REGIONAL JOINT ADDENDUM


A Specifications Committee, including a representative of each of the participating agencies, was organized to study and recommend changes to the standard specifications. Interested parties may address suggested changes and questions to the Specifications Committee for Design and Construction Standards for Wastewater Collection Systems, c/o any of the participating agencies listed on the cover of this publication.

The following participating agencies of the Clark County, Nevada area have adopted this Regional Joint Addendum by Resolution of their governing bodies as follows:

CLARK COUNTY WATER RECLAMATION DISTRICT
   Adopted by Board of Trustees

CITY OF BOULDER CITY
   Adopted by Resolution

CITY OF HENDERSON
   Adopted by Resolution

CITY OF LAS VEGAS
   Adopted by Resolution

CITY OF NORTH LAS VEGAS
   Adopted by the Director of Utilities in accordance with the City of North Las Vegas Municipal Code 13.04.140
SECTION 1 – GENERAL INFORMATION:
No changes.

SECTION 2 – DESIGN STANDARDS:
Revise as Follows:

2.2.3 Pipe Slope Requirements:

a. Public interceptor, public collector sewer and private collector sewer pipe slopes shall generally be selected to achieve the flow depth (d) divided by pipe diameter (D) ratio requirements of the Agency (design d/D ratio) when transporting the peak dry weather flow for the Project and upstream tributary flows designated by the Agency, if any. The Engineer shall submit to the Agency, with the Construction Documents submitted for approval, flow depth and velocity calculations in accordance with Sections 2.2.3.b and 2.2.3.c, and actual number of contributing Equivalent Residential Units (ERUs) for all public interceptors, public collector sewers and private collector sewers within the Project. Pipe slopes shall be sufficient to permit the pipe to flow at a minimum velocity of not less than 2 feet per second (FPS) when half-full and not more than 10 feet per second when 75-percent full at the ultimate peak wet-weather design flow for the eventual final tributary area, unless otherwise approved by the Agency. The minimum slopes in Table “D” have been calculated to achieve flow velocities of at least 2 feet per second in each nominal sewer pipe size presented when that pipe is half-full where there is sufficient flow from the tributary area upstream. The maximum slopes in Table “D” have been calculated to limit flow velocities in each nominal pipe size presented to not more than 10 feet per second when the pipe is 75-percent full. It is expected that where upstream flow quantities are sufficient to reach at least pipe half-full levels at peak dry weather flow, pipe slopes as designed for the Project will fall within the ranges presented in Table “D”. Where upstream tributary areas do not generate sufficient flow to reach half-full levels in the public interceptors, public collector sewers and/or private collector sewers, then the minimum pipe slopes listed in Table “D” shall be utilized.

2.3.5 Drawing Requirements:

w. Indicate all sewer laterals which require a backwater valve (BWV) per SD-29.

x. Provide a Signature Block per Agency requirements for Agency approval signatures.
y. List Developer's company name, business address, business telephone number (contact number Monday-Friday between 8:00 am and 5:00 pm Pacific time) 24/7, emergency contact telephone number and contact individual primarily responsible for the Project.

z. List Engineer's company name, business address, business telephone number (contact number Monday-Friday between 8:00 am and 5:00 pm Pacific time) 24/7, emergency contact telephone number and contact individual primarily responsible for the Project.

aa. Show Engineer's Stamp

bb. Prepare all drawings in a neat and legible manner on sheets that measure 24-inches by 36-inches

c. Provide a Vicinity Map (Major Cross Streets) for the project.

d. List the Project name shall be on each sheet.

e. Provide Benchmark data

ff. Include a Legend identifying all symbology used of the drawings

gg. Provide a Master Utility Plan Sheet for all Projects having two or more utility sheets. The Master Utility Plan shall include all manhole data, pipe data, street data and Agency signature block. Indicate estimated peak dry weather sanitary wastewater flow in MGD, type of Project (single-family, multi-family, commercial, industrial, mixed-use or other type), and number of units by type.

For sewers, force mains or other sanitary sewer system appurtenances to be placed in easements the following additional drawings shall be provided:

hh. Plan views of all easement areas at legible scale in accordance with Standard Drawings SD-28A and SD-28B depicting all surfaces, grading slopes, the proposed sanitary sewer, sanitary sewer laterals, all other underground and overhead utilities, drainage, removable bollards, fencing, block walls, wall footings, any other foundations, structures and all other site objects within or immediately adjacent to the easement that are to remain upon completion of construction.

ii. Cross-sections as appropriate at 1:1 vertical and horizontal scale showing existing and proposed ground elevations, all underground and overhead utilities, fencing, block walls, wall footings, other foundations, structures, and all other site objects within and immediately adjacent to the easement that are to remain upon completion of construction. One cross-section shall be provided at each end of the easement and one
additional cross-section at key points in the easement for each 2 feet of fall along the easement, unless otherwise directed by the Agency.

jj. Two longitudinal profile views at the same scale as the plan view drawn along the easement at its centerline, one looking right from the centerline and the other looking left from the centerline, depicting the final ground surface, the proposed sanitary sewer, all other underground and overhead utilities, fencing, block walls, wall footings, any other foundations, structures and any other site objects within the easement that are to remain following completion of construction.

kk. Show the “drivable access” in accordance with Section 2.2.14 provided for facility maintenance. Provide a structural roadway section of materials and design for the “drivable access”.

