



JEFFERSON COUNTY
DEPARTMENT OF ADMINISTRATIVE SERVICES
729 MAPLE ST / PO BOX 100
HILLSBORO MO 63050
WWW.JEFFCOMO.ORG

ADDENDUM #2:

BID #: 19-0052

Invitation for Bid: **ANIMAL CARE FACILITY RENOVATION**
PROJECT NO. PW19B035BLD

Addendum **6-4-2019**
Date Issued:

ORIGINAL INVITATION FOR BID NOTICE ISSUED: **5-9-2019**

BIDS SHALL BE ACCEPTED UNTIL: **TUESDAY, JUNE 18, 2019** AT 2:00 P.M. LOCAL TIME.

Specification
Contact:

JASON JONAS
Department of Public Works
636-797-5369
jjonas@jeffcomo.org

Contract
Contact:

VICKIE PRATT
Department of Administrative Services
636-797-5380

Mail (3) Three
Complete Copies
With Vendor And
Bid Information As
Shown In Sample:

SAMPLE ENVELOPE

VENDOR NAME

VENDOR ADDRESS

CONTACT NUMBER

DEPARTMENT OF THE COUNTY CLERK
JEFFERSON COUNTY MISSOURI
729 MAPLE ST / PO BOX 100
HILLSBORO MO 63050-0100

SEALED BID: (BID NAME)

Contract Term:

ONE YEAR CONTRACT
UPON APPROVAL OF THE
COUNTY COUNCIL AND
COUNTY EXECUTIVE

The undersigned certifies that he/she has the authority to bind this company in an agreement/contract to supply the commodity or service in accordance with all terms, conditions, and pricing specified. Prices are firm during this agreement term, unless agreed upon in writing by the County. The County has the option to renew this agreement at the same terms and conditions as the original agreement for one additional one-year term with the written consent of the successful bidder. Price increases for renewals are not authorized unless approved in writing by the County.

Vendor
Information:

Company Name

Authorized Agent (Print)

Address

Signature

City/State/Zip Code

Title

Telephone #

Date

Tax ID #

E-mail

Fax #

ADDENDUM #2:

THE INVITATION FOR BID FOR ANIMAL CARE FACILITY RENOVATION PROJECT NO. PW19B035BLD BID SPECIFICATIONS HAS BEEN REVISED.

Addendum 2

Bidder shall initial all pages and return where the Bid Document denotes "BIDDER'S INITIALS: _____"

This document should be submitted with the original bid/proposal.

WHEN BID PACKAGES ARE RETURNED PAGES 1-58 NEED TO HAVE THE PAGE NUMBERS AND BIDDER'S INITIALS AT THE BOTTOM OF THE PAGE AS WELL ADDENDUM 1 PAGES 1-3 AND ADDENDUM 2 PAGES 1-3.

In Witness thereof, the parties hereto have executed this Agreement, in triplicate, as of this _____ day of _____ 2019:

Company Name

County of Jefferson, State of Missouri

Signature

Dennis J. Gannon County Executive

Print

Company Address: _____

Phone: _____

I hereby certify under section 50.660 RSMo., there is either: (1) a balance of funds, otherwise unencumbered, to the credit of the appropriation to which the obligation contained herein is chargeable, and a cash balance otherwise unencumbered, in the treasury, to the credit of the funds from which payment is to be made, each sufficient to meet the obligation contained herein; or (2) bonds or taxes have been authorized by vote of the people and there is a sufficient unencumbered amount of the bonds yet to be sold or of the taxes levied and yet to be collected to meet the obligation in case there is not a sufficient unencumbered cash balance in the treasury.

County Auditor

APPROVED AS TO FORM

County Counselor

GENERAL SITE CONSTRUCTION REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited to
 - 1. General procedures and requirements for Site Work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 EXAMINATION

- A. Site Verification Of Conditions
 - 1. 48 hours minimum before performing any work on site, contact 1-800 DIG-RITE and Jefferson County Public Works to arrange for utility location services.
 - 2. Perform minor, investigative excavations to verify location of various existing underground facilities at sufficient locations to assure that no conflict with the proposed work exists and sufficient clearance is available to avoid damage to existing facilities.
 - 3. Perform investigative excavating 10 days minimum in advance of performing any excavation or underground work.
 - 4. Upon discovery of conflicts or problems with existing facilities, notify Architect by phone or fax within 24 hours. Follow telephone or fax notification with letter and diagrams indicating conflict or problem and sufficient measurements and details to evaluate problem.

3.2 PREPARATION

- A. Protection
 - 1. Spillage -
 - a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.
 - b. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.
 - 2. Dust Control -
 - a. Take precautions necessary to prevent dust nuisance, both on-site and adjacent to public and private properties.
 - b. Correct or repair damage caused by dust.
 - 3. Erosion Control -
 - a. Take precautions necessary to prevent erosion and transportation of soil downstream, to adjacent properties, and into on-site or off-site drainage systems.
 - b. Develop, install, and maintain an erosion control plan if required by law.
 - c. Repair and correct damage caused by erosion.
 - 4. Existing Plants And Features - Do not damage tops, trunks, and roots of existing trees and shrubs on site which are intended to remain. Do not use heavy equipment within branch spread. Interfering branches may be removed only with permission of Architect. Do not damage other plants and features which are to remain.
- B. If specified precautions are not taken or corrections and repairs not made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of The Work.

3.3 REPAIR / RESTORATION

- A. Adjust existing covers, boxes, and vaults to grade.
- B. Replace broken or damaged covers, boxes, and vaults.
- C. Independently confirm size, location, and number of covers, boxes, and vaults which require adjustment.

3.4 FIELD QUALITY CONTROL

- A. Notify Architect 48 hours before performing excavation or fill work.
- B. If work has been interrupted by weather, scheduling, or other reason, notify Architect 24 hours minimum prior to intended resumption of grading or compacting.
- C. Owner reserves right to require additional testing to re-affirm suitability of completed work including compacted soils which have been exposed to adverse weather conditions.

END OF SECTION

SECTION 02230

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Prepare site for rough grading and structure excavation as described in Contract Documents.
- B. Related Sections
 - 1. Section 02051 - General Site Construction Requirements
 - 2. Section 02312 - Finish grading of existing topsoil stored on site and addition of imported topsoil.

1.2 DEFINITIONS

- A. Existing topsoil is defined as total amount of soil stripped and stored for reuse, less vegetation layer stripped and disposed of as specified in Paragraph 3.1,C below.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 PERFORMANCE

- A. Tree And Brush Removal
 - 1. Cut off trees, shrubs, brush, and vegetative growth 12 inches maximum above ground.
 - 2. Do not pull up or rip out roots of trees and shrubs that are to remain. If excavation through roots is required, excavate by hand and cut roots with sharp axe. Make clean, smooth, sloping cuts.
 - 3. Cut roots 6 inches or larger in diameter only with Architect's written permission.
- B. Grubbing
 - 1. Grub out stumps and roots 12 inches minimum below original ground surface, except as follows -
 - a. Under buildings, remove roots one inch and larger entirely.
 - b. Entirely remove roots of plants which normally sprout from roots, as identified by Architect.
- C. Stripping
 - 1. Strip existing vegetation layer 6 inches deep minimum from areas of site to receive buildings, landscaping, and paving and remove from site prior to stripping topsoil for storage and reuse.
 - 2. After stripping vegetation layer, strip existing topsoil 6 additional inches deep minimum from areas of site to receive buildings and paving and store on site for later use.
 - a. Existing topsoil is property of Contractor with restriction that topsoil is to be used first for Project landscape topsoil requirements and second for fill and backfill.
 - b. After Project fill, backfill, and landscape topsoil requirements are satisfied, remove excess existing topsoil from site. Do not remove existing topsoil from site without Architect's written approval.

3.3 CLEANING

- A. Remove from site trees, shrubs, uprooted stumps, vegetative layer, and surface debris and dispose of legally.
- B. Do not bury cuttings, stumps, roots, and other vegetative matter or burnt waste material on site.

END OF SECTION

SECTION 02311

ROUGH GRADING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Perform rough grading work required to prepare site for construction as described in Contract Documents.
- B. Related Sections
 - 1. Section 02051 - General Site Construction Requirements

1.2 QUALITY ASSURANCE

- A. Pre-Installation Conference
 - 1. Schedule conference after completion of site clearing but before beginning grading work.
 - 2. Identify benchmark to be used in establishing grades and review Contract Document requirements for grades, fill materials, and topsoil.
 - 3. Examine site to pre-plan procedures for making cuts, placing fills, and other necessary work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Materials used for fill shall be as specified for backfill in Section 02315.

PART 3 EXECUTION

3.1 PREPARATION

- A. Before making cuts, remove topsoil over areas to be cut and filled that was not previously removed by stripping specified in Section 02230. Stockpile this additional topsoil with previously stripped topsoil.

3.2 PERFORMANCE

- A. Site Tolerances
 - 1. Maximum variation from required grades shall be 1/10 of one foot.
 - 2. To allow for final finish grades of parking lot and planting areas, rough grade elevations before placing topsoil are -
 - a. Sod Areas - 7 inches below top of walk or curb.
 - b. Seeded Areas And Ground Cover Areas - 6 inches below top of walk or curb.
 - c. Shrub Areas - 15 inches below top of walk or curb
- B. When existing grade around existing plants to remain is higher than new finish grade, perform regrading by hand. Do not expose or damage shrub or tree roots.
- C. Compact fills as specified in Section 02315.
- D. If soft spots, water, or other unusual and unforeseen conditions affecting grading requirements are encountered, stop work and notify Architect.

