Project Manual for:
Graham County Cemetery Department Concrete Steps Construction (2) Santeetlah Cemetery

Project No. GCCD-25-057

Robbinsville, North Carolina
March 12, 2025

GRAHAM COUNTY
196 KNIGHT STREET – 12 NORTH MAIN STREET (Mailing)
ROBBINSVILL E, NC 28771 p: 828-479-7960

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Public Notice

Request for Quotes for Project No.: GCCD-25-057 Santeetlah Cemetery Concrete Steps and Handrail

Graham County Government is soliciting a Request for Quotes from concrete construction professionals for services related to the installation of approximately 8' wide by 13' in length of new concrete reinforced steps with aluminum handrail on both sides in the Santeetlah Church Cemetery located at 20 Santeetlah Cemetery Road in Robbinsville, NC.

Copies of the detailed Statement of Work (SOW)(RFQ), including a description of the services to be provided by respondents, specifications, project bid schedule, and scheduling to inspect the site can be obtained by contacting Graham County Project Manager Jason Marino at 828-479-7960 or by email at: jason.marino@grahamcounty.org Additional information can be found on the County's website under Forms/RFQ/RFI/BIDS and the Project Manager page at www.grahamcounty.org.

All project requests for clarification and related questions shall be submitted in writing to the Graham County Project Manager Jason Marino by email at: jason.marino@grahamcounty.org no later than Thursday, March 20, 2025, by 5:00 p.m. Any required addenda will be issued no later than March 21, 2025.

Quotes must be received in the Graham County Administrative Building Room 117 located at 196 Knight Street in Robbinsville, NC by **Monday, March 24, 2025, by 2:00 p.m**.

Graham County, North Carolina reserves the right to waive any informalities or to reject any or all bids.

See Graham County Procurement Statement Below:
To the greatest extent possible, training / employment opportunities and contracts for work are to be awarded to businesses located in or owned in substantial part by persons residing in Graham County. Please note that this does not guarantee actual employment or contracts. For further information, or to request to be added to the County's list of Section 3 businesses / residents, please contact Graham County Project Manager Jason Marino Mailing: 12 N Main Street, Physical: 196 Knight Street, Robbinsville, NC 28771; phone 828-479-7960; email: jason.marino@grahamcounty.org

The County is an Equal Opportunity Employer and encourages proposals from small, minority, and female-owned businesses (M/WBE); historically underutilized businesses (HUB); disadvantaged business enterprise (DBE); and locally owned/operated businesses that provide employment and training opportunities to low-income individuals. The County does not discriminate based on race, color, religion, sex, national origin, handicap, age, familial status, in the admission, access to, treatment, or employment in projects and activities.

This information is available in Spanish or any other language upon request. Please contact Graham County at 828-479-7961 or at 196 Knight Street, Robbinsville, NC 28771. Esta información está disponible en español o en cualquier otro idioma bajo petición. Por favor, póngase en contacto con Graham County at 828-479-7961 o a 196 Knight Street, Robbinsville, NC para obtener ayuda. "

EQUAL HOUSING OPPORTUNITY

Statement of Work (SOW) Request for Quotes (RFQ)
Construction of Concrete Steps (2) at the Santeetlah Church Cemetery
20 Santeetlah Cemetery Road
Robbinsville, NC 28771

1.0 STATEMENT OF WORK

The Contractor shall furnish all management, supervision, labor, material, equipment, tools, supplies, parts, and related services, in accordance with this SOW, plans and specifications as provided. Electronic copies of the SOW documentation shall be furnished by the Graham County Project Manager upon Contractors' written request. Hard copies of the SOW documentation are available at the Graham County Administrative Offices building in the project manager's office room 104 located at 196 Knight Street, Robbinsville, NC. Contact the Graham County Project Manager to set up a pre-scheduled project site survey by email: jason.marino@grahamcounty.org or by phone: 828-735-5322. Contractors shall inspect the work area and will be responsible for verifying all quantities and dimensions. The general scope of work includes but is not limited to: Construction of one new set of steel reinforced concrete steps, approx. 8' x 13', with matching height to existing steps aluminum handrail on both sides located at the Santeetlah Church Cemetery in Robbinsville, NC. Upon completion of installation ensure the work area is clean and free of all construction materials and debris.

2.0 GENERAL

1. The contractor will communicate with the Graham County Project Manager on all questions, concerns, review of project scope, comments, site survey, access, etc.
2. Changes, RFI responses, etc. will be issued as an addendum prior to quote submission deadline as required.
3. Work required for this project shall be in accordance with the best practices of the building trades involved and in accordance with the true intent and meaning of the SOW, contract plans, specifications, documents and requirements without additional cost to Graham County Government.
4. Prior to procurement, provide product information and technical specifications submittal for each material used. The owner will make final selections on size, color, finishes, etc. after award.

3.0 GENERAL CONDITIONS

1. The use of all Personal Protective Equipment (PPE) is required on all Graham County property and projects. Maintain a clear, clean, and safe working environment.
2. As needed, protect the entire work area and equipment.
3. Prevent damage to existing work area surfaces, equipment and finishes.
4. Maintain a secure construction site with controlled access.
5. Provide all manufacturer and contractor warranty information, O & M Manuals.
6. Construction debris dump fees will be waived ONLY if delivered to the Graham County Sanitation Department on Snowbird Road.

4.0 PROJECT SCHEDULE AND TIMELINE

1. Upon notice of award the contractor shall provide a copy of their Certificate of Insurance (COI) within 3 business days.
2. Notice to Proceed (NTP) will be issued within 7 days of award.
3. Upon issuance of a NTP, the contractor shall provide the owner a schedule of the projects planned start and completion dates within 3 business days.

TIMELINE

The key activities and milestone dates for the solicitation of this project are listed below:

Activity	**Milestone Date**
RFQ Published and Distributed:	3.12.2025
Deadline for Respondent Questions:	3.20.2025 by 5:00 PM
Issuance of Addenda as needed:	3.21.2025
Quote Submission Deadline:	3.24.2025 by 2:00 PM
Contractor Selection Notification*	

**To be determined.*

5.0 PRICING SHEET

The undersigned, contractor, hereby declares that: the only person or persons interested in this proposal as principal or principals is or are named herein, and no other person than herein mentioned has any interest in this proposal or in the Contract to be entered into; this proposal is made without connection with any other person, company, or party submitting a quote or proposal; and it is in all respects fair and in good faith without collusion or fraud. The contractor further declares that: he/she has examined the site of the work and is informed fully in regard to all conditions pertaining to the place where the work is to be done; and has examined the specifications for the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of quotes; and he has satisfied with the relative work to be performed.

The contractor proposes and agrees if this proposal is accepted to contract with **Graham County** hereinafter called the Owner, in the form of a Contract specified, to furnish all necessary material, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete all portions of the work for the **Graham County Cemetery Department Construction of Concrete Steps (2) at the Santeetlah Church Cemetery in Robbinsville,** North Carolina for Graham County, North Carolina, in full and complete accordance with the contract documents to the full and entire satisfaction of the Owner with a definite understanding that no money will be allowed for extra work except as set forth in the General Contract Conditions and Contract Documents, for the sum of:

BASE QUOTE (Written):_____

_____Dollars $_____

Respectfully submitted this _____day of_____, 2025

_____ _____
(Name of Firm or Corporation Submitting Quote) Signed

Title:_____ License No.:_____
(Owner, partner, Corp. Pres. or Vice Pres., etc.)

