FILED

JUL 09 2015

COURT OF APPEALS
DIVISION III
STATE OF WASHINGTON
By_____

No. 329071

COURT OF APPEALS, DIVISION III OF THE STATE OF WASHINGTON

ALLAN MARGITAN,

Appellant

v.

SPOKANE REGIONAL HEALTH DISTRICT
SPOKANE REGIONAL HEALTH DISTRICT BOARD
Respondents
MARK AND JENNIFER HANNA, Husband and Wife,
Cross Appellants

APPELLANT MARGITAN's RESPONSE BRIEF

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I. CORRECTION OF MISTATED FACTS

The following misstated facts confirm Stan Perdue and Michelle Fossum frequently violate RPC 3.3 Candor Toward the Tribunal and RPC 4.1 Truthfulness in Statements to Others in their written documents and testimony provided to the District, Board, Spokane Superior Court and the Court of Appeals Division III.

The District states that approximately ten years after Hanna's Septic System was approved (this would be 2013), it became aware that Hanna's property was subject to a 40 foot easement. This is incorrect and misleads the court. Washington law authorizes only the District to grant approval of water and septic systems in the platting process. During the creation of the short plat, the District required the easement to be as depicted in the Preliminary Short Plat map. AR 23,24 The easement was depicted as 40 feet. AR 97 The District granted its approval of Short Plat 1227-00 in March 2002. Short Plat map AR 27 #1 confirms there was a 40 foot dedicated easement for ingress, egress and utilities. At AR 27 # 10 the District writes:

> THE PUBLIC WATER SYSTEM, PURSUANT TO THE WATER PLAN APPROVED BY COUNTY AND STATE HEALTH AUTHORITIES, THE LOCAL FIRE PROTECTION DISTRICT, DIVISION OF BUILDING AND CODE ENFORCEMENTAND WATER PURVEYOR, SHALL BE INSTALLED

> WITHIN THIS SUBDIVISION AND THE APPLICANT SHALL PROVIDE FOR INDIVIDUAL DOMESTIC WATER SERVICE AS WELL AS FIRE PROTECTION TO EACH TRACT PRIOR TO SALE OF EACH TRACT AND PRIOR TO ISSUANCE OF A BUILDING PERMIT FOR EACH TRACT.

The Short Plat map displays the signature of the District's employee. The District granted its approval of the Short Plat on March 11, 2002. Therefore, on March 11, 2002, the District was aware that Parcel 2 of Short Plat 1227-00, Hanna's property, was subject to a 40 foot easement.

One year later, on March 11, 2003, Hanna's submitted an application for a Septic System with a copy of the Short Plat map attached. Once more, the District was made aware that Hanna's property was subject to a 40 foot utility easement.

The District knew all along of the 40 foot easement. It is untrue that it learned of the easement for the first time in 2013.

1) The District stated in its brief at page 8 that:

> SRHD also became aware that litigation was ongoing between Hannas and Margitan to determine the existence and location of other easements on Hanna's property.

This statement is incorrect and again misleads the court.

Hanna's also lie to the court at page 9 of Hannas Amended Brief stating they entered the Agreement with the District "to avoid moving the drain field twice since the **placement of easements on the Hannas'**

property is uncertain." (emphasis added) CP 131, 135; AR 153, 229, 230

The **location of easements** on Hanna property was never in question. The location of each easement was known to all. The District was provided with the location of all easements on the "Preliminary Short Plat 1227-00" map. AR 97 Rather, in the litigation mentioned, Hanna's complaint attempted to **void** deeded easements.

2) March 27, 2015, Michelle Fossum signed the District's brief. On page 9 of the brief, the District states:

> Hanna was directed by the Health Officer to provide additional information as to the precise location of the water line. CP 22-23.

This statement misleads the Court. The District is not disclosing here the following information which was also withheld by the District under a previous public disclosure request. In e-mails between the District and Hanna dated July 15, 2014, Hanna informed Michelle Fossum that Hanna was unable to comply with the District's January 27, 2014 letter. Hanna stated to the District:

> Just for purposes of the appeal. We actually don't know. We are having trouble finding someone who can accurately locate the plastic pipe without mistakenly rupturing the water line. Everyone we contact are afraid. It would be easier if the pipe were metal. And there are no records from the excavator exactly where the pipe was laid. We're going to have to move the drain field anyway and so whether it's within ten feet or not it won't be after the litigation is over. (Exhibit A)

3) Washington State Department of Health delegates its authority to the District to enforce the "Pipeline Separation Design and Installation Reference Guide" which regulates pipeline utilities in its region. http://www.ecy.wa.gov/programs/wq/reclaim/advisorycommittee/Pipeline%20Separation%20Guidance.pdf (Exhibit B)

a) Page 1 of the guide confirms Margitan is adversely affected by the District's order:

> Pipeline separation is a necessity for protection of public health and safety, property and the quality of the pipeline contents. Pipeline failure or leaks can result in pipeline contamination that increases risks public health and safety. Pipelines do not have to rupture completely or collapse to cause concern. Even the process of excavating one pipeline to repair a leak creates the risk of complete failure of adjacent pipelines.

b) See "Separation-the Final Protection" page 2.

c) Page 18 states that reduced separation options are only available where **standard separation is not available.** (emphases added)

> The agencies have developed a revised approach to the review and approval process for pipeline separations and provided this guidance to allow designers discretion and more flexibility under many conditions where standard **10-foot separation distances are not available**. (emphases added)

The District's approval of Short Plat 1227-00 **without variances** confirms that standard separation was available when the Plat was developed.

4) At page 19, (District's Brief) the District quotes WAC 246-272A-0430 claiming it has great latitude in resolving the Hannas illegal septic system. The District has failed to comply with this WAC in both its January 27, 2014 letter issued by Joel McCullough, MD, MPH, MS, Public Health Director and Health Officer, and in the October 2013 District/Hanna Agreement. In both, the District fails to provide a specific date by which to comply. WAC 246-272A-0430(4)(e) Michelle Fossum informed the Board, ARP 37, that Hanna's must move the septic system by the end of litigation in Superior Court. But here, to this Court, at page 19 of her Response Brief, she states:

> SRHD has required that the drain field be moved once the courts have decided whether there are other easements and if so, where those easements are located.

The time of compliance is continually changing. The District now refers to the "court" to encompass the Court of Appeals and the Supreme Court?

It should be noted that Michelle Fossum testified, while under oath in the Administrative Hearing, that the District did not intend the Hanna/District agreement to extend past April of 2014. ARP 3

Hanna joins the District in this charade. At the Administrative Hearing, Mr. Perdue testified, while under oath, that the septic system would be moved at the end of the Superior Court Litigation. ARP 38 Mr.

Perdue again filed documents with the Spokane County Superior Court stating that the septic system would be moved at the end of the Superior Court Litigation. CP131, CP 135, CP136

Hanna's state in their Amended Brief on March 24, 2015 at page 8:

> The Hannas have, by contract, agreed with the SRHD to bring the septic drain field into compliance at the conclusion of litigation in Spokane County Superior Court about the legal location of other easements on the Hannas' property.

At the time this was written, Stan Perdue had knowledge that the Superior Court litigation had ended on January 16, 2015. He represented Hannas in the Superior Court action yet Hannas have taken no steps to bring their septic system into compliance by the time of Margitan's response, July 2015.

In its Agreement, the Health Officer required the Hanna's to remove their septic system from the easement. There were no penalty provisions in the event Hannas did not perform this task. The District fails to provide notice of the consequences of failure to comply pursuant to WAC 246-272A-0430(4)(f).

This WAC also requires the enforcement order to be personally served "in the manner of service of a summons in a civil action or in a manner showing proof of receipt." WAC 246-272A-0430(5) No summons or proof of service has been disclosed to Margitan by the

District. To Margitan's detriment, there is no valid enforceable order to date.

5) The District states on page 20 of its brief:

> WAC 246-272A-210 requires a horizontal separation of ten feet between a drain field and a pressurized water line unless there is additional mitigation.

This quote of the WAC is a lie and misleads the court. The WAC does not permit reduction of the ten foot requirement between a drain field and a pressurized water line. As WAC 246-272A-210(6) states:

> The local health officer may approve a sewer transport line within ten feet of a water supply line (emphasis added) if the sewer line is constructed in accordance with section C1-9 of the department of ecology's 'Criteria For Sewage Works Design,' December 1998.

This WAC only allows the reduction of the ten foot horizontal separation between the "sewer transport line" and the pressurized water line not the drain field and the pressurized water line. Hanna's admitted their drain field is within ten feet of Margitan's pressurized water line. CP 135 Hanna's retract this admission after counsel for the District pressures Hanna's to retract. Exhibit C – newly discovered, withheld evidence.

There is no evidence that Hanna's ever applied for a variance at the time of construction. There is no evidence that additional mitigation occurred. The District has not followed its own rules and thereby places Margitan at great risk.

6) At page 22 of the District's brief and page 8 and 9 of Hanna's brief RCW 19.27.097(1) is cited. Both claim Margitan had the obligation to show the County there was adequate supply of potable water at the time of obtaining a Building Permit. The District and Hanna's once more mislead the Court. The District's signature on the final Plat map of 1227-00 confirms that all parcels of the Plat had adequate potable water at the time of development. The fact that the District permitted Hanna's to install a septic system within the same utility easement as Margitan's water line did not become known to Margitan until after the Remodel Permit for the more than seventy-five year old home was issued by the County.

Their argument is also dishonest. The Inspection Result is a public document. The District knows that Spokane County Building and Planning stated:

> A Certificate of Occupancy can be issued upon receipt of documentation (SRHD and/or water puveyor) accepting the waterline and it's adequacy for residential use.
>
> Exhibit D

To this date, the District will not provide the requested documentation to Margitan or Spokane Building and Planning, Exhibit E, yet argues in its brief that Margitan has the burden of testing his water, checking for proper pressure, smell, and color. Margitan is unable to obtain a "Certificate of Occupancy" because of the District.

7) Hanna's go a step further. In their brief they claim that a favorable decision in this court will not eliminate the Agreement/contract entered between Hanna's and the District. Hanna's claim that the Court of Appeals cannot cause the Agreement to end and the District to enforce the law and decommission Hanna's septic system. The Hanna's claim that:

> so long as litigation continues regarding the placement of easements in the Short Plat the Hannas are not required to move the septic drain field.

Respondents' Brief page 9; Respondents' Amended Brief page 11

8) Hanna's argue that they "are only involved in this litigation because they were forced to participate by Mr. Margitan". Therefore, Hanna's should be granted attorney fees. Respondents Hannas' Response to Appellant's Response to Amended Brief, April 13, 2015, page 3. Actually, recently discovered evidence revealed that on January 31, 2014 Hanna's counsel requested a cross appeal of the Public Health Director's decision that Hanna's be required to establish the location of Margitan's water line. Exhibit F Another incident of intentionally misleading the Court.

III. ARGUMENT

1) ATTORNEYS AS WITNESSES

The District placed Michelle Fossum and Stan Purdue under oath. Margitan did not request the attorneys be placed under oath. They did this

willingly and proceeded to testify for their clients. These parties put on no witnesses.

American States Ins. Co. ex rel. Kommavongsa v. Nammathao, 153 Wash, App 461, 466, 220 P.3d 1283 (2009), citing Public Utility Dist. No. 1 of Klickitat County v. Int'l Ins. Co., 124 Wash. 2nd 789,812, 881, P.3s 1020 (1994) cited by the District in its response brief does not support the claim that Michelle Fossum and Stan Purdue may continue representing their clients. In the cited case, the opposing party requested that counsel be removed because the opposing party felt that the attorney would be required to be a witness.

Margitan never requested the attorneys become witnesses. Margitan never states that these attorneys would be required to testify.

The District also citied *Cottonwood Estates, Inc. v. Paradise Builders, Inc., 128 Ariz. 99, 624 P.2d 296 (1981).* The case supports Margitan:

> The attorney who testifies diminishes his effectiveness as advocate as well as his effectiveness as a witness. Universal Athletic Sales Co. v. American Gym, Recreational & Athletic Equipment Corp., 546 F.2d 530 (3d Cir.1976),cert. denied sub nom., Super Athletics Corp. v. Universal Athletic Sales Co., 430 U.S. 984, 97 S.Ct. 1681, 52 L.Ed.2d 378 (1977); Lau Ah Yew v. Dulles, supra. Like any witness, the attorney is subject to cross-examination on any relevant matter, Ariz.R.Evid. 611, including the professional and financial interest in the outcome of the litigation, Universal Athletic Sales Co. v. American Gym, Recreational & Athletic Equipment Corp., supra, and impeachment by the usual methods of demonstrating bias or

prejudice. Gonzales v. City of Tucson, 124 Ariz. 450, 604 P.2d 1161 (App. 1979); Ariz.R.Evid. 607.

When an attorney persists in acting both as witness and advocate, ordinary procedural safeguards designed to give the parties a full and fair hearing become problematic. For example, the familiar mechanics of question-and-answer interrogation become impossible. The rule excluding witnesses from the courtroom may be invoked, yet the advocate-witness obviously must be allowed to remain. The advocate who testifies places himself in the position of being able to argue his own credibility. This special witness can take the stand, objectively state the facts from personal knowledge, then press home those facts by argument to the jury. Our belief is that an adversary system works best when the roles of the judge, of the attorneys, and of the witnesses are clearly defined. Any mixing of those roles inevitably diminishes the effectiveness of the entire system. Inglett & Co. v. Everglades Fertilizer Co., 255 F.2d 342 (5th Cir.1958). The practice not only raises the appearance of impropriety, Alexander v. Watson, 128 F.2d 627 (4th Cir.1942); Erwin M. Jennings Co. v. DiGenova, supra, but also disrupts the normal balance of judicial machinery. Ethical Consideration 5-9. Occasionally a lawyer is called upon to decide in a particular case whether he will be a witness or an advocate. If a lawyer is both counsel and witness, he becomes more easily impeachable for interest and thus may be a less effective witness. Conversely, the opposing counsel may be handicapped in challenging the credibility of the lawyer when the lawyer also appears as an advocate in the case. An advocate who becomes a witness is in the unseemly and ineffective position of arguing his own credibility. The roles of an advocate and of a witness are inconsistent; the function of an advocate is to advance or argue the cause of another, while that of a witness is to state facts objectively. Ethical Consideration 5-10. Problems incident to the lawyer-witness relationship arise at different stages; they relate either to whether a lawyer should accept employment or should withdraw from employment.

The District misleads the court when it states:

> Third, Margitan has not identified any portion of the administrative record in which counsel testified as witness during the administrative hearing.

Page 13 Districts' Brief

The District itself quotes the Court stating:

> Rather counsel for the respondents elicited testimony from witnesses and answered questions presented to them by the Board.

Response brief page 11; CP 125

What is "answering questions" posed by Board members if not testimony by sworn witnesses?

Michelle Fossum and Stan Purdue are licensed to practice law in the State of Washington. They know the ramifications of being sworn-in at a hearing.

Margitan served the District and at the request of the District, Michelle Fossum. The District requested Michelle Fossum be sworn-in thereby making her the witness for the District at the administrative hearing. The District failed to reply and it should have been defaulted. Margitan's proposed order to the Superior Court should have been entered. CP 36, 37, 38

2) DISTRICT EXCEEDED STATUTORY AUTHORITY

The District has cited no law granting it authorization to request Hannas locate Margitans water line. The District exceeded its statutory authority when it took the use of Margitan's 40 foot easement. The District has provided no authority that it has the legal right to take away

the use of Margitans home. Finally, the District exceeded its statutory authority entering into a contract where there was no consideration exchanged.

