CITY OF CLYDE

CLYDE, OHIO

SPECIFICATIONS FOR BUCKEYE STREET IMPROVEMENTS - PHASE III

ADDENDUM NO. 1

July 9, 2010

All prospective bidders are hereby notified that this addendum forms a part of the contract documents and modifies the original bidding documents dated June, 2010. Acknowledge receipt of this addendum in the space provided in the bid proposal section of the specifications. Failure to do so may subject the bidder to disqualification.

PREPARED BY:

GGJ, INC.
35585 Curtis Blvd., Unit C
Eastlake, Ohio 44095
(440) 953-1567 (voice)
(440) 953-0580 (fax)

****THIS ADDENDUM IS BEING TRANSMITTED VIA FAX ONLY. NO "HARD COPY" WILL BE SENT.****

Please acknowledge receipt by signing below and faxing back this cover sheet <u>only</u> ASAP to (440)953-0580.

COMPANY _____

NAME _____

DATE _____

CONTRACT SPECIFICATIONS

1. **SECTION 00300 (BID PROPOSAL FORM)**

   REPLACE this section with the attached Section 00300. (A bid item for 12" RCP was added.)

2. **SECTION 03100 (CONCRETE FORMWORK)**

   ADD the attached Section 03100.

3. **SECTION 03120 (CAST IN PLACE CONCRETE)**

   ADD the attached Section 03120.

4. **SECTION 03200 (CONCRETE REINFORCEMENT)**

   ADD the attached Section 03200.

5. **SECTION 03345 (CONCRETE FINISHING AND CURING)**

   ADD the attached Section 03345.

6. **SECTION 03535 (CONCRETE WATERPROOFING)**

   ADD the attached Section 03535.

CLARIFICATIONS FROM PRE BID MEETING

1. Project to be funded and contractor paid through State issue I funds. The notice to proceed will be requested within the week after the project is awarded. Project completion time will not begin until the notice to proceed is received from the Ohio Public Works Commission.

2. Verizon Phone Company, now Frontier Phone Company, has a switching center building located on West Buckeye with numerous underground lines exiting the building and underground along West Buckeye Street. GGJ to meet with Frontier next Wednesday to have the phone company supply more definite locations and depth.

3. The Clyde Country Fair is September 17th to the 20th. The work at the intersection of West Buckeye Street and South Main Street must be done before or after the Fair dates but cannot conflict with the activities of the Fair during that weekend.

4. Contractor must supply a pre-construction video before starting work on the project.

5. Why is the bid amount to install the 4"concrete sidewalk considerably lower than the amount of sidewalk to be removed? Sidewalk to be removed has a larger quantity because it contains the existing sidewalk to be removed thru the drive apron areas and the sidewalk to be replaced in these areas will fall under the bid item for 6" concrete apron replacement.

6. Traffic during construction was discussed with the Contractor to maintain 1 lane of traffic when possible but he will be able to close the road to all traffic in his immediate work zone, keeping in mind that he must be ready to let emergency vehicles pass when necessary.

CITY OF CLYDE, OHIO
BUCKEYE STREET IMPROVEMENTS – PHASE III

BASIS OF PAYMENT

GENERAL: Payment for the work Items shall be at the total unit or lump sum price Bid for each unit of work completed and accepted in accordance with the Contract Documents.

The latest "State of Ohio, Department of Transportation, Construction and Material Specifications" manual shall govern the material and procedures used in this project, if not otherwise specified in the project Specifications or noted on the Drawings.

PRICES TO INCLUDE: For each Bid Item, the total unit price or lump sum price Bid shall be considered full compensation for the completed and accepted work, and shall include all labor, materials, tools, equipment and transportation needed to perform the work in accordance with the Contract Documents so as to provide a complete and properly functional system. The General Contractor shall be responsible for reviewing the contents and conditions of all Contract Documents as they may relate to the work under this Contract and comply with the requirement thereof.

ITEM 1 - BONDS AND INSURANCE

A. Payment:

1. The lump sum amount stated in the Bid Schedule for bonds and insurance shall include all bonds and insurance required to be in force at the commencement of the work. Successful bidder will be required to provide receipts verifying the actual costs of this item when known.

2. Subsequent expenses for bonds and insurance as may be necessary throughout the contract period for changes to the contract or for other occurrences, shall not be a part of this item.

3. Fees for bonds and insurance due to changes in the work shall be respectively a part of the cost of that work.

ITEM 2 - MOBILIZATION

A. Work included: As described in Section 00800 Supplementary Conditions SC-22 and other work incidental to this Item.

B. Payment: Lump Sum price with payments as specified in Section 00800 Supplementary Conditions SC-22.

ITEM 3 – MAINTENANCE OF TRAFFIC

A. Description: This work in this Item shall consist of work shall consists of maintaining and protecting vehicular and pedestrian traffic at the work area while the contract is in force, in accordance with the latest Ohio Department of Transportation Construction and Material Specifications, including all current supplemental specifications and standard construction drawings and all specifications and drawings in these Contract Documents and in this contract book.

B. Payment: The Lump Sum Price bid for Item Maintaining Traffic shall include the cost of removal of conflicting pavement markings and placement of interim markings, maintaining the existing roadways in a safe condition for public use, providing flaggers and their equipment, furnishing and maintaining and subsequently removing temporary traffic control items as required by the plans and specifications.

ITEM 4 – RESTORATION: TOPSOIL, SEEDING & MULCHING

A. Description: The quantity of each type of restoration: topsoil, seeding and mulching will be measured for unit price payment purposes will be the number of square yards of topsoil, seeding and mulching acceptably placed and compacted when required per detail as specified over an area with the contract (pay) limits.

B. Payment: The unit price stipulated to be paid per square yard of restoration: topsoil, seeding and mulching work performed and measured for payment purposes shall be full compensation for the actual number of square yards furnished and installed which is directly or indirectly caused by the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 5 – REMOVE AND RESET EXISTING GROUND MOUNTED SIGNS

A. Description: This work in this Item shall consist of removing and resetting existing ground mounted signs as shown in the Drawings and/or specified in the Contract Documents.

B. Payment: The unit price stipulated shall be full compensation for each existing ground mounted sign removed and reset as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 6 – CONCRETE CURB REMOVED

A. Description: The work in this Item consist of the removal and disposal of existing concrete curb as shown on the Drawings and/or Specifications and as follows:

1. All removed material shall be disposed of by the Contractor at his own expense.

B. Payment: The unit price stipulated for removal of this Item – Concrete Curb which shall be a lump sum including labor, equipment, and disposal of same by the contractor.

ITEM 7 – REMOVE EXISTING SIDEWALK, INCLUDING CURB RAMPS

A. Description: The work in this Item shall consist of the removal and disposal of existing sidewalks and curb ramps as shown on the Drawings and/or Specifications and as follows:

1. All removed material shall be disposed of by the Contractor at his own expense.

2. A neat joint shall be sawed or otherwise cut at the removal limit if it does not occur at an existing joint.

B. Payment: The unit price stipulated shall be full compensation for removal of each square foot of sidewalk or curb ramp which shall include labor, equipment, saw cutting and disposal of same by the contractor.

ITEM 8– CATCH BASIN REMOVED

A. Description: This work in this Item shall consist of the removal of existing catch basins as shown on the Drawings and/or Specifications.

B. Payment: The unit price stipulated shall be full compensation for each catch basin removed. The price shall include furnishing labor, backfill, compaction, sheeting, shoring, restoring all disturbed areas and utilities to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

C. Disposal of Catch Basins shall be as follows:

1. All removed material shall be disposed of by the Contractor at his own expense.

2. All castings shall be stored by the contractor for salvage by the City

ITEM 9 – MANHOLE REMOVED

A. Description: This work in this Item shall consist of the removal of existing manholes as shown on the Drawings and/or Specifications.

B. Payment: The unit price stipulated shall be full compensation for each manhole removed. The price shall include furnishing labor, backfill, compaction, sheeting, shoring, restoring all disturbed areas and utilities to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

C. Disposal of Manholes shall be as follows:

1. All removed material shall be disposed of by the Contractor at his own expense.

2. All castings shall be stored by the contractor for salvage by the City

ITEM 10 - EXCAVATION INCLUDING EMBANKMENT

A. Description: The work in this Item shall consist of the removal and disposal of existing material, including existing asphalt pavement, to reach the bottom of the sub-base of the proposed pavement. This item also includes the use of acceptable excavated material to be used for embankment purposes as shown on the Drawings and/or Specifications.

B. Payment: The unit price stipulated for this Item– Excavation Including Embankment Construction including removal and disposal of existing material will be a lump sum for all work involved.

ITEM 11 - TACK COAT .05 GAL./S.Y.

A. Description: The work in this Item shall consist of preparing and treating a paved surface with bituminous material and will be measured by the gallon actually installed under this item.

B. Payment: The unit price stipulated per gallon of this Item – Tack Coat as shown on the Drawings and/or Specifications including labor, materials and equipment.

ITEM 12 - PRIME COAT 0.35 GAL./S.Y.

A. Description: The work in this Item shall consist of preparing and treating a paved surface with bituminous material and will be measured by the gallon actually installed under this item.

B. Payment: The unit price stipulated per gallon of This Item – Prime Coat as shown on the Drawings and/or Specifications including labor, materials and equipment.

ITEM 13 – COMBINATION CURB & GUTTER, TYPE 2

A. Description: This work shall consist of the construction of Type 2 Curb and Gutter and shall conform to the plans and specifications.

B. Payment: The unit price stipulated to be paid for each linear foot of Type 2 Curb and Gutter shall be full compensation for the actual number of linear feet installed including all labor, laying, restoring all disturbed areas, and all appurtenances to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 14 – 6" PERFORATED PIPE UNDERDRAIN WITH FILTER SOCK AND WASHED GRANULAR MATERIAL

A. Description: This work in this Item shall consist of the placement of shallow pipe underdrains as shown on the plans and specification and shall include excavation, bedding, and tees left for future connections.

B. Payment: The unit price stipulated to be paid for each lineal foot of Pipe Underdrain With Filter Sock and Washed Granular Material, shall be full compensation for the actual number of lineal feet of pipe furnished and installed including labor, materials and equipment.

ITEM 15- 2” ASPHALT CONCRETE (AC-20, LEVELING COURSE TYPE 2)

A. Description: The work in this Item shall consist of constructing a leveling course of aggregate and asphalt cement mixed in a central plant and spread on a prepared surface in accordance with the Drawings and/or Specification.

B. Payment: The unit price stipulated per cubic yard of this Item – Asphalt Concrete, shall be full compensation for the actual number of cubic yards installed complete and in place, including labor, materials and equipment.

ITEM 16 - 1-1/2” ASPHALT CONCRETE (AC-20, SURFACE COURSE TYPE 1)

A. Description: The work in this Item shall consist of constructing a surface course of aggregate and asphalt cement mixed in a central plant and spread on a prepared surface in accordance with the Drawings and/or Specification.

B. Payment: The unit price stipulated per cubic yard of this Item – Asphalt Concrete, shall be full compensation for the actual number of cubic yards installed complete and in place, including labor, materials, equipment, and grinding of existing pavement.

