CHEMICAL GROUTING OF MANHOLES

PART 1 – GENERAL

1.01 SCOPE OF WORK
This section governs all work, materials and testing required for the chemical grouting of manhole defects. Manholes or sections of manholes with leaks shall be repaired as indicated in the Plans and Specifications. The rehabilitated manholes will have no leaks after performance of work.

1.02 DESCRIPTION
The Contractor shall be responsible for furnishing all labor, materials, equipment, and testing required for the completion of chemical grouting of manhole defects in accordance with the Contract Documents.

1.03 MANUFACTURER'S RECOMMENDATIONS
All Materials, additives, mix ratios, and procedures needed for the grouting process shall be in accordance with manufacturer's recommendations. Manufacture must provide material data sheets and S.D.S sheets.

1.04 MANHOLES
Manholes to be grouted are of brick, concrete, plastic, or fiberglass construction.

PART 2 – PRODUCTS

2.01 GROUTING MATERIALS
Chemical grout shall be a polyurethane based material designed for use in a wet environment but be able to withstand prolonged dry cycles. As applicable the material must be capable of withstanding movement.

1) General: Where pressurized injection of chemical grout behind structure's walls and joints are required, material supplied shall be urethane gel or polyurethane resin with the following properties:
    a. During injection, chemical sealant shall be able to react/perform in presence of infiltrating water.
2) Cured Sealant:
    a. Capable of withstanding submergence in water without degradation.
    b. Prevent passage of water through structure defect.
    c. Flexible as opposed to brittle or rigid.
    d. In place, able to withstand freeze/thaw and wet/dry cycles without adversely affecting seal.
    e. Not biodegradable; additives may be used to meet this requirement, if long-term strength is not affected.
    f. Chemically stable and resistant to concentrations of acids, alkalis, and organics found in normal sewage.
    g. The foam shall be hydrophobic.
3) Mixing of component materials shall be compatible with field conditions.
4) Residual sealing materials shall be easily removable from structure bench.

Grouting Materials: Alchatek

Polyurethane Chemical Grout
F400
H100

H200
Highfoamer

Injection Accessories
Oakum Rope
Grout Needles
Injection Ports

The following properties shall be exhibited by the grout.

1. Documented service of satisfactory performance in similar usage.
2. Resistance to chemicals; to most organic solvents, mild acids and alkali.
3. The chemical shall be non-toxic in a cured form.
4. The material shall be able to withstand freeze/thaw and moving load conditions.

2.02 ADDITIVES
Additives may be utilized for catalyzing the reaction, lowering the freezing temperature of the chemical, and minimizing dehydration of the materials.

2.03 MATERIAL IDENTIFICATION
The Contractor shall completely identify the types of grout, mortar, and sealant used and provide case histories of successful use or demonstrate the choice of grouting materials based on chemical and physical properties, ease of application, and expected performance, to the satisfaction of the Engineer.

2.04 MIXING AND HANDLING
Mixing and handling of chemical grout shall be in accordance with the recommendations of the manufacturer. It is the responsibility of the Contractor to provide appropriate protective measures to ensure that chemicals are handled by authorized personnel in the proper manner. All equipment shall be subjected to the approval of the Engineer. Only personnel thoroughly familiar with the handling of the grout material and additives shall perform the grouting operations. Chemical grout shall be shipped and stored in a controlled environment between 60 and 95 degrees.

PART 3 – EXECUTION

3.01 GENERAL
Manhole grouting shall not be performed until the repair of the manhole frame and grade rings or any other structural manhole repairs are complete.

3.02 PRELIMINARY REPAIRS
A. The Contractor shall cut and trim all roots within the manhole.
B. The Contractor shall seal all unsealed lifting holes, unsealed step holes, voids larger than approximately one-half (1/2) inch in thickness. All cracked or deteriorated material shall be removed from the area to be patched and replace with a waterproof quick setting mortar in accordance with manufacturer's specifications.
C. The Contractor shall perform the joint, large crack and annular gap repair by soaking dry Oil Free Oakum with F400 and packing the Oakum/Resin plug into opening until it sets.