For sewers, force mains or other sanitary sewer system appurtenances to be placed in easements the following additional drawings shall be provided:

II. Provide Lift Station site plan and elevation drawings - Designated as Private or Public

mm. Provide Lift Station Data Sheet - If Public

nn. Include Lift Station Shop Drawings - After design, but prior to installation, if Public

oo. Indicate the Date sent to Lift Station Operation For Review if Public Station

pp. Provide O&M Manuals

For subdivisions the following additional drawings shall be provided:

qq. Provide a Cover Sheet (Master Utility Plan)

rr. Indicate Lot and block numbers on all sheets

ss. Show typical cross-section of streets showing all underground utilities. (See Standard Drawing SD-19.)

tt. Sanitary sewers and appurtenances shall be designed to prohibit the entry of storm water inflow.

uu. Indicate the number of lots to be served by the Project and if the Project is a phase of a larger development indicate the total number of lots for full build-out (if known)
For pump stations, the Engineer shall contact the Agency for the drawing requirements for pump stations and ancillary facilities.

2.5.5 **Termination:**

Force mains shall be extended only as far as the closest gravity sewer. Force mains shall discharge to private manholes as shown in Standard Drawing SD-10 where feasible. The private manholes shall then discharge to private gravity sewers which in turn shall discharge to new public manholes along the sanitary sewer main. Where site conditions do not permit the installation of private manholes and private gravity sewers and where approved by the Agency, force mains may discharge directly to public sanitary sewer mains at new manholes as shown in Standard Drawing SD-11. Only one set of dual force mains shall be connected to a manhole. This manhole shall be configured to reduce turbulence, minimize odor release and control erosion from the incoming force main flow. Manholes receiving discharges from force mains shall be provided with corrosion protection in accordance with Section 3.16.8 Agency requirements.

2.5.6 **Discharge Pipe:**

c. If required by Agency, pressurized cleanouts as shown in Standard Drawing SD-36A shall be provided every 400 feet along force mains.

2.2.10 **Manholes and Manhole Appurtenances:**

b. Additional Requirements for Manhole Bases:

All manholes on new main sewers and new laterals shall have pre-cast manhole bases. **Cast-in-place manhole bases may be utilized on new sewer mains per Agency requirements. For manholes deeper than 25-feet, structural plans for the manhole base are required. No internal platforms are allowed. The drop across the cast-in-place or pre-cast manhole invert shall be 0.2 ft minimum, except:**

1. For manholes constructed as “through” manholes in accordance with SD-7, no drop across the manhole invert is required. A “through” manhole is a manhole where there is no change in horizontal direction or vertical slope, and the pipe continues through the manhole at a constant slope and direction.
2. For manholes where the incoming pipe diameter is smaller than the outgoing pipe diameter, both pipes should have matching crown elevations at the manhole.
New manholes on existing sewers or existing laterals may have cast-in-place bases or pre-cast bases at the Contractor’s option. Pre-cast manhole bases shall conform to Section 4.9.1, Standard Drawing SD-1 and other Standard Drawings as applicable. Cast-in-place base construction shall conform to Section 3.16.1, Standard Drawing SD-7 and other Standard Drawings as applicable. Concrete shall conform to 4.11.2.

c. Changes of Flow Direction Within Manholes:

For public sewer mains 12-inches nominal diameter and smaller, the maximum change in angle of the flow path through a manhole shall not exceed 90-degrees, unless otherwise approved by the Agency. For public sewer mains 15-inches nominal diameter and larger, the maximum change in angle of the flow path through a manhole shall not exceed 45-degrees, unless otherwise approved by the Agency.

f. Frames and Covers:

Manhole frames and covers shall conform to Section 4.9.2. The “Standard Concentric Dual Cover and Frame” shown in Standard Drawing SD-2 shall be used for all manholes without steps. The “Standard Eccentric Dual Cover and Frame” shown in Standard Drawing SD-3 shall be used for manholes with steps. Locking manhole covers shall be used as directed by the Agency.

g. Steps: **DELETED FROM STANDARDS**

*Where required by the Agency, manholes shall be fitted with steps in accordance with Section 4.9.3, Standard Drawing SD-1A, Standard Drawing SD-6, and OSHA requirements. Steps shall be factory-installed only. Steps may not be field-installed under any circumstances. Manhole steps shall be aligned in each section to form a continuous ladder within the assembled manhole with steps equally spaced vertically at a maximum distance of 16 inches. The manhole steps shall face 180 degrees from the outgoing sewer pipe.*

i. Corrosion Protection:

Corrosion Projection meeting Agency requirements and conforming to Sections 3.16.8 and 4.9.9 shall be provided in all locations where it may be reasonably anticipated that odors and/or corrosive gasses may be released in the sewer as a result of turbulence or other factors. The Engineer shall contact the Agency as early as possible in the Project design process to identify any additional requirements for design and
installation of corrosion protection of PVC corrosion liners in areas of high groundwater. As a minimum corrosion protection shall be provided in the following locations:

1. All manholes for sewers 15-inches in diameter and larger;
2. All manholes where the pipe slope decrease between upstream and downstream sewers greater than 4-percent;
3. All manholes for sewers 10 inches and larger where there are changes in horizontal direction greater than 45 degrees or there are more than one inlet connection to the manholes;
4. All manholes receiving the discharge from a force main and one manhole upstream and one manhole downstream from the manhole receiving the discharge from a force main;
5. All siphon inlet and outlet structures and the next manhole downstream from the siphon outlet structure;
6. All drop manholes per Standard Drawing SD-12;
7. All pump station wet wells; and
8. All manholes where the incoming pipe slope is greater than 4-percent, the change in horizontal direction is greater than 45-degrees, and where the d/D is 0.25 at peak flow after build out; and,
9. All other locations as directed by the Agency

