VILLAGE OF VILLA PARK

PUBLIC WORKS STANDARDS

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VILLAGE OF VILLA PARK
STANDARD ENGINEERING NOTES
Revised 05/02/2008

1. The Public Works Department, (630) 834-8505, must be notified twenty-four (24) hours in advance for inspections and shutoffs and forty-eight (48) hours in advance for water taps.

2. One (1) set of approved plans must be on the site at all times.

3. All paving, curb & gutter, driveways, and sidewalks, including earthwork required for preparation of sub-grade, will be constructed in accordance with the Illinois Department of Transportation's (IDOT) "Standard Specifications for Road and Bridge Construction," current edition and supplements, except as modified to conform with Village of Villa Park requirements.

4. Trenches under and within three feet (3') of pavement (streets, driveways, curb & gutter, and sidewalks) will be backfilled with granular trench backfill conforming to a gradation of CA-6/Grade 8. Granular trench backfill will be mechanically compacted in layers of 12" maximum, loose measure, to 95% of standard density (ASTM D698).

5. All existing pavement to be removed will be saw cut full depth along the limits of the removal.

6. Replacement of the street pavement subsequent to the installation of utilities will meet IDOT Standard Specifications for Road and Bridge Construction, Article 442.06, and be made as follows:

    a. Asphalt - 2" Hot-Mix Asphalt Surface Course, Mix "D", N50, over a 4" Hot-Mix Asphalt Binder Course, N50, or to Village Engineer's specifications.

    b. P.C.C. - 8" minimum thickness, tie into the existing pavement with #6 x 24" dowels, embedded 8" and staggered at 24" O.C.

7. All pavements will be replaced within one week of their removal.

8. All sidewalks will meet existing widths with a minimum thickness of four inches (4") except at any existing or proposed driveway(s) the thickness will be six inches (6"). Bedding will be a minimum of 4" of CA-6/Grade 8. All existing sidewalks and curb and gutter sections must be replaced unless waived by the Village Engineer.

9. All driveways will be replaced as follows:

Residential	Hot-Mix Asphalt	4"	Surface Course
		6"	CA-6, Grade 8 Stone
	Portland Cement Concrete	6"	Class SI
		4"	CA-6, Grade 8 Stone
Commercial	Hot-Mix Asphalt	6"	Surface Course
		8"	CA-6, Grade 8 Stone
	Portland Cement Concrete	8"	Class SI
		6"	CA-6, Grade 8 Stone

All manholes and buffalo boxes within a PCC driveway must be boxed out with 1" expansion material.

10. All parkways disturbed during construction will be restored with four inches (4") of topsoil and salt-tolerant sod.

11. All parkway and nearby trees on adjoining property will have guards to protect trees. A minimum of four (4) stakes shall be used and the fence shall be four (4) feet from the trunk of the tree.

12. All stumps must be removed to a minimum of one foot below proposed ground elevation.

13. Materials and installation for all water and sewer related work will be in accordance with the "Standard Specifications for Water and Sewer Main Construction in Illinois," current edition and the American Water Works Association except as modified to conform with Villa Park requirements.

14. All water main shutdowns will be performed by Village personnel only. A minimum of twenty-four (24) hours notice will be given to the Public Works Department prior to requested shutdown.

15. Existing water and sanitary sewer services will not be reused without a written approval from the Water/Wastewater Superintendent.

16. Band-seal flexible connectors (non-shear mission couplings) will be used to join pipes of dissimilar materials.

17. All PVC pipe joints will conform to ASTM D 3212 and shall be sealed by rubber gaskets conforming to ASTM F 477.

18. Down spouts and sump pumps will discharge at grade and be directed away from and at least ten feet (10’) from adjacent properties.

19. Provide for the immediate removal of any mud and debris that is deposited onto the streets and sidewalks, which were caused by the construction.

20. Any soil erosion control measures that are deemed necessary by the Village Engineer will be implemented immediately by the contractor.

21. All footing and top of foundation elevations, and building setbacks and dimensions must be surveyed and a spot survey must be submitted and approved prior to any future construction.