ITEM 17 - 6” BITUMINOUS AGGREGATE BASE

A. Description: The work in this Item shall consist of constructing a base course of aggregate and bituminous material, mixed in a central plant and spread on a prepared surface in accordance with the Drawings and/or Specifications.

B. Payment: The unit price stipulated to be paid per cubic yard of this Item - 6” Bituminous Aggregate Base complete and in place including labor, materials and equipment.

ITEM 18 - 6” AGGREGATE BASE

A. Description: The work in this Item shall consist of the furnishing, placing and compacting one or more courses of aggregate, including furnishing and incorporating all water required for compacting on a prepared surface, and in reasonably close conformity to the lines, grades and typical cross sections shown on the Drawings and/or Specifications.

B. Payment: The unit price stipulated to be paid per cubic yard of aggregate base work performed and measured for payment purposes shall be full compensation for the actual number of cubic yards installed complete and in place, including labor, materials and equipment.

ITEM 19 – SUBGRADE COMPACTION

A. Description: The work in this Item shall consist of the preparation of the sub-grade where pavement is to be placed. Including the testing of the stability and uniformity of compaction as well as proof rolling of the same.

B. Payment: The unit price stipulated shall be full compensation for each square yard of Sub-grade Compaction as measured under the proposed pavement and shall include Proof Rolling.

ITEM 20 – 4” CONCRETE SIDEWALK

A. Description: This item of work shall consist of constructing concrete walks in reasonable close conformity with lines, grades and dimensions shown on the plans or established by the Engineer.

B. Payment: The unit price stated for 4” concrete sidewalk walk shall be full compensation for the actual number of square foot, calculated from pay limits, including labor, excavation, backfill, base course, expansion joint, forming, and excavation and removal of all excavated material, completed in compliance with the contract Drawings and Specifications.

ITEM 21 – CONCRETE CURB RAMPS W/TRUNCATED DOME PAVERS

A. Description: The work in this Item consists of construction of concrete curb ramps as shown on the plans and specifications.

B. Payment: The unit price stipulated for each curb ramp shall be for the materials and labor to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 22 – ADJUST EXISTING CASTINGS/ VALVE BOXES TO GRADE

A. Description: The work in this Item consists of the adjustment of existing castings or valve boxes to grade.

B. Payment: The unit price stated for this item shall be a lump sum for all of the work involved with adjusting existing castings or valve boxes to grade due to the proposed pavement improvements.

ITEM 23 – CONCRETE DRIVEWAY REMOVAL & REPLACEMENT

A. Description: This work shall consist of removal and disposal of existing driveway materials and constructing a pavement composed of unreinforced Portland cement concrete shown on the plans and specifications.

B. Payment: The unit price stipulated shall be paid per square yard installed of this item, and shall be full compensation for removal, disposal, furnishing and placing all materials including labor, equipment, excavation, backfill, base course, expansion joint, forming and saw cutting to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 24 – CONCRETE APRON REMOVAL & REPLACEMENT

A. Description: This work shall consist of removal and disposal of existing driveway materials and constructing a pavement composed of unreinforced Portland cement concrete shown on the plans and specifications.

B. Payment: The unit price stipulated shall be paid per square yard installed of this item, and shall be full compensation for removal, disposal, furnishing and placing all materials including labor, equipment, excavation, backfill, base course, expansion joint, forming and saw cutting to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 25 – ASPHALT DRIVEWAY REMOVAL & REPLACEMENT

A. Description: This work shall consist of removal and disposal of existing driveway materials and constructing an asphalt pavement as shown on the plans and specifications.

B. Payment: The unit price stipulated shall be paid per square yard installed of this item, and shall be full compensation for removal, disposal, furnishing and placing all materials including labor, equipment, excavation, backfill, base course, expansion joint, and saw cutting to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 26 – GRAVEL DRIVEWAY REMOVAL & REPLACEMENT

A. Description: This work shall consist of removal and disposal of existing driveway materials and constructing gravel driveway as shown on the plans and specifications.

B. Payment: The unit price stipulated shall be paid per square yard installed of this item, and shall be full compensation for removal, disposal, furnishing and placing all materials including labor, equipment, and saw cutting to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 27 – 8" REINFORCED DECORATIVE CONCRETE PAVEMENT

A. Description: This work shall consist of constructing a pavement composed of reinforced Portland cement concrete on a prepared subgrade and base course in accordance with the details, lines, grades, thickness and typical cross sections shown on the plans and specifications.

B. Payment: The unit price stipulated shall be paid per square yard installed of this item, and shall be full compensation for furnishing and placing all materials including labor, equipment, reinforcement, saw cutting, decorative stamping, decorative coloring, and jointing to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 28 – TRENCH REPAIR

A. Description: The work in this Item shall consist of the trench repair in the areas shown on the Drawings. All replacement shall be in accordance with O.D.O.T. Item 301 & 702.

B. Payment: The unit price stipulated to be paid for each square yard of trench repair shall be full compensation for the actual number of square yards, calculated from payment limits as called for in the contract drawings, completed in compliance with the contract drawings and specifications and accepted for payment purposes and shall include furnishing all labor, materials, tools, appliances and equipment necessary thereto and, in connection with same, restore all disturbed site features and other items plus provide all appurtenances to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 29 - CATCH BASIN TYPE 3-A

A. Description: The work in this Item shall consist of the construction of Catch Basins of the type and sizes shown on the Drawings and /or Specifications and shall include excavation, bedding, and backfill.

B. Payment: The unit price for each precast catch basin shall be full compensation for the catch basin, furnished, installed, and connected in accordance with the Drawings and Specifications including excavation, backfill, labor material, frame and grates, equipment, and restoration.

C. Disposal of Catch Basins shall be as follows:

1. All removed material shall be disposed of by the Contractor at his own expense.

2. All castings shall be stored by the contractor for salvage by the City

ITEM 30 – 12" RCP SEWER PIPE (STORM)

A. Description: The work in this Item shall consist of furnishing and installing RCP Storm Sewer Pipe as shown on the Drawings and/or specified, including removal and disposal of existing sewers. Measurements shall be made on a linear foot basis for the actual work performed under this item, measured along the horizontal projection of the longitudinal axis of the pipe.

B. Payment: The unit price stated on the Bid Schedule shall be compensation for each lineal foot of pipe installed including all fittings and plugs measured for payment. The price shall include furnishing labor, backfill, compaction, laying, sheeting, shoring, inspection, testing of pipe and fittings, restoring all disturbed areas and utilities, removing existing sewers, concrete encasement and all appurtenances to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for –use installation.

ITEM 31 – 24" RCP SEWER PIPE (STORM)

A. Description: The work in this Item shall consist of furnishing and installing RCP Storm Sewer Pipe as shown on the Drawings and/or specified, including removal and disposal of existing sewers. Measurements shall be made on a linear foot basis for the actual work performed under this item, measured along the horizontal projection of the longitudinal axis of the pipe.

B. Payment: The unit price stated on the Bid Schedule shall be compensation for each lineal foot of pipe installed including all fittings and plugs measured for payment. The price shall include furnishing labor, backfill, compaction, laying, sheeting, shoring, inspection, testing of pipe and fittings, restoring all disturbed areas and utilities, removing existing sewers, concrete encasement and all appurtenances to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for –use installation.

ITEM 32 – STORM MANHOLE TYPE "A" – 48" BASE

A. Description: The work in this Item shall consist of the construction of Manholes of the type and sizes shown on the Drawings and /or Specifications and shall include excavation, bedding, and backfill.

B. Payment: For each Item – Manholes, shall be as stated below:

1. The unit price for each precast manhole shall be full compensation for the manholes, furnished, installed, and connected in accordance with the Drawings and Specifications including excavation, backfill, labor material, frame and grates, equipment and restoration.

2. The unit price stated in the Bid Schedule shall include precast sections, waterproofing, manhole steps, grade adjusting, labor, construction, backfill, compaction, regular and drop manhole connections, frame and covers, restoration of all disturbed areas and utilities, and all other appurtenances for the work shown on the Drawings and/or specified in the Construction Documents for a complete and ready-for-use installation.

ITEM 33 – 12" POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE – ASTM D-3034, SDR 35 (SANITARY)

A. Description: The work in this Item shall consist of furnishing and installing PVC Sanitary Sewer Pipe as shown on the Drawings and/or specified, including removal and disposal of existing sewers. Measurements shall be made on a linear foot basis for the actual work performed under this item, measured along the horizontal projection of the longitudinal axis of the pipe.

B. Payment: The unit price stated on the Bid Schedule shall be compensation for each lineal foot of pipe installed including all fittings and plugs measured for payment. The price shall include furnishing labor, backfill, compaction, laying, sheeting, shoring, inspection, testing of pipe and fittings, restoring all disturbed areas and utilities, removing existing sewers, concrete encasement and all appurtenances to complete the work as shown on the Drawings and specified in the Contract Documents for a complete and ready-for –use installation.

ITEM 34– 6" POLYVINYL CHLORIDE (PVC) GRAVITY SANITARY LATERAL CONNECTION

A. Measurement: Measurement shall be for each lateral connection installed, as shown on the contract drawings and/or specified for a complete and ready-for-use installation.

B. Payment: The unit price stated in the Bid Schedule shall be full compensation for each lateral connection installed for payment. The price shall include furnishing, backfill, compaction, laying, sheeting, shoring, inspecting, testing of pipe and fittings, restoring all utilities, and all appurtenances to complete the work as shown on the Drawings and/or specified in the Contract Documents for a complete and ready-for-use installation.

ITEM 35 – SANITARY MANHOLE TYPE “A” – 48” BASE

A. Description: The work in this Item shall consist of the construction of Manholes of the type and sizes shown on the Drawings and /or Specifications and shall include excavation, bedding, and backfill.

B. Payment: For each Item – Manholes, shall be as stated below:

1. The unit price for each precast manhole shall be full compensation for the manholes, furnished, installed, and connected in accordance with the Drawings and Specifications including excavation, backfill, labor material, frame and grates, equipment and restoration.

2. The unit price stated in the Bid Schedule shall include precast sections, waterproofing, manhole steps, grade adjusting, labor, construction, backfill, compaction, manhole connections, frame and covers, restoration of all disturbed areas and utilities, and all other appurtenances for the work shown on the Drawings and/or specified in the Construction Documents for a complete and ready-for-use installation.

ITEM 36 – 6” POLYVINYL CHLORIDE (PVC) SANITARY CLEANOUT

A. Measurement: Measurement shall be for each cleanout installed, as shown on the contract drawings and/or specified for a complete and ready-for-use installation.

B. Payment: The unit price stated in the Bid Schedule shall be full compensation for each cleanout installed for payment. The price shall include furnishing, backfill, compaction, laying, sheeting, shoring, inspecting, testing of pipe and fittings, restoring all utilities, and all appurtenances to complete the work as shown on the Drawings and/or specified in the Contract Documents for a complete and ready-for-use installation.

