

SECTION 009113 – ADDENDUM FOUR

PART 1 - ADDENDA

1.1 PROJECT INFORMATION

- A. Project Name: 22034.03 Meridian High School Baseball/Softball
- B. Owner: Meridian Public School District, 1019 25th Avenue, Meridian, MS 38391
- C. Architect: Dale | Bailey, an Association, One Jackson Place, Suite 250, 188 East Capitol Street, Jackson, MS 39201-2100
- D. Architect Project Number: 22034.03
- E. Date of Addendum Four: 19 April 2023



1.2 NOTICE TO BIDDERS

- A. This Addendum is issued to all registered plan holders pursuant to the Instructions to Bidders and Conditions of the Contract. This Addendum serves to clarify, revise, and supersede information in the Project Manual, Drawings, and previously issued Addenda. Portions of the Addendum affecting the Contract Documents will be incorporated into the Contract by enumeration of the Addendum in the Owner/Contractor Agreement.
- B. The Bidder shall acknowledge receipt of this Addendum in the appropriate space on the Bid Form.
- C. The date for receipt of bids is unchanged by this Addendum. Bid date May 2, 2023 at 3pm; the location of bids is unchanged.

1.3 GENERAL RESPONSES TO REQUESTS FOR INFORMATION

- A. QUESTION: The specs call for Expansion Joint Assemblies but we cannot find them on the drawings. Please advise.

ANSWER: No expansion joint assemblies are required on this project.

1.4 REVISIONS TO TECHNICAL SPECIFICATIONS

- A. 004113 Bid Form; (Revised). Additional Unit Pricing Included.
- B. 012200 Unit Prices; (New). See Attached.
- C. 079200.01 Undersealing; (New). See Attached.
- D. 093013 Ceramic Tiling; (Revised). Replace entirely with new version of section.
- E. 313523.20 TIED Concrete Block Mat; (New). See Attached.
- F. 321216 Asphalt Concrete Pavement (2004 Edition); (New). See Attached.
- G. 330130.11 Inspection and Evaluation of Gravity Pipelines; (New). See Attached.

- H. 330507.13 Utility Directional Drilling; (New). See Attached.

1.6 REVISIONS TO DRAWINGS

- A. Sheet C-10 - General Notes & Index. Add new sheet to Construction Documents.
- B. Sheet C-20 - Traffic Control Plan Phasing. Add new sheet to Construction Documents.
- C. Sheet C-100 - Existing Conditions. Add new sheet to Construction Documents.
- D. Sheet C-101 - Existing Conditions. Add new sheet to Construction Documents.
- E. Sheet C-102 - Existing Conditions. Add new sheet to Construction Documents.
- F. Sheet C-200 - Demo Plan. Add new sheet to Construction Documents.
- G. Sheet C-300 - Overall Site Plan. Add new sheet to Construction Documents.
- H. Sheet C-301 - Site Plan. Add new sheet to Construction Documents.
- I. Sheet C-302 - Site Plan. Add new sheet to Construction Documents.
- J. Sheet C-303 - Site Plan. Add new sheet to Construction Documents.
- K. Sheet C-400 - Overall Geometric Plan. Add new sheet to Construction Documents.
- L. Sheet C-401 - Geometric Plan. Add new sheet to Construction Documents.
- M. Sheet C-402 - Geometric Plan. Add new sheet to Construction Documents.
- N. Sheet C-403 - Geometric Plan. Add new sheet to Construction Documents.
- O. Sheet C-500 - Overall Grading Plan. Add new sheet to Construction Documents.
- P. Sheet C-501 - Grading Plan. Add new sheet to Construction Documents.
- Q. Sheet C-502 - Grading Plan. Add new sheet to Construction Documents.
- R. Sheet C-503 - Grading Plan. Add new sheet to Construction Documents.
- S. Sheet C-600 - Drainage Plan. Add new sheet to Construction Documents.
- T. Sheet C-601 - Drainage Plan. Add new sheet to Construction Documents.
- U. Sheet C-602 - Drainage Plan. Add new sheet to Construction Documents.
- V. Sheet C-603 - Drainage Plan. Add new sheet to Construction Documents.
- W. Sheet C-604 - Detention Pond. Add new sheet to Construction Documents.
- X. Sheet C-700 - Overall Utility Plan. Add new sheet to Construction Documents.
- Y. Sheet C-701 - Sewer Plan and Profile. Add new sheet to Construction Documents.
- Z. Sheet C-702 - Water Layout. Add new sheet to Construction Documents.
- AA. Sheet C-800 - Construction Details. Add new sheet to Construction Documents.
- BB. Sheet C-801 - Construction Details. Add new sheet to Construction Documents.
- CC. Sheet C-802 - Construction Details. Add new sheet to Construction Documents.
- DD. Sheet C-803 - Construction Details. Add new sheet to Construction Documents.
- EE. Sheet C-804 - Water Details. Add new sheet to Construction Documents.
- FF. Sheet C-805 - Sewer Details. Add new sheet to Construction Documents.
- GG. Sheet C-806 - Driveway Curb and Gutter & Sidewalk. Add new sheet to Construction Documents.
- HH. Sheet C-807 - Driveway Curb and Gutter & Sidewalk. Add new sheet to Construction Documents.
- II. Sheet C-808 - Curb Ramps Detectable Warning Details. Add new sheet to Construction Documents.
- JJ. Sheet C-809 - Flexible Pipe Culvert Insulation. Add new sheet to Construction Documents.
- KK. Sheet C-810 - Junction Box for Pipe Culverts. Add new sheet to Construction Documents.
- LL. Sheet C-811 - Junction Box for Box Culvert to Concrete Arch Pipe. Add new sheet to Construction Documents.
- MM. Sheet C-812 - Junction Box Type-2 for Traffic Load. Add new sheet to Construction Documents.
- NN. Sheet C-813 - Branch Connections. Add new sheet to Construction Documents.
- OO. Sheet C-814 - Median Inlets for Box Culverts. Add new sheet to Construction Documents.
- PP. Sheet C-815 - Gutter inlet for Type 2 Curb. Add new sheet to Construction Documents.
- QQ. Sheet C-816 - Gutter Inlet for Type 2 Curb. Add new sheet to Construction Documents.
- RR. Sheet C-817 - Storm Sewer Inlet Type SS-2. Add new sheet to Construction Documents.
- SS. Sheet C-818 - Drop Inlet and Grate Details for Pipe and Box Culverts. Add new sheet to Construction Documents.

- TT. Sheet C-819 - Flared End Section for Concrete Pipe. Add new sheet to Construction Documents.
- UU. Sheet C-900 - Erosion Control Plan. Add new sheet to Construction Documents.
- VV. Sheet C-901 - Erosion Control Details. Add new sheet to Construction Documents.
- WW. Sheet E-000 – Electrical Legend. Add new sheet to Construction Documents.
- XX. Sheet E-004 – Panel Schedule. Add new sheet to Construction Documents.
- YY. Sheet E-000 – Electrical Legend. Revised Schedule.
- ZZ. Sheet E-004 – Panel Schedule. Revised Schedule.

1.7 ATTACHMENTS

- A. This Addendum includes the following attached Specifications:
 - 1. 004113 Bid Form dated 19 April 2023.
 - 2. 012200 Unit Prices dated 19 April 2023.
 - 3. 079200.01 Undersealing dated 19 April 2023.
 - 4. 093013 Ceramic Tiling dated 19 April 2023.
 - 5. 313523.20 TIED Concrete Block Mat dated 19 April 2023.
 - 6. 321216 Asphalt Concrete Pavement (2004 Edition) dated 19 April 2023.
 - 7. 330130.11 Inspection and Evaluation of Gravity Pipelines dated 19 April 2023.
 - 8. 330507.13 Utility Directional Drilling dated 19 April 2023.

- B. This Addendum includes the following attached Drawings:
 - 1. Sheet C-10 - General Notes & Index dated 19 April 2023.
 - 2. Sheet C-20 - Traffic Control Plan Phasing dated 19 April 2023.
 - 3. Sheet C-100 - Existing Conditions dated 19 April 2023.
 - 4. Sheet C-101 - Existing Conditions dated 19 April 2023.
 - 5. Sheet C-102 - Existing Conditions dated 19 April 2023.
 - 6. Sheet C-200 - Demo Plan dated 19 April 2023.
 - 7. Sheet C-300 - Overall Site Plan dated 19 April 2023.
 - 8. Sheet C-301 - Site Plan dated 19 April 2023.
 - 9. Sheet C-302 - Site Plan dated 19 April 2023.
 - 10. Sheet C-303 - Site Plan dated 19 April 2023.
 - 11. Sheet C-400 - Overall Geometric Plan dated 19 April 2023.
 - 12. Sheet C-401 - Geometric Plan dated 19 April 2023.
 - 13. Sheet C-402 - Geometric Plan dated 19 April 2023.
 - 14. Sheet C-403 - Geometric Plan dated 19 April 2023.
 - 15. Sheet C-500 - Overall Grading Plan dated 19 April 2023.
 - 16. Sheet C-501 - Grading Plan dated 19 April 2023.
 - 17. Sheet C-502 - Grading Plan dated 19 April 2023.
 - 18. Sheet C-503 - Grading Plan dated 19 April 2023.
 - 19. Sheet C-600 - Drainage Plan dated 19 April 2023.
 - 20. Sheet C-601 - Drainage Plan dated 19 April 2023.
 - 21. Sheet C-602 - Drainage Plan dated 19 April 2023.
 - 22. Sheet C-603 - Drainage Plan dated 19 April 2023.
 - 23. Sheet C-604 - Detention Pond dated 19 April 2023.
 - 24. Sheet C-700 - Overall Utility Plan dated 19 April 2023.
 - 25. Sheet C-701 - Sewer Plan and Profile dated 19 April 2023.
 - 26. Sheet C-702 - Water Layout dated 19 April 2023.
 - 27. Sheet C-800 - Construction Details dated 19 April 2023.
 - 28. Sheet C-801 - Construction Details dated 19 April 2023.
 - 29. Sheet C-802 - Construction Details dated 19 April 2023.
 - 30. Sheet C-803 - Construction Details dated 19 April 2023.
 - 31. Sheet C-804 - Water Details dated 19 April 2023.