22. All concrete curbs, sidewalk and driveway aprons require pre-inspection.

23. All construction sites will require a stone access road 10 feet wide with a 6" depth comprising of CA-1 stone.

24. Any activity that disturbs the pavement, vegetation or soil requires a DuPage County Stormwater Permit.

25. An RPZ valve is required for development other than single family residential, unless a written waiver is obtained from the Public Works Department.

26. Residential dual check valve backflow preventor (series 7) is required if a private well is located on the premises and is not capped be a certified well contractor.

27. All existing grades along property lines must be maintained.

28. Proposed grade changes will not cause surface water runoff to be diverted onto or detained on abutting or nearby property, will not significantly alter existing drainage patterns and will not increase or concentrate storm water runoff onto abutting or nearby property.

29. Downspout drainage must discharge at grade and must not drain onto or toward adjacent properties. Indicate on the plans the proposed downspout locations and their direction of drainage.

30. Drainage swales must have sufficient depth and width to direct storm water runoff toward a storm drainage system. Swales must meet existing grades at the property lines and have a minimum slope of 1%. Damming or displacing water onto adjacent properties is not permitted.

31. Proposed driveway must meet existing grades along the property line and then slope 1/8” to ¼” per foot away from the property line and toward the center of the driveway in order to keep water runoff on site and prevent runoff towards adjacent properties. Include details on the driveway and the property line (spot elevations at property line, centerline and at garage slab). If installing curb along the driveway make sure it will not dam water on adjacent properties. Show top of curb elevations and grades on adjoining property.

32. Landscaping that effectively changes yard elevations or existing drainage patterns will not be permitted unless a fill permit is issued by the Village.

WATER DISTRIBUTION

A. REFERENCE STANDARD:

1. American Water Works Association (AWWA), latest edition
2. American Society for Testing and Materials (ASTM), latest edition
3. Illinois State Plumbing Code, latest edition
4. Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.
5. Standard Specifications for Water and Sewer Main Construction in Illinois, latest edition

B. DUCTILE IRON PIPE

1. Conform to AWWA C151
2. Minimum Thickness:
   a. Class 52 standard thicknesses for mechanical and push-on joint piping.

3. **Push-On Joints:**
   a. Provide in accordance with AWWA C111, except gaskets will be neoprene or other synthetic rubber. Natural rubber not acceptable.

4. **Fittings:**
   a. Provide fittings required to provide complete and operational system
   b. Provide mechanical joint fittings with mega-lug retainers
   c. Fittings may be ductile or cast iron in accordance with AWWA C110 and AWWA C151
   d. Fitting Pressure Rating: 250 psi
   e. Retainer glands for mechanical joint fittings (mega lugs):
      1. Ductile iron.
      2. F1058 by Clow, Inc.
      1. Or equal in strength and restraining ability
      2. All below grade fasteners to be stainless steel and conform to the following standards: bolts and threaded rods – grade #304; nuts and washers – grade #300.

   f. Couplings for connecting new water mains to existing water mains:
      1. Ductile iron or cast iron
      2. F1208 by Clow, Inc.
      3. Or equal in strength and sealing ability
      4. Some existing water mains may have nonstandard external diameters, measure existing mains prior to ordering couplings
      5. All below grade fasteners to be stainless steel and conform to the following standards: bolts and threaded rods – grade #304; nuts and washers – grade #300.

   g. Tie rods and bands for restraining couplings:

1. Steel or malleable iron
2. Corrosion resistant alloy or coated to resist corrosion

3. Rod diameter: 3/4-inch minimum
4. Sufficient in strength and restraining ability to resist working pressures, test pressures, and surge pressures in water mains.

h. Cut-In Sleeves
1. Mueller H-841
2. Or equal in strength and sealing ability

i. Tapping Sleeve
1. Mueller H-615
2. Or equal in strength and sealing ability

j. Anchoring Tee
1. Clow F-1217
2. Or equal in strength and sealing ability

C. COPPER SERVICE PIPE

1. Conform to ASTM B88
2. Water service piping is to be 1" (min.) type "K" copper with no unions or couplings allowed unless length is in excess of 100 feet. Services are to be augured and pushed unless otherwise specified by ENGINEER.

