

WAGE RATES

For

HEADWATERS TRAIL-PHASE VII

Mantua Center Rd. and Mennonite Rd., Portage County, Ohio

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Prevailing Wage Rate

Skilled Crafts

Name of Union: Labor Local 894 Building

Change # : LCN01-2021fbLoc894

Craft : Laborer Effective Date : 01/12/2021 Last Posted : 01/12/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund	Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)	
Classification											
Laborer Group 1	\$32.92		\$7.00	\$3.80	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.22 \$60.68
Laborer Group 2	\$33.07		\$7.00	\$3.80	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.37 \$60.91
Laborer Group 3	\$33.12		\$7.00	\$3.80	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.42 \$60.98
Laborer Group 4	\$33.42		\$7.00	\$3.80	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.72 \$61.43
Laborer Group 5	\$27.95		\$7.00	\$3.80	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$39.25 \$53.22
Apprentice	Percent										
1ST 1-1000 hrs	60.00	\$19.75	\$7.00	\$3.80	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$31.05 \$40.93
2nd 1000-2000 hrs	70.00	\$23.04	\$7.00	\$3.80	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$34.34 \$45.87
3rd 2000-3000 hrs	80.00	\$26.34	\$7.00	\$3.80	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$37.64 \$50.80
4th 3000-4000 hrs	90.00	\$29.63	\$7.00	\$3.80	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$40.93 \$55.74
More than 4000 hrs	100.00	\$32.92	\$7.00	\$3.80	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.22 \$60.68

Special Calculation Note : \$0.10 for LECET is for Labor Management

Ratio :

1 Apprentice to 1 Journeymen
1 Apprentice to 4 Journeymen

Jurisdiction (* denotes special jurisdictional note) :

MEDINA, PORTAGE, SUMMIT

Special Jurisdictional Note :

Details :

Group 1

Building & Construction Laborer, Welder Helper, Carpenter Tender, Landscape Laborer, Mason Tender, Concrete Bucket Tender, Concrete & Construction Specialist, Asbestos Laborer, Toxic/Hazardous Waste Laborer, Lead Removal, Level D

Group 2

Air Driven Boring Machine, Tamper Operator, Asphalt Raker, Paving Bed Maker, Concrete Puddler on Building Work, Concrete Batch Dumper, Materials Mixer, Wire Mesh Handler, Hook-up on Demolition Work, Scaffold Erector, Structural, Precast Erector, Power Tools - Air, Gas or Electric, Hazardous Waste Laborer, Lead Removal Level C

Group 3

Pipe Layer, Rock Driller, Mucker-Tunnel, Burner, Form Setter, Power Saw Jackhammer, Bottom Man, Hod Carrier, Power Buggy or Power Wheelbarrow, Bob Cat, Skid Steer Work and or similar, Hazardous Waste Laborer, Lead Removal Level B

Group 4

Gunnite Nozzle Man, Tunnel Miner, Water Link Caulker, Dynamite Man, Structural Precast Welder, Pump Hose Nozzle Man, Hazardous Waste Laborer, Lead Removal Level A

Group 5

Watchman

Hazardous Waste Removal and Lead Abatement:

For Laborers, working in an exclusive or "hot" area with toxic or hazardous materials, one of the following personal protective equipment ensembles will be required.

Level A

When the area has been determined to contain extremely toxic contaminants or contaminants unknown but may be expected to be extremely toxic and/or immediately dangerous to life and health. This ensemble includes a fully encapsulated chemical suit, self contained breathing apparatus (SCBA) or airline fed respirator, and various types and numbers of boots and gloves; cool vests and voice-activated radios are optional equipment sometimes worn.

Level B

Protective equipment includes a chemically resistant splash suit and a SCBA or airline respirator. This ensemble is required when the situation is very hazardous, such as oxygen deficient atmospheres, IDLH atmospheres, or confined space entries, but the risk of skin exposure is not as great as in Level A situation.

Level C

Protective equipment includes a protective suit and an air purifying respirator (APR) with the appropriate filter canisters. The ensemble is used when the contaminants are reliably known not to be hazardous to the skin and not IDLH (Immediately Dangerous to Life or Health) and correct

filter protection is available.

Level D

Protective Equipment to be worn only in established "safe zones" may consist of, from normal work clothes to normal skin protection such as gloves, face shields goggles, coveralls and occasionally respiratory protection.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Labor HevHwy 2

Change # : LCN01-2020fbLaborHevHwy2

Craft : Laborer Group 1 Effective Date : 05/14/2020 Last Posted : 05/14/2020

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Laborer Group 1	\$33.05		\$7.00	\$3.80	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.40	\$60.92
Group 2	\$33.22		\$7.00	\$3.80	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.57	\$61.18
Group 3	\$33.55		\$7.00	\$3.80	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.90	\$61.67
Group 4	\$34.00		\$7.00	\$3.80	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$45.35	\$62.35
Watch Person	\$25.35		\$7.00	\$3.80	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$36.70	\$49.38
Apprentice	Percent											
0-1000 hrs	60.00	\$19.83	\$7.00	\$3.80	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$31.18	\$41.10
1001-2000 hrs	70.02	\$23.14	\$7.00	\$3.80	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$34.49	\$46.06
2001-3000 hrs	80.00	\$26.44	\$7.00	\$3.80	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$37.79	\$51.01
3001-4000 hrs	90.00	\$29.74	\$7.00	\$3.80	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$41.10	\$55.97
More Than 4000 hrs	100.00	\$33.05	\$7.00	\$3.80	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.40	\$60.92

Special Calculation Note : Watchman has no Apprentices. Tunnel Laborer rate with air-pressurized add \$1.00 to the above wage rate.

Ratio :

1 Journeymen to 1 Apprentice
3 Journeymen to 1 Apprentice thereafter

Jurisdiction (* denotes special jurisdictional note) :

ASHTABULA, ERIE, HURON, LORAIN,
LUCAS, MAHONING, MEDINA, OTTAWA,
PORTAGE, SANDUSKY, STARK, SUMMIT,
TRUMBULL, WOOD

Special Jurisdictional Note : Hod Carriers and Common Laborers - Heavy, Highway, Sewer, Waterworks, Utility, Airport, Railroad, Industrial and Building Site, Sewer Plant, Waste Water Treatment Facilities Construction

Details :

Group 1

Laborer (Construction); Plant Laborer or Yardman, Right-of-way Laborer, Landscape Laborer, Highway Lighting Worker, Signalization Worker, (Swimming) Pool Construction Laborer, Utility Man, *Bridge Man, Handyman, Joint Setter, Flagperson, Carpenter Helper, Waterproofing Laborer, Slurry Seal, Seal Coating, Surface Treatment or Road Mix Laborer, Riprap Laborer & Grouter, Asphalt Laborer, Dump Man (batch trucks), Guardrail & Fence Installer, Mesh Handler & Placer, Concrete Curing Applicator, Scaffold Erector, Sign Installer, Hazardous Waste (level D), Diver Helper, Zone Person and Traffic Control.

*Bridge Man will perform work as per the October 31, 1949, memorandum on concrete forms, by and between the United Brotherhood of Carpenters and Joiners of America and the Laborers' International Union of North America, which states in; "the moving, cleaning, oiling and carrying to the next point of erection, and the stripping of forms which are not to be re-used, and forms on all flat arch work shall be done by members of the Laborers' International Union of North America."

Group 2

Asphalt Raker, Screwman or Paver, Concrete Puddler, Kettle Man (pipeline), All Machine-Driven Tools (Gas, Electric, Air), Mason Tender, Brick Paver, Mortar Mixer, Skid Steer, Sheeting & Shoring Person, Surface Grinder Person, Screedperson, Water Blast, Hand Held Wand, Power Buggy or Power Wheelbarrow, Paint Striper, Plastic fusing Machine Operator, Rodding Machine Operator, Pug Mill Operator, Operator of All Vacuum Devices Wet or Dry, Handling of all Pumps 4 inches and under (gas, air or electric), Diver, Form Setter, Bottom Person, Welder Helper (pipeline), Concrete Saw Person, Cutting with Burning Torch, Pipe Layer, Hand Spiker (railroad), Underground Person (working in sewer and waterline, cleaning, repairing and reconditioning). Tunnel Laborer (without air), Caisson, Cofferdam (below 25 feet deep), Air Track and Wagon Drill, Sandblaster Nozzle Person, Hazardous Waste (level B), ***Lead Abatement, Hazardous Waste (level C)

***Includes the erecting of structures for the removal, including the encapsulation and containment of Lead abatement process.

Group 3

Blast and Powder Person, Muckers will be defined as shovel men working directly with the miners, Wrencher (mechanical joints & utility pipeline), Yarnier, Top Lander, Hazardous Waste (level A), Concrete Specialist, Curb Setter and Cutter, Grade Checker, Concrete Crew in Tunnels. Utility pipeline Tappers, Waterline, Caulker, Signal Person will receive the rate equal to the rate paid the Laborer classification for which the Laborer is signaling.

Group 4

Miner, Welder, Gunitite Nozzle Person

A.) The Watchperson shall be responsible to patrol and maintain a safe traffic zone including but not limited to barrels, cones, signs, arrow boards, message boards etc.

The responsibility of a watchperson is to see that the equipment, job and office trailer etc. are secure.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Operating Engineers - Building Local 18 - Zone I

Change # : LCN01-2020fbLoc18

Craft : Operating Engineer **Effective Date :** 05/14/2020 **Last Posted :** 05/14/2020

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Operator Class 1	\$39.73		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$55.18	\$75.04
Class 2	\$39.63		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$55.08	\$74.90
Class 3	\$38.59		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$54.04	\$73.34
Class 4	\$37.37		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$52.82	\$71.50
Class 5	\$32.08		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$47.53	\$63.57
Class 6	\$39.98		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$55.43	\$75.42
Class 7	\$40.23		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$55.68	\$75.79
Class 8	\$40.73		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$56.18	\$76.54
Class 9	\$40.98		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$56.43	\$76.92
Apprentice	Percent											
1st Year	50.00	\$19.86	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$35.32	\$45.25
2nd Year	60.00	\$23.84	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$39.29	\$51.21
3rd Year	70.00	\$27.81	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$43.26	\$57.17
4th Year	80.00	\$31.78	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$47.23	\$63.13
Field Mechanic Trainee												
1st Year	50.00	\$19.86	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$35.32	\$45.25
2nd Year	60.00	\$23.84	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$39.29	\$51.21
3rd Year	70.00	\$27.81	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$43.26	\$57.17
4th Year	80.00	\$31.78	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$47.23	\$63.13

Special Calculation Note : Other: Education & Safety Fund is \$0.09 per hour.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :

For every (3) Operating Engineer Journeymen employed by the company ,there may be employed (1) Registered Apprentice or Trainee Engineer through the referral when they are available. An apprentice, while employed as

SUMMIT, PORTAGE

part of a crew per Article VIII, paragraph 77,
will not be subject to the apprenticeship ratios in
this collective bargaining

Special Jurisdictional Note :

Details :

Note: There will be a 10% increase for the apprentices on top of the percentages listed above provided they are operating mobile equipment. Mechanic Trainees will receive 10% increase if required to have CDL

Class 1 - Barrier Moving Machine; Boiler Operators or Compressor Operators, when compressor or boiler is mounted on crane (Piggyback Operation); Boom Trucks (all types); Cableways Cherry Pickers; Combination - Concrete Mixers & Towers; All Concrete Pumps with Booms; Cranes (all types) Derricks (all types); Draglines Dredges (dipper, clam or suction) 3-man crew; Elevating Graders or Euclid Loaders; Floating Equipment; Gradalls; Helicopter Operators; hoisting building materials; Helicopter Winch Operators, Hoisting building materials; Hoes (All types) Hoists (with two or more drums in use); Hydraulic Gantry (lift system); Laser Finishing Machines; Lift Slab or Panel Jack Operators; Locomotives (all types); Maintenance Engineers (Mechanic and/or Welder); Mixers, paving (multiple drum); Mobile Concrete Pumps, with booms, Panelboards, (all types on site); Pile Drivers; Power Shovels; Prentice Loader; Rail Tamper (with automatic lifting and aligning device); Rotary Drills (all), used on caissons for foundations and sub-structure work; Side Booms; Slip Form Pavers; Straddle Carriers (Building Construction on site); Tug Boats. Horizontal Directional Drill, Rough Terrain Fork-lift with Winch/Hoist, Laser Screed, and Like equipment, Compact Cranes, track or rubber over 4,000 pound capacity, self-erecting cranes: stationary, track or truck (all configurations) bucket trench machines (over 24 " wide).

Class 2 - Asphalt Pavers; Bobcat-type and/or skid steer loader with hoe attachment greater than 7000 lbs.; Bulldozers; CMI type Equipment; C; Endloaders; Hydro Milling Machine; Kolman-type Loaders (Dirt Loading); Lead Greasemen; Mucking Machines; Pettibone-Rail Equipment; Power Graders; Power Scoops; Power Scrapers; Push Cats; Vermeer Type Concrete Saw, All rotomills, grinders & planers of all types. Articulating/end dumps (minus \$4.00/hour from Class 2 rate)

Class 3 - A Frames; Air Compressors, Pressurizing Shafts or Tunnels; All Asphalt Rollers; Bobcat-type and/or skid steer loader with or without attachments; Boilers (15 lbs pressure and over); All concrete Pumps (without booms with 5 inch system); Fork Lifts (except masonry); Highway Drillers - all types (with integral power); Hoists (with one drum); House Elevators (except those automatic call button controlled); Buck Hoists, Transport Platforms, Construction Elevators; Hydro Vac/Excavator when a second person is needed, the rate of pay will be "Class E"; Man Lifts; Mud Jacks; Pressure Grouting; Pump Operators (installing or operating Well Points or other types of Dewatering Systems); Pumps (4 inches and over discharge); Railroad Tie

Insertor/Remover; Rotovator (Lime-Soil Stabilizer); Submersible Pumps (4 inches and over discharge); Switch & Tie Tampers (without lifting and aligning device); Trench Machines (24 inches and under); Utility Operators, Material hoist/elevators.

Class 4 - Ballast Re-locator; Backfillers and Tampers; Batch Plant Operators; Bar and Joint Installing Machines; Bull Floats; Burlap and Curing Machines; Clefplanes; Compressors, on building construction; Concrete Spreader; Conveyors, used for handling building materials; Concrete Mixers, one bag capacity (side loader); Concrete Mixers, capacity more than one bag; Crushers; Deck Hands; Drum Fireman (in Asphalt Plant); Farm type tractors pulling attachments; Finishing Machines; Form Trenchers; Generators; Gunite Machines; Hydro-Seeders; Pavement Breakers (hydraulic or cable); Post Drivers; Post Hole Diggers; Pressure Pumps (over 1/2 inch discharge); Road Widening Trenchers; Rollers (except asphalt); All Concrete pumps (without Boom with 4 inch or smaller systems); self-propelled Power Spreaders; self-propelled Sub-graders; Shotcrete Machines; Tire Repairmen; Tractors, pulling sheepfoot rollers or graders; VAC/ALLS; Vibratory Compactors, with integral power; Welder Operators.

Class 5 - Boilers (less than 15 lbs. pressure); Inboard/outboard Motor Boat Launches; Light Plant Operators; Masonry Fork Lifts; Oilers/Helpers; Power Driven Heaters (oil fired); Power Scrubbers; Power Sweepers; Pumps (under 4 inch discharge); Signalmen, Submersible Pumps (under 4 inch discharge). Directional Drill Locator and Allen Screed Concrete Paver, Fueling & greasing (Primary Operator with Specialized CDL Endorsement Add \$3.00/ hour), compact cranes: track or rubber under 4,000 pounds.

Class 6 - Master Mechanic

Class 7 - Boom & Jib 150 - 180 feet

Class 8 - Boom & Jib 180 - 249 feet

Class 9 - Boom & Jib 250 - or over

Prevailing Wage Rate

Skilled Crafts

Name of Union: Operating Engineers - Building Local 18 - Zone I

Change # : LCN01-2020fbLoc18

Craft : Operating Engineer **Effective Date :** 05/14/2020 **Last Posted :** 05/14/2020

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Operator Class 1	\$39.73		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$55.18	\$75.04
Class 2	\$39.63		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$55.08	\$74.90
Class 3	\$38.59		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$54.04	\$73.34
Class 4	\$37.37		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$52.82	\$71.50
Class 5	\$32.08		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$47.53	\$63.57
Class 6	\$39.98		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$55.43	\$75.42
Class 7	\$40.23		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$55.68	\$75.79
Class 8	\$40.73		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$56.18	\$76.54
Class 9	\$40.98		\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$56.43	\$76.92
Apprentice	Percent											
1st Year	50.00	\$19.86	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$35.32	\$45.25
2nd Year	60.00	\$23.84	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$39.29	\$51.21
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3rd Year	70.00	\$27.81	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$43.26	\$57.17
4th Year	80.00	\$31.78	\$8.51	\$6.00	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.00	\$47.23	\$63.13

Special Calculation Note : Other: Education & Safety Fund is \$0.09 per hour.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :

For every (3) Operating Engineer Journeymen employed by the company ,there may be employed (1) Registered Apprentice or Trainee Engineer through the referral when they are available. An apprentice, while employed as

SUMMIT, PORTAGE

part of a crew per Article VIII, paragraph 77,
will not be subject to the apprenticeship ratios in
this collective bargaining

Special Jurisdictional Note :

Details :

Note: There will be a 10% increase for the apprentices on top of the percentages listed above provided they are operating mobile equipment. Mechanic Trainees will receive 10% increase if required to have CDL

Class 1 - Barrier Moving Machine; Boiler Operators or Compressor Operators, when compressor or boiler is mounted on crane (Piggyback Operation); Boom Trucks (all types); Cableways Cherry Pickers; Combination - Concrete Mixers & Towers; All Concrete Pumps with Booms; Cranes (all types) Derricks (all types); Draglines Dredges (dipper, clam or suction) 3-man crew; Elevating Graders or Euclid Loaders; Floating Equipment; Gradalls; Helicopter Operators; hoisting building materials; Helicopter Winch Operators, Hoisting building materials; Hoes (All types) Hoists (with two or more drums in use); Hydraulic Gantry (lift system); Laser Finishing Machines; Lift Slab or Panel Jack Operators; Locomotives (all types); Maintenance Engineers (Mechanic and/or Welder); Mixers, paving (multiple drum); Mobile Concrete Pumps, with booms, Panelboards, (all types on site); Pile Drivers; Power Shovels; Prentice Loader; Rail Tamper (with automatic lifting and aligning device); Rotary Drills (all), used on caissons for foundations and sub-structure work; Side Booms; Slip Form Pavers; Straddle Carriers (Building Construction on site); Tug Boats. Horizontal Directional Drill, Rough Terrain Fork-lift with Winch/Hoist, Laser Screed, and Like equipment, Compact Cranes, track or rubber over 4,000 pound capacity, self-erecting cranes: stationary, track or truck (all configurations) bucket trench machines (over 24 " wide).

Class 2 - Asphalt Pavers; Bobcat-type and/or skid steer loader with hoe attachment greater than 7000 lbs.; Bulldozers; CMI type Equipment; C; Endloaders; Hydro Milling Machine; Kolman-type Loaders (Dirt Loading); Lead Greasemen; Mucking Machines; Pettibone-Rail Equipment; Power Graders; Power Scoops; Power Scrapers; Push Cats; Vermeer Type Concrete Saw, All rotomills, grinders & planers of all types. Articulating/end dumps (minus \$4.00/hour from Class 2 rate)

Class 3 - A Frames; Air Compressors, Pressurizing Shafts or Tunnels; All Asphalt Rollers; Bobcat-type and/or skid steer loader with or without attachments; Boilers (15 lbs pressure and over); All concrete Pumps (without booms with 5 inch system); Fork Lifts (except masonry); Highway Drillers - all types (with integral power); Hoists (with one drum); House Elevators (except those automatic call button controlled); Buck Hoists, Transport Platforms, Construction Elevators; Hydro Vac/Excavator when a second person is needed, the rate of pay will be "Class E"; Man Lifts; Mud Jacks; Pressure Grouting; Pump Operators (installing or operating Well Points or other types of Dewatering Systems); Pumps (4 inches and over discharge); Railroad Tie

Insert/Remover; Rotovator (Lime-Soil Stabilizer); Submersible Pumps (4 inches and over discharge); Switch & Tie Tampers (without lifting and aligning device); Trench Machines (24 inches and under); Utility Operators, Material hoist/elevators.

Class 4 - Ballast Re-locator; Backfillers and Tampers; Batch Plant Operators; Bar and Joint Installing Machines; Bull Floats; Burlap and Curing Machines; Clefplanes; Compressors, on building construction; Concrete Spreader; Conveyors, used for handling building materials; Concrete Mixers, one bag capacity (side loader); Concrete Mixers, capacity more than one bag; Crushers; Deck Hands; Drum Fireman (in Asphalt Plant); Farm type tractors pulling attachments; Finishing Machines; Form Trenchers; Generators; Guniting Machines; Hydro-Seeders; Pavement Breakers (hydraulic or cable); Post Drivers; Post Hole Diggers; Pressure Pumps (over 1/2 inch discharge); Road Widening Trenchers; Rollers (except asphalt); All Concrete pumps (without Boom with 4 inch or smaller systems); self-propelled Power Spreaders; self-propelled Sub-graders; Shotcrete Machines; Tire Repairmen; Tractors, pulling sheepfoot rollers or graders; VAC/ALLS; Vibratory Compactors, with integral power; Welder Operators.

Class 5 - Boilers (less than 15 lbs. pressure); Inboard/outboard Motor Boat Launches; Light Plant Operators; Masonry Fork Lifts; Oilers/Helpers; Power Driven Heaters (oil fired); Power Scrubbers; Power Sweepers; Pumps (under 4 inch discharge); Signalmen, Submersible Pumps (under 4 inch discharge). Directional Drill Locator and Allen Screed Concrete Paver, Fueling & greasing (Primary Operator with Specialized CDL Endorsement Add \$3.00/ hour), compact cranes: track or rubber under 4,000 pounds.

Class 6 - Master Mechanic

Class 7 - Boom & Jib 150 - 180 feet

Class 8 - Boom & Jib 180 - 249 feet

Class 9 - Boom & Jib 250 - or over

Prevailing Wage Rate

Skilled Crafts

Name of Union: Truck Driver Bldg & HevHwy Class 1
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : OCRO1-2019fbBldgHevHwy

Craft : Truck Driver **Effective Date :** 09/11/2019 **Last Posted :** 09/11/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Truck Driver CLASS 1 4 wheel service, dump, and batch trucks, Oil Distributor - Asphalt Distributor-Tandems	\$28.04		\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.14	\$57.16
Apprentice	Percent											
First 6 months	80.00	\$22.43	\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$37.53	\$48.75
7-12 months	85.00	\$23.83	\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$38.93	\$50.85
13-18 months	90.00	\$25.24	\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$40.34	\$52.95
19-24 months	95.00	\$26.64	\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$41.74	\$55.06
25-30 months	100.00	\$28.04	\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.14	\$57.16

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON,

CRAWFORD, DARKE, DEFIANCE,
DELAWARE, ERIE, FAIRFIELD, FAYETTE,
FRANKLIN, FULTON, GALLIA, GREENE,
GUERNSEY, HAMILTON, HANCOCK,
HARDIN, HARRISON, HENRY, HIGHLAND,
HOCKING, HOLMES, HURON, JACKSON,
JEFFERSON, KNOX, LAWRENCE,
LICKING, LOGAN, LORAIN, LUCAS,
MADISON, MAHONING, MARION,
MEDINA, MEIGS, MERCER, MIAMI,
MONROE, MONTGOMERY, MORGAN,
MORROW, MUSKINGUM, NOBLE,
OTTAWA, PAULDING, PERRY,
PICKAWAY, PIKE, PORTAGE, PREBLE,
PUTNAM, RICHLAND, ROSS, SANDUSKY,
SCIOTO, SENECA, SHELBY, STARK,
SUMMIT, TRUMBULL, TUSCARAWAS,
UNION, VAN WERT, VINTON, WARREN,
WASHINGTON, WAYNE, WILLIAMS,
WOOD, WYANDOT

Special Jurisdictional Note :

Details :

** Asphalt - Oil spray bar man when operating from cab shall receive \$0.20 cents per hour above their Basic Hourly Rate.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Truck Driver Bldg & HevHwy Class 2
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : LCRO1-2019-fbBldgHevHwy

Craft : Truck Driver **Effective Date :** 10/16/2019 **Last Posted :** 10/16/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECE T (*)	MISC (*)		
Classification												
Truck Driver CLASS 2 Tractor Trailer-Semi Tractor Trucks-Pole Trailers-Ready Mix Trucks-Fuel Trucks- Asphalt-Oil Spray bar men- 5 Axle & Over -Belly Dumps-End Dumps-Articulated Dump Trucks- Low boys- Heavy duty Equipment(irrespective of load carried) when used exclusively for transportation-Truck Mechanics (when needed)	\$28.46		\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.56	\$57.79
Apprentice	Percent											
First 6 months	80.00	\$22.77	\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$37.87	\$49.25
7-12 months	85.00	\$24.19	\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$39.29	\$51.39
13-18 months	90.00	\$25.61	\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$40.71	\$53.52
19-24 months	95.00	\$27.04	\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.14	\$55.66
25-30 months	100.00	\$28.46	\$7.00	\$7.90	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.56	\$57.79

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :

3 Journeymen to 1 Apprentice

ADAMS, ALLEN, ASHLAND, ASHTABULA,
ATHENS, AUGLAIZE, BELMONT, BROWN,
BUTLER, CARROLL, CHAMPAIGN,
CLARK, CLERMONT, CLINTON,
COLUMBIANA, COSHOCTON,
CRAWFORD, DARKE, DEFIANCE,
DELAWARE, ERIE, FAIRFIELD, FAYETTE,
FRANKLIN, FULTON, GALLIA, GREENE,
GUERNSEY, HAMILTON, HANCOCK,
HARDIN, HARRISON, HENRY, HIGHLAND,
HOCKING, HOLMES, HURON, JACKSON,
JEFFERSON, KNOX, LAWRENCE,
LICKING, LOGAN, LORAIN, LUCAS,
MADISON, MAHONING, MARION,
MEDINA, MEIGS, MERCER, MIAMI,
MONROE, MONTGOMERY, MORGAN,
MORROW, MUSKINGUM, NOBLE,
OTTAWA, PAULDING, PERRY,
PICKAWAY, PIKE, PORTAGE, PREBLE,
PUTNAM, RICHLAND, ROSS, SANDUSKY,
SCIOTO, SENECA, SHELBY, STARK,
SUMMIT, TRUMBULL, TUSCARAWAS,
UNION, VAN WERT, VINTON, WARREN,
WASHINGTON, WAYNE, WILLIAMS,
WOOD, WYANDOT

Special Jurisdictional Note :

Details :

** Asphalt - Oil spray bar man when operating from cab shall receive \$0.20 cents per hour above their Basic Hourly Rate.