2.2.22 Other Utility Crossing and Clearances, Aerial Crossings, and Parallel Utility Installations:

a. Below-Grade Utility Crossings and Clearances

Crossings of new utilities beneath existing main sanitary sewers and laterals shall conform to Standard Drawing SD-20. Crossings of new utilities above existing or new main sanitary sewers and laterals shall conform to Standard Drawing SD-21. In locations where SD-20 or SD-21 apply, identify the protection on the civil plans in profile. The Engineer shall contact the Agency as early as practical in the Project design process to establish the specific requirements for all crossing designs.
Revise as follows:

3.9 CONSTRUCTION STAKING

At its option, Contractor may use a station/offset system or a coordinate system for locating improvements for construction. This locating system shall be shown on the Construction Drawings approved by the Agency. The offset, station and cut or XYZ coordinates matching the approved Construction Drawings shall be printed at each hub. Hub spacing shall not exceed 20 feet to 25 feet on curved sewers, as determined by the Agency depending on the radius of the curve, and on all sewer mains with slope less than 1-percent; and, 10 foot intervals in intersections with heavy traffic conditions, unless unusual field conditions require additional staking to assure accurate placement of the new sewer in accordance with the approved Construction Documents and the tolerances specified in Section 3.8. Contractor shall replace damaged or lost hubs prior to construction of sewer segments and sewer appurtenances in the immediate vicinities of such hubs. Hubs shall remain in place at least until the sewer segments in the vicinities of the hubs are installed, backfilled, inspected, and successfully tested.

3.14 PIPE INSTALLATION

Gravity sewer pipe shall be laid in accordance with the latest editions of: ASCE Manual of Practice No. 60, the Uni-Bell PVC Pipe Association Handbook of PVC Pipe, Design and Installation, and the pipe manufacturer's recommendations. Force mains shall be installed in accordance with AWWA C605 and pipe manufacturer's recommendations. HDPE shall be installed by contractors certified by the pipe manufacturer. The pipe runs between manholes shall be a single pipe size, pipe material and structural classification.

Pipe shall be laid in finished trenches free from water or debris, and shall be commenced at the lowest point and laid continuously, with the spigot ends pointing in the direction of the flow. Protect the pipe during handling against impact shocks and free fall. Do not permit hooks to come in contact with pre-molded joint surfaces. Handle pipe having pre-molded joint rings or attached couplings so that no weight, including the weight of the pipe itself, will bear on or be supported by the jointing material. Avoid dragging the spigot ring on the ground or allowing it to be damaged by contact with gravel, crushed stone, or other hard surface. The internal beads on butt-fusion welded HDPE shall be reamed flush with the interior pipe wall.

After delivery alongside the trench, carefully examine each piece of pipe for soundness and specification compliance. Acceptable pipe may be marked by the Agency's Representative with paint or other permanent marking material. The marks should be plainly visible after installation in the trench and before the pipe is covered.
Clean joint contact surfaces immediately prior to jointing. Use lubricants, primers, or adhesives as recommended by the pipe or joint manufacturer.

Unless otherwise required, lay all pipe straight between changes in alignment and at uniform grade between changes in grade. Excavate bell holes for each pipe joint. When jointed in the trench, the pipe shall form a true and smooth line. Keep trenches dry during pipe-laying. Before pipe-laying is started, remove all water that may have entered the trench.

During construction of new facilities, a debris trap shall be provided in accordance with SD-30 in the first manhole upstream from the existing sewer to which the new sewer will be connected and a plug installed in the outlet pipe of that manhole to prevent debris from entering the existing sanitary sewer. This trap and plug shall remain in place until the new sewer is completed, tested and is ready for transfer to the Agency. The Contractor is cautioned that hydrogen sulfide, methane, and other potentially hazardous and/or explosive gasses or other materials may be present in existing or new sanitary sewers. There also may not be sufficient oxygen to support life. Therefore the Contractor is advised to take suitable precautions to protect its work forces and the general public from exposure and shall provide odor control and other systems suitable for such conditions.

As the new sewer is prepared for final testing, additional trap(s) and plug(s) shall be placed at the downstream end of each sewer segment being cleaned to prevent the discharge of debris to either the existing sanitary sewer or to other downstream segments of the new sewer that have already been cleaned and tested. All debris collected in traps shall be removed prior to removing plugs. Upstream plugs and traps shall be removed once all cleaning and testing upstream of the plugs/traps have been completed.

At times when pipe-laying is not in progress, the open end of the pipe shall be closed with a tight-fitting cap or plug to prevent the entrance of foreign matter into the pipe. These provisions shall apply during the noon hours as well as overnight. In no event shall water that has infiltrated into the trenches be allowed to enter into the existing sanitary sewer system. The pipeline under construction may be used to remove water that has infiltrated into the trenches provided it is removed before entering the existing sanitary sewer system.

