Technical Bulletin

To	Internal and External stakeholders
Thru	Raleigh Water Executive Management Team
Department	Raleigh Water
Date	November 17, 2025
Subject	Summary of proposed updates – Raleigh Water DIP and PVC regulations

Summary of proposed updates – Raleigh Water DIP and PVC regulations

- PVC can be used for depths greater than 20 feet. (Revision to depth chart in Handbook)
- Horizontal and vertical separation materials and design.
    - All DEQ design standards must be followed.
    - A municipality may have more stringent requirements.
    - Any main that has less than 36 inches (3 feet) of cover from final earth grade, ductile iron pipe must be used.
    - If a design professional wishes to use a different material, a Variance must be acquired from DEQ. The municipality may not issue a variance.
    - Ductile iron pipe or other pipe with proper bedding to develop design supporting strength shall be provided where sewers are subject to traffic bearing loads.
    - Perpendicular crossing between 6 - 18 inches require a concrete cradle and may use PVC (with the appropriate wall thickness) or DIP.
    - 6 inches or less require DIP and concrete cradle.
    - If sewers have less than 10 feet horizontal separation from existing or proposed water main, the water main should be at least 18 inches above the top of the sewer. If it is impossible to obtain proper horizontal and vertical separation as previously described, both the water main and sewer must be constructed of ferrous pipe complying with public water design standards and be pressure tested to 150 psi to assure watertightness before backfilling.
    - If less than 100 feet from any private or public water supply source (WS-1 waters or Class I, Class II impounded reservoirs used as a source of drinking water), ferrous sewer pipe with joints equivalent to public water

supply design standards and pressure tested to 150 psi to assure watertightness, shall be used. FYI, the min separation shall not however be less than 25 feet from a private well or 50 feet from a public water supply well.

- PVC sanitary sewer with bell clamps or restrained joint PVC may be used in casings (SDR 35, 26, 21, C-900, C-905).
- C-900 or 905 shall be used when transitioning from PVC to DIP.

Depth Chart and pipe material

Guidance

Pipe Size (in)	**AWWA Standard**	**DR / Pressure Class**	**Max Burial Depth (ft)**	**Notes**
4 – 12	C900	DR 14 (305 psi)	20	
14 – 24	C905	DR 18 (150 psi)	40	Suitable for larger diameter installations
4 – 12	C900	DR 18 (235 psi)	40	Higher pressure rating
14 – 24	C905	DR 25 (165 psi)	40	Higher pressure rating
4 – 12	C900	DR 25 (165 psi)	40	Higher pressure rating
14 – 24	C905	DR 25 (165 psi)	40	Higher pressure rating

Pipe Size (in)	**ASTM Standard**	**Wall Thickness (in)**	**SDR**	**Max Burial Depth (ft)**	**Notes**
4 – 15	ASTM D3034	0.113 – 0.180	35	18	SDR 35 for depths ≤ 18 ft; SDR 26 for depths > 18 ft
18 – 27	ASTM F679	0.180 – 0.270	26	15	SDR 26 recommended for depths ≤ 15 ft
4 – 12	ASTM D2729	0.113 – 0.180	35	10	Suitable for shallow installations

Key Considerations:

- **Soil Class:** The burial depth is influenced by the soil class (e.g., Class I, II, III) as defined in ASTM D2321.

- **Deflection Limits:** PVC pipes are flexible and can deflect under load. Maximum deflection should not exceed 5% to maintain structural integrity.
- **Embedment Materials:** Proper bedding and backfill materials are crucial for supporting the pipe and preventing damage.
- **Installation Practices:** Follow ASTM D2321 guidelines and City of Raleigh Standard Details for trenching, bedding, and backfilling to ensure proper installation.

For precise installation requirements, always consult the latest ASTM and AWWA standards and consider local conditions and regulations.

Detail: Shallow PVC Pipe Installation (<3 ft) in Concrete Cradle

1. Scope

This detail applies to PVC sewer (pending DEQ approval) that is buried less than 3 feet below finished grade, where soil cover is insufficient for structural support. A concrete cradle shall be provided to prevent pipe flotation, damage, or deflection. DIP must be used in accordance with DEQ standards when installing pipe < 3ft in depth and the sewer is not subject to traffic bearing loads.

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2. Materials

Component	Specification
PVC Pipe	ASTM D3034 / D2241 (sewer) or AWWA C900/C905 (pressure), appropriate DR
Concrete	Class A or minimum 3000 psi compressive strength at 28 days
Bedding	Clean granular material (sand or gravel), 4–6 inches thick under pipe

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3. Installation Steps

1. **Excavation**
    - Excavate trench to required depth and width.
    - Ensure trench bottom is smooth and free of rocks or debris.
2. **Bedding**
    - Place 4–6 inches of compacted granular bedding.
    - Level bedding to provide uniform support along the pipe's length.
3. **Concrete Cradle**
    - Place concrete at the trench bottom to form a cradle supporting the pipe at **12 o'clock and sides**.

- Typical cradle dimensions:
    - Width: Pipe OD + 6–12 inches (3 inches minimum on each side)
    - Height: 3–6 inches beneath pipe barrel
- Ensure the cradle does **not block the pipe bell** or interfere with joints.

