BID DOCUMENTS

FOR

FORMER EASTSIDE CLEANERS VAPOR BARRIER INSTALLATION
910 EAST MAIN STREET, OWOSSO, SHIAWASSEE COUNTY, MICHIGAN

CITY OF OWOSSO
301 W. MAIN STREET
OWOSSO, MICHIGAN 48867

September 6, 2016

NOTICE TO BIDDERS
FORMER EASTSIDE CLEANERS VAPOR BARRIER INSTALLATION,
FOR THE CITY OF OWOSSO, MICHIGAN

Sealed proposals will be received by the City of Owosso for the **Former Eastside Cleaners Shoring Installation** bid and should be addressed to:

Bid Coordinator
City of Owosso
301 W. Main Street
Owosso, Michigan 48867

Major items include:

- Mobilization
- Supplying and Installing Vapor Barrier System Components/Materials
- Demobilization

Bids will be accepted until **3:00 p.m. Thursday, September 22, 2016** for the **FORMER EASTSIDE CLEANERS VAPOR BARRIER INSTALLATION,** at which time bids will be publicly opened and read aloud at City Hall.

All bids must be in writing and must contain an original signature by an authorized officer of the firm. Electronic bids (i.e., telephonic, fax, email, etc.) are **NOT** acceptable.

All bids must be accompanied by a certified **Cashier's Check or Bid Bond** for a sum of not less than five percent (5%) of the total bid and shall be made payable to the city of Owosso. This amount shall be forfeited in the case of failure on the part of the successful bidder to sign a contract and furnish satisfactory bonds as required within ten (10) consecutive calendar days after the acceptance of the bid by the city of Owosso.

All bids shall clearly contain on the outside of the **sealed** envelope in which they are submitted:

FORMER EASTSIDE CLEANERS VAPOR BARRIER INSTALLATION, Bid

Hard copies of the proposal, contract forms and specifications are on file and may be obtained for a fee in accordance with the city's FOIA Policy at the office of the Bid Coordinator, City Hall, 301 West Main Street, Owosso, Michigan 48867. Bid documents are available at no charge on our website at www.ci.owosso.mi.us or on the MITN website at www.mitn.info.

The city reserves the right to accept any proposal; or to reject any proposal; to waive irregularities in a proposal; or to negotiate if it appears to be in the best interest of the city of Owosso.

No work can begin before **October 3, 2016** and all work is to be completed by **November 18, 2016**.

INQUIRIES/ADDENDUMS

Addendums will be available on the city's website at www.ci.owosso.mi.us and on the MITN website at www.mitn.info.

All inquiries regarding this bid request must be received at least five (5) calendar days prior to the submission and shall be received in, and responded to, in writing, or via FAX at 989-723-8854 or by e-mail to jane.hunt@ci.owosso.mi.us, and be address to the Bid Coordinator. Call 989-725-0550 to arrange a field inspection.

INSTRUCTIONS TO BIDDERS

1. Bidders are requested to use the Vendor Proposal form furnished by the city when submitting proposals. Bid responses must be in a **sealed** envelope/container when submitted and clearly marked on the outside indicating the name of the bid.

2. Proposals, to receive consideration, must be received prior to the specified time of opening and reading as designated in the invitation.

3. Each proposal must be signed by the bidder with his usual signature. Bids by partnerships should be signed with the partnership name by one of the members of the partnership or by an authorized representative, followed by the signature and title of the person signing. Proposals by corporations must be signed with the name of the corporation, followed by the signature and designation of the president, vice-president or person authorized to bind it in the matter. **Any paperwork not filled out properly or signed will cause the bid to be considered non-responsive and shall be rejected by the city.**

4. Proposals having and erasures or corrections thereon may be rejected unless explained or noted over the signature of the bidder.

5. Proposals should be mailed or delivered to the Bid Coordinator's Office, City Hall, 301 W. Main Street, Owosso, MI 48867.

6. Special conditions included in this invitation shall take precedence over any conditions listed under General Conditions or Instructions to Bidders.

7. Insurance Coverage – the winning bidder, prior to execution of the contract, shall file with the city copies of completed certificates of insurance naming the city of Owosso as an additional insured party, as evidence that the contractor carries adequate insurance satisfactory to the city.

8. The city of Owosso has a local preference policy for the purchase of goods and services. The policy in part states: *A business located within the city limits and paying real or personal property taxes to the city of Owosso will be granted a six percent (6%) bid advantage or $2,500, whichever is less, over a business located outside Shiawassee County. A business located outside the city limits but within Shiawassee County and paying property taxes to the county will be granted a three percent (3%) bid advantage or $2,500, whichever is less, over a business located outside Shiawassee County. The preference also applies to subcontractors performing twenty-five percent (25%) or more of the work of a general contract.*

9. **The following items must be included with the bid response:**
    a. **Vendor Proposal / Acknowledgement of Addendum(s)**
    b. **Local Preference Affidavit**
    c. **W-9 Request for Taxpayer ID No. and Certification**
    d. **Bid Bond**

BID Proposal

FORMER EASTSIDE CLEANERS VAPOR BARRIER INSTALLATION, FOR THE CITY OF OWOSSO, MICHIGAN

TO: THE CITY OF OWOSSO (HEREINAFTER CALLED THE "CITY")

Bidder must provide pricing for each item listed. If additional pricing elements are being offered by the bidder are to be listed under "other services/items offered."

The undersigned, having examined the bid proposal forms and specifications, does hereby offer to **Former Eastside Cleaners Vapor Barrier Installation** from October 3, 2016 through November 18, 2016 listed below at the following prices to wit:

Base Bid Item No.	Bid Quantity	Description	Unit Price	Item Bid Price
1	**MOBILIZATION AND PROJECT ADMINISTRATION**			
1a	LS	Mobilization, Demobilization and Project Administration	$ LS	$
2	**VAPOR BARRIER INSTALLATION**			
2a	LS	Installation of vapor barrier system components	$ LS	$
2b	330	VaporVent trenchless gas collection piping	$ /Ln Ft	$
2c	4	4-inch vapor vent outlets and vent riser stubs	$ /Each	$
2d	6,300	Geo-Seal Film-11 Geomembrane	$ /Sq Ft	$
2e	6,300	Geo-Seal CORE vapor barrier material	$ /Sq Ft	
2f	6,300	Geo-Seal BOND protection material	$ /Sq Ft	$
		TOTAL BASE BID AMMOUNT		**$**

Bidder's Initial _____

VARIANCE FROM SPECIFICATIONS: If the bidder is unable to comply with the specifications as outlined, the bidder shall clearly note these variations from the specifications. The bidder may also propose additions to these specifications for the city to consider, but the costs associated with these additions shall be stated separately.

The undersigned agrees that if the city accepts this proposal, Contractor will, within 10 consecutive calendar days after receiving notice of this acceptance, enter into a contract to furnish all labor, equipment and tools necessary to execute the work at the unit prices named in the bid proposal. Contractor will furnish the surety for performance, for 100% of this bid, which shall be accepted and approved by the city.

The undersigned agrees that if the city accepts this proposal, Contractor will start this project no sooner than October 3, 2016 and will substantially complete the entire work under this contract by November 18, 2016. This schedule may be extended for rain days or cold weather for calendar days after November 18, 2016, only as approved by the city of Owosso.

On behalf of _____, I hereby submit this proposal for **Former Eastside Cleaners Vapor Barrier Installation** for your consideration. The undersigned acknowledges that this proposal is subject to the General Conditions and the General Specifications included in the contract documents. In submitting this proposal, it is understood that the right is reserved by the CITY to reject any and all proposals, and waive any irregularities in the bidding process. The CITY may award this contract based on any combination of the total bid and/or alternates.

Dated and signed at _____ State of _____

This _____ day of _____, 20____.

_____

Bidder

Witness:

_____ By/s/

_____

Business Address

_____

Signature

_____

Title

_____

Telephone Number

LOCAL PREFERENCE POLICY

The following affidavit should be completed if a bidder is located within Shiawassee County or intends to sub-contract more than twenty-five percent (25%) to a Shiawassee County based business: The city of Owosso has a local preference policy for the purchase of goods and services as recorded in the city ordinance in section 2-348. "Lowest qualified bidder" defined.

1. The term "lowest qualified bidder," as used in this division, shall mean the lowest bidder having qualifications to perform the work which are satisfactory to the council. The lowest bidder shall be determined based on an adjusted bid tabulation which shall be prepared in the following manner: To the bid of any bidder which is neither a city-based business nor a county-based business shall be added an amount equal to six (6) percent of the bid or two thousand five hundred dollars ($2,500.00), whichever is less.

2. To the bid of any bidder which is a county-based business shall be added an amount equal to three (3) percent of the bid or two thousand five hundred dollars ($2,500.00), whichever is less; provided, however, that if no bid is received from a city-based business, no additional amount shall be added to the bid of a county-based business.

3. "Owosso-based business" shall be interpreted to mean a business registered with the county clerk or a corporation registered with the state having a business address within the city limits which pays real and/or personal property taxes levied by the city.

   The term "county-based business" shall be interpreted to mean a business other than a city-based business registered with the county clerk or a corporation registered with the state having a business address within the county which pays real and/or personal property taxes levied by the county.

4. If twenty-five (25) percent or more of a contract for construction or other services is to be subcontracted by a city-based business bidder to a non-city-based business or businesses, or by a county-based business bidder to a non-county-based business or businesses, the adjusted bid shall be calculated by applying the provisions of this section separately to each portion of the contract based on the status of the contractor or subcontractor performing that portion of the contract as a city-based or county-based business.

AFFIDAVIT

In accordance with Section 2-348 of the Owosso city code, the bid from a business located in Shiawassee County shall be adjusted to reflect a preference. In order for the city to calculate the adjustment, the bidder hereby deposes and states that their business address is registered, and is currently paying real and/or personal property taxes in Shiawassee County at the following address:

_____
Registered business address

The affiant further deposes and states that a sub-contract with a business registered, and paying real and/or personal property taxes in Shiawassee County will be executed for a percentage equal to or greater than twenty-five percent (25%) as stated below:

_____
Business name and address of sub-contractor

_____
Percentage of contract

_____
Authorized signature

_____ _____
Date Title

_____
Company name

SIGNATURE PAGE AND LEGAL STATUS

The undersigned certifies that he is an official legally authorized to bind his firm and to enter into a contract should the city accept this proposal.

Bid proposal by _____
(Name of Firm)

Legal status of bidder. Please check the appropriate box and **USE CORRECT LEGAL NAME.**

A. Corporation ____ ; State of Incorporation _____

B. Partnership ____ ; List of names _____

_____

C. DBA ____ ; State full name _____ DBA

_____

_____

D. Other ____ ; Explain _____

_____

Signature of Bidder _____ Title _____
(Authorized Signature)

Signature of Bidder _____ Title _____
(Authorized Signature)

Address _____ City _____ Zip _____

Telephone ( ) _____

Signed this _____ day of _____ 20____.

Bidder acknowledges receipt of the following Addenda:

ADDENDUM NO.	BIDDER'S INITIALS
_____	_____
_____	_____
_____	_____

W-9 INFORMATION FOR LEGAL STATUS

Sole proprietor. Enter your individual name as shown on your income tax return on the "Name" line. You may enter your business, trade, or "doing business as (DBA)" name on the "Business name/disregarded entity name" line.

Partnership, C Corporation, or S Corporation. Enter the entity's name on the "Name" line and any business, trade, or "doing business as (DBA) name" on the "Business name/disregarded entity name" line.

Disregarded entity. Enter the owner's name on the "Name" line. The name of the entity entered on the "Name" line should never be a disregarded entity. The name on the "Name" line must be the name shown on the income tax return on which the income will be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a domestic owner, the domestic owner's name is required to be provided on the "Name" line. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on the "Business name/disregarded entity name" line. If the owner of the disregarded entity is a foreign person, you must complete an appropriate Form W-8.

Note. Check the appropriate box for the federal tax classification of the person whose name is entered on the "Name" line (Individual/sole proprietor, Partnership, C Corporation, S Corporation, Trust/estate).

Limited Liability Company (LLC). If the person identified on the "Name" line is an LLC, check the "Limited liability company" box only and enter the appropriate code for the tax classification in the space provided. If you are an LLC that is treated as a partnership for federal tax purposes, enter "P" for partnership. If you are an LLC that has filed a Form 8832 or a Form 2553 to be taxed as a corporation, enter "C" for C corporation or "S" for S corporation. If you are an LLC that is disregarded as an entity separate from its owner under Regulation section 301.7701-3 (except for employment and excise tax), do not check the LLC box unless the owner of the LLC (required to be identified on the "Name" line) is another LLC that is not disregarded for federal tax purposes. If the LLC is disregarded as an entity separate from its owner, enter the appropriate tax classification of the owner identified on the "Name" line.

Other entities. Enter your business name as shown on required federal tax documents on the "Name" line. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on the "Business name/disregarded entity name" line.

Please see attached W-9 Request for Taxpayer Identification Number and Certification form for a detailed explanation on filling out the W-9 form.

Form **W-9**
(Rev. December 2011)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See Specific Instructions on page 2.

Name (as shown on your income tax return)

Business name/disregarded entity name, if different from above

Check appropriate box for federal tax classification:
☐ Individual/sole proprietor ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶

☐ Other (see instructions) ▶

☐ Exempt payee

Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

City, state, and ZIP code

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number

			-		-				

Employer identification number

		-							

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 4.

Sign Here | **Signature of U.S. person ▶** | **Date ▶**

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

PROOF OF INSURANCE

This is to certify that the following endorsement is part of the policy(ies) described below:

NAMED INSURED (CONTRACTOR)	**COMPANIES AFFORDING COVERAGE**
	A.
	B.
ADDRESS	**C.**

It is hereby understood and agreed that the city of Owosso, its city council and each member thereof and every officer and employee of the city shall be named as joint and several assureds with respect to claims arising out of the following project:

FORMER EASTSIDE CLEANERS VAPOR BARRIER INSTALLATION, 910 EAST MAIN STREET, OWOSSO, MICHIGAN

It is further agreed that the following indemnity agreement between the city of Owosso and the named insured is covered under this policy: Contractor agrees to indemnify, hold harmless and defend city, its city council and each member thereof and every officer and employee of city from any and all liability or financial loss resulting from any suits, claims, losses or actions brought against and from all costs and expenses of litigation brought against city, its city council and each member thereof and any officer or employee of city which results directly or indirectly from the wrongful or negligent actions of contractor's officers, employees, agents or others employed by Contractor while engaged by contractor in the (performance of this agreement) construction of this project.

It is further agreed that the inclusion of more than one assured shall not operate to increase the limit of the company's liability and that insurer waives any right on contribution with insurance which may be available to the city of Owosso.

The contractor, or any of their subcontractors, shall not commence work under this contract until they have attained the insurance required below, and shall keep such insurance in force during the entire life of this contract. All coverage shall be with insurance companies licensed and admitted to do business in the State of Michigan and acceptable to the city of Owosso. The requirements below should not be interpreted to limit the liability of the Contractor. All deductibles and SIR's are the responsibility of the Contractor.

The Contractor shall procure and maintain the following insurance coverage:

1. **Worker's Compensation Insurance** including Employers' Liability Coverage, in accordance with all applicable statutes of the State of Michigan.

2. **Commercial General Liability Insurance** on an "Occurrence Basis" with limits of liability not less than $1,000,000 per occurrence and aggregate. Coverage shall include the following extensions: (A) Contractual Liability; (B) Products and Completed Operations; (C) Independent Contractors Coverage; (D) Broad Form General Liability Extensions or equivalent, if not already included.

3. **Automobile Liability** including Michigan No-Fault Coverages, with limits of liability not less than $1,000,000 per occurrence, combined single limit for Bodily Injury, and Property Damage. Coverage shall include all owned vehicles, all non-owned vehicles, and all hired vehicles.

4. **Additional Insured:** Commercial General Liability and Automobile Liability, as described above, shall include an endorsement stating the following shall be ***Additional Insureds*****:** City of Owosso, all elected and appointed officials, all employees and volunteers, all boards, commissions, and/or authorities and board members, including employees and volunteers thereof. It is understood and agreed by naming City of Owosso as additional insured, coverage afforded is considered to be primary and any other insurance the city of Owosso may have in effect shall be considered secondary and/or excess.

5. Cancellation Notice: All policies, as described above, shall include an endorsement stating that it is understood and agreed that a Ten (10) days notice for non-payment of premium is required and a Thirty (30) days notice is required for Non-Renewal, Reduction, and/or Material Change, shall be sent to: City of Owosso, Bid Coordinator, 301 W. Main Street, Owosso, Michigan 48867.

