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SECTION 31 00 00

EARTHWORK
08/23

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO T 180 (2025) Standard Method of Test for
Moisture-Density Relations of Soils Using
a 4.54-kg (10-lb) Rammer and a 457-mm
(18-in.) Drop

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C600 (2023) Installation of Ductile-Iron Mains
and Their Appurtenances

ASTM INTERNATIONAL (ASTM)

ASTM C33/C33M (2024a) Standard Specification for
Concrete Aggregates

ASTM C117 (2023) Standard Test Method for Materials
Finer than 75-um (No. 200) Sieve in
Mineral Aggregates by Washing

ASTM C136/C136M (2025) Standard Test Method for Sieve
Analysis of Fine and Coarse Aggregates

ASTM C150/C150M (2024) Standard Specification for Portland
Cement

ASTM C260/C260M (2024) Standard Specification for
Air-Entraining Admixtures for Concrete

ASTM C618 (2025a) Standard Specification for Coal
Fly Ash and Raw or Calcined Natural
Pozzolan for Use in Concrete

ASTM C989/C989M (2025) Standard Specification for Slag
Cement for Use in Concrete and Mortars

ASTM D698 (2012; R 2021) Standard Test Methods for
Laboratory Compaction Characteristics of
Soil Using Standard Effort (12,400
ft-lbf/cu. ft. (600 kN-m/cu. m.))

ASTM D1140 (2017) Standard Test Methods for
Determining the Amount of Material Finer

	than 75-µm (No. 200) Sieve in Soils by Washing
ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³) (2700 kN-m/m ³)
ASTM D2216	(2019) Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D2487	(2017; R 2025) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4253	(2016; E 2019) Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4254	(2016) Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D4318	(2017; E 2018) Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4829	(2021) Standard Test Method for Expansion Index of Soils
ASTM D4832	(2016; E 2018) Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders
ASTM D6023	(2016) Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material (CLSM)
ASTM D6103/D6103M	(2017; E 2021) Standard Test Method for Flow Consistency of Controlled Low Strength Material (CLSM)
ASTM D6938	(2017a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
U.S. ARMY CORPS OF ENGINEERS (USACE)	
EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846.3-3

(1999, Third Edition, Update III-A) Test
Methods for Evaluating Solid Waste:
Physical/Chemical Methods

1.2 DEFINITIONS

1.2.1 Structural Fill

Soil material placed to support buildings, walls, pads, and other similar facilities.

1.2.2 Porous Fill

Free-draining material placed for subsurface drainage, as a capillary break, or another specific purpose.

1.2.3 Topsoil

Surface layer of primarily organic soil capable of supporting vegetation growth.

1.2.4 Utility Bedding Material

Fill placed to directly support pipes, conduits, cables, and appurtenant structures. Bedding may also be used to provide a cushion between utilities and bedrock, obstacles, obstructions and other unyielding materials.

1.2.5 Flowable Fill

Fill placed in a plastic or liquid form that flows to near its final placement location with limited assistance and subsequently cures or solidifies to provide a stable or impermeable barrier.

1.2.6 Satisfactory Materials

Satisfactory materials for fill, backfill, and/or any in-situ soils to remain in place comprise any materials classified by ASTM D2487 as GW, GP, GM, GC, SW, SP, SM, SC, ML. Maximum particle size to be no greater than one-half of the allowable lift thickness in any dimension.

1.2.7 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; roots and other organic matter or frozen material. Notify the Contracting Officer when encountering any contaminated materials.

1.2.8 Cohesionless Materials

Cohesionless materials include materials classified in ASTM D2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D4318, ASTM C117, ASTM C136/C136M and ASTM D1140.

1.2.9 Cohesive Materials

Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when the fines are plastic. Perform testing, required for classifying materials, in accordance with ASTM D4318, ASTM C117, ASTM C136/C136M and ASTM D1140.

1.2.10 Unstable Material

Unstable materials are too weak to adequately support the utility pipe, conduit, equipment, or appurtenant structure. Satisfactory material may become unstable due to ineffective drainage, dewatering, becoming frozen, excessive loading.

1.2.11 Expansive Soils

Expansive soils are defined as soils that have an expansion index greater than 20 when tested in accordance with ASTM D4829.

1.2.12 Degree of Compaction (Proctor)

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D1557 ASTM D698 abbreviated as a percent of laboratory maximum dry density. Since ASTM D1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum dry density in accordance with AASHTO T 180-21 paragraph 1.5, Note 1.

1.2.13 Degree of Compaction (Relative Density)

Degree of compaction required for soils with less than 5 percent passing the No. 200 sieve, is expressed as a relative percentage of the maximum index density/dry unit weight and minimum index density/dry unit weight, obtained by the test procedures in accordance with ASTM D4253 and ASTM D4254, respectively, abbreviated as a percent of laboratory relative density.

1.2.14 Borrow

Soil brought to the project site from an external location for the purposes of project construction.

1.2.15 Subgrade

Earth materials directly below foundations and directly below granular base materials in building slab and pavement areas including shoulders.

1.3 SUBSURFACE DATA

Subsurface soil boring logs are shown in project plans. These data represent available subsurface information; however, variations may exist between boring locations.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals with a "G, AE" designation are for Architect/Engineer of Record approval; submittals not having a "G" or "G, AE" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Excavation and Trenching Plan; G, AE

Borrow Plan; G, AE

Dewatering Work Plan; G, AE

SD-03 Product Data

Flowable Fill Mix Design; G

Geotextiles

SD-06 Test Reports

Material Test Report; G, AE

Borrow Site Testing; G, AE

Pipe Inspection Report; G, AE

Geotechnical Evaluation Report; G

1.5 QUALITY CONTROL

1.5.1 Geotechnical Engineer

Provide a Professional Geotechnical Engineer to provide inspection of excavations and soil/groundwater conditions throughout construction. The Geotechnical Engineer is responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Geotechnical Engineer is responsible for preparing and updating the Excavation and Trenching Plan and Dewatering Work Plan as construction progresses to reflect changing conditions and submit an updated plan if necessary. Submit a monthly Geotechnical Evaluation report, informing the Contractor and Contracting Officer of the status of the plan and an accounting of the Contractor's adherence to the plan addressing any present or potential problems. The Contractor is responsible for arranging meetings with the Geotechnical Engineer and Contracting Officer throughout the contract duration.

1.5.2 Qualified Technician

Provide a Qualified Technician to inspect, monitor, sample, and performing field testing. The technician qualifications need to be one of the following: a current National Institute for Certification in Engineering Technologies (NICET) Level II minimum certification in Construction Materials Testing Soils; a Geologist-in-Training with minimum one-year experience; an Engineer-in-Training with minimum one-year experience; a Registered Geologist; or a Professional Engineer.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

2.1.1 Structural Fill

Materials classified as GW, GP, GM, GC, GW-GM, GP-GM, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, CL, or CH in accordance with ASTM D2487. Select material type appropriate for the intended purpose.

2.1.2 Porous Fill

Materials containing less than 5 percent passing the No. 200 sieve. Provide the gradation as appropriate for the intended purpose.

2.1.3 Topsoil

Material suitable for topsoil obtained from offsite areas excavations is defined as: Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.

2.1.4 Utility Bedding Material

Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600. Install bedding for plastic piping to spring line of pipe. Utility bedding material may include the following:

2.1.4.1 Class I

Angular, 0.25 to 1.5 inch, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.

2.1.4.2 Class II

Coarse sands and gravels with maximum particle size of 1.5 inch, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D2487.

2.1.4.3 Sand

Clean, coarse-grained sand classified as SW or SP by ASTM D2487 for bedding as indicated.

2.1.4.4 Gravel and Crushed Stone

Clean, coarsely graded natural gravel, crushed stone or a combination thereof identified as ASTM D2487 for bedding. Do not exceed maximum particle size of 1.5 inches.

2.2 FLOWABLE FILL

Design and submit flowable fill mix design to consist of Portland cement,

fly ash, and/or slag cement and fine aggregate. Include the dry weights of cementitious material(s); quality and gradation of aggregates in the saturated surface-dry weights along with gradation tests; quantities, types, and names of admixtures; and quantity of water per cubic yard. The maximum unconfined compressive strength to be 200 psi at 28 days in accordance with ASTM D4832. The aggregates in accordance with ASTM C33/C33M Fine Aggregates. Air-entrain fill in accordance with ASTM C260/C260M. The air content to be between 8 and 15 percent in accordance with ASTM D6023. The flow to be between 8 and 12 inches in accordance with ASTM D6103/D6103M. Portland cement to be Type I or II in accordance with ASTM C150/C150M. Fly ash to be Class C in accordance with ASTM C618. Provide slag cement in Grade 100 or 120 in accordance with ASTM C989/C989M.

2.3 BURIED WARNING AND IDENTIFICATION MARKERS

Provide polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inches minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.

Warning Tape Color Codes	
Red	Electric
Orange	Telephone and Other Communications
Blue	Water Systems
Green	Sewer Systems

2.3.1 Warning Tape for Metallic Piping

Provide acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.003 inch and a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.3.2 Detectable Warning Tape for Non-Metallic Piping

Provide polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.004 inch, and a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Manufacture tape with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket

or provide with other means of corrosion protection.

2.3.3 Detection Wire for Non-Metallic Piping

Insulate a single strand, solid copper detection wire with a minimum of 12 AWG.

2.4 MATERIAL FOR RIP-RAP

Provide filter fabric and rock conforming to requirements noted on the plans for construction indicated.

2.5 BORROW

Provide borrow materials from sources located outside of Government property meeting the requirements of paragraph STRUCTURAL FILL.

2.6 GEOTEXTILE

Provide a pervious sheet of polyester, nylon, glass or polypropylene ultraviolet resistant filaments woven, spun bonded, fused, or otherwise manufactured into a non-raveling fabric with uniform thickness and strength. Submit a sample and material product data for all Geotextiles utilized.

PART 3 EXECUTION

3.1 PROTECTION

Perform all work specified in accordance with applicable requirements of the Corps of Engineers publication EM 385-1-1 Safety and Health Requirements Manual.

Use equipment of type and size appropriate for the site conditions (soil character and moisture content). Maintenance of exposed subgrades and fills is the responsibility of the Contractor. The Contractor is required to prevent damage by ineffective drainage, dewatering, and heavy loads and equipment by implementing precautionary measures. Repair or replace any defects or damage.

3.1.1 Underground Utilities

Location of the existing utilities indicated is approximate. Physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor is responsible for protecting utilities from damage during construction.

3.1.2 Drainage and Dewatering

Provide for the collection and disposal of surface and subsurface water encountered during construction.

3.1.2.1 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary

ditches, swales, and other drainage features and equipment as required to keep soils from becoming unstable, prevent erosion, or undermining of foundations. Remove unstable material from working platforms for equipment operation and soil support for subsequent construction features and provide new material as specified herein. It is the responsibility of the Contractor to assess the site conditions to employ necessary measures to permit construction to proceed.

3.1.2.2 Dewatering

Control groundwater flowing toward or into excavations to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches are not allowed within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Perform control measures by the time the excavation reaches the water level in order to maintain the integrity of the in-situ material. While the excavation is open, maintain the water level continuously, at least 2 feet below the working level. Submit a Dewatering Work Plan outlining procedures for accomplishing dewatering work. Operate dewatering system continuously until construction work below existing water levels is complete. Measure and record performance of dewatering system at same time each day by use of observation wells or piezometers installed in conjunction with the dewatering system.

3.1.3 Shoring and Sheet piling

Submit an Excavation and Trenching Plan to stabilize features, prevent undermining or unintended horizontal and vertical movement of adjacent structures, and prevent slippage or movement in banks or slopes adjacent to the excavation. Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheet piling of excavations. Drawings to include material sizes and types, arrangement of members, and the sequence and method of installation and removal. Calculations are to include data and references used.

3.1.4 Protection of Graded Surfaces

Protect newly backfilled, graded, and topsoiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.2 BORROW

Select borrow material to meet the requirements and conditions of the fill for which it is to be used. Obtain borrow material from approved private sources. Submit a Borrow Plan that includes materials to be excavated, stockpile locations, proposed slopes, drainage, and closure. Unless otherwise provided in the contract, the Contractor is responsible for obtaining the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling from the owners. Unless specifically provided, do not obtain borrow within the limits of the project site without prior written approval. **Environmental Test results shall be submitted to the Government 60 days before any imported or relocated fill material is placed on site. See Appendix B for Construction Work Plan for Navy Dig Permit.**

3.2.1 Government Furnished Borrow Area(s)

3.2.1.1 Stripping and Stockpiling Operations in Borrow Area

Strip in accordance with paragraph STRIPPING. Strip at least 5 feet beyond the limits of the borrow excavation and any stockpiles of fill materials.

Stockpile materials within the borrow area work limits such that the stockpiles does not interfere with borrow operations. Stockpile borrow material awaiting transport in approved segregated piles. Maintain a minimum of 30 feet between all stockpile toes and the top of the borrow cut.

3.2.1.2 Drainage of Borrow Excavations

Provide adequate drainage of borrow area. Ensure that borrow operations result in minimum detrimental effects on natural environmental conditions.

3.2.2 Contractor Furnished Borrow Area(s)

Obtain approved borrow materials from approved offsite sources. If a borrow source is selected that is not a commercial entity from which soil material is directly purchased, submit a Borrow Plan that includes the borrow source location, geotechnical test results showing the fill material meets the Contract requirements, environmental test results in accordance with paragraph ENVIRONMENTAL REQUIREMENTS FOR OFF-SITE SOIL, and any Federal, State, and local permits required for excavation and reclamation of the borrow area.

3.2.3 Environmental Requirements for Off-Site Soil

Test offsite soils brought in for use as backfill for Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and full Toxicity Characteristic Leaching Procedure (TCLP) including ignitability, corrosivity and reactivity. Backfill may not contain concentrations above the most current South Carolina Department of Environmental Services (SCDES) risk-based screening criteria, EPA Regional Screening Levels (RSLs), and EPA Toxicity Characteristics Leaching Procedure (TCLP) regulatory limits and Resource Conservation and Recovery Act (RCRA) hazardous waste characteristics 200 parts per million (ppm) of total petroleum hydrocarbons (TPH) and 20 ppm of the sum of Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and pass the TCLP test. Determine TPH concentrations by using EPA Method 8015. Determine BTEX concentrations by using EPA SW-846.3-3 Method 5030/8020/8260B. Perform TCLP in accordance with EPA SW-846.3-3 Method 1311. Perform hazardous waste characteristic tests for ignitability, corrosivity, and reactivity in accordance with accepted standard methods. Perform PCB testing in accordance with accepted standard methods for sampling and analysis of bulk solid samples. Provide borrow site testing for petroleum hydrocarbons and BTEX from a grab sample of material from the area most likely to be contaminated at the borrow site (as indicated by visual or olfactory evidence), with at least one test from each borrow site. Provide borrow site testing for hazardous waste characteristics (TPH, BTEX and TCLP) from a composite sample of material, collected in accordance with standard soil sampling techniques. Do not bring borrow material to project site until Borrow Plan containing environmental test results has been received and approved by the Contracting Officer.

