



**Roads & Pavements IDIQ Contract
US Naval Academy Complex
&
Areas of Responsibility
Annapolis MD**



**Specification Prepared by:
Facilities Engineering & Acquisition Division
Public Works Department, U.S. Naval Academy**

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DEPARTMENT OF THE NAVY
UNITED STATES NAVAL ACADEMY
NAVAL FACILITIES ENGINEERING COMMAND

SPECIFICATION NO:
21-09-0503
CONTRACT NO:
N40080-09-R-0503

**ROADS AND PAVEMENTS
INDEFINITE QUANTITY
(IDIQ)
CONTRACT**

UNITED STATES NAVAL ACADEMY COMPLEX
&
AREAS OF RESPONSIBILITY

ANNAPOLIS, MARYLAND

SPECIFICATION PREPARED BY:

PUBLIC WORKS DEPARTMENT
UNITED STATES NAVAL ACADEMY
ANNAPOLIS, MARYLAND

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PART 1

BID SCHEDULE FOR INDEFINITE QUANTITY WORK (SEE SEPARATE SPREADSHEET)

PART 2

GOVERNMENT ESTIMATE OF QUANTITIES

(OMITTED)

PART 3

DESCRIPTION OF LINE ITEMS

PART 03**DESCRIPTION OF LINE ITEMS****MAJOR ITEMS OF WORK**

The following are major items of work to be performed under this contract and this list is not intended to be a complete listing of every item of work required. In some cases and as mutually agreed, equivalent line items may be used to address items not specifically addressed in this list. Material substitutions are not authorized unless specifically approved by the Contracting Officer.

0001 BITUMINOUS PAVING SURFACE COURSE, UP TO 50 TN

Provide all materials, labor, and equipment to install bituminous surface course and tack coat in accordance with Section 32 12 10 and Section 32 10 00, Bituminous Concrete Paving, Type SC or SF and Bituminous Tack and Prime Coats. Provide surface course from 1" to 3" thick for delivery orders that have a total quantity of less than 50 tons. All pavement roadwork includes traffic control in accordance with Section 01 50 00, Temporary Construction Facilities and Controls. Work includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations.

0002 BITUMINOUS PAVING SURFACE COURSE, OVER 50 TN

Provide all materials, labor, and equipment to install bituminous surface course and tack coat in accordance with Section 32 12 10 and Section 32 10 00, Bituminous Concrete Paving, Type SC or SF and Bituminous Tack and Prime Coats. Provide surface course from 1" to 3" thick for delivery orders that have a total quantity of more than 50 tons. Work includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations per Section 01 50 00, Temporary Construction Facilities and Controls.

0003 BITUMINOUS PAVING BASE COURSE, UP TO 50 TN

Provide all materials, labor, and equipment to install bituminous base course in accordance with Section 32 10 00, Bituminous Concrete Paving, Type BC or BF. Provide base course from 2" to 4" thick for delivery orders that have a total quantity of less than 50 tons. Work includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations per Section 01 50 00, Temporary Construction Facilities and Controls.

0004 BITUMINOUS PAVING BASE COURSE, OVER 50 TN

Provide all materials, labor, and equipment to install bituminous base course in accordance with Section 32 10 00, Bituminous Concrete Paving, Type BC or BF. Provide base course from 2" to 4" thick for delivery orders that have a total quantity of more than 50 tons. Work includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations per Section 01 50 00, Temporary Construction Facilities and Controls.

0005 COLD MILLING, UP TO 1000 SY

Provide all labor and equipment to cold mill and dispose of existing pavement in accordance with Section 32 01 16.17, Cold Milling of Bituminous Pavement. Mill depth is up to 3". Use for delivery orders with total quantity of less than 1000 SY. Work includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations per Section 01 50 00, Temporary Construction Facilities and Controls.

0006 COLD MILLING, OVER 1000 SY

Provide all labor and equipment to cold mill and dispose of existing pavement in accordance with Section 32 01 16.17, Cold Milling of Bituminous Pavement. Mill depth is up to 3". Use for delivery orders with total quantity of more than 1000 SY. Work includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations per Section 01 50 00, Temporary Construction Facilities and Controls.

- 0007 BITUMINOUS PAVEMENT SLURRY SEAL, UP TO 1000 SY**
Provide all materials, labor, and equipment to install bituminous pavement slurry seal in accordance with Section 32 10 00, Bituminous Slurry Seal Coat. Use for individual areas less than 1000 SY. Work includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations per Section 01 50 00, Temporary Construction Facilities and Controls.
- 0008 BITUMINOUS PAVEMENT SLURRY SEAL, OVER 1000 SY**
Provide all materials, labor, and equipment to install bituminous pavement slurry seal in accordance with Section 32 10 00, Bituminous Slurry Seal Coat. Use for individual areas more than 1000 SY. Work includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations per Section 01 50 00, Temporary Construction Facilities and Controls.
- 0009 BITUMINOUS PAVEMENT CHIP SEAL, UP TO 1000 SY**
Provide all materials, labor, and equipment to install bituminous pavement chip seal in accordance with Section 32 01 17.16, Sealing of Cracks in Bituminous Pavements. Use for individual areas less than 1000 SY. Work includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations per Section 01 50 00, Temporary Construction Facilities and Controls. Chip seal information is available at www.pavementrecycling.com.
- 0010 BITUMINOUS PAVEMENT CHIP SEAL, OVER 1000 SY**
Provide all materials, labor, and equipment to install bituminous pavement chip seal in accordance with Section 32 01 17.16, Sealing of Cracks in Bituminous Pavements. Use for individual areas more than 1000 SY. Work includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations per Section 01 50 00, Temporary Construction Facilities and Controls. Chip seal information is available at www.pavementrecycling.com.
- 0011 PAVING FABRIC**
Provide and install paving fabric in accordance with Section 32 10 00, Bituminous Concrete Paving.
- 0012 BITUMINOUS CURB**
Provide all materials, labor, and equipment to install bituminous curb, straight or radius, in accordance with Section 32 10 00, Bituminous Concrete Paving, Type BC or BF. See Drawing 05.
- 0013 BITUMINOUS SPEED BUMP, NARROW**
Provide all materials, labor, and equipment to install bituminous based speed bump in accordance with Section 32 10 00. See Drawing 15. Use for speed bumps 24 to 36 inches wide.
- 0014 BITUMINOUS SPEED BUMP, WIDE**
Provide all materials, labor, and equipment to install bituminous based speed bump in accordance with Section 32 10 00. See Drawing 15. Use for speed bumps 60 to 72 inches wide.
- 0015 BITUMINOUS PATCH/PAVE, VARIOUS AREAS**
Provide all materials, labor, and equipment to remove deteriorated asphalt in accordance with Section 02 41 00, Demolition, prepare surface, apply tack coat, and install bituminous base and surface course in accordance with Section 32 10 00, Bituminous Concrete Paving, for individual areas greater than 25 SF and less than 1000 SF. Does not include saw cutting. Work

includes assignment of designated flagmen, cones and/or signage for traffic control during road construction operations per Section 01 50 00, Temporary Construction Facilities and Controls.

0016 POT HOLE REPAIR, HOT MIX

Provide all materials, labor, and equipment to remove deteriorated asphalt in accordance with Section 02 41 00, Demolition, prepare surface, and install bituminous base and/or surface course in accordance with Section 32 10 00, Bituminous Concrete Paving, for individual areas less than 25 SF. Does not include saw cutting.

0017 POT HOLE REPAIR, COLD PATCH

Provide all materials, labor, and equipment to remove deteriorated asphalt in accordance with Section 02 41 00, Demolition, prepare surface, and install bituminous cold patch pavement for individual areas less than 25 SF. Does not include saw cutting.

0018 SEAL CRACKS & JOINTS

Prepare, clean and seal cracks in asphalt pavement in accordance with Section 32 01 17.16, Sealing of Cracks in Bituminous Pavement.

0019 SIDEWALKS, 4" THICK

Provide all materials, labor, and equipment to install fiber or mesh reinforced concrete sidewalks, 4" thick in accordance with Section 32 16 13, Concrete Sidewalks and Curbs and Gutters. Includes all necessary formwork, reinforcing material, and expansion joint material. Does not include surface preparation or excavation.

0020 SIDEWALKS, 6" THICK

Provide all materials, labor, and equipment to install fiber or mesh reinforced concrete sidewalks, 6" thick in accordance with Section 32 16 13, Concrete Sidewalks and Curbs and Gutters. Includes all necessary formwork, reinforcing material, and expansion joint material. Does not include surface preparation or excavation.

0021 CONCRETE PAD, 6" THICK

Provide all materials, labor, and equipment to install reinforced concrete pad, 6" thick in accordance with Section 32 13 13.06, Concrete Pavement for Roads and Site Facilities. Includes all necessary formwork, reinforcing material, and expansion joint material. Does not include surface preparation or excavation.

0022 CONCRETE PAD, 8" THICK

Provide all materials, labor, and equipment to install reinforced concrete pad, 8" thick in accordance with Section 32 13 13.06, Concrete Pavement for Roads and Site Facilities. Includes all necessary formwork, reinforcing material, and expansion joint material. Does not include surface preparation or excavation.

0023 CONCRETE PAD, 12" THICK

Provide all materials, labor, and equipment to install reinforced concrete pad, 12" thick in accordance with Section 32 13 13.06, Concrete Pavement for Roads and Site Facilities. Includes all necessary formwork, reinforcing material, and expansion joint material. Does not include surface preparation or excavation.

0024 CONCRETE CURB, STRAIGHT

Provide all materials, labor, and equipment to install concrete curb, straight, in accordance with Section 32 16 13, Concrete Sidewalks and Curbs and Gutters. See Drawing 06.

0025 CONCRETE CURB, RADIUS

Provide all materials, labor, and equipment to install concrete curb and gutter, radius, in accordance with Section 32 16 13, Concrete Sidewalks and Curbs and Gutters. See Drawing 06.

- 0026 CONCRETE CURB & GUTTER, STRAIGHT**
Provide all materials, labor, and equipment to install concrete curb and gutter, straight, in accordance with Section 32 16 13, Concrete Sidewalks and Curbs and Gutters. See Drawing 06.
- 0027 CONCRETE CURB & GUTTER, RADIUS**
Provide all materials, labor, and equipment to install concrete curb and gutter, radius, in accordance with Section 32 16 13, Concrete Sidewalks and Curbs and Gutters. See Drawing 06.
- 0028 HANDICAP RAMP**
Provide all materials, labor, and equipment to construct handicap ramp at curb in accordance with Section 32 16 13, Concrete Sidewalks and Curbs & Gutters and the Americans with Disability Act (ADA). See Drawing 04.
- 0029 BRICK SIDEWALK, GRAVEL/SAND BASE**
Provide all materials, labor, and equipment to construct brick sidewalk in accordance with Section 04 20 00, Unit Masonry and Drawing 20. The work shall include edge brick set in mortar and bedding and joint sand. Does not include surface preparation or excavation.
- 0030 BRICK SIDEWALK, 4" CONCRETE BASE**
Provide all materials, labor, and equipment to construct brick sidewalk in accordance Section 32 13 13.06, Concrete Pavement for Roads and Site Facilities, Section 04 20 00, Unit Masonry, and Drawing 21. Does not include surface preparation or excavation.
- 0031 BRICK SIDEWALK, REMOVE & RESET BRICK**
Provide all labor and equipment to remove & reset brick sidewalk in accordance with Section 04 20 00, Unit Masonry with Reused Brick.
- 0032 BRICK PAVERS**
Provide all materials, labor, and equipment to install brick road pavers in accordance with Section 04 20 00, Unit Masonry, and Drawing 22. The work shall include edge brick set in mortar and bedding and joint sand. Does not include surface preparation or excavation. May be added to concrete pad line items for increased load capacity.
- 0033 CONCRETE BLOCK PAVERS**
Provide all materials, labor, and equipment to install concrete block pavement surfaces per ASTM C 936. The work shall include edge block set in mortar and bedding and joint sand. Does not include surface preparation or excavation. May be added to concrete pad line items for increased load capacity.
- 0034 ASPHALT BLOCK PAVER**
Provide all materials, labor, and equipment to install asphalt block pavers per ASTM C 902. The work shall include edge block set in mortar and bedding and joint sand. Does not include surface preparation or excavation. May be added to concrete pad line items for increased load capacity.
- 0035 RESET GRANITE STEPS/CAPSTONES**
Provide all labor and equipment to reset Granite Steps/Capstones.
- 0036 SAWCUT ASPHALT PAVEMENT, UP TO 4"**
Provide all labor and equipment to sawcut asphalt pavement up to 4" deep in accordance with Section 02 41 00, Demolition.

- 0037 SAWCUT ASPHALT PAVEMENT, OVER 4"**
Provide all labor and equipment to sawcut asphalt pavement an additional depth per inch over 4" deep in accordance with Section 02 41 00, Demolition.
- 0038 SAWCUT CONCRETE, UP TO 4"**
Provide all labor and equipment to sawcut concrete up to 4" deep in accordance with Section 02 41 00, Demolition.
- 0039 SAWCUT CONCRETE, OVER 4"**
Provide all labor and equipment to sawcut concrete an additional depth per inch over 4" deep in accordance with Section 02 41 00, Demolition.
- 0040 DEMO REINFORCED CONCRETE, UP TO 12"**
Provide all labor and equipment to remove and dispose of reinforced concrete in accordance with Section 02 41 00, Demolition, for concrete up to 12" thick.
- 0041 DEMO REINFORCED CONCRETE, OVER 12"**
Provide all labor and equipment to remove and dispose of reinforced concrete in accordance with Section 02 41 00, Demolition, for concrete 12" to 24" thick.
- 0042 DEMO BITUMINOUS PAVEMENT, UP TO 12"**
Provide all labor and equipment to remove and dispose of asphalt pavement in accordance with Section 02 41 00, Demolition, for pavements up to 12" thick. Does not include concrete base, if present.
- 0043 DEMO CONCRETE SIDEWALKS, UP TO 6"**
Provide all labor and equipment to remove and dispose of concrete sidewalks in accordance with Section 02 41 00, Demolition, for sidewalks up to 6" thick.
- 0044 DEMO CONCRETE CURBS**
Provide all labor and equipment to remove and dispose of concrete curbs in accordance with Section 02 41 00, Demolition.
- 0045 DEMO CONCRETE CURB & GUTTER**
Provide all labor and equipment to remove and dispose of concrete curb and gutter in accordance with Section 02 41 00, Demolition.
- 0046 DEMO BITUMINOUS CURB**
Provide all labor and equipment to remove and dispose of bituminous curbs in accordance with Section 02 41 00, Demolition.
- 0047 EXCAVATION, GENERAL**
Provide all labor and equipment for general excavation in accordance with Section 31 23 00, Excavation and Fill.
- 0048 EXCAVATION, TRENCHING**
Provide all labor and equipment for trenching excavation in accordance with Section 31 23 00, Excavation and Fill. Up to 2 feet wide, 4 feet deep.
- 0049 DISPOSAL, CLEAN EARTH MATERIALS**
Provide all labor and equipment to dispose of contaminated earth materials in accordance with Section 31 23 00, Excavation and Fill.
- 0050 DISPOSAL, MIXED EARTH MATERIALS**
Provide all labor and equipment to dispose of mixed earth materials in accordance with Section 31 23 00, Excavation and Fill.

- 0051 DISPOSAL, CONTAMINATED EARTH MATERIALS (CONTROLLED)**
Provide all labor and equipment to dispose of contaminated earth materials (controlled) in accordance with Section 31 23 00, Excavation and Fill. Waste stream records requirements apply.
- 0052 AGGREGATE BASE/SUBBASE, CR-6**
Provide all materials, labor, and equipment to place and compact aggregate base or subbase in accordance with Section 32 11 16, Base Course for Rigid and Subbase Course for Flexible Paving. Work is in addition to subgrade preparation.
- 0053 STONE BASE, NO. 57**
Provide all materials, labor, and equipment to place and compact #57 stone in accordance with Section 31 23 00, Excavation and Fill. Measured compacted.
- 0054 DOLOMITIC MARBLE SCREENINGS, NO. 10**
Provide all materials, labor, and equipment to place and compact #10 Dolomitic Marble Screenings as needed in accordance with Section 31 23 00, Excavation and Fill. Measured compacted.
- 0055 FILL EARTH, CLEAN**
Provide all materials, labor, and equipment to place and compact, place and compact general fill in accordance with Section 31 23 00, Excavation and Fill. Work is in addition to subgrade preparation. Materials from outside source.
- 0056 SUBGRADE PREPARATION**
Provide all materials, labor, and equipment to grade, compact, and otherwise prepare subgrade in accordance with Section 31 23 00, Excavation and Fill.
- 0057 GEOTEXTILE FABRIC**
Provide and install geotextile fabric in accordance with Section 31 05 19, Geotextile.
- 0058 GEOGRID EARTH STABILIZER**
Provide and install geogrid in accordance with Section 31 05 21, Geogrid Soil Reinforcement.
- 0059 DRAINAGE PIPE, 4" DIAM**
Provide all materials, labor, and equipment to install 4" diameter pipe for underground drainage lines in accordance with Section 33 40 00, Storm Drainage. Use ADS/HPDE or equivalent piping and accessories and install per manufacturer's recommendations. Work includes excavation up to 4' deep, compacted backfill, and return to grassed/stabilized surface. Does not include pavements or other surface improvements.
- 0060 DRAINAGE PIPE, 6" DIAM**
Provide all materials, labor, and equipment to install 6" diameter pipe for underground drainage lines in accordance with Section 33 40 00, Storm Drainage. Use ADS/HPDE or equivalent piping and accessories and install per manufacturer's recommendations. Work includes excavation up to 4' deep, compacted backfill, and return to grassed/stabilized surface. Does not include pavements or other surface improvements.
- 0061 DRAINAGE PIPE, 8" DIAM**
Provide all materials, labor, and equipment to install 8" diameter pipe for underground drainage lines in accordance with Section 33 40 00, Storm Drainage. Use ADS/HPDE or equivalent piping and accessories and install per manufacturer's recommendations. Work includes excavation up to 4' deep, compacted backfill, and return to grassed/stabilized surface. Does not include pavements or other surface improvements.

- 0062 DRAINAGE PIPE, 12" DIAM**
Provide all materials, labor, and equipment to install 12" diameter pipe for underground drainage lines in accordance with Section 33 40 00, Storm Drainage. Use ADS/HPDE or equivalent piping and accessories and install per manufacturer's recommendations. Work includes excavation up to 4' deep, compacted backfill, and return to grassed/stabilized surface. Does not include pavements or other surface improvements.
- 0063 DRAINAGE PIPE, 18" DIAM**
Provide all materials, labor, and equipment to install 18" diameter pipe for underground drainage lines in accordance with Section 33 40 00, Storm Drainage. Use ADS/HPDE or equivalent piping and accessories and install per manufacturer's recommendations. Work includes excavation up to 4' deep, compacted backfill, and return to grassed/stabilized surface. Does not include pavements or other surface improvements.
- 0064 DRAINAGE PIPE, 24" DIAM**
Provide all materials, labor, and equipment to install 24" diameter pipe for underground drainage lines in accordance with Section 33 40 00, Storm Drainage. Use ADS/HPDE or equivalent piping and accessories and install per manufacturer's recommendations. Work includes excavation up to 4' deep, compacted backfill, and return to grassed/stabilized surface. Does not include pavements or other surface improvements.
- 0065 DRAINAGE PIPE, 36" DIAM**
Provide all materials, labor, and equipment to install 36" diameter pipe for underground drainage lines in accordance with Section 33 40 00, Storm Drainage. Use ADS/HPDE or equivalent piping and accessories and install per manufacturer's recommendations. Work includes excavation up to 4' deep, compacted backfill, and return to grassed/stabilized surface. Does not include pavements or other surface improvements.
- 0066 STORM DRAIN, CURB INLET & BOX**
Provide all materials, labor, and equipment to install precast curb inlet (MD SHA Standard No. 374.51, COG-5) and box in accordance with Section 33 40 00, Storm Drainage.
- 0067 STORM DRAIN, GUTTER INLET FRAME & GRATE**
Provide all materials, labor, and equipment to install (MD SHA Standard No. 374.23) in accordance with Section 33 40 00, Storm Drainage.
- 0068 STORM DRAIN, GUTTER/BASIN BOX ONLY**
Provide all equipment, materials, and labor to install precast box in accordance with Section 33 40 00, Storm Drainage.
- 0069 MANHOLE/CATCH BASIN, FRAME & COVER**
Provide all materials and labor to install manhole/catch basin frame (MD SHA Standard No. MD-383.31) and cover (MD SHA Standard No. 383.32) in accordance with Section 33 40 00, Storm Drainage.
- 0070 MANHOLE/CATCH BASIN, ELEV ADJUSTMENT**
Provide all materials and labor to install Neenah Foundry, R-1979 series or equivalent, adjustment rings in accordance with Section 33 40 00, Storm Drainage, to raise manholes or catch basins.
- 0071 VALVE BOX/HAND HOLE, FRAME & COVER**
Provide all materials and labor to install valve box frame and cover in accordance with Section 33 40 00, including placement of 36" diameter concrete ring around valve box in accordance with Drawing 16.

- 0072 VALVE BOX/HAND HOLE, ELEV ADJUSTMENT**
Provide all materials and labor to adjust elevation of valve boxes and hand holes with cast iron adjustment rings or by lowering valve box riser. Adjustment includes replacement of 36" diameter concrete ring around valve box in accordance with Drawing 16.
- 0073 VALVE BOX/HAND HOLE, BOX ONLY**
Provide all materials and labor to install valve box in accordance with Section 33 40 00, including placement of 36" diameter concrete ring around valve box in accordance with Drawing 16.
- 0074 REPAIR BRICK/MASONRY/CONCRETE BEDDING COURSE**
Provide all materials and labor to repair brick, masonry, or concrete bedding course in manholes or catch basins in accordance with Section 33 40 00, Storm Drainage.
- 0075 PAINT REMOVAL**
Provide all labor and equipment to remove paint on pavement in accordance with Section 32 01 11.51, Paint Removal from Pavements, by either mechanical means or high pressure water jet.
- 0076 PAINTING, LINE BLACKOUT**
Provide all materials, labor, and equipment to blackout existing faded lines or other lines as directed in accordance with Section 32 17 24, Pavement Markings. Use flat black paint, asphalt emulsion product, or other blackout material.
- 0077 PAINTING, CURBS**
Provide all materials, labor, and equipment to paint curbs in accordance with Section 32 17 24, Pavement Markings. Work includes removal of loose paint in accordance with Section 32 01 11.51, Paint Removal from Pavements. Standard paint colors include white, yellow, blue, and red.
- 0078 PAINTING, 4" WIDE, STANDARD**
Provide all materials, labor, and equipment to paint 4" wide lines on road surface in accordance with Section 32 17 24, Pavement Markings. Standard paint colors include white, yellow, blue, and red.
- 0079 PAINTING, 4" WIDE, REFLECTIVE**
Provide all materials, labor, and equipment to paint 4" wide lines on road surface in accordance with Section 32 17 24, Pavement Markings. Reflective paint colors include white and yellow.
- 0080 PAINTING, CROSSWALKS**
Provide all materials, labor, and equipment to paint crosswalks on road surface in accordance with Section 32 17 24, Pavement Markings and Drawing 17. Use reflective paint. Reflective paint colors include white and yellow. Measurement is the total area of crosswalk.
- 0081 PAINTING, STOP LINE, 12" WIDE**
Provide all materials, labor, and equipment to paint 12" wide stop lines on road surface in accordance with Section 32 17 24, Pavement Markings. Use reflective paint. Reflective paint colors include white and yellow.
- 0082 PAINTING, ARROWS & LOGOS**
Provide all materials, labor, and equipment to paint directional arrows and logos on road surface in accordance with Section 32 17 24, Pavement Markings, and Drawing 07. Use reflective paint. Reflective paint colors include white and yellow.

- 0083 PAINTING, LETTERS & NUMBERS, UP TO 12"**
Provide all materials, labor, and equipment to paint letters and numbers up to 12" tall on road surface in accordance with Section 32 17 24, Pavement Markings. Use standard paint. Standard paint colors include white, yellow, blue and red.
- 0084 PAINTING, LETTERS & NUMBERS, 12" TO 24"**
Provide all materials, labor, and equipment to paint letters and numbers from 12" to 24" tall on road surface in accordance with Section 32 17 24, Pavement Markings. Use standard paint. Standard paint colors include white, yellow, blue and red.
- 0085 PAINTING, HANDICAP LOGO**
Provide all materials, labor, and equipment to paint handicap logo on road surface in accordance with Section 32 17 24, Pavement Markings and Drawings 8 and 18. Use standard white lines on blue background.
- 0086 PAINTING, YELLOW TRIANGLE**
Provide all materials, labor, and equipment to paint yellow staff/faculty triangles on road surface in accordance with Section 32 17 24, Pavement Markings, and Drawing 18. Use standard yellow paint.
- 0087 WHEEL STOPS, CONCRETE**
Provide all materials and labor to install concrete wheel stops, including pinning rods.
- 0088 WHEEL STOPS, PLASTIC**
Provide all materials and labor to install grey recycled plastic wheel stops, including pinning rods.
- 0089 WHEEL STOPS, REMOVE & RESET**
Provide all materials and labor to remove and reset plastic or concrete wheel stops, including pinning rods.
- 0090 WHEEL STOPS, REMOVE AND DISPOSE**
Provide all labor and equipment to remove and dispose of parking wheel stops and support pins in accordance with Section 02 41 00, Demolition.
- 0091 PIPE BOLLARD, 4" DIAMETER**
Provide all materials, labor and equipment to install 4" diameter pipe bollards per Drawing 14. Work includes excavation and disposal of excess materials.
- 0092 PIPE BOLLARD, 6" DIAMETER**
Provide all materials, labor and equipment to install 6" diameter pipe bollards per Drawing 14. Work includes excavation and disposal of excess materials.
- 0093 PIPE BOLLARD, 8" DIAMETER**
Provide all materials, labor and equipment to install 8" diameter pipe bollards per Drawing 14. Work includes excavation and disposal of excess materials.
- 0094 PIPE BOLLARD, REMOVE & RESET**
Provide all labor and equipment to remove existing bollards from ground, break up concrete ball, and reset bollard per Drawing 14. Work includes excavation and disposal of excess materials.
- 0095 PIPE BOLLARD, REMOVE & DISPOSE**
Provide all labor and equipment to remove existing bollards from ground and fill hole with fill material. Work includes disposal of removed materials and fill material. Does not include restoration of above ground improvements.

- 0096 GUARDRAIL, TIMBER**
Provide all materials, labor, and equipment to erect a timber guardrail per Drawing 31. Work includes all vertical and horizontal members, driven posts or posts set in concrete, and all applicable hardware. May choose equivalent quantities for repair of existing guardrails.
- 0097 GUARDRAIL, STEEL W BEAM**
Provide all materials, labor, and equipment to erect steel "W" beam guardrail conforming to AASHTO M180, Class A, Type 1. See Drawings 32A and 32B. Work includes all vertical and horizontal members, driven posts or posts set in concrete, and all applicable hardware. May choose equivalent quantities for repair of existing guardrails.
- 0098 SILT FENCE**
Provide all materials and labor to install silt fence in accordance with Drawing 11.
- 0099 STABILIZED CONSTRUCTION ENTRANCE**
Provide all materials, labor and equipment to install stabilized construction entrance in accordance with Drawing 12.
- 0100 CORE SAMPLES, 3" DIAM**
Provide all labor and equipment to obtain concrete or asphalt core samples not already required per Section 32 13 13.06, Concrete Pavement for Roads and Site Facilities and Section 32 10 00, Bituminous Concrete Pavement. Sample depth up to 6". Provide required testing on the cores in accordance with the referenced sections.
- 0101 CONCRETE TEST CYLINDERS**
Provide all labor and equipment to obtain concrete cylinder samples not already required in Section 32 13 13.06, Concrete Pavement for Roads and Site Facilities. Provide required testing on the cores in accordance with the referenced sections.
- 0102 CONCRETE SLUMP & AIR ENTRAINMENT TEST**
Provide all labor and equipment to test concrete samples for slump and air entrainment not already required in Section 32 13 13.06, Concrete Pavement for Roads and Site Facilities.
- 0103 CONSTRUCTION SCHEDULES**
Provide all construction schedules (per submittal if necessary) as specified in this contract in accordance with Section 01 32 16.00 20, Construction Progress Documentation.
- 0104 TRAFFIC CONTROLS SIGNS**
Provide all materials, labor and equipment to install traffic control signs in accordance with Manual on Uniform Traffic Control Devices for Streets and Highways (2003 edition, 2007 revision). Work includes signs, posts, required hardware, and placement of posts in concrete to a depth of 36".
- 0105 TOPSOIL**
Provide all material, labor, and equipment to install and prepare topsoil in accordance with Section 32 92 23, Sodding, suitable for plantings.
- 0106 SOD, UP TO 25 SY**
Provide all material, labor, and equipment to install fescue sod in accordance with Section 32 92 23, Sodding, for areas less than 25 SY.
- 0107 SOD, OVER 25 SY**
Provide all material, labor, and equipment to install fescue sod in accordance with Section 32 92 23, Sodding, for areas larger than 25 SY.

- 0108 PRESSURE WASHING**
Provide all labor and equipment to clean various surfaces using high-pressure water.
- 0109 WORK OUTSIDE NORMAL HOURS**
For work outside of normal contract working hours. Approximately 10% of the work in line items 0001 to 0105 is expected to occur outside normal working hours.
- 0110 CARPENTER**
Provide labor for miscellaneous carpentry work not directly specified in this contract.
- 0111 LABORER**
Provide labor for miscellaneous general work not directly specified in this contract.
- 0112 POWER EQUIP OPERATOR**
Provide labor for miscellaneous operation of power equipment for work not directly specified in this contract.
- 0113 CONCRETE FINISHER**
Provide labor for miscellaneous finishing of concrete that is not directly specified in this contract.
- 0114 STAKEOUT SURVEYOR**
Provide labor for miscellaneous survey stakeout work not directly specified in this contract.
- 0115 ELECTRICIAN**
Provide labor for miscellaneous electrical work not directly specified in this contract.
- 0116 PLUMBER**
Provide labor for miscellaneous plumbing work not directly specified in this contract.
- 0117 SUPERVISOR**
Provide supervision for miscellaneous carpentry work not directly specified in this contract.
- 0118 MATERIAL**
Provide miscellaneous material for work not directly specified in this contract.
- 0119 EQUIPMENT**
Provide miscellaneous equipment for work not directly specified in this contract.

PART 4

REFERENCE SPECIFICATIONS

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

The work includes maintenance, repair, and construction of site facilities including, but not limited to, roads, pavements, pavement striping, sidewalks, curbs and gutters, drainage systems, bollards, and environmental controls.

1.1.2 Location

All work covered in this contract is primarily located at the U.S. NAVAL ACADEMY and NAVAL SUPPORT ACTIVITY, Annapolis, Maryland, but may include work at the Chesapeake Beach Detachment site of NRL, Navy and Marine Corps Reserve Centers in Baltimore, and the former Naval Academy Dairy Farm in Crownsville. The exact location will be detailed in each delivery order.

1.2 MAJOR ITEMS OF WORK

See Part 3 – Description of Line Items for all major items of work

1.3 EXISTING WORK

In addition to "FAR 52.236-9, Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements":

- a. The contractor shall remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.
- b. The contractor shall repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

1.4 LOCATION OF UNDERGROUND FACILITIES

The contractor shall obtain digging permits prior to start of excavation by contacting the Contracting Officer at least 15 calendar days in advance. Scan the construction site with electromagnetic or sonic equipment and mark the surface of the ground where existing underground utilities are suspected/discovered. Verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed but that are indicated or discovered during scanning in locations to be traversed by new piping, ducts, and other work. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made. Excavate test pits where indicated or shown by the Contracting Officer to locate existing water lines.

1.4.1 Notification Prior to Excavation

Notify the Contracting Officer at least 48 hours prior to starting excavation work.

PART 2 PRODUCTS

Not used.

ARTICLE I. PART 3 EXECUTION

Not used.

--- End of Section ---

SECTION 01 20 00.00 20**PRICE AND PAYMENT PROCEDURES**

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 in the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP-1110-1-8 (2005) Construction Equipment Ownership and Operating Expense Schedule, Vol 1-12

1.2 CONTRACT MODIFICATIONS

In conjunction with the Contract Clause "DFARS 252.236-7000, Modification Proposals-Price Breakdown," and where actual ownership and operating costs of construction equipment cannot be determined from Contractor accounting records, equipment use rates shall be based upon the applicable provisions of the EP-1110-1-8.

1.3 CONTRACTOR'S INVOICE

1.3.1 Content of Invoice

Requests for payment in accordance with the terms of the contract shall consist of the following:

- a. Contractor's Invoice on NAVFAC Form 7300/41, which shall show, in summary form, the basis for arriving at the amount of the invoice.
- b. Contractor's Monthly Estimate for Voucher (LANTNAVFACENGCOM Form 4-4330/110 (New 7/84)), with subcontractor and supplier payment certification.
- c. Updated copy of submittal register.
- d. Updated copy of progress schedule. Furnish as specified in "FAR 52.236-15, Schedules for Construction Contracts."

1.3.2 Quantities of Monthly Invoices and Supporting Forms

Forms will be furnished by the Contracting Officer. Requests for payment shall be processed in accordance with "FAR 52.232-5, Payments Under Fixed-Price Construction Contracts." Monthly invoices and supporting forms for work performed through the anniversary award date of the contract shall be submitted to the Contracting Officer within 5 calendar days of the date of invoice (e.g., contract award date is the 7th of the month, the date of each monthly invoice shall be the 7th and the invoice shall be submitted by the 12th of the month) in the following quantities:

- a. Contractor's invoice - Original and five copies
- b. Contractor's monthly estimate for voucher - Original and two copies shall be required on jobs where there is a schedule of prices
- c. Updated submittal register - Two copies

- d. Progress schedule - Two copies

1.4 PAYMENTS TO THE CONTRACTOR

Payments will be made on submission of itemized requests by the Contractor which comply with the requirements of this section, and will be subject to reduction for overpayments or increase for underpayments made on previous payments to the Contractor.

- a. Basis for Contracting Officer's consideration to allow progress payment for material delivered on the site (but not installed) and for completed preparatory work, as authorized under FAR 52.232-5(b), shall be (1) major high cost items and (2) long lead special order items. Materials that will not be paid for prior to installation include, but are not limited to, bulk quantities such as nails, fasteners, conduits, gypsum board, etc. In the request for progress payment, such items shall be specifically identified in the Contractor's estimates of work submitted for the Contracting Officer's approval in accordance with work completed under task order issued by Contracting Officer. At the time of invoicing, the amount billed shall be supported by documents establishing its value.

1.4.1 Obligation of Government Payments

The obligation of the Government to make payments required under the provisions of this contract will, at the discretion of the Contracting Officer, be subject to reductions and/or suspensions permitted under the FAR and agency regulations including the following in accordance with "FAR 32.503-6:

- a. Reasonable deductions due to defects in material or workmanship;
- b. Claims which the Government may have against the Contractor under or in connection with this contract;
- c. Unless otherwise adjusted, repayment to the Government upon demand for overpayments made to the Contractor; and
- d. Failure to provide up to date record drawings not current as stated in Contract Clause "FAC 5252.236-9310, Record Drawings."

1.4.2 Payment for Materials Offsite

Payments may be made to the Contractor for materials stored off construction sites under the following conditions:

- a. Conditions described in the paragraph entitled "Payments to the Contractor";
- b. Material within a distance of 50 miles by streets and roads to the construction site;
- c. Materials adequately insured and protected from theft and exposure;
- d. Materials not susceptible to deterioration or physical damage in storage or in transit to the job site are acceptable for progress payments. Items such as steel, machinery, pipe and fittings, and electrical cable are acceptable; items such as gypsum wallboard, glass, insulation, and wall coverings are not;
- e. Materials in transit to the job site or storage site are not acceptable for payment; and
- f. Conditions specified in "FAR 52.232-5(b) Payments Under Fixed Price Construction Contracts."

1.5 EQUITABLE ADJUSTMENTS: WAIVER AND RELEASE OF CLAIMS

- a. Whenever the Contractor submits a claim for equitable adjustment under any clause of this Contract which provides for equitable adjustment of the Contract, such claim shall include all types of adjustments in the total amounts to which the clause entitles the Contractor, including, but not limited to, adjustments arising out of delays or disruptions or both caused by such change.
- b. Except as the parties may otherwise expressly agree, the Contractor shall be deemed to have waived (1) any adjustments to which it otherwise might be entitled under the clause where such claim fails to request such adjustments, and (2) any increase in the amount of equitable adjustments additional to those requested in its claim.
- c. The Contractor agrees that, if required by the Contracting Officer, he will execute a release, in form and substance satisfactory to the Contracting Officer, as part of the supplemental agreement setting forth the aforesaid equitable adjustment. The Contractor further agrees that such release shall discharge the Government, its officers, agents and employees, from any further claims, including but not limited to, further claims arising out of delays or disruptions or both caused by the aforesaid change.

1.6 CHANGES ESTIMATES

In making all equitable adjustments under the Changes Clause, compensation for additions will be based upon estimated costs at the time the work is performed and credit for deductions will be based upon estimated costs at the time the Contract was made. In arriving at the amount of the change in price, if any, allowance may be made for profit overhead and general expenses, plant rental and other similar items.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

--- End of Section ---

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

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 in the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

15 CFR 772 Individual Validated Licenses and Amendments

15 CFR 773 Special Licensing Procedures

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-01 Preconstruction Submittals

List of contact personnel; G

1.3 MINIMUM INSURANCE REQUIREMENTS

Procure and maintain during the entire period of performance under this contract the following minimum insurance coverage:

- a. Comprehensive general liability: \$500,000 per occurrence
- b. Automobile liability: \$200,000 per person, \$500,000 per occurrence for bodily injury, \$20,000 per occurrence for property damage
- c. Workmen's compensation as required by Federal and State workers' compensation and occupational disease laws.
- d. Employer's liability coverage of \$100,000, except in States where workers compensation may not be written by private carriers,

1.4 CONTRACTOR PERSONNEL REQUIREMENTS

1.4.1 Subcontractors and Personnel

Furnish a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.4.2 Identification Badges

Identification badges, if required, will be furnished without charge. Application for and use of badges will be as directed. Immediately report instances of lost or stolen badges to the Contracting Officer.

1.5 SUPERVISION

Have at least one qualified supervisor capable of reading, writing, and conversing fluently in the English language at each job site during working hours. In addition, if a Quality Control (QC) representative is required on the contract, then that individual shall also have fluent English communication skills. Note that delivery orders may be issued concurrently at different job sites within the Naval Academy complex.

1.6 PRECONSTRUCTION CONFERENCE

After award of the contract but prior to commencement of any work at the site, meet with the Contracting Officer to discuss and develop a mutual understanding relative to the administration of the value engineering and safety program, preparation of the schedule prices, shop drawings, and other submittals, scheduling programming, and prosecution of the work. Major subcontractors who will engage in the work shall also attend.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

--- End of Section ---

SECTION 01 32 16.00 20

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-01 Preconstruction Submittals

Construction schedule; G

1.2 CONSTRUCTION SCHEDULE

Within 21 days after receipt of the Notice of Award, prepare and submit to the Contracting Officer for approval a construction schedule in the form of a progress chart in accordance with the terms in Contract Clause "FAR 52.236-15, Schedules for Construction Contracts," except as modified in this contract.

1.3 UPDATED SCHEDULES

Update the construction schedule and equipment delivery schedule at monthly intervals or when schedule has been revised. Reflect any changes occurring since the last update. Submit copies of the purchase orders and confirmation of the delivery dates as directed.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

--- End of Section ---

SECTION 01 33 00**SUBMITTAL PROCEDURES****PART 1 GENERAL****1.1.1 Government-Furnished Information**

Submittal register database and submittal management program will be delivered to the Contractor, by Contracting Officer on a CD-RW disc. Register database will have the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-04 Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Column (f): Indicate approving authority for each submittal. A "G" indicates approval by contracting officer; a blank indicates approval by QC manager.

The database and submittal management program will be extractable from the disk furnished to contractor, for operation on contractor's IBM compatible personal computer with 640kb RAM, a hard drive, and 3 1/2 inch high density floppy disk drive.

1.2 DEFINITIONS**1.2.1 Submittal**

Shop drawings, product data, samples, and administrative submittals presented for review and approval. Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

1.2.2 Types of Submittals

All submittals are classified as indicated in paragraph "Submittal Descriptions (SD)". Submittals also are grouped as follows:

- a. Shop drawings: As used in this section, drawings, schedules, diagrams, and other data prepared specifically for this contract, by contractor or through contractor by way of subcontractor, manufacturer, supplier, distributor, or other lower tier contractor, to illustrate portion of work.
- b. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate portion of work, but not prepared exclusively for this contract.
- c. Samples: Physical examples of products, materials, equipment, assemblies, or workmanship that are physically identical to portion of work, illustrating portion of work or establishing standards for evaluating appearance of finished work or both.

- d. Administrative submittals: Data presented for reviews and approval to ensure that administrative requirements of project are adequately met but not to ensure directly that work is in accordance with design concept and in compliance with contract documents.

1.2.3 Submittal Descriptions (SD)

SD-01 Preconstruction Submittals

- Certificates of insurance
- Surety bonds
- List of proposed subcontractors
- List of proposed products
- Construction Progress Schedule
- Submittal schedule
- Schedule of values
- Health and safety plan
- Work plan
- Quality control plan
- Environmental protection plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the contractor for integrating the product or system into the project.

Drawings prepared by or for the contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports

Daily checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

Factory test reports.

SD-10 Operation and Maintenance Data

Data intended to be incorporated in operations and maintenance manuals.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

As-built drawings

Special warranties

Posted operating instructions

Training plan

1.2.4 Approving Authority

Person authorized to approve submittal.

1.2.5 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce construction and materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.3 SUBMITTALS

Submit the following in accordance with the requirements of this section.

SD-11 Closeout Submittals

Submittal register; G

1.4 USE OF SUBMITTAL REGISTER DATABASE

Prepare and maintain submittal register, as the work progresses. Use electronic submittal register program furnished by the Government or any other format. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by government; retain data which is output in columns (a), (g), (h), and (i) as approved.

1.4.1 Submittal Register

Submit submittal register as an electronic database, using submittals management program furnished to contractor. Submit with quality control plan and project schedule required by Section 01 45 02, "Quality Control" and Section 01 32 16, "Construction Progress Documentation." Do not change data in columns (c), (d), (e), and (f) as delivered by the government. Verify that all submittals required for project are listed and add missing submittals. Complete the following on the register database:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date contractor needs approval of submittal.

Column (i) Contractor Material: Date that contractor needs material delivered to contractor control.

1.4.2 Contractor Use of Submittal Register

Update the following fields in the government-furnished submittal register program or equivalent fields in program utilized by contractor.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.4.3 Approving Authority Use of Submittal Register

Update the following fields in the government-furnished submittal register program or equivalent fields in program utilized by contractor.

Column (b).

Column (l) List date of submittal receipt.

Column (m) through (p).

Column (q) List date returned to contractor.

1.4.4 Contractor Action Code and Action Code

Entries used will be as follows (others may be prescribed by Transmittal Form):

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.4.5 Copies Delivered to the Government

Deliver one copy of submitted register updated by contractor to government with each invoice request. Deliver in electronic format, unless a paper copy is requested by contracting officer.

1.5 PROCEDURES FOR SUBMITTALS

1.5.1 Reviewing, Certifying, Approving Authority

QC organization shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. Approving authority on submittals is QC manager unless otherwise specified for specific submittal. At each "Submittal" paragraph in individual specification sections, a notation "G," following a submittal item, indicates contracting officer is approving authority for that submittal item.

1.5.2 Constraints

- a. Submittals listed or specified in this contract shall conform to provisions of this section, unless explicitly stated otherwise.
- b. Submittals shall be complete for each definable feature of work; components of definable feature interrelated as a system shall be submitted at same time.
- c. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.
- d. Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

1.5.3 Scheduling

- a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.
- b. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 15 working days for submittals for QC manager approval and 20 working days for submittals for contracting officer approval. Period of review for submittals with contracting officer approval begins when Government receives submittal from QC organization. Period of review for each resubmittal is the same as for initial submittal.
- c. For submittals requiring review by fire protection engineer, allow review period, beginning when government receives submittal from QC organization, of 20 working days for return of submittal to the contractor. Period of review for each resubmittal is the same as for initial submittal.

1.5.4 Variations

Variations from contract requirements require Government approval pursuant to contract Clause entitled "FAR 52.236-21, Specifications and Drawings for Construction" and will be considered where advantageous to government.