32. Sheet C-805 - Sewer Details dated 19 April 2023.
33. Sheet C-806 - Driveway Curb and Gutter & Sidewalk dated 19 April 2023.
34. Sheet C-807 - Driveway Curb and Gutter & Sidewalk dated 19 April 2023.
35. Sheet C-808 - Curb Ramps Detectable Warning Details dated 19 April 2023.
36. Sheet C-809 - Flexible Pipe Culvert Insulation dated 19 April 2023.
37. Sheet C-810 - Junction Box for Pipe Culverts dated 19 April 2023.
38. Sheet C-811 - Junction Box for Box Culvert to Concrete Arch Pipe dated 19 April 2023.
39. Sheet C-812 - Junction Box Type-2 for Traffic Load dated 19 April 2023.
40. Sheet C-813 - Branch Connections dated 19 April 2023.
41. Sheet C-814 - Median Inlets for Box Culverts dated 19 April 2023.
42. Sheet C-815 - Gutter inlet for Type 2 Curb dated 19 April 2023.
43. Sheet C-816 - Gutter Inlet for Type 2 Curb dated 19 April 2023.
44. Sheet C-817 - Storm Sewer Inlet Type SS-2 dated 19 April 2023.
45. Sheet C-818 - Drop Inlet and Grate Details for Pipe and Box Culverts dated 19 April 2023.
46. Sheet C-819 - Flared End Section for Concrete Pipe dated 19 April 2023.
47. Sheet C-900 - Erosion Control Plan dated 19 April 2023.

48. Sheet C-901 - Erosion Control Details dated 19 April 2023.
49. Sheet E-000 – Electrical Legend dated 19 April 2023.
50. Sheet E-004 – Panel Schedule dated 19 April 2023.

END OF ADDENDUM FOUR

DOCUMENT 004113 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: 22034.03 Meridian High School Baseball/Softball.
- C. Project Location: 2320 32nd St, Meridian, MS 39305.
- D. Owner: Meridian Public School District, 1019 25th Avenue, Meridian, MS 38391.
- E. Architect: Dale | Bailey, An Association, One Jackson Place, Suite 250, 188 East Capitol Street, Jackson, MS 39201-2100.
- F. Architect Project Number: 22034.03.

1.2 CERTIFICATIONS AND BASE BID

- A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Dale|Bailey, An Association, and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:
 - 1. _____ Dollars
(\$_____).
 - 2. The above amount may be modified by amounts indicated by the Bidder on the attached Document 004322 "Unit Prices Form" and Document 004323 "Alternates Form."

1.3 ALLOWANCES. Include the allowances below in the base bid. Refer to section 012100-ALLOWANCES.

- A. Allowance No. 01: Lump Sum Contingency Allowance of Three Hundred and Seventy-Five Thousand Dollars (\$375,000.00) total for Construction Contingency Allowance.
- B. Allowance No. 02: Lump Sum Contingency Allowance of Forty Thousand Dollars (\$40,000.00) for Mississippi Power Utility Allowance.

1.4 UNIT RATES. Refer to Section 012200 – Unit Rates for description of unit Rates.

- A. Lime Treatment (\$/Ton): _____.

- B. Soil Mixing (\$/SY): _____.
- C. Geogrid (\$/SY): _____.
- D. Undersealing (\$/LB)_____.

1.5 ALTERNATES. Refer to Section 012300 - Alternates for description of Alternates.

- A. Additive Alternate No. 01: South Section of Additional Stadium Bleachers and Awning as shown in documents.
_____ Dollars
(\$_____).

- B. Additive Alternate No. 02: West Section of Additional Stadium Bleachers and Awning as shown in documents.
_____ Dollars
(\$_____).

- C. Additive Alternate No. 03: Upgrade from Base Bid Scoreboard to Video Scoreboard.
_____ Dollars
(\$_____).

1.6 BID GUARANTEE

- A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 . days after a written Notice of Award, if offered within 90 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

1. _____ Dollars
(\$_____).
- B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.7 SUBCONTRACTORS AND SUPPLIERS

A. The following companies shall execute subcontracts for the portions of the Work indicated:

- 1. Concrete Work: _____.
- 2. Masonry Work: _____.
- 3. Roofing Work: _____.
- 4. Plumbing Work: _____.
- 5. HVAC Work: _____.
- 6. Electrical Work: _____.

1.8 TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect and shall substantially complete the Work by May 28, 2024. Work is subject to liquidated damages.

1.9 ACKNOWLEDGMENT OF ADDENDA

A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

- 1. Addendum No. 1, dated _____.
- 2. Addendum No. 2, dated _____.
- 3. Addendum No. 3, dated _____.
- 4. Addendum No. 4, dated _____.
- 5. Addendum No. 5, dated _____.

1.10 BID SUPPLEMENTS

A. The following supplements are a part of this Bid Form and are attached hereto.

- 1. Bid Form Supplement - Bid Bond Form (AIA Document A310-2010).

1.11 CONTRACTOR'S LICENSE

A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in Mississippi, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.12 SUBMISSION OF BID

- A. Respectfully submitted this _____ day of _____, 20323.
- B. Submitted By: _____(Name of bidding firm or corporation).
- C. Authorized Signature: _____(Handwritten signature).
- D. Signed By: _____(Type or print name).
- E. Title: _____(Owner/Partner/President/Vice President).
- F. Witnessed By: _____(Handwritten signature).
- G. Attest: _____(Handwritten signature).
- H. By: _____(Type or print name).
- I. Title: _____(Corporate Secretary or Assistant Secretary).
- J. Street Address: _____.
- K. City, State, Zip: _____.
- L. Phone: _____.
- M. Email: _____.
- N. License No.: _____.
- O. Federal ID No.: _____(Affix Corporate Seal Here).

END OF DOCUMENT 004113

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for procedures for using unit prices to adjust quantity allowances.

1.2 DEFINITIONS

- A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Unit Price No. 1. Lime Treatment.

1. Description: Lime Treatment - Provide a unit price for the lime material to be used in lime treatment of subgrade soils and/or unsuitable soils if encountered and if needed for expediency. Only as directed per engineer/testing agency.
 2. Unit of measurement: Per Ton
- B. Unit Price No. 2. Soil Mixing.
1. Description: Soil Mixing - Provide a unit price for the mixing of lime material with the subgrade soils as per the geotechnical report recommendations if needed for expediency. Only to be used as directed per engineer/testing agency.
 2. Unit of Measurement: Square Yard.
- C. Unit Price No. 3. Triaxial Geosynthetic (Geogrid TX5).
1. Description: Triaxial Geosynthetic (Geogrid TX5) (if needed per Geotech report).
 2. Unit of Measurement: Square Yard.
- D. Unit Price No. 4. Undersealing.
1. Description: Undersealing (Inject Polyurethane to Seal RCP Joints).
 2. Unit of Measurement: per pound (lb).

END OF SECTION 012200

DOCUMENT 079200.01 – UNDERSEALING
PART 1 - GENERAL

1-01 DESCRIPTION

- A. This work shall consist of filling voids (undersealing) in the soil adjacent to a pipe culvert(s), box culverts(s), bridge structure(s), or other locations determined by the Engineer. It is intended that the voids around the pipe culverts will be filled from the surface and voids around the box culverts will be filled from within the box culvert.

PART 2 – MATERIAL

- A. The material for filling the voids shall be a “hydro-sensitive” high density polyurethane meeting the following requirements.

<u>Properties</u>	<u>Test Value</u>	<u>Test Method</u>
Density, lbs./ft., minimum	4.0	ASTM D 1622
Tensile Strength, psi, minimum	100	ASTM D 1622
Compression Strength, psi (at yield point), minimum	90	ASTM D 1621

The Contractor shall furnish the Engineer with certified test reports showing that the material meets the requirements of the specification.

PART 3 – EXECUTION

- A. Construction Requirements - All undersealing will be done at the locations specified in the plans, or as directed by the Engineer. Contractor to use camera equipment to locate joints of drainage structures and determine which joints need to be Undersealed to restore integrity of pipe and seal off joint from soil/water intrusion.
- B. Equipment - The equipment shall be that customarily used in undersealing operations. Generally, it shall consist of a pneumatic or electric drill capable of drilling holes of adequate size in the embankment soil or culvert wall to accomplish the work. The exact depth into the embankment shall be determined by the Contractor. The equipment shall be in satisfactory operating condition and operated in such a manner as to prevent unnecessary damage to existing roadways, structures, and the surrounding area. The pump shall be capable of injecting the high density polyurethane at a rate and to a depth necessary to fill the void adjacent to the existing structures. Contractor to camera/inspect the lines during injection and upon completion to ensure joints were sealed properly and excess material was cleaned from interior of drainage structure.
- C. Drilling Holes - Unless otherwise shown in the plans, the size and location of the injection holes shall be as determined by the Manufacturer/Contractor.
- D. Injection Process - The nozzle of the discharge hose shall be secured in the drilled hole in a manner that provides an adequate seal during the pumping process. The polyurethane material shall be injected through the drilled holes until all known or encountered voids are filled. The rate and amount of material injection shall be determined by the Manufacturer/Contractor.

When the nozzle is removed, the hole shall be plugged or sealed to the satisfaction of the Engineer. Any excess polyurethane material shall be removed.