END OF SECTION

SECTION 02312

FINISH GRADING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Perform finish grading work required to prepare site for installation of landscaping as described in Contract Documents.
- B. Related Sections
 - 1. Section 02051 - General Site Construction Requirements
 - 2. Section 02230 - Stripping and storing of existing topsoil
 - 3. Section 02917 - Soil amendments

1.2 REFERENCES

- A. American Society For Testing And Materials
 - 1. ASTM 1557-91, 'Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort'

1.3 SUBMITTALS

- A. Quality Assurance / Control
 - 1. Submit test on imported topsoil by licensed laboratory prior to use, using criteria on Owner Form 3332. Imported topsoil shall meet minimum specified requirements and be approved by Architect prior to use.
 - 2. Submit report stating location of source of imported topsoil and account of recent use.

1.4 QUALITY ASSURANCE

- A. Pre-Installation Conference - Participate in pre-installation conference specified in Section 02311.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Imported Topsoil
 - 1. Fertile, loose, friable soil meeting following criteria -
 - a. Chemical Characteristics -
 - 1) Acidity / alkalinity range - pH 5.5 to 7.7
 - 2) Soluble Salts - less than 2.0 mmhos/cm
 - 3) Sodium Absorption Ratio (SAR) - less than 3.0
 - 4) Organic Matter - greater than one percent
 - b. Physical Characteristics -
 - 1) Gradation as defined by USDA triangle of physical characteristics as measured by hydrometer.
 - Sand - 15 to 60 percent
 - Silt - 10 to 60 percent
 - Clay - 5 to 30 percent
 - 2) Clean and free from toxic minerals and chemicals, noxious weeds, rocks larger than 1-1/2 inch in any dimension, and other objectionable materials.
 - 3) Soil shall not contain more than 2 percent of particles measuring over 1/16 inch in largest size.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not commence work of this Section until grading tolerances specified in Section 02311 are met.

3.2 PREPARATION

- A. Protection - Protect utilities and site elements from damage.
- B. Surface Preparation
 - 1. Before grading, dig out weeds from planting areas by their roots and remove from site. Before placing topsoil in landscape areas, remove rocks larger than 1-1/2 inches in size and foreign matter such as building rubble, wire, cans, sticks, concrete, etc.
 - 2. Before placing topsoil, remove imported paving base material present in planting areas down to natural subgrade or other material acceptable to Architect.
 - 3. Disk, till, or aerate with approved agricultural aerator to depth of 6 inches.
 - 4. Limit use of heavy equipment to areas no closer than 6 feet from building or other permanent structures. Use hand held tillers for preparation of subsoil in areas closer than 6 feet.

3.3 PERFORMANCE

- A. Site Tolerances
 - 1. Total Topsoil Depth -
 - a. Lawn And Groundcover Planting Areas - 5 inches minimum
 - b. Shrub Planting Areas - 12 inches minimum throughout entire shrub bed area.
 - 2. Elevation of topsoil relative to walks or curbs before adding soil amendments specified in Section 02917 -
 - a. Seeded Lawn Areas - One inch below
 - b. Sodded Lawn Areas - 2 inches below
 - c. Shrub And Ground Cover Areas - One inch below
- B. Do not expose or damage existing shrub or tree roots.
- C. Redistribute approved existing topsoil stored on site as a result of work of Section 02230. Remove organic material, rocks and clods greater than 1-1/2 inch in any dimension, and other objectionable materials. Provide additional approved imported topsoil required to bring surface to specified elevation relative to concrete site element.
- D. Where topsoil depth is 12 inches or greater, place topsoil in layers not to exceed 12 inches and, to prevent settling, compact to 85 percent relative density in accordance with ASTM D 1557. Do not place topsoil whose moisture content makes it prone to compaction during placement process.
- E. Slope grade away from building for 12 feet minimum from walls at slope of 1/2 inch in one ft minimum unless otherwise noted. High point of finish grade at building foundation shall be 6 inches minimum below finish floor level. Direct surface drainage in manner indicated on Drawings by molding surface to facilitate natural run-off of water. Fill low spots and pockets with topsoil and grade to drain properly.

END OF SECTION

SECTION 02315

EXCAVATION AND FILL

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Perform Project excavating, trenching, backfilling, and compacting as described in Contract Documents, except as specified below.
 - 2. Procedure and quality for excavating, trenching, backfilling, and compacting performed on Project under other Sections unless specifically specified otherwise.
- B. Related Sections
 - 1. Section 02051 - General Site Construction Requirements
 - 2. Section 02230 - Site Clearing
 - 3. Sections Under 02500 Heading - Utility Services
 - 4. Section 02630 - Storm Drainage
 - 5. Sections Under 02700 Heading - Compaction of sub-grade under walks and paving
 - 6. Performance of excavating, backfilling, and compacting inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 REFERENCES

- A. American Society For Testing And Materials
 - 1. ASTM D 1557-00, 'Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort'
 - 2. ASTM D 2216-98, 'Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock'
 - 3. ASTM D 2487-00, 'Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)'
 - 4. ASTM D 2922-96, 'Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)'
 - 5. ASTM D 3017-96, 'Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)'

1.3 DEFINITIONS

- A. Relative Compaction - Ratio of field dry density as determined by ASTM D 2922 and ASTM D 3017 or 2216, and laboratory maximum dry density as determined by ASTM D 1557.

1.4 QUALITY ASSURANCE

- A. Pre-Installation Conference - Participate in pre-installation conference specified in Section 02311.

1.5 SEQUENCING

- A. Do not backfill against bituminous dampproofing for 24 hours after application of dampproofing.
- B. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Architect and until instructed by Architect.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Site Material - Existing excavated material on site is suitable for use as fill and backfill to meet Project requirements.
- B. Imported Fill / Backfill
 - 1. Well graded material conforming to ASTM D 2487 free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
 - a. Under Building Footprint And Paved Areas - Fill shall comply with soil classification groups GW, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches diameter and 90 percent minimum of fill shall be smaller than 1-1/2 inch in any direction.
 - b. Under Landscaped Areas -
 - 1) Fill more than 36 inches below finish grade shall comply with soil classification groups GW, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches diameter and 90 percent minimum of fill shall be smaller than 1-1/2 inch in any direction.
 - 2) Fill less than 36 inches below finish grade shall comply with soil classification groups SW, SP, SM, or SC. Fill may not contain stones larger than 1-1/2 inches in any direction and 90 percent minimum of fill shall be smaller than 3/8 inch in any direction.
- C. Excavatable Slurry Fill / Backfill
 - 1. Contain maximum of 94 lbs of cement per yard of slurry fill / backfill.
 - 2. Minimum stable air content of 20 percent, Darafill dosage as necessary.
 - 3. Maximum water content of 36 gallons per yard of backfill.
 - 4. Maximum compressive strength of 150 psi at 28 days.
 - 5. Acceptable Products -
 - a. Darafill by W R Grace & Co, Cambridge MA (800) 354-5414 www.gcp-grace.com
 - b. Equal as approved by Architect before use. See Section 01600.
- D. Engineered Fill
 - 1.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Carefully examine site and available information to determine type soil to be encountered. Discuss problems with Architect before proceeding with work.

3.2 PREPARATION

- A. Protection of Existing Utilities
 - 1. Protect existing utilities identified in Contract Documents during excavation.
 - 2. If existing utility lines not identified in Contract Documents are encountered, contact Architect before proceeding.

- B. Before placing fill, base, or finish work, prepare sub-grade as follows
 - 1. Under Building Slabs / Pads, Concrete Site Elements, And Portland Cement Concrete Driveways And Parking Areas - Scarify sub-grade 6 inches deep, moisture condition to uniform moisture content of between optimum and 4 percent over optimum, and mechanically tamp 6 inches deep to 90 percent minimum of relative compaction.
 - 2. Under Asphalt Concrete Driveways And Parking Areas - Scarify sub-grade 6 inches deep, moisture condition to uniform moisture content between optimum and 4 percent over optimum, and mechanically tamp to 95 percent minimum of relative compaction.
 - 3. Landscape Areas - Compact sub-grade to 85 percent relative compaction.

