



**Department of
Transportation**

**ENGINEERING
INSTRUCTION**

**EI
15-008**

Title: **SPECIAL SPECIFICATION FOR PIPE BURSTING**

**SUPERSEDED BY EB 23-024
EFFECTIVE 8/3/23**

Approved:

Robert L. Sack, P.E.
Deputy Chief Engineer (Research)

1 June 15
Date

ADMINISTRATIVE INFORMATION:

- This Engineering Instruction (EI) is effective beginning with projects submitted for the lettings on or after September 1, 2015.
- This EI does not supersede any previous issuances.
- The revisions issued with this EI will reside in the Special Specifications directory of the Toolbox Server.

PURPOSE: The purpose of this EI is to issue a new special specification for the rehabilitation of pipe via pipe bursting methods.

TECHNICAL INFORMATION:

- Design guidance for trenchless installation of casing is being issued concurrently via EI 15-009.
- PIN Approval: The pipe bursting special specification is to be approved on a project-by-project basis. Designers will need to send their request for approval to DQAB and the Geotechnical Engineering Bureau through their special specification (SS) coordinator as per HDM Chapter 21. The specifications are organized based on the depth of the existing pipe to be burst along with the existing pipe size and burst pipe size (XX denotes existing pipe size for bursting and NN denotes the new pipe size to be installed after bursting).

IMPLEMENTATION:

- The following special specification is approved:

US Cust	Item 650.60XXNN17: Pipe Bursting of Pipe Less Than 12 Feet Deep
US Cust	Item 650.61XXNN17: Pipe Bursting of Pipe Greater Than or Equal to 12 Feet Deep and Less Than 18 Feet Deep
US Cust	Item 650.62XXNN17: Pipe Bursting of Pipe Greater Than or Equal to 18 Feet Deep
Metric	Item 650.60XXNN17: Pipe Bursting of Pipe Less Than 3.6 Meters Deep
Metric	Item 650.61XXNN17: Pipe Bursting of Pipe Greater Than or Equal to 3.6 Meters and Less Than 5.5 Meters Deep
Metric	Item 650.62XXNN17: Pipe Bursting of Pipe Greater Than or Equal to 5.5 Meters Deep

TRANSMITTED MATERIALS:

Attached are the following special specifications:

Item 650.60XXNN17: Pipe Bursting of Pipe Less Than 12 Feet Deep

Item 650.61XXNN17: Pipe Bursting of Pipe Greater Than or Equal to 12 Feet Deep and Less Than 18 Feet Deep

Item 650.62XXNN17: Pipe Bursting of Pipe Greater Than or Equal to 18 Feet Deep

Item 650.60XXNN17: Pipe Bursting of Pipe Less Than 3.6 Meters Deep

Item 650.61XXNN17: Pipe Bursting of Pipe Greater Than or Equal to 3.6 Meters and Less Than 5.5 Meters Deep

Item 650.62XXNN17: Pipe Bursting of Pipe Greater Than or Equal to 5.5 Meters Deep

BACKGROUND: The pipe bursting operation consists of a cone-shaped tool ("bursting head") inserted into an existing pipe and forced through it, fracturing the pipe and pushing its fragments into the surrounding soil. At the same time a new pipe is either pulled or pushed in the annulus left by the expanding operation. The rear of the bursting head is connected to the new pipe.

The intent of the special specification is to pay the Contractor for rehabilitating an existing length of pipe by a pipe bursting method and concurrently relining the burst path with a new pipe.

Definitions. The following are definitions of acceptable pipe bursting methods (Ref. No. 1).

A. Pneumatic Pipe Bursting. A pipe bursting method which utilizes a pneumatic bursting head that uses pulsating air pressure to drive the head forward and burst the existing pipe. A small pulling device guides the head via a constant tension winch and cable.

B. Hydraulic Expansion. A pipe bursting method which utilizes a hydraulic bursting head that expands and closes sequentially as it is pulled through the pipe, bursting the existing pipe along its way.

C. Static Pull. A pipe bursting method which utilizes a static bursting head that has no moving internal parts. The static head is simply pulled through the existing pipe by a heavy-duty pulling device via a segmented drill rod assembly or heavy anchor chain.