Address: _____ Federal ID No.:_____

Addenda Received and Used in Computing Quote (Initial as appropriate)

Addendum No._____Dated _____ Received_____
Addendum No._____Dated _____ Received_____
Addendum No._____Dated _____ Received_____

6.0 PROPOSAL ACCEPTANCE

Quote Price (Written): _____

_____Dollars $_____

Firm/Company and address:_____

Authorized Representative Print Name:_____Title:_____

Authorized Representative Signed: _____Date: _____

Phone Number:_____

Email: _____

Graham County Government

Signed:_____

Print Name:_____

Title:_____

Date:_____

SECTION 02933
SEEDING AND MULCHING

1. DESCRIPTION: The work covered by this section consists of furnishing all labor, materials, and equipment to perform all necessary operations to topsoil, fine grade, fertilize, mulch and maintain temporary and permanent seeding of all graded, cleared, or disturbed areas during construction. The work covered by this section shall be in conformance with Section 880 of the "Standard Specifications for Roads and Structures" dated latest edition, published by the North Carolina Department of Transportation and with Chapter 6 of the "Erosion and Sediment Control Planning and Design Manual" published by the Land Quality Section of the North Carolina Department of Environment and Natural Resources unless otherwise stated herein.

2. MATERIALS:

2.1 Topsoil: Topsoil shall be from stockpiles created from stripping and required excavation. Should additional topsoil be required in excess of that obtained from stripping and excavation, the contractor shall obtain material from other sources on the site where authorized by the Owner, or from approved sources off the site. The topsoil shall be natural, friable soil, possessing characteristics of representative soils in the vicinity which produce heavy growths of crops of grass. It shall be obtained from naturally well-drained areas, shall be reasonably free from subsoil, brush, objectionable weeds, and other litter and shall be free from toxic substances, clay lumps, stones, roots and other objects larger than l inch in diameter, or any other material which might be harmful to plant growth or be a hindrance to grading, planting, and maintenance operations.

2.2 Fertilizer: Fertilizer shall be the product of an approved commercial fertilizer manufacturer and shall be 5-10-10 grade, or otherwise recommended by soil testing, uniform in composition, free-flowing material suitable for application with approved standard equipment. The fertilizer shall conform to the applicable State fertilizer laws and shall be delivered to the site in bags or other convenient containers each fully labeled and bearing the name, trademark, and warranty of the producer.

2.3 Lime: Lime shall be ground limestone containing not less than 85% of total carbonates and shall be ground to such fineness that at least 50% will pass through a 100-mesh sieve and at least 90% will pass through a 20-mesh sieve. Coarser materials will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing the l00-mesh sieve, but no additional payment will be made for the increased quantity.

2.4 Mulch: Mulch shall be straw from wheat or oats. Materials for securing mulch may be one of the following:

2.5 Mulch Netting: Lightweight plastic, cotton, jute, wire or paper nets shall be used.

2.6 Peg and Twine: Bailing twine and soft wood pegs l/2" x l" x l2".

2.7 Liquid Mulch Binder: RC-2 cut back asphalt conforming to the requirements of Federal Specifications SS-A67lA, and asphalt emulsion shall conform to the requirements of Federal Specification SS-A-674, Type V.

2.8 Seed: Seed used shall bear the official "certified seed" label inspected by North Carolina Crop Improvement Association. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be acceptable. The seed used shall be that shown in seeding schedule specified under description and NCDOT.

3. INSTALLATION:

3.1 Seedbed Preparation:

3.1.1 Clearing: Prior to or during grading and tillage operations, the ground surface shall be well drained, cleared of all brush, roots, stones larger than 2 inches in diameter, or any other material which may hinder proper grading, tillage, or subsequent maintenance operations.

3.1.2 Fine Grading: Areas to be seeded shall be graded as shown on the drawings or as directed and all surfaces shall be left in an even and properly compacted condition so as to prevent the formation of depressions where water will stand. Areas to be top soiled shall be graded to a smooth surface and to a grade that will allow top soiling to finished grade.

3.1.3 Top soiling: Immediately prior to placing topsoil, the subgrade, where excessively compacted by traffic or other causes, shall be loosened by scarifying to a depth of at least 2 inches to permit bonding of the seeding and mulching to the subgrade.

3.1.4 Tillage: After grassed areas required to be seeded have been brought to the grades shown on the plans and as specified, they shall be thoroughly tilled to a depth of 3 inches by approved methods, until the condition of the soil is acceptable to the Owner. Any objectionable undulations or irregularities in the

surface resulting from tillage or other operations shall be removed before planting operations are begun. The work shall be performed only during periods when satisfactory results are likely to be obtained. When conditions are such, by reason of drought, excessive moisture or other factors, that results are not likely to be satisfactory, the Owner

3.1.5 will stop the work and it shall be resumed only when, in his opinion, the desired results are likely to be obtained.

3.2 Limestone, Fertilizer and Seed:

3.2.1 General: Seasonal limitations for seeding operations; the kinds and grades of fertilizers; the kinds of seed; the rates of application of limestone, fertilizer, and seed shall be as shown in the seeding schedule.

3.2.2 Equipment to be used for the application, covering, or compaction of limestone, fertilizer, and seed shall have been approved by the Owner before being used on the project. Approval may be revoked at any time if equipment is not maintained in satisfactory working condition, or if the equipment operation damages the seed.

3.2.3 Limestone, fertilizer, and seed shall be applied within 24 hours after completion of seedbed preparation unless otherwise permitted by the Owner, but no limestone or fertilizer shall be distributed and no seed shall be sown when the Owner determines that weather and soil conditions are unfavorable for such operations.

3.2.4 During the application of fertilizer, adequate precautions shall be taken to prevent damage to structures or any other appurtenances. The Contractor shall either provide adequate covering or change methods of application as required to avoid such damage. When such damage occurs, the Contractor shall repair it, including any cleaning that may be necessary.

3.3 Limestone and Fertilizer: Limestone may be applied as a part of the seedbed preparation, provided it is immediately worked into the soil. If not so applied, limestone and fertilizer shall be distributed uniformly over the prepared seedbed at a specified rate of application and then harrowed, raked, or otherwise thoroughly worked or mixed into the seedbed.

3.3.1 If liquid fertilizer is used, storage containers for the liquid fertilizer shall be located on the project and shall be equipped for agitation of the liquid prior to its use. The storage containers shall be equipped with approved measuring or metering devices which will enable the Owner to record at any time the amount of liquid that has been removed from the container. Application equipment for liquid fertilizer, other than a hydraulic seeder, shall be calibrated to insure that the required rate of fertilizer is applied uniformly.

3.4 Seeding: Seed shall be distributed uniformly over the seedbed at the rate indicated in the seeding schedule, and immediately harrowed, dragged, raked, or otherwise worked so as to cover the seed with a layer of soil. The depth of covering shall be as directed by the Owner. If two kinds of seed are to be used which require different depths of covering, they shall be sown separately.

3.4.1 When a combination seed and fertilizer drill is used, fertilizer may be drilled in with the seed after limestone has been applied and worked into the soil. If two kinds of seed are being used which require different depths of covering, the seed requiring the lighter covering may be sown broadcast or with a special attachment to the drill, or drilled lightly following the initial drilling operation.

3.4.2 When a hydraulic seeder is used for application of seed and fertilizer, the seed shall not remain in water containing fertilizer for more than 30 minutes prior to application unless otherwise permitted by the Owner.

3.4.3 Immediately after seed has been properly covered, the seedbed shall be compacted in the manner and degree approved by the Owner.

3.5 Modifications: When adverse seeding conditions are encountered due to steepness of slope, height of slope, or soil conditions, the Owner may direct or permit that modifications be made in the above requirements which pertain to incorporating limestone into the seedbed; covering limestone, seed, and fertilizer; and compaction of the seedbed.

3.5.1 Such modifications may include but not be limited to the following:

1. The incorporation of limestone into the seedbed may be omitted on (a) cut slopes steeper than 2:1 (b) on 2:1 cut slopes when a seedbed has been prepared during the excavation of the cut and is still in an acceptable condition; or (c) on areas of slopes where the surface of the area is too rocky to permit the incorporation of the limestone.

2. The rates of application of limestone, fertilizer, and seed on slopes 2:l or steeper or on rocky surfaces may be reduced or eliminated.

3. Compaction after seeding may be reduced or eliminated on slopes 2:1 or steeper, on rocky surfaces, or on other areas where soil conditions would make compaction undesirable.

3.6 Mulch:

3.6.1 General: All seeded areas shall be mulched unless otherwise indicated on the plans or directed by the Owner. Application rate of mulch shall be indicated in seeding schedule.