ATTORNEY FEES

a) Both the District and Hannas request attorney fees. This is a new issue and not previously requested at the Administrative and Superior Court level. Both the District and Hannas are limited by RCW 34.05.554 Limitation on new issues. Attorney fees should not be awarded when the parties fail to argue for them previously.

b) The District has stepped outside the bounds of its legislated authority. The District has admitted that it has placed Margitan and his guests at risk. CP 30 It should not be entitled to attorney fees and cost. Also, the District requested attorney fees under RCW 4.84.370. This applies in only Land Use Decisions. This is not a land use decision by definition. The District also cites RAP 14.2 and RAP 18.1 in its support of its request for fees. The District is a "nominal party" by definition in this section. It is a party who is named but has no real interest in the controversy. The District is supposed to be doing its job rather than being used as a tool of Hannas to inflict harm on Margitan. The District is not entitled to attorney fees and costs.

c) Hannas claim they are entitled to receive fees and costs under RCW 4.84.340. Hannas have failed to provide any evidence that they are "qualified parties" under the provisions of this statute. Margitan has provided documentation that proves Hannas are not qualified parties. Hannas have not disputed these public documents. Hannas have not provided a "Net Worth Statement" to prove they are qualified parties. Hannas misled the District at the time of their application for a Septic System. AR 219, 220. Hannas should not be rewarded for lying to a State agency, the District. Margitan previously requested that Hannas provide all parties and the Court with a Net Worth Statement, with all supporting documentation. Since Hannas have failed to provide their Net Worth Statement, Hannas have forfeited their request for attorney fees and costs.

RCW 4.84.340 also provides that attorney fees will be paid by the agency not by an aggrieved party such as Margitan.

3) STANDING

The case confirming Margitan has standing to protect his drinking water line and requires the District to remove Hanna's illegal system from Margitan's easement is *City of Burlington v. Washington State Liquor Control Board HK LLC,* NO.72437-0-1 DIVISION ONE, May 26, 2015.

Here, the state Liquor Control Board (agency) attempted to thwart the City of Burlington's objection to the agency's granting of a liquor permit to a particular business. The agency argued that the City did not have standing to have the Court review the Board's actions.

The court quoted Anderson, 64 Wash. L.Rev. stating: (at page19)

> We note that Professor Andersen emphasized the vital function performed by judicial review of agency action:
> [T]o keep administrative agencies within the bounds set for them by legislative and constitutional command. During judicial review courts support the legislative process by insisting that legislatively prescribed boundaries of agency action are respected. Courts also may be enforcing any constitutional limits the people thought wise to impose on agencies or legislatures. Agencies benefit from judicial review. Courts can support vigorous agency action with statutory clarification. Courts sometimes can insulate agencies from wrongful pressure from other public or private actors. In a broader sense, judicial review confers legitimacy on the administrative process, in essence, certifying that the agency action is legislatively authorized, and hence is democratically accountable.17
> Andersen, 64 Wash. L.Rev. at 820.

The court further noted: (at page19)

> The question of the Board's alleged illegal action would also evade judicial review to the detriment of the City's interest in the safety of its residents.

The court states: (at page13)

> The injury in fact test is not meant to be a demanding requirement.14 Typically, if a litigant can show that a potential injury is real, that injury is sufficient for standing:
>> It might be thought that the first condition is merely a de minimis rule: if substantial harm is not threatened, no important social purpose is served by review. But a

> judicial appraisal of the extent of harm is not contemplated. The requirement of harm is best thought of as one rational way to delimit the class of persons who can seek review. It is rational because it provides review for those close enough to the agency action to feel its impact in a tangible way and excludes those who are further removed. Thus, a person should be able to meet this condition if he or she can show that the potential injury is real, not that it is substantial. As the United States Supreme Court stated, an "identifiable trifle" should be sufficient.
>
> Andersen, 64 Wash. L.Rev.. at 824 (quoting United States v. Students Challenging Regulatory Agency Procedures, 412 U.S. 669, 689 n. 14, 93 S.Ct. 2405, 37 L.Ed.2d 254 (1973)).15

The court also states:

> We do not examine the extent of the alleged harm. A party seeking standing need only demonstrate that the threatened injury is likely to occur, not that it is substantial.

Margitan has shown actual, substantial harm. Through the District's illegal contract and unwillingness to enforce the law, it has stopped Margitan from using his residence. This is not a threatened injury.

When discussing the injury-in-fact test the court states:

> It is rational because it provides review for those close enough to the agency action to feel its impact in a tangible way and excludes those who are further removed.
>
> [C]ourts are most likely to examine narrowly drawn challenges to the legality of agency action at the instance of parties who have suffered injury in a setting which bespeaks injustice.

Margitan has been impacted in a tangible way through the District's failure to perform its job and thereby preventing Margitan from using his home for years.

4) NEW EVIDENCE

The City of Burlington, (supra) decision further addresses the Superior Court's refusal to allow Margitan to submit the County inspection report at the time the Court entertained Hannas Cross Appellant Motion to Dismiss alleging Margitan lacked standing. City of Burlington states: (at page10)

> A party seeking review of an agency action may submit additional evidence to demonstrate standing particularly where, as here, no hearing occurred at the administrative level. See Trades Council, 129 Wn.2d 798–99. Typically, judicial review of an agency action is limited to the administrative record. Because the City was not required to demonstrate standing for judicial review at the administrative level, and because the Board denied the City an adjudicative hearing, the administrative record is limited on evidence of standing. We conclude that the trial court should have considered the City's supplemental declarations, because the evidence went only to the question of standing for judicial review and not the merits. Nw. Envt'l Def. Ctr. v. Bonneville Power Admin ., 117 F.3d 1520, 1528 (9th Cir.1997) ("Because Article Ill's standing requirement does not apply to agency proceedings, petitioners had no reason to include facts sufficient to establish standing as a part of the administrative record. We therefore consider the affidavits not in order to supplement the administrative record on the merits, but rather to determine whether petitioners can satisfy a prerequisite to this court's jurisdiction.").

This is on point. Standing was not addressed or argued at the administrative hearing. The court should have allowed Margitan to

Report thereby obtaining the corroborating evidence the Court knew would be required.

Margitan has standing to cause Spokane Regional Health District to immediately enforce the law and decommission Hanna's Septic System. There is specific harm to Margitan.

IV. CONCLUSION

For purposes of standing, Margitan's **injuries**-in-fact include:

1) The taking of Margitan's 40 foot easement;
2) Requiring Margitan to drive over Hanna's septic system in order to reach the Margitan home;
3) Prohibiting Margitan from occupying and using my home;
4) The District's requirement of testing the water at my home, monitoring it for pressure change, color and smell.

Margitan requests this Court order the immediate decommission of the Hanna Septic System.

July 8, 2015

Allan Margitan

EXHIBIT A

Michelle Fossum

From: Michelle Fossum
Sent: Tuesday, July 15, 2014 9:19 AM
To: Stanley Perdue
Subject: RE: From Allan Margitan

FYI – Just got off the phone with Allan. Based on the concession in your brief, he intends to take action to force the issue. You may not be able to back up the train on this one. I haven't researched it recently, but I know there can be ramifications from an admission in a party's brief. I'm not sure yet what position SRHD will take.

Michelle K. Fossum

Michelle K. Fossum, P.S.
201 W. North River Drive, Suite 460
Spokane, WA 99201
(509) 324-9500
(509) 324-9505 fax
mfossum@fossumlegal.com

Please note that my email address has changed to mfossum@fossumlegal.com.

From: Stanley Perdue [mailto:perduelaw@me.com]
Sent: Tuesday, July 15, 2014 8:57 AM
To: Michelle Fossum
Subject: Re: From Allan Margitan

Okay, I understand. I will amend my brief.

Thanks.

Stanley

On Jul 15, 2014, at 9:55 AM, Michelle Fossum <mfossum@fossumlegal.com> wrote:

It isn't clear from your brief that it is a limited concession. Part of the basis of the ruling was that it was unclear whether the water line was within ten feet or not. Your client was ordered to find the location of the water line as part of the Health Officer's decision on the appeal. We have yet to have any communication from you on that point, unless something has been provided directly to SRHD that I am not aware of. Now, it appears that your client has agreed that there is a violation of the horizontal separation. If that is true, SRHD must consider what to do about that violation.

Michelle K. Fossum

Michelle K. Fossum, P.S.
201 W. North River Drive, Suite 460
Spokane, WA 99201

(509) 324-9500
(509) 324-9505 fax
mfossum@fossumlegal.com

Please note that my email address has changed to mfossum@fossumlegal.com.

From: Stanley Perdue [mailto:perduelaw@me.com]
Sent: Tuesday, July 15, 2014 8:47 AM
To: Michelle Fossum
Subject: Re: From Allan Margitan

Just for purposes of the appeal. We actually don't know. We are having trouble finding someone who can accurately locate the plastic pipe without mistakenly rupturing the water line. Everyone we contacted are afraid. It would be easier if the pipe were metal. And there are no records from the excavator exactly where the pipe was laid. We're going to have to move the drain field anyway and so whether it's within ten feet or not it won't be after the litigation is over.

Did you have a particular point to make??

Stanley

On Jul 15, 2014, at 9:40 AM, Michelle Fossum <mfossum@fossumlegal.com> wrote:

Stan,

Is your client conceding that Hanna's drainfield is within 10 feet of the pressurized water line?

Regards,

Michelle K. Fossum

Michelle K. Fossum, P.S.
201 W. North River Drive, Suite 460
Spokane, WA 99201
(509) 324-9500
(509) 324-9505 fax
mfossum@fossumlegal.com

Please note that my email address has changed to mfossum@fossumlegal.com.

From: MARGINEL@aol.com [mailto:MARGINEL@aol.com]
Sent: Tuesday, July 15, 2014 7:13 AM
To: Michelle Fossum; Gina Christensen
Subject: From Allan Margitan

Please see attached and please acknowledge receipt of the document.
Thanks

EXHIBIT B

Pipeline Separation Design and Installation Reference Guide

Version 9

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Department of Heal

May 2006
Publication Number 06-10-029

Printed on Recycled Paper

Pipeline Separation Design & Installation Reference Guide

Version 9

Prepared by:
Washington State Water Reuse Workgroup
Washington State Department of Ecology
Water Quality Program
Washington State Department of Health
Office of Environmental Health and Safety

With Acknowledgment to Primary Authors:
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For more information contact:

Department of Ecology
Water Quality Program
Program Development Services Section
P.O. Box 47600
Olympia, WA 98504-7600

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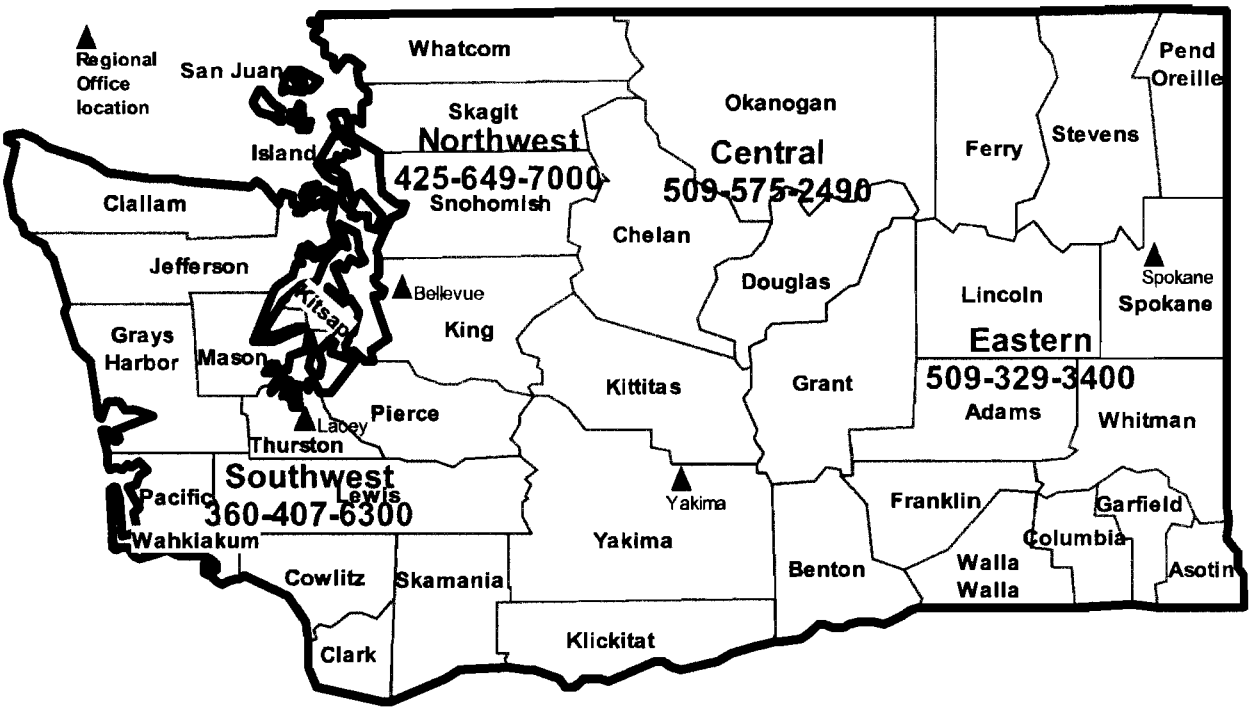

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Persons with a speech disability can call 877-833-6341.

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Executive Summary

Introduction

As water reclamation and recycling assumes a larger and more important role in the management of water resources, challenges in designing and locating piping systems for the distribution of reclaimed water are daunting. Existing standards require horizontal and vertical separations between potable water, reclaimed water, storm water and sanitary sewage that are rarely available in developed urban areas. While special construction practices are allowed to overcome these obstacles, regulatory approval is required on a case-by-case basis. This process is cumbersome, and increases design and construction costs, as well as the completion schedules. The Washington State Department of Ecology and the Department of Health developed this guidance in response to the need for a streamlined process and to assist utility engineers with pipeline separation design and installation.

Pipeline separation is a necessity for protection of public health and safety, property and the quality of the pipeline contents. Pipeline failure or leaks can result in pipeline contamination that increases risks public health and safety. Pipelines do not have to rupture completely or collapse to cause concern. Even the process of excavating one pipeline to repair a leak creates the risk of complete failure of adjacent pipelines.

Separation Standards

The current pipeline separation standards are based on accumulated field and design experience, and the *Ten State Standards.*[1] These standards generally require a minimum horizontal separation of 10 feet between parallel pipes, and 18 inches of vertical separation. Many states have adopted these standards as guidance or regulation.

In 1968, engineers at Utah State University investigated the effects of trench excavation on separation distances from a buried parallel pipe. Their work resulted in a relationship between the distance from the trench face to the parallel pipe [sidewall thickness, X] necessary to prevent trench wall failure, the *critical* trench depth [Z], which depends on soil strength characteristics; the depth of bury [H] of the parallel pipe; and size of the parallel pipe [D]:

$$\frac{X}{D} = 3 \cdot \frac{H}{Z}$$

An analysis using this relationship shows that, in some instances, distances less than the standard horizontal separation distance can be justified. However, this distance is highly dependent on site and soil conditions. In almost all conditions, a minimum sidewall coverage depth of 2 to 3 feet is necessary to allow sufficient room for maintenance and repair efforts in the trench, the minimum pipe-to-pipe separation should be 3½ to 4 feet.

[1] Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers – Recommended Standards of Water Works, Criteria for Water Works, Section 8.6.

Separation-the Final Protection

Pipeline separation provides the final barrier of protection in the multi-barrier approach to pipeline protection. Other barriers include: 1) the selection of the pipe material, 2) pipe jointing method, 3) pipe bedding procedures and 4) thrust restraint or blocking. Barriers are intended to reduce risks to public health and safety; protect property; prevent contamination of the pipeline contents; protect pipeline customers and prevent collateral damage to other adjacent facilities. Pipeline separation is the final and most important barrier because it remains in place when the other barriers fail.