Cost for maintenance of traffic and individual traffic control devices as required for undersealing operations shall be included in the unit price for undersealing and will not be measured for separate payment.

END OF DOCUMENT 079200.01

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceramic mosaic tile.
2. Quarry tile.
3. Porcelain tile.
4. Glazed wall tile.
5. Stone thresholds.
6. Tile backing panels.
7. Metal edge strips.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Face Size: Actual tile size, excluding spacer lugs.
- D. Module Size: Actual tile size plus joint width indicated.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

1.5 INFORMATIONAL SUBMITTALS

1.6 QUALITY ASSURANCE

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 - 2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.

- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
1. Stone thresholds.
 2. Waterproof membrane.
 3. Crack isolation membrane.
 4. Cementitious backer units.
 5. Metal edge strips.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

- A. Ceramic Tile for Shower Floor and Full Height Wall: Factory-mounted glazed ceramic mosaic tile.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Crossville, Inc. Color Blox 2.0; or comparable product by one of the following:
 - a. American Olean; a brand of Dal-Tile Corporation.
 - b. Daltile; a brand of Dal-Tile Corporation.
 - c. Crossville, Inc.
 2. Composition: Vitreous or impervious natural clay or porcelain.
 3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
 4. Module Size: 3x3 Mosaics .
 5. Thickness: 6.4 mm.
 6. Face: Plain with cushion edges.
 7. Surface: Smooth, without abrasive admixture.
 8. Dynamic Coefficient of Friction: Not less than 0.42.
 9. Tile Color and Pattern: As selected by Architect from manufacturer's full range .
 10. Grout Color: As selected by Architect from manufacturer's full range .

11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cove: Cove, module size 3x3 Cove Base.
 - b. Cap & External Corners: Bead (bullnose), module size 3x3 Bullnose .

B. Ceramic Tile Accents for Wall & Floor: Unglazed square-edged quarry tile.

1. Basis-of-Design Products: Subject to compliance with requirements, provide Crossville, Inc. Color Blox 2.0; or comparable product by one of the following:
 - a. American Olean; a brand of Dal-Tile Corporation.
 - b. Daltile; a brand of Dal-Tile Corporation.
 - c. Crossville, Inc.
2. Composition: Vitreous or impervious natural clay or porcelain.
3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
4. Face Size: 6x6 .
5. Thickness: 6.4 mm.
6. . Face: Plain with cushion edges.
7. Wearing Surface: Nonabrasive, smooth .
8. Dynamic Coefficient of Friction: Not less than 0.42.
9. Tile Color and Pattern: As selected by Architect from manufacturer's full range (up to 2 colors in use for pattern).
10. Grout Color: As selected by Architect from manufacturer's full range .

2.4 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of 10 according to ASTM C1353 or ASTM C241/C241M and with honed finish.
1. Description: Uniform, fine- to medium-grained white stone with gray veining.
 2. Description: As selected by Architect from manufacturer's full range.

2.5 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Georgia-Pacific Gypsum LLC.
 - b. USG Corporation.
 2. Thickness: 1/4 inch or As indicated.

2.6 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thinset): ANSI A118.11.
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Bostik; Arkema.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 - d. Sakrete; CRH Americas, Oldcastle APG.
 - 2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 - 3. Provide prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at Project site.

2.7 GROUT MATERIALS

- A. High-Performance Tile Grout: ANSI A118.7.
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Bostik; Arkema.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 - d. Sakrete; CRH Americas, Oldcastle APG.
 - 2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
 - 3. Polymer Type: Acrylic resin in liquid-latex form for addition to prepackaged dry-grout mix.
- B. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.8 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A276/A276M or ASTM A666, 300 Series exposed-edge material.
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Schluter Systems L.P.

2.9 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.

- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF CERAMIC TILE

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation

methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Exterior tile floors.
 - b. Tile floors in wet areas.
 - c. Tile swimming pool decks.
 - d. Tile floors in laundries.
 - e. Tile floors consisting of tiles 8 by 8 inches or larger.
 - f. Tile floors consisting of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 1. Ceramic Mosaic Tile: 1/8 inch.
 2. Quarry Tile: 3/8 inch.
 3. Glazed Wall Tile: 1/8 inch.
 4. Porcelain Tile: 1/4 inch .
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

- J. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry-set mortar (thinset).
- K. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

3.4 INSTALLATION OF TILE BACKING PANEL

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.6 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093013

DOCUMENT 313523.20 – TIED CONCRETE BLOCK MAT

PART 1 - GENERAL

1-01 DESCRIPTION

- A. This item shall consist of installing a tied concrete block erosion control mat. Furnishing and placing the matt on prepared areas, pinning in accordance with these SPECIFICATIONS and MANUFACTURER RECOMMENDATION at the locations shown on the PLANS or as indicated in the SPECIFICATIONS by the ENGINEER.
- B. This item shall include the provision of all labor, materials, equipment, supplies and incidentals necessary to accomplish the erosion control activities specified herein.

PART 2 - MATERIALS

2-01 TIED CONCRETE BLOCK EROSION CONTROL MAT

- A. Matt shall be manufactured from individual concrete blocks tied together with high strength polypropylene bi-axial geogrid. Each block shall be tapered, beveled and interlocked and include connections that prevent lateral displacement of the blocks within the mats when they are lifted for placement.

Tied Concrete Block Mats shall be Flexamat, manufactured by Motz Enterprises, Inc. or approved equal (See Section 3, Alternative Products).

- B. Blocks. Furnish blocks manufactured with concrete conforming to the cement requirements of ASTM C150 and to the aggregate requirements of ASTM C33. Meet a minimum compressive strength of 5,000 psi at 28 days. Furnish blocks that have a minimum weight of 3 lb. per block and placed no further than 2 in. apart.
- C. Polypropylene Bi-Axial Geogrid. The geogrid will be composed of Polypropylene multifilament yarns coated with an acrylic based coating which is designed to resist degradation in environments with exposure to water and low pH (,4 pH) and high pH (>9 pH). When combined with the revetment mat this will yield a high tenacity, low elongating, and continuous filament polypropylene fibers that is securely cast into and embedded within the base of the concrete blocks and obtains connection strength greater than that of the geogrid. Ensure the geogrid meets the requirements of Table 1:

Table1 Polypropylene Bi-Axial Geogrid

Description	Requirement
UV Stabilization	2% Carbon Black
Ultimate Tensile Strength	2055 lb./lf

- D. Underlayment Materials: Includes 5-Pick Leno Weave Fabric, Curlex® II and Recyclex TRM-V. The backing material shall be packaged within the roll of the Block mat Tied Concrete Blocks.

Leno Weave Five-Pick Netting:

This is a woven, white polypropylene netting that provide added strength and support to the underlayments.

<u>Index Property</u>	<u>Units</u>	<u>Value</u>
GSM	g/m ²	118 (-3~ +3)
Density	Picks/10cm	62 x 24 (+/- 2)
Warp Strength	N/5cm	≥ 350
Warp Elongation	%	20 - 50
Weft Strength	N/5cm	≥ 280

Weft Elongation	%	20 - 50
Warp Shrinkage	%	≤ 7
Weft Shrinkage	%	≤ 9

Curlex® II:

Curlex II Tied concrete block mat (ECB) consists of a specific cut of naturally seed free Great Lakes Aspen curled wood excelsior with 80% six-inch fibers or greater fiber length. It is of consistent thickness with fibers evenly distributed throughout the entire area of the blanket. The top and bottom of each blanket is covered with degradable polypropylene netting.

<u>Index Property</u>	<u>Test Method</u>	<u>Value</u>
Thickness	ASTM D 6525	0.418 in (10.62 mm)
Light Penetration	ASTM D 6567	34.6%
Resiliency	ASTM D 6524	64%
Mass per Unit Area	ASTM D 6475	0.57 lb/yd ² (309 g/m ²)
MD-Tensile Strength Max.	ASTM D 6818	127.0 lb/ft (1.9 kN/m)
TD-Tensile Strength Max.	ASTM D 6818	50.9 lb/ft (0.7 kN/m)
MD-Elongation	ASTM D 6818	28.64%
TD-Elongation	ASTM D 6818	29.84%
Swell	ECTC Procedure	89%
Water Absorption	ASTM D 1117/ECTC	199%
Bench-Scale Rain Splash	ECTC Method 2	SLR = 6.84 @ 2 in/hr 2,3
Bench-Scale Rain Splash	ECTC Method 2	SLR = 7.19 @ 4 in/hr 2,3
Bench-Scale Rain Splash	ECTC Method 2	SLR = 7.56 @ 6 in/hr 2,3
Bench-Scale Shear	ECTC Method 3	2.6 lb/ft ² @ 0.5 in soil loss 3
Germination Improvement	ECTC Method 4	645%

¹ Weight is based on a dry fiber weight basis at time of manufacture. Baseline moisture content of Great Lakes Aspen excelsior is 22%.

² SLR is the Soil Loss Ratio, as reported by NTPEP/AASHTO. ³ Bench-scale index values should not be used for design purposes.

Recyclcx® TRM:

Recyclcx TRM – V is a permanent non-degradable Turf Reinforcement Mat (TRM), consists of 100% post-consumer recycled polyester (green or brown bottles) with 80% five-inch fibers or greater fiber length. It is of consistent thickness with fibers evenly distributed throughout the entire area of the TRM. The top and bottom of each TRM is covered with heavy duty polypropylene net. Fibers are tightly crimped and curled to allow fiber interlock, and to retain 95% memory of the original shape after loading by hydraulic events. Fibers have a specific gravity greater than 1.0; therefore, the blanket will not float during hydraulic events. Recyclcx TRM – V meets Federal Government Executive Order initiatives for use of products made from, or incorporating, recycled materials. Recyclcx TRM – V shall be manufactured in the U.S.A. and the fibers shall be made from 100a% recycled post-consumer goods.