6. **Proof of Insurance Coverage**: The Contractor shall provide the city of Owosso, at the time that the contracts are returned by him/her for execution, a Certificate of Insurance as well as the required endorsements. In lieu of required endorsements, if applicable, a copy of the policy sections where coverage is provided for additional insured and cancellation notice would be acceptable. Copies or certified copies of all policies mentioned above shall be furnished, if so requested.

If any of the above coverages expire during the term of this contract, the Contractor shall deliver renewal certificates and endorsements to the city of Owosso at least ten (10) days prior to the expiration date.

Please include a copy of insurance declaration verifying amounts of coverage. The verification of insurance is not an insurance policy and does not amend, extend or alter the coverage afforded by the policies listed herein. Notwithstanding any requirement, term, or condition of any contract or other document with respect to which this certificate or verification of insurance may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

DATE _____ BY _____
Authorized Insurance Agent

AGENCY _____ TITLE _____

ADDRESS _____

_____

CONTRACT FORMS

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1.0 GENERAL CONDITIONS

Refer to Appendix A for General Conditions associated with the Bid Documents.

2.0 BACKGROUND

2.1 Site Information

The Site consists of one parcel, which was combined from four legal parcels with street addresses of 830, 832, 834, and 910 East Main Street, in Owosso, Shiawassee County, Michigan. The Site is listed under a combined parcel number of 050-580-000-070-00, totals 0.68 acres, has an address of 910 East Main Street, and is owned by Southwind Restaurant, LLC (Property Owner).

The Site is currently undergoing remedial activities under a separate contract with the State of Michigan to remove soils within the property boundaries located above the water table that contain contaminant concentrations exceeding the Part 201 Residential and Nonresidential Soil Volatilization to Indoor Air Inhalation (SVII) cleanup criterial and/or Soil Saturation (Csat) screening levels.

Standard and other historical sources document that prior ownership of the eastern 910 East Main Street building was listed as East Side Super Service beginning in the early 1930s, and Palmer's Sales and Service Filling Station in 1945. The site was likely operating as a filling station and automotive service garage until the early 1960s. The site operated as a drycleaner under various names from the late 1960s until 2012, including John's One Hour Martinizing & Shirt Laundry; One Hour Martinizing & Shirt Laundry; Munley Co; and Eastside Cleaners.

The residential buildings formerly addressed 830, 832, 834 East Main Street, were demolished in January 2016, including removal of foundations and abandonment of sub-grade utility leads (i.e., sanitary sewer, water, and natural gas). Above-grade portions of the former 910 East Main Street (former drycleaner) building were also demolished in January 2016. However, the floor slab, footings, and associated buried utility leads (i.e., sanitary sewer, water, and natural gas) to the former building were left in place.

Exterior portions of the Site consist of concrete parking lot pavement and sidewalk areas surrounding the former 910 East Main Street building to the west, east, and south, and areas of groomed grass and landscaping to the north, east, and south. Areas surrounding the former residential buildings west of the concrete parking lot, consist of grass/landscaping, and areas of graded foundation fill.

An unpaved alleyway adjoins the Site to the south, beyond which residential properties are located. Adjoining properties to the north and east consist of commercial properties. Residential properties adjoin the Site to the west.

Utilities

Figure 2 in Appendix B depicts the approximate location of buried sanitary sewer, storm sewer, water, and natural gas utilities at the Site and within the adjoining East Main Street (M-21) and South Gould Street right-of-ways (ROWs), based on Miss Dig markings observed during previous subsurface investigations. Overhead electrical utilities with corresponding telecommunications utilities are also present at the Site and in the adjoining East Main Street and South Gould Street ROWs.

Current On-Site Buildings

The residential buildings formerly addressed 830, 832, 834 East Main Street, were demolished in January 2016, including removal of foundations and abandonment of sub-grade utility leads (i.e., sanitary sewer, water, and natural gas). Above-grade portions of the former 910 East Main Street (former drycleaner) building were also demolished in January 2016. However, portions of the floor slab and footings were left in-place. Associated buried utility leads (i.e., sanitary sewer, water, and natural gas) to the former building were terminated prior to the start of remedial excavation activities.

No other building structures exist at the site.

Proposed Building

The site will be redeveloped with a new retail plaza building, anchored by a Qdoba restaurant. The plaza will consist of a single building with a 2,808 square foot restaurant and two tenant spaces of 1,713 and 1,770 square feet, for a total of 6,291 square feet. The proposed building will be a single-story slab-on-grade structure.

Refer to Figures 2, 3, 3A, and 4A within Appendix B for the location and layout of the proposed building. Appendix C contains the proposed building/site plan.

2.2 Contaminant Assessment Data

The site is a "facility" as defined under Part 201 of P.A. 451 of 1994, as amended based on the presence of petroleum compounds and chlorinated solvents in soil and groundwater, which exceed the Part 201 Residential and Nonresidential Generic Cleanup Criteria, as outlined below.

Global Environmental Engineering (GEE) completed a Phase I Environmental Site Assessment (ESA) for the Site on October 7, 2014.

Recognized Environmental Conditions identified as part of the GEE Phase I ESA are outlined below.

- Based on review and the completion of a previous Phase I ESA, the site (910 East Main, eastern building) historically operated as a gasoline station and automotive service garage from the late 1920's to early 1960s and a drycleaner from the late 1960s to 2012. A Baseline Environmental Assessment (BEA) was completed for the site in August 2012 by Rubob Real Estate LLC and Crowne Point Properties LLC indicating the presence of 1,2,4-trimethylbenzene, n-propylbenzene, n-butylbenzene, cis-1,2-dichloroethylene, tetrachloroethylene, trichloroethylene in the groundwater.

- The site (formerly) known as 834 East Main Street is a residential parcel located adjacent to the 910 East Main Street (eastern most building) parcel. During previous investigations, the 910 East Main street parcel was not delineated as part of the scope of work. The potential exists that the historical use of the 910 E Main Street parcel could have negatively affected the 834 East Main Street parcel.

GEE completed a Phase II investigation in 2012, which included a subsurface investigation on the site consisting of eight (8) soil borings (SB-1 through SB-8) to depths between 12 and 16 feet

below surface grade, and the collection of soil and groundwater samples for laboratory analysis of volatile organic compounds (VOCs), polynuclear aromatic compounds (PNAs), cadmium, chromium, and lead, or some combination thereof. Additional subsurface investigation activities were conducted by PM Environmental., Inc. (PM; the project Professional) in April and November 2015, which included 22 soil borings (PSB-1 through PSB-22) to a maximum depth of 25.0 feet below ground surface (bgs), and the collection of soil and groundwater samples for laboratory analysis of VOCs.

Soil Data

Subsurface geology at the site generally consists of interbedded layers of sand and clay to a depth of 25.0 feet bgs, the maximum depth explored.

Analytical results of soil samples collected from the site documented the presence of benzene, sec-butylbenzene, cis-1-2-dichloroethylene, ethylbenzene, naphthalene, n-propylbenzene tetrachloroethylene, toluene, trichloroethylene, 1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, vinyl chloride, and xylenes concentrations in soil above the Part 201 Residential and Nonresidential Groundwater Surface Water Interface Protection (GSIP), Drinking Water Protection (DWP), Direct Contact (DC), and/or SVII cleanup criteria, with concentrations of tetrachloroethylene also identified above the Csat screening levels.

The highest soil concentrations are present at or above the apparent water table in areas north and east of the former 910 East Main street building, and extend laterally to the south and east with the highest concentrations in those areas generally correlating with capillary fringe soils located above the water table. The horizontal and vertical extent of soil concentrations exceeding the Part 201 Residential and Nonresidential cleanup criteria has not been fully defined to the north, east, and south. However, the horizontal extent of soil concentrations within the Site boundaries above the water table that exceed the Part 201 Residential and Nonresidential SVII cleanup criteria and Csat screening levels have generally been defined.

Groundwater Data

Perched groundwater was generally encountered at the sand/clay interface or within sand seams interbedded within clay, at depths between 7.0 and 10.0 feet bgs, with groundwater encountered at progressively deeper intervals towards the south property boundary. The perched groundwater is not representative of an aquifer but due to the interbedded nature of sand and clay geology at the Site may be in communication with a lower aquifer.

Analytical results of groundwater samples collected from the site documented the presence of benzene, cis-1-2-dichloroethylene, ethylbenzene, naphthalene, n-propylbenzene, tetrachloroethylene, trichloroethylene, 1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, vinyl chloride, and xylenes concentrations in groundwater above the Part 201 Residential and Nonresidential Groundwater Surface Water Interface (GSI) and/or Drinking Water (DW), cleanup criteria. Concentrations of benzene, cis-1-2-dichloroethylene, tetrachloroethylene, trichloroethylene, and vinyl chloride, also identified above the Michigan Department of Environmental Quality (MDEQ) Residential and Nonresidential Vapor Intrusion Screening Levels (VISLs).

The highest groundwater concentrations are located at or above the apparent water table in areas north and west of the former 910 East Main Street building, and extend laterally to the south and east. The horizontal and vertical extent of groundwater concentrations exceeding the Part 201

Residential and Nonresidential cleanup criteria has not been fully defined to the north, east, and south.

Remediation Activities and Funding Sources for Site Activities

Remediation (soil excavation) activities are currently being conducted on the eastern portion of the site under a separate contract with the State of Michigan to remove soils within the property boundaries located above the water table that contain contaminant concentrations exceeding the Part 201 Residential and Nonresidential SVII cleanup criterial and/or Csat screening levels. Refer to Figures 3A and 4A located in Appendix B for the boundaries of the excavation area, the maximum depth of which is 10.0 feet below ground surface.

A vapor barrier will be installed at the proposed building to prevent the migration of subsurface vapors into the proposed building by providing a barrier to upward migration of vapors to the proposed building.

Multiple funding sources are being utilized to complete eligible activities such as remediation and vapor barrier installation, including MDEQ Grant and Loan Funds, and MDEQ Strategic Water Quality Initiatives Funds, as indicated on Figure 3 located in Appendix B. The vapor barrier installation activities will be funded using MDEQ Loan funds, under contract with the City of Owosso.

2.3 Vapor Barrier Objectives and Approach

The vapor barrier installation is to be completed safely (i.e., no incidents), in full compliance with applicable laws and in a cost-effective manner. The objective of the vapor barrier installation is to prevent the migration of subsurface vapors into the proposed building by providing a barrier to upward migration of vapors to the proposed building as depicted in the site/building plans included in Appendix C. The vapor barrier must provide pressure relief of sub-slab vapors and venting of vapors present beneath the barrier to the atmosphere above the roof line. Refer to Section 4.0 for vapor barrier installation requirements.

To accomplish this, bidders should prepare their respective proposals based upon the installation of a vapor barrier to the limits of interior building areas noted on the site/building plans within Appendix C.

2.4 Vapor Barrier Installation Oversight

The Professional or his designated onsite representative shall coordinate all construction activities in conjunction with the City of Owosso and Property Owner in connection with the site. The Professional shall be responsible for final inspections, including verification of vapor barrier system tightness following vapor barrier smoke testing by the vapor barrier installation contractor.

The Professional will administer the contract between the City of Owosso and the vapor barrier installation contractor, and provide any instructions, directions and notices to the vapor barrier installation contractor, required by the contract. The Professional will provide onsite representatives to review, inspect, verify, document and administer the vapor barrier installation activities and work performed by the vapor barrier installation contractor. The Professional will sign all documents required of the City of Owosso for the vapor barrier installation, and if applicable, confirm and approve changes to the design and field installation of vapor barrier components, if any; conduct job meetings to confirm job progress; take actions to maintain the

project schedule and resolve construction problems; provide the City of Owosso with weekly reports and obtain all certifications, reports and data from the vapor barrier installation contractor.

3.0 PROPOSAL SUBMITTALS

The following submittals are required as part of the vapor barrier installation proposal:

3.1 Qualifications, References, and Related Project Experience

The Bidder is required to provide a list of qualifications, company references and project experience related to the size and scope of this project. Additionally, Bidders should identify any subcontractors that may be included as a part of the project.

As a part of their qualifications, the Bidder is required to provide the following information:

- Experiences Modification Ratio (EMR) for the last three years;
- Insurance Certificates;
- Any Occupational Safety and Health Administration (OSHA) citations received in the last five years;
- Description of vapor barrier installation experience for similar projects, including sites impacted with the chlorinated solvents and petroleum compounds identified at the site.
- Documentation that the bidder is a manufacturer-certified installer, including certification expiration dates, as applicable.

3.2 Project Approach and Schedule

The Bidder must provide a general project approach, including task sequencing, prioritization, and task duration. Bidder's project approaches should include, at a minimum, the following items:

- Site-specific Health & Safety Plan Preparation;
- Mobilization and staging/storage of materials;
- Vapor barrier sequencing (including installation of sub-membrane venting system components and outlets; installation of the vapor barrier membrane system; coupon (thickness) and tightness testing (smoke testing), and final patching if smoke testing identifies perforations or imperfections in the membrane);
- Post-installation demobilization

An overall project schedule, including milestones for completion of each task based on the Bidder's proposed approach, shall be provided as part of the Bidder's proposal.

Bids that do not meet the above requirements will not be considered.

3.3 Construction Cost Estimate

The Bidder will provide a summary of costs for the completion of the vapor barrier installation in a unit cost/total cost format on the Bid Proposal included in the Bid Documents.

Any optional cost items must be identified independently, as must any assumptions, exceptions, or limitations. In addition to the items above, the manufacturer's standard warranty period for the proposed vapor barrier must be clearly identified.

The following is a summary of base bid pay items:

a) Item 1a - Mobilization, Demobilization, and Project Administration
   1) Payment: Payment for Line Item 1 b shall be paid at the Contract Lump Sum Price.
   2) Measurement: Payment for Line Item 1 b shall be based on work actually completed as determined by the percentage of Work received and approved, and as itemized in the approved "Schedule of Values". This item shall be full compensation for all labor, equipment, materials, supplies and incidentals necessary to complete the following: mobilization of all the required material, supplies, personnel and equipment necessary to complete the project; and attend daily site health and safety meetings, progress meetings, and inspection meetings.

      This item also includes mobilization and demobilization of all the required material, supplies, personnel and equipment necessary to complete the project, general administration of the Work, which includes, but is limited to preparation of a schedule of values, invoicing, payment processing, progress meetings, project management, and coordination. This item also includes all other work and expenses incidental thereto for which payment is not provided under other items.

b) Item 2a – Installation of Vapor Barrier Components
   1) Payment: Payment for Line Item 2a shall be paid at the Contract Lump Sum Price.
   2) Measurement: Payment for Line Item 2a shall be based on work actually completed as determined by the percentage of Work received and approved, and as itemized in the approved "Schedule of Values". This item shall be full compensation for all labor, equipment, materials, supplies and incidentals necessary to install the vapor barrier system as identified in the Figure D1 - Proposed Vapor Barrier Layout (Appendix D), including installation of sub-membrane vent piping, connections, and end outlets into sub-slab fill materials installed by the property owner, installing four-inch poly-vinyl chloride (PVC) vent riser stubs, sealing/detailing up to 60 utility penetrations, and construction quality assurance testing (i.e., coupon testing and smoke testing). This item also includes all other work and expenses incidental thereto for which payment is not provided under other items.

c) Item 2b- Vapor Vent Trenchless Gas Collection System Piping
   1) Payment: Payment for Line Item 2b shall be paid for at the Contract Unit Price per linear foot.
   2) Measurement: Payment for Line Item 2b shall be based on the number of linear feet of vapor vent gas collection piping installed, inclusive of any piping connections /fittings and associated supplies required to meet the piping layout depicted in as identified in Figure D1 - Proposed Vapor Barrier Layout (Appendix D). Payment shall be

determined by measuring the total linear footage of vapor vent piping installed prior to installation of the vapor barrier membrane.

d) Item 2c- 4-Inch Vapor Vent End Outlets and Vent Riser Stubs
   1) Payment: Payment for Line Item 2c shall be paid for at the Contract Unit Price per Vapor Vent End Outlet installed.
   2) Measurement: Payment for Line Item 2c shall be based on the number of Vapor Vent End Outlets installed, inclusive of 4-inch diameter vent riser stubs installed to a height of 24-inches above finished floor, as identified in Figure D1 - Proposed Vapor Barrier Layout (Appendix D). Payment shall be determined by based on the number of Vapor Vent End Outlets and associated vent riser stubs installed prior to installation of the vapor barrier membrane.

e) Item 2d- Geo-Seal Film 11 Geomembrane
   1) Payment: Payment for Line Item 2d shall be paid for at the Contract Unit Price per horizontal square foot of Film-11 Geomembrane material installed.
   2) Measurement: Payment for Line Item 2d shall be based on the number of square-feet of Film-11 Geomembrane material installed, as identified in Figure D1 - Proposed Vapor Barrier Layout (Appendix D). Payment shall be determined by measuring the total square footage of Film-11 Geomembrane material installed. Any Film-11 Geomembrane material required for perimeter, foundation, or footing detailing in accordance with manufacturer's installation specifications/requirements is incidental to this item, as is any Film-11 Geomembrane material required to seal/detail utility penetrations up to the specified number of utility penetrations outlined in Item 2a above.

f) Item 2e- Geo-Seal Core Vapor Material
   1) Payment: Payment for Line Item 2e shall be paid for at the Contract Unit Price per horizontal square foot of Core Vapor Material installed.
   2) Measurement: Payment for Line Item 2e shall be based on the number of square-feet of Core Vapor Material installed, as identified in Figure D1 - Proposed Vapor Barrier Layout (Appendix D). Payment shall be determined by measuring the total square footage of Core Vapor Material. Any Core Vapor Material required for perimeter, foundation, or footing detailing in accordance with manufacturer's installation specifications/requirements and/or perimeter application of Core Vapor Material to a height of 4-inches around the interior perimeter walls is incidental to this item, as is any Core Vapor Material required to seal/detail utility penetrations up to the specified number of utility penetrations outlined in Item 2a above.

g) Item 2f- Geo-Seal Bond Protection Material
   1) Payment: Payment for Line Item 2f shall be paid for at the Contract Unit Price per horizontal square foot of Geo-Seal Bond Protection Material installed.
   2) Measurement: Payment for Line Item 2f shall be based on the number of square-feet of Geo-Seal Bond Protection Material, as identified in Figure D1 - Proposed Vapor Barrier Layout (Appendix D). Payment shall be determined by measuring the total square footage of Geo-Seal Bond Protection Material installed. Any Geo-Seal Bond Protection Material required for perimeter, foundation, or footing detailing in accordance with manufacturer's installation specifications/requirements is incidental to this item, as is any Geo-Seal Bond Protection Material required to seal/detail utility penetrations up to the specified number of utility penetrations outlined in Item 2a above.