3.6.2 Mulching: Mulch shall be applied within 36 hours after the completion of seeding unless otherwise permitted by the Owner. Care shall be exercised to prevent displacement of soil or seed or other damage to the seeded area during the mulching operations.

3.6.3 Mulch shall be uniformly spread by hand or by approved mechanical spreaders or blowers which will provide an acceptable application. An acceptable application will be that which will allow some sunlight to penetrate and air to circulate but also partially shade the ground, reduce erosion, and conserve soil moisture.

3.6.4 Mulch Binding: Mulch shall be held in place using devices approved by the Owner as per manufacturer's recommendations. During application, the Contractor shall take adequate precautions to prevent damage to structures or appurtenances.

3.7 Maintenance:

3.7.1 General: The Contractor shall be responsible for the proper care and maintenance of the seeded areas until the work under the entire contract has been completed and accepted by the Owner. Maintenance shall consist of repair and replacement of eroded areas, watering, re-fertilizing, re-liming, reseeding, and re-mulching as necessary to provide an even, fixed growth of grass. In addition, the Contractor shall provide protection against traffic and shall erect the necessary barricades and warning signs immediately after planting is completed.

3.7.2 Mowing: The seeded areas shall be mowed with approved mowing equipment as per seeding schedule. If weeds or other undesirable vegetation threaten to smother the planted species, such vegetation shall be removed at no cost to the Owner.

3.8 Inspection and Testing:

3.8.1 Fertilizer and Lime: The Owner shall be furnished with duplicate copies of invoices for all fertilizer and lime used on the project. Invoices for fertilizer shall show the grade furnished. Invoices for lime shall show total minimum carbonates and minimum percentages of the material furnished that pass l00-mesh and 20-mesh sieve. Upon completion of the project, a final check of the total quantities of fertilizer and lime used will be made against the total area top soiled and seeded, and if the minimum rates of application have not been met, the Owner may require the distribution of additional quantities of these materials to make up the minimum application specified at no additional cost to the Owner.

3.8.2 Seed: The Owner shall be furnished duplicate signed copies of a statement from the Vendor, certifying that each container of seed delivered is fully labeled and in full accordance with the specifications in this section and the seeding schedule.

END OF SECTION

SECTION 03110 - CONCRETE FORMWORK

PART 1 - GENERAL

Related Documents: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division 1 Specification Sections, apply to work of this Section.

Summary: The extent of formwork is indicated by the concrete structures shown on the Contract Drawings. Work shall include (except as specified elsewhere in the Contract Documents) providing formwork and shoring for cast-in-place concrete; and installation of items furnished by others into formwork such as anchors, plates, inserts, frames, nosing's, and any other items embedded in concrete. Form openings for penetrations such as mechanical, electrical and architectural work.

RELATED WORK SPECIFIED ELSEWHERE:

Cast-In-Place Concrete: Elsewhere in Division 3
Concrete Reinforcement: Elsewhere in Division 3

QUALITY ASSURANCE:

Codes and Standards: Current editions of the following as references apply to work of this Section except as otherwise specified herein.

Publications of the American Concrete Institute:

ACI 347 "Recommended Practice for Concrete Formwork"

ACI 301 "Specification for Structural Concrete for Buildings"

ACI 117 "Standard Tolerances for Concrete Construction and Materials"

Qualifications of Workmen: Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed, the referenced standards and the requirements of this work, and who shall direct work performed under this Section.

SUBMITTALS:

Product Data and Manufacturer's Printed Installation Instructions: Submit (in triplicate) Manufacturer's specifications and installation instructions for proprietary materials and items as required, including form coatings, form materials, manufactured form systems, ties, accessories, formwork facing material, jointing, reveals, chamfers, etc.

Re-shoring: Submit (in triplicate) Contractor's sequence, locations, and placement of shores and re-shores. Load capacity of shores shall be shown on this submittal.

PART 2 - PRODUCTS

FORMWORK MATERIALS:

Exposed Concrete Surfaces:

Formwork for exposed concrete surfaces shall be constructed with high quality plywood materials or other approved materials to obtain a smooth, straight, non-yielding surface. Form plywood shall be a resin overlay type similar to Burke-Neotex, Fin Form, or have a polyurethane or similar coating sufficiently heavy to prevent transfer of wood grain and to fill and cover plugs and defects in the plywood. Plywood forms shall be constructed with 4' x 8' minimum size sections of plywood to minimize the number of joints in the formwork.

Joints in the plywood and around holes shall be cleaned of release agents' residue and sealed with a 2" wide vinyl or polyester film tape similar to 3M Number 351 Scotch par film to prevent leakage of water and grout at the joints. In lieu of a tape, a continuous silicone sealant may be used along the joints to seal joints in the formwork. Joints shall be continuously sealed to prevent any leakage of water or grout.

Unexposed Concrete Surfaces: Shall be formed with plywood not less than 5/8" thick, 5-ply Douglas Fir plywood conforming to PS 1, and as manufactured by a member of APA; B-B Ply form, Class I, EXT-APA.

Form Ties: Provide factory-fabricated, adjustable-length, non-leaking metal form ties with plastic cones for all exposed concrete walls. The ties shall be designed to prevent form deflection and to prevent spalling of concrete surfaces upon removal. Snap-off metal ties designed to prevent form deflection and to prevent spalling of concrete surfaces upon removal may be used for concrete that is not exposed. Plastic cones on snap ties shall be a type that places the portion remaining within concrete (after removal of exterior parts) at least 1-1/2" from outer surface of concrete. Twisted wire ties or band iron will not be permitted.

Form Coating: Provide commercial formulation of form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces; and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion; nor impede wetting of surfaces to be cured with water or curing compounds.

Form-facing materials: Shall be such as to provide specified surface tolerances and finishes, and to meet requirements of Section 2 of ACI 301.

PART 3 - EXECUTION

EXAMINATION:

General: Prior to work of this Section, carefully inspect the site and the installed work of all other trades and verify that such work is complete to the point where this installation may properly commence in accordance with the requirements shown on the drawings and specified herein. Verify that forms may be constructed in accordance with pertinent codes and regulations, the referenced standards, and the requirements of these Specifications. In the event of discrepancy, immediately notify Graham County. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

DESIGN OF FORMWORK:

Design, erect, support, brace, and maintain formwork so that it will safely support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure.

Contractor shall be responsible for the design and adequacy of formwork in its entirety. The design of the formwork shall meet the requirements of ACI 347 except as specified herein.

Thicknesses of formwork shall be sufficient to withstand pressure of newly placed concrete without bow or deflection. Bow or deflection of form-facing materials for exposed concrete shall not exceed L/600 of the span between supports.

Design formwork to be readily removable without impact, shock, or damage to concrete surfaces and adjacent materials.

Unless otherwise shown or specified, design, construct, erect, maintain, and remove forms and related structures for cast-in-place concrete work in compliance with ACI 347.

Support conveying equipment for placing concrete directly on formwork or structural member without bearing on reinforcing steel. Where cast finishes are required, materials which will impart a stain to the concrete shall not be applied to the form surface. Where finished surfaces are to receive coatings, materials applied to the form surfaces shall be compatible with the coatings.

Concrete in Earth: Where trench excavation is used, and where sides of excavations are cut neatly in good, firm soil, side-forms may be omitted.

Form Construction:

Forms shall be constructed to comply with requirements of ACI 347. Forms shall be to exact sizes, shapes, lines, and dimensions shown; and as required to obtain accurate alignment, location, grades, level, and plumb in finished structures.

Provide for openings, sleeves, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required. Bevel, marker and rustication strips shall be applied in straight lines and well nailed to prevent displacement.

Form intersecting planes to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.

Provide openings in wood forms to accommodate other work, including mechanical and electrical work. Place accurately and support securely items required to be built into forms.

Drill forms to suit ties used, and to prevent leakage of concrete mortar around tie-holes. Do not splinter forms by driving ties through improperly prepared holes. Seal holes and openings in formwork for exposed concrete surfaces.

Do not use metal cover plates for patching holes or defects in forms.

Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Butt joints solidly, and provide backup material at joints as required to prevent leakage and fins.

Fit forms (placed in successive units for continuous surfaces) to accurate alignment, free from irregularities, and within allowable tolerances.

Cleanouts, Cleaning, and Tightening: Provide temporary openings in forms as required to facilitate cleaning and inspection. Thoroughly clean forms and adjacent surfaces which will receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before concrete is placed. Retighten forms immediately after concrete placement (as required) to eliminate mortar leaks.

Formwork for Exposed Work: Construct forms for exposed work with 4' x 8' minimum size sheets of overlaid plywood to provide continuous, straight, smooth exposed surfaces. Use largest practicable size of plywood to minimize number of joints. Provide continuous watertight sealants for joints in plywood forms for exposed work using a 2" wide vinyl or polyester tape or applying a continuous seal with a silicone caulking. Provide chamfered corners at corners of exposed concrete. Joints shall be accurately cut, fitted, and sealed to prevent leakage of grout.

Formwork for Unexposed Work: For unexposed surfaces in finished structure, construct formwork with plywood, boards, metal, or other acceptable material.

Construction Joints: Forming material for flush surfaces exposed to view shall overlap hardened concrete of previous placement by a minimum of 1 foot. Contact surface of form shall be held against hardened concrete sufficiently tight to prevent offsets or loss of mortar at joint, and shall maintain a true surface.

Form Coatings: Coat contact surfaces of forms with form-coating compound immediately before reinforcement is placed. Do not allow excess form coating to accumulate in forms or come in contact with reinforcing steel or embedded items. Apply in strict accordance with manufacturer's recommendations.

Embedded Items: Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or separated by cast-in-place concrete. Use setting drawings or instructions, and directions provided by suppliers of items to be attached thereto.

Form Removal:

Formwork not supporting the weight of wet concrete, such as sides of walls, columns, and similar parts of the work, may be removed 72 hours after placement of concrete, provided concrete is sufficiently hard so as not to be damaged by form-removal operations, and provided that curing and protection operations are maintained on newly exposed concrete for an additional 96 hours.
Circular column forms shall be removed within five days from casting unless otherwise approved by the form manufacturer.

Formwork supporting the weight of wet concrete shall not be removed until after concrete has attained a minimum of 75% of specified design strength. Compressive strength of concrete cured under field conditions shall be verified by the Contractor by methods acceptable to Graham County prior to removing forms.

Shores and Reshoring: Shores and re-shores shall extend at least three (3) levels below the floor level or roof where concrete is being placed. Maintain at all times a minimum of two (2) levels of shoring below the level where concrete is being placed. Locate shores directly under level being placed so that loads from construction above will be transferred directly to the shores at the level below. Space shores in the level below this level in such a manner that no level or member will be excessively loaded. In general, shores at this level will be approximately 1/2 of the shores required at the level above. Extend shores below this level if required to insure proper distribution of loads throughout the structure. Shores and re-shores shall be sized to safely support the

loads from the wet concrete and construction loads at the level being constructed. Re-shores cannot be removed until the concrete in the level placed has attained a minimum of 80% of its specified compressive strength.

Re-Use of Forms: Clean and repair surfaces of forms to be re-used in the work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable. Apply new form-coating compound to surfaces in contact with concrete as specified for new formwork.

Tolerances: Tolerances for formwork and resulting concrete shall conform to requirements of ACI 347 and ACI 117.

END OF SECTION 03110

SECTION 03210 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division 1 Specification Sections, apply to work of this Section.

SUMMARY: Reinforcement for cast-in-place concrete (including bars, welded wire fabric, ties, and supports) as shown on Drawings, and as specified herein.

RELATED WORK SPECIFIED ELSEWHERE:

Concrete Formwork: Elsewhere in Division 3

Cast-In-Place Concrete: Elsewhere in Division 3

QUALITY ASSURANCE:

Codes and Standards: Current editions of the following as references apply to the work of this Section.

Publications of the ACI:

ACI 117 "Standard Tolerances for Concrete Construction and Materials"

ACI 301 "Specification for Structural Concrete for Buildings"

ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures"

ACI 318 "Building Code Requirements for Reinforced Concrete"

Publication of the AWS:

AWS D1.4 "Recommended Practice for Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction"

Publication of the CRSI: "Manual of Standard Practice"

DELIVERY, STORAGE, HANDLING:

Delivery and Identification: Reinforcing steel shall be delivered to the project site properly tagged, bundled, and ready to place.

Protection: Reinforcing steel delivered to the project site shall be protected from mud, excessive rust-producing conditions, oil, grease, or distortion. Reinforcing steel shall be stored off ground on heavy timbers.

PART 2 - PRODUCTS

REINFORCING MATERIALS:

Reinforcing Bars: New, deformed bars, conforming to ASTM A615-S1 Grade 60, as required on Drawings.

Bar Mats: Bar mats for concrete reinforcement shall conform to the requirements of ASTM A184 "Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement."

Welded Wire Reinforcement: Welded plain wire reinforcement for concrete reinforcement shall conform to ASTM A185 "Specification for Steel Welded Wire Reinforcement, Plain, for Concrete Reinforcement" except that for wire with a specified yield strength exceeding 60,000 psi shall have a stress corresponding to a strain of 0.35 percent if the yield strength exceeds 60,000 psi. Wire for welded wire reinforcement shall be made of wire conforming to ASTM A82, "Specification for Steel Wire, Plain, for Concrete Reinforcement". Provide reinforcement in sheets.

Mechanical Splices: Where called for or specified on the Drawings, mechanical splices for reinforcing steel shall be a positive connecting threaded type with a coupler. Splices shall meet the requirements of ACI 318. Bar ends shall be threaded with coupler manufacturer bar threads to ensure proper thread engagement. Bars shall be tightened to the manufacturer's recommended wrench setting. Mechanical splices shall be capable of providing an ultimate strength of 125% of the yield strength of the reinforcing steel.

Plain Smooth Dowels: Plain smooth dowels for construction joints in slabs on grade shall conform to ASTM A306.

Accessories: Fabricate from concrete, metal, plastic or other approved materials. Chairs or bolsters for use in exposed concrete shall have plastic-coated or stainless steel (AISI Alloy 302 or 304) legs.

PART 3 - EXECUTION

FABRICATION:

General: Reinforcing steel shall be fabricated to shapes and dimensions indicated on Drawings, and in compliance with applicable provisions of ACI 301 and ACI 318.

Field Bending: No bars shall be bent in field, unless specifically indicated on Drawings or approved in writing by Graham County.

Tolerances: Bars used for concrete reinforcement shall meet the following requirements for fabrication tolerances:

Sheared length:	± one inch
Stirrups and ties:	± one-quarter inch
All other bends:	± one inch

PLACING OF REINFORCING STEEL:

General: Reinforcing shall be free from scale, loose rust, mud, or coatings which will reduce bond to concrete. Bars with kinks or bends not shown on Drawings shall not be placed. Heating of reinforcement for bending or straightening will not be permitted. Minimum concrete cover for reinforcing shall be as shown on Drawings. Bars shall not be bent after embedment in hardened concrete except as shown on the Drawings.

Tolerances: Bars shall be placed to the following tolerances:

Concrete cover to formed surfaces: ± one-quarter inch for members 8" deep or less and ± one-half inch for members deeper than 8"

Clearance to vertical form surface: ± one-quarter inch

Spacing of Bars: Minimum clear distance between parallel bars in a beam shall be equal to 1.5 times the nominal diameter of bar. In no case shall clear distance between bars be less than 1", nor less than 1-1/3 times maximum size of coarse aggregate. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter or enough to exceed tolerances required, resulting arrangement of bars shall be subject to approval by Graham County.

Accessories: Furnish approved bar supports over formwork. Where concrete surface will be exposed to weather in finished structure, or where rust would impair subsequent finishes, portions of accessories in contact with formwork shall be made of stainless steel or shall have plastic-coated legs. Nails shall not be driven into formwork to support reinforcement.