Special Construction Design

Most urbanized areas do not have the space available for standard separation distances. However, special construction methods can be used to assure equivalent levels of protection. Special construction methods are necessary whenever the minimum horizontal and vertical separations cannot be maintained. There are many common methods in use today. In selecting the special construction method and design, the design engineer needs to consider design factors such as external forces, impacts of ground water, and soils-strength characteristics.

Conclusions

To streamline the design and approval process, the agencies have identified three design conditions.

- Condition A exists when adequate separation distance is available and requires no unusual design considerations.
- Condition B exists when available horizontal separation is between 4 and 10 feet, and/or available vertical separation is between 6 and 18 inches. For Condition B, special construction methods developed, presented, and approved during the engineering phase of the project and included in the construction drawings through standard details are acceptable.
- When Condition C exists, available separation is less than 4 feet horizontally and/or 6 inches vertically. Under Condition C, the agencies must approve special construction on a case-by-case basis.

Introduction

Need for this Guidance

The installation of reclaimed water transmission and distribution piping is a major portion of any water reclamation project. The cost of piping and the challenges in fitting additional buried utilities into crowded utility corridors is often a deciding factor in assessing the project feasibility. Compliance with commonly used standards for horizontal and vertical pipe separation is proving difficult for nearly every project. Currently, the Department of Health and the Department of Ecology (the agencies) have allowed variations from these standards on a case-by-case approval basis. This approach is cumbersome and time consuming for the utility and the regulatory agencies. The agencies recognized the need for a more streamlined, responsive approach.

The agencies developed this guidance to streamline the approach to pipeline separation. These guidelines:

- Provide background information regarding the basis for pipeline separation standards;
- Describe the present standards developed from experience and soils mechanics;
- Describe modes of pipeline failure, the results of pipe failure, and factors that should be considered in the design of special conditions, and
- Provide general design guidance regarding approaches that can be approved by the regulatory agencies and can be applied without case-by-case, individual location approvals.

Background

Underground utility pipes provide the core services necessary to urban life. Drinking water transmission and distribution, wastewater collection and stormwater drainage systems now share underground corridors with natural gas, telecommunications, television and electrical power. In many water-limited areas, piped irrigation water lines are common, with reclaimed water being added to the collection of buried utilities. In order to allow access for maintenance and repair, utilities must compete for precious space in increasingly congested public right-of-ways.

The design of underground utilities commonly focuses on the selection of the pipe size to assure manageable pipeline velocities and internal pressure ratings. Other design concerns include:

- Pipe materials to address service life and product quality
- Pipe wall thickness to address internal and external pressures and forces
- Corrosion control needs and methods
- Valves for isolation and drainage
- Pipe jointing methods and
- Thrust restraint and control

During the design phase, engineers may not focus on the impact of existing, adjacent pipelines. This is because a construction project focuses on isolating, protecting, and addressing these conditions on a large scale. The original design should also address the needs during maintenance and repairs. Unfortunately, many pipeline failures occur because of the lack of attention to affects on and from existing pipelines.

The Need for Pipeline Separation

Importance of adequate separation

Many people do not easily understand or recognize the role of pipeline separation in protecting public health and the environment. However, pipeline contamination can expose pipeline customers to pollutants. Contamination results from cross-connections, leaks, or complete pipe failure of adjacent underground pipes. Pipeline designers can increase pipeline reliability through the proper selection of pipe materials, wall thickness, pipe joint systems, thrust restraint systems, pipe bedding, and internal and external corrosion control. But ultimately, pipelines corrode, leak, and fail. Adequate separation between pipelines provides the final barrier of protection. This minimizes incidental damage during the repair of other pipelines and leakage effects between pipes. Adequate separation also assures sufficient room to repair leaks and replace broken sections. Finally, separation reduces the potential for pipeline failure caused by a leak or failure of its neighboring pipeline.

Figure 1: Pavement damage due to pipe leak

Leakage Damage

The benefits provided by assuring pipeline integrity are neither readily recognized nor easily quantified, until a problem arises. Underground pipelines are out of sight, and out of mind. Commonly, we are aware of problems with these buried pipes only when a water line break shuts water off at home, or a sewer backs up into the basement. But these two instances represent inconveniences compared to more common results from pipeline leaks. The following photos show graphic damage created by leaking municipal utilities. Figure 1 shows pavement damage due to a leaking sewer and the consequences of a water main break in a residential area. Figures 2 and 3 show extensive damage caused to neighborhood streets by the collapse of a water or sewer line.

Public Health and Safety Protection

In extreme cases, attempts to repair damage to pipelines and the leaks from the pipeline can result in the death of utility workers. Between 1992 and 2001, 542 fatalities occurred in the United States that were attributed to trench and excavation cave-ins.[2] However, fatalities are not limited to utility workers alone. A leaking water main in North Carolina was implicated in a mudslide. The mudslide, in turn, caused the road to collapse into a house, killing a resident.

Figure 2: Water line break repair

The risk to public safety is obvious. The extent of property damage and injury can range from slight to catastrophic.

All piped utilities suffer damage, aging and wear. These problems can allow leakage or infiltration of ground water into the pipe. This reduces the quality of the pipeline contents and results in additional costs for delivery, maintenance, or disposal of the pipe contents.

Figure 3: Sewer break

Leaks in potable water lines can pose a significant health risk. In addition, they can cause a loss of revenue from a water system that has an investment in the withdrawal, treatment, and distribution.

[2] Centers for Disease Control, *Occupational Fatalities During Trenching and Excavation Work --- United States, 1992—2001*, April 23, 2004

Potable distribution and reclaimed water pipelines that operate under pressure and are subject to customer demands, fluctuating reservoir levels, and pump operation cycles. Hydraulic transients result from pump starts and stops, power failures, main breaks system operation, or sudden demand changes. This can result in both pressure surges and negative pressure conditions in the pipe.[3] Leaks may push water out of the pipeline, as well as pull water, soil, and naturally-occurring microbes back into the pipelines. This can result in contamination of the pipeline contents from micro-organisms and chemicals present in the soils surrounding the pipeline. These micro-organisms inoculate the pipe and support microbiologic regrowth. Pathogenic microorganisms are often more prolific in microbiologic regrowth materials.

Product Contamination

Pipe leaks or breaks can cause contaminants to spread into the environment or from pipe to pipe. Either condition requires pipe repair to maintain product quality. During the excavation and repair of one pipe, adjacent pipes remain in service and vulnerable to failure. Pipes exposed or damaged during an excavation repair of an adjacent pipe (Figure 4) often represent the largest source of leaks. Pipelines undergoing repair provide the best opportunity for contaminants to enter large openings created during the repair process.

Figure 4: Pipeline exposure during repair

Contamination of the contents of underground pipelines occurs when the contents of one pipe leaks out and into the soil, and then is drawn into an adjacent underground pipe. Even small leaks present a contaminant source. Materials outside the pipe can be drawn into the pipe during pressure surges and vacuum conditions created by hydraulic transients.

Pipe-to-pipe contamination includes: 1) raw sewage leaking into water mains, 2) chemical leakage into reclaimed water mains, 3) raw ground water leaks entering potable pipelines, or 4) contaminated soil being drawn into drinking water systems. Raw sewage, petroleum, or chemical products can leak into the environment causing environmental degradation. In the case of natural gas pipelines, leaks can cause explosions.

[3] Gullick, LeChevallier, Svindland, & Friedman, *Occurrence of Transient Low and Negative Pressures in Distribution Systems*, Journal AWWA, 96:11; November 2004

Collateral Damage

All underground utilities are at risk of a leak or pipe failure. The leak or failure can severely damage adjacent utilities. The collapse of a sewer can cause damage to adjacent utilities, as depicted in Figure 5. This figure shows a worker standing on a water main as the excavation is being dewatered from another portion of the hole. Figure 6 shows damage to electrical, gas, and telephone utilities.

Figure 5: Waterline exposed by sewer collapse

Maintenance & Repair

All underground pipelines eventually require maintenance and repair. In an effort to maximize their water resources, public water systems increasingly require leak detection and correction. Maintenance to repair small leaks, broken valves, or leaking valve stems requires excavation to access the pipe or valves.

Figure 6: Collateral utility damage due to sewer collapse

The process of locating and exposing underground utilities for repair places other buried utilities in jeopardy of creating more leakage from movement of unsupported, exposed joints, or directly from excavation equipment. Primary components of any maintenance program include 1) ease of access for maintenance and 2) repair and protection of workers and adjacent utilities. Proper design decisions ease future maintenance just as poor design decisions complicate repair or replacement.

Pipeline Separation Challenges

The protective barrier provided by adequate separation creates additional design and economic challenges. With increasing needs, utilities must maximize utility corridors in public right-of-ways. Either utilities must widen utility corridors at great expense for additional land, if available, or remove and relocate an existing utility.

Alternatively engineers can devise strategies that will provide an equivalent level of protection as that afforded by adequate spacing. This alternative process requires more time; and stretches completion schedules. However, the benefits include reliability and protection for public health and safety, with potential savings in construction materials and effort.

Pipe Separation Standards

Elements of Adequate Separation

Excavations are made to install or repair underground pipes. To do so, provide sufficient room between the trench wall and the pipe on both sides to conduct the work. The agencies recommend a 12- to 18-inch minimum distance.

The design adage holds very true for underground pipelines:

All of the really important mistakes are made the first day (during design).

The design must focus on maintenance and repair, not just the installation of a new pipeline.

Current Standard

The current pipeline separation standards address conditions where potable and non-potable pipelines run parallel to each other, and where these pipelines cross vertically. The best-known standards are those published in well-known and used utility design guidelines and standards. However, parallel separation requirements follow the principles of soil mechanics. The approach based on soil mechanics provides a basis for reduction of horizontal separations under some conditions, and reinforces the need for significant separations in others.

Published Separation Criteria

The current standards are based on standard practices developed decades ago and published as the *Ten State Standards.*[4] These standards have been widely adopted and can now be found in other industry standards and state regulations such as:

- American Water Works Association - Manual M24- Dual Distribution Systems and California –Nevada Section AWWA – Guidelines for Distribution of Nonpotable Water
- Washington State Department of Ecology – Criteria for Sewage Works Design
- Washington State Department of Health – Water System Design Manual

The current standards require a minimum horizontal separation of 10 feet between separate trenches, and vertical separations of at least 18 inches. Pipe crossings require a minimum vertical separation of 18 inches with the section of the top pipe centered over the bottom. When these separations cannot be provided, special construction methods must be provided.

[4] Ibid 1

Horizontal Separation

The minimum horizontal separation required between potable and reclaimed water pipelines that run parallel to other nonpotable pipelines is 10 feet of clear, pipe-to-pipe separation. Figure 7 provides a cross-section of a typical urban street with drinking water pipelines, reclaimed water distribution pipes and sanitary sewers. Figure 8 illustrates a typical cross-section after a reclaimed water retrofit.

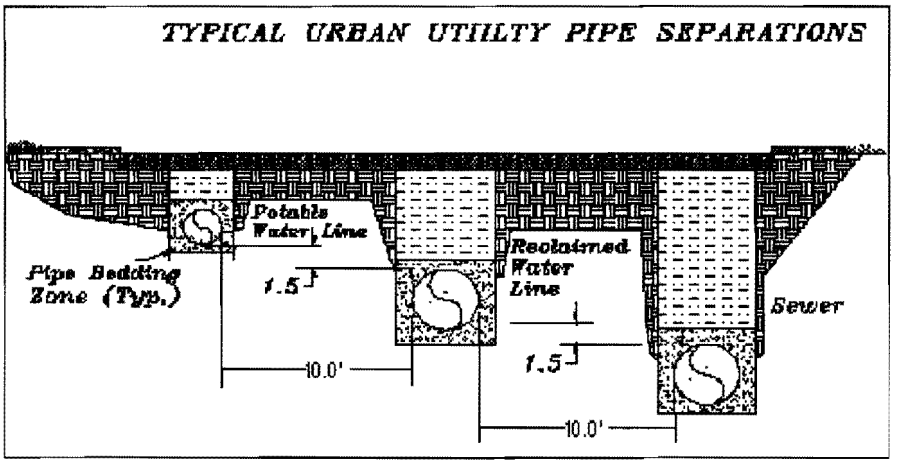


Figure 7: Standard horizontal pipe separation detail

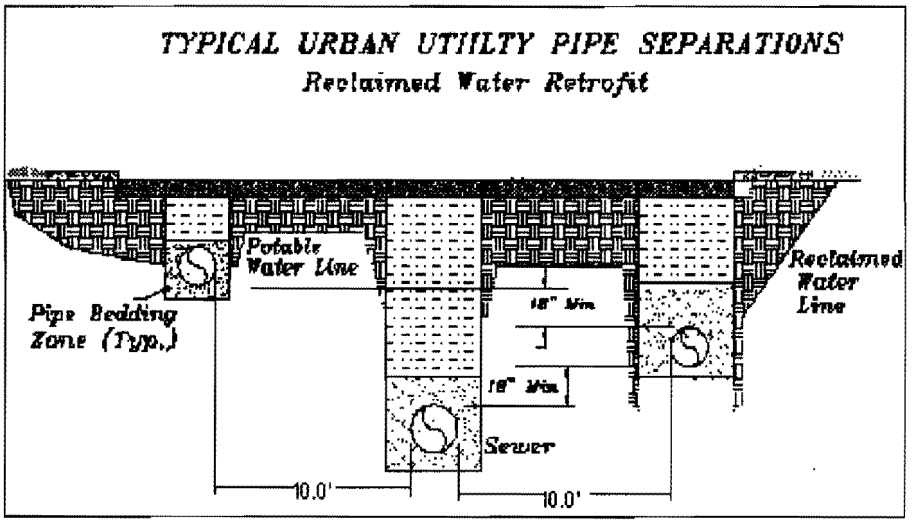


Figure 8: Standard horizontal pipe separation new construction detail of reclaimed water in developed utility corridor

Vertical Separation

The minimum vertical separation between potable and nonpotable pipelines at crossings is 18 inches (Figure 9). Potable water lines should cross above the nonpotable lines. When the nonpotable line must cross above the potable pipeline, the engineer should encase one or both of the pipelines encased with a pressure rated casing pipe extending at least 10 feet on either side of the crossing.

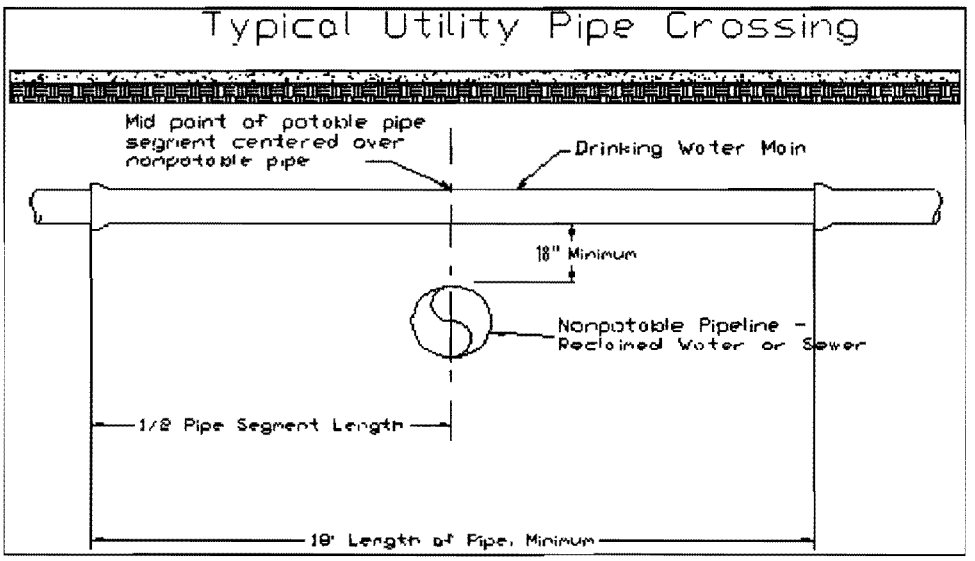


Figure 9: Standard pipe crossing new construction detail - vertical separation

Current States' Standards

While many states have adopted the *Ten State Standards* as regulation, several other states have adopted different pipeline separation standards. Some regulations address only water and sewer separations, while others address water, reclaimed water, and sanitary sewer separations jointly or separately. Unfortunately, the standards do not provide a great deal of consistency regarding horizontal and vertical separations, other than the requirements to provide a minimum separation. Table 1 provides a summary of pipeline separation standards for several states.

