

Category	Question	NASSCO Response	Date
Infiltration Control	Is there a need for an extra CCTV at the end of the warranty period?	<p>A1: The Suggested Specification requires a portion of the work to be tested or CCTV inspection. It must be decided prior to the bid. See Section 3.14 of the NASSCO Suggested Specification.</p> <p>A2: The end of the warranty period entails a retesting of a percentage of the joints to ensure they remain well sealed, which includes a CCTV inspection for those segments. The language we use typically say, "A. Conduct warranty testing on 15% of the mainline sewer pipe segments 24 months after Conditional Acceptance. Engineer will select the pipe segments to be warranty tested. B. If more than 10% of the warranty tested fail, test an additional 15% of the pipe segments. If more than 10% of the second group of warranty tested fail, test 100% of the the remaining untested pipe segments at no additional compensation. Grout and retest all failing warranty testing at no additional compensation. For each pipe warranty tested, perform a Warranty Inspection. "</p>	Nov-15
Infiltration Control	When the contractor grouted an SMH in our Town he ended up using a lot more than anticipated. Some of the grout ended up entering in the sewer line and eventually hardened in the pump station and caused blockage. How can it be prevented?	<p>A1: Adding dye to the grout in conjunction to a cctv camera in the mainline could have reduced the chances of blocking the sewer with grout</p> <p>A2: Crews are typically trained to lamp the US & DS pipe sections in manholes where significant grout is pumped. If grout is observed in the pipe, the line is jetted clean.</p>	Nov-15
Infiltration Control	Is it possible to grout a fracture using the methods described in this presentation if that fracture is not circumferential?	<p>A1: Injection grouting is not a structural repair but special packers and technics have been used in some instances to effectively stabilize the area adjacent to the longitudinal fractures.</p> <p>A2: Yes, but requires a unique packer.</p>	Nov-15
Infiltration Control	Does set up time effect the life span of grout?	<p>A1: If by set time you mean Gel Time, absolutely. The longer the gel time, the more permeation into the soil which provides greater protection for a longer period of time.</p>	Nov-15
Infiltration Control	Why the air temperature is important for gel not the ground temp since it's underground?	<p>A1: The ambient air temperature, the temperature of the water used in the grout mix are important and easy to monitor. The sewer water temperature is relatively stable under normal conditions. The majority of the grout mix his held in the tanks and hoses. Grout being pumped in groundwater that is much colder than the grout mix itself will take longer to react (extended gel time).</p> <p>A2: Air temperature affects the supply-side of the materials in both Tank A and Tank B. When the 2 supply sides combine at the packer, the product temperature is closer to air verses trench.</p> <p>A3: It is the change in air temperature which is most concerning as it can change the temperature of the grout within the hoses/tanks. Changes is grout temperature can greatly effect the gel time.</p>	Nov-15
Infiltration Control	When grouting between host pipe and liner at the service connection. Would a additive such as latex or earth be used to strengthen the grout and help keep the grout in place.	<p>A1: The sticky nature of the latex reinforcing agent could help this purpose. I've tested samples (above ground) without reinforcing agents and in order to blow out the annulus grout we were in excess of 25 psi.</p> <p>A2: Yes.</p>	Nov-15
Infiltration Control	What is a reasonable distance to specify to grout in a lateral connection to the main line?	<p>A1: This varies by project and objectives of the project along with budgets. If specifying effective sealing distances that require pre-inspection, pre-cleaning and post inspection and post cleaning the cost will not be the same. Access points (cleanouts or other) might affect the cost of the work to be performed. There are many contractors that are sealing up to 6 feet into the lateral from the mainline without pre-inspection of the lateral.</p> <p>A2: We are currently grouting 4-inch laterals for a distance of 20 feet. The cost is \$1,200 per lateral. This compares to a cost of \$330 for an 8 foot distance.</p> <p>A3: Depending on pipe conditions & construction, 5-10 feet is a reasonable distance to specify. If the laterals are cast iron or orangeburg then this distance is not feasible. The same can be said for laterals which contain significant mineral deposits. However, in most cases, typical VCP laterals can be easily sealed 5-10 feet from the mainline without pre-inspection of the lateral.</p>	Nov-15