3.3 SURFACE PREPARATION

3.3.1 Clearing and Grubbing

Clear and grub as specified in Section 31 11 00 CLEARING AND GRUBBING.

Remove trees, stumps, logs, shrubs, brush and vegetation and other items that would interfere with construction operations. Remove stumps entirely. Grub out matted roots and roots over 3 inches in diameter to at least 18 inches below existing surface.

3.3.2 Stripping

Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be wasted. Locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed.

3.3.3 Proof Rolling

Perform proof rolling on exposed subgrade that is unfrozen and free of surface water (wet conditions resulting from rainfall). Notify the Contracting Officer a minimum of three days prior to proof rolling. Perform proof rolling in the presence of the Contracting Officer.

After stripping, excavating, and rough grading to the planned elevation, proof roll the existing subgrade of all building, pavement locations with six passes of a loaded tandem axle dump truck. Operate the truck in a systematic manner to ensure the number of passes over all areas, and at speeds between 2.5 to 3.5 miles per hour. Subgrade materials that exhibit excessive deflection and/or rutting during proof rolling need to be scarified, aerated, and re-compacted to specified density at plus or minus 2 percent of optimum moisture content prior to being considered for remedial action by the Contracting Officer. When proof rolling under buildings, the building subgrade is considered to extend 5 feet beyond the building lines, and make one-half of the passes with the roller in a direction perpendicular to the other passes.

3.3.4 Stockpiling Operations

Place and grade stockpiles of satisfactory and unsatisfactory and wasted materials as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials from contamination which may destroy the quality and fitness of the stockpiled material. Do not create stockpiles that could obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, remove and replace such material with satisfactory material from approved sources.

3.4 EXCAVATION

Excavate to contours, elevation, and dimensions indicated. Excavate soil disturbed or weakened by Contractor's operations, and soils softened or made unstable for subsequent construction due to exposure to weather. Use material removed from excavations meeting the specified requirements in the construction of fills, subgrades, shoulders, bedding (as backfill), and for similar purposes to minimize surplus material and to minimize additional material to brought on site. Do not excavate below indicated depths except to remove unstable material as determined by the Geotechnical Engineer and confirmed by the Contracting Officer. Remove and replace excavations below the grades shown with appropriate materials as directed by the Contracting Officer. **Environmental Test results shall be submitted to the Government 60 days before any excavation work is performed on site. See Appendix B for the Construction Work Plan for Navy Dig Permit.**

If at any time during excavation, including excavation from borrow areas, the Contractor encounters material that may be classified as rock or as hard/unyielding material, uncover such material, and notify the Contracting Officer. Do not proceed with the excavation of this material until the Contracting Officer has classified the materials as common excavation or rock excavation. Failure on the part of the Contractor to uncover such material, notify the Contracting Officer, and allow sufficient time for classification and delineation of the undisturbed surface of such material will cause the forfeiture of the Contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Contracting Officer for the areas of work in which such deposits occur.

3.4.1 Ditches, Gutters, and Channel Changes

Finish excavation of ditches, gutters, and channel changes by cutting accurately to the cross sections, grades, and elevations shown. Do not excavate below grades shown. Backfill excessive excavation as directed by the Contracting Officer, with satisfactory, compacted, material or with suitable stone or cobble to grades shown. Dispose excavated material as shown or as directed. Do not allow material to be deposited within 4 feet from edge of a ditch. Maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.4.2 Trench Excavation Requirements

Excavate the trench as recommended by the manufacturer of the pipe to be installed. Slope trench walls below the top of the pipe, or make vertical, and of such width as recommended by the manufacturer. Provide vertical trench walls where no manufacturer installation instructions are available. Do not exceed the trench width of 24 inches below the top pipe plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter, and do not exceed 36 inches plus pipe outside diameter for pipe sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, provide redesign, stronger pipe, or special installation procedures. The Contractor is responsible for the cost of redesign, stronger pipe, or special installation procedures without any additional cost to the Government.

3.4.2.1 Bottom Preparation

Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell holes to the necessary size at each joint or coupling to eliminate point bearing. Remove stones of 2 inch or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing.

3.4.2.2 Removal of Unyielding Material

Where overdepth is not indicated and unyielding material is encountered in the bottom of the trench, notify the Contracting Officer. Following approval, remove such material 4 inch below the required grade and replaced with suitable materials as provided in paragraph FILLING AND COMPACTION.

3.4.2.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it to the proper grade with suitable material as provided in paragraph FILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the Contractor is responsible for excavating the resulting material and replacing it without additional cost to the Government.

3.4.2.4 Excavation for Appurtenances

Provide excavation for manholes, catch-basins, inlets, or similar structures of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown.

3.4.3 Underground Utilities

Perform work adjacent to utilities as indicated. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

3.4.4 Structural Excavation

Following general excavation and rough grading activities, excavate the entire building footprint area and at least 5 feet beyond, to the deeper of 4 feet below existing grade or 2 feet below bottom of footings. Scarify the exposed surface to a depth of 6 to 8 inches, moisture-condition, and compact to at least 95 percent of laboratory maximum dry density. Do not excavate to final grade until just before concrete is to be placed. Roughen level surfaces. Cut sloped surfaces as indicated into rough steps or benches to provide a satisfactory bond for compacting materials. For new pavement areas including exterior concrete pads, over-excavate to a minimum of 12 inches below bottom of new pavement/pad base course, scarify, moisture-condition, and compact to at least 95 percent.

Make excavations to the lines, grades, and elevations shown, or as directed. Provide trenches and foundation pits of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or other hard foundation material of loose debris and cut to a firm, level, stepped, or serrated surface. Remove loose disintegrated rock and thin strata.

Concrete placement is not allowed until footing subgrades have been inspected and approved by the Contracting Officer.

3.4.5 Pile Cap Excavation

Stop the excavation at an elevation 6 to 12 inches above the bottom of the footing before driving piles. After pile driving has been completed, complete the remainder of the excavation to the elevations shown. Excavate to bottom of pile cap prior to placing or driving piles, unless authorized otherwise by the Contracting Officer. After the pile driving has been completed, remove loose and displaced material and complete excavation, leaving a smooth, solid, undisturbed surface to receive the concrete or masonry. Backfill and compact over-excavations and changes in grade due to pile driving operations to 95 percent of ASTM D698 maximum dry density.

3.4.6 Rock Excavation

Excavate rock encountered in the cut section to a depth of 6 inches below finished grade and replace with satisfactory material.

3.5 SUBGRADE PREPARATION

3.5.1 General Requirements

Shape subgrade to line, grade, and cross section as indicated. Remove unsatisfactory and unstable material in surfaces to receive fill or in excavated areas, as determined by proof rolling, and replaced with satisfactory materials. Do not place material on surfaces that are muddy, frozen, contain frost, or otherwise containing unstable material. Scarify the surface to a depth of 6 inches prior to placing fill. Step or bench sloped surfaces steeper than 1 vertical to 4 horizontal prior to scarifying. Place 6 inches of loose fill and blend with scarified material. When subgrade is part fill and part excavation or natural ground, scarify to a depth of 8 inches.

3.5.2 Subgrade for Structures, Spread Footings, and Concrete Slabs

Do not excavate below depth shown for structures, spread footings, and concrete slabs. If over excavation occurs, compact disturbed material to 95 percent of ASTM D698. After final rolling, the surface of the subgrade for buildings and pavements must not show deviations greater than 0.05 foot when tested with a 12-foot straightedge applied both parallel and at right angles to the centerline of the area.

3.5.3 Subgrade for Pavements

Compact top 12 inches of subgrade for pavements to at least 95 percent of ASTM D698. After final rolling, the surface of the subgrade for buildings and pavements must not show deviations greater than 0.05 foot when tested with a 12-foot straightedge applied both parallel and at right angles to the centerline of the area.

3.5.4 Subgrade Filter Fabric

Place filter fabric as indicated directly on prepared subgrade free of vegetation, stumps, rocks larger than 2 inch diameter and other debris which may puncture or otherwise damage the fabric. Repair damaged fabric by placing an additional layer of fabric to cover the damaged area a minimum of 3 feet overlap in all directions. Overlap fabric at joints a minimum of 3 feet. Obtain approval of filter fabric installation before placing fill or backfill. Place fill or backfill on fabric in the direction of overlaps and compact as specified herein. Follow manufacturer's recommended installation procedures.

3.6 FILLING AND COMPACTION

Prepare ground surface on which backfill is to be placed and provide compaction requirements for backfill materials in conformance with the applicable portions of paragraphs for SUBGRADE PREPARATION. Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Fill and backfill to contours, elevations, and dimensions indicated. Compact and test each lift before placing overlaying lift.

3.6.1 Trench Backfill

Backfill trenches to the grade shown. Backfill the trench to 2 feet above the top of pipe prior to performing the required pressure tests. Leave the joints and couplings uncovered during the pressure test. Do not backfill the trench until all specified tests are performed.

3.6.1.1 Replacement of Unyielding Material

Replace unyielding material removed from the bottom of the trench with satisfactory material or initial backfill material.

3.6.1.2 Replacement of Unstable Material

Replace unstable material removed from the bottom of the trench or excavation with satisfactory material placed in layers not exceeding 6 inches loose thickness.

3.6.1.3 Bedding and Initial Backfill

Provide bedding of the type and thickness shown. Place initial backfill material and compact it with approved tampers to a height of at least one foot above the utility pipe or conduit. Bring up the backfill evenly on both sides of the pipe for the full length of the pipe. Take care to ensure thorough compaction of the fill under the haunches of the pipe. Except where shown or when specified otherwise in the individual piping section, provide bedding for buried piping in accordance with PART 2 paragraph UTILITY BEDDING MATERIAL. Compact backfill to top of pipe to 95 percent of ASTM D698 maximum dry density. Provide plastic piping with bedding to spring line of pipe.

3.6.1.4 Final Backfill

Do not begin backfill until construction below finish grade has been

approved, underground utilities systems have been inspected, tested and approved, forms removed, and the excavation cleaned of trash and debris. Bring backfill to indicated finish grade. Where pipe is coated or wrapped for protection against corrosion, the backfill material up to an elevation 2 feet above sewer lines and one foot above other utility lines need to be free from stones larger than one inch in any dimension. Heavy equipment for spreading and compacting backfill are not to be operated closer to foundation or retaining walls than a distance equal to the height of backfill above the top of footing; compact remaining area in layers not more than 4 inches in compacted thickness with power-driven hand tampers suitable for the material being compacted. Place backfill carefully around pipes or tanks to avoid damage to coatings, wrappings, or tanks. Do not place backfill against foundation walls prior to 7 days after completion of the walls. As far as practicable, bring backfill up evenly on each side of the wall and sloped to drain away from the wall.

Fill the remainder of the trench, except for special materials for buildings and pavements with satisfactory material. Place backfill material and compact as follows:

3.6.1.4.1 Buildings and Pavements

Place backfill up to the required elevation as specified. Do not permit water flooding or jetting methods of compaction. Compact as specified for Structural Fill.

3.6.1.4.2 Turfed or Seeded Areas and Miscellaneous Areas

Deposit backfill in layers of a maximum of 12 inches loose thickness, and compact it to 85 percent maximum dry density for cohesive soils and 90 percent maximum dry density for cohesionless soils. Apply this requirement to all other areas not specifically designated above.

3.6.1.5 Electrical Distribution System

Provide a minimum cover of 24 inches from the finished grade to direct burial cable and conduit or duct line, unless otherwise indicated.

3.6.1.6 Displacement of Features

After other required tests have been performed and the trench backfill compacted to the finished grade surface, inspect the pipe to determine whether unexpected or damaging displacement has occurred. Conduct walk-through inspection of pipe sizes larger than 48 inches. Inspect pipes smaller than 48 inches using remote methods using closed circuit television, sonar, or hybrid that can provide a 360-degree inspection of the pipe. Prepare and submit a pipe inspection report consisting of digital video or photos. If, in the judgment of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, replace or repair the defects as directed at no additional cost to the Government.

3.6.1.7 Buried Tape And Detection Wire

3.6.1.7.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.6.1.7.2 Buried Detection Wire

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inches above the top of pipe. Extend the wire continuously and unbroken, from manhole to manhole. Terminate the ends of the wire inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. Furnish insulated wire over its entire length. Install wires at manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, terminate the wire in the valve pit at the pump station end of the pipe.

3.6.2 Structural Fill Placement

Place fill and backfill beneath and adjacent to structures in successive horizontal layers of loose material not more than 8 inches in depth, or in loose layers not more than 4 inches in depth when using hand-operated compaction equipment. Do not place over wet or frozen materials. Compact to at least 90 percent of laboratory maximum dry density for cohesive materials or 95 percent of laboratory maximum dry density for cohesionless materials, except as otherwise specified. Perform compaction in such a manner as to prevent wedging action or eccentric loading upon or other damage to the structure. Moisture condition fill and backfill material to a moisture content that will readily facilitate obtaining the specified compaction.

3.6.3 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed, place backfill in such a manner that the structure is not be damaged by the shock of falling earth. Deposit the backfill material, compact it as specified for final backfill, and bring up the backfill evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.6.4 Porous Fill Placement

Provide under floor and area-way slabs on a compacted subgrade. Place in a single lift and compact with a minimum of two passes of a hand-operated plate-type vibratory compactor.

3.6.5 Flowable Fill

Place fill in a manner to completely fill voids in the location indicated. Do not place when atmospheric temperatures are expected to be below 33 degrees F at any time during the 3 day period following placement.

3.6.6 Compaction

3.6.6.1 General Site

Compact underneath areas designated for vegetation and areas outside the 5 foot line of the paved area or structure to 90 percent of ASTM D698.

3.6.6.2 Adjacent Areas

Compact areas within 5 feet of structures to 95 percent of ASTM D698.

3.7 RIP-RAP CONSTRUCTION

Construct rip-rap on filter fabric in accordance with SCDHEC State Standard, in the areas indicated. Trim and dress indicated areas to conform to cross sections, lines and grades shown within a tolerance of 0.1 foot.

3.7.1 Stone Placement

Place rock for rip-rap on prepared bedding material to produce a well graded mass with the minimum practicable percentage of voids in conformance with lines and grades indicated. Distribute larger rock fragments, with dimensions extending the full depth of the rip-rap throughout the entire mass and eliminate "pockets" of small rock fragments. Rearrange individual pieces by mechanical equipment or by hand as necessary to obtain the distribution of fragment sizes specified above.

