SECTION 330561 - CONCRETE MANHOLES

This Section specifies cast-in-place precast concrete and masonry manholes to access subsurface drainage and sewerage piping. Included in this Section are structures, frames, and covers.

PE manholes are specified in Section 330573 and fiberglass manholes are specified in Section 330576.

1. GENERAL
	* + 1. SUMMARY
				1. Section Includes:

Modular precast concrete manholes and structures with tongue-and-groove joints and [**precast concrete grade rings**] transition to cover frame, covers, anchorage, and accessories.

Cast-in-place concrete manholes and structures with [**precast concrete grade rings**] transition to cover frame, covers, anchorage, and accessories.

Doghouse manhole connections to existing [**sanitary**] [**storm**] sewer lines.

Vertical adjustment of existing manholes and structures.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 031000 - Concrete Forming and Accessories: Erection and bracing of forms.

Section 032000 - Concrete Reinforcing: Reinforcing steel as required by this Section.

Section 033000 - Cast-in-Place Concrete: Concrete type for manhole and structure foundation slab construction.

Section 042000 - Unit Masonry: Clay brick units for use in manhole and structure construction.

Section 061300 - Heavy Timber Construction: Timber cradle construction.

Section 310000 – Earthwork: Excavation procedures.

Section 310001 – Earthwork Materials: Soils for backfill.

Section 316219 - Timber Piles: Pile support systems.

Section [**330505.33 - Infiltration and Exfiltration Testing**] [**330505.36 - Vacuum Testing**]: Testing requirements for manholes.

Section 330130.61 - Packer Injection Grouting: Grout sealing as required by this Section.

Section 330130.86 - Manhole Rim Adjustment: Resetting existing castings and grates.

Section 330573 - Polyethylene Manholes: Requirements for manholes constructed of PE.

Section 330576 - Fiberglass Manholes: Requirements for manholes constructed of fiberglass.

Section 333100 - Sanitary Sewerage Piping: Piping connections to manholes.

Section 334200 - Stormwater Conveyance: Piping connections to manholes and structures.

Section 337119 - Electrical Underground Ducts, Ductbanks, and Manholes: Ducts and manholes affected by this Section.

* + - 1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

LEED requires compliance with specific editions of referenced standards. Consider including publication dates for referenced standards in this Section to ensure that correct standard is used for LEED compliance.

* + - * 1. American Association of State Highway Transportation Officials:

AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.

AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

* + - * 1. The Masonry Society:

TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.

* + - * 1. ASTM International:

ASTM A48 - Standard Specification for Gray Iron Castings.

ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

ASTM C55 - Standard Specification for Concrete Building Brick.

ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.

ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.

ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.

ASTM C877 - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.

ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.

ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.

ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

* + - 1. COORDINATION
				1. Coordinate Work of this Section with connection to [**municipal sewer utility service**] [**facility sanitary sewer system**] [**facility storm sewer system**] <**\_\_\_\_\_\_\_\_**> and trenching.
			2. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: Submit manufacturer information for manhole covers, component construction, features, configuration, dimensions [**, and**] <**\_\_\_\_\_\_\_\_**>.

USE PARAGRAPH BELOW WITH EPD REQUIREMENT WHEN PROJECT ESTIMATE IS $1M OR MORE.

* + - * 1. Submit an Environmental Product Declaration (EPD) from the manufacturer for each type of precast structure within this specification section, if available. A statement of the contractor’s good faith effort to obtain the EPD shall be provided if not available.

Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services.*

* + - * 1. Shop Drawings:

Indicate structure locations and elevations.

Indicate sizes, elevations, and relative orientations of [**piping,**] [**conduit,**] penetrations [**, and**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
				2. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
				3. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
				4. Qualifications Statement:

Coordinate following subparagraph with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer.

* + - 1. SUSTAINABLE DESIGN SUBMITTALS
				1. Section 018113 - LEED Documentation Requirements: Requirements for sustainable design submittals.
				2. Manufacturer's Certificate:

Certify that products meet or exceed specified sustainable design requirements.