4.0 SCOPE OF WORK

The Scope of Work (SOW) generally consists of the following work items:

- Mobilization/Demobilization
- Vapor Barrier Installation

The SOW is described further in the following subsections.

4.1 Mobilization and Demobilization

This task includes all mobilization and demobilization tasks required to complete the work including the following items:

- The Contractor shall follow OSHA requirements as described in Title 29 Code of Federal Regulation (CFR), Part 1910, and Section 120 as applicable.

- Mobilization and demobilization of the awarded contractor's personnel and equipment. The awarded contractor will provide all labor, equipment, and materials to complete the SOW.

- The awarded contractor is responsible for the health and safety of their personnel during the project and is responsible for providing all necessary personal protective equipment and safety training for its employees. The awarded contractor shall participate and document a daily health and safety meetings with all onsite personnel.

- The awarded contractor shall conduct a Utility One Call (Miss Dig) and review any historical drawings or documentation prior to commencing any underground construction activities.

- Participate in a pre-construction meeting prior to the commencement of work.

- The awarded contractor shall participate in daily/weekly construction progress meetings.

Invoicing is to be conducted on a monthly basis due on the first business day of each calendar month. Each invoice will be paid on a percent complete basis, as determined by the Professional.

4.2 Vapor Barrier Installation and Requirements

This task includes providing all labor, material, and equipment necessary to install a passive, spray-applied vapor barrier system.

The awarded contractor is required to include a reasonable amount of time into their schedule to allow for supporting routine inspections by the Professional to confirm milestone completion and performance verification (i.e., coupon testing, smoke testing and associated patching) by the awarded contractor, as the vapor barrier installation progresses. The Professional will confirm vapor barrier component installation, whether coupon testing and smoke testing/patching has been completed, and associated milestones achieved. Any materials application and patching activities required to ensure that the required vapor barrier thickness is achieved and that the

vapor barrier is tight and passes associated smoke testing at the time of installation, is considered incidental to this task.

This item will be paid on a lump sum basis for installation and unit basis for installed materials. The awarded contractor will be responsible for reporting materials units to the Professional.

Minimum Vapor Barrier Requirements

A Land Science Technologies Geo-Seal® passive vapor intrusion barrier system (hereafter referred to as the 'vapor barrier') is proposed for the proposed building (6,300 square feet) to prevent the migration of subsurface vapors into the proposed building by providing a barrier to upward migration. The vapor barrier must provide pressure relief of sub-slab vapors and venting of vapors present beneath the barrier to the atmosphere above the roof line.

The vapor barrier material is to be compatible with the VOC concentrations identified in soil and groundwater beneath the site building, as identified in the figures and tables included in Appendix B.

Manufacturer-published vapor barrier diffusion rate specifications for compounds representative of volatile contaminants of concern identified in soil and groundwater beneath the eastern portion of the site must be equivalent to or less than the following:

- Benzene – 6.9E-16 m^2/second
- PCE – 4.0E-17 m^2/second

The vapor barrier associated with the proposed building must be installed by a manufacturer-certified installer and will be constructed of the following components:

- 330 linear-feet of fabric-wrapped VaporVent® trenchless gas collection piping, and any required connectors, installed within the sub-slab fill materials installed by the property owner prior to the installation of the concrete floor slab by the property owner. The VaporVent® acts as a means for collection and pressure relief of sub-slab vapors via vapor vent end outlets and four-inch diameter PVC vertical vent piping that will exit above the roof line of the building.

  A conceptual layout diagram of gas collection piping is included within Figure D1 - Proposed Vapor Barrier Layout (Appendix D). Appendix E includes technical specifications for the VaporVent® piping and associated end outlets.

- A spray applied vapor barrier system within the approximate 6,300 square-foot interior of the proposed building, consisting of an initial layer of Geo-Seal® Film-11 Geomembrane (i.e., cross-laminated high-density polyethylene membrane) over the entire interior footprint of the building followed by the installation of associated penetration/detailing materials at all penetration locations; a spray application of Geo-Seal® CORE vapor barrier material at a minimum thickness of 60 mils; followed by a top layer of Geo-Seal® BOND protection material.

  Appendix E includes technical specifications for the Geo-Seal® Film-11, Geo-Seal® CORE, and Geo-Seal® BOND materials.

The bidders must specify the proposed thickness of the spray applied layer in their proposals, which must be verified via the collection and measurement of 15 coupon samples during installation to document that the required vapor barrier thickness is met.

The vapor barrier material will be spray applied to a height of 4-inches around the perimeter walls, which will ensure a vapor tight seal for the system as a whole, and match the thickness of the surface concrete cap. Coupon testing will be conducted by the vapor barrier contractor during vapor barrier installation to document that the required barrier thickness specification is met.

- Prior to the installation of the vapor barrier, all sub-slab fill materials (i.e., sand and/or gravel) and sub-slab utilities will be installed by the property owner. Sub-slab utility penetrations will be stubbed above finished floor elevation by the property owner to facilitate installation of the vapor barrier such that all penetrations are encapsulated with the vapor barrier material by the vapor barrier contractor using manufacturer-specified termination methods, to ensure a vapor-tight seal. **The base bid for this project includes detailing/sealing up to 60 utility penetrations.**

  Vent riser outlet stubs (four-inch diameter, 24-inch tall PVC) installed by the vapor barrier contractor must be temporarily blocked with expandable plugs and labeled as "vapor mitigation system piping" by the vapor barrier contractor prior to sealing with the vapor barrier material using manufacturer-specified termination methods to ensure that they are differentiated from other piping stubs. The vent riser outlet stubs must be positioned so that they are located within one-inch of the northern wall of the proposed building spaces.

  Although these activities are not included in vapor barrier installation tasks to be conducted by the winning bidder, they have been included to facilitate an understanding of the overall vapor barrier system operation following installation:

  > The four-inch diameter vertical PVC vent risers will later be installed above the roof line by the property owner following vapor barrier installation by the awarded contractor, which will be connected to the vent riser outlet stubs installed by the awarded contractor.
  >
  > Each vent riser will be equipped with a shutoff valve. Four 2-inch diameter test ports will be installed at the northern exterior wall of the building, which will correspond to the four main legs of the vapor barrier venting system within the building. The test ports will be used in combination with the vent riser shutoff valves to assist with future operation and maintenance (O&M) inspections and smoke testing events conducted on the system to verify performance. The shutoff valves will be used to close off individual vent risers during O&M/smoke testing events to demonstrate that the vent risers are in communication with the subsurface environment and to demonstrate continuity of flow between the risers.

- The vent riser outlet stubs will be used during construction-phase smoke testing events during which indicator smoke will be introduced into vent riser outlet stub by the vapor barrier contractor to demonstrate the following:

  - Overall tightness of the vapor barrier following initial application over horizontal and interior perimeter areas (i.e., as evidenced by the lack of indicator smoke);

- Integrity of the vapor barrier system, which will be documented via a visual inspection of floor areas of the vapor barrier.
- Continuity of flow through the vapor vent gas collection piping (i.e., visual indication via the presence of smoke exiting the vent risers).

The vent riser outlet stubs will be labeled as "vapor mitigation system piping" and equipped with vapor tight, locking caps by the vapor barrier contractor.

- A surface cap of reinforced concrete, with a 4-inch minimum thickness, will be applied over all horizontal areas of the building footprint by the property owner. Installation of the concrete surface cap is not to be included in the bidders' proposals.

4.3 Construction Quality Control

The awarded contractor is responsible to ensure proper construction quality control (CQC) is exercised during all facets of the SOW. The Professional will be responsible for verifying that all Contractor materials (as supplied and installed) and procedures comply with the Drawings and Technical Specifications.

The awarded contractor is required to supply materials that meet the specification for the project. Product Submittals shall be provided to the Professional for review prior to the material being delivered to the site. In the event the awarded contractor's materials do not meet the project specifications, the materials will be removed from the site at no cost to the City of Owosso or its representatives.

As indicated in Section 4.2, the vapor barrier contractor is required to collect and measure 15 coupon samples during installation to document that the specified vapor barrier thickness is met. The vapor barrier contractor is also required to conduct smoke testing at the time of vapor barrier installation to document tightness/integrity of the vapor barrier system and continuity of flow through the vapor vent piping. These activities are incidental to vapor barrier installation under Pay Item 2a.

Appendix A

PM ENVIRONMENTAL Environmental & Engineering Services

GENERAL CONDITIONS

1. LOCAL PREFERENCE POLICY
The city of Owosso has a local preference policy for the purchase of goods and services. The policy in part states: *A business located within the city limits and paying real or personal property taxes to the city of Owosso will be granted a 6% bid advantage or $2,500, whichever is less, over a business located outside Shiawassee County. A business located outside the city limits but within Shiawassee County and paying property taxes to the county will be granted a 3% bid advantage or $2,500, whichever is less, over a business located outside Shiawassee County. The preference also applies to subcontractors performing 25% or more of the work of a general contract.*

2. BID ACCEPTANCE
The city reserves the right to reject any or all proposals. Unless otherwise specified, the city reserves the right to accept any item in the proposal. In case of error in extending the total amount of the bid, the unit prices shall govern.

3. PAYMENT
Unless otherwise stated by the bidder, time, concerning discount offered, will be computed from date of delivery and acceptance at destination or from date correct bill or claim voucher properly certified by the contractor is received. When so stated herein, partial payments, based on a certified approved estimate by the city of materials, supplies or equipment delivered or work done, may be made upon presentation of a properly-executed claim voucher. The final payment will be made by the city when materials, supplies, equipment or the work done have been fully delivered or completed to the full satisfaction of the city.

4. BID DEFAULT
In case of default by the bidder or contractor, the city of Owosso may procure the articles or services from other sources and hold the bidder or contractor responsible for any excess cost occasioned thereby.

5. UNIT PRICES
Prices should be stated in units of quantity specified.

6. QUOTED PRICES
Unless otherwise stated by the bidder, prices quoted will be considered as being based on delivery to a designated destination and to include all charges for packing, crating, containers, shipping, etc., and being in strict accordance with specifications and standards as shown.

7. SUBSTITUTIONS
Wherever a reference is made in the specifications or description of the materials, supplies, equipment, or services required, to a particular trade name, manufacturer's catalog, or model number, the bidder, if awarded a contract or order, will be required to furnish the particular item referred to in strict accordance with the specifications or description unless a departure or substitution is clearly noted and described in the proposal.

8. HOLD CITY HARMLESS
The bidder, if awarded an order or contract, agrees to protect, defend, and save the city harmless against any demand for payment for the use of any patented material, process, article, or device that may enter into the manufacture, construction, or form a part of the work covered by either order or contract. Bidder further agrees to indemnify and save the city harmless from suits or action of every nature and description brought against it, for or on account of any injuries or damages received or sustained by any party or parties, by or from any of the acts of the contractor, his employees, subcontractors, or agents.

9. COMPETITIVE BIDDING STATUTES
The laws of the state of Michigan, the charter and ordinances of the city of Owosso, as far as they apply to the laws of competitive bidding, contracts and purchases, are made a part hereof.

10. SAMPLES
Samples, when requested, must be furnished free of expense to the city and, if not destroyed, will upon request be returned at the bidder' expense.

11. BONDS
A certified check or bid bond may be required, payable to the City of Owosso. If so required in the bid documents, a performance bond and labor and material bond in the amounts stated in the bid documents, shall be on file with the city before work commences. The city will determine the amount and sufficiency of the sureties.

12. PROPOSAL GUARANTEE
All checks or bid bonds except those of the three lowest bidders will be returned when the bids have been opened and tabulated. The certified checks or bid bonds of the three lowest bidders will be held until the contract documents have been signed, after which remaining certified checks or bid bonds will be returned to the respective bidders.

13. BIDDERS
The city may demand that the contractor file a sworn experience and financial statement setting forth the financial resources, adequacy of plant and equipment, organization, experience and other pertinent and material facts as may be desirable.

14. DAMAGE LIABILITY AND INSURANCE
The contractor shall save harmless and indemnify the city and its employees against all claims for damages to public or private property and for injuries to persons arising during the progress and because of the work.

a. Workers' compensation insurance - The contractor, before the execution of the contract, shall file a certification that the contractor carries workers' compensation insurance.

b. Bodily injury and property damage - The contractor, before execution of the contract, shall file with the city copies of completed certificates, of insurance acceptable to the city naming the city as an insured party. The coverage shall afford protection against damage claims to public or private property, and injuries to persons, arising out of and during the progress of the work, and to its completion and, where specified in the proposal, similar insurance to protect the owners of premises on or near which construction operations take place.

c. Bodily injury and property damages other than automobile - Unless otherwise specifically required by special provisions in the proposal, the minimum limits of property damage and bodily injury liability covering each contract shall be:

   Bodily injury and property damage liability:
   Each occurrence: $1,000,000
   Aggregate: $2,000,000

   Such insurance shall include, but not be limited to, coverage for: a) underground damage to facilities due to drilling and excavating with mechanical equipment and b) collapse or structural injury to structures due to blasting or explosion, excavation, tunneling, pile driving, cofferdam work, or building moving or demolition.

d. Owners' protective liability - Bodily injury and property damage protection shall be extended to the city.

e. Bodily injury liability and property damage liability automobiles - Unless otherwise specifically required by special provisions in the proposal, the minimum limits of bodily injury liability and property damage liability shall be:

Bodily injury liability:
Each person: $ 500,000
Each occurrence: $1,000,000

Property damage liability:
Each occurrence: $1,000,000

Combined single limit for bodily injury and property damage liability:
Each occurrence: $2,000,000

f. Notice - The contractor shall not cancel or reduce the coverage of any insurance required by this section without providing 30-day prior written notice to the city. All such insurance must include an endorsement under which the insurer shall agree to notify the city immediately of any reduction by the contractor. The contractor shall cease operations on the occurrence of any such cancellation or reduction, and shall not resume operations until new insurance is in force.

g. Reports - At the request of the city, the contractor or the contractor's insurance carrier shall report claims received, inspections made, and disposition of claims.

15. PROTECTION OF LAND MONUMENTS AND PROPERTY STAKES

Land monuments or stakes marking property corners shall not be moved or otherwise disturbed except as directed by the city. If any land monuments or lot stakes are moved or disturbed by the contractor, the cost of replacing each land monument or lot stake so moved or disturbed shall be deducted from any money due the contractor, as payment to the city for the cost of replacing said land monument or lot stakes.