Table 1: Utility separation regulations and standards from various states

State	Drinking Water-Sanitary Sewer	Drinking Water – Reclaimed Water	Reclaimed Water – Sanitary Sewer	Source of Standard	Notes
Utah	10 ft horizontal	10 ft horizontal	10 ft horizontal or 3 ft horizontal	Utah Administrative Code	If reclaimed water is below or above sewer
Massachusetts	10 ft horizontal		Not addressed	2001 Guidelines and Policies for Public Water Systems	Reclaimed water not specifically addressed
Oklahoma	10 ft horizontal	5 ft horizontal	Not addressed	Oklahoma Regulations for Public Water Systems; Water Pollution Control Facility Construction	Sewer and water line cannot occupy same trench
California	10 ft horizontal & 1 ft vertical	Reference to Cal-Nevada AWWA Guidelines for Distribution of Non-Potable Water	Reference to Cal-Nevada AWWA Guidelines for Distribution of Non-Potable Water	California Safe Drinking Water Act	If unable to meet separation; separation as far as possible in separate trenches
Georgia	10 ft horizontal Not is same trench with sewer	3 ft outside to outside of pipe, 18 inches from bottom of water and top of reuse	3 ft outside to outside of pipe	Georgia Guidelines for Water Reclamation and Urban Water Reuse & Minimum Standards for Public Water Systems	Maximum obtainable separation possible; water-sewer separations less than 10 ft – case by case review
Texas	9' outside to outside in *all* directions	Not specifically addressed	Not specifically addressed	Texas Administrative Code, Title 30, Part 1, Chapter 290.44	Parallel installations require separate trenches
Texas Special Conditions	Non-pressure sewers: PE determination of no leaks; water 2 ft above, minimum 4 ft horizontal New waterline: minimum 150 psi pressure rated pipe; water 2 ft above, minimum 4 ft horizontal Crossings: water 2 ft above sewer; if sewer leaking – replace 9 ft either side of water (18' total) with 150 psi rates pipe; New water line installation above sewer – segment centered over sewer 9 ft to joint both directions; New water over existing non pressure sewer – water centered over sewer, sewer to have minimum pipe stiffness of 150 psi at 5% deflection, sewer embedded in cement stabilized sand [2½ bags cementer per cubic yard of mixture] 6 inches above and 4 inches below sewer				

Engineering and Soils Mechanics Methods

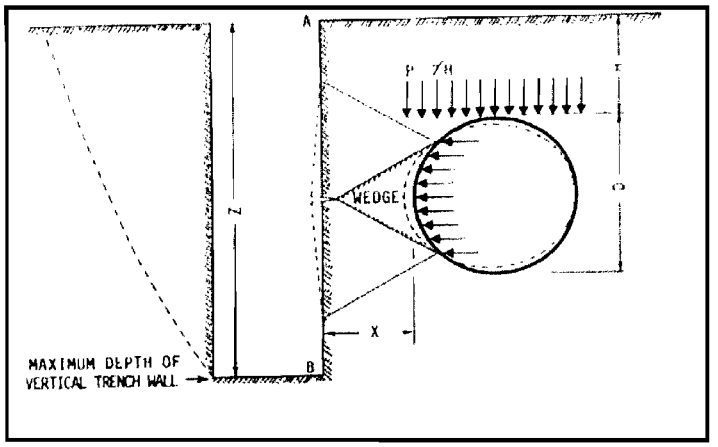
Research at Utah State University in 1968 identified mechanisms of failure and trench collapse for the excavation of parallel trenches. The researchers identified mechanisms for failure of a parallel buried pipe related to the separation distance to a newly excavated trench. They also developed design guidance to assure adequate separation from the trench wall to the parallel pipe. The information and the following illustrations in Figures 10 and 11 were taken from *Structural Mechanics of Buried Pipes.*[5]

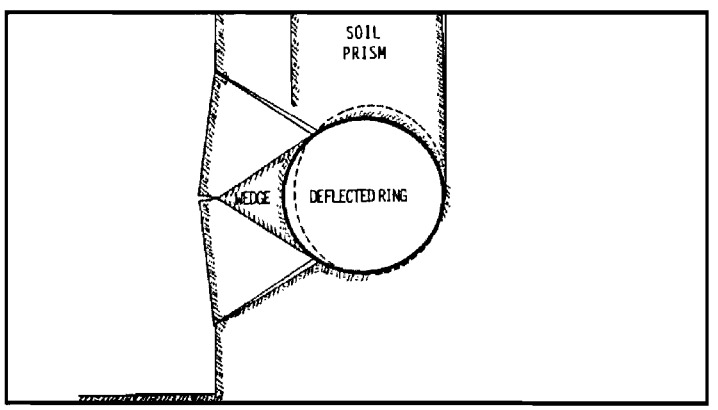
The result was a dimensionless relationship that correlates the diameter of the buried pipe (D), the depth of bury of the pipe (H), the *critical trench depth (Z),* and the side-wall cover, or minimum horizontal spacing from the trench face to the face of the pipe (X). The ratio between the critical trench depth and the depth of bury of the pipe, and the ratio between side-wall cover to pipe size is given by Equation 1:

$$\frac{X}{D} = 3 \times \frac{H}{Z}$$

Where:

X = side cover or minimum horizontal spacing, feet
D = pipe diameter, feet
H = depth of bury of the pipe, feet
Z = critical trench depth, feet





Figures 10 and 11: Mechanism for parallel trench collapse

The critical trench depth (Z) is the depth at which the native soil will stand in a vertical cut without sloughing or raveling. The engineer can estimate critical trench depth based on field experience, from a field cut, or estimated from the principles of soils mechanics. The soils mechanics method uses soils properties of unit soil weight (pcf [γ]), soil cohesion (psf [C]), and the soil friction angle of the trench wall ([φ]) as follows:

[5] Reynold King Watkins, PhD., P.E. and Loren Runar Anderson, PhD., *Structural Mechanics of Buried Pipes*, Utah State University, CRC Press, 2000, ISBN 0-8493-2395-9

Equation 2:

$$\frac{2C}{\gamma Z} = \tan\left[\ 45° - \varphi/2\ \right] \quad \text{or} \quad Z = \frac{[2C]}{\left[\gamma \tan\left(45° - \frac{\varphi}{2}\right)\right]}$$

Soils Properties Impacts on Critical Trench Depth

Critical trench depth is directly depended upon the soil cohesive strength, C. Typical strength characteristics of soils are shown in Table 2 below.[6]

Table 2: Soil Strength Properties

Group Symbol	Soil density, g, pcf		Cohesion, C, psf		Soil friction angle	Description
	Minimum	Maximum	Compacted	Saturated	φ, degrees, ∘	
GW	125	135	0	0	38	well graded, clean sands, gravel sand mixtures
GP	115	125	0	0	37	poorly graded clean gravels, gravel-sand mixture
GM	120	135	-	-	34	silty gravels, poor graded gravel - sand silt
GC	115	130	-	-	31	clayey gravels, poorly graded gravel-sand-clay
SW	111	130	0	0	38	well graded clean sands, gravely sands
SP	100	120	0	0	37	poorly graded clean sands sand-gravel mix
SM	110	125	1050	420	34	silty sands, poorly graded sand-silt mix
SM-SC	100	130	1050	300	33	sand-silt-clay mix with slightly plastic fines
SC	105	125	1550	230	31	clayey sands, poorly graded sand-clay mix
ML	95	120	1400	190	32	inorganic silts and clayey silts
ML-CL	100	120	1350	460	32	mixture of organic silt and clay
CL	95	120	1800	270	28	inorganic clays of low-to-medium plasticity
OL	80	100	-	-	-	organic silts and silt-clays, low plasticity
MH	70	95	1500	420	25	inorganic clayey silts, elastic silts
CH	75	105	2150	230	19	inorganic clays of high plasticity
OH	65	100	-		-	organic and silty clays

Table 2 also displays the effect of soil properties on basic soil strength. Coarse-grained soils such as sands and gravels exhibit no cohesive force, which would result in predicted critical trench depths (Z) of zero. *The presence of ground water also greatly influences soils strength.* Under saturated conditions, cohesive soils such as clays, which normally exhibit significant cohesive strength, develop cohesive strength that is often less than ⅓ of the dry, compacted value. Critical trench depth depends on soil density.

Figure 12 shows a comparison of predicted critical trench depths related to soils classifications in cohesive soils based on the range of reported soil densities and the condition of the soils.

[6] *Civil Engineering Reference Manual*, Professional Publications, Inc., San Carlos CA; Page 9-17

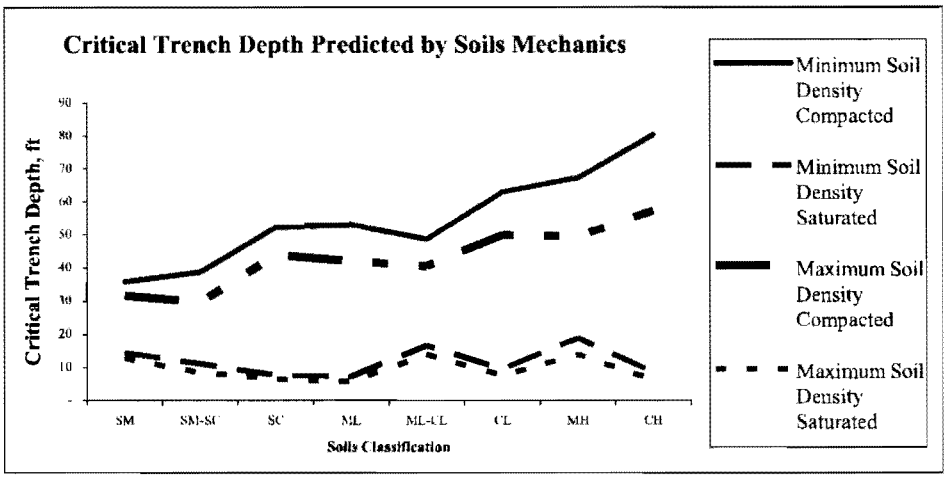


Figure 12: Critical trench depth based on soils properties

Cohesive soils have a wide range of predicted critical trench depths. The differences in the predicted critical trench depths for cohesive soils are noteworthy. These predictions reinforce the need to base design decisions on the worst-case excavation conditions expected along the pipeline route.

Parallel Trench Separation vs. Critical Trench Depth:

Estimates of pipe and trench separation distances based on soils properties and critical trench depths help confirm the written standards. Equation #1 can predict horizontal trench wall-to-pipe and pipe-to-pipe separation. Engineers should design separation to include sufficient space between the pipe and the trench wall for construction or repair activities at least 12 inches, and preferably 18 inches wide as shown in Figure 13.

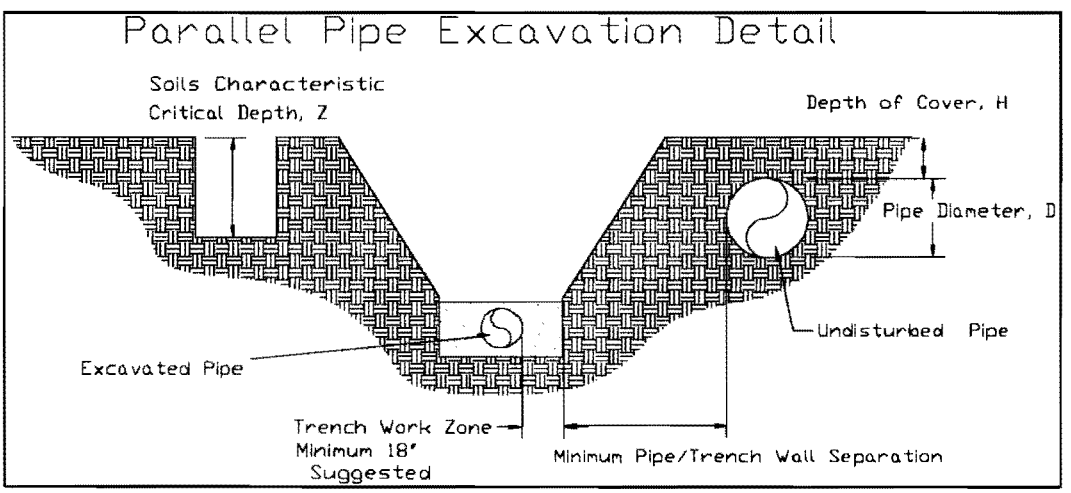


Figure 13: Parallel pipe excavation mechanics

Tables 3 and 4 illustrate the affect of soils properties and the size and depth of cover of an adjacent pipe on minimum sidewall coverage or horizontal spacing. These tables predict

the sidewall cover thickness required for excavation parallel to a water line and a sanitary sewer based on Equation 1. The calculations in Table 3 assume the water line is buried at a typical depth of 3½ feet, and varies from 6 inches to 24 inches in diameter. The calculations in Table 4 assume the sanitary sewer is buried at a typical depth of 6 feet, and varies in size from 6 inches to 24 inches.

Table 3: Estimates of horizontal pipe separation vs. critical trench depth for water line buried at 3.5 feet

Horizontal Separation Requirements for Parallel Pipes

X/D = 3H/Z & X = 3HD/Z

Burial Depth, H, ft = 3.5 feet Parallel Waterline

Critical Depth, Z, ft	Pipe Diameter, D, inches 6	8	10	12	15	18	24
2.00	2.6	3.5	4.4	5.3	6.6	7.9	10.5
2.50	2.1	2.8	3.5	4.2	5.3	6.3	8.4
3.00	1.8	2.3	2.9	3.5	4.4	5.3	7.0
3.50	1.5	2.0	2.5	3.0	3.8	4.5	6.0
4.00	**1.3**	**1.8**	**2.2**	**2.6**	**3.3**	**3.9**	**5.3**
4.50	1.2	1.6	1.9	2.3	2.9	3.5	4.7
5.00	1.1	1.4	1.8	2.1	2.6	3.2	4.2
5.50	1.0	1.3	1.6	1.9	2.4	2.9	3.8
6.00	0.9	1.2	1.5	1.8	2.2	2.6	3.5

Table 4: Estimates of horizontal pipe separation vs. critical trench depth for sanitary sewer line buried at 6.0 feet

Horizontal Separation Requirements for Parallel Pipes

X/D = 3H/Z & X = 3HD/Z

Burial Depth, H, ft = 6.0 feet Parallel Sanitary Sewer

Critical Depth, Z, ft	Pipe Diameter, D, inches 6	8	10	12	15	18	24
2.00	4.5	6.0	7.5	9.0	11.3	13.5	18.0
2.50	3.6	4.8	6.0	7.2	9.0	10.8	14.4
3.00	3.0	4.0	5.0	6.0	7.5	9.0	12.0
3.50	2.6	3.4	4.3	5.1	6.4	7.7	10.3
4.00	**2.3**	**3.0**	**3.8**	**4.5**	**5.6**	**6.8**	**9.0**
4.50	2.0	2.7	3.3	4.0	5.0	6.0	8.0
5.00	1.8	2.4	3.0	3.6	4.5	5.4	7.2
5.50	1.6	2.2	2.7	3.3	4.1	4.9	6.5
6.00	1.5	2.0	2.5	3.0	3.8	4.5	6.0

As an example, a project engineer proposes a new pipeline installation parallel to and below an existing 18 inch-diameter waterline that is buried 42 inches (3½ feet) deep. If the soils along the project route are cohesive and stand to a critical trench depth of 3 feet, the engineer should provide a minimum trench side wall thickness of 5.3 feet. The design should also include an 18 inch work space. Thus, the design should provide minimum pipe-to-pipe horizontal separation of 6.8 feet (5.3 + 1.5).