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Infiltration Control	If a CIPP liner has a pin hole leak or a leaking Vacuum patch would grout be a tool to seal it.	A1: The pinhole leaks are often too small to allow the grout to travel through it and along the annulus. If an attempt is performed to seal the pinhole, the pumping rate and gel times should be adjusted to allow this to happen. A2: No. The pinhole is too small reliably to get grout through.	Nov-15
Infiltration Control	We have clay soil and have had issues when trying to use Chemical Grout in Clay. Are we doing something wrong or is there a grout that works in clay soil?	A1: AV-100 is the thinnest product on the market and best for injecting in clay soils. Make certain you're injecting enough grout to permeate fissures in the clay to stop unwelcome groundwater in the sewer trench and surrounding the joint.	Nov-15
Infiltration Control	Have you ever damaged a clay pipe from pressure grouting?	A1: Yes A2: Yes, contractors have experienced additional damage if injecting with too much pressure. Follow recommended guidelines. A3: Yes, the contractor needs to carefully examine each joint or lateral prior to injection of grout in order to verify no cracks or small fractures are present. If these type of issues are present, precautions must be made to avoid damaging the pipe.	Nov-15
Infiltration Control	Can you perform injection grouting with high levels of infiltration occurring? (i.e.: infiltration is running/gushing at joint)	A1: Yes, injection grouting as we know it is designed to work in the presence of active leaks. An experienced contractor will probably double up on the solids content and use a faster gel time, when known ahead of time. A2: Absolutely	Nov-15
Infiltration Control	What is the consistency of AV-100 when cured?	A1: AV-100 has no strength until a matrix is formed with the soil which has been measured at 120 psi.	Nov-15
Infiltration Control	Can you comment on "grouting to refusal" as mentioned in the ASTM 2304 standard?	A1: Section 3.9 B of the NASSCO Suggested Standard Specification addresses the refusal definition.	Nov-15
Infiltration Control	Are soil reports used for prediction of required passes or grouting procedure?	A1: No.	Nov-15
Infiltration Control	What life expectancies can be expected for the various grout types?	A1: The life expectancy of the grout and the life expectancy of the repair are two different issues. The life expectancy of the repair is relative to the grout mixture, gel times used vs pumping rates and the volume of grout placed adjacent to the defect. When done properly the life expectancy of the repair could be as long as 20 years (Article in Trenchless Technology May 2008 "Acrylamide Grout aces 20-Year Test") A2: According to US DOE, AV-100 has a 362 year half-life in the soil. For polyurethanes, life expectancy is often stated equal to the life of the structure.	Nov-15
Infiltration Control	Should you set a minimum gel time, say 60 seconds, to force the contractor to stay at the joint?	A1: I believe that there is an appropriate gel time for the pipe sizes and pumping rates. A fixed 60 sec gel time might be appropriate for some situations but too long in other cases ending up costing the owner too much money. A2: Gel time is a specific calculation based on packer void and desired permeation into the soil, not for disciplining the contractor. A3: Section 3.4 D of the NASSCO Suggested Standard Specification provides a good gel time fomula for contractors to follow. It takes into consideration the pipe diameter and the size of the packer void.	Nov-15
Infiltration Control	What reservations do you have in implementing a sewer grouting program in karst areas?	A1: None. Grouting is a soil sealing process and adds value outside of the pipe to stabilize soil which is important in karst areas.	Nov-15
Infiltration Control	What is the life expectancy of the grout?	A1: The life expectancy of the grout and the life expectancy of the repair are two different issues. The life expectancy of the repair is relative to the grout mixture, gel times used vs pumping rates and the volume of grout placed adjacent to the defect. When done properly the life expectancy of the repair could be as long as 20 years (Article in Trenchless Technology May 2008 "Acrylamide Grout aces 20-Year Test") A2: According to US DOE, AV-100 has a 362 year half-life in the soil.	Nov-15

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Infiltration Control	Can grouting be performed with constant ground water infiltration (not just infiltration caused by storm events)?	<p>A1: Yes, injection grouting as we know it is designed to work in the presence of active leaks. An experienced contractor might increase on the solids content of the grout if known ahead of time.</p> <p>A2: Yes, this is the best possible subsurface condition for grout.</p> <p>A3: Definitely, sealing active leaks is one of the best applications for checmical grout. An active leak is easy to identify once grouted / sealed you receive an immediate visual verification of the effectiveness of the work.</p>	Nov-15