16. CONTRACTOR'S RESPONSIBILITY FOR WORK

The contractor shall be responsible for any damages that the work may sustain before its acceptance, and shall rebuild, repair, restore and make good, at its own expense, all injuries and damages to any portion of the work by the action of the elements or from any cause whatsoever before its acceptance. Neither the final payment nor any provision in the contract documents shall relieve the contractor of the responsibility for negligence or faulty materials or workmanship within the extent and period provided by law, and, upon written notice, the contractor shall remove any defects due therefrom and pay for any damaged due to other work resulting therefrom, which shall appear within one year after the date of completion and acceptance.

17. PAYMENT

At monthly intervals commencing after construction has been started, the city will make partial payment to the contractor based on a duly-certified estimate prepared by the city of the work done by the contractor during the preceding four-week period. Each estimate will be submitted to the city council for approval on either the first or third Monday of each month. The city will retain ten percent (10%) of the amount of each such estimate until final completion and acceptance of all work covered by this contract.

Before the contractor shall demand final estimates or payment, contractor will furnish to the city, supported by sworn statements, satisfactory evidence that all persons that have supplied labor, materials, or equipment for the work embraced under this contract have been fully paid for the same; and that, in case such evidence be not furnished as aforesaid, such sums as the city may deem necessary to meet the lawful claims of such persons may be retained by the city from any monies that may be due or become due to the contractor under this contract until such liabilities shall be fully discharged and the evidence thereof be furnished to the city.

18.

CITY'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION THEREOF
Besides the payment to be retained by the city under the preceding provisions of these general conditions, the city may withhold a sufficient amount of any payment otherwise due to the contractor to cover a) payments earned or due for just claims for furnish labor or materials on the project under this contract, b) for defective work not remedied and c) for failure of the contractor to make proper payments to subcontractors. The city shall disburse and shall have the right to act as agent for the contractor in disbursing such funds as have been previously withheld pursuant to this paragraph to the party or parties who are entitled to payment from it. The city will pay to the contractor a proper accounting of all such funds disbursed for the contractor.

19. OWNER'S RIGHT TO DO WORK
If the contractor should neglect to prosecute the work properly or fail to perform any provisions of this contract, the city, after three (3) days' written notice to the contractor and contractor's surety, may without prejudice to any other remedy he may have, make good such deficiencies and may deduct the cost of it from the payment due the contractor.

20. DEFINITION OF NOTICE
Where in any of the contract documents there is any provision in respect to the giving of notice, such notice shall be deemed given to the owner, when written notice is delivered to the city manager, or placed in the United States mail addressed to the city clerk; as to the contractor, when a written notice shall be delivered to contractor's representative at the project site or by mailing such written notice in the United States mail addressed to the contractor at the place stated in the bid proposal as the business address; as to the surety on the performance bond, when a written notice is placed in the United States mail addressed to the surety at the surety's home office or to its agent or agents who executed such performance bond on behalf of the surety.

21. SUBCONTRACTS
The contractor shall not subcontract any work in the execution of this contract without the written consent of the city. The contractor shall be responsible for the acts or omissions of any subcontractor and of anyone employed directly or indirectly by such subcontractor.

22. ASSIGNMENT OF CONTRACT
The contractor shall not assign this contract or any part hereof without the written consent of the city. No assignment shall be valid unless it shall contain a provision that any funds to be paid to the assignee under this agreement are subject to a prior lien for services rendered or materials or supplies for the performance of the work specified in the contract in favor of all persons, firms, or corporations rendering such services or supplying such materials.

23. MAINTAINING TRAFFIC
The contractor shall provide flares, signs, barricades, traffic regulators, etc., to conform to the current *Michigan Manual of Uniform Traffic Control Devices* or as directed by the city. The contractor shall not close any road or street without the permission of the city. If any street or road is to be closed by the contractor, it shall be the responsibility of the contractor to notify the Owosso fire department when the street will be closed and again when the street is open to traffic. Traffic control devices for any detours deemed necessary by the city shall be provided by the contractor. Cost of maintaining shall be incidental to the cost of the project unless otherwise provided.

24. ORDER OF COMPLETION
The contractor shall submit, whenever requested by the city, a schedule of the work showing completion dates. The city may request that certain portions of the work be done before other portions. If so requested, the contractor shall arrange to schedule to meet the request by the owner.

25. USE OF COMPLETED PORTIONS
The city shall have the right to take possession and use any completed or partially completed portions of the work; but such taking possession and use shall not be deemed acceptance. Pending final completion

and acceptance of the work, all necessary repairs and adjustments on any section of the work due to defective material, workmanship, natural causes, or other operations of the contractor, other than normal wear and tear, shall be done by and at the expense of the contractor.

26. WATER SUPPLY

The contractor shall arrange for securing an adequate water supply for use in construction and for drinking water for his employees. If the city's water is used on the work, the contractor shall make the necessary application and shall pay all costs involved. Connections, piping and the contractor shall furnish and maintain fittings for conveying water. Contractor shall pay for water according to the city's established rates.

27. CLEANUP

The contractor shall keep the project free from waste materials or rubbish caused by its employees or work. This includes as a minimum excess excavation or backfill material, broken or rejected materials, empty containers or general debris. The owner may require complete cleanup of certain areas as construction is completed.

28. SUPERVISION

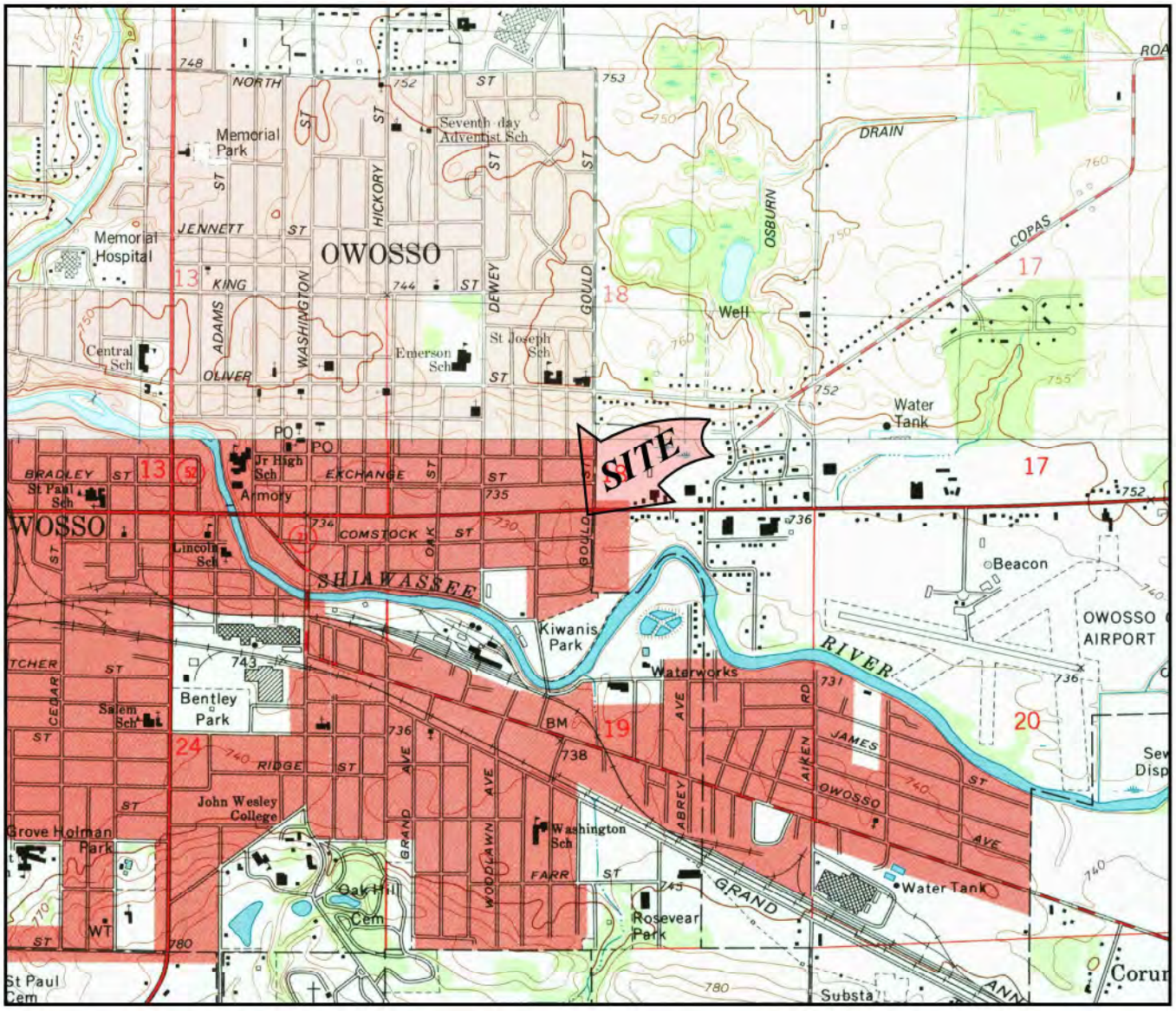
The contractor shall have a superintendent on the job site to coordinate and expedite the various construction activities for the duration of this contract.

29. EQUAL EMPLOYMENT OPPORTUNITY AND OTHER CLAUSES

The contractor shall agree not to discriminate against any employee or applicant for employment because of age, race, religion, color, handicap, sex, physical condition, developmental disability as defined by Michigan Complied Statutes, or national origin. This provision shall include but not be limited to the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rate of pay or other forms of compensation, and selection for training including apprenticeship. The contractor further agrees to take affirmative action to ensure equal employment opportunities for persons with disabilities. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provision of the non-discrimination clause.

Appendix B

PM ENVIRONMENTAL Environmental & Engineering Services



MICHIGAN QUADRANGLE LOCATION

SHIAWASSEE COUNTY

SCALE 1:24,000

1 MILE 1/2 MILE 0 1 MILE

FIGURE 1

SITE LOCATION MAP

USGS, 7.5 MINUTE SERIES

OWOSSO NORTH , MI QUADRANGLE, 1974.
OWOSSO SOUTH , MI QUADRANGLE, 1972.

PM ENVIRONMENTAL | Environmental & Engineering Services

PROJ:
FORMER EAST SIDE CLEANERS
910 EAST MAIN STREET
OWOSSO, MI

THIS IS NOT A LEGAL SURVEY

VERIFY SCALE
0 2,000'
IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRN BY: CS/ES	DATE: 2/2/2016
CHKD BY: AP	SCALE: 1" = 2,000'
FILE NAME: 01-5363-0-004F01R00	

RESIDENTIAL

917 EAST MAIN STREET
STECHSCHOLTE GAS & OIL

1001 EAST MAIN STREET
WALGREEN'S PHARMACY

1002 EAST MAIN STREET
RITE AID PHARMACY

EAST MAIN STREET (M-21)

SANITARY (10" DIA.)

STORM (60" DIA.)

WATER (8" DIA.)

WATER (12" DIA.)

SIDEWALK

SIGN

APPROXIMATE LOCATION OF
FORMER DRY CLEANING MACHINE

830 EAST MAIN STREET FORMER HOUSE

832 EAST MAIN STREET FORMER HOUSE

834 EAST MAIN STREET FORMER HOUSE

910 EAST MAIN STREET FORMER DRY CLEANERS (SLAB STILL PRESENT)

FORMER GARAGE

FORMER GARAGE

CONCRETE

GRASS

GRAVEL

ALLEY

SOUTH GOULD STREET

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

LEGEND:

- SUBJECT PROPERTY
- APPROXIMATE FORMER/ HISTORICAL SITE FEATURES
- W — WATER
- SAN — SANITARY SEWER
- ST — STORM SEWER
- OHEL — OVERHEAD ELECTRIC LINE
- PARCEL / LOT BOUNDARIES
- PROPOSED SITE FEATURES
- W — PROPOSED WATER
- SAN — PROPOSED SANITARY SEWER
- ST — PROPOSED STORM SEWER
- GAS — PROPOSED GAS
- GAS — NATURAL GAS LINE
- PROPOSED STORM DRAIN

PM ENVIRONMENTAL | Environmental & Engineering Services

FIGURE 2
DIAGRAM OF SITE

PROJ:
FORMER EAST SIDE CLEANERS
910 EAST MAIN STREET
OWOSSO, MI

THIS IS NOT A LEGAL SURVEY	DRN. BY: CS/KS/ES	DATE: 2/2/2016
VERIFY SCALE 0 — 30' IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	CHKD BY: AP	SCALE: 1" = 30'
	FILE NAME: 01-5363-0-004F02R00	

RESIDENTIAL

917 EAST MAIN STREET
STECHSCHOLTE GAS & OIL

1001 EAST MAIN STREET
WALGREEN'S PHARMACY

REMOVE BUILDING FOUNDATION
IN EXCAVATION AREA

REMOVE PAVEMENT IN
EXCAVATION AREA

CONCEPTUAL INTERIOR RESPONSE
SOIL EXCAVATION AREA

APPROXIMATE LOCATION OF
FORMER DRY CLEANING MACHINE

1002 EAST MAIN STREET
RITE AID PHARMACY

EAST MAIN STREET (M-21)

SIGN

REMOVE SIDEWALK IN
EXCAVATION AREA

830 EAST MAIN STREET FORMER HOUSE

832 EAST MAIN STREET FORMER HOUSE

834 EAST MAIN STREET FORMER HOUSE

910 EAST MAIN STREET FORMER DRY CLEANERS (SLAB STILL PRESENT)

FORMER GARAGE

FORMER GARAGE

FORMER GARAGE

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

ALLEY

SOUTH GOULD STREET

INSTALL EXCAVATION SHORING
AT NORTHERN AND EASTERN
EXCAVATION BOUNDARIES

REMOVE PAVEMENT IN
EXCAVATION AREA

= SWQIF Funds Used

= Loan Funds Used

= Grant Funds Used

LEGEND:

- SUBJECT PROPERTY
- APPROXIMATE FORMER/ HISTORICAL SITE FEATURES
- W — WATER
- SAN — SANITARY SEWER
- ST — STORM SEWER
- OHEL — OVERHEAD ELECTRIC LINE
- PARCEL / LOT BOUNDARIES
- PROPOSED SITE FEATURES
- W — PROPOSED WATER
- SAN — PROPOSED SANITARY SEWER
- ST — PROPOSED STORM SEWER
- GAS — PROPOSED GAS
- GAS — NATURAL GAS LINE
- PROPOSED EXCAVATION LIMITS
- INSTALL EXCAVATION SHORING
- PROPOSED STORM DRAIN
- GEE SOIL BORING (2012)
- GEOTECHNICAL SOIL BORING
- PM SOIL BORING/TEMPORARY MONITORING WELL (2015)
- MAN HOLE
- 8' EXCAVATION DEPTH
- 10' EXCAVATION DEPTH
- CONCENTRATIONS IN SOIL EXCEEDING UNIVERSAL TREATMENT STANDARDS