3.8 FINISHING/FINISH OPERATIONS

During construction, keep excavations shaped and drained. Maintain ditches and drains along subgrade to drain effectively at all times. Do not disturb the finished subgrade by traffic or other operation. Protect and maintain the finished subgrade in a satisfactory condition until ballast, subbase, base, or pavement is placed. Do not permit the storage or stockpiling of materials on finished subgrade. Do not lay subbase, base course, ballast, or pavement until the subgrade has been checked and approved, and in no case place subbase, base, surfacing, pavement, or ballast on a muddy, spongy, frozen or otherwise unstable subgrade.

Finish the surface of excavations and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated except as indicated for subgrades specified in paragraph SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed to a smoothness suitable for the application of turfing materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.8.1 Grading Around Structures

Construct areas within 5 feet outside of each building and structure line true-to-grade, shape to drain, and maintain free of trash and debris until final inspection has been completed and the work has been accepted.

3.8.2 Grading

Finish grades as indicated within one-tenth of one foot. Grade areas to drain water away from structures. Maintain areas free of trash and debris. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

3.8.3 Topsoil and Seed

Provide as specified in Section 32 92 19 SEEDING.

On areas to receive topsoil, prepare the compacted subgrade soil to a 2 inches depth for bonding of topsoil with subsoil. Spread topsoil evenly

to a thickness of 2 inch and grade to the elevations and slopes shown. Do not spread topsoil when frozen or excessively wet or dry. Keep topsoil separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Remove from the site any surplus of topsoil from excavations and gradings. Obtain material required for topsoil in excess of that produced by excavation within the grading limits from offsite areas.

3.9 DISPOSITION OF SURPLUS MATERIAL

Remove from Government property all surplus or other soil material not required or not suitable for filling or backfilling, along with brush, refuse, stumps, roots, and timber. Properly disposed of in accordance with all applicable laws and regulations.

3.10 TESTING

Perform testing as indicated in Table 1. Submit Material Test Reports within 24 hours of tests being completed.

Material Type	Location of Material	Test Method	Test Frequency
Fill and Backfill Subgrade	Structures (adjacent to) Pavement and Structures	Density - ASTM D6938.	One test per 2000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines. Double testing frequency for areas compacted by hand-operated machines. If ASTM D6938 is used, check in-place densities by ASTM D1556/D1556M as follows: One check test per lift for every 6 tests.
Fill and Backfill Subgrade	Structures (adjacent to) Pavement and Structures	Moisture Content - ASTM D2216	Two tests per day for each type of fill and backfill. Sample taken immediately prior to compaction after moisture conditioning.

Material Type	Location of Material	Test Method	Test Frequency
Fill and Backfill Subgrade	Structures (adjacent to) Pavement and Structures	Moisture Density Relationship - ASTM D698	One representative test per 500 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum dry density. Sample to be taken from stockpile or location of placement.
Fill and Backfill Subgrade	Structures (adjacent to) Pavement and Structures	Relative Density - ASTM D4253 and ASTM D4254	One test per 2000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines. Double testing frequency for areas compacted by hand-operated machines.

Material Type	Location of Material	Test Method	Test Frequency
Fill and Backfill Subgrade	Structures (adjacent to) Pavements and Structures	Gradation - ASTM C136/C136M	One representative test per 500 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum dry density. Sample to be taken from stockpile or location of placement.
Fill and Backfill Subgrade	Structures (adjacent to) Pavements and Structures	Atterberg Limits - ASTM D4318	One representative test per 500 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum dry density. Sample to be taken from stockpile or location of placement.

Material Type	Location of Material	Test Method	Test Frequency

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SECTION 31 62 13.20

PRECAST/PRESTRESSED CONCRETE PILES

11/20, CHG 2: 02/24

PART 1 GENERAL

1.1 DESCRIPTION

Design, furnish, install and test precast prestressed concrete piles at the locations indicated on the drawings and specified herein. Assume test piles will be directed to be placed in locations that can be incorporated into the work. Test piles that meet performance requirements can be incorporated into the permanent work.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 214R	(2011) Evaluation of Strength Test Results of Concrete
ACI 318	(2019; R 2022) Building Code Requirements for Structural Concrete (ACI 318-19) and Commentary (ACI 318R-19)
ACI MNL-66	(2020) ACI Detailing Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2018; Amd 1 2020) Structural Welding Code - Reinforcing Steel
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ASTM INTERNATIONAL (ASTM)

ASTM A27/A27M	(2020) Standard Specification for Steel Castings, Carbon, for General Application
ASTM A416/A416M	(2024) Standard Specification for Low-Relaxation, Seven-Wire for Prestressed Concrete
ASTM A572/A572M	(2025) Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A615/A615M	(2025) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A706/A706M	(2025) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A996/A996M	(2016) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM A1064/A1064M	(2024) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31/C31M	(2026) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33/C33M	(2024a) Standard Specification for Concrete Aggregates
ASTM C39/C39M	(2024) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C136/C136M	(2025) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2024) Standard Specification for Portland Cement
ASTM C172/C172M	(2017) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C494/C494M	(2024) Standard Specification for Chemical Admixtures for Concrete
ASTM C618	(2025a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666/C666M	(2015) Resistance of Concrete to Rapid Freezing and Thawing
ASTM C989/C989M	(2025) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1077	(2026) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1202	(2025) Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
ASTM C1218/C1218M	(2020c) Standard Test Method for Water-Soluble Chloride in Mortar and

Concrete

ASTM C1260	(2023) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1567	(2025) Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM D1143/D1143M	(2007; R 2013) Piles Under Static Axial Compressive Load
ASTM D4945	(2017) Standard Test Method for High-Strain Dynamic Testing of Deep Foundations
ASTM E329	(2025b) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

PRECAST/PRESTRESSED CONCRETE INSTITUTE (PCI)

PCI BDM	(2011) Precast Prestressed Concrete Bridge Design Manual
PCI JR-382	(1993) PCI Journal: Recommended Practice for Design, Manufacture and Installation of Prestressed Concrete Piling
PCI MNL-116	(2021) Manual for Quality Control for Plants and Production of Structural Precast Concrete Products, 5th Edition
PCI MNL-135	(2000) Tolerance Manual for Precast and Prestressed Concrete Construction

1.3 SUBSURFACE DATA

Subsurface soil data logs are provided on the project drawings.

1.4 BASIS OF BID

1.4.1 Production Pile Acceptance Criteria

Maximum allowable design capacity for piles is 57 tons (114 kips). Allowable compression and allowable tension capacities for the piles are provided on the drawings. Drive piles to a minimum depth as indicated on the drawings, and to such additional depth as required to obtain a bearing capacity of not less than 55 tons. The Contractor's Geotechnical Consultant will determine the terminal driving criteria based on results of dynamic pile driving tests at end of drive or restrrike, static load tests and wave equation analysis.

1.5 LUMP SUM PAYMENT

Base bids upon providing the number, size, capacity, and length of piles

as indicated on the drawings.

Include the cost of all necessary equipment, tools, material, labor, and supervision required to: deliver, handle, install, cut-off, dispose of any cut-offs, and meet the applicable contract requirements. Include mobilization, pre-drilling, and redriving heaved piles. If, in redriving, it is found that any pile is not of sufficient length to provide the capacity specified, notify the Contracting Officer, who reserves the right to increase or decrease the total length of piles to be provided and installed by changing the pile locations or elevations, requiring the installation of additional piles, or directing the omission of piles from the requirements shown and specified. If total number of piles or number of each length vary from that specified as the basis for bidding, an adjustment in the contract price or time for completion, or both, will be made in accordance with specification Section 00 22 13.00 20 SUPPLEMENTARY INSTRUCTIONS TO OFFERORS. Payment for piles will be based on successfully installing piles to both the minimum tip elevation and satisfying the acceptance criteria identified herein. No additional payment will be made for: damaged, rejected, or misplaced piles; withdrawn piles; any portion of a pile remaining above the cut-off elevation; backdriving; cutting off piles; splicing; build-ups; any cut-off length of piles; or other excesses beyond the assumed pile length indicated for which the Contractor is responsible.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals with a "G, AE" designation are for Architect/Engineer of Record approval; submittals not having a "G" or "G, AE" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Installation Procedures; G

Contractor's Geotechnical Consultant Documentation; G

Wave Equation Analysis; G

Precasting Manufacturer's Quality Control Procedures; G

Instrumentation and Monitoring Program Report; G

Testing Agency Qualifications; G

SD-02 Shop Drawings

Piles; G, AE

Identify location of control piles (which are permitted to be production piles) and one sacrificial test pile.

Pile Splices; G

Pile Placement; G

As-Driven Survey; G, AE

Load Tests; G, AE

Pile Shoe; G

SD-03 Product Data

Pile Driving Equipment; G

SD-05 Design Data

Concrete Mix Design; G, AE

SD-06 Test Reports

Aggregates; G

Concrete Compressive Strength; G

Test Piles and Control Piles; G, AE

Load Tests; G, AE

Dynamic Pile Analysis; G

SD-07 Certificates

Aggregates; G

Admixtures; G

Prestressing Steel; G

Cement; G

Fly Ash and Pozzolan; G

Ground Slag; G

Load Test Supporting Data; G

SD-11 Closeout Submittals

Pile Records; G, AE

1.7 DELIVERY, STORAGE, AND HANDLING

Store, handle, and transport piles in accordance with PCI MNL-116 except as follows. Use methods for handling and storage of piles such that the piles are not subjected to excessive bending stress, cracking, spalling, or other damage. Follow the lifting instructions of the precaster.

1.7.1 Damaged Piles

Inspect each pile for sweep and structural damage such as cracking and spalling before transporting them to the project site and immediately prior to placement in the driving leads. Bring any cracks (cracks other than crazing, surface drying, shrinkage cracks and end cracks) to the attention of the Contracting Officer. Piles which are damaged during delivery, storage, or handling to the extent they are rendered unsuitable

for the work, in the opinion of the Contracting Officer, will be rejected and removed from the project site, or may be repaired, if approved, at no cost to the Government.

Any pile damaged by reason of internal defects or by improper driving must be corrected by one of the following methods approved by the Engineer for the pile in question and the project Structural Engineer:

The pile is withdrawn, if practicable, and replaced by a new and, if necessary, longer pile.

One or more replacement piles are driven adjacent to the defective pile.

A Pile Dynamic Analysis and low integrity testing must be performed by the Contractor's Geotechnical Consultant to assess the structural integrity of the driven pile(s).

A pile driven below the specified butt elevation must be corrected by one of the following methods approved by the Engineer:

The pile is spliced (if approved).

A sufficient portion of the footing is extended down to properly embed the pile.

A pile driven out of its proper location or out of plumb as approved by the Engineer, must be corrected by one of the following methods approved by the engineer:

One or more replacement piles are driven next to the pile in question.

As directed by the structural engineer.

1.7.2 Repairable Cracks

Reject or repair piles with cracks equal to or greater than 0.006 inches but less than 0.06 inches. As an alternate to pile rejection, the Contractor may submit a proposal to repair deficient piles, which must be restored prior to driving to provide its required design capacity, perform its intended function in the structure, and take into consideration long term durability in corrosive environment.

1.7.3 Non-Repairable Cracks

Piles with cracks equal to or greater than 0.06 inches will be rejected.

1.7.4 Pile Sweep

Limit sweep to 1/8 inch per 10 feet over the length of the pile. Piles having excessive sweep will be rejected.

1.8 QUALITY CONTROL

1.8.1 Piles

Prepare in accordance with ACI MNL-66. Indicate placement of reinforcement including tendons. Indicate location of special embedded or attached lifting devices, employment of pick-up points, support points

other than pick-up points, and any other methods of pick-up. Provide certification of a Professional Engineer registered in any jurisdiction of the U.S. or its territories, that layout and details of reinforcement and tendons conform with that shown on the structural design drawings.

1.8.2 Quality Control Procedures

Submit the precasting manufacturer's quality control procedures and inspection records established in accordance with PCI MNL-116.

1.8.3 Installation Procedures

- a. Submit information on the type of equipment proposed to be used, proposed methods of operation, pile driving plan including proposed sequence of driving, and details of all pile driving equipment and accessories.
- b. Provide details of pile driving equipment and a Wave Equation Analysis of pile drivability for selection of the hammer along with a statement of driving procedures. The Wave Equation Analysis is to be completed by the Contractor's Geotechnical Consultant for each test pile location where different subsurface conditions exist and is to include the following information pertaining to the proposed pile driving equipment:
 - (1) Complete Pile and Driving Equipment Data Form, (which can be downloaded at: <https://www.wbdg.org/dod/ufgs/ufgs-forms-graphics-tables>) for each proposed pile hammer and pile type combination.
 - (2) Copies of computer input and output sheets and graphs showing soil resistance versus blow count as well as maximum tension and compression stresses versus blow count. Analysis must be run at the estimated tip elevation as well as other required elevations to define maximum stress levels in the pile during driving.
- c. Provide detailed procedures for conducting the dynamic pile load test and equipment to be used for conducting the load test. The detailed description must explain how specific information of pile performance will be evaluated.

1.8.4 Contractor's Geotechnical Consultant Documentation

Hire the services of an independent, Registered Professional Geotechnical Engineer, experienced in soil mechanics and Pile Dynamic Analysis, to observe test pile installation and production pile installation as specified herein. The Contractor's Geotechnical Consultant must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

Provide instructions and procedures on how the Contractor will assist the Government in the processes of Dynamic Pile Testing, Inspection and Monitoring of piles during installation and testing.

1.8.5 Concrete Mix Design

Certify, using a Government-approved independent commercial testing laboratory, that proportioning of mix is in accordance with ACI 211.1 or ACI 318 for specified strength and is based on aggregate data which has

been determined by laboratory tests during last 12 months. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolan, ground slag, and admixtures; and applicable reference specifications. Submit additional data regarding concrete aggregates if the source of aggregate changes. Submittal must clearly indicate where each mix design will be used when more than one mix design is submitted. Submit a concrete mix design before concrete is placed, for each type of concrete used for the piles. Submit concrete cylinder compressive strength test results.

1.8.6 Load Test Supporting Data

Submit Jack calibration records, a testing arrangement description and diagram, and the proposed loading sequence.