<u>Index Property</u>	<u>Test Method</u>	<u>Value</u>
Thickness	ASTM D 6525	0.294 in (7.47 mm)
Light Penetration	ASTM D 6567	57%
Resiliency	ASTM D 6524	86%
Mass per Unit Area	ASTM D 6566	0.50 lb/yd ² (271 g/m ²)
MD-Tensile Strength Max.	ASTM D 6818	295.2 lb/ft (4.32 kN/m)
TD-Tensile Strength Max.	ASTM D 6818	194.4 lb/ft (2.85 kN/m)
MD-Elongation	ASTM D 6818	32.2%
TD-Elongation	ASTM D 6818	40.8%

Swell	ECTC Procedure	8%
Water Absorption	ASTM D 1117/ECTC	33.8%
Specific Gravity	ASTM D 792	1.21
UV Stability	ASTM D 4355 (1,000 h r)	80% minimum
Porosity	Calculated	97.5%
Bench-Scale Rain Splash	ECTC Method 2	SLR = 5.86 @ 2 in/hr ^{1,2}
Bench-Scale Rain Splash	ECTC Method 2	SLR = 5.00 @ 4 in/hr ^{1,2}
Bench-Scale Rain Splash	ECTC Method 2	SLR = 6.33 @ 6 in/hr ^{1,2}
Bench-Scale Shear	ECTC Method 3	2.41 lb/ft ² @ 0.5 in soil loss 2
Germination Improvement	ECTC Method 4	432%

¹ SLR is the Soil Loss Ratio, as reported by NTPEP/AASHTO. ² Bench-scale index values should not be used for design purposes.

- E. Cover the mat or otherwise protect it during long periods of storage to protect against degradation of the backing material as recommended by the manufacturer.
- F. Mats will be rolled for shipment and are packaged with handling straps. These handling straps shall only be used for lifting below 2 ft. to place heavy duty lifting straps under rolls. Upon delivery, rolls may be left exposed for up to 30 days. If exposure will exceed 30 days, cover or tarp the rolls to minimize UV exposure.

All mats to be inspected upon delivery. Assure that all units are sound and free of defects that would interfere with the proper placing of the unit or impair the strength or permanence of the construction.

Chipping or missing concrete resulting in a weight loss exceeding 15% of the average weight of a concrete unit is grounds for rejection by the engineer. Replace, repair or patch the damaged areas per the manufacturer's recommendations.

2-02 ALTERNATIVE PRODUCTS

- A. Alternative products may be considered if composition matches the materials detailed in Section 2. Such products must be pre-approved in writing by the Engineer prior to bid date. Alternative product packages must be submitted to the Engineer a minimum of fifteen (15) days prior to bid date. Submittal packages for alternate products must include, as a minimum, the following:
- a. Product Properties – Composition of materials, stating product is comprised of the following components:
 - i. Concrete Blocks - minimum compressive strength of 5,000 psi at 28 days. Furnish blocks that have a minimum weight of 3 lb. per block. Blocks shall be placed no further than 2 in. apart.
 - ii. Polypropylene Bi-Axial Geogrid – Multifilament yarns coated with an acrylic based coating with minimum tensile strength of 2055lbs
 - iii. Underlayment - Minimum of a 5 – pick reno weave netting, double-net excelsior (wood fiber) blanket, plus additional turf reinforcement. Underlayment must be packaged within the Tied Concrete Block Mat rolls.
 - b. Full-Scale laboratory testing performed by an independent 3rd party testing facility with associated engineered calculations certifying the hydraulic capacity of the proposed Tied-Concrete Block Erosion Control Mat meets the performance requirements listed in Section 4 of this specification.
 - c. A list of 15 comparable projects in terms of project size, application and material dimensions in the United States, where the results of the specific alternative material's use can be verified and reviewed

for system integrity and sustained after a minimum of 5 years of service life.

2-01 PERFORMANCE

- A. Full-Scale laboratory testing performed by an independent 3rd party testing facility with associated engineered calculations certifying the hydraulic capacity of the proposed Tied-Concrete Block Erosion Control Mat meets the following requirements:

Test	Tested Value	Bed Slope	Soil Classification	Limiting Value
ASTM 6460	Shear Stress	30%	Sandy Loam (USDA)	24lb./ft ²
ASTM 6460	Velocity	20%	Loam (USDA)	30 ft./sec

PART 3 - INSTALLATION

3-01 GENERAL

- A. Prior to installing Block mat, prepare the subgrade as detailed in the plans. All subgrade surfaces to be smooth and free of all rocks, stones, sticks, roots, and other protrusions or debris of any kind that would result in an individual block being raised more than 3/4 in. above the adjoining blocks. When seeding is shown on the plans, provide subgrade material that can sustain growth.

Ensure the prepared subgrade provides a smooth, firm, and unyielding foundation for the mats. The subgrade shall be graded into a parabolic or trapezoidal shape to concentrate flow to middle of mat or mats.

Provide the proper equipment to place the mat that will not damage the mat material or disturb the top soil subgrade and seed bed.

When vegetation is required, distribute seed on the prepared topsoil subgrade before installation of the concrete mats in accordance with the specifications.

Install mats to the line and grade shown on the plans and per the manufacturer’s guidelines. The manufacturer or authorized representative will provide technical assistance during the slope preparation and installation of the concrete block mats as needed.

Provide a minimum 18 in. deep concrete mat embedment toe trench at all edges exposed to concentrated flows. Recess exterior edges subject to sheet flow a minimum of 3 in.

When needed, provide fastening or anchoring as recommended by the manufacturer or engineer for the site conditions.

For seams parallel to the flow line in ditch or channel applications, center a minimum 3 ft. wide strip of soil retention blanket under the seam. Fasten along the seam at 5 ft. maximum spacing. Parallel seams in the center of the ditch shall be avoided when possible.

Shingle seams perpendicular to the flow line with the downstream mat recessed a minimum of 2 blocks under the upstream mat and fastened together along the seam at 2 ft. maximum spacing if required by manufacturer or engineer.

END OF DOCUMENT 313523.20

DOCUMENT 321216 – ASPHALT CONCRETE PAVEMENT

PART 1 - GENERAL

1-01 DESCRIPTION

- A. This item shall include the furnishing of all labor, materials, equipment and incidentals necessary and required for paving roadways, driveways, and parking areas in accordance with the contract Drawings and these Specifications.
- B. Paving shall be performed with machinery equipped with a 40 foot ski attachment for proper grade control, so that a smooth riding surface is achieved.
- C. Any required adjustments of existing utility manholes, valves and appurtenances will be performed by CONTRACTOR as necessary.
- D. Dimensions shall be as indicated on the Drawings.
- E. Where reference is made to the Mississippi Department of Transportation, it is intended to be in accordance with the Mississippi Standard Specifications for Road and Bridge Construction, Mississippi State Highway Department, 2004 Edition.

PART 2 - MATERIALS

2-01 GENERAL

- A. All materials for asphalt paving and related work shall comply with Mississippi Standard Specifications for Road and Bridge Construction, MDOT, 2004 Edition as follows:
 - 1. Hot Mix Asphalt (HMA) – General - Section 401
 - 2. Hot Mix Asphalt Pavement – Section 403
 - 3. Tack Coat - Section 407
 - 4. Utility Adjustments - Section 613
- B. The term "course" used in this Section shall be understood to mean a layer of specified thickness shown on the plans and for which quantities are estimated on the plans and in the proposal as the basis for bidding. A course may, in some cases consist of a single layer, and, in other cases, may consist of two or more layers depending on the finished thickness specified.
- C. The CONTRACTOR shall retain a certified testing laboratory and pay all costs associated with conforming to these Specifications.

PART 3 - EXECUTION

3-01 BASE COURSE (25mm and 19mm Mixes):

- A. General: Where indicated on the Drawings this work shall consist of the construction of a base course in one or more courses composed of mineral aggregates in the proportions specified and placed hot. The base course shall be constructed on a prepared subgrade foundation in accordance with these specifications and in close conformity with the thickness, lines, grades and sections as shown on the plans.

- B. The base course shall comply with Section 403 of the MDOT Specifications.
- C. A job mix formula shall be submitted to the ENGINEER for review prior to placing any base material. See Paragraph E of this section.
- D. The job mix formula shall be set within the master range as indicated below. The job mix formula shall be maintained within the job mix tolerance and shall not exceed the limits of the ranges.
1. The job mix temperatures shall be between 225 degrees Fahrenheit minimum and 340 degrees Fahrenheit maximum with a tolerance of +/-25 degrees Fahrenheit.
 2. The job mix formula as approved shall be considered as tentative until a sufficient amount of the mixture has been processed through the plant, spread and compacted.
 3. Extractions shall be made on samples of each mixture, produced by the plant, before any mixture is placed on the project.
 4. After the job mix formula is approved, the mixture furnished to the project shall remain unchanged, within the tolerances specified for the mixture, throughout the duration of the job. No change in properties or proportions of any ingredient of the mix shall be made without written permission of the ENGINEER.
- E. The gradation of the mixture shall meet the requirements as shown in the Design Master Range found in Section 401.02.1.2.3.
- F. Bituminous Materials shall be petroleum asphalt cement grade PG 67-22, unless otherwise specified.
- G. Mineral filler shall meet the requirements of Section 703.16 of the MDOT Specifications. Mineral filler may be used as necessary to obtain desired properties; however, excessive use shall not be permitted in the mix.
- H. Weather Limitations: Base course shall be placed on a dry unfrozen surface and only when the air temperature in the shade is above 40 degrees F. and rising, or above 50 degrees F. when falling, and when the weather is not rainy or foggy.
- I. Density:
- a. For all single lift overlays, with or without, leveling and/or milling, the required lot density shall be 92.0 percent of maximum density.
 - b. For all multiple lift overlays of two (2) or more lifts, excluding leveling lifts, the required lot density of the bottom lift shall be 92.0 percent of maximum density and subsequent lifts shall have a 93.0 percent of maximum density.
 - c. For all pavements on new construction, the required lot density for all lifts shall be 93.0 percent of maximum density
 - d. Maximum density for asphalt lots shall be 95.0 percent of maximum density.
- J. Base course shall be placed in layers not to exceed four (4) inches in thickness, unless approved by the ENGINEER.
- K. Surface tolerance shall conform to the designated grade and cross section within the tolerances set forth in Section 403.03.2 of MDOT Specifications.