When pipe is to be installed at or below the groundwater table and wherever groundwater is encountered whether above or below the groundwater table, water dams shall be installed along the trench through the area of high groundwater at not more than 100-foot intervals, unless otherwise approved by the Agency. Water dams shall be constructed of a 1-foot nominal thickness of CLSM or a 3-foot nominal thickness of clay compacted to a minimum of 95-percent modified Proctor Density and having a permeability when completed of not more than 0.00001 centimeters per second. Water dams shall extend the full width of
the trench and keyed in to the undisturbed trench wall and shall extend from the undisturbed trench bottom to a height equal to top of established water table or 2-feet above top of pipe, whichever is greater.

For curvilinear sewers, the maximum allowable deflection per joint shall be 75-percent of the maximum allowable deflection per joint recommended by the pipe manufacturer.

Installation of new sewer facilities that cross over or under existing utility pipes, sewer mains or laterals, except water mains and water services shall be in accordance with Standard Drawings SD-20 and SD-21. Water main and water service crossings shall be in accordance with UDACS requirements.

Ductile iron pipe and fittings shall be protected with a minimum of 2 layers of 8 mil polyethylene encasement material in accordance with Sections 4.6.2.f and 4.8.5.d as applicable. The overall installation of the encasement and the making of joints between sections of the encasement material shall be in accordance with AWWA C 105, the DIP manufacturer's recommendations and the encasement material manufacturer's recommendations. In case of conflict among these recommendations, the recommendation yielding the greater protection of the ductile iron pipe/fitting shall generally apply. The Agency Representative shall have final authority to determine which individual recommendations or composite of recommendations shall be followed. The encasement shall be installed such that punctures and/or tears are minimized. Minor punctures shall be and tears shorter than 6-inches shall be repaired as recommended by the encasement material manufacturer. Encasements having tears greater than 6-inches shall be removed and replaced. Pipe cover materials shall be placed in a manner that does not puncture or tear the encasement material. The polyethylene encasement materials shall extend a minimum of 3-feet or 3 pipe–diameters, whichever is greater, beyond the ends of DIP pipe or fittings where DIP pipe transitions to non-metallic pipe materials.

Pipe locator ribbon conforming to Section 4.12.1 shall be placed no less than 18 inches nor more than 24 inches above the top of pipe, centered along the entire lengths of public interceptor sewers, public collector sewers and private collector sewers, force mains, effluent reuse lines, and laterals as shown in Standard Drawings SD-15 through SD-18, SD-20, SD-21 and SD-25. A second locator ribbon conforming to Section 4.12.2 shall be placed immediately below raw wastewater and reuse force mains. The metallic component shall be extended into the pump station dry well and the force main discharge manhole at the main gravity sanitary sewer.

Agency approved marker balls conforming to Section 4.12.3 shall be placed above each lateral connection to the main sewer and above the upstream end of each lateral as shown on Standard Drawings SD-22, SD-23 and SD-25. Agency approved marker balls conforming to Section 4.12.3 shall be placed at uniform intervals not exceeding 25 feet above curvilinear sewers and stub-
outs. Agency approved marker balls conforming to Section 4.12.4 shall be placed at uniform intervals not exceeding 50-feet and at changes in horizontal or vertical alignment above each force main in dual force main installations. Agency approved marker balls conforming to Section 4.12.4 shall be placed at uniform intervals not exceeding 50-feet and at changes in horizontal or vertical alignment above pressurized water reuse lines. Where marker balls are installed during project on adjacent or crossing pipelines, the marker balls need to be offset from one other by 25-feet. Where possible, marker balls shall be at least 3-feet below finish grade, but not more than 5-feet below finish grade under any circumstances.

Watertight plugs shall be placed at the ends of all sewer stub-outs and laterals. These plugs shall be restrained from blow-out by concrete thrust blocks at least one cubic foot in volume or other restraining devices approved by the Agency capable of resisting air-pressure testing and sewer maintenance operations. Concrete shall conform to Section 4.11.2.

3.16.2 Assembling Pre-Cast Concrete Manhole Components:

Pre-cast manhole sections and grade rings on manholes and cast-in-place structures shall be joined by one of the following:

a. Pre-Cast Manhole Sections:

The “tongue” of the lower pre-cast section shall be placed pointing upward. In areas where groundwater is not likely to present, place one row of preformed butyl rubber rope sealant conforming to Section 4.9.7 in the lower step of the joint. In areas of higher groundwater and where designated by the Agency, place a double row of sealant in each pre-cast section joint to and including the barrel-to-cone joint. Place one row each on the upper step and the lower step of each tongue-and-groove joint. Corrosion protection of the manhole sections shall be in accordance with Section 3.16.8. The Engineer shall contact the Agency as early as possible in the Project design process to identify any additional requirements for design and installation of corrosion protection in areas of high groundwater. Where a PVC corrosion liner is utilized, weld liner lap joints between manhole sections in accordance with Section 3.16.8. The Engineer shall contact the Agency as early as possible in the Project design process to identify any additional requirements for design and installation of PVC corrosion liners in areas of high groundwater.

3.16.8 Corrosion Protection (as required by Agency):

Contractor shall contact the Agency for the specific corrosion protection measures required for manholes and cast-in-place structures.
a. Manhole Corrosion Protection – Factory-Installed Coatings PVC Lining Systems:

Factory installed coatings shall conform to Section 4.9.9.a. Coatings shall be applied only after the manhole/structure has been completed. Coatings shall cover the manhole/structure base including the flow channel, walls, cone/top and grade rings. Following final adjustment of the manhole/structure frame to finish grade, any grade adjustment rings added to the manhole/structure shall also be coated and conform to Sections 4.9.9.a or 4.9.9.b.