3. Fittings:
a. Copper
b. Compression Type:
1. Mueller 110
2. Or equal

D. SERVICE CONNECTIONS

1. Corporation stops are to be Mueller H-15000 and may be installed either "wet" or "dry"
2. Curb stops are to be Mueller H-15154 Minneapolis pattern
3. Curb boxes are to be Mueller H-10302 Minneapolis pattern

E. WEDGE VALVES, 4" through 24"

1. Wedge valves will be in accordance with all applicable provisions of Section 42 of the "Standard Specifications for Water and Sewer Main Construction in Illinois, latest Edition," with the following exceptions:

a. To be WATEROUS resilient seat wedge valve Model 2500.

2. Vaults and boxes- All new Valves must be installed within a Valve Vault. Valve

Boxes require written approval from the Water Superintendent.

F. TAPPING VALVE

WATEROUS model 2500.

G. FIRE HYDRANTS

1. Waterous 5-1/4" Pacer Model Number WB-67-250 6 foot bury with auxiliary resilient seat wedge valve and valve box.

H. THRUST BLOCKS

1. Class si concrete in accordance with IDOT Standard Specifications for Road and Bridge Construction, Section 1020.

I. CROSS CONNECTION CONTROL

1. RPZ- required for development other than single family residential, unless a written waiver is obtained from the Public Works Department.

2. Residential dual check valve number 7 is required if a private well is located on the premises and is not capped be a certified well contractor.

J. WATER METERS

New Meters 5/8" x 3/4", 1" and 2" sizes, meter size to be one size less than diameter of service.
Rockwell/Sensus Model SR II/SR or approved equal.

K. ABANDONMENT OF OLD WATER SERVICES

Removal and disposal of old services including the Buffalo Box is required. Corporation stop has to be shut off at the main and service line removed. If corporation stop leaks, remove from main and use Smith Blair 261 Sleeves to abandon the existing service.

L. WATER MAIN TESTING

1. PRESSURE TEST

a. Test pressures will be as follows:

1. Water Main Test Pressure: 150 psi at lowest elevation in test section for 2 hours.

b. Test Procedure:

1. Add water to expel air.
2. Pressurizing equipment will include a regulator set to avoid over pressurizing and damaging otherwise acceptable line.
3. Make test connection, subject main to normal water pressure, and examine for leaks.
4. Apply test pressure by means of a force pump of such design and capacity that required pressure can be applied and maintained, without interruption for duration of the test.
5. Measure test pressure by means of tested and properly calibrated pressure gauge.
6. Maintain initial test pressure for sufficient length of time to permit inspecting piping under test, but not less than 30 minutes.
7. In case repairs are required, repeat pressure test until pipe installation conforms to specified requirements.
8. Perform final test at required test pressure for two hours.

c. Water main considered to have failed pressure test if applied pressure drops five psi or more.

2. **LEAKAGE TEST**

a. Conduct pressure test and initial leakage test concurrently. Final leakage test may be waived by OWNER if found unnecessary to add water during duration of final pressure test.

b. Leakage defined as quantity of water to supplied into newly laid pipe, or any section thereof, necessary to maintain specified leakage test pressure after main filled with water and entrapped air expelled.

1. Leakage shall not exceed number of gal/hr. as determined by following formula for rubber sealed joints:

$$Gph = \frac{ND\sqrt{P}}{7400}$$

Where:

Gph = gal/hr.
N = Number of joints under test
D = Nominal diameter of main in inches
P = Average pressure in psi gauge during leakage test

2. In case section under test contains joints of various diameters, allowable leakages will be sums of computed leakage for each size of joint.

c. Test Procedure:

1. Submit test section to approximately 1000 psi gauge pressure at highest elevation of water main under test.
2. Conduct final leakage test for one hour.
3. Repair defects and retest until acceptable test results obtained.

3. DISINFECTING

a. Disinfect in accordance with AWWA C601, Illinois State Plumbing Code, and local municipality code, or IDOTSPECS Article 561.04 and 561.05.