Standards: Space bar supports in accordance with ACI 315, ACI 301, and CRSI Manual of Standard Practice except as shown on the Drawings.

Securing Reinforcement: Reinforcing bars shall be supported and wired together to prevent displacement by construction loads or by concrete being placed, beyond tolerances as set forth hereinbefore. Maintain metal reinforcement securely and accurately in place until concrete is placed. Use bar bolsters on side-forms for concrete walls and piers.

Disturbances: Any disturbance of reinforcement shall be corrected fully prior to placement of concrete. Damaged bar-supports and spacers shall be repaired, or shall be removed and replaced.

Column and Pier Dowels: To insure proper placement of column and pier dowels, plywood templates shall be furnished for dowels.

Welding: When approved in writing by Graham County, welding of reinforcing steel shall conform to AWS D1.4. Do not weld at bend in a bar. Welding of cross bars will not be permitted.

SPLICES OF REINFORCEMENT:

General: Splices and offsets in reinforcement shall not be made at points of maximum stress. Splices shall be approved. Splices shall provide sufficient lap to transfer required stress. Stagger splices of adjacent bars wherever possible. Character and design of each splice shall conform to requirements of ACI 318. Minimum splice shall be 36 bar diameters for reinforced concrete and 48 bar diameters for reinforced masonry.

MECHANICAL SPLICES:

General: Examine the threaded bar ends to make sure that they are undamaged and clean. If cleaning is required, use a wire brush. Damaged threads and couplers shall be rejected. Determine that the coupler is the correct size for the bar being spliced.

Installation: Screw the coupler to the end of the bar to be spliced and tighten by hand. Screw the second bar into the coupler and hand-tighten. Tighten each coupler with an inspection wrench furnished by the manufacturer. Tighten to the minimum required wrench setting value shown for the specific coupler size being installed.

FIELD QUALITY CONTROL:

Review of Placement of Reinforcing Steel: Graham County shall be given advance notice of not less than 24 hours prior to concrete placement to allow review of reinforcing steel. Any concrete placed without approval of Owner's representative will be subject to rejection. Review of placement of reinforcement in a section will be made only after placement is complete for that section to be poured. Such reviews shall not relieve the Contractor of his responsibility to provide work in accordance with the requirements of the Contract Documents. Such reviews are for purpose of minimizing errors in field work.

END OF SECTION 03210

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

Related Documents: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division 1 Specification Sections, apply to work of this Section.

Summary: The extent of cast-in-place concrete work is shown on the Drawings and, not by way of limitation, includes concrete footings, walls, slabs on grade, grout, and other elements as detailed. Also included in this Section are related items of quality control, quality-assurance testing, and evaluation of concrete strength.

RELATED WORK SPECIFIED ELSEWHERE:

Concrete reinforcement: Elsewhere in Division 3.

Concrete formwork: Elsewhere in Division 3.

QUALITY ASSURANCE:

Codes and Standards: The current editions of the following standards as references for the work of this Section except as indicated otherwise on the Drawings or specified herein:

ACI 117	"Standard Specifications for Tolerances for Concrete Construction and Materials and Commentary", except where more stringent requirements are specified.
ACI 211.1	"Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete"
ACI 212	"Guide for Use of Admixtures in Concrete"
ACI 301	"Specifications for Structural Concrete"
ACI 302	"Guide for Concrete Floor and Slab Construction"
ACI 304	"Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete"
ACI 305	"Hot Weather Concreting"
ACI 306	"Cold Weather Concreting"
ACI 308	"Recommended Practice for Curing Concrete"
ACI 309	"Recommended Practice for Consolidation of Concrete"
ACI 311	"Recommended Practice for Concrete Inspection"
ACI 318	"Building Code Requirements for Reinforced Concrete"

Building Code: North Carolina Building Code – Most Current Edition with all current amendments.

Ready-mixed concrete production facilities shall be certified by the National Ready-Mixed Concrete Association, or the producer shall demonstrate, to the satisfaction of Graham County, ability to comply with this Section.

Concrete testing service:

The Owner, at their discretion, will employ a testing laboratory to perform concrete testing during construction. Concrete testing shall be performed by a laboratory meeting the requirements of ASTM E-329, Standard Specifications for engaged in the Testing and/or Inspection of Materials Used in Construction. Specimens shall be taken as follows:

A set of four (4) test cylinders shall be taken on each type and class of concrete for each day's pour up to 100 cubic yards, not less than one for each 4000 sq. ft. of surface area for walls or slabs. A second set shall be taken for 100 c.y. to 200 c.y., and a third set for more than 200 c.y. poured in any one sequence. Two

cylinders out of each set shall be tested at seven days and two at twenty-eight days. Cylinders for compressive strength tests shall be molded and cured in accordance with ASTM C31 and tested in accordance with ASTM C39.

In addition to the strength tests on standard test cylinders, the following additional tests shall be made by the Owner's testing laboratory.

Slump - one test for each load from which test cylinders are taken at point of discharge made in accordance with ASTM C143. Slump tests other than those made by the Owner's Testing Laboratory from concrete sampled for test cylinders shall be made by the Contractor.

Air Content - one test for each set of test cylinders made in accordance with ASTM C173 or ASTM C231 and random tests on loads as directed by Graham County.

Concrete Temperature - one test for each truck when outside air temperature is 50°F and below, or 80°F and above, and one for each set of standard test cylinders.

Unit Weight - one test for each set of test cylinders.

Reports of compressive strength tests shall contain project identification name, date of concrete placement, name of contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests, slump, air content, unit weight, and concrete temperature. List type and amount of admixtures on report.

Mix Designs:

Mix designs shall be prepared and reported by a Ready-mixed concrete production facility certified by the National Ready-Mixed Concrete Association, or the producer shall demonstrate, to the satisfaction of Graham County, ability to comply with this Section.

Proportions of materials for concrete shall be established in the mix designs to provide:

Workability and consistency to permit concrete to be placed and worked readily into forms and around reinforcement under conditions of placement employed by the Contractor without segregation or excessive bleeding.

Resistance to special exposures for concrete exposed to freezing and thawing in a moist condition.

Average compressive strengths as required in Section 5.3.2 of ACI 318 for the strength class of concrete pecified. Water/cement ratios shall not exceed 0.45 for elevated slabs, beams, and girders.

The minimum cement content of all concrete mixes shall be 520 lb. of cement per cu. yd.

Design mixes shall be proportioned either on the basis of field experience and/or trial mixtures in accordance with the requirements set forth in Chapter 5 of ACI 318 after the standard deviation and average compressive strength required for each strength class of concrete has been established.

The standard deviation shall be established in accordance with Section 5.3.1 of ACI 318.

The required average strength for each class of concrete shall be established in accordance with Section 5.3.2 of ACI 318.

Design mixes shall be prepared using the maximum slumps and temperature of fresh concrete permitted in these Specifications.

Mix designs shall be formulated taking into consideration the method of placement of the concrete in the forms (i.e. chutes, buckets, pumps, conveyors, etc.). Within a given class of concrete, if placement methods require different designs, separate mix designs must be submitted for approval.

PART 2 - PRODUCTS

CONCRETE MATERIALS:

Portland Cement: ASTM C150, Normal Type I. Cement shall be from the same manufacturer for the entire project, unless approved in writing by Graham County. Samples of cement from each shipment shall be retained by the Concrete Supplier until completion of the project.

Normal Weight:

Aggregates: ASTM C33.

Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.

Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:

Crushed stone, processed from natural rock or stone meeting ASTM C33.

Maximum Aggregate Size: Not larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars.

Light Weight: None required

Aggregate: ASTM C330.

Water: Clean, fresh, potable.

Air-Entraining Admixture: ASTM C260.

Water-Reducing Admixture: ASTM C494, Type A. Use only admixtures which have been tested and accepted in mix designs, unless otherwise approved in writing by Graham County.

