush valve tail piece.

N. Install backwater valves in building drain piping as indicated. For interior installation,

provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing. Fasten wall hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated. For exterior installation provide handhole with hinged cover and top mounted to be flush with grade.

O. Fasten recessed, wall mounting plumbing specialties to reinforcement built into walls.

P. Secure supplies to supports or substrate.

Q. Install individual stop valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve as appropriate is not indicated.

R. Install water supply stop valves in accessible locations.

S. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep pattern escutcheons if required to conceal protruding pipe fittings.

T. Include wood blocking reinforcement for recessed and wall mounting plumbing specialties.

U. Install ball valves at all shock absorbers to allow removal for service/replacement.

3.4. WATER METER INSTALLATION REQUIREMENTS

A. Install water meters, piping, and specialties according to AWWA M6 requirements.

1. Install plate strainer upstream of water meter.

2. Install displacement type water meters with shutoff valve on water meter inlet. Install valve on water meter outlet and valved bypass around meter, unless prohibited by authorities having jurisdiction.

3. Install compound type water meters with shutoff valves on water meter inlet and outlet and on valved bypass around meter. Support meters, valves, and piping on brick or concrete piers.

4. Install detector type water meters with shutoff valves on water meter inlet and outlet and on full size valved bypass around meter. Support meter, valves, and piping on brick or concrete piers. Install roughing in piping and specialties for water meter installation according to utility’s instructions and requirements.

B. Install power and control wiring from water meter to ATC system.

C. Field insulate and jacket water meter to prevent condensation.

D. Provide spare strainer screen for all water meters with integral strainers.

E. Install power wiring to water meter and encoder/reader.

3.5. FITTINGS FOR FIXTURES SUPPLIED BY OTHERS

A. Fixtures such as built in sink in counters and kitchen equipment are provided under other divisions of the specifications and are complete with strainer and tailpiece. Fittings, accessories and connection of these fixtures to the plumbing system are provided under this section.

B. Rough-in and final connection includes but is not limited to all domestic water, waste, and vent, gas and compressed air systems. Furnish stops, strainers, vacuum breakers, and under counter insulation where not furnished under another Division of these specifications.

3.6. KITCHEN EQUIPMENT INSTALLATION

A. The kitchen equipment plumbing fixtures are provided under the Architectural Division of these specifications. Rough-in and final connection shall be provided under this Division. Coordinate final connection and rough-in dimensions with Architectural Contract drawings.

B. The rough-in requirements are as scheduled on the drawings. The equipment No's are per the kitchen equipment drawings.

C. Water Inlets:

1. Water inlets shall be located above the positive water level wherever possible to prevent siphoning of liquids into the water supply system. Wherever conditions shall require a submerged inlet, a suitable type of check valve (except in jurisdictions where check valves are prohibited) and vacuum breaker shall be placed on the fixture to prevent siphoning. Where exposed to view, piping and fittings shall be chrome-plated.

D. Drain Lines:

1. Plumbing Contractor shall provide and install indirect waste lines from equipment which will discharge into floor drains or safe wastes in accordance with Plumbing Rough-In plans, chrome-plated where exposed. Extend to a point at least 1-inch (or as required by local codes) above the rim of the floor drain, cut bottom on 45 degree angle and secure in position.

2. All horizontal piping lines shall be run at the highest possible elevation and not less than 6-inch above finished floor, through equipment where possible.

3. No exposed piping in or around fixtures or in other conspicuous places shall show tool marks of more than one thread at the fitting.

4. Provide suitable pressure regulating valves for all equipment with such components that might reasonably be expected to be affected over a period of time by adverse pressure conditions.

E. Sealants:

1. Provide and apply sealant where kitchen equipment plumbing fixtures come in

contact with walls and floors.

2. Sealant, shall conform to ASTM C920; type S Grade NS, Class 25, Use Nt, with characteristics that when fully cured and washed meets requirements of Food and Drug Administration Regulation 21 CFR 177.2600 and N.S.R. RTV-732 for use in areas where it comes in contact with food.

3. Dow-Corning #780 or General Electric "Silastic", or approved equal, in either clear or approved color to match surrounding surfaces and applied in accordance with manufacturers recommendations for a smooth, sealed finish.

3.7. TESTING

A. After plumbing fixtures are connected, all piping and fixtures shall be tested for operation and a smoke or peppermint test shall be made on all soil, waste and vent piping.

B. After the building has been occupied and the various equipment is in actual use, the Contractor shall make an operating test of all equipment at a time directed by the Engineer to determine that all contract requirements are met.

3.8. CLEANING AND STERILIZATION

A. After final testing for leaks, all potable water lines shall be thoroughly flushed, by plumbing contractor, to remove foreign material. Before placing the systems in service, sterilize the new water lines in accordance with local health department codes and at a minimum according to the following procedure:

1. Through a ¾-inch hose connection in each branch main and building main, pump in sufficient sodium hypochlorite to produce a free available chlorine residual of not less than 200 ppm. Plumbing Contractor shall provide plumbing connections and power for pumping chlorine into system.

2. Proceed upstream from the point of chlorine application opening all faucets and taps until chlorine is detected. Close faucets and taps when chlorine is evident.

3. When chlorinated water has been brought to every faucet and tap with a minimum concentration of 200 ppm chlorine, retain this water in the system for at least three (3) hours.

4. CAUTION: Over-concentration of chlorine and more than three (3) hours of retention may result in damage to piping system. It is not necessary to retain chlorine in any system for twenty-four hours to achieve sterilization. AWWA states that 200 ppm chlorine for three hours is sufficient.

5. At the end of the retention period, no less than 100 ppm of chlorine shall be present at the extreme end of the system.

6. Proceed to open all faucets and taps and thoroughly flush all new lines until the chlorine residual in the water is less than 1.0 ppm.

7. Obtain representative water sample from the system for analysis by an independent

and recognized bacteriological laboratory.

8. If the sample tested for coliform organisms is negative, a letter and laboratory report shall be submitted by the service organization to the Contractor, certifying successful completion of the sterilization. Additionally, this report shall be forwarded to the Owner as well as be included in the O&M Manual.

9. If any samples tested indicate the presence of coliform organisms, the entire sterilization procedure shall be repeated.

10. Take precautions to avoid use of plumbing fixtures and domestic water systems during sterilization period. Place signs on all plumbing fixtures and outlets during sterilization period.

3.9. EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

3.10. PREPARATION

A. Review the Kitchen Equipment Consultant’s equipment cut sheets. Confirm rough-in location and size of fixtures and openings prior to commencing work.

B. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.11. INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.12. CLEANING

A. At completion, clean plumbing equipment.

3.13. ELEVATOR PIT SUMP PUMP INSTALLATION REQUIREMENTS

A. Provide access space around pump for service and motor replacement.

B. Install all float wiring and water level controls.

C. Install all interlock wiring from pump to oil minder control panel and automatic temperature control system.

D. Furnish and install removable galvanized steel grate to match pit sump opening size.

E. Provide factory start-up and training.

F. Test/Balance Engineer to test pump and all controls and submit results in the TAB report.

3.14. DOMESTIC BOOSTER PUMP INSTALLATION REQUIREMENTS

A. Set up and adjust all sensors, control panels, alarms, and controls.

B. Provide factory authorized startup and training.

C. Interlock domestic booster pump control panel with ATC system as required to provide monitoring requirements indicated on the control diagram and points list. Coordinate with ATC subcontractor.

D. Test and Balance Contractor to test domestic booster pumps as specified.

E. Furnish, install, and interlock remote pressure sensor and monitor on automatic temperature control system. Coordinate with ATC subcontractor.

**END OF SECTION**

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DIVISION 22 SECTION 22 61 13
COMPRESSED-AIR PIPING FOR DENTAL SYSTEMS
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# SECTION 22 61 13
# COMPRESSED-AIR PIPING FOR DENTAL SYSTEMS

## PART 1. GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Dental compressed-air piping, designated "dental air."
2. Gas-powered-tool compressed-air piping, designated "instrument air."
3. Shape-memory-metal couplings.
4. Pressure-seal fittings.
5. Flexible pipe connectors.
6. Zone valve box assemblies.
7. Ball valves.
8. Check valves.
9. Gas safety valves.
10. Compressed-air service connections.

B. Related Requirements:

1. Section 226119 "Compressed-Air Equipment for Dental Systems" for air compressors and specialties.

1.3 DEFINITIONS

A. Compressed-Air Piping Systems: Include dental air.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Seismic Qualification Data: Certificates, for compressed-air manifolds, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Material Certificates: Signed by Installer, certifying that dental compressed-air piping materials comply with requirements in NFPA 99 for positive-pressure dental gas systems.

D. Brazing certificates.

E. Field Quality-Control Reports: Brazing certificates.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For dental compressed-air piping specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Dental Air Piping Systems for Healthcare Facilities: In accordance with ASSE Standard #6010 and NFPA 99 for medical-gas-system installers.

2. Shape-Memory-Metal Coupling Joints: An authorized representative who is trained and approved by manufacturer in accordance with ASSE Standard #6040 and NFPA 99.

B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the vacuum piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL, and that is acceptable to authorities having jurisdiction.

1. Qualify testing personnel in accordance with ASSE Standard #6020 and NFPA 99 for dental-gas-system inspectors and ASSE Standard #6030 and NFPA 99 for dental-gas-system verifiers.

C. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications," or AWS B2.2/B2.2M.

## PART 2. PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Dental air operating at 80 to 100 psig (550 to 690 kPa).

2.2 PIPES, TUBES, AND FITTINGS

A. Comply with NFPA 99 for dental air piping materials.

1. All positive-pressure dental compressed-air piping, tubing, and fittings shall be manufacturer cleaned, purged, and sealed as for oxygen service, in accordance with CGA G-4.1.

a. Each length of tubing shall be delivered plugged or capped by the manufacturer and kept sealed until prepared for installation.
b. Fittings and other components shall be delivered manufacturer sealed and labeled, and kept sealed until prepared for installation.

B. Comply with ASME B31.1 for dental air piping operating at more than 150 psig (1035 kPa).

C. Comply with ASME B31.9 for dental air piping operating at 150 psig (1035 kPa) or less.

D. Copper Medical Gas Tube: ASTM B819, Type K, seamless, drawn temper. Include standard color marking "Dental Compressed Air" in green for Type K tube and in blue for Type L tube.

E. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type.

F. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

G. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.

1. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3-mm) maximum thickness, full-face type.

2. Flange Bolts and Nuts: ASME B18.2.1 carbon steel.

H. Shape-Memory-Metal Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Aerofit, Inc.
b. CAMERON; A Schlumber Co.
c. Motion Industries.
d. Smart Tap; Smart Technology, Inc.

2. Description: Cryogenic compression fitting made of nickel-titanium, shape-memory alloy.

I. Pressure-Seal Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
b. FNW; Ferguson Enterprises, Inc.
c. Viega LLC.

2. NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.

3. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Bronze fitting with stainless steel grip ring and EPDM O-ring seal in each end.

J. Flexible Pipe Connectors:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Flex-Hose Co., Inc.
b. Flexicraft Industries.
c. Hyspan Precision Products, Inc.
d. Mercer Rubber Co.
e. Metraflex Company (The).
f. Proco Products, Inc.
g. Universal Metal Hose.

2. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

a. Working-Pressure Rating: 200 psig (1380 kPa) minimum.
b. End Connections: Plain-end copper tube.

## 2.3 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys.

B. Threaded-Joint Tape: PTFE.

## 2.4 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged in accordance with CGA G-4.1 for oxygen service.

B. Zone-Valve Box Assemblies: Box with dental gas valves, tube extensions, and gauges.

1. Steel Box with Stainless Steel Cover:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1) Tri-Tech Medical.
2) Amico Corporation.
3) BeaconMedaes.
4) Ohio Medical Corporation.

b. Description: Formed-steel box with cover, anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gauges and in sizes required to permit manual operation of valves.
c. Positive-pressure compressed-air valves shall be manufacturer cleaned, purged, and sealed as for oxygen service, in accordance with CGA G-4.1.

1) Valves shall be delivered sealed and labeled and kept sealed until prepared for installation.

d. Interior Finish: Factory-applied white enamel.
e. Cover Plate: Stainless steel with frangible or removable windows.
f. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, in accordance with NFPA 99.

C. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Amico Corporation.
b. Apollo Valves; a part of Aalberts Integrated Piping Systems.
c. BeaconMedaes.
d. Marwin Valve; Richards Industries.
e. NIBCO INC.
f. Ohio Medical Corporation.
g. Oxequip Health Industries; a division of Allied Healthcare Products Inc.
h. Tri-Tech Medical.

2. Standard: MSS SP-110.

3. Description: Three-piece body, brass or bronze.

4. Pressure Rating: 300 psig (2070 kPa) minimum.

5. Ball: Full-port, chrome-plated brass.

6. Seats: PTFE or TFE.

7. Handle: Lever type with locking device.

8. Stem: Blowout proof with PTFE or TFE seal.

9. Ends: Manufacturer-installed ASTM B819, copper-tube extensions and manufacturer-installed ASTM B819, copper-tube extensions with pressure gage on one copper-tube extension.

10. Positive-pressure dental air valves shall be manufacturer cleaned, purged, and sealed as for oxygen service, in accordance with CGA G-4.1.

    a. Valves shall be delivered sealed and labeled and kept sealed until prepared for installation.

D. Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Amico Corporation.
    b. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    c. BeaconMedaes.
    d. Marwin Valve; Richards Industries.
    e. NIBCO INC.
    f. Ohio Medical Corporation.
    g. Oxequip Health Industries; a division of Allied Healthcare Products Inc.
    h. Tri-Tech Medical.

2. Description: In-line pattern, bronze.

3. Pressure Rating: 300 psig (2070 kPa) minimum.

4. Operation: Spring loaded.

5. Ends: Manufacturer-installed, ASTM B819, copper-tube extensions.

6. Positive-pressure dental compressed-air valves shall be manufacturer cleaned, purged, and sealed as for oxygen service, in accordance with CGA G-4.1.

    a. Valves shall be delivered sealed and labeled and kept sealed until prepared for installation.

E. Gas Safety Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Amico Corporation.
    b. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    c. CEODEUX Meditec.
    d. UCSF Health Environment of Care.

2. Bronze body.

3. ASME-construction, poppet, pressure-relief type.

4. Settings to match system requirements.

5. Positive-pressure dental compressed-air valves shall be manufacturer cleaned, purged, and sealed as for dental service, in accordance with CGA G-4.1.

    a. Valves shall be delivered sealed and labeled and kept sealed until prepared for installation.

F. Dental Compressed-Air Safety Valves:

1. Bronze body.

2. ASME-construction, poppet, pressure-relief type.

3. Settings to match system requirements.

4. Positive-pressure compressed-air valves shall be manufacturer cleaned, purged, and sealed as for oxygen service, in accordance with CGA G-4.1.

    a. Valves shall be delivered sealed and labeled and kept sealed until prepared for installation.

G. Pressure Regulators:

1. Bronze body and trim.

2. Spring-loaded, diaphragm-operated, relieving type.

3. Manual pressure-setting adjustment.

4. Rated for 250-psig (1725-kPa) minimum inlet pressure.

5. Capable of controlling delivered air pressure within 0.5 psig for each 10-psig (5.0 kPa for each 100-kPa) inlet pressure.

6. Positive-pressure dental air regulators shall be manufacturer cleaned, purged, and sealed as for dental service, in accordance with CGA G-4.1.

    a. Valves shall be delivered sealed and labeled and kept sealed until prepared for installation.

## PART 3. EXECUTION

3.1 PREPARATION

A. Cleaning of Dental Air Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:

1. Clean dental air tube and fittings, valves, gauges, and other components of oil, grease, and other readily oxidizable materials as required for dental compressed air service in accordance with CGA G-4.1.

2. Wash dental air tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb (0.453 kg) of chemical to 3 gal. (11.3 L) of water.

    a. Scrub to ensure complete cleaning.
    b. Rinse with clean, hot water to remove cleaning solution.

3.2 PIPING INSTALLATION

A. General Location and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install seismic restraints on dental compressed-air piping.

C. Comply with NFPA 99 for installation of dental compressed-air piping.

D. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

G. Install piping adjacent to equipment and specialties to allow service and maintenance.

H. Install piping with 1 percent slope downward in direction of flow.

I. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications specified in "Piping Schedule" Article unless otherwise indicated.

J. Install eccentric reducers, if available, where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

K. Install branch connections to mains from top of main. Provide drain leg at end of each main and branch at low points.

L. Install piping to permit valve servicing.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and for branch connections.

O. Install dental air piping to dental air service connections in equipment specified in Section 226119 "Compressed Air Equipment for Dental Systems," and to equipment specified in other Sections requiring dental air service.

P. Piping Restraint Installation: Install seismic restraints on compressed-air piping. Seismic-restraint devices are specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

Q. Install service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.

R. Connect piping to dental air compressors and to compressed-air outlets and equipment requiring compressed-air service.

S. Install unions in copper tubing adjacent to each valve and at final connection to each machine, specialty, and piece of equipment.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section 220500 “Common Work Results for Plumbing.”

U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section 220500 “Common Work Results for Plumbing.”

V. Connect to dental chair equipment per dental chair equipment manufacturer’s requirements.

## 3.3 VALVE INSTALLATION

A. Install shutoff valve at each connection to and from dental compressed-air equipment and specialties.

B. Install check valves to maintain correct direction of compressed-air flow from compressed-air equipment.

C. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.

D. Install zone valves and gages in valve boxes. Rotate valves to angle that prevents closure of cover when valve is in closed position.

E. Install pressure regulators on dental compressed-air piping where reduced pressure is required.

F. Install flexible pipe connectors in discharge piping and in inlet air piping from remote air-inlet filter of each air compressor.

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of cleaned tubing and fittings before assembly.

C. Threaded Joints: Apply appropriate tape to external pipe threads.

D. Brazed Joints: Join copper tube and fittings in accordance with CDA's "Copper Tube Handbook," Ch. "Brazed Joints." Do not use flux. Continuously purge joint with oil-free dry nitrogen during brazing.

E. Soldered Joints: Apply ASTM B813, water-flushable flux to tube end. Join copper tube and fittings in accordance with ASTM B828.

F. Extruded-Tee Outlets: Form branches in copper tube in accordance with ASTM F2014, with tools recommended by tube manufacturer.

G. Flanged Joints:

1. Copper Tubing: Install flange on copper tubes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts in accordance with ASME B31.9 for bolting procedure.

H. Shape-Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of shape-memory-metal coupling joints.

3.5 DENTAL COMPRESSED-AIR SERVICE COMPONENT INSTALLATION

A. Install dental compressed-air pressure-control panel in walls. Attach to substrate.

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic-restraint devices specified in Division 23 Section 230548, “Vibration Controls for HVAC, Plumbing & Fire Protection Equipment.”

B. Comply with requirements for hangers, supports, and anchor devices specified in Division 22 Section 220500 “Common Work Results for Plumbing.”

C. Vertical Piping: MSS Type 8 or Type 42 clamps.

D. Individual, Straight, Horizontal Piping Runs:

1. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel, clevis hangers.

2. Longer Than 100 Feet (30 m): MSS Type 43, adjustable, roller hangers.

E. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44 pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.

F. Base of Vertical Piping: MSS Type 52 spring hangers.

G. Install hangers for copper tubing with maximum horizontal spacing and minimum rod diameters to comply with MSS SP-58, NFPA 99, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

H. Support horizontal piping within 12 inches (300 mm) of each fitting and coupling.

I. Support vertical runs of copper tubing to comply with MSS SP-58, NFPA 99, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

## 3.7 IDENTIFICATION

A. Install identifying labels and devices for dental compressed-air piping, valves, and specialties. Comply with requirements in Division 22 Section 220500 “Common Work Results for Plumbing.”

B. Install identifying labels and devices for dental compressed-air piping systems in accordance with NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:

1. Dental Air: Black letters on yellow background.

## 3.8 FIELD QUALITY CONTROL FOR DENTAL COMPRESSED-AIR

A. Testing Agency:

1. Owner will engage a qualified testing agency to perform tests and inspections.

2. Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections with the assistance of a factory-authorized service representative.

D. Tests and Inspections:

1. Dental Compressed-Air Testing Coordination: Perform tests, inspections, verifications, and certification of dental compressed-air piping systems concurrently with tests, inspections, and certification of dental compressed air piping systems.

2. Preparation: Perform the following Installer tests in accordance with requirements in NFPA 99 and ASSE Standard #6010:

a. Initial blowdown.
b. Initial pressure test.
c. Cross-connection test.
d. Piping purge test.
e. Standing pressure test for positive-pressure dental compressed-air piping.
f. Repair leaks and retest until no leaks exist.

3. System Verification: Perform the following tests and inspections in accordance with NFPA 99, ASSE Standard #6020, and ASSE Standard #6030:

a. Standing pressure test.
b. Individual-pressurization cross-connection test.
c. Valve test.
d. Piping purge test.
e. Piping particulate test.
f. Piping purity test.
g. Final tie-in test.
h. Operational pressure test.
i. Dental compressed air-purity test.
j. Verify correct labeling of equipment and components.

4. Testing Certification: Certify that specified tests, inspections, and procedures have been performed, and certify report results. Include the following:

a. Inspections performed.
b. Procedures, materials, and gases used.
c. Test methods used.
d. Results of tests.

E. Piping will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.9 PROTECTION

A. Protect tubing from damage.

B. Retain sealing plugs in tubing, fittings, and specialties until installation.

C. Clean tubing not properly sealed, and where sealing is damaged, in accordance with "Preparation" Article.

3.10 PIPING SCHEDULE

A. Connect new tubing to existing tubing with memory-metal couplings.

B. Flanges may be used where connection to flanged equipment is required.

C. Dental Air Piping, NPS 3 (DN 80) and Smaller Shall Operate between 15 psig (103 kPa) and 50 psig (345 kPa): Type L copper tubing: wrought copper fittings; and brazed joints.

3.11 VALVE SCHEDULE

A. Zone Valves: Ball valve with manufacturer-installed ASTM B819, copper-tube extensions with pressure gauge on one copper-tube extension.

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DIVISION 22 SECTION 22 61 19
COMPRESSED-AIR EQUIPMENT FOR DENTAL SYSTEMS
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# SECTION 22 61 19
# COMPRESSED-AIR EQUIPMENT FOR DENTAL SYSTEMS

## PART 1. GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section Includes:

1. Dental air compressors.

2. Dental air-compressor control panels.

### 1.3 DEFINITIONS

A. Actual Air: Air delivered at air-compressor outlet. Flow rate is compressed air delivered and measured in acfm (actual L/s).

B. Medical air equipment includes dental air compressors and accessories for healthcare facilities.

C. Standard Air: Free air at 68 deg F (20 deg C) and 1 atmosphere (29.92 in. Hg) before compression or expansion and measured in scfm (standard L/s).

### 1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For air compressors and compressed-air dryers.

1. Include plans, elevations, sections, and mounting details.

2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

4. Include diagrams for power, signal, and control wiring.

### 1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Seismic Qualification Certificates: For air compressors, accessories, and components from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculations.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For compressed-air equipment to include in operation and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Air-Compressor, Inlet-Air Filter Elements: Equal to 25% percent of quantity installed, but no fewer than two (2) units.

2. Belts: Two (2) for each belt-driven compressor.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Laboratory Air Equipment for Nonmedical Laboratory Facilities: An employer of workers trained and approved by manufacturer.

2. Medical Air Equipment for Healthcare Facilities: Qualify installers according to ASSE 6010.

B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the compressed-air equipment testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL and that is acceptable to authorities having jurisdiction.

1. Qualify testing personnel according to ASSE 6020 for inspectors and ASSE 6030 for verifiers.

## PART 2. PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design compressed-air equipment mounting.

B. Seismic Performance: Air compressors and accessories shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the air compressor and receiver will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Component Importance Factor: 1.5.