SEWERAGE AND DRAINAGE

A. REFERENCE STANDARDS:

1. American Society for Testing and Materials (ASTM), latest edition
2. American Water Works Association (AWWA), latest edition
3. Illinois State Plumbing code, latest edition.
4. Illinois Department of Transportation Standard Specification for Road and Bridge Construction, latest edition. (IDOT)
5. Standard Specifications for Water and Sewer Main Construction in Illinois, latest edition.

B. MATERIALS (SANITARY MAINS, AND BUILDING SEWERS)

1. PVC Sewer Pipe and Fittings:

   a. 4 to 15 in. Dia.: ASTM D-2241, D-2672, D-2729, D-3033, or D-3034 SDR 26; PVC Type 1, Grade 1
   b. 18 to 27 in. Dia.: ASTM F679; PS46; PVC Type 1, Grade 1
   c. Fittings:
      1. The connection of the building sewer service into the public sewer main shall be made at a TEE/WYE fitting (installed with a construction of new mains), if such a branch is available at a suitable location. If there is no properly located TEE/WYE fitting at a main, a neat machined hole may be cut into the public sewer main and a “Sealtite” Type “S” (or approved equal) sewer saddle has to be used to receive the building sewer service, at an angle of about forty-five (45) degrees.

      2. Provide approved adapters for transitions to other types of pipe materials.

      3. No building sewer connection shall be made in a manhole unless such manhole is designed and constructed to receive such building sewer.

   d. Pipe Joints:
      1. ASTM D2564 or D1869.
      2. Field applied heat fusion or solvent welded joints between pipe sections, pipe and fittings or fitting components not permitted.
      3. Assembled joint shall pass performance tests as required in ASTM D3212.

   e. Pipe Markings:
      1. Manufacturer's name or trademark.
      2. Nominal pipe size.
      3. PVC cell classification.
      4. Legend, "Type PSM SDR-26 PVC Sewer Pipe" or "PS46 PVC Sewer

Pipe" as applicable.
5. ASTM D3034, ASTM F679 or ASTM D2241 as applicable.
6. Extrusion date, period of manufacture or lot number

f. Fitting Markings:
1. Manufacturer's name or trademark.
2. Nominal pipe size.
3. Material Designations: PVC.
4. PSM SDR 26 or PS46 as applicable.

g. Tapping Saddles:
1. Equivalent to Sealtite sewer tapping saddle system or TAPRITE "MD" Cut-ins manufactured by General Engineering Company.

h. Pipe Section Length:
1. 12 ft. minimum.
2. Use full sections to maximum practical extent.
3. No section shall be shorter than 3 ft. in length.

i. Flexible Boots:
1. Conform to ASTM C923.
2. Kor-N-Tee
3. PSX by Press Seal, Inc.
4. Or equal

C: REINFORCED CONCRETE PIPE (RCP) (STORM SEWER ONLY):

1. ASTM C76 with bell and spigot joints to strength class specified in Table following Article 550.03 of IDOT Standard Specifications for Road and Bridge Construction, except that pipes which will have less than four feet of cover shall be Class IV. The manufacturer shall mark exterior of each pipe section with pipe class.

2. Joints: Rubber gaskets conforming to ASTM C361.

3. Tapping Saddles: Equivalent to Sealtite sewer tapping saddle system or TAPRITE "MD" Cut-ins by General Engineering Company.

4. Fittings:
a. Conform to strength, water tightness, joint type, and other requirements of main line pipe to which joined.
b. Securely attach fabricated branches for wyes and tees to wall of pipe in watertight manner and flush with inside surface of pipe.
c. Tee Branches: Axis perpendicular to longitudinal axis of pipe.
d. Wye branches: Axis approximately 60 degrees or 45 degrees from longitudinal axis of pipe, measured from bell end.
e. Do not interrupt pipe reinforcement beyond radial distance of 3 in. outside fitting.
5. Lift holes not permitted.

6. Pipe Section Length:
    a. 7 ft. minimum.
    b. Use full sections to maximum practical extent.
    c. No section shall be shorter than 3 ft. in length.