High-Range Water-Reducers (Superplasticizers): High-range water-reducers shall be either a sulfonated naphthalene formaldehyde condensate or a sulfonated melamine formaldehyde condensate conforming to ASTM C494 Type F. In concrete mixes containing other chemical admixtures, water reducers and air entrainment, the compatibility between these admixtures and the high-range water-reducers shall have been investigated by the manufacturer and the results found to be satisfactory. Dosage rates of normal Type A water reducers and air-entraining admixtures shall be adjusted in concrete mixes with high-range water-reducers in accordance with the recommendations of the manufacturer of the admixtures.

Fly Ash: Fly ash shall have a high fineness and low carbon content and shall exceed the requirements of ASTM C618, “Specification for Fly Ash and Raw or Calcined Natural Pozzolon for Use as a Mineral Admixture in Portland Cement Concrete”, for Class F except that the loss on ignition shall be less than 3% and all fly ash shall be a classified process material. Fly ash shall be obtained from one source for the entire project and for all concrete delivered to the project. Complete chemical and physical analysis of the fly ash shall be submitted to the Engineer prior to use, and the reports of chemical and physical tests on all shipments to the supplier shall be maintained by the supplier for the duration of the project. The amount of fly ash in concrete mixes prepared with fly ash shall not be less than fifteen percent (15%) nor more than twenty-five percent (25%) by weight of cement.

Vapor Barrier: Provide vapor barrier that is resistant to deterioration when tested according to ASTM E 154. In addition, polyethylene facing shall comply with North Carolina weights and measures ACT (G-5-81A) and North Carolina Department of Agriculture packaging and labeling regulations (2N.C.A.C. 38-0300) with respect to length, width, thickness and weight.

Water-resistant barrier consisting of heavy kraft papers laminated together with fiber reinforcement and over coated with black polyethylene on each side.

Product: Subject to compliance with requirements, provide Moistop by Fortifiber Corporation or Griffolyn T-65 3-ply by Reef Industries.

CURING MEMBRANES:

Liquid-Membrane Curing Compounds: If used, Liquid-membrane curing compounds shall be high-solids, water-based, VOC-compliant, acrylic-based compound exceeding the requirements of ASTM C309 when tested in accordance with ASTM C156. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT LIQUID-MEMBRANE CURING COMPOUNDS ARE COMPATIBLE WITH FINISH FLOORING MATERIALS AND ADHESIVES USED TO ATTACH FINISH FLOORINGS TO THE CONCRETE SLABS. DO NOT USE CURING AGENTS OR OTHER ADDITIVES THAT COULD PREVENT BONDING. CONSULT WITH FINISH FLOORING MANUFACTURERS AND SECURE WRITTEN APPROVAL OF PROPOSED CURING COMPOUNDS AND OTHER ADDITIVES. WHERE MEMBRANE WATERPROOFING IS SHOWN, USE ONLY CURING COMPOUNDS THAT ARE ACCEPTABLE TO THE WATERPROOFING MANUFACTURER. DAMP CURE WITH BURLAP, IF REQUIRED.

Burlap: Shall be free of sizing or any substances that are injurious to concrete and cement or that can cause discoloration. Burlap shall be soaked and rinsed in water prior to use. Burlap shall have sufficient thickness to retain water without frequent wetting.

RELATED MATERIALS:

Joint Fillers: Preformed non-extruding resilient type, non-asphaltic, conforming to ASTM D1751, 1/4" thick, unless otherwise noted.

Dovetail Slots: Shall be 18-gage, galvanized, designed to receive the type of ties and anchors indicated on the Drawings.

Joint Sealing Compound: Shall be a two-part, self-leveling, polyurethane having a Shore A hardness of 35±5 and a compressibility and extensibility factor of 25%.

Embedded Shapes: Embedded steel angles, plates, and other shapes shown on the Drawings shall conform to ASTM A36. Embedded shapes shall be either hot-dip galvanized or receive a near-white abrasive blast-cleaning equal to SSPC-SP10 and a shop-applied prime coat of an inorganic zinc paint applied at a rate of 3.0 mils DFT.

ADMIXTURES:

Use air-entraining admixture in exterior exposed concrete. Add air-entraining admixture at the manufacturer's prescribed rate in the plant to result in concrete at the point of placement having air content within the limits of Table 4.2.1 of ACI 318. Dosage rates shall be determined using temperature and slump ranges expected and specified herein.

Concrete structures, beams, elevated slabs and slabs on grade exposed to freezing and thawing temperatures while in a moist condition shall have entrained air in accordance with Table 4.2.1 of ACI 318 and a maximum water-cement ratio of 0.45.

Use admixtures for water-reduction in strict compliance with the manufacturer's directions. Do not use set-control admixtures.

Use amounts of admixtures as recommended by the manufacturer for climatic conditions prevailing at the time of placement. Adjust quantities and types of admixtures as required to maintain quality control.

Slump Limits: Proportions in design mixes and concrete placed in the field shall result in concrete slumps at the point of placement for all concrete of 3" minimum, not to exceed 4 1/2" maximum, unless otherwise approved in writing by Graham County. Concrete having a slump in excess of 4 1/2" shall be removed from the job site. The addition of water to the concrete mix at the job site to increase the slump to the 4 1/2" maximum slump permitted will not be permitted except as approved by Graham County in writing. Concrete mixes containing a high-range water-reducer shall have a maximum slump of six inches (6") after the H.R.W.R. is added, and comply to the previously stated limits prior to the addition of the H.R.W.R.

CONCRETE MIXING:

Ready-Mix Concrete: Comply with requirements of ASTM C94, and as herein specified.

Minimal addition of water at job site, when approved in writing by Graham County, shall be permitted unless the delivery ticket states the amount of water that can be added without exceeding the design water amount less 1 gallon per cubic yard and the slump of the mix, and the amount of water and mix proportions shown on the delivery ticket are based on a computer printout of the proportions of materials used in each truck. Water shall not be added on the job site if this requirement is not met and if not approved in writing by Graham County. The addition of water shall also be done under the direct supervision of a certified concrete technician employed by the ready-mix supplier. Addition of water exceeding these requirements shall be cause for rejection of concrete.

During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 shall be required as follows:

When the air temperature is between 85°F and 90°F, reduce the mixing and delivery time from 1-1/2 hours to 75 minutes, and when the air temperature is above 90°F, reduce the mixing and delivery time to 60 minutes.

COMPRESSIVE STRENGTHS:

Concrete shall have minimum 28-day compressive strengths as indicated on the structural drawings as determined by tests on standard 6" x 12" concrete cylinders unless otherwise approved by the Owner.

JOINTS:

Construction Joints:

Locate and install construction joints, which are not shown on the Drawings, which will least impair the strength and appearance of the structure, and as approved by Graham County prior to construction.

Place construction joints perpendicular to the main reinforcement across construction joints.

Roughen surfaces of set concrete at construction joints. Clean surfaces of laitance, coatings, loose particles and foreign matter. Roughen surfaces in a manner that will expose bonded aggregate uniformly and leave no laitance, loose particles of aggregate, foreign matter, or damaged concrete at the surfaces.

Provide keyways at least 1-1/2" deep in construction joints in walls, supported slabs and beams, and between walls and foundation systems. See typical details on the Drawings.

At horizontal joints between columns and beams, roughen surfaces to expose aggregate as specified herein. Dampen, but do not saturate surfaces prior to placement of the concrete in the supported elements.

Construction and control joints in concrete slabs on grade shall conform to the details shown on the Drawings. Construction and control joints shall not be located farther apart than sixteen feet in either direction unless shown otherwise on the Drawings.

Provide isolation joints in concrete slabs on grade at points of contact between the slabs on grade and vertical surfaces, and elsewhere as indicated.
Fill sawn control and construction joints in the concrete slabs on grade with a two-part, self-leveling polyurethane sealant after the joints have been cleaned and approved for sealing. See typical details, on the drawings.

INSTALLATION OF EMBEDDED ITEMS:

General: Set and build into the work, anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings and directions provided by the suppliers of the items to be attached thereto.

