

# Project Manual

Bid Package 03: Foundation



COLLEGE OF  
**Osteopathic Medicine**  
AT THE CHEROKEE NATION

Tahlequah, Oklahoma

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March 20, 2019





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## LEGEND

First Column:	Current Date for Section
Second Column:	Checked Indicates Section is Included in Current Issue
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## ISSUES

<b>Bid Package 01, Demolition</b>	<b>2019-01-18</b>	
<b>Addendum No. 01</b>	<b>2019-02-08</b>	
<b>Bid Package No. 02, Rough Grading</b>	<b>2019-02-08</b>	
<b>Bulk Steel Package</b>	<b>2019-03-15</b>	<b>Not for Construction</b>
<b>Bid Package No. 03, Foundation</b>	<b>2019-03-20</b>	

### NOTE FOR REVISED SPECIFICATION SECTIONS

1. DELETED INFORMATION IS INDICATED BY A STRIKETHROUGH (IE, ~~THIS IS DELETED~~).
2. NEW INFORMATION IS INDICATED BY A DOUBLE UNDERLINE (IE, THIS IS ADDED).
3. ALL REVISED INFORMATION IS FURTHER IDENTIFIED BY A HEAVY VERTICAL LINE TO THE RIGHT OF ALL REVISIONS IN EACH INDIVIDUAL SPECIFICATION SECTION (REFER TO HEAVY BOLD LINE TO THE RIGHT FOR AN EXAMPLE).

## VOLUME 1

### DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

	<input type="checkbox"/>	00 1115	Invitation to Bid
	<input type="checkbox"/>	00 2113	Instructions to Bidders
2019-02-08	<input type="checkbox"/>	00 3100	Available Project Information
	<input type="checkbox"/>	00 4100	Bid Form
	<input type="checkbox"/>	00 5200	Agreement Form
	<input type="checkbox"/>	00 6100	Bonds
2019-02-08	<input type="checkbox"/>	00 7200	General Conditions
	<input type="checkbox"/>	00 7300	Supplementary Conditions

### DIVISION 01 - GENERAL REQUIREMENTS

	<input type="checkbox"/>	01 0500	Design Selections
	<input type="checkbox"/>	01 0510	Exterior Design Selections
	<input type="checkbox"/>	01 0520	Interior Design Selections
	<input type="checkbox"/>	01 1000	Summary

**17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-03-15**

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	<input type="checkbox"/>	01 2100	Allowances
2019-02-08	<input type="checkbox"/>	01 2200	Unit Prices
2019-02-08	<input type="checkbox"/>	01 2300	Alternates
2019-02-08	<input type="checkbox"/>	01 2500	Substitution Procedures
2019-02-08	<input type="checkbox"/>	01 2600	Contract Modification Procedures
2019-02-08	<input type="checkbox"/>	01 2900	Payment Procedures
2019-02-08	<input type="checkbox"/>	01 3100	Project Management and Coordination
2019-02-08	<input type="checkbox"/>	01 3200	Construction Progress Documentation
	<input type="checkbox"/>	01 3233	Photographic Documentation
	<input type="checkbox"/>	01 3300	Submittal Procedures
	<input type="checkbox"/>	01 4000	Quality Requirements
	<input type="checkbox"/>	01 4200	References
2019-02-08	<input type="checkbox"/>	01 4323	Special Inspection
2019-02-08	<input type="checkbox"/>	01 4339	Visual Mock-Up Requirements
2019-02-08	<input type="checkbox"/>	01 4516	Field Test for Water Leakage
	<input type="checkbox"/>	01 4540	Testing Mock-Up for Building Enclosure Systems
2019-02-08	<input type="checkbox"/>	01 5000	Temporary Facilities and Controls
2019-02-08	<input type="checkbox"/>	01 6000	Product Requirements
2019-02-08	<input type="checkbox"/>	01 7300	Execution
2019-02-08	<input type="checkbox"/>	01 7419	Construction Waste Management and Disposal
	<input type="checkbox"/>	01 7420	LEED Construction Waste Management and Disposal
2019-02-08	<input type="checkbox"/>	01 7700	Closeout Procedures
2019-02-08	<input type="checkbox"/>	01 7823	Operations and Maintenance Data
2019-02-08	<input type="checkbox"/>	01 7839	Project Record Documents
2019-02-08	<input type="checkbox"/>	01 7900	Demonstration and Training
	<input type="checkbox"/>	01 7910	Demonstration and Training
2019-02-08	<input type="checkbox"/>	01 8111	Sustainable Construction Requirements
	<input type="checkbox"/>	01 8112	LEED Construction Requirements
	<input type="checkbox"/>	01 8113	LEED Construction Requirements for New Construction and Major Renovations
	<input type="checkbox"/>	01 8123	LEED Construction Requirements for Commercial Interiors
	<input type="checkbox"/>	01 8133	LEED Construction Requirements for Core and Shell Development
	<input type="checkbox"/>	01 8143	LEED Construction Requirements for Schools
2019-02-08	<input type="checkbox"/>	01 9113	General Commissioning Requirements

**DIVISION 02 - EXISTING CONDITIONS**

2019-01-18	<input type="checkbox"/>	02 1113	Selective Site Demolition
		02 1116	Building Demolition
	<input type="checkbox"/>	02 4119	Selective Demolition

**DIVISION 03 - CONCRETE**

	<input type="checkbox"/>	03 0150	Concrete Patching
2019-03-20	<input checked="" type="checkbox"/>	03 1000	Concrete Forming and Accessories
	<input type="checkbox"/>	03 1100	Concrete Forming
	<input type="checkbox"/>	03 1500	Concrete Accessories
2019-03-20	<input checked="" type="checkbox"/>	03 2000	Concrete Reinforcing

2019-03-20	<input checked="" type="checkbox"/>	03 3000	Cast-In-Place Concrete
	<input type="checkbox"/>	03 3500	Concrete Finishing
	<input type="checkbox"/>	03 3543	Polished Concrete
	<input type="checkbox"/>	03 3600	Special Concrete Finishes
	<input type="checkbox"/>	03 3800	Post-Tensioned Concrete
	<input type="checkbox"/>	03 4100	Plant-Precast Structural Concrete
	<input type="checkbox"/>	03 4500	Architectural Precast Concrete
	<input type="checkbox"/>	03 4713	Tilt-Up Concrete
	<input type="checkbox"/>	03 4900	Glass-Fiber Reinforced Precast Concrete (GFRC)
	<input type="checkbox"/>	03 5216	Lightweight Insulating Concrete
	<input type="checkbox"/>	03 5300	Concrete Toppings
	<input type="checkbox"/>	03 5416	Hydraulic Cement Underlayment

#### DIVISION 04 - MASONRY

	<input type="checkbox"/>	04 2100	Masonry Veneer
2019-03-20	<input checked="" type="checkbox"/>	04 2200	Concrete Unit Masonry
	<input type="checkbox"/>	04 2300	Glass Unit Masonry
	<input type="checkbox"/>	04 4200	Exterior Stone Cladding
	<input type="checkbox"/>	04 4216	Steel Supported Stone Cladding
	<input type="checkbox"/>	04 7200	Cast Stone Masonry
	<input type="checkbox"/>	04 7500	Adhered Masonry Veneer

#### DIVISION 05 – METALS

2019-03-15	<input type="checkbox"/>	05 1000	Structural Steel
	<input type="checkbox"/>	05 1200	Structural Steel Framing
2019-03-15	<input type="checkbox"/>	05 1213	Architecturally Exposed Structural Steel (AESS) Framing
	<input type="checkbox"/>	05 1636	Barrier Cables
	<input type="checkbox"/>	05 2100	Steel Joists Framing
2019-03-15	<input type="checkbox"/>	053000	Metal Decking
	<input type="checkbox"/>	05 3100	Steel Decking
	<input type="checkbox"/>	05 3123	Steel Roof Deck System
	<input type="checkbox"/>	05 3133	Permanent Metal Forming
	<input type="checkbox"/>	05 4000	Cold-Formed Steel Framing
	<input type="checkbox"/>	05 4300	Slotted Channel Framing
2019-03-15	<input type="checkbox"/>	05 5000	Metal Fabrications
2019-03-15	<input type="checkbox"/>	05 5100	Metal Stairs
	<input type="checkbox"/>	05 5213	Pipe and Tube Railings
	<input type="checkbox"/>	05 5300	Metal Gratings
	<input type="checkbox"/>	05 5813	Ornamental Metal Column Covers
2019-03-15	<input type="checkbox"/>	05 6000	Metal Equipment Support System
	<input type="checkbox"/>	05 7000	Ornamental Metal
	<input type="checkbox"/>	05 7300	Ornamental Handrails and Railings

#### DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

	<input type="checkbox"/>	06 1053	Miscellaneous Rough Carpentry
	<input type="checkbox"/>	06 1643	Exterior Gypsum Sheathing

<input type="checkbox"/>	06 4023	Interior Architectural Woodwork
<input type="checkbox"/>	06 4223	Slatwall Paneling
<input type="checkbox"/>	06 6100	Simulated Stone Fabrications
<input type="checkbox"/>	06 6400	Plastic (FRP) Paneling
<input type="checkbox"/>	06 6413	Translucent Resin Panel Fabrications
<input type="checkbox"/>	06 6419	Simulated Stone Paneling
<input type="checkbox"/>	06 6713	Louvered Light Diffusers
<input type="checkbox"/>	06 6813	Plastic Gratings

**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

	<input type="checkbox"/>	07 0151	Preparation for Re-Roofing
	<input type="checkbox"/>	07 0152	Patching of Existing Roofing
	<input type="checkbox"/>	07 1114	Asphalt Mastic Dampproofing
	<input type="checkbox"/>	07 1328	Pre-Applied Sheet Waterproofing
	<input type="checkbox"/>	07 1352	Modified Bituminous Sheet Waterproofing
	<input type="checkbox"/>	07 1413	Hot Fluid-Applied Rubberized Asphalt Waterproofing
	<input type="checkbox"/>	07 1416	Cold Fluid Applied Waterproofing
	<input type="checkbox"/>	07 1616	Crystalline Waterproofing
	<input type="checkbox"/>	07 1700	Bentonite Waterproofing
	<input type="checkbox"/>	07 1800	Traffic Coatings
	<input type="checkbox"/>	07 1900	Water Repellents
	<input type="checkbox"/>	07 2100	Thermal Insulation
	<input type="checkbox"/>	07 2119	Spray-Applied Foam Insulation
	<input type="checkbox"/>	07 2400	EIFS
	<input type="checkbox"/>	07 2423	DEFS for Soffits
	<input type="checkbox"/>	07 2500	Mechanically Fastened Air and Water Barriers
2019-03-20	<input checked="" type="checkbox"/>	07 2600	Under-Slab Vapor Retarder
	<input type="checkbox"/>	07 2613	Rubberized Asphalt Vapor Retarders
	<input type="checkbox"/>	07 2617	Below Slab Vapor Retarders
	<input type="checkbox"/>	07 2713	Self-Adhering Air and Water Barriers
	<input type="checkbox"/>	07 3113	Asphalt Shingles
	<input type="checkbox"/>	07 3127	Simulated Slate Roofing
	<input type="checkbox"/>	07 3200	Roof Tiles
	<input type="checkbox"/>	07 4114	Metal Roof Panels
	<input type="checkbox"/>	07 4213	Formed Metal Wall Panels
	<input type="checkbox"/>	07 4229	Terra Cotta Wall Panels
	<input type="checkbox"/>	07 4243	Composite Metal Wall Panels
	<input type="checkbox"/>	07 4263	Insulated-Core Metal Wall Panels
	<input type="checkbox"/>	07 5013	Single-Ply Membrane Roofing
	<input type="checkbox"/>	07 5216	Modified Bituminous Membrane Roofing
	<input type="checkbox"/>	07 5556	Fluid-Applied Protected Membrane Roofing
	<input type="checkbox"/>	07 5563	Vegetated Protected Membrane Roofing
	<input type="checkbox"/>	07 6200	Flashing and Sheet Metal
	<input type="checkbox"/>	07 7200	Roof Accessories
	<input type="checkbox"/>	07 7600	Roof Pavers and Pedestal Assemblies
	<input type="checkbox"/>	07 8116	Cementitious Fireproofing
	<input type="checkbox"/>	07 8123	Intumescent Mastic Fireproofing
	<input type="checkbox"/>	07 8413	Penetration Firestopping
	<input type="checkbox"/>	07 8446	Fire-Resistive Joint Firestopping

- 07 9100 Preformed Joint Seals
- 07 9200 Joint Sealants
- 07 9500 Expansion Control

**DIVISION 08 - OPENINGS**

- 08 0610 Door Schedule
- 08 1113 Hollow Metal Doors and Frames
- 08 1114 Interior Hollow Metal Frames
- 08 1170 Steel Fire Door and Frame Assembly
- 08 1216 Interior Aluminum Frames
- 08 1416 Prefinished Flush Wood Doors
- 08 1433 Stile and Rail Wood Doors
- 08 3113 Access Doors and Frames
- 08 3213 Sliding Aluminum-Framed Glass Doors
- 08 3313 Coiling Counter Doors
- 08 3323 Overhead Coiling Doors
- 08 3326 Overhead Coiling Grilles
- 08 3338 Interior Side Coiling Grilles
- 08 3470 Acoustical Metal Door, Window, and Frame Assemblies
- 08 3513 Folding Doors
- 08 3515 Accordion Folding Fire Doors
- 08 3613 Sectional Overhead Doors
- 08 4110 Interior Storefront
- 08 4127 Exterior All-Glass Entrances and Storefronts
- 08 4128 Interior All-Glass Entrances and Storefronts
- 08 4213 Exterior Aluminum Entrance Doors
- 08 4216 Interior Aluminum Entrance Doors
- 08 4229 Automatic Entrances
- 08 4233 Revolving Entrance Doors
- 08 4243 Medical Specialty Sliding Entrances
- 08 4400 Glazed Aluminum Framing Systems
- 08 4426 Structural Glass Curtainwall
- 08 4500 Translucent Insulating Panel Assemblies
- 08 5113 Aluminum Windows
- 08 5619 Sliding Pass Windows
- 08 5656 Bullet-Resistive Windows
- 08 6200 Unit Skylights
- 08 6300 Metal-Framed Skylights
- 08 7100 Door Hardware
- 08 7121 Interior Automatic Door Operators for Staff Use
- 08 7122 Automatic Door Operators for the Disabled
- 08 8000 Glazing
- 08 8300 Unframed Mirrored Glazing
- 08 8816 Between Glass Blinds Units
- 08 8840 Switchable Privacy Glass Units
- 08 9100 Wall Louvers

## DIVISION 09 - FINISHES

<input type="checkbox"/>	09 0565	Floor Preparation for Renovation Work
<input type="checkbox"/>	09 0600	Room Finish Schedule
<input type="checkbox"/>	09 2300	Gypsum Plastering
<input type="checkbox"/>	09 2400	Portland Cement Plastering
<input type="checkbox"/>	09 2600	Veneer Plastering
<input type="checkbox"/>	09 2613	Gypsum Veneer Plastering
<input type="checkbox"/>	09 2713	GFRG Fabrications
<input type="checkbox"/>	09 2900	Gypsum Board Assemblies
<input type="checkbox"/>	09 3000	Tiling
<input type="checkbox"/>	09 5113	Acoustical Panel Ceilings
<input type="checkbox"/>	09 5133	Acoustical Metal Pan Ceilings
<input type="checkbox"/>	09 5135	Snap-in Metal Pan Ceilings
<input type="checkbox"/>	09 5423	Linear Metal Ceilings
<input type="checkbox"/>	09 5436	Suspended Decorative Grids
<input type="checkbox"/>	09 6115	Concrete Floor Sealer
<input type="checkbox"/>	09 6116	Liquid Floor Hardener
<input type="checkbox"/>	09 6119	Moisture Floor Treatment
<input type="checkbox"/>	09 6340	Stone Flooring
<input type="checkbox"/>	09 6400	Wood Flooring
<input type="checkbox"/>	09 6500	Resilient Flooring
<input type="checkbox"/>	09 6513	Resilient Base and Accessories
<input type="checkbox"/>	09 6520	Interlocking Rubber Tile Flooring
<input type="checkbox"/>	09 6603	Precast Terrazzo Flooring for Stairs
<input type="checkbox"/>	09 6613	Thick-Set Terrazzo Flooring
<input type="checkbox"/>	09 6623	Thin-Set Terrazzo Flooring
<input type="checkbox"/>	09 6723	Resinous Flooring
<input type="checkbox"/>	09 6800	Carpeting
<input type="checkbox"/>	09 6900	Access Flooring
<input type="checkbox"/>	09 7200	Wall Covering
<input type="checkbox"/>	09 7213	Tackboard Wall Coverings
<input type="checkbox"/>	09 7500	Interior Stone Facing
<input type="checkbox"/>	09 7723	Fabric Wrapped Panels
<input type="checkbox"/>	09 8433	Acoustical Wall Panels
<input type="checkbox"/>	09 9100	Painting
<input type="checkbox"/>	09 9413	Textured Interior Coatings
<input type="checkbox"/>	09 9600	High-Performance Coatings
<input type="checkbox"/>	09 9613	Multicolored Interior Coatings
<input type="checkbox"/>	09 9653	Elastomeric Coatings
<input type="checkbox"/>	09 9663	Textured Acrylic Coating