The PVC liner system conforming to Section 4.9.9.a. shall be installed in the concrete section fabrication plant as part of the initial casting of the manhole barrel sections, wet-well sections, cone sections and undersides of flat-top sections. PVC liner installation in pre-cast manhole base sections shall conform to Standard Drawings SD-1A and SD-1B. PVC liner installation in cast-in-place manhole bases shall conform to Standard Drawing SD-7. Liners installed by bonding to cured concrete sections are not acceptable. The liner system shall cover 100-percent of: the vertical walls of the manhole or wet-well; the interior of the cone section, if any; and, the interiors of the adjustment rings. The adjustment ring liner shall be one piece from the manhole frame to the cone section shall be field-installed as part of the final manhole grade adjustment process. The joints between the PVC liner system sections shall be thermally welded in accordance with manufacturer's recommendations. Worker(s) performing the thermal welding shall be trained by the liner manufacturer. Manufacturer shall provide a written certification to the Agency attesting that said training has been conducted. This certification shall be effective for one year after its date of issuance after which time the worker(s) must receive follow-up training and recertification. Manufacturer shall provide a representative on site to witness the joint welding in at least the first manhole installed and shall provide a written certification that the welding was performed in accordance with manufacturer's requirements. The Engineer shall contact the Agency as early as possible in the Project design process to identify any additional requirements for design and installation of PVC corrosion liners in areas of high groundwater.

c. Manhole Corrosion Protection – Polymer Manholes:

Pre-cast Polymer manholes may be used when corrosion protection is required. Polymer manholes shall be per Agency's approved materials list.
3.16.9 Debris Trap:

Following completion of the first manhole(s) upstream of the new connection(s) to the Agency’s existing sanitary sewer system, a debris trap as shown in SD-30 shall be installed in said manhole. If the Contractor plans to place particular portions of the new sanitary sewers in operation before the entire system is completed, then each portion to be brought into service early shall also be protected from debris entry from upstream systems by similar such debris traps. The debris trap shall remain in place until all sanitary sewer improvements in the Project have been constructed, infiltration-tested, cleaned, mandrel-tested, televised and initially accepted by the Agency. Contractor shall inspect the debris trap weekly no less often than monthly during construction and immediately following any sewer cleaning operations and shall immediately remove any debris that has accumulated. The Contractor is cautioned that hydrogen sulfide, methane, and other potentially hazardous and/or explosive gasses or other materials may be present in existing or new sanitary sewers. There also may not be sufficient oxygen in the sanitary sewer system to support life. Therefore the Contractor is advised to take suitable precautions to protect its work forces and the general public from exposure and shall provide odor control and other systems suitable for such conditions. After the new sanitary sewers are accepted by the Agency, the Contractor shall remove the trap in the presence of the Agency’s Representative.

3.17.2 Lateral Connections to Existing Sewers:

The Contractor is cautioned that hydrogen sulfide, methane, and other potentially hazardous and/or explosive gasses or other materials may be present in existing or new sanitary sewers. There also may not be sufficient oxygen in the sanitary sewer system to support life. Therefore the Contractor is advised to take suitable precautions to protect its work forces and the general public from exposure and shall provide odor control and other systems suitable for such conditions.

Lateral connections made directly to existing public interceptor sewers, public collector sewers and private collector sewers shall conform to Standard Drawings SD-22 or SD-23 as applicable. To maintain the structural integrity of the existing mainline pipe, lateral connection taps shall be constructed in accordance with and using materials in accordance with existing sewer main pipe material manufacturer’s recommendations. In the event that pipe manufacturer can’t be determined, the Contractor shall follow the applicable pipe material trade association recommendations. The Contractor shall advise the Agency immediately and prior to performing any existing sewer taps, if it discovers any conflicts between that the sewer pipe manufacturer’s (or trade association’s) recommendations and these Standards. The Contractor shall propose modifications to these Standards as necessary to resolve the conflict
Laterals may be connected to existing sanitary sewers by two methods at the Contractor's option, unless otherwise directed by the Agency. Method 1: A section of the existing sewer shall be removed and replaced with a new wye fitting matching the pipe materials of the existing sewer and conforming to Section 4.7; or, Method 2: A hole shall be cored into the existing sewer and an appropriately sized tapping saddle conforming to Section 4.7.5 shall be installed in accordance with the saddle manufacturer's recommendations.

Wye fittings shall be connected to the existing sewer using appropriately sized synthetic or natural rubber couplings conforming to Section 4.9.6. Tapping saddles shall conform to Section 4.7.5. Both the wye-fitting and tapping-saddle type connections shall be supported by controlled low strength materials (CLSM) having a seven-day strength of not less than 150 psi and not more than 300 psi and conforming to Section 4.11.1. The CLSM shall be a minimum of 6-inches in thickness and shall fully encase the main longitudinally at least three diameters upstream and downstream from the new service connection along the main sewer and along the lateral. CLSM material for supporting new lateral connections to existing mains may be mixed on-site, provided that all aggregates used are washed and free of fines; and, Type V cement is used.

The locations and configurations for lateral connections to existing sewers shall be in accordance with the approved Construction Documents. Field changes to the approved lateral connection locations/configurations shall be approved by the Agency’s Representative prior to installation. The Representative shall also inspect lateral connection installations after the pipe is installed but prior to CLSM placement and backfilling. Any connections backfilled without Agency Representative observation shall be re-excavated for inspection at no cost to the Agency.