2.2 GENERAL REQUIREMENTS FOR AIR COMPRESSORS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 544, "Medical and Dental Equipment," for medical compressed-air equipment.

C. Description: Factory-assembled, -wired, -piped, and -tested; electric-motor-driven; air-cooled; continuous-duty air compressors and receivers that deliver air of quality equal to intake air.

D. Control Panels: Automatic control station with load control and protection functions. Comply with NEMA ICS 2 and UL 508.

1. Enclosure: NEMA ICS 6, Type 12 control panel unless otherwise indicated.

2. Motor Controllers: Full-voltage, combination-magnetic type with undervoltage release feature and motor-circuit-protector-type disconnecting means and short-circuit protective device.

3. Control Voltage: 120-V ac or less, using integral control power transformer.

4. Motor Overload Protection: Overload relay in each phase.

5. Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.

6. Automatic control switches to alternate lead-lag air compressors for duplex air compressors.

7. Instrumentation: Include discharge-air and receiver pressure gages, air-filter maintenance indicator, hour meter, air-compressor discharge-air and coolant temperature gages, and control transformer.

8. Alarm Signal Device: For connection to alarm system to indicate when backup air compressor is operating.

E. Receivers: Steel tank constructed according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

1. Pressure Rating: At least as high as highest discharge pressure of connected air compressors and bearing appropriate code symbols.

2. Interior Finish: Corrosion-resistant coating.

3. Accessories: Include safety valve, pressure gage, automatic drain, and pressure regulator.

F. Mounting Frame: Fabricate base and attachment to air compressor and components with reinforcement strong enough to resist movement during a seismic event when base is anchored to building structure.

## 2.3 INLET-AIR FILTERS

A. Description: Combination inlet-air filter-silencer, suitable for remote installation, for each air compressor.

1. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.

2. Capacity: Match capacity of air compressor, with collection efficiency of 99 percent retention of particles larger than 10 micrometers.

B. Description: Combination inlet-air filter-silencer, suitable for remote installation, for multiple air compressors.

1. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.

2. Capacity: Match total capacity of connected air compressors, with collection efficiency of 99 percent retention of particles larger than 10 micrometers.

## 2.4 COMPRESSED-AIR FILTER ASSEMBLIES

A. Compressed-Air Filter Assemblies:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Arrow Pneumatics, Inc.
b. Dollinger; Celeros Flow Technology.
c. Donaldson Company, Inc.
d. EMSE Corporation.
e. Ingersoll Rand.

f. Parker (Parker Hannifin).
g. Pioneer Air Systems, Inc.
h. SPXFLOW, Air Treatment.
i. Van Air Systems, Inc.
j. Zeks Compressed Air Solutions.

2. Description: Filter assemblies suitable for compressed air, in parallel duplex arrangement. Size each assembly for maximum capacity of connected equipment and operating pressure of compressed-air system. Include automatic ejection of condensate from airstream, inlet and outlet pressure gages, and shutoff valves.

a. Option: Factory-fabricated filter system consisting of three air filters equivalent to those specified, pipe, fittings, valves, differential pressure switch, and enclosure; and with additional automatic drain traps and gages.

3. Size filter assemblies for 5-psig (34.5-kPa) maximum air-pressure drop when filters are new and clean, at system rated capacity, and at 100-psig (690-kPa) pressure.

4. Differential Pressure Switch: Adjustable, diaphragm type, with electrical connections for alarm system, to indicate when air-pressure drop through filters rises to more than 2 psig (13.8 kPa) greater than when new and clean.

5. Particulate Filters: Collection efficiency of 98 percent retention of particles 1 micrometer and larger.

6. Odor and Taste Filters: Vapor-absorbing, activated charcoal.

7. Coalescing Filters: Collection efficiency of 99.9 percent retention of particles 0.3 micrometer and smaller.

8. Include automatic drain trap for each filter.

## 2.5 DENTAL AIR COMPRESSORS

A. Dental Air Compressors

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AMICO.
b. Arrow Pneumatics, Inc.
c. Beacon Medaes, Inc.
d. Dollinger; Celeros Flow Technology.
e. Donaldson Company, Inc.
f. EMSE Corporation.
g. Ingersoll Rand.
h. Parker (Parker Hannifin).
i. Pioneer Air Systems, Inc.

j. SPXFLOW, Air Treatment.
k. Tri-Tech Medical Inc.
l. Van Air Systems, Inc.
m. Zeks Compressed Air Solutions.

2. Description: Factory-assembled, -tested, and -packaged; automatic, dental compressed-air system that will deliver air of quality at least equal to intake air; suitable for dental applications and capable of producing air at 80 psig (550 kPa).

3. Air Compressor(s): Oilless reciprocating type.

a. Option: Construction may be oil-free, sliding-vane or scroll type.

4. Compressor Controls: Adjustable, tank-mounted, pressure switches and alternator for duplex air compressors.

5. Check Valves: In discharge piping of each air compressor.

6. Air Filter: Integral with air compressor or separate unit for field installation in compressed-air piping.

7. Dryer: Desiccant type integral with air compressor.

8. Receiver: Steel tank rated for at least 100 psig (690 kPa) with rubber isolators on feet.

a. Pressure Regulator: Adjustable.
b. Safety Valve: ASME relief valve with setting of 100 psig (690 kPa) or less.
c. Drain: Automatic valve.

9. Cabinet: Enameled steel, with control panel with manual on-off switch, on light, and pressure gage.

B. Capacities and Characteristics: As indicated on the Contract Drawings.

## 2.6 DENTAL AIR-COMPRESSOR CONTROL PANELS

A. Dental Air-Compressor Control Panels:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Arrow Pneumatics, Inc.
b. Dollinger; Celeros Flow Technology.
c. Donaldson Company, Inc.
d. EMSE Corporation.
e. Ingersoll Rand.
f. Parker (Parker Hannifin).
g. Pioneer Air Systems, Inc.

h. SPXFLOW, Air Treatment.
i. Van Air Systems, Inc.
j. Zeks Compressed Air Solutions.

2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

3. Comply with UL 544, "Medical and Dental Equipment," for medical vacuum equipment.

4. Description: Wall-mounted type with visual indicators to indicate equipment in operation and to perform the following:

a. Shut off dental air equipment.
b. Shut off water supply to dental air equipment. Include solenoid-operated valve for installation in water piping.
c. Remote switch with timer.

B. Control panels may be combined with dental vacuum pump control panels in single dental equipment control panels.

2.7 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Division 22 Section 220500, “Common Work Results for Plumbing.”

## PART 3. EXECUTION

3.1 PREPARATION

A. Clean compressed-air equipment, accessories, and components that have not been cleaned for oxygen service and sealed or that are furnished unsuitable for dental air applications, according to CGA G-4.1, "Cleaning Equipment for Oxygen Service."

3.2 COMPRESSED-AIR EQUIPMENT INSTALLATION

A. General Requirements for Compressed-Air Equipment Installation:

1. Install compressed-air equipment to allow maximum headroom unless specific mounting heights are indicated.

2. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces unless otherwise indicated.

3. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

4. Install equipment to allow right of way for piping installed at required slope.

5. Install the following devices on compressed-air equipment:

   a. Thermometer, Pressure Gage, and Safety Valve: Install on each compressed-air receiver.
   b. Pressure Regulators: Install downstream from air compressors, dryers, purification units, and filter assemblies.
   c. Drain Valves: Install on aftercoolers, receivers, and dryers. Discharge condensate over nearest floor drain.
   d. Concrete filled inertia base.
   e. Main line pressure switch and interlock to alarm panel.

B. Dental Air System Equipment Installation:

1. Install according to ASSE 6010 and NFPA 99.

2. Install dental air system units on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Division 22 Section 220500, “Common Work Results for Plumbing.”

3. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 “Vibration Controls for HVAC, Plumbing & Fire Protection Equipment”

4. Maintain manufacturer's recommended clearances for service and maintenance.

5. Install control panels for dental compressed-air equipment on wall near equipment.

## 3.3 CONNECTIONS

A. Comply with requirements for water-supply piping specified in Division 22 “Plumbing Piping, Fittings, and Valves.” Drawings indicate general arrangement of piping, fittings, and specialties.

B. Comply with requirements for drain piping specified in Division 22 “Plumbing Piping, Fittings, and Valves.” Drawings indicate general arrangement of piping, fittings, and specialties.

C. Comply with requirements for compressed-air piping specified in Section 226113 "Compressed-Air Piping for Dental Systems." Drawings indicate general arrangement of piping, fittings, and specialties.

D. Where installing piping adjacent to equipment, allow space for service and maintenance.

E. Connect compressed-air piping to compressed-air equipment, accessories, and specialties with shutoff valve and union or flanged connection.

F. Connect water supply to compressed-air equipment that requires water. Include backflow preventer.

3.4 IDENTIFICATION

A. Identify dental compressed-air equipment system components. Comply with requirements for identification specified in Division 22 “Common Work Results for Plumbing” and with NFPA 99.

3.5 FIELD QUALITY CONTROL FOR DENTAL COMPRESSED-AIR EQUIPMENT

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative.

1. Dental Compressed-Air Equipment Testing Coordination: Perform tests, inspections, verifications, and certification of dental compressed-air equipment concurrently with tests, inspections, and certification of dental compressed-air piping systems.

2. Preparation: Perform dental compressed-air equipment tests according to requirements in NFPA 99 for the following:

a. Air-quality purity test.
b. System operation test.

3. Equipment Verification: Comply with requirements in ASSE 6020, ASSE 6030, and NFPA 99 for verification of dental compressed-air equipment.

4. Replace damaged and malfunctioning controls and equipment.

5. Testing Certification: Certify that specified tests, inspections, and procedures have been performed and certify report results. Include the following:

a. Inspections performed.
b. Procedures, materials, and gases used.
c. Test methods used.
d. Results of tests.

D. Components will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

2. Check for lubricating oil in lubricated-type equipment.

3. Check belt drives for proper tension.

4. Verify that air-compressor inlet filters and piping are clear.

5. Check for equipment vibration-control supports and flexible pipe connectors and verify that equipment is properly attached to substrate.

6. Check safety valves for correct settings. Ensure that settings are higher than air-compressor discharge pressure, but not higher than rating of system components.

7. Check for proper seismic restraints.

8. Drain receiver tank(s).

9. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

10. Test and adjust controls and safeties.

B. Prepare written report documenting testing procedures and results.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air compressors, compressed-air dryers and compressed-air filter assemblies.

**END OF SECTION**

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VACUUM PIPING FOR DENTAL SYSTEMS
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**SECTION 22 62 13**
**VACUUM PIPING FOR DENTAL SYSTEMS**

## PART 1. GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Dental vacuum piping, designated "dental vacuum."

B. Related Requirements:

1. Section 226219 "Vacuum Equipment for Dental Facilities" for vacuum producers and accessories.

1.3 DEFINITIONS

A. Vacuum Piping Systems: Include dental vacuum.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Seismic Qualification Data: Certificates, for accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Material Certificates: Signed by Installer, certifying that dental vacuum piping materials comply with requirements in NFPA 99 for dental vacuum systems.

D. Brazing certificates.

E. Field quality-control reports.

F. Source Quality Control Reports:

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For vacuum piping specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Medical Vacuum Piping Systems for Healthcare Facilities: In accordance with ASSE Standard #6010 and NFPA 99 for dental vacuum-gas-system installers.

2. Pressure-Seal Joining Procedure for Copper Tubing: An authorized representative who is trained and approved by manufacturer.

3. Extruded-Tee Outlet Procedure: An authorized representative who is trained and approved by manufacturer.

4. Shape-Memory-Metal Coupling Joints: An authorized representative who is trained and approved by manufacturer in accordance with ASSE Standard #6040 and NFPA 99.

B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the vacuum piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL, and that is acceptable to authorities having jurisdiction.

1. Qualify testing personnel in accordance with ASSE Standard #6020 and NFPA 99 for medical-gas-system inspectors and ASSE Standard #6030 and NFPA 99 for medical-gas-system verifiers.

C. Brazing: Qualify processes and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications," or AWS B2.2/B2.2M.

**PART 2. PRODUCTS**

2.1 SYSTEM DESCRIPTION

A. Dental vacuum operating at 12 in. Hg (305 mm Hg).

2.2 PIPES, TUBES, AND FITTINGS

A. Comply with NFPA 99 for dental vacuum piping materials.

B. Copper Dental Gas Tube: ASTM B819, Type L, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service or in accordance with CGA G-4.1 for oxygen service. Include standard color marking in blue.

C. Copper Water Tube: ASTM B88/ASTM B88M, Type M, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service.

D. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type that has been manufacturer cleaned, purged, and sealed for medical gas service or in accordance with CGA G-4.1 for oxygen service.

E. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

F. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.

1. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness, full-face type.

2. Flange Bolts and Nuts: ASME B18.2.1 carbon steel.

G. Shape-Memory-Metal Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Aerofit, Inc.
b. CAMERON; A Schlumber Co.
c. Motion Industries.
d. Smart Tap; Smart Technology, Inc..

2. Description: Cryogenic compression fitting made of nickel-titanium, shape-memory alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service in accordance with CGA G-4.1.

H. Pressure-Seal Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. FNW; Ferguson Enterprises, Inc.
b. NIBCO INC.
c. Viega LLC.

2. NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.

3. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Bronze fitting with stainless steel grip ring and EPDM O-ring seal in each end.

I. Extruded-Tee Outlets: ASTM F2014 procedure for making branch outlets in copper tube.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. T-DRILL Industries Inc.

J. Flexible Pipe Connectors:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Flex-Hose Co., Inc.
b. Flexicraft Industries.
c. Hyspan Precision Products, Inc.
d. Mercer Rubber Co.
e. Metraflex Company (The).
f. Proco Products, Inc.
g. Universal Metal Hose.

2. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

a. Working-Pressure Rating: 200 psig (1380 kPa) minimum.
b. End Connections: Plain-end copper tube.

2.3 JOINING MATERIALS

A. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux in accordance with ASTM B813.

B. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys.

C. Threaded-Joint Tape: PTFE.

2.4 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged in accordance with CGA G-4.1 for oxygen service.

B. Zone-Valve Box Assemblies: Box with dental vacuum valves, tube extensions, and gages.

1. Zone-Valve Boxes:

a. Steel Box with Stainless Steel Cover:

1) Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

(a) Flex-Hose Co., Inc.
(b) Flexicraft Industries.
(c) Hyspan Precision Products, Inc.
(d) Mercer Rubber Co.

(e) Metraflex Company (The).
(f) Proco Products, Inc.
(g) Universal Metal Hose.

b. Description: Formed-steel box with cover, anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valve. Dental vacuum tubing, valves, and gages may be incorporated in zone valve boxes for medical gases.

1) Interior Finish: Factory-applied white enamel.

2) Cover Plate: stainless steel with frangible or removable windows.

3) Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, in accordance with NFPA 99.

C. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Tri-Tech Medical.
b. Allied Healthcare Products Inc.
c. Amico Corporation.
d. Apollo Valves; a part of Aalberts Integrated Piping Systems.
e. BeaconMedaes.
f. Marwin Valve; Richards Industries.
g. NIBCO INC.
h. Ohio Medical Corporation.

2. Standard: MSS SP-110.

3. Description: Three-piece body, brass or bronze.

4. Pressure Rating: 300 psig (2070 kPa) minimum.

5. Ball: Full-port, chrome-plated brass.

6. Seats: PTFE or TFE.

7. Handle: Lever type with locking device.

8. Stem: Blowout proof with PTFE or TFE seal.

9. Ends: Manufacturer-installed ASTM B819, copper-tube extensions and manufacturer-installed ASTM B819, copper-tube extensions with pressure gauge on one copper-tube extension.

D. Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Tri-Tech Medical.
   b. Allied Healthcare Products Inc.
   c. Amico Corporation.
   d. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   e. BeaconMedaes.
   f. Marwin Valve; Richards Industries.
   g. NIBCO INC.
   h. Ohio Medical Corporation.

2. Description: In-line pattern, bronze.

3. Pressure Rating: 300 psig (2070 kPa) minimum.

4. Operation: Spring loaded.

5. Ends: Manufacturer-installed ASTM B819, copper-tube extensions.

## PART 3. EXECUTION

### 3.1 PREPARATION

A. Cleaning of Dental Vacuum Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:

1. Clean dental vacuum tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service in accordance with CGA G-4.1.

2. Wash vacuum tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb (0.453 kg) of chemical to 3 gal. (11.3 L) of water.

   a. Scrub to ensure complete cleaning.
   b. Rinse with clean, hot water to remove cleaning solution.

### 3.2 PIPING INSTALLATION

A. General Location and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of dental vacuum piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, vacuum producer sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Comply with NFPA 99 for installation of dental vacuum piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install piping with 1 percent slope downward in direction of flow.

H. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than piping pressure rating used in applications specified in "Piping Schedule" Article unless otherwise indicated.

I. Install eccentric reducers, if available, where vacuum piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

J. Provide drain leg and drain trap at end of each main and branch and at low points.

K. Install piping to permit valve servicing.

L. Install piping free of sags and bends.

M. Install fittings for changes in direction and for branch connections. Extruded-tee branch outlets in copper tubing may be made where specified.

N. Install vacuum piping from vacuum service connections specified in this Section, to equipment specified in Section 226219 "Vacuum Equipment for Dental Systems," and to equipment specified in other Sections requiring dental vacuum service.

O. Install vacuum service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.

P. Install vacuum bottle bracket adjacent to each wall-mounted vacuum service connection suction inlet.

Q. Connect vacuum piping to vacuum producers and to equipment requiring vacuum service.

R. Install unions in copper vacuum tubing adjacent to each valve and at final connection to each machine, specialty, and piece of equipment.

S. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 “Common Work Results for Plumbing.”

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 “Common Work Results for Plumbing.”

U. Connect to dental chair/equipment as required by dental chair manufacturer.

3.3 VALVE INSTALLATION

A. Install shutoff valve at each connection to and from vacuum equipment and specialties.

B. Install check valves to maintain correct direction of vacuum flow to vacuum-producing equipment.

C. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.

D. Install zone valves and gages in valve boxes. Rotate valves to angle that prevents closure of cover when valve is in closed position.

E. Install flexible pipe connectors in suction inlet piping to each vacuum producer.

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Apply appropriate tape to external pipe threads.

D. Brazed Joints: Join copper tube and fittings in accordance with CDA's "Copper Tube Handbook," Ch. "Brazed Joints." Do not use flux. Continuously purge joint with oil-free dry nitrogen during brazing.

E. Soldered Joints: Apply ASTM B813, water-flushable flux to tube end. Join copper tube and fittings in accordance with ASTM B828.

F. Extruded-Tee Outlets: Form branches in copper tube in accordance with ASTM F2014, with tools recommended by tube manufacturer.

G. Flanged Joints:

1. Copper Tubing: Install flange on copper tubes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts in accordance with ASME B31.9 for bolting procedure.

H. Pressure-Sealed Joints: Join copper tube and copper and copper-alloy fittings with tools recommended by fitting manufacturer.

I. Shape-Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of shape-memory-metal coupling joints.

## 3.5 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for hangers, supports, and anchor devices specified in Division 22 “Common Work Results for Plumbing.”

B. Vertical Piping: MSS Type 8 or Type 42, clamps.

C. Individual, Straight, Horizontal Piping Runs:

1. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel, clevis hangers.

2. Longer Than 100 Feet (30 m): MSS Type 43, adjustable, roller hangers.

D. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44 pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.

E. Base of Vertical Piping: MSS Type 52 spring hangers.

F. Install hangers for copper tubing with maximum horizontal spacing and minimum rod diameters to comply with MSS SP-58, NFPA 99, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

G. Support horizontal piping within 12 inches (300 mm) of each fitting and coupling.

H. Support vertical runs of copper tubing to comply with MSS SP-58, NFPA 99, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

## 3.6 IDENTIFICATION

A. Install identifying labels and devices for laboratory vacuum piping, valves, and specialties. Comply with requirements in Division 22 “Common Work Results for Plumbing.”

B. Install identifying labels and devices for dental vacuum piping systems in accordance with NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:

1. Dental Vacuum: Black boxed letters on white-and-black diagonal stripe background.

## 3.7 FIELD QUALITY CONTROL FOR DENTAL VACUUM PIPING

A. Testing Agency:

1. Owner will engage a qualified testing agency to perform tests and inspections.

2. Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections with the assistance of a factory-authorized service representative.

D. Tests and Inspections:

1. Dental Vacuum Testing Coordination: Perform tests, inspections, verifications, and certification of dental vacuum piping systems concurrently with tests, inspections, and certification of dental compressed-air piping systems.

2. Preparation: Perform the following Installer tests in accordance with requirements in NFPA 99 and ASSE Standard #6010:

a. Initial blowdown.
b. Initial pressure test.
c. Cross-connection test.
d. Piping purge test.
e. Standing pressure test for vacuum systems.
f. Repair leaks and retest until no leaks exist.

3. System Verification: Perform the following tests and inspections in accordance with NFPA 99, ASSE Standard #6020, and ASSE Standard #6030:

a. Standing pressure test.
b. Individual-pressurization or pressure-differential cross-connection test.
c. Valve test.
d. Piping purge test.
e. Final tie-in test.
f. Operational vacuum test.
g. Verify correct labeling of equipment and components.

4. Testing Certification: Certify that specified tests, inspections, and procedures have been performed, and certify report results. Include the following:

a. Inspections performed.
b. Procedures, materials, and gases used.
c. Test methods used.
d. Results of tests.

E. Piping will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.8 PROTECTION

A. Protect tubing from damage.

B. Retain sealing plugs in tubing, fittings, and specialties until installation.

C. Clean tubing not properly sealed, and where sealing is damaged, in accordance with "Preparation" Article.

3.9 PIPING SCHEDULE

A. Connect new copper tubing to existing copper tubing with memory-metal couplings.

B. Connect PVC pipe to copper tube with transition fittings.

C. Flanges may be used where connection to flanged equipment is required.

D. Dental Vacuum Piping: Use copper water tube, wrought-copper fittings, and joints.

3.10 VALVE SCHEDULE

A. Shutoff Valves:

1. Copper Tubing: Copper-alloy ball valve with manufacturer-installed ASTM B819, copper-tube extensions.

B. Zone Valves: Copper-alloy ball valve with manufacturer-installed ASTM B819, copper-tube extensions with pressure gage on one copper-tube extension.

**END OF SECTION**

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VACUUM EQUIPMENT FOR DENTAL SYSTEMS
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**SECTION 22 62 19**
**VACUUM EQUIPMENT FOR DENTAL SYSTEMS**

## PART 1. GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Dental vacuum pumps.

2. Dental vacuum pump control panels.

1.3 DEFINITIONS

A. Actual Air: Air delivered at vacuum producer inlet. Flow rate is air measured in acfm (actual L/s).

B. Dental Vacuum Equipment: Includes dental vacuum producers and accessories for healthcare facilities.

C. Standard Air: Free air at 68 deg F (20 deg C) and 1 atmosphere (29.92 in. Hg) before compression or expansion and measured in scfm (standard L/s).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For vacuum producers.

1. Include plans, elevations, sections, and mounting details.

2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

4. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Seismic Qualification Certificates: For vacuum producers, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For vacuum equipment to include in operation and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: Two for each belt-driven vacuum producer.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Medical Vacuum Equipment for Healthcare Facilities: Qualify installers according to ASSE 6010.

B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the vacuum equipment testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL, and that is acceptable to authorities having jurisdiction.

1. Qualify testing personnel according to ASSE 6020 for inspectors and ASSE 6030 for verifiers.

## PART 2. PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Vacuum producers and accessories shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Component Importance Factor: 1.5.

2.2 GENERAL REQUIREMENTS FOR VACUUM PUMPS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 99, "Health Care Facilities," for vacuum equipment and accessories for dental vacuum systems.

C. Comply with UL 544, "Medical and Dental Equipment," for medical vacuum equipment.

D. Description: Factory-assembled, -wired, -piped, and -tested; electric-motor-driven; air-cooled; continuous-duty vacuum pumps and receivers.