Insert material certifications list below to suit products specified in this Section and Project sustainable design requirements. Specific certificate submittal and supporting data requirements are specified in Section 018113.

Sustainable Sites Certificate: Certify paving materials Solar Reflectance Index (SRI).

Materials Resources Certificates:

Certify source and origin for [**salvaged**] [**and**] [**reused**] products.

Certify recycled material content for recycled content products.

Certify source for regional materials and distance from Project Site.

Certify that lumber is harvested from Forest Stewardship Council (FSC) Certified well-managed forest.

* + - * 1. Product Cost Data:

Submit cost of products to verify compliance with Project sustainable design requirements.

Exclude cost of labor and equipment to install products.

Provide cost data for following products:

Edit list of material cost data below to suit products specified in this Section and Project sustainable design requirements. Specific cost data requirements are specified in Section 018113.

Salvaged, refurbished, and reused products.

Products with recycled material content.

Regional products.

Certified wood products.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. CLOSEOUT SUBMITTALS
				1. Project Record Documents: Record actual locations of manholes and connections, and record invert elevations.
			2. QUALITY ASSURANCE

Include this Article to specify compliance with overall reference standards affecting products and installation included in this Section. The Design shall be responsible for verifying the design meets the requirements of Client Agency Standards.

In following paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," “Department of Corrections and Community Supervision”, “Office of Children and Family Services” or other agency as appropriate.

* + - * 1. Perform Work according to <**\_\_\_\_\_\_\_\_**> standards.

Include following paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain <**\_\_\_\_\_\_\_\_**> [**copy**] [**copies**] of each standard affecting Work of this Section on Site.
			1. QUALIFICATIONS

Coordinate following paragraph with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
			1. DELIVERY, STORAGE, AND HANDLING
				1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
				2. Handling: Comply with precast concrete manufacturer instructions and ASTM C913 for unloading and moving precast manholes and drainage structures.
				3. Storage:

Store materials according to manufacturer instructions.

Store precast concrete manholes and drainage structures to prevent damage to Director’s Representative property or other public or private property.

Repair property damaged from materials storage.

* + - * 1. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
				1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

1. PRODUCTS
	* + 1. CONCRETE MANHOLES
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=13268&mf=04&src=wd):

Fort Miller Co., Inc., (518) 695-5000, PO Box 98, Schuylerville, NY 12871.

Monarch Products, (717) 938-8303, 385 Sipe Road, York Haven, PA 17370.

Oldcastle Infrastructure, (888) 965-3227, 8392 Riverview Parkway, Littleton, CO 80125.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements.

* + - * 1. Manhole Sections:

Materials:

Reinforced Precast Concrete: Comply with ASTM C478.

Gaskets: Comply with ASTM C923.

Joints:

Comply with ASTM C913.

Maximum Leakage: 0.025 gal. per hour per foot of joint at 3 feet of head.

Load Rating:

AASHTO HS-20 with 30% Impact and 130 lb/cf equivalent soil pressure.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Manhole Sections:

Reinforced Cast-in-Place Concrete: As specified in Section [**033000 - Cast-in-Place Concrete**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_**>.

* + - * 1. Mortar and Grout:

Mortar:

ASTM 270, Type: [**S**] <**\_\_\_\_\_\_\_\_**>.

Grout: As specified in Section [**330130.61 - Packer Injection Grouting**].

* + - * 1. Reinforcement:

Formed steel [**wire**] [**reinforcing rods**].

Thickness: <**\_\_\_\_\_\_\_\_**> gage.

Finish: [**Galvanized**] [**Unfinished**].

* + - * 1. Shaft and [**Concentric**] [**Eccentric**] Cone Top Sections:

Pipe Sections: Reinforced [**precast**] [**cast-in-place**] concrete.

Joints:

Lipped male/female.

[**Dry.**]

Sleeved to receive [**pipe**] [**conduit**] [**and**] <**\_\_\_\_\_\_\_\_**> sections.