PM ENVIRONMENTAL | Environmental & Engineering Services

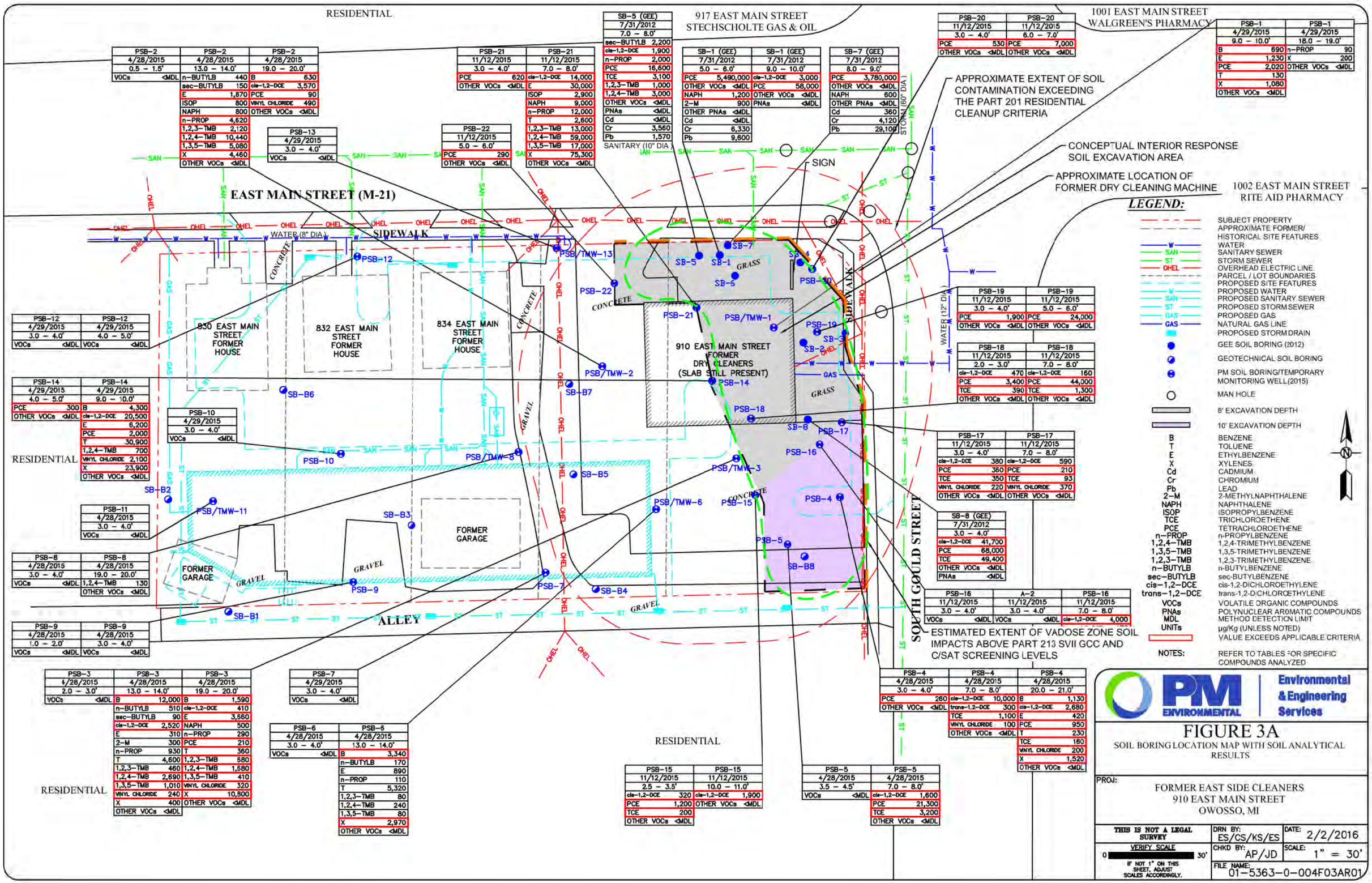
FIGURE 3

Conceptual Fund Expenditure Locations

PROJ:

FORMER EAST SIDE CLEANERS
910 EAST MAIN STREET
OWOSSO, MI

THIS IS NOT A LEGAL SURVEY	DRN BY: ES/CS/KS/ES	DATE: 2/2/2016
VERIFY SCALE 0 30' IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	CHKD BY: AP/JD/AP	SCALE: 1" = 30'
	FILE NAME: 01-5363-0-004F03R01	


RESIDENTIAL
917 EAST MAIN STREET
STECHSCHOLTE GAS & OIL
1001 EAST MAIN STREET
WALGREEN'S PHARMACY
1002 EAST MAIN STREET
RITE AID PHARMACY
EAST MAIN STREET (M-21)
SIDEWALK
WATER (8" DIA.)
WATER (12" DIA.)
SANITARY (10" DIA.)
STORM (60" DIA.)
SIGN
APPROXIMATE EXTENT OF SOIL CONTAMINATION EXCEEDING THE PART 201 RESIDENTIAL CLEANUP CRITERIA
CONCEPTUAL INTERIOR RESPONSE SOIL EXCAVATION AREA
APPROXIMATE LOCATION OF FORMER DRY CLEANING MACHINE
830 EAST MAIN STREET FORMER HOUSE
832 EAST MAIN STREET FORMER HOUSE
834 EAST MAIN STREET FORMER HOUSE
910 EAST MAIN STREET FORMER DRY CLEANERS (SLAB STILL PRESENT)
FORMER GARAGE
FORMER GARAGE
FORMER GARAGE
SOUTH GOULD STREET
ALLEY
RESIDENTIAL
RESIDENTIAL
RESIDENTIAL
CONCRETE
GRASS
GRAVEL
PSB-2 4/28/2015 0.5 – 1.5' VOCs <MDL
PSB-2 4/28/2015 13.0 – 14.0' n-BUTYLB 440 sec-BUTYLB 150 E 1,870 ISOP 800 NAPH 800 n-PROP 4,620 1,2,3-TMB 2,120 1,2,4-TMB 10,440 1,3,5-TMB 5,080 X 4,460 OTHER VOCs <MDL
PSB-2 4/28/2015 19.0 – 20.0' B 630 cis-1,2-DCE 3,570 PCE 90 VINYL CHLORIDE 490 OTHER VOCs <MDL
PSB-13 4/29/2015 3.0 – 4.0' VOCs <MDL
PSB-22 11/12/2015 5.0 – 6.0' PCE 290 OTHER VOCs <MDL
PSB-21 11/12/2015 3.0 – 4.0' PCE 620 OTHER VOCs <MDL
PSB-21 11/12/2015 7.0 – 8.0' cis-1,2-DCE 14,000 E 30,000 ISOP 2,900 NAPH 9,000 n-PROP 12,000 T 2,600 1,2,3-TMB 13,000 1,2,4-TMB 59,000 1,3,5-TMB 17,000 X 75,300 OTHER VOCs <MDL
SB-5 (GEE) 7/31/2012 7.0 – 8.0' sec-BUTYLB 2,200 cis-1,2-DCE 1,900 n-PROP 2,000 PCE 16,600 TCE 3,100 1,2,3-TMB 1,000 1,2,4-TMB 3,000 OTHER VOCs <MDL PNAs <MDL Cd <MDL Cr 3,560 Pb 1,570
SB-1 (GEE) 7/31/2012 5.0 – 6.0' PCE 5,490,000 OTHER VOCs <MDL NAPH 1,200 2-M 900 OTHER PNAs <MDL Cd <MDL Cr 6,330 Pb 9,600
SB-1 (GEE) 7/31/2012 9.0 – 10.0' cis-1,2-DCE 3,000 PCE 58,000 OTHER VOCs <MDL PNAs <MDL
SB-7 (GEE) 7/31/2012 8.0 – 9.0' PCE 3,780,000 OTHER VOCs <MDL NAPH 600 OTHER PNAs <MDL Cd 360 Cr 4,120 Pb 29,100
PSB-20 11/12/2015 3.0 – 4.0' PCE 530 OTHER VOCs <MDL
PSB-20 11/12/2015 6.0 – 7.0' PCE 7,000 OTHER VOCs <MDL
PSB-1 4/29/2015 9.0 – 10.0' B 690 E 1,230 PCE 2,020 T 130 X 1,080 OTHER VOCs <MDL
PSB-1 4/29/2015 18.0 – 19.0' n-PROP 90 X 200 OTHER VOCs <MDL
PSB-19 11/12/2015 3.0 – 4.0' PCE 1,900 OTHER VOCs <MDL
PSB-19 11/12/2015 5.0 – 6.0' PCE 24,000 OTHER VOCs <MDL
PSB-18 11/12/2015 2.0 – 3.0' cis-1,2-DCE 470 PCE 3,400 TCE 390 OTHER VOCs <MDL
PSB-18 11/12/2015 7.0 – 8.0' cis-1,2-DCE 160 PCE 44,000 TCE 1,300 OTHER VOCs <MDL
PSB-17 11/12/2015 3.0 – 4.0' cis-1,2-DCE 380 PCE 360 TCE 350 VINYL CHLORIDE 220 OTHER VOCs <MDL
PSB-17 11/12/2015 7.0 – 8.0' cis-1,2-DCE 590 PCE 210 TCE 93 VINYL CHLORIDE 370 OTHER VOCs <MDL
SB-8 (GEE) 7/31/2012 3.0 – 4.0' cis-1,2-DCE 41,700 PCE 68,000 TCE 49,400 OTHER VOCs <MDL PNAs <MDL
PSB-16 11/12/2015 3.0 – 4.0' VOCs <MDL
A-2 11/12/2015 3.0 – 4.0' VOCs <MDL
PSB-16 11/12/2015 7.0 – 8.0' cis-1,2-DCE 4,000
ESTIMATED EXTENT OF VADOSE ZONE SOIL IMPACTS ABOVE PART 213 SVII GCC AND C/SAT SCREENING LEVELS
PSB-12 4/29/2015 3.0 – 4.0' VOCs <MDL
PSB-12 4/29/2015 4.0 – 5.0' VOCs <MDL
PSB-14 4/29/2015 4.0 – 5.0' PCE 300 OTHER VOCs <MDL
PSB-14 4/29/2015 9.0 – 10.0' B 4,300 cis-1,2-DCE 20,500 E 6,200 PCE 2,000 T 30,900 1,2,4-TMB 700 VINYL CHLORIDE 2,100 X 23,900 OTHER VOCs <MDL
PSB-10 4/29/2015 3.0 – 4.0' VOCs <MDL
PSB-11 4/28/2015 3.0 – 4.0' VOCs <MDL
PSB-8 4/28/2015 3.0 – 4.0' VOCs <MDL
PSB-8 4/28/2015 19.0 – 20.0' 1,2,4-TMB 130 OTHER VOCs <MDL
PSB-9 4/28/2015 1.0 – 2.0' VOCs <MDL
PSB-9 4/28/2015 3.0 – 4.0' VOCs <MDL
PSB-3 4/28/2015 2.0 – 3.0' VOCs <MDL
PSB-3 4/28/2015 13.0 – 14.0' B 12,000 n-BUTYLB 510 sec-BUTYLB 90 cis-1,2-DCE 2,520 E 310 2-M 300 n-PROP 930 T 4,600 1,2,3-TMB 460 1,2,4-TMB 2,690 1,3,5-TMB 1,010 VINYL CHLORIDE 240 X 400 OTHER VOCs <MDL
PSB-3 4/28/2015 19.0 – 20.0' B 1,590 cis-1,2-DCE 410 E 3,660 n-PROP 290 PCE 210 T 360 1,2,3-TMB 580 1,2,4-TMB 1,580 1,3,5-TMB 410 VINYL CHLORIDE 320 X 10,800 OTHER VOCs <MDL
PSB-7 4/29/2015 3.0 – 4.0' VOCs <MDL
PSB-6 4/28/2015 3.0 – 4.0' VOCs <MDL
PSB-6 4/28/2015 13.0 – 14.0' B 3,340 n-BUTYLB 170 E 890 n-PROP 110 T 5,320 1,2,3-TMB 80 1,2,4-TMB 240 1,3,5-TMB 80 X 2,970 OTHER VOCs <MDL
PSB-15 11/12/2015 2.5 – 3.5' cis-1,2-DCE 320 PCE 1,200 TCE 200 OTHER VOCs <MDL
PSB-15 11/12/2015 10.0 – 11.0' cis-1,2-DCE 1,900 OTHER VOCs <MDL
PSB-5 4/28/2015 3.5 – 4.5' VOCs <MDL
PSB-5 4/28/2015 7.0 – 8.0' cis-1,2-DCE 1,600 PCE 21,300 TCE 3,200 OTHER VOCs <MDL
PSB-4 4/28/2015 3.0 – 4.0' PCE 260 OTHER VOCs <MDL
PSB-4 4/28/2015 7.0 – 8.0' cis-1,2-DCE 10,000 trans-1,2-DCE 300 TCE 1,100 VINYL CHLORIDE 100 OTHER VOCs <MDL
PSB-4 4/28/2015 20.0 – 21.0' B 1,130 cis-1,2-DCE 2,680 E 420 PCE 950 T 230 TCE 160 VINYL CHLORIDE 200 X 1,520 OTHER VOCs <MDL
LEGEND:
SUBJECT PROPERTY
APPROXIMATE FORMER/ HISTORICAL SITE FEATURES
WATER
SANITARY SEWER
STORM SEWER
OVERHEAD ELECTRIC LINE
PARCEL / LOT BOUNDARIES
PROPOSED SITE FEATURES
PROPOSED WATER
PROPOSED SANITARY SEWER
PROPOSED STORM SEWER
PROPOSED GAS
NATURAL GAS LINE
PROPOSED STORM DRAIN
GEE SOIL BORING (2012)
GEOTECHNICAL SOIL BORING
PM SOIL BORING/TEMPORARY MONITORING WELL(2015)
MAN HOLE
8' EXCAVATION DEPTH
10' EXCAVATION DEPTH
B BENZENE
T TOLUENE
E ETHYLBENZENE
X XYLENES
Cd CADMIUM
Cr CHROMIUM
Pb LEAD
2-M 2-METHYLNAPHTHALENE
NAPH NAPHTHALENE
ISOP ISOPROPYLBENZENE
TCE TRICHLOROETHENE
PCE TETRACHLOROETHENE
n-PROP n-PROPYLBENZENE
1,2,4-TMB 1,2,4-TRIMETHYLBENZENE
1,3,5-TMB 1,3,5-TRIMETHYLBENZENE
1,2,3-TMB 1,2,3-TRIMETHYLBENZENE
n-BUTYLB n-BUTYLBENZENE
sec-BUTYLB sec-BUTYLBENZENE
cis-1,2-DCE cis-1,2-DICHLOROETHYLENE
trans-1,2-DCE trans-1,2-DICHLOROETHYLENE
VOCs VOLATILE ORGANIC COMPOUNDS
PNAs POLYNUCLEAR AROMATIC COMPOUNDS
MDL METHOD DETECTION LIMIT
UNITs µg/Kg (UNLESS NOTED)
VALUE EXCEEDS APPLICABLE CRITERIA
NOTES: REFER TO TABLES FOR SPECIFIC COMPOUNDS ANALYZED
PM ENVIRONMENTAL Environmental & Engineering Services
FIGURE 3A
SOIL BORING LOCATION MAP WITH SOIL ANALYTICAL RESULTS
PROJ: FORMER EAST SIDE CLEANERS 910 EAST MAIN STREET OWOSSO, MI
THIS IS NOT A LEGAL SURVEY
VERIFY SCALE 0 30'
IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.
DRN BY: ES/CS/KS/ES
DATE: 2/2/2016
CHKD BY: AP/JD
SCALE: 1" = 30'
FILE NAME: 01-5363-0-004F03AR01

RESIDENTIAL

917 EAST MAIN STREET
STECHSCHOLTE GAS & OIL

1001 EAST MAIN STREET
WALGREEN'S PHARMACY

1002 EAST MAIN STREET
RITE AID PHARMACY

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

SOUTH GOULD STREET

EAST MAIN STREET (M-21)

ALLEY

SIDEWALK

SANITARY (10" DIA.)

WATER (8" DIA.)

WATER (12" DIA.)

STORM (60" DIA.)

