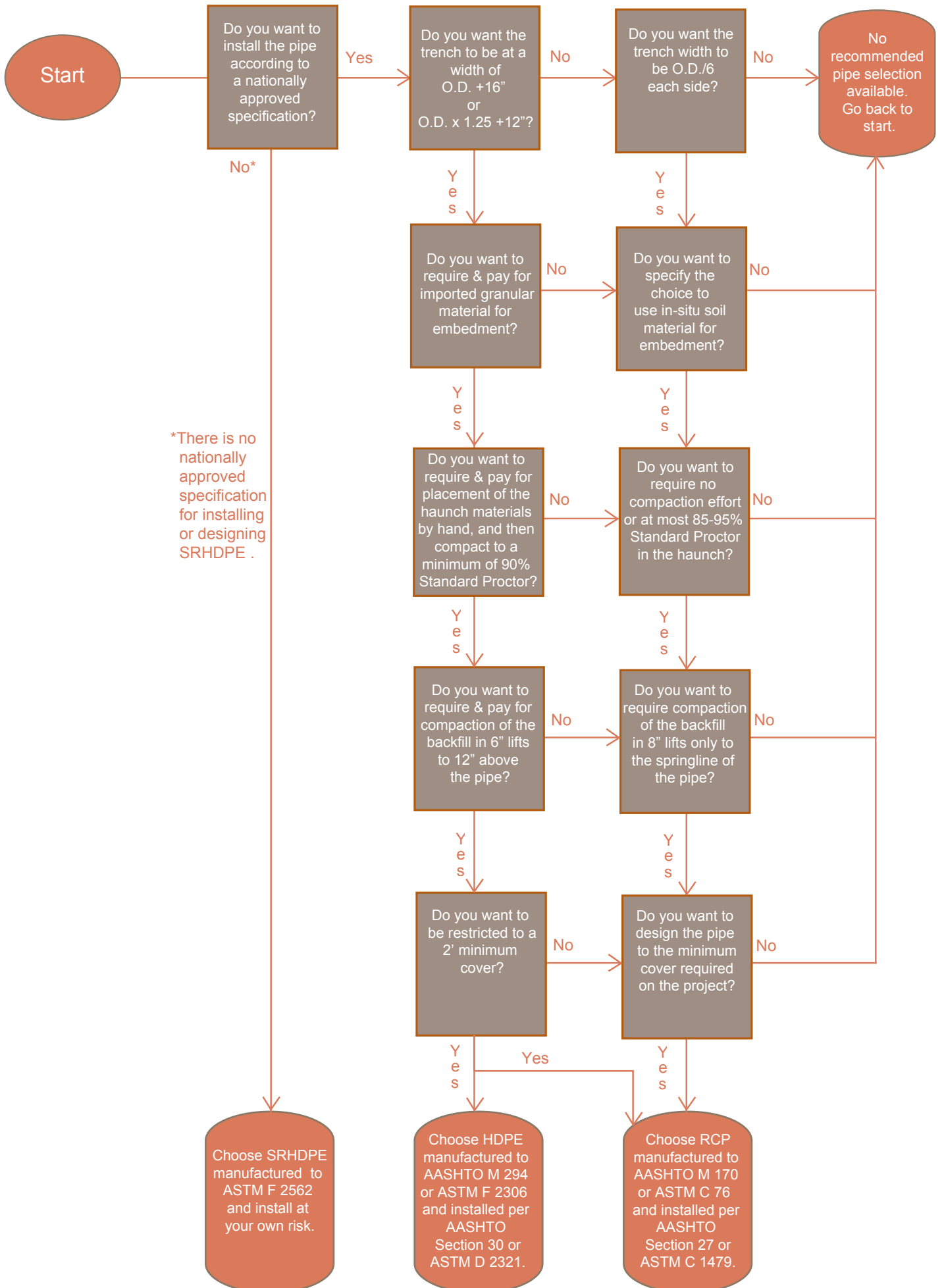


# Concrete, HDPE, & SRHDPE Pipe Installation Considerations For Owners and Engineers



# PIPE INSTALLATION COMPARISON: CONCRETE / HDPE / SRHDPE

Material	Applicable Material Specifications	Significant Material Requirements	Installation Specifications	Trench Width	Foundation & Trench Wall Support	Bedding Materials	Haunch Materials	Embedment Materials
Concrete Pipe	Manufacture/ Materials: reinforced pipe ASTM C 76, AASHTO - M 170 Plain concrete pipe: ASTM C 14	Composed of cement, reinforcing steel (for reinforced concrete pipe), aggregates, and water in accordance with national and local specifications.	ASTM C 1479  AASHTO LRFD Bridge Construction Specifications (Section 27)	ASTM C 1479 & AASHTO Section 27 states minimum trench width = O.D./6 each side and shall be adequate to enable compaction.  <b>Sample Calculations:</b> O.D. = 24" ID + 3" wall thickness x 2 = 30" Total trench width = O.D. + (O.D./6 x 2) 30" + (30/6 x 2) 30" + 10" = 40" min.	Foundation - moderately firm to hard in-situ soil or stabilized soil or compacted material  In-situ soil at foundation & trench walls should be strong enough to support pipe & compaction of embedment materials  Confirmation of strength of foundation 90-95% standard proctor	Uniform support & grade  Thickness normal earth foundation O.D./24 min 3"  In rock thickness O.D./12 min 6"  No compaction directly under pipe	Helps pipe support load, uniformly transfers load from pipe wall to foundation. <b>Pipe can provide MAJORITY of system strength</b> Hand placement of material in this area is <u>not</u> required for RCP Placed in 8" lifts to allow compaction to 85% - 95% standard proctor.  No compaction effort may be permissible depending on soil type	Compact to required density in 8" lifts up to springline according to installation Type (1, 2, 3, or 4)  <b>Required only up to springline</b>