PROPOSAL TO THE CITY OF CLYDE, OHIO
BUCKEYE STREET IMPROVEMENTS – PHASE III

TO: MR. DANIEL WEAVER, CITY MANAGER
CITY OF CLYDE
222 N. MAIN STREET
CLYDE, OHIO 43410

Gentlemen:

Proposal of _____(hereinafter called "BIDDER"), organized and existing under the laws of the State of __Ohio__doing business as _____*. To the CITY OF CLYDE (hereinafter called "Owner").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of the BUCKEYE STREET IMPROVEMENTS – PHASE III in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submitting this BID, the BIDDER, or in the case of a joint BID, each party thereto, certifies as to its own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

The undersigned have full knowledge of the project site, Drawings, and the conditions of the proposal. The undersigned also, hereby agrees to furnish all the services, labor, materials and equipment necessary to complete these projects according to the Drawings and Specifications and to accept as full compensation the lump sum or unit prices stated in the Bid Schedule for the work and for use when calculating the price of a deduction or an increase in quantities.

BIDDER hereby agrees to commence WORK under this Contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within the period stipulated in the INSTRUCTIONS TO BIDDERS. BIDDER further agrees to pay as liquidated damages and that the CITY may retain from monies that are, or which may become due. The amount of such liquidated damages shall be as stipulated in the CONTRACT AGREEMENT FORM (Section 00500 herein).

* Insert "a corporation", "a partnership", or "an individual" as applicable.

The Bidder hereby acknowledges receipt of the following addenda:

ADDENDUM NO.	DATE

We further agree that the Owner may reject any or all bids.

SUBMITTED BY:

_____
Firm, Corporation or Individual

_____
Address

_____
Telephone Number

Contractor License Number _____

Signature: _____ Date: _____

NOTE: Evidence of authority to sign and the corporate seal must be affixed and attested by the Secretary.

COMPLETION DATE: 120 Calendar Days commencing on the date as shown on Notice to Proceed for Final Completion.

PROPOSAL TO THE CITY OF CLYDE, OHIO
BUCKEYE STREET IMPROVEMENTS – PHASE III

BID SCHEDULE

Bid Item Number	Item Description	Est. Qty.	Unit	Unit Cost Labor	Unit Cost Materials	Total Unit Cost	Total Cost
	General						
1	BONDS AND INSURANCE	1	Lump Sum				
2	MOBILIZATION	1	Lump Sum				
3	MAINTENANCE OF TRAFFIC	1	Lump Sum				
	Miscellaneous						
4	RESTORATION: TOPSOIL, SEEDING & MULCHING	1200	SY				
5	REMOVE AND RESET EXISTING GROUND MOUNTED SIGNS	6	Each				
	Roadway						
6	CONCRETE CURB REMOVED	1	Lump Sum				
7	REMOVE EXISTING SIDEWALK, INCLUDING CURB RAMPS	5090	SF				
8	CATCH BASIN REMOVED	2	Each				
9	MANHOLE REMOVED	1	Each				
10	EXCAVATION INCLUDING EMBANKMENT	1	Lump Sum				
11	TACK COAT .05 GAL./S.Y.	97	Gal.				
12	PRIME COAT 0.35 GAL./S.Y.	675	Gal.				
13	COMBINATION CURB & GUTTER, TYPE 2	798	LF				
14	6” PERFORATED PIPE UNDERDRAIN WITH FILTER SOCK AND WASHED GRANULAR MATERIAL	798	LF				
15	2” ASPHALT CONCRETE (AC-20, LEVELING COURSE TYPE 2)	108	CY				
16	1-1/2” ASPHALT CONCRETE (AC-20, SURFACE COURSE TYPE 1)	81	CY				
17	6” BITUMINOUS AGGREGATE BASE	322	CY				
18	6” AGGREGATE BASE	311	CY				
19	SUBGRADE COMPACTION	1864	SY				
20	4” CONCRETE SIDEWALK	3549	SF				

21	CONCRETE CURB RAMPS W/TRUNCATED DOME PAVERS	2	Each				
22	ADJUST EXISTING CASTINGS/ VALVE BOXES TO GRADE	1	Lump Sum				
23	CONCRETE DRIVEWAY REMOVAL & REPLACEMENT	13	SY				
24	CONCRETE APRON REMOVAL & REPLACEMENT	251	SY				
25	ASPHALT DRIVEWAY REMOVAL & REPLACEMENT	21	SY				
26	GRAVEL DRIVEWAY REMOVAL & REPLACEMENT	13	SY				
27	8" REINFORCED DECORATIVE CONCRETE PAVEMENT	441	SY				
28	TRENCH REPAIR	296	SY				
	Drainage						
29	CATCH BASIN TYPE 3-A	2	Each				
30	12" RCP SEWER PIPE (STORM)	30	LF				
31	24" RCP SEWER PIPE (STORM)	316	LF				
32	STORM MANHOLE TYPE "A" – 48" BASE	1	Each				
	Sanitary						
33	12" POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE – ASTM D-3034, SDR 35 (SANITARY)	594	LF				
34	6" POLYVINYL CHLORIDE (PVC) GRAVITY SANITARY LATERAL CONNECTION	32	Each				
35	SANITARY MANHOLE – 48"	2	Each				
36	6" POLYVINYL CHLORIDE (PVC) SANITARY CLEANOUT	18	Each				
	TOTAL						

TOTAL AMOUNT OF PROJECT (IN FIGURES) _____

TOTAL AMOUNT OF PROJECT (IN WORDS) _____

SECTION 03100

CONCRETE FORMWORK

PART ONE - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall design, provide, and install all concrete formwork needed to place the cast-in-place concrete as required by the Project Specifications and Drawings.

B. Related work:

1. Documents affecting work of this Section include, but are not limited to the General Conditions, Supplementary Conditions, and the other Sections of these Specifications. See specifically Section 02220 Excavating, Backfill and Compaction; Section 03200 Concrete Reinforcement; and Section 03120 Cast-in-Place Concrete.

1.02 QUALITY ASSURANCE

A. Products used in the work of this Section shall be produced by suppliers regularly engaged in the manufacture of similar items and with a history of satisfactory production acceptable to the Engineer.

B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper installation of the work in this Section.

C. Contractor shall be responsible for the design of all formwork used on the project.

D. In addition to complying with pertinent regulations of governmental agencies having jurisdiction, comply with pertinent provisions of ACI 347.

1.03 SUBMITTALS AND SUBSTITUTIONS

A. Comply with pertinent provisions of Section 01300 Submittals.

B. The following product data shall be submitted for record purposes only and not for approval.

1. Suppliers' data and installation instructions for proprietary materials including form coatings, ties, accessories, and manufactured form systems.

2. Suppliers' recommended installation procedures, which the Contractor shall follow on the project Work.

1.04 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01350 Product Requirements and Handling.

PART TWO - PRODUCTS

2.01 FORM MATERIALS

A. Use new or like-new forms and form materials that will produce a high quality concrete surface at the locations shown on the Drawings. Materials may be reused during the progress of the Work provided they are completely cleaned and reconditioned, recoated for each use, and capable of producing the required finished concrete quality. All parts of removed forms set aside for reuse shall be inspected, cleaned, and repaired as necessary. Any part or panel that has been dented, deformed or otherwise rendered unsafe or unfit for reuse shall be discarded.

B. For footings and foundations, use Douglas Fir boards or planks secured to wood or steel stakes, constructed to shape indicated and to support the required loads.

C. For studs, wales, and supports, use standard grade or better Douglas Fir, dimensions as required to support the loads but not less than 2" X 4". Support spacings for the various thicknesses shall be in accordance with American Plywood Association recommendations, with deflection, flexural stress and shear stress being limited to 1/270 of

the span, 1500 psi and 70 psi respectively.

D. Wall forms:

1. Exposed concrete surfaces:

a. Use 3/4" minimum thickness Douglas Fir plywood, grade B/B, class I or II, exterior, sanded both sides, comply with PS-1.

b. Seal edges and coat both faces with colorless coating which will not affect application of applied finishes.

2. Unexposed concrete surfaces:

a. Use 1" X 6" shiplap Douglas Fir boards, surface one side and two edges, or 3/4" minimum thickness Douglas Fir plywood, grade B/B plyform class I or II, sanded both sides, mill-oiled.

E. Column forms, if required:

1. For square or rectangular columns, use two (2) inch thick Douglas Fir planks or joists, surfaced one side and two edges, or use plywood or metal forms.

2. For rounded columns, use metal forms or patented paper tube forms approved by the Engineer.

3. Construct column forms with tight joints and securely clamped together with steel clamps.

2.02 FORM TIES

A. Hold inner and outer forms for vertical concrete together with steel ties and spreaders approved by the Engineer.

1. Space ties symmetrically in tiers and rows, each tier plumb from top to bottom and each row level.

2. At horizontal pour lines, locate ties not more than 6" below the pour lines. Tighten after concrete has set and before the next pour is made.

B. Ties shall be adjusted in length to permit tightening of forms, and of a type leaving no metal closer than one (1) inch from the surface. Ties shall not be fitted with any lugs, cones, or other devices, to act as a spreader within the forms, or for any purpose, which will leave a hole larger than 7/8 inch in diameter or which will leave a void back of the exposed face of the concrete.

C. Form ties for walls of tanks, sheets or other liquid-retaining structures shall be provided with a fixed water stop, centered in the form.

D. For exposed concrete surfaces, provide form ties of removable type with she-bolts equipped with permanent plugs and a system approved by the Engineer for fixing the plugs in place.

2.03 DESIGN OF FORMWORK

A. General:

1. Design, erect, support, brace, and maintain formwork so it will safely support vertical and lateral loads without harmful deflection or distortion that might be applied, until such loads can be supported by the concrete structure.

2. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.

3. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.

4. Design forms and false-work to include assumed values of live formwork, dead load, weight of moving equipment operated on the formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of the

structure during construction.

5. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof.

6. Provide truss supports when adequate foundations for shores and struts cannot be secured.

7. Support form materials by structural member spaced sufficiently close to prevent objectionable deflection.

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

9. Provide formwork sufficiently tight to prevent leakage of cement paste during backup material at joints as required to prevent leakage and prevent fins.

10. Provide camber in formwork as required for anticipated deflection due to weight and pressures of fresh concrete and construction loads.

11. Any weep hole forming required shall be stainless steel of nonmetallic material.

2.04 EARTH FORMS

A. Side forms for footing may be omitted, and concrete may be placed directly against excavation, only when requested by the Contractor and approved by the Engineer.

B. When omission of forms is accepted, provide additional concrete one (1) foot on each side of the minimum design profile and dimensions shown on the Drawings.

PART THREE - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.03 INSTALLATION

A. Install the work of this Section in strict accordance with the suppliers' recommendations and shop drawings as approved by the Engineer.

B. Upon completion of the installation, carefully inspect each component and verify that all items have been installed in their proper location, adequately anchored, and adjusted to achieve optimum operation.

3.04 FORM CONSTRUCTION

A. General:

1. Construct forms complying with ACI 347 to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, and level and plumb work in the finished structure.

2. Provide for openings, offsets, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features as required.

3. Temporary openings shall be provided, where required, to facilitate cleaning and inspection, prior to placing concrete. This is particularly required at the bottom of wall forms. Shavings, chips, and all refuse shall be removed and the forms shall be broom cleaned before any concrete is placed.

B. Fabrication:

1. Fabricate forms for easy removal without hammering or prying against concrete surfaces.

2. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.

3. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.

4. Provide top forms for inclined surface where so directed by the Engineer.

C. Forms for exposed concrete:

1. Drill forms to suit ties being used, and to prevent leakage of cement paste around tie holes. Do not splinter forms by driving ties through improperly prepared holes.