1.5.4.1 Considering Variations

Discussion with contracting officer prior to submission, will help ensure functional and quality requirements are met and minimize rejections and resubmittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

1.5.4.2 Proposing Variations

When proposing variation, deliver written request to the contracting officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to government. If lower cost is a benefit, also include an estimate of the cost saving. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

1.5.4.3 Warranting That Variation Are Compatible

When delivering a variation for approval, contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.5.4.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

1.5.5 Contractor's Responsibilities

- a. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.
- b. Transmit submittals to QC organization in accordance with schedule on approved Submittal

Register, and to prevent delays in the work, delays to government, or delays to separate contractors.

- c. Advise contracting officer of variation, as required by paragraph entitled "Variations."
- d. Correct and resubmit submittal as directed by approving authority. When resubmitting disapproved transmittals or transmittals noted for resubmittal, the contractor shall provide copy of that previously submitted transmittal including all reviewer comments for use by approving authority. Direct specific attention in writing or on resubmitted submittal, to revisions not requested by approving authority on previous submissions.
- e. Furnish additional copies of submittal when requested by contracting officer, to a limit of 20 copies per submittal.
- f. Complete work which must be accomplished as basis of a submittal in time to allow submittal to occur as scheduled.
- g. Ensure no work has begun until submittals for that work have been returned as "approved," or "approved as noted" or "approved except as noted; resubmission not required" except to the extent that a portion of work must be accomplished as basis of submittal.

1.5.6 QC Organization Responsibilities

- a. Note date on which submittal was received from contractor on each submittal.
- b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.
- c. Review submittals for conformance with project design concepts and compliance with contract documents.
- d. Act on submittals, determining appropriate action based on QC organization's review of submittal.
 - (1) When QC manager is approving authority, take appropriate action on submittal from the possible actions defined in paragraph entitled, "Actions Possible."
 - (2) When contracting officer is approving authority or when variation has been proposed, forward submittal to Government with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of submittal determines appropriate action.
- e. Ensure that material is clearly legible.
- f. Stamp each sheet of each submittal with QC certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.
 - (1) When approving authority is contracting officer, QC organization will certify submittals forwarded to contracting officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with contract Number [____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC manager _____, Date _____"
(Signature)

(2) When approving authority is QC manager, QC manager will use the following approval statement when returning submittals to contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with contract Number [____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is _____ approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by QC manager _____, Date _____"
(Signature)

- g. Sign certifying statement or approval statement. The person signing certifying statements shall be QC organization member designated in the approved QC plan. The signatures shall be in original ink. Stamped signatures are not acceptable.
- h. Update submittal register database as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by contracting officer.
- i. Retain a copy of approved submittals at project site, including contractor's copy of approved samples.

1.5.7 Government's Responsibilities

When approving authority is Contracting Officer, the Government will:

- a. Note date on which submittal was received from QC manager, on each submittal for which the contracting officer is approving authority.
- b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.
- c. Identify returned submittals with one of the actions defined in paragraph entitled "Actions Possible" and with markings appropriate for action indicated.

1.5.8 Actions Possible

Submittals will be returned with one of the following notations:

- a. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by contractor or for being incomplete, with appropriate action, coordination, or change.
- b. Submittals marked "approved" "approved as submitted" authorize contractor to proceed with work covered.

- c. Submittals marked "approved as noted" or "approved except as noted; resubmission not required" authorize contractor to proceed with work as noted provided contractor takes no exception to the notations.
- d. Submittals marked "revise and resubmit" or "disapproved" indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until resubmittal is approved.

1.6 FORMAT OF SUBMITTALS

1.6.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels, to office of approving authority. Transmit submittals with transmittal form prescribed by contracting officer and standard for project. The transmittal form shall identify contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled "Identifying Submittals." Process transmittal forms to record actions regarding sample panels and sample installations.

1.6.2 Identifying Submittals

Identify submittals, except sample panel and sample installation, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

- a. Project title and location.
- b. Construction contract number.
- c. Section number of the specification section by which submittal is required.
- d. Submittal description (SD) number of each component of submittal.
- e. When a resubmission, alphabetic suffix on submittal description, for example, SD-10A, to indicate resubmission.
- f. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other second tier contractor associated with submittal.
- g. Product identification and location in project.

1.6.3 Format for Product Data

- a. Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.
- b. Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.
- c. Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project.

1.6.4 Format for Shop Drawings

- a. Shop drawings shall not be less than 8 1/2 by 11 inches nor more than 30 by 42 inches.

- b. Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.
- c. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled "Identifying Submittals."
- d. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Shop drawing dimensions shall be the same unit of measure as indicated on the contract drawings. Identify materials and products for work shown.

1.6.5 Format of Samples

- a. Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:
 - (1) Sample of Equipment or Device: Full size.
 - (2) Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.
 - (3) Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.
 - (4) Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.
 - (5) Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.
 - (6) Color Selection Samples: 2 by 4 inches.
 - (7) Sample Panel: 4 by 4 feet.
 - (8) Sample Installation: 100 square feet.
- b. Samples Showing Range of Variation: Where variations are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range.
- c. Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples shall be in undamaged condition at time of use.
- d. Recording of Sample Installation: Note and preserve the notation of area constituting sample installation but remove notation at final clean up of project.
- e. When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.6.6 Format of Administrative Submittals

- a. When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply contractor's approval stamp to document, but to a separate sheet accompanying document.

- b. Operation and Maintenance Manual Data: Submit in accordance with Section 01781, "Operation and Maintenance Data." Include components required in that section and the various technical sections.

1.7 QUANTITY OF SUBMITTALS

1.7.1 Number of Copies of Product Data

Submit six copies of submittals of product data requiring review and approval only by QC organization and seven copies of product data requiring review and approval by contracting officer. Submit three copies of submittals of product data for operation and maintenance manuals.

1.7.2 Number of Copies of Shop Drawings

Submit shop drawings in compliance with quantity requirements specified for product data.

1.7.3 Number of Samples

- a. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to contractor.
- b. Submit one sample panel. Include components listed in technical section or as directed.
- c. Submit one sample installation, where directed.
- d. Submit one sample of non-solid materials.

1.7.4 Number of Copies of Administrative Submittals

- a. Unless otherwise specified, submit administrative submittals compliance with quantity requirements specified for product data.
- b. Submit administrative submittals required under "SD-10 Operation and Maintenance Manuals" to conform to Section 01781, "Operation and Maintenance Data."

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

--- End of Section ---

SECTION 01 35 26

SAFETY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Related Sections

- a. Section 01 30 00, "Administrative Requirements"
- b. Section 01 50 00, "Temporary Facilities and Controls"
- c. Section 02 41 00, "Site Demolition"
- d. Section 31 23 00, "Excavation and Fill"

1.2 REFERENCES

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

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.32	(2004) Fall Protection
ASSE/SAFE A10.34	(2001; R 2005) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE Z359.1	(2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

ASME INTERNATIONAL (ASME)

ASME B30.22	(2005) Articulating Boom Cranes
ASME B30.3	(2004) Construction Tower Cranes
ASME B30.5	(2004) Mobile and Locomotive Cranes
ASME B30.8	(2004) Floating Cranes and Floating Derricks

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA NPG 8621.1	(2004a) NASA Mishap Reporting, Investigating and Record Keeping Policy
NASA NPG 8715.3	(2004) NASA Safety Manual
NASA NSS 1740.12	(1993) NASA Safety Standard For Explosives, Propellants and Pyrotechnics

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2006; Errata 2006) Standard for Portable Fire Extinguishers
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NFPA 241	(2004) Safeguarding Construction, Alteration, and Demolition Operations
NFPA 51B	(2003) Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2007) National Electrical Code - 2008 Edition
NFPA 70E	(2004; AMD 2004) Electrical Safety in the Workplace

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008) Safety -- Safety and Health Requirements
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

10 CFR 20	Standards for Protection Against Radiation
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1919	Gear Certification
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.500	Fall Protection

1.3 DEFINITIONS

- a. Certified Industrial Hygienist. An industrial hygienist is an individual who is certified by the American Board of Industrial Hygiene.
- b. Certified Safety Professional. A safety manager, safety specialist, or safety engineer that has passed the CSP exam administered by the Board of Certified Safety Professionals.
- c. Competent Person. A competent person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
- d. Confined Space. A space which by design has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces include, but are not limited to storage tanks, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines.
- e. First Aid. First aid is any one-time treatment, and any follow-up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care, even though provided by a physician or registered professional personnel.

- f. Health and Safety Plan (HASP). The HASP is the Navy equivalent Army term of SHP or SSHP used in EM-385-1-1. "USACE" property and equipment specified in EM-385-1-1 should be interpreted as Government property and equipment.
- g. Lost Workdays. The number of days (consecutive or not) after, but not including, the day of injury or illness during which the employee would have worked but could not do so; that is, could not perform all or part of his normal assignment during all or any part of the workday or shift; because of the occupational injury or illness.
- h. Medical Treatment. Medical treatment includes treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.
- i. Multi-employer work site (MEWS). A multi-employer work site, as defined by OSHA, is one in which many employers occupy the same site. The Navy considers the prime contractor to be the "controlling authority" for all work site safety and health of the subcontractors.
- j. Operating Envelope. There is an "operating envelope" around any crane, and inside the envelope are the operator, riggers, rigging gear between the hook and the load, the load and the crane's supporting structure (ground, rail, etc.).
- k. Qualified Person. One who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated his or her ability to solve or resolve problems related to the subject matter, the work or the project.
- l. Recordable Occupational Injuries or Illnesses. Any occupational injuries or illnesses which result in:
 - (1) Fatalities, regardless of the time between the injury and death, or the length of the illness; or
 - (2) Lost Workday Cases, other than fatalities, that result in lost workdays, or
 - (3) Non-Fatal Cases without lost workdays which result in transfer to another job or termination of employment, or require medical treatment (other than first aid) or involve: loss of consciousness or restriction of work or motion. This category also includes any diagnosed occupational illnesses which are reported to the employer but are not classified as fatalities or lost workday cases.
- m. Safety Officer. The superintendent or other qualified or competent person who is responsible for the on-site safety required for the project. The contractor quality control person cannot be the safety officer, even through the QC has safety inspection responsibilities as part of the QC duties.
- n. Serious Accidents. Any work-related incident, which results in, a fatality, in-patient hospitalization of three or more employees, or property damage in excess of \$200,000.
- o. Significant Accident. Any contractor accident which involves falls of (4 feet) or more, electrical accidents, confined space accidents, diving accidents, equipment accidents, crane accident or fire accidents, which, result in property damage of \$10,000 or more, but less than \$200,000; or when fire department or emergency medical treatment (EMT) assistance is required.

- p. Weight Handling Equipment (WHE) Accident. A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.).

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-07 Certificates

Accident Prevention Plan (APP); G

Activity Hazard Analysis (AHA); G

SD-11 Closeout Submittals

Reports. Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

1.5 QUALITY ASSURANCE

1.5.2 Qualifications

a. Qualifications of Safety Officer:

- (1) Ability to manage the on-site contractor safety program through appropriate management controls.
- (2) Ability to identify hazards and have the capability to expend resources necessary to abate the hazards.
- (3) Must have worked on similar types of projects that are equal to or exceed the scope of the project assigned with the same responsibilities.
- (4) Shall, as a minimum, have attended an OSHA training qualification class including at least 10 hours of classroom instruction.

1.5.3 Meetings

1.5.3.1 Preconstruction Conference

The safety officer shall attend the preconstruction conference.

1.5.3.2 Meeting on Work Procedures

- a. Meet with Contracting Officer to discuss work procedures and safety precautions required by the APP. Ensure the participation of the contractor's superintendent, the quality control, and the CSP or CIH.

1.5.3.3 Weekly Safety Meetings

Hold weekly at the project site. Attach minutes showing contract title, signatures of attendees and a list of topics discussed to the QC Contractor Quality Control daily report.

1.5.3.4 Work Phase Meetings

The appropriate AHA shall be reviewed and attendance documented by the Contractor at the preparatory, initial, and follow-up phases of quality control inspection.

1.5.3.5 New Employee Indoctrination

New employees will be informed of specific site hazards before they begin work. Documentation of this orientation shall be kept on file at the project site.

1.5.4 Certifications

1.5.4.1 Accident Prevention Plan (APP)

Submit the APP at least 15 calendar days prior to start of work at the job site, following Appendix A of EM-385-1-1. Make the APP site specific. Notice To Proceed will be given after Government finds the APP acceptable.

1.5.4.2 Activity Hazard Analysis (AHA)

Submit the AHA for review at least 15 calendar days prior to the start of each phase. Format subsequent AHA as amendments to the APP. In accordance with contract quality control requirements each AHA will be reviewed during an on-site preparatory inspection.

1.6 ACCIDENT PREVENTION PLAN (APP)

Prepare the APP in accordance with the required and advisory provisions of EM-385-1-1 including Appendix A, "Minimum Basic Outline for Preparation of Accident Prevention Plan," and as modified herein. Include the associated AHA and other specific plans, programs and procedures listed on Pages A-3 and A-4 of EM-385-1-1, some of which are listed below.

1.6.1 Contents of the Accident Prevention Plan

- a. Name and safety related qualifications of safety officer (including training and any certifications).
- b. Qualifications of competent and of qualified persons.
- c. Identity of the individual who will complete exposure data (hours worked); accident investigations, reports and logs; and immediate notification of accidents to include subcontractors.
- d. Emergency response plan. Conform to EM-385-1-1, paragraph 01.E and include a map denoting the route to the nearest emergency care facility with emergency phone numbers. Contractor may be required to demonstrate emergency response.
- e. Confined Space Entry Plan. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by contractor personnel and the

coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

- f. Hazardous Material Use. Provisions to deal with hazardous materials, pursuant to the Contract Clause "FAR 52.223-3, Hazardous Material Identification and Material Safety Data." And the following:
- (1) Inventory of hazardous materials to be introduced to the site with estimated quantities.
 - (2) Plan for protecting personnel and property during the transport, storage and use of the materials.
 - (3) Emergency procedures for spill response and disposal, including a site map with approximate quantities on site at any given time. The site map will be attached to the inventory, showing where the hazardous substances are stored.
 - (4) Material Safety Data Sheets for inventoried materials not required in other section of this specification.
 - (5) Labeling system to identify contents on all containers on-site.
 - (6) Plan for communicating high health hazards to employees and adjacent occupants.
- g. Hazardous Energy Control Plan. For hazardous energy sources, comply with EM-385-1-1, paragraph 12.A.07.
- h. Critical Lift Plan. Weight handling critical lift plans shall be prepared and signed in accordance with EM-385-1-1, paragraph 16.c.18.]
- i. Alcohol and Drug Abuse Plan
- (1) Describe plan for random checks and testing with pre-employment screening in accordance with the DFAR Clause subpart 252.223-7004, "Drug Free Work Force."
 - (2) Description of the on-site prevention program
- j. Fall Protection and Prevention (FP&P) Plan. The plan shall be site specific and address all fall hazards in the work place. It shall address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A qualified person shall prepare the plan. The plan shall include fall protection and prevention systems, equipment and methods employed, responsibilities, rescue and escape equipment and operations, training requirements, and monitoring methods. FP&P Plan shall be revised [once every six months] for lengthy projects, to reflect any new changes during the course of construction, due to changes of personnel, equipment, systems or work habits.
- k. Silica Exposure Reduction. The plan shall include specific procedures to prevent employee silica inhalation exposures.
- n. Site Demolition Plan. The safety and health aspects prepared in accordance with Section 02 41 00, "Site Demolition" and referenced sources.'
- o. Excavation Plan. The safety and health aspects prepared in accordance with Section 31 23 00, "Excavation and Fill".
- p. Training Records and Requirements. List of mandatory training and certifications which are applicable to this project (e.g. explosive actuated tools, confined space entry, fall protection,

crane operation, vehicle operator, forklift operators, personal protective equipment); list of requirements for periodic retraining/certification; outline requirements for supervisory and employee safety meetings.

- q. Severe Weather Plan. Procedures of ceasing on-site operations during lightning or upon reaching maximum allowed wind velocities.
- r. Emergency Lighting and Power Systems Plan (e.g. periodic testing of batteries for emergency lighting.)

1.7 ACTIVITY HAZARD ANALYSIS (AHA)

Prepare for each phase of the work. As a minimum, define activity being performed, sequence of work, specific hazards anticipated, control measures to eliminate or reduce each hazard to acceptable levels, training requirements for all involved, and the competent person in charge of that phase of work. For work with fall hazards, including fall hazards associated with scaffold erection and removal, identify the appropriate fall arrest systems. For work with materials handling equipment, address safeguarding measures related to materials handling equipment. For work requiring excavations, include excavation safeguarding requirements. The appropriate AHA shall be reviewed and attendance documented by the Contractor at the preparatory, initial, and follow-up phases of quality control inspection.

1.9 DRUG PREVENTION PROGRAM

Conduct a proactive drug and alcohol use prevention program for all workers, prime and subcontractor, on the site. Ensure that no employees either use illegal drugs or consume alcohol during work hours. Ensure there are no employees under the influence of drugs or alcohol during work hours. After accidents, collect blood, urine or saliva specimens and test injured employee's influence. A copy of the test shall be made available to the Contracting Officer upon request.

1.10 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

1.10.1 Scaffolds

Delineate the fall protection requirements necessary during the erection and dismantling operation of scaffolds used on the project in the Fall Protection and Prevention (FP&P) plan and activity hazard analysis for the phase of work.

1.10.2 Training

Institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, Contractor shall provide training for each employee who might be exposed to fall hazards.

1.11 DUTIES OF THE SAFETY OFFICER

- a. Ensure construction hazards are identified and corrected.
- b. Maintain applicable safety reference material on the job site.
- c. Maintain a log of safety inspections performed.
- d. Attend the pre-construction conference as required.
- e. Identify hazardous conditions and take corrective action. Failure to do so will result in a dismissal from the site, with a work stoppage pending approval of suitable replacement personnel.

1.12 DISPLAY OF SAFETY INFORMATION

Display the following information in clear view of the on-site construction personnel:

- a. Map denoting the route to the nearest emergency care facility with emergency phone numbers.
- b. AHA
- c. Confined space entry permit.

1.13 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in the article "References." Maintain applicable equipment manufacturers' manuals.

1.14 FIRE/MEDICAL EMERGENCIES

Contact USNA FIRE DEPARTMENT. Call (410)-293-3333
Information that will be requested by Emergency Dispatcher

- 1. Name
- 2. Address, or building (example: Bancroft Hall, 1st deck, room 5155)
- 3. Phone number you are calling from.
- 4. What type of emergency.
- 5. Are you calling from a safe location.
- 6. Remember to stay on the line until the dispatcher has all information requested.

The Emergency Medical Personnel will decide what Medical facility the patient will be transported.

1.17 REPORTS

1.17.1 Accident Reports

- a. For recordable occupational injuries and illnesses, the Prime Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the Navy Contractor Significant Incident Report (CSIR) form and provide to the Contracting Officer within 5 calendar days of the accident. The Contracting Officer will provide a copy of the CSIR form.
- b. For a weight handling equipment accident the Prime Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the WHE Accident Report form and provide to the Contracting Officer within 30 calendar days of the accident. The Contracting Officer will provide a copy of the WHE accident report form.

1.17.2 Notification

Notify the Contracting Officer as soon as practical, but not later than four hours, of any accident meeting the definition of Recordable Occupational Injuries or Illnesses or Significant Accidents. Information shall include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; and brief description of accident (to include type of construction equipment used, PPE used, etc.).

1.17.3 Monthly Exposure Report

Monthly exposure reporting, to the Contracting Officer is required to be attached to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor.

1.17.4 OSHA Citations and Violations

Provide the Contracting Officer with a copy of each OSHA citation, OSHA report and contractor response. Correct violations and citations promptly and provide written corrective actions to the Contracting Officer.

1.17.5 Crane Notification

Notify Contracting Officer at least 15 days prior to bringing any crane equipment on-site so that the contracting officer may arrange for any additional quality assurance spot checks necessary by the government.

PART 2 PRODUCTS

2.1 FALL PROTECTION ANCHORAGE

Fall protection anchorage, conforming to ANSI Z359.1, will be left in place and so identified for continued customer use.

2.2 CONFINED SPACE SIGNAGE

Provide permanent signs integral to or securely attached to access covers for new permit required confined spaces. Signs wording: "DANGER--PERMIT REQUIRED CONFINED SPACE - DO NOT ENTER -" on bold letters a minimum of one inch in height and constructed to be clearly legible with all paint removed. The signal word "DANGER" shall be red and readable from 5 feet.

PART 3 EXECUTION

3.1 CONSTRUCTION

Comply with EM-385-1-1, NFPA 241, the accident prevention plan, the activity hazard analysis and other related submittals and activity fire and safety regulations.

3.1.1 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint are prohibited. Exceptions to the use of any of the above excluded materials may be considered by Contracting Officer upon written request by Contractor.

3.1.2 Unforeseen Hazardous Material

If material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages a minimum of 15 days in advance. As a minimum, the request should include the location of the outage, utilities being effected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved and prior to beginning work on the utility system requiring shut down, the Contractor shall attend a pre-outage coordination meeting with the ROICC and the Station Utilities Department to review the scope of work and the lock out/tag out procedures for worker protection. No work will be performed on energized electrical equipment unless proven impassable. Working equipment "hot" must be considered the last option.

3.3 PERSONNEL PROTECTION

3.3.1 Hazardous Noise

Provide hazardous noise signs, and hearing protection, wherever equipment and work procedures produce sound-pressure levels greater than 85 dBA steady state or 140 dBA impulse, regardless of the duration of the exposure.

3.3.2 Fall Protection

Enforce use of the fall protection device designated for each specific work activity in the FP&P plan and/or AHA all times when an employee is on a surface 6 feet or more above lower levels. Personal fall arrest systems are required when working from an articulating or extendible boom, scissor lifts, swing stages, or suspended platform. Fall protection must comply with ANSI A10.14.

3.3.2.1 Personal Fall Arrest Device

Personal fall arrest device equipment, systems, subsystems, and components shall meet ANSI Z359.1, "Safety Requirements for Personal Fall Arrest Systems". Only a full-body harness with a shock absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest device. Body belts may only be used as a positioning device system such as steel reinforcing assembly and in conjunction with another fall arrest system. Harnesses shall have a fall arrest attachment, which is a connector, affixed to the body support (usually a D-ring) and specifically designated for attachment to the rest of the system. Only double locking snap hooks and carabiners shall be used. Webbing, straps, and ropes shall be made of synthetic fiber.

3.3.2.2 Fall Protection for Roofing Work

Fall protection controls shall be implemented based on the type of roof being constructed and work being performed. The roof area to be accessed shall be evaluated for its structural integrity including weight-bearing capabilities for the projected loading.

3.3.2.2.1 Low Sloped Roofs

- a. For work within 6 feet of an edge, on low-slope roofs, personnel shall be protected from falling by use of personal fall arrest systems, guardrails, or safety nets. Safety monitoring system is not adequate fall protection and is not authorized.
- b. For work greater than 6 feet from an edge, warning lines shall be erected and installed in accordance with 29 CFR 1926.502(f).

3.3.2.2.2 Steep Roofs

Work on steep roofs requires personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also includes residential or housing type construction.

3.3.2.3 Safety Nets

If safety nets are used as the selected fall protection system on the project, they shall be provided at unguarded workplaces, over water, machinery, dangerous operations and leading edge work.

3.3.2.4 Existing Anchorage

Existing anchorages, used for attachment of personal fall arrest equipment, if to be used by the Contractor, shall be re-certified by the contractor's fall protection engineer (QP).

3.4 SCAFFOLDING

Employees shall be provided with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Stair towers or ladders built into scaffold systems in accordance with USACE EM 385-1-1 Appendix J are required for work platforms greater than 20 feet in height. Contractor shall ensure that employees that are qualified perform scaffold erection. Do not use scaffold without the capability of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection plan. Minimum platform size shall be based on the platform not being greater in height than three times the dimension of the smallest width dimension for rolling scaffold. Some Baker type scaffolding has been found not to meet these requirements. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward. Special care shall be given to ensure scaffold systems are not overloaded. Outrigger brackets used to extend scaffold platforms on self supported scaffold systems for the storage of material is prohibited. The first tie-in shall be at the height equal to 4 times the width of the smallest dimension of the scaffold base.

3.5 EQUIPMENT

3.5.1 Material Handling Equipment

- a. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.
- b. The use of hooks on equipment for lifting of material must be in accordance with manufacturers printed instructions.

3.5.2 Weight Handling Equipment

- a. Cranes must be equipped with:
 - (1) Load Indicating Devices (LIDs) and a Boom Angle or Radius Indicator,
 - (2) or Load-Moment Indicating Devices (LMIs).
 - (3) Anti-two-block prevention devices.
 - (4) Boom Hoist Hydraulic Relief Valve, Disconnect, or Shutoff (stops hoist when boom reaches a predetermined high angle).
 - (5) Boom Length Indicator (for telescoping booms).

- (6) Device to prevent uncontrolled lowering of a telescoping hydraulic boom.
- (7) Device to prevent uncontrolled retraction of a telescoping hydraulic boom.
- b. The Contractor shall notify the Contracting Officer, in advance, of any cranes entering the activity so that necessary quality assurance spot checks can be coordinated.
- c. The Contractor shall comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Erection shall be performed under the supervision of a designated person (as defined in ASME B30.5). All testing shall be performed in accordance with the manufacturers recommended procedures.
- d. The Contractor shall comply with ASME B30.5 for mobile cranes, and ASME B30.22 for articulating boom cranes.
- e. The presence of Naval station safety and health inspectors does not relieve the Contractor of an obligation to comply with all applicable safety regulations. The Government will investigate all complaints of unsafe or unhealthful working conditions received in writing from contractor employees, federal civilian employees, or military personnel.
- f. Each load shall be rigged/attached independently to the hook/master-link in such a fashion that the load cannot slide or otherwise become detached. Christmas-tree lifting (multiple rigged materials) is not allowed.
- g. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and shall follow the requirements of ASME B30.5 or ASME B30.22 as applicable.
- h. Crane supported work platforms shall only be used in extreme conditions if the Contractor proves that using any other access to the work location would provide a greater hazard to the workers. Personnel shall not be lifted with a live hoist or friction crane.
- i. A fire extinguisher having a minimum rating of 10BC and a minimum nominal capacity of 5lb of extinguishing agent shall be available at all operator stations or cabs of cranes. Portable fire extinguishers shall be inspected, maintained, and recharged as specified in NFPA 10, Standard for Portable Fire Extinguishers.
- j. All employees shall be kept clear of loads about to be lifted and of suspended loads.
- k. A weight handling equipment operator shall not leave his position at the controls while a load is suspended.
- l. A Contractor Crane Operation Checklist shall be used by the CQC representative during oversight of contractor crane operations (refer to COE EM-385-1-1 Appendix H and ROICC for copies).
- m. Only contractor crane operators who have met the requirements of 29 CFR 1910.94, 29 CFR 1910.120, 29 CFR 1926.65, 29 CFR 1926.502(f), COE EM-385-1-1, ASME B30.5, and ASME B30.22 and other local and state requirements shall be authorized to operate the crane.
- n. Cribbing shall be utilized by the Contractor when performing lifts on outriggers.
- o. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

- p. A physical barricade must be positioned to prevent personnel from entering the tailswing area of the crane.
- q. A substantial and durable rating chart containing legible letters and figures shall be provided with each crane and securely mounted onto the crane cab in a location allowing easy reading by the operator while seated in the control station.
- r. Certification records which include the date of inspection, signature of the person performing the inspection along with the serial number or other identifier of the crane which was inspected. This record will always be available for review by contracting officer personnel.
- s. Written reports listing the load test procedures utilized along with any repairs or alterations performed on the crane will be available for review by the contracting officer personnel.
- t. Contractor shall certify that all of the crane operators have been trained not to bypass safety devices (e.g. anti-two block devices) during lifting operations.

3.6 EXCAVATIONS

The competent person for excavation performed as a result of contract work shall be on-site when work is being performed in excavation, and shall inspect excavations prior to entry by workers. The competent person must evaluate for all hazards, including atmospheric, that may be associated with the work, and shall have the resources necessary to correct hazards promptly. Prior to digging the appropriate digging permit must be obtained. All underground utilities in the work area must be positively identified by a utility locating service and coordinated with Station Utility Departments. The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system. If construction is parallel to an existing utility the utility shall be exposed by hand digging every 30 m (100 feet) if parallel within 5 feet of the excavation. Trench and shoring systems must be identified in the accepted safety plan and activity hazard analysis. Extreme care must be used when excavating near direct burial electric underground cables. Trenching machines with digging chain drives shall be operated only when the spotters/laborers are in plain view of the operator. Operator and spotters/laborers shall be provided training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Documentation of the training shall be kept on file in the project site office or trailer.

3.7 ELECTRICAL

3.7.1 Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cable intended to be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the Contracting Officer and Station Utilities for identification. The Contracting Officer will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cutting remotely. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers shall be permitted to enter. When work requires Contractor to work near energized circuits as defined by the NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. Insulating blankets, hearing protection, and switching suits may be required, depending on the specific job and as delineated in the Contractor AHA.

3.7.2 Portable Extension Cords

Portable extension cords shall be sized in accordance with manufacturer ratings for the tool to be powered.

3.8 WORK IN CONFINED SPACES

Comply with the requirements in Section 06.I of EM-385-1-1. Any potential for a hazard in the confined space requires a permit system to be used.

- a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 06.I.05 of EM-385-1-1 for entry procedures.) All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.
- b. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained.
- c. Ensure the use of rescue and retrieval devices in confined spaces greater than 5 feet in depth. Conform to Sections 06.I.09, 06.I.10 and 06.I.11 of EM-385-1-1.
- d. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.
- e. Include training information for employees who will be involved as entrant attendants for the work. Conform to Section 06.I.06 of EM-385-1-1.
- f. Entry Permit. Use ENIFORM 5044-R or other form with the same minimum information for the Daily Confined Space Entry Permit, completed by the qualified person. Post the permit in a conspicuous place close to the confined space entrance.

3.9 CRYSTALLINE SILICA

Grinding, abrasive blasting, and foundry operations of construction materials containing crystalline silica, shall comply with OSHA regulations, such as 29 CFR 1910.94, and EM-385-1-1, (Appendix C). The Contractor shall develop and implement effective exposure control and elimination procedures to include dust control systems, engineering controls, and establishment of work area boundaries, as well as medical surveillance, training, air monitoring, and personal protective equipment.

3.10 HOUSEKEEPING

3.10.1 Clean-up

All debris in work areas shall be cleaned up daily or more frequently as necessary. Construction debris may be temporarily located in an approved location, however garbage accumulation must be removed each day.

3.10.2 Dust Control

In addition to the dust control measures required elsewhere in the contract documents dry cutting of brick or masonry shall be prohibited. Wet cutting must address control of water run off.

3.11 ACCIDENT SCENE PRESERVATION

For serious accidents, and accidents involving weight handling equipment, ensure the accident site is secured and evidence is protected remaining undisturbed until released by the Contracting Officer.

3.12 FIELD QUALITY CONTROL

3.12.1 Inspections

Include safety inspection as a part of the daily Quality Control inspections required in Section 01 45 02, "Quality Control".

3.13 FLAMMABLE AND COMBUSTIBLE LIQUID HANDLING AND STORAGE

3.13.1 Safety Gas Containers

Handling of flammable and combustible liquids shall be in safety containers with flame arresters, with not more than 5 gallons capacity, having a spring-closing lid and spout cover and designed to safely relieve internal pressures under fire exposures. Flammable and combustible Liquids shall be stored in separate NFPA approved storage cabinets 50 feet away from any sources of ignition with suitable NO SMOKING OR OPEN FLAME signs posted in all such areas.

--- End of Section ---

SECTION 01 45 02

NAVFAC QUALITY CONTROL

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 in the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 52.2 (2007; Interpretation 1: 2007) Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

ASTM INTERNATIONAL (ASTM)

ASTM D 6245 (2007) Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation

ASTM D 6345 (1998; R 2003e1) Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1507 (1995) IAQ Guidance for Occupied Buildings Under Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2003) Safety -- Safety and Health Requirements

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED (2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

LEED Reference Guide (2005) LEED-NC Reference Guide for New Construction

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-01 Preconstruction Submittals

Quality Control (QC) plan; G

Submit a QC plan within 15 calendar days after receipt of Notice of Award.

1.3 INFORMATION FOR THE CONTRACTING OFFICER

Deliver the following to the Contracting Officer:

- a. Combined Contractor Production Report/Contractor Quality Control Report (1 sheet): Original and 1 copy, by 10:00 AM the next working day after each day that work is performed;
- b. Field Test Reports: 2 copies, within 2 working days after the test is performed, attached to the Contractor Quality Control Report;
- c. Monthly Summary Report of Tests: 2 copies attached to the Contractor Quality Control Report;
- d. Testing Plan and Log, 2 copies, at the end of each month;
- e. Rework Items List: 2 copies, by the last working day of the month
- f. QC Meeting Minutes: 2 copies, within 2 working days after the meeting and
- g. QC Certifications: As required by the paragraph entitled "QC Certifications."

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. The QC program consists of a QC Manager, a QC Plan, a Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review and approval, testing, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this contract. The QC program shall cover on-site and off-site work and shall be keyed to the work sequence.

1.4.1 Preliminary Work Authorized Prior to Approval

The only work that is authorized to proceed prior to the approval of the QC plan is mobilization of storage and office trailers, temporary utilities, and surveying.

1.4.2 Approval

Approval of the QC plan is required prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC Plan and operations as necessary to ensure the specified quality of work. The Contracting Officer reserves the right to interview any member of the QC organization at any time in order to verify the submitted qualifications.

1.4.3 Notification of Changes

Notify the Contracting Officer, in writing, of any proposed change, including changes in the QC organization personnel, minimum of seven calendar days prior to a proposed change. Proposed changes must be approved by the Contracting Officer.

1.5 QC MANAGER

1.5.1 Duties

Provide a QC Manager at the work site to implement and manage the QC program. The Superintendent may also serve as QC Manager. In addition to implementing and managing the QC program, the QC Manager may perform the duties of project superintendent. The QC Manager is required to attend the Coordination and Mutual Understanding Meeting, conduct the QC meetings,

perform the three phases of control, perform submittal review, perform submittal approval, ensure testing is performed and provide QC certifications and documentation required in this Contract. The QC Manager is responsible for managing and coordinating the three phases of control and documentation performed by Testing Laboratory personnel and any other inspection and testing personnel required by this Contract.

1.5.2 Qualifications

An individual with a minimum of 5 years experience as a superintendent, inspector, QC Manager, project manager, or construction manager on similar size and type construction contracts which included the major trades that are part of this Contract.

1.5.3 Alternate QC Manager Duties and Qualifications

Designate an alternate for the QC Manager at the work site to serve in the event of the designated QC Manager's absence. The period of absence may not exceed two weeks at one time, and not more than 30 workdays during a calendar year. The qualification requirements for the Alternate QC Manager shall be the same as for the QC Manager.

1.7 QUALITY CONTROL (QC) PLAN

1.7.1 Requirements

Provide for approval by the Contracting Officer, a QC plan submitted in a 3-ring binder that covers, both on-site and off-site work and includes, the following:

a. A table of contents listing the major sections identified with tabs in the following order:

- I. QC ORGANIZATION
- II. NAMES AND QUALIFICATIONS
- III. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONEL
- IV. OUTSIDE ORGANIZATIONS
- V. APPOINTMENT LETTERS
- VI. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER
- VII. TESTING LABORATORY INFORMATION
- VIII. TESTING PLAN AND LOG
- IX. PROCEDURES TO COMPLETE REWORK ITEMS
- X. DOCUMENTATION PROCEDURES
- XI. PROCEDURES FOR IMPLEMENTING THREE PHASES OF CONTROL
- XII. THREE PHASE CONTROL CHECKLIST
- XIII. PERSONNEL MATRIX

b. A chart showing the QC organizational structure and its relationship to the production side of the organization.

c. Names and qualifications, in resume format, for each person in the QC organization.

d. Duties, responsibilities and authorities of each person in the QC organization.

e. A listing of outside organizations such as architects, and consulting engineering firms that will be employed by the Contractor and a description of the services these firms will provide.

f. A letter signed by an officer of the firm appointing the QC Manager and stating that he/she is responsible for managing and implementing the QC program as described in this contract. Include in this letter the QC Manager's authority to direct the removal and replacement of non-conforming work.

- g. Procedures for reviewing, approving and managing submittals. Provide the name[s] of the person[s] in the QC organization authorized to review and certify submittals prior to approval.
- h. Testing laboratory information required by the paragraphs entitled "Accredited Laboratories" or "Testing Laboratory Requirements", as applicable.
- i. A Testing Plan log that indicates the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test.
- j. Procedures to identify, record, track and complete rework items.
- k. Documentation procedures, including proposed report formats.
- l. Provide a Three Phase Control Plan (inspection) Checklist: This Checklist shall:
 - 1. List of definable features of work by specification section. A Definable feature of work (DFOW) is a task which is separate and distinct from other tasks and requires separate control procedures. As a minimum consider each section of each division of the specifications as a definable feature of work. However, at times there may be more than one definable feature of work in each section and of the specifications.
 - 2. Schedule preparatory, initial and follow-up phase controls for each definable feature of work.
 - 3. Be keyed to the construction schedule and in the order of the construction sections.
 - 4. Include all controls and tests required by the contract documents.

1.8 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan, and prior to the start of construction, meet with the Contracting Officer to discuss the QC program required by this Contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration for on-site and off-site work, and the coordination of the Contractor's management, production and the QC personnel. At the meeting, the Contractor will be required to explain in detail how three phases of control will be implemented for each definable feature of work. As a minimum, the Contractor's personnel required to attend shall include the project manager, project superintendent, QC Manager, and subcontractor representatives. Each subcontractor who will be assigned QC responsibilities shall have a principal of the firm at the meeting. Minutes of the meeting will be prepared by the QC Manager and signed by both the Contractor and the Contracting Officer. A copy of the signed minutes shall be provided to all attendees by the Contractor.

1.9 QC MEETINGS

After the start of construction, the QC Manager shall conduct QC meetings once every two weeks at the work site with the project superintendent and the foreman responsible for the upcoming work. The QC Manager shall prepare the minutes of the meeting and provide a copy to the Contracting Officer within 2 working days after the meeting. The Contracting Officer may attend any of these meetings. The QC Manager shall notify the Contracting Officer at least 48 hours in advance of each meeting. As a minimum, the following shall be accomplished at each meeting:

- a. Review the minutes of the previous meeting;
- b. Review the schedule and the status of work:

- Work or testing accomplished since last meeting
 - Rework items identified since last meeting
 - Rework items completed since last meeting;
- c. Review the status of submittals:
- Submittals reviewed and approved since last meeting
 - Submittals required in the near future;
- d. Review the work to be accomplished in the next 2 weeks and documentation required:
- Establish completion dates for rework items
 - Update the schedule showing planned and actual dates of the preparatory, initial and follow-up phases, including testing and any other inspection required by this Contract.
 - Discuss construction methods and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each definable feature of work.
 - Discuss status of off-site work or testing
 - Documentation required;
- e. Resolve QC and production problems; and
- f. Address items that may require revising the QC plan:
- Changes in procedures.

1.10 THREE PHASES OF CONTROL

The three phases of control shall adequately cover both on-site and off-site work and shall include the following for each definable feature of work.

1.10.1 Preparatory Phase

Notify the Contracting Officer at least 2 working days in advance of each preparatory phase. Conduct the preparatory phase with the superintendent, and the foreman responsible for the definable feature of work. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report and in the Quality Control checklist. Perform the following prior to beginning work on each definable feature of work:

- a. Review each paragraph of the applicable specification sections;
- b. Review the contract drawings;
- c. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required;
- d. Review the testing plan and ensure that provisions have been made to provide the required QC testing;

- e. Examine the work area to ensure that the required preliminary work has been completed;
- f. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data;
- g. Review the safety plan and appropriate activity hazard analysis to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted; and
- h. Discuss construction methods and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each definable feature of work.

1.10.2 Initial Phase

Notify the Contracting Officer at least 2 working days in advance of each initial phase. When construction crews are ready to start work on a definable feature of work, conduct the initial phase with the foreman responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with Contract requirements. Document the results of the initial phase in the daily Contractor Quality Control Report and in the Quality Control checklist. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each definable feature of work:

- a. Establish the quality of workmanship required;
- b. Resolve conflicts;
- c. Review the Safety Plan and the appropriate activity hazard analysis to ensure that applicable safety requirements are met; and
- d. Ensure that testing is performed.

1.10.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary until the completion of each definable feature of work and document in the daily Contractor Quality Control Report and in the Quality Control checklist:

- a. Ensure the work is in compliance with Contract requirements;
- b. Maintain the quality of workmanship required;
- c. Ensure that testing is performed; and
- d. Ensure that rework items are being corrected.

1.10.4 Notification of Three Phases of Control for Off-Site Work

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

1.11 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review and approval of submittals are described in section entitled "Submittal Procedures."

1.12 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under this contract.

1.12.1 Testing Laboratory Requirements

Provide an independent testing laboratory qualified to perform sampling and tests required by this contract. When the proposed testing laboratory is not accredited by an acceptable accreditation program as described by the paragraph entitled "Accredited Laboratories", submit to the Contracting Officer for approval, certified statements signed by an official of the testing laboratory attesting that the proposed laboratory meets or conforms to the following requirements:

- a. Laboratories engaged in testing of construction materials shall meet the requirements of ASTM E 329.
- b. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C 1077.
- c. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D 3666.
- d. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D 3740.
- e. Laboratories engaged in nondestructive testing (NDT) shall meet the requirements of ASTM E 543.
- f. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA.

1.12.2 Accredited Laboratories

Acceptable accreditation programs are the National Institute of Standards and Technology (NIST)/National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO) program and the American Association for Laboratory Accreditation (A2LA) program. Furnish to the Contracting Officer a copy of the Certificate of Accreditation and Scope of Accreditation and latest directory of the accrediting organization for accredited laboratories. The scope of the laboratory's accreditation shall include the test methods required by the contract.

1.12.3 Inspection of Testing Laboratories

Prior to approval of non-accredited laboratories, the proposed testing laboratory facilities and records may be subject to inspection by the Contracting Officer. Records subject to inspection include equipment inventory, equipment calibration dates and procedures, library of test procedures, audit and inspection reports by agencies conducting laboratory evaluations and certifications, testing and management personnel qualifications, test report forms, and the internal QC procedures.

1.12.4 Capability Check

The Contracting Officer retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this contract. If an item tested fails to conform, the Contracting Officer must be notified immediately.

1.12.5 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If item fails to conform, notify the Contracting Officer immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results shall be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. Furnish a summary report of field tests at the end of each month. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month.

1.12.6 Test Reports and Monthly Summary Report of Tests

The QC Manager shall furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the Contracting Officer. Attach a copy of the summary report to the last daily Contractor Quality Report of each month.

1.13 QC CERTIFICATIONS

1.13.1 Contractor Quality Control Report Certification

Each Contractor Quality Control Report shall contain the following statement: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report."

1.13.2 Invoice Certification

Furnish a certificate to the Contracting Officer with each payment request, signed by the QC Manager, attesting that as-built drawings are current and attesting that the work for which payment is requested, including stored material, is in compliance with contract requirements.

1.13.3 Completion Certification

Upon completion of work under this contract, the QC Manager shall furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the contract."

1.14 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities.

1.14.1 Contractor Production Report

Reports are required for each day that work is performed and shall be attached to the Contractor Quality Control Report prepared for the same day. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Production Reports are to be prepared, signed and dated by the project superintendent and shall contain the following information:

- a. Date of report, report number, name of Contractor, Contract number, title and location of Contract and superintendent present.
- b. Weather conditions in the morning and in the afternoon including maximum and minimum temperatures.

- c. A list of Contractor and subcontractor personnel on the work site, their trades, employer, work location, description of work performed and hours worked.
- d. A list of job safety actions taken and safety inspections conducted. Indicate that safety requirements have been met including the results on the following:
 - Was a job safety meeting held? (If YES, attach a copy of the meeting minutes)
 - Were there any lost time accidents? (If YES, attach a copy of the completed OSHA report.)
 - Was crane/trenching/scaffold/high voltage electrical/high work done? (If YES, attach a statement or checklist showing inspection performed.)
 - Was hazardous material/waste released into the environment? (If YES, attach a description of meetings held and accidents that happened.)
- e. A list of equipment/material received each day that is incorporated into the job.
- f. A list of construction and plant equipment on the work site including the number of hours used, idle and down for repair.
- g. Include a "remarks" section in this report which will contain pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site.