3.3 PERFORMANCE

- A. Excavation
 - 1. Building Footings And Foundations -
 - a. Excavate as necessary for proper placement and forming of footings and foundations.
 - b. Bottom of excavations to receive footings shall be undisturbed soil.
 - c. Excavation Carried Deeper Than Required -
 - 1) Under Footings - Fill with concrete specified for footings.
 - 2) Under Slabs - Use specified compacted backfill material.
 - 2. Pavement And Concrete Site Elements -
 - a. Excavate as necessary for proper placement and forming of concrete site elements and pavement structure. Remove vegetation and deleterious material and remove from site.
 - b. Backfill over-excavated areas with compacted base material specified in Sections under 02700 heading.
 - c. Remove and replace exposed material which becomes soft or unstable.
 - 3. Utility Trenches -
 - a. Unless otherwise indicated, excavation shall be open cut. Short sections of trench may be tunneled if pipe or duct can be safely and properly installed and backfill can be properly tamped in tunnel sections and if approved by Architect.
 - b. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.
 - c. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
 - d. Pipe 4 Inches In Diameter Or Larger -
 - 1) Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its length.
 - 2) Except where rock is encountered, take care not to excavate below depths indicated.
 - a) Where rock excavations are required, excavate rock with minimum over-depth of 4 inches below required trench depths.
 - b) Backfill over-depths in rock excavation and unauthorized over-depths with loose, granular, moist earth, thoroughly compacted.
 - 3) Whenever wet or unstable soil incapable of properly supporting pipe, as determined by Architect, occurs in bottom of trench, remove soil to depth required and backfill trench to proper grade with coarse sand, fine gravel, or other suitable material acceptable to Architect.
 - 4. If unusual excavating conditions are encountered, stop work and notify Architect.
- B. Fill / Backfill
 - 1. General -
 - a. Around Buildings And Structures - Slope grade away from building as specified in Section 02312. Hand backfill when close to building or where damage to building might result.
 - b. Site Utilities -
 - 1) In Landscape Areas - Use backfill consisting of on-site soil.
 - 2) Under Pavement And Concrete Site Elements - Extend excavatable slurry fill / backfill to elevation of subgrade. Do not place base material until excavatable slurry fill / backfill has cured 72 hours.
 - c. Do not use puddling or jetting to consolidate fill areas.
 - 2. Compacting -
 - a. Fill / Backfill And Base -

- 1) Under Building Slabs or Pads, Driveways, And Parking Areas - Place in 8 inch maximum layers, dampen (do not soak), and mechanically tamp to 95 percent minimum of maximum density as established by ASTM D 1557.
- 2) Under Concrete Site Elements And Around Foundation Walls - Place in 8 inch maximum layers, dampen (do not soak), and mechanically tamp to 90 percent minimum of maximum density as established by ASTM D 1557.
- 3) Utility Trenches -
 - a) Site - Place fill in 12 inch layers and moisture condition to plus or minus 2 percent of optimum moisture content. Compact fill to 90 percent minimum relative compaction to within 12 inches of finish grade. Compact fill above 12 inches to 85 percent relative compaction
 - b) Under Slabs - Place fill in 6 inch layers, moisture condition to plus or minus 2 percent of optimum moisture content, and compact to 95 percent minimum relative compaction to within 4 inches of finish grade. Final 4 inches of fill shall be granular base as specified in Section 02316.
- 4) Fill Slopes - Compact by rolling or using sheepsfoot roller.
- 5) Backfill Under Footings - Not allowed.
- 6) Other Backfills - Place other fills in 12 inch layers and compact to 90 percent relative compaction.
- b. Engineered Fill -
 - 1)

3.4 REPAIR / RESTORATION

- A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.5 CLEANING

- A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION

SECTION 02316

GRANULAR BASE

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Furnish and install granular base under interior slabs-on-grade as described in Contract Documents.
- B. Products Installed But Not Supplied Under This Section
 - 1. Under-slab vapor retarder and seam tape.
- C. Related Sections
 - 1. Section 02051 - General Site Construction Requirements
 - 2. Section 02742 - Base course under asphalt concrete paving
 - 3. Section 02753 - Base course under Portland cement concrete paving
 - 4. Section 02776 - Granular base under concrete site elements
 - 5. Section 07261 - Furnishing of vapor retarder and seam tape

1.2 REFERENCES

- A. American Society For Testing And Materials
 - 1. ASTM E 1643-98, 'Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs'

1.3 SEQUENCING

- A. Install vapor retarder and granular base system after application of termite control and before placing concrete. If termite control is disturbed or receives precipitation before being covered with vapor retarder, re-apply termite control.

PART 2 PRODUCTS

2.1 GRANULAR BASE

- A. Gravel - 1/4 inch minimum to one inch maximum well-graded, clean gravel or crushed rock.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install vapor retarder in accordance with ASTM E 1643 and following instructions.
 - 1. Install vapor retarder over compacted subgrade and tops of interior stem walls so entire area under slab is covered.
 - 2. Lap joints 3 inches minimum and seal with specified seam tape.
 - 3. Seal vapor retarder around pipes, conduits, and other utility items which penetrate vapor retarder using factory-fabricated boot installed as recommended by Manufacturer.
 - 4. Except for punctures required for reinforcing and anchor bolts at top of stem walls, seal tears and punctures before placing granular base.
- B. Place 4 inches minimum of granular base over vapor retarder, level, and compact with two passes of 2-1/2 ton minimum roller.

- C. Do not allow water onto vapor retarder or granular base before placing concrete.

3.2 FIELD QUALITY CONTROL

- A. Notify Architect 2 days before installation of concrete to allow inspection of vapor retarder and granular base installation.

END OF SECTION

FIRE SUPPRESSION WATER DISTRIBUTION

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 1. Perform excavation and backfill required for installation of work of this Section.
 2. Furnish and install fire water system as described in Contract Documents.
 3. Furnish and install connection to water main.
- B. Related Sections
 1. Section 02051 - General Site Construction Requirements
 2. Section 02315 - Procedure and quality of excavating, backfilling, and compacting
 3. Section 08712 - Padlock for post indicator valve.

1.2 REFERENCES

- A. American National Standards Institute / American Water Works Association
 1. ANSI A21.10 / AWWA C 110-93, 'Fittings, 3 inch through 48 inch, for Water and Other Liquids, Gray-Iron and Ductile-Iron'
 2. ANSI A21.11 / AWWA C 111-90, 'Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings'
 3. ANSI A21.50 / AWWA C 150-91, 'Thickness Design of Ductile-Iron Pipe'
 4. ANSI A21.51 / AWWA C 151-91, 'Ductile-Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds for Water or Other Liquids'
- B. American Society For Testing And Materials
 1. ASTM A 126-95, 'Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings'
 2. ASTM A 197-00, 'Standard Specification for Cupola Malleable Iron'
 3. ASTM A 307-00, 'Standard Specification for Carbon Steel Bolts and Studs 60 000 psi Tensile Strength'
 4. ASTM A 506-00, 'Standard Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, Regular Quality and Structural Quality'
 5. ASTM A 575-96, 'Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades'
- C. American Water Works Association
 1. AWWA C 502-85, 'Specification for Dry Barrel Fire Hydrants'
- D. National Fire Protection Association
 1. NFPA 13-1991, 'Standard for the Installation of Sprinkler Systems'
 2. NFPA 24-1992, 'Standard for the Installation of Private Fire Service Mains and Their Appurtenances'

1.3 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies
 1. Install exterior fire water system according to NFPA 13, NFPA 24, and Cast Iron Pipe Research Institute Procedures unless specified otherwise below.
 2. Install hydrant in accordance with AWWA C 502.
 3. Install exterior fire water system up to and including pipe flange 12 inches above floor inside building.
 4. Install exterior fire water system in accordance with the requirements of the City of Herculaneum.
- B. Pre-Installation Conference - Participate in pre-installation conference specified in Section 03313.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

- A. Pipe - Ductile iron pipe in accordance with ANSI A21.51 / AWWA C 151 and ANSI A21.50 / AWWA C 150.
- B. Fittings - Ductile iron pipe fitting in accordance with ANSI A21.10 / AWWA C 110 and rubber gaskets joints in accordance with ANSI A21.11 / AWWA C 111.
- C. Hydrants
 - 1. Dry-barrel fire hydrant (base valve type) complying with AWWA C 502, with 150 psi working pressure with two 2-1/2 inch hose connections and one 4-1/2 inch pumper connection with caps and chains. Nozzle cap nuts to match operating stem nuts.

SPECIFY - If AHJ does not specify specific hydrant, include approved manufacturer, model number, etc, of hydrant being included in design.

- 2. Acceptable Products -
 - a. Hydrants accepted by authority having jurisdiction are approved.
- D. Gate Valves
 - 1. Cast iron body with bolted bonnet.
 - 2. Indicator post pattern.
 - 3. Non-rising stem.
 - 4. 175 psi working pressure.
 - 5. Approved Products -
 - a. Nibco -
 - 1) Model M-609 with mechanical connection.
 - 2) Model F-609 with flanged connection.
 - b. Mueller -
 - 1) Model A-2052-5 with mechanical connection.
 - 2) Model A-2052-6 with flanged connection.
- E. Indicator Post Valve
 - 1. UL / ULC / FM Approved.
 - 2. Adjustable type.
 - 3. Cast iron body.
 - 4. Approved Products -
 - a. Nibco - Model NIP1A Vertical Post.
 - b. Mueller - Model A-20800
- F. Tamper Switch
 - 1. UL / ULC / FM Approved.
 - 2. Weather and tamper resistant.
 - 3. Single Pole Double Throw Switch.
 - 4. Approved Product -
 - a. Potter Electric Signal - Model PCVS
- G. Anchorages
 - 1. Provide anchorages for tees, plugs, caps, bends, and hydrants in accordance with NFPA 24.
 - 2. Miscellaneous Fittings -
 - a. Clamps, Straps, And Washers - Steel, meeting requirements of ASTM A 506.
 - b. Rods - Steel, meeting requirements of ASTM A 575.
 - c. Rod Couplings - Malleable iron, meeting requirements of ASTM A 197.

- d. Bolts - Steel, meeting requirements of ASTM A 307.
- e. Cast Iron Washers - Meeting requirements of ASTM A 126, Class A.
- f. Thrust Block - 2500 psi (17.237 Kpa) concrete.

2.2 MANUFACTURERS

- A. Mueller Company, Decatur, IL (800) 423-1323 or (217) 423-4471 www.muellerflo.com
- B. Nibco Inc, Elkhart, IN (800) 234-0227 or (219) 295-3000 www.nibco.com
- C. Potter Electric Signal Company, St Louis, MO (800) 325-3936 or (314) 878-4321 www.pottersignal.com
- D. Potter-Roemer, Santa Ana, CA (800) 366-3473 or (714) 530-5300 www.potterroemer.com

PART 3 EXECUTION

3.1 EXAMINATION

- A. Before installation, inspect pipe for defects and cracks. Do not use defective, damaged, or unsound pipe.