## DIVISION 10 - SPECIALTIES

<input type="checkbox"/>	10 1100	Visual Display Boards
<input type="checkbox"/>	10 1146	Visual Display Fabrics
<input type="checkbox"/>	10 1400	Interior Signage
<input type="checkbox"/>	10 1443	Photoluminescent Exit Path Marking System
<input type="checkbox"/>	10 1700	Telephone Specialties
<input type="checkbox"/>	10 2113	Toilet Compartments



<input type="checkbox"/>	10 2115	Cubicle Specialties
<input type="checkbox"/>	10 2213	Wire Mesh Partitions
<input type="checkbox"/>	10 2223	Accordion Folding Partitions
<input type="checkbox"/>	10 2238	Operable Panel Partition
<input type="checkbox"/>	10 2239	Vertically Folding Panel Partitions
<input type="checkbox"/>	10 2613	Wall and Corner Guards
<input type="checkbox"/>	10 2813	Toilet Accessories
<input type="checkbox"/>	10 2819	Shower Doors and Enclosures
<input type="checkbox"/>	10 4116	Emergency Key Cabinets
<input type="checkbox"/>	10 4400	Fire Protection Specialties
<input type="checkbox"/>	10 4450	Automated External Defibrillators (AED)
<input type="checkbox"/>	10 5113	Metal Lockers
<input type="checkbox"/>	10 5116	Wood Lockers
<input type="checkbox"/>	10 5503	USPS-Delivery Postal Specialties
<input type="checkbox"/>	10 5506	Private-Delivery Postal Specialties
<input type="checkbox"/>	10 5713	Wall Mounted Coat Rack and Shelf
<input type="checkbox"/>	10 7113	Exterior Sun Control Devices
<input type="checkbox"/>	10 7500	Flagpoles

**DIVISION 11 - EQUIPMENT**

<input type="checkbox"/>	11 1300	Loading Dock Equipment
<input type="checkbox"/>	11 2400	Building Maintenance Equipment
<input type="checkbox"/>	11 5213	Projection Screens
<input type="checkbox"/>	11 7000	Medical Equipment
<input type="checkbox"/>	11 7313	Wall-Mounted Fold-Up Writing Surface
<input type="checkbox"/>	11 7316	Wall-Mounted Chart Rack

**DIVISION 12 - FURNISHINGS**

<input type="checkbox"/>	12 2113	Horizontal Louver Blinds
<input type="checkbox"/>	12 2116	Vertical Louver Blinds
<input type="checkbox"/>	12 2413	Roller Window Shades
<input type="checkbox"/>	12 2500	Between Glass Blinds
<input type="checkbox"/>	12 3553	Laboratory Casework
<input type="checkbox"/>	12 3571	Stainless Steel Casework
<input type="checkbox"/>	12 3640	Stone Countertops
<input type="checkbox"/>	12 3661	Simulated Stone Countertops
<input type="checkbox"/>	12 4816	Entrance Floor Grilles
<input type="checkbox"/>	12 4843	Entrance Floor Mats
<input type="checkbox"/>	12 6300	Stadium Seating
<input type="checkbox"/>	12 9313	Bicycle Racks

**DIVISION 13 - SPECIAL CONSTRUCTION**

<input type="checkbox"/>	13 2817	Ballpark Netting and Supports	
<input type="checkbox"/>	13 3448	Pre-Fabricated Rooftop Helipad	
<input type="checkbox"/>	13 4900	Radiation Protection	
<input type="checkbox"/>	13 4923	RF/MRI Modular Shielding Enclosure	
2019-03-15	<input type="checkbox"/>	13 8500	Seismic Protection

## DIVISION 14 - CONVEYING EQUIPMENT

<input type="checkbox"/>	14 1000	Dumbwaiters
<input type="checkbox"/>	14 2100	Electric Traction Elevators
<input type="checkbox"/>	14 2400	Hydraulic Elevators
<input type="checkbox"/>	14 3100	Escalators
<input type="checkbox"/>	14 9100	Chutes
<input type="checkbox"/>	14 9200	Pneumatic Tube Systems

## DIVISION 31 - EARTHWORK

2019-01-18	<input type="checkbox"/>	31 1000	Site Clearing
	<input type="checkbox"/>	31 2000	Earth Moving
2019-02-08	<input type="checkbox"/>	31 2200	Grading
2019-02-08	<input type="checkbox"/>	31 2300	Excavation and Fill
2019-03-20	<input checked="" type="checkbox"/>	31 2311	Earthwork for Building Construction
	<input type="checkbox"/>	31 2400	Earthwork for Structures
2019-01-18	<input type="checkbox"/>	31 2500	Erosion and Sedimentation Controls
	<input type="checkbox"/>	31 3116	Termite Control
	<input type="checkbox"/>	31 6213	Prestressed Concrete Piles
	<input type="checkbox"/>	31 6216	Steel H Piles
	<input type="checkbox"/>	31 6218	Mini-Piles
	<input type="checkbox"/>	31 6329	Drilled Concrete Piers

## DIVISION 32 - EXTERIOR IMPROVEMENTS

2019-02-08	<input type="checkbox"/>	32 1100	Base Courses
2019-02-08	<input type="checkbox"/>	32 1300	Rigid Paving
	<input type="checkbox"/>	32 1313	Concrete Paving
2019-02-08	<input type="checkbox"/>	32 1373	Concrete Paving Joint Sealants
	<input type="checkbox"/>	32 1413	Interlocking Precast Concrete Paving
	<input type="checkbox"/>	32 1416	Brick unit Paving
	<input type="checkbox"/>	32 1440	Stone Paving
2019-02-08	<input type="checkbox"/>	321613	Curbs and Gutters
	<input type="checkbox"/>	32 1715	Parking Accessories
	<input type="checkbox"/>	32 3113	Chain Link Fencing
	<input type="checkbox"/>	32 3115	Tubular Steel Fencing
	<input type="checkbox"/>	32 3117	Gate Operators
	<input type="checkbox"/>	32 3121	Cable Guardrail System

## DIVISION 33 - UTILITIES

2019-01-18	<input type="checkbox"/>	33 1000	Water Utilities
	<input type="checkbox"/>	33 4613	Foundation Drainage System

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## SECTION 03 1000

### CONCRETE FORMING AND ACCESSORIES

#### PART 1 - GENERAL

##### 1.1 WORK INCLUDED

- A. This section includes formwork for cast-in-place concrete, including water stops, and installation of embedded items.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Reinforcement - Section 03 2000
- B. Cast-In-Place Concrete - Section 03 3000
- C. **Under-Slab Vapor Retarder – Section 07 2600**

##### 1.3 QUALITY ASSURANCE

- A. Comply with the American Concrete Institute Standard, ACI 347-04, Recommended Practice for Concrete Formwork.

##### 1.4 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM), latest versions.
  - 1. ASTM D 226 Specification for Asphalt - Saturated Organic Felt used in Roofing and Waterproofing"
  - 2. ASTM D 1751 Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood complying with Voluntary Product Standard PS 1-07 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better or metal, metal-framed plywood or other acceptable panel-type materials. Plywood shall be mill-oiled and edge-sealed, with each piece bearing legible inspection trademark. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
- B. Forms for Unexposed Finish Concrete: Use plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings: Commercial formulation that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- D. Chamfer Strips: ¾ inch by ¾ inch wood, PVC, or rubber.

- E. Preformed Construction Joint: 24-gage steel, galvanized, shaped to form a continuous tongue and groove key.
- F. Preformed Control Joint: Rigid plastic or metal strip with removable top section.
- G. Expansion Joint Material: Asphalt saturated fiberboard, ½ inch thick, meeting the requirements of ASTM D 1751.
- H. Felt: Asphalt-saturated organic felt, weighing 30 pounds per 100 square feet, meeting the requirements of ASTM D 226.
- I. Water stops: Volclay RX manufactured by Colloid Environmental Technologies Co. (CETCO).
- J. Recycled Content: Minimum 5 percent post-consumer content, or minimum 20 percent pre-consumer recycled content at contractor's option.