2. Provide sharp, clean corners at intersecting planes, without visible edges of offsets. Back the joints with extra studs or girts to maintain true, square intersections.

3. Use extra studs, wales, and bracing to prevent objectionable bowing of forms between studs, and to avoid bowed appearance in concrete. Do not use narrow strips of form material that will produce bow.

D. Corner treatment:

1. Unless shown otherwise, form chamfers with 3/4" X 3/4" strips, accurately formed and surfaced to produce uniformly straight lines and tight edges.

2. Extend terminal edges to required limit, and miter the chamfer strips at changes in direction.

E. Locate control joints as indicated on the Drawings and, where required but not shown on the Drawings, as approved by the Engineer.

F. Provisions for other trades:

1. Provide openings in concrete formwork to accommodate work of other trades.

2. Verify size and location of openings, recesses, and chases with the trade requiring such items.

3. Accurately place and securely support items to be built into the concrete.

3.05 FORM COATINGS

A. Coat form contact surface with form coating compound before reinforcement is placed.

1. Do not allow excess form coating material to accumulate in the forms or to come in contact with surfaces that are supposed to bond to fresh concrete.

2. Apply the form coating material in strict accordance with its manufacturer's recommendations.

3.06 REMOVAL OF FORMS

A. General:

1. Forms shall be removed in accordance with ACI 318-77. Upon removal of forms, the Owner's Representative shall be notified by the Contractor in order that an inspection of the newly stripped surfaces may be made prior to patching.

2. Do not disturb or remove forms until the concrete has hardened sufficiently to permit form removal with complete safety.

3. Do not remove shoring until the member has acquired sufficient strength to support its own weight, the load

upon it, and the added load of construction.

4. In determination of the items for the removal of false-work, forms and housing, and discontinuance of heating, consideration shall be given to the location and character of the structure, the weather conditions and other conditions influencing the setting of the concrete, and the materials used in the mix. The following periods, exclusive of days when the temperature is below 40°F, may be used as a guide in determining the minimum time after placing concrete when forms may be removed unless instructed otherwise by the Owner's Representative. Contractor shall assume all risk relative to removing the forms from the concrete structures.

   Footings - 12 to 24 hours
   Center under beams or flat slab - 14 days
   Other floor slabs - 7 to 14 days
   Walls - 1 to 2 days
   Columns - 1 to 7 days
   Sides of beams and all other parts - 1 day

B. Finished surfaces:

1. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged, and that corners are true, sharp, and unbroken.

2. Release sleeve nuts or clamps, and pull the form ties neatly.

3. Do not permit steel spreaders, form ties, or other metal to project from, or be visible on, any concrete surface except where so shown on the Drawings.

4. Solidly pack form tie holes, rod holes, and similar holes in the concrete. For packing, use the cement grout specified in Section 03120 of these Specifications, flushing the holes with water before packing, screeding off flush, and grinding to match adjacent surfaces.

PART FOUR – SPECIAL PROVISIONS

N/A

END OF SECTION

PART ONE - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall provide, transport, and place all concrete required to construct conduits, pavements, curbing, foundations, slabs, walls, floors, columns, beams, tanks, roads, highways, drives and other concrete structures; and for special uses as required by the Project Specifications or as shown on the Drawings.

B. Related Work:

1. Related work includes, but is not limited to, the General Conditions, Supplementary Conditions, Section 01300 Submittals, Section 03200 Concrete Reinforcement, Section 03100 Concrete Formwork, Section 01410 Testing Laboratory Services, and all other applicable Sections of the Project Technical Specifications.

1.02 QUALITY ASSURANCES

A. Where applicable State and local codes exist and conflict with this Section, the State and local code requirements shall control.

1. Ohio Department of Transportation requirements shall apply to all road and highway work.

B. American Society for Testing and Materials, (ASTM) and American Concrete Institute (ACI) standards as specified herein shall apply.

C. Laboratory Services and Control

1. The laboratory providing the services specified in Section 01410 shall make sample tests as required to assure that the concrete provided is of the specified quality and composition.

2. Laboratory technicians shall have free access to the job and concrete production facilities at all times and receive the full cooperation of the Contractor for the preparation, storage, and transportation of concrete sample test cylinders and/or test beams.

3. The laboratory shall provide the forms for testing cylinders and beams.

4. The Contractor shall provide to the Owner, design mixes that include the weight in pounds of fine aggregate, coarse aggregate, cement, and water per cubic yard of concrete; the number of 94 pound sacks of cement per cubic yard of concrete; the pounds of water per sack of cement; gross weight and yield per cubic yard of concrete; weight in ounces or pounds of admixture per sack of cement; slump; air content; and compressive strength of test cylinders at seven (7) days and twenty-eight (28) days. Weight of fine and coarse aggregate shall be determined in saturated, surface dry condition. Material samples shall be provided, as required, to the Owner for verification of the design mix.

a. The laboratory shall, as directed by the Engineer, test and produce reports of mix designs for all concrete incorporated in the work.

b. Only the laboratory shall adjust concrete mixes, as required, to obtain a product in conformance with the specified limiting requirements.

5. It shall be the responsibility of the Contractor to obtain mix designs for each specified class of concrete used. The Engineer shall approve the mix designs before the Contractor starts concrete production.

a. The mix design for pumped concrete shall conform to concrete industry standard ANSI/ACI 304.2R.

6. The laboratory shall make scheduled quality control tests consisting of the following:

a. Test specimens (compressive strength)

b. Slump

c. Air Entrainment

7. When concrete is procured from a central batching plant or transit mixers are used, the Owner may provide a representative at such plant to check the proportioning of aggregates and water, and mixing time.

D. Schedule of Tests

1. Quality control tests for concrete each mix shall be performed as determined necessary by the Engineer.

2. Three (3) test cylinders shall be made for each 20 cu. yds. or part thereof of concrete poured each day.

3. Two (2) test beams shall be made for each 250 sq. yds. of concrete pavement placed.

4. When cylinders and/or beam samples are made, the slump and air tests shall be made using concrete from the same batch.

5. Samples of concrete tested for determining air content and slump and for test cylinders and beams shall be taken at the point of discharge into the structure unless otherwise directed by the Engineer.

E. Standard Testing Specifications

1. Test specimens shall be made in accordance with "Standard Method of Making and Curing Concrete Test Specimens in the Field," ASTM Designation C31.

2. Tests for compression shall be performed in accordance with "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens," ASTM Designation C 39.

3. Tests of beam specimens shall be made in accordance with "Standard Test Method for Flexural Strength of Concrete" (Using Simple Beam with Center-Point Loading), ASTM Designation C 293.

4. Slump tests shall be made using "Standard Test Method for Slump of Portland Cement Concrete," ASTM Designation C 143.

5. Air content shall be determined for concrete mixes composed of sand, gravel, and stone aggregates by use of "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method," ASTM Designation C 231. Where slag aggregate is used, the air content shall be determined by the Volumetric Method, ASTM Designation C 173.

6. Should the twenty-eight (28) day strength fall below that specified for the particular class of concrete, the Contractor shall take such action as necessary to assure that the strength is not less than that specified.

7. Acceptance of concrete shall conform to ACI 301, Chapter 17.

F. Concrete Plant

1. Plant equipment and facilities shall be in accordance with applicable requirements of ASTM Designation C 94 and as specified herein.

2. Equipment shall comply with the following requirements:

a. The accuracy of the weighing equipment shall conform to the requirements of the United States Bureau of Standards.

b. Equipment shall be capable of compensating for the varying weight of moisture contained in the aggregates, or for changing the proportionate batch weights.

c. The equipment shall be capable of accurately controlling the weight of the cement and aggregate.

d. The equipment shall be so arranged as to permit the convenient removal of overweight material.

e. Standard testing weights and other necessary equipment for testing the accuracy of the weighing

equipment shall be available at the plant at all times.

3. Plant Inspection

   a. A qualified representative of the testing laboratory shall, as directed by the Engineer, inspect the plant and determine if the necessary facilities and equipment are available and adequate for the scheduled production of concrete as specified.

   b. If the plant does not meet requirements, the Contractor shall be informed of the deficiencies so that they may be corrected.

   c. When, in the opinion of the laboratory representative, the plant meets the requirements for specified production, he shall so notify the Engineer in writing. The notification shall include a list of all major facilities necessary for use in production of specified concrete for use in the Project.

4. Production of concrete shall not be started until the Engineer has approved the plant for use.

G. Mixing and Transporting Concrete

1. Concrete may be mixed in portable mixers located at the job site, in central plant mixers, or in transport mixers. Mixers of all types shall conform to the requirements specified herein.

2. Transit and central plant mixed concrete shall be mixed in approved batch mixers of the rotary drum type having sufficient capacity to assure continuous delivery at the required rate, except that relatively small quantities may be hand mixed with special permission. The mixing drum shall be kept free of set concrete at all times. A water storage tank equipped with a gauge glass and an accurate measuring device shall be provided to determine the exact amount of water added to each batch. The measuring device shall be readily adjustable, and so designed that it can be locked after setting and that the amount of added water cannot be altered after such setting. Mixing shall continue at least one (1) minute at the manufacturer's rated drum speed after water, all aggregate, and cement have been added; and until every particle of aggregate is coated with mortar and the whole mass is uniform in color and homogeneous in texture. The Contractor shall supply a discharge locking device, so designed that concrete cannot be discharged in less than the required mixing time. The mixer also shall be equipped with an alarm that sounds at the end of the mixing time, and with an approved batch meter that will accurately record each batch delivered.

3. Transit mixed concrete shall be mixed completely in truck mixers equipped with the specified water-measuring control and locking device. Each batch of concrete shall be mixed for not less than 70 nor more than 100 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of the equipment as mixing speed. Mixing shall be at the speed designated by the manufacturer of the equipment at their rated capacity. Trucks shall be equipped with counters that register the number of revolutions of the drum or blades.

4. The Contractor shall furnish two (2) delivery tickets with each load containing the following information:

   a. Date
   b. Producer and Plant
   c. Job, name, and location
   d. Truck number and time dispatched
   e. Concrete designation and cement type
   f. Admixture descriptions and contents
   g. The time discharge was started and completed
   h. Amount of concrete in load
   i. Amount of any materials added at the site and authorized signature.

1.03 SUBMITTALS

A. Contractor

1. Plant certification

2. Cement certificate for each shipment
3. Admixture certificate

4. Concrete mix design

    a. Design mix approval
    b. Test results
    c. Sieve analysis of coarse and fine aggregates
    d. Admixtures
    d. Pozzolan admixture, Type F

PART TWO - PRODUCTS

2.01 MATERIALS

A. Cement shall conform to the requirements of ASTM C 150 or ASTM C 595. Types as provided in Table 1.

B. Admixtures

1. Air entrainment admixtures conforming to ASTM Designation C 260 shall be introduced into the mix in quantities to entrain air as follows:

   Class A, B & D 5% optimum - allowable variance 1%
   Class C 6% optimum - allowable variance 2%

2. Pozzolan admixture shall conform to the requirements of ASTM Designation C 618, Class F.

3. Calcium chloride or admixtures containing more than 0.1% chloride ions are prohibited.

4. High range water reducing admixture (super-plasticizer) may be used as an option by the Contractor, but at no additional cost to the Owner.

   a. The admixture shall conform to ASTM C494, Type F.