3.2 PREPARATION

- A. Excavate and backfill as specified in Section 02315 with following additional requirements
 - 1. Runs shall be as close as possible to those shown on Drawings.
 - 2. Excavate to required depth.
 - 3. Grade to obtain fall required.
 - 4. Bottom of trenches shall be hard. Tamp as required.
 - 5. Remove debris from trench prior to laying of pipe.
 - 6. Do not cut trenches near footings without consulting Architect.
 - 7. Excavate trenches so outside pipe will be 12 inches minimum below frost line or 48 inches minimum below finish grade, whichever is deeper.
 - 8. Cover pipe only after testing is complete and accepted by Architect.

3.3 INSTALLATION

- A. General
 - 1. When work is not in progress, close open ends of pipe and fittings so no trench water, soil, or other substances will enter pipes or fittings.
 - 2. Keep trenches free from water until pipe jointing material has set. Do not lay pipe when condition of trench or weather is unsuitable for such work.
- B. Placing And Laying of Underground Pipe
 - 1. Deflections from straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall not exceed 6/D inches per linear foot of pipe where D represents nominal diameter of pipe expressed in inches
 - 2. Deflections to be determined between center lines extended of two connecting pipes.
 - 3. If alignment requires deflection in excess of these limitations, provide special bends or sufficient number of shorter lengths of pipe to provide angular deflections within limits approved by Architect.
 - 4. Laying -
 - a. Shape trench bottom to give substantially uniform circumferential support to lower third of each pipe.
 - b. Pipe laying shall proceed up-grade with spigot ends of bell-and-spigot pipe pointing in direction of flow.
 - c. Lay each pipe true to line and grade and in such manner as to form close concentric joint with adjoining pipe and to prevent sudden offsets of flow line.
 - d. Support fittings at bends in pipe line by concrete thrust blocks firmly wedged against vertical face of trench. Blocks shall be at least two cu ft in size.
 - e. As work progresses, clear interior of pipe of dirt and superfluous materials. Where cleaning after laying is difficult because of small pipe, keep suitable swab or drag in pipe and pull forward past each joint immediately after jointing has been completed.

- C. Make joints between ductile iron and cast iron pipe and other types of pipe with standard manufactured cast-iron adapters and fittings.
- D. Provide cast iron valve box for fire protection valve. Encase valve box in concrete.
- E. Install ductile iron pipe to flange connection 12 inches above floor. Provide 2 inch minimum clearance around pipe at penetration through floor. Fill clearance with mastic.
- F. Make joints between ductile iron and other types of pipe with standard manufactured adapters and fittings. Make connections between new work and existing mains using specials fittings to suit actual conditions.
- G. Incidental Items of Work
 - 1. Valve, plug, or cap, as directed by Architect, where pipe ends are left for future connections.
 - 2. Make key for unlocking valve handle identical to key used to open doors to building.

3.4 FIELD QUALITY CONTROL

- A. Test system according to 'Contractor's Material & Test Certification for Underground Piping' NFPA 13, figure 1-10.1(b).2 and as directed and required by the City of Hercules.

END OF SECTION

SECTION 02554

GAS DISTRIBUTION

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Perform excavation and backfill required for work of this Section.
 - 2. Furnish and install gas piping and fittings as described in Contract Documents from L.P. gas tanks to building.
- B. Related Sections
 - 1. Section 02051 - General Site Construction Requirements
 - 2. Section 02315 - Procedure and quality of backfilling and compacting
 - 3. Section 02776 - Concrete meter base
 - 4. Section 05090 - Welding standards and requirements
 - 5. Section 15196 - Gas line from meter to building

1.2 REFERENCES

- A. American Society For Testing And Materials
 - 1. ASTM A 53-01, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless'
 - 2. ASTM A 234-00a, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures'
 - 3. ASTM D 2513-00, 'Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings'

1.3 QUALITY ASSURANCE

- A. Qualifications
 - 1. Welders shall be certified and bear evidence of certification 30 days before commencing work on project. If there is doubt as to proficiency of welder, Owner's Representative may require welder to take another test. This shall be done at no cost to Owner. Certification shall be by Pittsburgh Testing Laboratories or other approved authority.
 - 2. Polyethylene pipe installers shall be properly trained and certified in procedure for joining polyethylene pipe.
- B. Requirements of Regulatory Agencies - Lay underground pipe in accordance with federal pipeline safety regulations and Missouri Natural Gas Company regulations and specifications.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not store polyethylene pipe so it is exposed to sunlight.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Above-Ground Pipe And Fittings - Black carbon steel, butt welded, Schedule 40 pipe meeting requirements of ASTM A 53. Welded forged steel fittings meeting requirements of ASTM A 234.
- B. Below-Ground Pipe And Fittings - Polyethylene pipe and fittings meeting requirements of ASTM D 2513 with No. 14 coated copper tracer wire.
- C. Valves

1. Iron body, 125 psi (861 kPa) square head cock, with bronze plug.
2. Quality Standard - Powell No. 2200
3. Approved Manufacturers -
 - a. Powell
 - b. Stockham

2.2 MANUFACTURERS

- A. The Powell Co, Cincinnati, OH
- B. Stockham Valve, Birmingham. AL (205) 592-6361

PART 3 EXECUTION

3.1 INSTALLATION

- A. Excavate and backfill as specified in Section 02315 with following additional requirements
 1. Runs shall be as close as possible to those shown on Drawings.
 2. Excavate to required depth.
 3. Bottom of trenches shall be hard. Tamp as required.
 4. Remove debris from trench prior to laying of pipe.
 5. Do not cut trenches near footings without consulting Architect.
 6. Place 4 inches of sand around pipe before trench is backfilled.
 7. Bury outside pipe 12 inches minimum below frost line or 18 inches minimum below finish grade, whichever is deeper.
 8. Backfill only after pipe lines have been tested, inspected, and approved by Architect.
- B. General installation shall be as specified in Division 15.
 1. Steel pipe 2-1/2 inches and larger shall have welded fittings and joints.
 2. Provide 24 inch minimum steel pipe between vertical rise of riser and end of polyethylene line if anode-less riser is not used. Use plastic-to-steel transition or compression fitting between end of service line and steel meter riser. Provide cathodic protection for steel riser or use anode-less riser.
 3. Place tracer wire along side of polyethylene pipe from meter to main.
- C. Set meter on concrete base.
- D. Provide necessary protection against damage for meter.

END OF SECTION

SECTION 02630

STORM DRAINAGE

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Perform excavating and backfilling required for work of this Section.
 - 2. Furnish and install storm drainage system as described in Contract Documents from point of water collection to terminating point.
- B. Related Sections
 - 1. Section 02051 - General Site Construction Requirements
 - 2. Section 02315 - Procedure and quality of excavating, backfilling, and compacting

1.2 REFERENCES

- A. American Association Of State Highway And Transportation Officials
 - 1. AASHTO M-252, 4 to 10 inch pipe, 'Specifications for Corrugated Polyethylene Pipe'
 - 2. AASHTO M-294, 12 to 48 inch pipe, 'Specifications for Corrugated Polyethylene Pipe'
- B. American Society For Testing And Materials
 - 1. ASTM A 74-98, 'Standard Specification for Cast Iron Soil Pipe and Fittings'
 - 2. ASTM A 536-84 (99), 'Standard Specification for Ductile Iron Castings'
 - 3. ASTM A 929-97, 'Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe.'
 - 3. ASTM C 14-99, 'Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe'
 - 4. ASTM C 76-00, 'Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe'
 - 5. ASTM C 564-97, 'Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings'
 - 6. ASTM D 2321-00, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'
 - 7. ASTM D 3034-00, 'Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings'
 - 9. ASTM D 3212-96a, 'Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals'
 - 10. ASTM F 794-99, 'Standard Specification for Poly(Vinyl Chloride)(PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter'
 - 11. ASTM F 1336-00, 'Standard Specification for Poly(Vinyl Chloride)(PVC) Gasketed Sewer Fittings'

PART 2 PRODUCTS

2.1 MATERIAL

- A. Bedding Material - 3/8 inch crushed gravel.

2.2 COMPONENTS

- A. Catch Basins, Curb Inlets, Etc
 - 1. Concrete -
 - a. Construct of 4000 psi minimum concrete.
 - b. Include cover inlet with cast iron frame and grate as shown on Drawings.
 - 2. PVC -
 - a. Comply with requirements of ASTM D 3212, ASTM F 794, and ASTM F 1336.
 - b. Metal grates, Frames, and hoods shall comply with ASTM A 536, Grade 70-50-05.

- c. Acceptable Products -
 - 1) Nyloplast-ADS, Buford, GA (866) 888-8479 www.nyloplast-us.com
 - 2) Equal as approved by Architect before bidding. See Section 01600.
- B. Concrete Pipe
 - 1. Non-Reinforced - Meet requirements of ASTM C 14.
 - 2. Reinforced -
 - a. Meet requirements of ASTM C 76, plain end.
 - b. Determine class of pipe by depth of cover over pipe at rough-graded elevations as follows -

<u>Depth Of Cover</u>	<u>Class Of Pipe</u>
Under 2 feet	V
2 feet to 3 feet IV	
3 feet to 6 feet III	
Over 6 feet	II
- C. PVC Pipe And Fittings
 - 1. Meet requirements of ASTM D 3034, SDR 35
 - 2. Fittings - Slip Joint type with elastomeric seals.
- D. Corrugated Polyethylene Pipe And Fittings
 - 1. Meet requirements of AASHTO M-252 or M-294, Type S.
 - a. Corrugated, helical or annular, exterior with smooth interior and gasketed connectors.
 - b. Corrugated, annular, with silt and water tight joints for storm sewers.
- E. Corrugated Metal Pipe
 - 1. Meet requirements of ASTM A 929.
 - 2. 16 gauge, standard round, galvanized with 2 ounces zinc per square foot sheet steel.
 - 3. Corrugations -
 - a. 6 to 10 Inch Pipe - 1-1/2 by 1/4 inch depth helical corrugations.
 - b. 12 to 60 Inch Pipe - 2-2/3 by 1/2 inch depth helical corrugations.
- F. Cast Iron Soil Pipe And Fittings
 - 1. Meet requirements of ASTM A 74.
 - 2. Joint Material - Rubber gaskets meeting requirements of ASTM C 564 and compatible with pipe used.

