conforming to ASTM D1248, and shall meet requirements for Type III, Class B, Grade P34, Category S, and PPI rating of PE 3408, when compounded. The pipe produced from the resin shall have a minimum cell classification of 345434 D or E under ASTM D3350. Polyethylene pipe shall have a maximum SDR value of 17, a minimum working pressure of 100 psi, and an inside diameter equivalent to the existing pipe or selected pipe size.

408.2.2 Ductile iron pipe shall be American Ductile Iron GS push pipe, Fastite Joint Push-Bar, Flex-Ring Joint Pipe, or approved equal.

408.2.3 HDPE shall be stored per 409.6.2.

408.3 EXECUTION

408.3.1 Locate insertion or access pits so that the total number is minimized, and footage of pipe installed in a single run is maximized. Use excavations at point repair locations for insertion pits, where possible.

408.3.2 Before excavating, check with various utility companies and determine the location of utilities in the vicinity of the work area. For damage done to utilities, the resulting repair, temporary service, and other such costs shall be borne by Contractor.

408.3.3 Perform excavation and backfill in accordance with the City of Tulsa, Specifications.

408.3.4 Install and operate necessary dewatering and surface water control measures in accordance with requirements of Part 111 – Dewatering.

408.4 PIPE INSTALLATION

408.4.1 GENERAL: Prior to installation, the Contractor shall thoroughly clean the existing line and conduct a closed-circuit television inspection of the same. Television inspection shall be in accordance with other requirements of this specification.

408.4.2 The Contractor shall maintain sewage flow at all times. When acceptable, the Contractor will be allowed to plug the upstream line and store flows in the upstream line segments. When inadequate storage exists to make this alternative acceptable, bypass pumping shall be required. The Contractor shall submit a plan describing the methods he intends to utilize for maintaining sewage flow.

408.4.3 Suitable pit shafts, or trenches shall be excavated for the purpose of conducting the trenchless operations and for placing end joints of the pipe. Wherever end trenches are cut in the sides of the embankment or beyond it, such work shall be sheeted securely and braced in a manner to prevent earth caving. The pits or trenches excavated to facilitate the operations shall be backfilled immediately after the pipe has been installed and tested.

408.4.4 Once insertion is initiated, the Contractor shall complete the insertion without interruption.
408.4.5 The pipe shall be laid true to the lines and grades within the existing sewer as shown on the Contract Drawings. The Contractor's operations shall be conducted to prevent damage to the liner or to adjacent facilities. The City shall inspect all pipe and fittings before and after installation.

A) Where the existing main to be replaced is less than 2' deep, all utilities and services crossing the main or running parallel to it, and lying within a distance of 2' horizontal from the edge of the existing line shall be exposed prior to pipe bursting.

B) Where the existing main to be replaced is between 2' and 4' deep, all utilities and services crossing the main or running parallel to it, and lying within a distance of 2' horizontal from the edge of the existing line shall be exposed prior to pipe bursting.

408.4.6 After insertion, the liner, if polyethylene pipe, shall be allowed a minimum of 12 hours (or as otherwise recommended by the pipe manufacturer) to reach temperature equilibrium with the sewer and to stress-relieve itself. No connection shall be made to the liner during this period. The Contractor is cautioned that he must pull such additional length of pipe as is required to compensate for contraction during this period.

408.4.7 HDPE shall be installed per 409.13.2, 409.13.3, 409.13.4, and 409.13.5.

408.5 BYPASSING SEWAGE

408.5.1 Contractor, when required, shall provide for the flow of sewage around the section or sections of pipe that are to be rehabilitated. The bypass shall be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle anticipated wet weather flow.

408.6 INTERRUPTION OF SERVICE

408.6.1 When preparing for making connection to the existing system or other work, which will interrupt service to the utility users, Contractor shall notify the affected user at least 48 hours in advance of service interruption, stating the approximate time and duration of interruption of service. Advance notification shall not extend beyond 72 hours. Contractor shall coordinate with the authorities having jurisdiction, any necessary interruption of service and shall limit such interruption to the duration mutually agreeable to both parties.

408.7 SERVICE CONNECTIONS

408.7.1 After the replacement pipe has been secured, service connections shall be excavated and reconnected to the new pipe. All service connections to existing buildings are to be reconnected, except where disconnection is approved by the Engineer. Service connection to a vacated lot shall not be reconnected. If more than one service is found per lot, then the Contractor shall verify that service connections are active by introducing dye into the lines at cleanouts, vents stacks, or other access points as