3-02 TACK COAT (Required Full Width)

- A. General: This work shall consist of preparing and treating a clay gravel base, an existing bituminous base or an existing concrete base with bituminous material in accordance with those shown on the plans or established by the ENGINEER. A tack coat shall be applied, for the full width of the course to be superimposed on a previously prepared and bonded clay gravel base, bituminized road surface or base, or concrete surface or base. The tack coat may be omitted from a previously primed road when deemed by the ENGINEER to be unnecessary.
- B. Tack coat is to be applied between each lift or course of asphalt pavement unless otherwise specified by the ENGINEER.
- C. A tack coat shall be applied over the base course and shall consist of 0.05 to 0.10 gallons per square yard of bituminous material grade RC-70 as specified in Section 410 of the MDOT Specification.
- D. Tack coat shall be applied with a distributor spray bar. A hand wand will only be allowed for applying tack coat on ramp pads, irregular shoulder areas, median crossovers, turnouts or irregular areas.
- E. Tack coat shall not be applied during wet or cold weather, after sunset or to a wet surface, and only on as much pavement as can be covered with additional courses in the same day. The surface to receive tack coat shall be prepared in accordance with Section 401.03.6 and 410.03.04 of MDOT Specifications.
- E. Separate Payment for tack coat shall not be made. The tack coat shall be an absorbed item.

3-03 LEVELING/SURFACE COURSE: (12.5mm, 9.5mm and 4.75mm Mixes)

- A. This work shall consist of the construction of a surface course, thickness indicated on drawings, in accordance with the Contract Drawings, these specifications and the Mississippi State Highway Department Specification 403, Hot Bituminous Pavement.
- B. A job mix formula shall be submitted to the ENGINEER for review prior to placing any surface course. See Paragraph C of this section.
- C. The gradation of the mixture shall meet the requirements as shown in the Design Master Range found in Section 401.02.1.2.3.
- D. Bituminous materials shall be petroleum asphalt cement grade PG 67-22.
- E. Density: The average percent density of samples obtained from the completed pavement shall be at least 92 percent (92%) of the average laboratory density for single lift overlays; all multiple lift asphalts shall be 92 percent (92%) of the average laboratory density for the bottom lift and 93% for subsequent lifts; all pavements on new construction shall be 93 percent (93%) of the average laboratory density.
- F. Mineral filler shall meet the requirements of Section 703.16 of the MSHD Specifications. Mineral filler may be used as necessary to obtain desired properties; however, excessive use shall not be permitted in the mix.
- G. Tests for stability determination, if required, will be made in accordance with Section 700.03, MDOT Specifications.
- H. Weather Limitations: Surface courses shall be placed only when the air temperature in the shade is 50 degrees F. or above, and the weather is not rainy or foggy.

- I. Surface Tolerances: Surface tolerances shall conform to the designated grades and cross section, within the tolerances set forth in Section 403.03.02 Tolerances of MDOT Specifications.

3-04 PRE-ROLLING

- A. Prior to application of base course, the sub-base shall be pre-rolled as may be required to determine possible presence of underlying soil failures.

3-05 TESTING

- A. The CONTRACTOR shall have the testing laboratory furnish certified gradation analysis of aggregates for binder and surface course and for material to be installed in the base course. These results shall be reviewed by the ENGINEER prior to the use of the material tested.
- B. Density testing shall be paid for by the CONTRACTOR, and taken a minimum of one (1) for each 10,000 square feet of pavement installed, or fraction thereof.
- C. Results of all testing shall be submitted to the ENGINEER in triplicate.
- D. Any prior use testing or certification costs shall be borne by the Contractors. Testing of the plant mix in the laboratory shall be paid for by the CONTRACTOR.

END OF DOCUMENT 321216

DOCUMENT 330130.11 - INSPECTION AND EVALUATION OF GRAVITY PIPELINES

PART 1 -- GENERAL

1.1 SCOPE

- A. It is the intent of this contract to assess the internal structural and service condition of the proposed storm drainage piping, inlets, junction boxes, sewer systems, including manholes, lift stations, and sewer lines prior to final approval of proposed improvements by OWNER. Assessment will be performed using visual inspection and pan and tilt color camera-CCTV.
- B. Qualifications of contractor:
1. If requested by the Engineer, the proposed contractor shall submit a reference list documenting the successful completion of a minimum of 500,000 linear feet of internal sewer/storm condition assessment on projects of similar size and scope to this project. The reference list, along with a list of available equipment & resumes of key personnel shall be submitted to the engineer a minimum of two weeks prior to bid.
- C. It is also the intent of this contract to survey individual sewer/storm lines that have been preconditioned to further assess condition and record findings.
- D. It is the responsibility of the Contractor to comply with applicable OSHA regulations. The Contractor shall provide written documentation that all workers have received the training required under these regulations and guidelines.
- E. Two forms of internal condition assessment are addressed by this specifications:
1. Sewer/storm survey – Detailed viewing of the sewer/storm (“survey”), with the aid of CCTV equipment, to assess internal structural condition, service condition, and identify and locate miscellaneous construction features, as well as assess the structural and service condition of laterals.
 2. Sewer/storm inspection – Viewing the sewer/storm system pursuant to investigative work following other operational activity including:
 - a. Locating manhole(s)/inlet(s) and/or lateral(s).
 - b. Sewer/storm preconditioning and cleaning activities
 - c. Sewer/storm rehabilitation, including point repairs
 - d. Such other similar purposes as may be required by the Owner.
 3. Sewer/storm inspection shall be carried out manually or with the aid of CCTV equipment, to assess overall condition.

1.2 SUBMITTALS

- A. As requested by the Engineer, the Contractor shall provide to the Engineer the following information in writing prior to the set deadline, or at the indicated frequency, whichever is applicable.

1. Project Schedule (At Pre-Construction Conference)

2. Listing of Cleaning Equipment & Procedures (At Commencement)
3. Listing of Flow Diversion Procedures (At Commencement)
4. Listing of Preconditioning Procedures (At Commencement)
5. Listing of Safety Precautions and Traffic Control Measures (At Commencement)
6. Listing of CCTV Equipment (At Commencement)
7. Listing of Backup and Standby Equipment (At Commencement)
8. Location where Debris from Cleaning will be Disposed (At Commencement)
9. Updated Schedule of Planned Inspections/Cleaning of Sewer/Storm Reaches (Post Commencement, Weekly)
10. Two (2) Copies of CCTV videos on DVD, zip drive, external hard drive or other suitable digital media, Two (2) Copies of Inspection Report incorporating a summary statistical breakdown of defects and main findings (As per Schedule in Exhibit "C")
11. Daily Logs and Progress Reports (Daily)

B. The Contractor shall complete a daily written record (diary) detailing the work carried out and any small items of work which were incidental to the contract. The Contractor shall include in his daily record, reference to:

1. Delays: e.g. dense traffic, lack of information, sickness, labor or equipment shortage.
2. Weather: conditions, e.g. rain, etc.
3. Equipment: on site, e.g. specialist cleaning, by-pass equipment, etc.
4. Submittals: to the designated representative
5. Personnel: on site by name, e.g., all labor, Specialist Services, etc.
6. Accident: report, e.g. all injuries, vehicles, etc.
7. Incident: report, e.g. damage to property, property owner complaint, etc.
8. Major defects encountered, including collapsed pipe, if any: e.g. cave-ins, sink holes, etc.

9. Visitors: on site

- C. The Engineer's designated representative on site shall certify receipt of the daily record noting any items and adding any observations with reference to claims for payment to the Contractor. The Owner may at his discretion, make an exception to this requirement for weekly submission of progress rather than for daily submission.

1.3 REQUIREMENTS AND EXTENT OF SURVEY/INSPECTION

- A. The Contractor shall survey and/or inspect proposed sewer/storm systems with digital cameras or color pan and tilt CCTV imagery as specified in order to record all relevant features and confirm their structural and service condition. Surveys/Inspections of sewer/storm systems shall be carried out in compliance with the NASSCO PACP reporting format and coding standards.
- B. All CCTV operator(s) responsible for direct reporting of sewer/storm condition shall have a minimum of 3 years previous experience in surveying, processing, and interpretation of data associated with CCTV surveys/inspections. If requested by the Engineer, the Contractor shall provide the designated representative with written documentation that all CCTV survey operators meet these experience requirements which shall include a list of projects undertaken as well as client name and telephone number for reference.
- C. Approved Contractors will be required to provide evidence acceptable to the Engineer that all CCTV technicians performing work under this contract have satisfactorily completed NASSCO Pipeline Assessment Certification Program (PACP) training and possess valid PACP Certification documents. All defect coding, as well as material, shape and lining coding used throughout the project will conform to NASSCO's Pipeline Assessment Certification Program, PACP. Required training to meet these requirements will be carried out at the Contractor's expense.

1.4 SURVEY/INSPECTION UNITS

- A. The Contractor shall provide sufficient survey/inspection units and all relevant ancillary equipment, including standby units in the event of breakdown, in order to complete all sewer/storm and manhole/inlet surveys/inspections as specified.

