
SECTION 5
SPECIFICATIONS

SECTION 011100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 LOCATION OF THE PROJECT

- A. The project is located in the City of Wickliffe along Homewood Drive from Lloyd Road to the cul-de-sac at the west end.

1.2 PROJECT DESCRIPTION

- A. The project consists of an 8-inch water main replacement and asphalt pavement resurfacing on Homewood Drive. Apron/sidewalk replacement and miscellaneous base repairs will be performed.

1.3 SPECIFICATIONS

- A. In general, these Specifications describe the work to be performed by the various trades, other than work specifically excluded. It shall be the responsibility of Contractors and Subcontractors to perform all work incidental to their trade, whether or not specific mention is made of each item, unless such incidentals are included under another Item.
- B. It is advised that all Contractors and Subcontractors familiarize themselves with the contents of the complete Specifications, particularly for the trades preceding, following, related or adjacent to their work.

1.4 DRAWING SCHEDULE

- A. The work to be done under this Contract is shown on the following Drawings:

<u>Title</u>	<u>Sheet No.</u>
Cover Sheet	1
Survey Control	2
General Notes	3
Maintenance of Traffic	4-5
Plan and Profile	6-8
Typical Section	9
Details	10-14

1.5 QUANTITY WORKSHEET

- A. Attached is a listing of the estimated quantities used for this project.

END OF SECTION 011100

**QUANTITY BREAKDOWN WORKSHEET
FOR HOMEWOOD DRIVE - #200318
WICKLIFFE, OHIO
AUGUST, 2020**

Item No.	ODOT Ref.	Item Ext.	Item Description	General	PP-1	PP-2	PP-3	Contingency /Extra	Total Quantity	Unit
BASE BID										
1	SPC	103s00011	PRECONSTRUCTION VIDEO DOCUMENTATION, AS PER PLAN	1					1	LUMP
2	201	201E21801	TREE REMOVED, 18 INCH SIZE, AS PER PLAN		4	4	3		11	EACH
3	201	201E26533	STUMP REMOVED, AS PER PLAN		4	4	3		11	EACH
4	204	204e13131	EXCAVATION OF SUBGRADE AND EMBANKMENT WITH GRANULAR MATERIAL, CCS, AS PER PLAN, CONTINGENCY, AS DIRECTED		39	47	43	11	140	CY
5	251	251e01301	PARTIAL DEPTH PAVEMENT REPAIR, AS PER PLAN					10	10	CY
6	SPC	253s03100	TYPE "A" PAVEMENT REPLACEMENT (CONCRETE), ROADWAY, AS PER PLAN					5	5	SY
7	SPC	253s03200	TYPE "B" PAVEMENT REPLACEMENT (ASPHALT OVER CONCRETE), ROADWAY, AS PER PLAN		69		22	9	100	SY
8	254	254E01001	PAVEMENT PLANING, ASPHALT CONCRETE, AS PER PLAN		1,162	1,402	1,296	40	3,900	SY
9	255	255e10170	FULL DEPTH PAVEMENT REMOVAL AND RIGID REPLACEMENT, CLASS QC MS, T=8", AS PER PLAN		139	168	156	12	475	SY
10	407	407E20205	TACK COAT, TRACKLESS TACK		180	220	200		600	GAL
11	SPC	409s95000	ASPHALT PRESERVATIVE SEAL, AS PER PLAN		1,162	1,402	1,296	40	3,900	SY
12	441	441E50001	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (448) PG64-22, AS PER PLAN		57	69	63	31	220	CY
13	441	441E50201	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 1, (448), AS PER PLAN		41	49	45	30	165	CY
14	SPC	450s00010	SPECIAL - CONCRETE SEALING SURFACE TREATMENT, SINAK, AS PER PLAN		978	2,107	2,051	64	5,200	SY
15	450	450e41010	SPECIAL - PAVEMENT REINFORCING FABRIC - FIBERGLASS/POLYESTER BLEND, AS PER PLAN		1,162	1,402	1,296	40	3,900	SY
16	452	452e10121	6 INCH NON-REINFORCED CONCRETE DRIVES AND APRONS, CLASS QC MS, INCL. FIBER REINFORCING, INCLUDING REMOVAL, AS PER PLAN		94	172	141	18	425	SY
17	SPC	603s98143	10 INCH CONDUIT POINT REPAIR, AS PER PLAN				1		1	EACH
18	SPC	603s98181	CONDUIT POINT REPAIRS, LATERAL RECONNECTION, AS PER PLAN				2	-	2	EACH
19	605	605E05211	4 INCH UNCLASSIFIED PIPE UNDERDRAIN, WITH FABRIC WRAP, AS PER PLAN	-	-	-	-	400	400	FT
20	608	608e10011	4 INCH CONCRETE WALK, INCLUDING REMOVAL, AS PER PLAN		884	1,935	1,910	271	5,000	SF
21	609	609e26011	CURB, TYPE 6, INCLUDING REMOVAL, AS PER PLAN					400	400	FT
22	611	611e01593	6 INCH SANITARY SEWER, PVC, AS PER PLAN					200	200	FT
23	611	611e01594	6 INCH SANITARY SEWER, DIP, AS PER PLAN					200	200	FT
24	611	611e01700	6 INCH STORM SEWER, AS PER PLAN					300	300	FT
25	611	611e05221	12" STORM SEWER, AS PER PLAN				13		13	FT
26	611	611e97201	CONDUIT, MISC.: CONNECTION TO EXISTING PIPE				1		1	EACH
27	611	611e98625	CATCH BASIN WITH SUMP & TRAP, AS PER PLAN				1	1	2	EACH
28	611	611E98627	CATCH BASIN ADJUSTED TO GRADE, METHOD D.1 (brick), AS PER PLAN		3	2	2		7	EACH
29	611	611e98636	CATCH BASIN PARTIALLY RECONSTRUCTED TO GRADE, AS PER PLAN					5	5	VERT. FT
30	611	611E99656	MANHOLE ADJUSTED TO GRADE, METHOD D.1 (brick), AS PER PLAN		2	4	2		8	EACH
31	611	611e99672	MANHOLE PARTIALLY RECONSTRUCTED TO GRADE, AS PER PLAN					5	5	VERT. FT
32	611	611E99820	SPECIAL - MISCELLANEOUS METAL	-	2,700	2,600	2,000	-	7,300	LB
33	614	614E11001	MAINTAINING TRAFFIC, AS PER PLAN	1					1	LUMP
34	623	623E39500	MONUMENT BOX ADJUSTED TO GRADE		1				1	EACH
35	630	630E85101	REMOVAL OF GROUND MOUNTED SIGN AND REERECTION, AS PER PLAN		1		2		3	EACH
36	638	638e00010	ABANDON EXISTING WATER MAIN, AS PER PLAN	1					1	LUMP
37	638	638e00016	CONNECT NEW WATER MAIN TO EXISTING WATER MAIN, AS PER PLAN				1		1	EACH
38	638	638e04906	1 INCH COPPER SERVICE BRANCH (LONG), AS PER PLAN		8	11	8		27	EACH
39	638	638e04907	1 INCH COPPER SERVICE BRANCH (SHORT), AS PER PLAN		9	11	8		28	EACH
40	638	638e06126	LEAD WATER SERVICE REPLACEMENT, FROM CURB BOX/METER TO HOUSE					250	250	FT
41	638	638E07900	8 INCH GATE VALVE AND VALVE BOX			1	1		2	EACH
42	638	638e10220	6 INCH FIRE HYDRANT ASSEMBLY, INCLUDING 6 INCH VALVE AND VALVE		1	2	2		5	EACH
43	638	638e10705	FIRE HYDRANT & VALVE BOX REMOVED AND DISPOSED, AS PER PLAN		1	2	2		5	EACH
44	638	638E10801	VALVE BOX ADJUSTED TO GRADE, AS PER PLAN					1	1	EACH
45	638	638E10811	VALVE BOX ADJUSTED TO GRADE, RISER RING, AS PER PLAN					1	1	EACH
46	638	638E40206	8 INCH WATER MAIN DUCTILE IRON PIPE ANSI CLASS 53, PUSH-ON JOINTS		307	525	488		1,320	FT
47	638	638e44123	WATER METER AND METER BOX, AS PER PLAN					1	1	EA.
48	638	638e44212	FLUSHING ASSEMBLY, AS PER PLAN		1				1	EA.
49	SPC	659s10010	LAWN RESTORATION INCL. LINEAL GRADING & TOPSOIL, AS PER PLAN	1					1	LUMP
50	690	690E12010	GEOTEXTILE FABRIC, 712.09 TYPE D	-	234	282	258	26	800	SY
51	690	690s12530	SPECIAL - VOID REDUCING ASPHALT MEMBRANE (VRAM)	-	300	525	486	39	1,350	FT
52	SPC	832s30025	TEMPORARY SEDIMENT AND EROSION CONTROL, AS PER PLAN	1					1	LUMP
53	SPC	999s99993	GAS COMPANY CHARGES ALLOWANCE	1					1	LUMP
54	SPC	999s99998	CONTINGENCY/DISCRETIONARY ALLOWANCE					1	1	LUMP

SECTION 011419 – USE OF SITE

PART 1 - GENERAL

1.1 GENERAL

- A. The Contractor will be allowed the use of as much of the site designated for the improvements as is necessary for his operation.

1.2 USE OF STREETS

- A. During the progress of the work, the Contractor shall make ample provisions for both vehicle and pedestrian traffic on any public street and shall indemnify and save harmless the Owner from any expense whatsoever due to their operations over said streets. The Contractor shall also provide free access to all the fire hydrants, water, and gas valves located along the line of his work. Gutters and waterways must be kept open or other provisions made for the removal of storm water. Street intersections may be blocked only one-half at a time, and the Contractor shall lay and maintain temporary driveways, bridges and crossings, such as in the opinion of the Engineer are necessary to reasonably accommodate the public.
- B. In the event of the Contractor's failure to comply with these provisions, the Owner may cause the same to be done, and may deduct the cost of such work from any monies due the Contractor under this Agreement, but the performance of such work by the Owner at its instance shall serve in no way to release the Contractor from his general or particular liability for the safety of the public or the work.
- C. The Contractor shall repair at no cost to the Owner, all existing roads, parking areas, grassed areas that are damaged due to the execution of his work. The Contractor shall remove daily all mud, soil and debris that may be tracked onto existing streets, drives, or walks by his equipment or that of subcontractors or suppliers.

1.3 CLOSING STREETS TO TRAFFIC

The Contractor may with the approval of the Engineer, close streets, or parts of streets, to vehicular traffic. The streets are to remain closed as long as the construction work or the condition of the finished work requires or as determined by the Engineer. The Engineer shall be the judge of how many streets or parts of streets it is necessary for the Contractor to close at any time, and may refuse to permit the closing of additional streets to traffic until the majority of the work on the closed streets is completed and they are opened to traffic.

1.4 RIGHTS-OF-WAY

- A. Whenever it is required to perform work within the limits of public or private property or in rights-of-way, such work shall be done in conformity with all agreements between the Owner and the owners of such. Care shall be taken to avoid injury to the premises entered, which premises shall be left in a neat and orderly condition by the removal of rubbish and the grading of surplus materials, and the restoration of said public or private property to the same general conditions as pertained at the time of entry for work to be performed under this contract.
- B. The Contractor shall not (except after consent from the proper parties) enter or occupy with men, tools or equipment, any land outside the rights-of-way or property of the Owner.
- C. When the Contractor performs construction within 10 ft. of a right-of-way or easement line, he shall place tall stakes properly identified at points of change in width or direction of the right-of-way or easement line and at points along the line so that at least two stakes can be seen distinctly from any point on the line.

1.5 EASEMENTS

- A. Where the work is to be constructed upon easements, such easements will be secured by the Owner without cost to the Contractor. The Contractor shall not enter upon or occupy any private property outside of the limits of the easements furnished.
- B. Care shall be taken to avoid injury to the premises entered, which premises shall be left in a neat and orderly condition by the removal of rubbish and the grading of surplus materials, and the restoration of said public or private property to the same general conditions as pertained at the time of entry for work to be performed under this contract.

1.6 PROTECTING EXISTING BUILDINGS, STRUCTURES AND ROADWAYS

- A. The Contractor shall, at his own expense, shore up and protect any buildings, roadways, utilities or other public or private structures which may be encountered or endangered in the prosecution of the work, and that may not be otherwise provided for, and he shall repair and make good any damages caused to any such property by reason of his operations. All existing fences removed due to the prosecution of the work shall be replaced by the Contractor. No extra payment will be made for said work or material, but the cost of this work must be included in the price stipulated for the work to be done under this contract.

1.7 SITE FACILITIES

- A. The Contractor shall furnish and place sufficient quantities of portable toilet facilities at locations convenient for use by the Contractor's personnel, Subcontractors, the Engineer, and the Owner.

1.8 RESTORATION

- A. The contractor shall restore all areas per the plans and specifications and if not specified, at least to the condition existing prior to the start of work.

END OF SECTION 011419

SECTION 011423 - ADDITIONAL WORK, OVERTIME

PART 1 - GENERAL

1.1 NIGHT, SUNDAY AND HOLIDAY WORK

- A. No work will be permitted at night, Sunday or legal holidays except as noted on the plans or in the case of emergency and then only upon written authorization of the Engineer. Where no emergency exists, but the Contractor feels it advantageous to work at night, Sunday or legal holidays, the Contractor shall notify the Engineer at least two (2) days in advance, requesting written permission. Any work performed during the absence of the Engineer will be done at the Contractor's risk and responsibility and may be subject to rejection upon later inspection.

END OF SECTION 011423

SECTION 012513 – PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 MATERIALS AND EQUIPMENT

- A. In the specifications and on the Engineer's drawings, are specified and shown certain pieces of equipment and materials deemed most suitable for the service anticipated. This is not done to eliminate other equipment and materials equally as good and efficient. The Contractor shall prepare his bid on the particular materials and equipment specified. Following the award of the contract, should the Contractor desire to use other equipment and materials, he shall submit to the Owner a written request for such change and state the advantage to the Owner and the savings or additional cost involved by the proposed substitution. The determination as to whether or not such change will be permitted rests with the Owner and the Engineer.

END OF SECTION 012513

SECTION 013119 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 PRECONSTRUCTION MEETING

- A. Prior to the Contractor beginning any work on the project, the Owner will schedule and hold a preconstruction meeting to discuss all aspects of the contract work.
- B. The Contractor shall be present and be prepared to comment in detail on all aspects of his work.
- C. The Contractor shall bring to the preconstruction meeting a proposed construction progress schedule, erosion control plan, quality control program, concrete mix designs, asphalt mix designs (JMF), etc. Approval of each by the Engineer is required prior to the start of any work.
- D. Included in the construction progress schedule shall be an implementation sequence of the proposed erosion control efforts required by the contract.

1.2 PROGRESS MEETINGS

- A. Monthly progress meetings will be held at a location to be determined by the Owner on a regularly scheduled day mutually convenient to the Owner, Contractor, and Engineer.
- B. The Contractor shall provide an updated construction progress schedule and be prepared to comment in detail on all aspects of his work.

END OF SECTION 013119

SECTION 013223.02 – SURVEY AND LAYOUT DATA

PART 1 - GENERAL

1.1 REFERENCE POINTS AND STAKING

- A. The Owner shall provide a surveyor to provide all reference points and staking. The Contractor shall protect and preserve the established staking and reference points as long as required for installation of the work and field verifications by any party. He shall report to the Engineer whenever any staking or reference point is destroyed. The Contractor shall reimburse the Owner for any staking or reference points destroyed by any party.

1.2 LAYOUT OF WORK

- A. The Contractor shall lay out his work and be responsible for correct locations, elevations and dimensions of all work executed by him under this Contract. The Contractor must exercise proper precautions to verify the figures shown on the Drawings before laying out the work and will be held responsible for any error resulting from his failure to exercise such precaution. The Contractor shall insure the new construction aligns with any existing work.

END OF SECTION 013223.02

SECTION 013236 – VIDEO MONITORING AND DOCUMENTATION

PART 1 - GENERAL

1.1 SCOPE

- A. Provide all labor, materials, equipment, and services, and perform all operations necessary to furnish to the Owner a complete color audio-video DVD record of the surface features within the proposed construction zone of influence. This record shall include, but not be limited to, all audio-video DVDs, storage cases, video logs, and indexes. The purpose of this coverage shall be to accurately document the pre-construction condition of these surface features.

1.2 QUALIFICATIONS

- A. The video DVD documentation shall be done by a responsible commercial firm known to be skilled and regularly engaged in the business of pre-construction color audio-video DVD documentation. The firm shall furnish such information as the Owner deems necessary to determine the ability of that firm to perform the work in accordance with the Contract specifications.

1.3 PRODUCTS

- A. The color audio-video recording delivered to the Owner shall be on a high quality DVD format.

END OF SECTION 013236

SECTION 013319.01 - FIELD TEST REPORTING
- AGGREGATE, SOILS, CONCRETE AND ASPHALT

PART 1 - GENERAL

1.1 SUMMARY

- A. The Contractor shall be responsible for the quality of all materials incorporated into the project work and shall be responsible for all costs of testing and certification of same. The Contractor shall provide the City Engineer a list of three (3) local qualified firms for the City to select from to be the Contractor's testing firm.
- B. The Contractor shall provide the engineer with a Quality Control Plan in which his testing methods/procedures are defined. Said Plan shall meet with the approval of the Engineer and include identification of laboratories, types of testing, and the tentative amount and scheduling of each.

All certification of tests and/or gradations for material to be utilized in the work and all quality control testing shall be performed by an independent laboratory (not affiliated with, owned by, or managed by the Contractor). The laboratory shall be accredited by the AASHTO Materials Reference Laboratory for the type of testing performed.

- C. The Owner may perform field Quality Assurance testing; however, such testing shall not relieve the Contractor from the responsibility of Quality Control testing or from supplying certificates from manufacturers or suppliers to demonstrate compliance with the specifications. It is intended that the testing by the Contractor and the Owner be complimentary toward a quality project; however, the Contractor may not assume the Owner will test or that any tests will be done in lieu of the Contractor's own Quality Control testing. In the same sense, the Contractor may not rely on Owner Quality Assurance testing as a basis of acceptance or approval of his work nor may any Owner-performed testing be reflected in his submitted plan.

1.2 TEST CRITERIA

- A. The following tests at a minimum shall be included with the Contractor's Quality Control Plan in accordance with the specifications:
 - 1. Aggregates
 - a. For each material and/or different source, the laboratory shall perform soundness, gradation, and other tests for all parameters specified. Aggregates incorporated into concrete or asphalt mixes shall also be tested for moisture content daily.