## **PART 3 - EXECUTION**

### **3.1 COORDINATION**

- A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

### **3.2 PREPARATION**

- A. Form Coating: Coat contact surfaces of forms with a form coating compound before reinforcement is placed. Thin form-coating compounds with thinning agent and apply as specified in manufacturer's instructions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed.

### **3.3 INSTALLATION**

- A. Formwork: Formwork shall support vertical and lateral loads that are applied until such loads can be supported by concrete structure. Formwork shall be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Construct forms to sizes, shapes, lines and dimensions shown. Perform surveys to obtain accurate alignment. Provide for recesses, chamfers, blocking, anchorages, inserts, and other features required in work. Select materials to obtain required finishes. Butt joints solidly and provide backup at joints to prevent leakage of cement paste.
- B. Chamfer Strips: Provide at exposed corners and edges.
- C. Form Ties: Use factory fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete surfaces upon removal.
- D. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

### 3.4 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set anchorage devices and other embedded items accurately. Use setting drawings, diagrams, templates and printed instructions provided by supplier. Secure embedded items such that they are not displaced during placement of concrete.
- B. Water stops: Install according to manufacturers printed instructions. Splice water stop sections using square cut butt joints and fuse sections together with indirect heat from preheated splicing iron. Use of direct flame is prohibited.
  - 1. Place water stops in all concrete construction joints in basement walls around the building perimeter that are exposed to soil, weather, or moisture, and in any other construction joints that have the potential to allow water infiltration into the building.

### 3.5 JOINTS

- A. Construction Joints in Elevated Slabs and Beams: Construction joints in Elevated Slabs, Beams, Grade Beams, and other flexural members shall only be made as shown in the contract drawings or as approved by the Engineer of Record. Joints shall be constructed in accordance with ACI 318 Section 6.4 with provisions made for the transfer of shear and other forces. Reinforcement shall be continuous through these joints unless noted otherwise.
- B. Construction Joints in Walls, Foundations, and Slabs on Grade: Provide keyways at least 1 ½ inches deep in vertical construction joints in walls and construction joints in slabs on grade and foundations. Discontinue every other horizontal bar through slab on grade construction joints unless noted otherwise.
- C. Preformed Construction Joint for Slabs on Grade: Secure with galvanized steel stakes, 1/8 inch thick by 1-1/8 inches wide with ½ inch deep rib and tapered point. Splice adjoining joints with 24 gage steel, galvanized splice plates.
- D. Isolation Joints in Slabs on Grade: Construct isolation joints in interior slabs using 30 lb. felt. Provide isolation joints at points of contact between slabs on grade and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated. Construct isolation joints on exterior slabs abutting vertical surfaces with ½ inch thick expansion joint material.
- E. Control Joints in Slabs-on-Grade:
  - 1. Preformed Strip: Insert premolded rigid plastic, or metal strip into fresh concrete. Cut groove for strip using 10-foot long straight edge cutting tool. Depths of strip shall be one fourth of slab thickness. Press strip into groove such that top of strip is level with the concrete surface. Pull off removable top section, if any, prior to troweling.
  - 2. Saw Cut: Contractor may saw cut control joints instead of using preformed strips. Saw cut joints shall be 1/8 inch wide. Saw cut depth should equal 1/4 of slab depth. Cut joints after concrete has hardened sufficiently to prevent raveling; usually 4 to 12 hours after slab has been cast and finished. Use diamond or silicone-carbide blades.
- F. Control Joints in Walls: Create weakened planes in cantilevered retaining walls at 25 feet on center. Use preformed strips, placed vertically, full height in each face of wall. Depth of strips shall be one inch. All joints shall be sealed with continuous pliable sealant.

### 3.6 REMOVAL OF FORMWORK

- A. General: Prevent excessive deflection, distortion, and damage to concrete when forms are stripped. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
- B. Formwork and supports at sides of concrete shall remain in place for 24 hours after concrete placement. This period represents cumulative number of hours, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50 degrees F. Formwork and shoring which support the weight of concrete shall not be removed until concrete has attained its specified compressive strength.
- C. Ensure safety of the structure. Do not superimpose any load on concrete until forms are removed and concrete is cured.

### **3.7 RE-USE OF FORMS**

- A. General: Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

When forms are intended for successive concrete placement, thoroughly clean surfaces and remove fins and latence. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces.

**END OF SECTION**

## SECTION 03 2000

### CONCRETE REINFORCEMENT

#### PART 1 - GENERAL

##### 1.1 WORK INCLUDED

- A. This section includes fabrication and installation of deformed bar and welded wire fabric reinforcing steel.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Forming and Accessories - Section 03 1000.
- B. Cast In Place Concrete - Section 03 3000.

##### 1.3 QUALITY ASSURANCE

- A. Reference Standards:
  - 1. American Concrete Institute (ACI), latest versions.
    - a. ACI 301                      Specifications for Structural Concrete for Buildings
    - b. ACI 315                      Details and Detailing of Concrete Reinforcement
    - c. ACI 318                      Building Code Requirements for Structural Concrete
  - 2. American Society for Testing and Materials (ASTM)
    - a. ASTM A 82/  
A82M                      Standard Specification for Steel Wire, plain, for Concrete Reinforcement
    - b. ASTM A 185/  
A185M                      Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
    - c. ASTM A 615/  
A 615M                      Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
  - 3. Concrete Reinforcing Steel Institute (CRSI). Design Handbook - latest Edition

##### 1.4 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for reinforcing steel. Comply with ACI 315 requirements showing layout, bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of reinforcing steel. Shop Drawings shall not be made by reproduction of the Contract Drawings.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60. Stirrups and ties may be Grade 40.
- B. Welded Wire Fabric: ASTM A 185, flat sheets.
- C. Steel Wire: ASTM A 82, 16 gage.
- D. Supports for Reinforcing Steel: Wire bar type and precast concrete block type meeting the requirements of CRSI Manual of Standard Practice.

## 2.2 FABRICATION

- A. Fabricate reinforcing steel in accordance with fabricating tolerances in ACI 315.
- B. Do not fabricate reinforcing steel until shop drawings are approved.

## PART 3 - EXECUTION

### 3.1 PLACING BAR SUPPORTS

- A. General: Provide bar supports meeting the requirements of CRSI Specification for Placing Bar Supports.
- B. Slabs-on-grade: Use supports with sand plates or precast concrete blocks or horizontal runners where base material will not support chair legs.

### 3.2 PLACING REINFORCING STEEL

- A. General: Comply with CRSI Code of Standard Practice for "Placing Reinforcing Bars".
- B. Clean reinforcing steel of loose rust and mill scale, earth, ice, and other materials, which reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcing steel against displacement by formwork, construction, or concrete placement operations. Place reinforcing steel to obtain minimum coverages. Arrange, space and securely tie bars and bar supports to hold reinforcing steel in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

Concrete Cover:

Concrete cast against and permanently exposed to earth 3 inches

Concrete exposed to earth or weather:

Bars larger than No. 5

2 inches

Bars No. 5 or smaller.

1 ½ inches

- D. Rebar Splices: Locate at points of minimum stress or as shown on contract drawings. Unless noted otherwise, provide lap splices 30 bar diameters (18 inches minimum) in length.
- E. Welded Wire Fabric Splices: Lap one complete wire spacing.
- F. Corner Reinforcing: Provide corner bars of same size and spacing as horizontal reinforcing steel. Lap with horizontal reinforcing 30 bar diameters or 18 inches minimum length.



- G. Reinforcing at Construction/Control Joints: Continue reinforcing steel through construction joints unless noted otherwise. Discontinue reinforcing steel 2 inches from preformed construction joints in slabs-on-grade. Cut alternate longitudinal bars at weakened plane control joints in walls.

**END OF SECTION**

**SECTION 03 3000**

**CAST IN PLACE CONCRETE**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. This section covers cast-in-place concrete including finishing, surface repair and curing.