      1) Approved products are Eucon - 37 by Euclid Chemical Company, Sikament by Sika Chemical Corporation or equal.

C. Fine Aggregate

1. Fine aggregate shall consist of natural sand composed of clean, hard, strong durable, uncoated grains, It shall be free from injurious amounts of shale, clay lumps, soft or flaky particles and other unsound or deleterious substances. It shall conform to Specifications for Concrete Aggregates, ASTM Designation C 33.

D. Coarse Aggregate

1. Coarse aggregate shall consist of gravel, slag, or broken stone composed of strong, hard, clean, durable, uncoated pebbles or rock fragments free from injurious amounts of shale, coal, clay lumps, soft fragments, dirt, glass, and organic or other deleterious substances. It shall conform to Specifications for Concrete Aggregates, ASTM Designation C 33, Size 467, 57 or 67, Class 4S. Slag shall weigh at least 75 lbs/cf.

2. For thin sections, the maximum stone size used shall be reduced when directed. For heavy sections the maximum stone size shall be increased when directed. In both cases, the graduation of other stone sizes shall be modified as directed. Crushed stone and gravel shall be washed if necessary to remove dust, dirt, or loam and if unsatisfactory shall be excluded from the work.

E. Non-shrinking Grout

1. Materials for non-shrink grout shall conform to CRD-C-621 "Corps of Engineers Specifications for Non-Shrink Grout". Approved products are Sauereisen F-100 Grout as manufactured by Sauereisen Cements Co., Pittsburgh, Pennsylvania; Five-Star Grout as manufactured by U.S. Grout Corp., Old Greenwich, Connecticut; Masterflow 713 as manufactured by Master Builders, Cleveland, Ohio and "Euco N-S" by Euclid Chemical Co.

F. Forms for Concrete

1. Forms shall be in accordance with Section 03100 Concrete Formwork and the following:

2. Forms for exposed surfaces shall be of approved material to produce a smooth surface with minimal joint marks.

3. When wood forms are used, they shall be constructed of sound top construction grade western fir or hemlock, or equivalent acceptable lumber, dressed on forming sides and neatly fitted. Joints shall be of quality to produce a smooth surface compatible with the type of finish required.

4. Plywood used for formwork shall be manufactured using waterproof glue made for this type of installation.

G. Concrete Reinforcement

1. Concrete reinforcement shall be in accordance with Section 03200 Concrete Reinforcement.

PART THREE - EXECUTION

3.01 PROPORTIONING

A. Normal weight concrete shall be designated Class A, B, C or D and be proportioned and mixed to develop not less than the minimum compressive strength shown in Table I. (ACI 301 - Proportioning on the basis of previous field experience or trial mixtures).

TABLE 1
CONCRETE REQUIREMENTS

Concrete Class	Cement Type	Min. 28-Day Compressive Strength PSI	Maximum Water-Cement Ratio	Minimum Cement Content Sack/CY	Slump Minimum	Max.
A	I	4000	0.45	6 - 1/2	1	4
B	I	2000	0.74	4 - 1/2	2	6
C	I	4000	0.50	6 - 1/2	1	4
D	II or IP	4000	0.45	6 - 1/2	1	4

Note: See paragraph 3.11 herein for the uses of the various classes of cast-in-place concrete.

B. Water-Cement Ratio

1. Except by special permission of the Engineer, maximum amounts of water (U.S. gallons), including the surface water carried by the fine and coarse aggregates per sack (94 lbs. net) of cement shall be that listed in Table 1. Standard methods shall be used for determination of surface moisture in the aggregates.

2. Concrete of the maximum strength, density, and durability possible with the specified water-cement ratio is required. No increase of these ratios will be permitted.

   a. Refer to ANSI/ACI 304.2R for placing concrete by pumping methods.

3. Water may be added with the approval of the Engineer, but in no case shall the maximum slump limit be exceeded.

C. Each cubic yard of concrete shall contain the minimum number of sacks (94 lbs. net per sack) of cement listed in Table 1.

1. The minimum amounts of cement listed shall be used regardless of tests and design methods used.

D. Proportions

1. The proportions of aggregate to cement for concrete of the specified water-cement ratio shall be such as to produce concrete that can be puddled readily into the corners and angles of forms and around reinforcement without excessive spading and without segregation of materials or collections of free water on the surface. In no case shall concrete be placed which shows slumps outside the limits listed in Table 1.

2. Consistency of the concrete shall be closely regulated and the proportions of fine and coarse aggregate shall be such as to produce no harshness in placing nor honeycombing in the structures. If required, the mixture shall be modified by changing the relative volume of fine and of coarse aggregate. The Contractor shall cooperate in every way to the end that concrete of the desired quality shall be obtained.

3.02 FORMS FOR CONCRETE

A. Concrete forms shall be in accordance with Section 03100 Concrete Formwork and the following:

B. Erection

1. All walls shall be plumb with level tops; all floors shall be either level or sloped toward a floor drain where provided.

2. Forms for repeated use shall be supplied in numbers to provide for the required rate of progress. Defective forms shall not be used.

3. Forms for all exposed surfaces of ceilings, beams and columns, and of walls of tanks, conduits and buildings shall be constructed of 3/4 inch or 7/8 inch plywood or lined by a method that assures smooth surfaces.

C. Forms shall not be removed until the concrete has attained sufficient strength to assure structural stability under all dead and construction loads, and so that removal can be accomplished without marring concrete surfaces. The determination of when forms may be removed shall take into account temperature and humidity. Formwork that does not support the weight of concrete shall remain in place for at least 24 hours after concrete placement. Formwork supporting the weight of concrete shall remain in place until the concrete has obtained 80% of the specified 28-day strength.

3.03 PLACING CONCRETE

A. Scheduling

1. The Contractor shall notify the Engineer at least twenty-four (24) hours in advance of placing concrete.

2. Concrete shall be placed between the hours of 8:00 A.M. and 6:00 P.M. unless permission is obtained to extend that time. No slab shall be placed after 12:00 Noon on any last working day of the week.

3. Each concrete pour shall be completed in a continuous operation with no interruption in excess of forty-five (45) minutes.

4. No concrete shall be placed after its initial set has occurred, and no re-tempered concrete shall be used under any circumstances.

5. When columns, brackets, or walls are to support beams or slabs, the concrete in the vertical or supporting member shall be deposited up to 1/2 inch above the bottom of the supported member and a period of at least twelve (12) hours shall elapse for settlement before placing concrete in the horizontal member.

6. No concrete shall be placed during rain, sleet, or snow unless adequate protection is provided and approval is obtained. Rainwater shall not be allowed to increase the mixing water nor damage the surface finish.

B. Before placing the concrete, all forms shall be thoroughly cleaned and the space to be occupied by the concrete shall be free from all laitance, silt, dirt, shavings, sawdust, and other debris.

C. Conveying Concrete to Forms

1. The method or device used for conveying the concrete from the mixer to its place in the work shall be such as to assure against the separation of the materials.

2. Where placing operations involve dropping the concrete more than four (4) feet, it shall be deposited through sheet metal or other approved pipes. These pipes shall be made in sections not to exceed four (4) feet in length.

D. Placing Concrete in Forms

1. Concrete placing shall conform to ACI 304.

2. Concrete shall be deposited at or near its final position and carried up evenly within forms, in layers not exceeding eighteen (18) inches in depth. It shall be thoroughly consolidated around and into contact with forms, reinforcement, pipes, or other shapes built into the work, by spading and vibrating. Voids or pockets of coarse aggregate shall be prevented and the completed work shall be a solid, watertight unit with smooth form surfaces. A sufficient number of workers shall be available at all times to perform the work properly. Control of methods and practices of placing shall be subject to the approval of the Engineer.

3. Where pipe or other shapes are built into the work, the concrete shall be placed from one side only and shall flow under the pipe or shape to the other side until all air is displaced.

3.04 PLACING CONCRETE DURING COLD WEATHER

A. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

B. When concrete is placed at or below an atmospheric temperature of 40°F, or whenever, in the opinion of the Engineer, the temperature may fall below 40°F within the curing period, the water, aggregate, or both shall be heated and suitable enclosures and heating devices shall be provided.

C. Heating of Materials

1. Heating of mixing water shall be controlled to maintain uniform temperature from batch to batch. In no case shall the water be heated to a temperature greater than 140°F.

2. Aggregate shall be uniformly heated to eliminate all frozen lumps, ice, and snow. However, the aggregate shall not be heated to a temperature of more than 100°F.

D. Placing

1. Concrete shall be placed at a temperature of not less than 50°F. and not more than 75°F. and the air surrounding the forms and deposited concrete shall be maintained within this temperature range for a period of not less than seven (7) days. The enclosures and heating devices shall not be removed at the end of this period until the temperature of the concrete has been permitted to drop, at a rate not to exceed 20°F. per twenty-four (24) hours, to within 20°F. of the atmospheric temperature. Thermometers shall be furnished by the Contractor so that the temperature within the enclosure may be determined.

2. Concrete shall not be placed in contact with materials having a temperature of less than 40°F. If necessary, the forms, reinforcing steel, and foundation materials shall be enclosed and heated before the concrete is placed.

3. The completion of suitable enclosures and the application of heat to bring the air surrounding the forms and deposited concrete to the specified temperature shall follow the placing of concrete as soon as possible.

4. Heaters shall be vented at all times. No products of combustion shall be permitted to come in contact with concrete surfaces before twenty-four (24) hours after finishing.

E. Form Insulation

1. In lieu of heated enclosures, the Contractor may protect concrete in slabs more than twelve (12) inches thick and in walls of structures by the use of insulation, if approved by the Engineer.

2. When form insulation is used, the concrete shall be placed at a temperature of not less than 50°F and not more than 75°F as directed by the Engineer, and maintained by the insulation at a surface temperature of the concrete of not less than 50°F and not more than 100°F. Sufficient thermometers shall be furnished and installed by the Contractor in such a manner that the surface temperature of the concrete may be readily determined. Whenever the surface temperature as indicated by the thermometer reading exceeds the specified maximum temperature, the forms or insulation shall be loosened or otherwise vented until the surface temperature is within the specified limits. If the thermometer readings indicate that the minimum required temperature is not being maintained, the structure shall be promptly enclosed and heat furnished as required.

3. The insulation material shall be wind and water-resistant. Special precautions shall be taken at edges and corners to insure that such points are adequately protected. The tops of pours shall be protected by a tarpaulin, or other approved waterproof cover over the insulation.

4. At the close of the protection period, the temperature of the concrete within the form shall be gradually decreased, by loosening the forms of insulation to permit a rate of cooling not to exceed 20°F per twenty-four (24), to within 20°F of the atmospheric temperature.

3.05 PLACING CONCRETE DURING HOT WEATHER

A. When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

B. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated to the total amount of mixing water.

C. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

D. Wet forms thoroughly before placing concrete.

E. Do not use retarding admixtures without the written acceptance of the Engineer.

3.06 JOINTS AND BONDING

A. Construction joints and expansion joints shall be placed as shown on the Drawings. Approval of the Engineer must be secured for the placing of any construction joints not shown on the Drawings.