2. **Compaction Tests**
 - a. Compaction tests or field density tests shall be taken on all embankment, trench backfill, subgrade, and subbase materials.
 - b. Minimum testing shall be as follows:
Embankment testing shall be at least one (1) test/5,000 SF of each lift; Trench backfill testing shall be at least one (1) test/50 LF of each lift; Subgrade and/or subbase testing shall be at least one (1) test/200 LF of pavement or 5,000 SF of slabs; subject to greater frequency due to soil conditions or Engineer's direction.
 - c. Proctors or relative density tests shall be performed as often as necessary for the differing soils or granular materials utilized. Proctors shall be run with a minimum of 5 points. Test reports shall show the wet (bulk) weight, dry weight, wet (bulk) density, dry density, moisture content weight and moisture content percentage. Both the dry curve and the wet curve shall be plotted.
3. **Concrete Mix Design**
 - a. For each type of concrete, the laboratory shall perform the necessary mix design providing all test data as required by the specifications.
4. **Concrete Field and Laboratory Tests**
 - a. The laboratory shall cast concrete cylinders and test beams:
 1. One set of four cylinders per 50 CY with a minimum of two sets per day. The cylinders shall be broken: one at 7 days, two at 28 days, one at 56 days, unless otherwise directed by the Engineer.
 2. One beam per 50 CY with a minimum of two beams per day.
 - b. Temperature and unit weight shall be run on fresh concrete at intervals sufficient for the type of structure being placed and a minimum of once per day. Bulk weight, bucket weight, (tare), net weight, bucket factor (bucket volume) and unit weight shall be recorded on the fresh concrete report. Show all batch weights for yield calculations. Slump and air content tests shall be taken a minimum of one test per 20 CY and at least once per day.
 - c. All field and laboratory testing shall be performed by technicians certified by the American Concrete Institute (ACI) for the type of testing performed.
 - d. Initial cure of all cylinders shall be in a temperature controlled cure box or temperature controlled water tank with a hi-low thermometer. Hi-low temperature readings shall be recorded on the fresh concrete report.
5. **Asphalt Mix Design**
 - a. For each type of asphalt mix, submit job mix formula (JMF) prepared by an ODOT pre-qualified laboratory from tests performed on the aggregates proposed for use.
 - b. Sample and test for gradation and bitumen content per ODOT 441.

1.3 LABORATORY REPORTS

- A. Reports of laboratory and field tests will be distributed to the Engineer, Owner, and Suppliers within 24 hours of completion.

END OF SECTION 013319.01

SECTION 013323 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.1 GENERAL

- A. The Contractor shall submit detailed drawings, acceptable catalog data, specifications and material certifications for all equipment and materials specified or required for the proper completion of the work.
- B. The intent of these items is to demonstrate compliance with the design concept of the work and to provide the detailed information necessary for the fabrication, assembly and installation of the work specified. It is not intended that every detail of all parts of manufactured equipment be submitted, however sufficient detail will be required to ascertain compliance with the specifications and establish the quality of the equipment proposed.

Shop Drawings shall be sufficiently clear and complete to enable the Engineer/Architect and Owner to determine that items proposed to be furnished conform to the specifications and that items delivered to the site are actually those that have been reviewed.

- C. It is emphasized that the Engineer/Architect's review of Contractor's submitted data is for general conformance to the contract drawings and specifications but subject to the detailed requirements of drawings and specifications. Although the Engineer/Architect may review submitted data in detail, such review is an effort to discover errors and omissions in Contractor's drawings. The Engineer/Architect's review shall in no way relieve the Contractor of his obligation to properly coordinate the work and to Engineer/Architect the details of the work in such manner that the purposes and intent of the contract will be achieved. Such review by the Engineer/Architect shall not be construed as placing on him or on the Owner any responsibility for the accuracy and for proper fit, functioning or performance of any phase of the work included in the contract.
- D. Shop Drawings shall be submitted in proper sequence and with due regard to the time required for checking, transmittal and review so as to cause no delay in the work. The Contractor's failure to transmit appropriate submittals to the Engineer/Architect sufficiently in advance of the work shall not be grounds for time extension.
- E. The Contractor shall submit Shop Drawings for all fabricated work and for all manufactured items required to be furnished in the Contract in accordance with the General Provisions and as specified herein. Shop Drawings shall be submitted in sufficient time to allow at least twenty-one (21) calendar days after receipt of the Shop Drawings from the Contractor for checking and processing by the Engineer/Architect.
- F. It is the responsibility of each Prime Contractor to furnish to all other Prime Contractors and especially the General Construction Contractor reviewed Shop Drawings for guidance in interfacing the various trades; i.e., sleeves, inserts, anchor bolts, terminations, and space requirements.

- G. No work shall be performed requiring Shop Drawings until same have been reviewed by Engineer/Architect.
- H. Accepted and reviewed Shop Drawings shall not be construed as approval of changes from Contract plan and specification requirements.
- I. The Engineer/Architect will review the first and second Shop Drawing item submittals at no cost to the Contractor. Review of the third submittal and any subsequent submittal will be at the Contractor's expense. Payment will be deducted from the Contract amount at a rate of 2.8 times direct labor cost plus expenses.

1.2 SUBMITTAL PROCEDURE

- A. All required submissions shall be made to the Engineer/Architect by the Prime Contractor(s) only. Any data prepared by subcontractors and suppliers and all correspondence originating with subcontractors, suppliers, etc., shall be submitted through the Contractor.
- B. Contractor shall review and approve all Shop Drawings prior to submission. Contractor's approval shall constitute a representation to Owner and Engineer/Architect that Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data or assumes full responsibility for doing so, and that Contractor has reviewed or coordinated each Shop Drawing or sample with the requirements of the work and the Contract Documents.
- C. Submittal Preparation: Mark each submittal with a permanent label or page for identification. Provide the following information on the label for proper processing and recording of action taken:
 - 1. Location
 - 2. Project Name
 - 3. Contract
 - 4. Name and Address of Engineer/Architect
 - 5. Name and Address of Contractor
 - 6. Name and Address of Subcontractor
 - 7. Name and Address of Supplier
 - 8. Name of Manufacturer
 - 9. Number and Title of appropriate Specification Section
 - 10. Drawing Number and Detail References, as appropriate.
 - 11. Submittal Sequence or Log Reference Number.
 - a. Provide a space on the label for the Contractor's review and approval markings and a space for the Engineer/Architect's "Action Stamp".
- D. Each Shop Drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor:

Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements.

Signature

Date

Company

- E. Shop Drawings shall be submitted in not less than six (6) copies to the Engineer/Architect at the address specified at the Preconstruction Conference. Single mylar or sepia reproducible copies of simple Shop Drawings may be submitted with prior approval of the Engineer/Architect.
- F. At the time of each submission, Contractor shall in writing identify any deviations that the Shop Drawings or samples may have from the requirements of the Contract Documents.
- G. Drawings shall be clean, legible and shall show necessary working dimensions, arrangement, material finish, erection data, and like information needed to define what is to be furnished and to establish its suitability for the intended use. Specifications may be required for equipment or materials to establish any characteristics of performance where such are pertinent. Suitable catalog data sheets showing all options and marked with complete model numbers may, in certain instances, be sufficient to define the articles which it is proposed to furnish.
- H. For product which require submittal of samples, furnish samples so as not to delay fabrication, allowing the Engineer reasonable time for the consideration of the samples submitted. Properly label samples, indicating the material or product represented, its place of origin, the names of the vendor and Contractor and the name of the project for which it is intended. Ship samples prepaid. Accompany samples with pertinent data required to judge the quality and acceptability of the sample, such as certified test records and, where required for proper evaluation, certified chemical analyses.

1.3 REVIEW PROCEDURE

- A. Engineer/Architect will review with reasonable promptness all properly submitted Shop Drawings. Such review shall be only for conformance with the design concept of the Project and for compliance with the information given in the plans and specifications and shall not extend to means, methods, sequences, techniques or procedures of construction or to safety precautions or programs incident thereto.
- B. The review of a separate item as such will not constitute the review of the assembly in which the item functions. The Contractor shall submit entire systems as a package.
- C. All Shop Drawings submitted for review shall be stamped with the Engineer/Architect's action and associated comments.

- D. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer/Architect will review each submittal, mark to indicate action taken, and return accordingly. Compliance with specified characteristics is the Contractor's responsibility.

Action Stamp: The Engineer/Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. If Shop Drawings are found to be in general compliance, such review will be indicated by marking the first statement.
 2. If only minor notes in reasonable number are needed, the Engineer/Architect will make same on all copies and mark the second statement. Shop Drawings so marked need not be resubmitted.
 3. If the submitted Shop Drawings are incomplete or inadequate, the Engineer/Architect will mark the third statement, request such additional information as required, and explain the reasons for revision. The Contractor shall be responsible for revisions, and/or providing needed information, without undue delay, until such Shop Drawings are acceptable. Shop Drawings marked with No. 3 shall be completed resubmitted.
 4. If the submitted Shop Drawings are not in compliance with the Contract Documents, the Engineer/Architect will mark the fourth statement. The Contractor will be responsible to submit a new offering conforming to specific products specified herein and/or as directed per review citations.
- E. No submittal requiring a Change Order for either value or substitution or both, will be returned until the Change Order is approved or otherwise directed by the Owner.

APPLICATION FOR USE OF SUBSTITUTE ITEM

TO: _____

PROJECT: _____

SPECIFIED ITEM:

Page	Paragraph	Description
A.		The undersigned requests consideration of the following as a substitute item in accordance with Article 6.05 of the General Conditions.
B.		Change in Contract Price (indicate + or -) \$ _____
C.		Attached data includes product description, specifications, drawings, photographs, references, past problems and remedies, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified. For consideration of the attached data as SHOP DRAWINGS, submittal shall be in accordance with requirements of Section 013323.
D.		Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments are correct:

1. The proposed substitute does not affect dimensions shown on Drawings.
2. The undersigned will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the requested substitution.
3. The proposed substitution will have no adverse affect on other contractors, the construction schedule, or specified warranty requirements. (If proposed substitution affects construction schedule, indicate below using + or -)

_____ CONSECUTIVE CALENDAR DAYS

4. Maintenance and service parts will be locally available for the proposed substitution.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the specified item, and agrees to reimburse the OWNER for the charges of the ENGINEER for evaluating this proposed substitute item.

E. Signature:

Firm:

Address:

Telephone:

Date:

Attachments:

For use by ENGINEER:

_____ Accepted as evidenced by affixed SHOP DRAWING REVIEW stamp.

_____ Accepted as evidenced by included CHANGE ORDER.

_____ Not accepted as submitted. See Remarks.

_____ Acceptance requires completion of submittal as required for SHOP DRAWINGS.

_____ Not accepted. Do not resubmit.

By:

Date:

Remarks:

APPLICATION FOR USE OF "OR-EQUAL" ITEM

TO: _____

PROJECT: _____

SPECIFIED ITEM:

Page	Paragraph	Description
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A. The undersigned requests consideration of the following as an "or-equal" item in accordance with Article 6.05 of the General Conditions.

B. Change in Contract Price (indicate + or -) \$ _____

C. Attached data includes product description, specifications, drawings, photographs, references, past problems and remedies, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified. For consideration of the attached data as SHOP DRAWINGS, submittal shall be in accordance with requirements of Section 013323.

D. Signature:

Firm: _____

Address: _____

Telephone: _____

Date: _____

Attachments: _____

For use by ENGINEER:

- _____ Accepted as evidenced by affixed SHOP DRAWING REVIEW stamp.
- _____ Accepted as evidenced by included CHANGE ORDER.
- _____ Not accepted as submitted. See Remarks.
- _____ Acceptance requires completion of submittal as required for SHOP DRAWINGS.
- _____ Not accepted. Do not resubmit.

By: _____ Date: _____

Remarks: _____

END OF SECTION 013323

SECTION 013326 – PRODUCT TESTING AND CERTIFYING

PART 1 - GENERAL

1.1 QUALITY OF MATERIALS

- A. Where the specifications call for mill or shop tests, the Contractor shall furnish duplicate copies of attested manufacturer's certificates showing details of quality or performance sufficient to demonstrate conformity to contract requirements. Mill, shop or witness tests shall be subject to view by the Engineer's representative, but the Engineer's representation shall not relieve the Contractor from the necessity of furnishing certificates specified. The Engineer shall be notified by the Contractor in writing, sufficiently in advance of the time of making tests, so that proper arrangements may be made. Waiving of witness of tests by the Engineer may be in writing only by the Engineer. All costs for travel, lodging, food and transportation that are necessary for the Engineer's representative and the Owner's representative to attend witness tests shall be included in the Contractor's bid for those item(s) specifically designated as being subject to witness testing.
- B. Unless otherwise specified, all materials, equipment and articles shall be erected, installed, applied, or connected, used, cleaned and conditioned in accordance with the printed instructions and directions of the manufacturer.
- C. The installation shall be so made that its several component parts will function together as a workable system. It shall be complete with all accessories necessary for its operation and shall be left with all equipment properly adjusted and in working order.
- D. The work shall be executed in conformity with the best practice and so as to contribute to efficiency of operation, minimum maintenance, accessibility and sightliness. It shall also be executed so that the installation will conform and accommodate itself to the building structure, its equipment and usage.
- E. Whenever in the contract documents a particular brand, make of material, device or equipment is shown or specified, such brand, make of material, device or equipment is to be regarded merely as a standard and such trade name shall be followed by "or equal".

1.2 QUALITY ASSURANCE

- A. The equipment and materials to be furnished under this Contract shall be the products of well established and reliable firms which have had ample experience for at least five (5) years in the manufacture of equipment or materials similar in design and of equal quality to that specified. If required, the manufacturer shall submit a list of installations of similar equipment which have been in successful operation for at least five (5) years.

END OF SECTION 013326

SECTION 013543 - ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 UNNECESSARY NOISE, DUST AND ODORS

- A. The Contractor's performance of this contract shall be conducted so as to eliminate all unnecessary noise, dust and odors.

1.2 SEWAGE, SURFACE AND FLOOD FLOWS

- A. The Contractor shall take whatever action is necessary to provide all necessary tools, equipment and machinery to adequately handle all sewage, surface flows and flood flows which may be encountered during the performance of the work. The entire cost of and liability for handling such flows is the responsibility of the Contractor and shall be included in the price for the appropriate item.

1.3 WORK IN FREEZING WEATHER

- A. Written permission from the Engineer shall be obtained before any work is performed which, in the judgment of the Engineer, may be affected by frost, cold, or snow. When work is performed under such conditions, the Contractor shall provide facilities for heating the materials and for protecting the finished work.

1.4 POLLUTION CONTROL

- A. It shall be the responsibility of the Contractor to prevent or limit pollution of air and water resulting from his operations.
- B. The Contractor shall perform work required to prevent soil from eroding or otherwise entering onto all paved areas and into natural watercourses, ditches, and public sewer systems. This work shall conform to all local ordinances and/or regulations, if any, and if not otherwise regulated by local ordinances or regulations shall at a minimum conform to the Ohio EPA General Storm Water NPDES Permit for Construction Activities and the Ohio Department of Natural Resources Rainwater and Land Development manual. This work may consist of but not be limited to construction and continual maintenance of silt fence, bio bag filters, sedimentation traps, stilling basins, check dams, temporary seeding, temporary mulching, erosion mats and other means to clarify waters containing suspended materials from excavations, embankments, cleared and grubbed or stripped areas, stockpiles, well points, and disposal sites and shall be commensurate with the contractor's schedule, sequence of work, means and methods. If a SWPPP plan is not required for the project, the contractor shall at a minimum submit a plan of his proposed erosion control prevention methods for approval by the Owner and/or other regulatory authorities having jurisdiction prior to starting any construction activities which may cause erosion.

- C. The Contractor shall perform work required to prevent dust attributable to his operations from entering the atmosphere. Dust on unsurfaced streets or parking areas and any remaining dust on surfaced streets shall be controlled with water and/or calcium chloride dust palliative as needed.
- D. Any material removed from sanitary or storm sewers shall be disposed in accordance with all applicable regulations.

END OF SECTION 013543

SECTION 014126 - GENERAL REGULATIONS AND PERMITS

PART 1 - GENERAL

1.1 REGISTRATION

All Contractors and subcontractors shall be registered with the Building Department having jurisdiction. Contact the Building Department for additional registration information.

1.2 ARCHAEOLOGICAL DISCOVERIES

Contractors and subcontractors are required under O.R.C. Section 149.53, to notify the Ohio Historical Society and the Ohio Historic Site Preservation Board of Archaeological Discoveries located in the project area, and to cooperate with those entities in archaeological and historic surveys and salvage efforts if such discoveries are uncovered within the project area.

Contact: Department Head
 Resource Protection and Review
 Ohio Historic Preservation Office
 800 E. 17th Avenue
 Columbus, Ohio 43211-2497
 614-298-2000

Should archaeological discoveries or other activities delay progress of the work, an adjustment in contract time will be made.

END OF SECTION 014126

SECTION 014223 - INDUSTRY STANDARDS

PART 1 - GENERAL

1.1 ABBREVIATIONS

- A. Abbreviations, as used, designate the following:

AASHTO	-	American Association of State Highway and Transportation Officials
ACI	-	American Concrete Institute
AIEE	-	American Institute of Electrical Engineers
AISC	-	American Institute of Steel Construction
ANSI	-	American National Standards Institute
ASTM	-	American Society of Testing and Materials
AWWA	-	American Water Works Association
CMS	-	Construction and Material Specifications
NEMA	-	National Electrical Manufacturers Association
ODOT	-	Ohio Department of Transportation
ORC	-	Ohio Revised Code
UL	-	Underwriters Laboratories, Inc.

1.2 REFERENCE TO OTHER SPECIFICATIONS

- A. Where reference is made to specifications such as ASTM, AWWA or AASHTO, the latest edition shall be used, unless otherwise noted on the plans or in the specifications.

1.3 CODES AND STANDARDS

- A. All work provided for by these specifications must be installed according to the provisions of the State and local building codes, subject to inspection and acceptance by the State and local inspectors.