PART 2 PRODUCTS

2.1 PILE REQUIREMENTS

Provide precast prestressed concrete piles per PCI Journal Volume 38, Number 2 (PCI JR-382). Production of piles must be in accordance with PCI MNL-116. Order test piles 10 feet longer in length than production piles. Drive the additional test pile length only when based upon the recommendation of the Contractor's Geotechnical Consultant and approved by the Contracting Officer. The Contractor's Geotechnical Consultant will use test pile data to determine "calculated" pile tip elevation and necessary driving resistance. This information will be given to the Contractor no later than 7 days from receipt of complete test data. Use this list as the basis for ordering the piles. Do not order piles until list is provided by the Contractor's Geotechnical Consultant. Provide test piles 5 feet longer than the bid length.

2.2 MATERIALS

2.2.1 Cementitious Materials

Cementitious materials must be portland cement or portland cement in combination with natural pozzolan or fly ash or ground granulated blast furnace slag and conforms to appropriate specifications listed below.

2.2.1.1 Cement

ASTM C150/C150M, Type I or II with a maximum alkali content of 0.60 percent. Cement certificates must include test results in accordance with ASTM C150/C150M, including equivalent alkalies indicated in the optional chemical requirements.

2.2.1.2 Fly Ash and Pozzolan

ASTM C618, Class N, or F except that the maximum total alkalies must be 3.0 percent, and the maximum allowable loss on ignition must be 3 percent. If the aggregates are reactive, the maximum calcium oxide content must be 13.0 percent. Do not use Class C.

2.2.1.3 Ground Iron Blast-Furnace Slag

ASTM C989/C989M, Grade 120.

2.2.2 Water

Water must be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete or steel.

2.2.3 Aggregates

ASTM C33/C33M. Do not mix, store in same stockpile, or use fine aggregates from different sources of supply in same concrete mix or same structure without approval. The fineness modulus of fine aggregate must be not less than 2.40 or greater than 3.0. For piles that will be exposed to freezing and thawing, fine and coarse aggregate subjected to five cycles of the sodium sulfate soundness test must show a loss not greater than 10 percent. If the selected aggregates fail the soundness test, the Contractor may use the aggregate source, provided concrete specimens made with the aggregates to be used for the piles must have a durability factor of not less than 80 based on 300 cycles of freezing and thawing when tested in accordance with ASTM C666/C666M. Prior to pile fabrication, submit certified test reports for the following tests specified in ASTM C33/C33M:

- a. Grading
- b. Amount of material finer than No. 200 sieve
- c. Organic impurities
- d. Soundness
- e. Clay lumps and friable particles
- f. Coal and lignite
- g. Weight of slag
- h. Abrasion of coarse aggregate
- i. Fineness modulus
- j. Reactive aggregates
- k. Freezing and thawing

2.2.3.1 Alkali-Silica Reactivity (ASR)

Evaluate and test fine and coarse aggregates to be used in all concrete for alkali-aggregate activity.

Separately evaluate the fine and coarse aggregates using ASTM C1260. Test results of the individual aggregates must have a measured expansion equal to or less than 0.08 percent at 14 days after casting per ASTM C1260. If the test data indicates an expansion of greater than 0.08 percent, reject the aggregate(s) or perform additional testing, using ASTM C1567, as follows: utilize the Contractor's proposed low alkali portland cement and SCM in combination with the proposed aggregate for the test portioning. Determine the SCM quantity that will meet all the requirements of these specifications and that will lower the ASTM C1567 expansion to equal or less than 0.08 percent at 14 days after casting.

If the above option does not lower the expansion to less than 0.08 percent at 14 days after casting, reject the aggregate(s) and submit new aggregate sources for retesting. Submit the results of testing to the Contracting Officer for evaluation and acceptance.

2.2.4 Admixtures

Chemical admixtures must conform to ASTM C494/C494M. Do not use admixtures containing chlorides.

2.2.5 Prestressing Steel

Use seven-wire stress-relieved or low-relaxation strand conforming to ASTM A416/A416M, Grade 270. Use prestressing steel free of grease, oil, wax, paint, soil, dirt, and loose rust. Do not use prestressing strands or wire having kinks, bends, or other defects.

2.2.6 Reinforcing Steel

ASTM A615/A615M, Grade 60; ASTM A706/A706M, Grade 60; or ASTM A996/A996M, Grade 60. Weld reinforcing steel in accordance with AWS D1.4/D1.4M.

2.2.7 Ties and Spirals

Steel, ASTM A1064/A1064M for spirals and ASTM A615/A615M for ties.

2.2.8 Anchorages and End Fittings

ACI 318.

2.2.9 Grout

Provide cement grout for prestressed piles using materials conforming to requirements stipulated herein for concrete mixes. Use admixtures, if required, known to have no injurious effects on steel or concrete. Do not use calcium chloride.

2.2.10 Pile Driving Points

Use pile driving points of steel conforming to the requirements of ASTM A27/A27M or ASTM A572/A572M.

2.3 CONCRETE MIX DESIGN

ACI 211.1 or ACI 318, Chapter 4. Concrete must have a minimum compressive strength of 5000 psi at 28 days and a maximum size aggregate of 3/4 inches. Concrete must be air entrained with a minimum of 4.5 percent and a maximum of 7.5 percent. Mix must contain fly ash, ground iron blast furnace slag or silica fume to meet the requirements specified herein to mitigate Alkali-Silica Reactivity (ASR).

2.4 FABRICATION

2.4.1 Formwork

Formwork and dimensional tolerances must be in accordance with PCI MNL-116, PCI MNL-135, and as specified herein. Provide forms of metal, braced and stiffened against deformation, accurately constructed, watertight, and

supported on unyielding casting beds. Forms must permit movement of pile without damage during release of prestressing force. Form precast dowel holes with galvanized flexible metal conduit.

2.4.2 Pretensioning

Perform pretensioning in accordance with PCI MNL-116, and as specified herein. Use gage calibrated within last 6 months by a laboratory approved by Contracting Officer. Provide means for measuring elongation of steel to nearest 1/8 inch. Give tensioning steel a uniform prestress prior to being brought to design prestress. Induce same initial prestress in each unit when several units of prestressing steel in a pile are stretched simultaneously.

2.4.3 Casting

2.4.3.1 Conveying

Convey concrete to formwork in accordance with PCI MNL-116, and as specified herein. Clean conveying equipment thoroughly before each run. During placing, make any free vertical drop of the concrete less than 3 feet. Remove concrete which has segregated in conveying or placing.

2.4.3.2 Placing and Casting

Perform concrete casting within 3 days after pretensioning steel; however, do not deposit concrete in forms until placement of reinforcement and anchorages has been inspected and approved by pile manufacturer's quality control representative. Produce each pile of dense concrete straight with smooth surfaces with reinforcement retained in its proper position during fabrication. Use vibrator with heads smaller than the minimum distance between steel for pretensioning. Make surface of pile ends perpendicular to axis of pile. Chamfer, a minimum of 3/4 inch, ends of piles and corners of square piles.

2.4.4 Curing of Piles

Cure piles using moist or accelerated curing in accordance with the PCI MNL-116 except as follows.

2.4.4.1 Moist Curing

Moist cure using moist burlap coverings, plastic sheeting, or membrane curing compound until minimum strength to detension is achieved.

2.4.4.2 Accelerated Curing

After placement of concrete, moist cure for a period of 4 hours. Follow by accelerated curing until concrete has reached specified release strength. Enclose casting bed for accelerated curing with a suitable enclosure. During application of steam or heat, increase the air temperature at a rate not to exceed 40 degrees F per hour. Cure at a maximum temperature of 150 degrees F until concrete has reached specified release strength. Reduce temperature at a rate not to exceed 20 degrees F per hour until a temperature of 20 degrees F above ambient air temperature is reached. After accelerated curing, moist cure using either water or membrane curing until a total accelerated and moist curing time of 72 hours is achieved.

2.4.5 Detensioning

Perform detensioning in accordance with PCI MNL-116, and as specified herein. Gradually release tension in strands from anchorage. Detension after approval by pile manufacturer's quality control representative. Perform transfer of prestressing force when concrete has reached a minimum compressive strength in accordance with pile manufacturer's requirements.

2.5 PRODUCT QUALITY CONTROL

Where piling is manufactured in a plant with an established quality control program as attested to by a current certification in the PCI "Certification Program for Quality Control" perform product quality control in accordance with PCI MNL-116. Where piling is manufactured by specialists or in plants not currently enrolled in the PCI "Certification Program for Quality Control," set-up a product quality control system in accordance with PCI MNL-116 and perform concrete and aggregate quality control testing using an independent commercial testing laboratory approved by the Contracting Officer in accordance with the following.

2.5.1 Piles

Prepare shop drawings in accordance with ACI MNL-66. Indicate placement of reinforcement including tendons. Indicate location of special embedded or attached lifting devices, employment of pick-up points, support points other than pick-up points, and any other methods of pick-up. Provide certification of a Professional Engineer registered in any jurisdiction of the U.S. or its territories, that layout and details of reinforcement and tendons conform with that shown on the structural design drawings.

2.5.2 Aggregate Tests

Take samples of fine and coarse aggregate at concrete batch plant and test. Perform mechanical analysis (one test for each aggregate size) in accordance with ASTM C136/C136M. Tabulate results of tests in accordance with ASTM C33/C33M.

2.5.3 Slump and Strength Tests

Sample concrete in accordance with ASTM C172/C172M at time concrete is deposited for each production line. Perform slump tests in accordance with ASTM C143/C143M. Mold cylinders in accordance with ASTM C31/C31M. Mold at least six cylinders per day or one for every 60 cubic yards of concrete placed, whichever is greater. Cure cylinders in same manner as piles and for accelerated curing, place at coolest point in casting bed. Perform strength tests in accordance with ASTM C39/C39M. Test two cylinders of each set at 7 days or 14 days, or at a time for establishing transfer of prestressing force (release strength) and removal of pile from forms. Test remaining cylinders of each set 28 days after molding.

2.5.4 Changes in Proportions

If, after evaluation of strength test results, compressive strength is less than specified compressive strength, make adjustments in proportions and water content and changes in temperature, moisture, and curing procedures as necessary to secure specified strength. Submit changes in mix design to Contracting Officer in writing.

2.5.5 Compressive Strength Test Results

Evaluate compressive strength test results at 28 days in accordance with ACI 214R using a coefficient of variation of 10 percent. Evaluate strength of concrete by averaging test results of each set of standard cylinders tested at 28 days. Not more than 10 percent of individual cylinders tested must have a compressive strength less than specified design strength.

2.5.6 Chloride Ion Concentration

Sampling and determination of water soluble chloride ion content in accordance with ASTM C1218/C1218M. Maximum water soluble chloride ion concentrations in hardened concrete at ages from 28 to 42 days contributed from the ingredients including water, aggregates, cementitious materials, and admixtures must not exceed 0.06 percent by weight of cement.

2.5.7 Chloride Ion Penetration

Proportion concrete to have the chloride ion penetration test in accordance with ASTM C1202 to ensure the durability of concrete in marine environment, and be below 3000 coulombs for concrete specimens tested at 56 days.

2.5.8 Precasting Manufacturer's Quality Control Procedures

Submit the precasting manufacturer's quality control procedures and inspection records established in accordance with PCI MNL-116.

2.6 PILE DRIVING EQUIPMENT

Submit descriptions of pile driving equipment, including hammers, power packs, driving helmets, hammer cushions, pile cushions, leads, extractors, jetting equipment, and preboring equipment at least 30 days prior to commencement of work.

Provide Pile Driving Equipment as mentioned in this section.

2.6.1 Pile Hammers

Provide a hammer capable of developing the indicated ultimate pile capacity at blow count less than 100 per foot considering hammer impact velocity; ram weight; stiffness of hammer and pile cushions; cross section, length, and total weight of pile; and character of subsurface material to be encountered. Use the same pile hammer, operating at the same rate and in the same manner, as that used for driving test piles. Use wave equation analysis to verify that the hammer will develop stresses within acceptable limits in the piles. At final driving, operate pile hammer in accordance with manufacturer's recommendation. Provide the plant and equipment for air hammers that have sufficient capacity to maintain, under working conditions, the pressure at the hammer specified by the manufacturer. The hose connecting the compressor with the hammer must be at least the minimum size recommended by the Manufacturer. Evaluate hammer performance at the end of driving by measuring blows per minute and comparing with the manufacturer's recommendations. Measure impact velocity of open-end (single acting) diesel hammers at all times during pile driving operations with a device for this purpose. If such a device is not available, obtain the stroke by measuring the speed of operation either manually or with a device that makes the measurement

automatically. Equip closed-end (double acting) diesel hammers with a bounce chamber pressure gauge in good working order, mounted near ground level so as to be easily read by the Contracting Officer. Provide a correlation chart of bounce chamber pressure and potential energy. Equip hydraulic hammers with a system for measurement of ram energy. The system must be in good working order and the results must be easily and immediately available to the Engineer.

2.6.2 Driving Helmets and Cushion Blocks

2.6.2.1 Driving Helmets or Caps and Pile Cushions

Use a steel driving helmet or cap including a pile cushion between top of pile and driving helmet or cap to prevent impact damage to pile. Use a driving helmet or cap and pile cushion combination capable of protecting pile head, minimizing energy absorption and dissipation, and transmitting hammer energy uniformly over top of pile. Provide driving helmet or cap that fits sufficiently loose around top of pile so that pile may be free to rotate without binding within driving helmet. Use pile cushion of solid wood or of laminated construction using plywood, softwood or hardwood boards with grain parallel to end of pile. Select the pile cushion thickness placed on the pile head prior to driving by wave equation analysis so that the limiting driving stresses are not exceeded. Replace pile cushion at the start of driving of each pile and when it becomes highly compressed, charred or burned, or has become spongy or deteriorated in any manner. Show details of driving helmets, capblocks (hammer cushions), and pile cushions. Submit 2 weeks prior to test pile installation.

2.6.2.2 Hammer Cushion or Capblock

Use a hammer cushion or capblock between driving helmet or cap and hammer ram consisting of aluminum and micarta (or equal) discs stacked alternately in a steel housing or a suitable polymer designed for this specific purpose as indicated by the hammer manufacturer. Use steel plates at top and bottom of capblock (hammer cushion). Replace aluminum, micarta or polymer discs that have become damaged, split or deteriorated in any manner. Do not use small wood blocks, wood chips, rope or other materials that permit excessive loss of hammer energy.

PART 3 EXECUTION

3.1 PRELIMINARY WORK

3.1.1 Wave Equation Analysis of Pile Drivability

- a. Prior to driving any pile, submit a pile Wave Equation Analysis, performed by Contractor's Geotechnical Consultant, for each size pile and distinct subsurface profile condition. These analyses must take into account the proposed hammer assembly, pile cap block and cushion characteristics, the pile properties and estimated lengths and the soil properties anticipated to be encountered throughout the installed pile length based on static capacity analysis with consideration of driving gain/loss factors. Only one specific model of pile hammer may be used for each pile type and capacity.
- b. Demonstrate using the Wave Equation Analysis that the piles will not be damaged during driving, must indicate that the driving stresses will be maintained within the limits below and indicate the blow count

necessary to achieve the required ultimate static pile capacities.