B. Keyways shall be provided in all construction joints. Unless shown otherwise on the Drawings, the width of all keyways shall be 1/3 of the wall or slab thickness by two (2) inches deep.

C. Horizontal Construction Joints (in walls).

1. Lower Joint Surface Construction

a. Proposed joint surfaces shall be finished straight by use of temporary straight edges tacked to the inside of the form with the lower edges on the line of the joint.

b. Keyway shall be formed before the concrete attains its initial set.

2. Completing Joint

a. Within twelve (12) hours after the keyway has been formed, the lower surface of the joint shall be thoroughly cleaned by the use of wire brushes and all laitance and loose material removed so as to expose clean, solid concrete. Care must be taken not to loosen any of the coarse aggregate in the concrete. If for any reason this laitance is not removed within twelve (12) hours after the concrete is placed, it shall be removed using such tools and methods as may be necessary to secure the results specified above.

b. After the lower surface has been prepared and immediately before placing concrete above the joint, the lower surface shall be thoroughly wetted and flushed and a bed of mortar composed of one (1) part Portland Cement and two (2) parts sand spread over the entire surface (two (2) inches minimum depth in wall pours). The mortar shall be thoroughly worked into all openings and crevices.

3.07 SURFACE FINISH

A. Concrete surfaces shall be finished even and reasonably free from imperfections and roughness. Angles shall be true and edges straight.

B. Patching

1. Upon removal of forms, cavities produced by form ties, honeycomb spots, broken corners or edges, and other defects shall be cleaned, saturated with water, and completely filled, pointed and trued with a mortar mix of cement and fine aggregate of the same proportions used in the concrete being finished. Form tie holes shall be completely filled by use of a pressure gun or by a hand ramming method.

2. On all exposed surfaces, all fins and irregular projections shall be removed with a stone or power grinder, in such a way as to avoid contrasting surface textures. Holes and other areas requiring corrective work shall be coated with neat cement and patched. Except where the surface is to be painted or otherwise covered, sufficient white cement shall be substituted for the regular cement in the patching mortar to produce finished patches of the same color as the surrounding concrete.

C. General Related to Finishing:

1. After removal of forms, give the concrete surfaces one or more of the finishes specified below where so indicated on the Drawings.

2. Revise the finishes as needed to secure the approval of the Engineer.

3. Concrete surfaces which will be exposed to view in the completed construction shall have a smooth even surface. Repairs shall be made to surface as soon as forms are stripped.

D. As-Cast Finish:

1. Rough form finish:

a. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.

b. Remove fins exceeding 1/4" in height.

2. Smooth form finish:

a. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with the number of seams kept to a practical minimum and in a uniform and orderly pattern.

b. Patch tie holes and defects.

c. Remove fins completely.

d. Unsightly ridges or lips on exposed concrete shall be removed by tooling and rubbing. All surfaces requiring rubbing shall be thoroughly washed with water after the rubbing is completed. Voids or stone pockets shall be cleaned out and patched. Wires and rods shall be cut off depressed not less than one inch below finished surface. Loose stones and all holes shall be cleaned out and the defects repaired with concrete to a smooth even surface. Holes left by removal of form ties shall be thoroughly and completely filled with patching concrete, as specified under Repairs and Patching. Plastering or cement wash will not be permitted unless otherwise specified in this section.

E. Finishing Slabs:

1. Definition of Finishing Tolerances:

a. "Class A": True plane within 1/8" in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.

b. "Class B": True plane within 1/4" in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.

c "Class C": True plane within 1/4" in two feet as determined by a two foot straightedge placed anywhere on the slab in any direction.

2. Scratched Finish: After the concrete has been placed, consolidated, struck-off, and leveled to a Class C tolerance, roughen the surface with stiff brushes or rakes before the final set.

3. Float Finish:

a. After the concrete has been placed, consolidated, struck-off, and leveled, do not work the concrete further until ready for floating.

b. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.

c. During or after the first floating, check the surface plane with a ten-foot straightedge applied at not less than two different angles.

d. Cut down high spots and fill low spots, and produce a surface with a Class B tolerance throughout.

e. Re-float the slab immediately to a uniform sandy texture.

4. Trowel Finish:

a. Provide a floated finish as described above, followed by power trowelling and then a hand trowelling.

1. Produce an initial surface which is relatively free from defects, but which still may show some trowel marks.

2. Provide hand trowelling when a ringing sound is produced as the trowel is moved over the surface.

3. Thoroughly consolidate the surface by hand trowelling.

4. Small areas may be entirely hand trowelled.

b. Provide a finished surface essentially free from trowel marks, uniform in texture and appearance, and in a plane of Class A tolerance.

1. For concrete on metal deck, Class B plane tolerance is acceptable.

2. On surfaces intended to support floor coverings, use grinding or other means as necessary and remove all defects of such magnitude as would show through the floor coverings.

5. Broom Finish:

a. Provide a floated finish as described above.

b. While the surface is still plastic, provide a textured finish by drawing a fiber bristle broom uniformly over the surface.

c. Unless otherwise directed by the Engineer, provide the texturing in one direction only.

d. Provide "light", "medium", or "course" texturing as directed by the Engineer or otherwise called for on the Drawings.

6. Scratch Finish:

a. If a surface is to receive bond-applied cementitious coating, provide a scratch finish.

7. Finish Schedule, unless otherwise indicated:

a. Building Interiors

Floors, bases, & curbs:	Trowel finish
Other slabs:	Float finish
Exposed formed surfaces:	Smooth-rubbed finish
Other formed surfaces:	As-cast finish

b. Building Exteriors

Slabs, drives, & walks:	Broom finish
Exposed formed surfaces:	Smooth-rubbed finish to 6 in. below grade
Other formed surfaces:	As-cast finish

c. Pedestrian ramps & exterior steps

Trowel finish (with slip-resistant aggregate applied) landings, platforms, garage floors

d. Tanks and Other Liquid Retaining Structures:

Slabs:	Float finish
Interior formed surfaces:	Smooth-rubbed down to 6 in. below water line when exposed to view As-cast finish below water line
Exterior formed surfaces:	Smooth-rubbed finish down to 6 in. below finished grade As-cast finish below finished grade
Other formed surfaces:	As-cast finish

F. Concrete floor hardener shall be furnished and applied to all interior exposed concrete floors, unless indicated otherwise on the Drawings. Floor hardener shall be Lapidolith as manufactured by Sonneborn, Inc., Hornolith as manufactured by A.C. Horn, Inc., or equal. Products shall be applied in conformance with the manufacturer's instructions and as specified herewith. The hardener shall be applied diluted with water in the following proportions:

1. First application - 1 part hardener to 2 parts water

2. Second application - 1 part hardener to 1 part water

3. Third application - 2 parts hardener to 1 part water

3.08 CURING OF CONCRETE

A. Curing of concrete shall be in conformance with ACI "Manual of Concrete Practice" Part I ACI 308 and as specified herein.

B. Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures, and mechanical injury, and shall be maintained with minimal moisture loss and at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The Contractor shall provide thermometers as required by the Engineer.

C. Horizontal units such as floor slabs and sidewalks shall be cured in two stages:

1. Initial curing shall begin immediately after concrete finishing is complete and shall be continued for twenty-four (24) hours and shall be in conformance with one of the following methods:

a. The concrete shall be covered with two thicknesses of an acceptable woven fabric such as burlap thoroughly saturated with water and shall be maintained in a saturated condition for the specified period. Lap the burlap strips by half widths when placing to give greater moisture retention and aid in preventing displacement of burlap during high wind or heavy rain.

b. Ponding of water over the entire surface for the specified period.

c. Continuous application of water by means of suitable sprinkling devices for the specified period.

2. Final curing shall last for a minimum of six (6) days and shall employ one of the following methods:

   a. Continuation of the water curing process employed in the initial curing period.

   b. An impervious paper or plastic covering, meeting ASTM Specification C 171, placed and maintained in contact with the concrete.

D. Vertical elements such as walls and columns shall be cured in two stages:

1. Initial curing shall begin immediately after the finishing of the concrete or within three (3) hours after placing operations cease. Curing shall consist of covering exposed surfaces with two (2) thicknesses of an approved woven fabric such as burlap, thoroughly saturated with water and maintained in a saturated state by means of a soaker hose placed on top of the burlap. If form work is to be left in place for more than forty-eight (48) hours, the forms should be loosened to assure that water runs down the inside of the forms, to keep the concrete surfaces wet.

2. Upon removal of the wet coverings and formwork used for the initial curing, one of the following methods for final curing may be used:

   a. Application of a continuous mist spray of water directly on the concrete.

   b. Application of an impervious paper of plastic covering, meeting ASTM Specifications C 171, directly upon the surface of the concrete.

E. When the mean daily temperature of the surrounding air is less than 40°F., the concrete shall be protected to maintain the temperature of the concrete between 50°F. and 70°F. for the curing period.

F. Curing water shall be approximately the same temperature as the concrete to alleviate temperature-change stresses that could be detrimental to the concrete.

3.09 PROTECTION

A. Free Water

1. Concrete for structures shall not be placed in water, nor shall water be allowed to come into contact with freshly poured concrete until it has attained a sufficient set, except where special permission may have been given to place concrete under water by the Engineer.

2. Water used for cleaning the placing equipment shall be discharged outside the forms.

B. All forms and reinforcing steel, located above the concrete being placed, and all placing equipment shall be kept clean and free of hardened concrete.

C. Aluminum Inserts:

1. All aluminum materials inserted in or in contact with concrete shall have the contract surface coated with bitumastic.

3.10 MUD MATS

A. Where called for on the plans or as directed by the Engineer, the Contractor shall construct concrete mud mats immediately after cleaning the excavation bottom, to preserve the bearing surface condition. Concrete for mud mats shall be not less than three (3) inches thick. Bottom of excavation shall be free of water, mud and loose material prior to mud mat placement.

3.11 CAST-IN-PLACE CONCRETE

A. All reinforced concrete shall be Class A, except as otherwise specified or shown on the Drawings.

B. Concrete used for mud mats, fill and channeling in manholes and chambers shall be Class B unless otherwise noted on the Drawings.

C. Concrete conforming to ODOT Current Edition shall be used for all concrete pavement, curbing, driveways, and sidewalks, unless noted otherwise on the Drawings.

D. Class B concrete may be used for encasing pipelines, fill, and pipe bedding.

E. Where Class B concrete fill is called for an installed in or on structures, the following steps shall be taken:

1. Scrub concrete slabs and/or walls with a stiff wire brush and streams of clean water.

2. Apply a bonding agency with a product name of Euco-Weld as manufactured by Euclid Chemical Company or equal.

3. The Class B concrete shall then be placed and screeded to bring the surface to final grade.

F. Class D concrete shall be used for sewerage treatment plants and sewerage pump stations, or as noted on the Drawings.

PART FOUR - SPECIAL PROVISIONS

4.01 NA

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART ONE - GENERAL

1.01 SCOPE

A. This Item includes furnishing and placing concrete reinforcing steel of the quality, type and size designated including steel dowels.

1.02 STANDARDS

A. Concrete reinforcement shall conform to requirements of ACI 301, latest edition, "Specifications for Structural Concrete for Buildings", except as modified herein.

