# SECTION 02300

Please review this section carefully, we are not sure how you want the earthwork handled and to what extent.

# EARTHWORK

**PART 1 GENERAL**

* 1. RELATED DOCUMENTS
		1. Drawings and other Contract Documents, listed in the agreement between the Owner and Contractor, apply to this Section.
	2. SUMMARY
		1. Section Includes:
			1. Site grading.
			2. Removal of topsoil and subsoil.
			3. Excavating.
			4. Backfilling, and compacting.
			5. Seeding of disturbed areas.
	3. SUBMITTALS
		1. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
		2. Dewatering Plan: Describe equipment, materials, installation and operation required to lower ground water table; include calculations to support plan.
		3. Shop Drawings: Indicate vibro-compaction grid for each size and configuration footing requiring soils densification.
		4. Product Data: Seed specifications.
		5. Certificates: Certify seed mixture and plants meet or exceed specified requirements.
			1. Seed: Certify each seed mix; include year of production and date of packaging.
		6. Soil Analysis: Test reports indicating recommended soil conditioning and fertilizers to support plant life specified in this Section. Provide separate recommendations for lawns, and each group of trees, shrubs, and ground cover requiring similar pH conditions and nutrients.
	4. REGULATORY REQUIREMENTS
		1. Perform work in accordance with local soil conservation and erosion protection regulations.
	5. DELIVERY, STORAGE, AND HANDLING
		1. Seed: Deliver seed in original, sealed, labeled, and undamaged containers.
		2. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
	6. WARRANTY
		1. Lawns: Provide 90 day warranty including coverage for uniform, smooth texture, free of bare spots and weeds.
	7. MAINTENANCE SERVICE
		1. Maintain seeded areas from time of planting until 90 days after date of Substantial Completion. Include the following as maintenance services to establish healthy, viable lawns:
			1. Watering, fertilizing, and weeding.
			2. Mowing, trimming.
			3. Replanting bare or eroded areas.
			4. Spraying to control disease and pests

# PART 2 PRODUCTS

* 1. SOIL MATERIALS
		1. Topsoil: Reusable excavated friable loam; free of subsoil, roots, grass, excessive amount of weeds, large stone, and foreign matter].
		2. Subsoil: Excavated material, graded free of lumps larger than 6 inches, rocks larger than 3 inches, and debris.
	2. FILL MATERIALS
		1. Type A - Select Granular Material: AASHTO 57 coarse stone aggregate with the following gradation:

|  |  |
| --- | --- |
| Sieve Size | Percent Passing |
| 1-1/2 inch | 100 |
| 1 inch | 90-100 |
| 3/8 inch | 20-55 |
| Number 4 | 0-10 |
| Number 8 | 0-5 |

* + 1. Type D - Subsoil: Reused free of rock larger than 3 inch size, and debris, conforming to ASTM D2487 Group Symbol CL or OL.
	1. GRASS
		1. Seed Mixture (Permanent Seeding): Minimum 80 percent germination for blue grass and 85 percent for other species; minimum 85 percent pure seed for each species; maximum 0.50 percent weed seed.
			1. Perennial Ryegrass: 30 percent.
			2. Jamestown Chewings Red Fescue: 30 percent.
			3. Creeping Red Fescue: 30 percent.
			4. Nassau Kentucky Bluegrass: 10 percent.

Please verify if vibro compaction is required

* + 1. Fertilizer: Fifty percent of the elements derived from organic sources; nitrogen, phosphoric acid, and soluble potash to proportions determined by soil analysis for plant life supported.
		2. Seed Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
		3. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.

# PART 3 EXECUTION

* 1. EXAMINATION AND PREPARATION
		1. Identify required lines, levels, contours, and datum.
		2. Notify Architect/Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
		3. Call Common Ground Alliance National Call Before You Dig buried utility line information service at 811 not less than three working days before performing Work.
			1. Request underground utilities to be located and marked within and surrounding construction areas.
		4. Identify and flag known utility locations. Notify utility company to remove and relocate utilities.

Coordinate utility company access to construction areas.