END OF SECTION 014223

SECTION 014323 – QUALIFICATIONS OF TRADESMEN

PART 1 - GENERAL

1.1 CHARACTER OF WORKMEN AND EQUIPMENT

- A. The Contractor shall employ competent and efficient workmen for every kind of work. Any person employed on the work who shall refuse or neglect to obey directions of the Engineer or his representative, or who shall be deemed incompetent or disorderly, or who shall commit trespass upon public or private property in the vicinity of the work, shall be dismissed when the Engineer so orders, and shall not be re-employed unless express permission be given by the Engineer. The methods, equipment and appliances used on the work and the labor employed shall be such as will produce a satisfactory quality of work, and shall be adequate to complete the contract within the specified time limit.

- B. In hiring of employees for the performance of work under this Contract, or any Subcontract hereunder, no Contractor or Subcontractor, nor any person acting on behalf of such Contractor or Subcontractor, shall, by reason of race, sex, creed or color, discriminate against any citizen of the State of Ohio in the work to which the employment relates. No Contractor, Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, creed, sex or color.

END OF SECTION 014323

SECTION 015100 - TEMPORARY POWER SERVICE

PART 1 - GENERAL

1.1 ELECTRICAL POWER

- A. The Contractor shall furnish at his own expense all electrical power which may be required for the project. All temporary lines shall be furnished and installed by the Contractor at his own expense in a manner which meets the approval of the Engineer, and shall be removed by the Contractor at the completion of the construction.

END OF SECTION 015100

SECTION 015136 - TEMPORARY WATER AND DISTRIBUTION

PART 1 - GENERAL

1.1 WATER

- A. The Contractor shall be responsible for an adequate supply of water suitable for his use for construction and drinking. At his own expense, he shall provide and maintain adequate supplies and supply lines in such locations and installed in such a manner as may be satisfactory to the Engineer.

END OF SECTION 015136

SECTION 015213 - FIRST AID

PART 1 - GENERAL

1.1 AID TO THE INJURED

The Contractor shall keep in his office and on the work site, all articles necessary for giving "First Aid to the Injured." He shall also have standing arrangements for the immediate removal and hospital treatment of any employee or other person who may be injured on the work site.

END OF SECTION 015213

SECTION 015526 - TEMPORARY TRAFFIC CONTROL DEVICES

PART 1 - GENERAL

1.1 BARRICADES, SIGNS AND LIGHTS

- A. The Contractor shall employ watchmen on the work when and as necessary. The Contractor shall erect and maintain such strong and suitable barriers and such lights as will effectively prevent the occurrence of any accident to health, limb or property. Lights shall be maintained between the hours of one-half (1/2) hour after sunset and one-half (1/2) hour before sunrise.
- B. No manhole, trench, excavation will be left open awaiting connection or removal at a later date by the Contractor's forces or others but shall be temporarily backfilled and resurfaced if applicable with a temporary pavement passable to traffic at no additional cost to the Owner.
- C. In addition to other safety requirements, a minimum of four (4) foot high fence will be incorporated around any shaft or manhole or other excavation left open at the end of a day's work.

1.2 MAINTENANCE OF TRAFFIC

- A. The Contractor is required to provide maintenance of traffic in conformance with the Ohio Manual of Uniform Traffic Control Devices and Item 614 of the current Construction and Material Specifications of the Ohio Department of Transportation.
- B. This work shall include providing suitable and satisfactorily trained and properly attired flagmen for use at any location where existing roadway is narrowed to a width of less than 2 full lanes (18 feet).
- C. The Contractor is also responsible for maintaining local access to all residences and businesses along the route of the construction and to provide whatever temporary materials are necessary to provide a safe, adequate drive surface.

END OF SECTION 015526

SECTION 016600 - PRODUCT HANDLING AND PROTECTION

PART 1 - GENERAL

1.1 DELIVERY AND STORAGE OF MATERIALS

- A. The Contractor shall be responsible for delivery and storage of all materials.
- B. The Contractor shall coordinate with the Engineer on the arrangement for storing construction materials and equipment. Deliveries of all construction materials and equipment should be made at suitable times.
- C. The Contractor shall store all materials required for the performance of this contract at sites designated by the Engineer.
- D. All stockpiles shall be neat, compact, completely safe, and barricaded with warning lights if necessary.
- E. Precautions shall be taken so that no shade trees, shrubs, flowers, sidewalks, driveways or other facilities will be damaged by the storage of materials. The Contractor shall be responsible for the restoration of all stockpile sites to their original condition.
- F. Materials, tools and machinery shall not be piled or placed against shade trees, unless they shall be amply protected against injury therefrom. All materials, tools, machinery, etc. stored upon public thoroughfares must be provided with red lights at night time so as to warn the traffic of such obstruction.
- G. Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, shall again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate their prompt inspection. Approved portions of the construction site may be used for storage purposes and for the placing of the Contractor's plant and equipment, but any additional space required therefore must be provided by the Contractor at his expense. Private property shall not be used for storage purposes without written permission of the property owner or lessee, and copies of such written permission shall be furnished the Engineer. All storage sites shall be restored to their original condition by the Contractor at his expense.

END OF SECTION 016600

SECTION 017800 - FINAL COMPLIANCE AND SUBMITTALS

PART 1 - GENERAL

- 1.1 The following forms and related sign-offs shall be documented in accordance with provisions of the contract. These forms shall be completed by the Contractor and approved by the Owner before final retainer is approved for release. Forms for Items A to E will be attached to the Contractor's executed copy of the contract.
- A. Certificate of Substantial Completion (To be submitted at time of Substantial Completion).
 - B. Contractor's Certification of Completion.
 - C. Contractor's Affidavit of Prevailing Wage.
 - D. Consent of Surety Company for Final Payment.
 - E. Affidavit of Final Acceptance Date and Correction Period.
 - F. Before the OWNER will approve and accept the work and release the retainer, the CONTRACTOR will furnish the OWNER a written report indicating the resolution of any and all property damage claims filed with the CONTRACTOR by any party during the construction period. The information to be supplied shall include, but not be limited to, name of claimant, date filed with CONTRATOR, name of insurance company and/or adjuster handling claim, how claim was resolved and if claim was not resolved for the full amount, a statement indicating the reason for such action.

END OF SECTION 017800

SECTION 017821 - CLEANING AND PROTECTION

PART 1 - GENERAL

1.1 GENERAL

- A. On or before the completion date for the work, the Contractor shall tear down and remove all temporary structures built by him, all construction plant used by him, and shall repair and replace all parts of existing embankments, fences or other structures which were removed or injured by his operations or by the employees of the Contractor. The Contractor shall thoroughly clean out all buildings, sewers, drains, pipes, manholes, inlets and miscellaneous and appurtenant structures, and shall remove all rubbish leaving the grounds in a neat and satisfactory condition.
- B. As circumstances require and when ordered by the Engineer, the Contractor shall broom sweep and/or hose-wash the hard surface of the road, or any driveway or sidewalk on which construction activity under this contract has resulted in dirt or any other foreign material being deposited.
- C. Failure to comply with this requirement when ordered by the Engineer or his representative, may serve as cause for the Engineer to stop the work and to withhold any monies due the Contractor until such order has been complied with to the satisfaction of the Engineer.
- D. As the work progresses, and as may be directed, the Contractor shall remove from the site and dispose of debris and waste material resulting from his work. Particular attention shall be given to minimizing any fire and safety hazard from form materials or from other combustibles as may be used in connection with the work, which should be removed daily.
- E. During and after installation, the Contractor shall furnish and maintain satisfactory protection to all equipment against injury by weather, flooding or breakage thereby permitting all work to be left in a new condition at the completion of the contract.

END OF SECTION 017821

SECTION 312323.13 – COMPACTED BACKFILL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. The Contractor shall furnish, place and compact all the materials needed from select excavated materials or furnish additional suitable material if the excavated material is deemed unsuitable or the moisture content is not or can not be made to be within acceptable tolerances of optimum moisture to achieve the specified compaction.
- B. This specification shall be used only where backfill is not under existing or proposed pavement or within the 1:1 zone of influence.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Suitable excavated material as specified in ODOT Item 203.

PART 3 - EXECUTION

3.1 PLACING

- A. Compacted backfill shall be properly placed in layers sufficient to meet the compaction requirement of 95% of maximum laboratory dry density per ASTM D 698 throughout the entire layer and thoroughly compacted with mechanical compaction equipment with moisture adjustment as needed. Should after settlement occur, the Contractor must add and compact additional material, and he must maintain the backfill at the required finished grade or sub-grade until the project is satisfactorily completed and during the correction period.
- B. Approved mechanical compaction equipment shall be used for tamping backfill. Flooding, jetting or puddling of backfill will not be permitted.

END OF SECTION 312323.13

SECTION 312323.14 – COMPACTED GRANULAR BACKFILL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. The Contractor shall furnish, place and compact all the materials needed.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Aggregate shall be ODOT 304 crushed limestone. Crushed gravel or slag products are unacceptable.
- B. Contractor shall submit current test reports for the lot(s) of the material to be supplied.

PART 3 - EXECUTION

3.1 PLACING AND COMPACTING

- A. Compacted granular backfill shall be properly placed in layers sufficient to meet the compaction requirement of 100% of maximum laboratory dry density per ASTM D 698 throughout the entire layer and thoroughly compacted with mechanical compaction equipment with moisture adjustment as needed. Should after settlement occur, the Contractor must add and compact additional material, and he must maintain the backfill at the required finished grade or sub-grade until the project is satisfactorily completed and during the correction period.
- B. Approved mechanical compaction equipment shall be used for tamping backfill. Flooding, jetting or puddling of backfill will not be permitted.

END OF SECTION 312323.14

SECTION 312333 - UNDERGROUND CONDUIT INSTALLATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Construction Drawings and General Provisions of this Contract including the General and Supplementary Conditions, Specific Project Requirements, Proposal, and all referenced standard specifications apply to work defined in this section.

1.2 DESCRIPTION

- A. This work shall consist of the construction or reconstruction of underground pipe conduits in accordance with these specifications and in reasonable close conformance to the lines and grades shown on the detailed plans or as otherwise established by the Engineer.
- B. This work shall include excavating for the conduit, fittings, and appurtenances; clearing and grubbing and removal of all materials necessary for placement of the conduit except any items paid for separately; furnishing and placing bedding and backfill as required; constructing and subsequently removing all necessary cofferdams, cribs and sheeting; pumping and dewatering; making all conduit joints as required; installing all necessary conduit; joining to existing and proposed appurtenances as required; performing leakage tests as required; restoration of all disturbed facilities and surfaces. The work shall also include the maintenance of existing flow and service to facilities being modified. Procedures for such maintenance shall be as approved by the Engineer prior to any work commencing.

PART 2 - MATERIALS

2.1 CONDUIT

- A. All conduit utilized shall be of one type and size specified in the proposal meeting the requirements of the detailed material specification.
- B. Shop drawings, catalog cuts, and test certifications may be required by the Engineer for all conduit, fittings, and appurtenances.
- C. Aggregate for the bedding and backfill shall conform to the requirements of the plan detail or as modified in writing by the Engineer. All aggregates shall conform to ODOT 703 for soundness and gradation.
- D. All other materials utilized as part of this work shall meet their respective ASTM requirements.

PART 3 - EXECUTION

3.1 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

A. Pavement, Sidewalks, and Curbing

1. Removal of existing pavements, sidewalks, curbing, and similar structures shall end at an existing joint or a sawed joint. Sawed joints shall be straight, neat, and free from chipped or damaged edges.
2. For non-reinforced concrete, the saw cut shall be completely through concrete.
3. For reinforced concrete, the saw cut shall be completely through the steel and concrete.
4. If the concrete is coated with a bituminous surface or other material, the saw cut shall be as specified above.

B. Manholes, Catch Basins, and Inlets

1. Existing drainage structures and sanitary manholes designated by the Engineer to be removed shall be completely removed.
2. Manholes designated to be abandoned shall be removed to an elevation of at least 3 ft. below the finished subgrade or ground surface. The remaining void shall be filled with backfill material in accordance with Section 312323.13 - Compacted Backfill.
3. Live sewers connected to structures removed or abandoned shall be rebuilt through the area with new conduit. Sewer flow shall be maintained between removal and replacement operations. Abandoned sewers shall be sealed and made watertight with approved precast stoppers or masonry bulkheads.
4. All castings salvaged from abandoned or removed structures shall remain the property of the Owner and shall be cleaned and transported by the Contractor to a nearby site designated by the Owner or incorporated in the work where called for on the drawings.

C. Guardrail and Fence

1. Where necessary, existing guardrail and fence shall be carefully dismantled and stored for reuse or for salvage by the Owner.
2. Posts and other materials not considered salvageable by the Engineer shall be disposed of by the Contractor.
3. The Contractor will be required to replace, at no cost to the Owner, material lost or damaged by negligence or by the use of improper methods.

3.2 METHOD OF EXCAVATION

- A. All excavation shall be in open cut unless otherwise permitted by the Engineer. Loosening of material by blasting will not be permitted without written authorization by the Owner specifying both the extent and location of the blasting to be done. If permission is granted the Contractor shall submit in writing his means and methods of blasting to the Owner for approval. Blasting shall not begin until the Owner issues written approval of the means and method of blasting.

- B. Excavation shall be made to undisturbed finish subgrade to the depth below the bottom of the conduit or structure as shown on the Contract Drawings details.
- C. Trenches shall be excavated with vertical sides from the bottom of the trench to one (1') foot above the top of the conduit from which point sides may slope to ground surface, except that, in streets or roadways, trenches shall be excavated with near vertical sides to the top of the trench. Width of trench in the vertical section shall be excavated only as wide as necessary to accommodate a safety box and to provide free working space on each side of the conduit or structure according to the size of the conduit or structure and the character of the ground. In every case there shall be sufficient space between the conduit or structure and the sides of the trench to make it possible to thoroughly ram the bedding around the conduit or structure and to secure tight conduit joints, but in no case more than twelve inches on either side of conduit. In no case, however, shall the width of the trench at the top of the conduit exceed the dimensions as shown on the contract drawings. In no case will it be permitted to excavate conduit trenches with sides sloping to the bottom.
- D. The trench bottom shall be firm and uniform for its full length. Should unstable material be encountered below plan subgrade, it shall be removed to a depth directed by the Engineer. Replacement of the additional excavation shall be with the specified bedding material or as otherwise directed by the Engineer.
- E. In the case the flow line is changed not to exceed one (1) foot or it becomes necessary to remove unstable material in an amount not to exceed one (1) foot, the same shall be done at one contract bid price or amount. When the flow line is lowered more than (1 foot) or if it becomes necessary to remove more than (1 foot) of unsuitable material below the bottom of the trench, compensation will be provided therefore in a supplemental agreement for the excavation and backfill beyond (1 foot).

3.3 UNAUTHORIZED EXCAVATIONS

- A. All excavations carried outside of the lines and grades given or specified, together with the disposal of such material, and all excavations and other work resulting from slides, cave-ins, swellings or upheavals shall be at the Contractor's own cost and expense. All spaces resulting from unauthorized excavations or from slides or cave-ins shall be refilled at the Contractor's expense with suitable material as specified in ODOT Item 203, "Roadway Excavation and Embankment" or Section 312323.13, "Compacted Backfill" in designated areas shown on the contract drawings or specified under this Section. Compaction requirements shall be in accordance with these specifications.

3.4 SHEETING AND SHORING

- A. The Contractor shall be responsible for supporting and maintaining all excavations required even to the extent of sheeting or shoring the sides and ends of excavations with timber or other satisfactory supports. If the sheeting, braces, shores, stringers, waling timbers, or other supports are not properly placed or are insufficient, the Contractor shall provide additional or stronger supports. The requirements of sheeting or shoring or of the addition of supports shall not relieve the Contractor of his responsibility for their sufficiency. All trench protection and sheeting and shoring must conform to the regulations of both the Ohio State Industrial Commission (OSIC) and the Federal Occupational Safety and Health

Act (OSHA) and will be subject to their respective inspections. All orders of OSIC and OSHA representatives must be complied with by the Contractor.

- B. All sheeting and shoring shall be removed where and when required and, upon its removal, all voids filled. If any sheeting or shoring is ordered to be left in place, it shall be cut-off as directed. In compensation for the sheeting and shoring left in place, if any, shall be by prior written change order.

3.5 REMOVAL OF WATER

- A. All conduit shall be installed in a dry and stable trench. The Contractor may pump or otherwise remove any water, sewage, or other liquid that may be found or may accumulate in the trench.
- B. If, in the opinion of the Contractor, dewatering pumps and equipment are required to maintain a dry and stable trench, suitably sized pumps shall be provided to meet the requirements. The manner and spacing of well points shall be at the Contractor's discretion.
- C. Excess water shall not be considered reason for undercut of trench bottom.
- D. The Contractor shall maintain the pumps for the duration of their need including a satisfactory discharge outlet. Power for the pumps shall be electric unless otherwise approved by the Engineer. Noise abatement may be required for any on-site generators in residential areas.

3.6 BEDDING FOR LAYING CONDUIT

- A. Bedding shall conform to the requirements of the plan detail unless otherwise modified by the Engineer.
- B. All granular bedding material shall be compacted to 95 percent of maximum laboratory dry density.
- C. All pipe bedding shall be of the gradation(s) specified and be limestone. Slag may not be used and gravel may be used with permission of the Engineer.

3.7 LAYING CONDUIT

- A. Except as otherwise permitted by the Engineer, all conduit shall be laid starting at the outlet end. Pressure conduits may be laid from either direction however the joints shall be such that the bell is upgrade or toward normal pressure.
- B. Line and grade for gravity conduits shall be established by the use of sufficient means to maintain acceptable installation tolerances and allow for reasonable checking observation by the Engineer.

- C. Line and grade shall be established and maintained over a length of fifty (50) feet minimum. Cut sheets establishing grade at fifty (50) foot intervals shall be provided to the Engineer prior to beginning work.
- D. The Contractor shall provide sufficient equipment and workers to safely handle and lay all conduit included as part of this work. All storage of materials shall be in a manner as to avoid damage to either surface prior to placement.
- E. The Contractor shall inspect each piece of conduit prior to placement in the trench and any unsatisfactory conduit shall be rejected.
- F. Conduit shall not be laid in water, mud, or any otherwise unsuitable trench. The conduit shall not be pushed into or allowed to fall to the bottom of the trench. Handling of the conduit shall be in conformance to the manufacturer's recommendations.
- G. The conduit shall be kept clean and any open ends of installed conduit shall be closed when work is not in progress.
- H. Jointing of the conduit shall be in accordance to the requirements of the manufacturers and as required by the specification material type. Any deviation from these acceptable methods requires approval of the Engineer.
- I. Testing of joints, where required, shall be done in accordance with the Specification for Testing. Should any section fail to meet test requirements, the Contractor shall make suitable corrections, at their cost, until the requirements are met.