REFERENCES: The definitions for the pipe bursting methods were obtained from the following:

1. US Army Corps of Engineers, Engineering Research and Develop Center (ERDC)
Guidelines for Pipe Bursting
TTC Technical Report #2001.02
Simicevic, J. and Sterling, R.L.
March, 2001 - <http://www.trenchless.tv/library/bursting.pdf>
2. International Pipe Bursting Assoc
Guidelines for Pipe Bursting
Division of NASSCO
January, 2012 –
<http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCQQFjAA&url=ht tp%3A%2F%2Fwww.inlandpiperehab.com%2Fpdf%2Fspecification-pipebursting.pdf&ei=5a5lVe-FsekNoaFg5gG&usg=AFQjCNG86pwzF6GGARU8nRxmAhxyDg60Aw&bvm=bv.93990622,d.e XY>
3. Plastics Pipe Institute
Handbook of Polyethylene Pipe
Chapter 16 – Pipe Bursting
<http://plasticpipe.org/pdf/chapter16.pdf>

CONTACT: Questions or comments regarding this issuance should be directed to Randall J. Romer, P.E., of the Geotechnical Engineering Bureau at (518) 457-4714, or via e-mail at randy.romer@dot.ny.gov.

ITEM 650.60XXNN17 - PIPE BURSTING OF PIPE LESS THAN 12 FEET DEEP

ITEM 650.61XXNN17 - PIPE BURSTING OF PIPE GREATER THAN OR EQUAL TO 12 FEET DEEP AND LESS THAN 18 FEET DEEP

ITEM 650.62XXNN17 - PIPE BURSTING OF PIPE GREATER THAN OR EQUAL TO 18 FEET DEEP

DESCRIPTION

This work shall consist of rehabilitating an existing pipe by a pipe bursting method and concurrently relining with a new pipe in accordance with the contract documents and as determined by the Engineer. Acceptable methods of pipe bursting include Pneumatic Pipe Bursting, Hydraulic Expansion and Static Pull. Alternate methods, or combination of methods, may be approved but will require an extended review period of an additional 10 work days.

Definitions

Pneumatic Pipe Bursting: A pipe bursting method which utilizes a pneumatic bursting head that uses pulsating air pressure to drive the head forward and burst the existing pipe. A small pulling device guides the head via a constant tension winch and cable.

Hydraulic Expansion: A pipe bursting method which utilizes a hydraulic bursting head that expands and closes sequentially as it is pulled through the pipe, bursting the existing pipe along its way.

Static Pull: A pipe bursting method which utilizes a static bursting head that has no moving internal parts. The static head is simply pulled through the existing pipe by a heavy-duty pulling device via a segmented drill rod assembly or heavy anchor chain.

MATERIALS

Furnish equipment of adequate capacity and power to install the pipe by pipe bursting methods. Supplement each rig with the necessary auxiliaries, appurtenances, tools, and other equipment required for proper operation.

Provide the type of pipe (certified to meet the designated ASTM), of sufficient length and size to fit inside of the host pipe, shown on the contract documents.

Provide video inspection/recording equipment (including power source) that is specifically designed for continuous viewing and recording of images of the interior walls of pipes and fittings and capable of providing a true-color image of the entire pipe periphery. Additional requirements:

- i. digital interface displaying real-time inspection footage.
- ii. captures both streaming video (MPEG-4) and single images (JPEG) with annotations.
- iii. ability to record entire inspection video to internal memory.
- iv. allows an operator to enter observation data including distance/location within the pipe.
- v. ability to zoom on live or recorded video.
- vi. a centering device to keep the camera centered in the pipe during inspection.
- vii. a camera/lighthead/push rod system capable of extending through the pipe.
- viii. waterproof, capable of filming underwater.

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- ix. an electronic distance counter capable of measuring the amount of rod dispensed within plus or minus 1.5 ft. per 400 ft.
- x. audio input.
- xi. offloads footage/data via USB or SD/SDHC card, with ability to provide a high quality DVD of all original recordings.