D. DUCTILE IRON PIPE (DIP) (SANITARY, STORM AND COMBINED):

1. Material:
    a. Conform to AWWA C151 or equal.

2. Thickness:
    a. Conform to AWWA C150, Class 52 minimum.

3. Joint:
    a. Conform to AWWA C111.
    b. Push on type.
    c. Neoprene or other synthetic rubber gaskets resistant to sanitary sewage. Natural rubber gaskets not permitted.

4. Pipe Lining:
    a. Conform to AWWA C104.

5. Coating:
    a. Cement lining conforming to AWWA C104.
    b. Bituminous conforming to AWWA C151.

6. Pipe Section Length:
    a. 18 ft. nominal.
    b. Use full sections to maximum practical extent.

7. Fittings:
    a. Conform to AWWA C110.
    b. Push-on joints conforming to AWWA C111.
    c. Fitting pressure rating: 250 psi.
    d. Cement lining conforming to AWWA C104.
    e. Bituminous coat conforming to AWWA C151 on interior and exterior.

E. FLEXIBLE CONNECTORS:

1. Materials:
    a. Synthetic rubber base compound formulated to resist acids, alkalies, solvents, and greases encountered in sanitary or storm sewers and contain no reclaimed rubber (non-shear mission coupling).
    b. Test in accordance with ASTM D543 and not lose weight in 1.0 normal sulfuric acid, 1.0 normal hydrochloric acid or 1.0 normal nitric acid.
    c. Show no etching, blistering, distortion or other evidence of chemical or bacterial attack and shall show no cracking on rapid cooling.

d. Under ASTM D412, ultimate tensile strength shall exceed 7u50 psi at 80 degrees F and elongation shall exceed 150%.
e. Under ASTM D570, water absorption shall not exceed 4%.
f. Under ASTM D2240 Type A hardness shall exceed 55 in 5 sec reading.

2. Material used in fabricating compression bands shall be Type 316 stainless steel and bolts and nuts shall be Type 305 stainless steel in accordance with ASTM A167.

3. Completed Joint: conform to material and performance standards of ASTM C425 for resilient sewer pipe joints.

4. Acceptable Manufacturers:
   a. Clow
   b. FERNCO, Inc.
   c. Or equal

F: TESTING:

1. Pressure testing.

   A. All sanitary sewers including service lines shall be tested for; low pressure air test, exfilteration test, television testing and deflection test per standard specifications and the Village code of the Village of Villa Park and shall be approved by the Village before acceptance.

   B. All sanitary sewers shall be televised before acceptance. All costs shall be incidental to the work. Testing shall be witnessed and approved by the Village of Villa Park before final acceptance. The location of television inspection shall be as designated by the Village Engineer.

   C. If the sanitary sewer installation fails to meet the test requirements specified, the contractor shall determine the cause or causes of the defect and shall, at his own expense, repair or replace all materials and workmanship as may be necessary to comply with the test requirements.

C. Contractor shall submit certified copies of all reports of tests conducted by an independent laboratory before installation of PVC plastic pipe. Tests shall be conducted in accordance with standard method of test for "external loading properties of plastic pipe by parallel plate loading, @ ASTM standard D2412. Tests shall also be conducted in accordance with ASTM D3212 to demonstrate joint performance at 5% maximum diametric deflection of the spigot, as specified in ASTM D3212 specifications work.

MANHOLES AND INLETS

A. **REFERENCE STANDARDS:**

1. American Society for Testing and Materials (ASTM), latest edition.

2. Standard Specifications for Road and Bridge Construction by Illinois Department of Transportation, latest edition (IDOT SPECS).

3. Standard Specifications for Water and Sewer Main Construction in Illinois, latest edition.

B. **MATERIALS:**

1. MANHOLES AND INLETS

   a. Pre-cast concrete conforming to ASTM C478.

      1. Sections and component parts to be marked by manufacturer with trade name and/or trademark and ASTM designation.

   b. Provide pre-cast concrete cone or flat tops as indicated on drawings.

   c. Elevations on drawings designate sewer elevations at center of structure. Adjust elevations of openings for incoming and outgoing pipes in accordance with sewer grades shown on drawings.