Infiltration Control	How are grouting quantities typically discussed when a project is bid and at what costs?	<p>A1: Grout costs about \$10 per gallon to make. We calculated the likely amount needed based on experience; there are many variables. Even with all our experience, we are often off by 50%!</p> <p>A2: The NASSCO Suggested Standard Specification provides an excellent guide to the typically bid items to be identified in a grouting project.</p>	Nov-15
Infiltration Control	Has chemical odor migrating through faulty traps in homes ever been an issue when grouting around laterals?	<p>A1: No issues ever reported to me.</p> <p>A2: AV-100 is odorless.</p>	Nov-15
Infiltration Control	Joint sealing of clay and RCP changed over time. What time period was it common practice to use tar to seal clay pipe joints? When did the modern practice of using rubber joints start?	<p>A1: Sealing Joints in the 30's, 40's and 50's was largely experimental including hot bitamastic materials, tar and jute as there was limited concern for infiltration. In the 60's rubber seals were introduced.</p>	Nov-15
Infiltration Control	Does the ICGA specification for grouting include the recommendations presented? Stage grouting? Additives for different conditions?	<p>A1: Yes, the spec details each of these items.</p>	Nov-15
Infiltration Control	Why is the air temperature important for gel not the ground temperature since it's underground?	<p>A1: The ambient air temperature, the temperature of the water used in the grout mix are important and easy to monitor. The sewer water temperature is relatively stable under normal conditions. The majority of the grout mix his held in the tanks and hoses. Grout being pumped in groundwater that is much colder than the grout mix itself will take longer to react (extended gel time).</p> <p>A2: Air temperature affects the supply-side of the materials in both Tank A and Tank B. When the 2 supply sides combine at the packer, the product temperature is closer to air verses trench.</p> <p>A3: It is the change in air temperature which is most concerning as it can change the temperature of the grout within the hoses/tanks. Changes is grout temperature can greatly effect the gel time.</p>	Nov-15
Infiltration Control	How do you determine which joints are leaking?	<p>A1: Visual stains at the joints, mineral deposits can usually be seen on joints that have been leaking for a certain period of time. The grouting process is called "Test & Seal" so an air test is performed on all on joints prior to sealing. Thus the air test process determines which joints could allow groundwater infiltration and the grouting (or sealing) process permanently seals the joint.</p> <p>A2: Ground temperature is important, but it does not change. Until we have a way of monitoring gel temperature at the packer void, the best surrogate is grout temperature in the tanks.</p>	Nov-15
Infiltration Control	What happens to the grout that remains inside the pipe at the packer? Is it washed out of the sewer after every injection?	<p>A1: Residual grout at the joints peels of the inside wall. One pass with the jetter will remove residual grout at the mainline joints.</p>	Nov-15
Infiltration Control	What is typical life expectancy of acrylamide grout	<p>A1: The life expectancy of the grout and the life expectancy of the repair are two different issues. The life expectancy of the repair is relative to the grout mixture, gel times used vs pumping rates and the volume of grout placed adjacent to the defect. When done properly the life expectancy of the repair could be as long as 20 years (Article in Trenchless Technology May 2008 "Acrylamide Grout aces 20-Year Test`")</p>	Nov-15
Infiltration Control	In the initial slides it showed connector between storm water pipe and the lower sewer line. why are they interconnected?	<p>A1: Not often seen, but an old practice included a link between storm and sanitary systems.</p>	Nov-15

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Infiltration Control	Will a grouted sewer line pass a pressure test?	A1: If there are other defects that were not addressed with the grouting or other technologies then it could fail a test. That is why the test & seal procedure addresses the immediate work that has been performed. A2: If all joints are sealed, and there are no taps, yes.	Nov-15
Infiltration Control	How effective is lateral grouting if the connection has a root mass located inside? Are there ways to prepare the connection internally with root intrusion?	A1: There needs to be a clear passage to invert the lateral bladder and seat the rubber against the host pipe walls. Cleaning with high pressure nozzles in the lateral from the mainline sewer have been effective in removing roots and other debris. A root inhibitor may be added to the grout to control regrowth. A2: If there are roots, there is infiltration. A topic herbicide is recommended in advance, but diclobinal may be used with grout to discourage future root growth.	Nov-15