SCHEDULE OF BID ITEMS

For

HEADWATERS TRAIL-PHASE VII

Mantua Center Rd. and Mennonite Rd., Portage County, Ohio

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**PORTAGE PARKS DISTRICT
HEADWATERS TRAIL PHASE VII
BID TAB**

Bid Item No	ODOT Item No	Bid Item Description	Unit	(A)	(B)	(C)	(D) = (B + C)	(A x D)
				Estimated Quantity	Material	Labor	Total Unit Price	Total Price for Item (PPD)
1	201	Clearing and Grubbing	L.S.	1	\$	\$		
2	203	Excavation (CUT)	Cu. Yd.	193	\$	\$		
3	203	Embankment (FILL)	Cu. Yd.	3,158	\$	\$		
4	606	Removal of Guardrail	LF	22	\$	\$		
5	203	Topsoil Stripped and hauled away	Cu. Yd.	490	\$	\$		
6	204	Subgrade Compaction and Proof Rolling	Sq. Yd.	662	\$	\$		
7	304	6" Aggregate Base	Cu. Yd.	110	\$	\$		
8	407	Tack Coat	Gal.	66	\$	\$		
9	441	1-1/2" Surface Course Asphalt Pavement, Type 1, PG 64-22 (448) (No RAP)	Cu. Yd.	28	\$	\$		
10	441	1-1/2" Intermediate Course Asphalt Pavement, Type 2, PG 64-22 (448) (No RAP)	Cu. Yd.	28	\$	\$		
11	630	Sign Flat Sheet	SF	57	\$	\$		

HEADWATERS TRAIL VII ALTERNATE BID

Bid Item No	ODOT Item No	Bid Item Description	Unit	(A)	(B)	(C)	(D) = (B + C)	(A x D)
				Estimated Quantity	Material	Labor	Total Unit Price	Total Price for Item
12	630	Sign Posts	LF	162	\$	\$		
13	606	Guardrail	LF	24	\$	\$		
14	606	Bike Railing	LF	475	\$	\$		
15	644	Crosswalk Ladder	L.F.	85	\$	\$		
16	644	Stop Bar	L.F.	30	\$	\$		
17	611	ODOT 2-2B Catch Basin	EA.	1	\$	\$		
18	611	Cleanout	EA.	3	\$	\$		
19	611	6" Shallow Pipe Underdrain / Edge Drain (perforated)	LF	423	\$	\$		
20	611	6" Shallow Pipe Underdrain / Edge Drain (non-perforated)	LF	124	\$	\$		
21	611	12" Conduit, Type C, 707.33 (HDPE N-12 Pipe)	LF	167	\$	\$		
22	601	Rock Channel Protection	Cu. Yd.	9	\$	\$		

HEADWATERS TRAIL VII ALTERNATE BID

Bid Item No	ODOT Item No	Bid Item Description	Unit	(A)	(B)	(C)	(D) = (B + C)	(A x D)
			Unit	Estimated Quantity	Material	Labor	Total Unit Price	Total Price for Item
23	832	Temporary Sediment and Erosion Control	Lump	1	\$	\$		
24	653	6" Topsoil Furnished and Placed	Cu. Yd.	368	\$	\$		
25	659	Seeding and Mulching	Sq. Yd.	2,209	\$	\$		
26	624	Mobilization and Permits	Lump	1	\$	\$		
27	623	Construction Staking	Lump	1	\$	\$		
Grand Total Items								

BID ALTERNATES

1	204	Bid Alternate Item No. 01: Undercutting Subgrade "As Directed"	Cy Yd	50	\$	\$		
2	204	Bid Alternate Item No. 02: Granular Embankment "As Directed"	Cy Yd	50	\$	\$		
3	204	Bid Alternate Item No. 03: Geotextile Fabric, 712.09 "As Directed"	Sq Yd	1	\$	\$		

TECHNICAL SPECIFICATIONS

For

HEADWATERS TRAIL-PHASE VII

Mantua Center Rd. and Mennonite Rd., Portage County, Ohio

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SECTION 00 01 10 – SUMMARY OR WORK

PART 1 - GENERAL

DESCRIPTION

- A. The proposed work is defined in this project specifications, construction drawings and other documents identified herein and is the official contract documents. All work shall be in accordance with these documents.
- B. The proposed Headwaters Trail Phase VII project is located at the south side of Mantua Center Road intersection with Mennonite Road in the Village of Mantua, Ohio. The site of the proposed work is an existing gravel trail end, repurposed from abandoned rail road tracks.
- C. The proposed work for this project includes installing a new 10 foot wide, approximately 550 lineal feet long asphalt trail to an existing gravel path. The project includes underdrains, storm sewer drainage work, guard rail placement and removal as well as fence/railing construction.
- D. In order to facilitate construction of the new trail proposed tree clearing, grubbing, earthwork and grading is anticipated for the project area. This project provides ADA access to the existing trail network.

The project also includes clearing trees/brush along the right of way of Mennonite Road at the park's entrance to improve line of site, site traffic control and signage.

- E. Access to the site will be from Mennonite Road, the contractor will be responsible for not tracking debris, dust and/or mud onto the nearby streets.
- F. This section includes descriptions and references to drawings and specifications intended to summarize the work of each separate prime contract. The descriptions and references included herein shall not limit the scope of the contract as may be further developed in the drawings and specifications as a whole. Each prime contractor shall review every drawing and every specification to fully ascertain the scope of the work contained herein, including drawings and specifications contained in other bid packages of the project that were made available to them. The assignment of work as defined in this section will prevail over work assignments that may be otherwise shown in the drawings and other sections of the specifications.
- G. In case of a single prime contractor performing the entire work, the assignment of work is generally the responsibility of the prime contractor, except as specifically required for specialty subcontractors and for meeting DBE requirements. The Owner reserves the right to review prime contractor's assignment of work and request substantiation of expertise in case of such specialties.

- H. The Contractor shall schedule their Work between the week day hours permitted by the Mantua Village as the project is located within a residential area with houses adjacent to the property. If work is required on weekends or outside of the hours mentioned above the contractor shall notify the owner and also make a request with the Village for the hours outside of those mentioned above.
- I. The contractor is responsible to provide all testing of materials and subgrade as called for in the project specifications and certifying test results meet the projects specifications.
- J. The contractor is responsible to obtain all required permits, registration with the Village to perform work, bonding, and insurance for the project and shall include these costs under Bid Items – Mobilization and permits
- K. This contractor shall be responsible for furnishing all supervision, labor, materials, tools, equipment, freight, trade permits, insurance, taxes and tariffs (as applicable), testing (as specified), inspection and permit fees, construction layout, and other services as necessary to completely furnish and install the new parking lot.

1.2 DEFINITION

- A. Whenever “Contractor” is reference in these specifications, it is meant to refer to the “Prime contractor”.

1.3 CONTRACT DOCUMENTS

- A. The Contract Documents include the following:

1. GENERAL REQUIREMENTS – Division 01.

2. Technical Specifications – Sections 02, 31, 32 and 33

3. Construction Drawings – Dated January 28, 2021 including the following.

- a. Cover Sheet
- b. Existing and Demolition Plan
- c. Site Plan
- d. Grading Plan
- e. SWPPP
- f. Notes and Legend
- g. Details

h. SWPPP Details

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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SECTION 01 04 00 – COORDINATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This sections covers all items that are to be coordinated by the prime contractor as part of their responsibilities.

1.2 DEFINITION

- A. Whenever “Contractor” is reference in these specifications, it is meant to refer to the “Prime or General contractor”.

1.3 RESPONSIBILITIES

- A. Coordinate scheduling, submittals, and requirements of specification sections to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Coordination amongst contractors
 - 1. General contractor/prime contractor is responsible for coordination of work between sub-contractors.
 - 2. General contractor/prime contractor is responsible for scheduling of work between sub-contractors.
 - 3. General contractor/prime contractors is responsible for coordinating all project-related meetings required by the contract documents, permits, site visits, etc.

1.4 CONSTRUCTION MOBILIZATION

- A. Cooperate with the Owner for location of field offices, employee parking, access, traffic, and other facilities.
- B. Comply with instructions of Owner for use of temporary utilities and construction facilities.
- C. Coordinate survey layout work with instructions from the Engineer.

1.4 PRE-CONSTRUCTION MEETING

- A. Prior to the start of a major construction phase or when specified in individual sections, convene pre-installation meeting or conference at project site before starting work of

that portion.

B. The following are required at the pre-construction meeting:

1. The prime contractor undertaking the work shall outline the specific activities and procedures to be carried out, including a discussion of the proper conditions required to conduct the work.
2. Other sub-contractors whose work interfaces the product being installed shall be in attendance. Prime contractors whose work proceeds and follows the installation under discussion shall be present.
3. Notify the Owner and Engineer of meeting schedule not less than one week before pre-construction meeting to allow arrangement for attendance by the Owner and engineer, as necessary.

1.5 COORDINATION OF CONSTRUCTION DOCUMENTS

- A. The general contractor/prime contractor shall be responsible to distribute construction documents to all sub-contractors having interdependent responsibilities for installing any of the project work scope items.
- B. The general contractor/prime contractor shall be responsible to distribute construction documents to all manufacturers and suppliers.
- C. Each sub-contractor shall provide complete information including marked up set of record installation drawings of all installed items to the general contractor/prime contractor.
- D. The general contractor/prime contractor shall provide a final marked up set of As Built/Record Drawings to the owner and engineer including all of their subs prior to the issuance of final substantial completion document.

1.6 COORDINATION AUTHORITY

- A. General Contractors/Prime Contractors and their sub-contractors are responsible to identify areas and report to the engineer where:
 1. Areas where potential conflicts may occur.
 2. Areas on plans where discrepancies occur from field conditions.
 3. Field coordination drawings are required.
- B. If any of the above items occur the Engineer will review the drawings to determine if design modifications are required.
- D. Failure to exercise coordination responsibilities mentioned above waives the general contractor/prime contractor's claims for an increase in the contract sum if design

modifications are required to resolve conflicts that might have been avoided by complying with requirements of this section.

1.7 COORDINATION OF CONTRACT CLOSEOUT

- A. Notify the Engineer when work is considered ready for Substantial Completion. Comply with Engineer's instructions for completion of portions of work.
- B. Coordinate completion and clean up of work of the separate specification sections in preparation for Substantial Completion.
- C. After Owner occupancy, coordinate access to project for correction of defective work to minimize disruption of Owner's activities.
- D. Assemble and coordinate closeout submittals specified in Section 01700.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 4 – METHOD OF MESUREMENT AND PAYMENT

NOT USED

END OF SECTION

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SECTION 01 20 00 – PROJECT MEEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This sections covers all items that are to be included and performed at construction progress meetings by the general contractor/prime contractor.
- B. The purpose of these meetings are to review progress during construction, discuss upcoming work items and to provide discuss issues that arise as a result of the construction. The owner and Engineer will conduct project progress meetings at regular intervals throughout the construction period at an interval determined by the owner.
- C. In general, for bidding purposes project progress meetings will be held weekly at the job site in accordance with a mutually acceptable schedule.
- D. Additional project review and coordination meetings may be called by the Owner and Engineer to deal with issues and problems arising during the project execution. Agenda and attendance of these meetings will be as determined by the Engineer.
- E. The Contractor's relations with his subcontractors and materials' suppliers, and discussions relative thereto, are his responsibility and are not part of project meeting's content.

1.2 MEETINGS

- A. Pre-Construction Meeting
- B. Progress Meetings
- C. Final Punch List Meeting

1.3 CONTRACTOR REPRESENTATION

- A. Persons attending project meetings for the general contractor/prime contractor shall be the one who has all required authority to commit the Contractor to decisions as agreed upon in the project meetings. The contractor shall provide at the pre-construction meeting a list of those who have the responsibility to make final decisions on behalf of the project for their team.
- B. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout the construction period.

1.4 AGENDA ITEMS

- A. The general contractor / prime contractor shall submit to the Owner and Engineer, at least 24 hours in advance of the regularly scheduled project progress meeting, a proposed agenda and a plan of their activities for the next two-week period for distribution to meeting participants.

1.5 RECORD OF MEETINGS

- A. The Engineer will compile the minutes of the meeting and distribute it to all attendees and any additional staff as requested. The general contractor/prime contractor is responsible to distribute all meetings to the appropriate members of their team.
- B. The minutes are an outline of items discussed, however it is the contractors responsibility to direct the work discussed at the meetings to his employees and subcontractors.
- C. Each attendee at the meetings will have up to five business days from the meetings to request corrections or additions to the minutes. Unless such corrections or additions are received within 5 days of issue, the minutes will be considered the final record of the meeting. If revisions are received and requested a new meeting minutes will be distributed.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 4 – METHOD OF MESUREMENT AND PAYMENT

NOT USED

END OF SECTION

SECTION 01 26 00 –MODIFICATION PROCEDURES

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This section includes the following:

1. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 CHANGES IN THE PROJECT WORK SCOPE

1. The contractor and/or owner shall request in writing the owner and requested change in the contract scope.
2. The contractor shall maintain a log of all change order requests and running total of work performed.
3. If agreed by the owner and engineer, the owner will request a proposal for the change in work. The proposal shall include the following:
 - a. Detailed description of the work, and products added/or non-performed.
 - b. Detailed breakdown of the quantities
 - c. Construction cost change including materials, labor, taxes, delivery etc.
 - d. Updated schedule for revised work.
 - e. Request if required for extension to time.

1.3 CHANGE ORDER PROCEDURES

- A. If approved by the Owner, the Engineer and /or Owner will issue a written approval of the change order including adjustment in overall contract amount.

1.4 CONSTRUCTION DIRECTIVE

- A. The engineer and/or owner may issue a work directive narrative in a letter to the contractor instructing of changes or clarification of work as a result of a contractor Request for Information. This represents a directive for work to be performed and does not indicate a change to the contract amount.
1. Construction Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

PART 2 – PRODUCTS

2.1 NA

PART 3 – EXECUTION

3.1 NA

END OF SECTION

SECTION 01 29 01 – MEASUREMENTS AND PAYMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Payment for the various Items of the Bid, as further specified herein, shall include compensation to be received by the Contractor for providing tools, equipment, supplies, and manufactured articles, and for labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the Work in accordance with the requirements of the Contract Documents. Work also includes costs of all permits, insurance, and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the State of Ohio and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for items that are not specifically set forth in the Bid, and costs therefore shall be included in the prices named in the Bid for the various Items of work.
- B. Payment for each respective item also includes all costs for printing of all construction sets of plans and specifications.
- C. See Portage Parks front end specification for Article 17 Estimated Quantities for the basis of quantities in the bid.
- D. The cost for the preparation and submittal of all shop drawings shall be included in each bid item.

1.02 REFERENCES

- A. All bid items shown below are based on the Ohio Department of Transportation Construction and Materials Specifications 2019 edition and additional technical specifications enclosed herein. Bid items shall include all items as called for under each respective ODOT bid item in the CMS manual and also as called for in the bid set plans and specifications.

1.03 BID ITEMS

- A. Bid Item No. 01: Clearing and Grubbing

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:

- (1) Removal of brush, grass, shrubs, trees, backfilling holes, removing stumps, etc required to install the multi-purpose path.
- (2) All items called for in ODOT Item 201 Clearing and Grubbing and as called for in Technical Specification Section 31 10 00 Clearing and Grubbing.

2. Measurement and Payment

- a. The owner will pay for all work described, including backfilling holes, scalping, and removing all trees and stumps, at the **Lump Sum** price bid. No separate payment will be made for each tree removal.

B. Bid Item No. 02: Excavation

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) Excavate all areas of the project area to the line and grades show on the plans.
 - (2) Excavation limits shall include to the bottom of all pavement subgrade and to a point 4-inches below the final surface for all grass areas.
 - (3) Excavation shall include all benching into the existing hillside per the plans and ODOT Item 203 specifications.
 - (4) All material and work shall be performed in accordance with ODOT CMS Item 203 Embankment, the Project's Geotechnical Report and technical specifications sections 31 20 00 Earth Moving, and section 31 22 00 Grading.
 - (5) Stockpile all excess excavated materials on site (separate from topsoil) at a location to be determined by the owner for use in the future. No hauling of materials will be permitted unless approved by owner.
 - (6) Topsoil striping will be paid for under a separate item.
 - (7) Permanent seeding of the topsoil stockpile area to be included in this bid item along with silt fence around stockpile.
 - (8) Contractor is responsible for final excavation quantities and adjust bid price to reflect their numbers. The quantity shown on the bid tab is an estimate used for bidding purposes. If the deviation between the contractor and bid tab quantity differs by more than 10% the contractor

shall request and RFI during bidding for this change and providing supporting documentation as their calculation for consideration. No additional payment will be provided if adjustment in bid item is not provided as part of an Addendum.

2. Measurement and Payment

- a. The owner will pay for all work described, including excavating, stockpiling, permanent seeding of stockpile and silt fence around stockpile at the contract price per **Cubic Yard** price bid.

C. Bid Item No. 03: Embankment

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) Embankment/fill all areas of the project area to the line and grades show on the plans.
 - (2) Excavation shall include all benching into the existing hillside per the plans and ODOT Item 203 specifications and ODOT GB2 Geotechnical Bulletin.
 - (3) All material and work shall be performed in accordance with ODOT CMS Item 203 Embankment, the Project's Geotechnical Report and technical specifications sections 31 20 00 Earth Moving, and section 31 22 00 Grading.
 - (4) Topsoil placement will be paid for under a separate item. Fill limits shall include all volume up to 4-inches from the surface
 - (5) Permanent seeding of the soil stockpile area to be included in this bid item along with silt fence around stockpile.
 - (6) Contractor is responsible for final embankment quantities and adjust bid price to reflect their numbers. The quantity shown on the bid tab is an estimate used for bidding purposes. If the deviation between the contractor and bid tab quantity differs by more than 10% the contractor shall request and RFI during bidding for this change and providing supporting documentation as their calculation for consideration. No additional payment will be provided if adjustment in bid item is not provided as part of an Addendum.

2. Measurement and Payment

- a. The owner will pay for all work described, including site embankment/filling, at the contract price per **Cubic Yard** price bid.

D. Bid Item No. 04: Removal of Guardrail

1. Scope of Work:

- a. Removing the existing section of guardrail as shown on plans including post removal.

2. Measurement and Payment

- a. The owner will pay for all work described per lineal foot of guardrail removed and shall include post removal.

E. Bid Item No. 05: Topsoil Stripped and Hauled Away

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:

- (1) Excavate and remove all topsoil, for bidding purposes assume an average 6-inches of topsoil from the grading limits.
- (2) All material and work shall be performed in accordance with ODOT CMS Item 203 Excavation, the Project's Geotechnical Report and technical specifications sections 31 20 00 Earthmoving, and section 31 22 00 Grading.
- (3) Excavation will be paid for under a separate item.
- (4) Contractor is responsible for final topsoil quantities and adjust bid price to reflect their numbers. The quantity shown on the bid tab is an estimate used for bidding purposes. If the deviation between the contractor and bid tab quantity differs by more than 10% the contractor shall request an RFI during bidding for this change and providing supporting documentation as their calculation for consideration. No additional payment will be provided if adjustment in bid item is not provided as part of an Addendum.

2. Measurement and Payment

- a. The owner will pay for all work described, including excavating, and hauling away at the contract unit price per Cubic Yard price bid.

F. Bid Item No. 06: Subgrade Compaction and Proof Rolling

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:

- (1) Compacting and poof roiling of the pavement subgrade.
- (2) All material and work shall be performed in accordance with ODOT CMS Item 204 Subgrade Compaction and Proof Rolling, the Project's Geotechnical Report and technical specifications and section 31 20 00 Earth Moving.

2. Measurement and Payment

- a. The owner will pay for all work described, including subgrade compaction and proof rolling at the contract price per Square Yard price bid.

G. Bid Item No. 07: 6" Aggregate Base

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:

- (1) Providing and installing ODOT Item 304 aggregate base complete in place.
- (2) All material and work shall be performed in accordance with ODOT CMS Item 304 Aggregate Base, installed and accepted by the owner.

2. Measurement and Payment

- a. The owner will pay for all work described, including compaction at the contract price per Cubic Yard price bid.

H. Bid Item No. 08: ODOT 407 Tack Coat

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:

- (1) Providing and installing ODOT Item 407 Tack Coat complete in place.

- (2) All material and work shall be performed in accordance with ODOT CMS Item 407 Tack Coat, installed and accepted by the owner.

2. Measurement and Payment

- a. The owner will pay for all work described at the contract price per gallon price bid.

- I. Bid Item No. 09: ODOT 441 1-1/2" Surface Course Asphalt Pavement, Type 1, PG 64-22 (No RAP)

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:

- (1) Providing and installing ODOT Item 441 Surface Course Asphalt Pavement, Type 1, PG 64-22. All material and work shall be performed in accordance with ODOT CMS Item 441 Asphalt Concrete, installed and accepted by the owner.

2. Measurement and Payment

- a. The owner will pay for all work described at the contract price per Cubic Yard price bid.

- J. Bid Item No. 10: ODOT 448 1-1/2" Intermediate Course Asphalt Pavement, Type 2, PG64-22 (No RAP)

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:

- (1) Providing and installing ODOT Item 441 Intermediate Course Asphalt Pavement, Type 2, PG 64-22. All material and work shall be performed in accordance with ODOT CMS Item 441 Asphalt Concrete, installed and accepted by the owner.

2. Measurement and Payment

- a. The owner will pay for all work described at the contract price per Cubic Yard price bid.

- K. Bid Item No. 11: Sign Sheet

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) The installation of all signage onto ground mounted posts including hardware.
 - (2) All signs shall be manufactured per the Ohio Manual of Uniform Traffic Control Devices standards and include reflective sheeting.
 - (3) All material and work shall be performed in accordance with ODOT CMS Item 630 Traffic Signs and Sign Supports and ODOT Standard Construction Drawing TC-41, TC-52.10 and 52.20, and the United States Access board ADA Accessibility Guidelines.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the installation of Sign Flat Sheet at the contract price per **Square Foot** price bid.

L. Bid Item No. 12: Ground Mounted Support, No. 3 Post

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) The installation of all sign posts No. 3 Type F
 - (2) All material and work shall be performed in accordance with ODOT CMS Item 630 Traffic Signs and Sign Supports and ODOT Standard Construction Drawing TC-41.

M. Bid Item No. 13: ODOT 606 Guardrail

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) The installation of all posts, guardrail, bolts etc. per the construction details and ODOT Item 606.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the installation of Bike Railing at the contract price per **Lineal Foot** price bid.

N. Bid Item No. 14: ODOT 607 Bike Railing

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) The installation of all posts, fence, railing, bolts etc. per the construction details and ODOT Item 607.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the installation of Bike Railing at the contract price per **Lineal Foot** price bid.

O. Bid Item No. 15: ODOT 644 Crosswalk Ladder

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) The installation of all crosswalk lines per ODOT Item 644 Thermoplastic Pavement Markings.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the installation of Crosswalk Ladder at the contract price per **Linear Foot** price bid.

P. Bid Item No. 16: ODOT 644 Stop Bar

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) The installation of all crosswalk lines per ODOT Item 644 Thermoplastic Pavement Markings.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the installation of Crosswalk Ladder at the contract price per **Linear Foot** price bid.

Q. Bid Item No. 17: ODOT 2-2B Catch Basin

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) All trenching and aggregate backfill per the project details.
 - (2) The installation a new pre-cast concrete ODOT 2-2B catch basin including frame and grate.
 - (3) All material and work shall be performed in accordance with ODOT CMS Item 611 Pipe Culverts, Sewers, Drains and Drainage Structures, Section 31 23 23 Trenching and Backfill and Section 33 40 40 Storm Water Drainage Piping.
 - (4) Measurement and Payment
- b. The owner will pay for all work described, including material and labor for the installation of ODOT 2-2B Catch Basin at the contract price per **Each** price bid.

R. Bid Item No. 18: Cleanout

2. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) All trenching and aggregate backfill per the project details.
 - (2) The installation a new cleanout including frame and grate.
 - (3) All material and work shall be performed in accordance with ODOT CMS Item 611 Pipe Culverts, Sewers, Drains and Drainage Structures, Section 31 23 23 Trenching and Backfill and Section 33 40 40 Storm Water Drainage Piping.
 - (4) Measurement and Payment

- b. The owner will pay for all work described, including material and labor for the installation of Cleanout at the contract price per **Each** price bid.

S. Bid Item No. 19: 6" Shallow Pipe Underdrain / Edge Drain (Perforated)

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) All trenching and aggregate backfill per the project details.
 - (2) The installation of ASTM No. 57 aggregate backfill.
 - (3) Impermeable liner around the aggregate base section.
 - (4) The installation of a 6" perforated underdrain pipe including fittings where shown on plans.
 - (5) All material and work shall be performed in accordance with ODOT CMS Item 605 Underdrains and Section 31 23 23 Trenching and Backfill, Section 31 32 19 Geotextile Fabric and Section 33 41 00 Subdrainage Piping.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the installation of 6" Shallow Pipe Underdrain / Edge Drain (Perforated) at the contract price per **Lineal Foot** price bid.

T. Bid Item No. 20: 6" Shallow Pipe Underdrain / Edge Drain (Non-Perforated)

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) All trenching and aggregate backfill per the project details.
 - (2) The installation of ASTM No. 57 aggregate backfill.
 - (3) Impermeable liner around the aggregate base section.
 - (4) The installation of a 6" solid wall underdrain pipe including fittings where shown on plans.
 - (5) All material and work shall be performed in accordance with ODOT CMS Item 605 Underdrains and Section 31 23 23 Trenching and Backfill,

Section 31 32 19 Geotextile Fabric and Section 33 41 00 Subdrainage Piping.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the installation of 6" Shallow Pipe Underdrain / Edge Drain (Non Perforated) at the contract price per **Lineal Foot** price bid.

U. Bid Item No. 21: 12" Conduit, Type C, 707.33 (HDPE N-12 Pipe)

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) All trenching and aggregate backfill per the project details.
 - (2) The installation of a high density polyethylene pipe N-12 or equal.
 - (3) Connecting to storm sewer pipes and or endwalls.
 - (4) All material and work shall be performed in accordance with ODOT CMS Item 611 Pipe Culverts, Sewers, Drains and Drainage Structures, Section 31 23 23 Trenching and Backfill, and Section 33 40 40 Storm Water Drainage Piping.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the installation of 12" Conduit, Type C, 707.33 (HDPE N-12 Pipe) at the contract price per **Lineal Foot** price bid.

V. Bid Item No. 22: Rock Channel Protection

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) Providing and installing ODOT Item 601 Rock channel Protection complete in place.

- (2) All material and work shall be performed in accordance with ODOT CMS Item 601 Slope and Channel Protection, installed and accepted by the owner.

2. Measurement and Payment

- a. The owner will pay for all work described, including compaction at the contract price per Cubic Yard price bid.

W. Bid Item No. 23: ODOT 832 Temporary Sediment and Erosion Control

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) Providing the Owner a marked up plan for the erosion and sediment control practices to be used on site.
 - (2) The installation of silt fence, silt sock and temporary sediment basin.
 - (3) The installation of a stabilized construction entrance, employee parking area, cement washout facility, construction debris dumpster and fuel containment dike.
 - (4) The removal of all sediment at the end of the construction project from the temporary sediment pond and disposed of.
 - (5) Temporary and permanent seeding.
 - (6) Inlet protection at all inlets.
 - (7) Maintaining and inspecting all erosion control practices during construction and the removal after full stabilization of the site.
 - (8) If directed by the owner, engineer and or the City replacing a damaged erosion control device or providing maintenance.
 - (9) All material and work shall be performed in accordance with ODOT Supplemental CMS Item 832, project details and Section 32 17 23 of the technical specifications.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the installation of Temporary Sediment and Erosion Control at the contract price per **LUMP SUM** price bid.

X. Bid Item No. 24: ODOT 653 Topsoil Furnished and Placed

1. Scope of Work:

- (1) Costs shall include all labor, material, and equipment associated with the following items: Screening the stockpiled topsoil and conditioning for reuse or importing topsoil
- (2) All material and work shall be performed in accordance with ODOT CMS Item 653 Topsoil Furnished and Placed, the Project's Geotechnical Report and technical specifications section 31 22 00 Grading.

2. Placing topsoil on all disturbed areas that do not have pavement to a depth of 4-inches. Measurement and Payment

- a. The owner will pay for all work described, including screening the stockpiled topsoil and conditioning for redistribution of topsoil at the contract price per Cubic Yard price bid.

Y. Bid Item No. 25: Seeding and Mulching

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:

- (1) Prepare the topsoil bed for seeding.
- (2) The installation of hydroseed or standard seeding and mulching practices.
- (3) Providing a one-year growing season warrantee on the grass areas and reseeding all grass areas that did not grow to the satisfaction of the owner from 1-year after the Substantial Completion date.
- (4) All material and work shall be performed in accordance with ODOT CMS Item 659 Seeding and Mulching, the Project's Geotechnical Report and technical specifications section 31 22 00 Grading.
- (5) Placing topsoil on all disturbed areas that do not have pavement to a depth of 4-inches.
- (6) Providing shop drawing for seeding and mulching materials.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the installation of Seeding and Mulching at the contract price per **Square Yard** price bid.

Z. Bid Item No. 26: Mobilization and Permits

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) The delivery of all equipment and temporary facilities to the site.
 - (2) Providing all temporary facilities as called for in technical specification Section 01 50 00 Temporary Facilities
 - (3) Proving all Village, County and State permit fees.
 - (4) Providing all construction closeout services as shown in Section 01 70 00 Project Closeout.
 - (5) All project meetings per technical specification Section 01 20 00 Project Meetings.
 - (6) All project coordination with all sub-contractors, ODOT "Purchase Contract" contractor and the owner.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the Mobilization and Permits at the contract price per **Lump Sum** price bid.

AA. Bid Item No. 27: Construction Staking

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) Providing construction staking for the overall project area per the technical specifications Section 02 21 20 Construction Staking.

2. Measurement and Payment

- a. The owner will pay for all work described, including material and labor for the Construction Staking at the contract price per **Lump Sum** price bid.

1.04 BID ALTERNATES

- A. The contractor shall provide bid prices for the following items that are BID ALTERNATE items and if accepted by the owner and approved by the owner the conditions of Section 1.01 and 1.02 of this document applies.

1.05 BID ALTERNATES ITEMS

- A. Bid Alternate Item No. 01: Undercutting Subgrade "As Directed"

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
- (1) Where directed by the owner and/or engineer soft spots of the subgrade after proof rolling and compaction testing shall be over excavated at a depth approved by the engineer.
 - (2) Stockpile all excess excavated materials on site (separate from topsoil) at a location to be determined by the owner for use in the future. No hauling of materials will be permitted unless approved by owner.

2. Measurement and Payment

- a. The owner will pay for all work described, including Undercutting Subgrade "As Directed" at the contract price per **Cubic Yard** price bid.

- B. Bid Alternate Item No. 02: : Granular Embankment "As Directed"

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
- (1) Where directed by the owner and/or engineer and the removal of soft soil from the subgrade from Bid Alternate Item No 04 is complete the contractor shall install granular backfill per ODOT CMS 203 using ASTM No. 1's and #2's aggregate to a depth approved by the owner and engineer.