      1. Holes shall be smooth, radial to centerline of manhole, and perpendicular to manhole wall.
      2. Holes for Sanitary and Storm Pipes: circular.
      3. Holes shall be cast in initial pouring of section or shall be cored in after concrete cured. Broken out holes or holes cut into green concrete are not permitted.

   d. Sanitary/Combined Manholes:

      1. Integral Base: 6 inches nominal thickness.
      2. Pipe Connection: Flexible synthetic rubber boot meeting ASTM C923.
         a. Cast-in or pressed-on types permitted.
         b. Cast-in type boot shall be installed in initial pouring of manhole section.
      3. Provide channels in invert to direct flows from incoming to outgoing pipe.
      4. Section Joints:
         a. ASTM C361 with synthetic rubber O-ring.

b. Tongue and groove.
c. ASTM C-877, Type II, External Joint Seals.

5. Eccentric manhole opening.
6. Optional precast concrete flat slab top refer to IDOT Standard 2354-2

e. Storm Manholes:

1. Integral Base: 6 inches nominal thickness.
2. Pipe Connection: Circular hole 1-1/2 inches to 3 inches larger than actual outside diameter of sewer pipe being connected.
3. Provide invert channels in storm manholes as specified in Paragraph 2.01.D.3.
4. Section Joints: Tongue and groove.
5. Eccentric manhole opening.
6. Optional precast concrete flat slab top refer to IDOT Standard 2354.

f. Inlets.

1. Type "A".

a. Integral Base: 4-inch nominal thickness.
b. Pipe Connection: circular hole 1-1/2 inches to 3 inches larger than actual outside diameter of sewer pipe.

2. Type "B".

a. Integral Base: 6-inch nominal thickness.
b. Pipe Connection: Circular hole 1-1/2 inches to 3 inches larger than actual outside diameter of sewer pipe.
c. Provide invert channels as specified in Paragraph 2.01.D.3.
d. Section Joints: tongue and groove.
e. Eccentric opening on cone.
f. Optional pre-cast concrete flat slab top refer to IDOT Standard 2354-2.

3. Type "C".

a. Integral Base: 6-inch nominal thickness.
b. Pipe Connection: Circular hole 1-1/2 inches to 3 inches larger than actual outside diameter of sewer pipe.
c. Provide invert channels as specified in Paragraph 2.01.D.3.
d. Section Joints: tongue and groove.
e. Eccentric opening on cone.
f. Optional precast concrete flat slab top refer to IDOT Standard 2354-2.

g. Wall Thickness:

1. For 2 ft.-0 in. Nominal ID: 3-in. minimum wall.
2. For 3 ft.-0 in. Nominal ID: 4-in. minimum wall.
3. For 4 ft.-0 in. Nominal ID: 5-in. minimum wall.
4. For 5 ft.-0 in. Nominal ID: 6-in. minimum wall.

2 ADJUSTING RINGS

a. Pre-cast concrete with steel reinforcement sufficient to prevent cracking in normal handling and use.

b. Mating Faces:

1. Smooth.
2. Parallel.
3. Free from cracks, chips, spall or casting irregularities interfering with watertight mating to structure top or casting.
4. Provide grooves in faces to contain extrudable preformed plastic gasket material when possible.

c. Thickness Range:
1. 2 inch nominal minimum.
2. 12 inch nominal maximum.

3 GASKET MATERIALS

a. Flexible Boots:
1. Conform to ASTM C923.
2. Synthetic rubber resistant to sanitary sewage.
3. Cast-in or pressed-on types acceptable.

b. O-Ring Gaskets:
1. Conform to ASTM C361.
2. Synthetic rubber resistant to sanitary sewage.

c. Extrudable Preformed Plastic Gasket:
1. Butyl rubber.
2. EZ Stick by Press Seal Gasket Company, or equal.

d. Internal Manhole Chimney Seal
1. **Conform to ASTM C-923**
2. **Cretex or approved equal.**
3. **The seal shall remain flexible throughout a 25-year design life, allowing repeated vertical movement of the frame of not less than 2 inches and repeated horizontal movement of the frame of not less than 2 inch. The sleeve portion of the seal shall be corrugated with a minimum unexpended vertical height of either 6 or 9 inches and shall be capable of being mechanically locked to the frame base flange.**