These examples shown in the tables reveal that, in addition to soils strength, the size and depth of bury of the adjacent parallel pipe have a significant effect on minimum side wall cover thickness. By including a minimum 18 inch repair zone, the minimum pipe-to-pipe separation in a soil exhibiting a critical trench depth of 4 feet varies from: :

- 3 to 4 feet for typical water distribution pipes of up to 10 inches in diameter at relatively shallow depths of bury (i.e., 42 inches-Table 3) and
- 4½ to 5 feet for typical sanitary sewers at relatively shallow depths of bury (i.e., 6 feet – Table 4).

For lower strength soils that will sustain only a 2-foot vertical trench wall, the minimum required separations increase to 4 to 6 feet for the shallow water line and 7½ to 9 feet for the shallow sanitary sewer.

These computations illustrate the variability estimated for minimum pipeline separation distances when the engineer knows the soil properties and has accurate knowledge of the adjacent underground pipelines. These computations also support the established minimum separation standards that have been applied historically. These standards were established as a one-size-fits-all approach without knowledge of local soils or adjacent utilities.

Minimum Pipe Separation Determination Procedures

General

The design decisions locating underground pipelines *must* account for future excavation for repair or replacement. This protects public health and the environment, as well as the other underground utilities and surface improvements. The agencies have developed a revised approach to the review and approval process for pipeline separations and provided this guidance to allow designers discretion and more flexibility under many conditions where standard 10-foot separation distances are not available.

This section provides the revised regulatory approach to review and approval, discussions of engineering design, relevant location issues, and additional mitigation measures that could be used for justification of shorter separation distances.

Current Procedures

Present project approval procedures require special design and installation proposals whenever a nonpotable pipeline encroaches within 10 feet parallel to a potable water main or within 18 inches at a vertical crossing. Under these conditions engineers must propose special design and installation methods and then submit them to the regulatory agencies. The agencies approve these special design and installation methods on a case-by-case basis. This procedure can result in a multitude of separate reviews and approvals during the course of one pipeline installation project.

Streamlined Procedures

The agencies have established streamlined procedures for three distinct sets of design and field conditions based on space available, knowledge of soils properties and adjacent utilities, and minimum distance designated for the *sidewall safety zone*. The first condition occurs when standard separation distances are available and common design practices are applied. The second condition occurs when the available vertical and/or horizontal separation distances are less than the required minimum but greater than the sidewall safety zone. The third condition exists when the available space for separation is less than necessary for the sidewall safety zone.

Sidewall Safety Zone

The *sidewall safety zone* is a zone in which additional caution is necessary during the design, construction, or repair process. Within this zone, the designers should collaborate with representatives of all the responsible utilities and regulatory agencies. These utilities may include the potable water system, sewage, storm water, reclaimed water, gas, electric, telephone and communications, or any other underground utility purveyor.

The agencies have selected the minimum dimensions of the sidewall safety zone as *4 feet horizontally* between parallel pipes and *6 inches vertically* at pipe crossings.

The agencies selected dimensions for the sidewall safety zone to define conditions that warrant special consideration in the design and location of underground pipelines for commonly encountered conditions in pipeline designs. The primary variables affecting the decision include soils strength characteristics and the size and location of adjacent buried pipelines (variables Z, D and H in Equation 1). In addition to these engineering based concerns, engineers should include practical construction-related considerations.

These dimensions of the sidewall safety zone were selected to:

- Allow space for construction or repair activities between the pipe and trench wall.
- Provide a minimum trench sidewall cover depth for a parallel pipe.
- Assure consideration of surface surcharge affects from operating construction equipment or excavation spoil pile on the minimum trench sidewall thickness.
- Allow for a minimum cover depth to assure protection from damage to pipes during construction and from native materials and adjacent pipes.

Construction / Repair Work Space

Past practices set the definition of "adequate space" in construction trenches at 12 inches. Historically, trench dimensions used in construction estimates were based on a minimum trench width equal to the outside pipe diameter plus 1 foot on each side of the pipe. More recently, due to construction safety requirements, 4-foot trench widths are used to accommodate trench boxes and other trench safety equipment (Figure 14). This practice provides a working zone of 2 feet from the pipe centerline to the trench wall, and allows work space of at least 18 inches for pipes up to 12 inches in diameter. Construction practices for larger pipes require sufficient space for bedding under the pipe haunch in lifts and to allow for compaction by either manual tamping or the use of plate compactors. A minimum of 24 inches between the trench wall and pipe is necessary to complete this work. However, for the majority of smaller pipe installations, an 18-inch work space under normal construction practices should be adequate.

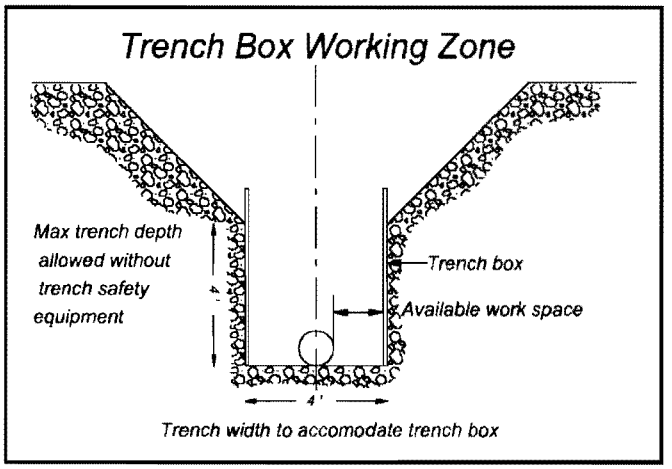


Figure 14: Trench working zone

The practice of assuring 18 inch work space is also consistent with the "best practices" of the National Utility Contractors Association, which defines an "excavation tolerance zone" as the "width of the facility plus 18 inches on either side of the outside edge of the underground facility on a horizontal plane."[7]

[7] National Utility Contractors Association, *Excavation Best Practices and Liability Protection.*

Minimum Trench Sidewall Cover Depth

The agencies used the Utah State University model presented in Equation 1 in selecting a minimum sidewall safety zone. This cover depth depends on typical soil characteristics and size and *effective* depth of bury of parallel underground pipes. Both the soil characteristics expected along a pipeline route and effective depth of bury vary much more than the expected sizes of the underground pipes. The selection of the sidewall safety zone was based on conditions that should be expected in the majority of designs and installations throughout this region. The conditions selected were:

- Pipe – 6-inch to 8-inch diameter: Current minimum pipe size for both water distribution pipes and gravity sewers of 8 inches generally represents the largest proportion of pipe lengths inventoried in water system plans and wastewater facility plans. The current minimum sizes increased from the previous minimum standard 6-inch diameter pipes.
- Soils strength characteristic – critical trench depth = 4 feet: Critical trench depth depends on the cohesive strength of soils, which depends on the characteristics of the soils that are predominant within the construction zone. These soils characteristics will presumably apply within established most cities and towns in this region. Most municipalities developed along the banks of rivers, lakes or the ocean shore, where soils are commonly alluvial sand, gravel, and silt deposits. Many alluvial soils are non-cohesive, resulting in a theoretical critical trench depth of zero. Field experience shows that where cohesive soils are encountered they exhibit trench walls up to about 4 feet without raveling or sloughing in dry conditions. Depths greater than 4 feet can occur, but infrequently.
- Effective depth of bury: Soils above a buried pipe exert pressure on the pipe, while forces created by surface activities increase the effective pressure created by the soils over the pipeline. The combination of soil pressure and surcharges create the forces that can cause collapse to a parallel trench. The pressure depends directly on the effective burial depth of the pipe.

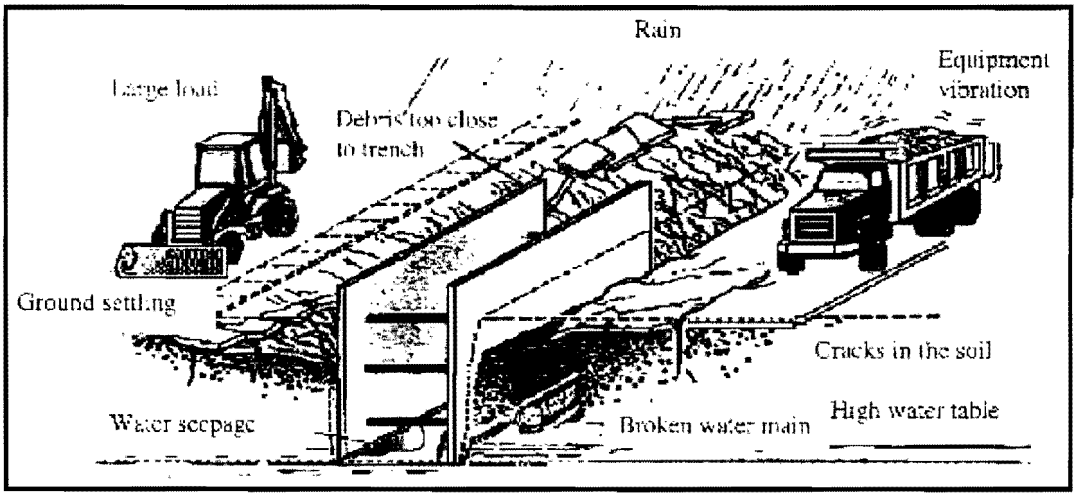


Figure 15: Causes of cave-ins (trench surcharges) from Saskatchewan Labour Ministry

The effective depth of burial depth was selected from considering common factors such as the minimum pipeline burial depth of 36 inches to assure structural adequacy of the pipe, minimum frost depth, which is 42 inches in the majority of this geographic region, and a burial depth of 8 to 9 feet to accommodate service to sanitary sewers from residential basements. In addition to the actual burial depth, surface activities requirements during construction that result in a pressure surcharge were considered. Surcharges are created by excavation spoil piles (Figure 15), operation of construction equipment at the trench, and even local traffic on roads and streets, resulting in an effective depth of bury much greater than the actual depth of bury. At a minimum, surcharge from trench excavation spoils of at least 50% of the depth of the excavation trench should be considered in establishing the effective depth of bury. For this analsyis, a minimum effective depth of bury of 6 to 7 feet was used.

Results: Table 5 shows the minimum depth of cover for a trench sidewall predicted by Equation 1 of 2.3 feet to 3.0 feet for 6 and 8-inch diameter pipes.

Table 5: Trench sidewall cover estimate

X/D = 3H/Z			
Effective Burial Depth, H, ft 6.0			
Critical Depth, Z, ft	Pipe Diameter, d, inches		
2.00	4.5	6.0	7.5
2.50	3.6	4.8	6.0
3.00	3.0	4.0	5.0
3.50	3.6	3.4	4.3
4.00	2.3	3.0	3.8

Horizontal Dimension

For the horizontal dimension of the sidewall safety zone use 4 feet. This represents the minimum dimension predicted using the Utah State University model (≈ 2½ feet), while allowing adequate work space (18 inches = 1½ feet).

Minimum Pipe Cover

This guidance recommends using a minimum vertical separation of 6 inches. The recommendation is based on recommended practices of pipe manufacturers for pipe bedding and common construction practices. Pipe manufacturers' standards require a minimum depth of cover of 6 inches surrounding a pipe to prevent damage to the pipe during installation. This depth assures sufficient separation between the pipe and any object, such as a rock that may be driven into the pipe or rub against it. The 6-inch separation allows settlement and pipe movement during compaction, without resulting in pipe failure.

The vertical separation also considers pipe bedding compaction methods for pipes in tight places. A minimum space of 6 inches achieves adequate backfill with select bedding and hand tamper compaction.

Design Review Conditions

Table 6 shows the three conditions designated based on space available.

Table 6: Conditions for separation in design with space available

	Horizontal Separation Space Available		Vertical Separation Space Available	
	Minimum	Maximum	Minimum	Maximum
➢ Condition A	≥10 feet	N/A	≥ 18 inches	N/A
➢ Condition B	< 10 Feet	> 4 feet	< 18 inches	> 6 inches
➢ Condition C		≤ 4 feet		≤ 6 inches

Regulatory Approval Requirements
Minimum requirements to receive regulatory approval will vary depending on the separation space available.

For **Condition A** situations, the engineering design report and specifications must show that the minimum horizontal and vertical separations of 10 feet and 18 inches, respectively will be maintained between potable water and any nonpotable pipe, and between reclaimed water and other nonpotable pipes.

For **Condition B** situations, engineers should include construction details and specifications in the construction documents submitted for agency review and approval. These details govern the location of pipelines within space limits shown above for Condition B. In developing these standard construction details, engineers need to consider critical or controlling design conditions such as expected soil cohesion, excavation depth, pipe materials, surface imposed damage risk, and groundwater levels.

Condition C situations require special construction details on a case-by-case basis. The engineer can identify these situations during design and provide construction details for each location in the construction drawings in addition to connection details and other critical locations.

In addition to the guidance above, Figure 16 provides a decision tree delineating the considerations for the pipe separations.

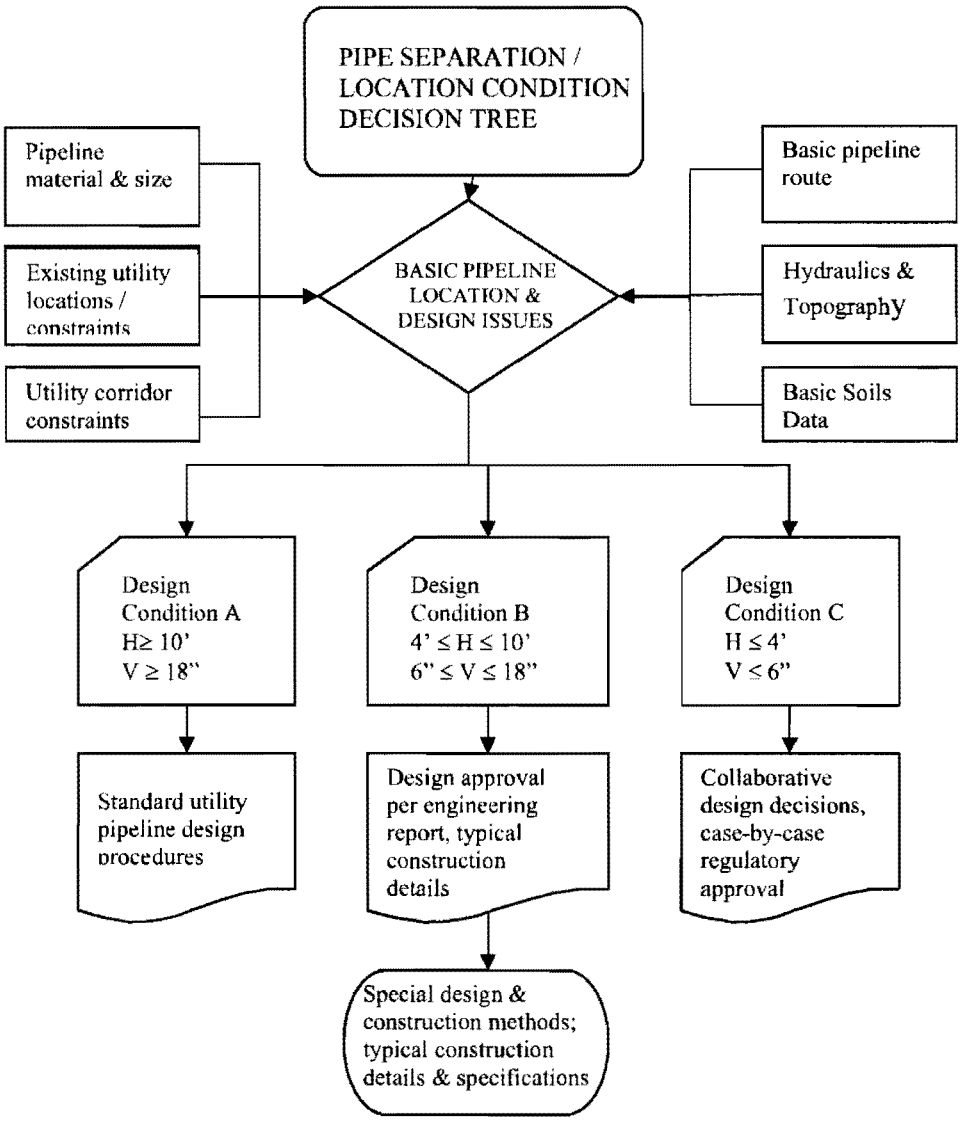


Figure 16: Pipe separation assessment decision tree

Recommendations for Alternatives to Standard Separation for Condition B

Design engineers should consider several current designs options to provide protection to public health and safety equivalent to the required minimum separations:

- Common trench construction with separate undisturbed benches
- Pipe and joint selection
  - Thick wall, pressure rated pipe
  - Special construction joints
  - Restrained joint piping versus thrust blocks
  - Substitution of pressure-rated pipe and joints in gravity installations
- Pipe sleeves
- Cement encasement
- Controlled density fill between pipelines
- Multiple pipe identification covers and location tapes
- Vapor barriers or trench curtains

Typical Construction Details Condition – B

Designers should implement alternative design procedures when Condition B spacing is encountered. The design engineer should include typical construction details (Figure 17) for these locations in construction drawings. Include limitations for use of these details such as:

- Variations in soil types that would preclude the application of normal trenching methods.
- High groundwater conditions.
- Saturated soils at the toe of the trench/
- Limits to the critical trench depth for soils encountered along the route. Both regulatory agencies should be aware of the potential conflicts of the standard separation sand the designs proposed to address these conditions. Therefore, the engineer must incorporate these limitations in the Facilities Plan, Engineering Report, or Project Report for the project.