2. Measurement and Payment

- a. The owner will pay for all work described, including Granular Embankment "As Directed" at the contract price per Cubic Yard price bid.

C. Bid Alternate Item No. 03: Geotextile Fabric, 712.09 "As Directed"

1. Scope of Work:

- a. Costs shall include all labor, material, and equipment associated with the following items:
 - (1) Where directed by the owner and/or engineer and the removal of soft soil from the subgrade from Bid Alternate Item No 04 is complete the contractor shall install a geogrid per ODOT 712.09 and technical specifications Section 31 32 19 – Geotextile Fabric.
 - (2) Biaxial polymer grids will be manufactured from 100% polypropylene, such as Tensar BX1200 and/or BX1300 as manufactured by the Tensar Corporation, 1210 Citizens Parkway, Morrow, Georgia 30260 (Phone 1-800-843-8417) or an approved equal.

2. Measurement and Payment

- a. The owner will pay for all work described, including Geotextile Fabric, 712.09 "As Directed" at the contract price per **Square Yard** price bid.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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SECTION 01 30 00 – SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies procedures for submittals by each general / prime contractor required for materials and products to be used as part of this project. Specific submittals described in the various technical specification sections shall be submitted in accordance with this section. The submittals addressed in this section are:

- 1. Project Schedule
- 2. Shop Drawings and Product Data
- 3. Samples

1.2 PROJECT SCHEDULE

- A. Submit a construction schedule and a list of shop drawings within 10 calendar days after Notice to proceed for approval by the Owner and Engineer.
- B. The construction schedule should show all project milestones, key dates and critical path items.
- C. Revise the schedule after each progress review meeting or activity, where revisions have been recognized or made. Issue the updated schedule to the Owner and Engineer so that it can be included with the minutes of the meeting.
- D. With the submittal of each pay application provide an updated project schedule including percent of work completed per task at each submitted invoice.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- A. The general contractor / prime contractor is responsible to compile all product shop drawings as called for in the technical specifications including, but not limited to the following items:
 - 1. Storm sewer and underdrain piping
 - 2. Catch Basin structures
 - 3. Gradation report of aggregate base 304 material

4. Gradation report of pipe backfill
 5. Gradation report of premium backfill in sewer trenches
 6. Asphalt pavement mix design
 7. Signs and sign posts
 8. Pavement marking materials
 9. Seed and mulch materials
- B. The general contractor / prime contractor is responsible to compile all product shop drawings and submit in a timely manner as to no hinder the projects construction schedule.
- C. The Engineer will respond to submittals within 7 days at the minimum. Extensive, voluminous, or complex submittals may require up to 14 days. Contractor shall make reasonable allowance in his schedule for the need of such extended review times.
- D. All submittals shall be delivered via email and pdf documents. In email title place the following in the subject line: Headwaters Trail – Phase VII – Shop Drawing Submittal Number – Item. Shop drawings will be returned the same manner.
- E. Each submittal shall include a cover sheet with the following information:
1. Project name
 2. Submittal number (must stay in chronological order, revised submittals shall be 1A, 1B etc. after root submittal number.
 3. Name and address of general contractor / prime contractor
 4. Name of contractor to install material
 5. Date of submittal
 6. Name of supplier/manufacturer including contact info
 7. Number and title of appropriate specification section
 8. Contract drawing sheet number and detail number product references
 9. Any proposed deviation from contract requirements and reasons for deviation
 10. Lead time required and anticipated installation date.
 11. Statement of certification signed by the Contractor that the submittal has been reviewed and verified by the contractor to be in accordance with drawings and

specifications. Any deviations, if applicable shall be noted.

- F. Shop drawing or Product Submittal shall include the following information:
 - 1. ASTM, AWWA, ODOT or other standard that product meets or exceeds.
 - 2. Manufacturer's printed recommendations
 - 3. Compliance with recognized trade association standards
 - 4. Compliance with recognized testing agency standards
 - 5. Application of testing agency labels and seals
- G. Fabrication or installation of work shall not be started until shop or setting drawings have been reviewed and returned to the contractor.
- H. The following are actions that will be returned with shop drawings:
 - 1. "Reviewed, No Exception Taken". The Contractor is authorized to proceed with fabrication, shipping to site and installation in accordance with the submittal.
 - 2. "Reviewed, Exceptions as Noted" by the Engineer. The Contractor is authorized to proceed with fabrication, shipping to site and installation in accordance with the submittal as noted in the Engineer's response.
 - 3. Shop drawings returned with the notation "Submit Specified Item" or "Revise and Resubmit" must be resubmitted with the corrections made. Specific request for revising the submittal in accordance with the comments provided in the Engineer's response will be provided. The subsequent revised submittal by the contractor shall include on the cover sheet a statement indicating the addition and/or revision made.
 - 4. Drawings with "Requires Review of Others" shall be forwarded to the appropriate reviewer.
 - 5. Shop Drawings returned with "For Record Only" are for that purpose only and does not constitute approval of the materials.
- I. Shop drawing review by the Engineer does not relieve the Contractor or any subcontractor of responsibility for full compliance with contract requirements; for correctness of dimensions, clearances and material quantities; for proper design of details; for proper fabrication and construction techniques; for proper coordination with other trades; and for providing all devices required for safe and satisfactory construction and operation.
- J. Where called for shop drawings shall be stamped by a Professional Engineer registered in the State of Ohio when so required by applicable codes and statutes.

- K. All shop drawings with drawings/sketches submitted shall be at a scale that is legible to the reviewer and drawn in Autocad or similar electronic drafting software.

1.4 SAMPLES

- A. When called for on the plans or specifications the contractor shall submit full-size, fully fabricated samples cured and finished as specified and identical in all respects with the material or product proposed. Some examples of products that may be requested if part of the project include decorative paver stone, plantings, stamped or colored concrete etc.
- B. Samples shall be delivered to the owner's office and include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern. The following shall be included with each sample:
1. Generic description of the sample
 2. Sample source
 3. Product name or name of manufacturer
 4. Color and texture name
 5. Compliance with recognized standards
 6. Availability and delivery time

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 4 – METHOD OF MESUREMENT AND PAYMENT

NOT USED

END OF SECTION

SECTION 01 40 00 –TESTING AND INSPECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This section includes the following:

1. Inspection and Testing Laboratory Services will be utilized on this contract and provided by the owner. The Contractor has agreed to a period of time for contract execution. Within that time period all construction activities must be monitored by an inspection service as directed by the owner. Portage Parks District requires an inspector to document project progress, obtain inspection and test results from the Contractor's/Supplier's Laboratory or other inspection firms, confirm quantities, check compliance with Contract requirements, represent the project to the owner, recommend/review proposed contract revisions, contact Portage Parks officials for issue resolution, and other items as directed by the Engineer.
2. The contractor is responsible for notifying the inspection service of any change in the routine construction schedule.
3. The inspection performed by the third party does not relieve the Contractor from their duty to perform the contract as specified. Defective, nonfunctional or incomplete work shall be corrected by the Contractor at their own expense whether inspected by Portage Parks District or not.
4. Testing Laboratory Services shall be used where testing is specified under each section of the Technical Specifications.

1.2 QUALIFICATIONS

- A. The Independent Third Party Inspection and Testing Laboratory Services shall comply with requirements of the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualifications", or ASTM #699, as appropriate.
- B. Testing equipment shall have been calibrated not more than 12 months prior to use on this contract by devices of accuracy traceable to either National Bureau of Standards or accepted values of material physical constants. Certificates of calibration, made by an accredited calibration agency, shall be submitted, before the start of the testing process.

1.3 INSPECTION SERVICE

- A. The Independent Third Party Inspection and Testing Laboratory shall cooperate with the Contractor and owners Engineer and follow directions as instructed by them.

- B. Specified inspections, sampling and testing of materials and methods of construction shall be performed in accordance with the applicable ASTM and ODOT standards and as specified herein.
- C. Prior to performing tests the Inspection and Testing Laboratory shall contact the owner and engineer of record 48 hours prior to the test so that they can determine if they will be present for the test.
- D. The Inspection and Testing Laboratory shall provide a report of the results of their inspections to the owner and engineer that includes the following items:
 - 1. Type/name of test
 - 2. Date of test
 - 3. Date of report
 - 4. Weather and temperature at time of test
 - 5. Name of Inspector/Testing Agent
 - 6. Table comparing result data versus plan, specification or ODOT requirements and indication as to whether test passed/meet or failed plans/specifications requirements.
 - 7. Map with location of test or sample taken, project plans can be used.
 - 8. Name of Inspection and Testing Laboratory representative and signature.
 - 9. Certification statement that tests were performed according to industry standards and requirements set forth by ASTM, ODOT and/or manufacturer.
- E. The Inspection and Testing Laboratory will approve and/or accept work on behalf of the owner or engineer. In addition, they shall not decipher or revise plans and or specifications without consultation with the engineer. Any items that need clarity shall be brought to the attention of the owner and their engineer.
- F. The contractor shall provide 48 hour advance notice of all tests to the Independent Third Party Inspection and Testing Laboratory so that a representative can be onsite.
- G. The contractor shall provide all samples of items to be tested to the testing agency including concrete, asphalt, soils etc.
- H. The contractor shall provide safe access to the site for all Inspection and Testing Laboratory representatives.
- I. The Contractor shall cooperate completely with the inspection service and treat them as fully empowered and authorized representatives of the Owner.

PART 2 – PRODUCTS

2.1 NA

PART 3 – EXECUTION

3.1 NA

END OF SECTION

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SECTION 01 50 00 – TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies requirements for providing temporary services and facilities, including the following:
1. Sanitary facilities
 3. Drinking Water
 4. Temporary Pavement and Roads
 6. Temporary Parking
 6. Signs
 7. Site Security and Protection
 8. Collection and Disposal of Waste
 9. Worker Safety
 11. Environmental Protection

1.2 RESPONSIBILITY

1. Unless otherwise specified, each prime and subcontractor shall furnish, install, and maintain temporary facilities and controls required for the construction of their work and their own construction personnel. Contractor shall remove such temporary facilities and controls upon completion of their work. All facilities and controls shall comply with Federal, State, and Local codes and safety regulations.
2. Each Contractor shall provide construction aids and equipment required to assure the complete and total safety of his personnel and to facilitate the execution of the work. All such equipment shall meet current OSHA requirements.
3. Each Contractor shall relocate facilities as required to accommodate the progress of construction, storage or work requirements, or to accommodate the requirements of the Owner, and other contractors employed at the site.
4. At the completion of the Contractor's work, or where otherwise directed by the Engineer, the contractor shall completely remove temporary structures, materials,

equipment, and facilities installed by the Contractor. The Contractor shall repair any damage caused by the installation or use of the temporary facilities and shall cleanup all evidence of the temporary facilities after their proper removal.

5. The contractor is responsible to keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities or permit them to interfere with progress. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on the site.
6. The contractor shall remove his temporary service and facility promptly when the need for it or a substantial portion of it has ended, or when it has been replaced by the authorized use of a permanent facility.
7. The contractor shall complete, or if necessary, restore permanent work which may have been delayed because of interference with the temporary service or facility. Repair damaged work, clean exposed surfaces and replace work which cannot be satisfactorily repaired.
8. The contractor is responsible to operate and maintain his temporary services and facilities in good operating condition throughout the time of use and until removal is required. Protect from damage by freezing temperature and other environmental conditions.
9. The contractor shall maintain distinct markers for underground lines. Protect from damage during excavating operations.

1.3 SERVICE UTILITIES

- A. The following temporary utility service may be required by the contractor on site to facilitate their construction:
 1. Temporary power and/or lighting
 2. Temporary water
 3. Temporary telephone or internet service
- B. All temporary utility service shall be installed per the utility company specifications and the contractor is responsible for paying all costs, service fees, obtaining all utility permit, approval, schedule for service, maintaining and disconnecting the service.
- C. The contractor shall provide a schedule for the temporary service to the Owner and Engineer.
- D. At completion of the work and prior to final acceptance by the Engineer, disconnect all temporary services to the satisfaction of the local authorities and utility companies.

1.4 SANITARY FACILITIES

- A. The contractor shall provide, maintain and remove adequate portable toilet facilities for the use of all construction personnel, located conveniently to work stations. Temporary toilets shall be provided at a rate of one for each fifteen (15) persons, or fractional part thereof. Separate facilities for men and women shall be provided and labeled as required.
- B. All portable toilets shall have a holding tank and be regularly serviced to prevent sewage backup and maintain working condition.

1.5 DRINKING WATER

- A. The contractor shall provide potable drinking water dispensers, cups, waste receptacles, and miscellaneous supplies for the use of their own personnel and subcontractor located in the field office.

1.6 FIELD OFFICES AND STORAGE SHEDS

- A. The contractor is responsible to designate all staging areas based on their construction means and methods and provide a marked up plan using the project Storm Water and Pollution Prevention Plan as a guide to mark up and submit to the Owner and Engineer for approval.
- B. Each Prime Contractor shall provide a suitable ODOT Type A construction field office, tool, and material storage sheds for their own use if deemed necessary. Field offices shall be set up so that on-site construction meetings can be held by the contractor, owner and engineer.
- C. The owner and engineer shall be allowed to use field offices when needed.
- D. Sufficient material storage sheds with raised floors shall be provided for the storage and protection of products to be incorporated into the project. The Contractor shall provide heat and ventilation as required to maintain specified conditions for storage of products and to comply with applicable code requirements and regulations.
- E. Contractor's sheds or trailers shall have the company name and address printed on the sides.
- F. The location of such sheds shall be as approved by the Owner and Engineer.
- G. All field offices shall comply with all codes and safety regulations for fire and personal protection requirements. Each Contractor is to provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

Minimum size is 15 lbs. In addition, it must comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

1.7 TEMPORARY PAVEMENT AND ROADS

- A. The contractor is required to provide a temporary construction entrance as shown on the project Storm Water Pollution Prevention Plans to allow for access into the site during all-weather conditions.
- B. The contractor is responsible to maintain traffic on all adjacent roads and sidewalks. Provide all flag persons, guards, and signs, all subject to the approval of the local authorities.
- C. Contractors using public or private roads to access the site must conform to all local regulations regarding load limits and use, including necessary permits. If the work of the Contractor requires that portions of the adjacent roads are needed to be closed, after obtaining the Engineer's approval, the work shall be done expeditiously and a detour route if needed shall be provided.
- D. All damage to public or private roads shall be repaired by the Contractor at their own cost and meet the requirements of the local municipality.
- E. All trucks or other vehicles leaving the site at any time shall be cleaned of mud and dirt clinging to wheels and exterior body surfaces.
- F. The contractor is responsible to sweep adjacent roads of mud and debris to keep the road clean to area residents.
- G. All trucks accessing the site or leaving shall have suitable coverings fastened over the load before they enter surrounding paved streets to prevent soil and/or material from spilling onto nearby roads.
- H. If the contractor fails to keep the adjacent roads free of mud, debris etc. and at the direction of the engineer and the municipality a private sweeper may be called and the contractor will be billed and/or this cost deducted from their final payment.
- I. If sidewalks are located adjacent or in the project area the contractor shall install structurally adequate protective walkways designed and stamped by a structural engineer for safe passage way through the construction zone.

1.8 TEMPORARY PARKING

- A. The contractor shall provide temporary parking on site for construction works utilizing the same aggregate section as the construction entrance.

1.9 SIGNAGE

- A. The contractor shall install a sign at the construction entrance indicating the project area for material delivery.
- B. Sign to be cut from standard 4 ft. x 8 ft. weatherproof plywood sheet, or other suitable material. Upon completion of construction the contractor shall remove and dispose of signs.
- C. Contractor shall provide "Construction Entrance Ahead" warning signs along Mennonite Road 400 feet in advance of the construction entrance.

1.10 SITE SECURITY AND PROTECTION

- A. The contractor shall be responsible for all site security including storing and protecting all material and equipment from theft and/or vandalism.
- B. All work that has been installed or material that is stored shall be protected from construction activity and from unauthorized site personnel. Any damage to property, material and products installed shall be replaced by the contractor at their own cost.
- C. The contractor shall carry insurance for theft or vandalism of their equipment and material on site whether installed or stored. The Portage Parks District will not be held responsible for any damages that occurs.

1.11 COLLECTION AND DISPOSAL OF WASTE

- A. The contractor shall provide trash containers and hauling services for the project. The contractor is responsible to maintain a clean site with no trash left loose on-site.
- B. The contractor will be subjected to fines and/or portion of payment withheld for trash that is left loose and litters the adjacent parks property. The area will be cleaned for the Contractor and appropriate charges, including administrative mark-up and supervision costs, will be deducted from the monies due the Contractor failing to perform. This will be done at the time of the next payment request. The clean-up work is likely to be performed for the non-responsive Contractor outside of normal working hours. Premium labor costs will be included in the back charges.
- C. Burning or burying of waste materials on the site will not be permitted.
- D. Washing of waste materials down sewers or into waterways will not be permitted.
- E. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 degrees F

1.11 CONSTRUCTION FENCE

- A. If shown on the Storm Water and Pollution Prevention Plans before construction begins the contractor shall install a general temporary enclosure fence. Locate where indicated on the Drawings. Install in a manner that will prevent people, pets and wild animals from easily entering the work area.

1.12 WORKER SAFETY

- A. Each Contractor shall take all necessary precautions for the safety of employees on the work and shall comply with all applicable provisions of Federal, State and Municipal Safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the work is being performed. The Contractors shall comply with all applicable provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America and IC-3 of the Industrial Commission of Ohio and also OSHA.
- B. The contractor shall provide a designated person who has a valid certificate in first aid training and a fully stocked first aid kit, OSHA compliant shall be maintained on the project site.
- C. Each contractor is required to ensure that his employees are not subject to noise, dust, and/or fume levels which exceed current OSHA standards. Each Contractor is to provide all necessary equipment required during the course of his work to prevent any damage or harm to personnel, structures, and/or the environment.
- D. The contractor shall furnish and install necessary barricades to protect the public and workmen during construction. Comply with recognized standards and code requirements for the erection of substantial, structurally adequate barricades where needed to prevent accidents and losses. Paint with appropriate colors, graphics and warning signs to inform personnel at the site and the public of the hazard being protected against. Provide lighting where appropriate and needed.
- E. Each Contractor is responsible for all required OSHA temporary protection and barricades necessary for the completion of his work. Temporary removal and reinstallation required for access is the responsibility of each Contractor requiring such access.
- F. The contractor shall prohibit smoking and enforce the smoking ban in hazardous fire exposure areas. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of possible fire.
- G. The contractor shall store combustible materials in containers in fire safe locations.

3.14 ENVIRONMENTAL PROTECTION

- A. The contractor shall provide and maintain during construction all Storm Water Pollution and Prevention measures as call for and shown on the project SWPPP plans must be implemented.

- B. The contractor shall provide earthen embankments or similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.
- C. Store fuel in tanks equipped with containment tanks with 110% capacity of the storage tank.
- D. The contractor is responsible for all Storm Water Pollution Prevention inspections during construction and after rain events. All damaged or disturbed practices shall be removed and replaced at no additional costs to the Owner.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 4 – METHOD OF MESUREMENT AND PAYMENT

NOT USED

END OF SECTION

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SECTION 00 16 00 - PRODUCTS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide products from one manufacturer for each type or kind as applicable. Provide secondary materials as recommended by manufacturers of primary materials.
- B. Provide products selected or approved equal. Products submitted for substitution shall be submitted with acceptable documentation, and include costs of substitution including related work.
- C. Request for substitution must be in writing. Conditions for substitution include:
 - 1. An 'or equal' phrase in the specifications.
 - 2. Specified material cannot be coordinated with other work.
 - 3. Specified material is not acceptable to authorities having jurisdiction.
 - 4. Substantial advantage is offered to the Owner in terms of cost, time, or other valuable consideration.
- D. Substitutions shall be submitted prior to award of contract, unless otherwise acceptable. Approval of shop drawings, product data, or samples is not a substitution approval unless clearly presented as a substitution at the time of submittal.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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SECTION 01 70 00 – PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This sections covers all items that are to be coordinated by the general contractor / prime contractor as part of their administrative responsibilities for project closeout, including the following:
 - 1. Substantial Completion Requirements
 - 2. Final punch list procedures
 - 3. Project record document submittal
 - 4. Final cleaning
 - 5. Requirements for Final Completion

1.2 SUBSTANTIAL COMPLETION REQUIREMENTS

- A. General
 - 1. Substantial Completion is achieved when the Contractor's work, or portion thereof, is sufficiently complete, that it is suitable for the Owner's use and occupancy. Actual use and occupancy may not coincide with Substantial Completion. The Owner may defer opening the facility, but the Contractor's obligations are fulfilled when they make the facility suitable for such occupancy.
 - 2. The Owners and Engineer's determination of Substantial Completion will not necessarily be based on the amount of approved progress payments, or the cost of the remaining work. An extensive list of corrections may require that the facility cannot be occupied, even if otherwise usable. This will be determined by the owner.
 - 3. The contract date of Substantial Completion is set in the contract documents and any delay achieving that date is subject to assessing the specified liquidated damage amounts if established by the owner.
- B. Prior to the owner issuing the Substantial Completion, the following items must be obtained to the satisfaction of the owner and engineer:
 - 1. All systems as shown on the project plans have been installed to the satisfaction of the owner and engineer.

2. All utility systems have been installed and tested. Results certifying the tests shall be delivered to the owner and engineer.
 3. All final punch list items have been completed.
 4. All final restoration items including seeding and mulching have been installed.
 5. All Sediment and Erosion Control items have been removed and disposed of.
 6. Any product warranties and installation manuals provided to the owner.
- C. Upon completion of the requirements of the above, the Contractor shall make a written claim of Substantial Completion. The claim must be accompanied by a list of uncompleted work left for Final Completion. Any pending claims for additional compensation and time must also be made at this time.
- D. The Substantial Completion Certificate is transmitted to the Contractor for signing and for agreement to the stated terms. When the signed certificate is returned, the Engineer makes a distribution and the Contractor submits the request for full payment less the value of the uncompleted work.
- E. All warranties will start for the date of issue of the Substantial Completion Certificate.

1.3 FINAL PUNCH LIST PROCEDURES

- A. Upon receipt of Contractor's request, the Owner and Engineer will visit the site and observe the work that was performed for compliance to contract documents. Based on their site visit the following will occur:
1. If the work is completed to the satisfaction of the Owner and Engineer they will prepare a Certificate of Substantial Completion and forward it to the contractor.
 2. If there are items left that are either missing or require corrective actions the Owner and Engineer will issue a final punch list document outlining the deficiencies found at this inspection. The contractor will be responsible to complete these items before a Certificate of Substantial Completion can be issued and final payment provided.
 3. The final punch list will contain the following items:
 - a. List of work completed to date
 - b. Description of deficient or not completed work.
 - c. The number of days to complete the punch list items work

- B. The engineer and owner will provide one (1) follow up site visit to observe items on the punch list for final acceptance. If the items are still not found to be completed and/or deficient the contractor will be instructed to complete these items and the contractor will be held responsible for the cost of another site visit by the Owner and Engineer to observe these items. Payment for their time for an additional site visit will be at time and material for their costs and will be taken from the contractor's final payment.

1.4 PROJECT RECORD DOCUMENT SUBMITTALS

- A. Specific requirements for record documents are indicated in individual sections of the technical specifications and include the final installed locations of all items as shown on the construction documents.
- B. The contractor shall maintain during construction a red-line marked up set of construction documents depicting items of actual installations that vary from the work as originally shown. Mark whichever drawing is most capable of showing "field" condition fully and accurately.
- C. The marked up set of plans shall show indicate all underground utility inverts/elevations as installed including all bends and fittings.
- D. If existing utilities or items were discovered during construction and either were not shown on the plans or in a different location the contractor shall mark up the observed locations on the set of plans.
- E. Where shop drawings are used for mark-up, record a cross-reference at corresponding location on working drawings. Mark with red erasable pencil and, where feasible, use other colors to distinguish between variations in separate categories of work.
- F. Maintain one copy of specifications, including addenda, bulletins, change orders and similar modifications issued in printed form during construction, and mark-up variations in actual work, in red color, in comparison with text of specifications and modifications as issued.
- G. Maintain one copy of all product substitutions, selection of options, and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Note related record drawing information and product data, where applicable.
- H. Maintain one copy of each product shop drawings data submitted and include variations in product as delivered to site and variations from manufacturer's instructions and recommendations for installation.
- I. Deliver one (1) copy of marked up record documents to the engineer for inclusion on the official record document submittal.

1.5 FINAL CLEANING

- A. The contractor shall provide a final site that is clean and acceptable to the owner and engineer prior to receiving the Certificate of Substantial Completion. The following are items that are required but not limited to for final accepted:
 - 1. Remove all labels that are not required as permanent labels.
 - 2. Remove debris and surface dust from limited-access spaces, including, trenches, manholes, and similar spaces.
 - 3. Clean light fixtures, lenses and lamps so as to function with full efficiency.
 - 4. Clean project site, including landscape areas, of litter and foreign substances. Sweep paved areas to a broom-clean condition; remove stains, petro-chemical spills and other foreign deposits.
- B. Removal of Protection: Except as otherwise indicated or requested by the Engineer, remove erosion and sediment control temporary protection devices and facilities which were installed during course of the work to protect previously completed work during remainder of construction period.

1.6 REQUIREMENTS OF FINAL COMPLETION

- A. As part of the Final closeout documents required to obtain a Substantial Completion Certificate the Contractor must also provide the following items to the owner:
 - 1. Copy of all permits obtained from the authorities necessary for occupying and operating the facility.
 - 2. Record Documents, marked prints of contract drawings, updated specifications and shop drawings, any sketches and notes that record changes made from documents issued by the Owner and Contractor for performing the work.
 - 1. Certified results of all testing during construction that they meet the project specifications.
 - 2. Site has been cleaned and restored to accepted condition by the Owner and Engineer.
 - 3. Letter stating all final punch list items have been completed.
 - 4. Provide all owner's manuals of products.
 - 5. Written notice of Contractor's claim of Final Completion.
- B. Upon receipt of Contractor's claim of Final Completion, the Engineer will conduct an inspection to verify such completion.
- C. Upon completion of inspection, the Engineer will prepare a certificate of final

acceptance, or advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

- D. Upon receipt of notification from the Engineer of acceptance of Final Completion, the Contractor will submit the request for final payment in the amount of the remaining contract sum plus approved change orders, less liquidated damage amounts. The final payment request shall be accompanied by:
1. Consent of surety to final payment.
 2. Evidence of final continuing insurance coverage
 3. Waiver of lien.
 4. Affidavit of wage compliance.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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DOCUMENT 02 21 20 – CONSTRUCTION STAKING

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This section includes the following.

1. Work included under this section includes all labor, materials and services required to properly and accurately locate line and grade of all new construction, measure line and grade of all existing bench marks.
2. All disturbed property pins and or monument boxes and pins shall be referenced prior to construction and replaced by a registered Surveyor in the State of Ohio.
3. The provisions of ODOT CMS Item 623 shall be followed except as modified herein and as directed by ThePortage Parks District and engineer. English units shall be used.

1.2 QUALIFICATIONS

A. All surveying work shall be done under the responsible direction of a surveyor registered as such by the State of Ohio.

PART 2 – PRODUCTS

2.1 SURVEYING

A. All products required to perform the surveying specified herein shall be furnished by the contractor and be equipment common to the practice of surveying in the State of Ohio.

PART 3 – EXECUTION

3.1 CONSTRUCTION CONTROL

A. Bench marks, centerlines and intersections are as shown on the plans. All additional elevation and location information required to execute the project according to these specifications is the responsibility of the Contractor.

- B. Elevations on the plans reference the bench marks. Figured dimensions on drawings take precedence over measurements by scale. Detailed drawings take precedence over general drawings and shall be considered explanatory of them and not as indicating extra work.
- C. Any inspection or checking of the construction survey control or the finished work by the engineer shall not relieve the Contractor of his responsibility to comply with the designed lines and grades, within the specified tolerances, unless requested modifications for constructability are approved by the Portage Parks District in advance.