PART 3 EXECUTION

3.1 PREPARATION

- A. Excavate and backfill as specified in Section 02315 with following additional requirements
 - 1. Runs shall be as close as possible to those shown on Drawings.
 - 2. Excavate to required depth.
 - 3. Grade to obtain fall required.
 - 4. Remove debris from trench prior to laying of bedding and pipe.
 - 5. Do not cut trenches near footings without consulting Architect.
 - 6. Backfill only after pipe lines have been tested, inspected, and approved by Architect.

3.2 INSTALLATION

- A. Concrete Pipe
 - 1. Provide 3 inches of uncompacted bedding material below pipe.
 - 2. After installation of pipe, provide additional bedding material up to springline of pipe.
- B. PVC / Polyethylene Pipe
 - 1. Install in accordance with ASTM D 2321.
 - 2. Minimum cover for corrugated polyethylene pipe and fittings shall be 12 inches for H-20 load.

- C. Use jacks to make-up gasketed joints.

3.3 FIELD QUALITY CONTROL

- A. Failure to install joints properly shall be cause for rejection and replacement of piping system.

3.4 CLEANING

- A. Remove excess earth from site or place as directed by Architect.

END OF SECTION

ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Prepare pavement sub-grade as described in Contract Documents to receive pavement base and paving.
 - 2. Furnish and install pavement base and asphaltic concrete paving in driveways and parking areas as described in Contract Documents
- B. Related Sections
 - 1. Section 02051 - General Site Construction Requirements
 - 2. Section 02315 - Compaction procedures and tolerances

1.2 REFERENCES

- A. American Society For Testing And Materials
 - 1. ASTM C 131-96, 'Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine'
 - 2. ASTM D 977-98, 'Standard Specification for Emulsified Asphalt'
 - 3. ASTM D 1075-96 (2000), 'Standard Test Method for the Effect of Water on Compressive Strength of Compacted Bituminous Mixtures'
 - 4. ASTM D 1188-96, 'Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens'
 - 5. ASTM D 1559-89, 'Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus'
 - 6. ASTM D 2027-97, 'Standard Specification for Cutback Asphalt (Medium-Curing Type)'
 - 7. ASTM D 2041-00, 'Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures'
 - 8. ASTM D 2397-98, 'Standard Specification for Cationic-Emulsified Asphalt'
 - 9. ASTM D 2726-00, 'Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens'
 - 10. ASTM D 3381-92 (1999), 'Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction'

1.3 SUBMITTALS

- A. Product Data - Manufacturer's published product data on pre-emergent herbicide.
- B. Quality Assurance / Control
 - 1. Mix design of asphalt concrete mixture.
 - 2. Copies of test results from tests conducted to assure compliance to Contract Document requirements.
 - 3. Manufacturer's application instructions for pre-emergent herbicide.

1.4 QUALITY ASSURANCE

- A. Qualifications - Pre-emergent herbicide shall be applied by applicator certified by State in which Project is located as an applicator of agricultural chemicals.
- B. Pre-Installation Conferences
 - 1. Participate in pre-installation conference specified in Section 02311.
 - 2. Schedule paving pre-installation conference after staking of parking areas and installation of sleeves, but before installation of base and paving.

1.5 PROJECT CONDITIONS

- A. Environmental Requirements
 - 1. Do not perform work during following conditions -
 - a. Ambient temperature or temperature of base below 50 deg F.
 - b. Presence of free surface water.
 - c. Over-saturated base and sub-grade materials.

PART 2 PRODUCTS

2.1 MATERIAL

- A. Pre-emergent herbicide
 - 1. Selective type pre-emergence control chemical containing 60 percent Trifluralin minimum.
 - 2. Labeled for under-pavement use.
 - 3. Acceptable Products -
 - a. Treflan or Spike 80W by Dow AgroSciences, Indianapolis, IN (800) 905-7326 or (317) 337-3000 www.dowagro.com
 - b. Trust 4EC by Agrilience LLC, St Paul, MN (800) 535-4635 or (651) 451-5000
 - c. Equal as approved by Architect before installation. See Section 01600.
- B. Base
 - 1. New Aggregate Base -
 - a. Road Base type gravel or crushed stone, graded as follows -

<u>Sieve</u>	<u>Percent by Weight Passing Sieve</u>
1 inch	100
3/4 inch	85 - 100
No. 4	45 - 60
No. 10	30 - 50
No. 200	5 - 10 (non-plastic)
 - 2. Recycled Aggregate Base -
 - a. Pulverized existing Portland cement or asphalt cement concrete paving mixed uniformly with existing aggregate base.
 - b. Conform to following gradation -

<u>Sieve</u>	<u>Percent by Weight Passing Sieve</u>
2 Inch	100
1-1/2 inch	85 - 100
3/4 inch	60 - 80
No. 4	30 - 50
No. 200	5 - 12
 - c. Quality Requirements as established by testing -
 - 1) R-value - 70 minimum
 - 2) Sand Equivalent - 25 minimum
 - 3) Durability Index - 35 minimum
- C. Asphalt Cement Primer - Meet requirements of ASTM D 2027, MC 70, plus or minus one grade.
- D. Tack Coat - Emulsified asphalt meeting requirements of either ASTM D 977, Grade SS-1H, or ASTM D 2397, Grade CSS-1H.
- E. Pavement
 - 1. Asphalt Cement -
 - a. Meet requirements of ASTM D 3381, Viscosity grade (Original Asphalt) as follows -
 - 1) AC5 in cold climatic conditions
 - 2) AC10 in moderate climatic conditions
 - 3) AC20 in hot climatic conditions
 - 2. Aggregates -

- a. Fine to coarse mineral aggregates with wear less than 40 percent as determined by ASTM C 131 and mineral filler suitable for pavement meeting following gradation requirements

<u>Sieve</u>	<u>Percent by Weight Passing Sieve</u>
3/4 inch	100
1/2 inch	95 - 100
3/8 inch	80 - 95
No. 4	54 - 71
No. 8	38 - 54
No. 30	17 - 32
No. 200	3 - 8 (non-plastic)

- b. Up to 15 percent by weight of total aggregates may consist of pulverized, recycled asphalt cement concrete pavement, providing aggregate grading requirements are met.

2.2 MIXES

- A. Central plant hot mix.
- B. Develop mix design according to Marshall Method to achieve optimum asphalt content as shown by test data curves based on testing samples containing 1/2 percent increments of asphalt content. Samples shall include minimum of two with asphalt content above optimum and two with asphalt content below optimum.
1. Make tests in accordance with ASTM D 1559 and ASTM D 1075. (50 blow count Marshall)
 2. Final design shall meet following criteria -
 - a. Stability - 1200 pounds minimum
 - b. Flow - 8 minimum, 18 maximum
 - c. Air voids - 2 percent minimum, 4 percent maximum
 - d. Voids in mineral aggregate - 15 percent minimum
 - e. Asphalt cement by weight of total - 5 percent minimum
 - f. Dry Strength - 200 psi
 - g. Index of Retained Strength - 75 percent

PART 3 EXECUTION

3.1 APPROVED INSTALLERS

- A. Approved Applicators
- 1.
 - 2.
 - 3.
1. Paving companies shall be pre-approved and included in Construction Documents by Addendum.

3.2 PREPARATION

- A. Survey and stake parking surfaces to show grading required by Contract Documents.
- B. Sub-Grade
1. Fine grade parking surface area to grades required by Contract Documents.
 2. Compact sub-grade as specified in Section 02315.
- C. Pre-emergent Herbicide
1. Apply to prepared subgrade dispersed in liquid. Concentrate shall be such that Manufacturer's full recommended rate of chemical will be applied to every 1000 sq ft and liquid will penetrate a minimum of 2 inches.
 2. Application shall be no more than one day before installation of base.
 3. Take necessary precautions to protect adjoining property and areas designated for planting on building site.

