ITEM 19

CATCH BASINS, INLETS AND STORM SEWERS

1.0 DESCRIPTION. Under Item 19, the Contractor shall furnish all labor and materials and shall construct catch basins, inlets, storm sewers and yard drains of the type shown on the plans, disturbed during construction or required during project installation and as required by the Engineer, including all earth, shale and rock excavation, sheeting and bracing, concrete brick or solid block walls, precast units, cast iron frames, grates, storm sewer pipe and connections to new or old storm sewers.

2.0 SUBMITTALS. The Contractor shall submit the following in accordance with the conditions of this Contract.

A. Reference Standards. Latest revisions:

1. For standard precast concrete manhole/catch basin sections, the precast concrete producer will supply shop drawings showing conformance to project drawings and requirements and to applicable ODOT and ASTM specifications listed in this specification. The precast concrete producer shall certify that such products will meet the ASTM specifications.
2. For all storm pipe and yard drains the Contractor shall supply shop drawings showing conformance to project drawings and requirements and to applicable ASTM, and Ohio DOT CMS specifications listed herein.
3. Precast Concrete Sections: ASTM C478, ODOT 611, 706.13.
4. Cast-In-Place Concrete: ODOT Class QC 1 concrete, ODOT 499.
5. Concrete Fill: ODOT QC 3, (3,000 psi compressive strength) concrete.
6. Rubber Gasket Joints: ASTM C443.
7. Manhole Steps: ASTM C478.
8. Castings/Gratings: ASTM A48, Class 30B heavy duty gray iron, ODOT 513, 711
9. Mortar: ASTM C270, Type S with no masonry cement; compose using two parts Portland cement to two parts sand by volume.

B. Shop Drawings.

1. Shop drawings shall be furnished by the precast concrete producer for approval by the Engineer. These drawings shall contain complete design, installation, and construction information in such detail as to enable the Engineer to determine the adequacy of the proposed units for the intended purpose. Details of steel reinforcement size and placement as well as supporting design calculations, if appropriate, shall be included. The means of watertight pipe connection information shall be included indicating confirmation to this specification.
2. The drawings shall include a schedule, which will list the size and type of precast concrete manholes/catch basins, the location where they are to be used, the angle(s) of all connections in relation to each other, the step location, the cone

orientation and the invert of each connection. The precast concrete manholes/catch basins shall be produced in accordance with the approved drawings.

3. The Contractor shall provide one (1) electronic copy of materials, equipment, equipment lists and spare parts data submittals in accordance with the provisions of the "General Conditions" and "Supplemental General Conditions" of this Contract.
4. Shop drawings shall indicate all principal dimensions, general construction and materials for the sewer system as specified herein.
5. Shop drawings shall:
   a. Show relationship of all sewer components, connections, and support items.
   b. Be complete in all details and include identified parts lists.
   c. Be submitted for review and approval and will be returned within two (2) weeks either approved or marked up for further design.
   d. Not be Manufacturer's catalog or general web-site information. These types of submittals will NOT be sufficient to fulfill shop-drawing requirements and returned as Not Approved.
6. After examination of such drawings by the Engineer and the return thereof, the Contractor shall make such correction to the drawings as have been indicated and shall furnish the Engineer with electronic corrections. If requested by the Engineer, the Contractor must furnish additional copies.

C. **Calculations.** This section is not applicable.

D. Certifications. This section is not applicable.

3.0 MATERIALS. Earth excavation, shale and rock excavation, concrete and sewer pipe, frames and grates, shall be made and placed in accordance with the appropriate items. Concrete, concrete structures, sewer pipe, frames and grates shall meet the specification and the approval of the owner of the storm sewer system being repaired and/or the Engineer.

A. Catch Basins and Inlets. shall be constructed in shapes and sizes shown on the drawings, equal to or better to the original configuration and as directed and approved by the owner of the storm sewer system or the Engineer, or as required during project installation except as otherwise provided, and to the lines and grades given by the Engineer.

1. ADA compliant and sinusoidal style grates shall be supplied where pedestrian or bicycle traffic, respectively may occur.

B. Installation of Storm Sewers. shall be in accordance with the appropriate sanitary sewer item, based on material applicable. If the owner of the storm sewer has no preference, the required materials and components are listed below.

C. Stone and Grout.

1. Stone Fill: Standard size number 67 stone or as otherwise approved.

2. Grout: Non-shrinking and non-corrosive: Five Star Grout by Five Star Products, Inc.; Sealtight 588 Grout by W.R. Meadows, Inc.; or as approved.