3.21.1 Major Requirements:

c. Cleaning Sewers:

All public interceptor sewers, public collector sewers and private collector sewers must be jet-cleaned prior to deflection testing and televising; and, must be cleaned again following street paving and/or the permanent patch replaced. This procedure includes all collection lines and outfall lines. Following all sewer cleaning, any debris traps installed at the downstream end of the new sewer system shall be cleaned and the debris trap elbow removed. See Standard Drawing SD-30 for approved trap. Cleaning shall be performed in the presence of the Agency’s Representative.

*If the existing sanitary sewer main receiving flow from the new
sanitary sewers is an average of 1/3 full, alternate methods of cleaning the line may be approved by the Agency.

SECTION 4 – CONTROL OF MATERIALS:
Revise as follows:

4.9.1 Pre-Cast Manhole Sections:

Pre-cast concrete manhole components, including bases, barrel sections, cones and grade rings, shall conform to ASTM C478 and Standard Drawings SD-1 through SD-13 as applicable. Concrete for pre-cast manhole components shall conform to 4.11.2. Pre-cast polymer manhole components shall be supplied by manufacturers listed on the Governing Agency's approved materials list.

4.9.3 Manhole Steps: DELETED FROM STANDARDS

Manhole steps shall be in accordance with ASTM-C-478 and conform to Standard Drawing SD-6. Steps shall be made from polypropylene meeting ASTM D-4101 and having an internal 1/2-inch Grade 60 steel reinforcing bar meeting ASTM A-615. Testing of manhole steps shall be in accordance with ASTM C-497.

4.9.9 Manhole Interior Corrosion Protection:

a Factory-Installed Corrosion Protection:

Factory-installed corrosion protection lining for pre-cast concrete manholes and other pre-cast sanitary sewer components shall be per the Agency’s approved materials list T-Lock Amer-Plate polyvinyl chloride liner by Ameron International or Agency-approved equal. The PVC liner shall have a T-ribbed back and shall be installed in the initial pour of the concrete section. Liners installed by bonding into cured concrete sections are not acceptable. The Engineer shall contact the Agency as early as possible in the Project design process to identify any additional requirements for design and installation of corrosion protection PVC corrosion liners in areas of high groundwater.

b Field-Installed Corrosion Protection:

Field-installed corrosion protection lining for pre-cast concrete manholes and other pre-cast or cast-in-place concrete sanitary sewer components shall comply with the Agency’s approved materials list be Raven 405, Sauereisen SewerGard 210 or Agency-approved equal. If required and as specified by the Agency, an underlayment of Sauereisen F-120, F-
c. Manhole Corrosion Protection – Polymer Manholes:

*Pre-cast Polymer manholes shall be per the Agency’s approved materials list.*

### 4.11.2 Concrete:

Concrete materials and mixing shall conform to Section 501 of the Standard Specifications. Concrete shall be as follows:

- **Minimum Compressive 28 Day Strength**: 4500 psi
- **3000 psi**
- **Slump (Maximum)**: 4 inches
- **Water/Cement Ratio**: 0.45

No additives shall be permitted unless prior approval of the Agency is obtained. Testing shall be taken at the Agency’s request.

### SECTION 5 – STANDARD DRAWINGS:

Revise as follows:

1. **SD-1A**
   a. Delete all references to manhole steps

2. **SD-1B**
   a. Revise noted 7: Pre-cast manhole bases shall be used for construction of newer sewer systems, whether publicly or privately owned. Pre-cast manhole bases or cast-in-place manhole bases per **SD-7 SD-9** may be used at the contractor’s option for new manholes being installed along existing sanitary sewers.
   b. Delete ½” min to 1” max over pipe openings. PVC liner may be scalloped in flow channel as necessary to provide required clearances

3. **SD-4**
   a. Revise note 1: Concrete shall be type V **4500 3000 psi** per Section 4.11.

4. **SD-6**
   a. Delete this plate.

5. **SD-7**
   a. Delete detail note “Where the Agency requires PVC liner corrosion protection in manholes, a PVC liner ring shall be cast into manhole base for welding to the manhole wall liner”
   b. Delete detail note “Manhole steps as required by Agency Install per SD-1A and SD-1B

6. **SD-14**
a. Revise note 1: All concrete to be type V, 4500 psi per Section 4.11.

b. Add note 5: For shallow manholes sewer pipe having less than 5-feet of cover shall be C-900 PVC or DIP as required by Agency. The C-900 or DIP pipe shall extend to the next manholes upstream and downstream.

7. SD-22
   a. Revise note 2: All CLSM concrete shall be 3000# in accordance with Section 4.11.

8. SD-23
   a. Revise note 2: All CLSM concrete shall be 3000# in accordance with Section 4.11.

9. SD-36B
   a. Add section cut.

SECTION 6 – TABLES:
Revise as follows:
Table D
   a. Revise 4-inch, 6-inch and 8-inch pipe for laterals to read “refer to Uniform Plumbing Code”
   b. Delete 10-inch pipe diameter under Public and Private Collector Sewers
   c. Add >8-inch under Public and Private Collector Sewers
   d. Add Public Interceptors in cul-de-sac
   e. Revise minimum slope for 8-inch pipe under Public and Private Collector to 0.004
   f. Revise minimum slope for 24-inch pipe under Public and Private Collector to 0.0010

Table E
   a. Delete table
Minimize number of sections to reduce number of joints

Manhole frame and cover per SD-2 or SD-3 as applicable

One or two grade rings maximum

6½

3" min. 12" max.