Infiltration Control	Are most all grouting rigs now equipped with positive-displacement pumps only. In other words, are air-over pressurized tank systems without pumps still used? Are there any advantages to the older pressurized tank methods.	A1: Most trucks being built today are either air pumps or positive displacement pumps. I find it easier to control the output using electric pumps.	Nov-15
Infiltration Control	How do you clean a lateral that has "main line access only"? You said it was possible.	A1: There is equipment available to launch cleaning nozzles from the mainline sewer to clean laterals up to 70 feet from the mainline access. Logiball Lateral Cleaning Launchers are being used by contractors to perform this kind of work from the mainline access only	Nov-15
Infiltration Control	Does residual grout in the lateral need to be cleaned out?	A1: The residual grout typically does not need to be removed as it is not sandwiched in between two pipes and is not in the soil. Residual grout left inside the lateral will eventually peel of from the inside wall and down the mainline pipe. If long effective sealing distances are done 15 - 20 feet and there are sags in the lateral it could be wise to clean residual grout as the grout could accumulate in the sag of the lateral and cause issues. A2: Only if it significantly blocks flow. Over time, grout inside the pipe will slough off. We typically require removal if thickness is greater than 1".	Nov-15
Infiltration Control	What are typical production rates when testing & sealing 8 or 10 inch joints?	A1: Depending on the joint spacing, failure rates, water in the line, easement work etc., production rates can vary between 60 to 100 joints a day for 8-10 inch pipes. A2: Vary widely, based on failure rates. When operating for a full 10 hour day, 100 joints per day is a good day. More typical rates are 70 per day. A3: Standard production rates in VCP pipe (2-5' pipe sections) are around 80 joints per day.	Nov-15
Infiltration Control	How many laterals can be sealed in a day? And how much \$?	A1: Typically the laterals within two manhole runs can be sealed in a 10 hour day. Depending on the number of laterals within the two manhole runs, the answer is between 7-12 laterals per day. This number will go down if easement work or long effective sealing distances are performed. Prices will vary according to the number of bidders and work to be performed. A2: 8-10 laterals per day, cost varies based on pipe location & length to be sealed. A sealing laterals 5' from the mainline on a typical residential street costs around \$300 each.	Nov-15
Infiltration Control	Would you add latex when grouting laterals?	A1: There is a common belief that adding latex to the mix will create a stickier seal in the annulus in relined pipes. This also takes longer for residual grout in the lateral to peel off the inside lateral wall A2: Yes	Nov-15
Infiltration Control	What if there are roots in the lateral and no cleanouts, how do you get rid of the roots?	A1: There is equipment available to launch cleaning nozzles from the mainline sewer to clean laterals up to 70 feet from the mainline access. Logiball Lateral Cleaning Launchers are being used by contractors to perform this kind of work from the mainline access only A2: Mainline launched chain flail.	Nov-15

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Infiltration Control	What if you have minute longitudinal cracks at the joints and can't pass the air test?	<p>A1: Hairline cracks present at joints may allow the air to escape out of the pipe, failing the air test. Depending on the size of the cracks it may be difficult to pump out enough grout through these minute openings to obtain a long term seal. When this is known ahead of the procedure longer gel times and slower pumping rates are suggested.</p> <p>A2: These are problematic as inflation of the packer on the joint can cause damage to the pipe. The goal is to seal all the joints which can be safely sealed without causing further damage to the pipe. <u>Some joints/defects simply cannot be sealed with grout.</u></p>	Nov-15
Infiltration Control	Where would you start a grouting program first (manholes, joints, laterals)?	<p>A1: I would choose a given basin and work the 4 infiltration points within that given basin. It is easier to collect data within a given basin and measure the effectiveness of the test & seal projects on reducing infiltration.</p> <p>A2: Joints</p> <p>A3: Manholes</p>	Nov-15
Infiltration Control	If there were three things for the inspector to check daily, what would they be?	A1: Grout mixture (mix & gel times), accuracy of the void pressure monitoring system , gallons of grout pumped per defect	Nov-15
Infiltration Control	Can grouts can be used to seal drinking water pipe leaks?	<p>A1: Drinking water pipes are usually in pressure operated systems (different than gravity). Typically you would have to use an NSF 61 approved grout.</p> <p>A2: Drinking water pipes are pressurized and grout is not recommended.</p>	Nov-15