Allowable Driving Stresses

Concrete

Compression - $0.85 f'c$ minus UPL
Tension - $(3 \text{ times } (\text{the square root of } f'c)) \text{ plus UPL}$

$f'c$ is compressive strength of concrete
UPL = Unit Prestress after Losses
(Obtain values from pile manufacturer)

- c. Perform a refined Wave Equation Analysis upon completion of the dynamic and static testing programs outlined in this specification section, taking into consideration the evaluated capacities, gain/loss factors and recommended production pile lengths. Develop production pile driving criteria based on the results of the refined Wave Equation Evaluations and dynamic pile driving tests using PDA, both at the end of initial drive and restrike test sequences.
- d. All pile driving equipment provided by the Contractor will be subject to the approval of the Contractor's Geotechnical Consultant. Complete the attached pile and driving equipment data form, including hammer information, in full as part of the submittal of the results of the Wave Equation Analyses.
- e. Pay for the cost of performing the Wave Equation Analyses and include in the base bid.

3.1.2 Pile Length Markings

Mark each pile prior to driving with horizontal lines at one foot intervals. Mark the interval number on pile every 5 feet from pile tip.

3.2 PILE DRIVING

3.2.1 Deep Pile Installation and Structural Controls

This facility will be built on a deep foundation system of 14-inch square precast concrete piles, driven to a target depth of approximately 72 feet. This ensures the piles are embedded securely within the dense Cooper Marl formation, which begins at a depth of approximately 45 feet. The following protocols will be strictly enforced to prevent vertical and horizontal contaminant migration, addressing specific SCDES concerns:

•**Protection of Confining Layer:** The Cooper Marl serves as the primary hydrogeological confining unit. To protect its integrity, any pre-augering activities used to advance piles through near-surface debris will be strictly limited to a maximum depth of 45 feet below ground surface. Confirm depths with existing conditions and do not pre-auger into the Cooper Marl layer. This ensures that drilling ceases at the top of the Cooper Marl formation, preventing any mechanical puncture of the protective layer. The subsequent pile driving will then displace and seal the formation as intended.

3.2.2 Driving Piles

Notify Contracting Officer 10 days prior to driving of test piles and load

test. Piles may be driven when the specified 28-day concrete strength has been achieved but not less than 7 days after casting. The Contractor's Geotechnical Consultant will determine the terminal driving criteria based on results of **dynamic pile driving tests at the end of drive and restrrike** and wave equation analysis. Drive piles to indicated tip elevation to reach a driving resistance established by the **dynamic pile driving tests at the end of drive and restrrike** and wave equation analyses (WEAP) in accordance with the schedule which the Contractor's Geotechnical Consultant will prepare from the test-pile driving data. During initial driving and until pile tip has penetrated beyond layers of very soft soil or below bottom of predrilled or prejetted holes, use a reduced driving energy of the hammer as required to prevent pile damage. Refusal criteria will be established by the Contracting Officer. If a pile fails to reach "calculated" tip elevation or if a pile reaches "calculated" tip elevation without reaching required driving resistance, notify Contracting Officer and perform corrective measures as directed. Provide hearing protection when noise levels exceed 140 dB. Do not handle or move piles or pile sections in any manner that would result in cracking or permanent damage to the concrete or to the grout surrounding the prestressing cables. Piles may be driven without pile guides or leads providing a hammer guide frame is used to keep the pile and hammer in alignment.

3.2.3 Protection of Piles

Take care to avoid damage to piles during handling, placing pile in leads, and during pile driving operations. Support piles laterally during driving, but allow rotation in leads. Where pile or projecting reinforcement orientation is essential, take precautionary measures to maintain the orientation during driving. Square top of pile to longitudinal axis of pile. Maintain axial alignment of pile hammer with that of the pile. If the Contractor elects to use a pile head with projecting strands or mild steel reinforcement, prevent direct impact forces from being transmitted through the reinforcement, by using a special driving head.

3.2.4 Pile Placement and Tolerances in Driving

Submit pile placement plans at least 30 days prior to delivery of piles to the job site.

Drive piles with a variation of not more than 2 percent from vertical for plumb piles. Maintain and check axial alignment of pile and leads at all times. If subsurface conditions cause pile drifting beyond allowable axial alignment tolerance, notify Contracting Officer and perform corrective measures as directed. Place butts within 4 inches of location indicated. Manipulation of piles within specified tolerances will be permitted, to a maximum of 1 1/2-percent of their exposed length above ground surface or mudline. In addition to specified tolerances, maintain a location to provide a clear distance of at least 5 inches from butt to edge of pile cap. If clear distance can not be maintained, then notify Contracting Officer. Check each pile for heave. Redrive heaved piles to required point elevation.

3.2.5 Rejected Piles

Withdraw piles damaged or impaired for use during handling or driving, mislocated, or driven out of alignment beyond the maximum tolerance. Replace with new piles or cut-off and abandon damaged or impaired piles and drive new piles as directed. Remove excess cut-off from piles and

unacceptable piles from the work site. Perform all work in connection with withdrawing and removing rejected piles from the site at no additional cost to the Government.

3.2.6 Jetting of Piles

Water jets will not be permitted.

3.2.7 Predrilling of Piles

Predrilling to remove soil or other material representing the bulk of the volume of the pile to be driven **is permitted. The diameter of the hole must not exceed two-thirds the width of the pile. See section 2.1 of this specification for additional information.**

3.2.8 Pile Splices

Splicing of piles is not permitted.

3.2.9 Build-Ups

Where required, pile section may be extended to cut-off elevation by means of a cast-in-place reinforced concrete build-up. Make build-up in accordance with PCI BDM. Construct build-ups made after completion of driving in accordance with detail, "Build-Up Without Driving." Make build-ups to be driven in accordance with detail "Build-Up With Driving." Have details of means for protecting joints by a suitable mortar or epoxy approved by Contracting Officer. Where build-ups are exposed to water, protect cast-in-place section from water during curing period. Concrete in build-up must have a minimum compressive strength of 5,000 psi. Build-ups will not be permitted on more than 10 percent of total number of piles. If this percent figure is exceeded, or if in the judgment of the Contracting Officer, the clustered location of build-ups is undesirable, withdraw piles of insufficient length and replace with longer piles. Payment for such withdrawal and replacement will be made as an adjustment to the contract price.

3.2.10 Pile Cut-Off

Cut-off piles with a smooth level cut using pneumatic tools, sawing, or other suitable methods approved by Contracting Officer. Use of explosives for cutting is not permitted. Remove cut-off sections of piles from the site and off government property upon completion of the work. Maintain prestressing strand at the top of pile as indicated on the drawings to develop full pile design uplift capacity.

3.2.11 Patching

Provide a one inch minimum conical depression around embedded lifting loops. Where indicated or directed, cut off lifting loops at bottom of depression and patch depression with epoxy mortar.

3.2.12 As-Driven Survey

After the driving of each pile group is complete and before concrete is placed, provide the Contracting Officer with an as-driven survey showing actual location and top elevation of each pile. Do not proceed with placing concrete until the Contracting Officer has reviewed the survey and verified the safe load for the pile group driven. Present a survey in

such form that it gives deviation from plan location in two perpendicular directions and elevations of each pile to nearest half inch. Survey must be prepared and certified by a licensed land surveyor.

3.2.13 Pile Shoe

Submit details about pile shoe used, if any. Where indicated or directed, securely attach pile shoes of an approved design to the piles in a manner described in the detail drawings.

3.3 FIELD QUALITY CONTROL

3.3.1 Test Piles and Control Piles

Use test and control piles of type, and drive as specified for piling elsewhere in this section. Order test and control piles 10 feet longer in length than production piles. Drive the additional test pile length only at the direction of the Contracting Officer. The Contractor's Geotechnical Consultant will use test pile data to determine "calculated" pile tip elevation or necessary driving criteria. Drive test piles at the locations indicated. Drive test and control piles to indicated tip elevation. Use test and control piles, if located properly and offering adequate driving resistance in finished work. Provide and operate a pile driving analyzer as specified in paragraph DYNAMIC PILE ANALYSIS during the driving of each test pile. Modify driving as required based upon recommendation of Contractor's Geotechnical Consultant and approval of the Contracting Officer.

3.3.2 Dynamic Pile Analysis

Submit a performance report summarizing dynamic test results for test piles within 7 calendar days of completing field work. For production piles, submit a performance report within one day of testing. Submit a typed report summarizing the results of dynamic testing of production piles on a monthly basis.

Dynamic testing provides supplemental information for evaluating pile integrity, hammer and drive system performance, assess pile installation driving stresses, and pile capacities. Perform dynamic testing on 100 percent of the test and control piles during the full length of the pile driving and during restrike a minimum of 7 days after initial driving. Dynamic pile testing must also be performed on production piles as chosen by the Contracting Officer. Use test and control piles of type as specified elsewhere in this section. Provide equipment to obtain dynamic measurements, record, reduce and display its data that meet the requirement of ASTM D4945. The equipment must have been calibrated within 6 months prior to the start of the testing operations and thereafter throughout the contract duration. **The PDA equipment and sensors must be within the 2 year validity period after its calibration, as recommended by the manufacturer.** Drive test and control piles at the locations indicated or at the locations selected by the Contracting Officer. Employ an independent inspection firm, hereinafter referred to as the "Contractor's Geotechnical Consultant", experienced in the pile driving process, monitoring of test pile installation, and in the use of the Pile Driving Analyzer and its related equipment. Perform dynamic pile analysis as follows:

3.3.2.1 Pile Analysis

Ten (10) working days prior to driving the test and control piles, submit the pile and complete driving equipment data to the Contracting Officer. The Contractor's Geotechnical Consultant must use the submitted information to perform wave equation analyses and must prepare a summary report of the wave equation results. The wave equation analysis using GRLWEAP software by Pile Dynamics, Inc. or equivalent must be used to assess the ability of the proposed driving system to install the pile to the required capacity and desired penetration depth within the allowable driving stresses. Approval of the proposed driving system by the Contracting Officer must be based upon the wave equation analyses indicating that the proposed driving system can develop a pile capacity of 220 kips at a driving resistance not greater than 100 blows per inch within allowable driving stress limits. The hammer must also be sized or adjustable such that the penetration per blow at the required ultimate capacity does not exceed 0.5 inches.

3.3.2.2 Pile Drivability

Perform each dynamic pile analysis in two steps. The first step is to check the hammer, pile and soil performance, and to determine the suitability of the proposed hammer for the size, length and type of pile being installed for the soil types encountered as the piles are driven. This initial monitoring must determine efficiency of the hammer relative to specified efficiency, effectiveness of cushion, level of compressive and tensile stress in pile and extent/location of any pile damage caused by the initial driving. With each blow of the pile, record the information listed below electronically and analyze the information using the Pile Driving Analyzer:

- (1) Blow number
- (2) Blow rate per minute and stroke.
- (3) Input and reflected values of force and velocity.
- (4) Value of upward and downward traveling force wave with time.
- (5) Maximum and final transferred energy to pile, hammer system efficiency.
- (6) Maximum compressive stress, velocity, acceleration and displacement.
- (7) Maximum tensile stress in pile.
- (8) Pile structural integrity, damage detection, extent and location.
- (9) Bearing capacity of pile by Case method.

If the pile, hammer and soil performance evaluation recommends changes to the hammer stroke, pile cushioning, augering or any other aspect for the pile driving operation, incorporate these changes into production pile driving in an effort to control excessive stresses and pile damage. Replace test piles damaged or broken during installation incorporating driving modifications as determined by the Contractor's Geotechnical Consultant and reviewed and approved by the Contracting Officer. Repeat this procedure until allowable tensile and compressive stresses are

achieved in the pile and/or pile damage is minimized. Subject selected initial driving records to rigorous computer analysis by the Case Pile Wave Analysis Program (CAPWAP) for determination of resistance distribution, soil resistance and properties, and estimation of anticipated gain/loss factors.

3.3.2.3 CAPWAP

Signal matching analysis by CAPWAP® software of the dynamic pile testing data must be performed on data obtained from the end of initial driving and the beginning of restrike of all control piles. CAPWAP analyses must be performed by an engineer who has achieved Advanced Level or better on the PDI / PDCA Dynamic Measurement and Analysis Proficiency Test for Providers of PDA Testing Services.

Upon completion of test pile driving, allow the piles to set-up for at least **7 days**. After evaluation of pile, hammer and soil performance by the Contractor's Geotechnical Consultant, the second step of the dynamic pile analysis may proceed. This portion of the evaluation requires striking the set-up piles a minimum of 20-50 times, or as directed by the Contractor's Geotechnical Consultant using the same hammer which was used for the test pile driving and which will be used for production pile driving. "Warm up" the hammer and make it optimally ready prior to restriking, in order to avoid capacity losses during evaluation of restrike data. Apply maximum hammer energy during restrike in order to fully mobilize the soil resistance. However, exercise care so as to not overstress the pile. In addition to those items listed above, selected restrike driving records (as directed by the Contractor's Geotechnical Consultant) are to be subjected to rigorous computer analysis by the Case Pile Wave Analysis Program (CAPWAP) for determination of resistance distribution, soil resistance and properties, and plot of applied load vs. average pile displacement based on the calculated soil properties.

3.3.2.4 Dynamic Load Test Reporting

Upon satisfactory completion of each dynamic load test, submit a Pile Performance Report for the Contractor by the Contractor's Geotechnical Consultant. The submittal must be prepared and sealed by a Professional Engineer registered in any jurisdiction of the U.S. or its territories.

The report for the Dynamic Pile Analysis must contain the following information:

- a. Capacity of pile from Case Pile Wave Analysis Program (CAPWAP). Information resulting from analysis of a selected restrike blow.
- b. Maximum and final transferred energy, hammer system efficiency during pile installation.
- c. Maximum compressive stress, velocity, acceleration and displacement.
- d. Maximum tensile stress in pile.
- e. Pile structural integrity, damage detection, extent and location.
- f. Blows per minute and blow number.
- g. Input and reflection values of force and velocity, upward and downward traveling force wave with time.

- h. Pile skin friction and toe resistance distribution.
- i. Maximum energy transferred to pile.

The maximum allowable pile design load must be proposed by the Contractor's Geotechnical Consultant based upon the results of a satisfactory pile load test conducted on a pile driven as specified herein and must include the effects of load transfer to the soil above the foundation stratum.