D. Individual Storm Water Components:

1. Bases: Integral or separate base riser and base slab; openings for pipe to be preformed or cored by manufacturer, with openings exceeding pipe outside diameter by more than 6 inches cause for rejection, provide transition sections when base is greater than 48 inches diameter.
2. Walls: Vertical precast concrete riser sections with rubber gasket joints.
3. Tops: Eccentric cone top section narrowing down to a minimum 3-inch high vertical neck with an inside diameter of not less than 24 inches and outside diameter not less than that of grade rings, except reinforced flat slab top for manholes and catch basins too shallow to accommodate a cone section; design flat slab tops to withstand HS-20 traffic loading and submit design calculations to the District upon request. Provide grade rings for a minimum height of 4 inches and a maximum height of 12 inches as required to set castings at proper elevation; ring inside diameter equal to the top section access opening, and outside diameter not less than the outside diameter of the casting frame.
4. Manhole Steps: Aluminum or reinforced polypropylene.
5. Rear yard catch basins(s): ASTM C14, Class 2 Non-reinforced concrete pipe with knockouts as indicated.
6. Manhole and Catch Basin Frames and Covers or Grates: a. Manhole Frame and Cover: East Jordan Iron Works, Inc. (EJ) Catalog 1040 with solid lid type B or as approved; machined surface, frame with 24-inch diameter clear opening, and 7-inch height.
7. Lids to have “STORM” cast into top.
8. Manhole and/or Catch Basin Flat Frame and Grate: East Jordan Iron Works, Inc., Catalogue No. 1040 frame with Type M1 flat grate, or as approved; machined surface, frame with 24-inch diameter clear opening, and 7-inch height.
9. Catch Basin Inlet Frame and Grate in Roll Curb: Neenah Foundry Company, R-3501 inlet for roll type curb, or as approved; inlet grate shall be either TR (flow right) or TL (flow left) as required for each application and shall conform to contour of curb section.
10. Catch Basin Inlet Frame and Grate in Straight Face Curb and Curb and Gutter: Neenah Foundry Company, R3274-A curb box with Type C grate; or as approved; curb box to conform to contour of curb section; picture of a “FISH” and “DUMP NO WASTE” – “DRAINS TO RIVER” cast into top of curb box; provide flat curb plate as required; complete with anchor bolts for embedment in concrete curb.
11. Catch Basin Frame and Convex Grate in Front Lawn Area: Neenah Foundry Company, R-1643 with Type B standard convex grate, or as approved; machined surface, frame with 24-inch diameter clear opening, and 7-1/2-inch height.
12. Catch Basin Frame and Grate in Rear Lawn Area: Neenah Foundry Company, R-5901-E frame with R2564 grate, or as approved.

13. Yard Drains shall be shall be Tuf-Tite brand drain sump (or equal) with a minimum of 4 connection openings. A minimum of one outlet connection and three inlet connections are required for yard drains requiring 6" connections. Cover all openings not connected to drain tile with plugs manufactured for that purpose. Provide grate style cover. Fittings shall be manufactured specifically for the use required and compatible with other materials used.

4.0 EXECUTION. The excavation shall not be larger than required and shall be well sheeted and shored. Should excavation be made deeper than required by the structure, the excavated space shall be filled with concrete, at the Contractor's expense, up to the base of the structure as shown on the drawings. No earth or gravel fill or foundation cushion will be permitted underneath special structures. All excavation for catch basins, inlets and storm sewers shall be properly enclosed, barricaded and lighted. All work shall be in accordance with the following requirements:

A. Bedding Materials.
1. Bedding shall be installed in accordance with Item 14 PVC Gravity Pipe Sewers.

B. Backfill.
1. Backfill shall be installed in accordance with SCMSD Specification Items 1, 14 and 21.

C. Concrete Curbs.
1. Curbs shall be installed in accordance with ODOT CMS 609.04; Class QC concrete.

D. Pipe Underdrains.
1. Underdrains shall follow ODOT CMS Standards 605 using polyethylene or PVC pipe standards referenced therein and approved the Engineer.

E. Monument Assemblies (in pavement).
1. Monuments shall use Neenah Foundry Company; R-1978- A2 with bolted lids or approved equal.

F. Curb Ramp Detectable Warning Truncated Domes. shall follow the most current ODOT CMS Standard 712.14.
1. Truncated domes shall consist of cast-in-place reinforced polymer composite tiles.
2. Material supplied shall be red color and installed by pressing tiles into place in the freshly poured concrete.
3. All material supplied and installed shall meet ODOT Standard Drawings and current ODOT approved products.
4. Concrete shall be ODOT Class QC.

G. Storm Sewer Pipe and Fittings. Install PVC plastic pipe and fittings in accordance with ASTM D2321 and the requirements of SCMSD Item 14. Install concrete pipe within the maximum allowable depths (ground surface to invert) and the maximum allowable trench widths (at the top of the pipe) as specified in the detailed drawing for sanitary sewer pipe.