1.03 SUBMITTALS FOR ENGINEER'S APPROVAL

A. The manufacturer shall submit certified results of at least one representative tensile and bending test for each size bar and fabric reinforcement furnished for contracts requiring 10,000 lbs. of reinforcing steel or more, unless otherwise required.

1.04 DELIVERY AND IDENTIFICATION

A. Reinforcing steel, as delivered to the job site, shall be bound in bundles of either bent or straight bars identified by a numbered weatherproof tag. The tag numbers shall identify the bars corresponding to those shown on the bar lists and placement drawings.

B. The Engineer shall be given a copy of the weigh bill and invoice for each shipment delivered.

1.05 PROTECTION

A. All reinforcing steel, metal chairs and supports shall be stored on timber supports above the ground and out of flood areas. It shall be protected from dirt, oil, grease, and rust.

PART TWO - PRODUCTS

2.01 QUALITY AND GRADE

A. Structures:

1. Bar reinforcement shall be Grade 60 deformed bars meeting the requirements of ASTM A 615 or ASTM A 616.

2. Steel fabric shall conform to "Specification for Fabricated Steel Bar or Rod Mats for Concrete Reinforcement", ASTM A 184, and shall be furnished in flat sheets.

3. Sizes shall be as indicated on the drawings.

B. Pavements, Curbing and Walks

1. Dowel bars for load transfer joints shall be straight, smooth, round bars conforming to the dimensions shown on the Drawings and shall be shop coated with a suitable rust inhibitor. For expansion joints, the dowel bars shall be fitted with expansion caps.

2. Longitudinal Bulkhead Joint Devices:

a. Hooked bolts for mechanically coupled lane tie assemblies shall have a 5/8-inch minimum shank diameter. Each assembly shall have a 24,000 lbs. minimum ultimate tensile strength.

b. Self-drilling anchors shall be the flush-end type of the snap-off chuck end type conforming to Federal Specifications No. FF-S-325 Group III, Type 1(a) or (c).

c. Longitudinal lane ties shall be 5/8-inch minimum diameter deformed reinforcing bars of length to embed fifteen (15) inch minimum into each lane of pavement.

3. Reinforcing steel shall be deformed bars conforming to ASTM A 615, A 616, or 617, Grade 60.

4. Fabric reinforcement shall conform to ASTM A 184.

2.02 DETAILED DRAWINGS

A. All detailing, fabrication accessories, and erection of reinforcing steel unless otherwise noted shall conform to the "Manual of Standard Practice for Detailing Reinforced Concrete" (ACI 315).

B. Laps and splices unless otherwise noted shall conform to "Building Code Requirements for Reinforced Concrete" (ACI 318).

PART THREE - EXECUTION

3.01 PLACEMENT

A. Reinforcement of the size and shape shown on the approved shop drawings, or as may be directed by the Engineer, shall be placed where indicated on the Drawings or as necessary to carry out the intent of the Drawings and Specifications.

B. The steel shall not be bent nor straightened in any injurious manner, such as by heating in the field. Bars with kinks or bends not shown on the Drawings shall be rejected.

C. Reinforcement shall be securely tied at intersections as often as necessary to maintain the bars in their proper position during placement of concrete.

D. The ends of spliced reinforcing bars shall overlap not less than forty (40) bar diameters unless otherwise shown on the Drawings. The splices in adjacent bars shall be staggered.

E. No reinforcing bars shall be driven nor forced into concrete after it has obtained its initial set.

F. Welding of main reinforcing is prohibited.

G. Before placing concrete in freezing weather, reinforcing bars shall be heated and kept warm to prevent concrete from freezing to the steel.

H. Reinforcing bars may be moved within allowable tolerance to avoid interference with other reinforcing steel, conduits, other embedded items, or openings.

I. The clear space between the outside face of reinforcing bars and the surface of concrete shall conform to the following dimensions, except as otherwise shown on the Drawings:

1. Concrete not in contact with earth or water or located over water

a. Columns, Beams, and Girders	1-1/2 in.
b. Slabs and Walls	3/4 in.
c. Wearing Surfaces	1 in.

2. Concrete in contact with or over water

a. All Members	2 in.

3. Concrete in contact with earth

a. Formed Walls and Columns	2 in.
b. Slabs on Ground	3 in.

3.02 SUPPORTS

A. All supports for reinforcement shall be of adequate strength, of the proper depth and number to securely hold the reinforcement in position while placing the concrete.

B. Metal supports shall have a shape that is easily enveloped by the concrete.

C. Metal supports in contact with formwork shall have plastic tips.

D. Where slabs are placed on forms, only metal supports will be permitted.

E. Where slabs are to be poured on firm ground or concrete mud mats, reinforcement may be supported by pre-cast concrete blocks or metal supports.

F. Pre-cast concrete spacer blocks of the required thickness shall be wired to wall and column steel to assure required concrete protection. However, pre-cast concrete spacer blocks will not be permitted where walls or columns will remain exposed after forms are removed.

PART FOUR – SPECIAL PROVISIONS

END OF SECTION

SECTION 03345

CONCRETE FINISHING AND CURING

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work included: Provide finishes on cast-in-place concrete as called for on the Drawings, specified herein, and needed for a complete and proper installation.

B. Summary of PART TWO - PRODUCTS

1. Subsection 2.01: Materials
2. Subsection 2.02: Sealer
3. Subsection 2.03: Waterproofing
4. Subsection 2.04: Other Materials

C. Summary of PART THREE - EXECUTION

1. Subsection 3.01: Surface Conditions
2. Subsection 3.02: Coordination
3. Subsection 3.03: Installation
4. Subsection 3.04: Finishing of Formed Surfaces
5. Subsection 3.05: Finishing Slabs
6. Subsection 3.06: Curing and Protection
7. Subsection 3.07: Sealing
8. Subsection 3.08: Waterproofing

D. Related Work

1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and sections in Division 1 of these Specifications.

2. Section 03120: Cast-in-Place Concrete

1.02 QUALITY ASSURANCE

A. Qualifications of Suppliers: Products used in the work of this Section shall be produced by suppliers regularly engaged in the manufacture of similar items and with a history of satisfactory production acceptable to the Engineer.

B. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper installation of the work in this Section.

C. Except as may be modified herein or otherwise directed by the Engineer, comply with ACI 301, "Specifications for Structural Concrete for Buildings".

1.03 SUBMITTALS AND SUBSTITUTIONS

A. Comply with pertinent provisions of Section 01300.

B. The following product data shall be submitted in accordance with the approved Construction Schedule required in Section 01300 of these Specifications:

1. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

2. Test data required elsewhere in this Specification.

1.04 PRODUCT HANDLING

A. General: Comply with pertinent provisions of Section 01350.

PART TWO - PRODUCTS

2.01 MATERIALS

A. General:

1. Carefully study the Drawings and these Specifications, and determine the location, extent, and type of required concrete finishes and curing.

2. As required for the Work, provide the following materials, or equals approved in advance by the Engineer.

B. Concrete Materials:

1. Comply with pertinent provisions of Section 03120, except as may be modified herein.

C. Curing and Protection Paper or Film:

1. Use waterproof paper or polyethylene film.

2. Approved products:

a. "Sisalkraft, Orange Label".

b. Equal products, comply with ASTM C171.

3. Where concrete will be exposed and will be subjected to abrasion, such as floor slabs, use non-staining paper such as "Sisalkraft, Seekure 896", or equal paper faced with polyethylene film.

D. Membrane Type Curing Compound:

1. Use products conforming to ASTM C-309/type 1D/Class A and Fed. Spec. TT-C-800A Type 2/Class. Approved products include the following:

a. Maximent floor seal, Set Projects, Inc.

b. Masterseal, Master Builders.

c. Sealtight CS-309 Acrylic Curing and Sealing Compound, W.R. Meadows, Inc.

d. Kure-N-Seal, Sonneborn, Building Products Division.

e. "Traz" Sealer, as manufactured by Chem-Masters Corporation, Chagrin Falls, Ohio.

2. Where application of specified finish materials will be inhibited by use of curing agents, cure the surface by water only; do not use chemical cure.

E. Floor and Deck Sealer with Hardener:

1. Approved products where no floor covering is to be installed:

a. Sealtight Cure-Hard Curing and Harding Compound, as manufactured by W.R. Meadows, Elgin, Illinois.

b. "Polyseal 4 in 1" Curing and Hardening Compound, as manufactured by Chem-Masters Corporation, Chagrin Falls, Ohio.

2. In areas where floor covering is to be installed, the chemical must be compatible with the adhesives to be used. Liquid curing and sealing agents, as specified above, may be used if shown to be compatible.

F. Slip-Resistant Abrasive Aggregate:

1. Provide aluminum oxide, 14/36 grading.

2. Acceptable manufacturers:

a. Carborundum Company

b. Norton Company

c. L.M. Schofield Company

2.02 SEALER

A. The sealer shall be Hydrozo Clear 16 as manufactured by Hydrozo Coatings Company, Lincoln, Nebraska or an approved equal. The sealer shall be an aluminum modified siloxane material containing approximately 6% solids and be applied by an approved applicator as per manufacturer's directions. It shall pass ASTM C67-80 with a repellency rating of 96%. It shall show, in twenty-eight (28) day submersion tests, a repellency rating of 99.55%. When tested for chloride ion resistance, it shall show little or no absorption. When tested per ASTM C672, Scaling Resistance Test, it shall have a rating of "No Scaling" after 40 cycles as compared to untreated concrete that had a rating of "Severe Scaling" after 10 cycles on non-air-entrained concrete. It shall have a Moisture Vapor Transmission Rate, per ASTM C 1653-72, of 52 grams per square foot per twenty-four (24) hours at 25°C.

2.03 WATERPROOFING

A. The waterproofing Xypex shall be as manufactured by Xypex Chemical Corporation, Richmond, British Columbia, Canada or an approved equal. The waterproofing shall be of the cementitious crystalline type that controls and permanently fixes non-soluble crystalline growth throughout the capillary voids of the concrete. The waterproofing material shall exhibit no leakage when two (2) inches, 2000 psi design samples are tested in conformance with U.S. Army Corps of Engineers' Permeability Specifications CRD C-48-73.

B. Clear sealers or cement-based compounds which utilize sodium silicate as a "gel" are not acceptable.

2.04 OTHER MATERIALS

A. Provide other materials, specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART THREE - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.03 INSTALLATION

A. Install the work of this Section in strict accordance with the manufacturer's recommendations and shop drawings as approved by the Engineer.

B. Upon completion of the installation, carefully inspect each component and verify that all items have been installed in their proper location, adequately anchored, and adjusted to achieve optimum operation.

3.04 FINISHING OF FORMED SURFACES

A. General:

1. After removal of forms, give the concrete surfaces one or more of the finishes specified below where so indicated on the Drawings.

2. Revise the finishes as needed to secure the approval of the Engineer.

3. Concrete surfaces which will be exposed to view in the completed construction shall have a smooth even surface. Repairs shall be made to surface as soon as forms are stripped.

B. As-Cast Finish:

1. Rough form finish:

a. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.

b. Remove fins exceeding 1/4" in height.