1.14.2 Contractor Quality Control Report

Reports are required for each day that work is performed and for every seven consecutive calendar days of no-work and on the last day of a no-work period. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Quality Control Reports are to be prepared, signed and dated by the QC Manager and shall contain the following information:

- a. Identify the control phase and the definable feature of work.
- b. Results of the Preparatory Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work, the drawings and specifications have been reviewed, submittals have been approved, materials comply with approved submittals, materials are stored properly, preliminary work was done correctly, the testing plan has been reviewed, and work methods and schedule have been discussed.
- c. Results of the Initial Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work the preliminary work was done correctly, samples have been prepared and approved, the workmanship is satisfactory, test results are acceptable, work is in compliance with the Contract, and the required testing has been performed and include a list of who performed the tests.
- d. Results of the Follow-up Phase inspections held including the location of the definable feature of work. Indicate in the report for this definable feature of work that the work complies with the

Contract as approved in the Initial Phase, and that required testing has been performed and include a list of who performed the tests.

- e. Results of the three phases of control for off-site work, if applicable, including actions taken.
- f. List the rework items identified, but not corrected by close of business.
- g. List the rework items corrected from the rework items list along with the corrective action taken.
- h. Include a "remarks" section in this report which will contain pertinent information including directions received, quality control problem areas, deviations from the QC plan, construction deficiencies encountered, QC meetings held, acknowledgement that as-built drawings have been updated, corrective direction given by the QC Manager and corrective action taken by the Contractor.
- i. Contractor Quality Control Report certification.

1.14.3 Quality Control Checklist

Maintain a Quality Control Checklist for each definable feature of work. Each control check should indicate that the work performed complies with contract requirements.

1.14.5 Testing Plan and Log

As tests are performed, the QC Manager shall record on the "Testing Plan and Log" the date the test was conducted, the date the test results were forwarded to the Contracting Officer, any remarks and acknowledgement that an accredited or Contracting Officer approved testing laboratory was used. Attach a copy of the updated "Testing Plan and Log" to the last daily Contractor Quality Control Report of each month.

1.14.6 Rework Items List

The QC Manager shall maintain a list of work that does not comply with the contract, identifying what items need to be reworked, the date the item was originally discovered, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the "Contractor Rework Items List" to the last daily Contractor Quality Control Report of each month. The Contractor shall be responsible for including on this list items needing rework including those identified by the Contracting Officer.

1.14.7 As-Built Drawings

The QC Manager is required to review the as-built drawings required by Section 01770, "Closeout Procedures," to ensure that as-built drawings are kept current on a daily basis and marked to show deviations which have been made from the Contract drawings. The QC Manager shall initial each deviation or revision. Upon completion of work, the QC Manager shall submit a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

--- End of Section ---

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS

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 WATER WORKS ASSOCIATION (AWWA)

AWWA C511 (1997e1) Standard for Reduced-Pressure Principle Backflow Prevention Assembly

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR List (continuously updated) List of Approved Backflow Prevention Assemblies

FCCCHR Manual (1988e9) Manual of Cross-Connection Control

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241 (2004) Safeguarding Construction, Alteration, and Demolition Operations

NFPA 70 (2007) National Electrical Code - 2008 Edition

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1 (Rev K) Obstruction Marking and Lighting

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD (2003, Rev 2007) Manual of Uniform Traffic Control Devices

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-01 Preconstruction Submittals

Traffic control plan; G

1.3 TEMPORARY UTILITIES

Reasonable amounts of electricity and potable water will be made available to the Contractor without charge.

The point at which the Government will deliver such utilities or services and the quantity available is as indicated. The Contractor shall pay all costs incurred in connecting, converting, and transferring the utilities to the work. The Contractor shall make connections, including providing backflow-preventing

devices on connections to domestic water lines; providing meters; and providing transformers; and make disconnections. Under no circumstances will taps to base fire hydrants be allowed for obtaining domestic water.

1.3.1 Contractor Utilities

The Contractor shall provide his own utilities.

1.4 WEATHER PROTECTION

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

1.4.1 Building and Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions shall include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

1.5 STORAGE AREAS

The two open sites available for storage shall be as indicated. The storage areas shall be approximately 1000 and 600 square feet respectively.

1.6 TEMPORARY SANITARY FACILITIES

Provide adequate sanitary conveniences of a type approved for the use of persons employed on the work, properly secluded from public observation, and maintained in such a manner as required and approved by the Contracting Officer. Maintain these conveniences at all times without nuisance. Upon completion of the work, remove the conveniences from the premises, leaving the premises clean and free from nuisance. Dispose of sewage through connection to a municipal, district, or station sanitary sewage system. Where such systems are not available, use chemical toilets or comparably effective units, and periodically empty wastes into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Include provisions for pest control and elimination of odors.

1.7 TEMPORARY BUILDINGS

Temporary facilities (including trailers) shall be in like new condition. Locate these facilities where directed and within the indicated operations area. Storage of material/debris under such facilities is prohibited. Contractor shall be responsible for the security of the stored property.

1.8.1 Trailers or Storage Buildings

Trailers or storage buildings will be permitted, where space is available, subject to the approval of the Contracting Officer. The trailers or buildings shall be in good condition, free from visible damage rust and deterioration, and meet all applicable safety requirements. Trailers shall be roadworthy and comply with all appropriate state and local vehicle requirements. Failure to maintain storage trailers or buildings to these standards shall result in the removal of non-complying units at the Contractor's expense. A sign not smaller than 24 by 24 inches shall be conspicuously placed on the trailer depicting the company name, business phone number, and emergency phone number. Trailers shall

be anchored to resist high winds and must meet applicable state of local standards for anchoring mobile trailers.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 TEMPORARY PHYSICAL CONTROLS

3.1.1 Access Controls

3.1.1.1 Signs

Place warning signs at the construction area perimeter designating the presence of construction hazards requiring unauthorized persons to keep out. Signs must be placed on all sides of the project, with at least one sign every 300 feet. All points of entry shall have signs designating the construction site as a hard hat area.

3.1.1.1 Traffic Work

All work around/involving roadways, to include roadway excavations and utility crossings, will be conducted in accordance with Manual of Traffic Control Devices (2003, Rev. 2007). Contractors shall provide and ensure appropriate road closure and detour signs are established as necessary for motor traffic management. All road closures shall be coordinated with the Contracting Officer in advance. Self-illuminated (lighted) barricades shall be provided during hours of darkness. Brightly-colored (orange) vests are required for all personnel working in roadways. Road closures shall require a road closure plan showing the location of signage.

3.2 TEMPORARY WIRING

Provide temporary wiring in accordance with NFPA 241 and NFPA 70, Article 305-6(b), Assured Equipment Grounding Conductor Program. Program shall include frequent inspection of all equipment and apparatus.

--- End of Section ---

SECTION 01 57 19.00 20

TEMPORARY ENVIRONMENTAL CONTROLS

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 in the text by the basic designation only.

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 530/F-93/004	(1993; Rev O; Updates I, II, IIA, IIB, and III) Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II) (SW-846)
EPA 833-R-060-04	(2000) Developing Your Storm Water Pollution Prevention Plan, a Guide for Construction Sites

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 112	Oil Pollution Prevention
40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities

40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 271	Requirements for Authorization of State Hazardous Waste Programs
40 CFR 272	Approved State Hazardous Waste Management Programs
40 CFR 273	Standards For Universal Waste Management
40 CFR 279	Standards for the Management of Used Oil
40 CFR 280	Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 355	Emergency Planning and Notification
40 CFR 372-SUBPART D	Specific Toxic Chemical Listings
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
40 CFR 82	Protection of Stratospheric Ozone
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Sediment

Soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.2 Solid Waste

Garbage, refuse, debris, sludge, or other discharged material (except hazardous waste as defined in paragraph entitled "Hazardous Waste" or hazardous debris as defined in paragraph entitled "Hazardous Debris"), including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations. Material not regulated as solid waste are: nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

- a. Green waste: The vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.
- b. Surplus soil: Existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included.
- c. Inert construction and demolition debris: Broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may be re-inforced with or contain ferrous wire, rods, accessories and weldments.
- d. Wood: Dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated and/or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included.
- e. Scrap metal: Scrap and excess ferrous and non-ferrous metals such as re-inforcing steel, structural shapes, pipe and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.
- f. Paint cans: Metal cans that are empty of paints, solvents, thinners and adhesives. If permitted by the paint can label, a thin dry film may remain in the can.
- g. Recyclables: Materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable. Metal meeting the definition of lead contaminated or lead based paint contaminated may not be included as recyclable if sold to a scrap metal company. Paint cans may not be included as recyclable if sold to a scrap metal company.

1.2.3 Debris

Non-hazardous solid material generated during the construction, demolition, or renovation of a structure which exceeds 2.5 inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.2.4 Hazardous Debris

As defined in paragraph entitled "Debris" of this section, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) per 40 CFR 261; or debris that exhibits a characteristic of hazardous waste per 40 CFR 261.

1.2.5 Chemical Wastes

This includes salts, acids, alkalies, herbicides, pesticides, and organic chemicals.

1.2.6 Garbage

Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2.7 Hazardous Waste

Hazardous waste as defined in 40 CFR 261 or as defined by applicable State and local regulations.

1.2.8 Oily Waste

Petroleum products and bituminous materials.

1.2.9 Class I Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act and includes the following chemicals:

chlorofluorocarbon-11 (CFC-11)	chlorofluorocarbon-213 (CFC-213)
chlorofluorocarbon-12 (CFC-12)	chlorofluorocarbon-214 (CFC-214)
chlorofluorocarbon-13 (CFC-13)	chlorofluorocarbon-215 (CFC-215)
chlorofluorocarbon-111 (CFC-111)	chlorofluorocarbon-216 (CFC-216)
chlorofluorocarbon-112 (CFC-112)	chlorofluorocarbon-217 (CFC-217)
chlorofluorocarbon-113 (CFC-113)	halon-1211
chlorofluorocarbon-114 (CFC-114)	halon-1301
chlorofluorocarbon-115 (CFC-115)	halon-2402
chlorofluorocarbon-211 (CFC-211)	carbon tetrachloride
chlorofluorocarbon-212 (CFC-212)	methyl chloroform

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-01 Preconstruction Submittals

Environmental protection plan; G

SD-11 Closeout Submittals

Some of the records listed below are also required as part of other submittals. For the "Records" submittal, maintain on-site a separate three-ring Environmental Records binder and submit at the completion of the project. Make separate parts to the binder corresponding to each of the applicable sub-items listed below.

Preconstruction survey

Solid waste disposal permit

Waste determination documentation

Disposal documentation for hazardous and regulated waste

Contractor 40 CFR employee training records

Regulatory notification

Solid waste disposal report

1.6 REPORTS

1.6.1 Preconstruction Survey

Perform a preconstruction survey of the project site with the Contracting Officer, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record.

1.6.2 Solid Waste Disposal Permit

Submit one copy of a State and local permit or license showing such agencies' approval of the disposal plan before transporting wastes off Government property.

1.6.3 Waste Determination Documentation

The Contractor shall complete a Waste Determination form (provided at the pre-construction conference) for all contractor derived wastes to be generated. The waste determination must be based upon either a constituent listing from the manufacturer used in conjunction with consideration of the process by which the waste was generated, EPA approved analytical data, or laboratory analysis (Material Safety Data Sheets (MSDS) by themselves are not adequate). All support documentation must be attached to the Waste Determination form. As a minimum, a Waste Determination form must be provided for the following wastes (this listing is not all inclusive): oil and latex based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and all containers of the original materials.

1.6.4 Disposal Documentation for Hazardous and Regulated Waste

Submit a copy of the applicable EPA [and State] permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities.

1.7 CLASS I ODS PROHIBITION

Class I ODS as defined and identified herein shall not be used in the performance of this contract, nor be provided as part of the equipment. This prohibition shall be considered to prevail over any other provision, specification, drawing, or referenced documents.

1.8 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

1.8.2 Licenses and Permits

Obtain licenses and permits pursuant to the "Permits and Responsibilities" FAR Clause.

For permits obtained by the Contracting Officer, whether or not required by the permit, the Contractor is responsible to perform quality control inspections of the work in progress, and to submit notifications and certifications to the applicable regulatory agency, via the Contracting Officer, that the work conforms to the contract and permit requirements. The inspections and certifications shall be provided through the services of a Professional Engineer, registered in the State where the work is being

performed. As a part of the quality control plan, which is required to be submitted for approval by the quality control section, provide a subitem containing the name, P.E. registration number, address, and telephone number of the professional engineer(s) who will be performing the inspections and certifications for each permit listed above.

1.8.3 Contractor Liabilities for Environmental Protection

The Contractor is advised that this project and the station are subject to Federal, State, and local regulatory agency inspections to review compliance with environmental laws and regulations. The Contractor shall fully cooperate with any representative from any Federal, State or local regulatory agency who may visit the job site and shall provide immediate notification to the Contracting Officer, who shall accompany them on any subsequent site inspections. The Contractor shall complete, maintain, and make available to the Contracting Officer, station, or regulatory agency personnel all documentation relating to environmental compliance under applicable Federal, State and local laws and regulations. The Contractor shall immediately notify the Contracting Officer if a Notice of Violation (NOV) is issued to the Contractor.

The Contractor shall be responsible for all damages to persons or property resulting from Contractor fault or negligence as well as for the payment of any civil fines or penalties which may be assessed by any Federal, State or local regulatory agency as a result of the Contractor's or any subcontractor's violation of any applicable Federal, State or local environmental law or regulation. Should a Notice of Violation (NOV), Notice of Noncompliance (NON), Notice of Deficiency (NOD), or similar regulatory agency notice be issued to the Government as facility owner/operator on account of the actions or inactions of the Contractor or one of its subcontractors in the performance of work under this contract, the Contractor shall fully cooperate with the Government in defending against regulatory assessment of any civil fines or penalties arising out of such actions or inactions.

1.10 ENVIRONMENTAL PROTECTION PLAN

Five days after the award of contract, the Contractor shall meet with the Contracting Officer to discuss the proposed Environmental Protection Plan and develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, and other measures to be taken. The Environmental Protection Plan shall be submitted in the following format and shall, at a minimum, address the following elements (also refer to paragraph entitled "Protection of Natural Resources" in this section):

- a. Description of the Environmental Protection Plan
 - (1) General overview and purpose
 - (2) General site information
- b. Protection of Natural Resources
 - (1) Land resources
 - (2) Tree protection
 - (3) Replacement of damaged landscape features
 - (4) Temporary construction
 - (5) Stream crossings
 - (6) Fish and wildlife resources

- (7) Wetland areas
- c. Protection of Historical and Archaeological Resources
 - (1) Objectives
 - (2) Methods
- d. Storm Water Management and Control
 - (1) Ground cover
 - (2) Erodible soils
 - (3) Temporary measures
 - (a) Mechanical retardation and control of runoff
 - (b) Vegetation and mulch
- e. Prevention of Releases to the Environment
 - (1) Procedures to prevent releases to the environment
 - (2) Notifications in the event of a release to the environment
- f. Protection of the Environment from Waste Derived from Contractor Operations
 - (1) Control and disposal of solid and sanitary waste
 - (2) Control and disposal of hazardous waste (Hazardous Waste Management Section)
 - This item shall consist of the management procedures for all hazardous waste to be generated. The elements of those procedures shall coincide with the Activity Hazardous Waste Management Plan. A copy of the Activity Hazardous Waste Management Plan will be provided by the Contracting Officer. As a minimum, include the following:
 - (a) Procedures to be employed to ensure a written waste determination is made for appropriate wastes which are to be generated;
 - (b) Sampling/analysis plan;
 - (c) Methods of hazardous waste accumulation/storage (i.e., in tanks and/or containers);
 - (d) Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted);
 - (e) Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268);
 - (f) Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and the like;
 - (g) Used oil management procedures in accordance with 40 CFR 279;

- (h) Pollution prevention\hazardous waste minimization procedures;
- (i) Plans for the disposal of hazardous waste by permitted facilities;
- (j) Procedures to be employed to ensure all required employee training records are maintained.

1.10.1 Environmental Protection Plan Review

Fourteen days after the environmental protection meeting, submit the proposed Environmental Protection Plan for further discussion, review, and approval. Commencement of work shall not begin until the environmental protection plan has been approved.

1.11 UNFORESEEN HAZARDOUS OR REGULATED MATERIAL

If material that is not indicated in the contract documents is encountered that may be dangerous to human health upon disturbance during construction operations, stop that portion of work and notify the Contracting Officer immediately. Intent is to identify materials such as PCB, lead paint, mercury, petroleum products, and friable and nonfriable asbestos. Within 14 calendar days the Government will determine if the material is hazardous. If the material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If the material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified. Conform to the national permitting requirements of the Clean Water Act.

3.1.1 Land Resources

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor shall be responsible for any resultant damage.

3.1.1.1 Protection of Trees

Protect existing trees which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed.

3.1.1.2 Replacement

Remove trees and other landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged trees and landscape features. Obtain Contracting Officer's approval before replacement.

3.1.2 Water Resources

3.1.2.1 Stream Crossings

The Contracting Officer's approval is required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain Contracting Officer's approval prior to installation. Remove temporary culverts or bridges upon completion of work, and repair the area [to its original condition] [or] [as indicated] [or] [as specified].

3.1.2.2 Oily and Hazardous Substances

Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water. For oil, fuel oil, or other hazardous substance spills, verbally notify the Contracting Officer immediately. Surround all temporary fuel oil or petroleum storage tanks with a temporary earth berm of sufficient size and strength to contain the contents of the tanks in the event of leakage or spillage.

3.1.3 Fish and Wildlife Resources

Do not disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as indicated or specified.

3.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Carefully protect in-place and report immediately to the Contracting Officer historical and archaeological items or human skeletal remains discovered in the course of work. Stop work in the immediate area of the discovery until directed by the Contracting Officer to resume work. The Government retains ownership and control over historical and archaeological resources.

3.3 EROSION AND SEDIMENT CONTROL MEASURES

Comply with the approved Erosion and Sediment Control Plan, Notes, and Details in the drawings.

3.4 CONTROL AND DISPOSAL OF SOLID WASTES

Pick up solid wastes, and place in covered containers which are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Recycling is encouraged and can be coordinated with the Contracting Officer and the activity recycling coordinator. Remove all solid waste (including non-hazardous debris) from Government property and dispose off-site at an approved landfill. Solid waste disposal off-site must comply with most stringent local, State, and Federal requirements including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

3.5 CONTROL AND DISPOSAL OF HAZARDOUS WASTES

3.5.1 Hazardous Waste/Debris Management

The Contractor shall identify all construction activities which will generate hazardous waste/debris. The Contractor must provide a documented waste determination for all resultant waste streams. Hazardous waste/debris shall be identified, labeled, handled, stored, and disposed of in accordance with all Federal, State, and local regulations including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268. Hazardous waste shall also be managed in accordance with the approved Hazardous Waste Management Section of the Environmental Protection Plan. Store hazardous wastes in approved containers in accordance with 49 CFR 173. Hazardous waste generated within the confines of Government facilities shall be identified as being generated by the Government. Prior to removal of any hazardous waste from Government property, all hazardous

waste manifests must be signed by activity personnel from the Station Environmental Office. No hazardous waste shall be brought onto Government property. Provide to the Contracting Officer a copy of waste determination documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D. For hazardous wastes spills, verbally notify the Contracting Officer immediately.

3.5.1.1 Regulated Waste Storage/Satellite Accumulation/90 Day Storage Areas

If the work requires the temporary storage/collection of regulated or hazardous wastes, the Contractor may request the establishment of a Regulated Waste Storage Area, a Satellite Accumulation Area, or a 90 Day Storage Area at the point of generation. The Contractor must submit a request in writing to the Contracting Officer providing the following information:

Contract Number _____ Contractor _____

Haz/Waste or
Regulated Waste POC _____ Phone Number _____

Type of Waste _____ Source of Waste _____

Emergency POC _____ Phone Number _____

Location of the Site: _____
(Attach Site Plan to the Request)

Attach a waste determination form. Allow ten working days for processing this request.

3.5.2 Pollution Prevention/Hazardous Waste Minimization

The Contractor shall actively pursue minimizing the use of hazardous materials and the generation of hazardous waste while on-base. The Hazardous Waste Management Section of the Environmental Protection Plan shall include the Contractor's procedures for pollution prevention/ hazardous waste minimization. For preparing this part of the plan, the Contractor may consult the activity Environmental Office for suggestions and to obtain a copy of the installation's pollution prevention/hazardous waste minimization plan for reference material. If no written plan exists, the Contractor may obtain information by contacting the Contracting Officer. The Contractor shall describe the types of the hazardous materials expected to be used in the construction when requesting information.

3.5.3 Hazardous Material Control

The Contractor shall include hazardous material control procedures in the Safety Plan. The procedures shall address and ensure the proper handling of hazardous materials, including the appropriate transportation requirements. The Contractor shall submit a MSDS and estimated quantities to be used for each hazardous material to the Contracting Officer prior to bringing the material on base. Typical materials requiring MSDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. At the end of the project, the Contractor shall provide the Contracting Officer with the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used. The Contractor shall also ensure that hazardous materials are utilized in a manner that will minimize the amount of hazardous waste that is generated. The Contractor shall ensure that all containers of hazardous materials have NFPA labels or their equivalent. Copies of the MSDS for hazardous materials shall be kept on site at all times and provided to the Contracting Officer at the end of the project. The Contractor shall certify that all hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste per 40 CFR 261.

3.5.4 Petroleum Products

Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. All used oil generated on site shall be managed in accordance with 40 CFR 279. The Contractor shall determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. In addition, used oil containing 1000 parts per million of solvents will be considered a hazardous waste and disposed of at Contractor's expense. Used oil mixed with a hazardous waste will also be considered a hazardous waste. All hazardous waste will be managed in accordance with the paragraph entitled Hazardous Waste/Debris Management of this section and shall be managed in accordance with the approved Environmental Protection Plan.

3.5.5 Spills of Oil and Hazardous Materials

Take precautions to prevent spills of oil and hazardous material. In the event of a spill, immediately notify the Contracting Officer. Spill response shall be in accordance with 40 CFR 300 and applicable State regulations.

3.6 DUST CONTROL

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

3.7 ABRASIVE BLASTING

3.7.1 Blasting Operations

The use of silica sand is prohibited in sandblasting.

Provide tarpaulin drop cloths and windscreens to enclose abrasive blasting operations to confine and collect dust, abrasive, agent, paint chips, and other debris. Perform work involving removal of hazardous material in accordance with 29 CFR 1910.

3.7.2 Disposal Requirements

Submit analytical results of the debris generated from abrasive blasting operations per paragraph entitled Laboratory Analysis of this section. Hazardous waste generated from blasting operations shall be managed in accordance with paragraph entitled "Hazardous Waste/Debris Management" of this section and with the approved HWMP. [Disposal of non-hazardous abrasive blasting debris shall be in accordance with paragraph entitled, "Control and Disposal of Solid Wastes".]

3.8 NOISE

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted without written permission from the Contracting Officer, and then only during the designated times. Confine pile-driving operations to the period between 8 a.m. and 4 p.m., Monday through Friday, exclusive of holidays, unless otherwise specified.

SECTION 01 74 19

WASTE MANAGEMENT

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Construction and Demolition Waste

Solid wastes such as building materials, packaging and rubble resulting from construction, remodeling, demolition and repair of buildings/facilities, paving and infrastructure.

1.1.2 Recyclable Materials

Products and materials that can be recovered and remanufactured into a new product. Recyclable materials include, but are not limited to, the following:

- a. Metals (ferrous and non-ferrous), including banding, metal studs, ductwork, piping
- b. Asphaltic concrete paving
- c. Portland cement concrete
- d. Land clearing debris including trees and plant materials
- e. Native rock and granular fill
- f. Gypsum products
- g. Paper and cardboard
- h. Wood products, including structural, finish, crates and pallets
- i. Brick and masonry
- j. Carpet and padding
- k. Plastics
- l. Copper wiring
- m. Mechanical and electrical products and equipment

1.1.3 Recycling Facility

A business that specializes in collecting, handling, processing, distributing, or remanufacturing waste materials generated by demolition and new construction projects, into products or materials that can be used for this project or by others.

1.1.4 Salvage and Reuse

Existing usable product or material that can be saved and reused in some manner on the project site. Materials that can be salvaged and reused must comply with the applicable technical specifications and include, but are not limited to, the following:

- a. Dimensional lumber and other wood products
- b. Structural steel
- c. Soil
- d. Masonry products

1.1.5 Salvage for Resale

Existing usable product or material that can be saved and removed intact (as is) from the project site to another site for resale to others without remanufacturing.

1.1.6 Trash

Product or material unable to be salvaged for resale, salvaged and reused, returned, or recycled.

1.1.7 Waste Materials

Product or material that can be salvaged for resale, salvaged and reused, returned to vendors, or recycled.

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-01 Preconstruction Submittals

Waste Management Plan; G

1.3 CONSTRUCTION WASTE MANAGEMENT

1.3.1 General Intent

The Contractor shall use all means available to divert to the greatest extent practical and economically feasible, construction and demolition waste from landfills and incinerators.

1.3.2 Construction Waste Management Operations

Take a pro-active, responsible role in management of construction waste and require all subcontractors, vendors, and suppliers to participate in the effort. Establish a construction waste management program that includes the following categories:

- a. Minimizing Packaging Waste
- b. Salvage and reuse
- c. Salvage for resale or donation
- d. Recycling
- e. Disposal

Salvage and reuse is a better waste management method than recycling because little or no reprocessing is necessary, thus less pollution is created when items are reused in their original form. Therefore, a diligent effort shall be made to salvage and reuse products and materials. Waste

materials that cannot be salvaged and reused, and have value as being recyclable, shall be recycled. Only trash shall be transported to a landfill or incinerator. The Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling construction waste for this project. Revenues or other savings obtained for recycling or returns shall accrue to the Contractor.

1.3.3 Construction Waste Management Plan

Perform a waste analysis to determine the types and quantity of construction waste anticipated and identify salvage for resale, salvage and reuse, recycling and disposal options available. Within 30 days after contract award and prior to performing any demolition work, submit a Waste Management Plan for review and approval. The Waste Management Plan shall include the following:

- a. Project waste analysis.
- b. Projected cost of disposing of all trash and waste materials as if there would be no salvage or recycling on this project.
- c. Name, address and phone number for each landfill or incinerator facility to be utilized.
- d. Tipping fee for each landfill or incinerator.
- e. A list of waste materials that will be salvaged for resale, salvaged and reused, and recycled.
- f. Identification of each recycling facility to be utilized.
- g. Anticipated net cost savings determined by subtracting the cost of separating and recycling from the following:
 - 1. Savings due to reuse of demolished materials.
 - 2. Revenue from the sale of salvaged and recycled materials.
 - 3. Landfill or incinerator tipping fees saved due to diversion of materials to recycling.
- h. Description of the method to be employed in recycling waste materials and description of the method that will be used to protect recycled materials from contamination.
- i. Description of the means of transportation of recyclable materials and the destination of the materials.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PROGRAM IMPLEMENTATION AND MONITORING

Implement and maintain, for the duration of the project, the construction waste management program. Establish a method of monitoring and documenting the program, and submit a periodic report with each application for payment that includes the following:

- a. Amount (by weight) and type of waste materials disposed of in a landfill or incinerator, the tip fee per ton, and the total cost of disposal including transportation costs, container rental costs, etc.

- b. Amount (by weight) and type of materials salvaged for sale, salvaged for reuse, and recycled. Provide destination, means of transportation, cost of transportation and handling, tipping fee savings and revenue generated for each material.
- c. Cost savings due to salvaging, reusing, and recycling materials.

3.1.1 Hazardous Materials/Hazardous Wastes

If any non-acceptable materials such as hazardous materials or hazardous wastes are encountered, notify the Contracting Officer.

3.2 SALVAGE AND REUSE

Encourage the practice of efficient waste management when, sizing, cutting, and installing products and materials.

3.3 SEPARATION OF RECYCLABLE WASTE MATERIALS

Provide the necessary containers and bins, to facilitate the waste management program, that are clearly and appropriately marked. Prevent contamination of recyclable materials from incompatible products and materials. Separate construction waste at the project site by one of the following methods:

- a. Source Separated Method: Waste products and materials, that are recyclable, are separated from trash and sorted into appropriately marked separate containers and then transported to the respective recycling facility for further processing. Trash is transported to a landfill or incinerator.
- b. Co-Mingled Method: All construction waste is placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed and the remaining trash is transported to a landfill or incinerator.
- c. Other methods proposed by the Contractor and approved by the Contracting Officer.

--- End of Section ---

SECTION 01 78 00

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-11 Closeout Submittals

As-built drawings; G

1.2 PROJECT RECORD DOCUMENTS

1.2.1 As-Built Drawings

"FAC 5252.236-9310, Record Drawings." In addition to the requirements of FAC 5252.236-9310, the Contractor shall survey the horizontal and vertical location of all underground utilities to within 0.1 feet relative to the station datum. All pipe utilities shall be surveyed at each fitting and every 100 LF of run length. Electrical and communication ductbank, direct buried conduit, and direct buried conductor shall be surveyed every 100 LF and at each change of direction. Locations and elevations shall be recorded on the Record Drawings. Submit drawings with QC certification. Submit drawings in AutoCAD 2002 format.

1.3 CLEANUP

Leave premises "broom clean." Clean debris from roofs, gutters, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

SECTION 02 41 00

DEMOLITION AND DECONSTRUCTION

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.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2003) Safety - Safety and Health Requirements Manual

1.2 GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Contracting Officer. Remove rubbish and debris from the project site daily; do not allow accumulations. The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Rubbish and debris shall be removed from Government property daily, unless otherwise directed, to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer. In the interest of occupational safety and health, the work shall be performed in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections. In the interest of conservation, salvage shall be pursued to the maximum extent possible (in accordance with Section 01 74 19, WASTE MANAGEMENT). If applicable, salvaged items and materials shall be disposed of as specified.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00. SUBMITTAL PROCEDURES:

SD-07 Certificates

Demolition plan; G,

SD-11 Closeout Submittals

Receipts

Receipts or bills of lading, as specified.

1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," safety requirements shall conform with ANSI A10.6.

1.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of debris.

1.6 PROTECTION

1.6.1 Traffic Control Signs

Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Contracting Officer prior to beginning such work.

1.6.2 Existing Work

Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government; any damaged items shall be repaired or replaced as approved by the Contracting Officer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement must have Contracting Officer approval.

1.6.3 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas so as to ensure effectiveness and to prevent displacement.

1.6.4 Trees

Trees within the project site which might be damaged during demolition, and which are indicated to be left in place, shall be protected by a 6 foot high fence. The fence shall be securely erected a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Any tree designated to remain that is damaged during the work under this contract shall be replaced in kind or as approved by the Contracting Officer. See Drawing 33 for additional Tree Protection Fence information.

1.6.5 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, shall remain standing without additional bracing, shoring, or lateral support until demolished, unless directed otherwise by the Contracting Officer. The Contractor shall ensure that no elements determined to be unstable are left unsupported and shall be responsible for placing and securing bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.6.6 Protection of Personnel

During the demolition work the Contractor shall continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral

support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.7 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair items to be relocated which are damaged or replace damaged items with new undamaged items as approved by the Contracting Officer.

1.8 REQUIRED DATA

Demolition plan shall include procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. The procedures shall provide for safe conduct of the work in accordance with EM 385-1-1.

1.9 USE OF EXPLOSIVES

Use of explosives will not be permitted.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Structures

Existing structures, sidewalks, curbs, gutters and street light bases shall be removed as indicated.

3.1.2 Utilities and Related Equipment

Remove existing utilities as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Contracting Officer. If utility lines are encountered that are not shown on drawings, contact the Contracting Officer for further instructions.

3.1.3 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs including aggregate base as indicated to a depth indicated. Provide neat saw-cuts at limits of pavement removal as indicated.

3.1.4 Concrete

Saw concrete along straight lines to a depth of not less than 3 inches. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete.

3.2 DISPOSITION OF MATERIAL

3.2.1 Title to Materials

Except where specified in other sections, all materials and equipment removed, and not reused, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition and removal procedures, and authorization by the Contracting Officer to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

3.2.2 Reuse of Materials and Equipment

Remove and store materials and equipment as indicated to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.2.3 Salvaged Materials and Equipment

Remove materials and equipment that are indicated to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site as directed within 6 miles of the work site.

Contractor shall salvage items and material to the maximum extent possible.

Material salvaged for the Contractor shall be stored as approved by the Contracting Officer and shall be removed from Government property before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.

Salvaged items to remain the property of the Government shall be removed in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage shall be repaired or replaced to match existing items. Containers shall be properly identified as to contents.

3.3 CLEANUP

Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

-- End of Section --

SECTION 04 20 00

UNIT MASONRY

1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 90	(2006b) Load-bearing Concrete Masonry Units
ASTM C 91	(2005) Masonry Cement
ASTM C 94/C 94M	(2007) Ready-Mixed Concrete
ASTM C 144	(2004) Aggregate for Masonry Mortar
ASTM C 150	(2007) Portland Cement
ASTM C 207	(2006) Hydrated Lime for Masonry Purposes
ASTM C 270	(2008) Mortar for Unit Masonry
ASTM C 476	(2008) Grout for Masonry
ASTM C 780	(2008) Preconstruction and Construction Evaluations of Mortars for Plain and Reinforced Unit Masonry
ASTM C 1072	(2006) Measurement of Masonry Flexural Bond Strength
ASTM C 1142	(1995I R 2007) Extended Life Mortar for Unit Masonry
ASTM E 514	(2008) Water Penetration and Leakage Through Masonry

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

ICBO UBC	(1997) Uniform Building Code
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1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-03 Product Data

Pre-mixed mortar

Expansion joints

Submit for each type.

SD-04 Samples

Masonry units; G

Mortar color; G

Submit three sets of each type masonry units, showing full range of color, texture, finish, and dimensions and two samples of each color of mortar.

SD-06 Test Reports

Unit strength method

Mortar properties

1.3 QUALITY ASSURANCE

1.3.1 Appearance

Do not change source or supply of materials after brick manufacturing work has started. Bricks shall be manufactured at one time and from the same batch. Blend all brick to produce a uniform appearance when installed. An observable "banding" or "layering" of colors or textures caused by improperly mixed brick is unacceptable.

1.3.2 Testing

Masonry strength shall be determined in accordance with ACI 530.1 and the cost of testing shall be paid by the Contractor.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver cementitious materials to the site in unbroken containers, plainly marked and labeled with manufacturers' names and brands. Store cementitious materials in dry, weathertight sheds or enclosures and handle so as to prevent entry of foreign materials and damage by water or dampness. Store masonry units off the ground and handle with care to avoid chipping and breakage. Protect materials from damage and, except for sand, keep dry until used. Cover sand to prevent intrusion of water and foreign materials and to prevent drying. Do not use materials containing frost or ice. Store Type II, concrete masonry units at the site for a minimum of 28 days for air cured units, 10 days for atmospheric steam or water cured units, and 3 days for units cured with steam at a pressure of 120 to 150 psi and at a temperature of 350 to 365 degrees F for at least 5 hours. Protect moisture controlled units (Type I) from rain and ground water.

1.5 ENVIRONMENTAL CONDITIONS

1.5.1 Hot Weather Construction

ACI 530.1.

1.5.2 Cold Weather Construction

ACI 530.1.

1.6 SCHEDULING

Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching.

PART 2 PRODUCTS

2.1 MASONRY UNITS

2.1.1 Brick Pavers for Maryland Avenue

Shall be 3" x 9 1/4" x 3 3/4", Boardwalk, #41 from Capital Brick and Tile or equal.

2.1.2 Brick Pavers for Sidewalks

Shall be P/B Red Range #37-35-705, 2 1/4" x 4" x 8" from General Shale Brick or equal.

2.2 MORTAR

2.2.1 Mortar Properties

ASTM C 270, Type M. Air content shall not be less than 11 percent for freeze thaw durability. Where colored mortar is indicated, add pigment to obtain the mortar color indicated. The quantity of metallic oxide pigment relative to the cementitious content of the mortar mix shall be no more than 10 percent by weight. Carbon black shall be no more than 2 percent by weight. Compressive strength shall equal.

2.2.1.1 Portland Cement

ASTM C 150, Type I

2.2.1.2 Sand

ASTM C 144.

2.2.1.3 Water

Clean, potable, and free from substances which could adversely affect the mortar.

2.2.2 Pre-Mixed Mortar

ASTM C 1142, Type RM.

2.3 Expansion Joint

See Section 02752, Concrete Pavement for Roads and Site Facilities.

2.4 Sealant

See Section 02752, Concrete Pavements for Roads and Site Facilities.

PART 3 EXECUTION

3.1 PREPARATION

Prior to start of work, masonry inspector shall verify the applicable conditions as set forth in ACI 530.1, inspection. The Officer in Charge of Construction will serve as inspector or will select a masonry inspector.

3.1.1 Protection

- a. Stains: Protect exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces with fiber brushes and wooden paddles. Protect base of walls from splash stains by covering adjacent ground with sand, sawdust, or polyethylene.
- b. Loads: Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed.
- c. Provide temporary bracing as required.

3.1.2 Surface Preparation

Surfaces on which masonry is to be placed shall be smooth, clean, and free of foreign substances when mortar is applied.

3.2 FIELD QUALITY CONTROL

3.2.1 Mortar Strength and Properties

ASTM C 780, for the first 3 consecutive days, and each third day thereafter.

3.3 MORTAR MIXING

Measure mortar materials in one cu. ft. containers to maintain control and accuracy of proportions. Do not measure materials with shovels. Mix mortar in a mechanical batch mixer for not less than 3 nor more than 5 minutes after all ingredients are in so as to produce a uniform mixture. Add water gradually as required to produce a workable consistency. Do not load mixer beyond its rated capacity. Keep mortar boxes, pans, and mixer drums clean and free of debris and dried mortar. Retemper mortar which has stiffened because of evaporation by adding water and mixing to obtain a workable consistency. Do not use or retemper mortar which has not been placed in final position within 2 1/2 hours after the initial mixing. Do not use antifreeze compounds, salts, or other substances to lower the freezing point of mortar.

- a. Mortar: Mix mortar in accordance with ASTM C 270 to obtain type mortar required. Where colored mortars are required, pigments may be added at the site or provided as part of prepackaged mortar mix. When masonry cement is provided, conform to masonry cement manufacturer's printed mixing instructions. During mixing, add water-repellant admixture in quantity recommended by the admixture manufacturer to mortar which will be used in exterior concrete masonry unit walls.

3.4 MORTAR JOINTS

Uniform thickness of 3/8 inch unless otherwise indicated. Tool exposed joints slightly concave with a round or other suitable jointer when the mortar is thumbprint hard.

3.5 TOLERANCES

The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavements shall be within the tolerances specified in Table 1 when checked with the straightedge.

TABLE 1
STRAIGHTEDGE SURFACE SMOOTHNESS--PAVEMENTS

Pavement Category	Direction of Testing	Tolerances (inches)
Roads and Streets	Longitudinal	3/16
	Transverse	1/4

3.5.1.1 Surface Smoothness Testing Method

The surface of the pavement shall be tested with the straightedge to identify all surface irregularities exceeding the tolerances specified above. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines approximately 15 feet apart. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length and measuring the maximum gap between the straightedge and the pavement surface, in the area between these two high points.

3.6 BRICKWORK

Provide brickwork that conforms to requirements of paragraph entitled "Tolerances" of this section. Select and place brick so that better face of stretchers and headers is exposed.

3.7 EXPANSION JOINTS

Provide where indicated in brick road. Fill joints with a permanently flexible preformed filler material and a sealant as specified below.

3.8 CLEANING

3.8.1 Protection

During cleaning operations, protect work which may be damaged, stained, or discolored.

3.8.2 Pointing

Upon completion of masonry work and before cleaning, cut out defective mortar joints and tuck point joints and all holes solidly with pre-hydrated mortar.

3.8.3 Cleaning

Clean exposed masonry surfaces with clear water and stiff fiber brushes and rinse with clear water. Where stains, mortar, or other soil remain, continue scrubbing with warm water and detergent. Where soil still remains on brickwork, continue cleaning as follows: Clean light-colored brickwork surfaces with non-acid or buffered-acid cleaners as recommended by the brick manufacturer. Use cleaners in accordance with the instructions and recommendations of the brick and cleaner manufacturers. Immediately after cleaning each area, rinse thoroughly with clear water. Do not use caustic solutions or sandblasting to clean surfaces. Masonry shall be free of stains, efflorescence, mortar or grout

droppings, and debris. Restore damaged, stained, and discolored work to original condition or provide new work.

SECTION 31 05 19**GEOTEXTILE**

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 4354	(1999; R 2004) Sampling of Geosynthetics for Testing
ASTM D 4355	(2007) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4491	(1999a; R 2004e1) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2004) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 2003) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D 4759	(2002; R 2007) Determining the Specification Conformance of Geosynthetics
ASTM D 4833	(2007) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(2002) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturing Quality Control Sampling and Testing

A minimum of 7 days prior to scheduled use, manufacturer's quality control manual.

SD-04 Samples

Quality Assurance Samples and Tests

Samples for quality assurance testing; 7 days shall be allotted in the schedule to allow for testing.

SD-07 Certificates

Geotextile

A minimum of 7 days prior to scheduled use, manufacturer's certificate of compliance stating that the geotextile meets the requirements of this section. For needle punched geotextiles, the manufacturer shall also certify that the geotextile has been continuously inspected using permanent on-line full-width metal detectors and does not contain any needles which could damage other geosynthetic layers. The certificate of compliance shall be attested to by a person having legal authority to bind the geotextile manufacturer.

1.3 DELIVERY, STORAGE AND HANDLING

Delivery, storage, and handling of geotextile shall be in accordance with ASTM D 4873.

1.3.1 Delivery

The Contracting Officer shall be notified a minimum of 24 hours prior to delivery and unloading of geotextile rolls. Rolls shall be packaged in an opaque, waterproof, protective plastic wrapping. The plastic wrapping shall not be removed until deployment. If quality assurance samples are collected, rolls shall be immediately rewrapped with the plastic wrapping. Geotextile or plastic wrapping damaged during storage or handling shall be repaired or replaced, as directed. Each roll shall be labeled with the manufacturer's name, geotextile type, roll number, roll dimensions (length, width, gross weight), and date manufactured.

1.3.2 Storage

Rolls of geotextile shall be protected from construction equipment, chemicals, sparks and flames, temperatures in excess of 160 degrees F, or any other environmental condition that may damage the physical properties of the geotextile. To protect geotextile from becoming saturated, rolls shall either be elevated off the ground or placed on a sacrificial sheet of plastic in an area where water will not accumulate.

1.3.3 Handling

Geotextile rolls shall be handled and unloaded with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Rolls shall not be dragged along the ground, lifted by one end, or dropped to the ground.

PART 2 PRODUCTS

2.1 RAW MATERIALS

2.1.1 Geotextile

Geotextile shall be a woven pervious sheet of polymeric material and shall consist of long-chain synthetic polymers composed of at least 95 percent by weight polyolefins, polyesters, or polyamides. The use of woven slit film geotextiles (i.e. geotextiles made from yarns of a flat, tape-like character) will not be allowed. Stabilizers and/or inhibitors shall be added to the base polymer, as needed, to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Regrind material, which consists of edge trimmings and other scraps that have never reached the consumer, may be used to produce the geotextile. Post-consumer recycled material shall not be used. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Geotextiles shall meet the requirements specified in Table 1. Where

applicable, Table 1 property values represent minimum average roll values (MARV) in the weakest principal direction. Values for AOS represent maximum average roll values.

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR DRAINAGE GEOTEXTILE

PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
GRAB STRENGTH	LBS	160	ASTM D 4632
PUNCTURE	LBS	55	ASTM D 4833
TRAPEZOID TEAR	LBS	55	ASTM D 4533
ULTRAVIOLET DEGRADATION	PERCENT	50 AT 500 HRS	ASTM D 4355

2.2 MANUFACTURING QUALITY CONTROL SAMPLING AND TESTING

The Manufacturer shall be responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request. Manufacturing quality control sampling and testing shall be performed in accordance with the manufacturer's approved quality control manual. As a minimum, geotextiles shall be randomly sampled for testing in accordance with ASTM D 4354, Procedure A. Acceptance of geotextile shall be in accordance with ASTM D 4759. Tests not meeting the specified requirements shall result in the rejection of applicable rolls.

PART 3 EXECUTION

3.1 QUALITY ASSURANCE SAMPLES AND TESTS

3.1.1 Quality Assurance Samples

The Contractor shall provide assistance to the Contracting Officer in the collection of quality assurance samples. Samples shall be collected upon delivery to the site for quality assurance testing at the request of the Contracting Officer in accordance with ASTM D 4354, Procedure B. Lot size for quality assurance sampling shall be considered to be the shipment quantity of the product or a truckload of the product, whichever is smaller. The unit size shall be considered one roll of geotextile. Samples shall be identified with a waterproof marker by manufacturer's name, product identification, lot number, roll number, and machine direction. The date and a unique sample number shall also be noted on the sample. The outer layer of the geotextile roll shall be discarded prior to sampling a roll. Samples shall then be collected by cutting the full-width of the geotextile sheet a minimum of 3 feet long in the machine direction. Rolls which are sampled shall be immediately resealed in their protective covering.