4. **Pipe Placement**
    - Lay PVC pipe on concrete cradle.
    - Use level and string line to ensure proper alignment and slope.
5. **Concrete Encasement (Optional / Where required)**
    - For extremely shallow or traffic bearing loads, provide **full concrete encasement**:
        - Minimum 2 inches above pipe crown
        - 3 inches minimum on sides of pipe
6. **Backfill**
    - Carefully place select granular material up to **pipe spring line**, hand tamp to prevent pipe movement.
    - Complete backfill to finish grade with appropriate soil compaction.

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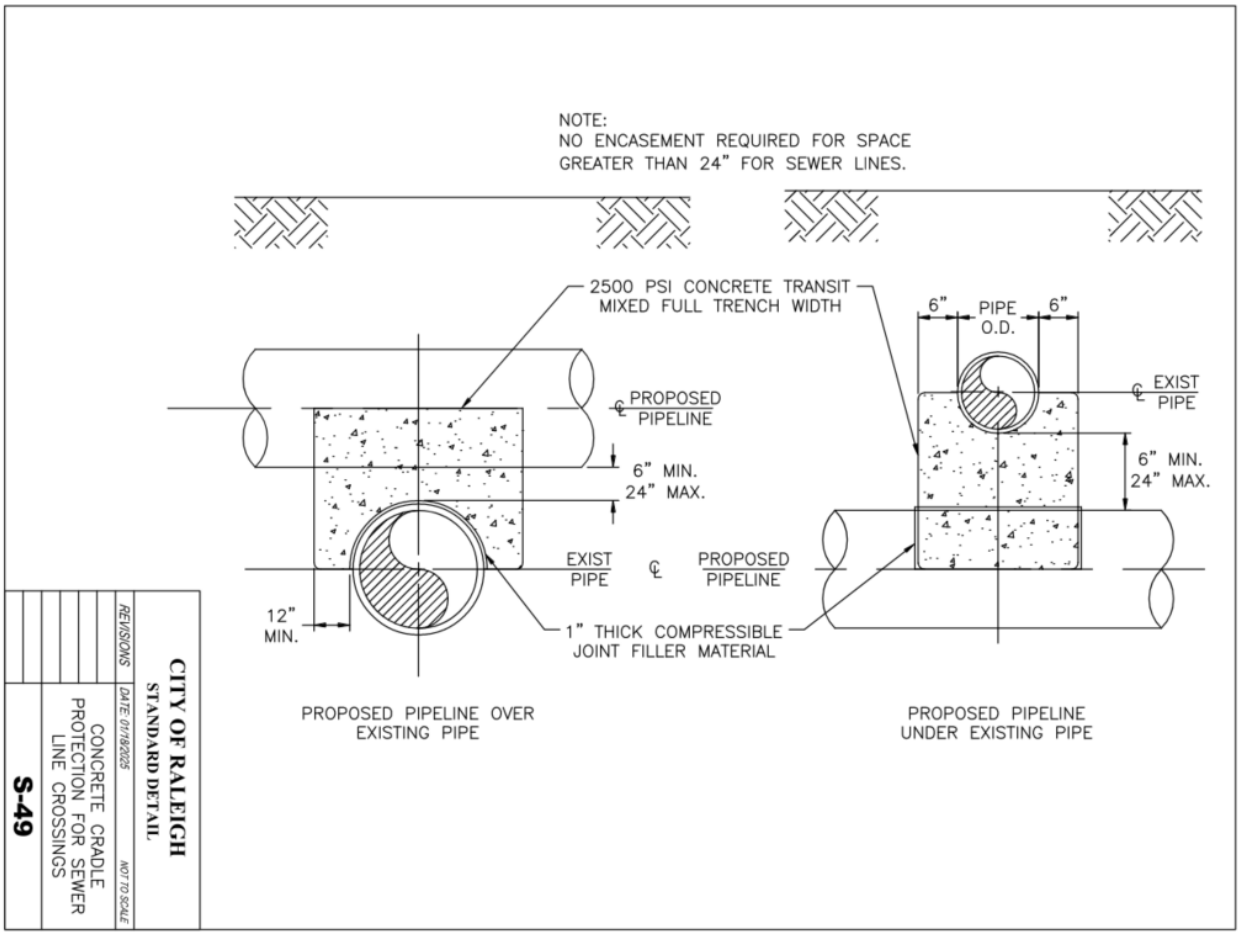
4. Notes / Key Considerations

- **Joint Protection:** Ensure joints are fully supported and protected from concrete contact if flexible joints are used.
- **Curing:** Concrete cradle should cure at least 24–48 hours before placing heavy loads above.
- **Pipe Deflection:** For PVC, avoid deflection >5%. Use cradle to maintain alignment.
- **Traffic Loads:** If traffic may pass over pipe, use full concrete encasement or protective slab.


NOTE:
NO ENCASEMENT REQUIRED FOR SPACE
GREATER THAN 24" FOR SEWER LINES.
2500 PSI CONCRETE TRANSIT
MIXED FULL TRENCH WIDTH
℄ PROPOSED
PIPELINE
6" MIN.
24" MAX.
EXIST
PIPE
℄
PROPOSED
PIPELINE
12"
MIN.
1" THICK COMPRESSIBLE
JOINT FILLER MATERIAL
PROPOSED PIPELINE OVER
EXISTING PIPE
6"
PIPE
O.D.
6"
℄ EXIST
PIPE
6" MIN.
24" MAX.
PROPOSED PIPELINE
UNDER EXISTING PIPE
CITY OF RALEIGH
STANDARD DETAIL
REVISIONS
DATE: 01/19/2025
NOT TO SCALE
CONCRETE CRADLE
PROTECTION FOR SEWER
LINE CROSSINGS
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