Use either a model 8G or PAX Pile Driving Analyzer as manufactured by Pile Dynamics, Inc., of Cleveland Ohio or approved equivalent, for dynamic testing of the pile hammer and for dynamic load testing of the test pile. All equipment necessary for the dynamic monitoring such as sensors, cables or wireless transmitters, etc., must be furnished by the Contractor's Geotechnical Consultant. The equipment must conform to the requirements of ASTM D4945.

Pay for all services of the Contractor's Geotechnical Consultant. The Contractor's Geotechnical Consultant must be available throughout the pile driving operation to consult with the Contracting Officer when required by the Contracting Officer. The cost of changes in the Contractor's procedure, as required by evaluation of the results of the Pile Driving Analysis, will be at the Contractor's expense.

3.3.3 Static Load Tests

Submit test set-up and procedures.

Perform compressive load tests on one test pile in accordance with ASTM D1143/D1143M (standard loading procedure) as modified herein. Allow a minimum of 72 hours following final test pile driving for pile set-up prior to load testing. Provide apparatus for applying vertical loads as required by method, using load from weighted box or platform applied to pile by hydraulic jack. Increase load in increments until rapid progressive settlement takes place or until application of total compressive load of 250% of design load kips for compressive load tests. Consider load test satisfactory when after one hour at full test load gross settlement of pile butt is not greater than gross elastic pile compression plus 0.15 inch plus one percent of pile tip width in inches, slope of gross load-settlement curve under full test load does not exceed 0.05 inches per ton, net settlement after removal of test load does not exceed 3/4 inch. Perform load tests at locations as proposed by the Contractor's Geotechnical Consultant and as directed by the Contracting Officer. Additional load tests, at Government expense, may be required by the Contracting Officer. Perform the loading, testing, and recording and analysis under the direct supervision of a Registered Professional Engineer, registered in the state of project location, and provided and paid for by the Contractor. Submit test pile records and load test data within 7 calendar days of test completion.

3.3.4 Pile Records

Submit pile and test pile records. Submit load test data and results.

Keep a complete and accurate record of each pile driven. Indicate the pile location, deviations from pile location, cross section shape and dimensions, original length, ground elevation, tip elevation, cut-off

elevations, number of blows required for each foot of penetration and number of blows for the last 6 inches penetration or fraction thereof as required for the "calculated" driving resistance. Include in the record the beginning and ending times of each operation during driving of pile, type and size of hammer used, rate of operation, stroke or equivalent stroke for diesel hammer, type of driving helmet, and type and dimension of hammer cushion (capblock) and pile cushion used. Record retap data and unusual occurrences during pile driving such as redriving, heaving, weaving, splicing, obstructions, and any driving interruptions. Install an energy monitor on the hammers and record readings every of pile installation. A preprinted pile driving log for recording pile driving data and pile driving equipment data form, which can be downloaded at: <https://www.wbdg.org/dod/ufgs/forms-graphics-tables>.

3.3.5 Testing Agency Qualifications

Engage an independent testing agency qualified according to ASTM C1077 and ASTM E329 for testing indicated. Submit testing agency qualifications to the Contracting Officer for approval.

3.4 SPECIAL INSPECTION AND TESTING FOR SEISMIC-RESISTING SYSTEMS

Perform special inspections and testing for seismic-resisting systems and components in accordance with Section 01 45 35 SPECIAL INSPECTIONS.

3.5 PRECONSTRUCTION CONDITION SURVEY

Perform preconstruction condition survey of structures and utilities within 200 feet of the pile driving activity. Perform outreach to the owner of the structures 28 days before performing the preconstruction condition survey. The Contractor must obtain written permission from the owner of the structure prior to accessing the structure. The preconstruction condition survey must include video and photographic documentation of the exterior and interior of above ground structures and of the interior of underground structures. Video documentation must be in high definition, and show existing conditions and highlight, where possible, existing cracks, deteriorated concrete, exposed and corroded reinforcement, cracked or broken brick or mortar, and other signs of distress. For utilities, perform the survey when the greatest extent of the interior is exposed. Provide supplementary artificial lighting as needed. The video must include annotation with location and structure nomenclature which describes any areas of distress over the video and time code superimposed on the video. Photographs must be accompanied by sketches or descriptions that indicate the location and direction of each photograph. For each structure surveyed, provide a Pre-Construction Condition Survey Report following completion of the survey. The report must contain all documentation associated with the survey including DVD copies. In the report, include notes, sketches, photographs, and videos. Provide general information, such as location details and structure type, as well as particular information on materials, condition, existing damage, aperture and persistence of cracks, and disrepair observed during visual survey. Provide a graphical depiction of locations of damage or other features of concern. Submit the Preconstruction Condition Survey Reports no later than 28 days before the commencement of pile driving activity. Accept responsibility for damages to existing adjacent or adjoining structures created by pile driving work, and repair any damages to these structures without cost to the Government.

3.6 CONSTRUCTION INSTRUMENTATION AND MONITORING PROGRAM

Prepare a geotechnical instrumentation program to monitor settlement and lateral movement of temporary and permanent structures and utilities during pile driving. The design and distribution of instrumentation must demonstrate an understanding of the need, purpose and application of each proposed type.

Monitoring must extend before, during and for a period after completion of construction activities related to pile driving when long-term performance issues are a concern. The monitoring plan must be designed to protect adjacent structures and utilities against damage due to the pile driving activities. Establish limiting values of vertical and horizontal movement for each structure and utility within the zone of influence, subject to review by the Government.

Prepare a Instrumentation and Monitoring Program Report detailing the proposed program of instrumentation and monitoring, establishing threshold values of monitored parameters, and describing the response plans that will be implemented when threshold parameters are exceeded. The report must include details about instrumentation consultant's experience, appropriate types, quantities, locations and monitoring frequencies of the instruments.

Upon acceptance of the instrumentation and monitoring program, provide, install and monitor the instrumentation and interpret the data. Submit instrumentation data reports not less than every 7 days after the monitoring program has begun. Take corrective actions, as necessary, based on the field instrumentation data and as defined in the instrumentation and monitoring program.

-- End of Section --

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**FURNITURE, FIXTURES & EQUIPMENT (FF&E)
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PREPARED FOR:

**DEPARTMENT OF HOMELAND SECURITY FEDERAL
LAW ENFORCEMENT TRAINING CENTER CUSTOMS & BORDER PATROL**
CS&SP TRAINING FACILITY
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CHARLESTON, SC*

SEPTEMBER 08, 2026

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YOUNG FURNITURE

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www.youngoffice.com



PREPARED BY:



ITEM NAME:

SWITCH MOBILE WHITEBOARDS

MANUFACTURER:

CLARIDGE

PRODUCT NAME OR #:

LCS2034R

DIMENSIONS:

36" (W) x 24" (D) x 60" (H)

PRODUCT DESCRIPTION:

- PROJECTION FRIENDLY
- ACCEPTS MAGNETIC ACCESSORIES
- GHOST / STAIN RESISTANT
- SCS INDOOR ADVANTAGE CERTIFIED, ECO-FRIENDLY, AND EMITS NO VOC'S
- LIFETIME WARRANTY
- ABILITY TO STACK (NEST) AND STORE PIECES INTO A SMALL FOOTPRINT.
- MOBILE ROLLING WHITEBOARD ON CASTERS. (2) LOCKING AND (2) NON-LOCKING HUBLESS CASTERS



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

TRIM MATTE FINISH COLORS: BLACK

FABRIC:

N/A

ITEM NAME:

TASK SEATING

MANUFACTURER:

VIA SEATING

PRODUCT NAME OR #:

GENIE 24/7

DIMENSIONS:

26" (W) x 17.5" (D) x 42.5" (H)

PRODUCT DESCRIPTION:

- ERGONOMIC BACK SHAPE: LAMP-SHAPED FRAME NARROWS AT THE TOP TO ENHANCE UPPER BODY MOBILITY AND THORACIC MOVEMENT.
- ADAPATIVE MESH SUPPORT: 4-WAY STRETCH ELASTOMERIC MESH FLEXED, BREATHABLE, COPPER-INFUSED MESH WITH NATURAL, ADDITIVE-FREE SELF SANITIZING PROPERTIES
- PRECISION IN MOTION: QUICK ADJUST SYNCHRO WITH SEAT DEPTH ADJUSTMENT, FORWARD TILT, 5-POSITION TILT LIMITER, BACK TENSION AND HEIGHT ADJUSTMENT
- BIFMA COMPLIANT
- WEIGHT CAPACITY: 300-400 LBS
- 12-YEAR WARRANTY
- *PROVIDE ARMS

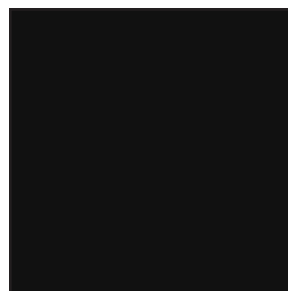
FINISH:

FRAME FINISH: MATTE BLACK (B)

CASTERS/GLIDES: BLACK CARPET CASTERS (16HP)



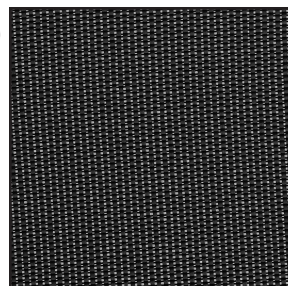
IMAGE USED FOR REFERENCE USE ONLY



FRAME FINISH:
MATTE BLACK (B)

FABRIC:

COPPER MESH COLOR: BLACK COPPER (11RE)



COPPER MESH COLOR:
BLACK COPPER (11RE)

ITEM NAME:

NESTING SEATING

MANUFACTURER:

VIA SEATING

PRODUCT NAME OR #:

RESET

DIMENSIONS:

26.5" (W) x 18" (D) x 34.5 (H)

PRODUCT DESCRIPTION:

- NESTING CHAIR TO LIGHT-WEIGHT TASK CHAIR.
- 4-WAY STRETCH ELASTOMERIC MESH BACK PROVIDEES 22° FLEX, PROVIDING ADAPTIVE SUPPORT
- ENHANCE COMFORT AND SUPPORT
- *PROVIDE ARMLESS
- BIFMA COMPLIANT
- WEIGHT CAPACITY: 300 LBS
- 12-YEAR WARRANTY



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

FRAME FINISH: MATTE BLACK (B)

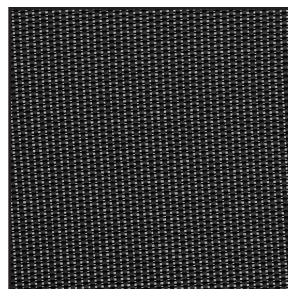
CASTERS/GLIDES: BLACK CARPET
CASTERS (16HP)



FRAME FINISH:
MATTE BLACK (B)

FABRIC:

COPPER MESH COLOR: BLACK COPPER (11RE)



COPPER MESH COLOR:
BLACK COPPER (11RE)

ITEM NAME:

MULTIPURPOSE SEATING

MANUFACTURER:

SIT-ON-IT

PRODUCT NAME OR #:

LUMIN

DIMENSIONS:

21.3" (W) x 22.1" (D) x 32.9" (H)

PRODUCT DESCRIPTION:

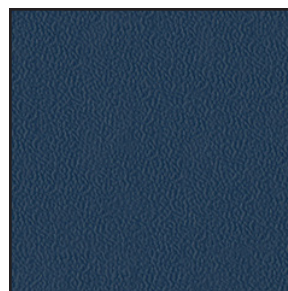
- 4-LEG AND WIRE ROD CHAIR
- PLASTIC SHELL (SEAT/BACK)
- ARMLESS
- BUILT-IN PULL HANDLE
- STACKABLE CHAIR
- 300 LB WEIGHT CAPACITY
- LIFETIME WARRANTY
- GSA APPROVED



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

FRAME FINISH: NAVY



FABRIC:

N/A

ITEM NAME:

TASK SEATING

MANUFACTURER:

CRAMER

PRODUCT NAME OR #:

FUSION

DIMENSIONS:

29" - 32" (H) - DESK HEIGHT

PRODUCT DESCRIPTION:

- HEAVY-DUTY STEEL SEAT FOR MULTI-SHIFT DURABILITY.
- CONTOURED MOLDED SEAT WITH WATERFALL EDGE ENSURES 24-HOUR COMFORT.
- DYNAMIC RANGE OF ADJUSTMENTS SUPPORT THE FULL RANGE OF SEATED POSTURES FROM ACTIVE FORWARD-LEANING TO RECLINE.
- SUPPORTS UP TO 350 LBS
- 10-YEAR, THREE SHIFT WARRANTY
- SCS INDOOR ADVANTAGE GOLD CERTIFICATION.
- 3-1/2" MOLDED FOAM SEAT
- 26.75" FIBERGLASS-REINFORCED NYLON BASE



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

FRAME FINISH: NYLON, BLACK BASE

FABRIC:

COLOR: BLACK



ITEM NAME:

LOCK ROOM BENCH

MANUFACTURER:

GLOBAL INDUSTRIAL

PRODUCT NAME OR #:

WB183670

DIMENSIONS:

72" (W) x 9-1/2 (D) x 17" (H)

PRODUCT DESCRIPTION:

- 1-1/4" (THK) MAPLE HARDWOOD WITH VARISHED CLEAR TOP FOR SPLINTER-FREE SITTING.
- BENCH MUST BE MOUNTED N HEAVY STEEL PEDESTALS (GRAY ENAMEL FINISH).
- MUST BE ANCHORED TO FLOOR FOR MAXIMUM STABILITY.
- 1-YEAR WARRANTY
- 350 LBS WEIGHT CAPACITY.



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

N/A

FABRIC:

N/A

ITEM NAME:

LOCKER ROOM BENCH

MANUFACTURER:

GLOBAL INDUSTRIAL

PRODUCT NAME OR #:

WB493701

DIMENSIONS:

48" (W) x 9-1/2 (D) x 17" (H)

PRODUCT DESCRIPTION:

- 1-1/4" (THK) MAPLE HARDWOOD WITH VARISHED CLEAR TOP FOR SPLINTER-FREE SITTING.
- BENCH MUST BE MOUNTED N HEAVY STEEL PEDESTALS (GRAY ENAMEL FINISH).
- MUST BE ANCHORED TO FLOOR FOR MAXIMUM STABILITY.
- 1-YEAR WARRANTY
- 350 LBS WEIGHT CAPACITY.