HDPE Pipe	Manufacture/ Materials: ASTM F 2306 AASHTO M 294	Virgin resins must be used. Cell class 435400C.  Material must have ability to withstand stress cracking	ASTM D 2321,  AASHTO LRFD Bridge Construction Specifications (Section 30)	AASHTO Section 30: 1.50.D <sub>o</sub> + 12" <b>Sample Calculations</b> O.D. 24" HDPE = 28" Trench width = (28" x 1.50) + 12" = 42" + 12" = 54" minimum trench width	Moderately firm to hard in-situ soil or stabilized soil or compacted material  In-situ foundation and trench wall soil should be strong enough to support pipe & compaction of embedment materials.  Confirmation of strength of foundation 90-95% standard proctor	Uniform support & grade  Coarse grain soils – manufactured aggregates normally imported  Thickness normal earth foundation - min 4"  In rock thickness min 6"  No compaction directly under pipe	<b>Haunch materials provide MAJORITY of structural strength of flex pipe/soil system</b>  Materials same as used in bedding zone  Work materials in by hand  Place in 6" lifts  90% minimum compaction (per section 30)	Compact to required density in 6" lifts to 12" above top of pipe  Removal of trench box must not allow movement of compacted material  Usually requires imported select material
SRHDPE Pipe	Manufacture/ Materials: ASTM F 2562 AASHTO provisional	Vertically placed thin metal hoops encapsulated by HDPE plastic	<b>DO NOT EXIST</b>	<b>No nationally approved installation or design specification. Research indicates that deflection limits will be significantly lower than conventional HDPE.</b>				

## Different Pipe Types Require:

### Different Design Considerations

- **Rigid pipe (RCP)** can provide the majority of the structural load carrying component of the pipe/soil system. Designers must understand and select proper pipe class for construction method.
- Soils placed around **flexible pipe** in flexible soil/pipe systems carry majority of load. Designers must properly predict soil strength component in designs and must confirm construction of the soil structure does not change during construction.

### Different Installation Methods

- RCP installations (Type 1-3) require structural embedment materials placed only up to springline.
- RCP structural embedment materials may be in-situ materials in many cases.
- Placement of materials in haunch for RCP not as critical as flexible pipe.
- Flexible pipe structural embedment materials placed to a height of one foot above pipe.