1.5 SURVEY/INSPECTION VEHICLE

- A. The survey/inspection vehicle shall have two totally separate areas. One of these, designated as the viewing area, shall be insulated against noise and extremes in temperature, include the provision for air conditioning, and shall be provided with means of controlling external and internal sources of light to insure the monitor screen display are clearly visible. Seating accommodation shall be provided by the Contractor to enable two people, in addition to the operator, to view clearly the on-site monitor, which shall display the survey/inspection as it proceeds.
- B. The working area shall be reserved for equipment, both operational and stored, and no equipment utilized within the sewer/storm shall be allowed to be stored in the viewing area.

1.6 CCTV SURVEY/INSPECTION AND OPERATIONAL EQUIPMENT REQUIREMENTS

- A. The surveying/inspection equipment shall be capable of surveying/inspecting a length of sewer/storm up to 1000 ft. when entry into the sewer/storm may be obtained at each end; and up to 750 ft. where a self-propelled unit is used, and entry is possible at one end only. The Contractor shall maintain this equipment in full working order and shall satisfy the designated representative at the commencement of each working shift that all items of equipment have been provided and are in full working order.
- B. Each survey/inspection unit shall contain a means to transport the CCTV camera in a stable condition through the sewer/storm under survey and/or inspection. Such equipment shall ensure the maintained location of the CCTV camera when used independently on or near to the central axis of a circular shaped sewer/storm when required in the prime position.
- C. Where the CCTV camera is towed by winch and drum through the sewer/storm, all winches shall be stable with either lockable or ratcheted drums. All drums shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the CCTV camera equipment. All winches shall be inherently stable under loaded conditions.
- D. Each unit shall carry sufficient numbers of guides and rollers such that, when surveying or inspecting, all bonds are supported away from pipe and manhole/inlet structures and all CCTV cables and/or lines used to measure the CCTV camera's location within the sewer/storm are maintained in a taut manner and set at right angles where possible, to run through or over the measuring equipment.
- E. Each unit shall carry a range of flow control plugs or diaphragms for use in controlling the flow during the survey/inspection. A minimum of one item of each size of plug or diaphragm – within the range of pipe sizes set out in the contract - shall be carried.
- F. Each survey/inspection unit shall have on-call equipment available to carry out the flushing, rodding and jetting of sewers/storms whenever such procedures are deemed necessary.

1.7 FIELD SUPERVISION BY CONTRACTOR

- A. The Contractor shall maintain on site at all times a competent field supervisor in charge of the survey/inspection. The field supervisor shall be approved in writing by the designated Engineer prior to commencement of work. Any change of supervision must also be approved in writing by the Engineer prior to the change. The field supervisor shall be responsible for the safety of all site workers and site conditions as well as ensuring that all work is conducted in conformance with these specifications and to the level of quality specified.

1.8 APPLICATION OF INSPECTION TYPE

- A. The following guidelines concerning the use of CCTV shall be followed, subject to the review and approval of the Engineer:

1. Generally, CCTV alone shall be used for internal condition assessment where the depth of flow of sewage is less than 25% of overall sewer/storm diameter at the start of the survey. The Contractor will make an informed decision to continue should the depth of flow increase beyond the 25% level but no greater than 40% of overall sewer/storm diameter at any time throughout the length.
2. Generally, CCTV combined with plugging and/or bypassing shall be used for internal condition assessment where depth of flow of sewage varies from 25% to 75% of overall sewer/storm diameter for sewers/storm greater than 24- inches in diameter. Where depth of flow of sewage/water exceeds 25% and is less than 75% of overall sewer/storm diameter, the Engineer shall instruct Contractor to either:
 - a. Continue using CCTV (where depth of flow is only marginally greater than 25% of overall diameter) or
 - b. Use plugging/bypass pumping to reduce flow levels below 25%.

1.9 RESPONSIBILITY FOR OVERFLOWS OR SPILLS

- A. It shall be the responsibility of the Contractor to schedule and perform his work in a manner that does not cause or contribute to incidence of overflows or spills of sewage/water from the sewer/storm system.
- B. In the event that the Contractors activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the designated representative in a timely manner.
- C. Contractor will indemnify and hold harmless the Owner for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the Owner in defending such fines and claims.

PART 2 – PRODUCTS (NOT USED) PART 3 –

EXECUTION

3.1 CLEANING PRIOR TO INTERNAL CONDITION INSPECTION

- A. Where required by the contract and instructed in writing or by written Order to Proceed, the Contractor shall clean the sewer/storm prior to internal condition inspection.

3.2 SEWER/STORM CLEANING UNITS AND EQUIPMENT

- A. The Contractor shall provide sufficient sewer/storm cleaning units and equipment, including standby units in the event of breakdown, in order to complete cleaning operations as specified.

3.3 REASONS FOR CLEANING OF SEWERS/STORMS

- A. Normal sewer/storm cleaning is defined as removal of minor quantities of silt and debris preventing observation of sewer/storm condition and defects.
- B. Heavy sewer cleaning is defined as removal and extraction of silt, debris, and obstructions from

the sewer/storm which actually prevent entry and use of CCTV equipment, or the completion of the sewer/storm run and/or manned-entry inspection of sewers/storms.

- C. Mechanical cleaning is defined as the removal of hard or semi-hard deposits, tuberculation, or other materials requiring the use of mechanically operated equipment which actually prevent entry and use of CCTV equipment, or the completion of the sewer/storm run and/or manned-entry inspection of sewers/storms.

3.4 EXTENT OF NORMAL CLEANING

- A. Normal Cleaning is considered to be cleaning of the sewer/storm prior to CCTV or manned-entry inspection and does not necessarily require removal and extraction of the silt and debris from the wastewater flow and will only be required should the level of silt be deemed to prohibit the accurate assessment of the pipeline under inspection. It normally includes up to three (3) complete cleaner passes of the entire sewer/storm line segment.

3.5 EXTENT OF HEAVY OR MECHANICAL CLEANING

- A. Heavy or mechanical cleaning is not required as part of the internal condition inspection service unless specifically designated in the bid schedule. Where such designation exists, heavy or mechanical cleaning shall be performed as necessary. Heavy cleaning is defined as the removal of loose debris that requires more than three (3) complete cleaner passes of the entire sewer/storm line segment. Mechanical cleaning is defined as the removal of hardened deposits, tuberculation, etc. and generally requires specialized cutting and cleaning equipment.

- B. In the event that heavy or mechanical cleaning is required, the Contractor shall:

1. Provide and/or manage the equipment necessary for proper jetting, rodding, bucketing, brushing, root cutting, flushing and vacuum uplift or any other approved removal and extraction system necessary to remove and extract silt, debris and obstructions from the sewer/storm which would otherwise preclude use of CCTV equipment and/or manned-entry inspection of the sewers/storms.
 2. Demonstrate the performance capabilities of the cleaning equipment and method for use when requested by the Engineer. If results obtained by the demonstration are not satisfactory, select other methods or equipment that will clean the sewer/storm line and repeat demonstration.
 3. Install a gauge to monitor working pressure on the discharge of high- pressure pumps for jetting equipment.
 4. Provide more than one type of equipment or attachments on a single reach or at a single location as required.
- C. The Contractor shall exert all reasonable care to avoid damage to the sewer/storm or manhole/inlet during the cleaning operation. Mechanical equipment used for heavy cleaning shall be equipped with an overload clutch to limit the risk of damage to the pipe.

3.6 REMOVAL OF DEBRIS WITH CLEANING

- A. The Contractor shall provide all equipment and personnel necessary to safely remove and extract silt and debris from the sewer/storm through existing manhole/inlet access, load it onto trucks for disposal, and dispose of the silt and debris at approved sites.

3.7 CCTV – GENERAL

- A. CCTV Camera Prime Position: The CCTV camera shall be positioned to reduce the risk of picture distortion. In circular sewers/storms the CCTV camera lens head shall be positioned centrally (i.e. in prime position) within the sewer/storm. In non-circular sewers/storms, picture orientation shall be taken at mid-height, unless otherwise agreed, and centered horizontally. In all instances the camera lens head shall be positioned looking along the axis of the sewer/storm when in prime position. A positioning tolerance of $\pm 10\%$ of the vertical sewer/storm dimension shall be allowed when the camera is in prime position.
- B. CCTV Camera Speed: The speed of the CCTV camera in the sewer/storm shall be limited to 30 LF per minute for surveys to enable all details to be extracted from the ultimate CD-ROM recording. Similar or slightly higher speed as agreed by the Engineer shall be provided for inspections.
- C. CCTV Color Camera: The Contractor shall provide a color pan and tilt camera(s) to facilitate the survey and inspection of all laterals, including defects such as hydrogen sulfide corrosion in the soffit of sewers/storms and benching or walls of manholes/inlets over and above the standard defects that require reporting, where required by the Engineer. These will be carried out as part of the normal CCTV assessment as the survey or inspection proceeds when instructed by the designated representative.
- D. Linear Measurement:
1. The CCTV monitor display shall incorporate an automatically updated record in feet and tenths of a foot of the footage of the camera or center point of the transducer, whichever unit is being metered, from the cable calibration point. The relative positions of the two center points should also be noted.
 2. The Contractor shall use a suitable metering device, which enables the cable length to be accurately measured to $\pm 1\%$ or 3 inches whichever is the greater.
 3. The Contractor shall demonstrate compliance with the tolerance listed above, using one or both of the following methods in conjunction with a linear measurement audit form which shall be completed each day during the survey:
Use of a cable calibration device
 - a. Tape measurement of the surface between manholes/inlets
 4. A quality control form will be completed and submitted by the contractor depicting the level of accuracy achieved.
 5. If the Contractor fails to meet the required standard of accuracy, the designated representative shall instruct the Contractor to provide a new device to measure the footage.
- E. Data Display, Recording and Start of Survey/Inspection:

1. At the start of each sewer/storm length being surveyed or inspected and each reverse set-up, the length of pipeline from zero footage, the entrance to the pipe, up to the cable calibration point shall be recorded and reported in order to obtain a full record of the sewer/storm length. Only one survey shall be indicated in the final report. All reverse set-ups, blind manholes/inlets, and buried manholes/inlets shall be logged on a separate log. Video digits shall be recorded so that every recorded feature has a correct tape elapsed time stamp. Each log shall make reference to a start and finish manhole/inlets unless abandonment took place because of blockage. Manhole/inlet number shall be indicated in the remark's column of the detail report.
2. The footage reading entered on the data display at the cable calibration point must allow for the distance from the start of the survey/inspection to the cable calibration point such that the footage at the start of the survey is zero.
3. In the case of surveying through a manhole/inlet where a new header sheet must be completed, the footage shall be set at zero with the camera focused on the outgoing pipe entrance.
4. At the start of each manhole/inlet length a data generator shall electronically generate and clearly display on the viewing monitor and subsequently on the CD-ROM recording a record of data in alpha-numeric form containing all fields required by the PACP information standard:
5. The size and position of the data display shall be such as notto interfere with the main subject of the picture.
6. Once the survey of the pipeline is under way, the following minimum Information shall be continually displayed:
 - a. Automatic update of the camera's footage position inthe sewer/storm line from adjusted zero
 - b. Sewer/storm dimensions in inches
 - c. Manhole/inlet or pipe length reference number (PLR). General convention allows upstream manhole/inlet number to be designated PLR.
 - d. Direction of survey, i.e., downstream or upstream
7. Correct adjustment of the recording apparatus and monitor shall be demonstrated by use of the test tape or other device. Satisfactory performance of the camera shall be demonstrated by the recording of the appropriate test device at the commencement of each day for a minimum period of 30 seconds.
8. Footage and corresponding time elapsed video digit shall be given throughout survey/inspection for all relevant defects and construction features encountered unless otherwise agreed.
9. Where silt encountered is greater than 10 percent of the diameter of the pipe, the depth of silt shall be recorded at approximately 50-foot intervals.

10. Only segments between manholes/inlets on the same sewer/storm reach or basin shall be included on one CD-ROM. There shall be no "split surveys" or "split basins" between CD-ROMs.

11. All continuous defects shall incorporate a start and finish abbreviation in the log report

F. Coding: Defect Coding, as well as Material, Shape, and Lining Coding, and conventions used throughout the project will be PACP-compliant. The CCTV Contractor must ensure that all surveyors conform to the detailed requirements of the reporting procedure concerning feature description and feature definition as well as the computer file format.

3.8 MAN ENTRY SURVEY – GENERAL

A. Photographic Camera Position – General Illustration of Sewer/Storm Interior:

1. The CCTV camera shall be positioned to reduce the risk of picture distortion. In circular sewers/storms the camera will be centered and oriented to look along the axis of the sewer/storm. In non-circular sewers/storms, picture orientation shall be taken at mid-height, unless otherwise agreed, and centered horizontally.

2. The CCTV camera shall be positioned so that the long side of the photograph or CD-ROM frame is horizontal.

B. Camera Position – Laterals/Specific Defect:

1. A means of accurately locating the photographic or camera's footage and any recorded lateral or defect, along the sewer/storm shall be provided, to an accuracy of $\pm 1\%$ or 6 inches whichever is the greater.

2. When requested by the designated representative in writing at any time during a survey or inspection, the Contractor shall demonstrate compliance with the above tolerance in subparagraph 3.2.B.1. The device used by the Contractor to measure the footage along the sewer/storm will be compared with a standard tape measure. The results will be noted. If the Contractor fails to meet the required standard of accuracy, the Engineer shall instruct the Contractor to provide a new device to measure the footage.

C. Photographic Quality: The CCTV system and suitable illumination shall be capable of providing an accurate, uniform and clear record of the sewer's/storm's internal condition. In-sewer/storm lighting standards shall meet the requirements of the PACP and applicable codes regarding safety and power.

3.9 PHYSICAL INSPECTION OF MANHOLES/INLETS AND LIFT STATIONS

A. General

1. Manholes/inlets and lift stations shall be inspected to assess general physical condition and to locate leaks which are causing or could cause soil erosion and degradation to the sanitary systems, and/or other underground utilities or surface structures, and which are allowing leaks into, or out of, the sewer/storm system.

B. Documentation of Inspection

1. Observations shall be recorded on a manhole/inlet and lift station physical inspection report form. Information recorded on these forms shall include but not be limited to location of the structure, relationship of a structure's incoming and outgoing lines, size of lines, depth of structure, condition of cover, ring, wall, bench and invert, type of material, and any other pertinent information which would allow sources of Infiltration/Inflow.
2. If requested by the Engineer, horizontal GPS coordinates, to an accuracy of 1 meter, shall be obtained for each manhole/inlet and wet well, geo-referenced and recorded as per these technical specifications.
3. Owner to provide manhole/inlet and lift station I.D. Residential addresses will I.D. private property.
4. Color photographs shall be taken of the interior and exposed exterior of all manholes/inlets and lift stations, and shall portray any defects as best as possible. The main purpose of the photographs is to assist management in decisions for future testing or rehabilitation purposes. The "Manhole/Inlet and Lift Station Inspection Report" form will be used to record the inspection results. The Engineer shall approve the form to be used.
5. Photographs shall be provided to the Owner in a digital electronic version on computer discs (CD's) in the JPEG format. Each digital photo file and photograph, shall have a unique I.D. applied to it that will indicate which manhole/inlet or Lift station is pictured, and will correspond to that features I.D. in the data.

- C. Contractor shall furnish all data and photographs gathered in the field investigation, and it shall be incorporated into a report listing all findings and recommendations for future inspection or rehabilitation.

3.10 CCTV AND MAN ENTRY SURVEY DATA SPECIFICATION**A. Survey Reporting:**

1. The Contractor shall submit to the Engineer two printed reports including summary statistical breakdown of all defects encountered and two CD- ROM/DVD's with copies of all descriptive data in digital format. All video and survey information shall be provided in electronic form utilizing a Microsoft Access compatible database. The supplied data and information shall remain the property of the Owner.
2. When requested, the Contractor shall provide hard copy output or manually completed site coding sheets at the time of the survey and shall forward copies of these sheets to the designated representative, preferably each day, but at least every other day, together with a daily report on progress.

- B. Site Coding Sheets: Each sewer/storm length, i.e. the length of sewer/storm between two consecutive manholes/inlets, shall be entered on a separate coding sheet or entered separately electronically. Thus where a Contractor elects to "pull through" a manhole/inlet during a CCTV Survey or "walk through" during a Man Entry survey a new coding sheet shall be started at the

manhole/inlet “pulled or walked through” and the footage re-set to zero on the coding sheet. Where a length of sewer/storm between consecutive manholes/inlets is surveyed from each end (due to an obstruction) two coding sheets should be used. Where a length of sewer/storm between two consecutive manholes/inlets cannot be surveyed or attempted, a coding sheet shall be made out defining the reason for abandonment. At uncharted manholes/inlets a new coding sheet must be started and the footage re-set to zero.

- C. Measurement Units: All dimensions shall be in feet and tenths of a foot. Measurement of sewers/storms shall be to the nearest tenth of a foot.
- D. CCTV And Man Entry Photographs:
1. Still photographs (JPEG format) shall be taken of all defective laterals and pipeline defects. Where a defect is continuous or repeated the photographs shall be taken at the beginning and end of the defect.
 2. CCTV Photographs must clearly and accurately show what is displayed on the monitor.
 3. Still photographs shall be durable and clearly identified in relation to the photograph number (cross referenced to the site survey sheet) street location, sewer/storm dimensions, manhole/inlet start and finish numbers, survey direction, footage and date when the photograph was taken.
 4. The annotation shall be clearly visible and in contrast to its background, shall have a figure size no greater than 14 point, and be type printed in upper case.
 5. The annotation shall be positioned so as not to interfere with the subject of the photograph.
- E. Control Sample Photographs and/or CD-ROMs: The designated representative may issue a written instruction to the Contractor to provide a sample of the photographs and/or CCTV tapes taken during the contract period.

3.11 CCTV PERFORMANCE

- A. Color CCTV: All CCTV work shall use color CCTV reproduction.
- B. CCTV Picture Quality:
1. An approved test device shall be provided and be available on site throughout the Contract, enabling the test specified in this clause to be checked.
 2. At the start of each and every working shift, the camera shall be positioned centrally and at right angles to the test card at a distance where the full test card just fills the monitor screen. The Contractor shall ensure that the edges of the test card castellations coincide with the edges of the horizontal and vertical scan (raster). The card shall be illuminated evenly and uniformly without any reflection. The illumination shall be to the same color temperature as the color temperature of the lighting that recorded for subsequent use by the Engineer, the recording time to be at least 30 seconds. The type of camera used is to be identified on the test recording. The recording must show the camera being introduced into the test device and reaching its stop position. Other test

devices may be used subject to approval by the Engineer.