3.3 INSTALLATION

- A. Site Tolerances
 - 1. Sub-Grade - 0.00 inches high. Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
 - 2. Base -
 - a. Base shall be 6 inches thick minimum after compaction, except where shown thicker on Drawings.
 - b. Measure using stringline from curb to curb, gutter, flat drainage structure, or grade break.
 - 3. Paving -
 - a. Apply asphaltic concrete paving in single lift 3 inches thick minimum after compaction, except where shown thicker on Drawings. Paving thicker than 3 inches may be applied in two lifts, the first 2 inches thick minimum and the second 1-1/2 inches thick minimum.
 - b. Paving adjacent to cast-in-place concrete site elements shall be between 1/4 inch higher than concrete and flush with concrete.
 - c. Surface texture of hand work areas shall match texture of machine-laid areas.
- B. Base
 - 1. If roller is smaller than 8 ton, lay gravel and compact in two courses.
 - 2. Compact as specified in Section 02315.
 - 3. Priming - Prime base with application of 0.2 to 0.5 gallons of asphalt cement primer per square yard if pavement will be laid more than three days after compaction of base, or if precipitation is anticipated between completion of compaction of base and laying of pavement.
 - 4. Recompact unprimed base if it receives precipitation before pavement is laid.
 - 5. Remove or repair improperly prepared areas as directed by Architect.
- C. Asphaltic Concrete Paving
 - 1. Tack coat vertical concrete surfaces that will be in contact with paving.
 - 2. Uniformly mix materials so aggregate is thoroughly coated with asphalt.
 - 3. Place at temperatures between 250 and 325 deg F with a self-propelled laydown machine.
 - 4. Longitudinal bituminous joints shall be vertical and properly tack coated if cold. Transverse joints shall always be tack coated.
 - 5. Compaction -
 - a. Compact asphaltic concrete paving to 96 percent minimum. Determine percent compaction by dividing density of test cores as determined by either ASTM D 1188 or ASTM D 2726 by laboratory compacted density as determined by ASTM D 1559. Maximum total air voids in completed asphaltic concrete shall be 8 percent as determined by ASTM D 2041.
 - b. Roll with powered equipment capable of obtaining specified density.
 - c. Begin breakdown rolling immediately after asphalt is placed when asphalt temperature is at maximum. Complete breakdown rolling before mix temperature drops below 240 deg F. Complete handwork compaction concurrently with breakdown rolling.
 - d. Complete intermediate rolling as soon as possible after breakdown rolling and before mix temperature drops below 185 deg F. Do not roll paving for compaction purposes after asphalt temperature falls below 185 deg F.
 - e. Execute compaction so visibility of joints is minimized. Complete finish rolling to improve asphalt surface as soon as possible after intermediate rolling and while asphalt paving is still warm. Do not use vibration for finish rolling.
 - 6. Surface shall be uniform with no 'birdbaths'. Leave finished surfaces clean and smooth. Variations from specified grades shall not exceed 1/2 inch.

3.4 FIELD QUALITY CONTROL

- A. Site Tests - When tested with 10 foot straight edge, surface of complete work shall not contain irregularities in excess of 1/4 inch.

END OF SECTION

PAVEMENT MARKING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Furnish material and apply pavement and curb markings as described in Contract Documents.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements - Paint handicap spaces to conform to ADA Standards and local code requirements.

1.3 PROJECT CONDITIONS

- A. Project Environmental Requirements
 - 1. Apply only on dry surfaces, during favorable weather, and when damage by rain, fog, or condensation is not anticipated.
 - 2. Latex Paint -
 - a. Atmospheric temperature above 50 deg F.
 - b. When temperature is not anticipated to drop below 50 deg F during drying period.
 - 3. Alkyd or Chlorinated Rubber Paint -
 - a. Atmospheric temperature above 40 deg F.
 - b. When temperature is not anticipated to drop below 40 deg F during drying period.

PART 2 PRODUCTS

2.1 MATERIAL

- A. Paint
 - 1. Non-reflectorized.
 - 2. Types -
 - a. Acrylic Latex for uncured paving
 - b. Alkyd or chlorinated rubber for cured paving
 - 3. Colors -
 - a. Yellow - Parking stripes, crosswalk stripes, and safety markings.
 - b. Blue And White - Handicapped markings.
 - c. Red - Fire lanes and no parking zones.
 - 4. Acceptable Products -
 - a. 442XX Traffic Marking Paint by ICI Devoe, Cleveland, OH (888) 681-6353 or (216) 344-8000 www.devoepaint.com
 - b. Set-Fast Traffic Marking Paint by Sherwin-Williams, Cleveland, OH (800) 321-8194 or (216) 566-2000 www.sherwin-williams.com
 - c. Equal as approved by Architect before application. See Section 01600.
- A. Preformed Thermoplastic
 - 1. Reflectorized.
 - 2. Colors -
 - a. Yellow - Parking stripes, crosswalk stripes, and safety markings.
 - b. Blue And White - Handicapped markings.
 - c. Red - Fire lanes and no parking zones.
 - 3. Approved Product -
 - a. Premark Plus by Flint Trading Inc, Thomasville, NC (336) 475-6600 www.flinttrading.com

PART 3 EXECUTION

3.1 PREPARATION

- A. Do not apply acrylic latex system until paving has cured 7 days minimum. Do not apply alkyd or chlorinated rubber systems until paving has cured 3 months minimum.
- B. Surfaces shall be dry and free of grease and loose dirt particles. Scrape and wire brush chipped or damaged paint on existing curbs.
- C. Perform layout with chalk or lumber crayon only.

3.2 APPLICATION

- A. Site Tolerances
 - 1. General - Make lines parallel, evenly spaced, and with sharply defined edges.
 - 2. Line Widths -
 - a. Plus or minus 1/4 inch variance on straight segments.
 - b. Plus or minus 1/2 inch variance on curved alignments.
- B. Provide two coat application, each coat with coverage of 150 sq ft per gal. Do not apply second coat within three hours minimum or until first coat is thoroughly dried, whichever is longer.

3.3 CLEANING

- A. Remove drips, overspray, improper markings, and paint material tracked by traffic by sand blasting, wire brushing, or other method approved by Architect prior to performance.

END OF SECTION

SECTION 02776

CAST-IN-PLACE CONCRETE SITE ELEMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Compact sub-base for cast-in-place concrete site elements as described in Contract Documents.
 - 2. Furnish and install granular base for cast-in-place concrete site elements as described in Contract Documents.
 - 3. Furnish and install cast-in-place concrete site elements as described in Contract Documents.
 - 4. Furnish and install sealants as described in Contract Documents.
- B. Products Installed But Not Supplied Under This Section
 - 1. Lightpole base anchors
 - 2. Pipe bollards
 - 3. Electric Transformer Pad
- C. Related Sections
 - 1. Section 02051 - General Site Construction Requirements
 - 2. Section 02315 - Compaction procedures and tolerances
 - 3. Section 02813 - Sleeves for underground irrigation system
 - 4. Section 05120 - Furnishing of pipe for pipe bollards
 - 6. Section 07920 - Quality of Sealants
 - 7. Section 10352 - Furnishing of flagpole base and foundation sleeve
 - 8. Section 16520 - Furnishing of lightpole base anchors

1.2 REFERENCES

- A. American Society For Testing And Materials
 - 1. ASTM D 1751-99, 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'

1.3 QUALITY ASSURANCE

- A. Pre-Installation Conferences
 - 1. Participate in pre-installation conference specified in Section 02311.
 - 2. Schedule concrete site element pre-installation conference after installation of sleeves, placing of base, and installation of forms, but before placing of concrete.
- B. Meet quality assurance / control requirements specified in Section 03313.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Formwork - Meet requirements specified in Section 03120.

B. Granular Base

1. Road Base type gravel or crushed rock, graded as follows -

<u>Sieve</u>	<u>Percent by Weight Passing Sieve</u>
1 inch	100
3/4 inch	85 - 100
No. 4	45 - 60
No. 10	30 - 50
No. 200	5 - 10 (non-plastic)

C. Expansion Joints

1. 1/2 inch thick.
2. Manufactured commercial fiber type -
 - a. Meet requirements of ASTM D 1751
 - b. Acceptable Products -
 - 1) Conflex by Masonite Building & Industrial Products Group, Chicago, IL (800) 257-7885
www.masonite.com
 - 2) Sealtight by W R Meadows Inc, Hampshire, IL (800) 342-5976 www.meadows.com
 - 3) Equal as approved by Architect before installation.
3. Recycled Vinyl -
 - a. Light gray color
 - b. Approved Products -
 - 1) Proflex by Oscoda Plastics Inc, Oscoda, MI (800) 544-9538 www.oscodaplastics.com

- D. Concrete - Meet requirements specified in Section 03313 for exterior concrete.

PART 3 EXECUTION

3.1 PREPARATION

- A. Sub-Base - Compact sub-base as specified in Section 02315.

3.2 INSTALLATION

- A. Granular Base - Except under mow strips, place 4 inches minimum of granular base, level, and compact as specified in Section 02315.
- B. Joints
1. Align joints of sidewalk and curb and gutter.
 2. Expansion And Contraction Joints -
 - a. Spacing -
 - 1) Sidewalks And Curbs - 50 feet on center
 - 2) Mow Strips - 100 feet on center
 - 3) Flat Drainage Structures - 50 feet on center
 - 4) Retaining Walls -
 - a) 36 feet on center at walls with guardrails
 - b) 50 feet on center at walls with chain link fencing
 - b. Install so top of expansion joint material is 1/4 inch below finished surface of concrete.
 - c. No expansion joint required between curbs and walks parallel to curb.
 - d. Provide expansion joint at end of walks perpendicular to and terminating at curb.
 3. Scored Control Joints -
 - a. Spacing -
 - 1) Curbs - 10 feet on center
 - 2) Sidewalks - 5 feet on center
 - 3) Mow Strips - 5 feet on center
 - 4) Flat Drainage Structures - 10 feet on center
 - 5) Retaining Walls -
 - a) 6 feet on center at walls with guardrails
 - b) 10 feet on center at walls with chain link fencing

- b. Depth of control joints shall be approximately one quarter of concrete slab thickness, but not less than one inch.
- C. Finish
 - 1. Curb, Gutter, Sidewalks, Mow Strips, Flat Drainage Structures, Stairs, And Miscellaneous -
 - a. Broom finish.
 - b. Round edges including edges formed by expansion joints.
 - c. Remove edger marks.
 - 2. Light Pole And Flagpole Bases - Exposed portion to have rubbed finish.
 - 3. Retaining Walls -
 - a. Immediately after removing forms, remove joints, marks, bellies, projections, loose materials, and cut back metal ties from surfaces to be exposed.
 - b. Point up voids with cement mortar, 1:2 mix, and rub exposed surface with carborundum to smooth, even surface.
- D. Special Requirements
 - 1. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree.
 - 2. Sidewalks, Exterior Stairs, And Landings -
 - a. Slope sidewalks with cross slope of 1/8 to 1/4 inch per ft in direction of intended drainage.
 - b. Slope sidewalks away from building one percent minimum.
 - c. Do not dust with cement.
 - 3. Mow Strips -
 - a. Granular base not necessary under mow strips. Compact subgrade under mow strip to density of undisturbed earth.
 - b. Form and cast mow strips in place.
 - c. Set top of mow strip 1-1/2 inches above finish grade.
 - d. Compact topsoil underneath mow strip to density of undisturbed earth.
 - 4. Light Pole Bases - Install bond breaker consisting of three layers of 30 lb roofing felt between pole base and adjoining sidewalk.
 - 5. Pipe Bollards - Install plumb and fill with concrete.