3.8 SERVICE CONNECTIONS

- A. In general, and as called for on the drawings, as required or as ordered, provision shall be made in the sewers for service connections by inserting a wye branch for each service connection with a branch size called for by the contract drawings but never less than six (6) inch, in the sewer at location shown, where required or ordered, for sewers to ten (10) feet in depth. For sewers exceeding ten (10) feet in depth, or indicated on the plans, the Contractor shall construct a riser, as per detail, in such manner, that the top of the riser shall be not less than seven (7) feet below grade or at such elevation as to properly receive the required service connection, with full regard to elevation of service sewer and slope from building or structure to the sewer which shall not be less than one percent (1%). Risers are to be encased in sonotube filled with No. 57 Limestone as shown on the contract drawings.
- B. The location of service connections is shown in a general way on the contract drawings. The Owner may also increase the number of connections or delete some connections as the sewer is being built, or increase the size of connections when it deems such advisable.

3.9 FINAL BACKFILL

- A. Final backfill shall be installed from the top of the Pipe Embedment to the final grade. Final backfill of all conduit trenches shall conform to the requirements of the plans and details, Section 312323.13 "Compacted Backfill", and Section 312323.14 "Compacted Granular Backfill". All final backfill under existing or proposed pavement or structures or within the 1:1 zone of influence of existing or proposed pavement or structures shall be "Compacted Granular Backfill". All final backfill not under existing or proposed pavement or structures or within the 1:1 zone of influence of proposed pavement or structures shall be "Compacted Backfill".
- B. Unless otherwise directed, all forms, bracing and lumber shall be removed during backfilling and the cavities and voids resulting from the removal shall be backfilled and compacted to 100% of Standard Proctor.
- C. The Contractor must use special care in placing backfill so as to avoid injuring or moving the conduit or structure when compacting the backfill.
- D. In areas used for temporary maintenance of traffic the top layer of final backfill from the elevation of the existing subbase base interface to the existing or proposed surface(s), shall be ODOT Item 304 Aggregate Base to provide a temporary surface traffic course.
- E. Should after settlement occur, the Contractor must add and compact additional material.
- F. Machine mounted mechanical tamper shall be used for backfill compaction. Flooding, jetting or puddling of backfill will not be permitted.
- G. Excavated material in excess of that needed for backfilling and all unsuitable material shall be disposed of by the Contractor at his own expense and the cost of such disposal shall be included in the unit or lump sum prices bid.
- H. The Owner and Engineer do not guarantee nor suggest the is-situ material to be excavated will be suitable or in its present state will consist of the proper moisture content to achieve the compaction requirements. The Contractor shall make his own determination as to the backfill material he will use. Upon request, the Owner will provide access to the site for the Contractor to conduct such investigations and tests deemed necessary to make his determination. No extra payment will be made to dispose of unsuitable material or to furnish and place suitable material meeting the requirements of Section 312323.13 "Compacted Backfill" or Section 312323.14 "Compacted Granular Backfill."

3.10 TESTING AND ACCEPTANCE

- A. Prior to final acceptance of the conduit or the placing of the conduit into service, testing and/or televising may be required.
- B. For all sanitary, water, or other pressured conduits, pressure testing shall be required in accordance to the specifications contained herein. Televising shall be required for all sanitary sewer and may be required for storm sewers as outlined or required by plan note.

- C. Final television inspection of conduit shall be performed by an experienced company and in a format satisfactory to the Owner. Televising shall be done in the presence of the Engineer unless so waived. The Engineer shall be provided with unedited video tapes and two (2) copies of the video log.
- D. Televising shall not be done until all known repairs are completed and the line has been suitably flushed.

3.11 SITE RESTORATION

- A. Restoration of the disturbed project area shall begin immediately after backfilling has been completed. All excess material, debris, and excavation shall be disposed of by the Contractor.
- B. Restoration of paved surfaces and of seeded areas shall be done as soon as conditions permit. The manner in which this work shall be done is defined in other specifications or the contract plans.
- C. While payment for site restoration may be included in other items, final acceptance of the underground conduit shall not occur until all work is complete. Where no separate pay items exist for restoration work, the Engineer may determine an appropriate value for this work to be retained until its completion.

END OF SECTION 312333

SECTION 320113.62 - ASPHALT SURFACE TREATMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

1.2 SUMMARY

- A. This work shall consist of furnishing all labor, equipment, and material, and in performing all operations necessary for the rejuvenation and in-depth sealing of asphaltic concrete surface course by spray application of petroleum oil and resins emulsified with water, complete, in accordance with the specifications, the applicable drawings or at locations specified by the Engineer.

1.3 QUALITY ASSURANCE

- A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and application instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The asphalt rejuvenating agent shall be composed of a petroleum resin oil base uniformly emulsified with water. The Contractor shall submit a certified statement from asphalt rejuvenating manufacturer showing that the asphalt rejuvenating emulsion conforms to the following physical and chemical requirements.

<u>Designation</u>	<u>Test Method</u>	<u>Requirements</u>
Viscosity, S.F. at 77 F., sec.	ASTM D244	15-40
Residue, % Min. (1)	ASTM D244 (Mod.)	60-65
Miscibility Test (2)	ASTM D244 (Mod.)	No Coagulation
Sieve Test, % Max. (3)	ASTM D244 (Mod.)	0.10
Particle Charge Test	ASTM D244	Positive
Tests on Residue from	ASTM D244 (Mod.)	
	ASTM D445	100-200

Viscosity cs, 140F		
Asphaltenes, % Max.	ASTM D2006-65-T	0.75
Maltenes Dist. Ratio	ASTM D2006-65-T	0.3-0.5
PC + A ₁ (4)		
<hr/>		
S + A ₂		

1. ASTM D244 Modified Evaporation Test for percent of residue is made by heating 50 gram sample to 300 F. foaming ceases, then cool immediately and calculate results.
 2. Test procedure identical with ASTM D244 except that .02 Normal Calcium chloride solution shall be used in place of distilled water.
 3. Test procedure identical with ASTM D244 except that distilled water shall be used in place of 2% sodium oleate solution.
 4. In the Maltenes Distribution Ratio Test by ASTM Method D2006-65-T;
 - PC - Polar Compounds; A - First Acidaffins; A - Second Acidaffins
 - S - Saturates
- B. The materials shall have a record of at least five years of satisfactory service as an asphalt rejuvenating agent and in-depth sealer; such satisfactory service being based on the capability of the material to increase the ductility and penetration value of the asphalt binder in the pavement surface and to seal the pavement in-depth to the intrusion of air and water.
- C. The Contractor shall furnish the manufacturer's certification that the material proposed for use is in compliance with the specification requirements and include copies of supporting tests and previous use documentation.

2.2 MANUFACTURER

- A. The product Reclamite, or approved equal, is acceptable for these requirements.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. The temperature of the emulsion at the time of application shall be as recommended by the manufacturer.
- B. Contents in tank cars or storage tanks shall be circulated at least ten minutes before withdrawing the material for application. When loading the distributor, the asphalt rejuvenating agent concentrate shall be loaded first and then the required amount of water shall be added. The water shall be introduced into the distributor with enough force to cause agitation and thorough mixing of the two materials. To prevent foaming, the discharge end of the water hose or pipe shall be kept below the surface of the material in the distributor which shall be used as a spreader. Cleanliness of the spreading equipment shall be subject to the approval and satisfaction of the Engineer.

- C. The distributor for spreading the emulsion shall be self-propelled, and shall have pneumatic tires. The distributor shall be designed and equipped to distribute the emulsion uniformly on variable widths or surface at readily determined and controlled rates from 0.05 to 0.5 gallons per square yard of surface, and with an allowable variation from any specified rate not to exceed 5 percent. Distributor equipment shall include full circulation spray bars, pump, tachometer, volume measuring device and a hand hose attachment suitable for application of the emulsion manually to cover areas or patches inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the emulsion within the tank.
- D. A check of distributor rate and uniformity of distribution shall be made when directed by the Engineer.
- E. The emulsion shall be applied only when the existing surface to be treated is thoroughly dry and when the weather is clear and is not threatening to rain. The emulsion shall not be applied when the atmospheric temperature is below 40°F.
- F. The asphalt rejuvenating agent shall be applied by distributor at the temperature recommended by the manufacturer and at the pressure required for the proper distribution. The emulsion shall be so applied that uniform distribution is obtained at all points of the areas to be treated. Distribution shall be commenced with a running start to insure full rate of spread over the entire area to be treated. Areas inadvertently missed shall receive additional treatment as may be required by hand sprayer application.
- G. Application of asphalt rejuvenating agent shall be on one-half width of the pavement at a time.
- H. When the second half of the surface is sealed, the distributor nozzle nearest the center of the road shall overlap the previous application by at least one-half the width of the nozzle spray. In any event the center line construction joints of the pavement shall be treated in both application passes of the distributor truck.
- I. A light coating of dry, gritty sand shall be applied to the surface in sufficient amounts to protect the traveling public.
- J. The Contractor shall schedule his operations and carry out the work in a manner to cause the least disturbance and/or interference with the normal flow of traffic over the areas to be treated. Treated portions of the bituminous surfaces shall be kept closed and free from traffic until penetration, in the opinion of the Engineer, has become complete, and the area is suitable for traffic. All necessary traffic control to assure the proper application of this material shall be included under this item.
- K. Before spreading, the asphalt rejuvenating agent shall be blended with water at the rate of two (2) parts rejuvenating agent to one (1) part water, by volume or as specified by the manufacturer. The combined mixture of asphalt rejuvenating agent and water shall be spread at the rate of 0.05 to 0.08 gallons per square yard, or as approved by the Engineer
- L. Grades or super elevations of surface that may cause excessive runoff, in the opinion of the Engineer shall have the required amounts applied in two (2) or more applications as directed.

- M. The rejuvenating agent shall be applied by an experienced applicator of such material. The applicator shall have a minimum of three (3) years experience in applying the product proposed for use. He shall submit a list of the last five (5) projects on which he applied said rejuvenator.

3.2 MEASUREMENT

- A. The quantity to be paid for under this item shall be the actual number of square yards of rejuvenating agent applied. The number of square yards shall be determined from the Engineer's measurements.

3.3 PAYMENT

- A. The quantity measured as above provided shall be paid for at the contract unit price bid as called for in the Proposal, which price shall constitute full compensation for surface preparation, furnish and applying rejuvenating agent, traffic control, sand cover and for all labor, tools, equipment and incidentals necessary to complete this item.

END OF SECTION 320113.62

SECTION 320116.71 - PAVEMENT PLANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. This work shall consist of planing the existing pavement and disposing of the cuttings in accordance with these specifications in areas designated on the plans or established by the Engineer. When provided for in the contract, the work shall also consist of patching the planed surface.

1.3 JOB CONDITIONS

- A. Existing Pavement Type
 - 1. The item description indicates the predominate type of pavement. All pavement encountered in the areas designated on the plans shall be planed, measured, and paid for under the item unless a separate item is provided in the contract.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Planing equipment shall be self-propelled with sufficient power and stability to consistently and efficiently produce the required results. The cutting element may be made of the grinding, sawing, or milling type. Bituminous surfaces also may be planed using the blade type cutter of the heater planer, unless otherwise specified.
- B. Planing cutters shall be mounted rigidly to the carrier and shall be adjustable and controllable as to depth of cut and cross-slope.

Longitudinal planing action may be produced either by means of a suitable carrier wheelbase or by means of an automatic control system having an external reference. Cross-slope adjustments or automatic controls shall be capable of producing either a variable or a constant cross-slope as required.

- C. Planing cutters shall be designed, maintained and operated so as to produce a surface free from grooves, ridges, gouges or other irregularities detrimental to the safe operation of vehicles in traffic routed onto the planed surface, temporarily or permanently.

- D. When heaters are used, adequate provisions shall be made for the safety of persons in the vicinity of the equipment and for preventing damage to adjacent property and facilities, public or private.
- E. Suitable supplemental equipment or methods, approved by the Engineer, may be used in small or confined areas.

PART 3 - EXECUTION

3.1 PLANING

- A. One or more planing passes shall be made over the designated area as necessary to remove such irregularities as bumps, corrugations, and wheel ruts, and when required, as necessary to establish a new pavement surface elevation or cross-slope.
- B. Cuttings shall be removed from the surface following each pass of the equipment. Before opening the completed area to traffic, the surface shall be cleaned thoroughly of all loose material that would create a hazard, a nuisance, or would be redeposited into the surface texture. Cuttings shall become the property of the Owner and shall be delivered to a site as directed by the Engineer.
- C. Effective measures shall be taken to control dust, smoke, contamination of the pavement, and the scattering of loose particles during planing and cleaning operations.
- D. Where sound pavement has been gouged, torn, or otherwise damaged during planing operations, the damaged area shall be repaired at no additional cost in a manner satisfactory to the Engineer to conform to the adjacent pavement in smoothness and durability.

3.2 SURFACE PATCHING

- A. Areas of the planed surface to be patched due to spalling or dislodgement of unsound pavement will be designated by the Engineer. The areas shall be cleaned of loose material, coated with ODOT 407.02 tack coat material, ODOT 702.02 or ODOT 702.04, and filled with asphalt concrete, ODOT 404, leveled and compacted to conform to the adjacent pavement.

3.3 SURFACE TOLERANCES

- A. When the contract provides for planing without resurfacing, the surface shall be planed to a smoothness of plus or minus 1/8 inch in 10 feet and the surfaces at the edges of adjacent passes shall be matched within plus or minus 1/8 inch. When the contract includes resurfacing, these tolerances shall be plus or minus 1/4 inch. The cross-slope of the planed surface shall conform to the specified cross-slope within plus or minus 3/8 inch in ten feet.

3.4 METHOD OF MEASUREMENT

- A. The quantity of pavement planing including the removal and disposal of cuttings shall be the number of square yards planed.
- B. The quantity of surface patching shall be the number of square yards patched including tack coat and asphalt concrete.

3.5 PAYMENT

- A. See "Basis of Payment."

END OF SECTION 320116.71

SECTION 320117.63 – FIBERGLASS/POLYESTER INTERLAYER REINFORCING FABRIC

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The work covered by this Section shall consist of furnishing and installing a fiberglass/polyester interlayer overlay fabric as shown on the plans and at locations designated by the Engineer.

PART 2 - PRODUCT

2.1 GENERAL

- A. Fiberglass/Polyester Interlayer Overlay Fabric shall be constructed of a blend of fiberglass, polyester, and adhesive. It shall meet the following physical requirements:

<u>Property</u>	<u>Test Method</u>	<u>Units</u>	<u>Typical Value</u>
Mass per unit area	ASTM D 5261	g/sm(oz/sy)	136 (4.0)
Tensile strength, MD	ASTM D 5035	N/50mm(lb/2in)	1250 (281)
Elongation at max. load, MD	ASTM D 5035	Percent	<5
Tensile strength, CD	ASTM D 5035	N/50mm(lb/2in)	1250 (281)
Elongation at max. load, CD	ASTM D 5035	Percent	<5
Melting point	ASTM D276	°C (°F)	>205 (400)
Asphalt Retention	ASTM D6140	Gal/sy	0.10
Shrinkage	Tex-616-J	Percent	0

Note conditions for tensile strength measurements:

Sample width: 8 inches Gage length: 4 inches
Sample length: 8 inches Crosshead speed: 0.4 in/min.

- B. All mat manufacturing procedures shall be ISO (International Standards Organization)-9002 Certified.
- C. The mat manufacturer shall furnish certified test data covering physical and engineering properties of the mat. A letter of certification stating the mat complies with specification requirements shall be furnished with each shipment.

- D. The fabric shall be protected from degradation by sunlight and shall be protected from moisture during storage.
- E. The asphalt sealant shall be PG64-22 meeting the requirements of 702.01.
- F. Certification shall be furnished in accordance with 101.061 before the fabric is placed. The Engineer may require sampling for testing purposes as directed by the Laboratory.

2.2 EQUIPMENT

- A. The Contractor shall provide equipment for heating and applying bituminous material. Heating equipment and distributors shall meet the requirements of 407.
- B. The mechanical laydown equipment shall be mounted on a four-wheeled vehicle that is capable of driving over the fabric while it is being installed to control the tension on the material. The laydown machine shall be equipped with clutches to adjust the roll tension and brooms to smooth out wrinkles during installation. Manual laydown may be used only with written permission of the Engineer and only for areas inaccessible to the laydown machine.
- C. Installation of fiberglass/polyester interlayer shall be performed or supervised during installation by a trained and experienced installer certified by the manufacturer or his representative.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. The cracks and entire road surface to be treated and at least one additional foot on each side shall be cleaned by sweeping, blowing, or other methods until all dust, mud, clay lumps, vegetation, and foreign material are removed entirely from the pavement before the bituminous material is applied. Care shall be exercised to prevent material so removed from becoming missed with the new surface.

3.2 APPLICATION OF ASPHALT SEALANT

- A. The application of the asphalt sealant shall conform to the applicable portions of 407. The asphalt sealant shall be uniformly sprayed over the area to be covered by fabric at a rate of 0.15 to 0.2 gallon per square yard.
- B. The quantity applied will vary with the surface condition of the existing pavement (degree of porosity, for example). The fabric alone, under heat of the overlay, will absorb at least 0.10 gallon per square yard. Within intersections or other zones where vehicle braking is commonplace, the application shall be reduced 20 percent. The sealant shall be applied to an area two to six inches wider than the widths of the fabric being placed, but restricted to the area of immediate fabric laydown. Application shall be by distributor with hand spraying allowed only where the distributor cannot be used. Asphalt spills shall be cleaned from the road surface to avoid flushing and possible movement at these asphalt rich areas.

- C. The asphalt cement used as a sealant shall have distributor tank temperatures between 300° and 350° F to avoid damage to the fabric.

3.3 FABRIC PLACEMENT

- A. The fabric shall be placed on the asphalt sealant as soon as practical and before the tackiness of the sealant is lost. There is no top or bottom side of the fabric and can be unrolled in either direction. Fiberglass/polyester interlayer fabric is stiffer than conventional fabrics. The fabric shall be placed as smoothly as possible to avoid wrinkles. Wrinkles severe enough to cause “folds” shall be slit and laid flat. Small wrinkles which flatten under compaction are not detrimental to performance. The fabric shall be broomed or squeegeed to remove air bubbles and make complete contact with the road surface as recommended by the fabric manufacturer. The fabric shall be laid straight within the sealant area. Due to stiffness the product will not bend or stretch around curves. Fiberglass/polyester fabric should be placed around curves in shortened lengths.
- B. Longitudinal joints shall be made by overlapping the fabric two to four inches. Transverse joints shall be made by overlapping the fabric four to six inches. Additional sealant (about 0.20 gal. per sq. yd.) shall be added to the joints as required. The additional sealant for transverse joints may be applied by hand spraying or with mop and bucket if extreme care is taken to not exceed the specified rate.
- C. To enhance the bond of the fabric with the existing pavement and to smooth out any wrinkles or folds in the fabric, the Contractor shall be required to pneumatically roll the fabric after it is placed.