3.2 RECORD AND AS-BUILTS DATA

- A. The Contractor shall submit to the Portage Parks District and Engineer of Record a set of Record Drawings upon which the as-built constructed lines and grades are clearly recorded. This shall be done in red on a set of 24" x 36" bid and construction drawings. All Record Drawing sheets shall be dated and signed off by the Contractor and submitted to the Portage Parks District and Engineer of Record within 60 days of project completion. .
- B. The Record Drawings shall incorporate addenda, change orders, field orders, work directive changes and all other changes to the original drawings to reflect the actual in-place installation of the work.
- C. The Record Drawings shall include, but not be limited to, the location and elevation of all new work, existing structures to remain.
- D. The Record Drawings shall also include the location and elevation of all existing underground utilities and structures, both noted and not noted on the original drawings. These shall be shown on the appropriate drawing plans, elevations and details and shall include observable dimensions and material types.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 WORK INCLUDES

- A. Contact the Ohio Utility Protection Services (811) and utility companies at least 48 hours prior to any site clearing / excavating operations.
- B. Locate, identify, verify, and protect existing trees and vegetation to remain.
- C. Protect bench marks, survey control points, and ex. site improvements to remain from damage or displacement.
- D. Contractors shall remain within property lines, lease lines, easement areas, designated perimeter limits, or limits of work areas shown on drawing.
- E. Clearing and grubbing. Include complete removal of any remaining stumps & vegetation. Protect plants, trees, vegetation noted to remain.
- F. Topsoil stripping. Apply herbicide to areas to be paved after stripping topsoil.
- G. Removal of above-grade site improvements and removal of any below grade improvements (ex. utilities, building foundations, etc. as applicable in order to install improvements shown on Contract Drawings.
- H. Locate, identify, and mark utilities within site boundaries to remain or be removed. Protect utilities to remain. Disconnect, cap, or seal and abandon site utilities in place per utility co. requirements. If noted on plans backfill pipes to be abandoned in place with grout or LSM. Notify engineer immediately if unknown utilities or utility connections are encountered.
- I. Identify and accurately locate capped utilities and other subsurface structural, electrical, technological, and mechanical conditions, as applicable. Note utility locations on contractor's as-built mark-up plans and submit copy to engineer. Coordinate clearing work and comply with all utility company requirements before starting work.
- J. Backfill any excavated areas with compacted fill suitable for the area. Refer to the backfill specifications and geotechnical report (if applicable) for additional information.
- K. Provide and maintain temporary soil erosion and sedimentation control measures per the project's SWPPP & specifications.
- L. Remove debris from site. Leave site in clean condition ready for earthwork.

- M. Make new openings in curbs and gutters neat, as close as possible to profiles indicated and only to extent necessary for new work.
- N. At concrete, paving, and other materials where edges of cuts remain exposed in the complete work, make cuts using power-saving equipment. Do not overcut at corners of cut openings.
- O. Contractor shall delineate limits of pavement removal in the field, neatly saw cut pavement at limits, remove and dispose off-site the existing pavement. Pavement removal shall include all base and subbase aggregate material.

1.2 DEFINITIONS

- A. "Topsoil": natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shades of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, and other objects more than 1-1/2 inches in diameter; and free of weeds, roots, and other deleterious materials.
- B. Caliper: Instrument used to measure tree diameter.
- C. Clearing: Removal and disposal of above-ground featured items defined herein.
- D. Grubbing: Removal and disposal of below-ground items defined herein.
- E. Salvage: Shall include, but not limited to such as items as castings, piping, brick, steel, iron, copper, brass, aluminum and other metals, wiring, conduits, lighting, signs, etc.

1.3 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled, salvaged, or to remain on OWNER'S property, cleared materials shall become CONTRACTOR'S property and shall be removed from the site.
- B. The ENGINEER and/or OWNER will direct the CONTRACTOR whether and/or where to store excess stripped topsoil on the property.
- C. If materials are determined to be salvageable and are not shown on the plans to be salvaged, the contractor shall notify the OWNER in writing via email and temporarily store items for them to make a claim. If after one week of notification the contractor is responsible for dispose of them.

1.4 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

- B. Record drawings/log of site clearing items.
- C. Site Clearing Plan; Submit schedule and methods for accomplishment of temporary and permanent erosion control work as applicable for clearing and grubbing, grading operations, borrow pits and haul roads; a plan for disposal of waste materials; and a schedule of operation at locations of high siltation potential in sufficient detail to clearly indicate how siltation of streams, lakes and reservoirs and the interruption of normal stream flows will be held to a practical minimum.

1.5 QUALITY ASSURANCE

- A. Pre-installation conference: conduct conference at project site

1.6 PROJECT CONDITIONS

- A. "Traffic": minimize interference with adjoining roads, streets, parking lots, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from OWNER and authorities having jurisdiction (AHJ).
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by AHJ.
- B. "Improvements on adjoining property": authority for performing indicated removal and alteration work on property adjoining OWNER'S property will be obtained by OWNER before award of contract.
- C. "Salvageable improvements": carefully remove items indicated to be salvaged and store on OWNER'S premises where indicated, or alternate location where applicable.
- D. Existing facilities, structures, and utilities are shown in accordance with available field survey data and record drawings. The indicated locations of trees, underground utilities and structures are approximate. Other trees and utilities may exist which are not indicated. CONTRACTOR shall notify utility locator service before site clearing in accordance with State Revised Code "Protecting underground utility facilities during construction of public improvement".
- E. The Contractor shall employ a qualified utility locating service for all underground utilities outside the public R/W.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction. Replace if damaged to satisfaction of the OWNER/ENGINEER.
- B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, walkways, roadways, and drives. Install items per the Storm Water Pollution Prevention Plan.
- C. Locate and clearly flag trees and vegetation to remain or to be relocated. Refer to SWPPP plans for additional information.
- D. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to OWNER.
- E. Comply with seasonal and permitting restrictions on when the Contractor may perform the clearing and grubbing operations.

3.2 TREE PROTECTION & REMOVAL

- A. Tree removal is prohibited between April 1st and November 15th due to federally endangered Indiana Bat and Northern Long-Eared Bat which may have roosting habitats in the project area. All tree cutting work must be completed before the March 31st deadline and may not begin until after November 15th.
- B. Remove all trees indicated on the Contract Documents to be removed, and their major roots existing within the area of new pavements and structures.
- C. Areas designated to receive pavement or structures shall be grubbed a depth of 18-inches. Measure cut from existing ground surface or proposed ground surface.
- D. Apply herbicide to remaining roots and vegetation to inhibit growth.
- E. Depressions made by grubbing shall be filled with suitable material and compacted to conform to the original adjacent grades.

- F. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, excavated material, or material stockpiling within drip line of remaining trees.
 - 2. Do not permit vehicles, equipment, stored materials, temporary facilities, or foot traffic within drip line of remaining trees.
- G. Except in areas to be excavated, stump holes and other holes from which obstructions are removed shall be backfilled with suitable material and compacted in accordance with the following:
 - 1. All embankments, except rock embankments, shall be constructed using moisture and density control. All subgrade, except rock and shale in cut sections, shall be constructed using moisture control and density control.
- H. Do not excavate within drip line of trees, unless otherwise indicated.
- I. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
 - 1. Cover exposed roots with burlap and water regularly to prevent roots from dying out. Backfill with soil promptly.
 - 2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
 - 3. Coat cut faces of roots more than 1-1/2 inches in diameter with emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 4. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction in a manner approved by the Landscape Architect.
 - 5. Use only hand methods for grubbing within drip line of remaining trees.
- J. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by the ENGINEER.
 - 1. Employ a qualified Arborist, licensed in jurisdiction where project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
 - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified Arborist.
- K. Protection of trees and shrubs scheduled to remain shall be assigned to the general CONTRACTOR and shall include tops, trunks and roots. Temporary tree protection fences are required because of proximity to the work. Tree protective fencing should be 6' high chain link (2" mesh) or safety orange mesh fencing. Any pruning required shall be with the approval and direction of the Landscape Architect. The general CONTRACTOR shall be responsible for the survival of protected trees for one (1) year after the construction project is substantially completed.

- L. Low hanging branches and unsound or unsightly branches on trees or shrubs within the project area which are designated to remain shall be removed as directed. Branches of trees extending over the roadbed shall be trimmed to give a clear height of 20 feet above the pavement surface or as directed by the OWNER/ENGINEER.

3.3 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
 - 2. Arrange to shut off affected utilities with utility companies.
- B. Existing utilities: do not interrupt utilities serving facilities occupied by OWNER or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner and Engineer in writing not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without OWNER'S and Engineer's written permission.
 - 3. The CONTRACTOR is to indicate in construction schedule any known utility interruption.
- C. Excavate for and remove underground utilities indicated to be removed. Include capping/plugging abandon ends of pipes and backfilling pipes/conduits that are to be abandoned in place with low strength mortar or grout.

3.4 CLEARING, GRUBBING AND TOPSOIL REMOVAL

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions, and grubbing roots. Strip all objectionable growth. Remove from the site all debris resulting from the stripping operations at frequent intervals to prevent accumulation of material. On-site disposal of material is not permitted.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or relocated.
 - 2. Completely remove stumps, roots, obstructions, and debris extending to a depth of 24 inches below exposed & final subgrade. Do not dispose of on-site.
- B. In a time defined prior to the start of construction, fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
- C. Place fill material in horizontal layers not exceeding 8-inch loose depth, and compact each layer in accordance with requirements for engineered fill.

3.5 TOPSOIL STRIPPING

- A. Strip topsoil to its full depth from entire area to be graded. Stockpile where directed by OWNER and where it will not interfere with construction activities. Install silt fence and/or silt sock round stockpile area. Topsoil to be reused shall be free from roots, brush and debris. Excess topsoil shall be deposited and/or spread on property as directed by the ENGINEER/OWNER. Refer to Geotechnical report, and Landscape drawings, and specifications for additional information.
- B. If stockpiling on-site, remove sod and grass before stripping topsoil.
- C. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.
- D. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water away. Cover stockpiles to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile topsoil within drip line of remaining trees.
 - 3. Dispose of excess topsoil as specified for waste material disposal.
 - 4. Install and maintain silt fence around any topsoil stockpiles.

3.6 EXISTING SITE IMPROVEMENTS

- A. Remove existing above-and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, buildings, foundations, utilities, and aggregate base as applicable.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Neatly saw-cut faces vertically.
 - 2. If noted on the drawings address existing wells and septic systems abandonment and/or removal per local Health Department Requirements and Standards.
 - 3. Wet down during the demolition operations to prevent dust from arising. Minimize spread of dust and airborne particles.
 - 4. Raze, remove and dispose of all buildings and foundations, structures, fences, guardrails, old pavement, abandoned pipe lines, storage tanks, septic tanks, vaults and other obstructions any portions of which are within the limits of the project, except utilities and those items for which other provisions have been made for removal. All designated salvageable material shall be removed, without unnecessary damage in sections or pieces which may readily be transported, and shall be stored and protected by the CONTRACTOR at specified places within the project limits.

5. Building demolition shall be performed per the Architect plans and specifications for building removal.

C. Underground Storage Tanks

1. Existing underground storage tanks encountered shall be removed by a certified UST removal contractor and reported to the state. If encountered on the project contact an Environmental Engineer for further direction.

3.7 DISPOSAL

- A. "Disposal": remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off-site at a State certified construction debris or hazardous waste landfill.
1. Do not burn or bury removed materials on project site.
 2. If hazardous materials are encountered during clearing operations, notify the ENGINEER for additional instructions. Comply with laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.
 3. In order to retard and prevent the spread of destructive insects limit the movement of regulated articles according to state Law.
 4. Observe requirements for handling and transporting of regulated articles in quarantined areas as defined by state requirements.
 5. Follow all federal and state requirements for quarantines and regulated articles.

END OF SECTION

SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

- A. For this project a Geotechnical Study and Report was provided by PSI dated February 24,2020 and is included as part of the bid package. This report governs where any conflict occurs between this section and the recommendations in the report.

1.1 WORK INCLUDES

- A. Preparing sub grades for slabs-on-grade, walks, pavements, lawns, and plantings.
- B. Aggregate base course for asphalt paving.
- C. Subsurface drainage backfill for walls and trenches.
- D. Engineered fill.
- E. Base bids on excavating and filling with materials encountered at site except where special fill or backfill materials are specified herein or indicated on Drawings. No allowance or extra payments will be made by reason of variations in types of soil encountered or variations in their moisture contents. Furnish additional fill material required and included as a part of the work. Include removal of excess or objectionable materials as part of the work.
- F. Excavating and filling areas containing unsuitable material. CONTRACTOR is to supply unit costs with bid for this item. This item is not included in base bid.
 - 1. Unit Cost 1 - Excavate and remove unsuitable material to limits determined by Engineer or Geotechnical Engineer. Properly install and compact excavation with engineered fill (ASTM NO 1's and 2's) over a geogrid and proof roll to verify suitability. In the event the engineered fill is found to be unsuitable it is the sole responsibility of the CONTRACTOR to provide a suitable backfilled excavation to the OWNER/ARCHITECT or ENGINEER. Provide cost per Cubic Yard.

1.2 DEFINITIONS

- A. Backfill: soil materials used to fill an excavation.
 - 1. Initial Backfill: backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: backfill placed over initial backfill to fill an excavated area to final grade.

- B. Base Course: layer placed between the sub-base course and asphalt paving.
- C. Sub-base course: layer placed over the excavated sub-grade in a trench before laying pipe. Layer placed between the sub-grade and base course for asphalt paving, or layer placed between the sub-grade and a concrete pavement or walk.
- D. Sub-grade: surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.
- E. Borrow Soils: satisfactory soil imported from off-site for use as fill or backfill as approved by the Geotechnical Engineer.
- F. Drainage Course: layer supporting slab-on-grade used to minimize capillary flow of pore water.
- G. Excavation: removal of material encountered above sub-grade elevations.
 - 1. Additional Excavation: excavation below subgrade elevations as recommended by the testing agency and approved by the OWNER/ENGINEER to reach specified compaction level. Additional excavation, replacement, and proof-roll unit costs are to be included in the base contract amount.
 - 2. Bulk Excavation: excavations more than 10 feet in width and pits more than 30 feet in either length or width.
 - 3. Unauthorized Excavation: excavation below sub-grade elevations or beyond indicated dimensions without direction by the testing agency and approved and directed by the OWNER/ENGINEER. Unauthorized excavation, as well as remedial work recommended by the testing agency and approved and directed by the OWNER/ENGINEER, shall be without additional compensation.
- H. Fill Soils: suitable soil materials, as determined by the testing agency geotechnical engineer and the OWNER/ENGINEER, used to raise existing grades.
- I. Shale: Laminated material, formed by the consolidation in nature of soil, having a finely stratified structure. For the purpose of these Specifications, the following bedrock types shall also be considered as shale: mudstone, claystone, siltstone and clay bedrock.
- J. Rock: rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 C.Y. for bulk excavation or 3/4 C.Y. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment, without systematic drilling, ram hammering, ripping, or blasting, when permitted.
- K. Structures: buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

- L. Utilities: Include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings, as applicable.
- M. Optimum Moisture: The water content at which the maximum density is produced in a soil as determined ASTM D698 (Standard Proctor), or field test strip.
- N. Field Testing: Testing of fill and subgrade compaction shall be as directed by the OWNER/ENGINEER and performed by the testing agency.
- O. Laboratory Dry Weight: The maximum laboratory dry weight shall be the weight provided by the Laboratory when the sample is tested in accordance with ASTM D698

1.3 SUBMITTALS

- A. Product data for the following:
 - 1. Notify and provide data to regulatory authorities and OWNER/ENGINEER prior to commencement of work.
 - 2. Provide notice of: encounter with unknown utilities; subgrades before filling; areas requiring testing or inspection.
 - 3. Materials Sources: Name of source, location, date of sample, sieve analysis, and laboratory compaction characteristics.
 - 4. Disposal Locations: Name and location of final destination for all materials hauled off site.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D2487 of each on site and borrow soil material proposed for fill and backfill.
 - 2. Current laboratory compaction curve according to ASTM D698 for each on site and borrow soil material proposed for fill and backfill.
 - 3. Field reports; in-place soil density tests.
 - 4. One optimum moisture – maximum density curve for each type of soil encountered.
 - 5. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
 - 6. Test reports must be submitted daily to the Architect and Owner.
 - 7. Water Content

C. Samples: for the following (if indicated by X below):

1. ___30-lb samples sealed in airtight containers, of each proposed soil material from on-site or borrow sources and engineered fill materials delivered to geotechnical testing agency for running proctor tests. Document borrow material source(s) for each sample submitted. Documentation shall include name of source, location, date of sample, sieve & grain size analysis, soil characteristics, unit weight, and Std. Proctor laboratory compaction results at designated optimum moisture content.

1.4 QUALITY ASSURANCE & REPORTS

A. Reference Standards:

1. American Association of State Highway and Transportation Officials (AASHTO).
2. American Society for Testing and Materials (ASTM).
3. Ohio State Department of Transportation "Construction Materials Specifications", 2019 or current edition.

B. "Codes and Standards" - perform earthwork complying with requirements of authorities having jurisdiction.

C. Tolerances: As indicated herein.

D. "Geotechnical Testing Agency Qualifications" - an independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

E. Soil testing service: The OWNER will engage a qualified independent testing agency to perform material evaluation tests for all geotechnical work specified herein. The testing agency shall provide the OWNER/ENGINEER a letter certifying soil material used and compaction results. All requested extra work and/or change orders based on existing soil conditions or tests of soils that do not meet the project specifications shall be approved and directed by the OWNER /ENGINEER.

F. Testing: Requirements as specified herein.

G. The testing agency shall provide results from field density testing during construction to OWNER/ENGINEER. Note material sampled and characteristics of soil. CONTRACTOR is to be advised immediately of tests failing to meet specifications. CONTRACTOR is solely responsible to correct deficiencies and to supply test and proof rolling results to Engineer in order to confirm suitability.

1.5 PROJECT CONDITIONS

- A. Subsurface Conditions: Subsurface soils investigations not have been made at the site.
- B. Existing Utilities: do not interrupt utilities serving facilities occupied by OWNER others unless permitted in writing by OWNER/ENGINEER, and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify OWNER/ENGINEER not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without OWNER/ENGINEER written permission.
 - 3. The utilities protection service does not locate utilities outside public R/W's. The CONTRACTOR shall employ a qualified utility locating service for all underground utilities on the project.
 - 4. Cut and cap, demolish, and completely remove from site existing underground utilities indicated to be removed in accordance with both City and utility provider requirements. Coordinate with utility companies to shut off services if lines are active. The Engineer may, with written approval, allow abandoned utilities greater or equal to 6" diameter, located under parking or buildings, to be completely filled with non-shrink grout or LSM.
 - 5. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult Utility OWNER/ENGINEER immediately for directions. Cooperate with OWNER/ENGINEER and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the Utility OWNER/ENGINEER and the utility owner representative.

1.6 PROTECTION

- A. Safety: Provide protective measures necessary for the safety of workmen, to the public and adjacent property. Prevent cave-ins, collapse of walls, structures, and slopes, both on and adjacent to the site.
- B. Standards: Comply with regulations of local authorities having jurisdiction, including all applicable O.S.H.A. requirements.
- C. Repair: Includes the removal and replacement with new materials affected by settlement.

1.7 ENVIRONMENTAL CONDITIONS:

- A. Do not apply soil treatment when temperature is at or below freezing or when ground is frozen or frost is expected.
- B. Do not apply soil treatment when surface water is present.

1.8 EXISTING CONDITIONS:

- A. Accept the site in the condition which it exists at the time of the award of the contract and perform all work to the grades indicated.
- B. Protect plant material, lawns and other features not designated for removal.
- C. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soil Materials:
 - 1. Complying with American Association of State Highway and Transportation Officials (AASHTO) M145, soil classification Groups A-1, A-2-4, A-2-5, and A-3. Soil classification Group A-6 may be satisfactory if approved by the testing laboratory.
 - 2. Complying with ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, AND SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. CL can be used if approved by the geotechnical testing agency engineer and approved by the OWNER.
 - 3. Compacted fill and backfill shall be free of deleterious matter such as frozen materials, organics, wood, debris, or rock larger than 4 inches.
 - 4. All material shall have a liquid limit and plasticity index not exceeding 40 and 15 respectively when tested in accordance with ASTM D-4318.
 - 5. The minimum dry unit weight shall not be less than 110 PCF maximum dry density as determined by ASTM D-1557 (Modified Proctor).
 - 6. All fill and backfill materials shall be obtained from on site or from off-site sources and shall be approved by the Geotechnical Engineer prior to placement.
 - 7. Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- C. Unsatisfactory Soils:
 - 1. ASTM D 2487 soil classification groups GC, SC, MH, CH, OL, OH, and PT, or a

combination of these group symbols.

2. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
 3. Unsatisfactory soil materials are those defined in AASHTO M145 soil classification Groups A-2-6, A-2-7, A-4, A-5, and A-7; also, peat and other highly organic soils. Material that fails to meet requirements for suitable materials; or contains any of the following:
 - a. Organic clay, organic silt, or peat; as defined in ASTM D2487.
 - b. Vegetation, wood, roots, leaves, or organic, degradable material.
 - c. Stones or rock fragments over six inches in any dimension.
 - d. Porous biodegradable matter, excavated pavement, construction debris, rubbish, or refuse.
 - e. Ice, snow, frost, or frozen soil particles.
 - f. Slag.
- D. General Fill: Suitable, unclassified soils.
- E. Structural Fill: Suitable material that is classified by the Unified Soil Classification System (USCS) in accordance with ASTM D2487 as GW, GP, GM, SW, SP, SM, or if approved CL. Verify that the largest particles in the fill are no greater in dimension than one-half the thickness of the compacted lift thickness.
1. Representative samples of the proposed fill materials should be collected at least one week prior to the start of the filling operations. The samples should be tested to determine the maximum dry density, optimum moisture content, particle size distribution and plasticity characteristics. These tests are needed to determine if the material is acceptable as structural fill and for quality control during the compaction process.
 2. All on site material that is stockpiled and designated to be used as Structural Fill shall be field tested and evaluated by the testing agency Geotechnical Engineer to determine if it meets the requirements ODOT and the additional requirements as set forth in this section. Written acceptance from the testing agency and owner shall be obtained prior to be accepted as Structural Fill.
 3. The fill should be placed in layers of not more than 8 inches in thickness, with each layer being compacted to a minimum density of 100 percent of the maximum dry density and within $\pm 2\%$ of the optimum moisture content, as determined by the Standard Proctor Method ASTM D-698. Moisture control (increasing or decreasing the natural moisture content) of the engineered fill materials may be necessary for

compaction.

4. Rock, shale and boulders is prohibited from being used as structural fill and shall be hauled and disposed of offsite.
 5. Silt shall not be used as fill in new pavement or building areas.
 6. The Structural Fill shall not be in a frozen condition during placement and should not be placed on a frozen subgrade.
- F. Granular Engineered Fill: naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a no. 200 sieve.
1. Engineered fill materials should consist of non-expansive materials. Pyritic and/or potentially expansive materials, such as mine tailings and slag should not be used as engineered fill material. Materials selected for use as engineered fill shall be properly moisture conditioned, inorganic and free of organic matter, cobbles, boulders, waste construction debris, or other deleterious materials.
 2. Fill materials shall have a Standard Proctor maximum dry density greater than 110 pounds per cubic foot (pcf), an Atterberg Liquid Limit less than 40, a Plasticity Index of less than 15, organic content less than 1% and a maximum particle size of 2 inches or less.
- G. Drainage fill:
1. Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel, (ASTM D 448 Coarse - aggregate grading size 57), with 100% passing of 1-1/2" sieve and not more than 5% passing a No. 8 sieve. Aggregate shall meet MSHA specification for No. 6 aggregate. Provide by CONTRACTOR from off-site source.
 - a. Located under all slab on grade areas.
- H. Backflow at Below Grade Walls
1. Provide a 24" wide zone of free draining gravel behind all below grade.
- I. Pavement Backfill:
1. Base: material shall comply with the requirements of ODOT Section 304 Aggregate Base Course.
 2. Sub Grade Preparation: material shall comply with the requirements of ODOT Section 203 and Section 204, Aggregate Base.
- J. Backfill for Utilities:

1. See Section 31 23 33 Trenching and Backfill
- K. Filter Material: narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading size 67; with 100 percent passing a 1- inch sieve and 0 to 5 percent passing a no. 4 sieve.
- L. Impervious Fill:
 1. Where noted on plans): clayey gravel and sand mixture capable of compacting to a dense state at optimum moisture content. In special instances the Engineer may recommend the use of bentonite clay or an impervious (EDPM or approved equal) material. Special instances are not included in base bid.
- M. Top Soil:
 1. Clean natural topsoil free of vegetation, debris and other deleterious matter, and approved by OWNER/ARCHITECT or ENGINEER Representative. Upper 6 inches of topsoil stripped may be used, if suitable, otherwise use imported, screened, loose, fertile, friable, free of grass, brush, roots and rocks > 1-1/2" diameter, loamy soil possessing characteristics representative of productive growing soils in the area.
- N. Drainage Fabric, Separation Fabric, Erosion Control Blankets and Erosion Control Fiber Mesh
 1. See Section 31 32 19 Geotextile Fabric

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify existing ground surfaces have been stripped of topsoil, root mat and existing pavement, unsatisfactory soils, concrete spoil, obstructions and deleterious material.
- B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- C. Protect sub-grades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- D. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties, walkways, and roadways.
- E. Protect trees, shrubs, lawns, rock out-croppings, and other features remaining

as a portion of final landscaping.

- F. Protect benchmarks/project control, existing structures, fences, sidewalks, paving, and curbs from equipment and vehicular traffic.
- G. Protect above and below grade utilities which are to remain.
- H. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation. Monitor shoring system and surrounding ground surface during construction to detect movement. If movement becomes significant, take contingency steps to brace excavation and adjacent utility lines.
- I. Notify OWNER/ARCHITECT or ENGINEER Representative of unexpected subsurface conditions and discontinue work in affected area until notified to resume work.
- J. Grade excavation top perimeter to prevent surface water run-off into excavation.
- K. Material cut or excavated from building areas which is suitable for backfilling may be stored on site to be distributed later.
- L. Remove unsuitable and/ or excess material from site immediately.
- M. Establish extent of excavation by area and elevation; designate and identify datum elevation.
- N. Set required lines and levels.
- O. Maintain bench marks, project control monuments, and other reference points. Relocate if necessary and reference all benchmarks to remain so that it can be reestablished if disturbed.
- P. Before starting excavation, establish location and extent of underground utilities occurring in work area.
- Q. Notify utility companies to remove and relocate lines which are in way of excavation. Maintain, reroute or extend as required, existing utility lines to remain which pass through work area.
- R. Protect utility services uncovered by excavation.
- S. Upon discovery of unknown utility or concealed condition, discontinue affected work and notify OWNER/ ENGINEER representative immediately.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from

ponding on prepared sub-grades, and from flooding project site and surrounding area. Unsuitable soils as a result of improper dewatering are to be removed and replaced at the General CONTRACTOR's expense.

- B. Protect sub-grades from softening, undermining, washout, and damage by rain or water accumulation. Unsuitable soils as a result of improper sub-grade protection are to be removed and replaced at the CONTRACTOR's expense.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 - 2. Install a dewatering system or drainage trench, when necessary to keep sub-grades dry and convey ground water away from excavations in accordance with the recommendations of the geotechnical report. Maintain system until dewatering is no longer required.
 - 3. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding Project site and surrounding area.
 - 4. Do not allow water to accumulate in excavations.
 - 5. If presence of subsurface water is encountered during excavation, provide interior drainage.
 - 6. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations.
 - 7. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas.

3.3 EXPLOSIVES

- A. The use of explosives is prohibited.

3.4 EXCAVATION, GENERAL

- A. Unclassified excavation: excavation to, and beyond, sub-grade elevations as necessary to reach specified compaction level, regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions. Unclassified excavated material may include rock, soil materials, and obstructions. Changes in the contract sum or the contract time will be authorized in writing by the OWNER/ENGINEER for excavation or removal of unclassified material.
- B. If excavated materials intended for fill and backfill include unsatisfactory soil

materials and rock, replace with satisfactory soil materials as directed and approved by testing agency geotechnical engineer and the OWNER/ENGINEER.

- C. Replacement of soils shall be included in both the contract time and contract sum. No adjustments shall be authorized to either component for such occurrences.
- D. Verify areas to be backfilled are free of debris, snow, ice or water, and ground surfaces are not frozen.
- A. Proof roll exposed subgrade in building and paving areas with 20 cu. yd. (min.) fully loaded dump truck or similar acceptable construction equipment, to detect unsuitable soil conditions. Commence proof rolling operations after a suitable period of dry weather to avoid degrading acceptable subgrade surfaces. Make 8 passes over each section with proof rolling equipment, with the last 4 passes perpendicular to the first 4 passes. Testing agency geotechnical engineer and the representative must be present for proof roll.
- E. Cut out soft areas of subgrade not readily capable of in-situ compaction. Backfill and compact to density equal to requirements for suitable backfill material. Refer to Section 2.0.
- F. Site backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet or spongy subgrade surfaces.
- G. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of materials excavated.
 - 1. Maintain sides and slopes of excavations in safe conditions until completion of backfilling.
- H. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.
 - 1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
 - 2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch.
- B. Extend excavations a sufficient distance from structures for placing and

removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for footings and foundations: do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for underground tanks, basins, and mechanical or electrical utility structures: excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended for bearing surface. Extend excavation sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
3. Refer to geotechnical report for additional recommendations.
4. Locate and mark existing underground utilities and services before beginning structural excavation.
5. Provide excavation for structures and footings, as required for construction, bracing and removal of forms, applying waterproofing, and to permit inspection.
6. Machine slope banks to angle of repose or less until shored. Do not allow excavation to interfere with normal 45 degrees angle bearing splay of any foundation.
7. Ensure bottom of excavation is reasonably level.
8. Maintain excavations in as near their natural moisture conditions as possible.
9. Fill over-excavated areas under structure bearing surfaces in accordance with testing agency geotechnical engineer direction.
10. Do not allow construction equipment to create "pumping" of soils.
11. Remove boulders or cobbles.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.
- B. Where rock or concrete spoil is encountered, carry excavation 18" below subgrade and backfill with suitable material approved by the testing agency geotechnical engineer and the OWNER/ENGINEER.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. See Section 31 23 23 Trenching and Backfill.