Figure 18 *suggests* the construction details for horizontal and vertical pipe separation included as typical construction details that could be incorporated into pipe system designs for Condition B.

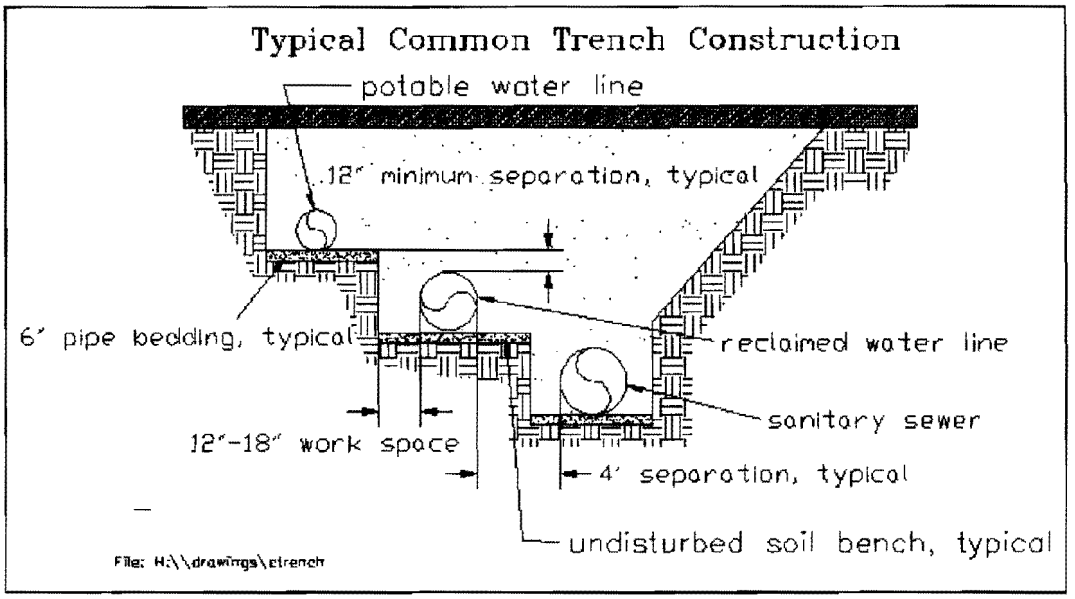


Figure 17: Typical benched - common trench construction detail

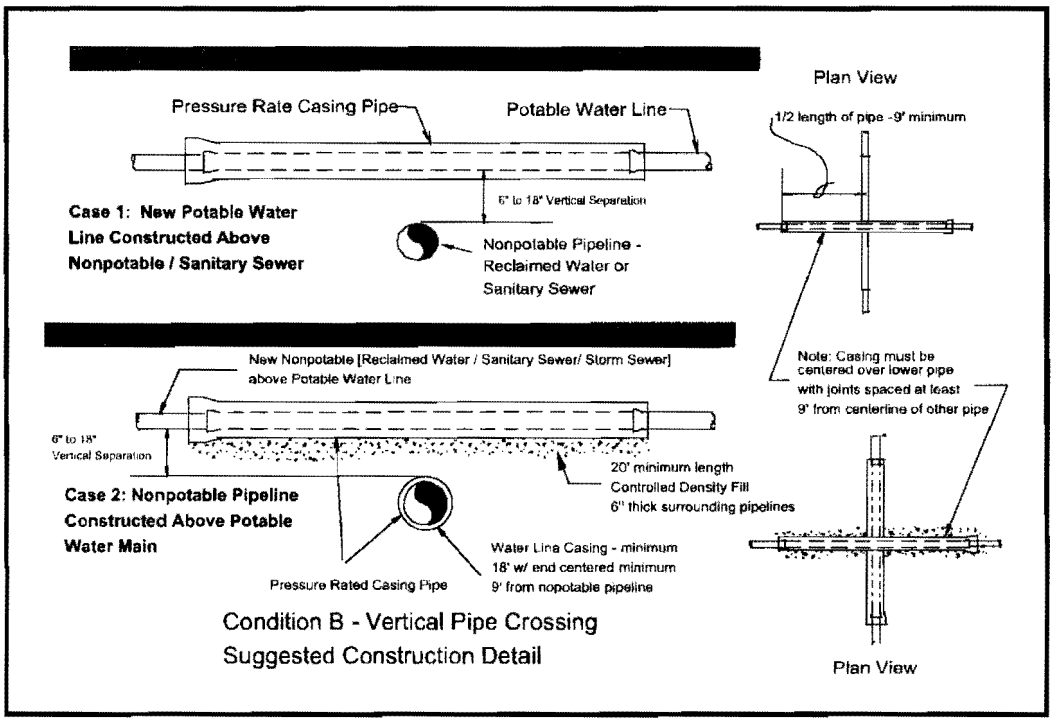


Figure 18: Typical pipe crossing construction detail Condition B separation

Case-by-case Approval Requirements – Condition C

General

Some situations will require special consideration and collaboration. The research into the effect of soil properties indicates that the point at which failure occurs between parallel trenches is sudden and catastrophic. The approach to minimum separation standards provides a sufficient side wall safety zone including a safety factor during the construction or repair phases. However, engineers may encounter some situations where an adequate side wall safety zone is not available to assure minimum pipe support by the soil structure. In these situations, the risk of pipe failure and collapse is the greatest. Prevention of pipe failure and contamination is considered critical to the integrity of the entire pipe system. All parties (the designer, management, operations staff, adjacent utility purveyors and regulatory personnel) must remain aware of these instances, ensure opportunities for collaboration, and integrate accumulated experience when the available separation distances are within the side wall safety zone.

Approval Requirements

For pipes located within the sidewall safety zone, the design must meet the following criteria: 4 feet or less horizontal pipe spacing and 6 inches or less vertical separation. In these situations, the owner must obtain regulatory review and approval on a case-by-case basis.

Approval Process

Engineers should propose Condition C design or location only when no other alternatives exist. Regulatory agencies view pipeline installation in this zone as the last resort. An engineering report must address all relevant issues in justifying the proposed location and construction methods. To receive regulatory agency approval the engineer must address all of the following factors:

1. Pipe material, wall thickness, deflection and structural integrity
2. Corrosion potential within the installation
3. Pipe joint type, deflection limits and integrity under deflection
4. Special bedding requirements or proposals
5. Pipe size, material specifications, and joint types for existing pipelines
6. Relative water quality and uses of proposed and existing pipelines
7. Relative levels of disinfectant residuals in the proposed and existing pipelines
8. Operating and surge pressures in the proposed and existing pipelines
9. Ability to control pressure and flows in adjacent underground utilities
10. Thrust restraint and thrust blocking of proposed and existing pipelines
11. Soils characteristics at the location
12. Ground water or water table conditions
13. Adjacent building and structure surcharges as it affects trench and pipe stability
14. Adjacent underground utilities and impacts
15. Comments and concerns of representatives of adjacent underground utilities potentially affected by the proposed installation
16. Construction related impacts
    a. Equipment and traffic vibration
    b. Spoil pile surcharge impacts
    c. Special structural support for adjacent pipelines

Suggested Solutions
The following sections address three potential Condition C pipeline locations:

Utility Tunnel – Condition C: The most common situation proposes a utility tunnel crossing under a stream or railroad and highway rights-of-way. Figure 19 provides a suggested construction detail to address Condition C concerns associated with utility tunnels. The project design should consider:

1. Locating potable water and reclaimed water lines above the midline of the tunnel and sanitary and storm sewers located below the midline as far as possible.
2. Encasing potable water pipeline in a pressure-rated pipe that is provided with corrosion protection or is non-corrodible, and has fused joints and providing pipe spacers to maintain the waterline centered in the water line casing.
3. Filling casing annular space or void with lean concrete, grout, bentonite or other proposed fill that assures the void is completely filled. The regulatory agencies must approve the construction methods to assure the void is completely filled.
4. Addressing methods that may be necessary to allow access for likely future maintenance and repair of *all* of the utilities using the tunnel or boring casing, such as casings that will allow removal of every utility pipe for future maintenance.

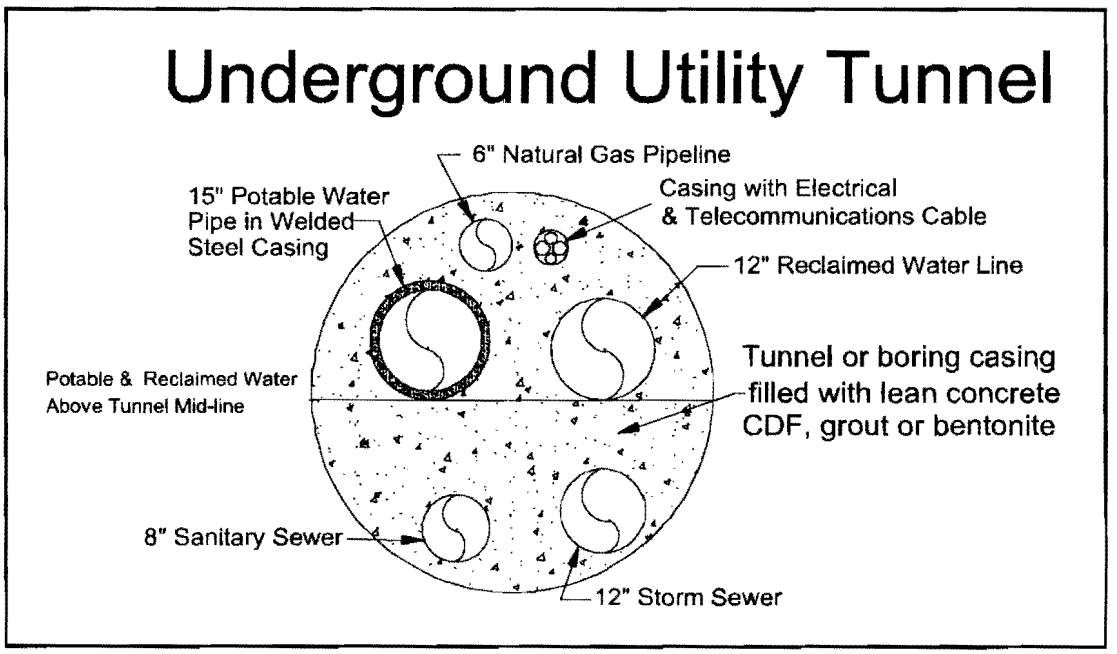


Figure 19: Condition C utility tunnel

Common Utility Corridor Construction- Condition C

At locations where a restricted, common underground utility corridor is required, the engineering report should consider:

1. Selecting pipe materials for the lowest level pipelines presuming future maintenance and repair is *not* possible.
2. Specifying fused or welded joints in the bottom and middle pipelines.
3. Limiting the length of these installations to very short distances, potentially 300 to 400 feet.
4. The upper most utilities will likely be natural gas, electrical or telecommunications. When installing these utilities consider that they will be affected by potential repair and maintenance of the water or reclaimed water pipelines and may sustain damage during such repairs.
5. Locating appurtenances for maintenance of potable and reclaimed water lines such as directional flow flushing to prevent impacts to the utility corridor from runoff, vibrations, or pressure surges.

Figure 20 illustrates a *suggested* construction detail.

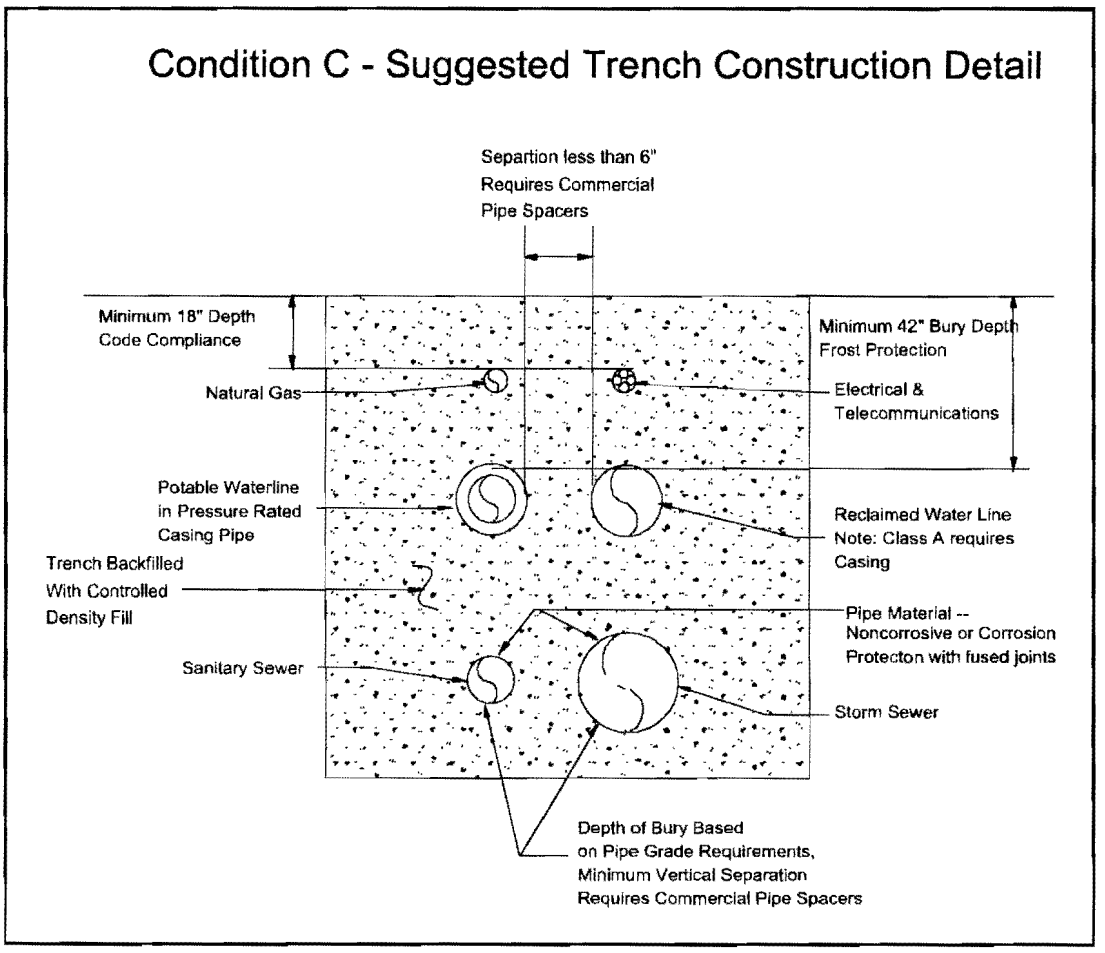


Figure 20: Common underground utility corridor

Pipeline Crossing – Condition C

For pipeline crossings of less than the required vertical separation distance, consider the following protections at a minimum:

1. Provide both the new pipeline and the existing pipe in the crossing with casing manufactured of pressure-rated pipe.
2. Provide commercial pipe spacers for the carrier pipes within each casing.
3. Provide controlled density fill of at least 6 inches in thickness around both cased pipelines for the entire length of each casing.
4. Seal the casings at the ends.
5. Provide a commercial pipe spacer between to the two casings at the crossing to assure a minimum separation is maintained.