Ambient temperature for installation should be 40°F and rising.

3.4 TREATMENT OF THE APPLIED FABRIC PRIOR TO THE ASPHALT CONCRETE

- A. It is unnecessary to tack coat the fabric prior to placement of the overlay unless there are circumstances such as delay of overlay, dust accumulation, or under application of sealant which would make tack coating desirable. If a tack coat is required, emulsified asphalt shall be applied at a rate of 0.02 to 0.05 gal. per sq. yd. residual asphalt. Placement of the asphalt concrete overlay shall closely follow fabric laydown. In the event that the sealant bleeds through the fabric before the asphalt concrete is placed it may be necessary to blot the sealant by spreading sand or asphalt concrete over the affected areas. This will prevent any tendency for construction equipment to pick up the fabric when driving over it.
- B. Turning of the paver and other vehicles shall be gradual to avoid movement or damage to the membrane. If it is necessary to open the road to traffic after fabric placement but prior to paving, it is advisable to spread a small amount of sand over the membrane to prevent tires from sticking to the sealant or pulling up the fabric. This practice is to be avoided if possible to prevent damage to the membrane.

If rain prior to the overlay should cause a blistered appearance and some bond loss throughout the membrane. It should be corrected by pneumatic rolling until adhesion is restored.

3.5 ASPHALT CONCRETE

- A. The asphalt concrete overlay shall conform to 401 except that the mixture shall be delivered to the paver at a temperature of 275°F to 335°F.

END OF SECTION 320117.63

SECTION 320190.35 - RIGHT-OF-WAY TREE MAINTENANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE OF WORK

- A. To provide all labor, supervision, equipment, services, and expertise necessary to perform right-of-way tree maintenance work on specified trees in the public right-of-way as specified herein. Since this work is of a potentially dangerous nature and requires special expertise, it is to be performed by a Contractor (or Subcontractor to the Contractor) that derives a majority of its annual income from arboricultural work and whose employees are highly trained and skilled in all phases of tree service work. Contractor shall have at least five years of experience in performing this scope of work and provide a list and references for same.

The Contractor has the responsibility to:

1. Remove or prune designated trees.
2. Reserve work space along any public streets.
3. Grind out stump when tree is to be removed.
4. Remove excess material and clean-up site.
5. Guarantee that specifications are met.
6. Keep work site safe at all times.
7. Any work incidental to above.

1.3 DEFINITIONS

- A. Reference: Reference to any other specifications or standards means the latest revision in effect on date of invitation to bid. This set of specifications governs when disagreement with reference specifications occurs.
- B. Specified: Means specified in the invitation to bid.
- C. ANSI Z-133: American Standard of Tree Worker Safety.
- D. ANSI A300: Standard Practices for Trees, Shrubs, and Other Woody Plant Maintenance.
- E. Contractor: A company that earns the majority of its annual revenue from pruning and maintaining trees. Contractor must employ an ISA Certified Arborist and/or Certified Tree Worker, who is on the job site at all times. Certifications shall be submitted with the bid.

1.4 WORK PROCEDURES

- A. **Equipment:** All bidders must have in their possession or available to them by formal agreement at the time of bidding: trucks, devices, chippers, hand tools, aerial and other equipment, and supplies which are necessary to perform the work as outlined in these specifications. The Owner and/or Engineer may inspect such equipment or agreements prior to the awarding of a contract.
- B. **Tree Location:** The Work shall be limited to trees located in the Owner's public right-of-way, permanent easements and temporary construction easements. All work under this contract shall be assigned by the Owner and/or Engineer by marking the trees with blue paint for priority pruning or red paint if tree is to be removed. The Owner reserves the right to change, add, or delete areas or quantities to be pruned or removed as it deems to be in its best interest. The Contractor shall be responsible for notifying the appropriate utility authority before removing trees growing in the utility wires or grinding stumps. Contractor shall be responsible for any damage to utilities during the removal or pruning process.
- C. **Supervision:** Contractor shall consult with the Owner and/or Engineer concerning details of scheduling of all work. Contractor shall have a competent person in charge of his work at all times to whom the Owner and/or Engineer may issue directives who shall accept and act upon such directives. Failure for the supervisor to act on said directives shall be sufficient cause to give notice that the Contractor is in default of contract unless such directives would create potential personal injury or safety hazards. The Contractor shall have an ISA Certified Arborist or Certified Tree Worker on the job site at all times.
- D. **Inspections:** The Owner and/or Engineer shall inspect the work at its discretion. Immediate correction of any work not done to industry standards as noted by the Owner and/or Engineer will be communicated to the Contractor and will be performed by the Contractor at no additional expense to the Owner.
- E. **Tree Damage:** Climbing irons, spurs, or spikes are not to be used on trees to be pruned. Any tree damage caused by the Contractor shall be repaired immediately at no additional expense to the satisfaction of the Owner. Trees damaged beyond repair, as judged by the Owner, shall be removed at no expense to the Owner and replaced by a tree of size and species designated by the Owner or the dollar value of such damaged trees, as determined by the Owner, is deducted from the monies owed the contractor.
- F. **Traffic Control:** The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the work site and shall provide the necessary warning devices, barricades, and personnel needed to give safety, protection, and warning to persons and vehicular traffic within and approaching the work area.
- G. **Utility Agencies:** Utility(s) shall be contacted by the contractor any time assistance is needed to work safely around overhead or underground installations. Tree trimming, tree removal and grinding operations may be conducted in areas where overhead or underground electric, telephone, data, cable television, gas, sanitary sewer, storm sewer or waterline facilities exist. The contractor shall protect all utilities from damage, shall

immediately contact the appropriate utility if damage should occur and shall be responsible for all claims for damage due to his operations.

The contractor shall make arrangements with the utility for removal of all necessary limbs, branches or stumps that may conflict with or create a personal injury hazard in conducting the operations of this contract.

- H. Safety: The Work shall conform to the latest revision of American National Standards Institute Standard Z-133.1 (Safety Requirement for Pruning, Trimming, Repairing, Maintaining, Removing Trees, and for Cutting Brush).
- I. Clean Up: Clean-up procedures shall be completed within two hours after debris has been placed around the site of each tree requiring pruning or removal. The work site shall be left equal to or cleaner than pre-work conditions. It shall be the responsibility of the Contractor to remove and dispose in a proper and acceptable manner all logs, brush, bark, and other organic debris resulting from the tree maintenance operations. Wood may be left for residents at the residents' request. It is the Contractor's responsibility to obtain written authorization from the resident to leave wood on private property. Copies of the authorization shall be provided to the Owner.
- J. Damages: Damages by the Contractor to any person or property, public or private, are the total responsibility of the Contractor and shall be repaired or compensated for by the Contractor to the satisfaction of both the injured party and the Owner at no cost to the Owner.

PART 2 - EXECUTION

2.1 WORK SPECIFICATIONS AND PROCEDURES

- A. Pruning Specifications: Pruning shall conform to the latest revision of ANSI A300. Generally, all pruning shall be performed to allow for development or maintenance of the vegetation's natural growth habit. All cuts shall be made as close as possible to the trunk or parent limb, without cutting into the branch collar or leaving a protruding stub. Stub cutting is only permitted with permission of the Owner on damaged trees where pruning as described above would remove an inordinate amount of wood from the tree. Bark at the edge of all pruning cuts should remain firmly attached. All branches too large to support with one hand shall be precut to avoid splitting or tearing of the bark. Where necessary, ropes or other equipment shall be used to lower large branches or stubs to the ground.
 - 1. Trees fronting each side of the right of way shall be trimmed or removed unless otherwise specified. Dead trees beyond the right of way which would fall onto the roadway shall be removed. Leaning trees beyond the Right of Way, which would fall onto the roadway in falling the tree and which would require trimming if not removed, shall either be removed or trimmed, except that shade, fruit or ornamental trees shall be trimmed and not removed, unless otherwise authorized. If outside the

Right of Way, the Owner will obtain a temporary construction easement from the property owner.

2. If, while pruning a tree, a problem which suggests that the tree should be removed is discovered, Contractor shall notify the Engineer of the problem and wait for the Owner's and/or Engineer's decision before resuming work on the tree.
 3. Tree wound dressing shall not be used.
 4. Equipment that will damage the bark and cambium layer should not be used on or in the trees. Sharp tools shall be used so that clean cuts will be made at all times.
 5. All cut limbs shall be removed from the crown upon completion of the pruning.
- B. Removal Specifications: Removals shall include topping and other operations necessary to safely remove the assigned trees. No trees or trunks shall be felled onto pavement. Work includes removal of basal sprout and brush and weeds within 3 feet of trunk. The tree stump shall be ground out to a depth of 6 inches below the normal surface level including all surface roots. Immediately after grinding each stump, the grindings must be removed from the work area. Adjacent sidewalks, lawns, driveways, streets, and ditches shall be cleaned. The cavity shall be cleaned and free from all grinding debris. The cavity shall be backfilled with clean, screened topsoil to normal ground level, seeded and mulched.
- C. Chemicals and sprays for vegetation control shall not be permitted.
- D. Clean-up and disposal of logs, branches or any other debris resulting from all operations shall be promptly and properly accomplished. The work area shall be kept safe at all times until the clean-up operation is completed.

END OF SECTION 320190.35

SECTION 321000- PAVEMENT REPLACEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. The Contractor shall furnish all of the equipment, labor and materials necessary to install, replace, and/or restore existing pavement structures together with their respective appurtenances as shown on the plans and as specified herein. This work shall include all of the subgrade preparation, subbase, base, intermediate pavement course(s), and finish pavement courses together with curbing, guttering, tack and/or prime coating, sealing and other pertinent work as necessary to meet the conditions of this contract.

1.3 QUALITY ASSURANCE

- A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

1.4 REPAIR OR REPLACEMENT WORK

- A. For the repair and/or replacement of all existing pavement structures and their respective appurtenances that are removed and destroyed or otherwise damaged by the Contractor in the course of his performance of the work required under this contract, the Contractor shall furnish all equipment, labor, and materials as necessary to properly restore to a condition equal to that at his entry, and to the satisfaction of the Engineer, the Ohio Department of Transportation, the County Engineer, City Engineer, all cinder, slag, gravel, water-bound macadam, bituminous macadam, asphalt and brick or concrete driveways, curbs, sidewalks and roadways in strict accordance with the drawings and as specified herein.
- B. In general, this item will include concrete, steel reinforcement, brick, stone, slag, cinders, gravel, asphalt and other bituminous materials and curbs, gutters, driveway culverts, road and curb drains and the demolition, excavation and removal of existing driveways, sidewalks and roadways.

1.5 REFERENCE TO OTHER PARTS

- A. Other sections of these specifications shall apply, as and where applicable to this section and such sections will be the same as though they were included in this section.

- B. For all old work where pavement is being repaired and/or replaced as a result of damages occurring thereto during the course of the work of this contract, all clearing and grubbing, removal and storage of topsoil, excavation and/or placing of compacted fill and granular backfill, shall be done as required under other parts of these specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Generally, for all repair and replacement work, all new materials shall match the existing and adjoining work in both composition and quality unless otherwise ordered, specified herein, and/or shown on the drawings. In any stone driveway or roadway, the material used for stone fill shall conform to the existing material.

PART 3 - EXECUTION

3.1 CONSTRUCTION

- A. All pavement work shall be done in strict accordance with the specifications of the governmental body concerned and the latest ODOT specifications as applicable or at the direction of the Engineer.
- B. All pavements disturbed by the Contractor's operations shall be relaid to the thickness of the adjoining pavement and, in all cases, the restoring of pavements, shall apply both to foundation courses and to the wearing surface.
- C. Should cracks or settlements appear in adjoining pavements, the paving shall be removed to the extent necessary to secure firm and undisturbed bearing and shall be replaced in a satisfactory manner.
- D. No permanent pavement shall be installed, repaired, and/or restored unless, or until, in the opinion of the Engineer, the condition of the backfill is such as to properly support the pavement.
- E. Where new or replacement concrete pavement or base is placed adjacent to existing concrete pavement or base, contraction joints shall be provided in the new or replacement pavement so as to form a continuous joint with that in the existing pavement.

3.2 ROADWAY SUBGRADE

- A. The entire area to be occupied by the roadways and parking areas shall be cleared, topsoil removed and stored, and the excavation or compacted fill made as required and brought to the proper cross-sections. Pipe trenches and other excavations shall be backfilled as required, and thoroughly compacted within the limits of the roadways or parking areas.

- B. After the surface of the subgrade has been properly shaped and before any stone or slag is placed, the entire subgrade shall be thoroughly rolled and compacted to a depth of 12 inches under this section. Rolling shall be done with an approved type of self-propelled roller, weighing not less than ten (10) tons. All hollows and depressions which develop during the rolling shall be filled with acceptable materials, and the subgrade rerolled. The process of filling and rolling shall be repeated until no depressions develop, and the entire subgrade has been brought to a uniform condition of stability.
- C. All places which, in the opinion of the Engineer cannot be properly rolled, shall be tamped with handheld mechanically or pneumatically powered tampers.
- D. In making the compacted fill and in doing the final subgrade rolling, the Contractor shall see that the material to be compacted and/or rolled has the proper moisture content to secure maximum compaction. When, in the opinion of the Engineer, the material is too wet, the compacting shall be delayed until the material has dried sufficiently. When, in the opinion of the Engineer, the material is too dry, the material shall be sprinkled with water in an amount to secure the proper moisture content.

3.3 TRAFFIC PAINT

It shall be the responsibility of the Contractor to replace all existing pavement markings in the style and at the locations that existed prior to this work. The Contractor shall make records of these markings as they exist and will supply these records to the Engineer prior to the start of any work. In the absence of such documentation, the Owner's discretion shall prevail. Unless specifically paid for in other items, the cost of pavement marking replacement shall be included in the Contractor's bid price of pavement.

END OF SECTION 321000

SECTION 321216 - ASPHALT CONCRETE PAVING AND MATERIALS

SECTION 1 - MATERIALS

- 1.1 The asphalt concrete mixture and installation thereof shall meet Ohio Department of Transportation (ODOT) Specifications except as modified in these specifications.
- 1.2 In the ODOT Specifications substitute "Engineer" for "Department" (except as stated below in reference to ODOT 403 for Department VA testing and acceptance).
- 1.3 No steel slag shall be used as coarse or fine aggregate for any asphalt concrete.
- 1.4 All asphalt cement utilized on this project shall meet AASHTO Provisional Standard MP1 or any superseding AASHTO specification for performance graded asphalt cement binder in conformance with PG 64-22.
- 1.5 The following exceptions shall be made for the Asphalt Concrete:
 - A. The coarse aggregate material shall be only limestone.
 - B. Recycled Asphalt Product (R.A.P.) will be permitted per ODOT 401.04 with the following exceptions: Maximum 0% R.A.P. for all surface courses and maximum 25% R.A.P. for all intermediate courses.
 - C. The Contractor shall provide documentation and certification to verify the above.
- 1.6 Except where designated otherwise in the plans or specifications all asphalt concrete mixes shall be designed for medium traffic volumes. Where light or heavy traffic pavements are designated in the plan, the contractor shall use an asphalt concrete mix designed for such traffic conditions.
- 1.7 Acceptance of the mixture will be based upon the certification that the mixture was produced according to the approved JMF within the production control and composition tolerances of the specifications. The Contractor shall hire and pay for an independent testing lab approved by the Engineer to perform all sampling, testing, monitoring, analysis and certification required by the Laboratory, Monitoring Team or Department in ODOT 403 and 441. All work by the independent laboratory shall be performed by personnel with ODOT Level II Bituminous Concrete certification.
- 1.8 ODOT 401.20 - "Asphalt Binder Price Adjustment" shall not apply to this contract.
- 1.9 Monument box and valve box risers shall be East Jordan Iron Works No. 8626, No. 8631, or approved equal. The Contractor shall follow the manufacturer's recommended installation procedure. New manhole frames and grate or frame and cover shall be EJIW 1710.

- 1.10 Brick used for manhole, catch basin, or inlet basin castings adjusted to grade under ODOT 611.10 Method D.1. shall be red shale or clay sewer brick meeting the requirements of ASTM C32 sewer brick, grade SM.
- 1.11 Risers used for manhole castings adjusted to grade under ODOT 611.10 Method D.2. shall be manufactured by Manhole Systems, Model MS-101TB, or approved equal.
- 1.12 All inlets and manholes shall be adjusted to grade after installation of the intermediate course(s), if any and prior to installation of the surface course.
- 1.13 All materials delivered to this project must have been weighed on a platform scale with electronic imprinter to show gross, tare, and net weights. No payment will be made for materials which are not correctly weighed as necessary. Material weight shall not exceed the current legal allowable limit.
- 1.14 Unless specified elsewhere in the specifications, material for berms shall be limestone only. Recycled concrete and asphalt concrete will not be permitted.

SECTION 2 - PAVING EQUIPMENT

- 2.1 All spreading equipment shall be self propelled. The Contractor shall identify the make and model of the paving machine that will be used for the intermediate and surface courses for approval prior to the pre-construction meeting.
- 2.2 All equipment, tools, and machines used in the performance of this work shall be maintained in satisfactory working order at all times. The Contractor shall be prepared to furnish proof of certification that all equipment to be used on the project has been calibrated within the past six (6) months.

SECTION 3 - GENERAL - PAVING

- 3.1 All paving shall be done on a single-lane basis.
- 3.2 If traffic loop detectors are encountered and broken, the Contractor is to repair as per local specifications. The cost for this work will be paid under the loop detector replacement bid item, if any; at negotiated unit prices; or by time and materials as directed by the Engineer.
- 3.3 Tack coat, Item 407, shall be applied at the rate of from 0.05 to 0.15 gallons per square yard as appropriate for the surface conditions with sand cover if required.
- 3.4 Asphalt driveway aprons shall be matched to new pavement with 24" transition sections or as shown on the drawings or required by the Engineer. The Contractor shall install apron wedge as required in the detailed drawings.