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

N/A

FABRIC:

N/A

ITEM NAME:

ADA LOCKER ROOM BENCH

MANUFACTURER:

GLOBAL INDUSTRIAL

PRODUCT NAME OR #:

LUMIN

DIMENSIONS:

42" (W) x 20" (D) x 37-1/4" (H)

PRODUCT DESCRIPTION:

- ADA COMPLIANT LOCKER ROOM BENCH, EXCEPTIONALLY STRONG AND DURABLE, PROVIDING BACK SUPPORT AND COMFORT.
- 1-1/4" (THK) MAPLE HARDWOOD WITH VARISHED CLEAR TOP FOR SPLINTER-FREE SITTING.
- 18" (H) BACK.
- ALMOND PEDESTALS ARE MADE OF HEAVY DUTY STEEL TUBING WITH TOP AND BOTTOM BELL FLANGES FOR ATTACHMENT AND PLACEMENT.
- 2-YEAR WARRANTY



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

N/A

FABRIC:

N/A

ITEM NAME:

COFFEE MAKER

MANUFACTURER:

BUNN

PRODUCT NAME OR #:

AXIOM 15-3 38700.0002

DIMENSIONS:

16.3" (W) x 22.1" (D) x 16.8" (H)

PRODUCT DESCRIPTION:

- AUTOMATIC WARMER SHUT-OFF
- PROP 65 WARNING DECAL INCLUDED IN PACKAGING WITH EQUIPMENT
- COFFEE EXTRACTION CONTROLLED WITH PROGRAMMABLE PRE-INFUSION, PULSE BREW AND DIGITAL TEMPERATURE PRECISION.
- HOT WATER FAUCET
- (3) LOWER WARMERS
- ELECTRONIC DIAGNOSTICS AND BUILT-IN TANK DRAIN MAKING SERVICE EASIER
- SPLASHGARD FUNNEL DEFLECTS HOT LIQUID AWAY FROM THE HAND
- ENERGY-SAVER MODE REDUCES TANK TEMPERATURE DURING IDLE PERIOD
- PROGRAMMING BREW LEVEL
- 120V, 15 AMP, 180 WATTS

FINISH:

STAINLESS STEEL

FABRIC:

N/A



IMAGE USED FOR REFERENCE USE ONLY

ITEM NAME:

UNDERCOUNTER ICE MACHINE

MANUFACTURER:

MANITOWOC

PRODUCT NAME OR #:

UNP0200A

DIMENSIONS:

96" (W) x 66" (D) x 30" (H)

PRODUCT DESCRIPTION:

- 115V/60/1 ICE MACHINES ARE FACTORY PRE-WIRED WITH A 6'-0" POWER CORD WITH NO PLUG.
- BITE-SIZE NUGGET ICE
- UP TO 330 LBS DAILY NUGGET ICE PRODUCTION
- UP TO 50 LBS ICE STORAGE CAPACITY
- HIGH LOAD CAPACITY BEARINGS FOR ENHANCED RELIABILITY
- R290 REFRIGERANT IS ENVIRONMENTALLY FRIENDLY WITH LESS OZONE DEPLETION COMPARED TO R404.
- EASY ACCESS DOOR, SLIDES UP AND OUT OF THE WAY

FINISH:

STAINLESS STEEL

FABRIC:

N/A



IMAGE USED FOR REFERENCE USE ONLY

ITEM NAME:

COUNTERTOP MICROWAVE

MANUFACTURER:

PANASONIC

PRODUCT NAME OR #:

NN-SD987SATH

DIMENSIONS:

23-7/8" (W) x 20" (D) x 14" (H)

PRODUCT DESCRIPTION:

- 2.2 Cu. FT CAPACITY
- 1,250-WATT COUNTERTOP MICROWAVE OVEN WITH INVERTER TECHNOLOGY
- 16-1/2" TURNTABLE
- 120V / 12.7AMPS
- 1-YEAR WARRANTY (PARTS)
- 1-YEAR WARRANTY (LABOR)



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

STAINLESS STEEL

FABRIC:

N/A

ITEM NAME:

UNDERCOUNTER REFRIGERATOR

MANUFACTURER:

SUMMIT APPLIANCES

PRODUCT NAME OR #:

FF1843BCSSADA

DIMENSIONS:

17-3/4" (W) x 24" (D) x 31-1/2" (H)

PRODUCT DESCRIPTION:

- 2.7 Cu. FT CAPACITY
- DEFROST TYPE: AUTOMATIC
- 1.1 AMPS
- 115V AC/60 Hz VOLTAGE / FREQUENCY
- 1-YEAR PARTS & LABOR WARRANTY
- 5-YEAR COMPRESSOR WARRANTY



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

STAINLESS STEEL

FABRIC:

N/A

ITEM NAME:

DISHWASHER

MANUFACTURER:

GE APPLIANCES

PRODUCT NAME OR #:

GDF630PSMSS

DIMENSIONS:

23-3/4" (W) x 24" (D) x 34" (H)

PRODUCT DESCRIPTION:

- ENERGY STAR QUALIFIED
- 1-YEAR PARTS & LABOR WARRANTY
- 1-YEAR LIMITED WARRANTY
- 120V / 60Hz / 7.1AMPS
- BUILT-IN 3RD RACK
- DRY BOOST
- 4 BOTTLE WASH JETS
- WASH ZONES PROVIDE HALF-LOAD IN THE UPPER AND LOWER RACKS



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

STAINLESS STEEL

FABRIC:

N/A

ITEM REVISED

RFP ITEM DISCONTINUED

ITEM NAME:

REFRIGERATOR

MANUFACTURER:

GE APPLIANCES

PRODUCT NAME OR #:

GTE21GTHSS

DIMENSIONS:

32.875" (W) x 34" (D) x 66.75" (H)

PRODUCT DESCRIPTION:

- 21.1 Cu. FT CAPACITY
- TOP-FREEZER REFRIGERATOR
- ENERGY STAR QUALIFIED
- UPFRONT TEMPERATURE CONTROLS - EASY-TO-USE CONTROLS REGULATES BOTH FRESH FOOD AND FREEZER SECTIONS
- ADJUSTABLE SPILL-RESISTANT GLASS SHELVES
- ADJUSTABLE HUMIDITY DRAWERS
- LARGE DOOR BINS
- WIRE FREEZER SHELVES
- SPILL PROOF FREEZER FLOOR
- ADA COMPLIANT



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

STAINLESS STEEL

FABRIC:

N/A

ITEM NAME:

INDUSTRIAL SHELVING

MANUFACTURER:

LYON

PRODUCT NAME OR #:

DDJDP3149

DIMENSIONS:

48" (W) x 18" (D) x 85" (H)

PRODUCT DESCRIPTION:

- IDEAL FOR GENERAL STORAGE, TOOLS, SUPPLIES AND MORE.
- CLOSED DESIGN ENCLOSURES ITEMS FOR ADDED SECURITY AND PROTECTION.
- DURABLE 14-GAUGE STEEL UPRIGHTS AND 24-GAUGE STEEL PANELS.
- EASY TO ADJUST SHELF HEIGHT FOR OPTIMAL STORAGE
- UNASSEMBLED FOR DIY SETUP, REQUIRES PROPER ANCHORING.
- LIFETIME LIMITED WARRANTY
- INCLUDES (5) SHELVES
- 500 ILBS CAPACITY PER LEVEL

FINISH:

DD, DOVE GREY

FABRIC:

N/A



IMAGE USED FOR REFERENCE USE ONLY



ITEM NAME:

INDUSTRIAL SHELVING

MANUFACTURER:

LYON

PRODUCT NAME OR #:

DDJDP3149

DIMENSIONS:

36" (W) x 18" (D) x 85" (H)

PRODUCT DESCRIPTION:

- IDEAL FOR GENERAL STORAGE, TOOLS, SUPPLIES AND MORE.
- CLOSED DESIGN ENCLOSURES ITEMS FOR ADDED SECURITY AND PROTECTION.
- DURABLE 14-GAUGE STEEL UPRIGHTS AND 24-GAUGE STEEL PANELS.
- EASY TO ADJUST SHELF HEIGHT FOR OPTIMAL STORAGE
- UNASSEMBLED FOR DIY SETUP, REQUIRES PROPER ANCHORING.
- LIFETIME LIMITED WARRANTY
- INCLUDES (5) SHELVES
- 500 ILBS CAPACITY PER LEVEL

FINISH:

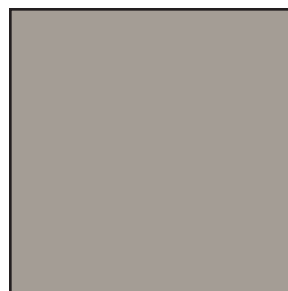
DD, DOVE GREY

FABRIC:

N/A



IMAGE USED FOR REFERENCE USE ONLY



ITEM NAME:

INDUSTRIAL STORAGE CABINET

MANUFACTURER:

LYON

PRODUCT NAME OR #:

AWC SHELF

DIMENSIONS:

36" (W) x 21" (D) x 64" (H)

PRODUCT DESCRIPTION:

- HEAVY-DUTY 14-GAUGE STEEL CONSTRUCTION, WELDED FRAME, AND STRONG HINGES.
- HOLDS HEAVY LOADS UP TO 1,450 LBS PER SHELF.
- EASILY ADJUSTABLE SHELF HEIGHT FOR VARIOUS STORAGE NEEDS.
- 4-INCH LEGS FOR EASY MOVEMENT FOR FORKLIFT.
- IDEAL FOR WAREHOUSES, WORKSHOPS, AND VARIOUS INDUSTRIAL SETTINGS.
- LIFETIME LIMITED WARRANTY.
- MADE IN THE USA.

FINISH:

DD, DOVE GREY

FABRIC:

N/A



IMAGE USED FOR REFERENCE USE ONLY



ITEM NAME:

TRAINING TABLE

MANUFACTURER:

NUCRAFT

PRODUCT NAME OR #:

FLEET

DIMENSIONS:

60" (W) x 24" (D) x 26-1/2" (H)

PRODUCT DESCRIPTION:

- C-LEG DESIGN STYLE
- EDGE-MOUNT: ALLOWS USERS TO BE SEATED ALONG THE LONG SIDES OF THE TABLE AND PROVIDES MAXIMUM LEG SPACE.
- TABLES ARE STANDARD WITH (4) LOCKING CASTERS
- THE VERTICAL SECTION OF EACH LEG INCLUDES A WIRE MANAGEMENT CHANNEL ALONG THE INSIDE SURFACE. A REMOVABLE CAP HIDES CABLES RUNNING FROM THE FLOOR.
- PROVIDE MODESTY PANEL (HINGED) ALLOWING IT TO SWIVEL WHEN THE TOP IS FLIPPED UP.
- TABLES ARE ABLE TO BE NESTED, PROVIDE GANGING CONNECTORS FOR GANGING END-TO-END

FINISH:

LAMINATE: WOODGRAIN (FORMICA), 8842-58, WEATHERED ASH

- PROVIDE 3MM PVC EDGE-BANDING

BASE FINISH: ANODIZED ALUMINUM

CASTER: BLACK

FABRIC:

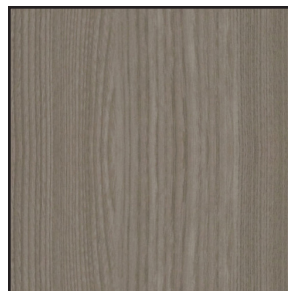
N/A



IMAGE USED FOR REFERENCE USE ONLY

POWER MATRIX CAN BE PROVIDED:

- POWER + AV CONNECTIVITY OPTIONS.
- (4) STANDARD SIZES EQUIPPED WITH:
- (2) AMP USB CHARGERS, (1 AMP PER PORT)



ITEM NAME:

INSPECTION WORKBENCH

MANUFACTURER:

LYON

PRODUCT NAME OR #:

DD232504A

DIMENSIONS:

72" (W) x 30" (D)

PRODUCT DESCRIPTION:

- HEIGHT ADJUSTABLE WORKBENCH w/ PAINTED STEEL TOP
- CONSTRUCTED WITH HEAVY-DUTY STEEL FRAME & ROBUST STEEL WORKTOP FOR MAXIMUM STRENGTH AND STABILITY.
- OPEN PANEL LEGS ARE JOINED TOGETHER WITH A STRINGER.
- ADJUSTABLE LEGS FOR CUSTOMIZATION TO SUIT INDIVIDUAL USER PREFERENCES AND TASK REQUIREMENTS.
- HOLDS UP TO 1,700 LBS.
- 1-YEAR WARRANTY



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

N/A

FABRIC:

N/A

ITEM NAME:

BREAKROOM TABLE

MANUFACTURER:

STEELCASE (COALESSE)

PRODUCT NAME OR #:

ENEA LOTUS

DIMENSIONS:

42" (W) x 30" (D) x 30" (H)

PRODUCT DESCRIPTION:

- ANSI / BIMFA COMPLIANT
- SCS INDOOR ADVANTAGE GOLD CERTIFIED
- LIMITED LIFETIME WARRANTY
- RECTANGLE STANDARD HEIGHT TABLE
- LAMINATE SOFT SQUARE TOP w/ 1/2" (THK) PHENOLIC CORE.
- GLIDES SHALL BE NON-SKID.

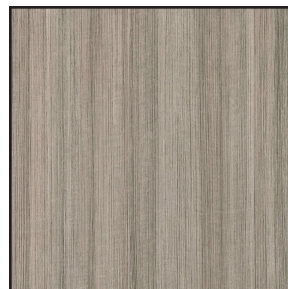


IMAGE USED FOR REFERENCE USE ONLY

FINISH:

LAMINATE: VERANDA TEAK, 2TH5

BASE FINISH: TEXTURED, WHITE (7241)



FABRIC:

N/A

ITEM NAME:

INSPECTION WORKBENCH

MANUFACTURER:

LYON

PRODUCT NAME OR #:

DD232502A

DIMENSIONS:

60" (W) x 30" (D)

PRODUCT DESCRIPTION:

- HEIGHT ADJUSTABLE WORKBENCH w/ PAINTED STEEL TOP
- CONSTRUCTED WITH HEAVY-DUTY STEEL FRAME & ROBUST STEEL WORKTOP FOR MAXIMUM STRENGTH AND STABILITY.
- OPEN PANEL LEGS ARE JOINED TOGETHER WITH A STRINGER.
- ADJUSTABLE LEGS FOR CUSTOMIZATION TO SUIT INDIVIDUAL USER PREFERENCES AND TASK REQUIREMENTS.
- HOLDS UP TO 1,700 LBS.
- 1-YEAR WARRANTY



IMAGE USED FOR REFERENCE USE ONLY

FINISH:

N/A

FABRIC:

N/A

ITEM NAME:

CONFERENCE TABLE

MANUFACTURER:

JSI FURNITURE

PRODUCT NAME OR #:

DD232502A

DIMENSIONS:

72" (W) x 36" (D) x 30" (H)

PRODUCT DESCRIPTION:

- RECTANGLE CONFERENCE TABLE
- OPEN METAL BASE
- (2) UNDER MOUNTED POWER UNITS;
INCLUDING FOUR POWER RECEPTAVLES AND
(3) TELECOM PLATES
- WIRE MANAGEMENT UNDER THE TABLE TOP
WITH THE WIRES RUNNING DOWN THE LEG
OF THE METAL BASE CONCEALED WITH A
MAGNETICALLY ATTACHED COVER.
- ANSI / BIFMA COMPLIANT
- GREENGUARD CERTIFIED
- LIFETIME WARRANTY
- REVERSED BEVEL (E1) - LAMINATE TOP

FINISH:

LAMINATE: WALNUT HEIGHTS

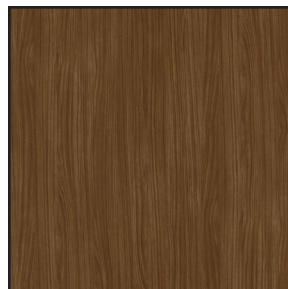
BASE FINISH: BLACK

FABRIC:

N/A



IMAGE USED FOR REFERENCE USE ONLY



(SID) FINISH PACKAGE

FEDERAL LAW ENFORCEMENT TRAINING CENTERS

FLETC



**US Army Corps
of Engineers®**



PREPARED FOR:

**DEPARTMENT OF HOMELAND SECURITY FEDERAL
LAW ENFORCEMENT TRAINING CENTER CUSTOMS & BORDER PATROL
TRADE & CARGO ACADEMY
&
CS&SP TRAINING FACILITY**

*2000 BAINBRIDGE AVENUE,
CHARLESTON, SC*

SEPTEMBER 08, 2026

PREPARED BY:



STV ARCHITECTS, INC.