E. Control Panels: Automatic control station with load control and protection functions. Comply with NEMA ICS 2 and UL 508.

1. Enclosure: NEMA ICS 6, Type 12 control panel unless otherwise indicated.

2. Motor Controllers: Full-voltage, combination-magnetic type with undervoltage release feature and motor-circuit-protector-type disconnecting means and short-circuit protective device.

3. Control Voltage: 120-V ac or less, using integral control power transformer.

4. Motor Overload Protection: Overload relay in each phase.

5. Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.

6. Automatic control switches to alternate lead-lag vacuum pumps for duplex vacuum pumps.

7. Instrumentation: Include vacuum pump inlet and receiver vacuum gages, hour meter, vacuum pump discharge-air and coolant temperature gages, and control transformer.

8. Alarm Signal Devices: For connection to alarm system to indicate when backup vacuum pump is operating.

F. Receivers: Steel tank constructed according to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1; bearing appropriate code symbols.

1. Interior Finish: Corrosion-resistant coating.

2. Accessories: Include vacuum relief valve, vacuum gage, and drain.

G. Mounting Frames: Fabricate base and attachment to vacuum pump and components with reinforcement strong enough to resist movement during a seismic event when base is anchored to building structure.

## 2.3 DENTAL VACUUM PUMPS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AMICO.
b. A-dec
c. Arrow Pneumatics, Inc.
d. Beacon Medaes, Inc.
e. Dean Pump
f. Dollinger; Celeros Flow Technology.
g. Donaldson Company, Inc.
h. EMSE Corporation.
i. Ingersoll Rand.
j. Parker (Parker Hannifin).
k. Pioneer Air Systems, Inc.
l. SPXFLOW, Air Treatment.
m. Tri-Tech Medical Inc.
n. Van Air Systems, Inc.
o. Zeks Compressed Air Solutions.

B. Dental Vacuum Pumps:

1. Description: Factory-assembled, -tested, and -packaged; duplex; automatic, dental vacuum system; suitable for dental applications and capable of producing not less than 12 in. Hg (305 mm Hg).

2. Duplex Vacuum Pumps: For mounting on concrete base.

a. Vacuum Pumps: Brass water-injection or liquid-ring type with rubber isolators on feet. Include fitting and tubing for circulation of approximately 80 percent of water through vacuum pump.
b. Cabinet: Enameled steel; open construction with sound-insulated cover. Include control panel with alternator, adjustable vacuum control for each vacuum pump, manual on-off switches, on light, and vacuum gage.

C. Capacities and Characteristics: Refer to Contract Drawings.

## 2.4 DENTAL VACUUM PUMP CONTROL PANELS

A. Dental Vacuum Pump Control Panels:

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Comply with UL 544, "Medical and Dental Equipment," for dental vacuum equipment.

3. Description: Wall-mounted type with visual indicators to indicate equipment in operation and to perform the following:

   a. Shut off dental vacuum equipment.
   b. Shut off water supply to dental vacuum equipment. Include solenoid-operated valve for installation in water piping.
   c. Remote switch with timer.

B. Control panels may be combined with dental air compressor control panels in single dental equipment control panels.

2.5 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Division 22 “Common Work Results for Plumbing."

## PART 3. EXECUTION

3.1 PREPARATION

A. Clean vacuum equipment, accessories, and components that have not been cleaned for oxygen service and sealed or that are furnished unsuitable for dental vacuum applications, according to CGA G4.1, "Cleaning Equipment for Oxygen Service."

3.2 VACUUM EQUIPMENT INSTALLATION

A. Install vacuum equipment for healthcare facilities according to ASSE 6010 and NFPA 99.

B. Equipment Mounting:

1. Install vacuum producers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Division 22 “Common Work Results for Plumbing.”

2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 “Vibration Controls for HVAC, Plumbing and Fire Protection Equipment.”

3. Comply with requirements for vibration isolation devices specified in Section 230548 “Vibration Controls for HVAC, Plumbing and Fire Protection Equipment.”

C. Install vacuum equipment anchored to substrate.

D. Orient equipment so controls and devices are accessible for servicing.

E. Maintain manufacturer's recommended clearances for service and maintenance.

F. Install the following devices on vacuum equipment:

1. Thermometer, Vacuum Gage, and Pressure Relief Valve: Install on each vacuum pump receiver.

2. Drain Valves: Install on receivers and separators. Discharge receiver condensate over nearest floor drain. Discharge separator oral evacuation fluids by direct connection into sanitary waste piping system.

3. Concrete filled inertia base.

4. Mainline pressure (vacuum) switch and interlock to alarm panel.

G. Dental Vacuum System Equipment Installation:

1. Install according to ASSE 6010 and NFPA 99.

2. Install dental vacuum system units on concrete bases with elastomeric mounts with a minimum deflection of 2 inches. Vibration isolation devices and installation requirements are specified in Section 230548 “Vibration Controls for HVAC, Plumbing and Fire Protection Equipment.”

3. Maintain manufacturer's recommended clearances for service and maintenance.

4. Install control panels for dental vacuum equipment on wall near equipment.

## 3.3 CONNECTIONS

A. Comply with requirements for water-supply piping specified in Division 22 “Plumbing Piping, Fittings and Valves.” Drawings indicate general arrangement of piping, fittings, and specialties.

B. Comply with requirements for drain piping specified in Division 22 “Plumbing Piping, Fittings and Valves.” Drawings indicate general arrangement of piping, fittings, and specialties.

C. Comply with requirements for vacuum piping specified in Section 226213 "Vacuum Piping for Dental Systems." Drawings indicate general arrangement of piping, fittings, and specialties.

D. Where installing piping adjacent to equipment, allow space for service and maintenance.

E. Connect vacuum piping to vacuum equipment, accessories, and specialties with shutoff valve and union or flanged connection.

F. Connect water supply to vacuum equipment that requires water. Include backflow preventer.

## 3.4 IDENTIFICATION

A. Identify dental vacuum equipment system components. Comply with requirements for identification specified in Division 22 Section 220500, “Common Works Results for Plumbing” and with NFPA 99.

## 3.5 FIELD QUALITY CONTROL FOR DENTAL VACUUM EQUIPMENT

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Preparation: Perform dental vacuum equipment tests according to requirements in NFPA 99 for the following:

a. System operation test.

2. Equipment Verification: Comply with requirements in ASSE 6020, ASSE 6030, and NFPA 99 for verification of dental vacuum equipment.

3. Replace damaged and malfunctioning controls and equipment.

D. Components will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

## 3.6 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

2. Check for lubricating oil in lubricated-type equipment.

3. Check belt drives for proper tension.

4. Verify that vacuum producer outlet piping is clear.

5. Check for equipment vibration-control supports and flexible pipe connectors and verify that equipment is properly attached to substrate.

6. Check safety valves for correct settings.

7. Check for proper seismic restraints.

8. Drain receiver and separator tank(s).

9. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

10. Test and adjust controls and safeties.

B. Verify that vacuum equipment is installed and connected according to the Contract Documents.

C. Verify that electrical wiring installation complies with manufacturer's submittal and written installation requirements in electrical Sections.

D. Prepare written report documenting testing procedures and results.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain vacuum producers.

**END OF SECTION**

DIVISION 23 SECTION 23 09 00
INSTRUMENTATION AND CONTROLS OF HVAC AND PLUMBING SYSTEMS
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**SECTION 23 09 00**
**INSTRUMENTATION AND CONTROLS OF HVAC AND PLUMBING SYSTEMS**

## PART 1. GENERAL

1.1. SUMMARY

A. For General Mechanical Requirements, see Division 23 Section, Common Work Results for HVAC, and Division 01 Sections.

B. Comply with all code requirements and fire safety requirements as specified in Division 23 Section, Common Work Results for HVAC.

C. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

D. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory wired controls.

E. The automatic temperature control system ATC and central control and monitoring system (CCMS) shall be electric/electronic direct digital control (DDC), Alerton as installed by Albireo Energy, Johnson Controls (Metasys), Johnson Controls FX (Facility Explorer) as installed by Modern Controls, Honeywell, Siemens, Automated Logic Corporation, Reliable Controls, Schneider Electric as installed by Tri-M, Advanced Power, Trane, and TAC Controls by Schneider Electric installed by Automation and Control Concepts or Niagara. All work associated with the automatic temperature control system shall be performed by personnel regularly and directly employed by the Automatic Temperature Controls Contractor. Control System shall be web based, allowing the client access via a standard web browser.

F. Coordinate controls with controlled equipment. Upon completion of the work, calibrate and adjust all controls for proper function. Electric wiring, including interlock wiring for all equipment shall be furnished and installed under this section. All electrical work shall conform to the applicable requirements of Division 26.

G. All automatic temperature control dampers, valves and separable wells for immersion elements furnished by the Control Manufacturer shall be installed by the Mechanical Contractor or his sheet metal subcontractor under the Control Manufacturer's supervision.

H. Reference is hereby made for this contractor to become familiar with Division 26 of these specifications. Familiarization is for coordination purposes only. The control contractor shall provide all necessary relays, contacts, interlock wiring etc. not provided under Division 26 for the automation of the ATC and CCMS systems as required by the sequence of operation and input/output schedule. The control contractor shall coordinate all requirements with the building Fire Alarm System. The control contractor shall provide all additional devices and interlock wiring required for the automation of the ATC system and monitoring of the CCMS system.

I. Furnish all labor, materials, software, equipment and services necessary for and incidental to furnishing and installing a complete direct digital control, automatic temperature control

system to meet the requirements of the sequence of operation described on the Drawings.

J. Unless the necessary items are specified to be provided with mechanical equipment by Division 23, the ATC contractor shall coordinate with Division 23, Mechanical, and shall furnish and install all items necessary to meet the requirements of the Sequence of Operation and the Central Control and Monitoring System (CCMS) indicated on the drawings and as required in this specification.

K. The control system shall include all necessary and specified control equipment properly installed in accordance with the specifications and drawings and shall include, but not be limited to the automatic temperature control and energy management system of the following:

1. Air Handling Units, Heating and Ventilating Units
2. Airflow Monitoring Stations
3. Air Curtains
4. Automatic Glycol Feeder
5. Baseboard Radiators
6. Boilers
7. Building Facilities
8. Building Demand and Energy Consumption
9. Carbon Monoxide Ventilation Systems
10. Carbon Monoxide Systems
11. Carbon Dioxide Sensors
12. Chilled Water Systems
13. Clothes Dryer
14. Condensate Overflow Safety Switches
15. Condensing Units
16. Control Valves
17. Differential Bypass Valves Transmitters
18. Dish Machine Exhaust Fan
19. Domestic Hot Water Systems

20. Domestic Booster Pump System
21. Domestic Water Consumption/Meters
22. Duct Heating Coils
23. Ductless Units
24. Dryer Duct Booster Fans
25. Duct Detector Fan Interlocks
26. Dust Collector Systems including Spark Detection/Extinguisher and Control Panel Wiring
27. Economizer Systems
28. Energy Recovery Ventilators
29. Elevator Sump Pumps
30. Electric Radiant Heat Panels
31. Electric Heating Equipment
32. Exterior Lighting Systems
33. Fan Coil Units.
34. Flow Measuring Stations
35. Flow Switches
36. Freeze Protection Pumps
37. Fume Hood Systems
38. General Exhaust Systems
39. Generator Monitoring
40. Glycol Feed Systems
41. Heat Pipes
42. Heating System
43. High Temperature Alarms
44. Hot Water Coils
45. Industrial Exhaust Fans

46. Industrial Air Cleaners
47. Kitchen Ventilation System
48. Lighting Systems (Interior and Exterior)
49. Make-up Water Systems Interlocks and Alarms
50. Make-up Air Units
51. Mechanical Room Heat and Ventilation Control
52. Miscellaneous interlocks required for gas systems, ventilation systems, etc.
53. Plug Load Management
54. Plumbing Systems
55. Pumps
56. Relief Air Fans/Dampers
57. Rooftop Units.
58. Radiant Heat Panels
59. Relative Humidity/Temperature Sensors
60. Sensors (i.e., temperature, relative humidity, $CO_2$, etc.)
61. Smoke Removal Assist System
62. Paint Spray Booth/Fans/Heat
63. Solenoid Valves
64. Single Zone VAV Units
65. Static Pressure Controllers
66. Unit Heater/Baseboard Radiation/Panel Radiator Control
67. Variable Speed Drives
68. Ventilation Systems
69. 100% Outside Air Units
70. Water Heaters
71. Welding Ventilation Systems

L. All labor, material, equipment and software to meet the functional intent of the system, as specified herein and as shown on the drawings, shall be included. Drawings are diagrammatic only. Equipment and labor not specifically referred to herein or on the plans, that are required to meet the functional intent, shall be provided without additional cost to the owner.

M. Where equipment is specified to be provided by equipment manufacturer or where packaged controls are specified map out all points provided by the manufacturer so the same can be viewed by ATC system. As a minimum all points indicated in the point list and control diagram must be viewable and adjustable from the ATC system. Coordinate with equipment manufacturer.

1.2. DEFINITIONS

A. DDC: Direct digital control.

B. I/O: Input/output.

C. LonWorks: A control network technology platform for designing and implementing interoperable control devices and networks.

D. MS/TP: Main tracking/token passing.

E. PC: Personal computer.

F. PID: Proportional plus integral plus derivative.

G. RTD: Resistance temperature detector.

H. UPS: Uninterruptible Power Supply.

I. NAE: Network Automated Engine.

1.3. SYSTEM PERFORMANCE

A. Comply with the following performance requirements:

1. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.

2. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.

3. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.

4. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.

5. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.

6. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.

7. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:

a. Water Temperature: Plus or minus 1 deg F (0.5 deg C).
b. Water Flow: Plus or minus 5 percent of full scale.
c. Water Pressure: Plus or minus 2 percent of full scale.
d. Space Temperature: Plus or minus 1 deg F (0.5 deg C).
e. Ducted Air Temperature: Plus or minus 1 deg F (0.5 deg C).
f. Outside Air Temperature: Plus or minus 2 deg F (1.0 deg C).
g. Dew Point Temperature: Plus or minus 3 deg F (1.5 deg C).
h. Temperature Differential: Plus or minus 0.25 deg F (0.15 deg C).
i. Relative Humidity: Plus or minus 5 percent.
j. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
k. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
l. Air Pressure (Space): Plus or minus 0.01-inch wg (2.5 Pa).
m. Air Pressure (Ducts): Plus or minus 0.1-inch wg (25 Pa).
n. Carbon Monoxide: Plus or minus 5 percent of reading.
o. Carbon Dioxide: Plus or minus 50 ppm.
p. Electrical: Plus or minus 5 percent of reading.

1.4. DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

B. System Software: Update to latest version of software at Project completion.

1.5. COORDINATION

A. Coordinate location of temperature sensors, humidity sensors, $CO_2$ sensors, dewpoint sensors, and other exposed control sensors with plans and room details before installation.

B. Coordinate equipment with Division 28 Section, “Fire Alarm System” to achieve compatibility with equipment that interfaces with that system.

C. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.

D. Coordinate equipment with Division 26 Section, Electricity Metering to achieve compatibility of communication interfaces.

E. Coordinate equipment with Division 26 Section, Panelboards to achieve compatibility with starter coils and annunciation devices.

1. Coordinate equipment with Division 26 Section, Motor-Controllers to achieve compatibility with motor starters and annunciation devices.

1.6. WORK BY OTHERS

A. Automatic temperature control valves, air flow stations, pipe taps, flow meters, and separable wells for immersion elements furnished by the control manufacturer shall be installed by the mechanical contractor under the control manufacturer's supervision. The control contractor shall deliver to the mechanical contractor valves and wells for installation within the various systems.

B. All automatic dampers furnished by the control manufacturer shall be installed by the mechanical contractor under the control manufacturer's supervision.

1.7. QUALITY ASSURANCE

A. Supplier shall have an in-place support facility with technical staff, spare parts inventory and all necessary test and diagnostic equipment. The fully staffed and equipped office shall be within a 60 mile radius of the job site.

B. The systems shall be complete in all respects, and shall be installed by skilled personnel. The Control Contractor shall have a successful history in the installation and maintenance of automatic temperature control systems similar in size and performance to that specified herein.

C. Refer to Contract Drawings for sequences of operations, control diagrams, and points lists.

D. All electrical wiring in connection with the Automatic Temperature Control System shall be furnished and installed by the ATC Contractor. This shall include all interlock wiring between the air handling units, kitchen ventilation systems, fans, pumps, heating systems, boilers, chillers, switches, dampers, heat pumps, energy recovery ventilators, ductless units, condensing units, static pressure controllers, and H&V units, single zone VAV units, industrial ventilation systems, flow measuring stations, airflow monitoring stations, etc.

E. Bids by wholesalers, contractors or franchised dealers or any other firm whose principal business is not that of manufacturing or installing automatic temperature control systems, shall not be acceptable. Bid documents that are not complete in their response to these documents or take exception to any of the capabilities defined within these documents shall not be acceptable.

F. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

H. Comply with ASHRAE 135 for DDC system components.

1.8. GUARANTEE AND INSTRUCTION

A. The control system including all components, system software, parts and assemblies herein specified shall be free from defects in workmanship and materials under normal use and

service. After completion of the installation, the Control Manufacturer shall regulate and adjust all thermostats, control valves, control motors, and other equipment provided under this contract. If within two (2) years from the date of acceptance by Owner any of the equipment herein described is proved to be defective in workmanship or materials, it will be replaced or repaired at no additional cost to the Owner. The Control Manufacturer shall, after completion, provide any service incidental to the proper performance of the Control System under guarantees outlined above for a period of two (2) years. Normal maintenance of the system is not to be considered part of the guarantee. All corrective modifications made during warranty service periods shall be updated on all user documentation including "as-built" shop drawings and on user and manufacturer archived software disks.

B. The control contractor shall completely check out, calibrate and test all connected hardware to insure that the system performs in accordance with the approved specifications and sequences of operation submitted.

C. Upon completion of the work, the control drawings encased in heavy plastic shall be provided where directed. Layout shall show all control equipment and the function of each item indicated.

D. The temperature control contractor's office shall be within a 100 mile radius of the job site.

E. The contractor shall respond to the job site with qualified technicians within a 4 hour period for any emergency relating to the control system or energy management systems.

F. This agreement shall include emergency service during normal working hours.

1.9. SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.

2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.

3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Bill of materials of equipment indicating quantity, manufacturer, and model number.

2. Schematic flow diagrams showing equipment, fans, pumps, coils, dampers, valves, and control devices.

3. Wiring Diagrams: Power, signal, and control wiring.

4. Details of control panel faces, including controls, instruments, and labeling.

5. Written description of sequence of operation.

6. Schedule of dampers including size, leakage, and flow characteristics.

7. Schedule of valves including flow characteristics.

8. DDC System Hardware:

   a. Wiring diagrams for control units with termination numbers.
   b. Schematic diagrams and floor plans for field sensors and control hardware.
   c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.

9. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.

10. Controlled Systems:

    a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
    b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
    c. Written description of sequence of operation including schematic diagram.
    d. Points list.

C. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with LonWorks or Bacnet.

D. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.

2. Program Software Backup: On a magnetic media or compact disc, complete with data files.

3. Device address list.

4. Printout of software application and graphic screens.

5. Software license required by and installed for DDC workstations and control systems.

E. Software Upgrade Kit: For Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.

F. Qualification Data: For Installer and manufacturer.

G. Field quality-control test reports.

H. Submit screen shots of ATC system graphics at substantial completion.

I. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section, Operation and Maintenance Data, and Division 23 Section, Common Work Results for HVAC include the following:

1. Maintenance instructions and lists of spare parts for each type of control device.

2. Interconnection wiring diagrams with identified and numbered system components and devices.

3. Keyboard illustrations and step-by-step procedures indexed for each operator function.

4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

5. Calibration records and list of set points.

J. Upon completion of the work, provide a complete set of “as-built" drawings and application software on CD, USB, or other type of electronic storage device. Drawings shall be provided in format as acceptable to the Owner’s files. Submit as-built drawings and specification to Owner's representative for review and approval prior to final project closeout.

1.10. SOFTWARE LICENSE AGREEMENT

A. The owner shall sign a copy of the manufacturer's standard software and firmware licensing agreement as a condition of this contract. Such license shall grant use of all programs and application software to owner as defined by the manufacturer's license agreement, but shall protect manufacturer's rights to disclosure of trade secrets contained within such software. All software and hardware upgrades shall be included in two (2) year warranty period.

B. Software license agreement shall not apply on projects where existing ATC system is being extended.

C. Minimum of four (4) software license seats shall be provided. Storage of all software shall be coordinated with the New Castle County’s Vocational School District IT Manager.

1.11. ELECTRICAL SURGE PROTECTION

A. It is the responsibility of the ATC/FMS contractor to provide adequate surge protection for all wall mounted control panels required for this project.

1. Devices under surge protection shall be of design that loss of memory will not occur in the event of the surge protection device being activated due to surge/spike conditions.

2. Surge protection devices will be required to be hard wired, with the exception of peripheral devices that use standard 110VAC plugs for connections (i.e. Modems).

3. Surge protection devices are to be rated for 120 VAC single phase, 20 (or greater) amps capacity.

4. Surge Protection devices to include internal fuse protection, audible surge alarm & LED indicators.

5. Surge protectors to have clamping voltage of 480V peak, maximum surge current rating of 50,000 amps. Unit to have NEMA 12 enclosure with wall mounting bracket and conduit connection.

1.12. TRAINING

A. The Automatic Temperature Controls (ATC) Contractor shall include in his bid, provisions for additional computer training at the company's regular school or training center. The ATC contractor shall include in his bid all costs associated with sending two (2) individuals to the ATC contractors school for a period of not less than one (1) week. This training is in addition to the aforementioned training required under the General Provisions.

B. The training time period shall be coordinated with the school system's facility Engineer. The schedule training period shall be arranged at the owner's convenience.

C. Cost shall include all training material, instruction books, and two copies of video tape with sound DVD of training session.

D. Upon completion of the work, the Control Contractor shall have completely adjusted the entire control system. He shall arrange to instruct the Owner's representative on the operation of the control system for a period of not less than two (2) eight (8) hour days. All training shall be by the control contractor and shall utilize specified manuals and as-built documentation.

E. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain control systems and components.

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.

2. Provide operator training on data display, alarm and status descriptors, requesting data, executing commands, calibrating and adjusting devices, resetting default values, and requesting logs. Include a minimum of 40 hours' dedicated instructor time on-site.

3. Review data in maintenance manuals. Refer to Division 01 Section, Contract Closeout.

4. Review data in maintenance manuals. Refer to Division 01 Section, Operation and Maintenance Data.

5. Schedule training with Owner, with at least seven days' advance notice.

6. Control Contractor shall also attend and participate in separate HVAC equipment systems training in addition to ATC training.

1.13. ALTERNATES

A. Refer to Division 01 Section, Alternates for description of work under this section affected by alternates.

1.14. NEW CASTLE COUNTY VOCATIONAL TECHNICAL SCHOOL DISTRICT SPECIFIC REQUIREMENTS

A. The ATC Subcontractor shall include in his bid all costs associated with incorporating the following specific requirements:

1. All holiday schedules shall incorporate a 12 month block. Coordinate exact holidays, schedules, calendars, occupied, unoccupied periods with Owner prior to writing software. All schedules shall be reviewed and approved by the Owner.

2. Relays for ATC equipment shall not be located in ceilings. All relays shall be located in equipment control panels and/or mechanical rooms.

3. All exhaust fans shall be assigned a designated point. Utilizing relays to provide digital point for exhaust fans shall not be acceptable.

4. Graphics on ATC computer shall in addition to basic requirements indicate the percentage open or closed on all valves and dampers.

5. The ATC Computer Graphics shall incorporate the final room numbers actually utilized in the school. All room names utilized in the graphic display shall be reviewed and approved by the Owner.