- 3.5 Unless otherwise shown on the drawings, jointing of new to existing pavement shall be by milled butt joints six (6) feet in width (or as shown on the plans) from edge of pavement to edge of pavement. Depth of this milled area shall equal the total of subsequent intermediate course and surface course as specified.
- 3.6 One (1) copy of each hauled/weighed material truck load ticket (plant ticket) for materials incorporated in this project shall be provided to the project representative daily. All bulk materials delivered to this project must have been weighed on a platform scale with electronic imprinter to show gross, tar and net weights. No payment will be made for materials which are not correctly weighed as necessary. Material weight shall not exceed the current legal allowable limit. If a partial load is used, the Contractor's foreman and the project representative shall confer and come to an agreement as to what portion of the product was used. The percent of material of this load, as reported by the project representative, is what shall be recorded as utilized.
- 3.7 For variable depth courses where tonnage tickets are used for determining quantities for payment, the conversion to cubic yards shall be number of tons verified and approved by the Engineer divided by 2.00 regardless of the actual density of the mix.
- 3.8 Positive drainage is to exist subsequent to the completion of the surface course. The Contractor shall take any necessary measures to assure positive drainage of the surface course. It shall be the responsibility of the Contractor to repair any low/puddled areas at his own cost by milling out the affected areas to a minimum depth equal to the nominal depth of the course being repaired and replacing with the specified asphalt concrete to grades that will correct the drainage problem.
- 3.9 Surface tolerances for all completed surface courses shall be as noted in ODOT 401.19. This tolerance shall apply regardless of whether or not an intermediate course is installed.
- 3.10 At the direction of the Engineer, periodic weight checks of asphalt concrete in loaded trucks shall be made by the Contractor and verified by the Engineer.
- 3.11 All quality control testing data performed on material incorporated into this project shall be forwarded to the Engineer for review as soon as it is available.
- 3.12 Quantity verification (but not necessarily payment quantity) for all asphalt concrete incorporated into the work shall be by weight tickets as produced by the plant or supplier or other means approved by the Engineer. Tack coat shall be verified by a ticket filled out and signed by the Contractor's tack truck driver based on weights taken or observations of level indicators. All verification tickets are required to be submitted to the Engineer on the day the material is incorporated into the work; however, the Engineer may, at his sole discretion, accept verification tickets for any items up to seven (7) calendar days subsequent to the work being performed. **After that date additional verification tickets for material will not be accepted for consideration of payment.**

- 3.12 No work is to be performed without the presence of the Engineer or his designated Project Representative. Forty-eight (48) hour advance notice of work shall be given to the Engineer and Owner by the Contractor.
- 3.13 All edges of surface courses abutting curbs or other appurtenances shall be sealed with hot AC-20.
- 3.14 The asphalt concrete, intermediate or surface course work will conform to ODOT Items 448-1 – Intermediate and Surfaces Courses and 448-2 – Intermediate Course. The paving foreman, at the Engineer’s request, will be required to correctly calculate the asphalt concrete “yield.” “Yield” is defined as the rate of material used, in cubic yards, in proportion to the area paved. The Contractor must be aware if he is under or over plan quantities for the area in question.

SECTION 4 – PREPARATION BEFORE RESURFACING AND REPAIRS

- 4.1 The Contractor is responsible for adequately preparing all roadways to the satisfaction of the Engineer, prior to beginning any resurfacing work. This will include removing any debris, which is currently on the roadway, such as dirt, paper, weeds, or any other such substances which will interfere with the proper bonding of the new road surfaces to the old.
- 4.2 The Contractor is to sweep all streets with an acceptable driven street sweeper/vacuum and must allow existing surfaces to dry prior to beginning resurfacing.
- 4.3 Cost of this preparation is to be included in the unit price bid of all other items. No additional compensation will be allowed.
- 4.4 At the direction of the Engineer, initial pavement repairs may be performed prior to pavement planing operations.

SECTION 5 – TRAFFIC PAINT

- 5.1 It shall be the responsibility of the Contractor to replace all existing pavement markings in the style and at the locations that existed prior to this work. The Contractor shall make records of these markings as they exist and will supply these records to the Engineer prior to the start of any work. In the absence of such documentation, the Owner’s discretion shall prevail. Unless specifically paid for in other items, the cost of pavement marking replacement shall be included in the Contractor’s bid price of asphalt pavement.

END OF SECTION 321216

SECTION 321216.10 - VOID REDUCING ASPHALT MEMBRANE (VRAM)

PART 1 - GENERAL

As part of this project, the Contractor will be required to construct sections of cold longitudinal joints using Void Reducing Asphalt Membrane (VRAM) material at specified locations. Provide additional core samples, loose mix samples and liquid material samples as directed by the Engineer.

Construct all surface course cold longitudinal joints per a typical section using VRAM material and conforming with the following requirements.

Materials. Provide J-bank produced by Asphalt Materials, Inc. or other approved asphalt material as follows:

Provide a base asphalt modified with styrene-butadiene diblock or triblock copolymer without oil extension, or a styrene-butadiene rubber elastomer. Do not use air-blown asphalt, acid modification, or other modifiers.

Test	Test Requirement	Test Method
Dynamic shear @ 82°C (unaged), G*/sin δ, kPa	1.00 min.	AASHTO T 315
Creep stiffness @ -18°C (unaged), Stiffness (S), MPa m-value	300 max. 0.300 min.	AASHTO T 313
Ash, %	6.0 max.	AASHTO T 111
Elastic Recovery, 100 mm elongation, cut immediately, 25°C, %	58 min.	AASHTO T301
Separation of Polymer, Difference in °C of the softening point (ring and ball)	3 max.	ASTM D7173, AASHTO T 53
Migration of VRAM, %	50-75	ITM XYZ

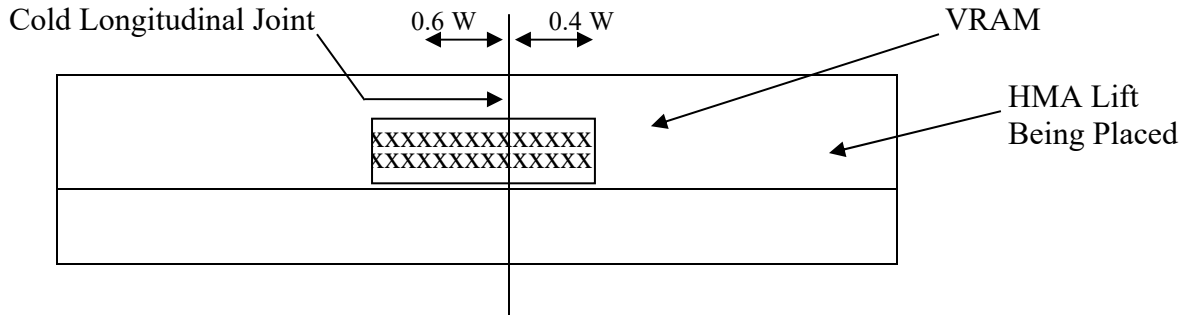
Equipment. When a pressure distributor is used to apply the VRAM, equip the distributor with a heating and recirculating system along with a functioning auger agitating system or vertical shaft mixer in the hauling tank to prevent localized overheating.

When a melter kettle is used to transport and apply the VRAM, use only oil jacketed double-boiler melter kettles with agitating and recirculating systems. Material from the kettle may be dispensed through a pressure feed wand with an applicator shoe or through a pressure feed wand into a hand-operated “thermal push cart.”

Preparation of Surface. Prior to placing VRAM, clean the pavement surface area to be treated of all foreign materials deemed detrimental by the Engineer. Only apply VRAM to surfaces that are dry and cleaned of all dust, debris, and any substances that will prevent the VRAM from adhering. The VRAM may be placed before or after the tack coat placement. When placed after the tack coat, ensure the tack coat is fully cured prior to placement of the VRAM.

Application of VRAM. Apply VRAM to cold longitudinal joints under surface courses. Only apply VRAM when the pavement surface temperature and the ambient temperature are a minimum of 40°F and rising.

Apply VRAM material on the cold longitudinal joint as detailed below:



Apply VRAM at the width and application rate required according to the following table:

VRAM Application Rate Table		
Overlay Thickness, (in.)	VRAM Width, “W”, (in.)	Application Rate ^[1] , (lb./ft.)
HMA Mixtures ^[2]		
1	15	0.95
1-1/4	15	1.09
1-1/2	15	1.22
1-3/4	15	1.36
2	15	1.49
2-1/4	15	1.62
2-1/2	15	1.76
2-3/4	15	1.89
3	15	2.03
3-1/4	15	2.16
3-1/2	15	2.30
3-3/4	15	2.43
4	15	2.57
SMA Mixtures ^[2]		
1-1/2	12	0.83
1-3/4	12	0.92
2	12	1.00

^[1] The application rate has a surface demand for liquid included within it. The nominal thickness of the VRAM may taper from the center of the application to a lesser thickness on the edge of the application. The width and weight/foot shall be maintained.

^[2] In the event of a joint between an SMA and HMA mixture, the SMA application rate will be used.

Apply VRAM in a single pass with a pressure distributor, melter kettle, or hand-applied from a roll, for asphalt courses up to 1 in. (50 mm) in thickness. Apply VRAM in two passes for asphalt courses between 2 and 4 in. (50 and 100 mm) in thickness. Ensure the applied width of VRAM is within ± 1.5 in. (38 mm) of the width specified. If the VRAM flows more than 2 in. (50 mm) from the initial placement width, immediately stop placement of VRAM and perform corrective actions. Coordinate the application of VRAM and placement of the asphalt mixture to ensure the center of the VRAM application is within ± 2.0 in. (50 mm) of the center of the asphalt pavement cold joint being constructed.

If the VRAM material will be exposed to traffic prior to closing the longitudinal joint, shift the location of the centerline of the VRAM material about the joint centerline such that no more than a nominal 6 in. (152 mm) of material is exposed. Do not open to traffic if width of exposed VRAM material is greater than 6 in. (152 mm).

If the paving operation only allows VRAM to be placed on one side of the cold longitudinal joint at a time, coat the vertical face of the cold longitudinal joint with VRAM material in addition to the requirements above. Do not seal the face of cold longitudinal joints as required per 401.17 when using VRAM for the cold longitudinal joint.

Furnish a bill of lading for each tanker supplying material to the project. Verify the application rate of VRAM within the first 1,000 ft. (305 m) of the day's scheduled application length and every 6,000 ft. (1,829 m) the remainder of the day. For projects less than 3,000 ft. (914 m), the rate will be verified once. Place a suitable paper or pan at a random location in the path of the placement for the VRAM. After application of the VRAM, pick up the paper or pan and obtain the weight of material. Calculate the weight per foot of VRAM. Ensure the actual weight per foot of VRAM is within ± 15 percent of the target weight/foot from the VRAM Application Rate Table. Replace the VRAM in the areas where the samples are taken.

When beginning placement of a run of VRAM, use a suitable release paper to cover previous VRAM application to prevent doubling up of thickness of VRAM.

The VRAM must be suitable for construction traffic to drive on without pickup or tracking within 30 minutes of placement. If pickup or tracking occurs, immediately stop placement of VRAM and repair damaged areas.

Prior to start of paving, ensure the paver end plate and any grade control devices are adequately raised above the finished height of the VRAM.

Immediately stop placement of asphalt mixture and VRAM if flushing is noted in the asphalt surface. Do not continue placement of the asphalt mixture until the issue is corrected.

END OF SECTION 321216.10

SECTION 321216.15 - ASPHALT CONCRETE – HIGH STRESS USING POLYESTER FIBERS

1 - GENERAL

The work shall consist of furnishing, placing and compacting surface or intermediate courses of hot mix asphalt, designed for high stresses, on a prepared surface in accordance with these specifications and in reasonably close conformity with the lines, grades, and typical sections shown on the plans or established by the Owner's representative.

Where reference is made to ODOT requirements, the requirements of the Ohio Department of Transportation, Construction and Materials Specifications, current edition shall apply.

Hot mix asphalt shall be placed by weight per unit of area as determined by the thickness shown on the plans or in the proposal and weight to volume conversion factors specified under method of measurement, ODOT 401.17.

The requirements of ODOT 441 AND 446 shall apply; deviations from these are as shown.

Tack coat, when required, and the use of reclaimed material also shall meet ODOT requirements.

When used in this specification, the term "Owner" is to be understood as the entity having ownership of the facility for which the work has been contracted.

2 – COMPOSITION

The hot mix asphalt mixture designed for high stresses shall be composed of aggregate, asphalt binder and fibers. Aggregate and asphalt binder shall meet ODOT requirements. Fibers shall meet the manufacturer's requirements as detailed in the mixture specifications provided herein.

The Contractor shall furnish a JMF (Job Mix Formula) or ODOT Bituminous Concrete Data Sheet suitable for the purpose of pavement construction. The JMF shall be established within the composition limits for the high stress mixture. Prior to producing material for this contract, the Contractor shall submit to the Owner's representative, for approval, a JMF or data sheet. The JMF shall include the mix type being used, aggregate type and gradation, percentage of asphalt binder by weight of mixture, grade of asphalt binder, source of the polyester fibers and unit weight of the mixture. The JMF, or data sheet, shall have previously been approved for use on ODOT work. Where no previously approved JMF is available, one shall be developed meeting all criteria established herein and shall be reviewed by an independent testing laboratory prior to submission to the Owner's representative. The person performing the review for the testing laboratory must be of its employ and shall have a current Level II Bituminous Concrete Certification from the Ohio Department of Transportation. The independent testing laboratory shall certify to the Owner the mix design is accurate, complete, and meets the requirements of this specification. Costs for performing this review shall be included in the price per unit of mix.

For surface courses except where noted below, the gradation and mixture requirements of ODOT 441, Type 1H shall apply. Intermediate course mixtures, except where noted below, shall meet the gradation and mixture requirements of ODOT 441, Type 2.

Mixture shall be designed for HEAVY traffic.

Course aggregate retained on the 4.75 mm (No. 4) sieve shall be a minimum of 100% mechanically crushed particles (ODOT Mechanical Crush Definition).

A maximum of 10% natural sand may be used.

Mixture composition shall include polyester fibers. Fibers shall be specifically manufactured and drawn for use in bituminous concrete mixes. The fibers shall have a uniform singular color and shall meet the following requirements:

Fiber Type	Polyester
Material	Petroflex 400 Series
Manufactured By	GFC Materials Co.
Denier; ASTM D-1577*	4.5 ± 1.5
Length, mm (inch)	6.35 ± .51 (0.25 ± 0.02)
Crimps; ASTM D-3937	None
Tensile strength, minimum, MPa (psi); ASTM D-2256*	483 (70,000)
Specific Gravity	1.36 ± 0.04
Melting Temperature, minimum, °C, (°F)	246 (475)

*This data must be obtained prior to cutting the fibers.

*This data must be obtained prior to cutting the fibers.

The Contract shall design the mix in accordance to ODOT Specification 441.02 using the fiber type to be incorporated into the project. The specified rate for introduction shall be 6.0 pounds / ton of total mix.

The asphalt binder, prior to the introduction of the fibers, shall meet G 64-22.

Prior to the start of full production, the Contractor shall produce a test batch of fiber asphalt concrete to demonstrate to the Owner's representative how the fibers will be introduced and mixed into the asphalt concrete. Satisfactory results shall be achieved before full production will be allowed. If, during production, the Contractor begins to get an unsatisfactory mix, production shall cease until the Contractor can produce a satisfactory test batch as described above.

When a batch type plant is used, the fibers shall be added as per the manufacturer's recommendation to the heated aggregate prior to introduction of the asphalt cement. The aggregate and fibers shall be mixed dry for a minimum of 10 seconds after the introduction of the fibers. The Owner's representative may increase this mixing time, if satisfactory results are not obtained.

When a drum mix type plant is used, the fibers shall be introduced per the direction of the fiber manufacturer.

If a mechanized delivery system is used for either a batch plant or a drum mix plant, it must be capable of delivering the fiber on a by weight basis and provide the necessary automatic printed recordation to document the fiber introduction rate in a manner approved by the Owner's representative.

3 – ACCEPTANCE

Acceptance of the mixture shall be in accordance with ODOT 446.05, except that an independent testing laboratory shall test the cores in accordance with ODOT Supplement 1036 and report the data to the Owner's representative for the purpose of calculating the pay factor. The person testing the cores shall have a current Level I Bituminous Concrete Certification from the Ohio Department of Transportation. Costs for the acceptance testing shall be included in the price per unit of mix.

Table A of ODOT 446.05 shall be modified as follows:

Mean of 10 cores as percent of daily MSG

93.0% or greater	1.00
92.0% to 92.9%	0.97
91.0% to 91.9%	0.94
90.0% to 90.9%	0.86
Less than 90.0%	*

*The Owner will determine whether the material will remain in place. The pay factor for such material allowed to remain in place will be 0.70.

END OF SECTION 321216.15

SECTION 321313.33 - PORTLAND CEMENT CONCRETE SEALING

PART 1 - SUBMITTALS

1.1 SUBMITTALS

- A. The Contractor shall submit technical information and a certified statement stating that the material to be furnished conforms to the material requirements of this section of the specifications.
- B. Copies of waybills and delivery tickets shall be submitted to the Contracting Officer during the progress of the work. Before final payment is allowed, the Contractor shall file with the Contracting Officer certified waybills and delivery tickets for all concrete sealer used in the work.

1.2. PORTLAND CEMENT CONCRETE SEALING TREATMENT

- A. The concrete sealer shall be an approved non-epoxy, non-silicone, non-toxic, non-hydrophobic, non-solvent material, and shall meet the following qualifications and AASHTO and ASTM test performance criteria, based in accordance with the manufacturer's recommended rate of coverage.

- 1. The penetrating sealer, after finished application, shall not darken, stain or discolor the treated concrete.
- 2. Application of the sealer shall not alter the surface texture or form a film or coating on the surface, and shall be compatible with the concrete pavement joint materials.
- 3. AASHTO T 259 Resistance of Concrete to Chloride Ion Penetration

Sealer-treated test specimens shall exhibit the following average values when an average of 0.125 inches of the treated concrete specimen has been abraded from the surface to simulate 10-12 years of traffic wear. Abrasion will be performed after treatment with sealer; and before ponding with chloride solution.

<u>Test</u>	<u>Duration</u>	<u>Average Absorbed CL</u>	<u>Method Used</u>
Salt water ponding	90 days	2.50 lbs. per cubic yard	AASHTO T259
	2160 hours	Depth of Measurement: 1/16" to 1/2" *	AASHTO T260
		0.04 lbs. per cubic yard	
		Depth of Measurement: 1/2" to 1.0"	

* Based on abraded concrete specimens.