1. Excavate trenches to a depth of 4 inches below the outside bottom of the pipe barrel and bell when the pipe is laid on its final grade to allow for bedding material.
2. Place bedding material (ODOT No. 57 crushed limestone) under, around, and to 12 inches over the pipe sewer for the full width of the trench; place in 6 to 12-inch layers, loose measure, and work the crushed stone around the pipe to provide even support, to fill all voids, and to lightly compact the crushed stone (by hand).
3. Install pipe at a minimum 10 feet horizontal distance from water mains and hydrants, and lay pipes at a minimum 18 inches vertical distance from water mains at their crossing, both as measured between the outside of the pipe walls.
4. At crossings, install one full length of pipe so both joints will be as far from the main as possible. From the top of the bedding to a point 5 feet below the adjacent ground level, backfill trenches in and within 5 feet of the edge of existing and proposed paved or stoned streets, alleys, and parking areas with granular material (ODOT No. 304 crushed limestone).
5. Place the crushed limestone material in maximum 36-inch layers, loose measurement. Mechanically level the crushed stone and compact each layer with an excavator-mounted vibratory plate compactor that produces a rated compactive force of at least 9 psi. Each layer to receive a minimum of two complete passes, except where CDF is indicated on the Drawings. The top 5 feet of the trench shall be backfilled with granular material (ODOT No. 304 crushed limestone).
6. Place the crushed limestone material in maximum 8-inch loose layers and mechanically compact to not less than 100 percent of the maximum dry unit weight as determined in accordance with ASTM D698 (Standard Proctor), except where CDF is indicated on the Drawings.
7. For trenches within 5 feet from the edge of existing and proposed paved or stoned streets, alleys, and parking areas, backfill with compacted granular material as specified above for trenches coming within same. For backfilling trenches yard and grass areas, replace as much of the excavated material as possible. Until backfilling has progressed to a depth of at least 3 feet over the top of the pipe barrel, use finely divided material, free of stones 3 inches or greater in any dimension, boulders and other harmful debris, and place in 18-inch layers, loose measurement, and compact by mechanical tamping.
8. Place remainder of backfill in maximum 12- inch layers, loose measurement, and compact by mechanical tamping. For backfill trenches within 5 feet of existing and proposed sidewalks and driveways, replace as much of the excavated

material as possible. Until backfilling has progressed to a depth of at least 3 feet over the top of the pipe barrel, use finely divided material, free of stones 3 inches or greater in any dimension, boulders and other harmful debris, and place in 8-inch layers, loose measurement, and compact by mechanical tamping. In no case shall the compaction be less than 92% as determined by the Standard Proctor Test.

H. Manholes and Catch Basins. All manholes and catch basins shall be installed without sumps or traps. Install base with top surface level; install on cushion of approved compacted granular material, minimum of 3 inches thick. For pipe connections, fill area between pipe and opening with grout, inside and outside of structure.

1. Install wall sections plumb and level. Precast walls shall be at least 6" thick with sufficient reinforcing. When walls include steps, install with steps in the center of a traffic lane or between lanes where possible when in pavement, and, when outside pavement, with steps located away from the pavement edge unless the manhole is within a ditch line, then locate steps on the high side of the ditch slope. Set grade rings in a full bed of mortar and mortar the interior of the grade rings to provide a smooth common surface from frame to top. Set casting frames firmly on top of grade rings with a full leveling bed of 1:1 cement mortar; in paved areas, make casting top 3/8 inch below top of pavement surface; in unpaved streets and alley areas, set the cover not to exceed 1 inch above the ground surface.
2. On right-of-way and in ditches cover elevation shall be as approved by the District. If not integrally cast with the base, after pipe installation provide a Class QC concrete invert having a depth equal to 1/2 the sewer pipe diameter and sloping upward toward walls approximately 3 inches; trowel concrete smooth. For concrete inverts integrally cast with the base, fill any void between base and wall with Class QC concrete to match top of shaped invert. Encase all manhole frames located in pavement in concrete extending from a horizontal plane 4 inches below the lowest grade ring up to the top of the frame, unless otherwise shown or noted.
3. Make the concrete encasement circular in plan by using a minimum 48-inch diameter steel casing ring as a form, centered on the frame. For rear yard catch basin, pour a 4-inch-thick Class QC concrete base upon compacted subgrade. Install catch basin pipe to finish grade, bell end up, upon base; connect pipes, and backfill; set frame and grate. Each lot shall have direct access to a rear yard catch basin.
4. Manholes and catch basins shall be located no further than 15 feet behind back of curb or edge of pavement unless approved by the SCMSD.

I. Service Connections. Provide for existing and future houses and businesses; minimum 6 inches in diameter unless otherwise specified or directed; maximum two service connections per lateral.