* + 1. Maintain and protect existing utilities to remain.
	1. PROTECTION OF ADJACENT WORK
		1. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
		2. Design sheeting and shoring to be left in place as part of the completed Work.
		3. When excavation protection is required, Contractor shall assume responsibility for damages caused by failure of the sheeting, shoring, or bracing and for settlement of either filled excavations or adjacent soil. Repair damage to new and existing work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.
		4. Grade excavation top perimeter to prevent surface water run-off into excavation or to adjacent properties.
	2. TOPSOIL EXCAVATING
		1. Do not excavate wet topsoil.
		2. Excavate topsoil and stockpile in area designated on site. Remove excess topsoil not being reused from site.
	3. VIBRO-COMPACTION
		1. Vibro-compact substrates below footing bearing surfaces for footings as indicated on Drawings as “VF” for vibro-compacted footings before excavating site.
		2. Densify existing subsoils with relative density rating of compact to dense to attain relative density rating of very dense.
			1. Densify subsoils to depth of 20 feet.
		3. Densification Equipment:
			1. Depth Vibrator: Poker type with follower tubes with visible marking every 12 inches to enable insertion depth measurement.
			2. Motion: radial in horizontal plane.
			3. Eccentric Force: 38 tons.
			4. Data Acquisition System: Record amps or pressure of the vibrator motor over time and depth.
		4. Perform densification in presence of Geotechnical Engineer directly under each footing with vibrator inserted in grid pattern at maximum 6 feet on center.
			1. Arrange compaction grid for each footing for maximum number of insertion points and with outermost insertion points within the bearing area of footings.
			2. Adjust compaction grid arrangement and spacing as directed by Geotechnical Engineer to achieve required densification.
		5. Insert vibrator to maximum specified depth. Densify soils for 30 seconds or other time as directed by Geotechnical Engineer. Withdraw vibrator in 12 inch increments and repeat densification at each increment.
			1. When subsurface obstruction prevents vibrator insertion to specified depth, request instructions from Geotechnical Engineer to compensate for obstruction.
		6. Tolerances:
			1. Maximum Deviation from Center of Completed Compaction: 8 inches from indicated postion.
			2. Maximum Deviation from Vertical: 4 degrees during vibrator insertion.
	4. DEWATERING
		1. Remove ground water by pumping or other methods to prevent the softening of surfaces exposed by excavation. Prevent removal of fines from subsoil.
		2. Lower ground water levels within excavation areas 12 inches, minimum below bottom of excavations. Relieve hydrostatic pressure in pervious zones below subgrade elevation in layered soils to prevent uplift.
		3. Place dewatering system in operation before excavating below ground water level. Operate system continuously, 24 hours per day, 7 days per week, until construction work below existing ground water levels is complete.
	5. SUBSOIL EXCAVATING
		1. Excavate subsoil required for foundations, construction operations, and other Work.
		2. Slope banks to angle of repose or less, until shored.
		3. Excavation shall not interfere with 45 degree bearing splay of any foundation.
		4. Correct unauthorized excavation at no extra cost to Owner.
		5. Fill over-excavated areas under structure bearing surfaces in accordance with direction by Architect/Engineer.
		6. Stockpile subsoil in area designated on site. Remove excess subsoil not being reused from site.
	6. PROOFROLLING FOOTING BEARING SURFACES
		1. After excavating to required elevations, test subgrade for degree of compaction for existing soils.
		2. Proofroll subgrade in presence of soils engineer, using Dynapac CA-25 vibratory roller or other means approved by soils engineer to 98 percent of maximum dry density.
		3. Adjust frequency and number of passes as directed by soils engineer.
		4. Verify compaction attained after proofrolling to depth of 5 feet below compaction surface.
		5. Provide additional proofrolling as directed by soils engineer to attain specified compaction.
	7. PROOFROLLING SLAB-ON-GRADE
		1. After excavating to required elevations, proofroll subgrade in presence of soils engineer, using Dynapac CA-25 vibratory roller or other means approved by soils engineer to 95 percent of maximum dry density.
		2. Adjust frequency and number of passes as directed by soils engineer.
		3. Perform in place compaction tests in accordance with ASTM D1556 or ASTM D6938 in number, frequency, and at elevations as directed by soils engineer.
	8. BACKFILLING
		1. Backfill areas to contours and elevations. Use unfrozen and unsaturated materials.
		2. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
		3. Place and compact fill materials in continuous layers not exceeding 6 inches loose depth
		4. Place and compact soil material in continuous layers not exceeding 8 inches loose depth.
		5. Maintain optimum moisture content of backfill materials to attain required compaction density.
		6. Backfill against supported foundation walls. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
		7. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise.
	9. PLACING TOPSOIL
		1. Place topsoil in areas where seeding is scheduled.
		2. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.
		3. Remove large stone, roots, grass, weeds, debris, and foreign material while spreading.
		4. Lightly compact placed topsoil.
		5. Leave stockpile area and site clean and raked, ready to receive landscaping.
	10. SEEDING
		1. Do not apply seed when wind velocity is grater than 5 mph.
		2. Apply seed with mechanical spreader at a rate of 4 lb per 1000 sq ft evenly in two intersecting directions.
		3. Rake seed lightly into top 1/8 inch of topsoil. Roll lightly.
		4. Immediately following seeding, apply agricultural mulch to a thickness of 1-1/2 inch loose depth.
		5. Anchor mulch by spraying with asphalt emulsion at rate of 10 to 13 gallons per 1000 square feet. Apply without damaging adjacent structures and plantings.
		6. Apply water with a fine spray immediately after each area has been mulched.
		7. Maintenance:
			1. Mow grass at regular intervals to maintain maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
			2. Neatly trim edges and hand clip where necessary.
			3. Immediately remove clippings after mowing and trimming. Do not let clippings lay in clumps.
			4. Water to prevent grass and soil from drying out.
			5. Control growth
			6. of weeds. Apply herbicides in accordance with manufacturer's instructions.
			7. Immediately reseed areas showing bare spots.
			8. Repair washouts or gullies
	11. TOLERANCES
		1. Top Surface of Exposed Subgrade: Plus or minus one inch.
		2. Top of Topsoil: Plus or minus 1/2 inch.