6. The ATC Computer Graphics shall indicate for each item of equipment the “on” or “off” status and command shall be “run” or “stop”.

7. The ATC Computer Graphic shall indicate for each duct smoke detector the “on” or “off” status and command.

8. All temperature sensors, equipment, relative humidity sensors, current sensors, CO2 sensors, differential pressure sensors, etc. indicated on ATC Control Diagrams and point list shall be displayed on the ATC Computer Graphic. Measured value or status shall be displayed.

9. For any multi-stage HVAC units, the quantity of compressor stages and the quantity of electric heat stages shall be displayed on the Computer Graphics.

10. The exact space temperature set points, relative humidity set points, changeover

set points. etc., shall be coordinated with Owner prior to final data entry. All items indicated in sequences of Operation as "adjustable" shall be reviewed and approved by Owner prior to implementation of the same.

11. The outside air relative humidity and outside air temperature shall be monitored on ATC system and reported on ATC Computer Graphics. See Floor plans for exact locations.

12. Provide a graphic of all floor plans indicating location of all equipment interlocked with ATC System including all control panels.

13. Graphic shall also indicate area of building served by each item of equipment. Graphics shall indicate all global sensor readings.

14. For the heating water system, and chilled water system, provide a single command on the control system to allow all control valves to be manually opened for balancing by activating a single command.

15. All equipment shall be labeled with name of equipment, area served, and area location (room name/number).

16. Scheduling of HVAC equipment/zones shall be such that for afterhours use the ATC system shall allow a temporary override of the pre-set occupied/unoccupied schedule by zone and for specific equipment in a zone. This must allow the school staff the ability to operate as few or many zones as desired without operating entire portions of the building.

17. Provide "Loss of Heat" monitoring and alarm on ATC system if any space temperature sensor in the building drops below 50 degrees Fahrenheit (Adjustable).

18. Provide additional software package and license so that Owner can install software on Owner provided laptop. Assist owner with installation of software.

19. Provide a "demand toggle control" switch on ATC system to automatically reduce HVAC electric demand (power) by automatically modifying setpoints to pre-determined values. Coordinate pre-determined setpoint values with Owner and document in the As-Built Documents.

20. Scheduling of HVAC equipment/zones shall be such that for afterhours use the ATC system shall allow a temporary override of the pre-set occupied/unoccupied schedule by zone and for specific equipment in a zone. This must allow the New Castle County Vocational School District the ability to operate as few or many zones as desired without operating entire portions of the building.

## 1.15. GLOBAL SENSORS

### A. General

1. Furnish and install global sensors and report the same on the automatic temperature control system.

2. Global sensors shall monitor and trend the following conditions:

a. Outside air temperature.
b. Outside air relative humidity.
c. Outside Air $CO_2$ level in ppm.
d. Chilled water supply temperature
e. Chilled water return temperature.
f. Heating water supply temperature
g. Heating water return temperature.
h. All ventilation fan speeds where variable frequency drives are specified.
i. Outside air carbon dioxide level.
j. All ventilation fan amperage where variable frequency drives are specified.
k. All pump or fan speeds where variable frequency drives are specified.
l. All pump amperage's where variable frequency drives are specified.
m. All fan amperages where variable speed fans are indicated. Graphic shall also indicate area of building served by each item of equipment.
n. Kitchen walk-in refrigerator and freezer space temperatures.
o. Main Distribution Frame (MDF), and I.T. server room space temperature sensor.
p. Global holiday schedules:
   i. Provide all interlock wiring and programming to allow a global holiday schedule for all equipment except the administration equipment. Global holiday schedule shall allow the Owner to shut down the entire building's HVAC systems if an unscheduled event occurs when school is cancelled.
   ii. System shall also be capable of individual scheduling of equipment as specified or all can be globally modified at once.
q. All equipment interlocked with ATC system shall be able to be turned on/off via ATC system as specified. Changing temperature set point alone is not acceptable method for turning equipment on/off.
r. Where valve or damper position is indicated ATC graphic shall indicate percentage open or percentage closed.

## PART 2. PRODUCTS

2.1. BUILDING MANAGEMENT SYSTEM

A. The Building Management System (BMS) shall use an open architecture and fully support a multi-vendor environment. To accomplish this effectively, the BMS shall support open communication protocol standards and integrate a wide variety of third-party devices and applications. The system shall be designed for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.

B. The Building Management System shall consist of the following:

1. Standalone Network Automation Engine(s)

2. Field Equipment Controller(s)

3. Input/Output Module(s)

4. Local Display Device(s)

5. Distributed User Interface(s)

6. Network processing, data storage and communications equipment

7. Other components required for a complete and working BMS

C. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers and operator devices, while re-using existing controls equipment.

D. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

E. Automation Network

1. The automation network shall be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard "off the shelf" products available through normal PC vendor channels.

2. The automation network shall be capable of operating at a communication speed of 100 Mbps, with full peer-to-peer network communication.

3. Network Automation Engines (NAE) and/or system controllers shall reside on the automation network.

4. The automation network will be compatible with other enterprise-wide networks. Where indicated, the automation network shall be connected to the enterprise network and share resources with it by way of standard networking devices and practices.

F. Control Network

1. Network Automation Engines and/or system controllers shall provide supervisory control over the control network and shall support all three (3) of the following communication protocols:

   a. BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9.
   b. LonWorks enabled devices using the Free Topology Transceiver (FTT-10a).
   c. The Johnson Controls N2 Field Bus or equivalent.
   d. Tridium FX-40
   e. Honeywell Webs
   f. TAC Controls by Schneider Electric
   g. Siemens P1/P2 Serial

2. Control networks shall provide either "Peer-to-Peer," Main-Tracking, or Supervised Token Passing communications, and shall operate at a minimum

communication speed of 9600 baud.

3. DDC Controllers shall reside on the control network.

4. Control network communication protocol shall be BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135.

5. A BACnet Protocol Implementation Conformance Statement shall be provided for each controller device (main or tracking) that will communicate on the BACnet MS/TP Bus.

6. The Conformance Statements shall be submitted with the BAS Submittals.

G. Integration

1. Hardwired

a. Analog and digital signal values shall be passed from one system to another via hardwired connections.
b. There will be one separate physical point on each system for each point to be integrated between the systems.

2. BACnet Protocol Integration – BACnet

a. The neutral protocol used between systems will be BACnet over Ethernet and comply with the ASHRAE BACnet standard 135-2003.
b. A complete Protocol Implementation Conformance Statement (PICS) shall be provided for all BACnet system devices.
c. The ability to command, share point object data, change of state (COS) data and schedules between the host and BACnet systems shall be provided.

H. Dedicated Web Based User Interface

1. Where required by the Owner, the BMS Contractor shall provide and install a personal computer for command entry, information management, network alarm management, and database management functions. All real-time control functions, including scheduling, history collection and alarming, shall be resident in the BMS Network Automation Engines to facilitate greater fault tolerance and reliability. Coordinate with Owner to determine computer type (i.e. PC (Windows based) or Macintosh (Apple)).

2. Dedicated User Interface Architecture – The architecture of the computer shall be implemented to conform to industry standards, so that it can accommodate applications provided by the BMS Contractor and by other third party applications suppliers, including but not limited to Microsoft Office Applications. Specifically it must be implemented to conform to the following interface standards.

a. Microsoft Internet Explorer for user interface functions
b. Microsoft Office Professional for creation, modification and maintenance of reports, sequences other necessary building management functions

c. Microsoft Outlook or other e-mail program for supplemental alarm functionality and communication of system events, and reports
d. Required network operating system for exchange of data and network functions such as printing of reports, trends and specific system summaries.

3. Computer Hardware – The personal computer(s) shall be configured as follows:

a. Description: A tower or all-in-one computer designed for normal use at a single, semipermanent location.
b. Performance Requirements:
   i. Performance requirements may dictate equipment exceeding minimum requirements indicated.
   ii. Energy Star compliant.
c. Personal Computer:
   i. Minimum Processor Speed: 3 gigahertz (GHz). Dual Core Processer.
d. RAM:
   i. Capacity: 16GB.
   ii. Speed and Type: 1333 MHz, SDRAM.
e. Hard Drive:
   i. Media: Solid state.
   ii. Number of Hard Drives: One.
   iii. Capacity: 250GB.
f. Optical Read and Write Drive:
   i. Include with at least 2 MB of data buffer.
   ii. Type: SCS1 CD-ROM Drive with Read/Write Capability.
   iii. Average access time of 150 ms or less.
g. At least four expansion slots.
h. Video Card:
   i. Resolution: 1920 by 1200 pixels.
   ii. RAM: 4 GB.
   iii. Controller Speed: 4GHz.
i. Sound Card:
   i. At least 128 voice wavetable synthesis.
   ii. Capable of delivering three-dimensional sound effects.
   iii. High-resolution 16-bit stereo digital audio recording and playback with user-selectable sample rates up to 48,000 Hz.
j. Two (2) Network Interface Cards: Include cards with connection, as applicable.
   i. 10-100-1000 base TX Ethernet with RJ45 connector port.
   ii. 100 base FX Ethernet with SC or ST port.
k. Wireless Ethernet, 802.11 a/b/g/n.
l. Optical Modem: Full duplex link for connection to optical fiber cable provided.
m. I/O Ports:
   i. Two USB 3.0 ports on front panel, six on back panel, and three internal on motherboard.
   ii. One serial port.
   iii. One parallel port.

iv. Two PS/2 ports.
v. One RJ-45.
vi. One stereo line-in and headphone/line-out on back panel.
vii. One microphone and headphone connector on front panel.
viii. One IEEE 1394 on front and back panel with PCI-e card.
ix. One ESATA port on back panel.

n. Battery: Life of at least three years to maintain system clock/calendar and ROM, as a minimum.

o. Keyboard:
i. 101 enhanced keyboard.
ii. Full upper- and lowercase ASCII keyset, numeric keypad, dedicated cursor control keypad, and 12 programmable function keys.
iii. Wireless operation within up to 72 inches (1800 mm) in front of workstation.

p. Pointing Device:
i. Either a two- or three-button mouse.
ii. Wireless operation within up to 72 inches (1800 mm) in front of workstation.

q. Flat Panel Display Monitor:
i. Display:
1. Color display with 21 inches diagonal viewable area.
2. Digital input signal.
3. Aspect Ratio: 16 to 9.
4. Antiglare display.
5. Tilt adjustable base.
6. Energy Star compliant.
7. Resolution: 1920 by 1200 pixels at 60 Hz.
8. Number of Displays: One.

r. Speakers:
i. Two, with individual controls for volume, bass and treble.
ii. Signal to Noise Ratio: At least 65 dB.
iii. Power: At least 4 W per speaker/channel.
iv. Magnetic shielding to prevent distortion on the video monitor.

s. I/O Cabling: Include applicable cabling to connect I/O devices.

t. Uninterruptable Power Supply.

I. User Interface Application Components

1. Operator Interface

a. An integrated browser based client application shall be used as the user operator interface program.

b. All Inputs, Outputs, Setpoints, and all other parameters as defined within Part 3 or on the drawings, shown on the design drawings, or required as part of the system software, shall be displayed for operator viewing and modification from the operator interface software.

c. The user interface software shall provide help menus and instructions for each operation and/or application.

d. All controller software operating parameters shall be displayed for the

operator to view/modify from the user interface. These include: setpoints, alarm limits, time delays, PID tuning constants, run-times, point statistics, schedules, and so forth.

e. The Operator Interface shall incorporate comprehensive support for functions including, but not necessarily limited to, the following:
   i. User access for selective information retrieval and control command execution
   ii. Monitoring and reporting
   iii. Alarm, non-normal, and return to normal condition annunciation
   iv. Selective operator override and other control actions
   v. Information archiving, manipulation, formatting, display and reporting
   vi. FMS internal performance supervision and diagnostics
   vii. On-line access to user HELP menus
   viii. On-line access to current FMS as-built records and documentation
   ix. Means for the controlled re-programming, re-configuration of FMS operation and for the manipulation of FMS database information in compliance with the prevailing codes, approvals and regulations for individual FMS applications.
   x. The operation of the control system shall be independent of the user interface, which shall be used for operator communications only. Systems that rely on an operator workstation to provide supervisory control over controller execution of the sequences of operations or system communications shall not be acceptable.

2. Navigation Trees

   a. The system will have the capability to display multiple navigation trees that will aid the operator in navigating throughout all systems and points connected. At minimum provide a tree that identifies all systems on the networks.
   b. Provide the ability for the operator to add custom trees. The operator will be able to define any logical grouping of systems or points and arrange them on the tree in any order. It shall be possible to nest groups within other groups. Provide at minimum 5 levels of nesting.
   c. The navigation trees shall be “dockable” to other displays in the user interface such as graphics. This means that the trees will appear as part of the display, but can be detached and then minimized to the Windows task bar or closed altogether. A simple keystroke will reattach the navigation to the primary display of the user interface.

3. Alarms

   a. Alarms shall be routed directly from Network Automation Engines to PCs and servers. It shall be possible for specific alarms from specific points to be routed to specific PCs and servers. The alarm management portion of the user interface shall, at the minimum, provide the following functions:
      i. Log date and time of alarm occurrence.
      ii. Generate a “Pop-Up” window, with audible alarm, informing a user that an alarm has been received.

iii. Allow a user, with the appropriate security level, to acknowledge, temporarily silence, or discard an alarm.
iv. Provide an audit trail on hard drive for alarms by recording user acknowledgment, deletion, or disabling of an alarm. The audit trail shall include the name of the user, the alarm, the action taken on the alarm, and a time/date stamp.
v. Provide the ability to direct alarms to an e-mail address or alphanumeric pager. This must be provided in addition to the pop up window described above. Systems that use e-mail and pagers as the exclusive means of annunciating alarms are not acceptable.
vi. Any attribute of any object in the system may be designated to report an alarm.

b. The FMS shall annunciate diagnostic alarms indicating system failures and non-normal operating conditions
c. The FMS shall annunciate application alarms as required.

4. Reports and Summaries

a. Reports and Summaries shall be generated and directed to the user interface displays, with subsequent assignment to printers, or disk. As a minimum, the system shall provide the following reports:
i. All points in the BMS
ii. All points in each BMS application
iii. All points in a specific controller
iv. All points in a user-defined group of points
v. All points currently in alarm
vi. All points locked out
vii. All BMS schedules
viii. All user defined and adjustable variables, schedules, interlocks and the like.
b. Summaries and Reports shall be accessible via standard UI functions and not dependent upon custom programming or user defined HTML pages.
c. Selection of a single menu item, tool bar item, or tool bar button shall print any displayed report or summary on the system printer for use as a building management and diagnostics tool.
d. The system shall allow for the creation of custom reports and queries via a standard web services XML interface and commercial off-the-shelf software such as Microsoft Access, Microsoft Excel, or Crystal Reports.

5. Schedules

a. A graphical display for time-of-day scheduling and override scheduling of building operations shall be provided. At a minimum, the following functions shall be provided:
i. Weekly schedules
ii. Exception Schedules
iii. Monthly calendars
b. Weekly schedules shall be provided for each group of equipment with a specific time use schedule.
c. It shall be possible to define one or more exception schedules for each

schedule including references to calendars

d. Monthly calendars shall be provided that allow for simplified scheduling of holidays and special days for a minimum of five years in advance. Holidays and special days shall be user-selected with the pointing device or keyboard, and shall automatically reschedule equipment operation as previously defined on the exception schedules.
e. Changes to schedules made from the User Interface shall directly modify the Network Automation Engine schedule database.
f. Schedules and Calendars shall comply with ASHRAE SP135/2003 BACnet Standard.
g. Selection of a single menu item or tool bar button shall print any displayed schedule on the system printer for use as a building management and diagnostics tool.

6. Password

a. Multiple-level password access protection shall be provided to allow the user/manager to user interface control, display, and database manipulation capabilities deemed appropriate for each user, based on an assigned password.
b. Each user shall have the following: a user name (24 characters minimum), a password (12 characters minimum), and access levels.
c. The system shall allow each user to change his or her password at will.
d. When entering or editing passwords, the system shall not echo the actual characters for display on the monitor.
e. A minimum of five levels of access shall be supported individually or in any combination as follows:
    i. Level 1 = View Data
    ii. Level 2 = Command
    iii. Level 3 = Operator Overrides
    iv. Level 4 = Database Modification
    v. Level 5 = Database Configuration
    vi. Level 6 = All privileges, including Password Add/Modify
f. A minimum of 100 unique passwords shall be supported.
g. Operators shall be able to perform only those commands available for their respective passwords. Display of menu selections shall be limited to only those items defined for the access level of the password used to log-on.
h. The system shall automatically generate a report of log-on/log-off and system activity for each user. Any action that results in a change in the operation or configuration of the control system shall be recorded, including: modification of point values, schedules or history collection parameters, and all changes to the alarm management system, including the acknowledgment and deletion of alarms.

7. Screen Manager - The User Interface shall be provided with screen management capabilities that allow the user to activate, close, and simultaneously manipulate a minimum of 4 active display windows plus a network or user defined navigation tree.

8. Dynamic Color Graphics

a. The graphics application program shall be supplied as an integral part of the User Interface. Browser or Workstation applications that rely only upon HTML pages shall not be acceptable.
b. The graphics applications shall include a create/edit function and a runtime function. The system architecture shall support an unlimited number of graphics documents (graphic definition files) to be generated and executed.
c. The graphics shall be able to display and provide animation based on real-time data that is acquired, derived, or entered.
d. Graphics runtime functions – A maximum of 16 graphic applications shall be able to execute at any one time on a user interface or workstation with 4 visible to the user. Each graphic application shall be capable of the following functions:
    i. All graphics shall be fully scalable
    ii. The graphics shall support a maintained aspect ratio.
    iii. Multiple fonts shall be supported.
    iv. Unique background shall be assignable on a per graphic basis.
    v. The color of all animations and values on displays shall indicate the status of the object attribute.
e. Operation from graphics – It shall be possible to change values (setpoints) and states in system controlled equipment by using drop-down windows accessible via the pointing device
f. Graphic editing tool – A graphic editing tool shall be provided that allows for the creation and editing of graphic files. The graphic editor shall be capable of performing/defining all animations, and defining all runtime binding.
    i. The graphic editing tool shall in general provide for the creation and positioning of point objects by dragging from tool bars or drop-downs and positioning where required.
    ii. In addition, the graphic editing tool shall be able to add additional content to any graphic by importing backgrounds in the SVG, BMP or JPG file formats.
g. Aliasing – Many graphic displays representing part of a building and various building components are exact duplicates, with the exception that the various variables are bound to different field values. Consequently, it shall be possible to bind the value of a graphic display to aliases, as opposed to the physical field tags.

9. Historical trending and data collection

a. Each Automation Engine shall store trend and point history data for all analog and digital inputs and outputs, as follows:
    i. Any point, physical or calculated, may be designated for trending. Two (2) methods of collection shall be allowed:
        1. Defined time interval
        2. Upon a change of value.
    ii. Each Automation Engine shall have the capability to store multiple samples for each physical point and software variable based upon available memory, including an individual sample time/date stamp. Points may be assigned to multiple history trends

with different collection parameters.

b. Trend and change of value data shall be stored within the engine and uploaded to a dedicated trend database or exported in a selectable data format via a provided data export utility. Uploads to a dedicated database shall occur based upon one of the following: user-defined interval, manual command, or when the trend buffers are full. Exports shall be as requested by the user or on a time scheduled basis. Trend data shall be available for a minimum of twelve (12) months.

10. Trend data viewing and analysis

a. Provide a trend viewing utility that shall have access to all database points.
b. It shall be possible to retrieve any historical database point for use in displays and reports by specifying the point name and associated trend name.
c. The trend viewing utility shall have the capability to define trend study displays to include multiple trends
d. Displays shall be able to be single or stacked graphs with on-line selectable display characteristics, such as ranging, color, and plot style.
e. Display magnitude and units shall both be selectable by the operator at any time without reconfiguring the processing or collection of data. This is a zoom capability.
f. Display magnitude shall automatically be scaled to show full graphic resolution of the data being displayed.
g. Trend studies shall be capable of calculating and displaying calculated variables including highest value, lowest value and time based accumulation.

J. Network Automation Engine (NAE)/ System Controllers

1. The Network Automation Engine (NAE)/ System Controllers or approved equal shall be a fully user-programmable, supervisory controller. The NAE shall monitor the network of distributed application-specific controllers, provide global strategy and direction, and communicate on a peer-to-peer basis with other Network Automation Engines.

2. Automation network – The NAE shall reside on the automation network and shall support a subnet of system controllers.

3. User Interface – Each NAE shall have the ability to deliver a web based User Interface (UI) as previously described. All computers connected physically or virtually to the automation network shall have access to the web based UI.

a. The web based UI software shall be imbedded in the NAE. Systems that require a local copy of the system database on the user's personal computer are not acceptable.
b. The NAE shall support up four (4) concurrent users.
c. The web based user shall have the capability to access all system data through one NAE.
d. Remote users connected to the network through an Internet Service Provider (ISP) or telephone dial up shall also have total system access

through one NAE.

e. Systems that require the user to address more than one NAE to access all system information are not acceptable.
f. The NAE shall have the capability of generating web based UI graphics. The graphics capability shall be imbedded in the NAE.
g. Systems that support UI Graphics from a central database or require the graphics to reside on the user's personal computer are not acceptable.
h. The web based UI shall support the following functions using a standard version of Microsoft Internet Explorer:
    i. Configuration
    ii. Commissioning
    iii. Data Archiving
    iv. Monitoring
    v. Commanding
    vi. System Diagnostics
i. Systems that require workstation software or modified web browsers are not acceptable.
j. The NAE shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems.

4. Processor – The NAE shall be microprocessor-based with a minimum word size of 32 bits. The NAE shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. NAE size and capability shall be sufficient to fully meet the requirements of this Specification.

5. Memory – Each NAE shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.

6. Hardware Real Time Clock – The NAE shall include an integrated, hardware-based, real-time clock.

7. The NAE shall include troubleshooting LED indicators to identify the following conditions:

    a. Power - On/Off
    b. Ethernet Traffic – Ethernet Traffic/No Ethernet Traffic
    c. Ethernet Connection Speed – 10 Mbps/100 Mbps
    d. FC Bus – Normal Communications/No Field Communications
    e. Peer Communication – Data Traffic Between NAE Devices
    f. Run – NAE Running/NAE In Startup/NAE Shutting Down/Software Not Running
    g. Bat Fault – Battery Defective, Data Protection Battery Not Installed
    h. Fault – General Fault
    i. Modem RX – NAE Modem Receiving Data
    j. Modem TX – NAE Modem Transmitting Data

8. Communications Ports – The NAE shall provide the following ports for operation of operator Input/Output (I/O) devices, such as industry-standard computers, modems, and portable operator's terminals.

a. Up to two (2) USB port
b. Up to two (2) URS-232 serial data communication port
c. Up to two (2) RS-485 port
d. One (1) Ethernet port

9. Diagnostics – The NAE shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The Network Automation Engine shall provide both local and remote annunciation of any detected component failures, low battery conditions, or repeated failures to establish communication.

10. Power Failure – In the event of the loss of normal power, The NAE shall continue to operate for a user adjustable period of up to 10 minutes after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.

    a. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.
    b. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.

11. Certification – The NAE shall be listed by Underwriters Laboratories (UL).

12. Controller network – The NAE shall support the following communication protocols on the controller network:

    a. The NAE shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.
        i. A BACnet Protocol Implementation Conformance Statement shall be provided for each controller device (main or tracking) that will communicate on the BACnet MS/TP Bus.
        ii. The Conformance Statements shall be submitted 10 day prior to bidding.
        iii. The NAE shall support a minimum of 100 control devices.
    b. The NAE shall support the Johnson Controls N2, Tridium FX-40, or Honeywell Webs or approved equal Field Bus.
        i. The NAE shall support a minimum of 100 N2 control devices.
        ii. The Bus shall conform to Electronic Industry Alliance (EIA) Standard RS-485.
        iii. The Bus shall employ a main/tracking protocol where the NAE is the main.
        iv. The Bus shall employ a four (4) level priority system for polling frequency.
        v. The Bus shall be optically isolated from the NAE.
        vi. The Bus shall support the Metasys Integrator System.