* + - * 1. Shape: [**Cylindrical**] [**Square**] [**Rectangular**] [**As indicated on Drawings**] <**\_\_\_\_\_\_\_\_**>.
				2. Clear Inside Dimensions:

Diameter: [**48**] <**\_\_\_\_\_\_\_\_**> inches.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

As indicated on Drawings.

* + - * 1. Design Depth:

As indicated on Drawings.

* + - * 1. Clear Cover Opening:

Diameter: [**30**] <**\_\_\_\_\_\_\_\_**> inches.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

As indicated on Drawings.

* + - * 1. Pipe Entry: Furnish openings as [**indicated on Drawings**] [**required**].
				2. Structure Joint Gaskets:

Butyl Joint Sealant: ASTM C990

ConSeal CS-202 or approved equivalent.

* + - 1. FRAMES, COVERS, AND GRATES
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=13269&mf=04&src=wd):

Neenah Foundry Company, P. O. Box 729, Neenah, WI 54957, (414) 729-3661

East Jordan Iron Works, P.O. Box 190, South Bay Rd., Cicero, NY 13039, (315) 699-2601

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Material:

Cast iron.

Comply with [**ASTM A48, Class 30B**] [**AASHTO M306**].

Lid:

Bearing Surface: Machined flat.

Configuration: Removable.

Security: [**Lockable**] [**Boltable**] [**None**].

Cover Design: [**Closed**] [**Open checkerboard grille**] [**Waterproof**] <**\_\_\_\_\_\_\_\_**>.

Live-Load: [**AASHTO HS-20 with 30% impact**].

[**Furnish sealing gasket.**]

Grate: [**Bicycle safe**] <**\_\_\_\_\_\_\_\_**>.

Nominal [**Lid**] [**Grate**] Size: <**\_\_\_\_\_\_\_\_**> by <**\_\_\_\_\_\_\_\_**> inches.

* + - 1. RISER RINGS
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=13267&mf=04&src=wd):

Neenah Foundry Company, P. O. Box 729, Neenah, WI 54957, (414) 729-3661.

East Jordan Iron Works, P.O. Box 190, South Bay Rd., Cicero, NY 13039, (315) 699-2601.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Riser Rings:

Thickness of 4 to 6 Inches:

Precast concrete.

Comply with ASTM C478.

Thickness Less Than 4 Inches:

Cast iron.

Comply with AASHTO M306.

Rubber Seal Wraps:

Wraps and Band Widths: Comply with ASTM C877, Type III.

Cone/Riser Ring Joint: Minimum 3-inch overlap.

Frame/Riser Ring Joint: 2-inch overlap.

Additional Bands: Overlap upper band by 2 inches.

Remove paragraph if not a LEED project.

* + - 1. SUSTAINABILITY CHARACTERISTICS

Insert sustainable design characteristics in this Article to suit content of this Section and Project sustainable design requirements as specified in Section 018113.

* + - * 1. Section 018113 – LEED Documentation Requirements: Requirements for sustainable design compliance.
				2. Material and Resource Characteristics:

Recycled Content Materials: Furnish materials with maximum available recycled content [**including:**] [**.**]

Insert list of materials specified in this Section required to have recycled content.

<**\_\_\_\_\_\_\_\_**>.

Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project Site [**including:**] [**.**]

Insert list of materials specified in this Section required to be regional materials.

<**\_\_\_\_\_\_\_\_**>.

Certified Wood Materials: Furnish wood materials certified according to FSC standards [**including:**] [**.**]

Insert list of materials specified in this Section required to be certified wood.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. ACCESSORIES

Note that Steps are not typically included on NYS DOCCS and OCFS Projects. Confirm with OGS PM.

* + - * 1. Steps:

Rungs: Formed [**PP**] [**galvanized steel**] [**aluminum**] <**\_\_\_\_\_\_\_\_**>.