3.3 FIELD QUALITY CONTROL

- A. Inspection - To allow Architect's verification of grades and elevations, notify Architect three days minimum before placing concrete for specified concrete site elements.

END OF SECTION

PART I - GENERAL

1.1 WORK INCLUDED IN THIS SECTION: The Contractor shall furnish all plant, labor, and materials and perform all operations in connection with the placing, watering, and firming of sodded and seeded areas, complete and in strict accordance with these specifications and applicable drawings, and subject to the terms and conditions of the Contract. The Contractor shall sod disturbed areas where shown on the Drawings. All other areas disturbed for any reason during construction (and not shown to be sodded) shall be seeded.

1.2 RELATED WORK IN OTHER SECTIONS:

Demolition, Clearing and Grubbing.....	Section 2100
Excavating, Filling and Grading.....	Section 2200

1.3 QUALITY ASSURANCE:

A. Qualifications of Workmen: Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.

1.4 SUBMITTALS: All certificates required by law shall accompany shipments. Upon completion of the installation, deliver all certificates to the Owner's Representative.

1.5 PRODUCT HANDLING:

A. Replacement: In the event of damage or rejection, immediately make all repairs and replacements necessary to the approval of the Owner and Engineer and at no additional cost to the Owner.

PART 2 - MATERIALS

2.1 TOPSOIL: Topsoil from the project site shall be used for all planting operations. All topsoil shall be to the satisfaction and approval of the Owner's Representative.

2.2 SOD: All grass sod shall be nursery grown native blue grass, zoysia, or fescue as necessary to match existing yard and free of objectionable grassy and broad leaf weeds. Sod shall be considered free of such weeds if less than 5 such plants are found per 100 sq. ft. of area. Sod will not be acceptable if it contains any of the following weeds: common bermuda grass (wiregrass), quackgrass, johnson grass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass. The sod shall be uniform thickness of 3/4" ($\pm 1/4$ ") and shall be mowed to a height of 2" to 2 1/2" prior to stripping.

2.3 SEED: Seed shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act. All seed shall be furnished in sealed standard containers unless exception is granted in writing by the Owner's Representative. Seed which has become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable. The minimum percentage by weight of pure live seed in each lot of seed shall be as follows:

Kind of Seed	Percentage
Blue Grass, Kentucky (Poa. Pratensis)	50
Alta Fescus (Festuca Elatior arundances var alta)	20
Red Top (Agrestis alba)	5
Rye Grass, Domestic (Lolium jultiflorum and perene)	<u>20</u>
Total Grass Seed	95
Material Other Than Grass Seed*	<u>5</u>
TOTAL	100

(*) The aggregate percent of material other than grass seed as above stated shall include all non-viable seed, chaff, bulbs, live seed of crop plants other than those specified above, harmless inert matter and weed seed not exceeding 1 per cent by weight of pure live seed and other material in the mixture.

2.4 COMMERCIAL FERTILIZER:

A. Shall be composed of a formula 12-12-12 and shall conform to the applicable State fertilizer laws. It shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original unopened containers each bearing the manufacturer's guaranteed analysis. Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted.

B. Agricultural limestone shall be finely ground limestone rock containing a minimum of a combined total of "calcium and magnesium carbonate equivalent" of from 85% to 90%. All the material shall pass a 3/16" screen, approximately 90% shall pass a #8 screen and approximately 15-20% shall pass a #100 screen.

2.5 MULCHING:

A. All seeded areas shall be mulched with mulch materials as specified hereinbefore or with clean dry straw and other binding materials subject to the approval of the Owner's Representative.

B. Hydro-Mulch: Mulch shall be a natural wood cellulose fiber processed so that it does not contain germination inhibiting factors and shall be dyed green. The fibers shall be capable of remaining in uniform suspension in water under agitation and of blending with grass seed and fertilizer to form a homogeneous slurry.

1. General: This Contractor has the option to hydro-mulch any or all of the areas to be seeded. Prior to carrying out this planting procedure, the Contractor shall submit in writing all materials, quantities, and equipment to be used for hydro-mulching to the Engineer for approval.

2. Application: When applied to the ground surface by hydraulic means, the mulch shall be capable of forming a strong moisture holding mat uniformly impregnated with seed; and which after application, will allow absorption of moisture and allow irrigation and rainfall to percolate to the underlying soil. Suppliers shall certify that their product meets the above requirement based on testing.

3. Weight Specifications of this material shall refer only to air dry weight of fiber material. Absolute air dry weight is based on normal standards of the Technical Association of Pulp and Paper Industry for wood cellulose and is considered equivalent to 10% moisture. Containers shall show air dry weight content marked by manufacturer.

2.6 WATER: Water used, hose, and other watering equipment required for the work shall be furnished by the Contractor.

PART 3 - INSTALLATION

3.1 JOB CONDITIONS:

- A. Areas to be seeded or sodded includes all project areas disturbed by excavation, grading, and other construction procedures required for the completion of this Contract.
- B. Sodding and seeding shall be performed only during the seasons when satisfactory growing conditions exist. The planting operation shall not be performed during times of drought or other unfavorable climatic conditions. Time of planting shall be approved by the Engineer.
- C. Prior to the work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- D. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION FOR PLANTING: The areas to be sodded or seeded shall be prepared immediately prior to the placing of the sod or seed by thorough cultivating, smoothing, removal of clods, surface stone 1-inch diameter or larger, and weeds. Soil shall be in a moist condition prior to placing sod.

Grades on the areas to be sodded or seeded shall be maintained in true, even, and compacted conditions so as to prevent the formations of depressions. Areas that have washed or eroded shall be brought to grade and compacted thoroughly by the Contractor at his own expense prior to placing the sod or seeding. No grading shall be done when the soil is in a muddy or frozen condition.

Sod placed on slopes steeper than 2 1/2:1 shall be staked with 6 stakes per square yard or roll of sod.

3.3 APPLYING FERTILIZER: The previously described fertilizer shall be applied to the finished grade by approved spreader at the rate of 7.5 lbs. per 1000 square feet and shall be thoroughly raked into the top 2 inches of the surface before planting of seed. Spread ground limestone over all areas to be seeded at the rate of 50 lbs. per 1000 square feet, at least 2 days before spreading the inorganic fertilizer. Lime and fertilizer shall be uniformly incorporated into the soil to a depth of 1 inch by raking, harrowing or other approved method.

3.4 PLANTING SEED: Seed mixed in proportions as hereinbefore specified shall be broadcast by approved sowing equipment at the rate of 400 lbs. per acre. The seed shall be uniformly distributed over the designated areas. The seed shall be covered to an average depth of 1/2 inch by means of a brush harrow, spike-tooth harrow, chain harrow, cultipacker, or other approved device.

When delays in operations carry the work beyond the most favorable planting season for the grasses designated, or when conditions are such, by reason of drought, high winds, excessive moisture, or other factors, that satisfactory results are not likely to be obtained, the seeding operation shall be stopped and work shall be resumed only when conditions are favorable again or when approved alternate or corrective measures and procedures have been put into effect. If inspection during seeding operations or after there is a show of green indicates that areas have been skipped, the sowing of additional seed on these areas will be required.

The seeded areas will be inspected for acceptable grass coverage and will be acceptable when the grasses designated are growing and are in good condition, and no area more than 1/2 of one per cent of the total area shall be bare, of which no single area shall be more than 3 sq. ft. in area. Any area larger than this will be not acceptable and shall be reseeded.

3.5 MULCHING:

A. All seeded areas shall be mulched at the rate of two tons per acre with clean dry straw and other binding materials and procedures specified hereinbefore.

B. All seeded areas optioned by the Contractor to be hydro-mulched shall be mulched at the following rates:

1. Slopes less than 4:1 = 2000 lbs. per acre
2. Slopes greater than 4:1 = 2500 lbs. per acre

3.6 LAYING OF SOD: Sod shall be laid so that no voids occur between strips and shall be immediately tamped or rolled. The sod shall then be thoroughly watered. The finished sodded surface shall be true to grade, smooth, even and equally firm at all points. Sod will be accepted after it shows definite growth and establishment. Areas of three square feet or more that do not show these signs shall be re-sodded by the Contractor, and those areas shall be in growing condition before acceptance will be made.