PART 3 - EXECUTION

PRE-CONCRETE PLACEMENT REQUIREMENTS:

General:

Before placing concrete, inspect and complete the formwork installation, reinforcing steel, post-tensioning tendons, and items to be embedded or cast-in. Notify other crafts to permit the installation of their work; cooperate with other trades in setting such work, as required. Soil or rock at the bottoms of foundation systems shall be reviewed by a representative of Graham County prior to placement of the concrete. Notify the Engineer at least twenty four (24) hours in advance of each placement of concrete in the elevated beams and joists.

VAPOR BARRIER INSTALLATION:

General: Prior to the placing of steel reinforcing and pouring of concrete slabs on grade and after crushed stone has been placed, place vapor barrier sheeting in position with longest dimension parallel with direction of pour.

Lap joints 6 inches and seal with manufacturers recommended mastic or pressure-sensitive tape.

Inspect membrane thoroughly just before concrete pours and patch any penetrations around conduit, pipes, columns, etc. with mastic, any holes in membrane in free areas by adding patches of membrane material set in mastic and pressure sensitive tape.

CONCRETE PLACEMENT:
General:

Comply with ACI 304, and as herein specified. Adequate equipment and competent personnel shall be employed for the placing and handling of concrete.

Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation due to re-handling or flowing. Excessive free drops of concrete will not be permitted.

Placing Concrete in Forms:

Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction and cold joints. Where placement consists of layers, place each layer while preceding layer is still plastic to avoid cold joints.

Consolidate placed concrete with the aid of mechanical vibrating equipment and supplemented by hand-spading and tamping in accordance with accepted practices such as those contained in ACI 309R. Consolidation of concrete shall be by electric- or pneumatic-drive immersion-type vibrators of sufficient power and capacity to consolidate the concrete effectively and quickly. Immersion-type vibrators shall maintain a frequency, when immersed in concrete, of not less than 8000 rpm and shall have a minimum amplitude of not less than 0.02 inches (0.5 mm). An adequate number of units capable of handling the rate and volume of concrete placed shall be provided. The duration of vibration shall be limited to that necessary to produce satisfactory consolidation. In consolidating each layer of concrete, the vibrator shall be operated in a near vertical position, and the vibrating head shall penetrate and re-vibrate the concrete in the upper portion of the underlying layer. The vibrator shall be inserted such that it quickly penetrates the layer and shall be slowly withdrawn such that the concrete layer is consolidated from the bottom upward. Vibration shall be performed in a systematic pattern to ensure overlap of the radius of action of the vibrator and complete coverage. Additional concrete shall not be placed until concrete previously placed has been vibrated thoroughly as specified. Special attention shall be given to the consolidation of concrete at construction joints, against forms, and around embedded items.

Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. At each insertion, limit the duration

of vibration to the time necessary to consolidate the concrete and to complete the embedment of reinforcement and other embedded items without causing segregation of the mix.

PLACEMENT OF CONCRETE IN SLABS:

General:

Deposit and consolidate concrete in slabs using a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.

Bring slab surfaces to the correct level with a straightedge and strike off. Use approved method to smooth the surfaces, leaving them free of humps or hollows. Do not sprinkle water or dry cement on the plastic surfaces. Do not disturb the slab surfaces prior to beginning finishing operations. Finish slab surfaces to the flatness and levelness requirements specified herein.

PUMPING OF CONCRETE:

General: Concrete mixes may be pumped to point of deposit in conformance with the following provisions:

Concrete pumps shall be positive piston-type pumps. No squeeze pumps will be permitted.

Concrete slumps shall not exceed 5 1/2" at the truck nor 4 1/2" at the discharge end of the nozzle.

The concrete mix design submitted for concrete placed by pumping shall indicate that the mix is designed to be pumped. Once mix designs are approved, changes in the mix to accommodate pumping shall be prohibited unless new mix designs are submitted for approval.

Mix designs for concrete placed by pumping shall not contain a ratio of less than 62% of coarse aggregate to the total aggregate by weight.

COLD WEATHER PLACEMENT:

General: Do not place concrete when temperature is 40°F and falling and when freezing weather is predicted within 24 hours except as authorized in the requirements set forth herein.

Authorization: Subject to written approval of a letter of request to Graham County from the Contractor, "Recommended Practice for Winter Concreting", ACI 306, may be followed for placing concrete in cold weather.

HOT WEATHER PLACEMENT:

General:

Cool reinforcement by wetting it sufficiently so that the steel temperature will not exceed the ambient air temperature immediately before concrete is placed.

Wet forms and subgrade before placing concrete.

Aggregate: The concrete supplier shall make provisions for cooling the coarse and fine aggregates during hot weather by pre-wetting the aggregates on the conveyor belt and/or maintaining stockpiles covered with crushed ice during the hot part of the day.

Temperature: Temperature of fresh concrete prior to placement shall not exceed 90°F. Concrete mixes with temperatures above 90°F shall be discarded off site unless otherwise approved by Graham County. When conditions of temperature, humidity, and wind are such that there is a risk of plastic cracking, the Contractor shall take measures as recommended in ACI 305 to prevent plastic shrinkage cracking.

Rough Form Finish: The concrete surfaces shall have the texture imparted by the form-facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height, rubbed down or chipped off. See other paragraphs of this Section for requirements for concrete surface repairs.

Smooth Form Finish: This is the as-cast concrete surface as obtained with selected form-facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed, leaving a smooth uniform texture and color.

Smooth Rubbed Finish:

Surfaces to receive a smooth rubbed finish shall receive smooth form finish treatment prior to smooth rubbed finish. Surfaces shall be cured by leaving the forms in place for a minimum of five (5) days.

As soon as the forms are removed, moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Apply a grout finish consisting of 1 part white Portland Cement, 1-1/2 parts of fine sand passing through a No. 50 sieve, and enough of a acrylic latex bonding agent to form a creamy paste. Apply uniformly with a brush, filling air bubbles and holes. Scour thoroughly with an 80-grit carborundum stone. Do not add water to the stone or surface. After making surface uniform in color and texture, let stand until the grout becomes tacky. Remove excess grout with a rubber float. No tool marks shall be visible. Moist-cure for 72 hours with wet burlap or by continuous dampening with a fog spray.

Related Unformed Surfaces: At tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces.

MONOLITHIC SLAB FINISHES:

Float Finish:

Apply float finish to monolithic slab surfaces that are to receive trowel finish and other finishes as hereinafter specified.

After screeding and consolidating slab concrete and releveling of slabs with a highway straightedge, do not work surface until it is ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats. Check and level surface plane to a tolerance of not less than F_F18/F_L15 as measured by a Floor Flatness Number except for surfaces to receive a trowel finish. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

Trowel Finish:

After floating, begin trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a surface plan tolerance not less than F_F25/F_L20 as measured by a Floor Flatness Number. Do not add water to the surface during the troweling operation.

Non-Slip Broom Finish:

Slope slab surfaces uniformly to drains within the tolerances specified in ACI 117. Apply non-slip broom finish to concrete surfaces as shown on Drawings or in schedules.

Immediately after float-finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Graham County before application. Finish to a surface plane tolerance not less than F_F18 as measured by a Floor Flatness F-Number. Broom finish shall provide a uniform texture and surface.

Non-Slip Exterior Steps: Install extruded aluminum safety stair nosings at each exterior tread/riser.

CONCRETE CURING AND PROTECTION:

General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures, and maintain continuous curing without drying at a nearly constant temperature for a period of time necessary for hydration of cement and proper hardening.

Curing Formed Surfaces: Cure formed concrete surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

MISCELLANEOUS CONCRETE ITEMS:

Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

CONCRETE SURFACE REPAIRS:

Patching Defective Areas:

Repair and patch defective areas with cement mortar immediately after removal of forms, but only when acceptable to Graham County.