# END OF SECTION

# SECTION 02782 UNIT PAVERS

**PART 1 GENERAL**

* 1. SUMMARY
		1. Section includes
			1. Clay and brick pavers.
			2. Aggregate setting bed
			3. Sand setting bed and joints.
	2. SYSTEM DESCRIPTION
		1. Paving and Setting Bed: To accommodate pedestrian traffic.
	3. SUBMITTALS
		1. Product Data: Provide data on characteristics of each type paver unit, special shapes, dimensions and geotextile fabric.
		2. Shop Drawings: Indicate on shop drawings, layout of pavers and dimensions of paved areas.
		3. Samples: Submit four samples of brick paver unit illustrating range of color, surface finish, and texture.
	4. QUALIFICATIONS
		1. Paver Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
		2. Installer: Company specializing in performing the work of this section with three years documented experience.
	5. MOCKUP
		1. Size: 100 sq ft, at location as selected.
		2. Install setting bed, pavers, and accessories to pattern indicated.
		3. Show range of shades, color, texture and pattern of pavers.
		4. Mockup may remain as part of the Work.

# PART 2 PRODUCTS

* 1. PAVER MATERIALS
		1. Paver types shall consist of granite, clay, and brick.
		2. Refer to drawings for manufacturer’s names, paver types and sizes.

Will there be any geotextile fabric?

* 1. BASE AND SETTING MATERIALS
		1. Graded Aggregate for Subbase: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 57.
		2. Graded Aggregate for Base: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 6.
		3. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements of ASTM C 33 for fine aggregate.
		4. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.
	2. ACCESSORIES
		1. Geotextile: Non-woven geotextile manufactured from polyester or polypropylene fibers, with a permeability rating 10 times greater than that of soil over which stone is set and an apparent opening size small enough to prevent passage of fines into graded aggregate of base course below.
		2. Cleaning Solution: Type recommended by paver manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

# PART 3 EXECUTION

* 1. EXAMINATION
		1. Verify substrate is ready to support pavers and imposed loads.
		2. Verify subsoil is compacted to 95 percent of maximum density.
		3. Verify gradients and elevations of substrate are correct.
	2. INSTALLATION - AGGREGATE SETTING BED
		1. Spread aggregate over prepared substrate to a total compacted thickness indicated on drawings.
		2. Place aggregate in single layer and compact to 95 percent maximum density.
		3. Level and contour surfaces to elevations and gradients indicated.
		4. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
		5. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
		6. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
	3. INSTALLATION - SAND SETTING BED
		1. Install geotextile fabric over prepared base. Turn perimeter edges up to top of pavers to prevent movement or loss of sand from setting bed.
		2. Spread sand evenly over prepared base to a nominal thickness indicated on drawings.
		3. Dampen and roller compact sand to level surface.
		4. Screed and scarify top 1/2 inch of sand.
		5. Place paver units in patterns as indicated on drawings.
		6. Place half units or special shaped units at edges and interruptions. Maintain tight joints.

Machine saw partial units.