**1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. Concrete Forming and Accessories - Section 03 1000
- B. Concrete Reinforcement - Section 03 2000
- C. Under Slab Vapor Retarder – Section 07 2600

**1.3 QUALITY ASSURANCE**

- A. Reference Standards: Meet the requirements of the following codes, specifications and standards.
  - 1. American Concrete Institute (ACI) Publications, latest versions;
    - a. ACI 301 Specifications for Structural Concrete for Buildings
    - b. ACI 306.1 Standard Specification for Cold Weather Concreting
    - c. ACI 318 Building Code Requirements for Structural Concrete.
  - 2. ASTM International (ASTM);
    - a. ASTM C 31/  
C31M Standard Practice for Making and Curing Concrete Test Specimens in the Field
    - b. ASTM C 33/  
C33M Standard Specification for Concrete Aggregates
    - c. ASTM C 39/  
C39M Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
    - d. ASTM C 94/  
C 94M Standard Specification for Ready-Mixed Concrete
    - e. ASTM C 131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
    - f. ASTM C 136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

g.	ASTM C 143 C 143M	Standard Test Method for Slump of Hydraulic Cement Concrete
h.	ASTM C 150/ C150M	Standard Specification for Portland Cement
i.	ASTM C 171	Standard Specification for Sheet Materials for Curing Concrete
j.	ASTM C 172/ C172M	Standard Practice for Sampling Freshly Mixed Concrete
k.	ASTM C 173/ C 173M	Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
l.	ASTM C 231/ C231M	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
m.	ASTM C 260/ C260M	Standard Specification for Air Entraining Admixtures for Concrete
n.	ASTM C 309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
o.	ASTM C 330/ 330M	Standard Specification for Lightweight Aggregates for Structural Concrete
p.	ASTM C 494/ C 494M	Standard Specification for Chemical Admixtures for Concrete
q.	ASTM C 567	Standard Test Method for Determining Density of Structural Lightweight Concrete
r.	ASTM C 618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
s.	ASTM D 4318	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

- B. Environmental Requirements: Manufacturer and Contractor shall conform to Federal, State, and Local V.O.C. (Volatile Organic Compound) Regulations in area where Project is located. Notify A/E in writing if variations to Specifications herein are required.
1. V.O.C. content shall be a maximum 250 (55) gm/liter, unless more stringent codes or laws apply.

#### 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and admixtures.

- B. Concrete Mix Design:
  - 1. Submit mix design in accordance with ACI-301, Section 4.
  - 2. Submit with mix design results of laboratory tests performed within previous 12 months indicating aggregates from the proposed source comply with the requirements of ASTM C 33 or C 330 as applicable.
  - 3. Submit the proposed area of use for each mix design submitted (footings, stemwalls, slabs, walls, columns, etc.).
- C. Granular Base Course: Submit gradation, plasticity index, and wear information.
- D. Test Reports: Submit copies of test reports for concrete compressive strength, air content, temperature and slump. Submit copies of granular base course test reports.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.  
Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Environmental Requirements: Manufacturer and Contractor shall conform to Federal, State, and Local V.O.C. (Volatile Organic Compound) Regulations in area where Project is located. Notify A/E in writing if variations to Specifications herein are required.
  - 1. V.O.C. content shall be a maximum 250 (55) gm/liter, unless more stringent codes or laws apply.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, low alkali. Use one brand of cement throughout project.
- B. Normal Weight Aggregates: ASTM C 33. Provide aggregates from a single source for exposed concrete.
- C. Water: Potable.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Water Reducing Admixture: ASTM C 494.
- F. Fly-Ash: ASTM C 618, Class C.
- G. Concrete Admixture: Concre Systems Admixture for waterproofing in all concrete for slabs-on-grade and elevated slabs to receive floor finishes.
- H. Crystalline Waterproofing Admixture: By Xypex, BASF or W.R. Meadows

- I. Moisture-Retaining Cover: Provide waterproof paper, polyethylene film, or polyethylene-coated burlap meeting the requirements of ASTM C 171.
- J. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound meeting the requirements of ASTM C 309; Type 1-D with fugitive dye for interior concrete and foundations; Type 2, white pigmented, for exposed exterior concrete except exposed exterior Architectural concrete, use Type 1-D.

Curing compound shall NOT be used on interior slabs, except exposed integrally colored concrete slabs. Curing compound to be used on integrally colored concrete slabs shall be approved by the manufacturer of the color.

- K. Vapor Retarder shall comply with Section 07 26 00 of these Specifications.
- L. Granular base shall meet the following grading requirements when tested in accordance with ASTM C 136.

Granular base shall meet the gradation and material properties requirements as listed in the General Structural Notes.

The plasticity Index shall be no greater than 3 when tested in accordance with ASTM D 4318. The coarse aggregate shall have a percent wear of 50 or less when tested in accordance with ASTM C 131.

## **2.2 PROPORTIONING AND DESIGN OF MIXES**

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial mixture or field experience methods as specified in ACI 301, Section 4. If trial mixture method is used, employ an independent testing facility, acceptable to Architect, for preparing and reporting proposed mix designs.
- B. Submit written reports to Architect, or Engineer, of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been approved.
- C. Refer to the General Structural Notes for concrete strengths.
- D. Slabs-on-ground or on vapor retarder shall have a water/total cementitious ratio not to exceed 0.45.
- E. Admixtures
  - 1. Use water reducing admixture conforming to ASTM C 494, Type A, in all concrete unless approved otherwise by the Structural Engineer.
  - 2. All other admixtures shall have the written approval of the Architect or Structural Engineer.
  - 3. Calcium chloride is not permitted.
  - 4. All admixtures, except high range water reducers, shall be added to the concrete at the batch plant.
  - 5. Use Concure Systems Admixture for waterproofing in all interior concrete for slabs-on-grade and interior elevated slabs to receive floor finishes.

6. Use crystalline waterproofing admixture in all exterior exposed concrete for balcony slabs.

## **PART 3 - EXECUTION**

### **3.1 COORDINATION**

- A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

### **3.2 PREPARATION**

- A. Before placing concrete, clean and roughen surface of previously placed concrete. Clean reinforcing steel. Remove debris, providing clean-outs at bottom of forms when necessary. Moisten surfaces to receive concrete unless otherwise prepared. Remove excess water before placing concrete.

### **3.3 CONCRETE PLACEMENT**

- A. General: Comply with ACI 301.
- B. Place concrete continuously in layers not deeper than 24 inches. Concrete shall not be placed against concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints. Deposit concrete as nearly as practicable to its final location to avoid segregation. Do not use vibrators to transport concrete.
- C. Maintain reinforcing in proper position during concrete placement operations.
- D. Consolidate concrete, immediately after placing, by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
- E. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface. Do not disturb slab surfaces prior to beginning finishing operations.
- F. Cold Weather Concreting: Protect concrete work from physical damage or reduced strength caused by frost, freezing or low temperatures. Comply with ACI 306.1.
- G. Hot Weather Concreting: When hot weather conditions exist that would impair quality and strength of concrete, reduce delivery time of ready mix concrete, lower the temperature of materials, or add retarder to ensure that the concrete is plastic. Retempering with water is not allowed. Comply with ACI 305R.

### **3.4 FINISH OF FORMED SURFACES**

- A. Rough Form Finish: Provide where formed concrete surfaces are not exposed to view. Tie holes and surface imperfections shall be repaired and patched and fins and other projections exceeding ¼ inch in height rubbed down or chipped off.

### **3.5 FINISH OF HORIZONTAL SURFACES**

- A. At tops of foundation walls and grade beams finish with a texture matching adjacent formed surfaces unless otherwise indicated.

### **3.6 SLAB FINISHES**

- A. Float Finish: Begin floating when surface water has disappeared and when concrete has stiffened sufficiently to permit operation of power-driven or hand floats. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding ¼ inch in 10 feet when tested with a 10 foot straightedge.
- B. Scratch Finish: Apply scratch finish to slab surfaces that are to receive floor topping. Roughen surface before final set, using stiff brushes, or brooms.
- C. Trowel Finish: Apply trowel finish to all slab surfaces unless noted otherwise. After floating, begin first trowel finish using a power-driven or hand trowel. Finish concrete surface by a final hand-trowel operation, free of trowel marks, and uniform in texture and appearance. The final surface finish for slabs-on-grade shall have a minimum FF = 25 and a minimum FL = 20 per ACI requirements. The final surface finish for elevated slabs shall have a minimum FF = 25. Verify with Architectural requirements.
- D. Broom Finish: Apply on exterior slabs, ramps, steps, and sidewalks. Immediately after concrete has received a float finish, draw a broom or burlap belt across the surface to give a coarse transverse scored texture.