SIGN

APPROXIMATE EXTENT OF GROUNDWATER CONTAMINATION EXCEEDING THE PART 201 RESIDENTIAL CLEANUP CRITERIA

APPROXIMATE LOCATION OF FORMER DRY CLEANING MACHINE

830 EAST MAIN STREET FORMER HOUSE

832 EAST MAIN STREET FORMER HOUSE

834 EAST MAIN STREET FORMER HOUSE

910 EAST MAIN STREET FORMER DRY CLEANERS (SLAB STILL PRESENT)

FORMER GARAGE

FORMER GARAGE

CONCRETE

GRAVEL

GRASS

PSB-1 PSB-2 PSB-3 PSB-4 PSB-5 PSB-6 PSB-7 PSB-8 PSB-9 PSB-10 PSB-11 PSB-12 PSB-13 PSB-14 PSB-15 PSB-16 PSB-17 PSB-18 PSB-19 PSB-20 PSB-21 PSB-22

PSB/TMW-1 PSB/TMW-2 PSB/TMW-6 PSB/TMW-8 PSB/TMW-11 PSB/TMW-13

SB-1 SB-2 SB-3 SB-4 SB-5 SB-6 SB-7 SB-8 SB-B1 SB-B2 SB-B3 SB-B4 SB-B5 SB-B6 SB-B7 SB-B8

TMW-13	
4/29/2015	
7.63 ~ 12.63' SCREEN	
B	1
cis-1,2-DCE	74
trans-1,2-DCE	2
PCE	15
TCE	11
VINYL CHLORIDE	14
OTHER VOCs	<MDL

TMW-2	
4/28/2015	
7.12 ~ 12.12' SCREEN	
cis-1,2-DCE	800
E	100
PCE	2,400
TCE	1,000
1,2,4-TMB	100
X	300
OTHER VOCs	<MDL

SB-1 (GEE)	
7/31/2012	
15.0 ~ 20.0' SCREEN	
cis-1,2-DCE	200
PCE	5,100
OTHER VOCs	<MDL
NAPH	17
2-M	7
OTHER PNAs	<MDL
Cd	<MDL
Cr	<MDL
Pb	<MDL

TMW-1	
4/29/2015	
4.83 ~ 9.83' SCREEN	
B	460
E	30
PCE	130
T	20
1,2,3-TMB	10
X	110
OTHER VOCs	<MDL

TMW-11	
4/28/2015	
8.54 ~ 13.54' SCREEN	
cis-1,2-DCE	8
OTHER VOCs	<MDL

TMW-8	
4/28/2015	
8.77 ~ 13.77' SCREEN	
cis-1,2-DCE	60
E	340
n-PROP	110
1,2,3-TMB	170
1,2,4-TMB	610
1,3,5-TMB	170
X	700
OTHER VOCs	<MDL

TMW-6	
4/28/2015	
9.68 ~ 14.68' SCREEN	
B	20
n-BUTYLB	10
cis-1,2-DCE	260
E	10
n-PROP	30
VINYL CHLORIDE	90
OTHER VOCs	<MDL

TMW-3	
4/28/2015	
7.19 ~ 12.19' SCREEN	
E	300
n-PROP	200
1,2,3-TMB	200
1,2,4-TMB	1,100
1,3,5-TMB	300
X	500
OTHER VOCs	<MDL

LEGEND:

- SUBJECT PROPERTY
- APPROXIMATE FORMER/ HISTORICAL SITE FEATURES
- W — WATER
- SAN — SANITARY SEWER
- ST — STORM SEWER
- OHEL — OVERHEAD ELECTRIC LINE
- PARCEL / LOT BOUNDARIES
- PROPOSED SITE FEATURES
- W — PROPOSED WATER
- SAN — PROPOSED SANITARY SEWER
- ST — PROPOSED STORM SEWER
- GAS — PROPOSED GAS
- GAS — NATURAL GAS LINE
- PROPOSED EXCAVATION LIMITS
- PROPOSED STORM DRAIN
- GEE SOIL BORING (2012)
- GEOTECHNICAL SOIL BORING
- PM SOIL BORING/TEMPORARY MONITORING WELL 2015)
- MAN HOLE
- 8' EXCAVATION DEPTH
- 10' EXCAVATION DEPTH

B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	XYLENES
Cd	CADMIUM
Cr	CHROMIUM
Pb	LEAD
TCE	TRICHLOROETHENE
PCE	TETRACHLOROETHENE
2-M	2-METHYLNAPHTHALENE
NAPH	NAPHTHALENE
n-PROP	n-PROPYLBENZENE
n-BUTYLB	n-BUTYLBENZENE
1,2,4-TMB	1,2,4-TRIMETHYLBENZENE
1,3,5-TMB	1,3,5-TRIMETHYLBENZENE
1,2,3-TMB	1,2,3-TRIMETHYLBENZENE
cis-1,2-DCE	cis-1,2-DICHLOROETHYLENE
trans-1,2-DCE	trans-1,2-DICHLOROETHYLENE
VOCs	VOLATILE ORGANIC COMPOUNDS
PNAs	POLYNUCLEAR AROMATIC COMPOUNDS
MDL	METHOD DETECTION LIMIT
UNITs	µg/L

VALUE EXCEEDS APPLICABLE CRITERIA

NOTES: REFER TO TABLES FOR SPECIFIC COMPOUNDS ANALYZED

PM ENVIRONMENTAL | Environmental & Engineering Services

FIGURE 4A

SOIL BORING/TEMPORARY MONITORING WELL LOCATION MAP WITH GROUNDWATER ANALYTICAL RESULTS

PROJ:

FORMER EAST SIDE CLEANERS
910 EAST MAIN STREET
OWOSSO, MI

THIS IS NOT A LEGAL SURVEY

VERIFY SCALE 0 30'

IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRN. BY: CS/KS/ES

CHKD BY: AP/JD

DATE: 2/2/2016

SCALE: 1" = 30'

FILE NAME: 01-5363-0-004F04AR01

TABLE 1 (Page 1 of 2)
SUMMARY OF SOIL ANALYTICAL RESULTS
830, 832, 834, 910 EAST MAIN STREET, OWOSSO, MICHIGAN
PM PROJECT #01-5363-0-001

VOLATILE ORGANIC COMPOUNDS, POLYNUCLEAR AROMATIC COMPOUNDS, & METALS (µg/Kg)			Benzene	n-Butylbenzene	sec-Butylbenzene	cis-1,2-Dichloroethylene	trans-1,2-Dichloroethylene	Ethylbenzene	Isopropyl benzene	2-Methylnaphthalene	Naphthalene	n-Propylbenzene	Tetrachloroethylene	Toluene
Chemical Abstract Service Number (CAS#)			71432	104518	135988	156592	156605	100414	98828	91576	91203	103651	127184	108883
Sample ID	**Sample Date**	**Sample Depth (feet bgs)**	**VOCs**											
SB-1 (GEE)	7/31/2012	5.0-6.0	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**5,490,000**	<10
SB-1 (GEE)	7/31/2012	9.0-10.0	<10	<10	<10	**3,000**	<10	<10	<10	<10	<10	<10	**58,000**	<10
SB-2 (GEE)	7/31/2012	10.0-11.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-3 (GEE)	7/31/2012	10.0-11.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-5 (GEE)	7/31/2012	7.0-8.0	<10	<10	2,200	**1,900**	<10	<10	<10	<10	<10	2,000	**16,600**	<10
SB-7 (GEE)	7/31/2012	8.0-9.0	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**3,780,000**	<10
SB-8 (GEE)	7/31/2012	3.0-4.0	<10	<10	<10	**41,700**	<10	<10	<10	<10	<10	<10	**68,000**	<10
PSB-1	04/29/2015	9.0-10.0	**690**	<80	<80	<80	<80	1,230	<400	<200	<400	<80	**2,020**	130
PSB-1	04/29/2015	18.0-19.0	<70	<70	<70	<70	<70	<70	<400	<100	<400	90	<70	<70
PSB-2	04/28/2015	0.5-1.5	<70	<70	<70	<70	<70	<70	<300	<100	<300	<70	<70	<70
PSB-2	04/28/2015	13.0.-14.0	<70	440	150	<70	<70	**1,870**	800	<100	800	**4,620**	<70	<70
PSB-2	04/28/2015	19.0-20.0	**630**	<70	<70	**3,570**	<70	<70	<300	<100	<300	<70	90	<70
PSB-3	04/28/2015	2.0-3.0	<80	<80	<80	<80	<80	<80	<400	<200	<400	<80	<80	<80
PSB-3	04/28/2015	13.0.-14.0	**12,000**	510	90	**2,520**	<70	310	<300	300	<300	930	<70	4,600
PSB-3	04/28/2015	19.0-20.0	**1,590**	<70	<70	410	<70	**3,660**	<400	<100	500	290	**210**	360
PSB-4	04/28/2015	3.0-4.0	<90	<90	<90	<90	<90	<90	<400	<200	<400	<90	**260**	<90
PSB-4	04/28/2015	7.0-8.0	<100	<100	<100	**10,000**	300	<100	<500	<200	<500	<100	<100	<100
PSB-4	04/28/2015	20.0-21.0	**1,130**	<80	<80	**2,680**	<80	420	<400	<200	<400	<80	**950**	230
PSB-5	04/28/2015	3.5-4.5	<70	<70	<70	<70	<70	<70	<300	<100	<300	<70	<70	<70
PSB-5	04/28/2015	7.0-8.0	<100	<100	<100	**1,600**	<100	<100	<500	<200	<500	<100	**21,300**	<100
PSB-6	04/28/2015	3.0-4.0	<80	<80	<80	<80	<80	<80	<400	<200	<400	<80	<80	<80
PSB-6	04/28/2015	13.0.-14.0	**3,340**	170	<70	<70	<70	890	<300	<100	<300	110	<70	5,320
PSB-7	04/29/2015	3.0-4.0	<70	<70	<70	<70	<70	<70	<400	<100	<400	<70	<70	<70
PSB-8	04/28/2015	3.0-4.0	<70	<70	<70	<70	<70	<70	<400	<100	<400	<70	<70	<70
PSB-8	04/28/2015	19.0-20.0	<80	<80	<80	<80	<80	<80	<400	<200	<400	<80	<80	<80
PSB-9	04/28/2015	1.0-2.0	<70	<70	<70	<70	<70	<70	<300	<100	<300	<70	<70	<70
PSB-9	04/28/2015	3.0-4.0	<80	<80	<80	<80	<80	<80	<400	<200	<400	<80	<80	<80
PSB-10	04/29/2015	3.0-4.0	<70	<70	<70	<70	<70	<70	<300	<100	<300	<70	<70	<70
PSB-11	04/28/2015	3.0-4.0	<60	<60	<60	<60	<60	<60	<300	<100	<300	<60	<60	<60
PSB-12	04/29/2015	3.0-4.0	<60	<60	<60	<60	<60	<60	<300	<100	<300	<60	<60	<60
PSB-12	04/29/2015	4.0-5.0	<70	<70	<70	<70	<70	<70	<300	<100	<300	<70	<70	<70
PSB-13	04/29/2015	3.0-4.0	<70	<70	<70	<70	<70	<70	<300	<100	<300	<70	<70	<70
PSB-14	04/29/2015	4.0-5.0	<80	<80	<80	<80	<80	<80	<400	<200	<400	<80	**300**	<80
PSB-14	04/29/2015	9.0-10.0	**4,300**	<400	<400	**20,500**	<400	**6,200**	<2,000	<700	<2,000	<400	**2,000**	**30,900**
PSB-15	11/12/2015	2.5-3.5	<75	<75	<75	320	<75	<75	<75	<370	<370	<75	**1,200**	<75
PSB-15	11/12/2015	10.0-11.0	<82	<82	<82	**1,900**	<82	<82	<82	<410	<410	<82	<82	<82
PSB-16	11/12/2015	3.0-4.0	<80	<80	<80	<80	<80	<80	<80	<400	<400	<80	<80	<80
A-2 (co-located PSB-16)	11/12/2015	3.0-4.0	<78	<78	<78	<78	<78	<78	<78	<390	<390	<78	<78	<78
PSB-16	11/12/2015	7.0-8.0	<79	<79	<79	**4,000**	**170**	<79	<79	<400	<400	<79	<79	<79
PSB-17	11/12/2015	3.0-4.0	<74	<74	<74	380	<74	<74	<74	<370	<370	<74	**360**	<74
PSB-17	11/12/2015	7.0-8.0	<70	<70	<70	590	<70	<70	<70	<350	<350	<70	**210**	<70
PSB-18	11/12/2015	2.0-3.0	<72	<72	<72	470	<72	<72	<72	<360	<360	<72	**3,400**	<72
PSB-18	11/12/2015	7.0-8.0	<69	<69	<69	160	<69	<69	<69	<340	<340	<69	**44,000**	<69
PSB-19	11/12/2015	3.0-4.0	<71	<71	<71	<71	<71	<71	<71	<350	<350	<71	**1,900**	<71
PSB-19	11/12/2015	5.0-6.0	<77	<77	<77	<77	<77	<77	<77	<390	<390	<77	**24,000**	<77
PSB-20	11/12/2015	3.0-4.0	<65	<65	<65	<65	<65	<65	<65	<320	<320	<65	**530**	<65
PSB-20	11/12/2015	6.0-7.0	<77	<77	<77	<77	<77	<77	<77	<380	<380	<77	**7,000**	<77
PSB-21	11/12/2015	3.0-4.0	<68	<68	<68	<68	<68	<68	<68	<340	<340	<68	**620**	<68
PSB-21	11/12/2015	7.0-8.0	<1,400	<1,400	<1,400	**14,000**	<1,400	**30,000**	2,900	<6,900	**9,000**	**12,000**	<1,400	**2,600**
PSB-22	11/12/2015	5.0-6.0	<75	<75	<75	<75	<75	<75	<75	<370	<370	<75	**290**	<75
Cleanup Criteria Requirements for Response Activity (R 299.1 - R 299.50) **Generic Soil Cleanup Criteria Tables 2 and 3: Residential and Non-Residential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Risk-Based Screening Levels, December 30, 2013** **MDEQ Guidance Document For The Vapor Intrusion Pathway, Policy and Procedure Number: 09-017, Appendix D Vapor Intrusion Screening Values, May 2013**														
Residential (µg/Kg)														
Statewide Default Background Levels			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Drinking Water Protection (Res DWP)			100	1,600	1,600	1,400	2,000	1,500	91,000	57,000	35,000	1,600	100	16,000
Groundwater Surface Water Interface Protection (GSIP)			4,000 {X}	ID	ID	12,000	30,000 {X}	360	3,200	4,200	730	ID	1,200 {X}	5,400
Soil Volatilization to Indoor Air Inhalation (Res SVII)			1,600	ID	ID	22,000	23,000	87,000	4.0E+05 {C}	2.70E+06	2.50E+05	ID	11,000	3.3E+05 {C}
Ambient Air Infinite Source Volatile Soil Inhalation (Res VSI)			13,000	ID	ID	1.80E+05	2.80E+05	7.20E+05	1.70E+06	1.50E+06	3.00E+05	ID	1.70E+05	2.80E+06
Ambient Air Finite VSI for 5 Meter Source Thickness			34,000	ID	ID	4.20E+05	8.30E+05	1.00E+06	1.70E+06	1.50E+06	3.00E+05	ID	4.80E+05	5.10E+06
Ambient Air Finite VSI for 2 Meter Source Thickness			79,000	ID	ID	9.90E+05	2.00E+06	2.20E+06	2.80E+06	1.50E+06	3.00E+05	ID	1.1E+06	1.20E+07
Ambient Air Particulate Soil Inhalation (Res PSI)			3.80E+08	2.00E+09	4.00E+08	2.30E+09	4.70E+09	1.00E+10	5.80E+09	6.70E+08	2.00E+08	1.30E+09	2.7E+09	2.70E+10
Direct Contact (Res DC)			1.80E+05	2.50E+06	2.50E+06	2.5E+06 {C}	3.8E+06 {C}	2.2E+07 {C}	2.5E+07 {C}	8.10E+06	1.60E+07	2.50E+06	2.0E+05 {C}	5.0E+07 {C}
Nonresidential (µg/Kg)														
Drinking Water Protection (Nonres DWP)			100	4,600	4,600	1,400	2,000	1,500	2.60E+05	1.70E+05	1.00E+05	4,600	100	16,000
Soil Volatilization to Indoor Air Inhalation (Nonres SVII)			8,400	ID	ID	41,000	43,000	4.6E+05 {C}	7.3E+05 {C}	4.90E+06	4.70E+05	ID	21,000	6.1E+05 {C}
Ambient Air Infinite Source Volatile Soil Inhalation (Nonres VSI)			45,000	ID	ID	2.10E+05	3.30E+05	2.40E+06	2.00E+06	1.80E+06	3.50E+05	ID	2.10E+05	3.30E+06
Ambient Air Finite VSI for 5 Meter Source Thickness			99,000	ID	ID	4.30E+05	8.40E+05	3.10E+06	2.00E+06	1.80E+06	3.50E+05	ID	4.90E+05	3.60E+07
Ambient Air Finite VSI for 2 Meter Source Thickness			2.30E+05	ID	ID	1.00E+06	2.00E+06	6.50E+06	3.00E+06	1.80E+06	3.50E+05	ID	1.1E+06	3.60E+07
Ambient Air Particulate Soil Inhalation (Nonres PSI)			4.70E+08	ID	ID	1.00E+09	2.10E+09	1.30E+10	2.60E+09	2.90E+08	8.80E+07	5.90E+08	1.2E+09	1.20E+10
Direct Contact (Nonres DC)			8.40E+05 {C}	8.00E+06	8.00E+06	8.0E+06 {C}	1.2E+07 {C}	7.1E+07 {C}	8.0E+07 {C}	2.60E+07	5.20E+07	8.00E+06	9.3E+05 {C}	1.6E+08 {C}
Screening Levels (µg/Kg)														
Soil Saturation Concentration Screening Levels (Csat)			4.00E+05	1.00E+07	1.00E+07	6.40E+05	1.40E+06	1.40E+05	3.90E+05	NA	NA	1.00E+07	88,000	2.50E+05
Residential Vapor Intrusion Soil Screening Levels ($S_{VI\text{-}res}$)			50	450	50	50	50	200	250	7,500	440	140	52	10,000
Nonresidential Vapor Intrusion Soil Screening Levels ($S_{VI\text{-}nr}$)			85	7,600	740	160	760	4,000	300	1.26E+05	8,900	2,400	1,000	1.69E+05

Applicable Criterion/RBSL Exceeded

BOLD Value Exceeds Applicable Criterion/RBSL

Nonresidential Screening Level Exceeded

bgs Below Ground Surface (feet)

1 1,2,3-Trimethylbenzene RBSLs based on the more restrictive of 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene.