3.7 MAINTENANCE: All sodded and seeded areas shall be kept in a healthy, growing condition by watering, weeding, mowing, rolling, trimming, edging, etc., upon completion and acceptance by the Owner.

END OF SECTION 02930

SECTION 312000 – EARTH MOVING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Perform rough grading work required to prepare site for construction as described in Contract Documents.

1.2 QUALITY ASSURANCE

- A. [Pre-Installation Conference](#)
 - 1. Schedule conference after completion of site clearing but before beginning grading work.
 - 2. Identify benchmark to be used in establishing grades and review Contract Document requirements for grades, fill materials, and topsoil.
 - 3. Examine site to pre-plan procedures for making cuts, placing fills, and other necessary work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Materials used for fill shall be as specified for backfill.

PART 3 EXECUTION

3.1 PREPARATION

- A. Before making cuts, remove topsoil over areas to be cut and filled that was not previously removed by stripping. Stockpile this additional topsoil with previously stripped topsoil.

3.2 PERFORMANCE

- A. Site Tolerances
 - 1. Maximum variation from required grades shall be 1/10 of one foot.
 - 2. To allow for final finish grades of parking lot and planting areas, rough grade elevations before placing topsoil are -
 - a. Sod Areas - 7 inches below top of walk or curb.
 - b. Seeded Areas And Ground Cover Areas - 6 inches below top of walk or curb.
 - c. Shrub Areas - 15 inches below top of walk or curb
- B. When existing grade around existing plants to remain is higher than new finish grade, perform regrading by hand. Do not expose or damage shrub or tree roots.
- C. Compact fills.
- D. If soft spots, water, or other unusual and unforeseen conditions affecting grading requirements are encountered, stop work and notify Architect.

END OF SECTION

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for [**slabs-on-grade**] [**walks**] [**pavements**] [**lawns and grasses**] [**and**] [**exterior plants**].
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete [**walks**] [**pavements**].
5. Subbase[**and base**] course for asphalt paving.
6. Excavating and backfilling for utility trenches.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: [ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM] [AASHTO M 145 Soil Classification Groups A-1, A-2-4, A-2-5, and A-3], or a combination of these groups; free of rock or gravel larger than [3 inches (75 mm)] <Insert dimension> in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups [GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487] [A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145], or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- H. Drainage Course: Narrowly graded mixture of [washed] crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing." during earthwork operations.

3.2 EXCAVATION

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus **1 inch (25 mm)**. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to **12 inches (300 mm)** higher than top of pipe or conduit, unless otherwise indicated.
 - 1. Clearance: [**12 inches (300 mm)** each side of pipe or conduit] [**As indicated**].
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. Excavate trenches **6 inches (150 mm)** deeper than elevation required in rock or other unyielding bearing material, **4 inches (100 mm)** deeper elsewhere, to allow for bedding course.

3.6 SUBGRADE INSPECTION

- A. Proof-roll subgrade [**below the building slabs and pavements**] **<Insert locations>** with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean

concrete fill, with 28-day compressive strength of **2500 psi (17.2 MPa)**, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill trenches excavated under footings and within **18 inches (450 mm)** of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "[**Cast-in-Place Concrete**] [**Miscellaneous Cast-in-Place Concrete**]."
- D. Provide **4-inch- (100-mm-)** thick, concrete-base slab support for piping or conduit less than **30 inches (750 mm)** below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of **4 inches (100 mm)** of concrete before backfilling or placing roadway subbase.
- E. Place and compact initial backfill of [**subbase material**] [**satisfactory soil**], free of particles larger than **1 inch (25 mm)** in any dimension, to a height of **12 inches (300 mm)** over the utility pipe or conduit.
 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- G. Install warning tape directly above utilities, **12 inches (300 mm)** below finished grade, except **6 inches (150 mm)** below subgrade under pavements and slabs.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than **8 inches (200 mm)** <Insert dimension> in loose depth for material compacted by heavy compaction equipment, and not more than **4 inches (100 mm)** in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to [ASTM D 698] [ASTM D 1557]:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top **12 inches (300 mm)** of existing subgrade and each layer of backfill or fill soil material at **[95]** <Insert percentage> percent.
2. Under walkways, scarify and recompact top **6 inches (150 mm)** below subgrade and compact each layer of backfill or fill soil material at **[92]** <Insert percentage> percent.
3. Under lawn or unpaved areas, scarify and recompact top **6 inches (150 mm)** below subgrade and compact each layer of backfill or fill soil material at **[85]** <Insert percentage> percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at **[85]** <Insert percentage> percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus [1 inch (25 mm)] <Insert tolerance>.
 - 2. Walks: Plus or minus [1 inch (25 mm)] <Insert tolerance>.
 - 3. Pavements: Plus or minus [1/2 inch (13 mm)] <Insert tolerance>.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.14 SUBBASE AND BASE COURSES

- A. Place subbase[**and base**] course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase[**and base**] course under pavements and walks as follows:
 - 1. Shape subbase[**and base**] course to required crown elevations and cross-slope grades.
 - 2. Compact subbase[**and base**] course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than [95] <Insert percentage> percent of maximum dry unit weight according to [ASTM D 698] [ASTM D 1557].

3.15 DRAINAGE COURSE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 - 1. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
 - 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than [95] <Insert percentage> percent of maximum dry unit weight according to ASTM D 698.

3.16 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 312000

SECTION 323113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Chain-Link Fences: Residential.
 - 2. Gates: **swing**.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations, components, materials, dimensions, sizes, weights, and finishes of components. Include plans, gate elevations, sections, details of post anchorage, attachment, bracing, and other required installation and operational clearances.
 - 1. Gate Operator: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
- C. Samples:
 - 1. Polymer-coated steel wire for fabric.
 - 2. Polymer coating on framing and accessories.
- D. Maintenance Data:

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. UL Standard: Provide gate operators that comply with UL 325.
- C. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for automatic gate operators serving as a required means of access.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

- A. General: Height indicated on Drawings Comply with ASTM A 392, CLFMI CLF 2445, and requirements indicated below:
 - 1. Steel Wire Fabric: Metallic coated wire with a diameter of 0.192 inch
 - a. Mesh Size: 2 inches
 - b. Aluminum Coating: ASTM A 491, Type I.
 - c. Metallic (Zinc) Coating: ASTM A 392, Type II.
 - d. Zn-5-Al-MM Aluminum-Mischmetal Alloy Coating: ASTM F 1345, Type III.
 - 2. Aluminum Wire Fabric: ASTM F 1183, with mill finish, and wire diameter of 0.192 inches.
 - a. Mesh Size: 2 inches
 - 3. Selvage: Knuckled at both selvages.

2.2 RESIDENTIAL FENCE AND GATE FRAMING

- A. Posts and Rails: Round
 - 1. Fence Height: 4 feet and 6 feet
 - 2. Duty Rating: Medium.
 - 3. Tube or Pipe Diameter and Thickness: According to ASTM F 761.
 - 4. Tube Size and Thickness: According to ASTM F 654.
 - 5. Gate: Comply with ASTM F 654 and the following:
 - a. Type: I, single swing steel frame tubing.
 - b. Fabric Height: 2 inches less than adjacent fence height
 - c. Leaf Width: 36 inches .
 - 6. Hardware: Latches permitting operation from both sides of gate, hinges; padlock accessible from both sides of gate.
 - 7. Metallic-Coated Steel: Posts, rails, and frames protected with an external coating of not less than 0.6 oz. of zinc/sq. ft. (183 g of zinc/sq. m), a chromate conversion coating, and a clear, verifiable polymer film; with an internal protective coating of not less than 0.6 oz. of zinc/sq. ft. (183 g of zinc/sq. m) or 81 percent, not less than 0.3-mil- (0.0076-mm-) thick, zinc pigmented coating.

2.3 FITTINGS

- A. General: Comply with ASTM F 626.
- B. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. zinc.
2. Aluminum: Mill finish.

2.4 CAST-IN-PLACE CONCRETE

- A. Materials: Portland cement complying with ASTM C 150, Type I aggregates complying with ASTM C 33, and potable water.
 1. Concrete Mixes: Normal-weight concrete air entrained with not less than 3000-psi compressive strength (28 days), 3-inch slump, and 1-inch maximum size aggregate.

2.5 FENCE GROUNDING

- A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 1. Material above Finished Grade: Copper.
 2. Material on or below Finished Grade: Copper.
 3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
- B. Connectors and Grounding Rods: Comply with UL 467.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 1. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 2. Mechanically Driven Posts: Drive into soil to depth of 30 inches . Protect post top to prevent distortion.
- D. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment.
- E. Line Posts: Space line posts uniformly at 10 feet maximum o.c.

- F. Post Bracing and Intermediate Rails: Install according to ASTM F 567. Install braces at end and gate posts and at both sides of corner and pull posts.
- G. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing.
- H. Top Rail: Install according to ASTM F 567.
- I. Bottom Rails: Install, spanning between posts.
- J. Chain-Link Fabric: Apply fabric to [outside] [inside] of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage, unless otherwise indicated.
- K. Tie Wires: Attach wire per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
- L. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.2 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.3 GROUNDING AND BONDING

- A. Fence Grounding: Install at maximum intervals of 1500 feet
- B. Fences within 100 Feet (30 m) of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
 - 1. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location.
- C. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
 - 1. Connections: Make connections so possibility of galvanic action or electrolysis is minimized.
- D. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.

3.4 FIELD QUALITY CONTROL

- A. Grounding-Resistance Testing: Engage a qualified independent testing agency to perform field quality-control testing.

END OF SECTION 323113