3.2 INSTALLATION

3.2.1 Subgrade Preparation

The surface underlying the geotextile shall be smooth and free of ruts or protrusions which could damage the geotextile. Subgrade materials and compaction requirements shall be in accordance with Section 31 23 00, Excavation and Fill.

3.2.2 Placement

The Contractor shall notify the Contracting Officer a minimum of 24 hours prior to installation of geotextile. Geotextile rolls which are damaged or contain imperfections shall be repaired or replaced as directed. The geotextile shall be laid flat and smooth so that it is in direct contact with the subgrade. The geotextile shall also be free of tensile stresses, folds, and wrinkles. On slopes steeper than 10 horizontal on 1 vertical, the geotextile shall be laid with the machine direction of the fabric parallel to the slope direction.

3.3 SEAMS

3.3.1 Overlap Seams

Geotextile panels shall be continuously overlapped a minimum of 12 inches at all longitudinal and transverse joints. Where seams must be oriented across the slope, the upper panel shall be lapped over the lower panel. If approved, sewn seams may be used instead of overlapped seams.

3.4 PROTECTION

The geotextile shall be protected during installation from clogging, tears, and other damage. Damaged geotextile shall be repaired or replaced as directed. Adequate ballast (e.g. sand bags) shall be used to prevent uplift by wind. The geotextile shall not be left uncovered for more than 14 days after installation.

3.5 REPAIRS

Torn or damaged geotextile shall be repaired. Clogged areas of geotextile shall be removed. Repairs shall be performed by placing a patch of the same type of geotextile over the damaged area. The patch shall extend a minimum of 12 inches beyond the edge of the damaged area. Patches shall be continuously fastened using approved methods. The machine direction of the patch shall be aligned with the machine direction of the geotextile being repaired. Geotextile rolls which cannot be repaired shall be removed and replaced. Repairs shall be performed at no additional cost to the Government.

3.6 PENETRATIONS

Engineered penetrations of the geotextile shall be constructed as shown on the drawings.

3.7 COVERING

Geotextile shall not be covered prior to inspection and approval by the Contracting Officer. Cover soil shall be placed in a manner that prevents soil from entering the geotextile overlap zone, prevents tensile stress from being mobilized in the geotextile, and prevents wrinkles from folding over onto themselves. On side slopes, soil backfill shall be placed from the bottom of the slope upward. Cover soil shall not be dropped onto the geotextile from a height greater than 3 feet. No equipment shall be operated directly on top of the geotextile without approval of the Contracting Officer. Equipment with ground pressures less than 7 psi shall be used to place the first lift over the geotextile. A minimum of 12 inches of soil shall be maintained between full-scale construction equipment and the geotextile. Cover soil material type, compaction, and testing requirements are described in Section 31 23 00 Excavation and Fill. Equipment placing cover soil shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding 5 mph.

-- End of Section --

SECTION 31 05 21**GEOGRID REINFORCEMENT**

PART 1 GENERAL

1.1 SUMMARY

Section Includes - Geogrid reinforcement of base/subbase course and/or subgrade improvement in the construction of paved or unpaved roadways, parking areas, container yards, and similar installations. Design details for geogrid reinforcement, such as geogrid type, fill thickness, pavement cross-section and associated details, shall be as shown on the contract drawings. Work consists of:

1. Providing supplier representative for pre-construction conference with the Contractor and the Engineer.
2. Furnishing geogrids as specified herein and shown on the contract drawings.
3. Storing, cutting, and placing geogrids in accordance with these specifications and in reasonably close conformity with the lines, grades, and dimensions shown on the contract drawings or as established by the Engineer.

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.

ASTM INTERNATIONAL (ASTM)

ASTM D 4355	(2007) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4595	(2005) Tensile Properties of Geotextiles by the Wide-Width Strip Method
ASTM D 4873	(2002) Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D 5262	(2007) Evaluating the Unconfined Tension Creep Behavior of Geosynthetics
ASTM D 5321	(2002) Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method

GEOSYNTHETIC INSTITUTE (GSI)

GSI GRI GG1	(1987; R 1988) Geogrid Rib Tensile Strength
GSI GRI GG4a	(1991) Determination of the Long-Term Design Strength of Stiff Geogrids
GSI GRI GG4b	(1991) Determination of the Long-Term Design Strength of Flexible Geogrids

- GSI GRI GG5 (1991) Test Method for Geogrid Pullout
- GSI GRI GG6 (1996) Grip Types for Use in Wide Width Testing of Geotextiles and Geogrids

1.3 SUBMITTALS

- 1.3.1 Submit geogrid product sample approximately 4 inches by 7 inches or larger.
- 1.3.2 Submit geogrid product data sheet and certification from the Manufacturer that the geogrid product supplied meets the requirements of sub-part 2.2A of this Section.
- 1.3.3 Submit Manufacturer’s installation instructions and general recommendations.

1.4 STORAGE AND PROTECTION

- 1.4.1 Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to the geogrid materials.
- 1.4.2 Store at temperatures above -20 degrees F (-29 degrees C).
- 1.4.3 Rolled materials may be laid flat or stood on end.
- 1.4.4 Geogrid materials should not be left directly exposed to sunlight for a period longer than recommended by the manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS

Shall be Tensar Earth Technologies, Spectra Pavement systems or equal. The geogrid shall be integrally formed and deployed as a single layer having the following characteristics (ALL VALUES ARE MINIMUM AVERAGE ROLL VALUES UNLESS A RANGE OR CHARACTERISTIC IS INDICATED):

<i>Property</i>	<i>Test Method</i>	<i>Units</i>	<i>Type 1</i>	<i>Type 2</i>
Aperture Stability Modulus at 20 cm-kg	Kinney - 01	cm-kg/deg	3.2	6.5
Rib Shape	Observation	N/A	Rectangular or Square	Rectangular or Square
Rib Thickness	Calipered	in	0.03	0.05
Nominal Aperture Size	I.D. Calipered	in	1.0 to 1.5	1.0 to 1.5
Junction Efficiency	GRI-GG2-87	%	93	93
Flexural Rigidity	ASTM D1388-96	mg-cm	250,000	750,000

Minimum True Initial Modulus in Use	ASTM D6637-01			
- MD		lb/ft	17,140	27,420
		(kN/m)	(250)	(410)
- CMD		lb/ft	27,420	44,550
		(kN/m)	(400)	(620)

PART 3 EXECUTION

3.1 EXAMINATION

The Contractor shall check the geogrid upon delivery to verify that the proper material has been received. The geogrid shall be inspected by the Contractor to be free of flaws or damage occurring during manufacturing, shipping, or handling.

3.2 PREPARATION

The subgrade soil shall be prepared as indicated on the construction drawings or as directed by the Engineer.

3.3 INSTALLATION

- 3.3.1 The geogrid shall be laid at the proper elevation and alignment as shown on the construction drawings.
- 3.3.2 The geogrid shall be installed in accordance with the installation guidelines provided by the manufacturer or as directed by the Engineer.
- 3.3.3 The geogrid may be temporarily secured in place with ties, staples, pins, sand bags or backfill as required by fill properties, fill placement procedures or weather conditions or as directed by the Engineer.

3.4 BASE COURSE/SUBBASE COURSE PLACEMENT OVER GEOGRID

- 3.4.1 Base course/subbase course material shall be placed in lifts and compacted as directed under Section 32 11 16. Base course/subbase course material shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in the geogrid and/or movement of the geogrid.
- 3.4.2 A minimum loose fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid. Rubber-tired equipment may pass over the geogrid reinforcement at slow speeds (less than 10 mph) when integrally-formed geogrids are used. When woven, multi-layer or welded-strip geogrids are used, rubber-tired equipment shall not be allowed directly on the geogrid. Sudden braking and sharp turning movements shall be avoided.

3.5 INSPECTION

- 3.5.1 The Owner or Owner’s representative may randomly inspect geogrid before, during and after (using test pits) installation.
- 3.5.2 Any damaged or defective (i.e. frayed coating, separated junctions, separated layers, tears, etc.) will be repaired/replaced in accordance with section 3.6

3.6 REPAIR

3.6.1 Any roll of geogrid damaged before, during and after installation shall be replaced by the Contractor at no additional cost to the Owner.

3.6.2 Proper replacement shall consist of replacing the affected area + 3ft (1m) of geogrid to either side of the affected area.

3.7 PROTECTION

Follow the Manufacturer's recommendations regarding protection from exposure to sunlight.

END OF SECTION

SECTION 31 23 00.00 20**EXCAVATION AND FILL**

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 in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33	(2007) Standard Specification for Concrete Aggregates
ASTM C 136	(2006) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 698	(2007e1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft (600 kN-m/m))
ASTM D 1140	(2000, R 2006) Amount of Material in Soils Finer Than the No. 200 (75-Micrometer) Sieve
ASTM D 1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2007) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft (2,700 kN-m/m))
ASTM D 2321	(2005) Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 2487	(2006) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2005) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2005) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM-385-1-1	(2003) Safety - Safety and Health Requirements Manual
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ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 530/F-93-004	1993; Rev O; Test Methods for Evaluating Solid Waste (Physical/Chemical Methods)
EPA 600/4-79-020	1983 Methods for the Chemical Analysis of Water and Wastes

1.2 DEFINITIONS

1.2.1 Hard Materials

Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.2 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.2.3 Cohesive Materials

Materials ASTM D 2487 classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when the fines have a plasticity index greater than zero.

1.2.4 Cohesionless Materials

Materials ASTM D 2487 classified as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.

1.2.5 Pile Supported Structure

As used herein, a structure where both the foundation and floor slab are pile supported.

1.2.6 Contaminated Soil

As used herein, a contaminated soil is defined as a soil that contains one or more contaminants from an unintentional or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of a hazardous substance, hazardous waste, pollutant, or naturally occurring contaminant at a concentration which fails to satisfy any applicable remediation standard.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-06 Test Reports

Fill and backfill test

Porous fill

Dolomitic Marble screenings

Density tests

SD-07 Certificates

Dewatering work plan

1.4 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

1.5 CRITERIA FOR BIDDING

Base bids on the following criteria:

- a. Surface elevations contours will be provided for each delivery order. It is the contractors responsibility to confirm these elevations before starting work.
- b. Pipes, utilities, and other artificial obstructions will be provided for each delivery order and are taken from best available records. Locations of these are approximate. It is likely that pipes, utilities, and other artificial obstructions, other than what is shown, will be encountered.
- c. Hard materials and rock will not be encountered.

1.6 REQUIREMENTS FOR OFF SITE SOIL

Soils brought in from off site for use as backfill shall be tested for TPH, BTEX and full TCLP including ignitability, corrosivity and reactivity. Backfill shall contain less than 100 parts per million (ppm) of total petroleum hydrocarbons (TPH) and less than 10 ppm of the sum of Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and shall not fail the TCPL test. TPH concentrations shall be determined by using EPA 600/4-79-020 Method 418.1. BTEX concentrations shall be determined by using EPA SW-846 Method 5030/8020. TCLP shall be performed in accordance with EPA SW-846 Method 1311. Material shall not be brought on site until tests have been approved by the Contracting Officer.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

Free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and frozen, deleterious, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

2.1.2 Backfill and Fill Material

ASTM D 2487, classification GW, GP, GM, GC, SW, SP, SM, with a maximum ASTM D 4318 liquid limit of 35, maximum ASTM D 4318 plasticity index of 12, and a maximum of 25 percent by weight passing ASTM D 1140, No. 200 sieve.

2.1.3 Topsoil

Provide as specified in Section 32 92 23, "Sodding"

2.2 POROUS FILL (#57 STONE)

Coarse aggregate meeting ASTM C 136 size #57 stone and conforming to the general soil material requirements specified in paragraph entitled "Soil Materials."

2.2.1 Grading Requirements

Sieve Size	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8
%Passing	100	95-100	--	25-60	--	0-10	--

2.3 BASE COURSE AND SUBBASE COURSE

Provide as specified in Section 32 11 16, "Base Course for Rigid and Subbase Course for Flexible Paving."

2.4 DOLOMITIC MARBLE SCREENINGS (#10 STONE)

Fine aggregate meeting the requirements of ASTM C 136 size #10 stone and conforming to the general soil material requirements specified in paragraph entitled "Soil Materials."

2.4.1 Grading Requirements

<u>Sieve Size</u>	<u>3/8"</u>	<u>#4</u>	<u>#8</u>	<u>#16</u>	<u>#30</u>	<u>#50</u>	<u>#100</u>	<u>#200</u>
%Passing	100	85-100	--	--	--	--	10-30	--

2.4.2 Chemical Requirements

<u>Chemical Compound</u>	<u>Range</u>
Calcium Carbonate (CaCO ₃)	51.0-61.0%
Magnesium Carbonate (MgCO ₃)	19.0-34.0%
Iron (Fe ₂ O ₃)	0.3-0.9%
Acid Insolubles	11.0-19.0%

2.5 BURIED WARNING AND IDENTIFICATION TAPE

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 inch 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. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

[Yellow:]	[Electric]
[Yellow:]	[Gas, Oil; Dangerous Materials]
[Orange:]	[Telephone and Other Communications]
[Blue:]	[Water Systems]
[Green:]	[Sewer Systems]
[White:]	[Steam Systems]
[Gray:]	[Compressed Air]

2.5.1 Warning Tape for Metallic Piping

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

2.5.2 Detectable Warning Tape for Non-Metallic Piping

Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured 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.

2.6 DETECTION WIRE FOR NON-METALLIC PIPING

Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

3.1.1 Clearing and Grubbing

Unless indicated otherwise, remove trees, stumps, logs, shrubs, and brush within the limit of demolition. Remove stumps entirely. Grub out matted roots and roots over 2 inches in diameter to at least 18 inches below existing surface.

3.2 PROTECTION

3.2.1 Protection Systems

Provide shoring, bracing, and sheeting in accordance with EM-385-1-1, except that banks may be sloped only when approved by the Contracting Officer.

3.2.2 Drainage and Dewatering

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

3.2.2.1 Drainage

So that construction operations progress successfully, completely drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/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 maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.2.2.2 Dewatering

Groundwater flowing toward or into excavations shall be controlled 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 will not be permitted 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. Control measures shall be taken 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, the water level shall be maintained continuously, at least 5 feet below the working level.

Operate dewatering system continuously until construction work below existing water levels is complete. Submit performance records weekly. 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.

3.2.3 Underground Utilities

Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor shall contact the Contracting Officer for assistance in locating existing utilities. The Contractor shall scan the construction site with electromagnetic and sonic equipment and mark the surface of the ground where existing underground utilities are discovered.

3.2.4 Machinery and Equipment

Movement of construction machinery and equipment over pipes during construction shall be at the Contractor's risk. Repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged.

3.3 EXCAVATION

Excavate to contours, elevation, and dimensions indicated. Reuse excavated materials that meet the specified requirements for the material type required at the intended location. Keep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations, soils softened or made unsuitable for subsequent construction due to exposure to weather. Refill with backfill and fill material and compact to 90 percent of ASTM D 1557 maximum density. Unless specified otherwise, refill excavations cut below indicated depth with backfill and fill material and compact to 90 percent of ASTM D 1557 maximum density.

3.3.1 Contaminated Soil/Hazardous Wastes

If any non-acceptable materials such as contaminated soil or hazardous wastes are encountered, notify the Contracting Officer immediately for direction.

3.4 SUBGRADE PREPARATION

3.4.1 Proof Rolling

Proof rolling is only necessary for subgrades under pavement that are larger than 500 sy. Proof rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. Proof roll the existing subgrade with six passes of a dump truck loaded 4 cubic yards. Operate the truck in a systematic manner to ensure the number of passes over all areas, and at speeds between 2 1/2 to 3 1/2 mph. When proof rolling, one-half of the passes made with the roller shall be in a direction perpendicular to the other passes. Notify the Contracting Officer a minimum of 3 days prior to proof rolling. Proof rolling shall be performed in the presence of the Contracting Officer. Rutting or pumping of material shall be undercut as directed by the Contracting Officer and replaced with fill and backfill or base course/subbase course material.

3.4.2 Construction

Subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This operation shall include plowing, diskings, and any moistening or aerating required to obtain specified

compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed. Rock encountered in the cut section shall be excavated to a depth of 6 inches below finished grade for the subgrade. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified. The elevation of the finish subgrade shall not vary more than 0.1 foot from the established grade and cross section.

3.4.3 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment to the specified percentage. Expressed as a percentage of maximum density. Determine in-place density of existing subgrade; if required density exists, no compaction of existing subgrade will be required. Density requirements specified herein are for cohesionless materials. When cohesive materials are encountered or used, density requirements may be reduced by 5 percent.

3.4.4 General Site

Compact underneath areas designated for vegetation and areas outside the 5 foot line of the structure to 85 percent of ASTM D 1557.

3.4.5 Structures, Spread Footings, and Concrete Slabs

Compact top 12 inches of subgrades to 95 percent of ASTM D 1557.

3.4.6 Trenches

Compact with two passes of a hand-operated, plate type vibratory compactor.

3.4.7 Adjacent Area

Compact areas within 5 feet of structures to 90 percent of ASTM D 1557.

3.4.8 Paved Areas

Compact top 12 inches of subgrades to 95 percent of ASTM D 1557.

3.4.9 Jogging Paths

Compact top 12 inches of subgrade to 90 percent of ASTM D 1557.

3.5 FILLING AND BACKFILLING

Fill and backfill to contours, elevations, and dimensions indicated. Compact each lift before placing overlying lift.

3.5.1 Backfill and Fill Material Placement

Provide for paved areas and under concrete slabs, except where base course/subbase course is provided. Place in 6 inch lifts. Place backfill material adjacent to structures as the structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against the structure. Compact backfill and fill material to 95 percent of ASTM D 1557 unless otherwise specified.

3.5.2 Base Course and Subbase Course Placement

Place in 6 inch lifts. Backfill adjacent to structures shall be placed as structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against structure. Compact base course/subbase course material to 95 percent of ASTM D 1557.

3.5.3 Dolomite Marble Screenings Placement

Provide to for jogging or running path. Place in 6 inch lifts. Backfill adjacent to structures shall be placed as structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against structure. Compact dolomitic marble screenings to 95 percent of ASTM D 1557.

3.5.4 Porous Fill Placement

Provide as specified on a compacted subgrade. Place in 4 inch lifts.

3.5.5 Trench Backfilling

Backfill as rapidly as construction, testing, and acceptance of work permits. Place and compact backfill under structures and paved areas in 6 inch lifts to top of trench and in 6 inch lifts to one foot over pipe outside structures and paved areas.

3.5.6.1 Bedding Requirements

Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D 698 maximum density. Plastic piping shall have bedding to spring line of pipe. Provide ASTM D 2321 materials as follows:

- a. Porous Fill
- b. Base Course and Subbase Course

3.6 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.

3.7 BURIED DETECTION WIRE

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inches above the top of pipe. The wire shall extend continuously and unbroken, from manhole to manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. The wire shall remain insulated over its entire length. The wire shall enter 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, the wire shall terminate in the valve pit at the pump station end of the pipe.

3.8 FINISH OPERATIONS

3.8.1 Grading

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

3.8.2 Protection of Surfaces

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

3.9 DISPOSITION OF SURPLUS MATERIAL

Remove from Government property surplus or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber.

3.10 FIELD QUALITY CONTROL

3.10.1 Sampling

Take the number and size of samples required to perform the following tests.

3.10.2 Testing

Perform one of each of the following tests for each material used. Provide additional tests for each source change.

3.10.2.1 Fill and Backfill Material Testing

Test fill and backfill material in accordance with ASTM C 136 for conformance to ASTM D 2487 gradation limits; ASTM D 1140 for material finer than the No. 200 sieve; ASTM D 4318 for liquid limit and for plastic limit; ASTM D 698 or ASTM D 1557 for moisture density relations, as applicable.

3.10.2.2 Dolomitic Marble screenings Testing

Test select material in accordance with ASTM C 136 for conformance to specified gradation limits; and for specified chemical compound relations.

3.10.2.3 Porous Fill Testing

Test porous fill in accordance with ASTM C 136 for conformance to gradation specified in ASTM C 33.

3.10.2.4 Density Tests

Test density in accordance with ASTM D 1556, or ASTM D 2922 and ASTM D 3017. When ASTM D 2922 and ASTM D 3017 density tests are used, verify density test results by performing an ASTM D 1556 density test at a location already ASTM D 2922 and ASTM D 3017 tested as specified herein. Perform an ASTM D 1556 density test at the start of the job, and for every 10 ASTM D 2922 and ASTM D 3017 density tests thereafter. Test each lift at randomly selected locations every 2000 square feet of existing grade in fills for structures and concrete slabs, and every 2500 square feet for other fill areas and every 2000 square feet of subgrade in cut.

END OF SECTION

SECTION 32 01 11.51

PAINT REMOVAL FROM PAVEMENTS

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 in the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910

Occupational Safety and Health Standards

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Schedule of work

High-pressure paint removal equipment

1.3 ENVIRONMENTAL CONDITIONS

Do not perform work when the temperature is below 40 degrees F, during lightning storms, or when the pavement is covered with snow or ice.

1.4 SAFETY

Comply with OSHA 29 CFR 1910.

1.5 SCHEDULE

1.5.1 Schedule of Work

Submit a schedule of work to the Contracting Officer for transmittal to the Operations Officer. Describe the work to be accomplished; noting the location of work, distances from the ends of runways, taxiways, buildings, and other structures; and indicating dates and hours during which the work will be accomplished. Schedule the work to conform to aircraft operating schedules. The Government will try to schedule aircraft operations so as to permit the maximum amount of time for the Contractor's work. However, in the event of any emergency, intense operational demands, adverse wind conditions, and other unforeseen difficulties, discontinue all work at locations in the aircraft operational area. Keep the approved schedule of work current and notify the Contracting Officer of any changes prior to beginning each day's work.

1.6 EQUIPMENT

1.6.1 Equipment Data

Submit descriptive data of high-pressure paint removal equipment including area of coverage per pass, range of water pressures, and water tank capacity.

PART 2 PRODUCTS

2.1 MATERIALS

Water to be used for high-pressure water equipment will be made available from Government hydrants at no cost to the Contractor. Furnish all equipment and labor for delivery of water from the hydrant to the job site. Notify the Contracting Officer on location of fire hydrants to be used and the respective times of use. Connections to a fire hydrant will be subject to the Contracting Officer's inspection and approval.

2.2 EQUIPMENT

Vehicular-mounted hydraulic system capable of delivering high-pressure water impact upon the pavement surface less or greater than 8,000 pounds per square inch. If high-pressure water is delivered from a spray bar, the nozzles shall be spaced to provide total coverage of the area being treated. The nozzle line shall have adjustable pressure regulators or relief valves and gauges measuring actual line pressure. Equipment shall be supported on pneumatic tires. Provide equipment, tools, and machinery which are safe and in satisfactory condition at all times.

PART 3 EXECUTION

3.1 DEGREE OF REMOVAL

Remove 80 percent of loose, flaking paint. Hard, firm paint that has the surface chalk removed may remain.

3.2 RATE OF REMOVAL

Remove paint at a minimum rate of 1,000 square feet per hour. Do not permit high-pressure water application to remove the existing pavement surface.

3.3 WATER PRESSURE

Provide water pressure impact upon the indicated pavement areas sufficient to remove the designated paint to the required degree of removal without damaging the existing pavement joint sealant, and other airfield appurtenances. Contractor shall be responsible for repairing any damage caused by the removal work.

3.4 REMOVAL OF RESIDUE

Remove all residue from the pavement. Obtain the approval of residue removal and disposal method from the Contracting Officer prior to beginning work.

-- End of Section --

SECTION 32 01 16.17

COLD-MILLING OF BITUMINOUS PAVEMENT

PART 1 GENERAL

1.1 ENVIRONMENTAL CONDITIONS

Cold milling shall not be performed when there is snow or ice on the pavement surface.

1.2 COORDINATION

Work performed under this section shall be coordinated with, and approved by the Contracting Officer. A minimum of seven days notice is required prior to start of milling work to minimize impact on activity operations.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Clean the pavement surface of excessive dirt, clay or other foreign matter with power brooms and hand brooms immediately prior to the milling operation.

3.2 COLD-MILLING OPERATION

Remove old pavement by cold milling. Ensure that only bituminous pavement is removed and the base course is not disturbed. Make sufficient passes so that the designated area is milled to the grades and cross sections indicated. The milling shall proceed with care so as not to damage the pavement below the designated grade. Care should be taken to research and assess pavement areas to be milled to ensure no abandoned manholes, utility vaults, and/or steel plates have been inadvertently or purposely covered in the past. Repair or replace damaged manholes, valve boxes, utility lines, or pavement that are torn, cracked, gouged, rutted, broken or undercut. All milled material shall be removed from the pavement and loaded into trucks. Avoid allowing traffic on milled areas until all loose material is removed.

3.3 FIELD QUALITY CONTROL

3.3.1 Grade-Conforming Tests

Test the finished milled surface of the pavement for conformance with the plan-grade requirements and test for acceptance by running lines of levels at intervals of 25 feet longitudinally and 25 feet transversely to determine the elevation of the completed pavement. The finished milled-pavement surfaces shall vary not more than 0.02 feet from the established plan grade line and elevation. Correct variations from the designated grade line and elevation in excess of the plan-grade requirements, as directed. Remove and replace deficient low areas. Skin patching for correcting low areas is not permitted. Correct low areas by removing sufficient material to allow at least 1 inch of asphalt concrete to be placed.

3.4 REMOVAL OF MILLED MATERIAL

All material that is removed by cold milling shall become the property of the contractor and shall be immediately removed from site.

-- End of Section --

SECTION 32 01 17.16

SEALING OF CRACKS IN BITUMINOUS PAVEMENTS

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 in this text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 509	(2006) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM D 6690	(2007) Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM D 3405	(most current edition) Joint Sealants, Hot-Applied, for Concrete and Asphalt Pavements
ASTM D 789	(2007) Determination of Relative Viscosity and Moisture Content of Polyamide (PA)

1.2 SYSTEM DESCRIPTION

Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and shall be maintained in satisfactory condition at all times.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Installation of Sealant;

Manufacturer's instructions 30 days prior to the use of the material on the project. Installation of the material will not be allowed until the instructions are received.

SD-04 Samples

Materials; G,

Samples of the materials 30 days prior to their use on the project. No material will be allowed to be used until it has been approved.

SD-06 Test Reports

Test Requirements;

Reports of all tests.

1.4 TEST REQUIREMENTS

The crack sealant and backup material, when required, shall be tested for conformance with the referenced applicable material specification. Samples of materials shall be furnished, in sufficient quantity to be tested, upon request. Conformance with the requirements of the laboratory tests specified will not constitute final acceptance of the materials. Final acceptance will be based on the performance of the in-place materials.

1.5 EQUIPMENT

Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and shall be maintained in satisfactory condition at all times.

1.5.1 Crack Cleaning Equipment

1.5.1.1 Routing Equipment

The routing equipment shall be a self-powered machine operating a power driven tool or bit specifically designed for routing bituminous pavements. The bit shall rotate about a vertical axis at sufficient speed to cut a smooth vertical-walled reservoir in the pavement surface and shall maintain accurate cutting without damaging the sides or top edges of the reservoir. The router shall be capable of following the trace of the crack without deviation. The use of rotary impact routing devices may be permitted if vertical-sided carbide tipped bits are used.

1.5.1.2 Concrete Saw

A self-propelled power saw with small diameter (6 inches or less) water-cooled diamond or abrasive saw blades shall be provided for cutting cracks to the depths and widths specified and for removing filler that is embedded in the cracks or adhered to the crack faces. The diameter of the saw blade shall be small enough to allow the saw to closely follow the trace of the crack.

1.5.1.3 Waterblasting Equipment

Waterblasting equipment shall include a trailer-mounted water tank, pumps, high-pressure hose, wand with safety release cutoff control, nozzle, and auxiliary water resupply equipment. The water tank and auxiliary resupply equipment shall be of sufficient capacity to permit continuous operations. The hose, wand, and nozzle shall be capable of cleaning the crack faces and the pavement surface on both sides of the crack for a width of at least 1/2 inch. A pressure gauge mounted at the pump shall show at all times the pressure in pounds per square inch at which the equipment is operating.

1.5.1.4 Hand Tools

Hand tools may be used, when approved, for removing defective sealant from cracks and repairing or cleaning the crack faces.

1.5.2 Crack Sealing Equipment

The unit applicators used for heating and installing the hot-poured crack sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the crack to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit design shall allow the sealant to circulate through the delivery hose and return to the inner kettle when not in use.

1.6 DELIVERY AND STORAGE

Materials delivered to the job site shall be inspected for defects, unloaded, and stored with a minimum of handling to avoid damage. Storage facilities shall be provided at the job site to protect materials from weather and to maintain them at the temperatures recommended by the manufacturer.

1.7 ENVIRONMENTAL CONDITIONS

The ambient air temperature and the pavement temperature within the joint wall shall be a minimum of 50 degrees F and rising at the time of application of the materials. Sealant shall not be applied if moisture is observed in the crack.

PART 2 PRODUCTS

2.1 SEALANTS

Sealants shall conform to ASTM D 3405 or ASTM D 1190. Usage of sealing materials for sealing cracks in the various paved areas indicated on the drawings shall be indicated by the Contracting Officer.

2.2 BACKUP MATERIALS

Backup material shall be a compressible, nonshrinking, nonstaining, nonabsorptive material and shall be nonreactive with the crack sealant. The melting point of the backing material shall be at least 5 degrees F greater than the maximum pouring temperature of the sealant being used, when tested in accordance with ASTM D 789. The material shall have a water-absorption of not more than 5 percent by weight when tested in accordance with ASTM C 509. The backup material shall be 25 percent (plus or minus 5 percent) larger in diameter than the nominal width of the crack.

PART 3 EXECUTION

3.1 PREPARATION OF CRACKS

Immediately before the installation of the crack sealant, the cracks shall be thoroughly cleaned to remove oxidized pavement, loose aggregate and foreign debris. The preparation shall be as follows:

3.1.1 Cracks

3.1.1.1 Hairline Cracks

Cracks that are less than 1/4 inch wide do not need to be sealed.

3.1.1.2 Small Cracks

Cracks that are 1/4 to 3/4 inch wide shall be routed to a nominal width 1/8 inch greater than the existing nominal width and to a depth not less than 3/4 inch, water-blasted and cleaned using compressed air.

3.1.1.3 Medium Cracks

Cracks that are 3/4 to 2 inches wide shall be water-blasted and cleaned using compressed air.

3.1.1.4 Large Cracks

Cracks that are greater than 2 inches wide shall be repaired using pothole repair techniques instead of sealing.

3.1.2 Existing Sealant Removal

The in-place sealant shall be cut loose from both crack faces and to a depth shown on the drawings, using a concrete saw or hand tools as specified in paragraph EQUIPMENT. Depth shall be sufficient to accommodate any backup material that is required to maintain the depth of new sealant to be installed. Prior to further cleaning operations, all old loose sealant remaining in the crack opening shall be removed by blowing with compressed air.

3.1.3 Routing

Routing of the cracks shall be accomplished using a rotary router with a bit that is at least 1/8 inch wider than the nominal width of the crack to remove all residual old sealant (resealing), oxidized pavement and any loose aggregate in the crack wall.

3.1.4 Sawing

Sawing of the cracks shall be accomplished using a power-driving concrete saw as specified in paragraph EQUIPMENT. The blade shall be stiffened as necessary with suitable dummy (or used) blades or washers. Immediately following the sawing operation, the crack opening shall be cleaned using a water jet to remove all saw cuttings and debris.

3.1.5 Backup Material

Backup material shall be used on all cracks that have a depth greater than 3/4 inch. The backup material shall be inserted into the lower portion of the crack as shown on the drawings. The Contractor shall ensure that the backup material is placed at the specified depth and is not stretched or twisted during installation.

3.1.6 Rate of Progress of Crack Preparation

The stages of crack preparation which include routing, sandblasting of the crack faces, air pressure cleaning and placing of the backup material shall be limited to only that linear footage that can be sealed during the same day.

3.2 PREPARATION OF SEALANT

Hot-poured sealants shall not be heated in excess of the safe heating temperature recommended by the manufacturer as shown on the sealant containers. Sealant that has been overheated or subjected to application temperatures for over 4 hours or that has remained in the applicator at the end of the day's operation shall be withdrawn and wasted.

3.3 INSTALLATION OF SEALANT

3.3.1 Time of Application

Cracks shall be sealed immediately following final cleaning of the crack walls and following the placement of the backup material (when required). Cracks that cannot be sealed under the conditions specified, or when rain interrupts sealing operations, shall be re-cleaned and allowed to dry prior to installing the sealant.

3.3.2 Sealing the Crack

Immediately proceeding, but not more than 50 feet ahead of the crack sealing operations, a final cleaning with compressed air shall be performed. The cracks shall be filled from the bottom up to 1/4 inch below the pavement surface. Excess or spilled sealant shall be removed from the pavement by approved methods and shall be discarded. The sealant shall be installed in a manner which

prevents the formation of voids and entrapped air. Several passes with the applicator wand may be necessary to obtain the specified sealant depth from the pavement surface. Gravity methods or pouring pots shall not be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the Contracting Officer. Cracks shall be checked frequently to ensure that the newly installed sealant is cured to a tack-free condition within 3 hours.

3.4 CRACK SEALANT INSTALLATION TEST SECTION

Prior to the cleaning and sealing of the cracks for the entire project, a test section at least 200 feet long shall be prepared using the specified materials and approved equipment, to demonstrate the proposed sealing of all cracks of the project. Following the completion of the test section and before any other crack is sealed; the test section will be inspected to determine that the materials and installation meet the requirements specified. If materials or installation do not meet requirements, the materials shall be removed and the cracks re-cleaned and resealed at no cost to the Government. When the test section meets the requirements, it may be incorporated into the permanent work and paid for at the contract unit price per linear foot for sealing items scheduled. All other cracks shall be sealed in the manner approved for sealing the test section.

3.5 CLEANUP

Upon completion of the project, unused materials shall be removed from the site and the pavement shall be left in a clean condition.

3.6 QUALITY CONTROL PROVISIONS

3.6.1 Crack Cleaning

Quality control provisions shall be provided during the crack cleaning process to correct improper equipment and cleaning techniques that damage the bituminous pavement in any manner. Cleaned cracks shall be approved prior to installation of the crack sealant.

3.6.2 Crack Seal Application Equipment

The application equipment shall be inspected to ensure conformance to temperature requirements and proper installation. Evidences of bubbling, improper installing, and failing to cure or set shall be cause to suspend operations until causes of the deficiencies are determined and corrected.

3.6.3 Crack Sealant

The crack sealant shall be inspected for proper cure and set rating, bonding to the bituminous pavement, cohesive separation within the sealant, reversion to liquid, and entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the crack, wasted, and replaced as specified herein at no additional cost to the Government.

-- End of Section --

SECTION 32 10 00

BITUMINOUS CONCRETE PAVEMENT

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 230 (1968; R 2000) Determining Degree of Pavement
Compaction of Bituminous Aggregate Mixtures

AASHTO T 30 (2007) Mechanical Analysis of Extracted Aggregate

ASTM INTERNATIONAL (ASTM)

ASTM D 2172 (2005) Quantitative Extraction of Bitumen from Bituminous
Paving Mixtures

ASTM D 2950 (2005) Density of Bituminous Concrete in Place by Nuclear
Methods

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Paving Fabric

SD-04 Samples

Uncompacted mix

Pavement cores

SD-06 Test Reports

Mix design

Asphalt concrete

Density

Thickness

Straightedge test

Submit reports for testing specified under paragraph entitled "Field Quality Control."

SD-07 Certificates

Asphalt mix delivery record

Asphalt concrete and material sources

Obtain approval of the Contracting Officer for materials and material sources 2 days prior to the use of such material in the work.

Asphalt concrete

1.3 QUALITY ASSURANCE

1.3.1 Regulatory Requirements

Provide work and materials in accordance with applicable requirements of Maryland Department of Transportation State Highway Administration (SHA) Standard Specifications for Construction and Materials. Sections mentioned herein refer to those specifications. Paragraphs in the MD SHA Standard Specifications for Construction and Materials entitled "Measurement and Payment" shall not apply.

1.3.2 Modification of References

Where term "Engineer" is used in MD SHA Standard Specifications for Construction and Materials it shall be construed to mean Contracting Officer. Where term "state" is used, it shall mean "Federal Government".

1.3.3 Mix Delivery Record Data

Record and submit the following information to each load of mix delivered to the job site. Submit within one day after delivery on Government-furnished forms:

- a. Truck No:
- b. Time In:
- c. Time Out:
- d. Tonnage and Discharge Temperature:
- e. Mix Type:
- f. Location:
- g. Stations Placed:

1.3.4 Trial Batch

Submit current bituminous design reports for all mix types proposed for use on the project.

1.3.5 Mix Design

Submit results of laboratory tests performed on each mix design. Testing shall have been accomplished not more than one year prior to date of material placement.

PART 2 PRODUCTS

2.1 ASPHALT CONCRETE

Provide asphalt concrete in accordance with the applicable requirements of the MD SHA Standard Specifications for Construction and Materials, except where specified otherwise.

2.2 SUBBASE

See section 32 11 16, BASECOURSE FOR RIGID AND SUBBASE COURSE FOR FLEXIBLE PAVING.

2.3 BASE COURSE

MD SHA Standard Specifications for Construction and Materials, materials for construction of the base course shall be in accordance with Section 904.06, Base Coarse (BC) or Base Fine (BF).

2.4 SURFACE COURSE

MD SHA Standard Specifications for Construction and Materials, materials for construction of the surface course shall be in accordance with Section 904.06, Surface Coarse (SC) or Surface Fine (SF).

2.5 SLURRY SEAL

MD SHA Standard specifications for Construction and Materials, materials for construction of the base course shall be in accordance with Section 923 (Emulsified Asphalt, SS, Type II or III), and methods of construction shall be in accordance with Section 507.

For additional information on slurry seal products see the Pavement Recycling Systems website available at <http://www.pavementrecycling.com>.

2.6 PAVING FABRIC

Provide a crack reduction/stress relief, geo-composite interlayer that consists of flexible high density asphaltic membrane laminated between a non-woven polyester and a woven polyester geotextile that meets the standards below

<u>Property</u>	<u>Value</u>	<u>Test Method</u>
Cold Flex	No cracking or seperation of fabric	ASTM D146(modified)
Tensile	2000 psi (min)	ASTM D412(modified)
Elongation	10% (min)	ASTM D412(modified)
Weight	0.9 lbs/sf	
Density	80 lbs/cf (min)	ASTM D70
Thickness	0.135 in (min)	ASTM D1777
Thickness ret.	75%(min) retained after loading	ASTM D395(modified)
Absorption	1% (max)	ASTM D517
Brittleness	pass	ASTM D517
Softening pt.	210-230 deg. F	ASTM D36

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Excavation and Filling

Excavation and filling to establish elevation of subgrade is specified in Section 31 23 00 EXCAVATION AND FILL.

3.2 CONSTRUCTION

Provide construction in accordance with the applicable requirements of the MD SHA Standard Specifications for Construction and Materials, except where indicated or specified otherwise.

3.2.1 Subgrade

Preparation of subgrade shall be in accordance with Section 31 23 00, EXCAVATION AND FILL.

3.2.2 Subbase

Methods of construction of the subbase shall be in accordance with Section 32 11 16, BASE COURSE FOR RIGID AND SUBBASE COURSE FOR FLEXIBLE PAVING.

3.2.3 Base Course

MD SHA Standard Specifications for Construction and Materials, methods of construction of the base course shall be in accordance with Section 504.03.

3.2.4 Surface Course

MD SHA Standard Specifications for Construction and Materials, methods of construction of the surface course shall be in accordance with Section 504.03. Placement will not be permitted unless the contractor has a working thermometer on site.

3.2.5 Slurry Seal

Refer to section 2.5 SLURRY SEAL.

3.2.6 Paving Fabric

3.2.6.1 Surface condition

Install fabric on a clean, dry pavement that is to be blown or broomed dry. Cracks or joints (1/4" to 2") shall be sealed in accordance with Section 32 13 13, Concrete Pavements for Roads and Site Facilities or Section 32 01 17, Sealing of Cracks in Bituminous Pavements. Cracks or joints larger than 2" or with a vertical elevation difference greater than 1/2" shall be filled with a hot mix asphalt surface course. Pavement shall be a minimum of 50 deg F and rising.

3.2.6.2 Placement procedure

Install tack coat to areas paving fabric is to be installed. Shall be installed woven polyester side up with the non-woven side attached to the tack coat and centered along the joint or crack. It shall be rolled immediately after placement on the tack coat.

3.3 FIELD QUALITY CONTROL

Sample shall be taken by Contractor as specified herein. Contractor shall replace pavement where sample cores have been removed. Submit 2 pavement cores when using the in-place nuclear density method.

3.3.1 Sample and Core Identification

Place each sample and core in a container and securely seal to prevent loss of material. Tag each sample for identification. Tag shall contain the following information:

- a. Contract No.
- b. Sample No.
- c. Quantity
- d. Date of Sample
- e. Sample Description
- f. Source/Location/Stations Placed/depth below the finish grade
- g. Intended Use
- h. Thicknesses of various lifts placed

3.3.2 Testing

3.3.2.1 Bituminous Mix Testing

Take two samples per day per mix type at plant or from truck. Test uncompacted mix for extraction in accordance with ASTM D 2172 and sieve analysis in accordance with AASHTO T 30. Test samples for stability and flow in accordance with ASTM D 1559. When two consecutive tests fail to meet requirements of specifications, cease placement operations and test a new trial batch prior to resumption of placement operations. Submit 2 per day of each mix type. When two tests on uncompacted mix fail submit new trial batch for approval.

3.3.2.2 Testing of Pavement Course

- a. Density: Determine density of pavement by testing cores obtained from the binder and wearing course in accordance with AASHTO T 230. Take three cores at location designated by Contracting Officer for each 200 tons, or fraction thereof, of asphalt placed. Deliver cores undisturbed and undamaged to laboratory and provide test results within 48 hours of each day placement of paving materials.
- b. Thickness: Determine thickness of the binder and wearing course from cores taken for density test.
- c. Straightedge Test: Test compacted surface of binder course and wearing course with a straightedge as work progresses. Apply straightedge parallel with and at right angles to center line after final rolling. Variations in the binder course surface shall not be more than 1/4 inches from the lower edge of the 10 foot straightedge; variations in wearing course surface shall not be more than 1/4 from the lower edge of the 10 foot straightedge. Pavement showing irregularities greater than that specified shall be corrected as directed by Contracting Officer.

3.3.2.3 Alternate Testing Method for Pavement Courses

At Contractor's option the following in-place testing method may be used to determine density and thickness in lieu of testing specified above. Frequency of testing shall be the same. When in-place

nuclear method to determine density is used, take two pavement cores at locations designated by Contracting Officer and turn over to Government to verify pavement thickness.

- a. Density: Determine density of pavement by in-place testing using Nuclear Method in accordance with ASTM D 2950.
- b. Thickness: Determine thickness of finished pavement by use of following equation:

$$t = \frac{W}{0.75d}$$

Where t= pavement thickness, in inches.

W= average weight per square yard of mixture actually used in work.

d= compacted density as measured by nuclear density device.

-- End of Section --

SECTION 32 11 16**BASE COURSE FOR RIGID AND SUBBASE COURSE FOR FLEXIBLE PAVING**

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 in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(2006) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2006) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 29/C 29M	(2007) Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM D 1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2007) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 1883	(2007) CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D 2922	(2005) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 2940	(2003) Graded Aggregate Material for Bases or Subbases for Highways or Airports
ASTM D 3017	(2005) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 75	(2003) Sampling Aggregates

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-05 Design Data

Gradation curve

SD-06 Test Reports

Bearing ratio

Liquid limit

Plasticity index

Gradation tests

Density tests

SD-07 Certificates

Source location and name

1.3 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site and store aggregates in a manner that will prevent segregation and contamination.

1.4 CONSTRUCTION EQUIPMENT

Subject to approval of the Contracting Officer, special equipment as dictated by local conditions may be used. Calibrated equipment, such as scales, batching equipment, spreaders, and other similar equipment, shall have been calibrated by a calibration laboratory approved by the Contracting Officer within 12 months of commencing work.

1.5 ENVIRONMENTAL REQUIREMENTS

Do not construct course when atmospheric temperature is below 35 degrees F or when weather conditions could detrimentally affect quality of finished course. When temperature falls below 35 degrees F, protect areas of completed course against freezing.