3.8 APPROVAL OF SUB-GRADE

- B. Notify testing agency when excavations have reached required sub-grade.
- C. If testing agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed with written approval of testing agency geotechnical engineer and the OWNER.
 - 1. Additional excavation and replacement material included in the CONTRACTOR's sum will be addressed either by unit price or allowance.
- D. Proof roll sub-grade with fully loaded, 20 yd (min.) tandem dump truck to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated sub-grades. The testing agency geotechnical engineer must be present for proof roll.
- E. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as recommend by the testing agency geotechnical engineer and and directed by OWNER/ENGINEER.

3.9 UNAUTHORIZED EXCAVATION

- A. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the testing agency geotechnical engineer and the OWNER/ENGINEER.
- B. Unauthorized excavation, as well as remedial work directed by the testing agency geotechnical engineer and the OWNER/ENGINEER shall be at CONTRACTOR's expense.
- C. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete or LSM fill may be used when approved by the testing agency geotechnical engineer and the OWNER/ENGINEER.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by the testing agency geotechnical engineer and the OWNER/ENGINEER..
 - 2. Consists of material removal beyond indicated subgrade elevations or dimensions without specific direction of the testing agency geotechnical engineer and the OWNER/ENGINEER.
 - 3. Correct unauthorized excavation, as well as remedial work as directed by the

testing agency geotechnical engineer and the OWNER/ENGINEER, at no additional cost to OWNER.

4. Backfill and compact other unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the testing agency geotechnical engineer and the OWNER/ENGINEER.

3.10 ADDITIONAL EXCAVATION:

- A. When excavation has reached required subgrade elevations, notify soils testing laboratory for examination of conditions.
- B. If unsuitable bearing materials are encountered at required subgrade elevations, excavate deeper and replace excavated material as directed by soils testing laboratory.
- C. Removal of unsuitable material and its replacement as directed will be paid on basis of Contract conditions relative to changes in Work. Proof rolling is to be included.

3.11 COLD WEATHER PROTECTION

- A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F. (1-degree C.).

3.12 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials when and where directed by the testing agency geotechnical engineer and the OWNER/ENGINEER. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water away. Cover stockpiles to prevent windblown dust.
 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
 2. Prevent saturation of soil above the optimum moisture content.
 3. Install silt fence/ silt sock around periphery of any topsoil stockpiles

3.13 BACKFILL

- A. Place and compact backfill in excavations promptly, or within time as specified by the Contract Documents, but not before completing the following:
 1. Construction below finish grade including, where applicable, damp proofing, waterproofing, and perimeter insulation.
 2. Surveying locations of underground utilities for record documents.

3. Inspecting and testing underground utilities.
4. Concrete and masonry have cured 28 days and is adequately braced.
5. Removing concrete formwork.
6. Removing trash and debris.
7. Removing temporary shoring and bracing, and sheeting.
8. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.14 FILL

- A. Preparation: remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 8 H to 1 V so fill material will bond with existing material. Bench into the existing slope per ODOT Document GB2 Special Benching and Sidefill Embankment Fills and in addition as follows:
 - a. Scalp the existing slope according to ODOT Item 201.
 - b. Cut horizontal benches in the existing slope to a sufficient width to blend the new embankment with the existing embankment and to accommodate placement, and compaction operations and equipment.
 - c. Bench the slope as the embankment is placed and compact in layers.
 - d. Begin each bench at the intersection of the existing slope and the vertical cut of the previous bench. Recompect the cut materials along with the new embankment.
- C. Place and compact fill material in layers to required elevations at locations as follows:
 1. Under grass and planted areas, use satisfactory screened topsoil.
 2. Under walks and pavements, ODOT 304 Aggregate Base and if subgrade is deficient provide engineered fill. Extend five (5) beyond the pavement edge and shall include the support slopes to their full width.
 3. Under steps and ramps, use structural fill.
 4. Under building slabs, use structural fill unless noted otherwise on structural drawings. Extend five (5) beyond the building edge and shall include the support slopes to their full width.

5. Under footings and foundations, use structural fill unless noted otherwise on structural drawings.
6. Drainage fill material shall be proof rolled to a uniform stable condition prior to placement of vapor retarder.
7. Do not place fill on frozen ground

3.15 MOISTURE CONTROL

- A. Uniformly moisten or aerate sub-grade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove & replace, or scarify & air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 % and is too wet to compact to specified dry unit weight

3.16 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.
- C. Compact soil to not less than the following percentages of maximum dry unit weight according to Std. Proctor test ASTM D 698.
 1. Unless specified elsewhere in the Geotechnical Report, under structures, building slabs and steps the compaction should be a minimum of 100 percent of the optimum density.
 2. Under walkways, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill material at 98 percent (Standard Proctor).
 3. Under lawn or unpaved areas, scarify and re-compact top 6 inches below sub-grade and compact each layer of backfill or fill material at 95 percent.
 4. Top 12" of sub-grade under roadways, drives, parking areas, foundations, backfill, footings, pads, paved pedestrian walks and courts, loading docks and paving primarily for vehicle traffic, the compaction shall be a minimum of 100 percent.

3.17 SUB-BASE AND BASE COURSES

- A. Under pavements and walks, place sub-base course on prepared sub-grade and as follows:
 - 1. Place base course material over sub-base.
 - 2. Compact sub-base and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 100 percent of maximum dry unit weight according to ASTM D 698 (standard proctor).
 - 3. Shape sub-base and base to required crown elevations and cross-slope grades.
 - 4. When thickness of compacted sub-base or base course is 6 inches or less, place materials in a single layer.
 - 5. When thickness of compacted sub-base or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.
- B. Pavement shoulders: place shoulders along edges of sub-base and base course to prevent lateral movement. Construct shoulders, at least 60 inches wide, of satisfactory soil materials and compact simultaneously with each sub-base and base layer to not less than 100 percent of maximum dry unit weight according to ASTM D 698.

3.18 GRADING

- A. See Section 31 22 00 Grading

3.19 PROTECTION

- A. Protecting graded areas: protect newly graded areas from traffic, freezing, and erosion. Keep all areas graded to drain, free of ruts, ponding water, trash, and debris. CONTRACTOR is to pump off all ponding water immediately. Keep free of trash and debris.
- B. Repair and reestablish grades to specify tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and re-compact.
- C. Where settling occurs before project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible, as satisfactory to the OWNER/ENGINEER.
- D. Protect areas with slopes exceeding 3 H to 1 V with erosion-control fiber mesh and with erosion-control blankets installed and stapled according to manufacturer's written instructions.
- E. Unless noted otherwise, protect areas with slopes not exceeding 3 H to 1 V by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

Anchor straw mulch by crimping into topsoil with suitable mechanical equipment, use tackifier, or erosion control netting. Maintain during construction

3.20 FIELD QUALITY CONTROL

- A. Testing agency: The OWNER will engage a qualified independent Geotechnical Engineering testing agency to perform field quality-control testing/compliance.
- B. Allow testing agency to inspect and test sub-grades and each fill/backfill layer. Proceed with subsequent earthwork only after field test results for previously completed work comply with requirements.
- C. Footing Sub-grade: at footing sub-grades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing sub-grades may be based on a visual comparison of sub-grade with tested sub-grade when approved by the Geotechnical Engineer.
- D. Testing agency will test compaction of soils in place according to ASTM D 698, ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 1. Paved and building slab areas: at sub-grade and at each compacted fill and backfill layer, at least one test for every 2,000 S.F. or less of paved area or building slab, but in no case fewer than three tests. In each compacted fill layer, make one field density test for every 2,000 sq. feet of overlaying building slab or paved area, but in no case less than 2 tests. Field density tests shall be made at all walkway entrances and ramps into the proposed building.
 2. Foundation wall backfill: at each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
 3. Trench backfill: at each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.

4. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent evaluation and approval of each footing subgrade should be performed by Geotechnical Testing Agency.
 5. Lawns, athletic fields and areas receiving topsoil: Perform field density tests on a spot-check basis to assist the CONTRACTOR in determining if compaction is in accordance with the specifications.
- E. When testing agency reports that sub-grades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten, aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

3.21 TESTING AND INSPECTION

- A. INSPECTION AGENCY: Inspect and test construction of embankments, fills, backfills, trenches, and subgrades and report to the OWNER/ENGINEER conformance in all particulars to specification requirements.
- B. Scheduling:
1. Assign qualified personnel to be on site at all times when operations are scheduled.
 2. The CONTRACTOR should note that no earthwork operation shall be permitted in their absence.
- C. Responsibilities:
1. Evaluation of subgrade preparation and suitability.
 2. Moisture content and field density tests on all layers of fill and backfill material placed.
 3. Evaluation of degree of compaction attained for all fill and backfill material placed.
 4. Testing and evaluation of borrow material.
 5. Sources of borrow and of select fill.
 6. Footing subgrade suitability.
 7. Inspection of installation of subdrainage system.
- D. Results of Tests:

1. Make results available to the OWNER?ENGINEER immediately upon completion of areas of layers.
- E. Final Report: The Geotechnical Testing Agency shall prepare a written report that summarizes the work inspected during the course of the project. A discussion of all deviations from the contract documents and specifications, with their related impact on the final construction, shall be described in detail. The engineer of record shall review this final report and recommend corrective measures (as deemed necessary) that must be made prior to final acceptance of the work. Prior to final payment, a written report certifying that the work meets the requirements of the contract documents, specifications, and all governing agencies shall be prepared, submitted, and approved by the ENGINEER.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off-site.
1. Do not burn or bury removed materials on project site.
 2. If hazardous materials are encountered during clearing operations, notify the Engineer for additional instructions. Comply with laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.

END OF SECTION 312000

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SECTION 31 22 00 - GRADING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section includes the following.
 - 1. Rough Grading
 - 2. Finish Grading
 - 3. Stockpiling of topsoil and subsoil
 - 4. Disposal of unsuitable and excess materials

1.2 DEFINITIONS

- A. "Topsoil": natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay. Particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, and other objects more than 1-1/2 inches in diameter; and free of weeds, roots, and other deleterious materials.
- B. CM refers to Construction Manager

1.3 SUBMITTALS

- A. Provide final As Builts survey and letter certifying storm water detention, retention, bio-retention cells have been constructed to the plan dimensions shown on the plans.

1.4 QUALITY ASSURANCE

- A. Pre-installation conference: Conduct conference at project site

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify survey benchmarks and intended elevations of work.
- B. Verify all Storm Water Pollution Prevention Plans erosion control measures have been installed correctly prior to commencing work.
- C. Immediately notify the Owner and Engineer if suspected hazardous materials are encountered and cease operations in that area.
- D. Identify areas loosened by frost action, softened by flowing or weather, or containing unsuitable materials.

3.2 PREPARATION

- A. Remove material loosened by frost action, softened by flooding or weather, or containing unsuitable material. Replace and compact to same requirements as for specified fill in Section 312000 Earth Moving..
- B. Stake and flag all known utility locations.
- C. Identify required lines, levels, grades and benchmarks/datums.
- D. Locate and protect all above ground and below ground utilities, structures, signage, landscaping, light poles, poles and other item.to remain.
- E. Notify all private utility owners of work near their facilities.

3.3 GENERAL

- A. Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.4 EROSION CONTROL

- A. All erosion control must comply with:
 - 1. Ohio Rainwater and Land Development Manual Standards and Specifications for Erosion and Sediment Control (Blue Book) and the Storm Water Pollution Prevention Plans.
 - 2. Protect areas with slopes exceeding 3H to 1V with erosion-control fiber mesh and with erosion-control blankets installed and stapled according to manufacturer's written instructions.
 - 3. Unless noted otherwise, protect areas with slopes not exceeding 3H to 1V by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/ acre to from a continuous blanket 1-1/2" in loose depth over a seeded area. Spread by hand, blower, or other suitable equipment.

3.5 ROUGH GRADING

- A. During all grading work the Contractor shall provide positive drainage across the site to the temporary storm water facilities.
- B. Topsoil remove and stockpile
 - 1. Strip all topsoil from areas that are to be excavated, landscaped, graded, or to have a structure built on it. See project Geotechnical Report for topsoil depth.
 - 2. Do not strip topsoil when wet or during inclement weather such as rain or snow.
 - 3. Separate all organic matter such as root zones, trash debris etc. from topsoil. Dispose of organic material off-site.
 - 4. Provide an area on site to stockpile the topsoil for future use on site or to be hauled away. Provide silt fence around the stockpile area. Keep topsoil away from other site soils.
- C. Subsoil removal and stockpiling
 - 1. Remove subsoil from areas that are to be excavated, landscaped, graded, or to have a structure built on it. See project Geotechnical Report for topsoil depth.
 - 2. Do not strip subsoil when wet or during inclement weather such as rain or snow.
 - 3. Provide an area on site to stockpile the topsoil for future use on site or to be hauled away. Provide silt fence around the subsoil area. Keep subsoil away from other site soils.
- D. Rough grade lawn area to a maximum of 4 H to 1 V. Steeper grades will require ground cover planting. Provide roundings at top and bottom of banks and at breaks in grade.
- E. Benching Slopes: All slopes that are steeper than 8H to 1V shall be benched horizontally to key the fill material into the slope for firm bearing and stability. Follow guidelines as call out in ODOT Document GB2 Special Benching and Sidefill Embankment Fills.

- F. Stability: Any damaged or displaced subsoil shall be replaced to the same requirements as called for in Section 31 20 00 Earth Moving.
- G. Disc level surfaces.
- H. Rough grade the site to achieve lines and grades indicated with allowances for imported fill thickness.
- I. Provide positive drainage from all buildings per the slope and grades show on the Site Grading Plan.

3.6 FINISH GRADING

- A. Prior to commencing with finish grading perform the following:
 - 1. Verify the subgrade prior to the placement of soil is properly contoured to the elevations shown on the plans and compacted per the requirements of Section 31 20 00 Earth Moving.
 - 2. Verify that all backfill has been accepted and approved.
- B. Fine grade the site to the final plan elevations shown on the Grading Plan. All uneven areas and depressions shall be corrected to allow for positive drainage. Follow the profile of the subgrade and bring to the final elevations as shown on the plans.
- C. Scarify sub-grade to a minimum depth of 5 inches before placement of topsoil. Remove all waste material.
- D. Minimum depth for compacted screened topsoil shall be 6 inches for grass and adequate depth for other planting materials.
- E. Protect newly graded areas from the elements. Repair all settlement and erosion and re-establish grades to the required elevations prior to acceptance.
- F. If unstable soil or subgrade is encountered during construction the contractor shall notify the Owner and Engineer to approve corrective actions.
 - 1. If approved, the Contractor shall remove some or all the unstable soil, place synthetic fabric and over material, or place aggregate refill, the finish graded section using approved material and compacted per Section 312000 Rough Grading.
 - 2. The Contractor shall coordinate this work with the OWNER/CM or ENGINEER in way that final measurements of the corrective measures taken can be measured and quantified.

3.7 STOCKPILING

- A. As part of the Site Clearing Plan called for in Section 312000 Site Clearing provide an area on site to stockpile topsoil and excavated subsoil. Do not place the stockpiles over existing or new utilities unless approval is granted by the Owner and Engineer.
- B. Provide positive drainage away from stockpile to prevent ponding or flooding of project area. Direct all drainage to temporary storm water facilities.
- C. The topsoil and subsoil stockpile shall be sloped no steeper than 2H:1V and at a maximum height of eight (8) feet.
- D. Provide silt fence around stockpile and immediately stabilize dormant stockpiles within seven (7) days per the specifications as shown on the projects Storm Water Pollution Prevention Plans. Dormant is considered any stockpile not actively used for more than thirty (30) days.

3.8 EXCESS MATERIAL

- A. Dispose of extra or unsuitable topsoil or subsoil material off-site.

3.9 TOLERANCES

- A. Excavations and Embankment work shall be performed and conform to the projects Grading Plan and if available cross sections and profiles. All work shall conform to the tolerances within this section. The Contractor shall understand and satisfy themselves as to the nature and distribution of the materials that they excavate.
- B. The Contractor shall verify their work with templates, slope boards or other approved devices accepted by the industry and to the satisfaction of the Owner and Engineer.
- C. The following are the accepted tolerances that work shall conform to:
 - 1. For cut and fill slopes deviations of ½ inch measured in a horizontal plane will not be permitted and will need corrective actions.
 - 2. Shoulders and ditches, the horizontal measurements from the centerline shall not be less than the plan dimensions, and the elevations thereof shall not be higher than specified but may vary not more than ½ inch below the established grades.
 - 3. Subgrades surface shall in no location vary more than ½-inch from a ten foot straight edge applied to the surface parallel to the centerline of pavement, nor more than ½-inch from subgrade elevation established by construction layout stakes.
 - 4. Finished Grade shall be installed within ½-inch from plan elevation shown on the Grading Plans.

3.10 CLEANING

- A. Once finish grading has occurred leave all areas clean and raked, ready to receive grass seed or landscaping.

END OF SECTION

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SECTION 31 23 33 - TRENCHING AND BACKFILL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section includes the following.
 - 1. Underground utility trench excavation and safety.
 - 2. Backfill materials and placement for underground utilities.
 - 3. Utility identification marking tape and trace wire

1.2 DEFINITIONS

- A. Percent Compaction or Compaction Density: The field density of compacted material, expressed as a percentage of maximum dry density.
- B. Field Dry Density of Field Density: In-place density as determined by ASTM D1556 (Sand Cone Method), ASTM D 2167 (Rubber Balloon Method), or ASTM D 6938 (Nuclear Method).
- C. Maximum Dry Density: Laboratory density as determined by ASTM D698 (Standard Proctor) and occurring at the optimum moisture content of the soil being tested.
- D. Pipe Embedment: Comprised of the following or combination of:
 - 1. Foundation: Required only when the native trench bottom does not provide a firm working platform or the necessary uniform and stable support for the installed pipe.
 - 2. Bedding: The zone between the bottom of trench and the bottom of pipe. Provides a firm, stable and uniform support of the pipe.
 - 3. Haunching: Zone from the bottom of the pipe to the springline of the pipe.
 - 4. Initial Backfill: From the top of the bedding or foundation layer to six (6) inches above the top of pipe, unless otherwise noted on the Construction Document trench details. Also, known as pipe cover.
 - 5. Final Backfill: After the initial backfill or pipe cover to the final surface or the pavement subgrade.
 - 6. Backfill: Both initial and final backfill.
- E. OWNER abbreviation for Construction Manager

1.3 SUBMITTALS

- A. Provide material for pipe bedding, initial and final backfill including the following:

1. Name of Source
2. Location
3. Date of Sample
4. Sieve Analysis
5. Laboratory Compaction Characteristics

1.4 QUALITY ASSURANCE

- A. The Contractor shall compact all backfill material in accordance with the specifications of the pipe manufacturer.
- B. The Contractor shall provide quality control acceptance field testing services of compacted backfill material, unless otherwise noted. Provide the Owner and Engineer a letter certifying compaction results.

1.5 DELIVERY SOTRAGE AND HANDLING

- A. If the trench detail calls for geotextile fabric it shall be protected from sunlight's ultraviolet rays during transportation and storage. Do not leave geotextile fabric exposed to sunlight's ultraviolet rays for more than five (5) days during installation.
- B. Do not leave PVC piping exposed to sunlight's ultraviolet rays for more than five (5) days during installation, transportation, or storage.

PART 2 - PRODUCTS

2.1 BACKFILL MATERIALS

- A. Trench bedding and Initial Backfill for the following pipes and fittings shall follow the pipe manufactures recommendations, the Trench detail shown on the Construction Documents and the following:
 1. Reinforced Concrete Pipe and Fittings
 - a. Bedding shall consist of coarse interlocking aggregate No. 57, 6, 67, 68, 7, 78, or 8 stone for 60-inch or smaller pipe. For 66-inch or larger diameter pipe No. 4 aggregate may be used.
 - b. Pipe Cover shall consist of compacted ASTM D Class I stone coarse interlocking aggregate No. 57, 6, 67, 7, 78, or 8 stone.
 2. High Density Polyethylene (HDPE) Pipe and Fittings
 - a. Bedding shall consist of coarse interlocking ASTM D2321 Class I aggregate No. 57 stone.
 - b. Pipe Cover shall consist of compacted coarse interlocking ASTM D2321 Class I aggregate No. 57 stone.

3. Ductile Iron Pipe and Fittings
 - a. Bedding shall be Select Granular Backfill (Spent core sand or foundry sand is strictly prohibited).
 - b. Pipe Cover shall consist of compacted Select Granular Backfill (Spent core sand or foundry sand is strictly prohibited).
4. Polyvinyl Chloride (PVC) Pipe and Fittings
 - a. Pipe bedding shall be ASTM No. 57 aggregate.
 - b. Pipe cover shall be ASTM No. 57 aggregate.
5. Pavement Underdrain / Curb Drains
 - a. ASTM NO. 57 Aggregate.

B. Final Backfill shall consist of the following:

1. Premium Backfill where trenches fall underneath or within the zone of influence of all pavement, concrete curbs and sidewalks or structures and shall consist of Premium Backfill with gradation conforming to ODOT Section 304. The materials shall be well graded with no particles larger than two (2) inches and having a maximum gradation meeting the limits described in the ODOT OWNERS specifications. The backfill shall be compacted in 6-inch lifts with equipment acceptable to the pipe manufacturer. The following materials are prohibited: Slag, crushed ACBFS, or steel slag.
2. Regular backfill from trench may be used for all areas not under pavement. Suitable material may be Class I, II, III or excavated materials installed in maximum 8" lifts, 93% compacted. No rocks over 1-1/2" are acceptable in upper 8" of backfill.

2.2 EQUIPMENT

- A. Compaction equipment shall be capable of consistently achieving the specified compaction requirements without damaging pipes.

2.3 UTILITY IDENTIFICATION

- A. Tracer Wire: Continuous, single-stranded copper wire, insulated, maximum 10 AWG. Clear plastic covering, imprinted with inscription describing specific utility in large letters.

- B. Detectable Warning Tape: acid-and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 5 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection. Tape shall be manufactured using a 0.8 mil clear virgin polypropylene film, reverse printed and laminated to a 0.35 mil solid aluminum foil core, and then laminated to a 3.75 mil clear virgin polyethylene film. Tape shall be printed using a diagonally striped design for maximum visibility, and meet the APWA Color-Code standard for identification of buried utilities. Detectable marking tape shall be Pro-Line Safety Products (or approved equal) and made in the USA., detectable by metal detector when tape is buried a maximum of 12" to 18" below grade; colored as follows:

1. APWA Uniform Color Codes

- a. RED - Electric Power Lines, Cables, Conduit, and Lighting Cables.
- b. YELLOW - Gas, Oil, Steam, Petroleum, or Gaseous Material.
- c. ORANGE - Communication, Alarm or Signal Lines, Cables, or Conduit.
- d. BLUE - Potable Water
- e. GREEN - Sewers and Drain Lines (Tape shall indicate storm or sanitary)
- f. WHITE - Proposed Excavation Limits or Route
- g. PINK - Temporary Survey Markings, Unknown / Unidentified Facilities
- h. PURPLE - Reclaimed Water, Irrigation, and Slurry Lines

PART 3 - EXECUTION

3.1 EXAMINATION

- A. When the Contractor trenching operations encounter existing or abandoned underground storage tanks (USTs), the operations shall be temporarily discontinued and notify the OWNER. The OWNER will contact an Environmental [ENGINEER] to determine the disposition thereof and further direction provided.
- B. When the Contractor trenching operations encounter remains of prehistoric people's site or artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and notify the OWNER. The OWNER will contact archeological authorities to determine the disposition thereof and further direction provided.

3.2 PREPARATION

- A. As per Section 31 00 00 EARTH MOVING.

3.3 SAFETY

- A. Trench boxes or sheeting and shoring shall be used for trenches per OSHA specifications.

3.4 PROTECTION OF IN-PLACE CONDITION

- A. As per Section 31 00 00 EARTH MOVING.

3.5 RESTORATION

- A. As per Section 31 00 00 EARTH MOVING.

3.6 TRENCH EXCAVATION

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line, 48" unless noted otherwise by the Contract Documents.
- C. Excavate trenches to uniform widths, in accordance with OSHA guidelines, to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
- D. Trench bottoms: excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape sub-grade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench sub-grade.
 - 1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed sub-grade.
 - 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference.
 - 3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- E. Preserve material below and beyond the line of excavation.
- F. Locate all stockpile excavated trench material at least four (4) feet from edge of excavations and prevent cave-ins or bank slides.
- G. Remove rocks larger than six (6) inches or as required by plan notes, seal if required, and backfill with bedding material.
- H. See Section 31 00 00 EARTH MOVING for additional requirements.

3.7 UNAUTHORIZED EXCAVATION

- A. Contractor is responsible for backfilling unauthorized excavations.
- B. Unauthorized excavations which extend to and expose rock will be sealed with at least six (6) inches of LSM, concrete, or sprayed with bitumen within eight (8) hours of exposure. If sealing is delayed more than eight (8) hours, over excavate at least six (6) inches below the bottom to expose the fresh rock and seal within six (6) hours.

3.8 BACKFILL

- A. Contractor is responsible to obtain all inspections and approvals for trench and pipe installation.
- B. All trenches and excavations shall be backfilled as soon as practical after the pipe has been installed unless other protection of the pipe is directed or shown on the plans.
- C. Coordinate backfilling with utilities testing.
- D. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- E. The backfill around the pipe up to the top of pipe shall be placed in loose layers not exceeding six (6) inches per layer and thoroughly compacted by hand or power tampers approved by the Owner or Engineer. Great care shall be used to obtain thorough compaction under the haunches and along the side of pipes. Over the top of pipe, backfill layers of approximately eight (8) inch depth shall be added with each layer compacted separately and thoroughly until the trench is completely and uniformly filled to a depth of two feet above the top of the pipe.
- F. Backfilling against pipe structures, whose joints involve the use of cement mortar or other concrete, or where buttresses are constructed, shall not be done until mortar has set at least 12 hours.
- G. Compaction over one foot above the pipe shall be done with approved mechanical tampers. Compaction density be per the pipe manufacture specifications.

- H. Backfill materials shall be brought up evenly by depositing the material in layers approximately nine (9) inches in loose depth and without damaging the pipe by shock, jar or excessive free fall. Each layer shall be thoroughly compacted by power tampers operated with care so as to not to damage the underlying pipe or appurtenances. Hand tampers may be used in corners or narrow places inaccessible to power tampers. If compaction is done using hydraulically-operated backhoe mounted compactors with minimum rated impulse force of 6,4000 pounds with a minimum 2,0000 cycles per minute, the backfill material may be deposited in layers not more than two (2) feet in loose depth. Layers in excess of two feet may be deposited only if tests, conducted at the contractor's expense, show, to the satisfaction of the Owner and Engineer that the specified degree of compaction is being achieved. There shall be at least three feet of compacted backfill over the pipe before this method of compaction may be employed.
- I. For all areas not under pavement, sidewalks and curbs the backfill shall be compacted to 90% of the maximum dry density at +/-2% of optimum moisture content as determined by tests approved by or conducted by the Owner. Backfill shall be compacted to not less than 95% of the maximum dry density at +/-2% of optimum moisture content for areas under pavement, sidewalks and curbs.
- J. Backfill shall be kept completed up to a point within 100 feet of the end of the newly installed pipe unless directed by the Owner and Engineer. During backfill operations, no sheeting or shoring shall be removed without permission from the Owner or Engineer.
- K. Backfill trench to the pavement subgrade or the finished grade less topsoil.
- L. Provide 4 inch thick, concrete-base slab support for piping or conduit less than thirty (30) inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway sub-base.
- M. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings with approval of Engineer.
- N. Place backfill as to not disturb or damage nearby work or facilities.
- O. Maintain all fill materials within two (2) percent of optimum moisture, to attain required compaction density.
- P. Place and compact material in equal continuous layers.
- Q. Maximum compacted depth is six (6) inches for aggregate material and eight (8) inches for soil materials, unless shown differently in the plans.
- R. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

3.9 COMPACTION

- A. As per Section 31 00 00 EARTH MOVING.

3.10 UTILITY IDENTIFICATION

- A. Install marking tape over all site utilities, twelve (12) inches below finish grade or as shown on the Trench Details in the plans. Install six (6) inches below subgrade under pavements and slabs.
- B. Install tracer wire at top center of parking tape; pull wire taut to remove slack.
- C. Extend tracer wire to utility boxes, manholes, hand holes, and junctions etc. to allow for connection to subsurface location equipment.