* + 1. Sprinkle sand over surface and sweep into joints. Moisten joints and recover with additional sand until firm joints are achieved. Remove excess sand.
		2. Tamp and level paver units with mechanical plate vibrator until units are firmly bedded, level, and to correct elevation and slope gradient.
	1. FIELD QUALITY CONTROL
		1. Compaction testing will be performed in accordance with ASTM D1557.
		2. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
		3. Frequency of Tests: Minimum one test for every 1,000 sf of base.
	2. CLEANING
		1. Clean soiled surfaces using cleaning solution. Do not harm pavers, joint materials, adjacent surfaces or environment.
		2. Use nonmetallic tools in cleaning operations.
		3. Rinse surfaces with clean water.
		4. Broom clean paving surfaces.
	3. PROTECTION OF FINISHED WORK
		1. Do not permit traffic over unprotected paver surface.

# END OF SECTION

# SECTION 03300

**CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL**

* 1. RELATED DOCUMENTS
		1. Drawings and other Contract Documents, listed in the agreement between the Owner and Contractor, apply to this Section.
	2. SUMMARY
		1. Section Includes:
			1. Formwork, reinforcement and accessories.
			2. Cast-in-place concrete for exterior slabs, foundation walls and footings.
			3. Curing.
			4. Drain pipe.
			5. Waterproofing
	3. DESIGN REQUIREMENTS
		1. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.
	4. SUBMITTALS
		1. Product Data: Indicate admixtures, anchors, curing and finishing materials, drain pipe and cast iron cover, waterproofing.
		2. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
		3. Submit certified copies of mill test report of reinforcement materials analysis.
	5. QUALITY ASSURANCE
		1. Perform cast-in-place concrete work in accordance with ACI 301 and ACI 318.
		2. For wood formwork products furnished for work of this Section, comply with applicable provisions of AF&PA National Design Specifications for Wood Construction.
		3. Perform reinforcing Work in accordance with CRSI - Manual of Standard Practice, ACI 301 and ACI 318.
		4. Detail reinforcement and prepare shop drawings in accordance with ACI 315.
		5. Perform concrete Work in accordance with ACI 301.
		6. Acquire cement and aggregate from one source for Work.
		7. Conform to ACI 305R when concreting during hot weather.
		8. Conform to ACI 306.1 when concreting during cold weather.

Please verify if there are any construction joints.

* 1. DELIVERY, STORAGE, AND HANDLING
		1. Store materials off ground in ventilated and protected manner to prevent deterioration from moisture.

# PART 2 PRODUCTS

* 1. FORM MATERIALS AND ACCESSORIES
		1. Form Materials:
			1. For Surfaces Exposed to View in Final Construction: Plywood PS1, MDO; sound

undamaged sheets with clean true edges.

* + - 1. For Other Locations: Contractors option.
		1. Form Ties: Snap-off cone type.
		2. Form Release Agent: Colorless mineral oil which will not stain concrete or impair natural bonding characteristics of coating intended for use on concrete.
		3. Formed Construction Joints for Slab-on-Grade: Extruded plastic, tongue and groove type profile, knockout holes to receive dowelling.
	1. REINFORCEMENT MATERIALS
		1. Reinforcing Steel: ASTM A615, 60 ksi (414 MPa) yield grade; #4 steel bars, unfinished.

Refer to drawings for additional information.