- 4. ASTM C672 Scaling Resistance of Concrete Surfaces

Sealer-treated test specimens shall exhibit a 0 (zero) scale reading, and an improvement over untreated specimens after completion of a minimum of 50 freeze-thaw cycles; or until a difference between treated and untreated specimens develops. Example after 50 cycles:

<u>Specimen</u>	<u>Scale Rating</u>
Untreated	2+ (light to moderate scaling)
Treated	0 (no scaling)

5. AASHTO T161/ASTM C666 Resistance of Concrete to Rapid Freezing and Thawing

Treated specimens shall demonstrate equal or better durability to surface scaling than the frost resistant concrete used as a control upon completion of the test after a minimum of 300 freeze-thaw cycles. Example:

<u>Cycles</u>	<u>Control</u>	<u>Treated</u>
146	Slight	None
237	Slight	Slight
480	Slight	Slight

6. ASTM C501 Relative Resistance to Wear

Treated test specimens shall meet or exceed the improvement percentages as specified below on nominal 3,000 psi concrete after 1,000 revolutions:

<u>Specimen</u>	<u>Average Abrasive Wear Index</u>	<u>Average Depth of Wear</u>	<u>Average Absolute Weight Loss</u>
Treated	27.4	.026	3.227 gm
Untreated	19.9	.033	4.525 gm
Improvement	37.7%	21.2%	28.7%

7. ASTM C882 Bond Strength of Epoxy-Resin Systems used with Concrete

Test results shall demonstrate bond strength of treated samples equal to untreated samples used as a control.

8. Depth of Penetration

Depth of Penetration shall be a minimum of 1/8 in. as demonstrated by successful testing in accordance with AASHTO T 2590 (based on abroad specimens).

- B. The concrete sealer to be used shall be SINAK Concrete Sealer or approved equivalent. To be considered equivalent, the Contractor must submit the following with his bid. Products submitted after the bid date will not be considered.
 - 1. Verifiable evidence from approved independent laboratory(s) confirming that the material proposed for consideration meets or exceeds the test criteria of each and every test set forth in this specification. Any product that does not meet or exceed the results of all tests will not be considered.
 - 2. A written certification from the manufacturer that the material proposed for consideration meets all of the other requirements of this specification as listed in Paragraph B. above.
 - 3. The manufacturer's application instructions and procedures, and rate of coverage shall be included with all submittals for consideration.

1.3 SURFACE PREPARATION

- A. The Contractor shall prepare surfaces to be sealed by thoroughly cleaning same with mechanical sweepers of an approved type and with wire brooms where necessary. All surfaces to be treated shall be power washed with a high pressure washer. To be clean, the surfaces shall be free of sand, clay, dust, salt, grease, oil, curing compound, and other foreign matter which might adversely affect the penetrating capability of the sealer.

1.4 APPLICATION OF CONCRETE SEALER

- A. Equipment to be used shall be as recommended by the manufacturer and shall include a low pressure airless or gravity type sprayer with an application pressure of approximately 40 psi, using a spray tip large enough to deliver an even fan spray without misting.
- B. Application of the concrete sealer shall be recommended by the manufacturer and in accordance with the following:
 - 1. The application shall consist of two coats minimum. Each coat shall be in a light, even coat which shall be allowed to dry completely before continuing application. If a light sheen is visible when the second coat is dry, stop sealer application, and proceed to the water spray application.

If no sheen is visible when the second coat is dry, repeat coats until a light sheen is apparent. Immediately after the final seal coat has been applied and allowed to dry,

a light, even water-spray shall be applied to all treated surfaces to ensure complete penetration of the sealer. If a sheen is still visible after the water coat has dried, additional water coats shall be applied until the sheen is no longer evident and the concrete finish appears dull.

Coverage rate for SINAK Concrete Sealer S-102 will generally average 300-500 square feet per coat. The manufacturer or approved distributor will be present during the application of the first 1,000 square feet application to insure proper application procedures are followed. Based upon the first 1,000 square feet application, the manufacturer (or distributor) and the Project Engineer will agree upon a coverage rate to use for both coats within the range noted above.

2. Weather Limitations

Sealer should not be applied when temperatures are below 40°F or are expected to fall below 32°F within 24 hours or when rain is forecasted within 24 hours.

1.5. WARRANTY

- A. The Manufacturer shall provide a 5-year warranty that shall cover labor and material for damages from water, freeze/thaw, salt, acid rain, and from surface deterioration due to reinforcing steel corrosion or from ultra-violet exposure.
- B. The warranty shall be valid even if the treated surfaces is abraded off to a depth of up to 1/16-inch.
- C. The applicator shall be factory-trained and certified as competent, by the manufacturer with respect to the products specified herein. The applicator shall provide proof of certification.

Installation furnished by the factory certified applicator is required to qualify the project for the 5-year warranty.

END OF SECTION 321313.33

SECTION 329200.19 – SEEDING AND MULCHING

PART 1 - GENERAL

1.1 SUMMARY

- . Installation of seeded areas shall be to the extent shown on Contract Drawings and shall include supplying all seed, topsoil, soil conditioning materials, mulching materials and watering, and the incorporation of these materials into the work as specified.
- A. The Contractor shall place topsoil at the depths specified in those areas requiring seeding. Topsoil shall be furnished by the Contractor.

1.2 SUBMITTALS

- A. Product Data: For the following:
 1. Provide copies of soils tests for both new topsoil (provided) and onsite topsoil for review and approval. This applies to all areas that require seeding, including reconditioned areas.
 2. Provide location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown in the past 2 years.
 3. Provide the name of the seed supplier, name and phone number, list of the seed, including varieties of seed, labels, and an analysis of the seed for review, 4 weeks prior to the start of seeding.
 4. Provide soil amendments information based on soils test requirements.
 5. Hydroseed mixture, mulch and application rates prior to performing the work.

1.1 QUALITY ASSURANCE

- A. Any subcontracted restoration work shall be performed by a qualified firm specializing in landscape work.
- B. The Contractor shall have a soils test done at his expense and analyzed by a state approved testing agency. Soil tests shall be done on both the topsoil stockpiled from the site and new topsoil brought to the site. A minimum of two (2) tests shall be done. The tests shall include percent organic matter, pH, Buffer pH, Phosphorus, Exchangeable Potassium, Calcium, Magnesium, Cation Exchange Capacity and Percent Base Saturation with recommendations for nitrogen, phosphate, potash, magnesium and lime based on plant type and use.
- B. Seed: All seed specified shall meet O.D.O.T. specifications as to the percentage purity,

weed seed, and germination. All seed shall be approved by the State of Ohio, Department of Agriculture, Division of Plant Industry, and shall meet the requirements of these specifications.

- D. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

1.4 PROJECT CONDITIONS

- B. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
- C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, such conditions shall be rectified by the Contractor before planting, with approval from the Owner's Representative.
- D. Soil Stabilization: The Contractor shall provide permanent or temporary soil stabilization to denuded areas within fifteen (15) days after final grade is reached on any portion of the site. Any such area which will not be regraded for longer than fifteen (15) days shall also be stabilized. Soil stabilization includes any measures which protect the soil from the erosive forces of raindrop impact and flowing water. Applications include seeding and/or mulching, or the use of other erosion control measures as directed by the Owner's Representative. If necessary, the Contractor shall coordinate soil stabilization practices with the local Soil and Water Conservation District.
- D. Spring-sown work shall be installed between April 1st and May 30th and Fall-sown work shall be installed between September 1st and October 15th. No permanent seeding shall take place between May 30th and September 1st and between October 15th and April 1st. The dates for seeding may be changed at the discretion of the Owner's Representative.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Topsoil shall be furnished by the Contractor. Stockpiled material, if any, shall be utilized prior to obtaining additional topsoil.
- B. All topsoil shall conform to the U.S. Department of Agriculture soil texturing triangle and shall contain between 3% to 8% organic matter. Topsoil shall be loamy and not consist of more than 38% clay. New topsoil shall be screened to remove clay lumps, brush, weeds, litter, roots, stumps, stones larger than ½" in any dimension and any other extraneous or toxic matter harmful to plant growth.

New topsoil shall be obtained only from naturally well drained sites where topsoil occurs in

a depth of not less than 4". Do not obtain from bogs or marshes.

- C. Soil amendments shall be added according to the soils test requirements. Amendments can include, but are not limited to fertilizer, lime, compost, sand, and organic matter. Organic matter shall consist of composted leaves or other approved material.

2.2 SEED

- A. Seed shall be vendor mixed, delivered in original bags and shall be proportioned as follows:

<u>Common Name</u>	<u>Proportion by Weight</u>
Kentucky Blue Grass	50%
Perennial Rye	50%

2.3 MULCH

- A. Mulch shall be clean straw free of seed and weed seed.
 - 1. Anchoring for mulch shall be an ODOT specified SS-1 at 60 gal./ton non-toxic tackifier such as Hydro-stik, or equal, or by securing with a photo degradable netting.
- B. If hydroseeding is used, wood fiber mulching material shall be used and shall consist of virgin wood fibers manufactured expressly from whole wood chips and shall conform to the following specifications.

- Moisture content	10.0% \pm 3.0%
- Organic content	99.2% \pm 0.8% O.D. Basis
- pH	4.8 \pm 0.5
- Water holding capacity, minimum (grams of water per 100 grams of fiber)	1,000

Wood fiber mulching material shall be processed in such a manner as to contain no growth or germination inhibiting factors, and must contain a biodegradable green dye to aid in visual metering during application.

PART 3 - EXECUTION

3.1 PREPARATION - GENERAL

- A. Rough grading to a depth necessary to accept the specified thickness of topsoil must be approved prior to placing topsoil.
- B. Loosen subgrade, remove any stones greater than ½" in any dimension. Remove sticks, roots, rubbish, and other extraneous matter.
- C. Spread topsoil to a minimum depth of 4 inches, to meet lines, grades, and elevations shown

on plan, after light rolling and natural settlement. Remove sticks, roots, rubbish, stones greater than 1/2" in any dimension, and other extraneous matter. Topsoil shall be tilled thoroughly by plowing, disking, harrowing, or other approved methods. Add specified soil amendments and mix thoroughly into the topsoil.

- D. Preparation of Unchanged Grades: Where seed is to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for planting as follows: Till to a depth of not less than 6 inches. Apply soil amendments and initial fertilizers as specified. Remove high areas and fill in depressions. Till soil to a homogenous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter. Soils test requirements apply here as well.
1. Prior to preparation of unchanged areas, remove existing grass, vegetation and turf. Dispose of such material outside of project limits. Do not turn existing vegetation over into soil being prepared for seed.

If necessary, supply and install topsoil in areas where there is no topsoil left after vegetation has been removed.
 2. Apply specified soil amendments at rates specified in the soils test and thoroughly mix into upper 2 inches of topsoil. Add topsoil if existing grade has less than 4" of topsoil. Delay application of amendments if planting will not follow within two (2) days.
- E. Fine grade areas to smooth, even surface with loose, uniformly fine texture. Roll, rake, and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Remove sticks, roots, rubbish, stones greater than 1/2" in any dimension, and other extraneous matter. Limit fine grading to areas which can be planted immediately after grading.
- F. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.
- G. Restore areas to specified condition, if eroded or otherwise disturbed, after fine grading and prior to planting.

3.2 SEEDING

- A. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage. Seed shall not be sown when the ground is frozen, muddy, or when weather conditions prevent proper soil preparation, interference with sowing and/or proper incorporation of seed into the soil.
- B. Sow seed using a spreader or hydroseeder. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over entire area by sowing 3 lbs. per 1000 S.F. at right angles to each other. Total amount to equal a minimum of 6 lbs. per 1000 S.F.
- C. For seed sown with a spreader, mulch shall be spread uniformly to form a continuous

blanket at a rate of 100 lbs. per 1,000 S.F. Mulch shall be 1 1/2" loose measurement over seeded areas and shall be anchored.

- D. Contractor has the option to hydroseed large lawn areas, using equipment specifically designed for such application. The rate of application of wood fiber mulching materials is 40 lbs./1,000 S.F. Contractor shall not hydroseed within close proximity to buildings and structures, or when unfavorable wind conditions may blow the hydroseed material onto the structure. Contractor shall clean all areas not to be seeded of overspray.
- E. The seeded area shall be watered, as soon as the seed is applied, at the rate of 120 gallons per 1000 square feet. The water shall be applied by means of a hydroseeder or a water tank under pressure with a nozzle that will produce a spray that will not dislodge the mulching material. Cost of this watering shall be included in the cost of seeding and mulching.

3.3 DORMANT SEEDING METHOD

- A. Seeding shall not take place from October 15 through November 20. During this period prepare the seed bed, add the required amounts of lime and fertilizer, and other amendments, then mulch and anchor.
- B. From November 20 through April 1, when soil conditions permit, prepare the seed bed, lime and fertilize, apply the selected seed mixture, mulch, and anchor. Increase the seeding rate by 50 percent.

3.4 RECONDITIONING EXISTING LAWNS

- A. A soils test shall be required for existing lawns prior to any reconditioning.
- B. Recondition all existing lawn areas damaged by Contractor's operations including storage of materials and equipment and movement of vehicles. Also recondition existing lawn areas where minor regrading is required.
- C. Provide soil amendments as called for in the soils test.
- D. Provide new topsoil, as required, to fill low spots and meet new finish grades.
- E. Cultivate bare and compacted areas according to the topsoil specifications.
- F. Remove diseased and unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from the Contractor's operations, including oil drippings, stone, gravel, and other loose building materials.
- G. All work shall be the same as for new seeding.
- H. Water newly planted seed areas. Maintenance of reconditioned lawns shall be the same as maintenance of new lawns.

3.5 ESTABLISHMENT

- A. Maintain work areas as long as necessary to establish a uniformly close stand of grass over the entire lawn area. A uniformly close stand of grass is defined as the seeded areas having 90%+ coverage of grass at 60 days after seeding. 90%+ coverage is defined as very little or no dirt showing when seeded area is viewed from directly overhead.
- B. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth acceptable lawn.
 - 1. Mowing
 - a. Mow lawn areas during the period of maintenance to a height of 2 inches whenever the height of the grass becomes 3 inches. A minimum of 3 mowings is required during the period of maintenance.
 - 2. Refertilizing
 - a. Distribute fertilizer on the seeded area between August 15 and October 15, during the period when grass is dry, and in accordance with the manufacturer's recommendations. The fertilizer shall be as specified in the soils test.
 - 3. Reseeding
 - a. Reseed with the seed specified for the original seeding, at the rate of 4 lbs. per 1,000 S.F. in a manner which will cause minimum disturbance to the existing stand of grass and at an angle of not less than 15 degrees from the direction of rows of prior seeding.
 - 4. Watering
 - a. The Contractor shall keep all work areas watered daily to achieve satisfactory growth. Water shall be applied at a rate of 120 gallons per 1,000 square feet. If water is listed as a pay item, it shall be separately paid for based on the actual amount of water used, measured in thousands of gallons.
 - 5. Any mulching which has been displaced shall be repaired immediately. Any seed work which has been disturbed or damaged from the displacement of mulch shall be repaired prior to remulching.

3.6 INSPECTION AND ACCEPTANCE

- A. When seeding work is complete and an acceptable stand of growth is attained, the Contractor shall request the Owner's Representative to make an inspection to determine final acceptance.
- B. Acceptance shall be based upon achieving a vigorous uniformly stand of the specified grasses. If some areas are satisfactory and some are not, acceptance may be made in blocks, provided they are definable or bounded by readily identified permanent surfaces, structures, or other reference means. Partial acceptance decisions may be made by the Owner's Representative. Excessive fragmentation into accepted and unaccepted areas shall not be allowed. Unaccepted areas shall be maintained by the Contractor until acceptable.
- C. No payment shall be made until areas are accepted.

- D. All seeded areas shall be guaranteed for one full growing season to commence upon final acceptance of the areas.

END OF SECTION 329200.19

SECTION 330130 - MISCELLANEOUS TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 MAINTENANCE OF SANITARY FLOWS

- A. The Contractor for this contract shall be responsible for maintaining all sanitary flows through the existing sanitary sewerage systems. Provisions shall be made for temporary pumping and/or storage of sanitary flows during periods of sewer and manhole reconstruction, or when flows must be interrupted to make connections to the new facilities as directed by the Engineer.

END OF SECTION 330130

SECTION 330130.04 - SEWER POINT REPAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Under this section, the Contractor shall replace existing sections of sewers and/or manholes necessary to restore the capacity, structural integrity and functional capabilities of the sewer system. Minimum sewer repairs are six (6) feet in length and may be longer depending on the conditions encountered. Manhole replacement will include sufficient lengths of sewer to reconnect the pipe to the manhole. Defects that could require point repairs include but are not necessarily limited to:
 - 1. Partial collapse where the pipe has broken and threatens to block the flow.
 - 2. Broken or protruding tap-in connections that cannot be repaired or cut from within the sewer pipe.
 - 3. Utility relocation where a utility line may have been constructed through the sewer pipe.
 - 4. Manhole replacement where the structural condition is too deteriorated for rehabilitation.
 - 5. Manhole separation where a common access manhole is removed and two separate manholes installed.
 - 6. Service connection test-tee replacement or new installation.
 - 7. Service connection pipe replacement.
- B. Point repairs are normally performed in established urban areas where the construction work is an inconvenience to the residents, business owners and traveling public. Therefore, the means and methods to be employed by the Contractor and the conduct of the Contractor's employees are important to the Owner. Any means, methods, or employee used in the execution of Point Repair work that is too disruptive to the public in the opinion of the Owner shall be modified by the Contractor to the satisfaction of the Owner at no additional cost to the Owner.
- C. Any point repair work performed by the Contractor shall be scheduled such that the excavation will be backfilled within two (2) days of the start of the work, unless additional time is granted by the specifications or granted in writing by the Engineer.
- D. Sewer Point Repairs will only be performed and paid for when the work is authorized in writing by the Engineer.

1.3 QUALITY ASSURANCE

- A. **Manufacturer's Qualifications:** Firms regularly engaged in manufacture of sanitary and/or storm system's products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. **Installer's Qualifications:** Firms with at least 3 years of successful installation experience on projects with sanitary and/or storm work similar to that required for project.
- C. **Codes and Standards:**
 - 1. **Plumbing Code Compliance:** Comply with applicable portions of National Standard Plumbing Code pertaining to selection and installation of sanitary and/or storm system's materials and products.
 - 2. **Environmental Compliance:** Comply with applicable portions of local Environmental Agency regulations pertaining to sanitary and/or storm systems.
 - 3. **Utility Compliance:** Comply with applicable portions of protection, installation and/or inspection requirements for each utility encountered during the construction of the point repair.