2.2. WIRING

A. The multi-conductor cable for field wiring of electronic analog sensors shall be minimum

No. 22 AWG, 300 volt, thermoplastic with stranded copper wire and 100 percent shield coverage. The number of conductors in each sensor cable shall be as determined by the Contractor. 2/c #22 shielded cables shall be Belden Cat. #8451 3/c #20 shielded cables shall be Belden Cat. #9770 or approved equal.

B. Conductors for digital sensors or contact control shall be the same as for the analog sensors, except the grounded shield is not required.

C. Individual conductors shall be color coded and in addition shall be numbered in the field to identify the particular terminal to which attached. Field numbering shall be performed with Brady or approved equal markers wrapped around the wire near the terminal connection. All wires shall be terminated with pressure type connectors suitable for wire size, material and terminal connection.

D. All exposed wiring or wiring concealed in partitions shall be installed in a designated conduit raceway. The conduit shall conform to Division 26 of the specification. Where wiring is installed in an air plenum the same shall be plenum rated cable.

E. All junction boxes shall have covers painted safety green, and be rigid steel.

F. All wiring between differential pressure transmitters and variable frequency drive pump controllers shall be shielded and grounded at the pump controller end. Directly route the variable frequency drive pump controller to the differential pressure transmitter(s).

G. All wiring between static pressure controllers and/or air flow monitoring stations and variable frequency drive fan controllers shall be shielded and grounded at the fan controller end. Directly route the variable frequency drive fan controller to the static pressure controller(s) and/or air flow monitoring stations.

H. Where a motor disconnect is indicated downstream of a variable frequency drive (VFD) provide interlock wiring from the auxiliary contacts on the disconnect to the VFD to de-energize when the disconnect is turned “off”.

2.3. CONTROLLERS

A. Temperature, relative humidity, and CO2 sensor covers shall be stainless steel wire guard type with vandal proof screws. All room relative humidity, CO2, and temperature sensors shall be mounted 4'-0 inches above the finished floor, except in stairways, corridors and toilets, which shall be 7'-0 inches. Provide insulating bases where temperature sensors are located on exterior or unconditioned walls. Each temperature sensor shall have adjustable limit stops and adjustable sensitivity. User adjustment shall be 2 degrees F above and below set points or as determined by the Owner. Room temperature sensors shall include range of 55 degrees F to 85 degrees F set point adjustment. Temperature sensors shall include set-point adjustors, U.L. approved for mounting base in air plenums, and RJ-11 jack for communications. Room temperature sensors shall be fully adjustable and shall display set point and actual temperature.

B. Low Limit Thermostats: Freezestats shall have a minimum 20 foot (averaging sensing element) capillary tube sized to the basis of one linear foot of capillary tube for each square foot of coil surface. Thermostat sensitivity shall be adjustable. Freezestats shall stop all fans and close the outside air damper if air temperature drops below 35 degrees F and open

hot water heating valves. Low limit thermostats shall include hardwire interlock to fans and the building automatic control system. Low limit thermostats shall remain active even when H-O-A switches are in "HAND". Additional requirements are indicated in Sequence of Operation.

C. Room temperature sensors shall be accessible to ADA occupants.

D. All global sensors shall be monitored in accessible locations. Exterior sensors shall be provided with sun shield and be installed to prevent bird nesting.

2.4. DAMPERS

A. Control Dampers

1. The temperature control contractor shall provide all automatic control dampers of the types indicated on the plans and not specified to be integral with other equipment. Frames shall be not less than 16 gauge galvanized steel. Blades shall not be over 6 inches wide airfoil shaped double skin construction of 14 gauge equivalent thickness. Bearings shall be stainless steel sleeves with 2 inch shafts. Blade edge seals shall be vinyl blade with flexible metal compressible jamb seals of the tight-seal spring type. Dampers and seals shall be suitable for temperature ranges of -40 to 250 degrees F.

2. All proportional control dampers shall be opposed blade type and all two-position dampers shall be parallel blade type.

3. Dampers shall be sized to meet flow requirements of the application. The sheet metal contractor shall furnish and install baffles to fit the damper to duct size. Baffles shall not exceed 6 inches.

4. Dampers shall be minimum leakage type to conserve energy and the temperature control manufacturer shall submit leakage and flow characteristic data for all control dampers with the temperature control submittal. Maximum leakage shall be 3 CFM/Sq. Ft. at static pressure of 1 inch W.C. for a damper width of 48 inches.

5. Ultra-low leakage dampers shall have blade edges shall to be fitted with replaceable, snap-on, inflatable seals to limit damper leakage to 2 percent at applied static pressure.

6. Medium and low pressure rectangular control dampers shall be Type CD60 airfoil low leakage damper as manufactured by Ruskin or as approved equal of American Warming and Ventilating, Air Balance and Arrow.

7. Round control dampers shall be Type CERS25 with blade edge seals as manufactured by Ruskin or as approved equal.

8. Fume hood and chemical storage room exhaust fan control damper and dampers mounted in stainless steel ductwork shall be Type 304 stainless steel construction, heavy duty control damper with blade edge seals suitable for fume hood, chemical service Type CDR82 manufactured by Ruskin or as approved equal.

9. Provide damper end switch for all control dampers where indicated. Damper end switch shall be independent of the damper actuator and shall provide "proof of open" prior to allowing fan to energize. Damper end switch shall be Model TS-475 Mechanical Damper Arm Switch (no-mercury) as manufactured by MDI, Inc. or approved equal. Install per manufacturer's recommendations on control damper. End switch shall have the following features:

    a. Housing Material: Glass filled PBT (polybutylene terephthalate).
    b. Bracket Material: Plated steel.
    c. Operation: Steel ball actuated sub-miniature snap action switch.
    d. Operating angle: 15 degrees. (Contact closes at 10 degrees above horizontal and contact opens at 5 degrees below horizontal).

B. Duct Smoke Detectors

1. Duct Smoke detectors shall be provided by the Electrical Contractor and installed by the Mechanical Contractor. All wiring, interlocks, etc., to be provided by Electrical Contractor. Wiring from duct smoke detectors to fans shall be by ATC Contractor. Duct smoke detectors shall be tested by the Test and Balance Engineer as specified in Division 23 Section, Testing Adjusting & Balancing for HVAC and Plumbing.

C. Damper Operators

1. Electric damper actuators shall be properly sized to provide sufficient torque to position the damper throughout its operating range.

2. Use devices which are quiet in operation and which in the event of power failure, will "fail safe" by spring action in either the normally open or normally closed position as required for freeze, moisture, smoke, or fire protection.

3. Electric actuators requiring a 24 VAC power supply will be utilized. Motors shall be specifically designed and sized with proper torque according to requirements of the device it is to be used on (i.e.: valve, damper). Each actuator will accept the proper control input as the system is designed, (i.e.: floating, 0-10VDC, 4-20Ma etc.) without the need for any additional interface devices.

4. For all exterior damper operators provide NEMA 4X stainless steel corrosion resistant enclosure. Damper operator enclosure shall be model ZS-300 as manufactured by Belimo or approved equal.

## 2.5. PRESSURE INDEPENDENT HYDRONIC CONTROL VALVES

A. All automatic control valves 2 inches and smaller shall be screwed type, and valves 2 ½ inches and larger shall be flanged. Valves shall be factory-rated to withstand the pressures encountered. Valves shall have stainless-steel stems and spring loaded Teflon packing with replaceable seats and discs. All control valves must be capable of withstanding the shut-off head of the pumps, they are connected to without the valve seat lifting. Valves shall have stainless steel stems and spring loaded Teflon packing with replaceable seats and discs.

1. All modulating straight-through water valves shall be provided with equal-percentage contoured throttling plugs and shall be pressure independent type. All three-way valves shall be provided with linear throttling plugs such that the total flow through the valve shall remain constant regardless of the valve's position modulating. Valves shall be sized for a pressure drop equal to the coil they serve but not to exceed 5 psi. Valves shall have replaceable seats and discs. Pressure independent control valves shall be as manufactured by Griswold, Delta P, Warren Controls, Danfos, Bray, or approved equal.

2. Pressure Independent Actuated Ball Valves (PIC-V) for Flows up to 85 GPM

   a. The modulating control valves shall be pressure independent.
   b. Valves shall accurately control flow within +/-5% (including manufacturing tolerance) independent of system pressure fluctuation by maintaining a constant pressure differential across the control valve so that the valve only repositions on a change in load demand.
   c. The pressure independent modulating control valve shall include a Pressure Compensating Cartridge, Actuated Ball Valve, 2 PT's, Manual Air Vent, Union, and Manual Isolation Ball in a single valve housing.
   d. The valve shall have an accuracy of +/- 5% including manufacturing tolerances and pressure variations.
   e. Valve housing shall consist of forged brass, rated at no less than 360 psi at 250°F.
   f. A venturi flow meter fitting shall be field installed so that the flow rate can be read by means of differential pressure. Valve shall include a field installed or factory installed venturi metering station so that the flow rate can be read by means of differential pressure. Venturi metering station shall not require any straight runs of piping before or after meter. Provide separate flow meter fitting if venturi flow meter is not integral to PIC valve assembly.
   g. Both the ATC and shutoff valve shall have stems that are field repairable with the valve in the line. The body design shall allow inspection or repair of the stem without disturbing piping connections or draining water. The repairable stem shall include two Teflon seals and one EPDM O-ring for protection against chemicals and modulating temperature.
   h. Valve shall have a union end connection with factory installed air vent to allow for venting of the coil or heat pump.
   i. The control valve shall accurately control the flow from 0 to 100% full rated flow.
   j. The ATC portion of the valve shall use the full 90 degrees of the stroke for control. Stroke limiting of the valve shall not be acceptable.
   k. A flow tag shall be furnished with each valve.
   l. A universal mounting plate shall allow installation of actuators meeting the system electrical requirements and valve torque requirements as provided by Honeywell, Invensys, Johnson Controls, KMC, Schneider, Neptronic, or Siemens.
   m. The actuator and plate can be rotated after mounting.
   n. The actuator mounting assembly shall accommodate no less than 1 ½" of insulation.
   o. Pressure Compensating Cartridge (PCC)

i. PCC shall automatically compensate for pressure changes in valve and shall maintain a constant pressure drop across the flow limiting actuated ball.
ii. The operating pressure range shall be available with the minimum range requiring 3 PSID to actuate the cartridge and the maximum 8 psid to actuate the cartridge
iii. Valve internal control mechanism includes a diaphragm and full travel linear coil spring.
iv. Valves shall include an accessible/ replaceable cartridge.
v. Dual pressure/temperature test valves for verifying the pressure differential across the cartridge and flow limiting ball shall be standard.

p. Actuated Ball Valve
i. Valve ball shall consist of chemically plated nickel brass or stainless steel.
ii. Actuator stem shall be removable/ replaceable without removing valve from line.
iii. Manufacturer shall be able to provide ball insert to limit flow to maximum flow rate with ±5% accuracy. Insert shall be constructed of a Glass-Filled Polymer. The insert shall be press fit to the inside of the ball. Clipping the insert onto the exiting side of the ball shall not be acceptable.
iv. Each maximum flow rate selected shall use a different characterizing disc so that stroke limiting is not required.
v. Valve shall have a minimum rangeability as follows: ½”-40:1, ¾”-160:1, 1” to 3”-400:1
vi. Valve shall have EPDM O-rings behind Reinforced Teflon (PTFE) ball seals.
vii. The valve shall have a minimum close-off pressure differential rating of 100 psi with 35 in-lbs of torque for 1/2" to 2" sizes.
viii. Actuator shall provide minimum torque required for full valve shutoff position.

q. Isolation Ball Valve
i. Valve shall include a 600 WOG manual isolation ball valve.
ii. Stem shall be removable/replaceable with the valve in the line.

r. The control valve actuator will be furnished by the controls contractor under Section 230900.

s. Pressure independent valves shall come as one complete assembly from Griswold Controls or approved equal and shall include a supply side combination shutoff/ strainer valve.

3. MVP Pressure Independent Control Valves for Flows above 85 GPM.

a. Pressure Independent Flow Control Valve 2.5” and Larger
i. The modulating control valves shall be pressure independent.
ii. Valve shall accurately control flow within +/-5% (including manufacturing tolerance) independent of system pressure fluctuation by maintaining a constant pressure differential across the control valve so that the valve only repositions on a change in load demand.

iii. Contactor shall install pressure independent flow control valves where indicated in drawings.
iv. Valve shall be electronic, pressure independent, modulating 2-way control device.
v. Balancing valves shall not be required where pressure-independent valves are installed.
vi. Install venturi flow meter fitting to measure flow rate in gallons per minute.
vii. Valve shall include a venturi flow meter fitting so that the flow rate can be read by means of differential pressure. Venturi flow meter fitting shall not require any straight runs of piping before or after meter. Provide separate flow meter fitting if not integral to control valve.

b. Valve Actuator
i. Valve actuator housing shall be rated to IP44 insulation.
ii. Actuator shall be driven by a 24Vdc motor, and shall accept 2-10 Vdc, 4-20mA, 3-point floating or pulse width modulation electric signal and shall include resistor to facilitate any of these signals.
iii. Actuator shall be capable of providing 4-20mA or 2-10 Vdc feedback signal to the control system so that the gpm can be determined.
iv. External LED readout of current valve position and maximum valve position setting shall be standard.
v. Maximum flow setting shall be adjustable to 51 different settings within the range of the valve size by changing the settings electronically on the actuator.
vi. Optional fail safe system to power valve to either open or closed position from any position in case of power failure shall be provided per the sequence of operations and the automatic temperature control diagrams.

c. Valve Housing
i. 2.5"–6": Housing shall be constructed of Ductile Iron ASTM A536-65T, Class 60-45-18 rated at no less than 580 psi static pressure and 248°C.

d. Pressure Regulation Unit
i. Pressure regulation unit shall consist of 304 Stainless Steel and hydrogenated acrylonitrile butadiene rubber (1/2"–1-1/2") or 316 Stainless Steel and EPDM (2"–6").
ii. Flow regulation unit shall be accessible for maintenance without disturbing the piping.
iii. Valve shall have a maximum of 8.6 psid to actuate the pressure regulating cartridge.
iv. Dual pressure/temperature test valves for verifying accuracy of flow performance shall be available for all valve sizes.

4. Where applicable, all two (2) position control valves may be furnished with hose kits at Contractor's option. Coordinate actuator and pressure drop requirements with hose kit supplier. Maximum allowable pressure drop for two (2) position modulating control valves shall be 12 feet at scheduled flow rate.

5. Optional accessories shall include a stem packing lubricator for factory or field assembly. Valve stem packing shall be low friction, tight sealing Teflon.

6. Unitary valves shall be straight-through or three way type as specified in the sequence of operation with high-pressure connections suitable for copper pipe and rated for 250 psig. Stems shall be polished stainless-steel and packing shall be ethylene-propylene suitable for both chilled water and 250 degree hot water service. Straight-through valves shall have back-seating feature, to allow packing to be replaced without draining system.

7. All valves shall use guided valve plugs for good seating and reliable operation. Valves ½ inch to 1 inch shall be ANSI Class 125 brass body with screwed ends. Valves 1-1/4 inches to 2 inches shall be ANSI Class 150 brass body with screwed ends. Valves 2-1/2 inches to 4 inches shall be Class 125 cast iron body with bronze trim and flanged ends. Valves 6 inches and larger shall be Class 125 steel body with bronze trim and flanged ends. Butterfly valves shall be DeZurick HIGH performance or Keystone Keylock, Lug style as specified in Division 23 Section, HVAC Piping, Fittings, and Valves.

8. All heating coil valves shall be normally open to the coil.

B. Control Valve Operators

1. Electric valve actuators shall be properly sized to provide sufficient torque to position valves throughout its operating range.

2. Use devices which are quiet in operation and which in the event of power failure, will "fail safe" by spring action in either the normally open or normally closed position as required for freeze, moisture, smoke, or fire protection. Spring return valves are required for all control valves where coils are exposed to outside air conditions.

3. Electric actuators requiring a 24VAC power supply will be utilized. Motors shall be specifically designed and sized with proper torque according to requirements of the device it is to be used on (i.e: valve, damper). Each actuator will accept the proper control input as the system is designed, (i.e.: floating, 0-10VDC, 4-10Ma etc.) without the need for any additional interface devices.

2.6. CONTROL PANELS

A. Furnish and install local panels for ATC devices. Control panels shall be fully enclosed cabinets, all steel construction and shall meet the requirements of NEMA 1 enclosures. Cabinet shall have piano hinged door with a locking latch. All cabinet locks shall use common key. Provide means of storing control system instructions and drawings inside cabinet for future reference. Panel shall be wall mounted or free standing and located where directed by the Contract Drawings or Engineer.

1. Each panel shall have all internal devices factory wired to a numbered terminal strip. Controllers and associated devices shall be mounted within the panel, accessible through a hinged door.

2. All ATC panels shall be provided with integral disconnect, wiring, and control transformers.

3. Any ATC control panel that is serving equipment on the emergency generator must be powered by an emergency generator fed circuit/electrical panel. Refer to electrical contract documents for all emergency powered equipment.

2.7. MISCELLANEOUS ELECTRICAL DEVICES

A. Electric Actuators. All automatically controlled devices, unless specified otherwise elsewhere, shall be provided with electric actuators which shall be sized to operate their appropriate loads with sufficient reserve power to provide smooth modulating action or two-position action and tight close off as specified.

B. Aquastats shall be line voltage strap on type with single pole, single throw switching. Switches shall have an adequate rating for the applied load. All wiring from aquastats to domestic recirculating pumps shall be by ATC contractor.

2.8. UNINTERRUPTIBLE POWER SUPPLY

A. Furnish, size and install uninterruptible power supplies (UPS's) at all ATC panels.

B. Provide all interlock and power wiring from U.P.S. to control panels as required such that all components are powered via the UPS. For hard-wired equipment furnished with pigtails/wire leads, e.g. control power transformers, splice pigtails/wire leads in junction box to a flexible cord with NEMA 5-15P Plug, which shall be plugged into the UPS.

C. UPS's shall be sized for the ATC panel load and shall provide at least 10 minutes of full load power in the event of a power outage.

D. UPS shall be furnished with plug and cord and shall be powered from emergency power receptacle(s) in ATC panels.

E. Refer to electrical Contract Documents for all equipment served by the generator. All ATC panels for such equipment must be provided with a UPS.

2.9. DESKTOP WORKSTATIONS

A. Description: A tower or all-in-one computer designed for normal use at a single, semipermanent location.

B. Performance Requirements:

1. Performance requirements may dictate equipment exceeding minimum requirements indicated.

2. Energy Star compliant.

C. Personal Computer:

1. Minimum Processor Speed: 3 gigahertz (GHz).

2. RAM:

   a. Capacity: 16GB.
   b. Speed and Type: 1333 MHz, SDRAM.

3. Hard Drive:

   a. Media: Solid state.
   b. Number of Hard Drives: One.
   c. Capacity: 250GB.

4. Optical Read and Write Drive:

   a. Include with at least 2 MB of data buffer.
   b. Type: SCS1 CD-ROM Drive with Read/Write Capability.
   c. Average access time of 150 ms or less.

5. At least four expansion slots.

6. Video Card:

   a. Resolution: 1920 by 1200 pixels.
   b. RAM: 4 GB.
   c. Controller Speed: 4GHz.

7. Sound Card:

   a. At least 128 voice wavetable synthesis.
   b. Capable of delivering three-dimensional sound effects.
   c. High-resolution 16-bit stereo digital audio recording and playback with user-selectable sample rates up to 48,000 Hz.

8. Two (2) Network Interface Cards: Include cards with connection, as applicable.

   a. 10-100-1000 base TX Ethernet with RJ45 connector port.
   b. 100 base FX Ethernet with SC or ST port.

D. Wireless Ethernet, 802.11 a/b/g/n.

1. Optical Modem: Full duplex link for connection to optical fiber cable provided.

2. I/O Ports:

   a. Two USB 3.0 ports on front panel, six on back panel, and three internal on motherboard.
   b. One serial port.
   c. One parallel port.
   d. Two PS/2 ports.
   e. One RJ-45.
   f. One stereo line-in and headphone/line-out on back panel.
   g. One microphone and headphone connector on front panel.

h. One IEEE 1394 on front and back panel with PCI-e card.
i. One ESATA port on back panel.

3. Battery: Life of at least three years to maintain system clock/calendar and ROM, as a minimum.

E. Keyboard:

1. 101 enhanced keyboard.

2. Full upper- and lowercase ASCII keyset, numeric keypad, dedicated cursor control keypad, and 12 programmable function keys.

3. Wireless operation within up to 72 inches (1800 mm) in front of workstation.

F. Pointing Device:

1. Either a two- or three-button mouse.

2. Wireless operation within up to 72 inches (1800 mm) in front of workstation.

G. Flat Panel Display Monitor:

1. Display:

a. Color display with 21 inches diagonal viewable area.
b. Digital input signal.
c. Aspect Ratio: 16 to 9.
d. Antiglare display.
e. Tilt adjustable base.
f. Energy Star compliant.
g. Resolution: 1920 by 1200 pixels at 60 Hz.
h. Number of Displays: One.

H. Speakers:

1. Two, with individual controls for volume, bass and treble.

2. Signal to Noise Ratio: At least 65 dB.

3. Power: At least 4 W per speaker/channel.

4. Magnetic shielding to prevent distortion on the video monitor.

I. I/O Cabling: Include applicable cabling to connect I/O devices.

2.10. CENTRAL CONTROL AND MONITORING SYSTEM (CCMS) (HARDWARE DESCRIPTION)

A. General

1. The Facilities Management Control System (FMCS) shall be comprised of a network of various independent, Stand-alone Digital Controllers (SDC'S), Mechanical System Digital Controllers (MSDC's), Air Handler Digital Controllers (AHDC's), Unitary Digital Controllers (UDC's); together with Centralized Control Stations (CCS), and Centralized Host Stations (CHS) as specified, to provide centralized access and facility wide control functions. The SDC's, MSDC's, AHDC's, and UDC's shall be interconnected in a communicating network to provide facility wide access and sharing of information. A Gateway Digital Controller (GDC's) shall be provided to allow interface with third party microprocessor based control systems that are specified for integration within specification. A Local Area Network (LAN) shall be provided to interconnect SDC's for high-speed data transmission.

2. Specification Nomenclature

| | | |
|---|---|---|
| a. | FMCS | Facility Management Control System |
| b. | SDC | Stand-alone Digital Controller |
| c. | MSDC | Mechanical System Digital Controller |
| d. | AHDC | Air Handler Digital Controller |
| e. | UDC | Unitary Digital Controller |
| f. | GDC | Gateway Digital Controller |
| g. | GP | Graphical Programmer |
| h. | CHS | Central Host Station |
| i. | CCS | Central Control Station |
| j. | RPTR | Communications Repeater |

B. Centralized Host Stations (CHS)

1. The FMCS shall include Centralized Host Stations. CHS's shall, in conjunction with the full compliment of Digital Controllers, provide the performance requirements within this specification. Each CHS shall include all hardware and software components to serve as a centralized facility operator station, providing color graphics, facility wide access, operator initiation of global control strategies, and centralized documentation.

   The CHS shall be capable of simultaneously interfacing with the following:

   a. -mouse pointing device
   b. -two parallel printers
   c. -high resolution VGA color graphics monitor
   d. -seven auto answer/auto dial modems
   e. -color inkjet printer
   f. -two serial printers
   g. -three FMCS LAN interface
   h. -Alarm Graphic and Report FAX dial out service interface
   i. -Mass storage tape system

   As a minimum, the temperature control contractor shall provide the types and quantities of CHS, CCS, SDC, MSDC, AHDC, GDC, and UDC as required.