Figure 21 provides a *suggested* construction detail.

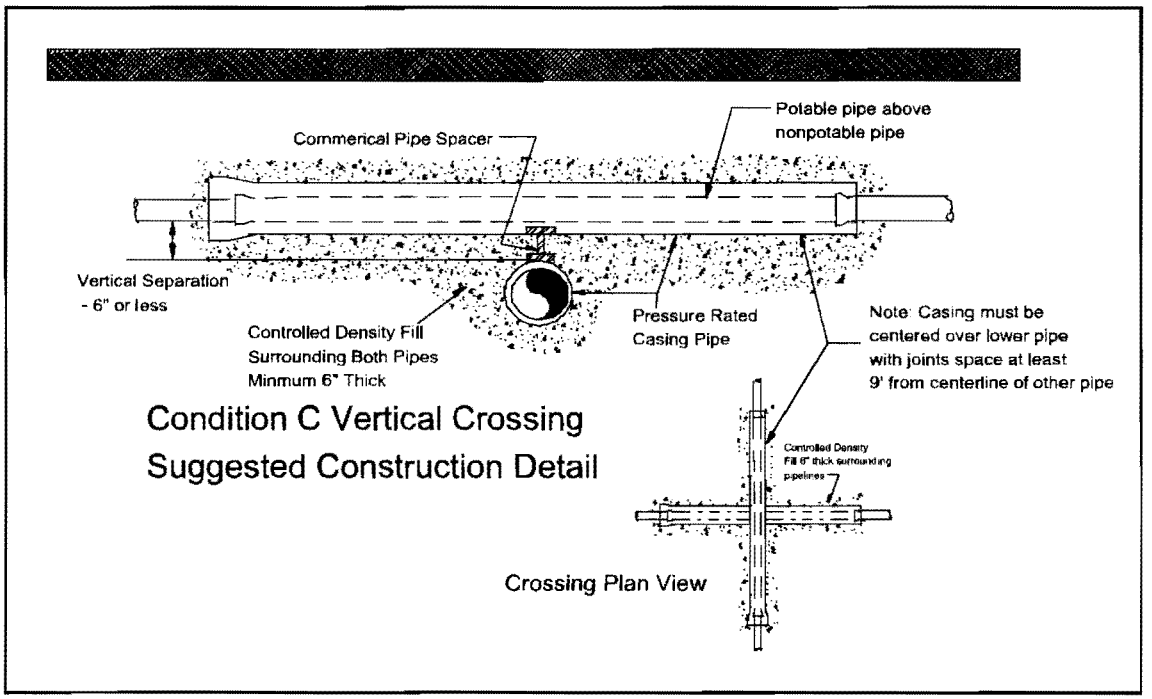


Figure 21: Condition C -vertical pipe crossing

Engineering Design and Location Approach

General Considerations
Numerous issues and constraints face the design team in selecting the proper location, size, and materials specifications. Several issues may significantly impact minimum separation distances. This section addresses specific design-related issues. The Departments of Health and Ecology (the agencies) do not intend to provide a complete or exhaustive list of design issues or variables in this guidance, but rather to address the majority of the important issues considered in the regulatory review and approval process.

Engineering Judgment
No written guidance can replace professional judgment. The agencies do not intend that these guidelines will supersede professional engineering judgment in any way. The guidelines provide a description of basic acceptable practices applicable to many, but certainly not all situations encountered. The agencies hope that deviation from these standard approaches, although expected, will be limited. We recognize that when developing other acceptable designs engineers must rely on professional engineering judgment to demonstrate the designs achieve equivalent public health protection.

Trench Protection
The agencies do not intend for this guidance to impose a single set of requirements for pipeline designers or maintenance supervisors to provide structural designs for trench shielding or trench box protection. The agencies recommend that site control be conducted by an individual certified in trench safety. The certified individual establishes a competent responsible party to assure trench protection during construction and repair excavations. These standards do not supersede or replace any trench safety and shoring protection required by the Washington State Department of Labor and Industries.

Basic Design Approach
The agencies prefer use of the minimum standard separations wherever possible in locating new or relocated buried utilities. The engineer should identify location conflicts and limits on pipeline separation during the preliminary design phase. To the extent reasonably possible, the design team should identify those locations that will trigger Conditions B and C. Potential location conflicts should become apparent from baseline information gathered from record drawings of existing pipes and utility corridors from local utilities, as well surface features found during initial field reconnaissance of potential pipeline routes.

Multiple Barriers of Protection
Pipelines provide economical and reliable transportation and delivery of consumable products and removal of waste products. The two most common underground utilities – drinking water and sanitary sewage – provide the foundation for a community's public health protection. All underground utilities provide services essential to the health and welfare of communities. All essential services must have the highest degree of reliability, and include multiple barriers of protection. Just as a potable water system provides multiple protections through source protection, treatment and disinfection, the

distribution systems also require separate and duplicative barriers. The project team – the design engineer, regulatory review staff, contractor and owner- must recognize that adequate pipe separation from other underground utilities provides the final, protective barrier.

Record Information Accuracy

Designs must begin with the best, available information. In the case of municipal underground utilities, this is often found in "as-built" or record drawings of "existing" pipelines or previous projects. Although this information can prove inaccurate, it may be the best information available as the design begins. Designers should consider as-built information during the initial design phase in determining the locations of potential separation conflicts. The extent of reliance on the accuracy of these records will depend on the judgment of the project design manager based on their professional experience.

Trigger Conditions

Special designs or pipe separation methods may not be necessary along the length of a project. Soils properties and site constraints vary along the route in most pipeline projects. Encroachment into the standard separation zones for a small portion of a pipeline does not require that the length of pipeline under Condition A be designed for Conditions B or C. The use of special pipeline designs or pipe separation methods is necessary in locations with the potential for significant risks as a result of the pipe locations. The design engineer should consider:

- The length of the parallel installations; pipe lengths greater than the length of two pipe 'sticks' or three or more pipe joints [36'-40'] would trigger special design.
- Health risks associated with the products transported in the adjacent pipes.
- The age and condition of existing pipe materials and joints.
- Non-cohesive soils which will require pipe special pipe supports or trench protection be used to excavate parallel trenches.
- Pipe installations that do not allow for full compaction of support soils between pipes.
- Pipe distribution systems subject to high pressures, large pressure variations and pipe velocity variations that tend to result in pipe thrust at bends and joints.

Design Considerations

As a project develops, site-specific conditions will be come apparent that will drive the details of the project design. The different factors that should be evaluated to justify smaller pipe separations include:

- System pressure ranges and hydraulics that may affect the tendency of the pipes to develop thrust during normal operations.
- Anticipated range of soil characteristics such as cohesive strength; critical trench depth and corrosion potential of the pipe material.
- Range of current and future pipe sizes in the utility corridor.
- Potential for saturated soil conditions at the deepest trench level.
- Types of pipe material and pipe joints preferred or available.
- Repair and patching methods for the pipe.
- Available space for spoil pile location and material stockpiling during repairs.
- Location of operating excavation and materials handling equipment.

- Separation to adjacent traffic and impacts from traffic on trench stability.
- The ability to accurately track, estimate or locate pipeline leakage.
- Risk to public health and safety that could result from cross contamination from leakage between adjacent pipes.
- Capability, facilities and equipment available to contain, control and clean and restore the pipe and produce quality to meet public health and safety standards.

Specific Design Concerns
Soils strength; trench construction – depth of bury, leakage impact, repair and replacement mitigation

Soil Strengths Data
Detailed soils data can be difficult and expensive to obtain, Fortunately, for these design purposes, only basic soils data is necessary to determine whether the soils are either cohesive or non-cohesive. Soils that provide any level of cohesive force will likely provide sufficient side wall coverage to allow smaller horizontal separation distance. Non-cohesive soils generally will not support sufficient side wall cover, and require more careful consideration.

Soils surveys provide information to a depth of 5 feet, which is valuable for most potable water lines buried between 3½ and 5 feet deep. Soil survey information is available from several locations electronically including these two websites:

National Resource Conservation Service at:
http://www.or.nrcs.usda.gov/pnw_soil/wa_reports.html

Washington State University at:
http://remotesens.css.wsu.edu/washingtonsoil/

Table 7. An Example of soils information from the NRCS Web site

General Soil Type:	*O5*	Region:	*O*
Map Unit Description:	*Soils derived from glacial outwash on river terraces; most soils are strongly loess-influenced in the upper part, gravelly or sandy in the lower part, and have low water-holding capacity; some are influenced by volcanic ash in the upper part*		
Moisture Regime:	*Xeric*		
Temperature Regime:	*Mesic*		
Taxonomic Classification:	*Vitrandic Xerochrepts, Vitrandic Haploxerolls, Typic Xerorthents, Typic Xeropsamments*		
Major Soil Series:	*Springdale-Garrison-Spens-Bisbee*		

Table 7 provides an example of soils information generated from the Washington State University website. The NRCS website gives greater detail.

The WSU website generates general maps of each county. Figure 22 shows maps for Lincoln and Spokane Counties. The engineer can find soils information by clicking on a soil type designated by color with a mouse.

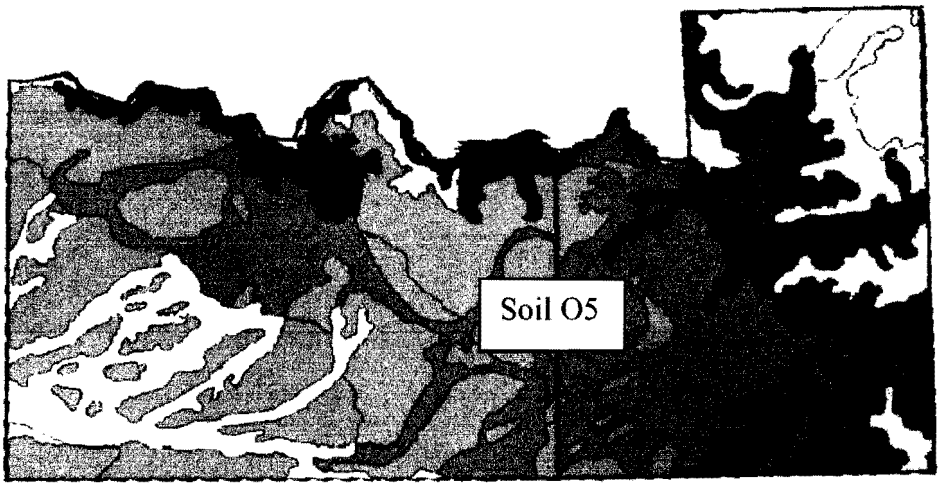


Figure 22. Lincoln and Spokane county soil types *(Soil Type O5 is displayed in red)*

In general, soils information available from soils maps or from local contactors and utilities should provide sufficient information during the initial route location stages.

Pipe Leakage

Pipe leakage is so common that designers can easily overlook the effects of leakage on the pipe design and location process. Leaks affect the amount of soil moisture or water in the immediate vicinity of a pipe. This dramatically affects the cohesive strength of the soil. Pipe failure may cause a leak; or a leak may help create pipe failure (Figure 23). Pipeline designs need to consider the fundamental conditions that create or allow leaks during the design and pipeline location process.

Figure 23: Pipe beam break due to corrosion

Conditions Causing Leaks

Pipeline leaks may be caused by external and internal forces on the pipes, corrosion and deterioration, or construction problems. External forces include traffic loads, earth loading, freeze and thaw cycles, earthquakes, and floods. External forces result in failure when:

- The pipe, acting as a beam in the soil, is not uniformly supported by adequate pipe bedding.
- The pipe is restrained from expansion and contraction, and differential thermal stress is applied.
- The force of rigid structures exerts pressure on the pipe.

Internal pressures that can result in pipeline damage include working pressure and surge pressures. All pipelines under pressure are subject to water hammer surges during normal operation of pipes, valves, and even faucets and hose bibs. If the pipes are brittle, hydraulic transients or water hammer can cause longitudinal cracks. Repetitive transient pressure surges affect the fatigue strength of the pipe material compromising the wall strength.

Pipeline Deterioration

Tuberculation and internal pipe corrosion can cause water quality degradation. Tuberculation is the development of blister-like growths of metal oxides resulting from metal pipe. Iron oxide tubercles often develop over pits in iron or steel pipe. These can seriously restrict the flow of water. Tubercules[8] not only affect the pipe wall integrity, but also increase pipe roughness. This, in turn, can result in larger pressure differentials during operation and can compound the impacts of internal and external forces.

Construction Related Problems

Poor bedding during construction can result in significant pipeline damage. Under pressure tiny leaks in gaskets result in major blowouts due to soil mining at the joint. Construction errors may include cracked bells, leaks caused by rolled gaskets (common with push-on joints), or a tiny bit of sand between the gasket and the pipe. Leaks from gaskets "sand blast" the pipe from the outside in and increase at an exponential rate. In extreme cases, the soil mining extends to the surface as shown in Figure 24.

Figure 24: Sand boils resulting from joint failure

Joint leaks in flexible pipe, including steel pipe, are common at welded joints, especially if the pipe is deflected due to soil movement or seismic forces. Bedding the pipe section with large and/or angular rocks can lead to breaks if the rock creates point stresses on the pipe wall. Such improper bedding results in punctures or breaks in the pipe ring.

Mechanics of Pipe Failure Due to Leaks

When leaks occur from beam breaks, joint leakage, main breaks or service line leaks, the liquid flushes soil particles from the region of the leak. The flushing undermines pipe

[8] The mounds characterized by reddish brown mounds of various heights attached to the interior of the pipe walls, resulting from many years of iron and manganese bacterial growth that deposit iron and/or manganese oxides along with particulate matter from the water trapped in the biomass from generations of iron bacteria. These bacteria are common in all water sources. Over twenty different iron bacteria can cause tuberculation. These bacteria are generally considered non-pathogenic. However, tubercules can aid in microbiologic regrowth, fostering the growth of pathogenic microorganisms.

bedding. The loss of pipe bedding can cause over-deflection at pipe joints, excess pull on joints, loss of thrust restraint, and loss of support from the soil underlying the pipe section. Ultimately, total pipe failure may result.

Allowable Leakage

All pipes should be expected to leak. The perception that pipelines are "sealed tight" is very common in the water and wastewater industry, but it is wrong. Standard construction specifications acknowledge this fact by establishing "allowable leakage rates" for the design life, when material quality and construction integrity are expected to be the best and external pressures are at a minimum. Designs generally consider allowable leakage limits for nearly all pipe materials, including some assumed to be "leak-free." Estimates of annual leakage shown in the spreadsheet model (Table 8) indicate that adequately constructed pipelines can be expected to lose a significant amount of water over time.