PART 2 PRODUCTS

2.1 BASE COURSE OR SUBBASE COURSE

ASTM D 2940, except as modified herein. Material shall consist of natural, processed or blends of gravel, stone, slag, chert, caliche, limerock, coral, shell, quarry and mine waste, sand, or screenings, and soil or other similar binding or filler material. Obtain materials from sources approved by the Contracting Officer. Preliminary approval of pits shall not mean that material found in the deposit will be acceptable. Maximum dimensions of material particles shall not be greater than two-thirds the compacted thickness of the layer in which it is to be placed. Coarse aggregate shall have a percentage of wear of not more than 40 as determined by ASTM C 131. Material shall have a bearing ratio of at least 30 as determined by laboratory test on a four day soaked specimen in accordance with ASTM D 1883; compact the specimen in accordance with ASTM D 1557, Method B, C, or D. Material passing the No. 40 sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than 5 in accordance with ASTM D 4318. Slag shall be an air-cooled blast furnace product having a dry weight not less than 65 pounds per cubic foot when tested in accordance with ASTM C 29/C 29M and consisting of angular fragments uniform in density and quality and reasonably free from thin and elongated pieces, dirt, or other objectionable material. Gradation of the final composite mixture shall conform to the following size and shall be the basis of the gradation curve:

Sieve Size (Square Openings)	Design Range (Percent Passing)	Job Mix Tolerance (Percent)
2 inch	100	-3
1 1/2 inch	90-100	+5
3/4 inch	70-90	
3/8 inch	55-70	
No. 4	40-55	±10
No. 16	20-40	
No. 40	10-20	
No. 200	0-10	+5

2.2 SOURCE QUALITY CONTROL

Prior to production and delivery of aggregates, take at least one initial sample in accordance with ASTM D 75. Collect each sample by taking three incremental samples at random from source material to make a composite sample of not less than 50 pounds. Repeat sampling procedure when source of material is changed or when deficiencies or variations from specified grading of materials are found in testing.

PART 3 EXECUTION

3.1 GRADE CONTROL

Provide line and grade stakes for control. Place grade stakes in lanes parallel to centerline of areas to be paved and space for string lining or other control methods.

3.2 PLACING AND MIXING

Clean underlying surface of foreign substances and ensure proper compaction and smoothness before placement of course. Recondition, reshape, and re-compact areas damaged by freezing, rainfall, or other weather conditions. Mix and place materials to obtain a uniform course for the water content and gradation specified. Construct course in one or more layers. Make each layer between 3 and 8 inches in compacted thickness.

3.3 COMPACTING AND FINISHING

Compact each layer to at least 100 percent of the maximum laboratory density determined in accordance with ASTM D 1557. Compact material inaccessible to rolling equipment by mechanical tamping. Finish surface of the layer by blading and rolling. Blade, roll, and tamp until surface is smooth and free from waves and irregularities. Aerate material excessively moistened by rain during construction. Aerate using blade graders, harrows, or other equipment until the moisture content is that needed to obtain specified density. Place and compact earth at edges of course for at least one foot of the shoulder.

3.4 FIELD QUALITY CONTROL

3.4.1 Sampling During Construction

Take one random sample of each 500 tons of material placed, but not less than one random sample per day's run. Take samples in accordance with ASTM D 75.

3.4.2 Testing

3.4.2.1 Material

Make gradation tests from each sample in accordance with ASTM C 136. Determine material passing the No. 200 sieve in accordance with ASTM C 117.

3.4.2.2 Smoothness Test

Test with a 10 foot straightedge applied parallel with and at right angles to centerline of the rolled area. Correct surface deviations in excess of 3/8 inch by loosening, adding or removing material, reshaping, watering, and compacting. When course is constructed in more than one layer, smoothness requirements apply only to the top layer.

3.4.2.3 Field Density Tests

ASTM D 1556 or ASTM D 2922, and ASTM D 3017. Take one field density test for each 500 square yards of each layer of course. When using ASTM D 2922 and ASTM D 3017 to test field compaction densities, verify the results of the tests by performing one test per day using ASTM D 1556 at locations previously tested by ASTM D 2922 and ASTM D 3017 and one additional test using ASTM D 1556 for every ten tests performed at locations previously tested by ASTM D 2922 and ASTM D 3017.

3.4.2.4 Laboratory Density Tests

ASTM D 1557, Method B, C, or D, for all material.

3.4.2.5 Thickness Test

Determine thickness of course from test holes not less than 3 inches in diameter. Obtain a thickness test for each 500 square yards of course. Where course deficiency is more than 1/2 inch, correct by scarifying, adding mixture of proper gradation, reblading, and recompacting. Where the measured thickness exceeds the indicated thickness by more than 1/2 inch, consider the measured thickness as the indicated or specified thickness plus 1/2 inch for determining the average. The average thickness shall be the average of the depth measurements and shall not underrun the thickness shown by more than 1/4 inch.

3.5 MAINTENANCE

After construction is completed, protect and maintain all areas of course against detrimental effects. Maintenance includes drainage, rolling, shaping, watering, or other action required to maintain course in proper condition. Maintain sufficient moisture by light sprinkling with water at the surface to prevent a dusty condition.

-- End of Section --

SECTION 32 12 10**BITUMINOUS TACK AND PRIME COATS****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 in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO T 40 (2002) Sampling Bituminous Materials

ASTM INTERNATIONAL (ASTM)

ASTM D 140 (2007) Sampling Bituminous Materials

ASTM D 2397 (2005) Cationic Emulsified Asphalt

ASTM D 2995 (1999) Determining Application Rate of Bituminous Distributors

ASTM D 977 (2005) Emulsified Asphalt

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Sampling and Testing

Copies of all test results for bituminous materials, within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating compliance with applicable specified requirements, not less than 30 days before the material is required in the work.

1.3 PLANT, EQUIPMENT, MACHINES AND TOOLS**1.3.1 General Requirements**

Plant, equipment, machines and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times.

1.3.2 Bituminous Distributor

The distributor shall have pneumatic tires of such size and number to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. The distributor shall be designed and equipped to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure

gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

1.3.3 Power Brooms and Power Blowers

Power brooms and power blowers shall be suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.4 WEATHER LIMITATIONS

Bituminous coat shall be applied only when the surface to receive the bituminous coat is dry. Bituminous coat shall be applied only when the atmospheric temperature in the shade is 50 degrees F or above and when the temperature has not been below 35 degrees F for the 12 hours prior to application.

PART 2 PRODUCTS

2.1 TACK COAT

Emulsified asphalt shall conform to ASTM D 977, Type SS-1 or ASTM D 2397, Type CSS-1.

2.2 PRIME COAT

Emulsified asphalt shall conform to ASTM D 977, Type SS-1 or ASTM D 2397, Type CSS-1.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, all loose material, dirt, clay, or other objectionable material shall be removed from the surface to be treated. The surface shall be dry and clean at the time of treatment.

3.2 APPLICATION RATE

The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer.

3.2.1 Tack Coat

Bituminous material for the tack coat shall be applied in quantities of not less than 0.05 gallon nor more than 0.15 gallon per square yard of pavement surface.

3.2.2 Prime Coat

Bituminous material for the prime coat shall be applied in quantities of not less than 0.15 gallon nor more than 0.40 gallon per square yard of pavement surface.

3.3 APPLICATION TEMPERATURE

3.3.1 Viscosity Relationship

Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. The temperature viscosity relation shall be furnished to the Contracting Officer.

3.3.2 Temperature Ranges

The viscosity requirements shall determine the application temperature to be used. The following is a normal range of application temperatures:

Emulsions

SS-1	70-160 degrees F
CSS-1	70-160 degrees F

3.4 APPLICATION

3.4.1 General

Following preparation and subsequent inspection of the surface, the bituminous coat shall be applied at the specified rate with uniform distribution over the surface to be treated. All areas and spots missed by the distributor shall be properly treated with the hand spray. Until the succeeding layer of pavement is placed, the surface shall be maintained by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, clean dry sand shall be spread to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment shall be permitted within 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. All traffic, except for paving equipment used in constructing the surfacing, shall be prevented from using the underlying material, whether primed or not, until the surfacing is completed. The bituminous coat shall conform to all requirements as described herein.

3.4.2 Prime Coat

The prime coat will be required if it will be at least seven days before the surfacing (Asphalt cement hot mix concrete) layer is constructed on the underlying (base course, etc) compacted material. The type of liquid asphalt and application rate will be as specified herein. The Contractor shall protect the underlying from any damage (water, traffic, etc.) until the surfacing is placed. If the Contractor places the surfacing within seven days, the choice of protection measures or actions to be taken is at the Contractor's option. Damage to the underlying material caused by lack of, or inadequate, protection shall be repaired (re-compacted or replaced) by approved methods at no additional cost to the Government. If the Contractor options to use the prime coat, it shall be applied as soon as possible after consolidation of the underlying material. To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, building paper shall be spread on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper. Immediately after application, the building paper shall be removed and destroyed.

3.4.3 Tack Coat

Tack coat shall be applied at the locations shown on the drawings.

3.5 CURING PERIOD

Following application of the bituminous material and prior to application of the succeeding layer of pavement, the bituminous coat shall be allowed to cure and to obtain evaporation of any volatiles or moisture. Prime coat shall be allowed to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course.

3.6 FIELD QUALITY CONTROL

3.7 SAMPLING AND TESTING

Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

3.7.1 Sampling

The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140 or AASHTO T 40. Sources from which bituminous materials are to be obtained shall be selected and notification furnished the Contracting Officer within 15 days after the award of the contract.

3.7.2 Calibration Test

The Contractor shall furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibration shall be made with the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibration of the bituminous distributor shall be in accordance with ASTM D 2995.

3.7.3 Trial Applications

Before providing the complete bituminous coat, three lengths of at least 100 feet for the full width of the distributor bar shall be applied to evaluate the amount of bituminous material that can be satisfactorily applied.

3.7.3.1 Tack Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous tack coat materials shall be applied in the amount of 0.05 gallons per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.3.2 Prime Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous materials shall be applied in the amount of 0.25 gallon per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.4 Sampling and Testing During Construction

Quality control sampling and testing shall be performed as required in paragraph FIELD QUALITY CONTROL.

-- End of Section --

SECTION 32 13 13.06**CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES**

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 in the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991; R 2002) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301	(2005) Specifications for Structural Concrete for Buildings
ACI 305R	(1999; Errata 2006) Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting

ASTM INTERNATIONAL (ASTM)

ASTM A 615/A 615M	(2008) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 775/A 775M	(2007b) Epoxy-Coated Reinforcing Steel Bars
ASTM C 1077	(2007a) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1260	(2007) Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C 143/C 143M	(2008) Slump of Hydraulic Cement Concrete
ASTM C 150	(2007) Portland Cement
ASTM C 171	(2007) Sheet Materials for Curing Concrete
ASTM C 172	(2007a) Sampling Freshly Mixed Concrete
ASTM C 231	(2008) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2006) Air-Entraining Admixtures for Concrete
ASTM C 309	(2007) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2008) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2007) Concrete Aggregates

ASTM C 494/C 494M	(2008) Chemical Admixtures for Concrete
ASTM C 618	(2008) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 78	(2008) Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading)
ASTM C 94/C 94M	(2007) Ready-Mixed Concrete
ASTM C 989	(2006) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Curing materials

Admixtures

Joint Sealant

Reinforcement

Submit a complete list of materials including type, brand and applicable reference specifications.

SD-05 Design Data

Concrete mix design

Thirty days minimum prior to concrete placement, submit a mix design, with applicable tests, for each strength and type of concrete for approval. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, slag, and admixtures; and applicable reference specifications. Provide mix proportion data using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required. Submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Obtain acknowledgement of approvals prior to concrete placement. Submit a new mix design for each material source change.

SD-06 Test Reports

Aggregate tests

Concrete slump tests

Air content tests

Compressive strength tests

SD-07 Certificates

Ready-mixed concrete plant

Batch tickets

Cementitious materials

1.3 DELIVERY, STORAGE, AND HANDLING

ASTM C 94/C 94M.

1.4 QUALITY ASSURANCE

1.4.1 Ready-mixed Concrete Plant Certification

Provide documentation that the ready-mix plant is certified by the National Ready-Mix Concrete Association (NRMCA).

1.4.2 Required Information

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other test for cementitious materials, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test reports shall be submitted along with the concrete mix design. Sampling and testing of materials, concrete mix design, sampling and testing in the field shall be performed by a commercial testing laboratory which conforms to ASTM C 1077. The laboratory shall be approved in writing by the Government.

1.4.3 Batch Tickets

ASTM C 94/C 94M. Submit mandatory batch ticket information for each load of ready-mixed concrete.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

2.1.1.1 Cement

ASTM C 150, Type I or II with maximum alkali content of 0.60%. Cement certificate shall include test results in accordance with ASTM C 150, including equivalent alkalis indicated in the Supplementary Optional Chemical Requirements.

2.1.1.2 Fly Ash and Pozzolan

ASTM C 618, Type F, except that the maximum allowable loss on ignition shall be 6%, maximum available alkalis content shall be 1.5%, and maximum calcium oxide (CaO) content 8%. Fly ash certificates shall include test results in accordance with ASTM C 618, including available alkalis indicated in the Supplementary Optional Chemical Requirements.

2.1.1.3 Slag

ASTM C 989, Ground Granulated Blast Furnace Slag (GGBFS), Grade 100 or 120. Certificates shall include test results in accordance with ASTM C 989.

2.1.2 Water

ASTM C 94/C 94M, fresh, clean, and potable.

2.1.3 Aggregate

2.1.3.1 Alkali Reactivity Test

Fine and Coarse aggregates to be used in all concrete shall be evaluated and tested by the Contractor for alkali-aggregate reactivity in accordance with ASTM C 1260. The coarse and fine aggregates shall be evaluated in a combination which matches the contractors' proposed mix design (including Class F fly ash or GGBF slag), utilizing the modified version of ASTM C 1260. Test results of the combination shall have a measured expansion of less than 0.08 percent at 16 days. Should the test data indicate an expansion of greater than 0.08%, the aggregate(s) shall be rejected and the contractor shall submit new aggregate sources for retesting or may submit additional test results incorporating Lithium Nitrate for consideration.

ASTM C 1260 shall be modified as follows to include one of the following options:

- a. Utilize the contractor's proposed low alkali Portland cement and Class F fly ash in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement and fly ash.
- b. Utilize the contractor's proposed low alkali Portland cement and ground granulated blast furnace (GGBF) slag in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement and GGBF.
- c. Utilize the contractor's proposed low alkali Portland cement and Class F fly ash and ground granulated blast furnace (GGBF) slag in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement, fly ash and GGBF.

2.1.3.2 Fine Aggregates

ASTM C 33.

2.1.3.3 Coarse Aggregates

ASTM C 33.

2.1.4 Admixtures

ASTM C 494/C 494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures. Where not shown or specified, the use of admixtures is subject to written approval of the Contracting Officer.

ASTM C 260: Air-entraining.

2.1.5 Reinforcement

2.1.5.1 Deformed steel bar mats shall conform to ASTM A 184. Bar reinforcement shall conform to ASTM A 615/A 615M, Grade 40. Epoxy coated in accordance with ASTM A 775/A 775M.

2.1.6 Curing Materials

2.1.6.1 White-Burlap-Polyethylene Sheet

ASTM C 171, 0.004 inch thick white opaque polyethylene bonded to 10 oz/linear yard (40 inch) wide burlap.

2.1.6.2 Liquid Membrane-Forming Compound

ASTM C 309, white pigmented, Type 2, Class B, free of paraffin or petroleum.

2.1.7 Joint Fillers and Sealant

2.1.8.1 Single Component Cold-Applied Silicone Sealant

Silicone sealant shall be self-leveling, non-acid curing, and meet the following requirements.

TEST	TEST METHOD	REQUIREMENTS
Weight Loss	ASTM C 792 Modified (See Note 1)	10 percent max.
Flow	ASTM C 639 (Type I)	Smooth and level
Extrusion Rate	ASTM C 603	30 sec. max.
Tack Free Time	ASTM C 679	5 hours max.
Hardness (Shore 00) (See Note 2)	ASTM C 661	30 - 80
Tensile Stress at 150 Percent Elongation (See Note 2)	ASTM D 412 (Die C)	30 psi max.
Percent Elongation (See Note 2)	ASTM D 412 (Die C)	700 min.
Accelerated Weathering	ASTM C 793	Pass 5000 hours
Bond and Movement	ASTM C 719	Pass 10 cycles at +50
Capability	percent movement (no adhesion or cohesion failure)	
Flame Resistant	FS SS-S-200	Pass

NOTES:

1. Percent weight loss of wet (uncured) sample after placing in forced-draft oven maintained at 158 degrees F + 1 degree F for two hours.
2. Specimen cured 21 days at 73 degrees F + 1 degree F and 50 percent.

ACCELERATED WEATHERING FACTORY TEST REPORT. For Accelerated Weathering test, in lieu of testing of actual joint sealant to be used on the project, a report of a factory test, performed within two years of contract award, may be submitted.

2.1.8.2 Blocking Media

Compressible, non-shrinkable, nonreactive with joint sealant and nonabsorption type such as plastic rod, free of oils or bitumen. Blocking media shall have a water absorption of not more than 5 percent by weight when tested in accordance with ASTM C 509. Blocking media shall be consistent with joint seal manufacturer's installation instructions and be at least 25 percent larger in diameter than width of joints as shown.

2.1.8.3 Expansion Joint Filler

Preformed joint filler, premolded, shall conform to ASTM D 1751, unless otherwise specified. Filler must be compatible with joint sealer material.

2.2 CONTRACTOR-FURNISHED MIX DESIGN

Contractor-furnished mix design concrete shall be designed in accordance with ACI 211.1 except as modified herein, and the mix design shall be as specified herein under paragraph entitled "Submittals." The concrete shall have a minimum compressive strength of 3500 pounds per square inch at 28 days. The concrete may be air entrained. If air entrainment is used the air content shall be 5.0 plus or minus 1.5 percent. Maximum size aggregate for slip forming shall be 1.5 inches. The minimum cementitious factor is 564 lbs per cubic yard and slump shall be 1 to 3 inches.

If the cementitious material is not sufficient to produce concrete of the compressive strength required it shall be increased as necessary, without additional compensation under the contract. The cementitious factor shall be calculated using cement, Class F fly ash, and or GGBF slag. The mix shall use a cement replacement (by weight) of 25%-35% Class F fly ash, or 40%-50% GGBF slag, or a combination of the two. In the combination, each 5% of Class F fly ash shall be replaced by 8% GGBF slag.

PART 3 EXECUTION

3.1 FORMS

3.1.1 Construction

Construct forms to be removable without damaging the concrete.

3.1.2 Coating

Before placing the concrete, coat the contact surfaces of forms except existing pavement sections where bonding is required, with a non-staining mineral oil, non-staining form coating compound, or two coats of nitro-cellulose lacquer. When using existing pavement as a form, clean existing concrete and then coat with asphalt emulsion bond-breaker before concrete is placed.

3.1.3 Grade and Alignment

Check and correct grade elevations and alignment of the forms immediately before placing the concrete.

3.2 REINFORCEMENT

3.2.1 Setting Slab Reinforcement

Reinforcement shall be positioned on suitable chairs prior to concrete placement. At expansion, contraction and construction joints, place the reinforcement as indicated. Reinforcement, when placed in concrete, shall be free of mud, oil, scale or other foreign materials. Place reinforcement accurately and wire securely. The laps at splices shall be 12 inches minimum and the distances from ends and sides of slabs and joints shall be as indicated.

3.3 MEASURING, MIXING, CONVEYING, AND PLACING CONCRETE

3.3.1 Measuring

ASTM C 94/C 94M.

3.3.2 Mixing

ASTM C 94/C 94M, except as modified herein. Begin mixing within 30 minutes after cement has been added to aggregates. When the air temperature is greater than 85 degrees F, reduce mixing time and place concrete within 60 minutes. Additional water may be added to bring slump within required limits as specified in Section 11.7 of ASTM C 94/C 94M, provided that the specified water-cement ratio is not exceeded.

3.3.3 Conveying

ASTM C 94/C 94M.

3.3.4 Placing

Follow guidance of ACI 301, except as modified herein. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete continuously at a uniform rate, with minimum amount of segregation, without damage to the grade and without unscheduled stops except for equipment failure or other emergencies. If this occurs within 10 feet of a previously placed expansion joint, remove concrete back to joint, repair any damage to grade, install a construction joint and continue placing concrete only after cause of the stop has been corrected.

3.3.5 Vibration

Immediately after spreading concrete, consolidate concrete with internal type vibrating equipment along the boundaries of all slabs regardless of slab thickness, and interior of all concrete slabs 6 inches or more in thickness. Limit duration of vibration to that necessary to produce consolidation of concrete. Excessive vibration will not be permitted. Vibrators shall not be operated in concrete at one location for more than 15 seconds. At the option of the Contractor, vibrating equipment of a type approved by the Contracting Officer may be used to consolidate concrete in unreinforced pavement slabs less than 6 inches thick.

3.3.5.1 Vibrating Equipment

Operate equipment, except hand-manipulated equipment, ahead of the finishing machine. Select the number of vibrating units and power of each unit to properly consolidate the concrete. Mount units on a frame that is capable of vertical movement and, when necessary, radial movement, so vibrators may be operated at any desired depth within the slab or be completely withdrawn from the concrete. Clear distance between frame-mounted vibrating units that have spuds that extend into the slab at intervals across the paving lane shall not exceed 30 inches. Distance between end of vibrating tube and side form shall not exceed 2 inches. For pavements less than 10 inches thick, operate vibrators at mid-depth parallel with or at a slight angle to the subbase. For thicker pavements, angle vibrators toward the vertical, with vibrator tip preferably about 2 inches from subbase, and top of vibrator a few inches

below pavement surface. Vibrators may be pneumatic, gas driven, or electric, and shall be operated at frequencies within the concrete of not less than 8,000 vibrations per minute. Amplitude of vibration shall be such that noticeable vibrations occur at 1.5 foot radius when the vibrator is inserted in the concrete to the depth specified.

3.3.6 Cold Weather

Except with authorization, do not place concrete when ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. When authorized, when concrete is likely to be subjected to freezing within 24 hours after placing, heat concrete materials so that temperature of concrete when deposited is between 65 and 80 degrees F. Methods of heating materials are subject to approval of the Contracting Officer. Do not heat mixing water above 165 degrees F. Remove lumps of frozen material and ice from aggregates before placing aggregates in mixer. Follow practices found in ACI 306.1.

3.3.7 Hot Weather

Maintain required concrete temperature in accordance with Figure 2.1.5 in ACI 305R to prevent evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. After placement, use fog spray, apply monomolecular film, or use other suitable means to reduce the evaporation rate. Start curing when surface of fresh concrete is sufficiently hard to permit curing without damage. Cool underlying material by sprinkling lightly with water before placing concrete. Follow practices found in ACI 305R.

3.4 FINISHING CONCRETE

3.4.1 FINISHING

Start finishing operations immediately after placement of concrete. Finish pavement surface on both sides of a joint to the same grade. Finish formed joints from a securely supported transverse bridge. Provide hand finishing equipment for use at all times. Transverse and longitudinal surface tolerances shall be 1/4 inch in 10 feet.

3.4.1 Initial Finishing

3.4.1.1 Joint Finish

Before concrete is hardened, correct edge slump of pavement, exclusive of edge rounding, in excess of 0.02 foot. Finish concrete surface on each side of construction joints to the same plane, and correct deviations before newly placed concrete has hardened.

3.4.1.2 Hand Finishing

Strike-off and screed surface of concrete to elevations slightly above finish grade so that when concrete is consolidated and finished pavement surface is at the indicated elevation. Vibrate entire surface until required compaction and reduction of surface voids is secured with a strike-off template.

3.4.1.3 Longitudinal Floating

After initial finishing, further smooth and consolidate concrete by means of hand-operated longitudinal floats. Use floats that are not less than 12 feet long and 6 inches wide and stiffened to prevent flexing and warping.

3.4.2 Texturing

Before the surface sheen has disappeared and before the concrete hardens, the surface of the pavement shall be given a texture as described herein. After curing is complete, all textured surfaces shall be thoroughly power broomed to remove all debris. Any type of transverse texturing shall produce grooves in straight lines across each lane within a tolerance of plus or minus 1/2 inch of a true line. The concrete in areas of recesses for tie-down anchors, lighting fixtures, and other outlets in the pavement shall be finished to provide a surface of the same texture as the surrounding area.

3.4.2.1 Burlap Drag Finish

Before concrete becomes non-plastic, finish the surface of the slab by dragging on the surface a strip of clean, wet burlap measuring from 3 to 10 feet long and 2 feet wider than the width of the pavement. Select dimension of burlap drag so that at least 3 feet of the material is in contact with the pavement. Drag the surface so as to produce a finished surface with a fine granular or sandy texture without leaving disfiguring marks.

3.4.2.2 Brooming

Finish the surface of the slab by brooming the surface with a new wire broom at least 18 inches wide. Gently pull the broom over the surface of the pavement from edge to edge just before the concrete becomes non-plastic. Slightly overlap adjacent strokes of the broom. Broom perpendicular to centerline of pavement so that corrugations produced will be uniform in character and width, and not more than 1/16 inch in depth. Broomed surface shall be free from porous spots, irregularities, depressions, and small pockets or rough spots such as may be caused by accidentally disturbing particles of coarse aggregate embedded near the surface.

3.4.3 Edging

At the time the concrete has attained a degree of hardness suitable for edging, carefully finish slab edges, including edges at formed joints, with an edge having a maximum radius of one-eighth inch. When brooming is specified for the final surface finish, edge transverse joints before starting brooming, then operate broom to obliterate as much as possible the mark left by the edging tool without disturbing the rounded corner left by the edger. Clean by removing loose fragments and soupy mortar from corners or edges of slabs which have crumbled and areas which lack sufficient mortar for proper finishing. Refill voids solidly with a mixture of suitable proportions and consistency and refinish. Remove unnecessary tool marks and edges. Remaining edges shall be smooth and true to line.

3.4.4 Repair of Surface Defects

Follow guidance of ACI 301.

3.5 CURING AND PROTECTION

Concrete shall be protected against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Unhardened concrete shall be protected from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period. Protect concrete adequately from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks and oil stains, and do not allow it to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Do not use membrane-forming compound on surfaces where its appearance would be objectionable, on surfaces to be painted, where coverings are to be bonded to concrete, or on concrete to which other concrete is to be bonded. Maintain temperature of air next to concrete above 40 degrees F for the full curing periods.

3.5.1 White-Burlap-Polyethylene Sheet

Wet entire exposed surface thoroughly with a fine spray of water, saturate burlap but do not have excessive water dripping off the burlap and then cover concrete with White-Burlap-Polyethylene Sheet, burlap side down. Lay sheets directly on concrete surface and overlap 12 inches. Make sheeting not less than 18 inches wider than concrete surface to be cured, and weight down on the edges and over the transverse laps to form closed joints. Repair or replace sheets when damaged during curing. Check daily to assure burlap has not lost all moisture. If moisture evaporates, re-saturate burlap and re-place on pavement (re-saturation and re-placing shall take no longer than 10 minutes per sheet). Leave sheeting on concrete surface to be cured for at least 7 days.

3.5.2 Liquid Membrane-Forming Compound Curing

Apply compound immediately after surface loses its water sheen and has a dull appearance and before joints are sawed. Agitate curing compound thoroughly by mechanical means during use and apply uniformly in a two-coat continuous operation by suitable power-spraying equipment. Total coverage for the two coats shall be at least one gallon of undiluted compound per 200 square feet. Compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. Apply an additional coat of compound immediately to areas where film is defective. Re-spray concrete surfaces that are subject to heavy rainfall within 3 hours after curing compound has been applied in the same manner.

3.5.2.1 Protection of Treated Surfaces

Keep concrete surfaces to which liquid membrane-forming compounds have been applied free from vehicular traffic and other sources of abrasion for not less than 72 hours. Foot traffic is allowed after 24 hours for inspection purposes. Maintain continuity of coating for entire curing period and repair damage to coating immediately.

3.5.3 Protection

Completed concrete shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.6 FIELD QUALITY CONTROL

3.6.1 Sampling

The Contractor's approved laboratory shall collect samples of fresh concrete in accordance with ASTM C 172 during each working day as required to perform tests specified herein. Make test specimens in accordance with ASTM C 31/C 31M.

3.6.2 Consistency Tests

The Contractor's approved laboratory shall perform concrete slump tests in accordance with ASTM C 143/C 143M. Take samples for slump determination from concrete during placement. Perform tests at the beginning of a concrete placement operation and for each batch (minimum) or every 20 cubic yards (maximum) of concrete to ensure that specification requirements are met. In addition, perform tests each time test beams and cylinders are made.

3.6.3 Compressive Strength Tests

The Contractor's approved laboratory shall test for compressive strength in accordance with ASTM C 78. Make four test specimens for each set of tests. Test two specimens at 7 days, and the other two at 28 days. Concrete strength will be considered satisfactory when the minimum of the 28-day test results equals or exceeds the specified 28-day compressive strength, and no individual strength test is

less than 3000 pounds per square inch. If the ratio of the 7-day strength test to the specified 28-day strength is less than 65 percent, make necessary adjustments for conformance. Frequency of compressive tests on concrete cylinders shall be not less than four test cylinders for each 50 cubic yards of concrete, or fraction thereof, placed. Concrete which is determined to be defective, based on the strength acceptance criteria therein, shall be removed and replaced with acceptable concrete.

3.6.4 Air Content Tests

Test air-entrained concrete for air content at the same frequency as specified for slump tests. Determine percentage of air in accordance with ASTM C 231 on samples taken during placement of concrete in forms.

3.6.5 Surface Testing

Surface testing for surface smoothness, edge slump and plan grade shall be performed as indicated below by the Testing Laboratory. The measurements shall be properly referenced in accordance with paving lane identification and stationing, and a report given to the Government within 24 hours after measurement is made. A final report of surface testing, signed by a Registered Engineer, containing all surface measurements and a description of all actions taken to correct deficiencies, shall be provided to the Government upon conclusion of surface testing.

3.6.5.1 Surface Smoothness Requirements

The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavements shall be within the tolerances specified when checked with a 12 foot straightedge: 1/5 inch longitudinal and 1/4 inch transverse directions for roads and streets and 1/4 inch for both directions for other concrete surfaces, such as parking areas.

3.6.5.2 Surface Smoothness Testing Method

The surface of the pavement shall be tested with the straightedge to identify all surface irregularities exceeding the tolerances specified above. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines approximately 15 feet apart. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length and measuring the maximum gap between the straightedge and the pavement surface, in the area between these two high points.

3.6.6 Plan Grade Testing and Conformance

The surfaces shall vary not more than 0.06 foot above or below the plan grade line or elevation indicated. Each pavement category shall be checked by the Contractor for conformance with plan grade requirements by running lines of levels at intervals to determine the elevation at each joint intersection.

3.6.7 Test for Pavement Thickness

Measure during concrete placement to determine in-place thickness of concrete pavement.

3.6.8 Reinforcement

Inspect reinforcement prior to installation to assure it is free of oil, mud, or other objectionable material and defects in the epoxy coating.

SECTION 32 16 13

CONCRETE SIDEWALKS AND CURBS AND GUTTERS

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.

ASTM INTERNATIONAL (ASTM)

ASTM D 1752 (2004) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Concrete

Copies of certified delivery tickets for all concrete used in the construction.

SD-06 Test Reports

Field Quality Control

Copies of all test reports within 24 hours of completion of the test.

1.3 WEATHER LIMITATIONS

1.3.1 Placing During Cold Weather

Concrete placement shall not take place when the air temperature reaches 40 degrees F and is falling, or is already below that point. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Provisions shall be made to protect the concrete from freezing during the specified curing period. If necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection shall be approved in writing. Approval will be contingent upon full conformance with the following provisions. The underlying material shall be prepared and protected so that it is entirely free of frost when the concrete is deposited. Mixing water and aggregates shall be heated as necessary to result in the temperature of the in-place concrete being between 50 and 85 degrees F. Methods and equipment for heating shall be approved. The aggregates shall be free of ice, snow, and frozen lumps before entering the mixer. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.

1.3.2 Placing During Warm Weather

The temperature of the concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed 95 degrees F at any time.

1.4 PLANT, EQUIPMENT, MACHINES, AND TOOLS

1.4.1 General Requirements

Plant, equipment, machines, and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times. The equipment shall have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Use of the equipment shall be discontinued if it produces unsatisfactory results. The Contracting Officer shall have access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

PART 2 PRODUCTS

2.1 CONCRETE

Concrete shall conform to the applicable requirements of Section 32 13 13 CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES except as otherwise specified. Concrete shall have a minimum compressive strength of 3500 psi at 28 days. Maximum size of aggregate shall be 1-1/2 inches.

2.1.1 Air Content

Shall conform to the applicable requirements of Section 32 13 13 CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES except as otherwise specified.

2.1.2 Slump

Shall conform to the applicable requirements of Section 32 13 13 CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES except as otherwise specified. .

2.1.3 Reinforcement Steel

Shall conform to the applicable requirements of Section 32 13 13 CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES except as otherwise specified.

2.2 CONCRETE CURING MATERIALS

Shall conform to the applicable requirements of Section 32 13 13 CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES except as otherwise specified.

2.3 CONCRETE PROTECTION MATERIALS

Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 JOINT FILLER AND SEALANTS

Shall conform to the applicable requirements of Section 32 13 13 CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES except as otherwise specified.

2.5 FORM WORK

Form work shall be designed and constructed to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.5.1 Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

2.5.2 Curb and Gutter Forms

Curb and gutter outside forms shall have a height equal to the full depth of the curb or gutter. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted in conformance with Section 31 23 00, EXCAVATION AND FILL.

3.1.1 Sidewalk Subgrade

The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Curb and Gutter Subgrade

The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

3.1.3 Maintenance of Subgrade

The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.2 FORM SETTING

Forms shall be set to the indicated alignment, grade and dimensions. Forms shall be held rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks

Forms for sidewalks shall be set with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10 foot long section. After forms are set, grade and alignment shall be checked with a 10 foot straightedge. Forms shall have a transverse slope of 1/4 inch per foot with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2.2 Curbs and Gutters

The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing. Gutter forms shall not be removed while the concrete is sufficiently plastic to slump in any direction.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Concrete shall be placed in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a strike off.

3.3.2 Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, the surface shall be finished with a wood float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

3.3.3 Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8 inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.3.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb and Gutter

Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators. Curve shaped gutters shall be finished with a standard curb "mule".

3.4.2 Curb and Gutter Finishing

Approved slipformed curb and gutter machines may be used in lieu of hand placement.

3.4.3 Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.

3.4.4 Joint Finishing

Curb edges at formed joints shall be finished as indicated.

3.4.5 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated. Expansion joints are not required between sidewalks and curb that abut the sidewalk longitudinally.

3.5.1 Sidewalk Contraction Joints

The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

3.5.2 Sidewalk Expansion Joints

Expansion joints shall be formed with 1/2 inch joint filler strips. Joint filler in expansion joints surrounding structures and features within the sidewalk may consist of preformed filler material conforming to ASTM D 1752 or building paper. Joint filler shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be cleaned and filled with cold-applied joint sealant. Joint sealant shall be gray or stone in color. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.5.3 Reinforcement Steel Placement

Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

3.6 CURB AND GUTTER JOINTS

Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

3.6.1 Contraction Joints

Contraction joints shall be constructed directly opposite contraction joints in abutting portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length. Contraction joints shall be constructed by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb and gutter. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

3.6.2 Expansion Joints

Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb and gutter directly opposite expansion joints of abutting portland cement concrete pavement, and shall be of the same type and thickness as joints in the pavement. Where curb and gutter do not abut portland cement concrete pavement, expansion joints at least 1/2 inch in width shall be provided at intervals not less than 10 meters (30 feet) nor greater than 35 meters (120 feet). Expansion joints shall conform to the applicable requirements of Section 32 13 13 CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES. Expansion joints and the top 1 inch depth of curb and gutter contraction joints shall be sealed with joint sealant. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.7 CURING AND PROTECTION

3.7.1 Shall conform to the applicable requirements of Section 02752 CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES except as otherwise specified.

3.8 FIELD QUALITY CONTROL

3.8.1 General Requirements

The Contractor shall perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, the Contractor shall take the action and submit reports as required below, and any additional tests to insure that the requirements of these specifications are met.

3.8.2 Concrete Testing

Shall conform to the applicable requirements of Section 02752 CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES except as otherwise specified.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the Government and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

-- End of Section --

SECTION 32 17 24.00 10

PAVEMENT MARKINGS

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 in the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 247 (2007) Glass Beads Used in Traffic Paints

ASTM INTERNATIONAL (ASTM)

ASTM D 4280 (2004) Extended Life Type, Nonplowable, Raised, Retroreflective Pavement Markers

ASTM D 4505 (2005) Preformed Retroreflective Pavement Marking Tape for Extended Service Life

ASTM D 792 (2000) Density and Specific Gravity (Relative Density) of Plastics by Displacement

ASTM E 28 (1999; R 2004) Softening Point of Resins Derived from Naval Stores by Ring and Ball Apparatus

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-B-1325 (Rev C) Beads (Glass Spheres) Retro-Reflective (Metric)

FS TT-P-1952 (Rev D) Paint, Traffic and Airfield Markings, Waterborne

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Reflective media for roads and streets

Paints for roads and streets

Thermoplastic compounds and primer

SD-06 Test Reports

Reflective media for roads and streets

Paints for roads and streets

Thermoplastic compounds and primer

Report from sampling and testing made in accordance with paragraph entitled "Sampling and Testing."

SD-07 Certificates

Reflective media for roads and streets

Paints for roads and streets

Thermoplastic compounds and primer

Construction equipment list

SD-08 Manufacturer's Instructions

Paints for roads and streets

Thermoplastic compounds and primer

Submit manufacturer's Material Safety Data Sheets.

1.3 DELIVERY AND STORAGE

Deliver paints, paint materials and thermoplastic compound materials in original sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer. Provide storage facilities at the job site for maintaining materials at temperatures recommended by the manufacturer.

1.4 WEATHER LIMITATIONS

Apply paint to clean, dry surfaces, and unless otherwise approved, only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F for oil-based materials; above 50 degrees F and less than 110 degrees F for water-based materials. Maintain paint temperature within these same limits.

1.5 EQUIPMENT

Machines, tools, and equipment used in the performance of the work shall be approved by the Contracting Officer and maintained in satisfactory operating condition. Submit construction equipment list approval by the Contracting Officer.

1.5.1 Paint Applicator

Provide self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. Provide machine having a speed during application capable of applying the stripe widths indicated at the paint coverage rate specified herein and of even uniform thickness with clear-cut edges. [Provide equipment used for marking streets and highways capable of placing the prescribed number of lines at a single pass as solid lines, intermittent lines, or a combination of solid and intermittent lines using a maximum of three different colors of paint as specified. The equipment for applying the paint for airfield pavements will be a self-propelled or mobile-drawn pneumatic spraying machine with an arrangement of atomizing nozzles capable of applying a width of line at any one time in multiples of 6 inches, from 6 to 36 inches. Provide paint applicator with paint reservoirs or tanks of sufficient capacity and suitable gages to apply paint in accordance with requirements specified. Equip tanks with suitable air-driven mechanical agitators.

Equip spray mechanism with quick-action valves conveniently located, and include necessary pressure regulators and gages in full view and reach of the operator. Install paint strainers in paint supply lines to ensure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Provide pneumatic spray guns for hand application of paint in areas where the mobile paint applicator cannot be used. Applicator for water-based markings shall be equipped with non-stick coated hoses; metal parts in contact with the paint material shall be constructed of grade 302, 304, 316, or equal stainless steel.

1.5.2 Reflective Media Dispenser

Attach dispenser for applying the reflective media to the paint dispenser and operate automatically and simultaneously with the paint applicator through the same control mechanism. Use dispenser capable of adjustment and designed to provide uniform flow of reflective media over the full width of the stripe at the rate of coverage specified herein at all operating speeds of the paint applicator to which it is attached.

1.5.3 Thermoplastic Application Equipment

Application equipment shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. The equipment used for the placement of thermoplastic pavement markings shall be of two general types: mobile applicator and portable applicator.

1.5.3.1 Portable Application Equipment

The portable applicator shall be defined as hand-operated equipment, specifically designed for placing special markings such as crosswalks, stop-bars, legends, arrows, and short lengths of lane, edge and centerlines. The portable applicator shall be capable of applying thermoplastic pavement markings by the extrusion method. It is intended that the portable applicator will be loaded with hot thermoplastic composition from the melting kettles on the mobile applicator. Equip the portable applicator with all the necessary components, including a materials storage reservoir, bead dispenser, extrusion shoe, and heating accessories, so as to be capable of holding the molten thermoplastic at a temperature of 375 to 425 degrees F, of extruding a line of 3 to 12 inches in width, and in thickness of not less than 0.125 inch nor more than 0.190 inch and of generally uniform cross section.

PART 2 PRODUCTS

2.1 MATERIALS

Provide materials conforming to the requirements specified herein.

2.1.1 Paints for Roads and Streets

FS A-A-2886, color as indicated selected.

2.1.2 Reflective Media for Roads and Streets

FS TT-B-1325, Type I, Gradation A.

2.1.3 Thermoplastic Compounds

The thermoplastic reflectorized pavement marking compound shall be extruded or sprayed in a molten state onto a primed pavement surface. Following a surface application of glass beads and upon cooling to normal pavement temperatures, the marking shall be an adherent reflectorized strip of the specified thickness and width that is capable of resisting deformation by traffic.

2.1.3.1 Composition Requirements

The binder component shall be formulated as a hydrocarbon resin. The pigment, beads and filler shall be uniformly dispersed in the binder resin. The thermoplastic composition shall be free from all skins, dirt, and foreign objects and shall comply with the following requirements:

<u>Component</u>	<u>Percent by Weight</u>	
	<u>White</u>	<u>Yellow</u>
Binder	17 min	17 min
Titanium dioxide	10 min	-
Glass beads	20 min	20 min
Calcium carbonate and inert fillers	49 min	*
Yellow pigments	-	*

*Amount and type of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer, providing the other composition requirements of this specification are met.

2.1.3.2 Physical Properties

- a. Drying time: When installed at 70 degrees F and in thicknesses between 1/8 and 3/16 inch, the composition shall be completely solid and shall show no damaging effect from traffic after curing 15 minutes.
- b. Softening point: The composition shall have a softening point of not less than 194 degrees F when tested in accordance with ASTM E 28.
- c. Specific gravity: The specific gravity of the composition shall be between 1.9 and 2.2 as determined in accordance with ASTM D 792.

2.1.3.3 Primer

- a. Asphalt concrete primer: The primer for asphalt concrete pavements shall be a thermosetting adhesive with a solids content of pigment reinforced synthetic rubber and synthetic plastic resin dissolved or dispersed in a volatile organic solvent. The solids content shall not be less than 10 percent by weight at 70 degrees F and 60 percent relative humidity. A wet film thickness of 0.005 inch, plus or minus 0.001 inch, shall dry to a tack-free condition in less than 5 minutes.
- b. Portland cement concrete primer: The primer for portland cement concrete pavements shall be an epoxy resin primer. The primer shall be of the type recommended by the manufacturer of the thermoplastic composition.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Allow new pavement surfaces to cure for a period of not less than 30 days before application of marking materials. Thoroughly clean surfaces to be marked before application of the paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required. Remove rubber deposits, existing paint markings, residual curing compounds, and other coatings adhering to the pavement by water blasting. For Portland Cement Concrete pavement, grinding, light shot blasting, and light scarification, to a resulting profile equal to ICRI 03732 CSP 2, CSP 3, and CSP 4, respectively, can be used in addition to water blasting, to either remove existing coatings or for surface preparation on most pavements.

Scrub affected areas, where oil or grease is present on old pavements to be marked, with several applications of trisodium phosphate solution or other approved detergent or degreaser and rinse thoroughly after each application. After cleaning oil-soaked areas, seal with shellac or primer recommended by the manufacturer to prevent bleeding through the new paint. Do not commence painting in any area until pavement surfaces are dry and clean.

3.2 APPLICATION

3.2.1 Rate of Application

3.2.1.1 Reflective Markings

Apply paint evenly to the pavement area to be coated at a rate of 105 plus or minus 5 square feet per gallon. Apply glass spheres uniformly to the wet paint on road and street pavement at a rate of (6) plus or minus (0.5) pounds of glass spheres per gallon.

3.2.1.2 Nonreflective Markings

Apply paint evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet per gallon.

3.2.1.3 Thermoplastic Compound

After surface preparation has been completed, prime the asphalt or concrete pavement surface with spray equipment. Allow primer materials to "set-up" prior to applying the thermoplastic composition. Allow the asphalt concrete primer to dry to a tack-free condition, usually occurring in less than 10 minutes. Allow the Portland Cement concrete primer to dry in accordance with the thermoplastic manufacturer recommendations. To shorten the curing time of the epoxy resins, an infrared heating device may be used on the concrete primer. Apply asphalt concrete primer to all asphalt concrete pavements at a wet film thickness of 0.005 inch, plus or minus 0.001 inch 265 to 400 square feet per gallon. Apply portland cement concrete primer to all concrete pavements (including concrete bridge decks) at a wet film thickness of between 0.04 to 0.05 inch 320 to 400 square feet per gallon. After the primer has "set-up", apply the thermoplastic at temperatures no lower than 375 degrees F nor higher than 425 degrees F at the point of deposition. Immediately after installation of the marking, apply drop-on reflective glass spheres mechanically at the rate of one pound per 20 square feet such that the spheres are held by and imbedded in the surface of the molten material. Apply all extruded thermoplastic markings at the specified width and at a thickness of not less than 0.125 inch nor more than 0.190 inch. Apply all sprayed thermoplastic markings at the specified width and the thickness designated in the contract plans. If the plans do not specify a thickness, apply centerline markings at a wet thickness of 0.090 inch, plus or minus 0.005 inch, and edgeline markings at a wet thickness of 0.060 inch, plus or minus 0.005 inch.