2. Computer

a. Furnish and install a new workstation computer and locate where indicated on the contract drawings. Provide modem terminal, and wiring as required to interface this school's CCMS system with FMS computer. I/P data drop shall be provided adjacent to the network panels.
b. Coordinate IP address with Owners' I.T. Department for network connection. The CCMS must be fully networkable.
c. Provide fiber optic cable as required.

3. Operator Workstation: One PC-based microcomputer with minimum configuration as follows:

a. Uninterruptible Power Supply: 2 kVa.
b. Operating System: Microsoft Windows – Latest Version.
   i. ASHRAE 135 Compliance: Workstation shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
   ii. LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.
c. Printer: Color, ink-jet type as follows:
   i. Print Head: 4800 x 1200 dpi optimized color resolution.
   ii. Paper Handling: Minimum of 100 sheets.
   iii. Print Speed: Minimum of 17 ppm in black and 12 ppm in color.

C. Centralized Control Stations (CCS)

1. The FMCS shall include Centralized Control Stations, as required. CCS's shall, in conjunction with the network of SDC's and additional CCS components as required, provide the performance requirements within this section of the specification. Each CCS shall include all hardware and software components to serve as a centralized facility operator station, providing facility wide access, for review and modification of global control strategies, real time system monitoring, controller database editing or creation, and centralized documentation.

D. Local Area Networks

1. The LAN shall utilize packetized transmissions, CRC 16 error checking, and distributed error recovery. Single or multiple SDC failures shall not cause loss of communication between other LAN-connected SDC's.

2. LAN connected SDC's shall be provided with a communications watchdog to assure that an individual SDC cannot permanently occupy the LAN. If an SDC is determined to be monopolizing communications, it shall be automatically shut down and an exception reported to annunciate this fact.

3. The LAN shall employ a token passing, peer-to-peer convention, same as or similar to the industry standard format IEEE 802.4. The content of messages shall be the manufacturer's standard. The Local Area Network components shall be manufacturer's standard or available from third party vendors which utilize the same chip implementation as used by the manufacturer.

4. Industry standard ANSI, RS-485 Network Communication System, Lon, or Bacnet, or Equivalent shall be utilized.

5. Trunk Wiring Practices - General

   a. The distributed communication network system shall consist of a multi-drop RS-485 bus architecture connecting SDC's, MSDC's, AHDC's, GDC's, and UDC's. The trunk shall consist of:
      i. A twisted pair of wires (24 awg) completely encased in continuous metallic conduit.
      ii. A twisted shielded pair of wires (24awg) with the shield grounded in accordance with the manufacturer's wiring practices.
      iii. Or a dual channel, 62.5 micron fiber cabling system with ST type connectors.

      There shall be no power wiring, in excess of 30 VAC rms voltage, run in conduit with communications trunk wiring. In cases where power or signal wiring is run in conduit with trunk wiring, all communications trunk wiring and power wiring shall be run using separate twisted shielded pairs (24awg) with the shields grounded in accordance with the manufacturer's wiring practices.
   b. Communication Transient Protection
      i. The manufacturer's catalog data sheet shall provide evidence that all FMCS products offered by the manufacturer are tested and comply with the standard for Transient Surge withstand capabilities for electrical devices ANSI C62.41, IEEE-587-1980, Categories A and B. Such testing shall have included power and communication trunk wiring. Compliance with IEEE-587 shall imply conformance with IEEE-472 transient standards based on the stated position of ANSI and IEEE regarding applicability of the rated standards.
      ii. In addition, at each building entry and exit point, the wire communications trunk wiring shall be protected with a transient surge protection device providing the minimal protection specifications of the General semiconductor, Model #422E device. Transient surge protection is not necessary if the communication trunk, external to the building, is fiber optic in nature.
      iii. The communications circuitry and input/output circuitry, of the SDC's, MSDC's, and AHDC's, shall provide protection against a 1000 volt, 3 amp transient signal, directly applied to the communication or input/output terminations. The manufacturer's catalog data sheet shall provide evidence of conformance with this requirement. Systems not complying with this requirement shall provide equivalent protection external to the FMCS controller. Protection shall be provided for the individual communications and input/output terminations for each FMCS controller. Submittal documentation shall clearly define how this requirement will be met and how the external protection will not affect the performance of the controllers.
   c. RS-485 Trunk Distance and Topology

The manufacturer's RS-485 trunk shall provide operation over end to end linear distances of 4000 feet for wire connections and 6,500 feet for fiber optic connections, without repeaters, at communication data rates of up to 64 kbps. The trunk may be extended up to 20,000 feet through the use of wire repeaters or 80,000 feet through the use of fiber optic repeaters.

At data rates of up to 19.2 kbps, the trunk distance shall be extendible to distances of up to 20,000 feet using RS-485 communication wire or fiber optic repeaters. A repeater shall be used each 4,000 feet of linear distance for wire or every 6,500 feet for fiber optics. Repeating devices shall contain separate LED indication for each communication interface trunk to indicate proper operation of the repeater as well as the communications trunks.

Contractors shall provide devices which are of FMCS control system manufacturer's design.

d. It shall be possible for the trunk to be "T" eed or "starred", at any location using a repeater, to facilitate the installation. Systems which do not provide this capability shall provide a trunk riser diagram showing end to end distances and locations of system topology necessary to meet the trunk diagram shown on the plans.

e. Fiber Optic Communication Trunk

The temperature control contractor shall provide a dual channel fiber optic data link, as required, to minimize the effects of transient surges caused by lightning or external EMI generating equipment. The data link shall be comprised of a single duplex cable containing two fibers (transmit and receive), of 62.5 micron construction, to accommodate data rates of up to 64 kbps.

The fiber optic trunk shall be connected to SDC devices using manufacturer's standard RS-485 to fiber optic data link modem. Repeating devices shall contain separate LED indication for each communication interface and the fiber modem, to indicate proper operation of all aspects of the device. Fiber modem devices shall be tested and conform with transient surge withstand tests for electrical devices, ANSI C62.41 IEEE-587 Categories A and B. Manufacturer's data sheet shall provide evidence of compliance with this requirement. Manufacturer's products which do not meet this minimum performance requirement shall not be acceptable.

Systems which require a special gateway controller to accommodate the fiber optic trunks, shall provide such a controller per point where the fiber optic cable enters and leaves the building. Gateway controllers shall not inhibit transfer of point data values between SDC controllers throughout the LAN. Such inhibitive systems shall not be acceptable.

In lieu of the above two options, the contractor may provide a fiber optic link to each SDC controller within the LAN. All controllers shall have access to the fiber optic link for LAN.

Fiber optic cable shall be fully tested and terminated by the temperature control contractor.

E. Standalone Digital Controllers (SDC)

1. General

Standalone Digital Controllers (SDC) shall be 16 bit microcomputer based, utilizing a multi-tasking, multi-user operating system.

The SDC controllers shall permit the simultaneous operation of all control, communication facilities management and operator interface software, as programmed by the Contractor or User. Modification of the on-board SDC controller database shall be performed on-line using the built-in or HHOT interface. Systems which require the SDC to be removed from service while DDC control sequences are modified shall not be acceptable.

SDC controllers shall utilize true floating point arithmetic capabilities. To accommodate totalization of large totalized values, SDC's with reporting capability shall support the calculation, accumulation and display of values within the range of +/-10 to the 10th power.

2. Database and Memory Back-up

All programming defining the functions to be performed by the SDC, including but not limited to application programs and point database within each SDC, shall be protected from loss due to power failure for a minimum of six months. Systems providing non-volatile memory for these functions are preferred. Systems not providing non-volatile memory shall provide a system rechargeable battery backup system sufficient to provide protection for the specified 6 month period. Systems not in compliance shall provide for uninterrupted power to each SDC.

3. Service Ports

SDC controllers shall be equipped with a minimum of one operator service port for the connection of a HHOT. The service port shall be either a built-in RS-232 data terminal port or an RJ-11 type jack which connects to the manufacturer's standard HHOT.

Connection of a service device, to a service port, shall not cause the SDC controller to lose communications with its peers or other networked device controllers.

The service port shall allow utilization of the same HHOT from any location. The same HHOT shall be utilized for any SDC, MSDC, AHDC, or UDC Systems which utilize more than one variety of HHOT shall not be acceptable.

4. Display and Readout Capability

The SDC controller shall provide manufacturer’s standard display and readout capability.

5. Manual/Auto Control and Notification

The SDC controller shall provide commanded override capability from the HHOT or the built-in operator interface. Such overrides shall be annunciated to the CHS's. Such overrides shall be valid as long as power is applied to the controller.

Manual service overrides, such as Hand/Off/Auto switches, shall be provided as

indicated on the drawings. Such overrides shall be located at the controlled device location and conform with OSHA Manual lockout regulations, as appropriate, for safety reasons. SDC indication of such manual override actions shall be provided as feedback status indication points shown on the drawings, in conjunction with the application programs within the SDC. Systems which provide built-in H/O/A switching devices with integral feedback shall provide external manual service overrides, as indicated, to comply with OSHA manual lockout regulations. H/O/A switches remotely located at the SDC controller are not acceptable.

6. Adjustments

Every control panel shall provide adjustments for the functions specified. In general, adjustments shall be provided for all set points used by controllers within each control panel. In addition, adjustments shall be provided for throttling ranges, mixed air damper minimum positions, or other items as specified. Adjustments shall be integral to each individual SDC. The built-in operator interfaces shall allow the easy execution of the adjustment through named identifiers within the SDC. From a single SDC user interface, any other SDC shall be accessible and full adjustment capabilities shall be provided.

7. Sensing and Control Outputs Requirements

a. Sensing
   i. All sensing inputs shall be provided via industry standard signals. Temperatures, humidities, differential pressure signals, and other signal inputs shall be one of the following types:
      1) 0-20 mA
      1) 4-20 mA
      1) 0-5 VDC
      1) 0-12 VDC
   ii. 1000 ohm platinum (at O°C, 2.62 ohms/°C)
   iii. 1000 ohm Balco (2.2 ohms/°F)
   iv. 10 k ohm Thermistor (at 25°C/77°F)

   Custom, definable input signals (accept sensor inputs from RTD devices, other than those of the manufacturer).

   All signal inputs shall be compatible with the controllers used, and with the requirements for readout of variables in true scaled engineering units as specified.

b. Control Outputs
   i. On/Off Outputs

   Control panel shall internally provide test points for the circuit driving the equipment contactor, for the purpose of troubleshooting the 120 VAC or 240 VAC circuit to the contactor. All such relays or digital output modules shall provide a pilot light or LED display of the same status. On/Off output modules shall be of the modular construction that can be easily and quickly replaced, on an individual basis, if the module were to be damaged.

   ii. Modulating Outputs

   Modulating outputs shall be industry standard 0-5 VDC, or 0-12 VDC with definable output spans, to adapt to industry available control products. Milliamp outputs of 0-20 mA or 4-20 mA are also acceptable. Drive

open/Drive closed type modulating outputs are acceptable provided that they also comply with the following requirements.

All modulating outputs shall provide within the control panel, a meter gauge, or display indication via on board display or HHOT, the commanded position signal for the actuating device. This meter, gauge, or display must provide either a 0-100 percent position indication, or read out directly in the engineering unit of the signal being used. Drive open/Drive closed type controllers shall include sufficient components and control algorithms to comply with this requirement. In the case of Drive open/closed technology, position feedback shall be provided to insure positive indication that the control device is at the commanded position.

F. Mechanical System Digital Controllers (Msdc's)

1. General

a. Controls shall be microprocessor based, Mechanical System Direct Digital Controllers (MSDC's). MSDC's shall be provided for air handling units, central pump systems and other applications as required. MSDC's shall be based on a minimum 16 bit microprocessor working from software program memory which is physically located in the MSDC. The application control program shall be resident within the same enclosure as the input/output circuitry which translates sensor signals. All input/output signal conversion shall be performed through a minimum of a 12 Bit A to D converter. All input/output points shall be universal in nature allowing their individual function definition to be assigned through the application software. All unused input/output points must be available as universally definable at the owner discretion. If input/output points are not fully universal in nature, unused points must be equal in quantity between Analog Input, Digital Input, Analog Output, Digital Output.

Contractor shall provide a minimum of one MSDC controller per mechanical system, as shown on the drawings.

The BAS contractor shall provide and field install al MSDC's specified under this section. Mechanical Equipment manufacturers desiring to provide MSDC type controls as factory mounted equipment, shall provide a separate bid for their product less all controls, BAS/Temperature Control Contractor.

b. All input/output signals shall be directly hardwired to the MSDC. Trouble shooting of input/output signals shall be easily executed with a volt-ohm-milli-amp meter (VOMA). As a result of this intent, it is specified that power line carrier systems, or other systems which command multiple outputs over a single pair of wires, shall not be used.

c. MSDC shall be in continuous direct communication with the network which forms the facility-wide Building Automation System (BAS). The MSDC's shall communicate with the SDC at a baud rate of not less than 19,200 baud.

2. Non-Volatile Memory

a. All control sequences programmed into the MSDC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery to

be retained. Power failures shall not cause the MSDC memory to be lost, nor shall there be any need for batteries to be recharged or replaced to maintain the integrity of the controller database. The MSDC shall allow for the creation of unique application control strategies. Systems that allow selection of sequences from the library or table are not acceptable.

b. All control sequences shall be fully field programmable at the MSDC controller, allowing for the creation or editing of an application sequence of operations.

c. Each MSDC shall be provided with manufacturer's standard built-in Operator Interface.

d. The MSDC shall allow for internal processing and reporting of user defined Time of Day Schedules, Alarms, Trend Reports, Run Time Totalization, Energy Utilization Reports, Application Program Documentation and interface with a peripheral device such as an autodial/autoanswer modem, a VT-100 Display Terminal, or a serial printer.

i. Systems not providing the above functionality at the MSDC are not acceptable and shall utilize an SDC in place of the MSDC.

e. The MSDC shall provide LED indication of transmit/receive communications performance as well as for the proper/improper operation of the controller itself.

f. The MSDC shall be provided with a battery backed time clock that is capable of maintaining the time of day and calendar for up to thirty days without loss of setting. The battery for the time clock shall be field replaceable by the customer. Integral daily, weekly, holiday and special event scheduling shall be provided, such that all schedules can be custom tailored to the facility. Predefined schedules, with set quantities of on/off cycles are not acceptable.

3. Controller Location

a. To simplify controls, mechanical service and troubleshooting, the MSDC shall be mounted directly in or on the control compartment of the mechanical system. The MSDC shall be provided in a NEMA 1 enclosure to accommodate direct mounting on the equipment to be controlled. The MSDC shall be constructed in a modular orientation such that service of the failed components can be performed quickly and easily. The modular construction should limit the quantities of printed circuit boards to a maximum of three. When required to replace a printed circuit board, it shall not be necessary to disconnect any field wiring. The MSDC shall allow for the creation of, unique, application control strategies. Systems that allow selection of sequences from a library or table are not acceptable. This shall allow all controls maintenance and troubleshooting to be made while at the unit location. MSDC shall be directly wired to sensory devices, staging relays or modulating valves for heating and cooling.

b. For compatibility to the environment of the mechanical systems, MSDC shall have wide ambient ratings. MSDC shall be rated for service from -40 Deg F (Degrees Fahrenheit) to 140 Deg F.

c. Contractor shall submit description of location for the MSDC's on all mechanical equipment.

G. Air Handler Digital Controller (AHDC)

1. General

a. Controls shall be microprocessor based, Air Handler Digital Controllers (AHDC's). AHDC's shall be provided for air handling units, H & V units, kitchen vent units, rooftop units energy recovery ventilators, make-up air units, and single zone VAV unit, and other applications as required. AHDC's shall be based on a minimum 16 bit microprocessor working from software program memory which is physically located in the AHDC. The application control program shall be resident within the same enclosure as the input/output circuitry which translates the sensor signals. All input/output signal conversion shall be performed through a minimum of a 10 bit A to D converter. All input points shall be universal in nature allowing their individual function definition to be assigned through the application software. All unused input points must be available as universally definable at the discretion of the owner. If the input points are not fully universal in nature, unused points must be equal in quantity between Analog Inputs and Digital Inputs.
Contractor shall provide a minimum of one AHDC controller per air handling system as shown on the drawings.
The BAS contractor shall provide and field install all AHDC's specified under this section. Mechanical equipment manufacturers desiring to provide AHDC type controls as factory mounted equipment, shall provide a separate bid for their products less all controls, actuators, valve assemblies and sensors, which are specified to be provided by the BAS/Temperature control contractor.

b. All input/output signals shall be directly hardwired to the AHDC. Troubleshooting of input/output signals shall be easily executed with a volt-ohm meter (VOM). As a result of this intent, it is specified that power line carrier systems, or other systems which command multiple outputs over a single pair of wires, shall not be utilized.

c. AHDC's shall be in continuous direct communication with the network which forms the facility wide Building Automation System. The AHDC's shall communicate with the SDC at a baud rate of not less than 19,200 baud.

2. Non-Volatile Memory

a. All control sequences programmed into the AHDC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained. Power failures shall not cause the AHDC memory to be lost, nor shall there be any need for batteries to be recharged or replaced to maintain the integrity of the controller database. The AHDC shall allow for the creation of unique application control sequences. Systems that only allow selection of sequences from a library or table, are not acceptable.

b. All control sequences shall be fully programmable at the AHDC, allowing for the creation and editing of an application control sequence, while at the unit.

c. The AHDC shall be provided with an interface port for the HHOT. The

interface port shall allow the HHOT to have full functionality as described. From the interface port, the HHOT shall be able to directly access any AHDC or UDC in the network.

d. The AHDC shall provide an input/output point trending utility that is capable of accumulating 48 analog point samples and 10 digital point samples, per Input/Output point. Each sample shall be taken on a user defined interval, ranging from 1 second to 255 hours per sample. The digital readings shall be on a change of state occurrence for the digital points. All samples shall be recorded with the engineering units for the value, along with a time and date identifier for each sample taken. The samples shall be protected against loss due to power interruptions through a battery or capacitor backup method for a minimum of 30 days.
   Systems unable to provide the above capability shall provide for the individual Input/Output point trending at the SDC. Specifics as to how each AHDC point will be trended, at the SDC, shall be provided in the submittal documents. Included in the explanation shall be the sample intervals, the memory allocation in the SDC and the number of AHDC's per SDC that can be expected.

e. The AHDC shall provide LED indication of transmit/receive communications performance, as well as for the proper/improper operation of the controller itself.

f. The AHDC shall be provided with a battery backed time clock that is capable of maintaining the time of day and calendar for up to thirty days, upon loss of power to the AHDC, without loss of setting. The battery for the time clock shall be replaceable by the customer. The AHDC shall be provided with integral time schedules; as a minimum, two seven day schedules with eight on/off periods per day shall be provided. Holiday override of weekly schedules shall be provided for pre-scheduling of holidays, for the year in advance.

3. Controller Location

a. To simplify controls and mechanical service troubleshooting, the AHDC shall be mounted directly in or on the controls compartment of the air handling system. The AHDC shall be provided in a NEMA 1 enclosure to accommodate direct mounting on the equipment to be controlled. The AHDC shall be constructed in a modular orientation such that service of the failed components can be done quickly and easily. The modular construction should limit the quantities of printed circuit boards to a maximum of two. All logic, control system, power supply and input/output circuitry shall be contained on a single plug-in circuit board. When required to replace a printed circuit board, it shall not be necessary to disconnect any field wiring. This shall allow all controls maintenance and troubleshooting to be made while at the air handling unit. The AHDC shall be directly wired to sensory devices, staging relays or modulating valves for heating and cooling.

b. For compatibility to the environment of the air handling unit, AHDC's shall have wide ambient ratings. AHDC's shall be rated for service from -40 Deg F (Degrees Fahrenheit) to 140 Deg F.

c. Contractor shall submit description of location of AHDC's on all

mechanical and air handling equipment.

H. Unitary Digital Controller (UDC)

1. General

a. Controls shall be microprocessor based Unitary Digital Controllers (UDC's). UDC's shall be provided for equipment as necessary. UDC's shall be based on a minimum 16 bit microprocessor working from software program memory which is physically located in the UDC. The application control program shall be resident within the same enclosure as the input/output circuitry which translates the sensor signals. All input/output signal conversion shall be performed through a minimum of a 10 bit A to D converter.
Contractor shall provide a minimum of one UDC controller per unitary system as required.
The BAS contractor shall provide and install all UDC's specified under this section. Mechanical equipment manufacturers desiring to provide UDC type controls as factory mounted equipment, shall provide a separate bid for their products less all controls, actuators, valve assemblies and sensors, which are specified to be provided by the BAS/Temperature control contractor.

b. All input/output signals shall be directly hardwired to the UDC. Troubleshooting of input/output signals shall be easily executed with a volt-ohm-milli-amp meter (VOMA). As a result of this intent, it is specified that power line carrier systems, or other systems which command multiple outputs over a single pair of wires, shall not be utilized.

c. UDC's shall be in continuous, direct communication with the network which forms the facility wide building automation system. The UDC's shall communicate with the SDC at a baud rate of not less than 9,600 baud.

2. Non-Volatile Memory

a. All control sequences programmed into the UDC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained. Power failures shall not cause the UDC memory to be lost, nor shall there be any need for batteries to be recharge or replaced to maintain the integrity of the controller database. The UDC shall allow for the creation of unique application control sequences. Systems that allow only selection of sequences from a library or table are not acceptable.

b. All control sequences shall be fully configurable at the AHDC, allowing for the creation and change of a sequence while at the unit.

c. The UDC shall be provided with the ability to interface with the HHOT. The interface port shall be provided at the wall sensor or within the unitary equipment, as specified on the plans. The interface port shall allow the HHOT to have full functionality as described hereinbefore of this specification. From the interface port, the HHOT shall be able to directly access any AHDC, or UDC in the network.

d. The UDC shall provide an input/output point trending utility that is capable of accumulating 48 analog point samples and 10 digital point samples per Input/Output point. Each sample shall be taken on a user

defined interval, ranging from 1 second to 255 hours per sample. The digital readings shall be on a change of state occurrence for the digital points. All samples shall be recorded with the engineering units for the value, along with a time and date identifier for each sample taken.

Systems unable to provide the above capability shall provide for the individual input/output point trending at the SDC. Specifics as to how each UDC point will be trended, at the SDC, shall be provided in the submittal documents. Included in the explanation shall be the sample intervals, the memory allocation in the SDC and the number of UDC's per SDC that can be expected.

e. The UDC shall provide LED indication of transmit/receive communication performance, as well as for the proper/improper operation of the controller itself.

3. Controller Location

a. To simplify controls and mechanical service troubleshooting, the UDC shall be mounted directly in the controls compartment of the unitary system. The UDC shall be provided with a sheet metal or polymeric enclosure that is constructed of material allowing for the direct mounting within the primary air stream, as defined by UL-465. The direct mounting shall allow all controls maintenance and troubleshooting to be made while at the unitary equipment. The UDC shall be directly wired to sensory devices, staging relays or modulating valves for heating and cooling.

b. For compatibility to the environment of the unitary equipment, UDC's shall have wide ambient ratings. UDC's shall be rated for service from 32 Deg F (Degrees Fahrenheit) to 140 Deg F.

c. Contractor shall submit description of location of UDC's on all mechanical and unitary equipment.

I. Gateway Digital Controller (GDC)

1. General

a. Controls shall be microprocessor based, Gateway Digital Controllers (GDC's). GDC's shall be provided for the purpose of integrating microprocessor based, communicating, direct digital control systems from vendors other than the primary, selected controls manufacturer. GDC's shall be based on a minimum 16 bit microprocessor working from software program memory which is physically located in the GDC. All communications interface control programs shall be resident within the GDC.