3.11 FIELD QUALITY CONTROL AND ASSURANCE

A. General

1. The Contractor shall perform field quality control tests separate from acceptance testing. Contractor test results will not be used by the Owner or Engineer for acceptance.
2. Field density testing for quality assurance shall be done in accordance with ASTM D1556, STM D2167, or ASTM D6938.
3. Compaction tests shall be deemed to comply with specifications when no more than one (1) test of any three (3) consecutive tests performed falls below the specified relative compaction. The one test shall be no more than three (3) percentage points below the specified compaction. The Contractor shall pay for the costs for any retesting or additional work not conforming to these specifications.
4. Where compaction tests indicate a failure to meet the specified compaction, the Contractor shall take additional tests in each direction until the extent of the failing area is identified. Rework the failed area until the specified compaction has been achieved.

B. Compaction

1. Material shall be placed and compacted in layers until the dry density is not less than the percentage of maximum dry density indicated in the table below determined by ASTM D698.

Max Lab Dry Wt. (lbs/ft ³)	Min. Compaction Requirements (% Lab Max.)
90 to 104.9	100
105 to 119.9	98
120 or more	95

4. The Owner or Engineer will evaluate field density test results in relation to maximum dry density as determined by testing the material in accordance with ASTM D698 (Standard Proctor).
5. Location of field density tests shall be determined by the Owner or Engineer.
6. Minimum frequency of the Contractor field density tests shall be as follows:
 - a. Under pavement, sidewalks, curbs, other structures: 1 per lift for every 1,000 lineal feet of trench.
 - b. Not under pavement, sidewalks, curbs, other structures: 1 per alternate lift for every 1,000 lineal feet of trench.
 - c. If requested by the Owner or Engineer the Contractor shall take more frequent tests.

3.12 SHRINKAGE

- A. Backfill trench to a height to allow for the shrinkage or consolidation of the backfill material over time.
- B. If backfill settles over trenches prior to subgrade work install additional backfill to level off areas.

END OF SECTION

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SECTION 31 32 19 – GEOTEXTILE FABRIC

PART 1 - GENERAL

1.1 WORK INCLUDES

- A. Work included in this section relates to all geotextile fabric materials, and appurtenances related to installation.

1.2 SUBMITTALS

- A. Submit shop drawings prior to ordering materials for approval.
- B. Shop drawings: include product material information for the following:
 - 1. Geotextile Fabric
 - a. Test results of physical properties.
 - b. Affidavit certifying that the raw and roll material tests results are submitted are accurate and meet the specification requirements.
 - c. Manufacturer's installation instructions.
 - d. Subgrade Stabilization design recommendations by the manufacturer.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. During shipment and storage, wrap the fabric in a heavy-duty protective covering to protect it from UV deterioration, temperature over 140 degrees Fahrenheit, direct sunlight, mud, dirt, dust, and other debris.
- B. Geotextile labeling, shipment and storage shall follow ASTM D 4873.
- C. Handle and store geotextile fabric according to manufacturer's moving and storage instructions.
- D. Handle and unload by hand, or with load carrying straps, a fork lift with stringer bar or axial bar. Fabric shall not be lifted by chains, cables or dropped on ground.

1.4 QUALITY ASSURANCE

- A. Comply with the requirements of authorities having jurisdiction and manufacturer's requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. All manufacturers are subject to compliance with requirements, specifications, and construction details, and must demonstrate compliance through appropriate test and documentation.

2.2 GEOTEXTILE FABRIC

- A. Furnish fabric composed of strong rot-proof polymeric fibers formed into a woven or non-woven fabric. Products must be tested by the National Transportation Product Evaluation Program (NTPEP). The Department will determine acceptance of Type A, B, C and D fabric according to data obtained in the most current NTPEP report - Laboratory Results of Evaluations on Geotextiles and Geosynthetics. The NTPEP testing results must meet or exceed the requirements listed in Table 712.09-1. For all tests except Ultraviolet Exposure, the products Minimum Average Roll Values (MARV), as published in the NTPEP report, must also meet or exceed the requirements listed in the table. If no MARV value is published in the NTPEP report, the manufacturer must submit to the Department certified test data showing the MARV values for the product will meet or exceed the requirements listed in Table 1 below. All minimum strengths shown are in the weakest principal direction.
- B. For Type E material, supply fabric conforming to the requirements of AASHTO M288, Section 10, Table 8. The Owner or Engineer will accept Type E material based on certified test data.
- C. Ensure that the fabric is free of any treatment that might significantly alter its physical properties.

TABLE 1

PROPERTY	TEXT METHOD	REQUIRED VALUES	
Type A: Underdrains and Slope Drains			
Minimum tensile strength	ASTM D 4632	80 lb	355 N
Minimum puncture strength [1]	ASTM D 6241	140 lb	625 N
	or ASTM D 4833	25 lb	110 N
Minimum tear strength	ASTM D 4533	25 lb	110 N
Apparent opening size	ASTM D 4751		
Soil Type-1: Soils with <= 50% passing No. 200 (75 m) sieve		AOS ≤ 0.6 mm	
Soil Type-2: Soils with 50-85% passing No. 200 (75 m) sieve		AOS ≤0.3 mm	
Minimum permittivity	ASTM D 4491	0.5 sec-1	
Type B: Filter Blankets for Rock Channel Protection			
Minimum tensile strength	ASTM D 4632	200 lb	890 N

Minimum elongation	ASTM D 4632	15%	
Minimum puncture strength [1]	ASTM D 6241	440 lb	1955 N
	or ASTM D 4833	80 lb	355 N
Minimum tear strength	ASTM D 4533	50 lb	220 N
Apparent opening size	ASTM D 4751	AOS $\leq$ 0.6 mm	
Minimum permittivity	ASTM D 4491	0.2 sec-1	

Type C: Sediment Fences

Minimum tensile strength	ASTM D 4632	120 lb	535 N
Maximum elongation	ASTM D 4632	50%	
Minimum puncture strength [1]	ASTM D 6241	275 lb	1225 N
	or ASTM D 4833	50 lb	220 N
Minimum tear strength	ASTM D 4533	40 lb	180 N
Apparent opening size	ASTM D 4751	AOS $\leq$ 0.84 mm	
Minimum permittivity	ASTM D 4491	0.01 sec-1	
Ultraviolet exposure strength retention [2]	ASTM D 4355	70%	

Type D: Subgrade-Base Separation or Stabilization

Minimum tensile strength	ASTM D 4632	180 lb	800 N
Maximum elongation	ASTM D 4632	50%	
Minimum puncture strength [1]	ASTM D 6241	385 lb	1715 N
	or ASTM D 4833	70 lb	310 N
Minimum tear strength	ASTM D 4533	70 lb	310 N
Apparent opening size	ASTM D 4751	Same as Type A	
Permittivity	ASTM D 4491	0.05 sec-1	

Type E: Pavement Reinforcement Fabric

AASHTO M 288, Section 9, Table 7

Notes:

1. ASTM D6241 is now the standard puncture resistance test required by AASHTO and NTPEP. NTPEP will continue to publish product data, tested under ASTM D4833, until the product is retested under ASTM D6241.
2. Provide certified test data to the Department. Include strength retention data at 0, 150, 300, and 500 hours

2.3 ENGINEERING GEOGRID MATERIAL

- A. Biaxial polymer grids will be manufactured from 100% polypropylene; such as Tensar BX1200 and/or BX1300 as manufactured by the Tensar Corporation, 1210 Citizens Parkway, Morrow, Georgia 30260 (Phone 1-800-843-8417) or an approved equal

2.4 EROSION CONTROL BLANKETS

- A. Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long. Install in detention basin per manufactures recommendations.

2.5 Erosion-Control Fiber Mesh:

- A. Biodegradable twisted jute or spun-coir mesh, a minimum of 0.92 lb. /sq. Yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long. Install on slopes greater that 1 Vertical to 3 Horizontal or areas subject to erosion in order to stabilize site.

PART 3 - EXECUTION

3.1 GEOTEXTILE FABRIC CONSTRUCTION METHOD

- A. When specified, place the geotextile fabric at the bottom of the cut or at locations designated in the construction plans and as directed by the Owner or Engineer.
- B. Place the geotextile fabric smooth and free of tension or wrinkles.
- C. Fold or cut the geotextile fabric to conform to curves.
- D. Overlap a minimum of 18 inches at the ends and sides.
- E. Hold the fabric in place with pins or staples.
- F. Place the suitable material on the fabric and do not operate the equipment directly on the fabric.
- G. Unless stated otherwise, spread the suitable material and maintain a minimum lift thickness of 12 inches.

3.2 ENGINEERING GEOGRID CONSTRUCTION

- A. Geogrid shall be laid at the proper elevation and alignment as shown on the plans and shall be oriented such that the roll length runs parallel to the trench.
- B. Geogrid sections shall be overlapped as shown in the plans or as directed by the CMT. Minimum overlap in horizontal plane shall be three feet. In vertical plane the minimum overlap shall be nine inches. Care shall be taken to ensure that geogrid sections do not separate at overlaps during construction. Placement of geogrid around curves or corners will require cutting of geogrid product and diagonal overlapping of same to ensure that excessive buckling of grid material does not occur.

- C. Specified granular fill material shall be placed in lift thicknesses and compacted as indicated on the plans and in accordance with Item 203 Aggregate Refill for subbase application and Section 312300, Excavation and Fill, for slag or limestone for trenches. Care shall be taken to assure that the geogrid is held in desired position during and after placement of granular fill.
- D. No construction equipment shall operate directly upon the geogrid. A minimum fill thickness of six inches is required prior to operation of any vehicles over the geogrid. Sudden braking or sharp turning shall be avoided while operating any equipment on reinforced fill.

END OF SECTION

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PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work included in this section pertains to all materials, equipment, finishing methods, installation, striping, symbols, etc. that relate to flexible paving.

1.2 DEFINITIONS

- A. ODOT: Ohio Department of Transportation Construction and Materials Specifications.

1.3 APPLICABLE SPECIFICATIONS

- A. The following standards form a part of these specifications:
 - 1. The American Society for Testing Materials Standards (ASTM):
 - a. C 29 Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate.
 - b. C 127 Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - c. D 75 Standard Practice for Sampling Aggregates.
 - 2. ODOT standard specifications (latest edition):
 - a. Section 304 - Aggregate Base.
 - b. Section 441 - Asphalt Concrete - Mix Design and Quality Control.
 - c. Section 407 - Tack Coat.
 - d. Section 412 - Crack Sealing Asphalt Pavements.
 - e. Section 418 - Asphalt Pavement Joint Adhesive.
 - f. Section 633 Conditioning Existing Pavement Prior to Hot Mix Asphalt (ASPHALT) Overlay
 - g. Section 635 - Cleaning and Preparation of Pavement Surfaces for Pavement Markings.
 - h. Section 640 - Reflectorized Pavement Marking Paints.
 - i. Section 685 - Epoxy Reflectorized Pavement Markings.

1.4 SYSTEM DESCRIPTION

- A. Provide hot mix asphalt paving according to materials, workmanship, and other applicable requirements of standard state specification.
- B. Special Conditions

1. Protection of work in place
 - a. All paving work shall be protected from construction traffic at all times after completion. All damaged work shall be replaced with no additional payment.

1.5 SUBMITTALS

- A. Quality Assurance / Control Submittals:
 1. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
 2. Job-Mix Designs: Certification by authorities having jurisdiction, of approval of each job mix proposed for the Work:
 - a. Certification: Provide material certificates signed by the material producer and the CONTRACTOR, certifying that each mixture does not contain ferrous material or ferrous minerals of any kind.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- B. Asphalt testing service: OWNER will engage a qualified independent testing agency to perform material evaluation tests (if required by the OWNER).
- C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the ODOT Construction Materials and Specifications for asphalt paving work, except where modified, changed or added to in this specification:
 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to the Section.
- D. Preinstallation Conference: Conduct conference at Project site.
 1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
 - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - b. Review condition of subgrade and preparatory work.
 - c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
 - d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Asphalt shall be delivered to the site per ODOT requirements and maintain asphalt temperature to apply at the temperatures called for in Section 401.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
1. Asphalt is to be delivered and installed at required temperature per mix design.
 2. Asphalt trucks are to be tarped and properly insulated during cold weather conditions (less than 50 degrees F).
 3. If the distance of hauling asphalt exceeds 20 miles insulate truck beds to maintain workable temperatures and covers are fastened against the wind.
 4. Do not exceed a 50 mile distance hauling asphalt from the plant unless approved by the engineer and a written guarantee by the asphalt manufacture that the integrity of the asphalt delivered to the site will meet ODOT requirements for installation.
 5. In no case shall more than 90 minutes elapse from loading the asphalt mixture on the truck to discharge into the spreading equipment.
 6. The CM/OWNER or ENGINEER has the right to reject and send back any mix design that does not meet the required asphalt delivered temperature at the time of spreading at no cost to the owner for loss of material.
 7. Temperature required for paving material component will determine temperature required for scheduled paving operation.
 8. No mixture shall be spread when the subbase is wet or when other conditions prevent proper spreading, finishing or compaction.
 9. Tack Coat: Comply with minimum atmospheric and surface temperature of course to be installed.
 10. Slurry Coat: Comply with weather limitations in ASTM D 3910.
 11. 301 Asphalt Temperature: Minimum air temperature for placement based on nominal compacted lift thickness is 40 degrees F. The minimum mixture temperature when delivered to the paver is 250 °F (120 °C). When using warm mix asphalt the minimum temperature is 230 °F (110 °C). The mixture temperature should be checked at a minimum, 4 times per day and more if required. The temperature should be documented in the project records.
 12. 441 Asphalt Temperature: Minimum surface temperature for placement based on nominal compacted lift thickness as follows per ODOT Section 401.06.
 - a. 36 degrees F and rising at time of placement (greater than 3 inch). If paving on aggregate or subgrade use air temperature of 40 degrees F or higher.
 - b. 40 degrees F and rising at time of placement (1.5 to 2.9 inches).
 - c. 50 degrees F and rising at time of placement (1.0 to 1.4 inches).
 - d. 60 degrees F and rising at time of placement (less than 1.0 inch).

- e. 40 degrees F and rising at time of placement (variable Intermediate Course, 0 to 3.0 inches).
 - f. In addition to the above surface temperatures requirements do not place surface courses if the air temperature is less than 40 degrees F.
13. Surface temperature measurements should be taken using the following procedures:
- a. When taking a reading in the sun, place the thermometer on the pavement and then shade that area with a clipboard, cardboard, or other available shading material. Then take the temperature reading after approximately 3 minutes. The intent is not to shade the area to allow it to cool, but to protect the thermometer from obtaining a false reading due to direct exposure to the sun.
 - b. The surface temperature should not be taken under the only shade tree or at the only sunny (unshaded) spot on the project. The surface temperature should be taken at a representative area.
 - c. The surface temperature should be taken in the lane to be paved and not the adjacent berm.
 - d. On Portland cement concrete pavements where flexible repairs have been performed, the surface temperature of the Portland cement concrete will be the governing temperature.
 - e. A new surface temperature should be taken when the existing pavement surface material changes (asphalt concrete to port land cement concrete or vice versa) to ensure that the new surface meets the minimum temperature specification. If this specification is not met, paving operations must be discontinued until the surface reaches specification temperature. Paving operations may be moved to a different area of the project where the surface meets minimum specification temperature.
14. Seasonal limitation, place asphalt surface course between May 1st and October 31st. When placing surface course outside of seasonal limitations, provide a limited warranty against defects in such work.
15. During a rain event, a load of material in the process of being dumped into the paver may be placed, with the requirement that the rollers follow closely behind the paver and a construction joint is formed at the end of the run. Do not allow waiting trucks to be to be dumped and placed. The material in the waiting trucks will retain sufficient heat for proper placing and compacting for an hour or more depending on the ambient temperature. Water can be kept from accumulating on the covers of the trucks and draining into the asphalt mixture by raising the truck beds slightly. These loads may be placed when conditions improve if the asphalt temperature is acceptable and the surface being paved is in a reasonably dry condition.
16. Asphalt delivery trucks are not allowed to clean out truck beds on the pavement that will be paved. The material that remains in truck beds is cold, will not compact correctly often causing a bump in the pavement and likely a future pot hole. Spreading or broadcasting the cold material across the pavement prior to paving does not solve the problem. The contractor shall designate a cleanout area and ensure truck drivers are using it.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aggregate base shall be in accordance with ODOT Item 304 Aggregate Base. The following materials are prohibited: Slag, crushed ACBFS, granulated slag, open hearth slag or steel slag.
- B. Asphalt Base Course shall be ODOT Item 301 - Asphalt Concrete Base (No R.A.P.)
- C. Intermediate course shall be in accordance with ODOT 441 - Asphalt Concrete Intermediate Course, Type 2, PG 64-22 (448) (No R.A.P.)
- D. Surface course shall be in accordance with ODOT 441 - Asphalt Concrete Surface Course, Type 1, PG 64-22 (448) (No R.A.P.)
- E. Gutter sealer shall be in accordance with ODOT CMS 705.04.
- F. Tack coat shall be in accordance with ODOT Item 407 - Tack Coat.
- G. The CONTRACTOR will engage the services of a testing laboratory to ensure compliance with all specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to **3 mph**.
 - 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck loaded with at least 20 tons of material.
 - 3. Excavate soft spots, unsatisfactory soils, and area of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF COMPACTED AGGREGATE BASE

- A. The entire area to receive compacted aggregate shall be proof rolled with a tandem dump truck loaded with at least 20 tons. The proof rolling shall be executed prior to installing the compacted aggregate. All soft and yielding areas shall be repaired.
 - 1. The acceptable observed subgrade deflection shall be 1/2 inch or less measured at the rear tire in the cross section perpendicular direction to traffic direction using a 10-foot straight-edge and 3/8 inch or less measured at the rear tire in the parallel direction of traffic using a 10-foot straight-edge.
- B. Compacted aggregate shall be installed immediately after acceptance of the subgrade proof roll operation by the soils engineer and Engineer.
 - 1. The subgrade shall be repaired and the proof roll operation repeated if approved subgrade is disturbed by construction traffic, rain or other circumstance prior to placing the compacted aggregate.
 - 2. The proof roll operation shall be repeated in the event the subgrade is left exposed for 3 work days or more prior to placing the compacted aggregate.
 - 3. No not spread on frozen surfaces or use frozen material.
- C. Place the aggregate material in accordance with applicable sections of the Ohio Department of Transportation CMS and as hereinafter specified.
- D. Aggregate material shall be compacted to thickness indicated on the Drawings. Each lift shall be compacted with approved rollers to no less than 100 percent of the maximum dry density as determined by Method C of AASHTO T99, as modified in Article 2.03.24.
- E. Do not exceed a compacted lift thickness of:
 - 1. 8 inches when using vibratory rollers greater than 12 tons.
 - 2. 6 inches with vibratory rollers weighing 10 to 12 tons.
 - 3. 4 inches with no vibratory roller. If the contractor is compacting with a vibrating plate compactor, the maximum lift thickness is 4 inches. If the contractor is compacting with a roller without any vibration, the maximum lift thickness is 4 inches.
 - 4. Can use a lighter roller with equivalent centrifugal force.
 - 5. Centrifugal force is the weight with vibration.
 - 6. Contractor needs to document the roller weight requirements are met.
- F. Place in equal lifts when the specified thickness exceeds 8 inches.
 - 1. Example: if 12-inch lift is specified, place in two 6 inch lifts
- G. All compacted aggregates for all bituminous pavements shall be install in multiple lifts, as indicated on the drawings.
- H. Grade Control: During construction maintain lines and grades, including crown and cross-slope of compacted aggregate course.

3.3 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving. Existing surfaces to receive asphalt must be clean prior to the installation of any portion of the work. Clean the surface on which the asphalt concrete is to be placed and keep it free of accumulations of materials that would, in the judgment of the OWNER/CM, contaminate the mixture, prevent bonding or interfere with spreading operations. Methods used may include but not be limited to the use of a sweeper that can wet and vacuum the area free of dirt and debris, clay, and dust, or any other foreign material.
- B. Repair pavement failures and perform crack repair according to their respective specification requirements prior to installation of any asphalt surface course.
- C. Cold-milling and/or grinding may be necessary to ensure that the asphalt edges at concrete abutments such as approaches, sidewalks, curbing, and drainage basins have smooth transitions. Butt mill at transitions to existing pavement.
- D. After site review, detail whether wedge milling is necessary to assure positive drainage and transition. Install leveling course, if required, on the project per the site details and quantities shown on the plan sheets.
- E. Any oil or grease spots shall be scraped and treated to prevent bleeding through the tack coat. Bad oil spills may require removal with a wire brush or other suitable tool. Maintain clean pavements prior to applying emulsified tack coat. When approved sub-grade or pavement coursed previously constructed under the Contract become loosened, rutted, or otherwise defective, the CONTRACTOR must correct the deficiency according to the contract item or items involved before the spreading of a subsequent pavement course.
- F. Placement shall not occur when weather is inclement. The forecast shall be for rising temperatures for all paving efforts.
- G. Detail and submit to the OWNER/CM a paving plan on the site plan sheet prior to placement of asphalt.
- H. Trucks shall have smooth, clean, and tight metal beds that do not have mixture sticking to the truck bed and from which the entire quantity of asphalt can be discharged smoothly into the spreading equipment. Trucks shall have a tarp and insulation as needed to protect mixture from wind, rain, and cold temperatures. Trucks for hauling asphalt mixture shall be in good, safe working condition. Tarp shall be fastened to truck to protect against wind.
- I. Surface course longitudinal joints shall run with the traffic pattern. Therefore, pulling across the driving lanes shall not be allowed unless express permission is given by the OWNER/CM.

- J. The entire parking lot surface course shall be paved on the same day. The timing and process should be discussed with and approved by the OWNER/CM before proceeding with the work.
- K. Paving Equipment must be capable of placing, spreading, and finishing courses of asphalt to the specified thicknesses. Asphalt shall be free of marks, segregation and be placed to the required uniform elevation with a smooth texture not showing tearing, shoving, or gouging. Auger extensions are required if segregation occurs while pavers are extended beyond the basic screed width. Hand work shall be minimized to ensure the best possible finished surface.

3.4 TACK COAT

- A. Ensure surface is thoroughly clean and dry.
- B. The tack coat contained in the distributor tank shall be homogeneous.
- C. The tack coat shall be applied to a prepared clean pavement. Material shall be applied uniformly across the width of the designated area. Partial coverage installations are NOT acceptable.
- D. The tack coat shall not be applied on a wet pavement surface or when the pavement surface temperature is below the requirements shown for asphalt.
- E. Tack / Prime Coat Distributor Truck must have an insulated tank, heating system and a distributor capable of maintaining a uniform application of emulsified asphalt under pressure throughout the area to be paved. This requires a pump in good working order, full circulating spray bars, and free flowing nozzles. Small, isolated areas may be tacked with a wand.
- F. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
- G. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

TYPICAL TACK COAT APPLICATION RATES

Surface Type	Application Rate (gal/yd2)
New Asphalt	0.05 to 0.06
Oxidized Asphalt	0.08 to 0.09
Milled Asphalt Surface	0.08 to 0.09
Milled PCC Surface	0.06 to 0.08
PCC Surface	0.06 to 0.08

3.5 ASPHALT PLACING

- A. Machine place asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix shall be mechanically tamped. Place each course to required grade, cross section, and thickness when compacted.

1. Place asphalt base course in number of lifts and thicknesses indicated. The following are maximum lift thicknesses:

MINIMUM / MAXIMUM LIFT THICKNESSES

Item	Min Lift	Max Lift	Taper to 0" *	Uniform Thickness Required
301 Asphalt Concrete Base	3"	6"	No	No
302 Asphalt Concrete Base	4"	7.75"	No	No
441 Asphalt Concrete Surface Course, Type 1 (448)	1"	1.5"	No	No
441 Asphalt Concrete Intermediate Course, Type 1 (448)	1"	1.5"	Yes	No
441 Asphalt Concrete Intermediate Course, Type 2 (448)	1.75"	3"	Yes	No

2. Place asphalt surface course in single lift.
 3. Spread mix at minimum temperature of 250 to 275 degrees F. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls, and tears in asphalt paving mat.
- B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.
1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.
 2. When placing the asphalt course do not place joint for paving pass/strip over the same joint as the previous asphalt course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.
- D. Special Conditions
1. Fenced areas: All fence fabric shall be removed from poles prior to paving fence areas.
 2. The paving machine shall not be allowed to track over or back track over any finished course of freshly placed bituminous mixture while the mixture is still hot or warm. Tracking the paving machine over freshly placed bituminous courses shall render that section of pavement unacceptable. All unacceptable pavements shall be removed and replaced with no additional payment.

3.6 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 24 inches.
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

- A. General: Begin compaction as soon as placed asphalt paving will bear roller weight without excessive displacement. Compact asphalt paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers. Equipment per ODOT Section 410.12.
 - 1. The Job Mix Formula (JMF) provides the optimal compaction temperature for the design. The mixture should be checked frequently to ensure the asphalt is being compacted at, or near that temperature. For asphalt concrete base pavements refer to Items 301 and 302 for minimum allowed mix temperature. In all cases the mixture should not be allowed to cool below a workable temperature for adequate compaction (175° F to 275° F) and the majority of compaction should be accomplished before the temperature reaches 225° F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to Comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while asphalt is still hot enough to achieve specified density. Continue rolling until asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the tolerances specified in ODOT Section 401.19.
 - 1. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved area. Longitudinal and transverse slopes indicated within the tolerances specified in ODOT Section 401.19.
 - 2. Traffic-Calming Devices: Compact and form asphalt to produce the contour indicated and within a tolerance of plus or minus 1/8 inch (3 mm) of height indicated above pavement surface.

3.9 FINAL ACCEPTANCE CRITERIA FOR HEAVY AND STANDARD DUTY PAVING

- A. Acceptance Submittals
 - 1. No bituminous pavements will be accepted until it has been demonstrated by the CONTRACTOR that the pavements are in accordance with the Drawings and Specifications. The CONTRACTOR shall submit the following:
 - a. Job mix formula from a state approved / certified asphalt manufacturing facility for each type of bituminous mixture. The job mix formula shall contain, at minimum, the aggregate gradation, percent bitumen, source and type of bitumen and the laboratory maximum compacted density for the mixture.
- B. Variation from Job Mix Formula or Required Gradations:

1. Calibrated equipment and qualified personnel must always be accessible during the construction of this ASPHALT. The CONTRACTOR shall provide the necessary equipment, materials, and labor to complete the job acceptable to the OWNER/CM. Variations in the size and amount of equipment will depend on the size of the area being paved.
2. It is imperative that all documents list a 'Person-in-Charge' who is responsible for the over-site of the previously listed activities. This individual will be the point of contact for the OWNER/CM and they shall work with the contractor to ensure timely project completion and specification compliance. This individual shall be knowledgeable in all aspects of asphalt design, production, and installation and shall be an employee of the company holding the contract with the OWNER/CM, even if the asphalt is being produced and supplied by a separate vendor.
3. Daily maximum theoretical specific gravity values must be made available to the OWNERS density technician for verifying in-place density within four hours of start of production.
4. Asphalt content, gradation, and bulk specific gravity (Gmb) testing shall be done a minimum of once every 400 tons of asphalt supplied or every third day for low tonnages that when added together successively do not equal 400 tons.
5. Acceptable average measures are made by use of a correlated nuclear density gauge, Pavement Quality Indicator or PaveTracker (non-nuclear) or by cutting (4) cores per lift, per day and testing per AASHTO T-166, Method C. Additional testing shall be performed on any given day once 400 tons of asphalt is placed.
6. Any average in-place density measure for surface course mixtures that is less than required for the day will result in a reduction in asphalt pay equal to the following chart. After reaching the 30% reduction mark the pavement shall be removed and replaced by the CONTRACTOR or left in place with no compensation due the CONTRACTOR. Base and leveling installation of asphalt shall meet local ODOT specifications for in-place density measures. Surface course longitudinal joints shall be measured 6" from the joint, centered upon core or density gauge, and shall meet the mat density requirements minus 2.0% at a minimum. Base and leveling course longitudinal joint density measures shall achieve between 95% - 100% of maximum achievable individually, with an average of 98% on any given day.

7.

In-Place Density Pay Schedule, Surface Course Mat Density	
Pay Factors, % (percent)	In-Place Density, % Maximum Theoretical Specific Gravity, Gmm
100	> 92.0%
100 - 0.5 for each 0.1% below 92.0%	91.0% to 92.0%
95 - 1.0 for each 0.1% below 91.0%	90.0% to 91.0%
85 - 1.5 for each 0.1% below 90.0%	89.0% to 90.0%
8. Process Control testing shall be in accordance with state standards for frequency and methods where the work being performed is done with a minimum of testing meeting the above QC requirements.

9. Protect the asphalt until such time that traffic can be placed upon the properly compacted asphalt and show no signs of deformation.