Infiltration Control	Do you recommend grouting before installing a T-liner with the Sigma seal?	<p>A1: Yes. I recommend grouting to stop infiltration that might risk the successful installation of CIPP (resin washout, lifts in liners, curing process etc.)</p> <p>A2: Grouting to stop active infiltration is recommended prior to lateral lining.</p>	Nov-15
Infiltration Control	How long does the grout last before deterioration and re-infiltration?	<p>A1: The life expectancy of the grout and the life expectancy of the repair are two different issues. The life expectancy of the repair is relative to the grout mixture, gel times used vs pumping rates and the volume of grout placed adjacent to the defect. When done properly the life expectancy of the repair could be as long as 20 years (Article in Trenchless Technology May 2008 "Acrylamide Grout aces 20-Year Test`")</p> <p>A2: In the sewer trench, there is plenty of humidity to keep the grout hydrated. In soil, AV-100 has a 362 year half-life.</p> <p>A3: <u>A properly grouted joint will remain permanently sealed if undisturbed.</u></p>	Nov-15
Infiltration Control	Is there any concern with grout that doesn't enter the joints/defects being discharged to downstream pumping stations?	<p>A1: Once grout gels, it is 100% inert and safe. The only concern is pumps operating 1 to 1. If only one side of the pump is firing, there is no gelation, so we have plenty of visual and practical safe guards against this.</p> <p>A2: Once grout gels, it is 100% inert and safe. The grout material which is not injected into the soil has the consistency of jello. It easily breakdowns within the collection system and does not cause any issues with your pump station.</p>	Nov-15
Infiltration Control	Can you seal laterals around sweeps and bend connections?	A1: Yes	Nov-15
Infiltration Control	What is the typical range of psi strength of grout?	A1: Cured grout forming a matrix with soil has been measured at 120 psi.	Nov-15
Infiltration Control	Can poly or acrylic grout add/improve structural integrity to the pipe?	<p>A1: My short answer is no, but it will enhance and stabilize the bedding that the grout has saturated</p> <p>A2: By improving the structural integrity of the bedding, it improves the structural integrity of the pipe.</p>	Nov-15
Infiltration Control	Do you have any recommendations for what to do in high groundwater areas?	<p>A1: In high groundwater areas where there are active gushing leaks I would consider a stronger grout mix so that the solids content of the grout is higher.</p> <p>A2: Grout is at its most effective in high groundwater areas.</p>	Nov-15
Infiltration Control	Are municipalities willing to spend their limited resources, money, to fix infiltration on private property laterals?	<p>A1: Municipalities are interested in reducing their infiltration. If work has been performed on mainlines and manholes, the groundwater that used to enter the system at these points now has probably moved to the service laterals and still ends up at the treatment plants.</p> <p>A2: Those whose only other options are more expensive, yes.</p> <p>A3: Yes, it is happening in hundreds of communities nationwide and growing daily.</p>	Nov-15

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Infiltration Control	When grouting mainline joints prior to installing CIPP and roots have been encountered, is it recommended to install a root inhibitor in the grout to prevent future intrusion of roots into the annular space?	<p>A1: When using a root inhibitor in the grout mix it is important to regularly keep these materials in suspension. Enough grout and material(root inhibitor) must be pumped in order to be effective long enough for the roots to find other sources of nutrients.</p> <p>A2: Yes, but only after the roots have been removed, ideally with chemical root treatment 6 months in advance.</p> <p>A3: Chemical root control prior to joint grouting, the use of root inhibitors within the grout and subsequent lining would be the best possible approach to limit root growth within the annulas.</p>	Nov-15
Infiltration Control	I have heard from grouting companies that any excess grout left in lateral pipes will wash away after some time. I have recently seen some laterals that after some time still have excess grout in the flow line. How does this get washed away and how long and how much flow will it take to dissipate?	<p>A1: There is residual grout and there is excess grout. Residual grout is a thin layer of grout that is left in the lateral when using the right lateral bladder for the lateral pipe size. Excess grout is when a 4 inch lateral bladder is used in a 6 inch diameter lateral. As the lateral is in service, water flushed from the house will eventually wash away the residual grout. If reinforcing agents are used it could take more time to peel off from the lateral wall.</p> <p>A2: This varies depending on the flow in the lateral, how much grout is left behind, whether the grout is in the flow line or on the roof, and how much latex is in the grout. But unless the line is plugged by grout, its presence does not cause future backups.</p>	Nov-15