[**Fabrication: Formed integral with manhole sections.**]

Diameter: [**3/4**] <**\_\_\_\_\_\_\_\_**> inch.

Width:

[**12**] <**\_\_\_\_\_\_\_\_**> inches.

Spacing:

[**16**] <**\_\_\_\_\_\_\_\_**> inches o.c. vertically, set into structure wall.

* + - * 1. Foundation Slab:

[**Cast-in-place concrete as specified in Section 033000 - Cast-in-Place Concrete**] [**Cast-in-place concrete as specified in Section <\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_>**] [**Precast concrete as specified in Section <\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_>**].

Top Surface: Level.

Indicate type of anchorage required for anchoring to other structural elements.

* + - * 1. Strap Anchors:

Shape: Bent steel.

Size: <**\_\_\_\_\_\_\_\_**> by <**\_\_\_\_\_\_\_\_**> inch by <**\_\_\_\_\_\_\_\_**> inch thick.

Finish: [**Galvanized**] [**Unfinished**].

* + - * 1. Joint Sealant: Comply with ASTM C990.
				2. Fasteners: [**Stainless steel; ASTM F593**] [**Galvanized steel; ASTM F1554**].
				3. Geotextile Filter Fabric:

Description:

Non-biodegradable.

[**Woven**] [**Nonwoven**] <**\_\_\_\_\_\_\_\_**>.

Comply with AASHTO M288.

Class: [**A**] [**B**].

<**\_\_\_\_\_\_\_\_**>, as manufactured by <**\_\_\_\_\_\_\_\_**>.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Geotextile Filter Fabric: As specified in Section 310001- Earthwork Materials.
				2. Concrete for Invert Channels: As specified in Section [**033000 - Cast-in-Place Concrete**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_**>.

Consider including following paragraph if surface water inflow through manhole covers is a concern on Project.

* + - * 1. Watertight PE Manhole Insert:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=13283&mf=04&src=wd):

Parson Environmental Products, P.O. Box 4474, Reading, PA, 29606.

Approved equivalent.

Consider including following paragraph if blockage of upstream flow is required to install doghouse manhole.

* + - * 1. Expandable Pipe Plug:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=13284&mf=04&src=wd):

Petersen Products Co., (800) 926-1926, 421 Wheeler Ave, Fredonia, WI, 53021.

Taylor Made Plastics Inc. (TMP), (800) 928-1218, 1561 Global Court Unit A, Sarasota, FL, 34240.

Approved equivalent.

* + - 1. FINISHES
				1. Bituminous Manhole Coating:

Provide [**two**] coats on manhole [**interior**] and [**exterior**].

ASTM A123 includes minimum coating thickness grade based on type of material and steel thickness of component.

* + - * 1. Steel Galvanizing:

Hot-dip galvanize after fabrication.

Comply with ASTM A123.

* + - 1. SOURCE QUALITY CONTROL
				1. Provide shop inspection and testing of completed assembly.

Include one or both of following paragraphs to require Director’s inspection or witnessing of test at factory.

* + - * 1. Director’s Inspection:

Make completed <**product name**> available for inspection at manufacturer's factory prior to packaging for shipment.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspection is allowed.

* + - * 1. Director’s Witnessing:

Allow witnessing of factory inspections and tests at manufacturer's test facility.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspections and tests are scheduled.

Include following paragraph if reliance on manufacturer's approved quality-control program is sufficient for Project requirements.

* + - * 1. Certificate of Compliance:

If manufacturer is approved, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

Specified shop tests are not required for Work performed by approved manufacturer.

1. EXECUTION
	* + 1. EXAMINATION
				1. Verify that items provided by other Sections of Work are properly sized and located.
				2. Verify that built-in items are in proper location and are ready for roughing into Work.
				3. Verify that excavation base is ready to receive Work and excavations and that dimensions and elevations are as indicated on [**Drawings**].
			2. PREPARATION
				1. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
				2. Coordinate placement of inlet and outlet pipe [**or duct sleeves**] as required by other Sections.