The sleeve and extension shall have a minimum thickness of 3/16 inches and shall be made from a high quality rubber compound conforming to the applicable requirements of ASTM C-923, with a minimum 1500 psi tensile strength, a maximum 18% compression set, and a hardness (durometer) of 48+- 5. The bands shall be fabricated from 16-gauge stainless steel conforming to ASTM A-240, Type 304, with no welded attachments and shall have a minimum adjustment range of 2 diameter inches. Any screws, bolts, or nuts used to lock the band in place shall be stainless steel conforming to ASTM F-593 and 594, Type 304

e. External Joint Sealing Bands

1. **Conform to ASTM C-877**
2. **Type II MacWrap or approved equal.**
3. **External joint seals shall consist of a collar 9 inches wide with an outer layer of polyethylene, with a minimum tensile strength of 4000 psi and a minimum tear resistance of 1500 psi, and an under layer of rubberized mastic that is reinforced with the collar 3/4 inches from the edge. The straps shall be confined in tubes that isolate them from the mastic and allow them to slip freely when mechanically tightened and locked around the manhole. The collar shall be furnished with a minimum 6 inches overlap and a closing flap to cover any remaining exposed strap.**

d. Materials to be new and provided in unopened containers where applicable.

4 CASTINGS

a. Conform to ASTM A48, Class 30.
b. Free from cracks, holes, swells, and cold shuts and patches.
c. Do not coat or paint.
d. Provide structural capacity, hydraulic capacity, water tightness, interior clearance dimensions, approximate vertical height, and range of adjustment equal to:

1. Combined, Sanitary and Water Manhole Frame and Water Resistant Cover:
   a. Neenah R-1713 heavy duty frame and self-sealing solid lid.
   b. East Jordan Iron Works (EJIW) 1050 frame, watertite assembly, and 1020 Type A solid cover
   b. Or approved equal.

2. Storm Manhole Frame and Solid Cover:
   a. Neenah R-1713 heavy duty frame and self-sealing solid lid.
   b. East Jordan Iron Works (EJIW) 1050 frame, watertite assembly, and 1020 Type A solid cover
   b. Or approved equal.

3. Curb Inlet with Bicycle Resistant Grate:
    a. Neenah R-3278-AL (W/B-6.12 curb and gutter).
    b. Neenah R-3278-AL (W/M-4.12 curb and gutter).
    c. Neenah R-3205 (at depressed curb).
    d. Or approved equal.

4. Label lids "Sanitary", "Water", or "Storm" as applicable.

5 CAST-IN PLACE CONCRETE

a. Class SI concrete in accordance with Section 637 of IDOT SPECS.
b. Use for field poured manhole bases, inverts, and plugs for existing inlet leads being abandoned.
c. Cement shall be ASTM C150, Type 1 - resistant to attack by sanitary sewage.
d. Reinforcement Bars: IDOTSPECS Section 508.

6 NON-SHRINK GROUT

a. Use for grouting concrete masonry units.
b. Five Star Grout, U.S. Grout Corporation or equal.

C. EXECUTION

1 SANITARY AND COMBINED MANHOLES

a. Place where shown on drawings and in accordance with details.
b. Excavate in accordance with Section 02220.
c. Connect pipes using flexible boots in accordance with boot manufacturers instructions.
    1. Center pipe in boot.
    2. Take special care to ensure connections are watertight.
d. Place O-ring gasket or double row of extrudable perform plastic gasket between manhole sections
e. Place appropriate top section, cone (depth > 6 feet) or flattop, (depth < 6 feet).
f. Place external Sealing Bands as shown on the detail at each joint between manhole sections in accordance with the manufacturer=s instructions.
g. **Grout all lift holes from the inside and outside with a non-shrink grout, prior to backfilling.**
h. Place two adjusting rings maximum on manhole top. Thickness of adjusting rings shall be 2 inches to 12 inches as necessary to bring completed manhole to elevation shown on drawings. Maximum height of adjustment shall be 12 inches.
    1. Place extrudable preformed plastic gasket material between adjusting ring and manhole top, and between adjusting ring and manhole

frame.