3.2.2 Painting

Apply paint pneumatically with approved equipment at rate of coverage specified herein. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking numbers, letters, and symbols. Manually paint numbers, letters, and symbols. Sharply outline all edges of markings. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. Discontinue painting operations if there is a deficiency in drying of the markings until cause of the slow drying is determined and corrected.

3.2.3 Reflective Media

Application of reflective media shall immediately follow the application of paint. Accomplish drop-on application of the glass spheres to ensure even distribution at the specified rate of coverage. Should

there be malfunction of either paint applicator or reflective media dispenser, discontinue operations until deficiency is corrected.

3.2.4 Thermoplastic Compound

Place thermoplastic pavement markings upon dry pavement. At the time of installation the pavement surface temperature shall be a minimum of 40 degrees F and rising. Thermoplastics, as placed, shall be free from dirt or tint. Apply all centerline, skipline, edgeline, and other longitudinal type markings with a mobile applicator. Place all special markings, crosswalks, stop bars, legends, arrows, and similar patterns with a portable applicator, using the extrusion method.

3.3 FIELD TESTING AND INSPECTION

3.3.1 Sampling and Testing

As soon as the paint and reflective and thermoplastic materials are available for sampling, obtain by random selection from the sealed containers, two quart samples of each batch in the presence of the Contracting Officer. Accomplish adequate mixing prior to sampling to ensure a uniform, representative sample. A batch is defined as that quantity of material processed by the manufacturer at one time and identified by number on the label. Clearly identify samples by designated name, specification number, batch number, project contract number, intended use, and quantity involved. Test samples by an approved laboratory. If a sample fails to meet specification, replace the material in the area represented by the samples and retest the replacement material as specified above. Submit copy of the test results to the Contracting Officer. Include in the report of test results a listing of any specification requirements not verified by the test laboratory.] [At the discretion of the Contracting Officer, samples provided may be tested by the Government for verification.

3.3.2 Inspection

Examine material at the job site to determine that it is the material referenced in the report of test results or certificate of compliance. A certificate of compliance shall be accompanied by test results substantiating conformance to the specified requirements.

3.3.2.1 Surface Preparations and Application Procedures

Surface preparations and application procedures will be examined by the Contracting Officer to determine conformance with the requirements specified. Approve each separate operation prior to initiation of subsequent operations.

3.4 TRAFFIC CONTROL AND PROTECTION

Place warning signs near the beginning of the work site and well ahead of the work site for alerting approaching traffic from both directions. Place small markers along newly painted lines to control traffic and prevent damage to newly painted surfaces. Mark painting equipment with large warning signs indicating slow-moving painting equipment in operation. Do not use foil-backed material for temporary pavement marking because of its potential to conduct electricity during accidents involving downed power lines.

-- End of Section --

SECTION 32 92 23

SODDING

PART 1 GENERAL

1.1 REFERENCES

ASTM INTERNATIONAL (ASTM)

ASTM D 4972 (2001; R 2007) pH of Soils

ASTM D 5268 (2007) Topsoil Used for Landscaping Purposes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Sod; G
Topsoil; G

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

- a. Sod. Classification, botanical name, common name, mixture percentage of species, percent purity, quality grade, field location and state certification.
- b. Topsoil. Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.

1.3 SOURCE INSPECTION

The sources of sod material and delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Sod

Sod shall be protected during delivery to prevent desiccation, internal heat buildup, or contamination.

1.4.1.2 Delivered Topsoil

Prior to the delivery of any topsoil, its availability shall be verified in paragraph TOPSOIL. A soil test shall be provided for topsoil delivered to the site.

1.4.2 Inspection

Sod shall be inspected upon arrival at the job site for conformity to species. Sod shall be checked for visible broadleaf weeds, and a visible consistency with no obvious patches of foreign grasses that exceed 2 percent of the canopy. Sod that is heating up, dry, moldy, yellow, irregularly shaped, torn, or of uneven thickness shall be rejected. Other materials shall be inspected for compliance with specified requirements. Open soil amendment containers or wet soil amendments; topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter; and topsoil that contains viable plants and plant parts, shall be rejected. Unacceptable materials shall be removed from the job site.

1.4.3 Storage

1.4.3.1 Sod

Sod shall be stored in designated areas and kept in a moist condition by watering with a fine mist, and covered with moist burlap, straw, or other covering. Covering shall allow air to circulate, preventing internal heat from building up. Sod shall be protected from exposure to wind and direct sunlight until installed.

1.4.3.2 Other Material Storage

Materials shall be stored in designated areas. Lime and fertilizer shall be stored in cool, dry locations, away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with sod operation materials.

1.4.4 Handling

Sod shall not be damaged during handling. Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.4.5 Time Limitation

Time limitation between harvesting and installing sod shall be a maximum 36 hours.

PART 2 PRODUCTS

2.1 SOD

2.1.1 Sod Classification

Maryland certified sod shall be provided as classified by applicable state laws. Sod section shall be sized to permit rolling and lifting without breaking.

2.1.2 Grass Species

Grass species shall be proportioned as follows:

Botanical Name	Common Name	Mixture Percent
Festuca arundinacea	Tall Fescue	98

2.1.3 Quality

Sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 1 inch in diameter, woody plant roots, and other materials detrimental to a healthy stand of grass plants. Broadleaf weeds and patches of foreign grasses shall be a maximum 2 percent of the sod section.

2.1.4 Thickness

Sod shall be machine cut to a minimum 1-3/8 inch thickness. Measurement for thickness shall exclude top growth and thatch.

2.1.5 Anchors

Sod anchors shall be as recommended by the sod supplier.

2.1.6 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

2.2 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite in accordance with Section 31 23 00 EXCAVATION AND FILL. When additional topsoil is required beyond the available topsoil from stripping operation, topsoil shall be delivered and amended as recommended by the soil test for the sod species specified.

2.2.1 On-Site Topsoil

Reusable surface soil stripped and stockpiled on site if requirements specified for topsoil in paragraph entitled "Composition" are met.

2.2.2 Off-Site Topsoil

Conform to requirements specified in paragraph entitled "Composition." Additional topsoil shall be furnished by the Contractor. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash, or other material over a maximum 1-1/2 inch diameter. Topsoil shall be free from viable plants and plant parts.

2.2.3 Composition

Containing from 5 to 8 percent organic matter as determined by the topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR. Maximum particle size, 3/4 inch, with maximum 3 percent retained on 1/4 inch screen. Other components shall be within the following percentages:

Silt	25-50
Clay	10-30
Sand	20-35
pH	5 to 7.6
Soluble Salts	600 ppm maximum

2.3 WATER

Water shall be the responsibility of the Contractor unless otherwise noted. Water shall not contain elements toxic to plant life.

2.4 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification, a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

PART 3 EXECUTION

3.1 INSTALLING SOD TIME AND CONDITIONS

3.1.1 Sodding Time

Sod shall be installed from March 1st to May 15th for spring establishment; and from August 15th to November 15th for fall establishment.

3.1.2 Sodding Conditions

Sodding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the sodding operations, proposed alternate times shall be submitted for approval.

3.1.3 Soil Test

Delivered topsoil, existing soil in smooth graded areas, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Sample collection on site shall be random over the entire site. Sample collection for stockpiled topsoil shall be at different levels in the stockpile. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the sod species specified.

3.2 SITE PREPARATION

3.2.1 Finished Grade and Topsoil

Prior to the commencement of the sodding operation, the Contractor shall verify that finished grades are as indicated on drawings; the placing of topsoil, smooth grading, and compaction requirements have been completed in accordance with Section 31 23 00.

3.2.2 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 4 inches deep. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 2 inches deep by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1-horizontal-to-1 vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements.

3.2.3 Prepared Surface

3.2.3.1 Preparation

The prepared surface shall be a maximum 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be rolled and completed with a light raking to remove from the surface debris and stones over a minimum 5/8 inch in any dimension.

3.2.3.2 Protection

Areas within the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing sod, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Areas shall be sodded as indicated. Adequate soil moisture shall be ensured prior to sodding by spraying water on the area to be sodded and wetting the soil to a maximum 1 inch depth.

3.3.1 Installing Sod

Rows of sod sections shall be placed parallel to and tightly against each other. Joints shall be staggered laterally. The sod sections shall not be stretched or overlapped. All joints shall be butted tight. Voids and air drying of roots shall be prevented. Sod sections shall be laid across the slope on long slopes. Sod sections shall be laid at right angles to the flow of water in ditches. Sod sections shall be anchored on slopes steeper than 3-horizontal-to-1-vertical. Anchoring may be required when surface weight or pressure upon placed sod sections is anticipated to cause lateral movement. Sod anchors shall be placed a minimum 2 feet on center with a minimum 2 anchors per sod section.

3.3.2 Finishing

Displacement of the sod shall be prevented by tamping or rolling the sod in place and knitting the sod to the soil. Air pockets shall be eliminated and a true and even surface shall be provided. Frayed edges shall be trimmed, and holes or missing corners shall be patched with sod.

3.3.3 Rolling

The entire area shall be firmed with a roller not exceeding 90 pounds per foot roller width. Slopes over a maximum 3-horizontal-to-1 vertical shall not be rolled.

3.3.4 Watering Sod

Watering shall be started immediately after completing each day of installing sod. Water shall be applied at least 3 times per week to supplement rainfall, at a rate sufficient to ensure moist soil conditions to a minimum depth of 1 inch. Run-off, puddling, and wilting shall be prevented. Unless otherwise directed, watering trucks shall not be driven over turf areas. Watering of other adjacent areas or plant material shall be prevented.

3.4 TEMPORARY SEEDING

When directed during contract delays affecting the sodding operation or when a quick cover is required to prevent surface erosion, the areas designated shall be seeded with a Annual Ryegrass annual seed. The application rate shall be 50 pounds per acre.

3.5 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program.

3.5.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

3.5.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

3.6 RESTORATION AND CLEAN UP

3.6.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the sodding operation shall be restored to original condition at Contractor's expense.

3.6.2 Clean Up

Excess and waste material shall be removed from the sodded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.7 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the sodding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed. Signage shall be in accordance with Section 10 14 01 EXTERIOR SIGNAGE.

3.8 SOD ESTABLISHMENT PERIOD

3.8.1 Commencement

The sod establishment period to obtain a healthy stand of grass plants shall commence on the first day of sodding work under this contract and shall continue through the remaining life of the contract and end 1 month after the last day of sodding operation required by this contract. Written calendar time period shall be furnished for the sod establishment period. When there is more than 1 sod establishment period, the boundaries of the sodded area covered for each period shall be described. The sod establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.

3.8.2 Satisfactory Stand of Grass Plants

Grass plants shall be evaluated for species and health. A satisfactory stand of grass plants from the sodding operation shall be living sod uniform in color and leaf texture. Bare spots shall be a maximum 2 inch square. Joints between sod pieces shall be tight and free from weeds and other undesirable growth.

3.8.3 Maintenance During Establishment Period

Maintenance of the sodded areas shall include eradicating weeds, insects and diseases; protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

3.8.3.1 Mowing

Sodded areas shall be mowed to a minimum 3-inch height when the turf is a maximum 4-inch height. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.8.3.2 Post-Fertilization

The fertilizer shall be applied as recommended by the soil test. A maximum 1/2 pound per 1000 square feet of actual available nitrogen shall be provided to the grass plants. The application shall be timed prior to the advent of winter dormancy and shall be made without burning the installed grass plants.

3.8.3.3 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.8.3.4 Repair

Unsatisfactory stand of grass plants shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.8.3.5 Maintenance Record

A record of each site visit shall be furnished which describes the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

-- End of Section --

SECTION 33 40 00**STORM DRAINAGE UTILITIES**

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 in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 270	(2008) Mortar for Unit Masonry
ASTM C 32	(2005) Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C 55	(2006e1) Concrete Brick
ASTM C 62	(2005) Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM D 3034	(2008) Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 PVC Pipe

ASTM D 3034, Type PSM, maximum SDR 35, produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.2 PE Pipe

The pipe manufacturer's resin certification indicating the cell classification of PE used to manufacture the pipe shall be submitted prior to installation of the pipe. The minimum cell classification for polyethylene plastic shall apply to each of the seven primary properties of the cell classification limits in accordance with ASTM D 3350. See attached product brochure (ADS N-12) for additional information.

2.1.2.1 Corrugated PE Pipe

AASHTO M 294, Type S or D, for pipes 12 to 48 inches and AASHTO M 294, Type S or D, for pipes 54 to 60 inches produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class in accordance with AASHTO M 294. Pipe walls shall have the following properties:

Nominal Size (in.)	Minimum Wall Area (square in/ft)	Minimum Moment of Inertia of Wall Section (in to the 4th/in)
12	1.50	0.024
15	1.91	0.053
18	2.34	0.062
24	3.14	0.116
30	3.92	0.163
36	4.50	0.222
42	4.69	0.543
48	5.15	0.543
54	5.67	0.800
60	6.45	0.800

See attached product brochure (ADS N-12) for additional information.

2.2 MISCELLANEOUS MATERIALS

2.2.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 3500 psi concrete under Section 32 13 13.06, Concrete Pavements for Roads and Site Facilities.

2.2.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar. Water shall be clean and free of harmful acids, alkalis, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and

finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.2.3 Brick

Brick shall conform to ASTM C 62, Grade SW; ASTM C 55, Grade S-I or S-II; or ASTM C 32, Grade MS. Mortar for jointing and plastering shall consist of one part portland cement and two parts fine sand. Lime may be added to the mortar in a quantity not more than 25 percent of the volume of cement. The joints shall be filled completely and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with 1/2 inch of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.

2.2.4 Frame and Grate for Inlets

Frame and grate for inlets shall be Maryland SHA Standard No. MD-374.23, which also references MD-374.02 and MD-374.03.

2.2.5 Frame and Cover for Manholes

Frame shall be Maryland SHA Standard No. MD-383.31. Cover shall be Maryland SHA Standard No. MD-383.32.

2.2.6 Curb Inlets

Curb inlets shall be Maryland SHA Standard No. MD-374.51, COG-5 (5 ft long).

2.2.7 Adjustment Rings

Adjustment rings shall be precast concrete and be in accordance with detail Maryland SHA Standard No. MD-384.01.

2.2.8 Joints for PVC Plastic Pipes

Joints shall be solvent cement or elastomeric gasket type in accordance with the specification for the pipe and as recommended by the pipe manufacturer.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 31 23 00 EXCAVATION AND FILL and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 12 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing, where required, shall be placed within the trench width as specified. Contractor shall not over-excavate. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock excavation shall be as specified and defined in Section 02300 EARTHWORK.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Plastic Pipe

Bedding for PVC and PE pipe shall meet the requirements of ASTM D 2321. Bedding, haunching, and initial backfill shall be either Class IB or II material.

3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

3.3.1 PVC Pipe

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.4 DRAINAGE STRUCTURES

3.4.1 Manholes and Inlets

Raising and lowering of manholes and inlets shall be as indicated.

3.5 BACKFILLING

3.5.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 12 inches above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 12 inches. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.5.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 12 inches.

3.5.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.5.4 Compaction

3.5.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.5.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

- a. Under paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.
- b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.
- c. Under non-traffic areas, density shall be not less than that of the surrounding material.

3.5.5 Determination of Density

Testing shall be the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 2167 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph

Calibration of the referenced publications. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017 or ASTM D 2922. Test results shall be furnished the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

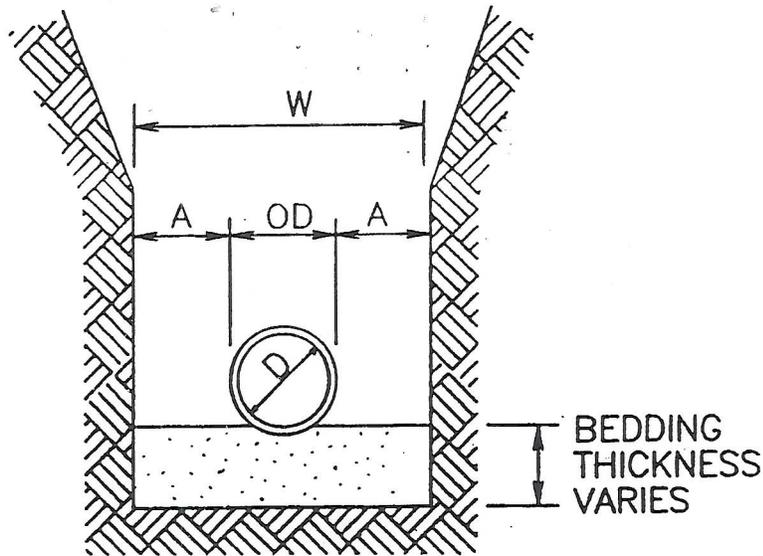
-- End of Section --

PART 5

DRAWINGS & DETAILS

INDEX OF DRAWINGS

<u>Drawing No.</u>	<u>Drawing Title</u>
01	Standard Pipe Trench Width
02	Bituminous Pavement Patching
03	Concrete Sidewalk
04	Handicap Ramp
05	Bituminous Curb
06	Curb and Gutter
07	Directional Arrows
08	Deleted
09	Crosshatching Detail
10	Wheel Stops (Concrete and Plastic)
11	Silt Fence detail
12	Stabilized Construction Entrance
13	Inlet Protection Details
14	Pipe Bollards
15	Speed Bump
16	Valve Box Frame and Cover
17	Crosswalks
18	Handicap Parking Symbol and Yellow Triangle
19	Brick Walkway (Plan view)
20	Brick Walkway
21	Brick Walkway with Concrete
22	Brick Roadway
23-30	ADS N-12 Brochure
31	Wooden Plank Guardrail
32A	Steel "H" Beam Post and Offset Block
32B	Steel W Beam Guardrail
33	Tree Protection



PIPE DIA "D"	MAXIMUM "A"
6" TO 15"	8"
16" TO 21"	10"
24" TO 30"	12"
33" TO 42"	15"
48" & LARGER	18"

MAXIMUM TRENCH WIDTH "W"
TAKEN AT TOP OF PIPE

- NOTES:
1. PROVIDE BEDDING IN ACCORDANCE WITH THE SPECIFICATIONS.
 2. DEPTH OF THE TRENCH IS AS INDICATED ON THE DRAWINGS.

STANDARD PIPE TRENCH WIDTH

UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM:

SUBJECT:

STANDARD PIPE TRENCH WIDTH

SKETCH NO.

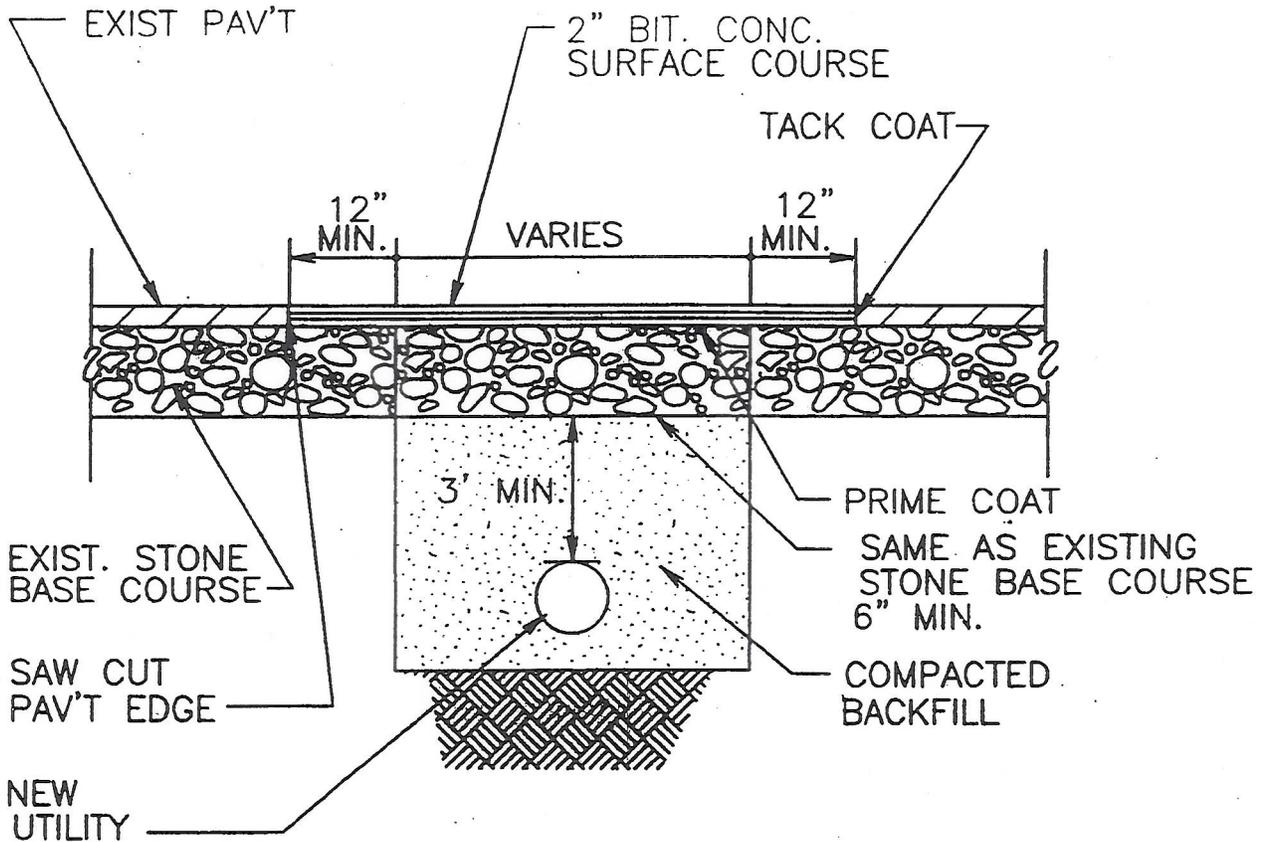
01

SCALE: NTS

BY:RET

DATE: 17 NOV 08

SHT: 1 OF 1



BITUMINOUS PAVEMENT PATCHING

N.T.S.

UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM:

SUBJECT:

BITUMINOUS PAVEMENT PATCHING

SKETCH NO.

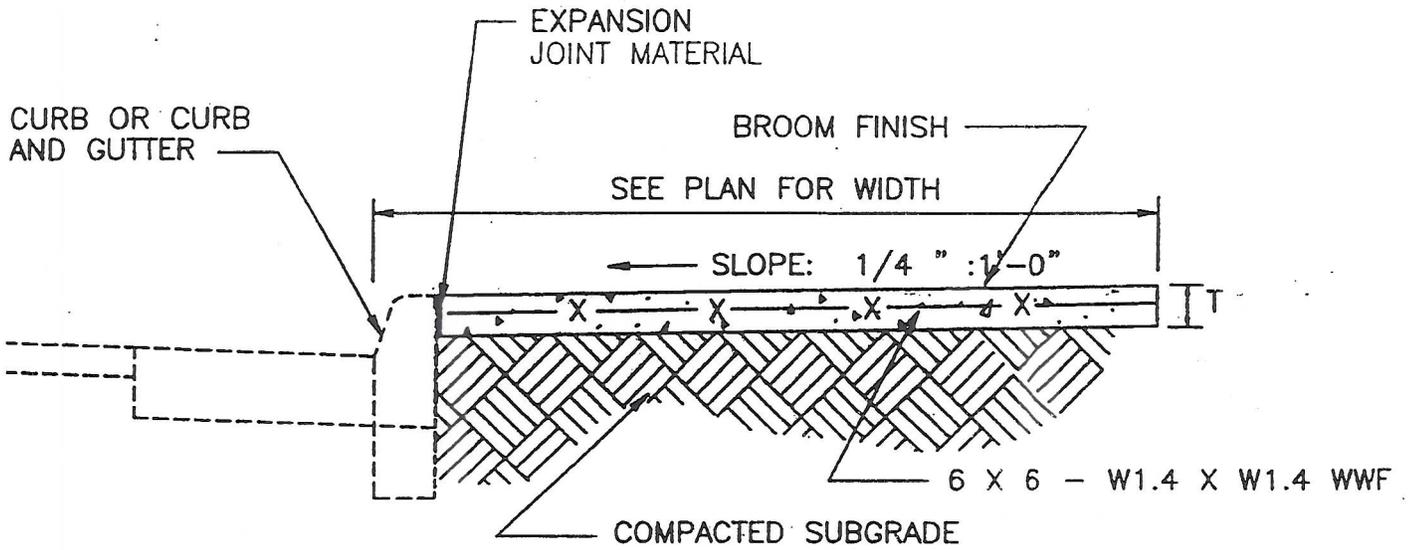
02

SCALE: NTS

BY:RET

DATE: 17 NOV 08

SHT: 1 OF 1



NOTE: TO BE USED WHERE ADJACENT TO CURB OR CURB AND GUTTER

CONCRETE SIDEWALK

NTS

UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM:

SUBJECT:

CONCRETE SIDEWALK

SKETCH NO.

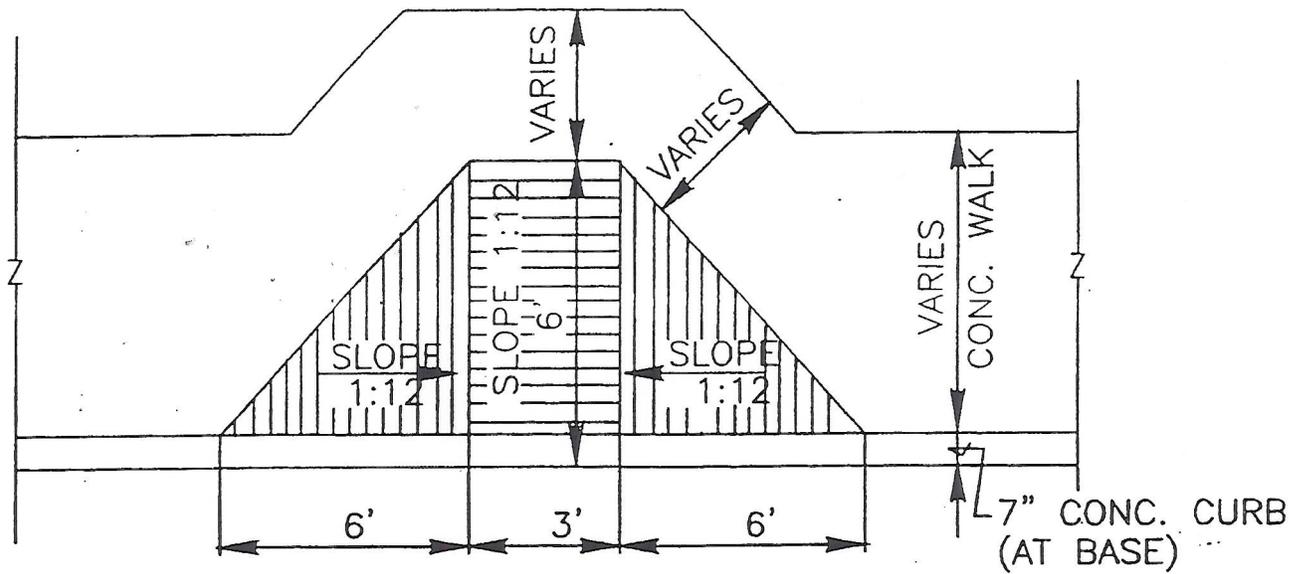
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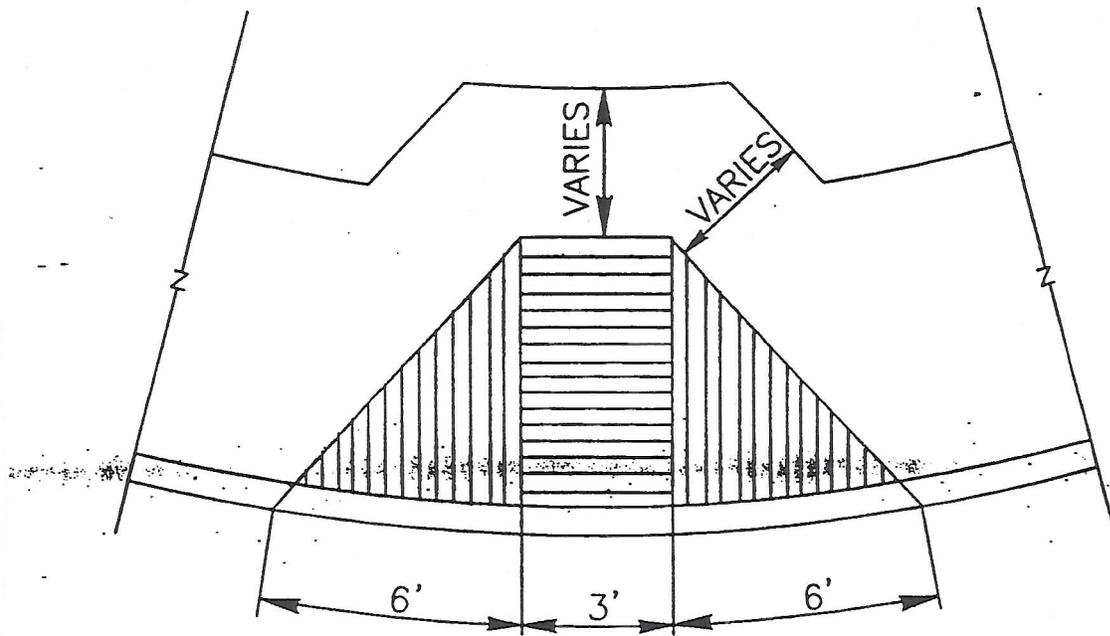
BY:RET

DATE: 17 NOV 08

SHT: 1 OF 1



RAMP ON TANGENT
N.T.S.



RAMP ON CURVE
N.T.S.

UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM:

SUBJECT:

HANDICAP RAMP

SKETCH NO.

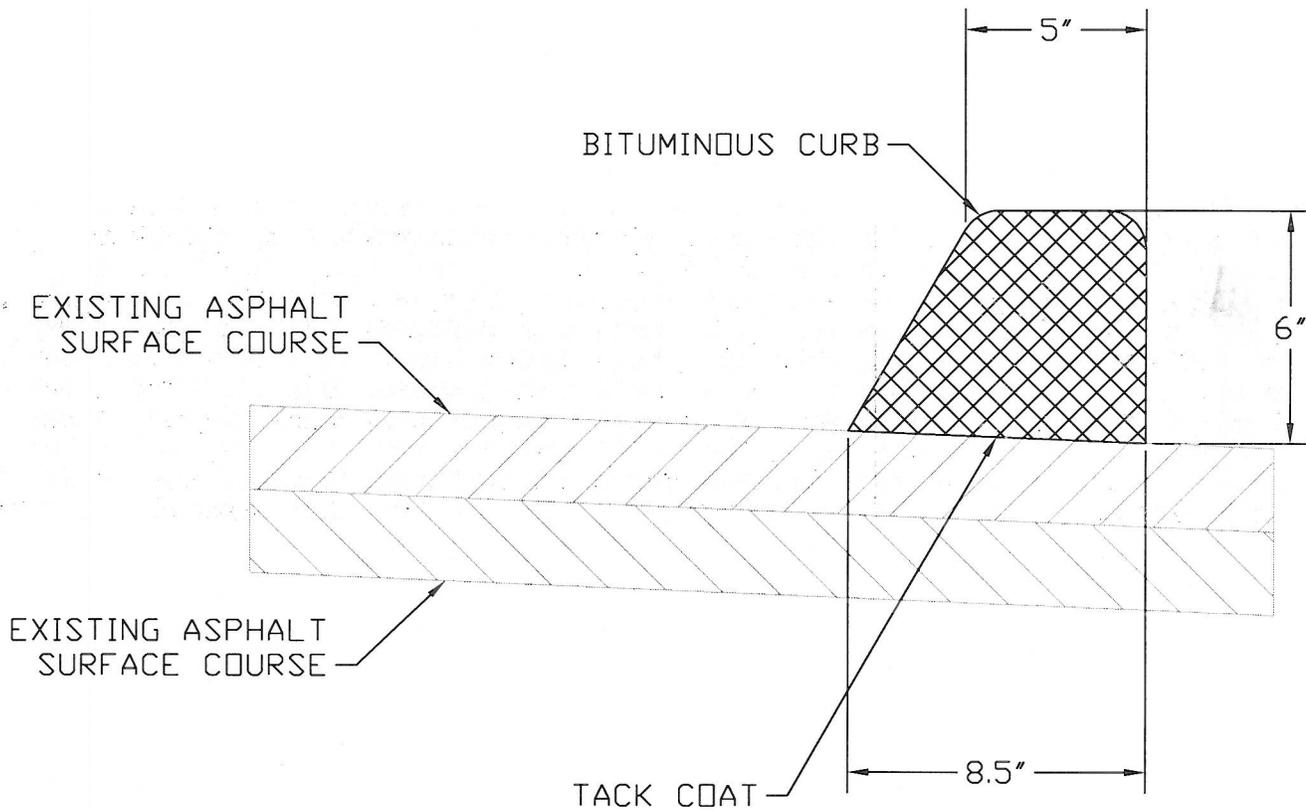
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SCALE: NTS

BY:RET

DATE: 17 NOV 08

SHT: 1 OF 1



UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM: X012

SUBJECT:

BITUMINOUS CURB

SKETCH NO.

05

SCALE: NTS

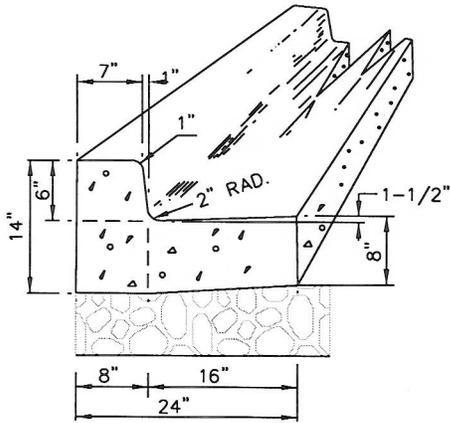
BY:RET

DATE: 4 MAR 05

SHT: 1 OF 1

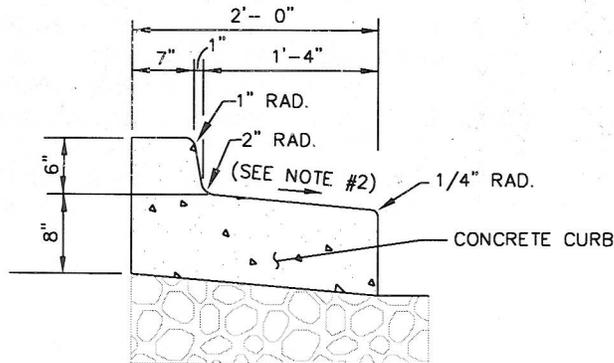
GENERAL NOTES

1. WHENEVER NEW CONCRETE CURB AND GUTTER MEETS EXISTING CONCRETE CURB (AND GUTTER), ASSURE CURBS ARE ON LINE AND ON GRADE.
2. TRANSITION CURBS SHALL BE USED WHENEVER A DIFFERENT TYPE OF CURB IS CALLED OUT. TRANSITIONS MUST BE 10' WIDE (MINIMUM).
3. REFER TO PAVING PLAN FOR SPECIFIC PARKING LOT GEOMETRICS AND FOR CURB SECTIONS WHICH REQUIRE TRANSITION OR SPILL GUTTER.



CONCRETE CURB & GUTTER (CATCH)

NTS



NOTES:

1. USE 1/2" PRE FORMED EXPANSION JOINT FILLER, NON-EXTRUDING.
2. SLOPE SHALL MATCH PROPOSED (ADJACENT) PAVEMENT SLOPE.

CONCRETE CURB & GUTTER (SPILL)

NTS

UNITED STATES NAVAL ACADEMY



ROADS AND PAVEMENT IDIQ

ITEM: X081

SUBJECT:

CURB AND GUTTER

SKETCH NO.

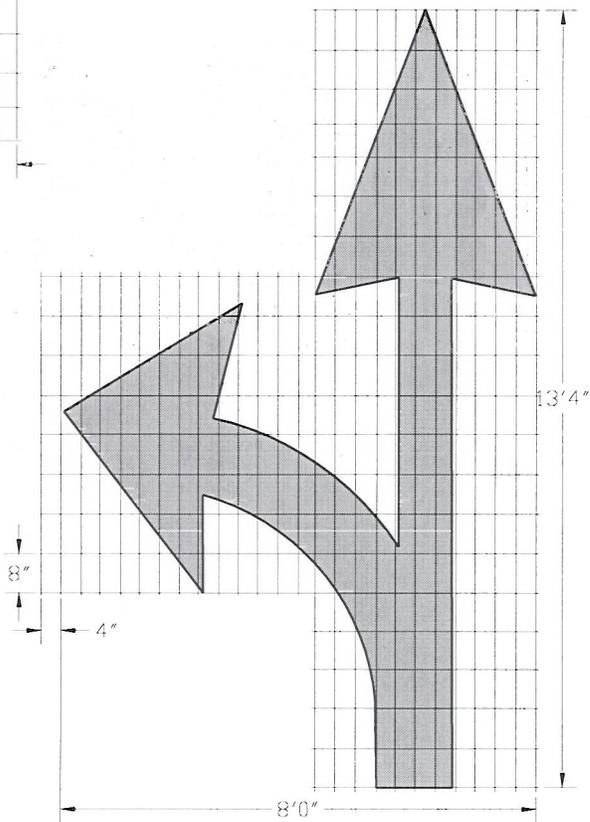
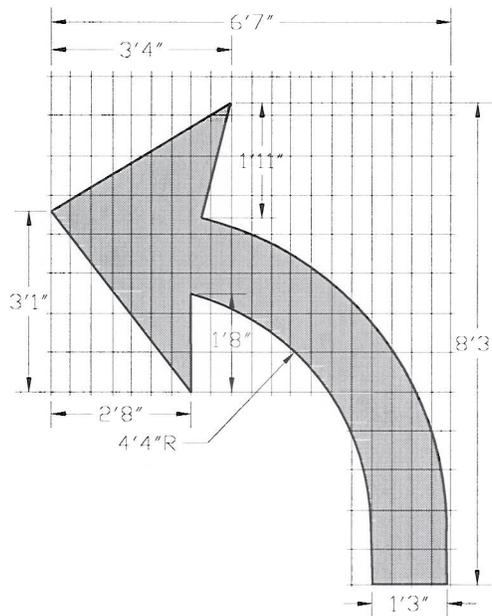
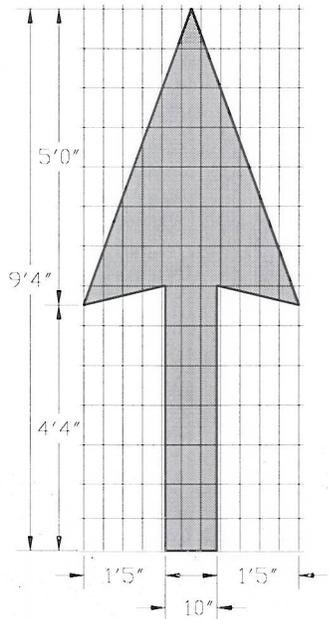
06

SCALE: NTS

BY:RET

DATE: 4 MAR 05

SHT: 1 OF 1



UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM: X042

X054

SUBJECT:
DIRECTIONAL ARROWS

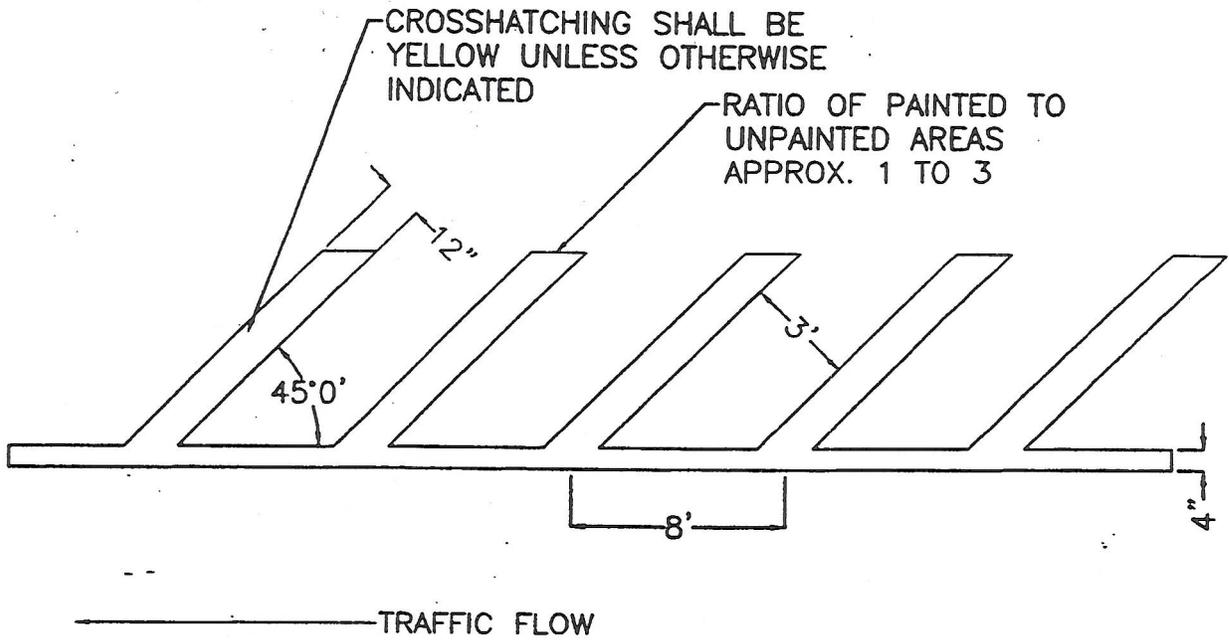
BY:RET

DATE: 4 MAR 05

SKETCH NO.
07

SCALE: NTS

SHT: 1 OF 1



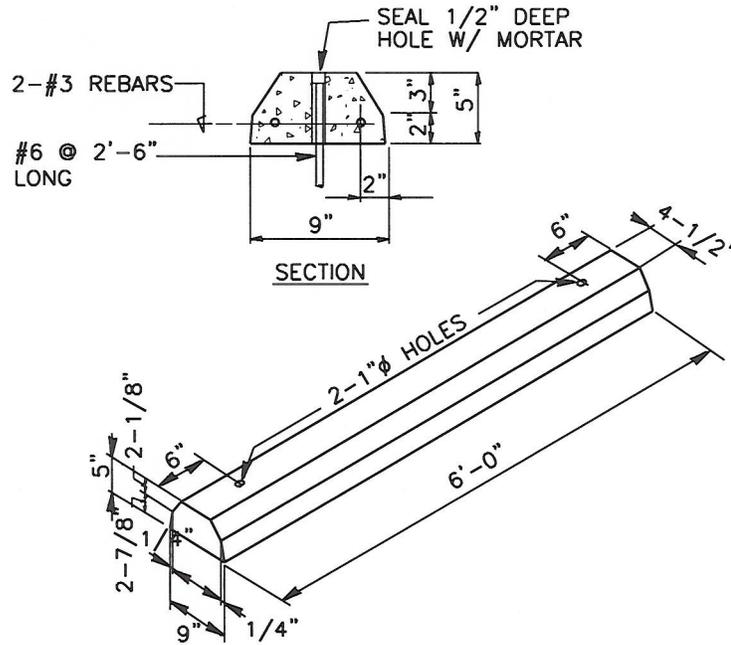
CROSSHATCHING DETAIL

NOT TO SCALE

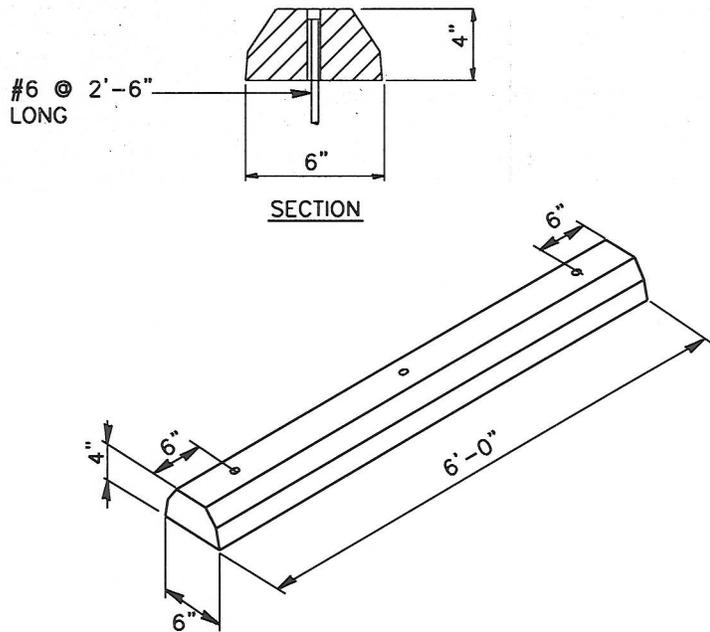
UNITED STATES NAVAL ACADEMY



ROADS AND PAVEMENT IDIQ	SUBJECT:	SKETCH NO.
	<u>CROSSHATCHING DETAIL</u>	09
ITEM:		SCALE: NTS
	BY:RET	DATE: 17 NOV 08
		SHT: 1 OF 1



CONCRETE WHEEL STOP



PLASTIC WHEEL STOP

UNITED STATES NAVAL ACADEMY



ROADS AND PAVEMENT
IDIQ

ITEM: X019

X020

SUBJECT:

WHEEL STOPS

CONCRETE AND PLASTIC

BY:RET

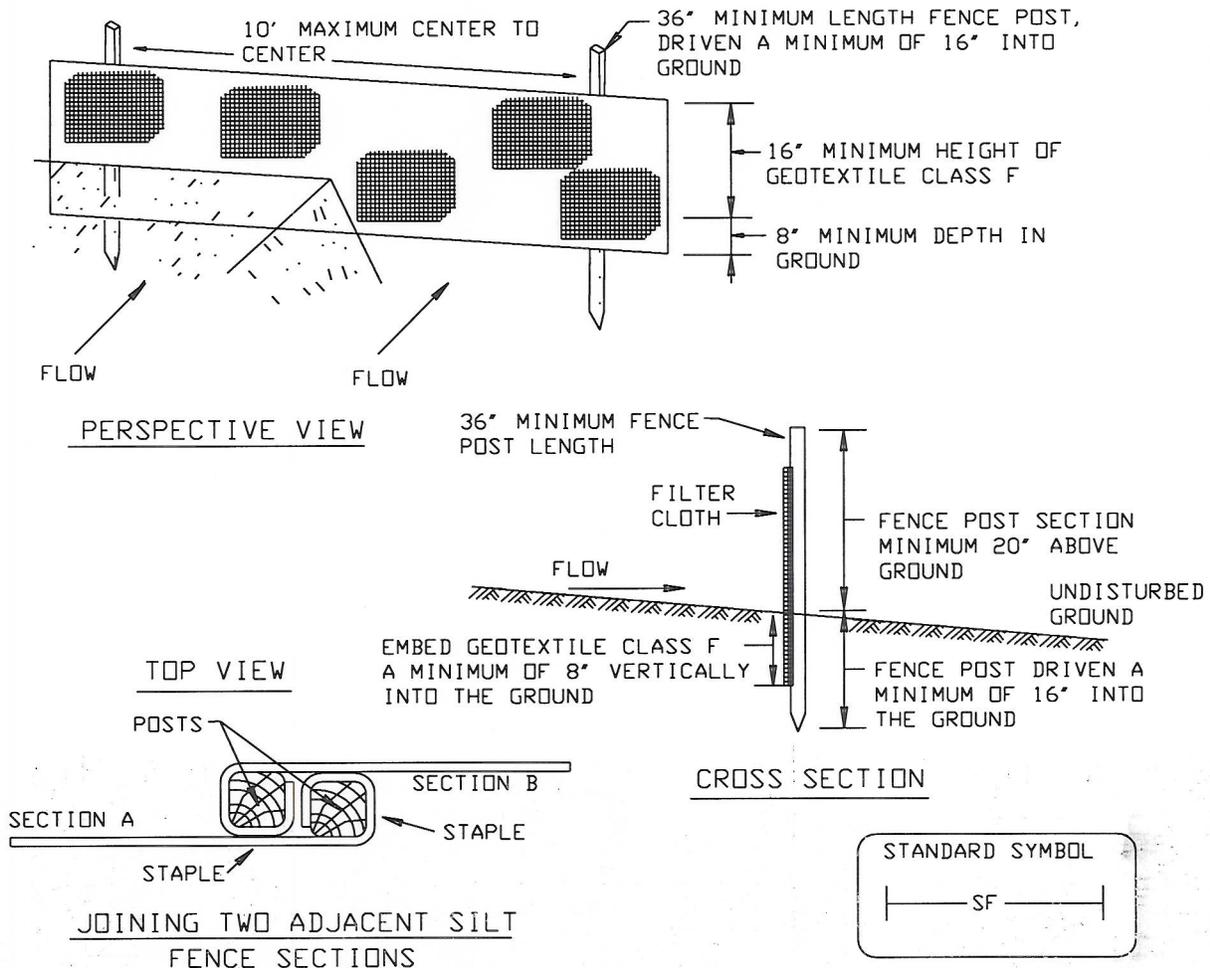
DATE: 4 MAR 05

SKETCH NO.