### **3.7 CONCRETE CURING AND PROTECTION**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Continue curing for at least 7 days.
- B. Moisture-retaining Cover curing: All interior concrete slabs, except exposed integrally colored concrete slabs, are to be cured with a moisture retaining cover for the first 7 days. After that time, the cover shall be removed and the slab should be allowed to dry. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed. Repair any holes or tears in cover during curing period.
- C. Curing compound: At contractor's option, exterior concrete slabs may be cured using curing compound. All vertical concrete (walls, beams, etc...) shall be cured using curing compound – apply compound to the vertical surface as soon as the forms are removed. Apply curing compound uniformly in accordance with the manufacturer's printed instructions. Curing compound shall NOT be used on interior slabs, except exposed integrally colored concrete slabs.
- D. Exposed integrally colored concrete slabs: Use curing compound recommended by the concrete supplier. Apply with and airless sprayer.

### **3.8 CONCRETE SURFACE REPAIRS**

- A. Patching Surface Imperfections: Remove loose material and patch surface imperfections and holes left by tie rods with cement mortar. Surface imperfections include honeycomb, excessive air voids, sand streaking and cracks.

### **3.9 FOR EXPOSED-TO-VIEW SURFACES**

- A. Blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

### **3.10 FIELD QUALITY CONTROL**

- A. The Owner shall employ the services of a qualified testing laboratory to perform tests and submit test reports.
- B. Sampling Fresh Concrete: ASTM C 172.
- C. Slump: ASTM C 143; one test for each set of compressive strength test specimens.
- D. Air Content: ASTM C 173 or C 231 for each set of compressive strength test specimens.
- E. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below, when 80 degrees F and above; and when compression test specimens are made.
- F. Compression Test Specimen: ASTM C 31, one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required. Mold one set of standard cylinders for volume of concrete specified below or fraction thereof.
  - 1. At least once a day
  - 2. At least once for each 150 cubic yds
  - 3. At least once for each 5000 square feet of surface area for slabs or walls. (This amounts to 61 cubic yards for a 4 inch slab, 77 cubic yards for a 5 inch slab and 124 cubic yards for an 8 inch wall.)
- G. Compressive Strength Tests: ASTM C 39; test 1 specimen at 7 days, 2 specimens at 28 days, and retain one specimen in reserve for later testing. Additional Tests: The testing laboratory will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure as directed by the Architect. The testing laboratory may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by the Architect or Engineer. The Owner shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.
- H. Granular Base Course: ASTM C 136 and ASTM D 4318 for every 500 square yards of building slab area.

**END OF SECTION**



## SECTION 04 2200

### REINFORCED UNIT MASONRY

#### PART 1 - GENERAL

##### 1.1 WORK INCLUDED

- A. This section includes the construction of reinforced hollow core unit masonry, masonry veneer and special shapes. It includes all split face units and smooth face units, as well as masonry mortar and grout.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Reinforcement - Section 03 2000
- B. Division 07 Section "Water Repellents" for water repellents applied to unit masonry assemblies.
- C. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
- D. Division 07 Section "Fire stopping" for fire stopping at tops of masonry walls and at openings in masonry walls.
- E. Division 08 Section "Louvers and Vents" for wall vents (brick vents).
- F. Products furnished, but not installed, under this Section include the following:
  - 1. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 05 Section "Structural Steel" and Division 13 Section "Metal Building Systems".
- G. Products installed, but not furnished, under this Section include the following:
  - 1. Cast-stone trim, furnished under Division 04 Section "Cast Stone".
  - 2. Steel lintels for unit masonry, furnished under Division 05 Section "Metal Fabrications".
  - 3. Manufactured reglets in masonry joints for metal flashing, furnished under Division 07 Section "Sheet Metal Fabrications".
  - 4. Hollow-metal frames in unit masonry openings, furnished under Division 08 Section "Steel Doors and Frames".

##### 1.3 QUALITY ASSURANCE

- A. Reference Standards
  - 1. ASTM International (ASTM), latest versions.
    - a. ASTM A 615/  
A615M                      Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
    - b. ASTM C 90                      Standard Specification for Load bearing Concrete Masonry Units

- c. ASTM C 780 Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and reinforced Masonry
  - d. ASTM C 270 Standard Specification for Mortar for Unit Masonry
  - e. ASTM C 476 Standard Specification for Grout for Masonry
  - f. ASTM C 1019 Standard Test Method for Sampling and Testing Grout
2. American Concrete Institute (ACI), latest version.
- a. ACI 530.1 Specification for Masonry Structures

#### 1.4 SUBMITTALS

- A. Product Data: Submit sample of exposed masonry unit of each color and texture to be used to complete the work. Submit copies of test reports performed within last 12 months for representative specimens to be used in accordance with ASTM C 140 for strength, absorption and moisture content, and ASTM C 426 for drying shrinkage.
- B. Test Reports: Submit copies of test reports for masonry units, mortar and grout.

#### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units above ground on level platforms, which allows air circulation under stacked units.
- B. Cover and protect against wetting prior to use.
- C. Handle units on pallets or flat bed barrows.
- D. Store cementitious ingredients in weather-tight enclosures.
- E. Waste Management and Disposal: As specified in Division 01 Section "Construction Waste Management" and as follows:
  - 1. Separate and recycle waste materials in accordance with the Waste Management Plan and to the maximum extent economically feasible.
    - a. Fold up metal banding; flatten and place in designated area for recycling.
    - b. Collect wood packing shims and pallets; place in designated area.
  - 2. Recycling: Undamaged, excess masonry materials are Contractor's property and shall be removed from the Project site for his use.
  - 3. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil contaminated sand, by crushing and mixing with fill material as fill is placed.
    - a. Crush masonry waste to less than 2 inches in greatest dimension.

- b. Mix masonry waste with at least 2 parts specified fill material for each part masonry waste. Fill material is specified in Division 31 Section "Earth Moving".
  - c. Do not dispose of masonry waste as fill within 18 inches of finished grade.
4. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste and legally dispose of off Owner's property.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Hollow Core Split Faced Scored Units: ASTM C 90, see architectural drawings for locations.
- B. Hollow Core Units: ASTM C90.
- C. Burnished, see architectural drawings for locations.
- D. Aggregate: Scoria, natural color at exposed block.
- E. Aggregate: Natural color at concealed block.
- F. Mortar: ASTM C 270 "Standard Specification for Mortar for Unit Masonry," Type S, f'c = 1800psi.
- G. Grout: ASTM C 476 "Standard Specification for Grout for Masonry."
- H. Cell Reinforcing: ASTM A 615 "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," Grade 60. Comply with Section 03 20 00.
- I. Bond Beam and Lintel Reinforcing: ASTM A 615, Grade 60. Comply with Section 03 20 00.
- J. Joint Reinforcing: Hot Dipped Galvanized, Standard Ladder Type 9 Gage Wire Dur-O-Wal or approved equal.
- K. Control Joint Material: Rubber, neoprene or PVC joint material for use with standard sash block by Dur-O-Wal or approved equal.
- L. Vertical Bar Positioner: Steel by Dur-O-Wal or approved equal.
- M. Mortar Plasticizer: Easy Spread by American Colloid Company or approved equal.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Provide jamb, header, lintel, bond beam, etc. units as required to complete the work. Lay only dry and unfrozen masonry units.
- B. All exposed masonry shall be scoria aggregate, split face, scored finish unless noted otherwise on the drawings. Masonry not exposed to view may be smooth finished.

- C. Discard any broken, chipped, or discolored masonry units.
- D. Use masonry saws to cut and fit masonry units.
- E. Lay units in running bond pattern with vertical joints located at center of masonry units in alternate course below.
- F. Set units plumb, true to line and with level courses accurately spaced.
- G. Adjust masonry unit to final position while mortar is soft and plastic.
- H. Anchors, flashing accessories and similar devices shall be built in as masonry progresses.

### **3.2 MORTAR**

- A. Mix all cementitious materials and sand in a mechanical batch mixer for a minimum of 5 minutes. Adjust the consistency of the mortar to the satisfaction of the mason, but add only as much water as is compatible with convenience in using the mortar. If the mortar begins to stiffen from evaporation or from absorption of a pat if the mixing water, re-temper the mortar immediately by adding water, and remix the mortar.
- B. Mortar for exterior walls shall have waterproofing added in accordance with the manufacturer's recommendations.
- C. Addition of admixtures or re-tempering of mortar at the mixer to extend its use will not be permitted.

### **3.3 RE-TEMPERING**

- A. All mortar shall be used within 2-1/2 hours of initial mixing and no mortar shall be used after it has begun to set. Re-tempering of mortar in which setting has saturated will not be permitted. However, mortar shall be re-tempered, except as above qualified, as necessary to keep it plastic.