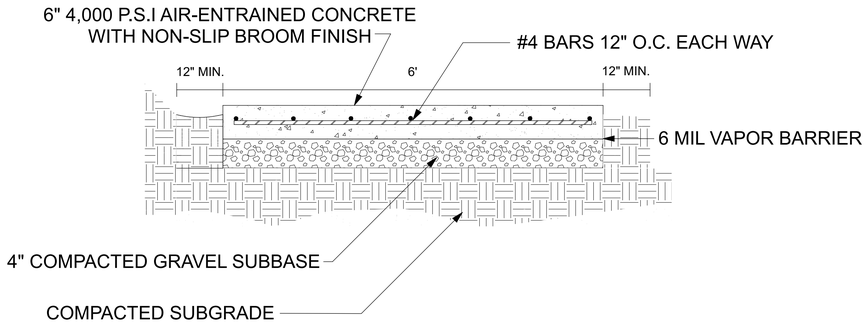
Cut out honeycomb, rock pockets, voids over 1 1/2" diameter, and holes left by tie rods down to solid concrete but, in no case to a depth of less than 1". Before placing cement mortar, thoroughly clean, dampen with water and brush-coat the area to be patched with neat cement grout. Proprietary patching compounds consisting of premeasured components may be used when acceptable to Graham County.

Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Graham County. Surface defects, as such, include texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets and holes left by tie rods, fins and other projections on surfaces, and stains and other discolorations that cannot be removed by cleaning.

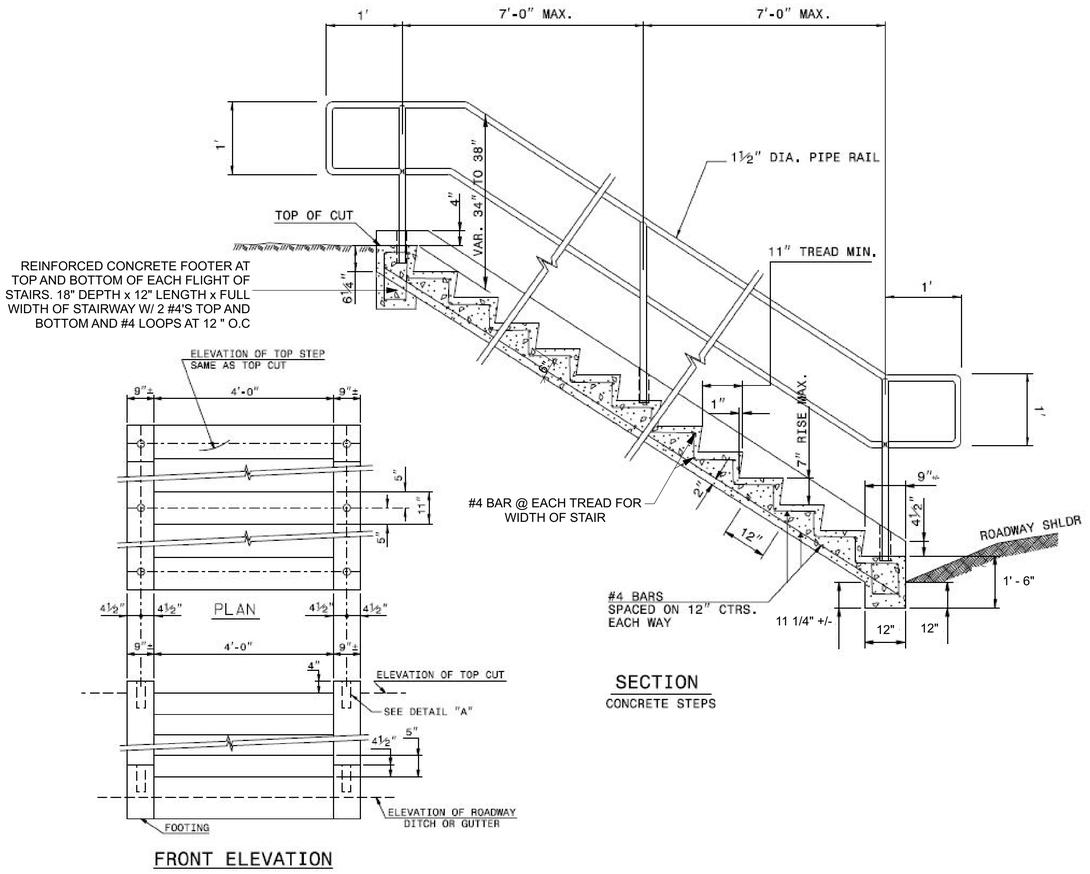
END OF SECTION 03300

GENERAL NOTES:

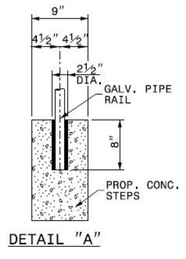
1 - CONSTRUCT PROPOSED STEEL PIPE RAIL OF 1 1/2" DIAMETER SCHEDULE 40 PLAIN END GALVANIZED STEEL PIPE MEETING THE REQUIREMENTS OF ASTM A53. EMBED PIPE RAIL 8" INTO PROPOSED STEPS WITH CHEMICAL OR CONCRETE GROUT ANCHORING SYSTEM. ON BOTH SIDES OF STEPS (AS REQUIRED)
2 - USE A ROTARY DRILL FOR DRILLING THE HOLES FOR THE PIPE RAIL.
3 - USE COMMERCIAL AIR-ENTRAINED CONCRETE THROUGHOUT FOR CONCRETE STEPS AND SIDEWALK/RAMP.
4 - LOCATION AND QUANTIES SHOWN ARE APPROXIMATE ONLY.
5 - 2" CLEAR SPACING ON ALL REINFORCING BARS.
6 - EXTEND HORIZONTAL REINFORCING BARS UPWARD INTO SIDE WALLS.
7 - SLOPE TREAD @ 1.0% MAX FOR DRAINAGE.
8 - UNLESS NOTED OTHERWISE, STAIR FINISH SHALL BE A NON-SLIP HORIZONTAL BROOM FINISH.
9 - POSTS SHALL BE SURFACE MOUNTED, CORED, SLEEVED OR SET IN POST FOOTERS - AS APPROVED BY THE OWNER.
10 - PLACE A CONTROL JOINT 1/4" WIDE X 1" DEEP WITH 1/8" RADI IN THE CONCRETE SIDEWALK AT 5' INTERVALS. ONE 1/2" EXPANSION JOINT WILL BE REQUIRED AT 50' INTERVALS. A 1/2" EXPANSION JOINT WILL BE REQUIRED WHERE THE SIDEWALK JOINS ANY RIGID STRUCTURE.



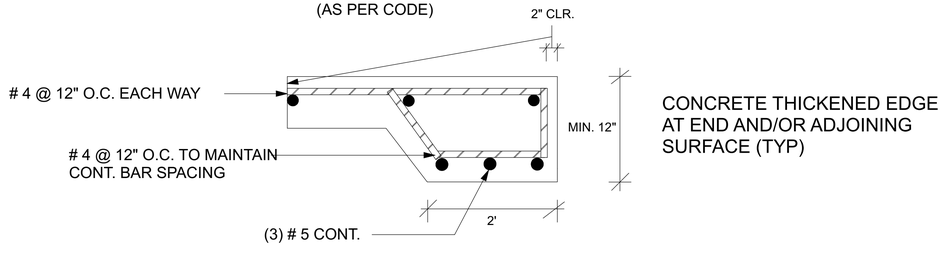
1 S1.0 SIDEWALK/RAMP DETAIL
N.T.S.



3 S1.0 CONCRETE STEPS DETAIL
N.T.S.



2 S1.0 GALV. PIPE RAIL DETAIL
N.T.S.



CONCRETE THICKENED EDGE AT END AND/OR ADJOINING SURFACE (TYP)

4 S1.0 MONOLITHIC FOOTING DETAIL (TYP)
N.T.S.

NO.	DESCRIPTION	BY	DATE

SHEET TITLE:
CONCRETE STEPS AND SIDEWALK/RAMP DETAIL

PROJECT DESCRIPTION:
GRAHAM COUNTY CEMETERY DEPARTMENT - NEW AND REPLACEMENT STEPS PROJECT CY20

FACILITY/BUILDING NO.:
GRAHAM COUNTY CEMETERY DEPARTMENT BUILDING NO. GC019

Project No:
GCRP-20-0028

Drawn By:
GCPM

DATE:
9/15/2020

SCALE:
N.T.S.

SHEET:
S1.0