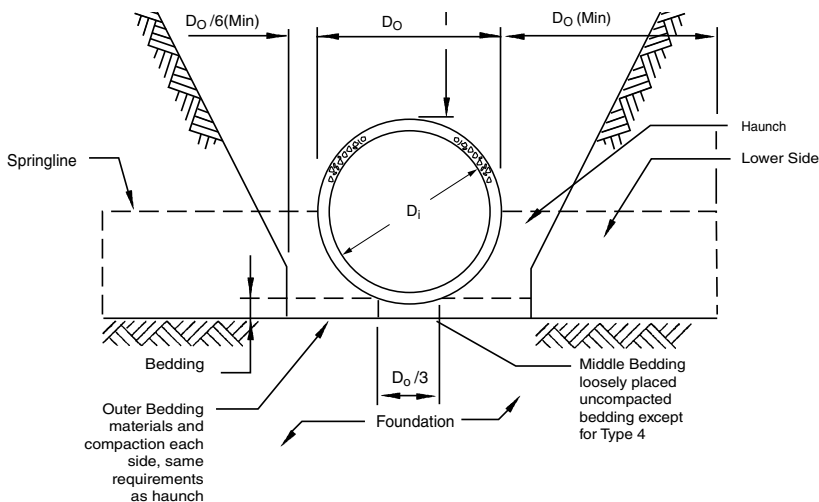
### Different Inspection Techniques

- RCP (AASHTO Sect. 27.6.1) = inspect for structural damage/defects (cracks, spalling, etc)
- Cracks ≤ 0.01" = no issue, no action
  - Cracks > 0.01" and ≤ 0.10" = evaluation by PE
  - Cracks > 0.10" = evaluation by PE for repair or replacement
- HDPE (AASHTO Sect. 30.5.6) = inspect for control of deflection = structural confirmation of system
- Deflection ≤ 5% = no issue, no action
  - Deflection > 5% but < 7.5% = evaluation by PE
  - Deflection exceeding 7.5% = evaluation by PE for repair or replacement
- CMP (AASHTO Sect. 26.5.7) = inspect for control of deflection
- Deflection exceeding 7.5% evaluation for repair or replacement

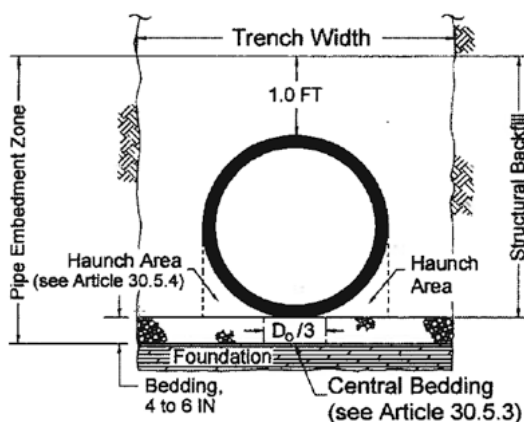
Inspection methods include the following:

- Video combined with laser deflectometer = check deflection
- Mandrels also may be used for deflection testing
- Video + micrometer used to measure cracks, joint gaps for all types

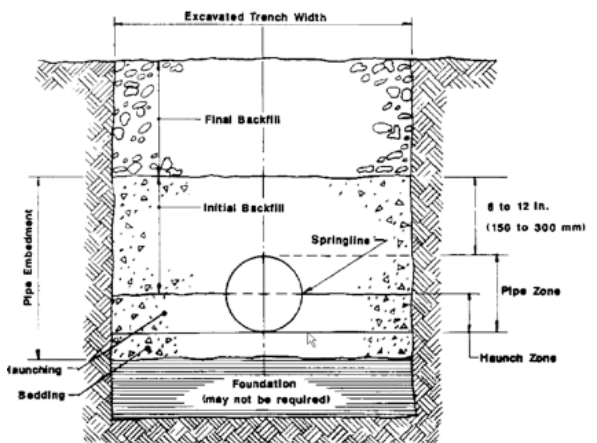
## AASHTO - Concrete Pipe Standard Installation



## Plastic Pipe National Standards



**AASHTO Section 30**



**ASTM D2321**