The BAS contractor shall provide and field install all GDC's specified under this section. Any interface requirement beyond a two wire communications wire link, shall be provided by the equipment manufacturer supplying the non-primary or third party microprocessor based, communicating, direct digital controllers.

b. All GDC's shall exist at the LAN level with the SDC's. The GDC's shall possess all capabilities described under the SDC section while additionally providing the interface to the third party systems described above. The GDC's shall communicate with the third party controllers at the highest

possible baud rate offered by the third party system. As a minimum, 9,600 baud communications shall be utilized.

c. All control sequences programmed into the GDC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained. Power failures shall not cause the GDC memory to be lost, nor shall there be any need for batteries to be recharged or replaced to maintain the integrity of the controller database. The GDC shall allow the standard database information from the third party system to be integrated in standard FMCS data formats, allowing for the creation of unique application control sequences. Systems that only allow selection of data and sequences from a library or table, are not acceptable.

d. Each GDC shall be provided with manufacturer's standard built-in operator interface.

The GDC shall provide Alarming, point trending and Energy report generation capabilities. Alarming points shall be uniquely definable, with multiple alarms assignable to a single point. Such alarm shall be provided with a unique 80 character message. Systems utilizing an alarm message library, shall describe the size of the library and verify how all alarming within the GDC will be guaranteed unique 80 character messages.

The quantities of trended point values shall be limited only by total controller memory space. If necessary, a GDC may be dedicated fully to a trending task, allowing all controller memory to be available for the trend storage. Each unique trend report shall contain a minimum of 4 different points and a minimum of 128 samples per point. Trending frequency for each report shall be operator definable from a sample once a second to a sample once every 24 hours. Trend reports shall be internally formatted by the GDC and shall be reportable directly to a serial printer, a VT-100 display terminal, a CCS, CHS or any other device capable of receiving a formatted ASCII data file.

e. The energy reports shall not be limited in quantities only by available memory within the GDC. Each Energy Report shall be fully formatted and reportable to a serial printer, a VT-100 display terminal, a CCS, a CHS or any other device capable of receiving a formatted ASCII data file. As a minimum, each Energy Report shall provide a daily report and a monthly report with summary information such as outside air temperature, outside air humidity, total energy consumed and degree day calculations.

f. The GDC shall be provided with a battery backed clock that is capable of maintaining the time of day and calendar for up to thirty days, upon loss of power to the GDC, without loss of setting. The battery for the time clock shall be field replaceable by the customer.

## 2.11. SYSTEM SOFTWARE DESCRIPTION

### A. General

1. Contractor shall provide all software for a complete and operational system as described herein. Software shall include manufacturer's standard multi-tasking, multi-user operating system for operator consoles and controllers, network communication software for dial-up and hard trunk applications, operator man-machine interface software, control application software and all other software

necessary to provide the functions specified herein.

2. System software shall be as manufactured by Siebe Environmental Controls, Johnson Controls, Johnson Controls Facility Explorer, Honeywell, Siemens, Alerton, Reliable Controls, Schneider Electric, Advanced Power, Trane, or approved equal.

2.12. EXCEPTION REPORTING SEQUENCES

A. Alarm/COS Reports

1. For those digital points indicated on the drawings, the Contractor shall provide a unique change-of-state alarm message of up to 70 characters. The message shall report to all devices assigned to the alarm class.

2. For those points indicated on the drawings which are designated as interrupt priority, the Contractor shall provide an interrupting process display at the CHS location which displays the current conditions for the operator.

In addition, the CHS computer shall automatically send a picture of the process graphic display to the remote locations via e-mail.

3. For those points designated in paragraph 3 above, the FMCS shall also send a history log to the system report printer of the immediate prior history of the points causing the interrupt priority. This log shall contain 1 minute samples of the previous 15 minutes of operation.

4. For those points on the drawings designed as Hard Facts points, the Contractor shall provide an alarm message to a remote facsimile location designated by the Owner. The FMCS system shall provide at the remote location, a facsimile print-out showing location, time/date of alarm and alarm message of the point. For interrupt priority fax alarms, the remote facsimile machine shall receive a hard copy of the interrupt process screen showing on-line dynamic data values of the current conditions.

B. Off Hours Exception Reporting

1. The Owner shall specify up to five sites to which off hours exceptions shall be auto-dialed and reported. This shall allow the owner to assign off hours exception responses to various facility personnel as necessary. Selection of the site to be dialed can be programmed by the Owner, and set to change automatically per time of day and day of week.

2.13. MONITORING SYSTEM, SENSORS AND WIRING

A. Sensors and other Devices for Input/Output Summary Schedule:

1. Provide all necessary sensors, relays, panels, conduits and wire for the points indicated in the input/output summary as shown on the contract drawings.

2. Analog sensing elements for remote indication shall be independent of local

sensors used for local control loops.

3. Temperature sensors shall be Resistance Temperature Detector (RTD) type of 1000 ohm balco. Space (60-90 degrees F); Duct/Well (-30-250 degrees F); Averaging Duct (-30-225 degrees F) or as required under Division 26.

    a. Space temperature sensors shall be provided with blank commercial type locking satin chrome covers.
    b. Duct temperature sensors shall be rigid stem or averaging type as specified in the sequence of operation. Water sensors shall be provided with a separable copper, monel or stainless steel well. Outside air wall mounted sensors shall be provided with a sun shield.
    c. The dew point sensor shall employ a non-reactive organic bobbin material to give precise dew point readings with accuracy of not more than + 1.5 degrees F. The dew point sensor shall incorporate an integral draft shield as part of the instrument for air velocities in excess of 50 feet per minute. The dew point sensor shall operate over a minimum dew point temperature range suitable to application.

4. Relative humidity sensors shall be capacitance type with 10 percent to 90 percent range. Duct mounted relative humidity sensors shall be provided with a sampling chamber. Wall mounted sensors shall be provided with covers identical to temperature sensors. Space 10 percent -90 percent RH; Duct 10 percent - 90 percent RH.

5. All wall mounted temperature sensors, relative humidity sensors, and CO2 sensors shall be installed with stainless steel wire guard. Set point adjustment shall be achievable without removing the wire guard.

6. Differential and Static Pressure Sensors and Switches

    a. Fan proof-of-flow switches shall be U.L. listed adjustable set point and differential pressure type. Switches shall be piped to fan discharge except where fans operate at less than one inch WG, they shall be piped across the fan. For fractional horsepower and non-ducted fans, relays or auxiliary contacts may be used. Maximum pressure rating shall be at least 10 inches WG. with .05-12 inch W.C. range.
    b. Pump proof-of-flow switches shall be U.L. listed adjustable differential pressure or flow type as specified in the sequence of operation or data point summary. Devices shall be 150 psi rated except chilled water flow switches shall be provided with totally sealed vapor tight switch enclosure on 300 psi body. Differential pressure switches shall have valved manifold for servicing, and a range of 3 psi-150 psi.
    c. Air flow and static pressure analog sensors shall be high accuracy suitable for the low velocity pressures to be encountered, be selected for approximately 50 percent overrange, and have a 4 to 20 ma output. These differential pressure sensors shall be connected to the air flow measuring station with valved lines for testing and calibration, and shall have adjustments for zero and span. 5 inch W.C. range.
    d. Water flow analog sensors shall be provided complete with flow element and shall be an all solid state precision industrial type with stainless steel

meter body, maximum error of no more than .5 percent or span, and 4 to 20 ma output. Sensor shall be rated for 250 psi minimum and installed in strict accordance to the manufacturer's instructions complete with three-valve manifold for calibration and maintenance.

7. Overall system accuracy, including electronic analog sensing elements, shall be as follows:

   a. Air: Plus or minus 1.0 degrees F temperature, plus or minus 2.5 percent r.h., plus or minus 2.0 percent static pressure.
   b. Water: Plus or minus 0.7 degrees F over full scale range for water points, plus or minus 1.0 degree F for others.
   c. Proof of fan or pumps operating status, or alarm conditions shall be through positive feedback from differential pressure switches across fan or pump. Auxiliary dry contacts may be used for proof of fans or pumps if the motors are fractional H.P., and other non-ducted fans.

8. Digital inputs from devices with isolated, dry type contacts (no grounds, no voltage) of either normally open (N.O.) or normally closed (N.C.) configuration shall be provided. Live contact inputs, those that have voltage present, shall be provided with isolating devices to meet dry contact requirements.

9. Liquid flow data shall be received and transmitted by commercial grade instruments similar in quality to Honeywell 411, Rosemount, Foxboro, MAMAC Systems or approved equal, type differential pressure transmitter. Pulse type data sensors shall not be acceptable. Speed response of differential pressure transmitters shall be at least 500 milliseconds. Maximum error signal shall be +/- 1 foot.

10. Start-stop relay module shall contain relays for start-stop function at the remote point, with relays mounted and factory wired to numbered terminal strips.

11. Outage Devices:

   a. Control Relays: Control relay contacts shall be rated for the application, with a minimum of two sets of Form C contacts, enclosed in a dustproof enclosure. Relays shall have silver-cadmium contacts with a minimum life-span rating of one million operations. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays shall be equipped with coil transient suppression limiting transients to nondamaging levels.
   b. Time Delay Relays: Time delay relay contacts shall be rated for the application with a minimum of two sets of Form C contacts enclosed in a dustproof enclosure. Relays shall have silver-cadmium contacts with a minimum life span rating of one million operations. Relays shall be equipped with coil transient suppression devices to limit transients to nondamaging levels. Delays contact opening or closing shall be adjustable from one to 60 seconds with a minimum accuracy of plus or minus 2 percent of setting.
   c. Latching Relays: Latching relay contacts shall be rated for the application with a minimum of two sets of Form C contacts enclosed in a dustproof

enclosure. Relays shall have silver-cadmium contacts with a minimum life-span rating of one million operations. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays shall be equipped with coil transient suppression devices to limit transients to nondamaging levels.

d. Reed Relays: Reed relays shall be encapsulated in a glass-type container housed in a plastic or epoxy case. Contacts shall be rated for the application. Operating and release times shall be one millisecond or less. Reed relays shall have a minimum life span rating of 10 million operations.

e. Contactors: Contactors shall be of the single-coil, electrically operated, mechanically held type. Positive locking shall be obtained without the use of hooks, latches, or semi-permanent magnets. Contacts shall be double-break silver-to-silver type protected by arcing contacts. Number of contacts and ratings shall be selected for the application. Operating and release times shall be 100 milliseconds or less. Contactors shall be equipped with coil transient suppression devices to limit transients to nondamaging levels.

f. Solid-State Relays: Input-output isolation shall be greater than 1000 megohms with a breakdown voltage of 1500 V rms or greater at 60 Hz. The contact life shall be 10 million operations or greater. The ambient temperature range shall be minus 20 degrees to plus 140 degrees F. Input impedance shall not be less than 500 ohms. Relays shall be rated for the application. Operating and release times shall be one millisecond or less. Transient suppression shall be provided as an integral part of the relay to limit transients to nondamaging levels.

12. Audible Alarm:

a. All alarms shall annunciate on the ATC system front end computer and via pagers.

## 2.14. CARBON MONOXIDE SENSORS

A. Carbon Monoxide (CO) sensors shall be Tox-CO/ANA as manufactured by Tox Alert, Inc., or approved equal. CO sensors shall be low voltage devices (24 VAC supply) with 4 to 20 mA output to be utilized with direct digital controller. Unit shall have 4 to 20 mA signal, which is linear over the sensor 0 to 400 ppm CO range. Locate CO sensors as indicated on Contract Drawings with vandal-proof locking cover.

B. Provide sensors with control system with audible alarm 0-10V DC output for exhaust fan interlock, and output for existing door operator interlock. Provide system in manufacturer standard cabinet with locking door for surface mounting.

## 2.15. MAKE-UP WATER FLOW METER/ALARM

A. In-line T-mounted Flowmeter: Made for installation between pipe flanges; measures flow directly in gallons per minute. As manufactured by Aaliant, Badger, Hersey, Kele, Data Industrial or approved equal.

1. Construction: Stainless steel body, with integral transmitter and direct - reading scale.

2. Pressure rating: 400 psig maximum.

3. Temperature Rating: 221 F maximum

4. Display: Two lines; alphanumeric characteristic each. Visual instantaneous rate of flow, with register to indicate total volume in gallons.

5. Output: Two simultaneous outputs; 4 to 20 mA, two-wire, pulse.

6. Transmitter: Universal flow transmitter with pulse output (totalization) to convert digital pulses to totalized gallons.

7. Electronic Housing: NEMA4, 3/4 NPT conduit connection, epoxy coated aluminum.

8. Accuracy: Plus or minus 1 percent of reading.

9. Key Pad: Setting of recalibration, engineering units, data logging sample time, alarms, response time.

B. Power and control wiring to be furnished and installed under this Section of Division 23.

2.16. FLOW MEASURING STATIONS

A. Furnish and install an Onicon Model F-1210, Hersey, Kobold or approved equal dual turbine insertion flow sensor complete with hot tap full port ball valve and installation hardware. The dual turbine element shall have counter rotating axial turbine elements, each with its own rotational sensing system, and an averaging circuit to reduce measurement errors due to swirl and flow profile distortion. Paddle type rotors will not be acceptable. Rotational sensing of each turbine shall be accomplished electronically by sensing impedance change and not with magnetic or photo-electric means. Each sensor shall be individually calibrated and tagged accordingly against the manufacturers primary standards which must be accurate to within 0.1 percent and traceable to the U.S. National Institute of Standards and Technology (NIST).

B. The sensor shall have a maximum operating pressure of 400 PSI, maximum operating temperature of 220 degrees F (optional 300 degrees F) and a pressure drop of less than 1 PSI at 17 feet per second flow rate. Flow sensor shall have 100:1 turndown ratio. Accuracy shall be + 2 percent of actual reading from 0.4 feet per second to 20.0 feet per second.

C. The sensor shall have integral analog outputs of 0-10 VDC and 4-20 mA current output for connection to the Central Control System. The sensor shall also include three integral frequency outputs, (top turbine, bottom turbine, average frequency) for diagnostic purposes and for connection to peripheral equipment (local display, BTU meter, etc.). All outputs shall be linear with flow rate.

D. The turbine elements shall be made of polypropylene with sapphire jewel bearings and tungsten carbide shafts. The flow sensor shall be constructed of 316 stainless steel with an aluminum electronics enclosure and gasketed cover.

E. Install flow measuring stations with minimum straight lengths of pipe upstream and

downstream from sensor as prescribed by manufacturer's written instructions.

F. Make electrical connections to power supply and interlock with ATC system.

G. Calibrate meters per manufacturer’s requirements.

2.17. WATER METER

A. A building consumption water meter shall be provided and installed under Division 23 Section, “Plumbing Equipment”. Refer to plumbing sections and drawing for type and location. The ATC contractor shall provide all necessary wiring, relays, terminations, etc., as required to interlock meter with ATC system. Building water flow shall be reported on ATC central computer. Flow rate and volume should be reported in ATC system.

B. Trend, hourly, daily, monthly, and yearly water use (in gallons) and forward to Engineer for one year. Create graphic on ATC system.

2.18. FIELD INSTALLED CONDENSATE OVERFLOW SWITCHES

A. Condensate overflow switches must be tested to comply with U.L. 508.

B. Interlock condensate overflow switches to shut-down cooling equipment and alarm on ATC system where overflow condition exists.

2.19. CO2 SENSORS/TRANSMITTER

A. Furnish and install wall mount CO2 sensor/transmitters at locations indicated on floor plans. CO2 sensor/transmitter shall be model CD-W00 as manufactured by Johnson Controls or approved equal.

B. Measuring Range: 0 to 2,000 ppm CO2.

C. Response Time: 1 minute

D. Output Signal: As required by ATC system

E. Max power consumption: Less than 2 watts.

F. Listing: U.L. Listed

G. Accessories: Mounting Kit, Transformer required.

H. Where installed in gyms, toilet rooms, tech rooms, shops, locker rooms, cafeteria, and corridors install heavy duty stainless steel guards.

2.20. CHILLER THERMAL DISPERSION FLOW SWITCHES

A. Furnish and install thermal dispersion flow switches in chiller piping as indicated on the Contract Drawings. The thermal dispersion flow switches shall be manufactured by IFM Efector, Inc., or approved equal. Coordinate exact chiller thermal dispersion flow switch requirements with the chiller manufacturer.

B. Units shall be normally open type and shall be interlocked to prevent chiller from operating until the fluid flow is proven. Unit shall be fully adjustable and include function display LED. Units shall be constructed of 316L stainless steel including housing and material surface sensor. All wetted surfaces shall also be constructed of 316L stainless steel.

C. Furnish with M12 connector and wiring for interface to chiller and automatic temperature control system. Coordinate wiring with ATC system and chiller control panel.

D. Install assembly, sensor, and adaptors as required.

2.21. DEW POINT SENSORS

A. Furnish and install dew point sensors where indicated on the Contract Documents.

B. Dew point sensor shall be model DP4AS as manufactured by TelAire or approved equal. Unit shall monitor dew point and dry bulb temperature and report the same on the ATC system.

C. Units shall comply with the following:

| Accuracy | |
|---|---|
| Enthalpy | ± 2 BTU/lb |
| Dew Point | ± 1.8°F (± 1°C) |
| Wet Bulb | ± 3°F (± 1.7°C) |
| Dry Bulb | ± 0.5°F (± 0.9°C) |
| Supply Voltage | 18-30 VDCm 100 mA |
| Signal Output | Field selectable: 4-20 mA (700Ω max load), 0-5 V, or 0-10 V Humidity and dry bulb temperature |
| Measurement Range | |
| Dew Point: Space | 40° to 90°F (4.4° to 32.2°C) |
| Enthalpy: Space | 0-50 BTU/lb |
| Wet Bulb Space: | 40° to 90°F (4.4° to 32.2°C) |
| Dry Bulb Space: | 40° to 90°F (4.4° to 32.2°C) |
| Sensing Technology | Capacitive and replaceable |
| Operating Humidity | 0 to 99% RH, non-condensing |
| Warranty | 1 Year |

D. Where installed in gyms, auxiliary, tech rooms, shops, gyms, toilet rooms, and corridors install heavy duty stainless steel guards.

2.22. WALL-BOX TIMER SWITCHES

A. Digital Preset Timer

1. Description: Solid state interval time switch with backlit LCD display.

2. Features:
   a. Adjustable Time Delay: 10, 20, 40, 60, 90 minutes/ 2, 4, 6, 8, hours.
   b. Single button timer selection
   c. LED indication
   d. Silent operation

e. Requires neutral conductor
f. UL listed.
g. BAS/ATC system interface.
h. Override on/off.

3. Ratings:
   a. 1 Amp at 30V maximum.

4. Electronic time switch shall be interlocked with ATC system and associated HVAC equipment.

**5.** Basis of Design: Tork Model SSA200R-24 (finish to match other wiring devices specified herein).

2.23. TOGGLE SWITCHES

A. Toggle switches shall be quiet-type, extra heavy-duty, horsepower-rated, industrial grade, 120/277V, 20A: Comply with NEMA WD 1, UL 20 and Federal Specification W-S-896. Switches shall have the following basic features:

1. Heavy-gauge one-piece copper alloy contact arm.
2. Fast "make" and positive "break" to minimize arcing.
3. Heavy-duty bumper pads for quiet operation.
4. High strength thermoplastic polycarbonate toggle.
5. Oversized silvery alloy contacts for long life and heat dissipation.
6. Nickel-plated steel strap with integral ground.
7. Auto-ground clip to assure positive ground.

B. Hubbell HBL1221 (single-pole), HBL1222 (two-pole), HBL1223 (three-way), HBL1224 (four-way), Pass & Seymour PS20AC1 (single-pole), PS20AC2 (two-pole), PS20AC3 (three-way), PS20AC4 (four-way), or approved equal by acceptable manufacturer.

C. Manual toggle switches shall be interlocked with ATC system and associated HVAC equipment.

2.24. SMOKE REMOVAL ASSIST SYSTEM

A. Under this Division furnish and install a smoke removal assist and smoke hatch system as indicated on the Contract Drawings. Furnish and install fire fighters' smoke removal assist system control panel, fan/damper interlocks, fire/smoke damper interlocks, monitoring, HVAC equipment interlocks, smoke hatch interlock, relays, monitoring modules, wiring, and programming as required for a complete code compliant system. Entire system shall comply with New Castle County Fire Marshal and City of Newark Fire Marshal Requirements.

B. Coordinate the work under this Division, with Division 28, "Digital, Addressable Fire Alarm System" for initiation device interlocks.

C. Monitor all devices and equipment. All fans, dampers, ERV's, and kitchen make-up air unit, shall be provided with keyed H-O-A switches and pilot lights for fire fighter use.

D. Assist with demonstration and training on the entire system. Also assist with demonstration and testing required by the Fire Marshal and the commissioning agent.

E. Locate the fire fighters' smoke removal assist and smoke hatch system control panel where shown on the Contract Drawings.

F. All components shall be listed for smoke control systems.

G. Monitor the automatic transfer switches/building normal power availability ATS-2/ATS-3. Upon loss of utility power, shut-off/lock out HVAC equipment (rooftop equipment, VF's, KEF's, EF's) associated with smoke removal except Boilers and associated pumps, freeze protection pumps, unit heaters as well as VF-2 and VF-4 (fire pump and emergency electric rooms)

H. If there is no building power and the Smoke Removal System is manually Activated, provide a control signal to Automatic Transfer Switch ATS-3 to load shed, and enable HVAC equipment to operate in Smoke removal mode. When the Smoke Removal System is turned off, remove load shed signal to enable ATS-3 to transfer to generator.

## PART 3. EXECUTION

3.1. GENERAL

A. The Automatic Temperature Control System and Central Control and Management System, shall be designed, installed, and commissioned in a turnkey fully implemented and operational manner.

3.2. BMS SPECIFIC REQUIREMENTS

A. Graphic Displays

1. Provide a color graphic system flow diagram display for each system with all points as indicated on the point list. All terminal unit graphic displays shall be from a standard design library.

2. User shall access the various system schematics via a graphical penetration scheme and/or menu selection.

B. Custom Reports:

1. Provide custom reports as required for this project:

3.3. WORKSTATION INSTALLATION

A. Desktop Workstations Installation:

1. Install workstation(s) at location(s) directed by Owner.

2. Install multiple-receptacle power strip with cord for use in connecting multiple workstation components to a single duplex electrical power receptacle.

3. Install software on workstation(s) and verify software functions properly.

4. Develop Project-specific graphics, trends, reports, logs and historical database.

5. Power each workstation through a dedicated UPS unit. Locate UPS adjacent to workstation.

B. Portable Workstations Installation:

1. Turn over portable workstations to Owner at Substantial Completion.

2. Install software on workstation(s) and verify software functions properly.

C. Color Graphics Application:

1. Use system schematics indicated as starting point to create graphics.

2. Develop Project-specific library of symbols for representing system equipment and products.

3. Incorporate digital images of Project-completed installation into graphics where beneficial to enhance effect.

4. Submit sketch of graphic layout with description of all text for each graphic for Owner's and Architect's review before creating graphic using graphics software.

5. Seek Owner input in graphics development once using graphics software.

6. Final editing shall be done on-site with Owner's and Architect's review and feedback.

7. Refine graphics as necessary for Owner acceptance.

8. On receiving Owner acceptance, print a hard copy for inclusion in operation and maintenance manual. Prepare a scanned copy PDF file of each graphic and include with softcopy of DDC system operation and maintenance manual.

## 3.4. INSTALLATION & SUPERVISION

A. All wiring and tubing shall be properly supported and run in a neat and workmanlike manner. All wiring and tubing exposed and in equipment rooms shall run parallel to or at right angles to the building structure. All piping and wiring within enclosures shall be neatly bundled and anchored to prevent restriction to devices and terminals.

B. The control contractor shall be responsible for all electrical installation required for a fully functional control and automation system and not shown on the electrical plans or required by the electrical specifications. All wiring shall be in accordance to all local and national codes.