### **3.4 JOINTS**

- A. Provide joints 3/8 inch nominal thickness and tooled unless shown otherwise on drawings.
- B. Construct uniform joints.
- C. Units shall be placed with sufficient pressure to extrude mortar and provide a tight joint.

### **3.5 REINFORCEMENT**

- A. Reinforcement shall be secured against displacement prior to grouting at a spacing not greater than 4 feet.
- B. Provide rebar lap lengths specified in the General Structural Notes on the drawings. Provide 6 inches minimum lap for all ladder type joint reinforcing.

### **3.6 GROUTING**

- A. Grout all cells, which are below grade.
- B. Grout lintel blocks over masonry openings and each jamb of masonry openings.

- C. Grout pours shall not exceed 5 feet in height.
- D. Grout all cells solid, which contain reinforcing.

Grout shall have a slump range of 8 to 11 inches tested in accordance with ASTM C143.

Consolidate grout pours 12 inches or less in height by mechanical vibration or by puddling. Consolidate pours exceeding 12 inches in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred. Typically this occurs within 2-4 minutes of placement of grout.

Place grout within 1-1/2 hours from introducing water in the mixture and prior to initial set.

### **3.7 POINTING AND CLEANING**

- A. At completion of unit masonry work, fill holes in joints and tool.
- B. Cut out and repoint defective joints.
- C. Dry brush masonry surface after mortar has set, at end of each day's work and after final pointing.
- D. Leave work and surrounding surfaces clean and free of mortar spots and droppings.

### **3.8 PROTECTION OF WORK**

- A. Protect sills, ledges, and offsets from mortar drippings or other damage during construction.
- B. Remove misplaced mortar or grout immediately.
- C. Cover top of walls with non-staining waterproof coverings when work is not in progress.
- D. Provide adequate bracing during construction to prevent damage from wind loads.

### **3.9 WEATHER CONDITIONS**

- A. Do not place concrete masonry units when air temperature is below 20 degrees F.
- B. For temperatures between 20 degrees F and 40 degrees F, sand and mixing water shall be heated to produce mortar temperatures between 40 degrees F and 120 degrees F. Mortar shall be maintained above 32 degrees F during placement.
- C. Masonry shall be protected from freezing for 24 hours after placement.

### **3.10 FIELD QUALITY CONTROL**

- A. The Owner shall employ the services of a qualified testing laboratory to perform tests and submit test reports.
- B. Concrete Masonry Units (CMU): Test in accordance with ASTM C 140. "Standard Test Methods of Sampling and Testing Concrete Masonry Units." Six units shall be sampled and tested for each lot of 10,000 units or less delivered to the job site. Twelve units shall be sampled from each lot of more than 10,000 units and less than 100,000 units.

- C. Mortar: By proportions according to ASTM C 780 "Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Masonry."
- D. Grout: Mold and test 4 test specimens in accordance with ASTM C 1019 "Test Method for Sampling and Testing Grout" from each day's grout placement. Test grout slump prior to each day's grouting process. Submit slump value with test specimen results. See General Structural Notes for required strength.

**END OF SECTION**

## SECTION 07 2600

### UNDER-SLAB VAPOR RETARDER FOR CONCRETE SLABS-ON-GRADE

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. Products Supplied Under This Section
  - 1. Vapor Retarder, seam tape, mastic, pipe boots for installation under concrete slabs.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Cast-in-place Concrete - Section 03 3000
- B. Concrete Forming and Accessories - Section 03 2000
- C. Earthwork for Building Construction - Section 31 23 11

##### 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM), latest versions.
  - 1. ASTM E 96/  
E96M Standard Test Methods for Water Vapor Transmission of Materials
  - 2. ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
  - 3. ASTM E 1643 Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
  - 4. ASTM E 1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
- B. American Concrete Institute (ACI), latest version.
  - 1. ACI 302.2R, Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

##### 1.4 SUBMITTALS

- A. Quality Control / Assurance
  - 1. Comply with Section 01 33 00 – Submittal Procedures.
  - 2. Independent laboratory test results showing compliance with ASTM & ACI Standards.

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3. Manufacturer's samples, literature
  4. Manufacturer's installation instructions for placement, seaming and pipe boot installation
- B. Delivery, Storage, and Handling
1. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
  2. Store materials in a clean dry area in accordance with manufacturer's instructions.
  3. Stack membrane on smooth ground or wood platform to eliminate warping.
  4. Protect materials during handling and application to prevent damage or contamination.
  5. Ensure membrane is stamped with manufacturer's name, product name and membrane thickness at intervals of no more than 85" (220 cm).
- C. Environmental requirements
1. Product not intended for uses subject to abuse or permanent exposure to the elements.
  2. Do not apply on frozen ground.

## **PART 2 – PRODUCTS**

### **2.1 MATERIALS**

- A. Vapor Retarder (Performance-Based Specifications)
1. Vapor Retarder must have the following qualities at minimum and meet floor finish manufacturer's warranty requirements.
    - a. Water Vapor Retarder ASTM E1745: Meets or exceeds Class A
    - b. Maximum Permeance ASTM E96: 0.01 perms or as required to meet Flooring Manufacturer's Warranties.
    - c. Tensile Strength ASTM E154, Section 9: not less than 45 LBS. Force/Inch
    - d. Puncture Resistance ASTM D1709, Method B.
    - e. Thickness of Retarder (plastic) ACI 302.1R-96: Not less than 15 mils
    - f. Material: Virgin Polyethylene or Polyolefin
  2. Vapor Retarder Products, may be by one of the following manufacturers or an approved equal, as long as the requirements above are met.

### **UNDER-SLAB VAPOR RETARDER FOR CONC SOG**



- a. Epro, <http://eproserv.com>
- b. Fortifiber, <http://www.fortifiber.com>
- c. Stego Industries, <http://www.stegoindustries.com>
- d. W.R. Meadows, <http://www.wrmeadows.com>
- e. Raven Industries, <http://www.vaporblock.com>
- f. Reef Industries, <http://www.reefindustries.com>

## **2.2 ACCESSORIES**

- A. Seam Tape
  1. Tape must have the following qualities:
    - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower
- B. Vapor Proofing Mastic
  1. Mastic must have the following qualities:
    - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower
- C. Pipe Boots
  1. Construct pipe boots from vapor Retarder material, pressure sensitive tape and/or mastic per manufacturer's instructions.

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION**

- A. Examine surfaces to receive membrane. Ensure compaction requirements have been completed and geotechnical firm has confirmed compaction requirements have been met. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

### **3.2 SURFACE PREPARATION**

- A. Prepare surfaces in accordance with manufacturers instructions.

### **3.3 INSTALLATION**

- A. Install Vapor Retarder:
  1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
    - a. Unroll Vapor Retarder with the longest dimension parallel with the direction of the pour.
    - b. Lap Vapor Retarder over footings and seal to foundation walls.

#### **UNDER-SLAB VAPOR RETARDER FOR CONC SOG**

- c. Overlap joints 6 inches and seal with manufacturer's tape.
- d. Seal all penetrations (including pipes) per manufacturer's instructions.
- e. No penetration of the Vapor Retarder is allowed except for reinforcing steel and permanent utilities.
- f. Repair damaged areas by cutting patches of Vapor Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

**END OF SECTION**

**UNDER-SLAB VAPOR RETARDER FOR CONC SOG**

**SECTION 31 2311**

**EARTHWORK FOR BUILDING CONSTRUCTION**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. The work covered by this Section consists of furnishing all plant, labor, equipment, appurtenances and material in performing all operations, hauling, placing, spreading, watering, processing, compacting and shaping earth sections, within the building limits, complete in place in accordance with the Project Manual and Drawings.

**1.2 RELATED WORK ELSEWHERE**

- A. Site Clearing - Section 31 1000
- B. Under-Slab Vapor Retarder – Section 07 2600
- C. General Foundation Notes on Drawings.
- D. Project Soils Report – shall be completely reviewed and understood by the contractor. In case of conflict or omission, the Project Soils Report shall govern.

**1.3 SUBSURFACE SOIL DATA**

- A. Subsurface soil investigations have been made and the results are available for examination by the Contractor. This is not a warranty of conditions; the Contractor is expected to examine the site and determine for himself the character of materials to be encountered.
- B. No additional allowance will be made for rock removal, site clearing and grading, filling, compaction, disposal, or removal of any unclassified materials.