18" max. including frame, rings and grout

Finish Grade

Tongue & groove jt. (Typ)

Stainless steel "U" lug 1" Ø min.

Stainless steel U lug 1" Ø min. opposite side of outgoing sewer

All pipe connections to manhole shall conform to Section 4.9.5

Granular bedding and foundation per Note 6

Factory cast flow channel per SD-9

Coupling per Note 8 for connection to existing sewer only

STANDARD PRE-CAST MANHOLE

ISSUED:  
NUMBER:  SD-1A
### TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D*</th>
<th>E</th>
<th>F</th>
<th>G</th>
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*Varies per manufacturer

Table of Dimensions not applicable to polymer manholes. Polymer manhole thickness per manufacturer's recommendation.

### NOTES:

1. Pre-cast concrete manhole sections and adjusting rings shall conform to ASTM C-478 and Section 4.9.1.
2. Provide interior corrosion protection meeting Agency requirements and Section 2.2.10. See Detail A below for PVC liner installation in pre-cast MH base.
3. In high groundwater areas and where directed by the Agency, seal exterior of pre-cast manhole sections with bitumastic or equal waterproofing coating and provide double Kent Seal or equal joint seals between all pre-cast sections including adjusting rings.
4. Manhole step placement shall conform to OSHA requirements and steps shall be placed 180 degrees from outgoing sewer.
5. In unstable soil conditions and where directed by the Agency, a second pipe joint shall be placed within 3-feet of each manhole connection.
6. Where the trench bottom is undisturbed soil, 4-inches of granular bedding material meeting Agency requirements shall be placed under the pre-cast manhole base. Where the trench bottom has been disturbed and in fill areas, 12-inches of granular bedding meeting Agency requirements shall be placed under the pre-cast manhole base. Provide additional suitable foundation per Section 3.13 and as required by the Agency in areas of unstable trench bottom, wet conditions, over-excavation, rocky trench bottom and elsewhere as directed by the Agency.
7. Pre-cast manhole bases shall be used for construction of new sewer systems, whether publicly or privately owned. Pre-cast manhole bases or cast-in-place manhole bases per SD-7 may be used at the contractor's option for new manholes being installed along existing sanitary sewers.
8. Fernco, Mission, or equal flexible rubber couplings conforming to Section 4.9.6 shall be provided for connections to existing sewers where new manholes are installed.

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**DETAIL A**

- #4 bar per SD-9
- 2" min. to 3" max. in areas where flow channel concrete abuts manhole wall
- Pre-cast manhole base
- Manhole flow channel in accordance with SD-9

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**STANDARD PRECAST MANHOLE**

**ISSUED:**

**NUMBER:** SD-1B
MANHOLE CONCRETE COLLAR

NOTES:
1. Concrete shall be type V 4,500 psi per Section 4.11.
2. Collars for paved and landscaped areas shall be circular. Collars for unimproved areas may be circular or square.
MANHOLE STEPS
As required by Agency

GENERAL NOTES
1. Manhole step shall conform to ASTM C-478, ASTM C-497 and Section 4.9.3.

2. Reinforced plastic steps shall be polypropylene plastic coated, with an inner deformed steel reinforcing rod (Grade 60/ASTM A-615).

3. Steps and installation shall conform to OSHA requirements.

NOTE:
All steps shall be epoxied in place during the manhole barrel fabrication process using epoxy as recommended by step manufacturer. Steps may not be field installed. Epoxy shall be resistant to degradation by sanitary wastewater and hydrogen sulfide.
TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>Size</th>
<th>A</th>
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<th>C</th>
<th>D</th>
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</table>

Manhole wall corrosion protection as required by Agency

Flow channel shall conform to SD-9

Bench slope 1" min. V to 10" H

Cast-in-place base to be completed in a single pour

Width of flow channel shall equal inside diameter of pipe

Pre-cast sections per SD-1A and SD-1B as required

Remove top half of PVC pipe flush with channel wall after base has cured a minimum of 7-days

SECTION A-A

Pre-cast sections per SD-1A and SD-1B as required

Kent seal or equal

Cast-in-place base

T & G joint matching pre-cast section-form using an impression ring

Sewer (typ)

CLSM to springline of sewer-all pipes

Undisturbed soil or foundation if required by Agency

ELEVATION ALONG SEWER

NOTES:
1. Along existing sewers, cast-in-place base may be used in lieu of a pre-cast base for new manholes.
2. A cast-in-place base may be used in lieu of a pre-cast base for new sewers only when the new manhole is a "through" manhole.
3. Concrete shall conform to Section 4.11.
4. Base may be round or square.
5. Provide suitable foundation per Section 3.13 and as required by the Agency in areas of unstable trench bottom, wet conditions, over-excavation, rocky trench bottom, and elsewhere as directed by the Agency.
6. If existing sewer pipe is damaged or if a pipe joint falls within the manhole base pour, the existing sewer pipe shall be replaced with PVC per Section 4.6.1. The replacement PVC pipe shall be reconnected to the existing sewer using flexible couplings per Section 4.9.6.