2. Avoid use of overly thick gasket material such as will likely produce after-settlement of manhole frame due to long-term cold flow of gasket materials.
3. For not grooved adjusting ring, provide two rows of 2 inch by 2 inch or 3/4 inch by 3/4-inch gasket material.
4. For grooved adjusting rings, provide size gasket material recommended by ring manufacturer. Single or multiple grooved rings permitted. Where multiple grooved rings used, place gasket material in each groove.

i. **Install manhole frame and cover and External Manhole Chimney Seal as shown on the detail, with extensions where needed to cover the entire chimney area, in accordance with the manufacturer's instructions.**

j. Backfill in accordance with Section 02220.

k. Pour manhole invert.

1. Provide poured-in-place channels (if manholes not furnished with pre-cast inverts) to direct flows from incoming pipes to outgoing pipes. Channels shall smoothly blend flows.
2. Make channel horseshoe shaped. Width and depth equal to the size of the outlet sewer.
3. To maintain flexibility of pipe connection boot, plug annular space between pipe and boot that falls in area where invert to be poured with extrudable preformed plastic gasket material. Plug shall prevent concrete from entering space between pipe and boot.
4. Invert channels may be placed any time after manhole base section (and connecting pipe) is back filled.

2 STORM MANHOLE AND INLETS

a. Construct in accordance with combined manholes except as follows:

1. Pipe connection:
   a. Center pipe in hole through base section and pack annular space with extrudable preformed plastic gasket material. Seal connection on interior and exterior with non-shrink grout.
   b. Take care that annular space is uniform around pipe and gasket material evenly distributed.
   c. Ensure connection is watertight.

2. Joint between pre-cast concrete sections:
   a. Provide one or two rows extrudable preformed plastic gasket material between sections as necessary for watertight joint.

3. Abandoning existing catch basins:
   a. Where drawings so indicate, remove existing catch basins for installation of new inlets and inlet leads. This removal shall be incidental to the cost of the installation of the new inlet.

b. Plug existing catch basin leads with Class SI concrete, in accordance with IDOTSPECS, at end of lead as exposed for removal of existing inlet and at connection of existing lead to combined sewer manhole. A minimum depth of plug shall be equal to inside diameter of existing lead.

c. Where drawings so indicate and as directed by ENGINEER, abandon existing catch basins that will not be replaced by new inlets. These catch basins shall be abandoned as follows:

1. Plug existing catch basin leads as outlined in Paragraph 3.02.A.3.b.
2. Remove existing castings and inform OWNER so that it can be removed from the job site.
3. Remove existing structure to a point at least 3 inches under the proposed sub-grade.
4. Fill catch basin with CA-6/Grade 8 material and compact in accordance with Section 02220.

4. Installing new inlets:

a. Locate approximately where shown on drawing. Exact location will be selected in field by ENGINEER.
b. ENGINEER will determine grades of new inlets.

3 CASTINGS

a. All castings shall remain the property of OWNER following their removal. Removed castings shall be stockpiled at one location onsite by the CONTRACTOR. The OWNER shall remove the castings they wish to keep; the remaining castings shall be the property of the CONTRACTOR and shall be responsible to

4 FIELD QUALITY CONTROL

a. Pre-cast reinforced concrete bases, risers, tops, adjusting rings, and iron castings shall be subject to rejection on account of failure to conform to any specification requirements.

b. Individual sections of bases, risers, and tops may be rejected because of:

1. Fractures or cracks passing through bell, except for single end crack not exceeding joint depth.
2. Excessive patching.
3. Grouted pipe openings.
4. Defects indicating imperfect proportioning, mixing, and molding.
5. Surface defects indicating honeycombed or open texture.
6. Damaged ends, where such damage would prevent making

satisfactory joint.

7. Continuous crack having surface width of 0.01 inches or more and extending for length of 12 inches or more, regardless of position.

c. Installation may be rejected because of:

1. Use of individual components subject to rejection.
2. Failure to conform to installation requirements.
3. Visible infiltration.
4. Variation from true vertical alignment by more than 2% of depth.
5. Variations in pipe and rim elevations greater than 0.5 inches from elevations shown on plans.