**1.4 REFERENCES**

- A. ASTM International, latest versions.
  - 1. ASTM D 1556 Standard Test Method for Density of Soil in Place by the Sand-Cone Method
  - 2. ASTM D 698-10a Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard effort (12,400 ft-lbf/ft<sup>3</sup>)(600kN-m/m<sup>3</sup>)]
  - 3. ASTM D 4318 Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
  - 4. ASTM D 6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

**1.5 SUBMITTALS**

- A. Submit copies of materials certificates and test results for materials in accordance with type of tests, frequencies and remarks as outlined in the sampling and testing schedule.

**1.6 TESTING AND INSPECTION**

- A. General: The Owner shall employ the services of a registered, licensed Geotechnical Engineer to observe all controlled earthwork soil testing. The testing laboratory shall provide continuous on-site observation by experienced personnel during construction of fill material. The Contractor shall notify the testing laboratory at least two working days in advance of any field operations of controlled earthwork, or of any resumption of operations after stoppages.
- B. Report of Field Density Tests
  - 1. The Geotechnical Engineer shall submit, daily, the results of field density tests required by these specifications.
- C. Costs of Tests and Inspection
  - 1. The cost of testing, inspecting and engineering, as specified in this section of the specifications, shall be borne by the Owner.
- D. Lines and Grades: Alignment and grade of all elements shall be made on true tangents and curves. Grades shall conform to the elevations indicated on Drawings, with minor adjustments, to provide a smooth approach at building lines, at connections to existing paving and to provide proper drainage. Correct irregularities at no cost to the Owner.

**1.7 WEATHER LIMITATIONS**

- A. Controlled fill shall not be constructed when the atmospheric temperature is below 35 degrees F. When the temperature falls below 35 degrees, it shall be the responsibility of the Contractor to protect all areas of completed work against any detrimental effects of ground freezing by methods approved by the testing laboratory. Any areas that are damaged by freezing shall be reconditioned, reshaped, and compacted by the Contractor in conformance with the requirements of this specification without additional cost to the Owner.

**PART 2 - PRODUCTS**

**2.1 STRUCTURAL FILL MATERIAL**

- A. On-Site Soils / Imported Fill: Gravelly CL of CI-CH, GC, SC, SW or GW.
- B. Low volume Change (LVC) Engineered Fill: Gravelly CL, GC or SC (LL<50).
- C. On-Site Soils: CH - **SHALL NOT BE PLACED WITHIN UPPER 2 FEET BENEATH FOUNDATIONS AND PAVEMENTS.**
- D. Material shall consist of soils that conform to the following physical characteristics:

Sieve Size Sq. Openings	Percent Passing By Weight
12 inch*	100

\* or lift thickness whichever is less

- E. The liquid limit of the material to be used for fill within 2 feet of bottom of foundations or slabs or backfill, as determined in accordance with ASTM D 4318 shall not exceed 50.
- F. CH clays with a liquid limit equal to or above 50 are suitable for use as controlled fill only if the percentage of rock fragments exceeds 35% or if placed 2 feet below foundations and slabs.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Clearing and Grubbing: Prior to placing structural fill all borrow areas and areas to receive structural fill shall be stripped of vegetation and deleterious materials. Strippings shall be hauled offsite or stockpiled for subsequent use in landscaped areas or non-structural fill areas as designated by the Owner or his representative and approved by the Geotechnical Engineer.

#### **3.2 CONSTRUCTION AREA TREATMENT**

- A. Site Preparation - Fill Areas: Prior to placing structural fill the areas to be filled shall be scarified to a depth of eight inches and moisture conditioned as described below. The area to be filled shall then be compacted to a minimum of 95 percent of standard proctor density as determined in accordance with ASTM D 698. Any soft or "spongy" areas shall be removed as directed by the Geotechnical Engineer and replaced with structural fill as described herein.
- B. Site Preparation - Cut Areas: Following excavation to rough grade all building and pavement areas shall be scarified to a depth of eight inches and moisture conditioned as described below. All building and paved areas shall be compacted to a minimum of 95 percent of standard proctor density as determined by ASTM D 698.

#### **3.3 EQUIPMENT AND METHODS**

- A. In areas not accessible to heavy equipment, distribute by and compact with hand operated vibratory compactors.

#### **3.4 BORROW**

- A. The Contractor shall provide sufficient material for fill to the lines, elevations and cross sections as shown on the contract drawings from borrow areas.
- B. The Contractor shall obtain from the Owners of said borrow areas the right to excavate material, shall pay all royalties and other charges involved, and shall pay all expenses in developing the source including the cost of right-of-way required for hauling the material.

#### **3.5 COMPACTION**

- A. Fill shall be spread in layers not exceeding 12 inches (loose), watered as necessary, and compacted. Moisture content at time of compaction shall plus/minus 2 percent of optimum moisture for CL, SC, GC, GW and SW soil types and 0-4% above optimum for CH soil types. A density of not less than 95 percent of maximum dry density shall be obtained within the building pads.

- B. Optimum moisture content and maximum dry density for each soil type used shall be determined in accordance with ASTM D 698.
- C. Compaction of the fill shall be by mechanical means only. Where vibratory compaction equipment is used, it shall be the Contractor's responsibility to ensure that the vibrations do not damage nearby buildings or other adjacent property. Where vibratory compaction is not possible, pneumatic rolling equipment shall be used.

MATERIAL	MINIMUM PERCENT COMPACTION
Structural & granular fill in construction area	95
Subgrade below structural fill	95
Structural fill under exterior walls	95
Miscellaneous backfill	90

**3.6 MOISTURE CONTROL**

- A. The material moisture content, while being compacted, shall be plus/minus 2 percent of optimum moisture for CL, SC, GC, GW and SW soil types and 0-4% above optimum for CH soil types.

**3.7 DENSITY REQUIREMENTS**

- A. Density of undisturbed soils, in-place fill and backfill shall be determined in accordance with the procedures of ASTM D 1556 or ASTM D 6938. If tests indicate that the density of in-place soil is less than required, the material shall be scarified, moistened or dried as necessary to obtain proper moisture content and recompacted as necessary to achieve the proper densities. Sufficient density tests shall be made and reports submitted by the Testing Laboratory indicating all cut and fill areas were compacted and graded in accordance with the requirements.

**3.8 SLOPE PROTECTION & DRAINAGE**

- A. Berming and grading shall be done as may be necessary to prevent surface water from flowing into and out of the construction area. Any water accumulating therein shall be removed by pumping or by other methods.

**3.9 SOIL EROSION PROTECTION**

- A. The Contractor shall ensure that no soil erodes or blows from the site into public right-of-way or onto private property.
- B. The Contractor shall promptly clean up any material which erodes or blows into the public right-of-way or onto private property.

**3.10 PRESERVATION OF PROPERTY**

- A. Provide temporary fences, barricades, coverings, or other protections to preserve existing items indicated to remain and to prevent injury or damage to persons or property. Apply protections to adjacent properties as required.
- B. Restore damaged work to condition existing prior to start of work, unless otherwise directed.

**3.11 EXISTING UTILITIES**

- A. The Contractor shall verify the location of any utility lines, pipelines, or underground utility lines in or near the area of the work in advance of and during Earthwork. The Contractor is fully responsible for any and all damage caused by failure to locate, identify and preserve any and all existing utilities, pipelines and underground utility lines. Repair damaged utilities to the satisfaction of the utility owner at no expense to the Owner.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during grading, consult the Architect immediately for directions as to procedures.
- C. Cooperate with the Owner and public or private utility companies in keeping service and facilities in operation.

**3.12 WASTE**

- A. Dispose of all waste off Owner's property.
- B. Burning of waste will not be permitted.

**3.13 AIR POLLUTION**

- A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt air pollution. Comply with governing regulations pertaining to environmental protection.

<b>SAMPLING AND TESTING SCHEDULE FOR EARTHWORK</b>			
<b>FIELD QUALITY CONTROL</b>			
<b>MATERIAL</b>	<b>TEST FOR</b>	<b>FREQUENCY</b>	<b>REMARKS</b>
NATURAL GROUND	Compaction in accordance with ASTM D 1556 or ASTM D 6938	1 per 2500 square feet of surface	Conduct a minimum of 3 tests on each section.
EMBANKMENT AND/OR SUBGRADE	Soil Conditions Moisture-Density in accordance with ASTM D 698	Test 1 per soil classification	
	Compaction control in accordance with ASTM D 1556 or ASTM D 6938	1 per each lift every 2500 square feet of surface	Immediately after placing, Conduct a minimum of 3 tests per section
		1 per each lift for each 2500 square feet of fill	

**END OF SECTION**