1. Install at a minimum of one percent slope.
2. Close service connections not immediately connected to an existing sewer with a sewer pipe plug. Plug shall be specifically designed for use with the pipe, shall be for use as a permanent or temporary plug, shall be watertight, and shall be removable without damaging the pipe. Do not backfill the ends of service connections until the location is referenced in accordance with the detail on the Drawings.
3. Provide a 2-inch square oak pole accurately placed over the terminus of each service connection and extending vertically flush with the surface of the ground so that it can be located.
4. Install 3 feet minimum into each lot, or as otherwise noted, true to line and on at least 1 percent grade with a minimum depth of 5 feet at the plug or the maximum depth possible for main sewers less than 5 feet deep. Provide riser sections of pipe and fittings between the main line sewer connection and that portion installed on at least a one percent grade where depths to the main sewer invert exceed 12 feet. Fix riser in place for its full height by providing thoroughly tamped pipe embedment material as shown.

J. Main Connections/Manholes.

1. New PVC pipe sewers 27-inch diameter and less: connect to the main sewer by providing an appropriately sized manufactured wye.
2. New PVC pipe sewer connections: greater than 27-inch diameter mains: for services up to 15-inch diameter connect to the main sewer by making a direct connect by providing an Inserta Tee manufactured by Inserta Fittings, or as approved by the District. For up to 8-inch diameter services, connect to the main sewer by using an appropriate size stainless steel sewer pipe saddle, as manufactured by General Engineering Company, or approved equal.
3. Existing PVC sewer pipe sewer connections: for up to 15-inch diameter services, connect to the main sewer by making a direct connect by providing an Inserta Tee manufactured by Inserta Fittings.
4. New and existing concrete pipe sewers 12-inch diameter and larger: for 6- and 10-inch diameter services connect to the main sewer by providing a Kor-N-Tee pipe to pipe lateral connector as manufactured by NPC. Hole shale be cored by using a diamond bit drill of the appropriate size. For 12 inch and 15-inch diameter, connect to the main sewer by providing an Inserta tee manufactured by Inserta Fittings.

K. Connections to Structures. Connect new sewers to structures through stubs, wall castings, wall sleeves, etc. provided for same.

1. If required, make an opening at the proper elevation in the wall of the structure, insert the pipe, and neatly and permanently close the opening around the pipe with grout and make the connections watertight.

2. Where necessary, reshape the bottoms of existing structures to give a smooth flow in all directions. Connect unlike types and sizes of pipe using proper adapter or connector by Fernco, Inc., Joints, Inc., Mission or as approved.

L. Yard Drains. Yard Drains shall be installed following the catch basin installation above.

1. Connections to the property lateral shall be by wye.
2. Drain shall be situated in an area where storm drainage will be directed and shall be recessed so that mowing operations will not damage the yard drain structure.
3. Restoration shall follow SCMSD Specification Item 25.

M. Driveway Culverts. Driveway culverts shall be corrugated smooth lined polyethylene pipe.

1. Pipes and fittings shall meet the requirements of ODOT 707.33 for Type S, including AASHTO M 294 for all pipe, couplings, and fittings. Material for pipe and fitting production shall be high density polyethylene conforming with the minimum requirements of cell classification 424420C for 4 through 10-inch diameters, and 435400C for 12- through 60-inch diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%. Corrugated Smooth Wall Pipe shall be ADS N-12 Dual Wall Pipe or Engineered approved equal.

5.0 ELECTRICAL. This section is not applicable.

6.0 QUALITY ASSURANCE.

A. Testing. This section is not applicable.

B. Observation.

1. SCMSD designated representative will visually observe the work performed. The representative will notify the Engineer of any discrepancies with the contract documents in the course of the contractor performing the work. The progress observations by the SCMSD do not waive any rights or remedies, nor divest the Contractor of any responsibility for contract compliance or liability for damage.

C. Warranty. This section is not applicable.

7.0 MEASUREMENT. All standard storm items will be measured for payment upon their final completion and acceptance.

A. Measurement for catch basins. shall be made from the lowest invert flow line of the basin to the finished grating installation including the curb work if applicable as shown

on the drawings.

B. Measurements for storm sewers will be made once complete and functioning and accepted by the Engineer or resident representative.

8.0 PAYMENT. All storm drain structures, piping and appurtenances shall include all material, labor, tools and appliances required to accomplish this work. The unit price stipulated per lineal foot for the various sizes of PVC/HDPE storm sewer pipe installed shall include earth excavation and backfill, the furnishing of all labor, materials, tools, and appliances necessary to complete the work as specified, shown or directed. The unit price stipulated per installed structure for the various catch basins and storm manholes and yard drains installed shall include earth excavation and backfill, the furnishing of all labor, materials, tools, and appliances necessary to complete the work as specified, shown or directed

No payment will be made for repairing house service sewers, or any public or privately-owned utility line when broken or when cut by the Contractor.

Item	**Unit**	**Description**
19	LF	Storm Sewer Replacement
19	EA	Catch Basin Replacement

END OF SECTION