3.10 SITE SPECIFIC IDENTIFICATION

- A. Remove and store bumper blocks and other lot accessories during operations, reinstall after work is completed, and replace any and all broken bumper blocks.
- B. Remove all waste materials from the site and dispose of according to local ordinances.
- C. Complete all work in compliance with ADA requirements.
- D. Supply OWNER/ENGINEER with Notarized Certificate of Compliance and total (tons, cu. yds., number) used for all products supplied to the project for each pay item.
- E. Supply OWNER/ENGINEER with yield calculations for all products used on the project. (Example: placement of 1,300 sq. yds. of Asphalt, 1-3/4" compacted thickness will require 128 tons when the unit weight = 150 pcf.)

3.11 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
 1. Do not allow milled materials to accumulate on-site.

END OF SECTION

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SECTION 33 40 00 - STORM WATER DRAINAGE PIPING

PART 1 - GENERAL

1.1 WORK INCLUDES

- A. This section includes storm drainage system installation for facilities located outside of the building including the following:
 - 1. Pipe and Fittings
 - 2. Manholes
 - 3. Catch Basins/Curb Inlets
 - 4. Cleanouts
- B. Contractor shall field measure all existing storm sewer tie in points and report discrepancies from the plans to the engineer of record.
- C. Contractor shall record final constructed locations of pipe runs, connections, manholes, catch basins, cleanouts, and invert elevations.
- D. Where applicable, discharge piping from an RPZ connected to a storm sewer shall be equipped with backwater check valve.

1.2 DEFINITIONS

- A. RCP: Reinforced Concrete Pipe
- B. PVC: Polyvinyl Chloride Plastic.
- C. HDPE: High Density Polyethylene.
- D. ASTM: American Society of Testing and Materials.
- E. AASHTO: American Association of State Highway and Transportation Officials.
- F. ODOT: Ohio Department of Transportation Construction and Material Specifications (latest edition)

1.3 SUBMITTALS

- A. Submit shop drawings prior to ordering materials for approval.
- B. Shop drawings: include plans, elevations, inverts, details, and attachments for the following:

1. Storm sewer pipe, fittings and joint material.
2. Pre-cast concrete manholes, catch basins, curb inlets and other structures, including frames, covers and grates; inverts, rims, concrete strength and reinforcement.
3. Cast-in-place concrete manholes, catch basins, curb inlets and other structures, including frames, covers and grates; inverts, rims, concrete strength and reinforcement.

C. Design mix reports and calculations: for each class of cast-in-place concrete.

D. Field test reports: indicate and interpret test results for compliance with performance requirements.

1.4 PERFORMANCE REQUIREMENTS

A. Gravity-flow, non-pressure-piping pressure ratings: at least equal to system test pressure.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures, pipe, and fittings in direct sunlight. Store in accordance with manufactures requirements.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Care shall be taken not to injure the coating or lining of pipe or other materials during the handling of transportation of the materials.

D. Non-rigid pipe shall be stored to prevent bowing. Pipes with deviations from straight greater than 1/16 inch per foot shall not be used.

E. Handle and store pipe, precast concrete manholes and other structures according to manufacturer's written rigging, unloading & storage instructions.

1.6 QUALITY ASSURANCE

A. Comply with the requirements of authorities having jurisdiction and manufacturer's requirements

1.7 PROJECT CONDITIONS

A. Site information: perform site survey, research public utility records, and verify existing utility locations as required by State Revised Code.

B. Locate and field measure existing structures and piping to be tied into or closed and abandoned. Report any discrepancies to the engineer for further direction.

- C. Existing utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions, and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. No utility interruptions are allowed without the Owner's written permission.
 - 3. Contractor is to include known utility interruptions in project schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. All manufacturers are subject to compliance with requirements, specifications, and construction details, and must demonstrate compliance through appropriate test and documentation.

2.2 PIPING MATERIALS

- A. If a specific type of pipe is specified on the drawings, the specified type must be used. All pipes, unless noted, are to use soil tight joints. All pipe and fittings used shall be suitably marked with the manufacture's name or trademark, lot or production number and ASTM designation and also include all requirements from ASTM A746.
- B. If a type of pipe is not specified, one of the following shall be provided:
 - 1. Reinforced Concrete Pipe and Fittings
 - a. Reinforced Concrete Pipe and Fittings per ASTM C-76.
 - b. Bell and spigot or tongue and groove ends and resilient and gasketed joints per ASTM C 443, rubber gaskets sealant joints with ASTM C-990, bitumen or butyl-rubber sealant.
 - 2. High Density Polyethylene (HDPE) Pipe and Fittings
 - a. Pipe shall be dual wall, smooth interior and annular exterior corrugations per ASTM 2468.
 - b. to 10-inch pipe shall meet AASHTO M252, Type S or SP
 - c. to 60-inch pipe shall meet AASHTO M294, Type S or SP, or ASTM F2306.
 - d. Fittings shall conform to AASHTO M252, AASHTO M294, or ASTM F2306. Bell and spigot connections shall utilize a welded bell and valley or saddle gasket meeting the soil tight joint performance requirements of AASHTO M252, AASHTO M294, or ASTM F2306.

- e. Soil tight joints shall be joined using a bell and spigot joint meeting the requirements of AASHTO M252, AASHTO M294, or ASTM F2306. The joint shall be soil-tight and gaskets for pipes 12 through 60-inch, shall meet the requirements of ASTM F477. For pipes 4-10-inch, the joint shall be soil tight using and engaging dimple connection.
 - f. Perforated pipe shall consist of AASHTO Class II perforations.
 - 3. Ductile Iron Pipe and Fittings:
 - a. Pipe shall conform with AWWA C151/ANSI 21.11, Class 52 with push-on joints
 - b. Gaskets per AWWA C111, rubber.
 - 4. Polyvinyl Chloride (PVC) Pipe and Fittings
 - a. All pipe and fittings shall conform to ASTM 3034 for 4 to 15-inch pipe with mainline sewer pipe being SDR 26 and service connections under 10 feet in depth (SDR 35) over 10 feet (SDR 26).
 - b. All pipe and fittings shall conform to ASTM F-679 for 18-inch and over SDR 26 pipe.
 - c. All joints shall be elastomeric gasket type and shall be assembled per manufactures recommendations and ASTM D 3212.
 - 5. MANHOLES
- C. Pre-Cast Concrete Manholes
 - 1. Manholes shall conform to ASTM C 478, AASHTO M 199, with reinforced concrete (min. $F_c' = 4,000$ psi, air-entrained), of depth indicated, with joint seal between pre cast manhole sections shall be resilient and flexible gasket conforming to ASTM C-443.
 - 2. Diameter: 48 inches inner diameter minimum, unless otherwise indicated on the Contract Drawings.
 - 3. Ballast: Increase thickness of precast concrete sections or add concrete extension to base section, as required to prevent flotation.
 - 4. Base Section: 6-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
 - 5. Structure channels and benches: factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious ratio. Include channels and benches in manholes.
 - a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - b. Benches: Concrete, sloped to drain into channel, Slope: 8 percent (max.).
 - 6. Riser Sections: 5-inch minimum thickness, and lengths to provide depth indicated.

7. Top Section: Eccentric-cone type, unless either concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
8. Gaskets: Resilient and flexible gasket conforming to ASTM C 443.
9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
10. Joint Sealant: ASTM C-442, bitumen or butyl rubber. In addition, to O-Ring joint between manhole sections, a flexible butyl rubber seal, Con Seal, or equal shall be used with a minimum temperature workability of 10 to 130 degrees Fahrenheit.
11. Flexible Sleeve: A watertight flexible sleeve Kor-n-Seal", Press Wedge or equal to be provided at all connections between manholes and pipes.
12. Grade Rings: Include two or three reinforced-concrete rings, of maximum 12-inch total thickness, that match 24-inch diameter frame and cover. Rings shall be set in a full bed of mortar.
13. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod (grade 60) complying with ASTM A 615/A 615M, ASTM C 478, and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into base, riser, top section, and sidewalls with steps at 16 inch intervals on center. No pipes shall enter a manhole in the thru the step area.
14. Manhole frames and covers: ASTM A 536, grade 60-40-18, Ductile-Iron castings designed for heavy-duty service. Include 24-inch inside diameter by 7-to 9-inch riser with 4-inch minimum width flange, and 24-inch diameter cover. Include indented top design with lettering "Storm Sewer" cast into cover. All frames and grates within R/W shall comply with AHJ's requirements.
15. Lift holes shall be provided in each section for handling. Seal all lift holes with approved concrete plugs.

D. Cast-in Place Manholes

1. Cast-in-place concrete manholes: constructed of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16, heavy-traffic, and structural loading; of depth, shape, dimensions, and appurtenances indicated.
2. Ballast: Increase thickness of precast concrete sections or add concrete extension to base section, as required to prevent flotation.
3. Concrete:
 - a. Cement: ASTM C 150, Type II.
 - b. Fine Aggregate: ASTM C 33, sand.
 - c. Coarse Aggregate: ASTM C 33, crushed gravel.
 - d. Water: Potable.
4. Portland cement design mix: 4000 psi minimum, with 0.45 maximum water-cementitious ratio.
5. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
6. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.
7. Structure channels and benches:

- a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - b. Benches: Concrete, sloped to drain into channel, Slope: 8 percent (max.).
8. Grade Rings: Include two or three reinforced-concrete rings, of maximum 12-inch total thickness, that match 24-inch diameter frame and cover. Rings shall be set in a full bed of mortar.
9. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod (grade 60) complying with ASTM A 615/A 615M, ASTM C 478, and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into base, riser, top section, and sidewalls with steps at 16 inch intervals on center. No pipes shall enter a manhole in the thru the step area.
10. Manhole frames and covers: ASTM A 536, grade 60-40-18, Ductile-Iron castings designed for heavy-duty service. Include 24-inch inside diameter by 7-to 9-inch riser with 4-inch minimum width flange, and 24-inch diameter cover. Include indented top design with lettering "Storm Sewer" cast into cover. All frames and grates within R/W shall comply with AHJ's requirements. Manhole frames shall be set in a full bed of mortar.

2.3 CATCH BASINS

A. Pre-Cast Concrete Catch Basin / Curb Inlets

1. Catch Basin/Curb Inlets shall conform to ASTM C 478, AASHTO M 199, with reinforced concrete (min. $F_c' = 4,000$ psi, air-entrained), of depth indicated, with joint seal between pre cast manhole sections shall be resilient and flexible gasket conforming to ASTM C-443.
2. Dimensions as indicated on the Contract Drawings.
3. Ballast: Increase thickness of precast concrete sections or add concrete extension to base section, as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 6-inch minimum thickness for walls for structures not under pavement and 8-inch for structures under pavement.
5. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
6. Gaskets: Resilient and flexible gasket conforming to ASTM C 443.
7. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to catch basin.
8. Joint Sealant: ASTM C-442, bitumen or butyl rubber. In addition, to O-Ring joint between catch basin sections, a flexible butyl rubber seal, Con Seal, or equal shall be used with a minimum temperature workability of 10 to 130 degrees Fahrenheit.
9. Flexible Sleeve: A watertight flexible sleeve Kor-n-Seal", Press Wedge or equal to be provided at all connections between manholes and pipes.

10. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod (grade 60) complying with ASTM A 615/A 615M, ASTM C 478, and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 16 inch intervals on center. No pipes shall enter a catch basin in the thru the step area.
11. Catch Basin/Curb Inlet Frames and Grates: ASTM A 536, grade 60-40-18, ductile iron designed for heavy-duty service. Size: 24 by 24 inches minimum, unless otherwise indicated on construction detail. Frames shall be set in a full bed of mortar.
 - a. Grate Free Area approximately 50 percent, unless otherwise indicated.
 - b. Catch basin, area and yard drain covers in accessible ways shall be ADA compliant and bicycle wheel proof. Covers shall also be safe for shoes with narrow heels (1/4" gap maximum).

2.4 IMPACT MODIFIED COPOLYMER POLYPROPYLENE MANHOLES / CATCH BASINS

- A. Impact modified copolymer polypropylene manhole/inlets meeting the material requirements of ASTM F2764. Eccentric cones shall be manufactured from polyethylene material meeting ASTM D3360 cell class 213320C.
- B. The joint shall conform to ASTM D3212 using flexible elastomeric seals.
- C. Elastomeric seals used for polyethylene cone and pipe connectors to the structure shall conform to ASTM F477.
- D. Provide a watertight connection for pipes entering the manhole/catch basin and provide adapters as specified by the manufacturer.
- E. Frame and Grate shall be 30-inch in diameter and conform to ASTM A536 grade 70-50-05 and painted black.
- F. No brick or concrete block shall be used to set frame and grate to grade.
- G. All grates shall be set in a 3'x3'x8" concrete pad

2.5 CLEANOUTS

- A. Gray-iron cleanouts:
 1. ASME A112.36.2m, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:
 - a. Light Duty: In earth or grass foot-traffic areas.

- b. Medium Duty: In paved foot-traffic areas.
 - c. Heavy Duty: In vehicle-traffic parking lots, drives, service areas. Recess slightly below pavement surface.
 - d. Extra-Heavy Duty: In public roads. Recess slightly below pavement surface.
 - e. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
- B. PVC Cleanouts (when approved by Engineer):
 - 1. PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to clean out of same material as sewer piping.
 - a. Light Duty: In earth or grass foot-traffic areas.
 - b. Medium Duty: In paved foot-traffic areas.
 - c. Heavy Duty: In vehicle-traffic parking lots, drives, service areas. Last section of pipe at surface shall be cast iron cut to field measurement ANSI Class 25. Set Cleanout casting in 3'-0" square, 8-inch thick 4,000 psi concrete. Casting shall be a cast iron disc or cap with magnetic element imbedded and mastic sealed.
- C. Lid and Frame: Cast iron construction, hinged lid.

2.6 PIPE SUPPORTS

- A. Ballast and pipe supports: Portland cement design mix, 3,000 psi minimum, with 0.58 maximum water-cementitious ratio.
 - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel

PART 3 - EXECUTION

3.1 3 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 31.

3.2 INSTALLATION, GENERAL

- A. General locations and arrangements: drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, and per the requirements.

- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.
- C. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated on the Contract Drawings.
- D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity flow, non-pressure pipe for site storm sewer pipes according to the following:
 - 1. Install piping pitched down in the direction of flow.
 - 2. Install RCP sewer pipe in accordance with ASTM C 1479.
 - 3. Install HDPE sewer pipe in accordance with ASTM D2321.
 - 4. Install PVC sewer pipe according to ASTM D 232, ASTM D 2774 and ASTM F 1688.
 - 5. Install ductile iron pipe per AWWA C6000.
- F. Install gravity-flow piping service connection to buildings storm drains or downspouts, of sizes and in locations as indicated. Terminate piping as indicated Contract Drawings.
- G. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
- H. Comply with manufacturer's requirements for installation, handling, and storage.
- I. Utilize magnetic marking tape for storm sewers - Install [24"] below finished grade.

3.3 PIPE JOINT CONSTRUCTION AND INSTALLATION

- A. General: Join and install pipe and fittings according to installations indicated and pipe manufacturer's specifications.
 - 1. Before joining pipe with a coupling or bell end, all surfaces of the portions of the pipe to be joined and all surfaces of factory made joining material shall be clean and dry. Lubricants, primers, adhesives, solvents bolts, etc. shall have been manufactured specifically for their intended use and shall be used as recommended by the pipe and/or pipe joint manufacturer. The jointing materials shall be fitted and adjusted or applied in such a manner to obtain a close fitting joint and to obtain the degree of water tightness required.

2. Where joining pipes of different materials is required or approved, this work shall be done utilizing special adapters and couplers manufactured specifically for this purpose. The adapters and couplers shall be installed and securely attached to both pipe barrels according to manufacturer's recommendations.
 3. As soon as possible after a joint is made, sufficient backfill materials shall be placed along each side of the pipe to support the pipe in its final position.
 4. Where a pipe stub or run of pipe is to be temporarily terminated for future expansion, the end of the pipe shall be sealed using an approved removable stopper.
 5. Install PE film, pipe encasement over hubless cast-iron soil pipe and fittings according to ASTM A 674 or AWWA C105.
 6. Handle, store, install and backfill all pipe in strict accordance with manufacturer's recommendations.
- B. Install with top surfaces of components, except piping, flush with finished surface.
- C. PVC sewer pipe and fittings as follows:
1. Join pipe and gasketed fittings with gaskets according to ASTM F 477.
 2. Install according to ASTM D 2321.
- D. Concrete pipe and fittings: install according to ACPA'S "Concrete Pipe Installation Manual."

3.4 MANHOLE INSTALLATION

- A. General: install manholes, complete with appurtenances and as required by the City of Streetsboro and ODOT.
- B. Form continuous concrete channels and benches between inlets and outlet.
- C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.
- D. Install precast concrete manhole sections with gaskets according to ASTM C 891.

3.5 CATCH-BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated as shown on the plans.
- B. Set frames and grates to elevations indicated.
- C. Engineered PVC Manholes shall be installed per ASTM D2321.

3.6 STORM DRAINAGE INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as required by City of Streetsboro and ODOT requirements.
- B. Construct riprap of stone, as indicated. Install with geotextile fabric, per City of Streetsboro and ODOT.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.
- F. Engineered PVC catch basins shall be installed per ASTM D2321.

3.7 TAP CONNECTIONS

- A. Make connections to existing piping and underground structures so finished work complies as nearly as practical with requirements specified for new work.
- B. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 4000 psi.
- C. Make branch connections from side into existing piping. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 4000 psi.
- D. Make branch connections from side into existing piping, or to underground structures by cutting opening into existing unit large enough to allow 3 inches of non-shrink grout to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - 1. Use concrete that will attain minimum 28-day compressive strength of 4,000 psi, unless otherwise indicated.
 - 2. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
- E. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- F. Abandoned piping: close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
1. Close open ends of piping with at least 8-inch thick, brick masonry or concrete bulkheads.
 2. Close open ends of piping with threaded metal caps, plastic plugs, concrete, or other acceptable methods suitable for size and type of material being closed. Usage of wood plugs is prohibited.
 3. All storm pipes to be abandoned are to be filled with low strength mortar, concrete, or non-shrink grout unless noted otherwise.
- G. Abandoned structures: excavate around structure as required and use one procedure below:
1. Remove structure and close open ends of remaining piping
 2. Remove top of structure down to at least 36 inches below final grade.
 3. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt.
 4. Fill to top with concrete, or Low Strength Mortar (LSM).
 5. Backfill to grade according to Section 312333.
 6. Existing catch basins that are to be abandoned in place shall be filled with low strength mortar (LSM).

3.9 FIELD QUALITY CONTROL

- H. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.
1. In large, accessible piping, brushes and brooms may be used for cleaning.
 2. Place plug in end of incomplete piping at end of day and when work stops.
 3. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.
- I. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of project.
1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from, or around piping.

3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
4. Re-inspect and repeat procedure until results are satisfactory. Provide owner and/or construction manager that the storm sewer piping system has been installed with no defects (as mentioned above).

END OF SECTION

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SECTION 33 41 16 - SUBDRAINAGE PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work included in this section relates to all pipe, fittings, materials, and appurtenances related to underground subdrainage.

1.2 SUBMITTALS

- A. Submit shop drawings prior to ordering materials for review.
- B. Provide shop drawings for the following:
 - 1. Underdrain pipe
 - 2. Impermeable liner

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

- A. Pipe materials in this article have perforated walls and typically are joined with loose joints.
- B. Perforated PE pipe and fittings:
- C. Perforated PVC sewer pipe and fittings: ASTM D 2729, gasketed bell-and-spigot ends.
- D. Solid wall PVC pipe, ASTM D 3034
- E. Solid wall PE pipe, AASHTO M252, or AASHTO M294, type S

2.2 SOIL AND GRANULAR MATERIALS

- A. Materials are specified in Section 31 23 33.

2.3 GEOTEXTILE FABRIC

- A. Materials are specified in Section 31 32 19

PART 3 – EXECUTION

3.2 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Excavating, earthwork, trenching, and backfilling are specified in Division 31.

3.3 FOUNDATION DRAINAGE INSTALLATION (where applicable).

- A. Refer to Architectural detail.
- B. Where applicable, tie foundation drains with PVC Sch 40 pipe (or equal) using positive slope (0.5% min.) to nearby storm sewers or storm structure impervious

3.4 FOUNDATION DRAINAGE INSTALLATION (where applicable)

- A. Place impervious fill material on sub-grade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches (150 mm) deep and 12 inches (300 mm) wide.
- B. Where applicable, lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted sub-grade and geotextile filter fabric, to compacted depth of not less than 4 inches (100 mm).
- D. Where applicable, encase pipe with sock-style geotextile filter fabric before installing pipe.
Connect sock sections per manufactures requirements.
- E. Add drainage course to width of at least 6 inches (150 mm) on side away from wall and to top of pipe to perform tests.
- F. After satisfactory testing, cover drainage piping to width of at least 6 inches (150 mm) on side away from footing and above top of pipe to within 12 inches (300 mm) of finish grade.
- G. Where applicable, install drainage course and wrap top of drainage course

with flat-style geotextile filter fabric overlapping edges at least 4 inches (100 mm).

- H. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches (150 mm). Thoroughly compact each layer. Final backfill to finish elevations and slope away from building where applicable.

3.5 LANDSCAPING DRAINAGE INSTALLATION (Where applicable. Refer to Landscape Drawings.)

- A. Provide trench width to allow installation of drainage conduit. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides (min 4 inches).
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches (100 mm).
- D. Install drainage conduits as indicated in part 3 "piping installation" article for landscaping subdrainage with horizontal distance of at least 6 inches (150 mm) between conduit and trench walls. Wrap drainage conduits without integral geotextile filter fabric with flat-style geotextile filter fabric before installation. Connect fabric sections with tape.
- E. Add drainage course to top of drainage conduits.
- F. After satisfactory testing, cover drainage conduit to within 12 inches (300 mm) of finish grade.
- G. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- H. Place layer of non-woven geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches (100 mm).
- I. Fill to grade: place satisfactory soil fill material over drainage course. Place material in loose- depth layers not exceeding 6 inches (150 mm). Thoroughly compact each layer. Fill to finish grade.

3.6 PIPING INSTALLATION

- A. Show relationships of piping and other materials on drawings.
- B. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

C. Miscellaneous (where applicable):

1. Underslab subdrainage: install piping level.
2. Foundation subdrainage: Install piping level and with a minimum cover of 36 inches (915 mm) unless otherwise indicated.
3. Retaining-wall subdrainage: when water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 36 inches (915 mm) unless otherwise indicated.
4. Landscaping subdrainage: install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches (915 mm) unless otherwise indicated.
5. Lay perforated pipe with perforations facing down.
6. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

D. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

E. Install thermoplastic piping according to ASTM D 2321.

3.7 PIPE JOINT CONSTRUCTION

- A. Join perforated pipe and fittings with couplings according to ASTM D 3212 with loose banded, coupled, or push-on joints.
- B. Join perforated PVC sewer pipe and fittings according to ASTM D 3212 with loose bell-and- spigot, push-on joints.
- C. Special pipe couplings: join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.8 BACKWATER VALVE INSTALLATION (Where applicable)

- A. Install horizontal backwater valves in header piping downstream from perforated subdrainage piping.
- B. Backwater valves must be accessible for maintenance. Detail backwater valves and manholes or pits if backwater valve's check valve cannot be reached from the surface.

- C. Install horizontal backwater valves in piping in manholes or pits where indicated.

3.9 CLEANOUT INSTALLATION

- A. Where applicable, cleanouts for foundation, retaining-wall and landscaping subdrainage:
 - 1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 - 2. In vehicular-traffic areas, use nps 4 (dn 100) cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, [18 by 18 by 12 inches (450 by 450 by 300 mm)] deep. Set top of cleanout flush with grade.
 - 3. In non-vehicular-traffic areas, use nps 4 (dn 100) cast-iron pipe and fittings for piping branch fittings and riser extensions to cleanout. Where applicable, set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches (300 by 300 by 100 mm) deep. Set top of cleanout 1 inch (25 mm) above grade.
 - 4. Comply with requirements for concrete specified. Use $F_c' = 3000$ psi concrete. Use air entrainment when concrete is exposed to freeze/thaw conditions.
- B. Cleanouts for underslab subdrainage:
 - 1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 - 2. Use nps 4 (dn 100) cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab

3.10 CONNECTIONS

- A. Contract Documents indicate general arrangement of piping, fittings, and specialties.
- B. Connect low elevations of subdrainage system to building's solid-wall-piping storm drainage system.
- C. Where required, connect low elevations of foundation and underslab subdrainage to stormwater sump pumps.

3.11 FIELD QUALITY CONTROL

A. Tests and inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

B. Drain piping will be considered defective if it does not pass tests and inspections.

C. If piping does not pass inspections and tests, the Contractor is to correct issues at no extra cost to the Owner.

D. Prepare test and inspection reports.

3.12 CLEANING

- A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION

GEOTECHNICAL REPORT

For

HEADWATERS TRAIL-PHASE VII

Mantua Center Rd. and Mennonite Rd., Portage County, Ohio

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Subsurface Exploration Report



For the Proposed

**Headwater Trail Phase- VII
Portage Park District
Infirmary & Mennonite Road
Streetsboro, Portage County, Ohio**

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Zaineddin Obeid
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Director/Principal Consultant

PSI Project No. 0142-2068

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BORING LOGS AND SYMBOLS
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1 PROJECT INFORMATION

1.1 PROJECT AUTHORIZATION

This report presents the results of a geotechnical subsurface exploration and foundation evaluation, conducted for Karpinski Engineering, in connection with the proposed Headwater Trail in Streetsboro, Portage County, Ohio. Authorization to perform this exploration and analysis was in the form of a signed contract between Professional Service Industries, Inc. and Karpinski Engineering on January 7, 2020 to accept the aforementioned proposal, dated December 13, 2019.

1.2 PROJECT DESCRIPTION

Based on the provided information, it is understood that the proposed project will include an earthen embankment to elevate the trail approximately 20 feet to meet the existing road grade to allow the trail to cross the road. The proposed project also includes a trail along the south side of Mennonite Road measuring approximately 860 feet in length and 20 feet in width including 5-foot shoulders on each side.

Based on the provided topographic information, the overall site slopes downwards from the the existing roadway with an elevation difference up to about 20 feet. It is estimated that the maximum fill operations of about 20 feet will be required for the proposed earthen embankment.

No other information was available at the time of this report. If any of the information noted above has changed or is incorrect, please inform PSI so that the recommendations presented in this report can be reviewed and amended, if appropriate.

1.3 PURPOSE AND SCOPE OF SERVICES

The purpose of this exploration was to evaluate the soil, rock and groundwater conditions at the site to provide recommendations, from a geotechnical engineering viewpoint, for foundation design and construction, site preparation and other construction considerations. The scope of the exploration and analysis included a reconnaissance of the project site, drill three (3) SPT soil test borings within in the project area, and an engineering analysis and evaluation of the subsurface materials.

The scope of services did not include an environmental assessment for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors or unusual or suspicious items or conditions are strictly for the information of the client.

2 GEOLOGY AND OBSERVATION OF TH EREPORT

2.1 SITE LOCATION AND DESCRIPTION

The project site for the proposed trail is located along the south side of Mennonite Road between Mantua Center Road and Infirmary Road in the City of Streetsboro, Portage County, Ohio. The overall site slopes downwards from the existing roadway with an elevation difference of about 20.

The existing pavement area is currently covered with asphalt pavement. The site for the proposed embankment area is currently undeveloped and covered with brush and trees.

2.2 SITE GEOLOGY

Portage County is part of the Appalachian Plateau of Ohio, which includes the glaciated part of northeastern Ohio. This county, of approximately 500 square miles in area, was once covered by several glaciers. The portage county sandstone and shale units are of the Mississippian and Pennsylvanian age with glacial till outwash that was deposited during the major glacial stages.

2.3 FIELD DRILLING OPERATIONS

As discussed in the Purpose and Scope of Services section, a total of three (3) test borings were drilled for the proposed trail. The test borings were drilled to depths of about 20 to 40 feet each below the existing grades. The approximate boring locations are shown on the Boring Location Plan presented in the Appendix of this report. The borings were advanced into the ground using hollow stem augers mounted on an ATV mounted drill rig. The split spoon sampling procedures used during this exploration are in basic accordance with Ohio Department of Transportation Specifications for Subsurface Exploration.

2.4 LAB TESTING

The soil samples obtained during the field exploration were transported to the laboratory and visually examined. The soil samples obtained from the drilling operation were tested for moisture content (AASHTO T-265), liquid limits (AASHTO T-89), plastic limits (AASHTO T-90), Unconfined Compressive Strength on Rock (ASTM D-7012 Method C) and grain size analyses (AASHTO T-88). The samples were classified in general accordance with the ODOT Specifications for Subsurface Investigations, Classification of Soil. Descriptions and lab test data of the soils encountered in the test boring are provided on the Boring Logs included in the Appendix. Groundwater conditions, standard penetration resistances, and other pertinent information are also included.