* + 1. Stirrups Steel: ASTM A82, unfinished.
		2. Welded Steel Wire Fabric: ASTM A185 Plain type, in flat sheets, refer to drawings.
	1. REINFORCEMENT ACCESSORY MATERIALS
		1. Tie Wire: Minimum 16 gage annealed type.
		2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for support of reinforcing.
	2. REINFORCEMENT FABRICATION
		1. Fabricate concrete reinforcing in accordance with ACI 318 and CRSI.
		2. Weld reinforcement in accordance with AWS D1.4.
		3. Locate reinforcement splices not indicated drawings, at point of minimum stress.
	3. CONCRETE MATERIALS
		1. Cement: ASTM C150, Normal-Type I Portland type and Type IA - Air Entraining, unless indicated otherwise.
		2. Fine and Coarse Aggregates: ASTM C33.
		3. Water: Clean and not detrimental to concrete.
		4. Air Entrainment Admixture: ASTM C260.
		5. Bonding Agent: Latex emulsion.
	4. ACCESSORIES
		1. Vapor Retarder: 6 mil thick fabric reinforced plastic film; type recommended for below grade application.
		2. Slab Edge Joint Filler: ASTM D1751, Premolded asphaltic board, 1/2 inch thick, unless indicated otherwise.
		3. Bonding Agent: Polymer resin emulsion.
	5. COMPOUNDS, HARDENERS AND SEALERS
		1. Curing Compound: Combination curing agent, hardener and sealer; Ashford Formula manufactured by Curecrete Chemical Company.
	6. CONCRETE MIX
		1. Mix and deliver concrete in accordance with ASTM C94, Alternative 2.
		2. Select proportions for normal weight concrete in accordance with ACI 301 field test data.
		3. Concrete Strengths, unless indicated otherwise on drawings:
			1. 3,000 psi for footing.
			2. 4,000 psi for walls and slabs.
		4. Add air entraining agent to concrete mix for concrete work exposed to exterior to attain 4 to 6 percent air by volume.
		5. Use of calcium chloride is prohibited.
		6. Use accelerating admixtures in cold weather only when approved. Use of admixtures will not relax cold weather placement requirements.
		7. Use set retarding admixtures during hot weather only when approved by Architect.
	7. DRAIN PIPE
		1. PVC drain pipe and sleeves and cast iron pipe cover.
		2. Refer to drawings for additional information.
	8. SHEET WATERPROOFING
		1. Waterproofing Membrane:60 mils thick, top surface of cross laminated polyethylene and an under surface of rubberized asphalt compound. Self adhering capabilities; manufactured by Grace & Co.; Bituthane 3000 Series..

# PART 3 EXECUTION

* 1. EXAMINATION
		1. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions are as indicated on Drawings and shop drawings.
		2. Verify requirements for concrete cover over reinforcement.
		3. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.
	2. PREPARATION
		1. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.
		2. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
	3. INSTALLATION - FORMWORK
		1. Formwork - General:
			1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
			2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
			3. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
			4. Complete wedging and bracing before placing concrete.
		2. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.
		3. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
		4. Obtain Architect’s approval before framing openings in structural members that are not indicated on Drawings.
		5. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view.

Do not patch formwork.

* 1. APPLICATION - FORM RELEASE AGENT
		1. Apply form release agent on formwork in accordance with manufacturer's recommendations.
		2. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
		3. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
		4. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer’s specifications. Do not coat forms for concrete indicated to receive “scored finish”. Apply form coatings before placing reinforcing steel.
	2. INSERTS, EMBEDDED COMPONENTS, AND OPENINGS
		1. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
		2. Install concrete accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
		3. Install waterstops continuous without displacing reinforcement.
		4. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
		5. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
		6. Place formed construction joint device in floor slab pattern pouring sequence.
		7. Place joint filler at perimeter of floor slab where indicated.
		8. Form Ties:
			1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
			2. Place ties at least 1 inch away from finished surface of concrete.
			3. Leave inner rods in concrete when forms are stripped.
			4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.
		9. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
		10. Construction Joints:
			1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
			2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
			3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
			4. Arrange joints in continuous line straight, true and sharp.
		11. Embedded Items:
			1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops, and other features.
			2. Do not embed wood or uncoated aluminum in concrete.
			3. Obtain installation and setting information for embedded items furnished under other Specification sections.
			4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
			5. Verify conduits and pipes, including those made of coated aluminum, meet

requirements of ACI 318, Section 6.3.

* + 1. Screeds:
			1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
			2. Slope slabs to drain where required or as shown on Drawings.
			3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.
		2. Screed Supports:
			1. For concrete over waterproof membranes and vapor barrier membranes, use cradle, pad or base type screed supports which will not puncture membrane.
			2. Staking through membrane is not permitted.
		3. Cleanouts and Access Panels:
			1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
			2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.
	1. REINFORCEMENT PLACEMENT
		1. Place, support and secure reinforcement against displacement. Do not deviate from required position.
		2. Do not displace or damage vapor retarder.
		3. Accommodate placement of formed openings.
	2. PLACING CONCRETE
		1. Place concrete in accordance with ACI 301 and ACI 318.
		2. Notify Architect minimum 24 hours prior to commencement of operations.
		3. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, are not disturbed during concrete placement.
		4. Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches and seal watertight. Repair damaged vapor retarder with vapor retarder material, lap over damaged areas minimum 6 inches and seal watertight.
		5. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.
		6. Separate slabs-on-grade from vertical surfaces with joint filler, extended from bottom of slab to within 1/4 inch of finished slab surface.
		7. Place joint filler in floor slab pattern placement sequence. Set top to required elevations.