Table 8. Allowable leakage based on standard specifications

$$L = \frac{S*d*P^{1/2}}{133{,}200}$$

L = allowable leakage in gallons per hour
S= length of pipe tested in feet
P= system pressure, psi

Allowable Leakage for 300 ft of pipe [1-urban block] in one year								
Pipe Diameter	System Pressure, psi							
inches	30	40	50	60	70	80	90	100
6	1,776	2,368	2,959	3,551	4,143	4,735	5,327	5,919
8	2,368	3,157	3,946	4,735	5,524	6,314	7,103	7,892
10	2,959	3,946	4,932	5,919	6,905	7,892	8,878	9,865
12	3,551	4,735	5,919	7,103	8,286	9,470	10,654	11,838
18	5,327	7,103	8,878	10,654	12,430	14,205	15,981	17,757
24	7,103	9,470	11,838	14,205	16,573	18,941	21,308	23,676
36	10,654	14,205	17,757	21,308	24,859	28,411	31,962	35,514
48	14,205	18,941	23,676	28,411	33,146	37,881	42,616	47,351

The fluid leaked from the pipe remains in the vicinity of the pipe, and affects the soil moisture content and water levels in the pipe excavation. This, in turn, affects the cohesive strength of the soil and the critical trench depth at the excavation site.

Excavation Site Conditions

Pipeline repair excavations provide a special application of the principals used to determine minimum sidewall coverage based on soil mechanics techniques. Soil strength and external forces on trenches and parallel underground utilities differ dramatically during repair operations. Undisturbed soil almost always exhibits greater strength than disturbed soil, regardless of the compaction method used. When excavating adjacent to an old trench, the prism of soil between the two trenches is generally very unstable.[9] Often the excavation backfill spoil pile or operating excavation equipment will be located on top of the parallel utility line. This practice significantly increases the effective depth

[9] S. Arasmith & H. Mason-Ploetz, *Cave-in Protection and Competent Person Training Manual,* Pg. 27

of bury and the external loads and increases the possibility of trench sidewall failure due to the vibrations caused by equipment or materials. Figure 25 shows setback separations required for three basic soils classifications.[10] For the purposes of this description: Type A soils are classified as cemented soils, providing the highest cohesive forces; Type B soils are cohesive soils, and Type C soils are classified as granular soils. These classifications do not directly relate to the soil group classifications shown previously.

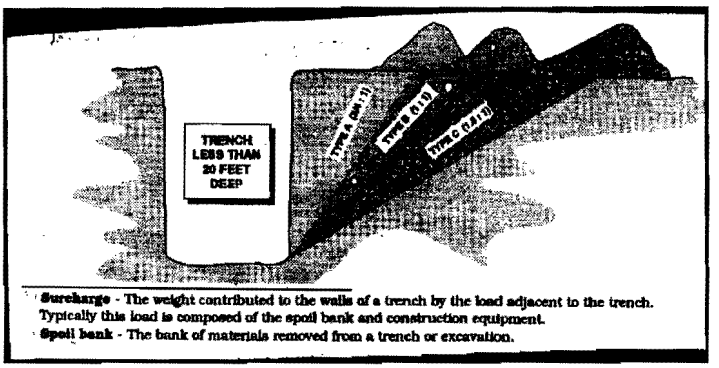


Figure 25: Typical trench surcharge conditions

Figure 26 shows the importance and potential impacts of spoil bank locations in a field excavation. Note that the right ditch bank appears to be stable at a relatively steep angle, while the left bank is sloughing.

Repair and Replacement Excavations: The effectiveness of pipe repairs or replacement of short sections during design is determined by allowing sufficient room for safe and effective repairs. Utilities with routine pipe repair procedures can justify more congested designs based on the standard practices and procedures. The design should consider the following factors:

- Availability of certified competent persons to oversee the excavation
- Experienced designers for:
  - Structural support of adjacent pipes or pipe joints
  - Trench shields
  - Trench boxes
- Provision of redundant pipe markings or pipe identification systems to prevent repair or tapping of the wrong pipe.

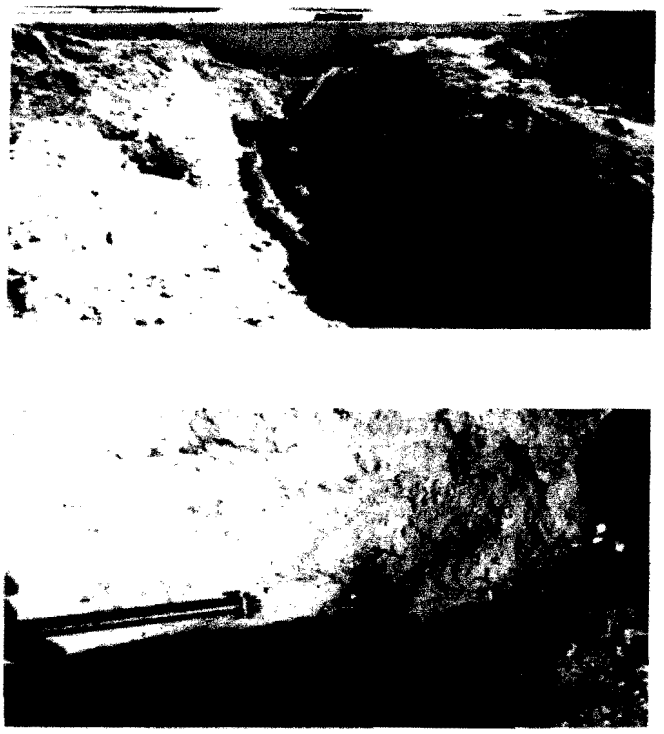


Figure 26: Field conditions - typical trench surcharge

[10] Ibid, Page 27

Conclusions

Many different issues significantly affect the decision making process used to set the final location of a new pipeline relative to existing underground utilities. The design of a new pipeline must consider needs to maintain and repair to all other adjacent utilities along its entire route. Natural and induced conditions can lead to deterioration and failure, which in turn leads to contamination and damage. The ability to readily and effectively address these needs depends predominantly on the decisions made in the original location of the pipeline.

EXHIBIT C

Michelle Fossum

From: Michelle Fossum
Sent: Tuesday, July 15, 2014 9:19 AM
To: Stanley Perdue
Subject: RE: From Allan Margitan

FYI – Just got off the phone with Allan. Based on the concession in your brief, he intends to take action to force the issue. You may not be able to back up the train on this one. I haven't researched it recently, but I know there can be ramifications from an admission in a party's brief. I'm not sure yet what position SRHD will take.

Michelle K. Fossum

Michelle K. Fossum, P.S.
201 W. North River Drive, Suite 460
Spokane, WA 99201
(509) 324-9500
(509) 324-9505 fax
mfossum@fossumlegal.com

Please note that my email address has changed to mfossum@fossumlegal.com.

From: Stanley Perdue [mailto:perduelaw@me.com]
Sent: Tuesday, July 15, 2014 8:57 AM
To: Michelle Fossum
Subject: Re: From Allan Margitan

Okay, I understand. I will amend my brief.

Thanks.

Stanley

On Jul 15, 2014, at 9:55 AM, Michelle Fossum <mfossum@fossumlegal.com> wrote:

It isn't clear from your brief that it is a limited concession. Part of the basis of the ruling was that it was unclear whether the water line was within ten feet or not. Your client was ordered to find the location of the water line as part of the Health Officer's decision on the appeal. We have yet to have any communication from you on that point, unless something has been provided directly to SRHD that I am not aware of. Now, it appears that your client has agreed that there is a violation of the horizontal separation. If that is true, SRHD must consider what to do about that violation.

Michelle K. Fossum

Michelle K. Fossum, P.S.
201 W. North River Drive, Suite 460
Spokane, WA 99201

EXHIBIT D

INSPECTION RESULTS

Report run on 09-03-2014 15:15:46

SPOKANE COUNTY

Spokane County Building and Planning
1026 W Broadway Avenue, Spokane WA 99260
(509) 477-3675
www.spokanecounty.org/bp

Application # RH-11004657 **Parcel #** 17274.9110 **Application Type** RESIDENTIAL ADDITION

Project Descr DEMOLISH A PORTION OF & REBUILD A PORT **Site Address** 14404 W CHARLES RD NINE MILE FALLS

Inspector	Inspection Type	Date	Status	Comments
Tim Utley	FINAL	03-Sep-14	RequiresReinspect	

Action Description	Status	Status Date

Task Description	Status	Comments
Inspection Notes	Violations found	1)You have notified us of encroachment of a septic drain field into the restricted zone of your water supply line which you claim endangers your potable water supply. You have also provided us corroboration of the issue through copies of SRHD documentation. A Certificate of Occupancy can be issued upon receipt of documentation (SRHD and/ or water puveyor) accepting the waterline and it's adequacy for residential use.

Required Correction:

EXHIBIT E

ALLAN MARGITAN
P.O Box 328
Nine Mile Falls, WA 99206
(509) 990-6169

Michelle Fossum
Spokane Regional Health District
1101 West College Avenue
Spokane, WA 99201

January 5, 2014

Re: On-Site Septic System at 14418 West Charles Road, Nine Mile Falls.

Dear Ms. Fossum,

Per our discussion of January 2, 2015:

Again I informed you that Spokane County Building and Planning will not grant me a "Certificate of Occupancy" on my home due to the District's actions. Again I brought to your attention that my building permit is on its **last extension** due to the actions of the District. I explained that my permit expires April 3, 2015. The District's actions and failure to perform its duty have prevented me from obtaining a "Certificate of Occupancy".

I asked by what date the district was going to assure me that my drinking water-line is provided the protection afforded under Washington law.

I also questioned when the district was going to require Hanna's Septic System to be removed from my dedicated easement as the District was negligent in allowing them to place it there. I inquired if the removal would be prior to April 3, 2015.

I request, in writing, the answers to my questions.

The laws of Washington State allow me to view or obtain a copy of all documents, information, notes, files, photos, or any other type of information that the Spokane Regional Health District and its employees have ever possessed regarding violations within its jurisdiction. I am requesting documentations of all violations, reports, and orders regarding On-Site Septic Systems that have been filed since 2000. I make this request for the above through this letter. Please contact me at 509-990-6169 when the above is available for my viewing. You may also reach me at my mailing address.

I have enclosed a copy of my letter to John Wiesman, Secretary of Health, Department of Health. It clearly explains the situation the District has placed me in through its negligence.

I expect your prompt response as this matter has been drawn-out considerably. The delays have continued to cost me greatly.

Sincerely,

Allan Margitan

ALLAN MARGITAN
P.O Box 328
Nine Mile Falls, WA 99206
(509) 990-6169

Michelle K, Fossum
201 W. North River Dr. Suite 460
Spokane, WA 99201

July 14, 2014

Re: On Site Septic System (OSS) located at 14418 West Charles Road, Nine Mile Falls, WA.

Dear Michelle,

Purdue Law Firm's "MEMORANDUM IN SUPPORT OF MOTION TO DISMISS." States:

1) *page 2, line 3, "The Hannas agree that their drain field is within the Short Plat easement and within ten feet of a pressurized water line, ..."*
2) *page 2, line 14, "...the drain field is within ten feet of a pressurized water line."*

Purdue Law Firms verifies that Spokane Regional Health Department (SRHD) failed:

1) To apply the laws of Washington State during the installation of the OSS.
2) To adequately investigate my complaint regarding the OSS.
3) To assure the health and safety of others before entering into an agreement with Hannas'.
4) To apply the laws of Washington State after the complaint was received.

Joel McCullough, MD, MPH, MS ruling of January 27, 2014 states:
"In reviewing the associated documentation, including the "Declaration of Mark Hanna", there is insufficient documentation to definitely determine whether or not your water line is within 10 feet of the drain field (Chapter 246-272A WAC requires a minimum setback of a horizontal distance of 10 feet between a pressured water supply line and the edge of soil dispersal component and reserve area). Therefore, it is unknown if there is non-compliance of the onsite sewage system at the address of 14418 W. Charles Road, Nine Mile Falls, Washington as it relates to the location of your pressurized water line based on the currently available documentation.
To determine if there is a potential public health risk, I am requesting that Mr. Hanna provide documentation to establish the exact location of the water line and its relationship to the drain field laterals to determine if there is non-conformity of the onsite sewage system and, if so, determine what mitigation measures would be necessary to bring the onsite sewage system into conformity."

SRHD must enforce the laws of Washington State by immediately decommissioning the OSS located at 14418 West Charles Road, Nine Mile Falls, WA.

Sincerely,

Allan Margitan

ALLAN MARGITAN
P.O Box 328
Nine Mile Falls, WA 99206
(509) 990-6169

Spokane Regional Health District
1101 West College Avenue
Spokane, WA 99201

August 28, 2014

Re: On Site Septic System at 14418 West Charles Road, Nine Mile Falls.

Dear Ms. Fossum,

Spokane County Building and Planning will not issue a Certificate of Occupancy to me for my home at 14404 West Charles Road, Nine Mile Falls until Spokane Regional Health District provides documentation "accepting the waterline and it's adequacy for residential use."

I would assume this means that you must provide me with documentation stating that the septic system at 14418 West Charles Road, Nine Mile Falls which has been allowed to continue to operate within my forty foot easement does not impact my drinking water (water line).

Also, please provide me with documentation confirming my water line is given the protection as required under Washington Laws and codes enacted to protect drinking water. As you are well aware, the septic system is installed in the forty foot easement required by the District in the development of the short-plat. Nowhere does it suggest that my water line must be placed in a specific area within the forty feet.

Is the District able to confirm that this septic system will not impact my drinking water? I request the District ensure there will be no safety issues for my family and my guests at this residence due to the District permitting the septic system to continue to operate.

I expect your prompt response as this matter has been drawn-out considerably. The delays have continued to cost me greatly. This documentation must satisfy Spokane County Building and Planning.

Sincerely,

Allan Margitan

EXHIBIT F

PERDUE LAW FIRM

41 Camino De Los Angelitos
Galisteo, NM 87540

T505-424-4704

perduelaw@me.com

January 31, 2014

Dr. Joel McCullough
Public Health Director and Health Officer
Spokane Regional Health District

Re: ***Mark and Jennifer Hanna/ On Site Septic System at 14418 W. Charles Rd., Nine Mile Falls***

Dear Dr. McCullough:

Thank you for your consideration of the Mr. Margitan's expedited appeal request re the above noted septic system. My clients, Mark and Jennifer Hanna would like to address in a cross appeal of your decision that they be required to establish the location of a water line belonging to Mr. Margitan.

Regards,

Stanley Perdue
Attorney at Law

FILED

JUL 08 2015

COURT OF APPEALS
DIVISION III
STATE OF WASHINGTON
By_____

CERTIFICATE OF SERVICE

I, Allan Margitan, certify under penalty of perjury that on July 8, 2015 I have served a copy of ("APPELLANT MARGITAN's RESPONSE BRIEF") the foregoing document to the listed parties via the means indicated

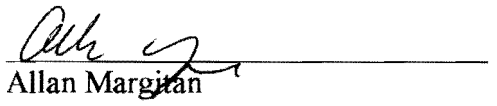
Stanley E. Perdue	X CERTIFIED U.S. MAIL
Perdue Law Firm	____ FACSIMILE
41 Camino Los Angelistors	____ HAND DELIVERY
Galisteo, NM 87540	____ ELECTRONIC DELIVERY

Attorney for Mark and Jennifer Hanna

Michelle K. Fossum,	X CERTIFIED U.S. MAIL
201 W. North River Drive,	____ FACSIMILE
Suite 460, Spokane WA	____ HAND DELIVERY
99201	____ ELECTRONIC DELIVERY

Attorney for Spokane Regional Health District and Board

Dated: July 8, 2015
Signed at Spokane, Washington on July 8, 2015



Allan Margitan