3 FINDINGS

3.1 SURFACE CONDITIONS

The surface of the site, at test boring locations B-001-0-20 was covered with a layer of limestone gravel measuring approximately 6 inches in thickness. The surface material at test boring locations B-002-0-20 and B-003-0-20 consists of sand and gravel measuring approximately 12 to 14 inches in thickness.

The subgrade soils a test boring location B-001-0-20 consisted of gravel and stone gragments with sand (A-1-b), sandy silt (A-4a), silt and clay (A-6a) with varying degrees of slag, rock fragments, concrete fragementes and cinders. The subgrade fill soils encountered to the depths ranging from 16 feet below the existing surface grades and exhibited moisture contents ranging from about 9 to 17 percent.

The fill soils at the test boring location B-001-0-20 and surface materials at B-002-0-20 and B-003-0-20 were underlain by natural soils and consisted of gravel and stone fragments (A-1-a), gravel and stone gragments with sand (A-1-b), course and fine sand (A-3a), sandy silt (A-4a), silt and clay (A-6a) with varying degrees of rock fragments. The natural soils extended to the terminal depths of exploration ranging from 20 to 40 feet below the existing surface grades. The subgrade cohesive soils exhibited a medium stiff to hard consistency and medium dense relative density for granular soils, based on the Standard Penetration tests.

The subsurface description is of a generalized nature provided to highlight the major strata encountered. The boring logs included in the Appendix should be reviewed for specific information at the individual boring locations. The stratifications shown on the boring logs represent the conditions only at the actual test positions. Variations may occur and should be expected between the boring locations. The stratifications represent the approximate boundary between the subsurface materials, and the transition may be gradual or not clearly defined.

3.2 GROUNDWATER CONDITION

The following table illustrates the groundwater levels encountered at the test boring locations during the field drilling operations:

Boring No.	Water Depth During Drilling	Water Depth After Drilling
B-001	28.5	--
B-002	6	13
B-003	9.5	--

Note that groundwater levels fluctuate seasonally as a function of precipitation. During a time of year or weather different from the time of drilling, there may be a considerable change in the water table or the occurrence of water where not previously encountered. Furthermore, the water levels in the boreholes often are not representative of the actual groundwater level, because the boreholes remain open for a relatively short time. Therefore, we recommend that the contractor determine the actual groundwater levels at the time of construction to evaluate groundwater impact on the construction procedures.

4 ANALYSIS AND RECOMMENDATIONS

4.1 SITE PREPARATION AND EARTHWORK CONSTRUCTION

It is recommended that all site preparation and earthwork operations be conducted in accordance with the following generalized procedures:

Areas of the site where the new pavement will be located, shall have any and all existing topsoil, base, highly organic soils, excessively soft/loose or wet soils, and all other deleterious materials, completely removed from the proposed construction areas. Additionally, the existing unsuitable fill materials will have to be partially removed or stabilized as described in the following text.

Careful visual control of clearing and stripping operations should be maintained to assure that all deleterious materials are removed. The extent to which deleterious materials are to be removed should be determined in the field following visual observation of the exposed subgrades. Subsequent to the site area clearing and stripping, all structural subgrade sectors should be subjected to critical proof-rolling operations and careful observation of subgrade reactions. Any sectors that exhibit instability are to be undercut or stabilized to such depths as may be necessary to assure satisfactory supporting properties. The undercut areas shall be backfilled with approved fill materials, placed and compacted under carefully controlled procedures as described below.

All areas that are to receive structural fill should be filled on a critically controlled, lift-by-lift basis, employing select, clean, non-organic materials. All structural fill should be verified and approved by the project's geotechnical engineer prior to placement. Individual fill lifts are to be of maximum 8-inch loose measure

thickness and each individual lift is to be adjusted in moisture content to within plus or minus two 2 percent of the optimum moisture content, as determined in accordance with ASTM Standard Proctor Method D-698. However, for granular fill materials, the moisture-density compaction curve for the fill will not be sensitive to placement moisture. Accordingly, the density defined for an energy corresponding to ASTM D-698 should be used for control of fill placement. The fill materials are to be systematically compacted such that an in-place density of at least 98 percent of the maximum laboratory density as determined in accordance with the above-referenced ASTM method is achieved. Specifications should require that the resulting subgrade and fill materials' densities be verified by test measurements conducted by the geotechnical engineer.

Careful attention will be required in fine grading the subgrade surfaces in order to eliminate undulations and depressions that would tend to collect water. The pavement subgrade surface should be graded in a manner such that positive drainage towards the pavement edges and/or drainage systems will be insured.

Throughout the course of the earthwork operations, surface grades are to be maintained to facilitate positive drainage within the construction area and to prevent inundation of either the existing subgrade or new fill material. No water should be allowed to impound on the subgrade surfaces during this time.

Cut excavations required at the Earthen Embankment will not be stable on a vertical slope. As such, it is recommended that the sides of the cut be properly sloped away from the excavation area, as conditions require for the safety of the workers. Further, applicable provisions for excavation slope support required by OSHA and pertinent construction codes should be followed.

It must be recognized that climatic conditions, surcharge loads at the top of the excavation, and water seepage from cut faces of the slopes, as well as the length of time for which the excavation remains open, will adversely affect the excavation slope stability.

Regardless of the initial slope configurations adopted, careful observation of the construction slopes should be maintained throughout excavation and construction. Throughout the course of the earthwork operations, surface grades are to be maintained to facilitate positive drainage within the construction area and to prevent inundation of either the existing subgrade or new fill material. No water should be allowed to impound on the subgrade surfaces during this time.

All slopes affected by the construction activity should be protected by suitable means per the guidelines of the Ohio Department of Transportation to minimize erosion, water infiltration and subsequent saturation.

4.2 SLOPE AND EMBANKMENT CONSTRUCTION

The benched placement of engineered structural fill on natural slope steeper than eight (8) horizontal to one (1) vertical where the final area will be uncontained is recommended. The placement of fill should begin at the base of the natural slope with benches or terraces. The benches or terraces should be a minimum of eight (8) feet wide laterally and should be cut into the slope every five (5) feet of vertical rise. The naturally occurring existing soils should be prepared and fill placed in accordance with the previously described structural fill guidelines. A representative of the geotechnical engineer should monitor the benching and fill placement operations. Most likely the slopes will be constructed after the removal of the existing trees and vegetation. Shoring and dewatering pumping should be considered for this project during slope construction.

Unless specifically designed, temporary slopes shall not exceed steeper than a ratio of two (2) horizontal to one (1) vertical where workers or equipment will occupy space at the toe or of the movement of the excavated slope will jeopardize the stability of an adjacent structure.

Fill construction should be extended by a distance of at least 10 feet beyond the proposed construction limits, and then gradually benched and sloped downwards at 2:1(H:V) slope or flatter until it meets the existing grade as outlined ODOT geotechnical bulletin GB.2, "Special benching and sidehill embankment fills".

The sides and top of the deep fill areas should be covered with natural cohesive soils. The minimum vertical cover should be 2 feet (measured from subgrade elevation). The minimum horizontal cover is 3 feet (measured from final slope line).

Whenever fill sectors meet existing natural slopes, the structural fill is to be tied into the existing slopes by means of benches and keys as outlined in ODOT construction and material specification item # 203.

Instrumentation and monitoring of the deep fill embankment are recommended during and after construction to evaluate the magnitude and rate of settlement. This information will be critical in evaluating the stability of the embankment during construction and determining the time at which the pavement can be constructed.

In order to reduce the risk of surface erosion and near-surface slips in the deep fill embankment areas, it is essential that surface water runoff be redirected away from the slope. Construction of a concrete-lined collection trench or storm sewer catch basins at the crest of the slope, with drainage routed to the storm drain system, may be an appropriate measure to improve surface drainage conditions and aid in keeping water off the slope.

5 CONSTRUCTION CONSIDERATIONS

5.1 DRAINAGE IMPROVEMENTS AND SURFICIAL EROSION MITIGATION MEASURES

In order to reduce the risk of surface erosion and near-surface slips in saturated soils, it is essential that surface water runoff be redirected away from the slope. A concrete-lined collection trench at the crest of the slope, with drainage routed to the storm drain system, may be an appropriate measure to improve surface drainage conditions and aid in keeping water off the slope.

Surficial erosion mitigation measures should consist of placing topsoil and a heavy-duty erosion control fabric suitable for permanent applications, and re-vegetating the slope. Product vendors should be consulted to aid in erosion mitigation.

5.2 EXCAVATION

In Federal Register, Volume 54, No. 209 (October, 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P." This document was issued to better insure the safety of workers entering trenches or excavations. It is mandated by this federal regulation that all excavations, whether they be utility trenches, basement excavations or foundation excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced. If they are not followed closely, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person" as defined in "CFR Part 1926," should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred. If the excavations are left open and exposed to the elements for a significant length of time, desiccation of the clays may create minute shrinkage cracks which could allow large pieces of clay to collapse or slide into the excavation.

Materials removed from the excavation should not be stockpiled immediately adjacent to the excavation, inasmuch as this load may cause a sudden collapse of the embankment.

6 GEOTECHNICAL RISK

The concept of risk is an important aspect of the geotechnical exploration. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools which geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical exploration should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations presented in the preceding section constitutes PSI's professional estimate of those measures that are necessary for the proposed structure to perform according to the proposed design based on the information generated and referenced during this exploration, and PSI's experience in working with these conditions.

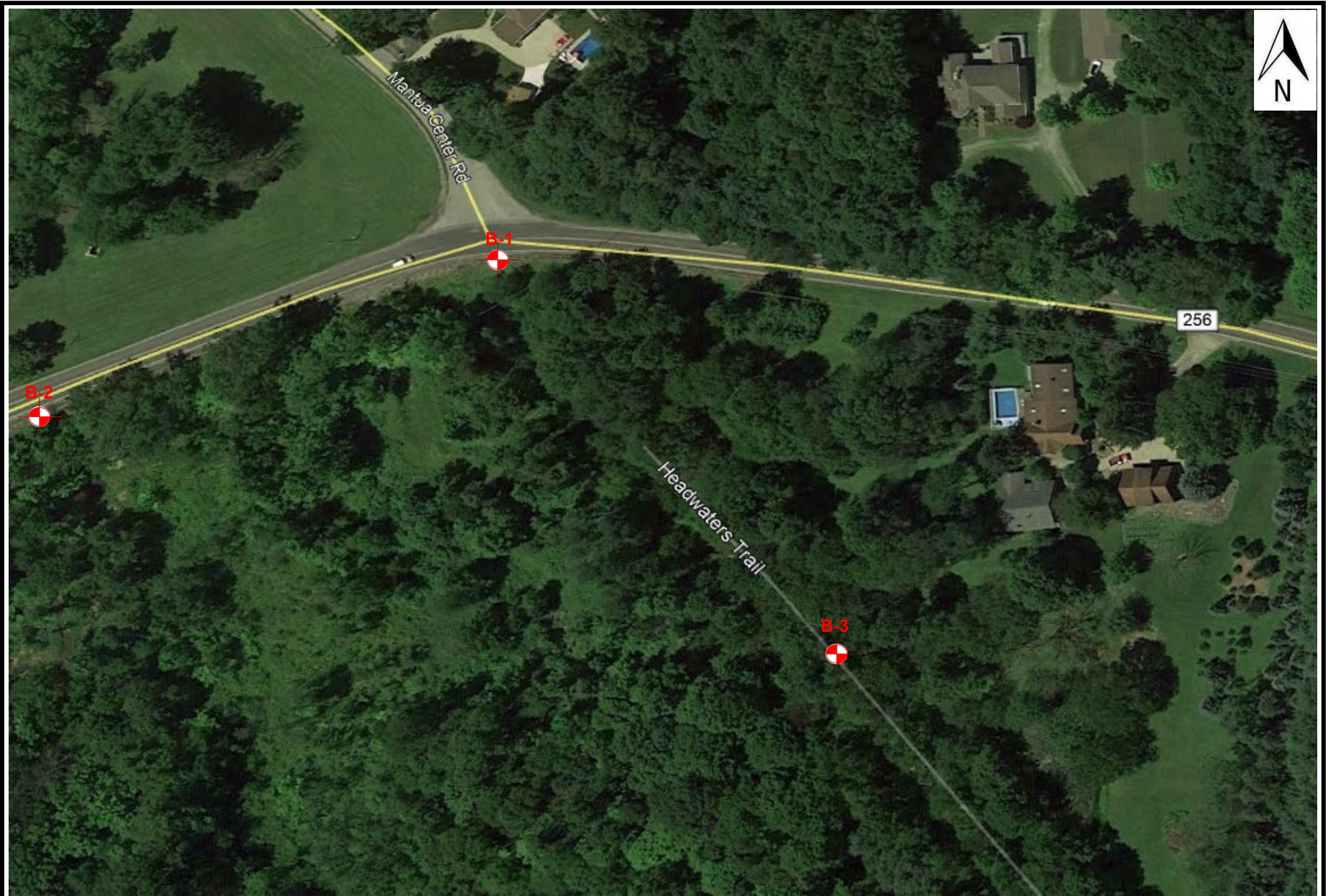
7 REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information developed by PSI and on the design information furnished by Mr. Christopher Bednar, P.E., Director of Civil at Karpinski Engineering for the proposed project. If there are any revisions to the plans for the proposed project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be retained to determine if changes in the recommendations are required. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the geotechnical recommendations for the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein, have been presented after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics and engineering geology. No other warranties are implied or expressed.

After the plans and specifications are complete, it is recommended that PSI be provided the opportunity to review the final design drawings and specifications, in order to verify that the earthwork and foundation recommendations are properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Karpinski Engineering for the specific application to the proposed Headwater Trail in Streetsboro, Portage County, Ohio.

APPENDIX
SOIL BORING LOCATION PLAN
BORING LOGS AND SYMBOLS
ODOT GENERAL NOTES



PROJECT: HEADWATER TRAIL PHASE-VII		DRILLING FIRM / OPERATOR: PSI / TOM		DRILL RIG: CME 55 ATV		STATION / OFFSET: 3+75, CL		EXPLORATION ID B-001-0-20											
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: PSI / Z.O.		HAMMER: CME AUTOMATIC		ALIGNMENT: HEADWATER TRAIL													
PID: SFN:		DRILLING METHOD: 3.25" HSA		CALIBRATION DATE: 10/25/11		ELEVATION: 1151.0 (MSL) EOB: 40.0 ft.		PAGE											
START: 1/23/20 END: 1/23/20		SAMPLING METHOD: SPT		ENERGY RATIO (%): 87.3		LAT / LONG: 41.285514°, -81.243393°		1 OF 2											
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	ABAN- DONED
		1151.0							GR	CS	FS	SI	CL	LL	PL	PI	WC		
6" LIMESTONE GRAVEL		1150.5	1	3															<V>
VERY STIFF, BROWN, SILT AND CLAY, TRACE CONCRETE/SLAG/CINDERS (FILL)			2	7 10	25	94	SS-1	-	-	-	-	-	-	-	-	-	9	A-6a (V)	<V>
		1147.5	3																<V>
VERY STIFF, BROWN, SANDY SILT, SLAG/GRAVEL, MOIST (FILL)			4	3 5 5	15	89	SS-2	-	-	-	-	-	-	-	-	-	13	A-4a (V)	<V>
			5																<V>
			6	4															<V>
			7	6 8	20	61	SS-3	-	-	-	-	-	-	-	-	-	11	A-4a (V)	<V>
			8																<V>
			9	2 1 2	4	83	SS-4	-	21	8	27	31	13	19	14	5	15	A-4a (2)	<V>
			10																<V>
			11																<V>
			12																<V>
			13																<V>
		1136.5	14	2 2 10	17	89	SS-5A	-	-	-	-	-	-	-	-	-	17	A-4a (V)	<V>
MEDIUM DENSE, BROWN, GRAVEL AND STONE FRAGMENTS WITH SAND, TRACE CONCRETE/SLAG/CINDERS, MOIST (FILL)		1135.0	15				SS-5B	-	32	22	31	12	3	NP	NP	NP	15	A-1-b (0)	<V>
VERY STIFF, BROWN, SANDY SILT, MOIST			16																<V>
			17																<V>
			18																<V>
			19	7 11 17	41	100	SS-6	-	19	14	31	- 36 -		15	13	2	12	A-4a (0)	<V>
			20																<V>
			21																<V>
			22																<V>
			23																<V>
			24	11 14 17	45	94	SS-7	-	-	-	-	-	-	-	-	-	10	A-4a (V)	<V>
			25																<V>
			26																<V>
			27																<V>
			28																<V>
		W 1122.5	29	7 9 9	26	89	SS-8	-	-	-	-	-	-	-	-	-	19	A-4a (V)	<V>

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT GDT - 2/19/20 14:38 - \PSIPRODDBW02.PSICLOUD.LOCAL\BENTLEY_GINT\PROJECTS\ODOT 0142\0142-2068 PORTAGE PARKS HEADWAT

PID: _____	SFN: _____	PROJECTHEADWATER TRAIL PHASE-V	STATION / OFFSET: 3+75, CL					START: 1/23/20	END: 1/23/20	PG 2 OF 2	B-001-0-20													
MATERIAL DESCRIPTION AND NOTES			ELEV. 1121.0	DEPTHS		SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	ABAN- DONED			
											GR	CS	FS	SI	CL	LL	PL	PI						
VERY STIFF, BROWN, SANDY SILT , MOIST <i>(continued)</i>			1116.5	TR	31	11	57	78	SS-9A	-	-	-	-	-	-	-	-	-	17	A-4a (V)				
					32																			
					33																			
					34																			
SHALE, GRAY, HIGHLY WEATHERED, VERY WEAK.			1111.0	EOB	34	18	58	28	SS-9B	-	-	-	-	-	-	-	-	-	18	Rock (V)				
					35	21				-	-	-	-	-	-	-	-	-	-	-	-			
					36																			
					37																			
					38																			
					39	10			23	17	SS-10	-	-	-	-	-	-	-	-	-	-	9	Rock (V)	
					40																			
NOTES: NONE																								
ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED																								

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT GDT - 2/19/20 14:38 - \PSIPRODDBW02.PSICLOUD.LOCAL\BENTLEY_GINT\PROJECTS\ODOT 0142\0142-2068 PORTAGE PARKS HEADWAT

PROJECT: <u>HEADWATER TRAIL PHASE-VII</u>		DRILLING FIRM / OPERATOR: <u>PSI / TOM</u>		DRILL RIG: <u>CME 55 ATV</u>		STATION / OFFSET: <u>0+00, CL</u>		EXPLORATION ID <u>B-002-0-20</u>	
TYPE: <u>ROADWAY</u>		SAMPLING FIRM / LOGGER: <u>PSI / Z.O.</u>		HAMMER: <u>CME AUTOMATIC</u>		ALIGNMENT: <u>HEADWATER TRAIL</u>			
PID: <u>SFN:</u>		DRILLING METHOD: <u>3.25" HSA</u>		CALIBRATION DATE: <u>10/25/11</u>		ELEVATION: <u>1139.0 (MSL)</u> EOB: <u>25.0 ft.</u>		PAGE 1 OF 1	
START: <u>1/24/20</u> END: <u>1/24/20</u>		SAMPLING METHOD: <u>SPT</u>		ENERGY RATIO (%): <u>87.3</u>		LAT / LONG: <u>41.285140°, -81.244718°</u>			

MATERIAL DESCRIPTION AND NOTES	ELEV. 1139.0	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	ABAN- DONED
								GR	CS	FS	SI	CL	LL	PL	PI			
12" SAND AND GRAVEL BASE	1138.0	1	5															<< < <
MEDIUM DENSE, BROWN, GRAVEL AND STONE FRAGMENTS WITH SAND , MOIST		2	8	19	67	SS-1	-	48	9	21	14	8	15	14	1	11	A-1-b (0)	< < < <
		3																< < < <
MEDIUM STIFF, BROWN TO GRAY, SANDY SILT , GRAVEL/ROCK FRAGMENTS, MOIST	1135.5	4	4	12	89	SS-2	-	8	11	28	32	21	22	13	9	13	A-4a (4)	< < < <
		5	4															< < < <
		6	0															< < < <
		7	12	19	67	SS-3	-	-	-	-	-	-	-	-	-	18	A-4a (V)	< < < <
		8																< < < <
		9	2	6	89	SS-4	-	-	-	-	-	-	-	-	-	22	A-4a (V)	< < < <
		10	2															< < < <
		11																< < < <
		12																< < < <
		13																< < < <
		14	4	12	100	SS-5	-	-	-	-	-	-	-	-	-	14	A-4a (V)	< < < <
		15	3															< < < <
		16	5															< < < <
		17																< < < <
		18																< < < <
LOOSE TO MEDIUM DENSE, GRAY, GRAVEL AND/OR STONE FRAGMENTS , TRACE SAND, MOIST	1120.5	19	6	12	56	SS-6	-	50	33	8	5	4	19	16	3	17	A-1-a (0)	< < < <
		20	4															< < < <
		21																< < < <
		22																< < < <
		23																< < < <
		24	17															< < < <
		25	18	52	100	SS-7	-	-	-	-	-	-	-	-	-	12	A-1-a (V)	< < < <
	1114.0	EOB																< < < <

NOTES: NONE
ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT GDT - 2/19/20 14:38 - \PSIPRODDBW02.PSICLOUD.LOCAL\BENTLEY, GINT\PROJECTS\ODOT 0142\0142-2068 PORTAGE PARKS HEADWAT

PROJECT: <u>HEADWATER TRAIL PHASE-VII</u>	DRILLING FIRM / OPERATOR: <u>PSI / TOM</u>	DRILL RIG: <u>CME 55 ATV</u>	STATION / OFFSET: <u>8+50, CL</u>	EXPLORATION ID
TYPE: <u>ROADWAY</u>	SAMPLING FIRM / LOGGER: <u>PSI / Z.O.</u>	HAMMER: <u>CME AUTOMATIC</u>	ALIGNMENT: <u>HEADWATER TRAIL</u>	B-003-0-20
PID: <u>SFN:</u>	DRILLING METHOD: <u>3.25" HSA</u>	CALIBRATION DATE: <u>10/25/11</u>	ELEVATION: <u>1132.0 (MSL)</u> EOB: <u>20.0 ft.</u>	PAGE
START: <u>1/23/20</u> END: <u>1/23/20</u>	SAMPLING METHOD: <u>SPT</u>	ENERGY RATIO (%): <u>87.3</u>	LAT / LONG: <u>41.284601°, -81.242365°</u>	1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	ABAN- DONED
								GR	CS	FS	SI	CL	LL	PL	PI			
14" SAND AND GRAVEL BASE	1132.0																	< > < >
MEDIUM STIFF, SILT AND CLAY , WITH GRAVEL	1130.8	1	3															< > < >
		2	4	10	67	SS-1	-	-	-	-	-	-	-	-	-	17	A-6a (V)	< > < >
	1128.5	3																< > < >
LOOSE, BROWN, COARSE AND FINE SAND , WITH SILT/CLAY/GRAVEL		4	2	6	72	SS-2	-	13	14	40	25	8	NP	NP	NP	23	A-3a (0)	< > < >
	1126.0	5	2															< > < >
MEDIUM STIFF, BROWN, SILT AND CLAY , TRACE SAND		6	0															< > < >
		7	2	7	89	SS-3	-	1	2	8	55	34	33	19	14	24	A-6a (10)	< > < >
		8																< > < >
	1122.5	9	3	12	100	SS-4A	-	-	-	-	-	-	-	-	-	16	A-6a (V)	< > < >
STIFF, BROWN, SANDY SILT , CLAY/ GRAVEL	1122.0	10	5			SS-4B	-	-	-	-	-	-	-	-	-	-	A-4a (V)	< > < >
		11																< > < >
		12																< > < >
		13																< > < >
		14	3	15	89	SS-5	-	-	-	-	-	-	-	-	-	13	A-4a (V)	< > < >
		15	4															< > < >
		16	6															< > < >
		17																< > < >
	1113.5	18																< > < >
MEDIUM DENSE, BROWN, COARSE AND FINE SAND , WITH GRAVEL		19	3	16	83	SS-6	-	-	-	-	-	-	-	-	-	17	A-3a (V)	< > < >
	1112.0	20	5															< > < >
		EOB	6															< > < >

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED

APPENDIX A.1 - ODOT Quick Reference for Visual Description of Soils

1) STRENGTH OF SOIL:

Non-Cohesive (granular) Soils - Compactness	
Description	Blows Per Ft.
Very Loose	≤ 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

2) COLOR :

If a color is a uniform color throughout, the term is single, modified by an adjective such as light or dark. If the predominate color is shaded by a secondary color, the secondary color precedes the primary color. If two major and distinct colors are swirled throughout the soil, the colors are modified by the term "mottled"

3) PRIMARY COMPONENT

Use **DESCRIPTION** from ODOT Soil Classification Chart on Back

Cohesive (fine grained) Soils - Consistency

Description	Qu (TSF)	Blows Per Ft.	Hand Manipulation
Very Soft	<0.25	<2	Easily penetrates 2" by fist
Soft	0.25-0.5	2 - 4	Easily penetrates 2" by thumb
Medium Stiff	0.5-1.0	5 - 8	Penetrates by thumb with moderate effort
Stiff	1.0-2.0	9 - 15	Readily indents by thumb, but not penetrate
Very Stiff	2.0-4.0	16 - 30	Readily indents by thumbnail
Hard	>4.0	>30	Indent with difficulty by thumbnail

4) COMPONENT MODIFIERS:

Description	Percentage By Weight
Trace	0% - 10%
Little	10% - 20%
Some	20% - 35%
"And"	35% -50%

5) Soil Organic Content

Description	% by Weight
Slightly Organic	2% - 4%
Moderately Organic	4% - 10%
Highly Organic	> 10%

6) Relative Visual Moisture

Description	Criteria	
	Cohesive Soil	Non-cohesive Soils
Dry	Powdery; Cannot be rolled; Water content well below the plastic limit	No moisture present
Damp	Leaves very little moisture when pressed between fingers; Crumbles at or before rolled to 1/8"; Water content below plastic limit	Internal moisture, but no to little surface moisture
Moist	Leaves small amounts of moisture when pressed between fingers; Rolled to 1/8" or smaller before crumbling; Water content above plastic limit to -3% of the liquid limit	Free water on surface, moist (shiny) appearance
Wet	Very mushy; Rolled multiple times to 1/8" or smaller before crumbles; Near or above the liquid limit	Voids filled with free water, can be poured from split spoon.



CLASSIFICATION OF SOILS

Ohio Department of Transportation

(The classification of a soil is found by proceeding from top to bottom of the chart.
The first classification that the test data fits is the correct classification.)

SYMBOL	DESCRIPTION	Classification		LL _O /LL x 100*	% Pass #40	% Pass #200	Liquid Limit (LL)	Plastic Index (PI)	Group Index Max.	REMARKS
		AASHTO	OHIO							
	Gravel and/or Stone Fragments	A-1-a			30 Max.	15 Max.		6 Max.	0	Min. of 50% combined gravel, cobble and boulder sizes
	Gravel and/or Stone Fragments with Sand	A-1-b			50 Max.	25 Max.		6 Max.	0	
	Fine Sand	A-3			51 Min.	10 Max.	NON-PLASTIC		0	
	Coarse and Fine Sand	--	A-3a			35 Max.		6 Max.	0	Min. of 50% combined coarse and fine sand sizes
	Gravel and/or Stone Fragments with Sand and Silt	A-2-4				35 Max.	40 Max.	10 Max.	0	
		A-2-5					41 Min.			
	Gravel and/or Stone Fragments with Sand, Silt and Clay	A-2-6				35 Max.	40 Max.	11 Min.	4	
		A-2-7					41 Min.			
	Sandy Silt	A-4	A-4a	76 Min.		36 Min.	40 Max.	10 Max.	8	Less than 50% silt sizes
	Silt	A-4	A-4b	76 Min.		50 Min.	40 Max.	10 Max.	8	50% or more silt sizes
	Elastic Silt and Clay	A-5		76 Min.		36 Min.	41 Min.	10 Max.	12	
	Silt and Clay	A-6	A-6a	76 Min.		36 Min.	40 Max.	11 - 15	10	
	Silty Clay	A-6	A-6b	76 Min.		36 Min.	40 Max.	16 Min.	16	
	Elastic Clay	A-7-5		76 Min.		36 Min.	41 Min.	≤ LL-30	20	
	Clay	A-7-6		76 Min.		36 Min.	41 Min.	> LL-30	20	
	Organic Silt	A-8	A-8a	75 Max.		36 Min.				W/o organics would classify as A-4a or A-4b
	Organic Clay	A-8	A-8b	75 Max.		36 Min.				W/o organics would classify as A-5, A-6a, A-6b, A-7-5 or A-7-6
MATERIAL CLASSIFIED BY VISUAL INSPECTION										
	Sod and Topsoil			Uncontrolled Fill (Describe)			Bouldery Zone			Peat, S-Sedimentary W-Woody F-Fibrous L-Loamy & etc
	Pavement or Base									

* Only perform the oven-dried liquid limit test and this calculation if organic material is present in the sample.