10

SCALE: NTS

SHT: 1 OF 1



Construction Specifications

1. Fence posts shall be a minimum of 36" long driven 16" minimum into the ground. Wood posts shall be 1 1/2" x 1 1/2" square (minimum) cut, or 1 3/4" diameter (minimum) round and shall be of sound quality hardwood. Steel posts will be standard T or U section weighting not less than 1.00 pound per linear foot.
2. Geotextile shall be fastened securely to each fence post with wire ties or staples at top and mid-section and shall meet the following requirements for Geotextile Class F:

Tensile Strength	50 lbs/in (min.)	Test: MSMT 509
Tensile Modulus	20 lbs/in (min.)	Test: MSMT 509
Flow Rate	0.3 gal ft ² / minute (max.)	Test: MSMT 322
Filtering Efficiency	75% (min.)	Test: MSMT 322
3. Where ends of geotextile fabric come together, they shall be overlapped, folded and stapled to prevent sediment bypass.
4. Silt Fence shall be inspected after each rainfall event and maintained when bulges occur or when sediment accumulation reached 50% of the fabric height.

UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM: X056

SUBJECT:
SILT FENCE

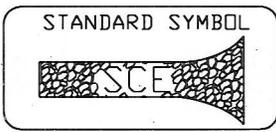
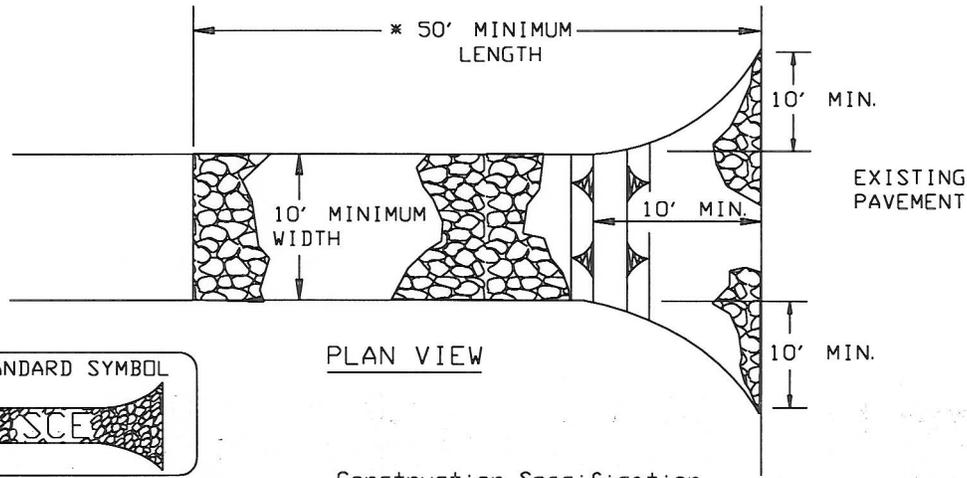
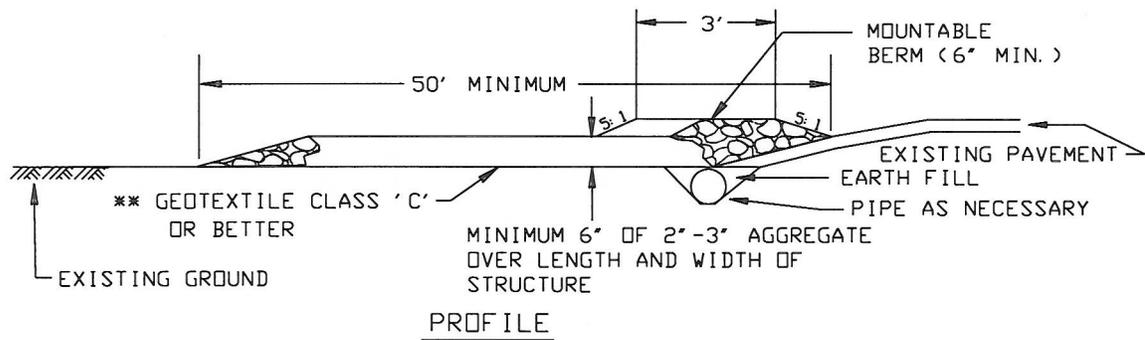
BY:RET

DATE: 4 MAR 05

SKETCH NO.
11

SCALE: NTS

SHT: 1 OF 1

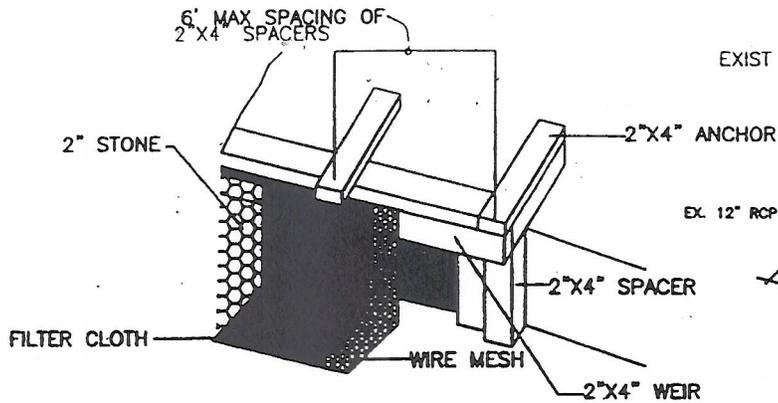


Construction Specification

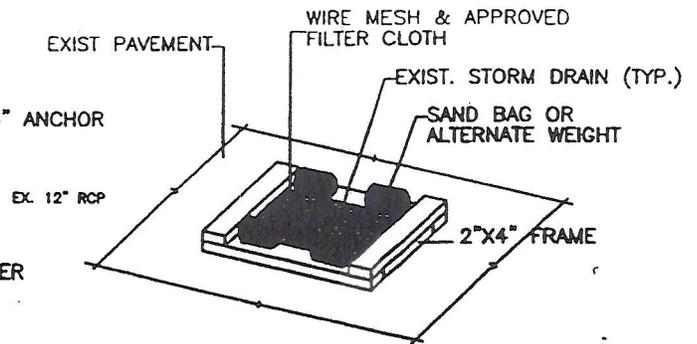
1. Length - minimum of 50' (*30' for single residence lot).
2. Width - 10' minimum, should be flared at the existing road to provide a turning radius.
3. Geotextile fabric (filter cloth) shall be placed over the existing ground prior to placing stone. **The plan approval authority may not require single family residences to use geotextile.
4. Stone - crushed aggregate (2" to 3") or reclaimed or recycled concrete equivalent shall be placed at least 6" deep over the length and width of the entrance.
5. Surface Water - all surface water flowing to or diverted toward construction entrances shall be piped through the entrance, maintaining positive drainage. Pipe installed through the stabilized construction entrance shall be protected with a mountable berm with 5:1 slopes and a minimum of 6" of stone over the pipe. Pipe has to be sized according to the drainage. When the SCE is located at a high spot and has no drainage to convey a pipe will not be necessary. Pipe should be sized according to the amount of runoff to be conveyed. A 6" minimum will be required.
6. Location - A stabilized construction entrance shall be located at every point where construction traffic enters or leaves a construction site. Vehicles leaving the site must travel over the entire length of the stabilized construction entrance.

UNITED STATES NAVAL ACADEMY

	ROADS AND PAVEMENT IDIQ	SUBJECT: <u>STABILIZED CONSTRUCTION ENTRANCE</u>	SKETCH NO. 12
	ITEM: X057		SCALE: NTS
	BY:RET	DATE: 4 MAR 05	SHT: 1 OF 1



CURB INLET PROTECTION



GRATE INLET PROTECTION

INLET PROTECTION DETAILS

NOT TO SCALE

UNITED STATES NAVAL ACADEMY



ROADS AND PAVEMENT IDIQ

ITEM:

SUBJECT:

INLET PROTECTION DETAILS

SKETCH NO.

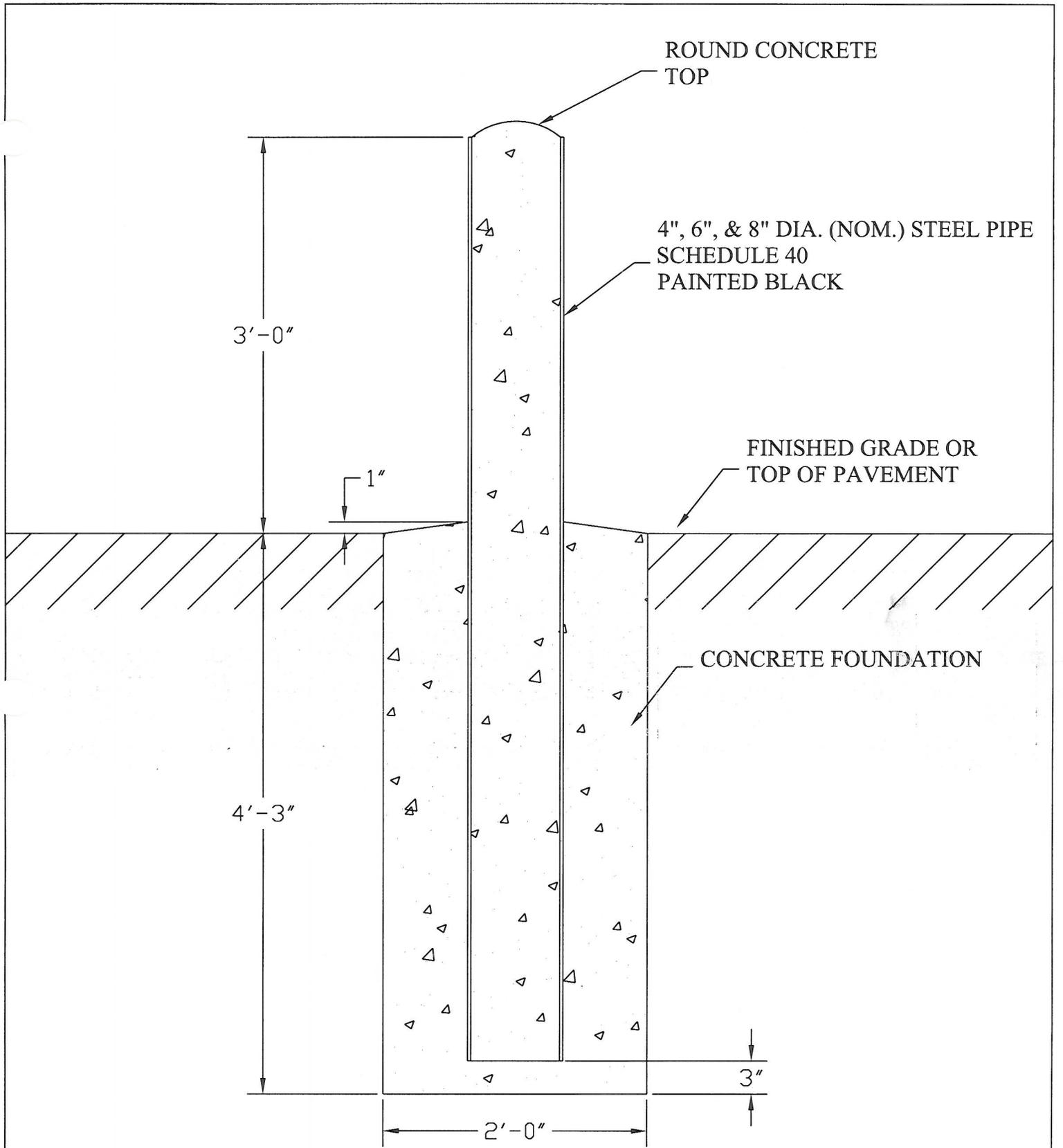
13

SCALE: NTS

BY:RET

DATE: 17 NOV 08

SHT: 1 OF 1



UNITED STATES NAVAL ACADEMY



ROADS AND PAVEMENT
IDIQ

ITEM: X070

SUBJECT:
PIPE BOLLARDS

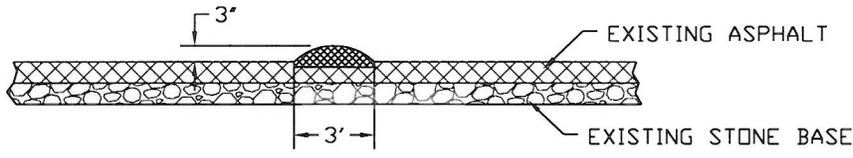
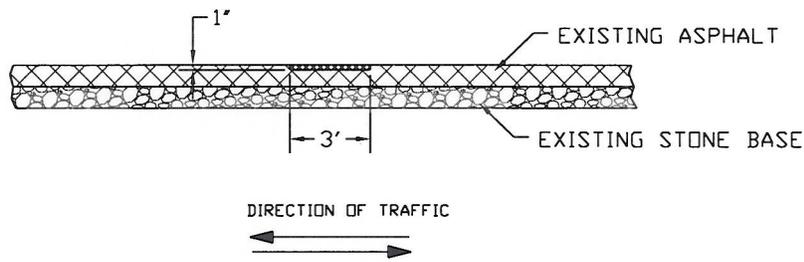
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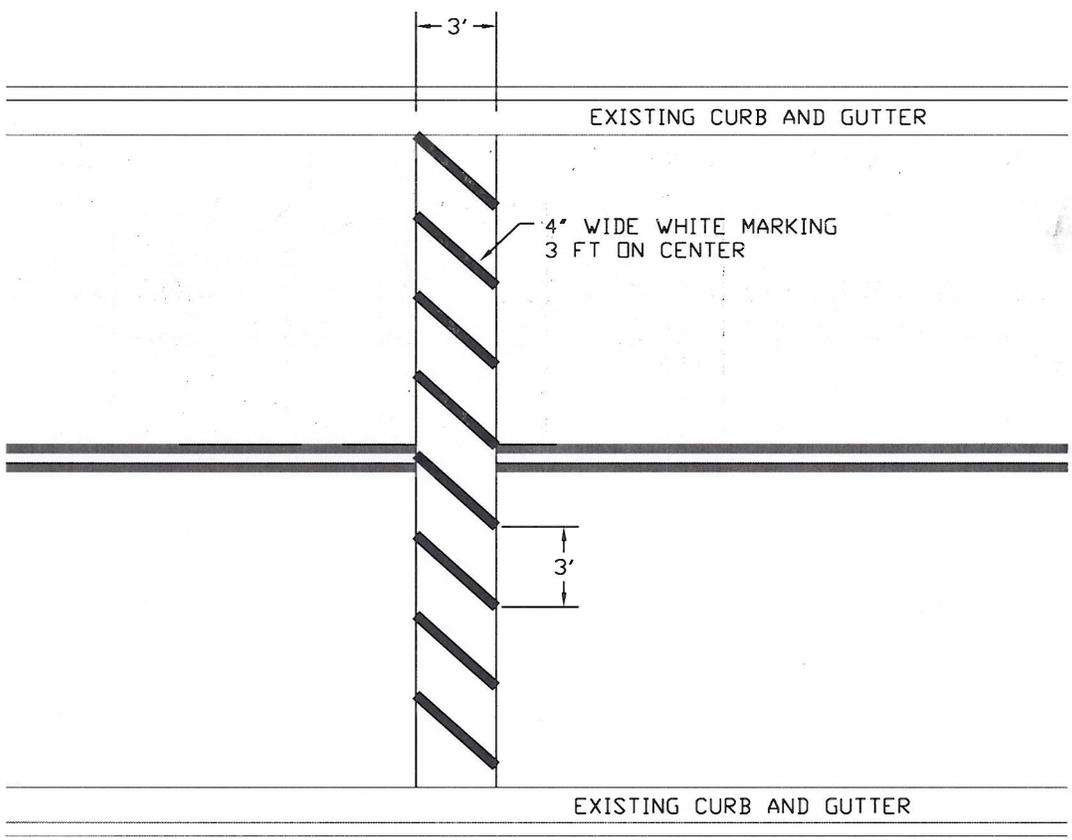
BY:RET

DATE: 4 MAR 05

SHT: 1 OF 1



SPEED BUMP DETAIL



SPEED BUMP STRIPING DETAIL

UNITED STATES NAVAL ACADEMY



ROADS AND PAVEMENT
IDIQ _____

ITEM: X021

SUBJECT:
SPEED BUMP

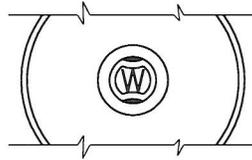
BY:RET

SKETCH NO.
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SCALE: NTS

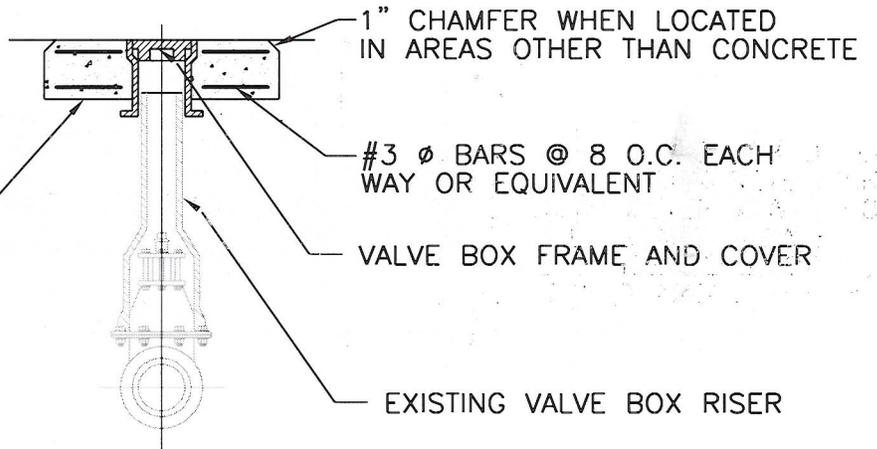
DATE: 4 MAR 05

SHT: 1 OF 1



VALVE BOX TOP

CAST AROUND THE TOP OF EACH VALVE BOX A CONCRETE DISK 3'-0" IN DIAMETER x 8" THICK WHEN VALVES ARE LOCATED IN ROADS, SIDEWALKS, OR OTHER PAVED AREAS



1" CHAMFER WHEN LOCATED IN AREAS OTHER THAN CONCRETE

#3 Ø BARS @ 8 O.C. EACH WAY OR EQUIVALENT

VALVE BOX FRAME AND COVER

EXISTING VALVE BOX RISER

UNITED STATES NAVAL ACADEMY



ROADS AND PAVEMENT
IDIQ

ITEM: X035

SUBJECT:

VALVE BOX FRAME AND COVER

SKETCH NO.

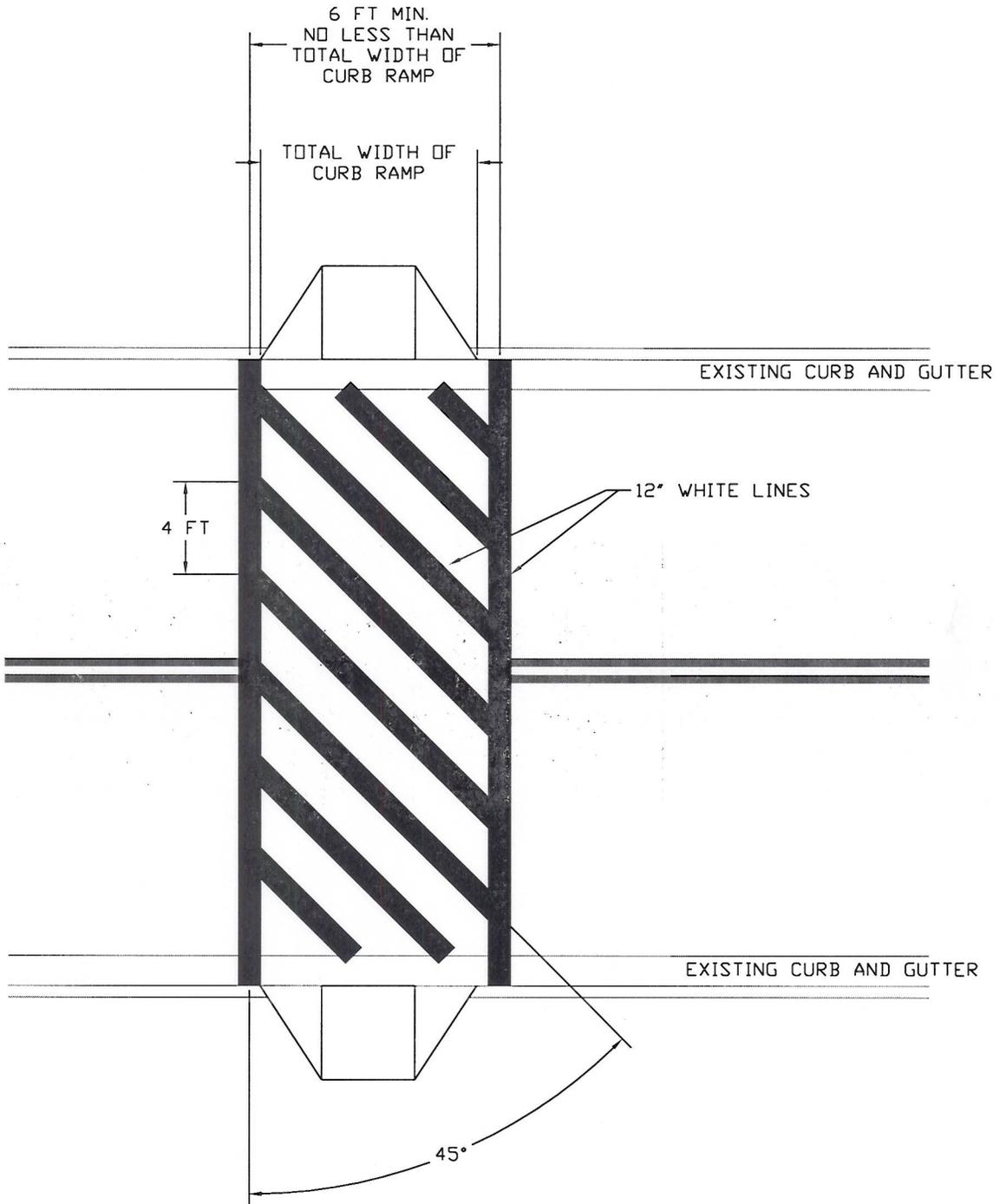
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SCALE: NTS

BY:RET

DATE: 4 MAR 05

SHT: 1 OF 1



UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM: X040

SUBJECT:
CROSSWALKS

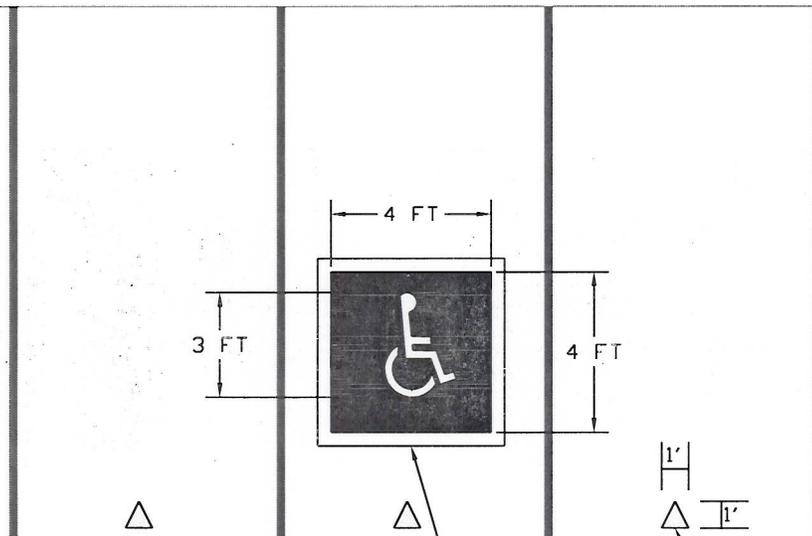
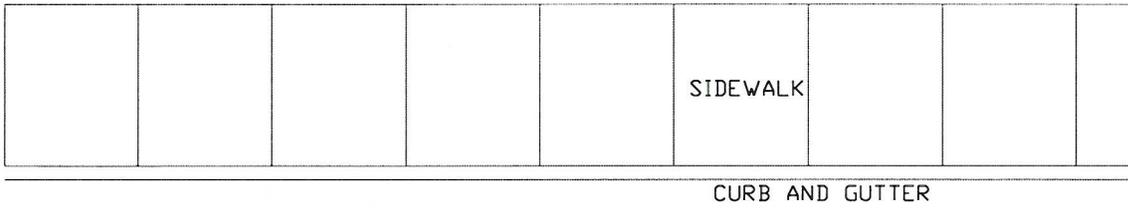
SKETCH NO.
17

SCALE: NTS

BY:RET

DATE: 4 MAR 05

SHT: 1 OF 1



YELLOW TRIANGLE
 FOR SPACES WITHIN
 82 FT OF A BUILDING

HANDICAP PARKING SPACE MARKING
 WHITE HANDICAP SYMBOL (4" WIDE) ON BLUE
 BACKGROUND WITH 6" WHITE BORDER

NOTE: DETAIL IS FOR MARKINGS ONLY. REFER TO AMERICAN DISABILITY ACT (ADA) FOR SPACE SIZE AND CONFIGURATION.

UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM: X045

X046

SUBJECT:

HANDICAP PARKING SYMBOL

YELLOW TRIANGLE

BY:RET

SKETCH NO.

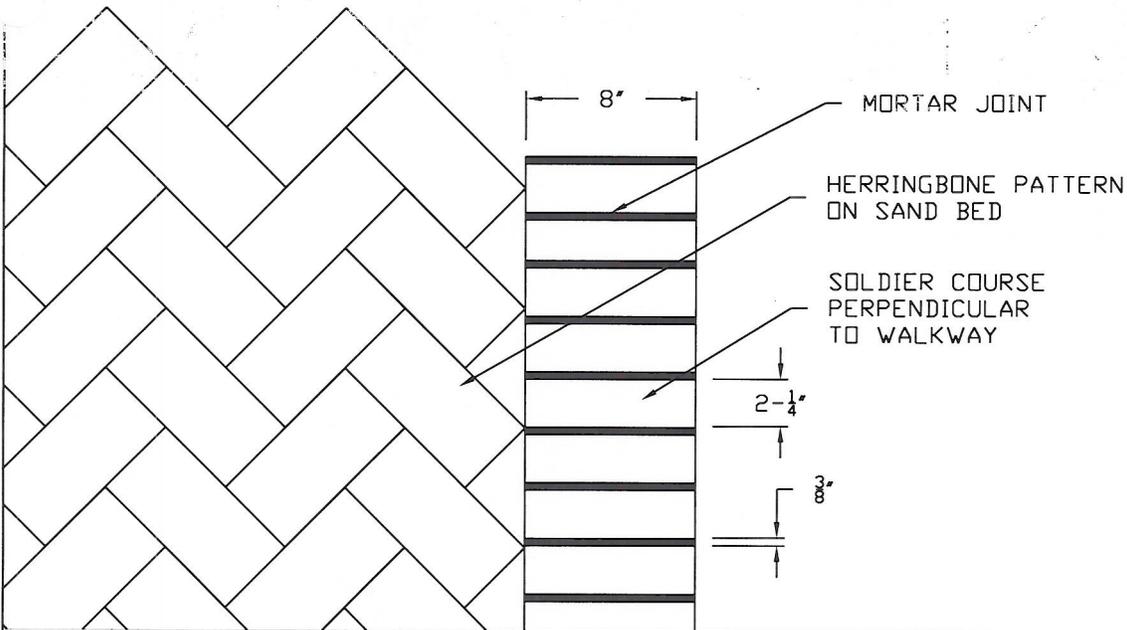
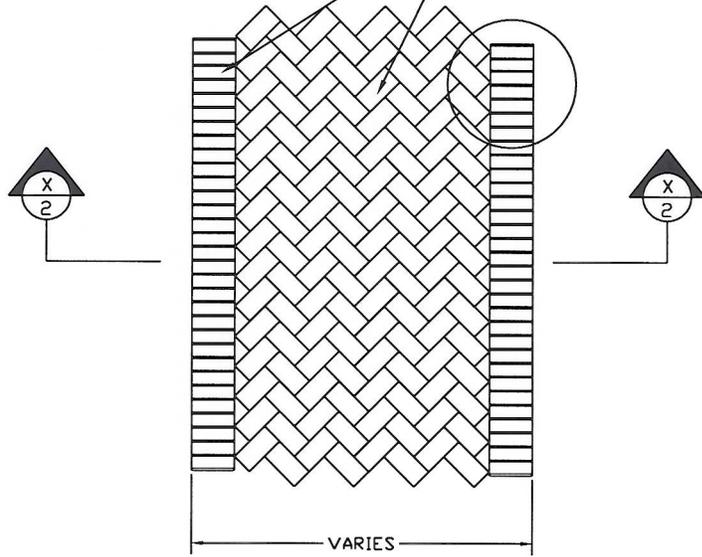
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DATE: 4 MAR 05

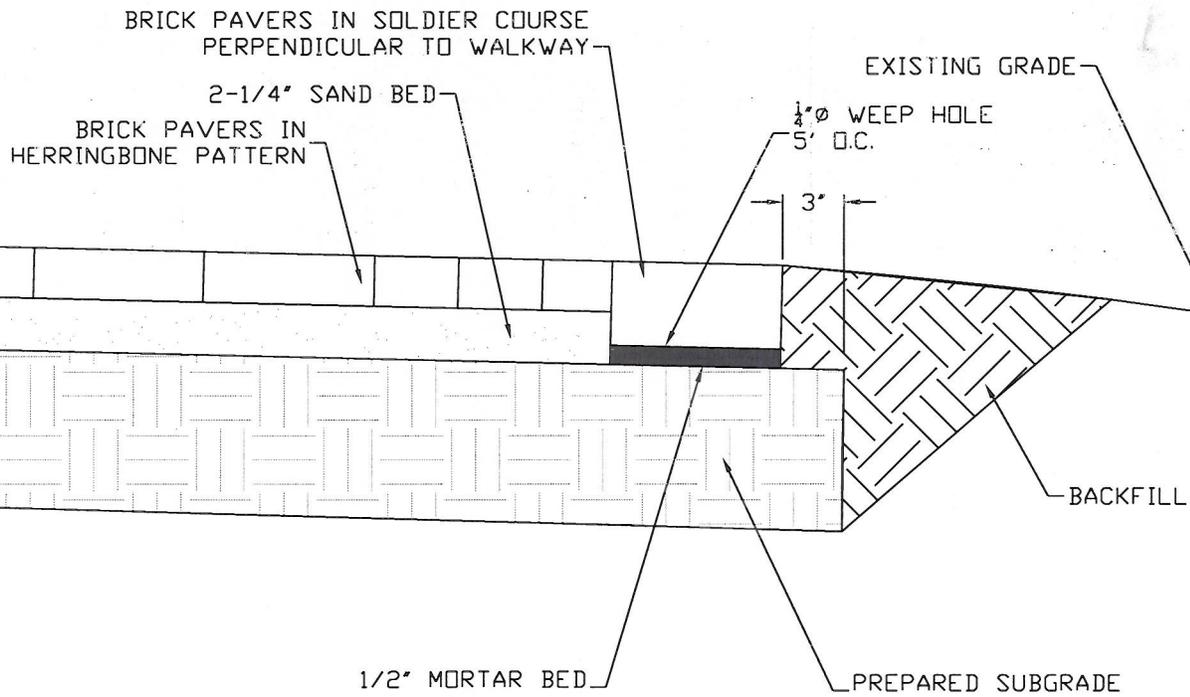
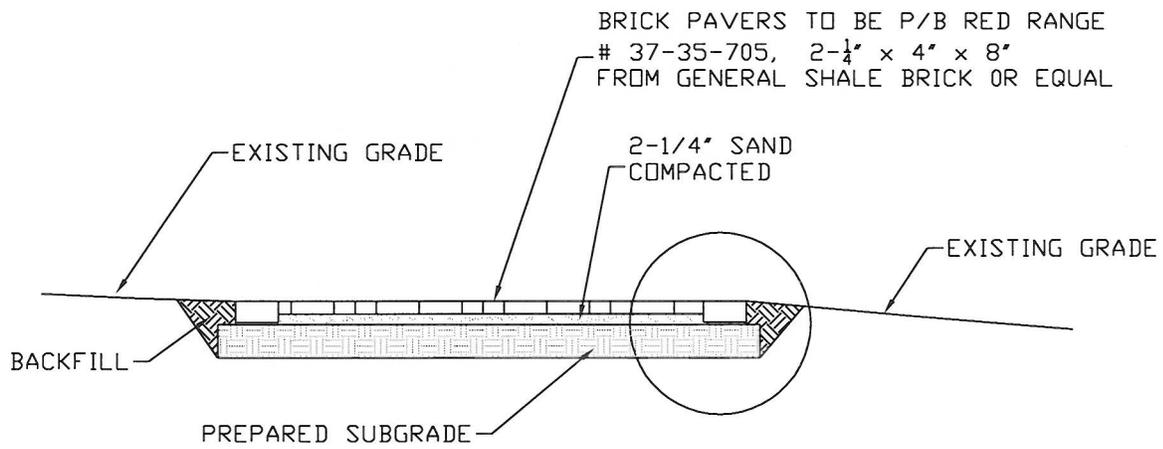
SHT: 1 OF 1

BRICK PAVERS TO BE P/B RED RANGE
 # 37-35-705, 2- $\frac{1}{4}$ " x 4" x 8"
 FROM GENERAL SHALE BRICK OR EQUAL



UNITED STATES NAVAL ACADEMY

	ROADS AND PAVEMENT IDIQ	SUBJECT: BRICK WALKWAY	SKETCH NO. 19
	ITEM: X087		SCALE: NTS
	X088	BY:RET	DATE: 4 MAR 05



UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM: X087

SUBJECT:
BRICK WALKWAY

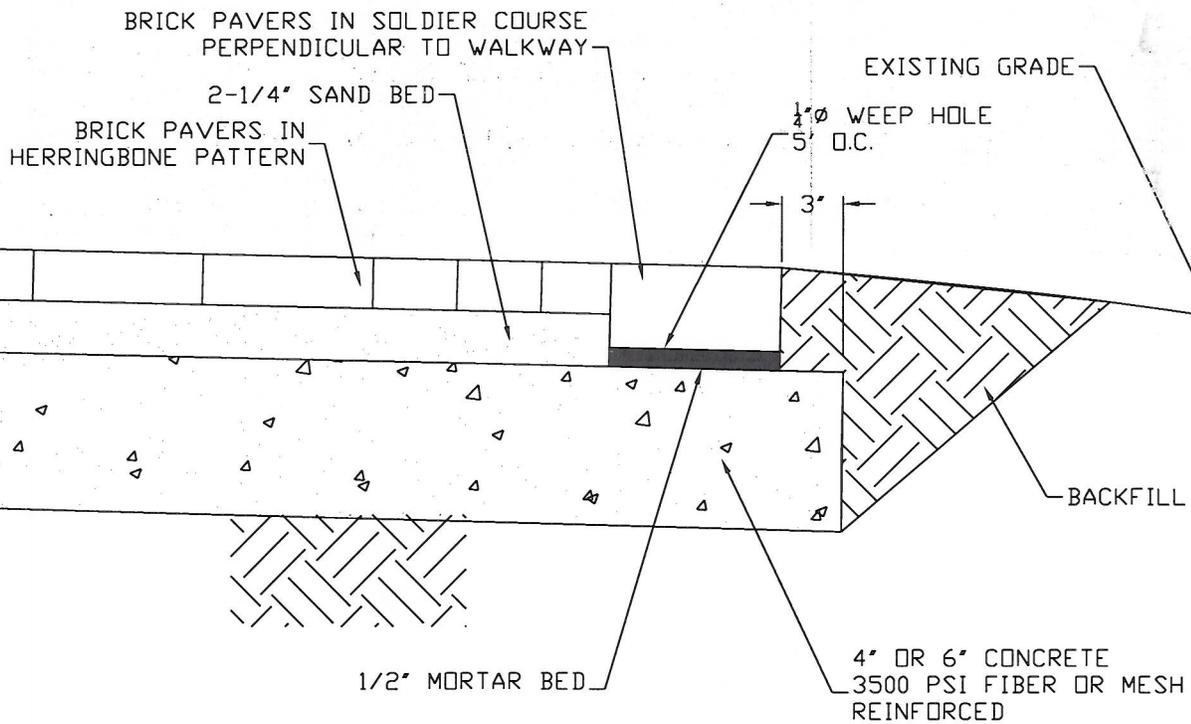
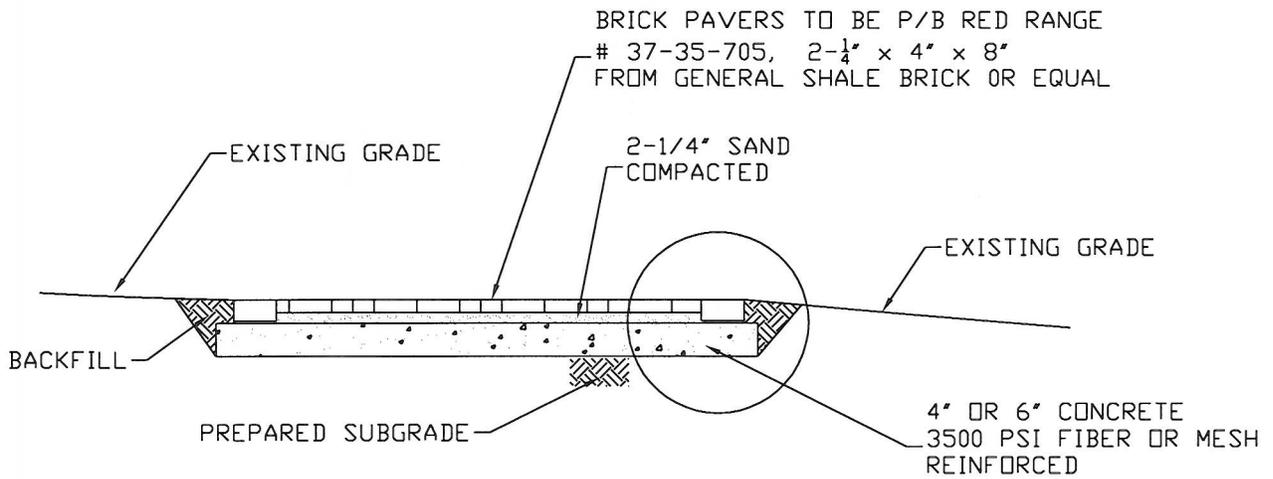
SKETCH NO.
20

SCALE: NTS

BY:RET

DATE: 4 MAR 05

SHT: 1 OF 1



UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM: X088

SUBJECT:
BRICK WALKWAY
WITH CONCRETE

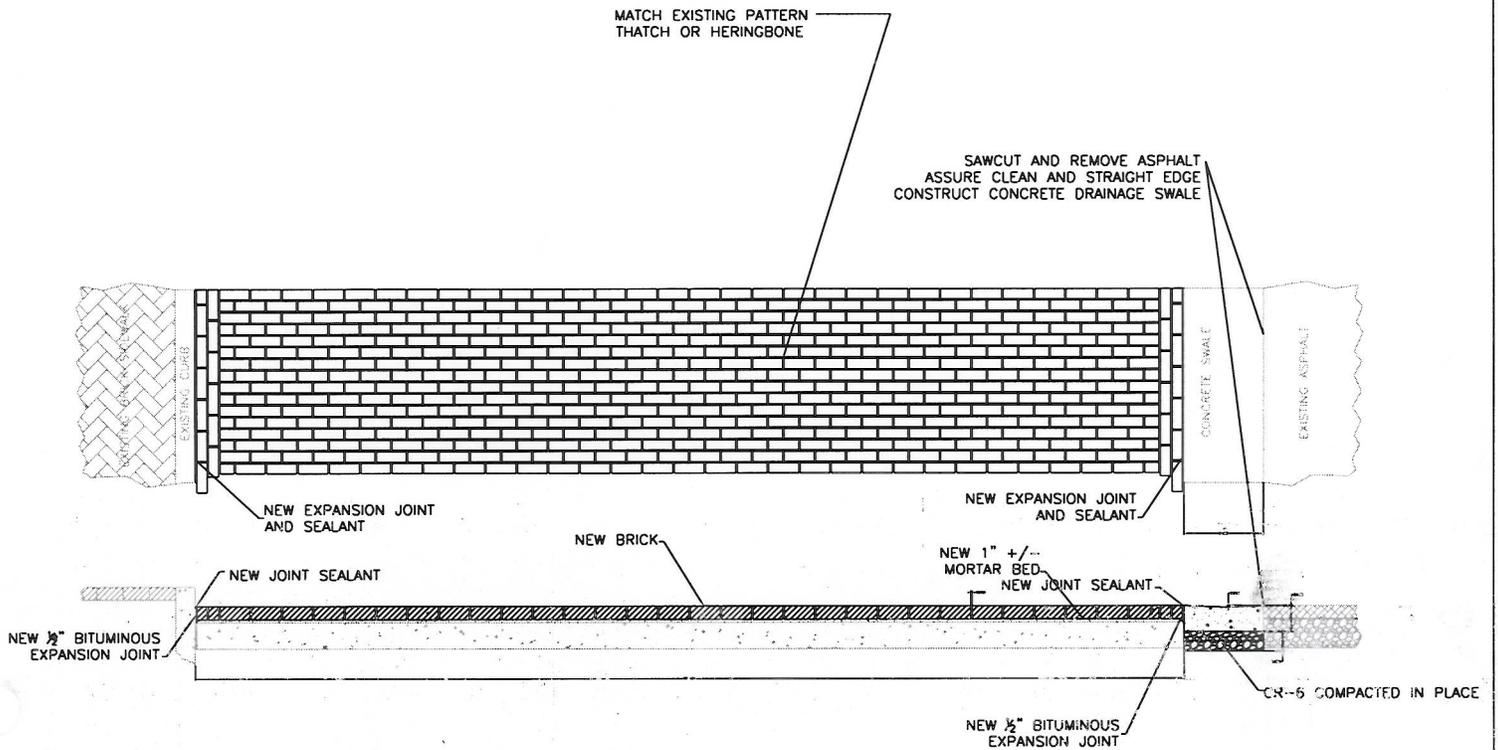
SKETCH NO.
21

SCALE: NTS

BY:RET

DATE: 4 MAR 05

SHT: 1 OF 1



UNITED STATES NAVAL ACADEMY



ROADS AND PAVEMENT IDIQ

ITEM: X089

SUBJECT: BRICK ROADWAY

SKETCH NO. 22

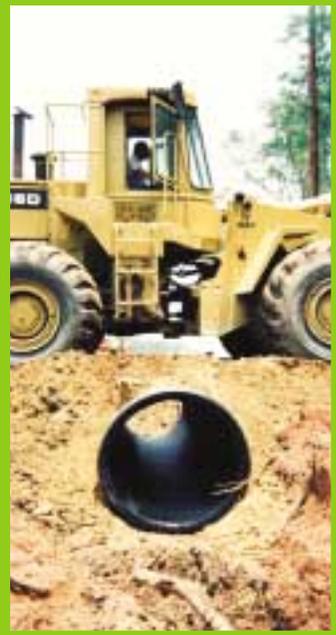
SCALE: NTS

BY:RET

DATE: 4 MAR 05

SHT: 1 OF 1

N-12[®] Pipe



The high-performance future of engineered drainage



The new standard in drainage pipe

Every day for more than 30 years, Advanced Drainage Systems corrugated high density polyethylene (HDPE) pipe has been building its reputation for economy, durability, and superior performance in gravity-flow drainage applications. During the 1970's and 1980's, ADS single wall pipe became the preferred product for agricultural, mining, turf/recreation, and residential drainage markets.