1. All line voltage wiring, all wiring exposed, and all wiring in equipment rooms shall be installed in conduit in accordance to the electrical specifications.

2. All electric and electronic wiring shall be minimum #20 AWG minimum THHN and shielded if required.

3. All wiring in the central control room shall be concealed in an approved manner.

C. Verify locations of temperature sensors, relative humidity sensors, CO2 sensors, and other exposed control sensors with plans and Owner prior to installation.

D. The installation and supervision of this project shall be carried out by factory trained personnel who are employed by the Contractor and licensed for this type of work.

E. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.

F. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation.

G. Install in accordance with manufacturer's instructions.

H. Check and verify location of space temperature sensors, relative humidity sensors, CO2 sensors, and other exposed control sensors with plans and room details before installation. Align with lighting switches and relative humidity sensors, and dewpoint temperature sensors.

I. Mount freeze protection thermostats using flanges and element holders.

J. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.

K. Provide separable sockets for liquids and flanges for air bulb elements.

L. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.

M. Install equipment plumb and level.

N. Install all equipment to be accessible for service and maintenance.

3.5. ACCEPTANCE TESTING

A. Point Verification

To verify end-to-end operation of the system the Contractor shall provide a hard copy of an All Points Summary Listing to the Owner of each part or system to be placed in warranty by the Owner. For CHS systems, the Contractor shall additionally provide a print screen of the process display showing real time dynamic point information for all points on the subsystem(s) to be accepted.

B. Sequence Verification

1. The Contractor shall notify the Owner's representative of systems which perform all specified sequences.

2. The warranty acceptance test shall be of 5 days duration and the system shall perform as follows:

   a. During the five days, the FMCS system shall not report any system diagnostics from the subsystem under test.
   b. The subsystem shall be performance verified as operational using temporary trends of each control loop located in the SDC or MSDC.
   c. During the occupied periods, BAS control loops, under test, shall maintain control of the process variable within the following scales:

| | | |
|---|---|---|
| i. | Duct Static Pressure | +/-0.3 inch WC |
| ii. | Pump Head Pressure | +/-10 percent of control range |
| iii. | Duct Temperature Loops | +/-2 degrees F |
| iv. | Room Temperature Loops | +/-1degrees F |
| v. | Pipe Temperature Loops | +/-2 degrees F |
| vi. | Duct Relative Humidity | +/-2x rated error of Humidity Transmitter |

   d. The contractor shall provide a hard copy printout of the process variable, process variable set point and control loop output percent for the period of 2 hours prior to occupancy to 2 hours after occupancy with samples taken every 15 minutes.

3.6. COORDINATE WITH TAB AGENCY

A. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, damper sequences, air and water reset, freeze stats and duct smoke detectors.

B. Verify that all controlling instruments are calibrated and set for design operating conditions prior to commencement of TAB work.

C. Calibrate sensors after installation, and before the sensor control verification tests are performed. Prove the accuracy of final settings by taking temperature readings. The readings shall be in a typical conditional space for each separately controlled zone.

D. Allow sufficient time in the project to provide assistance and instruction to the balancing agency in the proper use and setting of control components such as, but not limited to, computers, static pressure controllers, or any other device that may need set points changed so that the testing and balancing work can be performed.

E. All control sequences, software, equipment, and components shall be started-up by a qualified technician. Start-up report shall be submitted to Engineer prior to the commencement of testing and balancing work. Testing and balancing shall not commence until start-up reports are completed, reviewed by Engineer and forwarded to Testing and Balancing Agency.

3.7. EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that systems are ready to receive work.

C. Beginning of installation means installer accepts existing conditions.

D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

F. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring, and tubing is installed prior to installation proceeding.

3.8. INTERLOCK REQUIREMENTS

A. The fan and equipment interlock requirements are as scheduled on the contract drawings.

B. Furnish and install all necessary relays, transformer, contactors, wiring, conduit, and accessories to perform fan, equipment, and damper interlocks.

C. Unless otherwise noted, fan interlocks shall be arranged such that dampers associated with fan shall be open when fan starts and close when fan stops.

D. In projects with condensing units/heat pumps, the evaporator fans shall be hard wired interlocked with the condensing unit/heat pumps so that if evaporator fan fails, the condensing unit/heat pump shall de-energize.

E. All boiler primary pumps shall be hardwired interlocked with boilers so that if primary pump fails, boiler shall de-energize.

3.9. SUBMITTALS AT PROJECT CLOSEOUT

A. Project Record Documents: Record actual locations of components and set points of controls, including changes to sequences made after submission of shop drawings.

3.10. CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

1. Install piping adjacent to machine to allow service and maintenance.

B. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

C. Connect hand-off-auto selection switches to override automatic interlock controls when switch is in hand position.

3.11. FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.

2. Test and adjust controls and safeties.

3. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.

4. Test each point through its full operating range to verify that safety and operating control set points are as required.

5. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.

6. Test each system for compliance with sequence of operation.

7. Test software and hardware interlocks.

8. Test all end switches and verify status is reported on the ATC system.

C. DDC Verification:

1. Verify that instruments are installed before calibration, testing, and loop or leak checks.

2. Check instruments for proper location and accessibility.

3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.

4. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.

5. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.

6. Check temperature instruments and material and length of sensing elements.

7. Check control valves. Verify that they are in correct direction.

8. Check DDC system as follows:

a. Verify that DDC controller power supply is from emergency power supply, if applicable.
b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
c. Verify that spare I/O capacity has been provided.
d. Verify that DDC controllers are protected from power supply surges.

D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

E. All temperature control and interlock wiring shall be installed in conduit unless otherwise noted on the plans. Power or interlock wiring shall be run in separate conduit from sensor and communications wiring.

3.12. ADJUSTING

A. Calibrating and Adjusting:

1. Calibrate instruments.

2. Make three-point calibration test for both linearity and accuracy for each analog instrument.

3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.

4. Control System Inputs and Outputs:

a. Check analog inputs at 0, 50, and 100 percent of span.
b. Check analog outputs using volt-ohm-milli-amp meter (VOMA) at 0, 50, and 100 percent output.
c. Check digital inputs using jumper wire.
d. Check digital outputs using ohmmeter to test for contact making or breaking.
e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.

5. Flow:

a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 0, 50, 90, and 100 percent of span.
b. Manually operate flow switches to verify that they make or break contact.

6. Pressure:

a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.

7. Temperature:

a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
b. Calibrate temperature switches to make or break contacts.

8. Stroke and adjust control valves and dampers.

9. Provide diagnostic and test instruments for calibration and adjustment of system.

10. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial $CO_2$ temperature and relative humidity set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose.

3.13. ON-SITE ASSISTANCE

A. Occupancy Adjustments: Within one year of date of Substantial Completion, provide up to three Project site visits, when requested by Owner, to adjust and calibrate components and to assist Owner's personnel in making program changes and in adjusting sensors and controls to suit actual conditions.

3.14. SCHEDULING

A. Submit spreadsheet to Owner indicating occupied/unoccupied times for each item controlled by ATC system. Incorporate all scheduling requirements into sequence of operation.

3.15. STAGING

A. Coordinate staging requirements with equipment being controlled. Where multistage units are scheduled or specified, provide all devices, controllers, wiring to control and sequence all stages.

**END OF SECTION**

DIVISION 26 SECTION 26 05 19
LOW-VOLTAGE ELECTRIAL POWER CONDUCTORS AND CABLES
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# SECTION 26 05 19
# LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

## PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.

2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Section 260513 "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 601 to 35,000 V.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For testing agency.

C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Testing Agency: Engage a qualified independent testing agency to perform field quality-control testing.

B. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements. Procedures: Perform each visual and mechanical inspection and electrical test state din NETA ATS Section 7.3.1. Certify compliance with test parameters.

C. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

D. Measure tightness of bolted connections and compare torque measurements with manufacturer’s recommended values.

E. Verify continuity of each branch circuit conductor.

F. Tests: Service Entrance Cables, Power & Lighting Distribution Feeders and Feeders to all major mechanical equipment at 60A and over (i.e., chillers, AHU's, etc.).

1. Tests shall be performed with a 1000-volt megger, and conductors shall test free from short-circuits and grounds.

2. Conductors shall be tested phase-to-phase and phase-to-ground.

3. Furnish the instruments, materials, and labor required. Perform the tests in the presence of the Contracting Officer.

4. Test readings shall be recorded and delivered to Owner and Engineer in a report.

5. Copy of Test results shall be included in O&M Manuals.

G. Demonstration: Subsequent to wire and cable hook-ups, energize circuit and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

## PART 2 - PRODUCTS

### 2.1 CONDUCTORS AND CABLES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Wires and Cables:

a. American Insulated Wire Corp.; Leviton Manufacturing Co.
b. BICC Brand-Rex Company.
c. Carol Cable Co., Inc.
d. Senator Wire & Cable Company.
e. Southwire Company.
f. Encore Wire.
g. CommScope.
h. nVent PYROTENAX

2. Connectors and Accessories for Wires and Cables:

a. AMP Incorporated.
b. Buchanan.
c. General Signal; O-Z/Gedney Unit.
d. Monogram Company; AFAC.
e. NSI Industries, Inc.
f. Square D Company; Anderson.
g. 3M Company; Electrical Products Division.

B. Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN/THWN-2, XHHW, USE, and SO.

D. Multiconductor Cable: Comply with NEMA WC 70 for metal clad cable, Type MC and Type SO with ground wire.

2.2 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

2. RoHS compliant.

3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8. for stranded conductors.

D. Conductor Insulation:

1. Type RHH and Type RHW-2: Comply with UL 44.

2. Type THHN and Type THWN-2: Comply with UL 83.

3. Type XHHW-2: Comply with UL 44.

4. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.

E. Shield:

1. Type TC-ER: Cable designed for use with VFCs, with oversized crosslinked polyethylene insulation, and sunlight- and oil-resistant outer PVC jacket.

2.3 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

2. Comply with UL 1569.

3. RoHS compliant.

4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Circuits:

1. Single circuit and multicircuit with color-coded conductors.

2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

E. Ground Conductor: Insulated.

F. Conductor Insulation:

1. Type THHN/THWN-2: Comply with UL 83.

2. Type XHHW-2: Comply with UL 44.

G. Armor: Steel, interlocked.

H. Jacket: PVC applied over armor.

2.4 MINERAL INSULATED (MI) CABLE

A. Provide mineral insulated (MI) cable as indicated on the drawings. Provide all necessary accessories, supports, connectors, etc. as required for a complete installation. Acceptable manufacturer shall be BICC Pyrotenax System 1850 2-hour fire rated or approved equal.

B. Mineral-Insulated Metal–Sheathed Cable shall be provided with the following characteristics:

1. Description: ANSI/NFPA 70, Type MI.

2. Conductor: Solid high conductivity copper.

3. Insulation Voltage Rating: 600 volts.

4. Cable Temperature Rating: 90 degrees C.

5. Termination Temperature Rating: 150 Degrees C.

6. Insulation Material: Magnesium oxide refractory material.

7. Metal-sheath Material: Seamless soft drawn copper.

8. Fire Rating: Cable assembly including supports shall have a 2-hour fire rating as listed and classified by Underwriters' Laboratories, Inc. (UL 2196)

9. Overjacket: None required; or PVC if required to be directly buried.

C. Provide cable and lug terminations and splices as follows:

1. Cable Termination:

a. BICC Pyrotenax Model Pyro-Pak Installation Sheet 545U.
b. BICC Pyrotenax Model Quick-Term Installation Sheet 599U.

2. Lug Connection:

a. ILSCO Model Lo-250: #1 AWG through 250 kcmil
b. ILSCO Model CRA-300: 350 kcmil
c. ILSCO Model CRA-400: 500 kcmil

3. Cable Splice: BICC Pyrotenax Installation Sheet 550.

D. Examination: Verify that cable end factory temporary seals have remained intact, that the insulation has not been exposed to air, and that no moisture has entered cable insulation. Verify that work of other trades likely to damage cable has been completed.

E. Storage: Cables shall be shipped from the manufacturer with ends sealed against moisture ingress. Protect the exposed cable ends with shrinkable, molded polyolefin end caps or other suitable means such as standard conduit sealing compound and PVC tape. Cable shall be stored in a clean dry location.

F. Handling: Cable shall be uncoiled by rolling or rotating supply reel. Do not pull from coil periphery or center. Take precautions necessary to prevent damage to cable from contact with sharp objects, including pulling over foreign material on sheaves.

G. Installation: Install products in accordance with manufacturer's instructions and the requirements of the UL Fire Resistance Directory Listing.

1. Bending: Not less than five (5) times the cable diameter for cable not more than 3/4-inch (250 kcmil). Not less than ten (10) times the cable diameter for cable more than 3/4 inch (350 and 500 kcmil).
2. Pulling: For all cables up to and including #1 AWG use ten inch (250mm) or larger sheaves. For #1/0 through 250 kcmil inclusive use 18 inch (460mm) or larger sheaves. For 350 kcmil and larger cables use 24 inch (590mm) or larger sheaves.

On pulls of over 360 degrees, contact manufacturer for assistance. 350 and 500 kcmil cables shall not be pulled more than 360 degrees in total.

H. Splicing: All fire rated splices shall be made in the factory. In the event a field splice is necessary, it must be approved by the engineer and be made in the field by a manufacturer's field technician or made in the field by personnel trained by the cable manufacturer using manufacturer's components.

I. Terminations: Field made terminations shall be made with cable manufacturer's termination kits only. Stripping tools, crimping and compression tools available from the manufacturer shall be used for proper cable termination. Terminations must be completed immediately once started to avoid moisture ingress from surrounding air. Prior to completing each termination, test insulation resistance and follow manufacturer's drying procedures until insulation resistance reaches an acceptable level. Connections to ferrous cabinets for single conductor cables shall incorporate brass plates ¼ inch (6mm) thick by 4 inch (100mm) wide by length as required with ¾ inch (19mm). 1 inch (25mm), or 1-1/4 inch (32mm) drilled and tapped holes. Installed per manufacturer's drawing. For applications using 90 degree C rating of cable lugs shall be rated 90 degrees C.

J. Sheath induction reduction: When multi-phase circuits have paralleled single conductors, cables shall be run in groups having one of each phase in each group. Each set of paralleled conductors shall be separated by at least two single cable diameters. On balanced three-phase wye circuits neutral conductors may be located within the two cable diameter space between groups of phase conductors. Each group of cables shall be fastened tightly together at least twice between each cable support using ½ inch (13mm) wide by 0.030 inch (0.75mm) thick stainless steel straps or heavy plastic cable ties.

K. Exposed or Surface Installations: Cable may be secured directly to building structure using one of, or any combination of, the following approved methods:

1. Straps: ½ inch (13mm) wide by 1-1/2 inch (38mm) long by 0.030 inch (0.75mm) thick stainless steel or copper straps. Each strap shall contain two ¼ inch (6mm) holes for securing with 3/16 inch (5mm) by minimum 1-3/4 inch (44mm) long steel anchors.

2. Steel struts and cable tray: Approved steel strut framing system with fittings manufactured by strut manufacturer.

3. Steel cable tray: Approved steel cable tray system.

4. Other approved method

Supports shall not exceed three feed on center horizontally or six feet on center vertically. Cables shall be installed parallel to building lines.

L. Embedded installations: Cables will be run in the same trifoil configuration as exposed installations. Protect against damage during pulling, and during concrete pouring or backfill and tamping. Where cables emerge from grade provide PVC conduit, metal plate

or angle iron. This protection shall minimally extend from 18 inches (460mm) below grade to 8 feet (2.5m) above grade.

M. Wall or floor penetrations: Provide sleeve to protect cable and penetration openings during pulling. Provide approved fire stopping of all penetrations. Neatly train and lace cable inside boxes, equipment, and panelboards.

N. Field Quality Control: Inspect cable for physical damage and proper connection. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values. Verify continuity of each conductor. Prior to energizing cables, measure insulation resistance of each cable. Tabulate and submit for approval. Provide certification from cable manufacturer that installation is in accordance with their requirements.

## 2.5 FIRE-ALARM WIRE AND CABLE

A. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

C. Non-Power-Limited Circuits: Solid-copper conductors with 600 V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.

1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.

2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.

3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire-alarm and cable tray installation, plenum rated.

## 2.6 CONNECTORS AND SPLICES

A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

B. Split Bolt Connectors: Not Acceptable.

C. Solderless Pressure Connectors: High copper alloy terminal. May be used only for cable termination to equipment pads or terminals. Not approved for splicing.

D. Spring Wire Connectors: Solderless spring type pressure connector with insulating covers for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller.

E. All wire connectors used in underground or exterior pull boxes shall be gel-filled twist connectors or a connector designed for damp and wet locations.

F. Mechanical Connectors: Bolted type tin-plated; high conductivity copper alloy; spacer between conductors; beveled cable entrances.

G. Compression (crimp) Connectors: Long barrel; seamless, tin-plated electrolytic high conductivity copper tubing, internally beveled barrel ends. Connector shall be clearly marked with the wire size and type and proper number and location of crimps.

H. Heat shrinkable tubing shall meet the requirements of ANSI C119.1-1986 for buried connections to 90°C and shall be material flame-retarded per IEEE 383 "Vertical Tray Flame Test". Motor connection kits shall consist of heat-shrinkable, polymeric insulating material over the connection area and a high dielectric strength mastic to seal the ends against ingress of moisture and contamination. Motor connection kits shall accommodate a range of cable sizes for both in-line and stub-type configurations. Connection kits shall be independent of cable manufacturer's tolerances.

I. Wire Nut Connectors:

1. Wire nuts install in wet locations, exterior, etc., shall be self-contained, waterproof and corrosion-proof units incorporating prefilled silicone grease to block out moisture and air.

2. Connectors shall be UL listed appropriately sized according to manufacturer's recommendation for the suitable wire sizes and voltage rating (600 volt minimum).

3. Connectors body shall have a color-coded outer shell.

4. Connectors shall be as manufactured by King Technology or approved equal.

## 2.7 DROP CORDS

A. Description: Continuous length of cable with locking blade type connector body at lower end as indicated on Drawings. Secure cable at both ends with wire type stainless steel cable grips to prevent transmission of tension directly to conductors or terminal screws.

B. Junction Box: Furnished and installed flush with ceiling anchored to building structure for fastening of upper cord grip.

C. Cable: Type SO 600 volt flexible cord with three #12 stranded wires.

D. Connector Body: Single 120 volt, grounding receptacle of twistlock type that grips on cable insulation and is manufactured for use with wire cable grips. Furnish and install drop cords in length required for a receptacle height of 6 feet 8 inches above the finished floor.

**PART 3 - EXECUTION**

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Soft Drawn Copper, 98% conductivity minimum, solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Soft Drawn Copper. 98% Conductivity minimum, Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. 600 volt, unless otherwise noted, #12 AWG minimum (except control cable may be #14 AWG).

B. Service Entrance: Type THHN/THWN-2, single conductors in raceway.

C. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

E. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

F. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal-clad cable, Type MC, except branch circuits concealed in CMU wall shall be EMT.

H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

I. Branch Circuits Installed below Raised Flooring: Metal-clad cable, Type MC.

J. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

K. Class 1 Control Circuits: Type THHN/THWN-2, in raceway.

L. Class 2 Control Circuits: Type THHN/THWN-2, in raceway.

M. Conductors shall be rated 75 deg C in wet locations and 90 deg C in dry locations.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Section 260429, "Hangers and Supports for Electrical Systems."

F. Identify and color-code conductors and cables according to Section 260553, “Identification for Electrical Systems."

3.4 INSTALLATION OF FIRE-ALARM WIRE AND CABLE

A. Comply with NFPA 72.

B. Wiring Method: Install wiring in metal pathway according to Section 260529 "Hangers and Supports for Electrical Systems."

1. Install plenum cable in environmental airspaces, including plenum ceilings.

2. Fire-alarm circuits and equipment control wiring associated with fire-alarm system must be installed in a dedicated pathway system.

a. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.

3. Fire-Rated Cables: Use of two-hour, fire-rated fire-alarm cables, NFPA 70, Types MI and CI, is permitted.

4. Signaling Line Circuits: Power-limited fire-alarm cables must not be installed in the same cable or pathway as signaling line circuits.

5. Wiringwithin Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all

connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

C. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes; cabinets; or equipment enclosures where circuit connections are made.

D. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

E. Risers: Install at least two vertical cable risers to serve the fire-alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent receipt or transmission of signals from other floors or zones.

F. Wiring to Remote Alarm Transmitting Device: 1 inch (25 mm) conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.5 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 8 inches (200 mm) of slack.

D. Comply with requirements in Section 284621 "Addressable Fire-Alarm Systems" for connecting, terminating, and identifying wires and cables.

E. Wiring for general 15 and 20 amp 120 volt and 277 volt branch circuit work shall be as follows unless otherwise indicated:

| HOME RUN LENGTH AND WIRE SIZE | | | | CIRCUIT LENGTH AND WIRE SIZE | | | |
|---|---|---|---|---|---|---|---|
| 120 Volt | | 277 Volt | | 120 Volt | | 277 Volt | |
| 0 – 60’ | #12 | 0 – 175’ | #12 | 0 – 100’ | #12 | 0 – 200’ | #12 |
| 60 – 100’ | #10 | 175 – 350’ | #10 | 100’ & Up | #10 | 200’ & Up | #10 |
| 100’ & Up | #8 | 350’ & Up | #8 | | | | |

Circuit length as given above shall be the wire length between the first and last outlet on the circuit. Home run length as given above shall be the wire length between the first outlet and the panelboard. In accordance with the above, where the size of branch circuit conductors is increased by the minimum required by the NEC for the branch circuit rating, it is the Contractor’s responsibility to ensure that the termination provisions of all equipment connected to such circuits are listed as suitable for the conductor sizes involved.

F. Joints of #10 AWG and smaller shall be made with properly insulated solderless type pressure connectors. Where stranded conductors or multiple solid conductors are connected to terminals, solderless lugs manufactured by Thomas and Betts Company or equivalent shall be used.

G. Joints of #8 AWG and larger in power and lighting circuits shall be of the type indented into the conductor by means of a hand or hydraulic pressure tool. Connectors shall be Burndy “Hy-dent’, T&B “St-Kon”, or equivalent. Connectors for control wiring shall be Burndy “Hy-Lug”, or equivalent.

H. All circuits for exterior electric work shall be #10 AWG (minimum) and contain an extra #10 AWG (minimum) copper ground conductor. All exterior wiring shall be installed in conduit as specified above, unless otherwise noted as larger on the Drawings.

## 3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 26 Section "Firestopping" and “Common Work Results for Electrical”.

B. Install to seal underground exterior-wall penetrations according to Division 26 Section, “Common Work Results for Electrical”.

## 3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 7 Section "Penetration Firestopping."

## 3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing agency to perform field quality-control testing.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors.

    a. Tests shall be performed with a 1000-volt megger, and conductors shall test free from short-circuits and grounds.
    b. Conductors shall be tested phase-to-phase and phase-to-ground.
    c. Furnish the instruments, materials, and labor required. Perform the tests in the presence of the Contracting Officer.
    d. Test readings shall be recorded and delivered to Owner and Engineer in a report.
    e. Copy of Test results shall be included in O&M Manuals.

2. Perform each of the following visual and electrical tests:

a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
b. Test bolted connections for high resistance using one of the following:
   1) A low-resistance ohmmeter.
   2) Calibrated torque wrench.
   3) Thermographic survey.
c. Inspect compression-applied connectors for correct cable match and indentation.
d. Inspect for correct identification.
e. Inspect cable jacket and condition.
f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable for a one-minute duration.
g. Continuity test on each conductor and cable.
h. Uniform resistance of parallel conductors.

3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
   a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
   b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

C. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

D. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

E. Verify continuity of each branch circuit conductor.

F. Demonstration: Subsequent to wire and cable hook-ups, energize circuit and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

**END OF SECTION**

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