CONSTRUCTION DETAILS

A. Submittals and Approvals Prior to Start of Work

- 1. Submit to the Engineer for review and approval a detailed work plan and schedule of activities required to perform all pipe burstings, including any proposed variation from the methods and techniques stipulated in this Specification or shown on the plans (See A.2.). Include the following minimum information in this work plan:
 - a. Qualifications of the Contractor showing that all pipe bursting operations will be performed by a competent operator who has successfully burst and installed pipe on a minimum of two projects in the past five (5) years, of similar size and type shown on the plans, via the proposed pipe bursting method. Details of the types of pipe bursts, owner contact names, and telephone numbers must be included.
 - b. Designed burst path indicating compliance with the design criteria.
 - c. Method for pipe bursting indicating the following:
 - i. Plan showing the work zone equipment configuration at the ends of the pipe(s), staging areas, storage areas, cuttings and pit spoil-handling areas, and final placement areas.
 - ii. Equipment list including make and model number and specifications (catalog cuts) of all major equipment proposed for use on the project. Size the pipe bursting head or boring tool based on the length and depth of the runs, type of existing pipe, the existing subsurface conditions expected surrounding the existing pipe, etc. For ASTM F417 pipe, only butt fusion welding will be allowed and shall be performed by trained technicians.
 - iii. Pipe bursting procedure, bursting head or boring tool, winching unit, special procedures to progress through any obstructions encountered, verification that size and type of pipe can withstand installation stresses, anticipated long-term soil loading and sacrificial scarring of up to 10% of the wall thickness during pipe installation, and method to verify that installed pipe is acceptable.
 - iv. If required, design (and support/protection for) insertion and reception pits in accordance with 29 CFR 1926 Subpart P *Excavations*, including shoring elements, type, depth, bracing size, etc. All excavation support system designs that are part of the construction submittal shall be stamped by a Professional Engineer and shall be done in accordance with the procedures

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contained in *Geotechnical Design Procedure for Flexible Wall Systems* (GDP-11). This publication is available on the Geotechnical Engineering Bureau's website.

- d. Method for pipe installation following the bursting operation indicating the following:
 - i. Materials list including pipe lubricant proposed for use on the project, along with material safety data sheets for all other materials used in the pipe insertion operation.

The Engineer will forward the proposed work plan to the Deputy Chief Engineer of Technical Services (DCETS) for review. The DCETS requires 15 work days from the date of receipt of the proposed work plan in the Bureau to perform the review.

Approval will remain in force only as long as all conditions set forth in the approval are met and satisfactory results are obtained. If unsatisfactory results and/or damage occurs, stop work, modify the methods of installation, and submit them for review and approval.

2. Do not start work prior to receiving the Engineer's approval. Approval, if granted, will be based on the decision of the DCETS, as to the acceptability of the proposed work plan and any variations to provide satisfactory bursting and pipe installation and avoid damage to the surrounding area and/or structure(s)/utilities.

B. General

1. Survey the existing ground surface along the proposed path of the pipe bursting and installation operation prior to the start of work to set baseline data. Establish points to determine presence/extent of ground movements.
2. Clean existing host pipe in accordance with Section 621 *Cleaning Culverts, Drainage Structures and Existing Roadside Sections*. It is not guaranteed that placement of surplus materials of spoil will be allowed within the right of way. Additionally, disposal of turbid water generated via the cleaning process shall be subject to appropriate environmental regulations.
3. Clear all areas in accordance with 16 NYCRR Part 753 *Protection of Underground Facilities*.
4. Perform pre-installation video inspection of the pipe length(s). Record a title screen for between 25 to 35 seconds, consisting of the route number, town, county, contract number, date of inspection, and station and offset of point of entry.
5. Shore insertion and reception pits as necessary to meet OSHA requirements and be in compliance with the submitted design required by A.1.c.iv.
6. If using ASTM F714, perform butt fusion of replacement pipe while recording length of heating, temperatures, pressure and cooling time. The entire length of pipe will be butt fused prior to starting the bursting operation. If this cannot be accomplished, provide the Engineer with an alternate proposal.
7. Burst and install the new pipe, of the length(s) and size(s), to the alignment(s) and

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profile(s), as specified in the contract documents.

C. Installation

1. Install the new pipe to the alignment identified in the contract documents. To ensure the bursting head does not break out of the pipe and move substantially outside the envelope of the existing pipe, locate the geometric point of origin of the new pipe to be within a distance of $\frac{1}{2}$ the radius of the existing pipe from the existing pipes geometric point of origin.
2. Closely monitor the pipe bursting and pipe installation process to eliminate ground movements. If ground movements occur, stop work and immediately stabilize the area of concern. If it is determined during the installation process that the method of installation is detrimental to the stability of the surrounding area, stop work. Modify the methods of installation and submit them for review and approval as stated in A.1.
 - a. The Contractor will be held responsible for surface subsidence and damage or disturbance to adjacent property and facilities that may result from the construction method.
3. Adequately support the new pipe during its advancement into the burst opening. Rollers and cradles shall be of the type that will prevent damage to the pipe and in sufficient number to prevent overstressing during the advancement procedure.
4. Clean the installed pipe in accordance with Section 621 *Cleaning Culverts, Drainage Structures and Existing Roadside Sections*. It is not guaranteed that placement of surplus materials of spoil will be allowed within the right of way. Additionally, disposal of turbid water generated via the cleaning process is subject to appropriate environmental regulations.