Secure to resist movement by wet concrete.

* + 1. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07900 for finish joint sealer requirements.
		2. Install construction joint devices in coordination with floor slab pattern placement sequence.

Set top to required elevations. Secure to resist movement by wet concrete.

* + 1. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
		2. Apply sealants in joint devices in accordance with Section 07900.
		3. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
		4. Place concrete continuously between predetermined expansion, control, and construction joints. Do not interrupt successive placement; do not permit cold joints to occur.
		5. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut 1 inch into depth of slab.
		6. Screed slabs on grade level, maintaining surface flatness of Ff of 20, maximum 1/4 inch in 10 feet. Slope as indicated on drawings.
	1. FORM REMOVAL
		1. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
		2. Remove formwork progressively and in accordance with code requirements.
	2. FORM CLEANING
		1. Clean forms as erection proceeds, to remove foreign matter within forms.
		2. Clean formed cavities of debris prior to placing concrete.
		3. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
		4. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.
	3. FINISHING
		1. Finish concrete surfaces in accordance with ACI 301 and ACI 302.1R.
		2. Finish slabs in accordance with ACI 302.1R
		3. Maintain surface flatness, with maximum variation of 3/16 inch in 10 feet.
	4. CURING AND PROTECTION
		1. Apply curing compound on floor surfaces in accordance with manufacturer's instructions.
		2. Immediately after placement, protect concrete from premature drying.
		3. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
	5. FORMED SURFACES
		1. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.
	6. PATCHING
		1. Allow Architect to inspect concrete surfaces immediately upon removal of forms.
		2. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect upon discovery.
		3. Patch imperfections as directed by Architect and in accordance with ACI 301.
	7. DEFECTIVE CONCRETE
		1. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
		2. Repair or replacement of defective concrete will be determined by Architect.
		3. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.
	8. ERECTION TOLERANCES
		1. Construct formwork to maintain tolerances required by ACI 301.
		2. Tolerances: Construct formwork to produce completed concrete surfaces within construction tolerances specified in ACI 117.
	9. DRAIN PIPE INSTALLATION:
		1. Install drain pipe and sleeves per detail s and locations on drawings. Connect cast iron cover and secure in-place.
	10. WATERPROOFING INSTALLATION
		1. Install waterproofing in accordance with manufacturer’s recommendations. Run waterproofing horizontally and vertically as indicated.
		2. Prior to installation inspect concrete substrate. Remove all loose materials and irregularities and protrusions.

# END OF SECTION

# SECTION 04065 MASONRY MORTAR AND GROUT

**PART 1 GENERAL**

* 1. SUMMARY
		1. Section includes:
			1. Mortar for masonry.
	2. SUBMITTALS
		1. Samples: Submit two samples of mortar, illustrating mortar color and color range.
		2. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions.
		3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
	3. QUALITY ASSURANCE
		1. Perform Work in accordance with ACI 530 Building Code Requirements for Masonry Structures and ACI 530.1 Specification for Masonry Structures.
	4. ENVIRONMENTAL REQUIREMENTS
		1. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
		2. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

# PART 2 PRODUCTS

* 1. MATERIALS
		1. Portland Cement: ASTM C150, Type I, gray color.
		2. Mortar Aggregate: ASTM C144, standard masonry type.
		3. Hydrated Lime: ASTM C207, Type S.
		4. Grout Aggregate: ASTM C404, fine coarse.
		5. Water: Clean and potable.
		6. Mortar Color: Mineral oxide pigment; color as selected.
			1. Solomon Colors; SGS Mortar Colors.
			2. Davis Colors; True Tone Mortar.
			3. Lanxess Corp.; Bayferrox Iron Oxide Pigments.
			4. Substitutions: In Accordance with Contract Documents.
		7. Mortar Type: Ready Mixed ASTM C1142: Site Mixed ASTM C270.
		8. Calcium chloride is not permitted.
	2. MIXES
		1. Mortar Mixes:
			1. Type S with gray cement.
		2. Mortar Mixing:
			1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed

for immediate use.

* + - 1. Achieve uniformly damp sand immediately before the mixing process.
			2. Add mortar color. Provide uniformity of mix and coloration.
			3. Re-temper only within two hours of mixing.

# PART 3 EXECUTION

* 1. INSTALLATION
		1. Install mortar and grout in accordance with Section 04810.