N-12® Pipe (4" - 60")

The hydraulic capabilities of the product were significantly improved in 1987 when ADS introduced the first HDPE drainage pipe to combine an annular corrugated exterior for strength with a smooth interior wall for maximum flow capacity. Named for its excellent Manning's "n" rating of 0.012, N-12 pipe was designed specifically for storm sewers, highways, airports, and other engineered construction. Through extensive field and university testing, ADS engineers were able to refine the corrugated wall design for larger diameters

without compromising the pipe's excellent strength-to-weight ratio. Its performance and economy have led to rapid acceptance by contractors and engineers, and official approval by state and municipal agencies.

Revolutionary joining technology

Years of research and testing have produced soil-tight and water-tight systems providing unsurpassed joint integrity, with built-in bell joints and fast push-together installation.

Soil-tight joint. N-12 ST IB pipe, delivered with an integral bell and spigot joint, meets the most stringent soil-tight requirements. The bell design resists distortion, chipping or cracking, and spans three corrugations, exceeding AASHTO M294 recommendations. The in-line bell design eliminates the need to dig bell holes in the trench. Joints are sealed by a factory-installed rubber O-ring gasket that meets all requirements of ASTM F477.

Water-tight joint. Incorporating patented technology developed in the aerospace industry, N-12 WT IB pipe adds two important features to the N-12 soil-tight pipe design. The sealing area of the bell is reinforced with a proprietary 2" ceramic/polymer composite collar which improves the joint's integrity and dimensional control. Secondly, a proprietary gasket designed to maximize sealing reference and meeting ASTM F477, is factory installed into the spigot. The result is a design that meets or exceeds ASTM D3212 lab test and ASTM F1417 water-tight field test requirements, and fills an essential role in complying with the stricter demands of new EPA water quality guidelines.

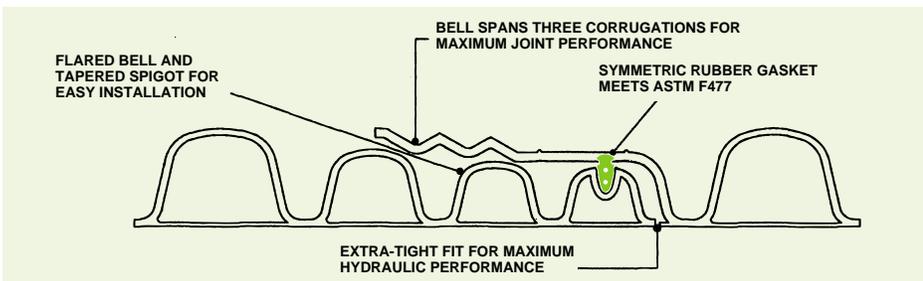
Applications

N-12 pipe meets the requirements for Type S pipe under AASHTO M 252, M 294, and MP7. This product can be specified for culverts, cross drains, storm sewers, landfills, and other public and private construction.



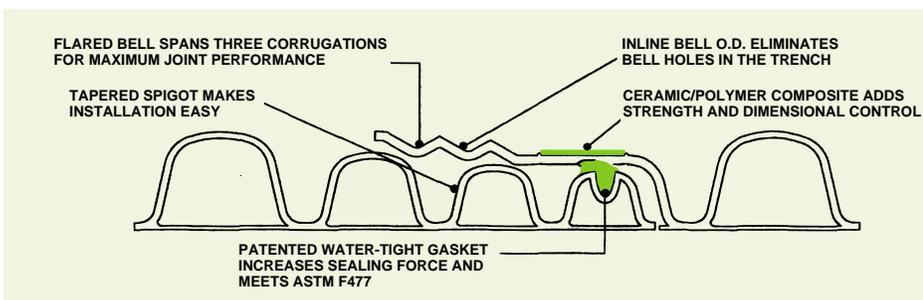
N-12® Pipe, (plain end, 4" – 60")

The first corrugated High Density Polyethylene drainage pipe with a smooth inner wall for superior hydraulics and maximum flow capacity.



N-12 ST IB Soil-tight Pipe, (4" – 60")

Integral gasketed bell-and-spigot joint for long-term soil-tight performance. (4"-10" sizes incorporate integral bell and non-tapered gasketed spigot.)



N-12 WT IB Water-tight Pipe, (4" – 60")

Reinforcing collar and proprietary sealing gasket provide a durable water-tight connection. (4"-10" sizes incorporate integral bell and non-tapered gasketed spigot.)

Technology creates a superior pipe material

Gone are the days when plastic pipe was specified only for cost reasons. Advances in polymer science and structural design have created a product that has **actually outperformed and outlasted concrete and metal pipe while maintaining its cost advantage.** By any measure, ADS N-12 pipe compares favorably to conventional materials.

Structural Strength

As a flexible conduit, HDPE pipe withstands vertical pressure by transferring most of the load to the surrounding soil. N-12 pipe will support H-25 live loads with 12" minimum cover* and E-80 loads under 24" cover. Maximum cover will vary with design conditions, but can usually be specified up to 60 feet. In controlled tests, N-12 has performed well at fill heights of more than 100 feet.

* 60" pipe requires 2' cover for H-25 loads.

Durability

High density polyethylene is an extremely tough material that can easily withstand the normal impacts involved in shipping and installation. It is highly resistant to chemical attack and is unaffected by soils or effluents with pH ranges from 1.5 to 14.

HDPE's ductility and molecular structure result in excellent resistance to abrasion. Polyethylene pipe shows less than 20% of the material loss of concrete pipe in abrasive environments, and is often specified for harsh mine slurries and as a slip liner for deteriorated culverts.

Hydraulic efficiency

The smooth interior of N-12 pipe provides superior flow characteristics. Tests on various sizes of N-12 pipe show Manning's "n" values ranging from 0.010 to 0.013. (It should be noted that "n" values tend to increase with slower velocities and larger pipe sizes.) The chart below indicates that

the values for N-12 pipe are basically the same as those yielded on previous tests of reinforced concrete pipe. On the other hand, the "n" ratings for corrugated metal pipe are considerably higher, and are predicated on the pipe running full to develop the spiral flow.

Light weight

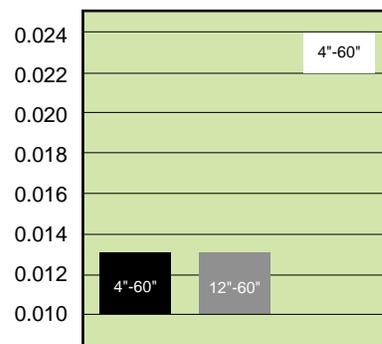
HDPE pipe is up to 30 times lighter than concrete pipe, making it far easier to transport and handle. On-site labor and equipment requirements are reduced, with a corresponding reduction in the potential risk of injury.

Fast installation

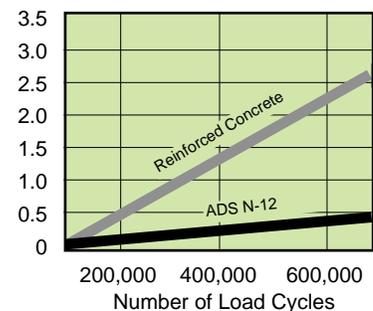
Long 6m (19' 8") lengths mean fewer joints. (N-12 pipe is also available in 13 ft. lengths for smaller trench boxes.) Soil-tight or water-tight connections are quick and easy with integral gasketed bell and spigot joints. The pipe cuts easily and does not need to be beveled for joining. In typical trench depths of 6 to 10 feet, contractors report installation rates ranging from 1,200 feet per day of 15"-24" pipe to more than 400 feet per day of 60" pipe.

How HDPE stacks up against the competition:

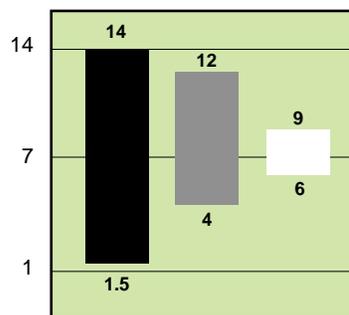
■ N-12 ■ Reinforced Concrete □ Corrugated Steel



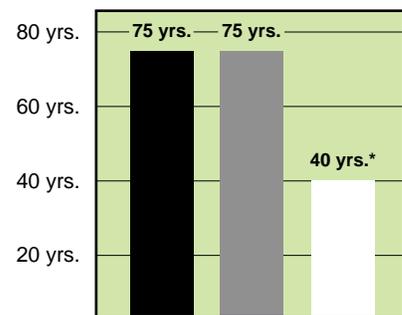
Hydraulic Efficiency
(Manning's "n" at Mid-Range Flow Velocity)



Abrasion Resistance
(Material Loss Rate in Mills)



Corrosion Resistance
(Recommended pH Range)



Anticipated Service Life
*CSP requires protective coating

The lowest installed cost of any drainage pipe

The material cost of HDPE is extremely competitive with concrete and corrugated metal. When installation costs are factored in, the savings start to multiply.

- Polyethylene's light weight cuts shipping charges. More lengths of pipe per truck means fewer delivery loads.
- Fewer people are needed for on-site unloading and handling.
- Heavy equipment requirements are reduced.
- Long lengths are easy to handle and require fewer joints.

A recent survey of state Departments of Transportation revealed that reductions in installed cost for HDPE pipe were 12 to 38 percent compared to concrete, and 5 to 28 percent vs. corrugated steel.

A choice of joining systems

1. Integral bell-and-spigot joints.

N-12 ST IB and N-12 WT IB pipe (see page 2) are engineered for fast installation of long straight sewer lines that require soil-tight or water-tight joint performance.

2. **Hinged split couplers and fabricated fittings** provide cost effective connections for normal drainage installations. ADS can fabricate virtually any fitting as long as it meets engineering standards.

3. **Pro Link[®] molded HDPE couplers** are available on fittings and repair couplers to meet specific joint performance requirements and provide installation savings. Just align the pipe or fitting sections, lubricate the bell and spigot, and push together. Bell/bell couplers are offered in 4" through 60" diameters. Single bell styles are factory welded in 30" through 60" pipe. Two levels of joint performance are available:

- **Pro Link ST[®]** provides a soil-tight joint for normal storm sewer and culvert applications.
- **Pro Link WT[®]** is a coupler that provides water-tight connections.

4. **Series 35[®] thermo-molded PVC sanitary fittings** meet the 10.8 psi pressure testing requirements of ASTM D 3212. Selection includes couplers, tees, wyes, elbows, caps and adaptors, each fitted with an O-ring seal. The

fittings connect not only corrugated HDPE pipe, but also PVC, concrete and other materials.

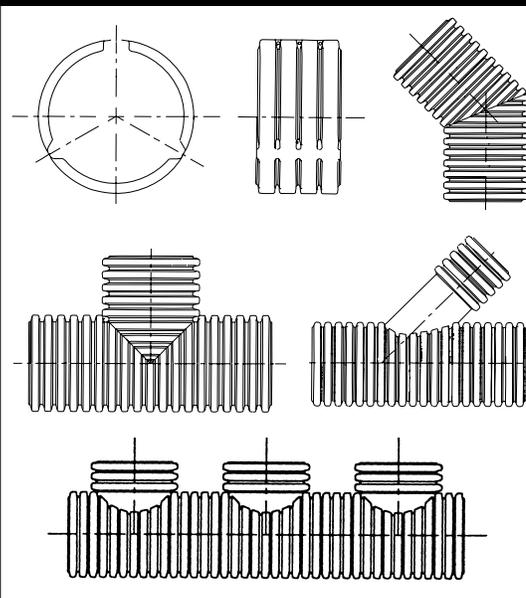
Installation recommendations

Proper installation is perhaps the major determinant of long-term performance of any drainage pipe, and the basic procedures and precautions for corrugated polyethylene are in fact quite similar to those for concrete and metal pipe.

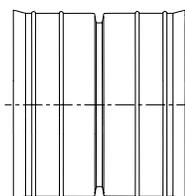
N-12 pipe is a flexible conduit which transfers live and dead loads to the surrounding soil. Particular care is therefore required in bedding, backfilling and compaction, and in the selection of backfill material. Class I, II, or III soils may be used for backfill, and should be compacted to at least 90% Standard Proctor Density.

Instructions for underground installation of plastic drainage pipe are contained in ASTM D 2321. AASHTO Section 30 is recommended for highway applications. Specific instructions for N-12 are detailed in ADS Product Note 3.115, "Installing N-12[®] Storm, Sanitary Sewer and Culvert Pipe".

Standard & Fabricated Drainage Fittings

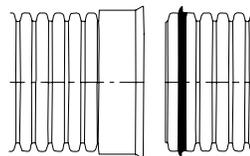


Pro Link[®] Couplers



Bell/Bell Couplers: 4" - 60"*

Pro Link ST: soil-tight, integral gasket
Pro Link WT: water-tight, integral gasket
*(except 10")

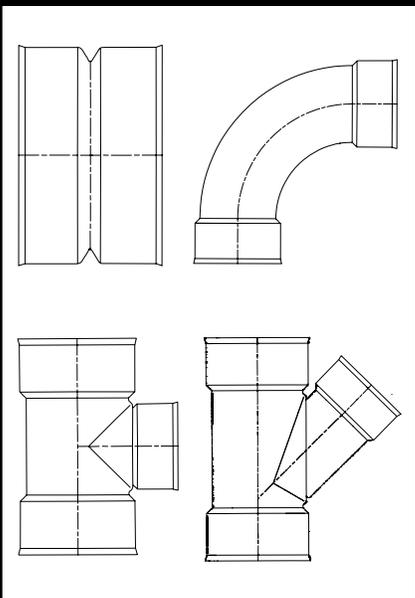


Welded Integral

Bell Couplers: 30" - 60"

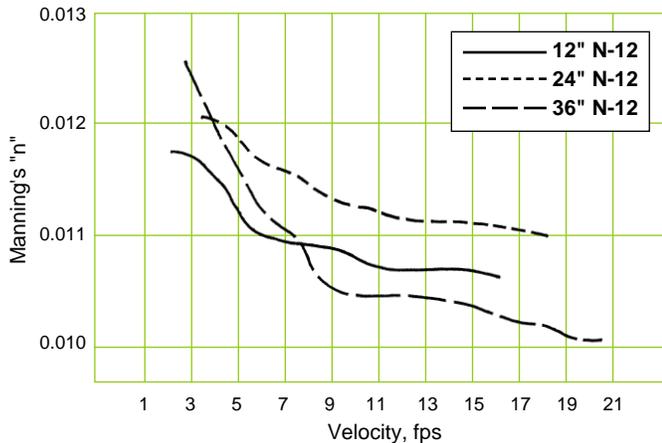
Pro Link ST: soil-tight (thru 60")
Pro Link WT: water-tight, with gasket (thru 36")

Series 35[®] Sanitary Fittings



Specifications

Manning's "n" vs. Velocity



Source: Tests at Utah State University

Recommended Manning's "n" for Design

Pipe Dia.	N-12	Reinforced Concrete ¹	Corrugated Steel ^{1,2}
4"– 10"	.010	N/A	.024
12"–15"	.012	.012	.024
18"–36"	.012	.012	.024
42" – 60"	.013	.013	.024

¹ Source: "Hydraulic Design of Highway Culverts" Federal Highway Administration, HDS No. 5

² 2 2/3 x 1/2 corrugation pattern

Height of Cover

Minimum Cover:

H-25 loads: 12" ** E-80 loads: 24"

Maximum Cover: Typically 50-60 feet but will vary depending on application and engineering design.

Notes:

- Cover heights are measured from the top of the pipe.
- Calculations based on load factor design per AASHTO procedures.
- Assume soil density of 120 lbs./cu. ft.
- Backfill compacted to minimum 90% density per AASHTO T-99.
- If a hydro-hammer is used for compaction, at least 48" of cover must be provided.

** 60" pipe requires 2' cover for H-25 loads.

Pipe Stiffness

Pipe Diameter	Minimum Pipe Stiffness (psi)
4", 6", 8"	50
10"	50
12"	50
15"	42
18"	40
24"	34
30"	28
36"	22
42"	19
48"	17
60"	14

Weight Comparison

Pipe Dia.	Pounds per Foot		
	N-12	Concrete ¹	Corrugated Steel ²
4"	.45	N/A	N/A
6"	.85	N/A	6
8"	1.5	N/A	7
10"	2.0	50	9
12"	3.2	79	11
15"	4.6	103	13
18"	6.4	131	16
24"	11.5	264	19
30"	15.4	384	24
36"	18.1	524	29
42"	25.3	686	34
48"	31.3	867	38
60"	46.3	1295	60

¹ Class B pipe

² 16 gauge steel

Applicable Standards

AASHTO M 252, Standard Specification for Corrugated Polyethylene Pipe, 75mm to 250mm Diameter (3"-10")

AASHTO M 294, Standard Specification for Corrugated Polyethylene Pipe, 300mm to 1200mm Diameter (12"-48")

AASHTO MP7, Standard Specification for Corrugated Polyethylene Pipe, 1350 and 1500 mm Diameter (54" and 60")

AASHTO Section 30, Construction Standard, Thermoplastic Pipe

ASTM D 2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications

ASTM D 3212, Standard Specification for Joints for Drain and Sewer Plastic Pipe Using Flexible Elastomeric Joints

ASTM F 1417, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-pressure Air

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

ASTM F 667, Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings

Solving drainage problems across the nation

PennDOT Deep Burial Study

In 1987, the Pennsylvania Department of Transportation initiated what is believed to be the most ambitious research project ever attempted by the plastic pipe industry. A total of 576 ft. of 24" corrugated HDPE pipe (both standard single wall and N-12 pipe) were buried at depths exceeding 100 feet in an embankment under Interstate 279 near Pittsburgh. Researchers from the University of Massachusetts administered the test, which sought to determine the performance limits of HDPE pipe under extreme loads.



Electronic and hydraulic systems have been monitoring many aspects of pipe performance, including wall strain, deflection, soil pressure and soil strain. The results to date are impressive. Despite the tremendous soil load, the total of pipe deflection and circumferential shortening is just 4.3%, and has remained constant since the second year of the test. In 2002, 15 years after the initial installation, a full inspection was conducted. The pipe was unchanged from the last inspection completed in 1997. PennDOT has provided the full report to the Federal Highway Administration for their distribution and use.

PennDOT officials view the pipe's performance under these severe soil pressures as very positive, particular-

ly since a sample of concrete pipe failed rather quickly under 65 feet in the same embankment. The study results have led PennDOT and other state transportation agencies to conclude that existing maximum fill height requirements for HDPE pipe are conservative and may be increased under certain project design conditions.

New space-saving design for stormwater storage

As communities across the nation were scrambling to meet compliance deadlines for new EPA stormwater control regulations, ADS introduced a compact, economical alternative to traditional retention/detention designs. The Storm Compressor™ system places large diameter N-12 pipes in contact with each other, eliminating the spaces and supporting backfill normally required between laterals. Smaller diameter N-12 pipes are placed in the upper and lower haunch areas, producing a bridging effect between the soil and laterals. The assembly is then wrapped with a



geogrid that holds the pipes together during installation, minimizes tensile stress, distributes overburden loads, and bridges void areas.

The Storm Compressor system has proven to be less costly than conventional retention/detention systems using corrugated steel pipe. An installation at a grocery/drug store complex in Elmhurst, Illinois illustrates the many advantages of the ADS design: installation time cut in half, 45 percent less excavation volume, 78 percent

less backfill, and a 45 percent smaller footprint.

Neighborhood storm sewer project installs easily

After 25 years of persistent flooding, the residents of the Lakeview subdivision of Madison Township, Ohio, applied for state public improvement funds to install a modern storm drainage system. Of all the materials bid, only the HDPE system fell within the funding limit.

The installation included 5,000 ft. of ADS N-12 pipe (12" to 36") and was accomplished well within the deadline and the limited budget. Since then, flooding complaints have been non-existent, despite a 100-year rain event in 1993.



Five years later, ADS cooperated in an internal inspection by an independent pipe cleaning company using a remotely controlled television camera. Three hours of video tape revealed no abnormalities with the 2,400 feet of sewer line inspected—no damage, no misaligned joints, no changes in line and grade.

Since the Lakeview installation, Madison Township has specified N-12 pipe on several other large drainage projects. Officials point to HDPE's ease of handling, and believe that it performs as well or better than

the concrete and metal pipe used previously.

Lakeview was also the first HDPE sewer installation for the contractor, who cites several advantages of the lighter weight pipe: use of smaller equipment, which made it easier to negotiate the narrow right-of-ways with numerous trees; less risk of damaging the streets; the 10 loads of polyethylene vs. 29 loads if the pipe were concrete; and the ability to unload and move the N-12 pipe by hand.

HDPE pipe speeds work on Olympic highway

N-12 pipe played a key role in what was called the biggest design-build freeway project in North America. Early in 1998, Salt Lake City began the massive task of replacing and expanding 17 miles of the I-15 highway in preparation for the 2002 Winter Olympic Games. Normally an 8-year project, the time frame was cut to 4½ years, placing a premium on time-saving methods and materials.



The project coordinator reported little difficulty in deciding on the drainage pipe material. "For the 33 miles of 24" and 30" pipe, polyethylene was the hands down winner. It should save us at least 15 percent in material and installation costs compared to reinforced concrete pipe. An 80-ft. run of PE requires three joints, while RCP needs ten. Two people can lay the 20-ft. sections in the trench and just 'pop' them together."

Designers selected ADS N-12 ST IB pipe with its integral bell-and-spigot

joining system. The even profile of this pipe eliminates the need for separate "digouts" to accommodate the protruding bell on standard pipe. The pipe's toughness is another time-saving factor, according to the coordinator. "We can drop PE pipe 100 feet and nothing will happen to it. If the bell on a concrete pipe is hit, the joint is gone and we have to get a new section."

New trench design engineered for 1,000 ft. pipe burial

The Morenci Mine in Arizona, owned by Phelps Dodge, processes more copper than any other mine in North America. The extraction technique is called "heap leaching", a process where an acid solution percolates through an extremely large stockpile of ore and is piped to a processing plant where the copper is recovered. The consulting engineer, Dames and Moore (now URS), believed that corrugated HDPE pipe could handle the acid and abrasion, but were not sure how the pipe would perform at surcharge pressures of 833 psi under 1,000 feet of crushed ore.



Working with Dames and Moore, ADS engineers developed a new installation method involving a narrower trench, highly compacted side walls, and the comparatively loose placement of fill above and around the pipe. The theory was that the settling of this loose overhead fill would promote soil arching of the ore, plac-

ing the main load on the compacted areas on either side of the pipe. A test installation proved the theory's viability, and three 1,000 ft. runs of 24" N-12 perforated pipe were installed on the site of the ore stockpile. Several months later, the initial covering of ore was in place, and the acid leaching process was begun. After four years, the pile has reached several hundred feet, and the three N-12 pipelines are performing flawlessly, delivering 35,000 gpm of copper leachate to the processing center.

Special school installs complex but economical drainage system

Small diameter N-12 pipe met all the requirements for an intricate drainage system to be installed at McArthur Tetzler Elementary in Spartanburg, South Carolina, a school for physically handicapped children. The building consisted of many wings spaced 30 ft. apart, with an exit door from each classroom leading to sidewalks between the wings. Because of the special needs of the children, no standing water was permitted to accumulate on these walkways.

This requirement, plus the limited space between wings, created the need for extensive roof drainage and numerous inlets and fittings in the underground pipe system. The designer specified 4" N-12 pipe for the roof drain connections, tying in to 6"-15" N-12 trunk lines and 12" or 15" watertight Nyloplast inline drains and drain basins.

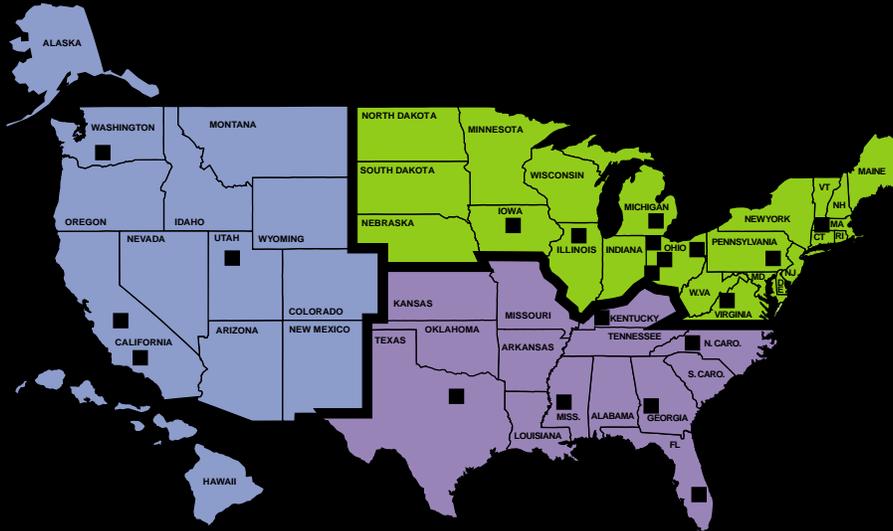
After evaluating many products, the engineer determined that ADS "offered an extremely cost effective system . . . The smooth interior of N-12 pipe allowed us to use smaller pipe sizes around the building because of better hydraulics. The pipe is lightweight and since you don't have to bevel the ends to connect with fittings, it is easier to install and more cost effective than PVC."

Tomorrow's drainage system products available everywhere today

As time takes its toll on the service life of installed concrete and metal pipe, N-12 pipe is fast becoming the preferred choice for gravity-flow drainage applications. In addition to its proven performance and economy, ADS HDPE pipe has the same wide-spread availability as traditional pipe materials.



ADS Sales and Service Locations



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LONDON, OH
1-800-733-9554

● **SOUTHERN**

FRANKLIN, TN
1-800-733-9987

● **WESTERN**

WASHOUGAL, WA
1-800-733-8523

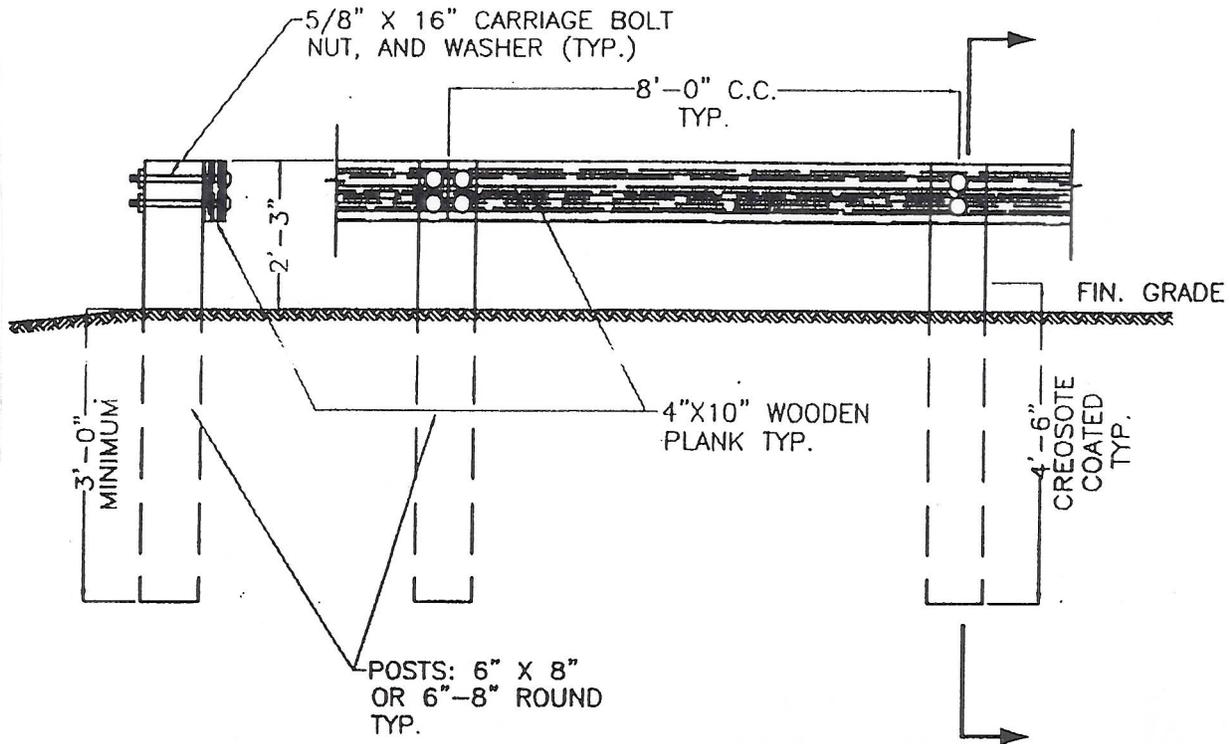
■ **MANUFACTURING FACILITY LOCATIONS**



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800-821-6710 www.ads-pipe.com



SECTION

ELEVATION

GUARDRAIL NOTES

1. GUARDRAIL COMPONENTS SHALL BE IN ACCORDANCE WITH NATIONAL PARK SERVICE, VDOT STANDARDS.
2. POSTS MAY BE SQUARE OR ROUND.
3. ALL LUMBER MUST BE PRESSURE TREATED FOR OUTDOOR USE IN ACCORDANCE WITH THE ABOVE STANDARDS.

WOODEN PLANK GUARDRAIL

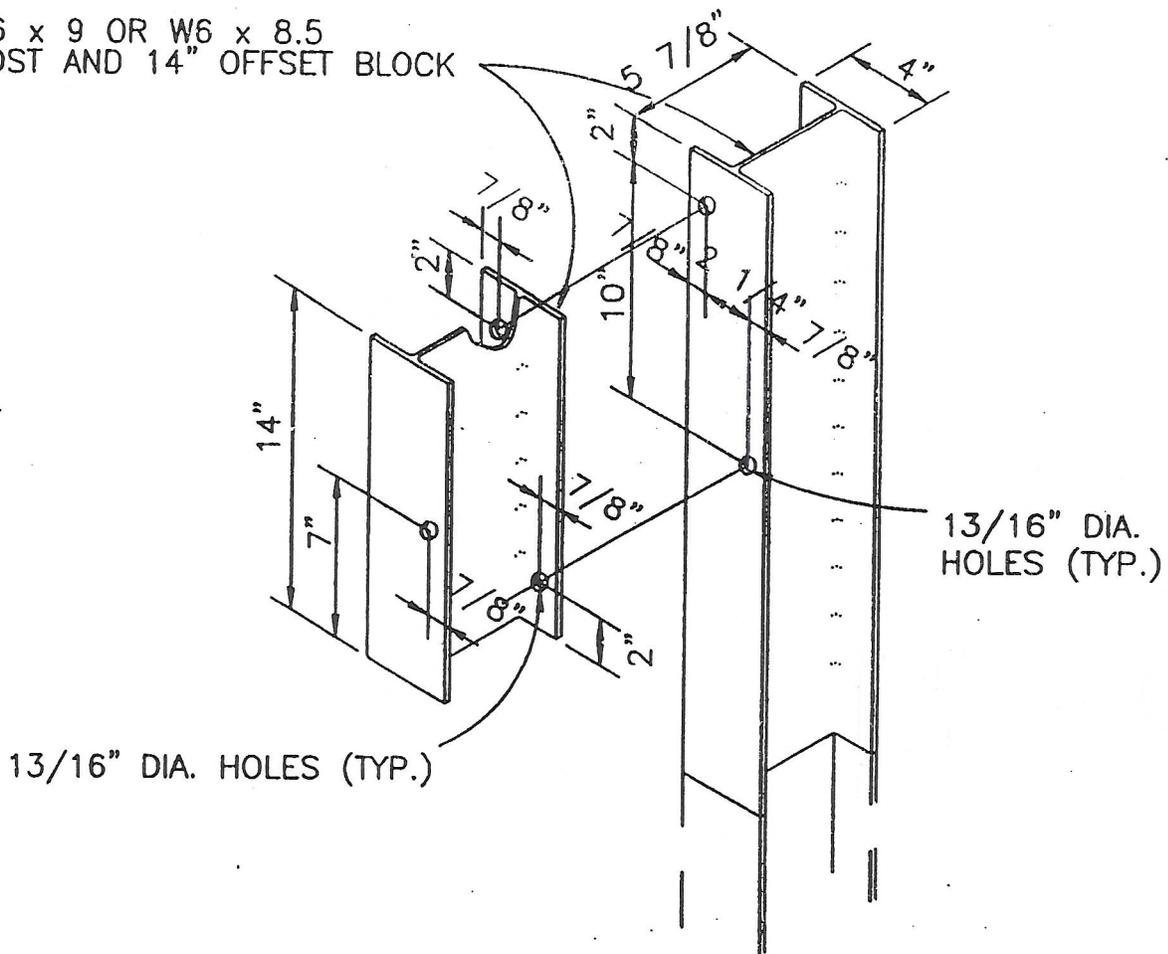
NOT TO SCALE

UNITED STATES NAVAL ACADEMY



ROADS AND PAVEMENT IDIQ	SUBJECT: <u>WOODEN PLANK GUARDRAIL</u>	SKETCH NO. 31
ITEM:	_____	SCALE: NTS
BY:RET	DATE: 17 NOV 08	SHT: 1 OF 1

W6 x 9 OR W6 x 8.5
POST AND 14" OFFSET BLOCK



ALTERNATE STEEL "H" BEAM POST
& OFFSET BLOCK

N.T.S.

UNITED STATES NAVAL ACADEMY



ROADS AND
PAVEMENT
IDIQ

ITEM:

SUBJECT:

ALTERNATE STEEL "H" BEAM

POST AND OFFSET BLOCK

SKETCH NO.
32A

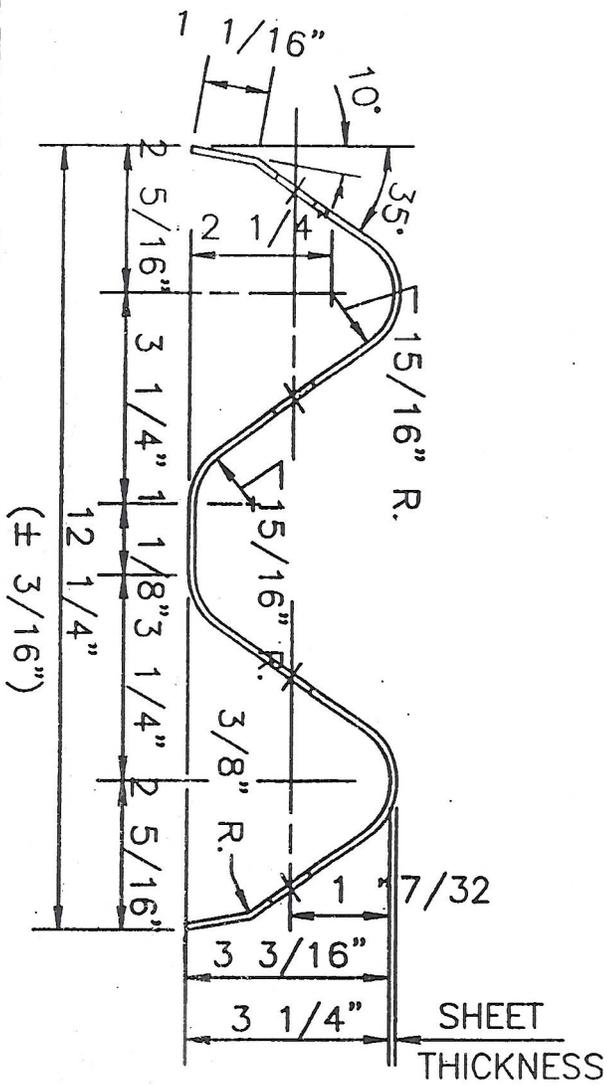
SCALE: NTS

BY:RET

DATE: 17 NOV 08

SHT: 1 OF 1

SECTION THRU STEEL W BEAM GUARDRAIL
 N.T.S.



UNITED STATES NAVAL ACADEMY



ROADS AND
 PAVEMENT
 IDIQ

ITEM:

SUBJECT:

SECTION THRU STEEL W BEAM

GUARDRAIL

SKETCH NO.

32 B

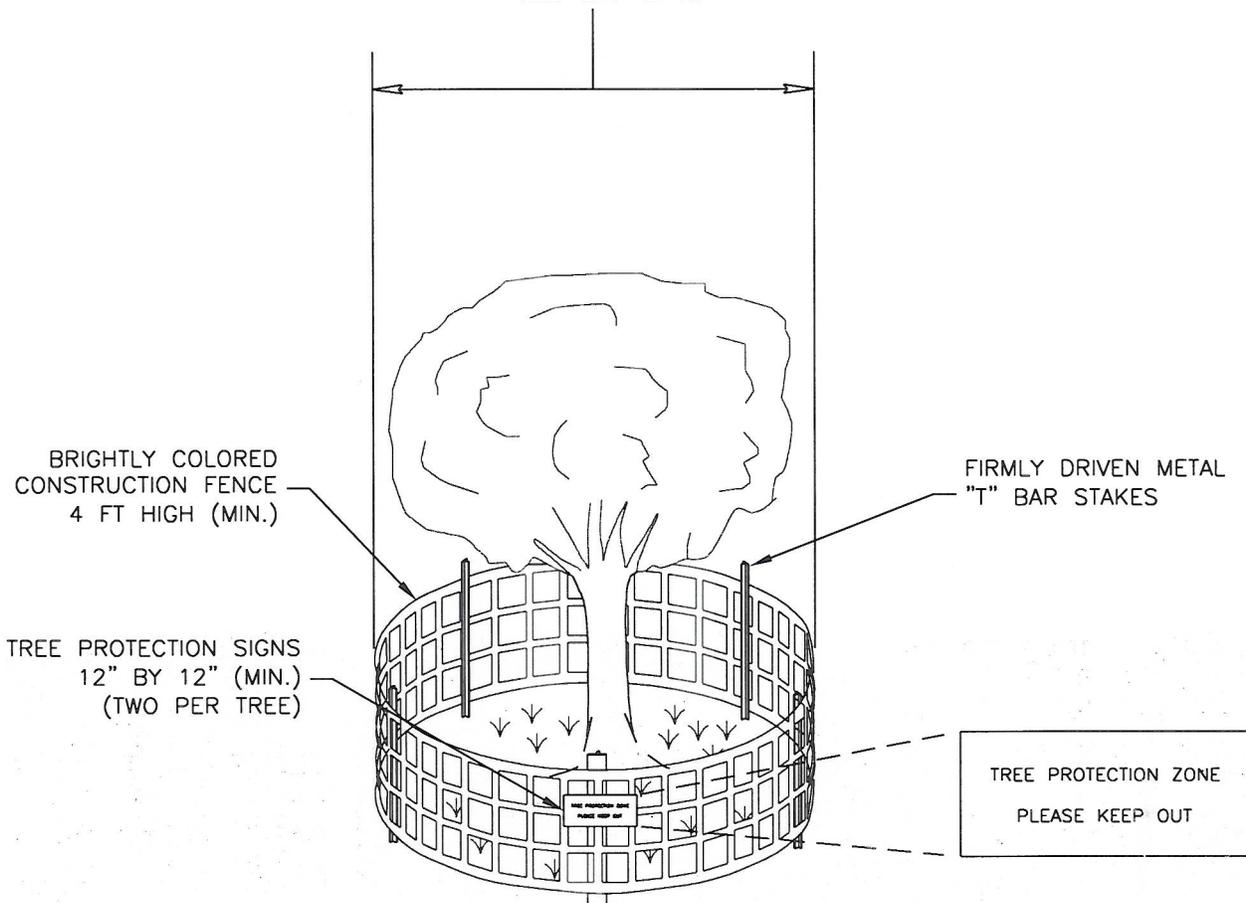
SCALE: NTS

BY:RET

DATE: 17 NOV 08

SHT: 1 OF 1

ALL PROTECTIVE FENCING
SHALL EXTEND BEYOND THE
TREE DRIPLINE



NOTES:

1. TREES WITHIN 25 FT OF A CONSTRUCTION SITE AND ASSOCIATED GRADING, PARKING AND UTILITY EXTENSIONS SHALL BE FENCED TO PREVENT MECHANICAL INJURY.
2. HEAVY EQUIPMENT OPERATORS WILL BE CAUTIONED TO AVOID DAMAGE TO EXISTING TREE TRUNKS AND ROOTS DURING LAND LEVELING OPERATIONS. TUNNEL UNDER ROOT SYSTEMS WHEN INSTALLING UTILITY LINES, IF POSSIBLE. TREE PROTECTION MAY NOT BE REMOVED WITHOUT THE PERMISSION OF THE CONTRACTING OFFICER.
3. TREE TRUNKS AND EXPOSED ROOTS AND LIMBS DAMAGED DURING EQUIPMENT OPERATIONS WILL BE CARED FOR AS PERSCRIBED BY A FORESTER OR LICENCED TREE EXPERT.
4. WHEN PROTECTIVE FENCING IS NOT PRACTICAL, WOOD CHIPS SPREAD TO A 4" DEPTH CAN BE USED TO HELP PREVENT SOIL COMPACTION AND DAMAGE TO TREES.
5. MATERIAL OR WASTE MAY NOT BE STOCKPILED INSIDE THE PERIMETER OF THE FENCE.

UNITED STATES NAVAL ACADEMY



ROADS AND PAVEMENT IDIQ	SUBJECT: TREE PROTECTION FENCE		SKETCH NO. 33
	ITEM: X089		SCALE: NTS
	BY:RET	DATE: 4 MAR 05	SHT: 1 OF 1