D. Pipe Installation Records

After completion of the pipe bursting and concurrent pipe installation(s), perform post-installation video inspection of the pipe length(s). Record a title screen for between 25 to 35 seconds, consisting of the route number, town, county, contract number, date of inspection, and station and offset of point of entry. Provide the Engineer with the original video recording in DVD format and a transmittal letter within 2 work days after the completion of the inspection. Recording of inspection runs at multiple locations on a single DVD is permitted, provided that each run is totally contained on the DVD.

Submit to the Engineer the installation records detailing the As-Built location of the pipe(s).

METHOD OF MEASUREMENT

The quantity for payment will be measured as the number of linear feet of each size pipe installed.

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BASIS OF PAYMENT

The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily install a pipe by pipe bursting methods including progressing through any obstructions encountered (damaged pipe, misaligned joints, etc.), lubrication mud, pre- and post-installation cleaning, and pre- and post-installation video recording.

Payment will be made under:

Item No.	Item	Pay Unit
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NOTE: XX denotes existing pipe size for bursting, NPS.
NN denotes new pipe size installed after bursting, NPS.

ITEM 650.60XXNN17 - PIPE BURSTING OF PIPE LESS THAN 3.6 METERS DEEP

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- vii. a camera/lighthouse/push rod system capable of extending through the pipe.
- viii. waterproof, capable of filming underwater.
- ix. an electronic distance counter capable of measuring the amount of rod dispensed within plus or minus 0.5 m per 120 m.
- x. audio input.
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in accordance with 29 CFR 1926 Subpart P *Excavations*, including shoring elements, type, depth, bracing size, etc. All excavation support system designs that are part of the construction submittal shall be stamped by a Professional Engineer and shall be done in accordance with the procedures contained in *Geotechnical Design Procedure for Flexible Wall Systems* (GDP-11). This publication is available on the Geotechnical Engineering Bureau's website.

- d. Method for pipe installation following the bursting operation indicating the following:
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B. General

1. Survey the existing ground surface along the proposed path of the pipe bursting and installation operation prior to the start of work to set baseline data. Establish points to determine presence/extent of ground movements.
2. Clean existing host pipe in accordance with Section 621 *Cleaning Culverts, Drainage Structures and Existing Roadside Sections*. It is not guaranteed that placement of surplus materials of spoil will be allowed within the right of way. Additionally, disposal of turbid water generated via the cleaning process shall be subject to appropriate environmental regulations.
3. Clear all areas in accordance with 16 NYCRR Part 753 *Protection of Underground Facilities*.
4. Perform pre-installation video inspection of the pipe length(s). Record a title screen for between 25 to 35 seconds, consisting of the route number, town, county, contract number, date of inspection, and station and offset of point of entry.
5. Shore insertion and reception pits as necessary to meet OSHA requirements and be in

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- compliance with the submitted design required by A.1.c.iv.
6. If using ASTM F714, perform butt fusion of replacement pipe while recording length of heating, temperatures, pressure and cooling time. The entire length of pipe will be butt fused prior to starting the bursting operation. If this cannot be accomplished, provide the Engineer with an alternate proposal.
 7. Burst and install the new pipe, of the length(s) and size(s), to the alignment(s) and profile(s), as specified in the contract documents.

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1. Install the new pipe to the alignment identified in the contract documents. To ensure the bursting head does not break out of the pipe and move substantially outside the envelope of the existing pipe, locate the geometric point of origin of the new pipe to be within a distance of $\frac{1}{2}$ the radius of the existing pipe from the existing pipes geometric point of origin.
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Payment will be made under:

Item No.	Item	Pay Unit
650.60XXNN17	Pipe Bursting of Pipe Less Than 3.6 Meters Deep	Meters
650.61XXNN17	Pipe Bursting of Pipe Greater Than or Equal to 3.6 Meters Deep and Less Than 5.5 Meters Deep	Meters
650.62XXNN17	Pipe Bursting of Pipe Greater Than or Equal to 5.5 Meters Deep	Meters

NOTE: XX denotes existing pipe size for bursting, NPS.
NN denotes new pipe size installed after bursting, NPS.