CAST-IN-PLACE MANHOLE BASE

ISSUED:      NUMBER: SD-7
D — Outside diameter of pipe

W — The width of the trench at the top of the flexible pipe shall be the diameter of the pipe plus 16" minimum. In any case, the width shall be sufficient for work in connection with laying, jointing, inspection, placing the bedding and to provide for the safety of workers and shall meet OSHA requirements.

NOTES:
1. All concrete to be type V, 4,500 psi per Section 4.11.
2. In all of the above examples, bedding shall conform to Section 3.13.
3. For PVC pipe, bedding shall also conform to Uni-Bell PVC Pipe Association Handbook and pipe manufacturer's recommendations.
4. DIP shall be wrapped with a double layer of 8 mil poly-wrap.
5. For shallow manholes, sewer pipe having less than 5-feet of cover, shall be C-900 PVC or DIP as required by Agency. The C-900 or DIP pipe shall extend to the next upstream and downstream manholes.

PIPE BEDDING METHODS

ISSUED: NUMBER: SD-14
NOTES:
1. All construction shall conform to Section 3.17.
2. All CLSM shall be in accordance with Section 4.11.
3. 22 1/2' or 45' bend may be rotated at sewer main only.
4. Lateral connections shown are limited to main line sanitary sewers 12-inches in diameter or smaller unless otherwise directed by Agency.
5. Place locator ribbon per SD-15 above lateral along its full length.
6. Place marker ball per Section 3.14 and Section 4.12.3 over lateral at connection to main and at upstream end of lateral at property line. Marker ball shall be 3' min. below finish grade where possible.

LATERAL CONNECTION TO SEWER MAIN
12" DIA AND SMALLER

ISSUED: 
NUMBER: SD-22
NOTES:
1. All construction shall conform to Section 3.17.
2. All CLSM shall be in accordance with Section 4.11.
3. 22 1/2" or 45° bend may be rotated at sewer main only.
4. Lateral connections shown are limited to main line sanitary sewers 12-inches in diameter or smaller unless otherwise directed by Agency.
5. Place locator ribbon per SD-15 above lateral; along its full length.
6. Place marker ball per Section 3.14 and Section 4.12.3 over lateral at connection to main and at upstream end of lateral at property line. Marker ball shall be 3' min. below finish grade where possible.

LATERAL CONNECTIONS TO SEWER MAINS 12" DIA AND SMALLER AROUND OBSTRUCTIONS

ISSUED:  
NUMBER: SD-23
NOTES:
1. All pipes shall be PVC or DIP conforming to Section 4.6 as required by the Agency.
2. Final configuration of cleanout shall be shown in the construction documents.

TYPICAL FORCE MAIN CLEAN-OUT

ISSUED:  NUMBER: SD-36B
TABLE “D”

MINIMUM REQUIRED AND MAXIMUM PERMITTED PIPE SLOPES

<table>
<thead>
<tr>
<th>Pipe Diameter (Inches)</th>
<th>Minimum Flow Rate (Cu Ft Per Sec) To Achieve a 50% Full Pipe at Min Slope</th>
<th>Minimum Slope (Feet per Foot) to Achieve a Velocity of 2 FPS at Pipe 50% full</th>
<th>Maximum Flow Rate (Cu Ft Per Sec) To Limit Depth to 75% Full Pipe at Max Slope</th>
<th>Maximum Slope (Feet per Foot) To Limit Velocity to 10 FPS at Pipe 75% Full</th>
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<tbody>
<tr>
<td>Laterals – Range of Pipe Slopes</td>
<td>Permitted (flow rates and velocities not considered)</td>
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<td>4</td>
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Public and Private Collector Sewers – having insufficient tributary flow to achieve half-full flow depth at peak dry weather flow rate from the tributary area

| 8 | (Not Applicable) | 0.010 | (Not Applicable) | (Not Applicable) |
| 10 | (Not Applicable) | 0.0060 | (Not Applicable) | (Not Applicable) |
| >8 | (Not Applicable) | 0.010 | (Not Applicable) | (Not Applicable) |

Public Interceptors, Public Collector Sewers and Private Collector Sewers in a cul-de-sac, or where public sewer will not be extended

| 8 | (Not Applicable) | 0.0060 | (Not Applicable) | (Not Applicable) |
| >8 | (Not Applicable) | 0.0060 | (Not Applicable) | (Not Applicable) |

Public Interceptors, Public Collector Sewers and Private Collector Sewers having sufficient tributary flow to achieve at least a half-full flow depth at the peak dry weather flow rate from the tributary area

| 8 | 0.40 | 0.004 | 3.21 | 0.0646 |
| 10 | 0.55 | 0.0025 | 5.02 | 0.0479 |
| 12 | 0.79 | 0.0020 | 7.23 | 0.0376 |
| 15 | 1.23 | 0.0015 | 11.29 | 0.0279 |
| 18 | 1.77 | 0.0012 | 16.26 | 0.0219 |
| 21 | 2.40 | 0.0010 | 22.13 | 0.0178 |
| 24 | 3.14 | 0.0010 | 28.90 | 0.0149 |
| >24 | | | | Per Agency requirements |

The Agency will review the proposed slopes for larger pipes and pipes that will exceed the above maximum slope values on a case-by-case basis. Sewers at slopes less than the minimum slopes listed in Table “D” will not be permitted.
TABLE E

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DATA SHEET FOR PLAN APPROVAL

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ENGINEER:

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NOTE:

Submitted with this data sheet are three complete sets of plans, along with other information the engineer feels is necessary to have this job reviewed.