3.03 TEMPERATURE
Normal grouting operations shall be performed in accordance with manufacturer's recommendations. Temperature will affect grout cure times.

3.04 GROUTING MATERIAL USAGE
Grouting to a manhole may include corbel, wall, pipe seals, manhole joints, well to flattop joint, and/or bench/trough. The Engineer will direct areas of the manhole designated to be grouted. If

entire manhole is scheduled for grouting, grouting shall include corbel, wall, pipe seals, and bench/trough. Pipe seal grouting shall include all pipe seals in the specified manhole and grouting of the specified manhole including the bench/trough to the maximum height of 18 inches from the crown.

3.05 DRILLING AND INJECTION

A. Injection holes shall be drilled through the manhole wall at locations recommended by the manufacturer.
B. Grout shall be injected through the holes under pressure suitable injection packers and or wall spears. Injection pressure shall not cause damage to the manhole structure or surrounding surface. Grout shall be injected through the lowest holes first. Then procedure shall be repeated until the manhole is externally sealed with grout.
C. Grout travel shall be verified by observation of grout to defects or adjacent injection holes. Provide additional injection holes, if necessary, to ensure grout travel.
D. Injection holes shall be cleaned and patched with a waterproof quick setting mortar.

3.06 TESTING OF REHABILITATED MANHOLES

If exfiltration or vacuum testing is used, usually 10 percent of the sealed manholes, as chosen by the inspector, are tested. Manholes that fail are reworked and retested by the Contractor. If more than 5 percent of the manholes tested fail the initial test, an additional 10 percent of the sealed manholes are tested. This process continues until the testing is satisfactory, or until all manholes have been tested.

Limitations and considerations include recognizing that exfiltration and vacuum testing may be impractical or cost-prohibitive for all manholes; therefore, the use of either method is subject to the following limitations and considerations.

A. Complete Sealing: These methods are used only when the entire manhole has been sealed or rehabilitated. The lack of sealing or rehabilitation of some portions of the manhole may prevent passage of either of these tests. Spot repairs and partial sealing or rehabilitation are therefore subject to infiltration and visual testing only.

B. Inlet and Outlet Sewers: Manholes built over a large diameter sewer may be impractical and uneconomical to test using either of these methods due to bypassing requirements, availability of plugs, and high forces that are generated on the plugs. Consideration must be given to these factors when determining the method of acceptance testing to be used.

C. Structural Condition: The structural condition of some manholes may be such that testing with these methods is impractical and destructive. The Owner's Representative and Contractor shall therefore deem as structurally sound, prior to testing and using these methods, those manholes that have not been structurally lined.

PART 4 – CONTRACTOR QUALIFICATIONS

A. The Grouting Contractor shall have 5 years verifiable experience of manhole grouting a minimum of 50 manholes. Employees of the Grouting Contractor shall also be qualified as receiving ongoing training in manhole grouting that is recognized by the Chemical Grout Manufacture.

B. The Grouting Contractor will demonstrate an ongoing commitment to safety by providing a Job Specific Safety Manual including all aspects of Confined Space Entry Procedures. Grouting Contractor to not have a negative Workers Compensation experience rating.

PART 5 – CONTRACTOR WARRANTY

A. Grouting Contractor to warranty work for a period of 1 year. Grouting Contractor to warranty that the manholes grouted will have no leaks. Contractor to provide Performance & Payment Bond and Warranty Bond to the owner.

B. Twelve months after completion of all chemical grouting work inspections will be conducted by the owner, owner's representative or engineer and the Contractor.

C. The owner is to notify the Grouting Contractor within one week of any leak detected or failure during the year after completion of chemical grouting work.
D. Previously grouted defects, which leak or fail within the first year after sealing work was completed, shall be resealed at no additional cost to owner
E. Inspection of previously grouted defects can consist of observation for leaks as well as any specified tests as required by the Inspector.

END OF SECTION