2 Maximum of analyzed or calculated total lead value.

ND Non-detected at levels above laboratory method detection limit (MDL)

NA Not Applicable

NL Not Listed

NLL Not Likely to Leach

NLV Not Likely to Volatilize

ID Insufficient Data

TABLE 1 (Page 2 of 2)
SUMMARY OF SOIL ANALYTICAL RESULTS
830, 832, 834, 910 EAST MAIN STREET, OWOSSO, MICHIGAN
PM PROJECT #01-5363-0-001

VOLATILE ORGANIC COMPOUNDS, POLYNUCLEAR AROMATIC COMPOUNDS, & METALS (µg/Kg)			Trichloroethylene	1,2,3-Trimethylbenzene*	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Vinyl chloride	Xylenes	Other VOCs	Naphthalene	2-Methylnaphthalene	Other PNAs	Cadmium	Chromium	Lead
Chemical Abstract Service Number (CAS#)			79016	526738	95636	108678	75014	1330207	Various	91203	91576	Various	7440439	16065831	7439921
Sample ID	**Sample Date**	**Sample Depth (feet bgs)**	**VOCs**							**PNAs**			**Metals**		
SB-1 (GEE)	7/31/2012	5.0-6.0	<10	<10	<10	<10	<10	<20	<MDL	**1,200**	900	<MDL	<200	6,330	9,600
SB-1 (GEE)	7/31/2012	9.0-10.0	<10	<10	<10	<10	<10	<20	<MDL	<330	<330	<MDL	NA	NA	NA
SB-2 (GEE)	7/31/2012	10.0-11.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-3 (GEE)	7/31/2012	10.0-11.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-5 (GEE)	7/31/2012	7.0-8.0	**3,100**	**1,000**	**3,000**	<10	<10	<20	<MDL	<330	<330	<MDL	<200	3,560	1,570
SB-7 (GEE)	7/31/2012	8.0-9.0	<10	<10	<10	<10	<10	<20	<MDL	600	<330	<MDL	360	4,120	29,100
SB-8 (GEE)	7/31/2012	3.0-4.0	**49,400**	<10	<10	<10	<10	<20	<MDL	<330	<330	<MDL	NA	NA	NA
PSB-1	04/29/2015	9.0-10.0	<80	<80	<80	<80	<80	**1,080**	<MDL	NA	NA	NA	NA	NA	NA
PSB-1	04/29/2015	18.0-19.0	<70	<70	<70	<70	<70	200	<MDL	NA	NA	NA	NA	NA	NA
PSB-2	04/28/2015	0.5-1.5	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-2	04/28/2015	13.0.-14.0	<70	**2,120**	**10,440**	**5,080**	<70	**4,460**	<MDL	NA	NA	NA	NA	NA	NA
PSB-2	04/28/2015	19.0-20.0	<70	<70	<70	<70	**490**	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-3	04/28/2015	2.0-3.0	<80	<80	<80	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
PSB-3	04/28/2015	13.0.-14.0	<70	460	**2,690**	**1,010**	**240**	400	<MDL	NA	NA	NA	NA	NA	NA
PSB-3	04/28/2015	19.0-20.0	<70	**680**	**1,680**	410	**320**	**10,800**	<MDL	NA	NA	NA	NA	NA	NA
PSB-4	04/28/2015	3.0-4.0	<90	<90	<90	<90	<90	<290	<MDL	NA	NA	NA	NA	NA	NA
PSB-4	04/28/2015	7.0-8.0	**1,100**	<100	<100	<100	**100**	<300	<MDL	NA	NA	NA	NA	NA	NA
PSB-4	04/28/2015	20.0-21.0	**160**	<80	<80	<80	**200**	**1,520**	<MDL	NA	NA	NA	NA	NA	NA
PSB-5	04/28/2015	3.5-4.5	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-5	04/28/2015	7.0-8.0	**3,200**	<100	<100	<100	<100	<300	<MDL	NA	NA	NA	NA	NA	NA
PSB-6	04/28/2015	3.0-4.0	<80	<80	<80	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
PSB-6	04/28/2015	13.0.-14.0	<70	80	240	80	<70	**2,970**	<MDL	NA	NA	NA	NA	NA	NA
PSB-7	04/29/2015	3.0-4.0	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-8	04/28/2015	3.0-4.0	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-8	04/28/2015	19.0-20.0	<80	<80	130	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
PSB-9	04/28/2015	1.0-2.0	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-9	04/28/2015	3.0-4.0	<80	<80	<80	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
PSB-10	04/29/2015	3.0-4.0	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-11	04/28/2015	3.0-4.0	<60	<60	<60	<60	<60	<160	<MDL	NA	NA	NA	NA	NA	NA
PSB-12	04/29/2015	3.0-4.0	<60	<60	<60	<60	<60	<160	<MDL	NA	NA	NA	NA	NA	NA
PSB-12	04/29/2015	4.0-5.0	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-13	04/29/2015	3.0-4.0	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-14	04/29/2015	4.0-5.0	<80	<80	<80	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
PSB-14	04/29/2015	9.0-10.0	<400	<400	**700**	<400	**2,100**	**23,900**	<MDL	NA	NA	NA	NA	NA	NA
PSB-15	11/12/2015	2.5-3.5	**200**	<75	<75	<75	<75	<225	<MDL	NA	NA	NA	NA	NA	NA
PSB-15	11/12/2015	10.0-11.0	<82	<82	<82	<82	<82	<242	<MDL	NA	NA	NA	NA	NA	NA
PSB-16	11/12/2015	3.0-4.0	<80	<80	<80	<80	<80	<240	<MDL	NA	NA	NA	NA	NA	NA
A-2 (co-located PSB-16)	11/12/2015	3.0-4.0	<78	<78	<78	<78	<78	<238	<MDL	NA	NA	NA	NA	NA	NA
PSB-16	11/12/2015	7.0-8.0	<79	<79	<79	<79	<79	<239	<MDL	NA	NA	NA	NA	NA	NA
PSB-17	11/12/2015	3.0-4.0	**350**	<74	<74	<74	**220**	<224	<MDL	NA	NA	NA	NA	NA	NA
PSB-17	11/12/2015	7.0-8.0	93	<70	<70	<70	**370**	<210	<MDL	NA	NA	NA	NA	NA	NA
PSB-18	11/12/2015	2.0-3.0	**390**	<72	<72	<72	<72	<212	<MDL	NA	NA	NA	NA	NA	NA
PSB-18	11/12/2015	7.0-8.0	**1,300**	<69	<69	<69	<69	<209	<MDL	NA	NA	NA	NA	NA	NA
PSB-19	11/12/2015	3.0-4.0	<71	<71	<71	<71	<71	<211	<MDL	NA	NA	NA	NA	NA	NA
PSB-19	11/12/2015	5.0-6.0	<77	<77	<77	<77	<77	<227	<MDL	NA	NA	NA	NA	NA	NA
PSB-20	11/12/2015	3.0-4.0	<65	<65	<65	<65	<65	<185	<MDL	NA	NA	NA	NA	NA	NA
PSB-20	11/12/2015	6.0-7.0	<77	<77	<77	<77	<77	<227	<MDL	NA	NA	NA	NA	NA	NA
PSB-21	11/12/2015	3.0-4.0	<68	<68	<68	<68	<68	<208	<MDL	NA	NA	NA	NA	NA	NA
PSB-21	11/12/2015	7.0-8.0	<1,400	**13,000**	**59,000**	**17,000**	<1,400	**75,300**	<MDL	NA	NA	NA	NA	NA	NA
PSB-22	11/12/2015	5.0-6.0	<75	<75	<75	<75	<75	<225	<MDL	NA	NA	NA	NA	NA	NA
Cleanup Criteria Requirements for Response Activity (R 299.1 - R 299.50) **Generic Soil Cleanup Criteria Tables 2 and 3: Residential and Non-Residential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Risk-Based Screening Levels, December 30, 2013** **MDEQ Guidance Document For The Vapor Intrusion Pathway, Policy and Procedure Number: 09-017, Appendix D Vapor Intrusion Screening Values, May 2013**															
Residential (µg/Kg)															
Statewide Default Background Levels			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,200	18,000	21,000
Drinking Water Protection (Res DWP)			100	1,800	2,100	1,800	40	5,600	Various	35,000	57,000	Various	6,000	30,000	7.00E+05
Groundwater Surface Water Interface Protection (GSIP)			4,000 {X}	570	570	1,100	260 {X}	820	Various	730	4,200	Various	{G,X}	3,300	{G,X}
Soil Volatilization to Indoor Air Inhalation (Res SVII)			1,000	2.6E+06 {C}	4.3E+06 {C}	2.6E+06 {C}	270	6.3E+06 {C}	Various	2.50E+05	2.70E+06	Various	NLV	NLV	NLV
Ambient Air Infinite Source Volatile Soil Inhalation (Res VSI)			11,000	1.60E+07	2.10E+07	1.60E+07	4,200	4.60E+07	Various	3.00E+05	1.50E+06	Various	NLV	NLV	NLV
Ambient Air Finite VSI for 5 Meter Source Thickness			25,000	3.80E+08	5.00E+08	3.80E+08	30,000	6.10E+07	Various	3.00E+05	1.50E+06	Various	NLV	NLV	NLV
Ambient Air Finite VSI for 2 Meter Source Thickness			57,000	3.80E+08	5.00E+08	3.80E+08	73,000	1.30E+08	Various	3.00E+05	1.50E+06	Various	NLV	NLV	NLV
Ambient Air Particulate Soil Inhalation (Res PSI)			1.30E+08	8.20E+10	8.20E+10	8.20E+10	3.50E+08	2.90E+11	Various	2.00E+08	6.70E+08	Various	1.70E+06	2.60E+05	1.0E+08
Direct Contact (Res DC)			5.0E+5 {C,DD}	3.2E+07 {C}	3.2E+07 {C}	3.2E+07 {C}	3,800	4.1E+08 {C}	Various	1.60E+07	8.10E+06	Various	5.50E+05	2.50E+06	4.00E+05
Nonresidential (µg/Kg)															
Drinking Water Protection (Nonres DWP)			100	1,800	2,100	1,800	40	5,600	Various	1.00E+05	1.70E+05	Various	6,000	30,000	7.00E+05
Soil Volatilization to Indoor Air Inhalation (Nonres SVII)			1,900	4.8E+06 {C}	8.0E+06 {C}	4.8E+06 {C}	2,800	1.2E+07 {C}	Various	4.70E+05	4.90E+06	Various	NLV	NLV	NLV
Ambient Air Infinite Source Volatile Soil Inhalation (Nonres VSI)			14,000	1.90E+07	2.50E+07	1.90E+07	29,000	5.40E+07	Various	3.50E+05	1.80E+06	Various	NLV	NLV	NLV
Ambient Air Finite VSI for 5 Meter Source Thickness			25,000	4.60E+08	6.00E+08	4.60E+08	170,000	6.50E+07	Various	3.50E+05	1.80E+06	Various	NLV	NLV	NLV
Ambient Air Finite VSI for 2 Meter Source Thickness			58,000	4.60E+08	6.00E+08	4.60E+08	4.20E+05	1.30E+08	Various	3.50E+05	1.80E+06	Various	NLV	NLV	NLV
Ambient Air Particulate Soil Inhalation (Nonres PSI)			5.90E+07	3.60E+10	3.60E+10	3.60E+10	8.90E+08	1.30E+11	Various	8.80E+07	2.90E+08	Various	2.2E+06	2.40E+05	4.4E+07
Direct Contact (Nonres DC)			6.6E+05 {C,DD}	1.0E+08 {C}	1.0E+08 {C}	1.0E+08 {C}	34,000	1.0E+09 {C}	Various	5.20E+07	2.60E+07	Various	2.1E+06	9.2E+06	9.00E+05 (DD)
Screening Levels (µg/Kg)															
Soil Saturation Concentration Screening Levels (Csat)			5.00E+05	94,000	1.10E+05	94,000	4.90E+05	1.50E+05	Various	NA	NA	Various	NA	NA	NA
Residential Vapor Intrusion Soil Screening Levels ($S_{VI\text{-}res}$)			50	3,200	2,200	1,700	40	290	Various	440	7,500	Various	NL	NL	NL
Nonresidential Vapor Intrusion Soil Screening Levels ($S_{VI\text{-}nr}$)			50	53,000	37,000	28,000	40	4,900	Various	8,900	1.26E+05	Various	NL	NL	NL

Applicable Criterion/RBSL Exceeded

BOLD Value Exceeds Applicable Criterion/RBSL

Nonresidential Screening Level Exceeded

bgs Below Ground Surface (feet)
1 1,2,3-Trimethylbenzene RBSLs based on the more restrictive of 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene.
2 Maximum of analyzed or calculated total lead value.
ND Non-detected at levels above laboratory method detection limit (MDL)
NA Not Applicable
NL Not Listed
NLL Not Likely to Leach
NLV Not Likely to Volatilize
ID Insufficient Data

TABLE 2 (1 OF 1)
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
830, 832, 834, 910 EAST MAIN STREET, OWOSSO, MICHIGAN
PM PROJECT #01-5363-0-001