3. The electronic systems, television camera and monitor shall be of such quality as to enable the following to be achieved:
 - C. Shades of Gray: The gray scale shall show equal changes in brightness ranging from black to white with a minimum of five clearly recognizable stages.
 - D. Color: With monitor adjusted for correct saturation, the six colors plus black and white shall be clearly resolved with the primary and complementary colors in order of decreasing luminance. The gray scale shall appear in contrasting shades of gray with no tint.
 - E. Linearity: The background grid shall show squares of equal size, without convergence/divergence over the whole of picture. The center circle shall appear round and have the correct height/width relationship ($\pm 5\%$)
 - F. Resolution: The live picture must be clearly visible with no interference and capable of registering a minimum number of TV lines/pictures height lines. The resolution shall be checked with the monitor color turned down. In the case of tube cameras this shall be 600 lines.
 - G. Color Constancy: To ensure the camera shall provide similar results when used with its own illumination source, the lighting shall be fixed in intensity prior to commencing the survey. In order to ensure color constancy, no variation in illumination shall normally take place during the survey.
 - H. The Contractor shall note that the Engineer may periodically check both the live and picture color consistency against the color bar. Any differences will require re- survey of the new length or lengths affected, at the Contractor's expense.
 - I. Playback and CD-ROM Labeling:
 1. Playback video shall be capable of a resolution of a minimum of 400 lines recorded at standard (SP setting) VHS speed. CD-ROM playback imaging shall be linked to electronic output of alpha-numeric data so that if necessary direct interrogation of database can take place with simultaneous viewing of CCTV images.
 2. Each CD-ROM disc shall be labeled by reference to the header record for the survey section completed together with the following information:
 - a. Sequential (unique) CD-ROM number
 - b. Basin/ catchment worked in
 - c. Survey company name and logo
 - d. Survey date
 - J. CCTV Focus/Iris/Illumination: The adjustment of focus and iris shall allow optimum picture quality to be achieved and shall be remotely operated. The adjustment of focus and iris shall provide a minimum focal range from 6 inches in front of the camera's lens to infinity. The distance along the sewer/storm in focus from the initial point of observation shall be a minimum of twice the vertical height of the sewer/storm. The illumination must allow an even distribution

of the light around the sewer/storm perimeter without the loss of contact picture, flare out or shadowing.

K. Contractor's Data Quality Control Procedure:

1. The Contractor shall operate a quality control system, to be approved by the Engineer, which will effectively gauge the accuracy of all survey reports produced by the operator.
2. The system shall be such that the accuracy of reporting is a function particularly of:
 - a. The number of faults not recorded (omissions)
 - b. The correctness of the coding and classification of each fault recorded.
3. The minimum levels of accuracy to be attained under the various survey headings are as follows:
 - a. Header Accuracy 95%
 - b. Detail Accuracy 85%

3.12 COLLAPSED SEWERS/STORMS AND DEFECTIVE MANHOLES/INLETS

- A. Any sewer/storm found with greater than 10% deformation (i.e. collapsed or near to collapse) must be reported to the designated representative immediately for remedial action.
- B. Any manhole/inlet found broken, cracked, with missing covers or surcharged, must be reported to the designated representative immediately for remedial action
- C. Any sewer/storm found with existing conditions that pose a threat of personal injury to the public, such as a collapsed sewer/storm with depressed roadway, must be protected by the Contractor until the designated representative arrives at the job site.
- D. Any manhole/inlet found where the existing conditions pose a threat of personal injury to the public, such as broken, cracked or missing covers or covers found in traveled portions of any sidewalk or roadway must be protected by the Contractor until the designated representative arrives at the job site.

END OF DOCUMENT 330130.11

DOCUMENT 330507.13 – UTILITY DIRECTIONAL DRILLING

SECTION 1 – GENERAL

1.01 DESCRIPTION

- A. The intent of this specification is to provide general technical guidance to the utility Contractor for the installation of pipelines using horizontal directional drilling (HDD) techniques.
- B. The Contractor shall furnish all labor, materials, equipment, and incidentals required to successfully perform the installation of water system components, wastewater gravity and/or force main components at locations shown on the plans by using horizontal directional drilling (HDD) methods.
- C. The pipeline shall be complete with all accessories and shall have passed all required testing per the Contract Documents.
- D. The Contractor shall have made all inspections of the area(s) within the vicinity of the project and the immediate area of the work and become thoroughly familiar with the natural and manmade features encompassed about the project.

1.02 QUALITY ASSURANCE

A. Requirements

- 1. At the discretion of the Owner, it may be required that the Contractor be prequalified and approved through a prequalification process. The Contractor must furnish references able to attest to their capabilities in accordance with the prequalification process. Typically, prequalification will include provision of experience actively engaged in the installation of utility horizontal directional drilling; projects of a similar or larger size; etc.
- 2. The Contractor's field supervisor(s) shall have similar length experience either with the Contractor or similar contracting company engaged in the installation of horizontal directional drilling. While utility horizontal directional drilling is being performed, the field supervisor(s) shall be on-site at all times.

1.03 REQUIRED SUBMITTALS

The Contractor shall submit the following items to the Engineer for review and approval:

- A. Pipe material shop drawings: Pipe materials shall be High Density Polyethylene (HDPE), butt-welded and fused joints. Sizes/types required shall be shown on the plans and other sections of the contract documents.
- B. Manufacturer's Installation Manual
- C. Certificates: Submit certificates of compliance with referenced standards where requested by the Engineer.
- D. Field installation plan including at a minimum the following:
 - 1. Method of following proposed horizontal utility directional drilling alignment, including

- horizontal and vertical information
 - 2. Erosion control plan
 - 3. Safety work plan
 - 4. Traffic control plan
 - 5. Surface settlement monitoring plan
 - 6. Operational factors to avoid fluid loss and spill contingency plan
 - 7. Sequencing and implementation schedule
 - 8. Site layout and size of pit(s) and work site(s)
 - 9. Contingency plan for possible problems
 - 10. Drawings necessary to document proposed plan
 - 11. Manufacturer and type of horizontal directional drilling equipment including all support equipment
 - 12. Tracking equipment to include:
 - a. Operating range
 - b. Degree of accuracy
 - c. Method of survey control
 - d. Frequency of survey control
 - e. Example of daily operations log
 - 13. Proposed drilling fluids
 - 14. Description of pilot hole
 - a. Prior to back reaming the Contractor shall submit a plotted profile of the pilot hole tracked points.
 - 15. Pullback hole enlargement procedures
 - a. Required reamer upsizing
 - b. Prior to pull back of pipe the Contractor shall submit a plotted profile of the reamed hole tracked points
 - 16. Pipe layout (pre-pull)
 - 17. Location and depth of all utilities
 - 18. Number of interruptions for pipe fusing
 - 19. Setbacks and drilling angles
 - 20. Spoil removal plan and disposal
- E. Record Drawings: During progress of the work, keep an up to date set of drawings showing field and shop drawing modifications including the drilling logs. The drawings shall show all piping on plans and in sections, with all reference dimensions and elevations required for complete record drawings of the directionally drilled pipe including the drilling logs to be included on the record drawings.

SECTION 2 – PIPE

2.01 STORAGE AND HANDLING

- A. Handle all pipe and accessories carefully with approved handling devices. Do not drop or roll pipe off trucks. Do not otherwise drop, roll or skid pipe. Materials cracked, gouged, chipped, dented or otherwise damaged will not be approved or accepted for use.
- B. Pipe and appurtenances shall be unloaded opposite to or as close to the place where they are to be laid as is practical to avoid unnecessary handling. Interiors shall be kept completely free from dirt and foreign matter.
- C. The Contractor shall be responsible for the proper support of the piping to ensure that the pipe is not over stressed or damaged in any manner.

SECTION 3 - INSTALLATION

3.01 GENERAL

A The work shall be performed by the Horizontal Directional Drill (HDD) Technique. Specific details of installation techniques are the responsibility of the utility Contractor and must fully comply with the pipe manufacturer’s installation recommendations. The Engineer will not direct “means and methods” to the Contractor to be used in installation of the directional drill pipe other than that pipe must be installed in accordance with the manufacturer specifications. In general, the work will proceed as follows:

1. All operations shall proceed in accordance with applicable safety rules, regulations, federal, state, local standards along with the Contractor’s safety plan.
2. Working conditions shall remain clean
3. Field verify location and depth of all existing utilities, including service connections, prior to initiation of the project improvements
 - a. With consultation and approval of Engineer the alignment, depth and/or grade may be modified to avoid utilities.
 - b. Check of baselines and benchmarks and report any discrepancies to Engineer. The baselines and benchmarks shall be used by the Contractor to establish and maintain all construction control.
4. The Contractor shall monitor the bore, reaming and pipe installation using a location and tracking system and provide shift and drilling logs. Frequency of the readings for the bore, reaming and pipe installation plots shall be approved by the Engineer. Typically these readings shall be made for every drill road at 3’ – 5’ intervals.
5. Pipe pulling shall immediately follow the pilot hole and reaming. Pipe placement/pulling in a collapsed/collapsing bore hole will not be permitted.
6. A 12-hour cooling relaxing period following installation is required prior to connection of and service lines or backfilling of the pit(s).
7. HDPE pipe shall protrude a minimum 6” into existing/new manholes. Upon removing the additional length within the manhole the pipe shall be restrained with flexible rubber connector and electrofusion flex restraints.
8. Make horizontal or vertical grade corrections to maintain allowable tolerances. For gravity sewer, a bore that result in a “belly” and/or a reverse grade is not acceptable and be replaced at no additional cost to the Owner. Replacement shall include the removal and replace of the non-accepted length of pipe by open-cut or a paralleled, drilled alignment as approved by the Engineer.
9. Tracer wire shall be required and the Contractor shall provide the manufacturers recommendation for the size and attachments for the tracing materials. Specification 330597.20 provides additional information/requirements for tracer wire/board installation.

3.02 BORE HOLE DIAMETER

A The Contractor shall minimize potential damage of soil displacement and/or settlement by limiting the ratio of the bore hole to the size of the installed pipe. If no back reaming is required the size of the pilot hole or back reamer bit shall be limited to the dimensions shown in the table

Maximum Pilot or Back-Reamer Bit Nominal Inside Pipe Diameter (In)	Diameter – Rotated 360 degrees Bit Diameter (In)
2”	4”
3”	6”