1.4 SUBMITTALS

- A. **Product Data:** Submit manufacturer's technical product data and installation instructions for sanitary and/or storm system materials and products.
- B. **Record Drawings:** At project closeout, submit record drawings of installed sanitary and/or storm sewage piping and products, in accordance with requirements of Division 1.
- C. **Submit a description of the equipment proposed for the control of the sewer grade.** When requested, include catalog data describing the function and the conditions of operation of the equipment. The Engineer shall have the right to disapprove the use of the proposed equipment if in his opinion such equipment will not provide a reliable control system.

1.5 SUBSURFACE CONDITIONS

- A. **The Contractor shall make whatever test holes he deems necessary to determine the subsurface ground conditions, including the presence of water and rock.** No extra compensation shall be allowed the Contractor as the result of subsurface conditions encountered within the project. All proposed test holes shall be approved by the Owner prior to digging.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **Pipe, fittings, and specials shall be of the size and material being replaced.**

1. Vitrified Clay Pipe shall conform to ASTM C 700, with ASTM C 425 joints.
 2. Reinforced Concrete Pipe shall conform to ASTM C 76, with ASTM C 443 joints for sanitary sewers or ASTM C 990 joints for storm sewers.
 3. PVC pipe and fittings shall conform to ASTM D 3034, with ASTM D 3212 joints – SDR 26.
- B. Manholes shall be precast concrete and shall conform to ASTM C 478.
1. Joints between sanitary manhole sections shall conform to ASTM C 443. Flexible connections for sanitary pipes shall conform to ASTM C 923, "A-Lok" Type as manufactured by A-Lok Products; or an approved equivalent.
 2. Joints between storm manhole sections shall conform to ASTM C 990. Cut-out openings for connecting pipes shall be made immediately after the pipe is removed from the casting form.
 3. Where pressure tight manhole frames and covers are called for, threaded inserts shall be cast in cones or flat slab tops and holes formed or cored in the adjusting rings to match bolt size and spacing specified for the manhole casting.
- C. Precast concrete collars shall conform to ASTM C 478.
- D. Mortar shall conform to specifications for mortar for Unit Masonry, ASTM C 270 Type S, containing no masonry cement.
1. Mortar shall be composed of one (1) part Portland cement, Type II, to two (2) parts sand by volume.
- E. Materials for nonshrinking grout shall conform to CRD-C "Corps of Engineers Specifications for Non-Shrink Grout". Approved products are "Sauereisen F-100 Grout" by Sauereisen Cements Co.; "Five Star Grout" by U.S. Grout Corporation; "Masterflow 713" by Master Builders; "Euco N-S" by Euclid Chemical Company.
- F. Manhole frames and covers shall comply with the type specified on the manhole typical detail.
1. Ferrous castings shall be of uniform quality free from blowholes, shrinkage or other defects.
 2. Metal shall conform to ASTM A 48, Class 35 for gray iron or ASTM A 536, Grade 65-45-12 for ductile iron.
 3. Castings shall be smooth and well cleaned by shot blasting.
 4. Castings shall be manufactured true to pattern.
- G. Round frames and covers shall have continuously machined bearing surfaces to prevent rocking and rattling.
- H. Other utility conduits, thrust blocks, and other appurtenances shall be of the size and kind being replaced or as approved by the governing utility company and the Engineer.
- I. Low Strength Mortar Backfill shall conform to ODOT 613.03 Type 2.

PART 3 - EXECUTION

3.1 GENERAL

- A. **Public Notification:** The Contractor shall notify nearby residents and business owners forty-eight (48) hours in advance of beginning each point repair. The notification shall briefly describe the work to be performed, state the reason for the work, provide emergency phone numbers, and give a time estimate as to when the work will be completed. The language of the notification shall be approved by the Engineer.
- B. **Utility Notification:** Before any excavation work is started, the Contractor shall call the "Ohio Utilities Protection Service", at 1-800-362-2764, 48 hours in advance of the work. Non-member utilities must be contacted directly. The Contractor shall take all necessary precautions, at no additional expense to the Owner, to avoid damage to existing underground and overhead utility lines during the entire project. In the event of damage to existing public and/or private utilities, the agency concerned shall be notified immediately and all repair work shall be executed in accordance with the specifications of the respective agency at no additional expense to the Owner, including any inspection fees or maintenance crews.
- C. **Inspection Scheduling:** The Contractor shall notify the Engineer forty-eight (48) hours in advance of beginning work which requires compaction testing. Work will not begin until testing and/or inspection arrangements have been completed and approved by the Engineer.
- D. **Blasting will not be permitted.**
- E. **Unauthorized Excavations:** All excavations made outside of the lines, grades and replacement limits established by the Engineer, including the excavation, handling, rehandling, backfilling and disposal of such material shall be performed at the Contractor's own expense. This shall include that work caused by cave-ins, slides, swellings or upheavals. All spaces beneath foundations of structures, utilities, pipes or other existing facilities shall be filled with concrete or other acceptable material.
- F. **Noise, Dust and Odor Control:** The Contractor's performance of this Contract shall be conducted so as to eliminate all unnecessary noise, dust and odors. Dust control shall be performed at the Contractor's own expense whenever directed by the Engineer.
- G. **The word "rock"** wherever used as the name of an excavated material, shall mean boulders and solid masonry larger than one-half cubic yard in volume, of solid ledge rock and masonry which, in the opinion of the Engineer, required for its removal drilling and blasting, wedging, sledging or barring, or breaking up with a power-operated hand tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel; no loose, shaken or previously blasted rock or broken stone in rock fillings or elsewhere; and no rock exterior to the minimum limits of measurement, which may fall into the excavation, will be measured or allowed when extra payment for rock excavation is set forth.

3.2 PREPARATORY WORK OUTSIDE PAVED AREAS

- A. The Contractor shall clear the work areas of all trees less than six (6) inch caliper, shrubs, hedges, plants and flowers as directed by the Engineer.
- B. Shrubs and hedge plants shall be set aside, appropriately stored, and replanted after backfilling the excavation. Any shrub or hedge plant that dies prior to expiration of the warranty period shall be replaced with new nursery stock.
- C. All refuse and rubbish shall be cleared from the work area and all tree stumps shall be grubbed out. All cleared material and stumps shall be removed from the work area and disposed of in a manner approved by the Engineer.
- D. After clearing, but prior to starting main excavations, the Contractor shall remove from the work area all loam, topsoil and sand found suitable for future top dressing or use.
- E. Such material shall be removed in such a manner that it is clearly separated from the underlying material and shall be stored in such a manner and location as directed by the Engineer.
- F. No extra compensation will be allowed the Contractor for Clearing and Grubbing.

3.3 PREPARATORY WORK WITHIN PAVEMENT AREAS

- A. The Contractor shall set up traffic control in accordance with Ohio Manual of Uniform Traffic Control Devices to the satisfaction of the Owner.
- B. The existing pavement shall be neatly saw cut, excavated and disposed of at a location approved by the Owner.

3.4 PROTECTION OF EXISTING UTILITIES

- A. Where existing utilities are indicated as being in the line of the point repair section, the Contractor shall carefully expose them so as to cause no damage to them or interruption of their intended use. Existing pipes or conduits crossing the sewer trench, or otherwise exposed shall be adequately braced and supported to prevent any disruption to the line or grade of the utility.
- B. The Contractor shall keep fire hydrants accessible at all times.
- C. Utility services broken or damaged shall be repaired at once to avoid inconvenience to customers. Storm sewers shall not be interrupted overnight. Temporary arrangements, as approved by the Engineer, may be used until any damaged items can be permanently repaired. All items damaged or destroyed by Point Repair construction must be subsequently repaired to the satisfaction of the governing utility company.

3.5 INSTALLATION

- A. Where the sewer is located adjacent to, or within any pavement area, the Contractor shall be required to maintain vertical sides on all trenches using full sheeting and bracing if necessary. Maximum top width of trench permitted under such conditions shall be four (4) feet, plus the inside diameter of the pipe unless otherwise specified on the plans or prior approval has been received from the Engineer. In no case will the Contractor be permitted to excavate pipe trenches with sides sloping to the bottom.
- B. All material excavated in trenching and all materials used in construction of the work shall be deposited so as not to endanger the work or create unnecessary annoyance to the public. During the progress of the work, all material piles shall be kept trimmed up and maintained in a neat workmanlike manner. Excavated material in excess of that needed for backfilling shall be disposed of in areas approved by the Owner.
- C. Construction shall be in accordance with ODOT Item 611 Pipe Culverts, Sewers and Drains, Manholes, Catch Basins, Inlets, Inspection Wells, Junction Chambers or Monuments with the following exceptions:
 - 1. Excavated soil suitable for reuse shall be stockpiled on plywood sheets or other suitable means which will prevent spillage of undesirable subgrade material onto the surrounding lawn area.
 - 2. Bedding material shall be crushed limestone only.
 - 3. Pipe lengths shall not be deflected at the joint to any greater degree than recommended by the manufacturer of the particular joint being used. All pipe deflections shall be performed only with the Engineer's approval.
 - 4. Under pavement areas, Low Strength Mortar Backfill Material shall be placed from the top of the bedding up to the bottom of the pavement. The excavation shall then be plated and reopened to traffic until the low strength mortar obtains sufficient strength to support vehicle loads. In no event shall traffic be permitted on Low Strength Mortar Backfill for less than forty-eight (48) hours after the trench has been backfilled.
 - 5. Near pavement areas, Low Strength Mortar Backfill Material shall be placed from the top of the bedding up to a depth equal to the distance from the edge of the pavement.
 - 6. Outside pavement influence areas, minimum compaction requirements shall be 100% of the maximum dry density of the backfill material.
- D. The replacement pipe shall be laid at a uniform grade between the two points of connection with the existing pipe using the equipment and methodology approved for the control of the sewer grade.

3.6 SERVICE CONNECTIONS

- A. In general, where service connections are in the point repair limits or as ordered, provision shall be made in the sewers for service connections by inserting a tilted-up "T" Branch for each service connection with a branch size equivalent to the existing connection where necessary, the Contractor shall construct a riser in such manner, that the top of the riser shall meet and properly receive the existing service connection. Risers are to be encased in Low Strength Mortar Backfill Material.

- B. The Contractor shall connect the new tee or wye branch to the existing service lateral so as to provide a leak free serviceable connection to the building owner.

3.7 MANHOLE SEPARATION

- A. Where directed by the Engineer, the Contractor shall remove the existing common (storm and sanitary access) manhole and construct two (2) new manholes as per the typical details.
 - 1. When feasible, the sanitary sewer shall be constructed at the same line and grade as the existing sewer. The storm sewer shall be offset from its existing alignment a sufficient distance to clear the outside wall of the new sanitary manhole.
 - a. The offset shall be achieved by using two (2) foot lengths of pipe and deflecting joints.
 - b. The required deflection shall be accomplished in the minimum length possible without exceeding the allowable tolerances.
 - B. The bottoms of all manholes shall be channeled to conduct flow in the planned direction. Channels shall be the true shape of the lower half of the sewer pipe and shall match inverts of the connecting pipe at the manhole wall.
 - C. In integral base sections (only) channels may be constructed using brick and Portland cement mortar. Mortar shall be 3/4-in. thick minimum between bricks and between bricks and concrete and 1-in. thick minimum on all exposed surfaces.
 - D. The shortest length of riser section to be incorporated into the manhole shall be installed immediately below the cone section or flat slab top.

3.8 SERVICE LATERAL POINT REPAIRS AND TEST TEE INSTALLATION

- A. When authorized by the Engineer, the Contractor shall perform a Point Repair to excavate service connections, replace existing pipe or install new pipe, and/or construct a new or replacement test tee to be used for rehabilitation of the service connection.
- B. The Contractor shall determine the alignment of the service connection. The excavation shall be made at a distance from the main line sewer as designated by the Engineer.
 - 1. Perform the excavation and remove six (6) feet of service connection pipe to allow access for video inspection.
 - 2. Clean and televise the service connection to the main line sewer in accordance with Service Connection Televising and Rehabilitation.
 - 3. A snow fence type of barricade shall be placed around every open excavation at the end of each work day.
 - 4. Each excavation may be left open for a maximum of two (2) working days unless an extension of time is granted by the Engineer.
 - 5. Reconnect the service connection with a test tee and cap to a height determined by the Engineer.

3.9 CLEANING SITE AND RESTORING DAMAGED SURFACES

- A. Upon completion of the backfill work, the Contractor shall immediately remove and dispose of all surplus materials including dirt and rubbish to the satisfaction of the Engineer.
- B. Unless otherwise called for on the plans, the Contractor shall replace in-kind all damaged or disturbed pavement and sidewalks to a condition equal to or better than that existing before the work was started as a part of performing the Point Repair work. Concrete sidewalks and pavement shall be replaced in whole blocks.
- C. All restoration of lawns, planting beds, and shrubbery shall be performed in accordance with Sodding, Seeding and Mulching as a part of performing the Point Repair work. The Contractor shall maintain the lawn and correct any settlement that occurs during the one-year maintenance period.
- D. Upon completion of the foregoing work, all tools and other property belonging to the Contractor shall be removed, and the site shall be left in good condition.

3.10 INSPECTION BEFORE ACCEPTANCE

- A. In addition to work being observed by the Engineer during construction, each section of sewer on which a point repair is made shall be inspected in accordance with Television Inspection before final acceptance by the Owner. The point repair shall be true to both line and grade, free from cracks, broken bells, and protruding joint materials and shall show no leaks. The hydraulics of the sewer shall be in no ways be impaired. There shall be no projections of connecting pipe into the sewer. Any deposits of sand, dirt, mortar, or other materials shall be removed from the pipe in accordance with Sewer Line Cleaning at no additional cost to the Owner.
- B. If, as the result of any inspection, before final acceptance of the work, it is found that any section of any sewer has unduly settled, that joints have opened up or when the jointing material has come loose and projects into the sewer, or if pipes or bells are found cracked, broken or misshaped beyond accepted standards, or if any other defects are found in the sewers or in any of their appurtenances which might impair the satisfactory performance of the sewer or which show non-conformance with the drawings or Specifications, the Contractor shall cause such effective or inferior work to be promptly removed and replaced or satisfactorily repaired by proper material and workmanship without extra compensation for the labor, equipment and materials required.
- C. Should the Engineer require that any work be uncovered because of suspected failure or non-conformance or for inspection or other cause, and if such work is subsequently found satisfactory, the cost involved for such work will be paid for at the unit price bid for the respective items of work involved.

END OF SECTION 330130.04

SECTION 333100.10 - VITRIFIED PIPE AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. The Contractor shall furnish all the materials for and shall properly place at the locations shown on the drawings or as directed, all vitrified pipe for sewers or drainage of the size and type specified, shown or required for the proper completion of the work included under this contract.

1.3 QUALITY ASSURANCE

- A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.
- B. The pipe manufacturer shall provide on-site installation instruction literature for both the Contractor and the Inspector so they will be aware of the manufacturer's recommended procedure and practice of installing pipe and fittings. This instruction shall be included at no additional cost to the Owner.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data, dimensions, joint detail, miscellaneous connectors or other appurtenances and application instructions.
- B. Provide letter from manufacturer as a certificate of compliance stating; acknowledgment of project, service usage, pipe size(s), class, joint type and style and applicable ASTM references.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All vitrified pipe and fittings shall be of the best quality, salt glazed, vitrified clay or shale, of the hub and spigot pattern, and of the sizes and dimensions of such dimensions that pipe and fittings can be properly jointed.
- B. All vitrified pipe and fittings shall be in accordance with ASTM C-700, class type; extra strength (ES), unglazed unless specifically noted otherwise on the project drawings.

- C. No old pipes or fittings that have been previously used will be allowed in the herein specified work.

2.2 PIPE JOINTS

- A. Joints to be of O-Ring type and conform to ASTM C- 425, compression joints for vitrified clay pipe and fittings unless specifically noted otherwise for service use on the project drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All trenches, when pipe laying is in progress, shall be kept dry. All pipes and fittings shall be laid accurately to the required lines and grades and shall be uniformly supported along their entire lengths. The bottom of the excavation shall be properly trimmed for uniform alignment and shaped at each joint to receive the bell to permit the proper seating of the joints.
- B. Pipe shall be fully entered and shall abut against adjacent pipe in such a manner that there will be no unevenness along the inverts.
- C. When pipes are to enter or pass through existing concrete walls, manholes, sewers or other structures, holes shall be made and coordinated in a workmanship manner and pipe entrance voids shall be properly grouted in place so as to form a watertight closure.
- D. Installation shall conform to ASTM C 12 as appropriate along with project detail requirements.

END OF SECTION 333100.10

SECTION 333100.13 - PVC PIPE (ASTM D 3034)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. The Contractor shall furnish all the materials for and shall properly place at the locations shown on the drawings or as directed, all PVC pipe of the sizes specified, shown or required for the proper completion of the work included under this contract.

1.3 QUALITY ASSURANCE

- A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and application instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All PVC pipe used, as covered under this section, shall conform to ASTM D 3034, with end being designated for one of the type joints as specified herein. PVC compounds shall conform to ASTM D 1784.
- B. The minimum class for PVC pipe under this Item shall be SDR 26.
- C. Materials of construction, including joints and fittings, shall be suitable for exposure to raw sewage, and shall also be UV stabilized with either 2% carbon black or titanium dioxide.

2.2 JOINTS AND FITTINGS

- A. Bell and spigot type joints, including their respective appurtenances shall conform to ASTM D 3212. Gaskets shall be in accordance with ASTM F 477.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All trenches, when pipe laying is in progress, shall be kept dry and all pipes and specials shall be laid accurately to the required lines and grades and shall be uniformly supported along their entire lengths. The bottom of the excavation shall be properly trimmed, with holes at each joint to receive the bell and to permit the properly cementing the joints.
- B. Pipe shall be fully entered and shall abut against adjacent pipe and in such a manner that there will be no unevenness along the inverts.
- C. When pipes enter or pass through concrete walls, manholes, sewers or other structures, holes shall be provided and the pipes properly cemented in place so as to form a watertight joint.
- D. Installation shall conform to ASTM D 2321.

END OF SECTION 333100.13