205 W. WEST DRIVE,
DOUGLASSVILLE PA, 19518

MAIN LOBBY

TYPICAL LOBBY & RECEPTION AREAS

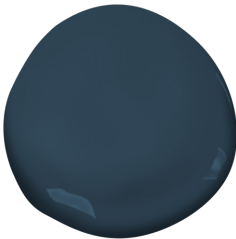


RENDERED VIEW - MAIN LOBBY

DRAWING NOT TO SCALE - FOR PRESENTATION PURPOSES ONLY



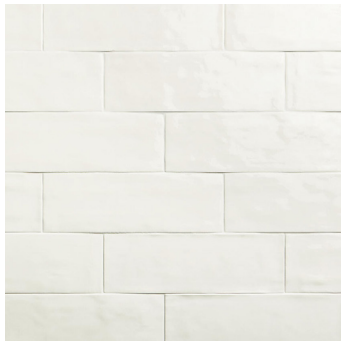
PAINT (PNT-1)



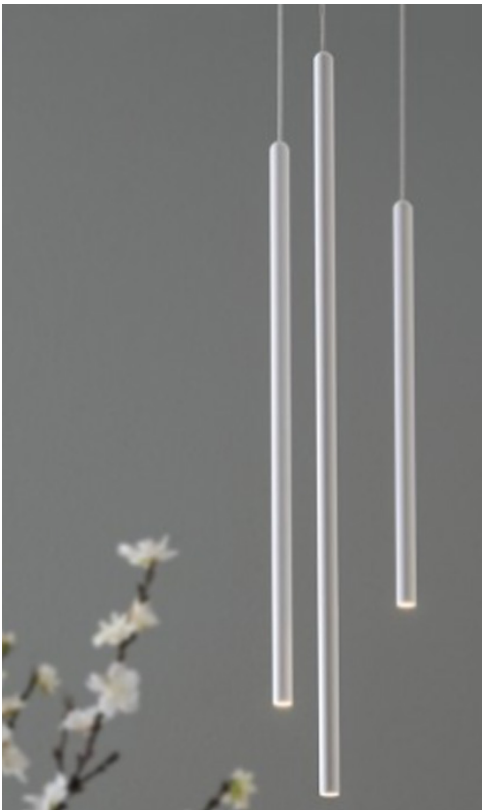
ACCENT PAINT (PNT-2)



TILE FLOORING (T-1, T-2)



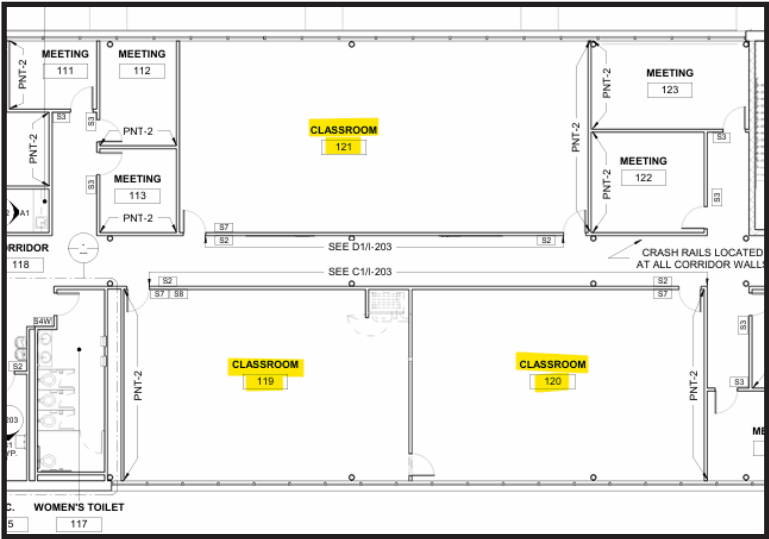
TILE WALL (T-3))



DECORATIVE LIGHTING

CLASSROOMS, MEETING, & ASSEMBLY ROOM

TYPICAL FINISHES - CORRIDOR ACCENT COLORS THROUGHOUT FLETC



PLAN VIEW - TYPICAL CLASSROOM

DRAWING NOT TO SCALE - FOR PRESENTATION PURPOSES ONLY

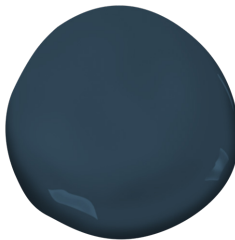
CORRIDOR ACCENT COLORS



CARPET TILE (CPT-3)



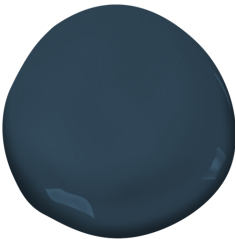
PAINT (PNT-1)



ACCENT PAINT (PNT-2)



PAINT (PNT-1)



ACCENT PAINT (PNT-2)



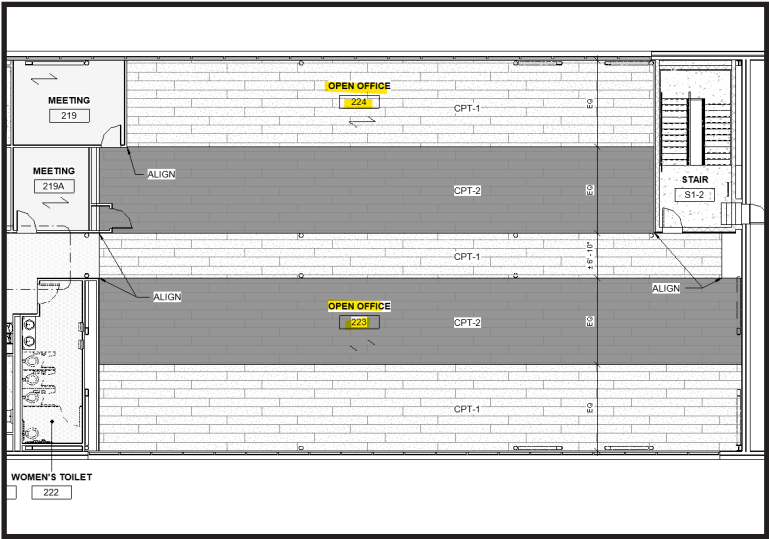
ACCENT PAINT (PNT-3)



ACCENT PAINT (PNT-4)

LARGE OPEN OFFICE

TYPICAL FINISHES - CORRIDOR ACCENT COLORS THROUGHOUT FLETC

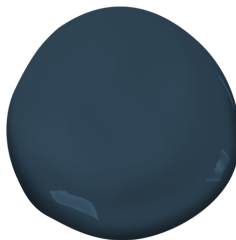


PLAN VIEW - TYPICAL LARGE OPEN OFFICE

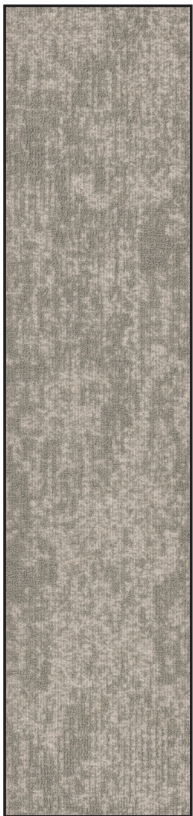
DRAWING NOT TO SCALE - FOR PRESENTATION PURPOSES ONLY



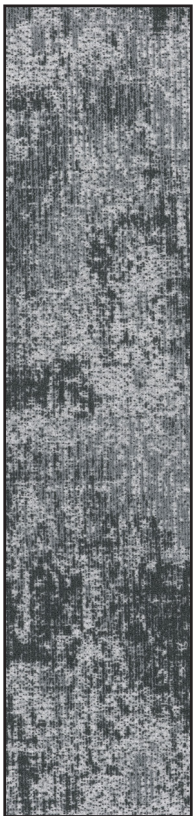
PAINT (PNT-1)



ACCENT PAINT (PNT-2)



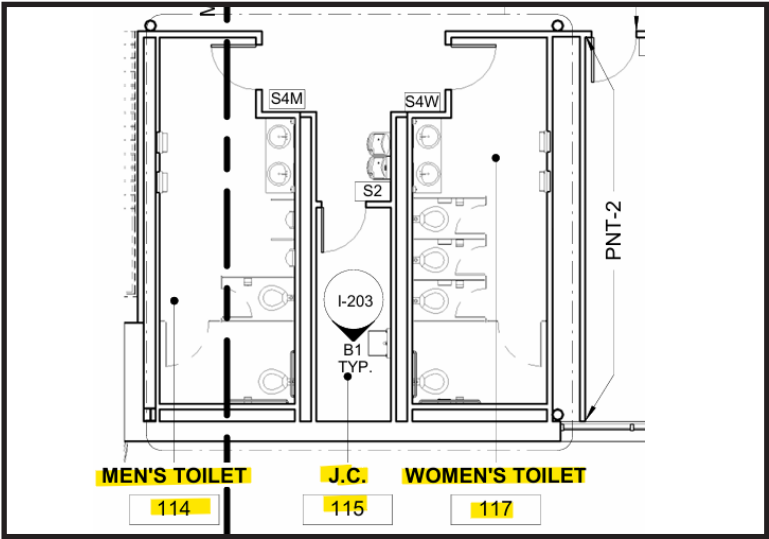
CARPET TILE (CPT-1)



CARPET TILE (CPT-2)

RESTROOM FINISHES

TYPICAL TCA & CSSPTF FACILITY RESTROOM FINISHES



PLAN VIEW - TYPICAL RESTROOM

DRAWING NOT TO SCALE - FOR PRESENTATION PURPOSES ONLY



PAINT (PNT-1)



SOLID SURFACE (SS-1)



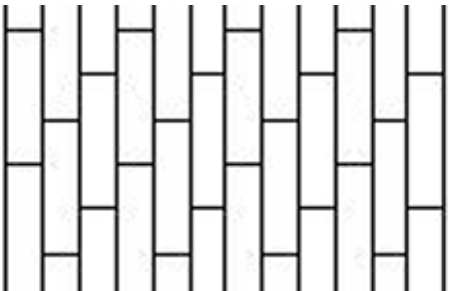
TILE FLOORING (T-1, T-2)



PLASTIC LAMINATE (PLAM-1)



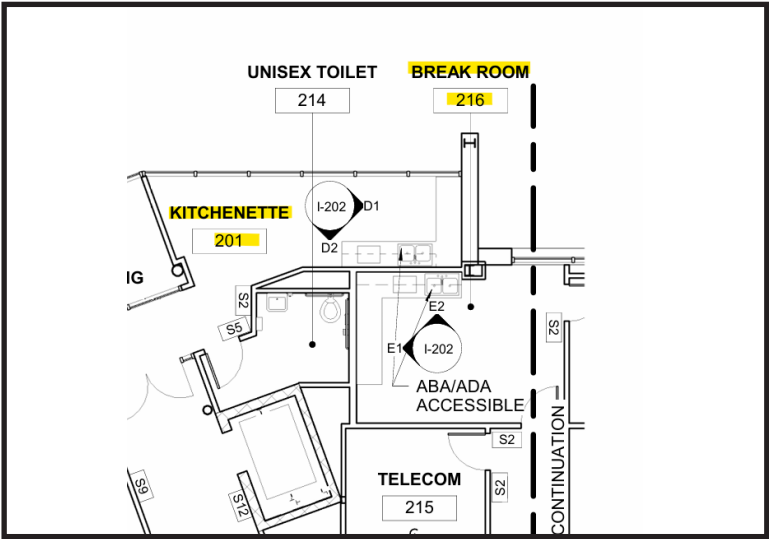
TOILET PARTITION (TP-1)



WALL TILE INSTALLATION

BREAKROOM/KITCHENETTE FINISHES

TYPICAL TCA & CSSPTF FACILITY BREAKROOM FINISHES

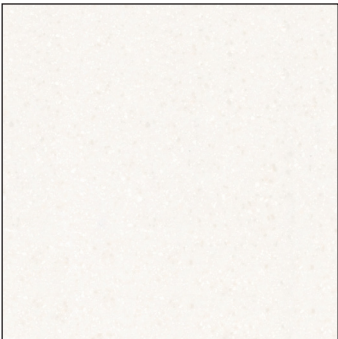


PLAN VIEW - TYPICAL BREAKROOM & KITCHENETTE

DRAWING NOT TO SCALE - FOR PRESENTATION PURPOSES ONLY



PAINT (PNT-1)



SOLID SURFACE (SS-1)



MILLWORK
CABINETS

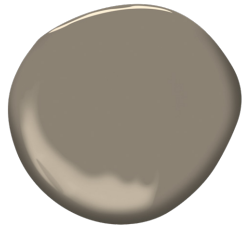
PLASTIC LAMINATE (PLAM-1)



LUXURY VINYL TILE (LVT-1)

GENERAL FINISHES

TYPICAL TCA & CSSPTF FACILITY FINISHES



PAINT (COLUMN & DOOR FRAMES), TYP.



ACOUSTICAL CEILING TILE (ACT-1)



CORNER GUARD (CG-1)



WINDOW SILL

SOLID SURFACE (SS-2)



ENTRANCE MAT