# END OF SECTION

# SECTION 04810

**UNIT MASONRY ASSEMBLIES**

**PART 1 GENERAL**

* 1. SUMMARY
		1. Section includes:
			1. Brick units.
			2. Concrete masonry units.
			3. Precast concrete cap and granite cap/
			4. Anchorage, and accessories.
	2. SUBMITTALS
		1. Shop Drawings: details of precast concrete cap and granite cap, methods of anchoring. Also details and attachment methods of stainless steel cap and PVC ends
		2. Product Data: Submit data for wall ties, anchors and other accessories. Also data on PVC
		3. Samples: Submit four samples of face brick units, precast concrete cap and granite cap to illustrate color, texture and extremes of color range.
		4. Samples: One set of two samples of precast concrete cap and granite cap, 12 x 12 inches, indicating range of color for selection. Also samples of stainless steel and PVC.
		5. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
	3. QUALITY ASSURANCE
		1. Perform Work in accordance with ACI 530 Building Code Requirements for Masonry Structures and ACI 530.1 Specification for Masonry Structures.
	4. QUALIFICATIONS
		1. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
	5. MOCK-UP
		1. Construct a masonry wall into a panel sized 4 feet long by 2 feet high, which includes CMU, brick, and granite cap, mortar and accessories, structural backup, and accessories.
		2. Locate where directed.
		3. Mock-up may remain as part of the Work.
	6. PRE-INSTALLATION MEETING
		1. Convene minimum one week prior to commencing Work of this section.
	7. DELIVERY, STORAGE, AND HANDLING
		1. Accept units on site. Inspect for damage.
		2. Maintain secure storage area for all materials throughout construction period.
	8. ENVIRONMENTAL REQUIREMENTS
		1. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
		2. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.
	9. COORDINATION
		1. Coordinate the masonry work with paver installation.

# PART 2 PRODUCTS

* 1. BRICK UNITS
		1. Refer to drawings for manufacturer, type and size of brick.
		2. Face brick: ASTM C216, Grade SW.
		3. Special Brick Shape: Shaped to profile indicated on Drawings.
	2. STANDARD CONCRETE MASONRY UNITS
		1. Hollow Load Bearing Concrete Masonry Units (CMU): ASTM C90; normal weight.
		2. Solid Load-Bearing Concrete Masonry Units (CMU): ASTM C90; normal weight.
		3. Hollow and Solid Non-Load Bearing Concrete Masonry Units (CMU): ASTM C129; normal weight.
	3. PRECAST CONCRETE CAP
		1. Precast Concrete Cap: Type, size and reinforcing as indicated, 3,000 psi strength at 28 days.
		2. Stainless steel cap: ASTM A240 or A666, Type 316, finish as selected.
		3. PVC Ends: Exterior heavy duty type as detailed on drawings. UV resistant, color as selected.
		4. Refer to drawings for additional information
	4. GRANITE CAP
		1. Refer to drawings for additional information on granite cap.
	5. WALL TIES
		1. Manufacturers:
			1. Dur-O-Wal, Inc.
			2. Hohmann & Barnard Inc.
			3. Heckmann Building Products Inc.
			4. Wire-Bond.
			5. Substitutions: In accordance with Contract Documents.
		2. Wall Ties: ASTM A82; steel wire; 0.188 inch diameter, formed triangular wire tie, length to suit application with 14 gage formed steel adjustable anchor; ASTM A153/A153M hot dip galvanized.
			1. Dur-O-Wal, Inc.; DA210 anchor with DA700 Series Ties.
			2. Hohmann & Barnard Inc.; DW-10HS anchor with Vee Wall Tie.
			3. Heckmann Building Products Inc.; 315-D anchor with 316 Series Wire Tie.
	6. MORTAR AND GROUT
		1. Mortar and Grout: As specified in Section 04065.
	7. ACCESSORIES
		1. Manufacturers:
			1. Dur-O-Wal, Inc.
			2. Hohmann & Barnard Inc.
			3. Heckmann Building Products Inc.
			4. Wire-Bond.
			5. Substitutions: In accordance with Contract Documents.
		2. Concrete Masonry Preformed Control Joints: Rubber, with corner and tee accessories, fused joints.
			1. Dur-O-Wal, Inc.; Rubber Control Joint Series.
			2. Hohmann & Barnard Inc.; RS Rubber Standard Rubber Control Joint.
			3. Heckmann Building Products Inc.; 352 Series Rubber Control Joint Anchor.
			4. Wire-Bond; Rubber Control Joint.
			5. Substitutions: In accordance with Contract Documents.
		3. Brick Masonry Preformed Control Joints: Closed cell neoprene, thickness to match width of head joints, depth to suit wythe thickness, conforming to ASTM D1056.
			1. Dur-O-Wal, Inc.; DA2015.
			2. Hohmann & Barnard Inc.; #NS Closed Cell Neoprene Sponge.
			3. Wire-Bond.; 3000 Vertical, closed cell neoprene.
		4. Preformed Control Joints: Rubber, Neoprene or Polyvinyl chloride material. Provide with corner and tee accessories, heat fused joints.
		5. Joint Filler: Closed cell polyvinyl chloride, polyethylene, polyurethane or rubber; oversized 50 percent to joint width; self expanding by maximum lengths.
		6. Cleaning Solution: Acidic, not harmful to masonry work or adjacent materials.
			1. Prosoco Inc.; Sure Klean Vana Trol masonry cleaner.
			2. Diedrich Technologies, Inc.; 222 Cast Stone Burnished Masonry Cleaner.
			3. Diedrich Technologies, Inc.; Specialty Masonry Cleaner.
			4. Chargar Corporation; AC-3 Cleaner.
	8. SOURCE QUALITY CONTROL
		1. Test brick efflorescence in accordance with ASTM C67. Brick rated greater than “slightly effloresced” is not acceptable.