2. Smooth form finish:

a. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform and orderly pattern.

b. Patch tie holes and defects.

c. Remove fins completely.

d. Unsightly ridges or lips on exposed concrete shall be removed by tooling and rubbing. All surfaces requiring rubbing shall be thoroughly washed with water after the rubbing is completed. Voids or stone pockets shall be cleaned out and patched. Wires and rods shall be cut off depressed not less than one inch below finished surface. Loose stones and all holes shall be cleaned out and the defects repaired with concrete to a smooth even surface. Holes left by removal of form ties shall be thoroughly and completely filled with patching concrete, as specified under Repairs and Patching. Plastering or cement wash will not be permitted unless otherwise specified in this section.

C. Unspecified Finish: If the finish of formed surfaces is not specifically called out elsewhere in the Contract Documents, provide the following finishes as applicable.

1. Rough form finish:

a. For all concrete surfaces not exposed to public view.

2. Smooth form finish:

a. For all concrete surfaces exposed to public view.

3.05 FINISHING SLABS

A. Definition of Finishing Tolerances:

1. "Class A": True plane within 1/8" in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.

2. "Class B": True plane within 1/4" in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.

3, "Class C": True plane within 1/4" in two feet as determined by a two foot straightedge placed anywhere on the slab in any direction.

B. Scratched Finish: After the concrete has been placed, consolidated, struck-off, and leveled to a Class C tolerance, roughen the surface with stiff brushes or rakes before the final set.

C. Floated Finish:

1. After the concrete has been placed, consolidated, struck-off, and leveled, do not work the concrete further until ready for floating.

2. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.

3. During or after the first floating, check the planeness of the surface with a ten-foot straightedge applied at not less than two different angles.

4. Cut down high spots and fill low spots, and produce a surface with a Class B tolerance throughout.

5. Re-float the slab immediately to a uniform sandy texture.

D. Trowelled Finish:

1. Provide a floated finish as described above, followed by a power towelling and then a hand trowelling.

   a. Produce an initial surface which is relatively free from defects, but which still may show some trowel marks.

   b. Provide hand trowelling when a ringing sound is produced as the trowel is moved over the surface.

   c. Thoroughly consolidate the surface by hand trowelling.

   d. Small areas may be entirely hand trowelled.

2. Provide a finished surface essentially free from trowel marks, uniform in texture and appearance, and in a plane of Class A tolerance.

   a. For concrete on metal deck, Class B plane tolerance is acceptable.

   b. On surfaces intended to support floor coverings, use grinding or other means as necessary and remove all defects of such magnitude as would show through the floor coverings.

   c. The inside of the chlorine contact tank shall be very carefully trowelled, with a hard smooth finish acceptable to the Engineer.

E. Broom Finish:

1. Provide a floated finish as described above.

2. While the surface is still plastic, provide a textured finish by drawing a fiber bristle broom uniformly over the surface.

3. Unless otherwise directed by the Engineer, provide the texturing in one direction only.

4. Provide "light", "medium", or "course" texturing as directed by the Engineer or otherwise called for on the Drawings.

F. Unspecified Finish: If the finish of slab surfaces is not specifically called for elsewhere in the Contract Documents, provide the following finishes as applicable:

1. Scratch finish:

   a. For surfaces scheduled to receive bond-applied cemetitious applications.

2. Floated finish:
   a. Only in areas directed.

3. Trowelled finish:

a. For floors intended as walking surfaces.

b. For floor scheduled to receive floor coverings or waterproof membrane.

c. For parking areas.

4. Non-slip finish (trowelled finished with slip-resistant aggregate applied):

a. For exterior platforms, steps, and landings.

b. For interior and exterior pedestrian ramps and walks.

c. For garage floors.

3.06 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.

B. Preservation of Moisture:

1. All concrete shall be cured in a manner which will prevent loss of moisture from the concrete surface and keep the concrete in a continuously moist condition for at least seven days.

2. Unless otherwise directed by the Engineer, apply one of the following procedures to concrete not in contact with forms, immediately after completion of placement and finishing.

a. Ponding or continuous sprinkling.

b. Application of absorptive mats or fabric kept continuously wet.

c. Application of sand kept continuously wet.

d. Continuous application of steam (not exceeding 150°F) or mist spray.

e. Application of waterproof sheet materials specified in Part 2 of this Section.

f. Application of other moisture retaining covering as approved by the Engineer.

g. Application of the curing agent specified in Part 2 of this Section or elsewhere in the Contract Documents.

3. Where forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safely.

4. Cure concrete by preserving moisture as specified above for at least seven (7) days.

5. If forms are removed sooner than seven (7) days after placement of concrete, curing shall be continued until as least seven (7) days have elapsed by application of the curing and sealing or curing and hardening compound of type specified in this Section, or as otherwise allowed by the Engineer. No compound shall be used which will adversely affect the application of any coatings, adhesives, waterproofing or damp-proofing or any other finishes indicated for the concrete surface on the Drawings or elsewhere in the Specifications. Any dyes in curing compounds used on exposed concrete must be fugitive-type.

6. Where hardeners are required on a floor, the floors shall be cured and hardened simultaneously as specified in this Section or an Engineer approved equal and compatible with any topping or finish which will be applied to the slab.

7. The Contractor shall make arrangements with the curing and hardening material manufacturer to make available at no cost to the Owner the services of a field representative to clarify to the Contractor the proper application of the products under prevailing job conditions.

C. Temperature, Wind and Humidity:

1. Cold Weather:

a. When the mean daily temperature outdoors is less than 40°F, maintain the temperature of the concrete between 50°F and 70°F for the required curing period.

b. When necessary, provide proper and adequate heating system capable of maintaining the required heat without injury due to concentration of heat.

c. Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.

2. Hot Weather: When necessary, provide windbreaks, fog spraying, shading, sprinkling, ponding, or wet covering with a light colored material, applying as quickly as concrete hardening and finishing operations will allow.

3. Rate of Temperature Change: Keep the temperature of the air immediately adjacent to the concrete during and immediately following the curing period as uniform as possible and not exceeding a change of 5°F in any one-hour period, or 50°F in any 24-hour period.

D. Protection from Mechanical Injury:

1. During the curing period, protect the concrete from damaging mechanical disturbances such as heavy shock, load stresses, and excessive vibration.

2. Protect finished concrete surfaces from damage from construction equipment, procedures, rain and running water.

3. Do not load self-supporting structures in such a way as to overstress the concrete.

3.07 SEALING

A. Unless otherwise specified, all exterior and submerged (extend sealer to two (2) feet above liquid level) cast-in-place concrete which is not painted (Section 09900) or waterproofing (Section 03345, paragraph 3.08) shall be sealed with two (2) coats of the specified sealer, Type “B” Waterproofing in section 03535.

B. All work shall be done in strict accordance with the manufacturer's printed instructions. The sealer shall be applied with approved equipment and shall be removed from any surfaces not specified to be coated.

C. All interior concrete floor subject to vehicle traffic shall receive sealer at the rate of 1.5 PSF.

3.08 WATERPROOFING

A. All below grade exterior concrete walls shall receive two (2) coats of Type “A” Waterproofing as per section 03535. Coverage shall extend to two (2) feet above liquid level.

B. The construction joints shall receive one (1) coat of Xypex Concentrate on all joint surfaces between pours.

C. All work shall be done in strict accordance with the manufacturer's printed instructions. The waterproofing shall be applied with approved equipment and shall be removed from any surfaces not specified to be coated.

PART FOUR – SPECIAL PROVISIONS

END OF SECTION

SECTION 03535

CONCRETE WATERPROOFING

PART ONE - GENERAL

1.01 SCOPE

A. Under this Item the Contractor shall furnish and apply the waterproofing materials necessary for the protection of concrete surfaces.

B. These materials shall be designed to protect the concrete surfaces against the penetration of moisture and the disintegrating influences of alkalis, acids, and frost.

C. Other finishes for concrete surfaces are included in other sections in Division 3 as well as Section 09900 Painting.

1.02 SUBMITTALS

A. The Contractor shall submit complete descriptive literature from the manufacturer for each type of special waterproofing material he proposes to use. If requested by the Engineer, the Contractor shall submit the manufacturer's complete formula for the special material if different from those mentioned in the specifications, in order that the Engineer may determine that the proposed materials are equal to those specified.

1.03 ENVIRONMENTAL REQUIREMENTS

A. The Contractor shall comply with manufacturer's recommendations as to environmental conditions under which waterproofing systems can be applied and to all applicable OSHA requirements.

B. Interior waterproofing may be done only when the building has been thoroughly dried, by natural or artificial heat, and when the work area is properly heated and ventilated, clean, and as nearly dust free as possible. A room temperature of at least 60 degrees F shall be maintained during application and until waterproofing materials are dry.

C. Face masks shall be used when applying toxic material in enclosed rooms or chambers, regardless of the amount of ventilation provided.

D. Exterior waterproofing shall not be done during or immediately following rainy or frosty weather or when the temperature is below 50 degrees F or likely to drop below freezing during drying period. The application of treatment while surfaces are exposed to the hot sun, or when the temperature is above 90 degrees F, or likely to be during the drying period, shall be avoided.

E. Waterproofing material shall not be applied in areas where dust is being generated.

PART TWO - PRODUCTS

2.01 MATERIALS

A. There shall be two types of waterproofing.

B. Type A.

1. Type A shall be a bituminous material in a liquid form that is suitable for cold application.

2. It shall be of such a nature as to bond firmly to the concrete surface without the use of primers and to maintain sufficient elasticity to perform its protective function permanently in spite of cracks which develop.

   a. Concrete surfaces shall be sand blasted in accordance with SSPC-SP7 Brush-off Blast Cleaning.

   b. Concrete surfaces shall be clean and dry in accordance with ACI 515.

3. In a non-potable water situation, Type A shall be "Super Service Black" by Koppers, "46-465 H.B." by Tnemec;

or equal.

C. Type B

1. Type B shall be clear colorless liquid silicone polymer material.

2. It shall not alter the appearances of the surface. It shall penetrate the concrete surface pores and deposit silicones which will retard water absorption by the concrete.

3. Type B shall be "Hydrocide S-X" by Sonneborn, "Dehydratine 22" by A.C. Horn, Inc., or equal.

PART THREE - EXECUTION

3.01 PREPARATION

A. All surfaces which are to be treated shall be thoroughly cleaned and dried in conformance with manufacturer's recommendations.

3.02 APPLICATION

A. Type A

1. Type A shall be applied to all concrete walls and columns in contact with sewage, sludge, or water from top to bottom; the underside of concrete covers and slabs on tanks and conduits; freeboard to tops of wall and to other surfaces.

   a. In addition to the above, Type A shall be applied to exterior building walls from the footing to finish grade.

2. Type A shall be applied in two coats. Each coat shall have a coverage rate of 60 to 80 sq. ft. per gallon.

B. Type B

1. Type B shall be applied to all exposed exterior concrete surfaces of new structures above grade to a line 6 in. below finished grade, including adjoining concrete steps and platforms. The Contractor shall use application equipment recommended by the manufacturer.

   a. Interior concrete shall be treated with two coats as specified below, unless otherwise shown on the Drawing.

2. Type B shall be applied in two coats. Each coat shall have a coverage rate of 80 to 100 sq. ft. per gallon.

PART FOUR – SPECIAL PROVISIONS

END OF SECTION