Determine if the paragraph below is applicable to the project and edit/remove accordingly.

* + - * 1. Do not install manholes and structures where Site conditions induce loads exceeding structural capacity of manholes or structures.
				2. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.
			1. INSTALLATION
				1. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.

Type of correcting materials (fine aggregate, coarse aggregate, or lean concrete) depends on type of subsoil, percolation characteristics, and compaction requirements.

* + - * 1. Correct over-excavation with [**Subbase Course Type 2**] <**\_\_\_\_\_**>, as specified in Section 310001 – Earthwork Materials.
				2. Remove large stones or other hard matter impeding consistent backfilling or compaction.
				3. Protect manhole from damage or displacement while backfilling operation is in progress.
				4. Excavating:

As specified in Section 310000 – Earthwork, and in indicated locations and depths.

Provide clearance around sidewalls of manhole or structure for construction operations [**, granular backfill,**] [**and**] [**placement of geotextile filter fabric**].

If ground water is encountered, prevent accumulation of water in excavations; place manhole or structure in dry trench.

Designer needs to verify the potential for floatation and design the structure base section accordingly.

Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation as indicated on the Contract Drawings.

* + - * 1. Base and Alignment:

Place foundation slab and trowel top surface level.

Provide cast-in-place concrete invert channel to achieve slope to exit piping, trowel smooth, and contour [**to form continuous drainage channel**] [**as indicated on Drawings**].

Place manhole sections plumb and level, trim to correct elevations, and anchor to foundation slab.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Base and Alignment:

Install manholes supported at proper grade and alignment <**\_\_\_\_\_\_\_\_**> [**support system as indicated on Drawings**].

Provide cast-in-place concrete invert channel to achieve slope to exit piping, trowel smooth, and contour [**to form continuous drainage channel**] [**as indicated on Drawings**].

Form and place manhole or structure cylinders plumb and level, to correct dimensions and elevations.

* + - * 1. Attachments:

As Work progresses, build [**fabricated metal items**] [**and**] <**\_\_\_\_\_\_\_\_**>.

Cut and fit for [**pipe**] [**conduit**] [**sleeves**] [**and**] <**\_\_\_\_\_\_\_\_**>.

Set cover frames and covers level to correct elevations without tipping.

* + - * 1. Backfilling: As specified in Section 310000 - Earthwork.
				2. Coating: Paint interior with two coats of bituminous interior coating at rate of [**120**] <**\_\_\_\_\_\_\_\_**> sq. ft./gal. for each coat.
				3. Precast Concrete Manholes:

Lift precast components at lifting points designated by manufacturer.

When lowering manholes [**and structures**] into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.

Assembly:

Assemble multi-section manholes and structures by lowering each section into excavation.

Install butyl rope joints between precast sections according to manufacturer recommendations.

Lower, set level, and firmly position base section before placing additional sections.

Remove foreign materials from joint surfaces and verify that sealing materials are placed properly.

Maintain alignment between sections by using guide devices affixed to lower section.

Joint sealing materials may be installed on Site or at manufacturer's plant.

Verify that installed manholes [**and structures**] meet required alignment and grade.

Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.

Cut pipe flush with interior of structure.

Shape inverts through manhole [**and structures**] as indicated on Drawings.

* + - * 1. Cast-in-Place Concrete Manholes:

Bear firmly and fully on [**support system as indicated on Drawings**].

Erect and brace forms against movement as specified in Section 031000 - Concrete Forming and Accessories.

Install reinforcing steel as indicated on Drawings and as specified in Section 032000 - Concrete Reinforcing.

Place and cure concrete as specified in Section 033000 - Cast-in-Place Concrete.

Frames and Covers:

Set frames using mortar and precast concrete grade rings.

Install radially laid concrete brick with 1/4-inch-thick, vertical joints at inside perimeter.

Lay precast concrete grade ring in full bed of mortar and completely fill joints.