# PART 3 EXECUTION

* 1. EXAMINATION
		1. Verify that field conditions are acceptable and are ready to receive work.
		2. Verify items provided by other sections of work are properly sized and located.
		3. Verify that built-in items are in proper location, and ready for roughing into masonry work.
	2. PREPARATION
		1. Direct and coordinate placement of metal anchors supplied to other sections.
		2. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.
	3. INSTALLATION
		1. Establish lines, levels, and coursing indicated. Protect from displacement.
		2. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.
		3. Coursing of Concrete Masonry Units:
			1. Bond: Running.
			2. Coursing: One unit and one mortar joint to equal 8 inches.
			3. Mortar Joints: Concave.
		4. Coursing of Brick Units:
			1. Bond: Running and Soldier where indicated.
			2. Coursing: Three units and three mortar joints to equal 8 inches.
			3. Mortar Joints: Concave.
		5. Placing And Bonding:
			1. Lay solid masonry units in full bed of mortar, with full head joints.
			2. Lay hollow masonry units with face shell bedding on head and bed joints.
			3. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
			4. Remove excess mortar as work progresses.
			5. Interlock intersections and external corners.
			6. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
			7. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
			8. Place precast concrete caps and granite caps as work progresses; mortar into place.
		6. Joint Reinforcement And Anchorage - Masonry Veneer:
			1. Install horizontal joint reinforcement 16 inches oc.
			2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches both sides of opening.
			3. Place joint reinforcement continuous in first and second joint below top of walls.
			4. Lap joint reinforcement ends minimum 6 inches.
			5. Attach wall ties to masonry backup horizontal joint reinforcement to bond veneer at maximum 16 inches oc vertically and 16 inches oc horizontally.
			6. Reinforce joint corners and intersections with strap anchors 16 inches oc.
	4. ERECTION TOLERANCES
		1. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.
		2. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
		3. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
		4. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
		5. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
	5. FIELD QUALITY CONTROL
		1. Brick Units: Test each type in accordance with ASTM C67, 5 random units for each 50,000 units installed.
		2. Concrete Masonry Units: Test each type in accordance with ASTM C140.
	6. CLEANING
		1. Remove excess mortar and mortar smears as work progresses.
		2. Replace defective mortar. Match adjacent work.
		3. Clean soiled surfaces with cleaning solution.
		4. Use non-metallic tools in cleaning operations.
	7. PROTECTION OF FINISHED WORK
		1. Protect exposed external corners subject to damage.
		2. Protect base of walls from mud and mortar splatter.
		3. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar.
		4. Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.

# END OF SECTION

# SECTION 99999

# COORDINATION OF CONSTRUCTION ACTIVITIES

The successful bidder is expected to coordinate construction activities with individuals performing services outside of this bid. These areas include; installation of electric and placement of lighting fixtures, installation of bronze eagle and bas relief wall plaques. Other areas of coordination may be required.

**END OF TECHNICAL SPECIFICATIONS**