Set frame and cover 2 inches above finished grade for manholes [**and structures**] with covers located within unpaved areas, to allow area to be graded away from cover beginning 1 inch below top surface of frame.

Consider including following paragraph if Project requires direct connections into existing sewer lines.

* + - * 1. Doghouse Manholes and Structures:

Stake out location and burial depth of existing sewer line in area of proposed manhole or structure.

Carefully excavate around existing sewer line to adequate depth for foundation slab installation.

Protect existing pipe from damage.

Cut out soft spots and replace with [**granular fill**] <\_\_\_\_\_> compacted to [**95**] <**\_\_\_\_\_\_\_\_**> percent maximum density.

Bear firmly and fully on [**support system as indicated on Drawings**].

[**Install precast concrete**] [**Construct cast-in-place concrete**] manhole or structure around existing pipe according to applicable Paragraphs in this Section.

Grout pipe entrances as specified in Section [**033000 - Cast-in-Place Concrete**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_**>.

Consider including following subparagraph if Project requires connection into an existing pipe that experiences large flow volumes, and off-peak-hour tie-in is necessary.

Perform connection to existing pipe between hours of [**12:00 AM**] <**\_\_\_\_\_\_\_\_**> and [**4:00 AM**] <**\_\_\_\_\_\_\_\_**>. Coordinate with Director’s Representative.

Block upstream flow at existing manhole or structure with expandable plug. Provide bypass pumping as required.

Use hydraulic saw to cut existing pipe at manhole or structure entrance and exit and along pipe length at a point halfway up OD on each side of pipe.

Bottom half of pipe is to remain as manhole flow channel.

Saw cut to smooth finish with top half of pipe flush with interior of manhole or structure.

Grout base of manhole or structure to achieve slope to manhole or structure channel as specified in Section [**033000 - Cast-in-Place Concrete**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_**> and trowel smooth.

* + - * 1. Sanitary Manhole Drop Connections:

Concrete Encasement: Minimum [**2**] <**\_\_\_\_\_\_\_\_**> feet outside of manhole.

Form channel from pipe drop to sweep into main channel at maximum angle of [**30**] <**\_\_\_\_\_\_\_\_**> degrees.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Sanitary Manhole Drop Connections: As indicated on Drawings.
				2. Castings:

Set frames using mortar and masonry [**as indicated on Drawings**].

Install radially laid concrete brick with [**1/4**] <**\_\_\_\_\_\_\_\_**>-inch-thick, vertical joints at inside perimeter.

Lay concrete brick in full bed of mortar and completely fill joints.

If more than one course of concrete brick is required, stagger vertical joints.

Set frame and cover [**2**] <**\_\_\_\_\_\_\_\_**> inches above finished grade for manholes and other structures with covers located within unpaved areas to allow area to be graded away from cover beginning [**1**] <**\_\_\_\_\_\_\_\_**> inch below top surface of frame.

* + - 1. FIELD QUALITY CONTROL
				1. Testing:

Cast-in-Place Concrete: As specified in Section [**033000 - Cast-in-Place Concrete**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_**>.

Concrete Manhole Sections: [**Comply with ASTM C497**] [**As specified in Section 330505.33 - Infiltration and Exfiltration Testing**] [**As specified in Section 330505.36 - Vacuum Testing**].

* + - * 1. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
			1. ADJUSTING
				1. Vertical Adjustment of Existing Manholes and Structures:

As specified in Section [**330130.86 - Manhole Rim Adjustment**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_**>.

If required, adjust top elevation of existing manholes and structures to finished grades as indicated on Drawings.

Frames, Grates, and Covers:

Remove frames, grates, and covers cleaned of mortar fragments.

Reset to required elevation according to requirements specified for installation of castings.

Reinforcing Bars:

Remove concrete without damaging existing vertical reinforcing bars if removal of existing concrete wall is required.

Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement as indicated on Drawings.

Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete as specified in Section [**033000 - Cast-in-Place Concrete**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_**>.

END OF SECTION 330561