VOLATILE ORGANIC COMPOUNDS, POLYNUCLEAR AROMATIC COMPOUNDS & METALS (µg/L)				Benzene	n-Butylbenzene	cis-1,2-Dichloroethylene	trans-1,2-Dichloroethylene	Ethylbenzene	n-Propylbenzene	Tetrachloroethylene	Toluene	Trichloroethylene	1,2,3-Trimethylbenzene [5]	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Vinyl chloride	Xylenes	Other VOCs	Naphthalene	2-Methylnaphthalene	Other PNAs	Cadmium	Chromium	Lead
Chemical Abstract Service Number (CAS#)				71432	104518	156592	156605	100414	103651	127184	108883	79016	526738	95636	108678	75014	1330207	Various	91203	91576	Various	7440439	16065831	7439921
Sample ID	**Sample Date**	**Screen Depth (feet bgs)**	**Depth to Groundwater (feet bgs)**	**VOCs**															**PNAs**			**Metals**		
SB-1 Water (GEE)	7/31/2012	15.0-20.0	16.0	<1	<1	**200**	<1	<1	<1	**5,100**	<1	<1	<1	<1	<1	<1	<1	<MDL	**17**	7	<MDL	<1	<10	<3
TMW-1	04/29/2015	4.83-9.83	6.86	**460**	<10	<10	<10	**30**	<10	**130**	20	<10	10	<10	<10	<10	**110**	<MDL	NA	NA	NA	NA	NA	NA
TMW-2	04/28/2015	7.12-12.12	6.63	<100	<100	**800**	<100	**100**	<100	**2,400**	<100	**1,000**	<100	**100**	<100	<100	**300**	<MDL	NA	NA	NA	NA	NA	NA
TMW-3	04/28/2015	7.19-12.19	7.43	<100	<100	<100	<100	**300**	200	<100	<100	<100	**200**	**1,100**	**300**	<100	**500**	<MDL	NA	NA	NA	NA	NA	NA
TMW-6	04/28/2015	9.68-14.68	7.02	**20**	10	**260**	<10	10	30	<10	<10	<10	<10	<10	<10	**90**	<30	<MDL	NA	NA	NA	NA	NA	NA
TMW-8	04/28/2015	8.77-13.77	6.93	<50	<50	60	<50	**340**	110	<50	<50	<50	**170**	**610**	**170**	<50	**700**	<MDL	NA	NA	NA	NA	NA	NA
TMW-11	04/28/2015	8.54-13.54	9.22	<1	<1	8	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<3	<MDL	NA	NA	NA	NA	NA	NA
TMW-13	04/29/2015	7.63-12.63	6.83	1	<1	**74**	2	<1	<1	**15**	<1	**11**	<1	<1	<1	**14**	<3	<MDL	NA	NA	NA	NA	NA	NA
Cleanup Criteria Requirements for Response Activity (R 299.1 - R 299.50) **Generic Groundwater Cleanup Criteria Table 1: Residential and Non-Residential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Risk-Based Screening Levels, December 30, 2013** **MDEQ Guidance Document For The Vapor Intrusion Pathway, Policy and Procedure Number: 09-017, Appendix D Vapor Intrusion Screening Values, May 2013**																								
Residential/Nonresidential (µg/L)																								
Residential Drinking Water (Res DW)				5.0 {A}	80	70 {A}	100 {A}	74 {E}	80	5.0 {A}	790 {E}	5.0 {A}	63 {E}	63 {E}	72 {E}	2.0 {A}	280 {E}	Various	520	260	Various	5.0 {A}	100 {A}	4.0 {L}
Residential Health Based Drinking Water Values				NL	NL	NL	NL	700 {E}	NL	NL	1,000 {E}	NL	NL	1,000 {E}	1,000 {E}	NL	10,000 {E}	Various	NL	NL	Various	NL	NL	NL
Nonresidential Drinking Water (Nonres DW)				5.0 {A}	230	70 {A}	100 {A}	74 {E}	230	5.0 {A}	790 {E}	5.0 {A}	63 {E}	63 {E}	72 {E}	2.0 {A}	280 {E}	Various	1,500	750	Various	5.0 {A}	100 {A}	4.0 {L}
Nonresidential Health Based Drinking Water Values				NL	NL	NL	NL	700 {E}	NL	NL	1,000 {E}	NL	NL	2,900 {E}	2,900 {E}	NL	10,000 {E}	Various	NL	NL	Various	NL	NL	NL
Groundwater Surface Water Interface (GSI)				200 {X}	ID	620	1,500 {X}	18	ID	60 {X}	270	200 {X}	17	17	45	13 {X}	41	Various	11	19	Various	{G,X}	11	{G,X}
Residential Groundwater Volatilization to Indoor Air Inhalation (Res GVII) [2]				5,600	ID	93,000	85,000	1.10E+05	ID	25,000	5.3E+5 {S}	2,200	56,000 {S}	56,000 {S}	61,000 {S}	1,100	1.9E+5 {S}	Various	31,000 {S}	25,000 {S}	Various	NLV	NLV	NLV
Nonresidential Groundwater Volatilization to Indoor Air Inhalation (Nonres GVII) [2]				35,000	ID	2.10E+05	2.00E+05	1.7E+5 {S}	ID	1.70E+05	5.3E+5 {S}	4,900	56,000 {S}	56,000 {S}	61,000 {S}	13,000	1.9E+5 {S}	Various	31,000 {S}	25,000 {S}	Various	NLV	NLV	NLV
Screening Levels (µg/L)																								
Residential Groundwater Vapor Intrusion Screening Levels ($GW_{VI\text{-}res}$) [3]				27	91	83	360	700	92	94	36,000	9.8	2,400	1,700	1200	2.8	10,000	Various	240	9.40E+02	Various	NL	NL	NL
Nonresidential Groundwater Vapor Intrusion Screening Levels ($GW_{VI\text{-}nr}$)[3]				140	380	350	1,500	2,600	390	460	1.50E+05	41	10,000	7,300	5,100	52	10,000	Various	1,200	3.9E+03	Various	NL	NL	NL
Residential Vapor Intrusion Shallow Groundwater Screening Levels ($GW_{VI\text{-}sump\text{-}res}$)[4]				5.0	1.0	70	100	700	1.0	5.0	1,000	5.0	5.0	1.7	1.2	2.0	10,000	Various	5.0	5	Various	NL	NL	NL
Nonresidential Vapor Intrusion Shallow Groundwater Screening Levels ($GW_{VI\text{-}sump\text{-}nr}$)[4]				5.0	1.0	70	100	700	1.0	5.0	1,000	5.0	10	7.3	5.1	2.0	10,000	Various	5.0	5	Various	NL	NL	NL
Water Solubility				1.75E+06	NA	3.50E+06	6.30E+06	1.69E+05	NA	2.00E+05	5.26E+05	1.10E+06	56,000	56,000	61,000	2.76E+06	1.86E+05	Various	31,000	25000	Various	NA	NA	NA
Flammability and Explosivity Screening Level				68,000	ID	5.30E+05	2.30E+05	43,000	ID	ID	61,000	ID	56,000 {S}	56,000 {S}	ID	33,000	70,000	Various	NA	ID	Various	ID	ID	ID
Acute Vapor Intrusion Screening Levels for Groundwater (µg/L)																								
IRASL Groundwater (AGW_{vi})				11,000	NL	6.4E+06	4,000	NL	NL	5.2E+04	2.6E+05	2.0E+06	NL	NL	NL	3.0E+05	1.5E+05	Various	NL	NL	Various	NL	NL	NL
IRASL Groundwater In Contact With Structure ($AGW_{vi\text{-}sump}$)				11	NL	6,400	4.0	NL	NL	53	260	2,000	NL	NL	NL	300	150	Various	NL	NL	Various	NL	NL	NL

Applicable Criteria/RBSL Exceeded

BOLD Value Exceeds Applicable Criteria

Nonresidential VISL Exceeded

bgs Below Ground Surface (feet)

ND Not detected at levels above the laboratory Method Detection Limit (MDL) or Minimum Quantitative Level (MQL)

[1] Rule 323.1057 of Part 4 Water Quality Standards

[2] Tier 1 GVII Criteria based on 3 meter (or greater) groundwater depth

[3] (2013 Vapor Intrusion Guidance) Screening Levels based on depth to groundwater less than 1.5 meters and not in contact with building foundation

[4] (2013 Vapor Intrusion Guidance) Screening levels based on groundwater in contact with the building foundation or within a sump

[5] 1,2,3-Trimethylbenzene RBSLs based on the more restrictive of 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene.

NA Not Applicable

NL Not Listed

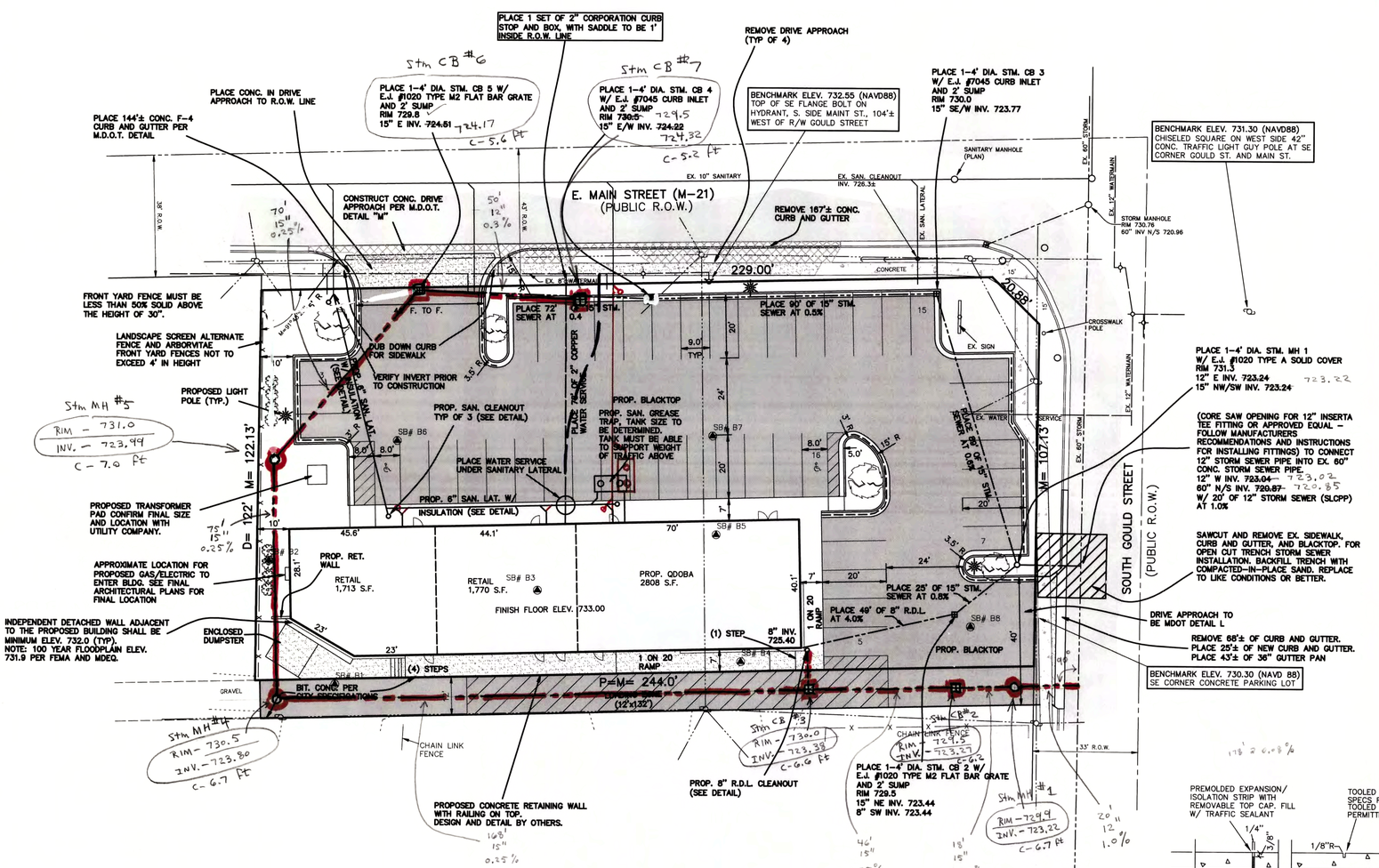
NLL Not Likely to Leach

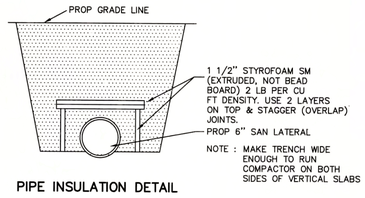
NLV Not Likely to Volatilize

ID Insufficient Data

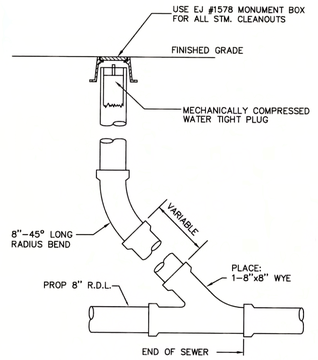
Appendix C

PM ENVIRONMENTAL Environmental & Engineering Services

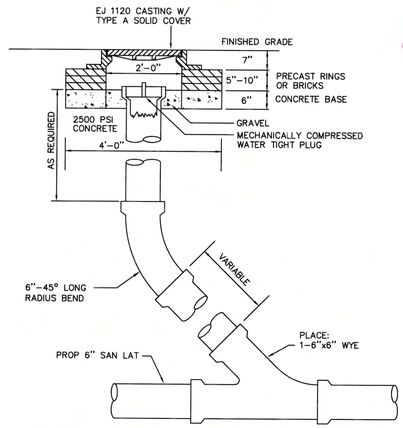




PIPE INSULATION DETAIL



8" ROOF DRAIN LEAD (R.D.L.) CLEANOUT DETAIL



SAN SEWER LATERAL CLEANOUT DETAIL

GENERAL NOTES:

1. Legal Description: Lots 83–87, Stafford Gardner & Trankles Central Add. except the N. 10' of said lots and also except a part of Lot 87 beginning at a point on the E. line Lot 87, 25' S. of the NE corner; thence N. on the E. line 15'; thence SE'ly to POB.
2. This property contains approximately 0.7 acres.
3. Existing Zoning – B–4 General Business District
   Building Setback Requirements:
   Front yard: 15 feet
   Side yard:
   –Corner lot which borders on a residential district to the rear: 20 feet
   –Exterior side yard abutting a residential district: 10 feet
   Rear yard: Adjacent to R–1, R–2 or RT–1 district: 10 percent of the depth of the lot 13 feet provided to center of alley
4. Parking Requirements:
   Restaurant:
   1 per 75 s.f. of useable floor area:
   2800 s.f.–80% useable=2240 s.f. / 75 = 30 spaces
   Retail:
   1 per each 200 s.f. of useable floor area:
   3407 s.f.–80% useable = 2726 s.f. / 200 = 14 spaces
   TOTAL required: 44 spaces
   Parking Provided:
   Standard spaces 44
   Barrier free spaces 2
   TOTAL 46
5. Underground utilities:
   Sanitary sewer – connect to existing sanitary sewer leads under M–21 (provide grease trap as necessary)
   Watermain – connect to existing 8" watermain along south ROW of M–21
   Storm sewer – provide catch basins in parking lot with outlet pipe tapped into 60 inch storm sewer along Gould Ave., as shown.
6. Site is in Shiawassee River 100 year floodplain. Floodplain earth fill and compensating floodplain earth cut at 930 Jerome Ave. shall be performed in compliance with the terms and specifications of MDEQ Permit No. 14–78–0006–P issued January 23, 2015.
7. Work inside M–21 ROW to be coordinated with MDOT.
8. Due dilligence must be exercised regarding on site environmental conditions as outlined in the global.environmental engineering inc. reports dated Aug. 10, 2012 titled: Baseline Environmental Assessment Report and Section 7a Compliance Analysis for the 910 East Main Street Site.
9. All curb radius are 5' to face unless otherwise noted.
10. For existing soils and engineered fill specifications recommendations and light duty asphalt, medium duty asphalt, and concrete section requirements,
    Refer to: Geotechnical Engineering Investigation
    Report dated March 19, 2015
    W.E.S.T. Project No. 15–0014
    By: Wolverine Engineering & Surveyors, Inc.
    312 North Street
    Mason, MI 48854
    Attn: Dan Wisinski
    Phone: (517) 676–9200

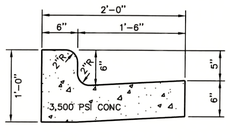
I.
11. PM Environmental
J. Adam Patton, CHMM
Phone: (517) 325-9867
Cell: (517) 202-4288

STORM SEWER NOTES:

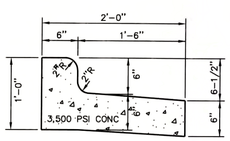
1. 12" storm sewer pipe shall be SLCPP with water tight joint connection
2. All 15" storm sewer pipe shall be C–76–III, or SLCPP with water tight joint connections.
3. 8" Roof drain lead and storm sewer pipe shall be PVC Schedule 40, or PVC SDR–26 pipe.
4. Storm sewer manhole and catchbasin structures shall be pre–cast concrete, per industry standards.

SANITARY SEWER AND WATERMAIN NOTES:

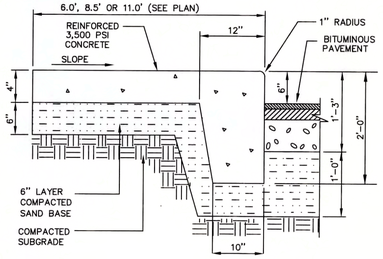
1. All sanitary sewer and watermain materials and construction methods shall conform to the standard specifications and details of the City of Owosso.
2. Verify existing sanitary lateral location, size, and depth before construction.
3. Any un–used (abandoned) sanitary lateral and water services shall be plugged and trench backfilled per City of Owosso approved methods. Existing size, location and depth information shall be furnished to the City of Owosso for accurate record keeping purposes.
4. Place proposed 6" sanitary lateral over proposed 15" storm sewer.
5. Proposed sanitary lateral and water service to have minimum 4 feet of earth cover, unless insulated and approved by the City.



24" HEAD CURB DETAIL (PITCHED IN)



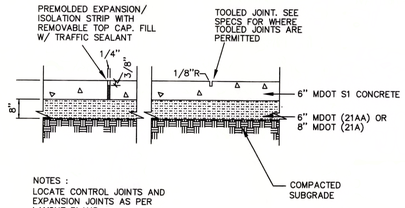
24" HEAD CURB DETAIL (PITCHED OUT)



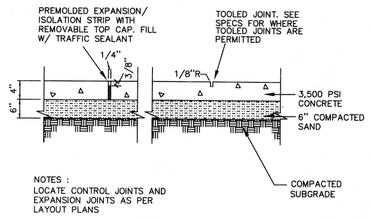
INTEGRAL CONC WALK/CURB

LIGHT DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)

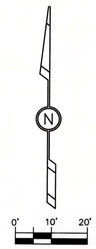
MEDIUM DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)



HEAVY DUTY CONC. DETAIL
(CONFIRM WITH SOIL REPORT)



4" CONCRETE WALKWAY DETAIL



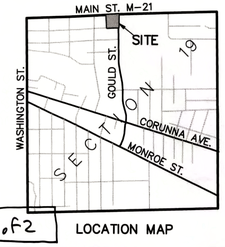
SCALE: 1" = 20'

Know what's below. Call before you dig.

STATE OF MICHIGAN
DONALD DE GROOT ENGINEER No. 34629
LICENSED PROFESSIONAL ENGINEER

May 11, 2015 Concept Utility Design Change WORK SHEET

1 of 2



LOCATION MAP

QDOBA/RETAIL SITE RE–DEVELOPMENT AND UTILITY PLAN

FOR: SOUTHWIND RESTAURANTS
109 EAST BROADWAY
MT. PLEASANT, MI 48858
ATTN: KEVIN EGNATUK

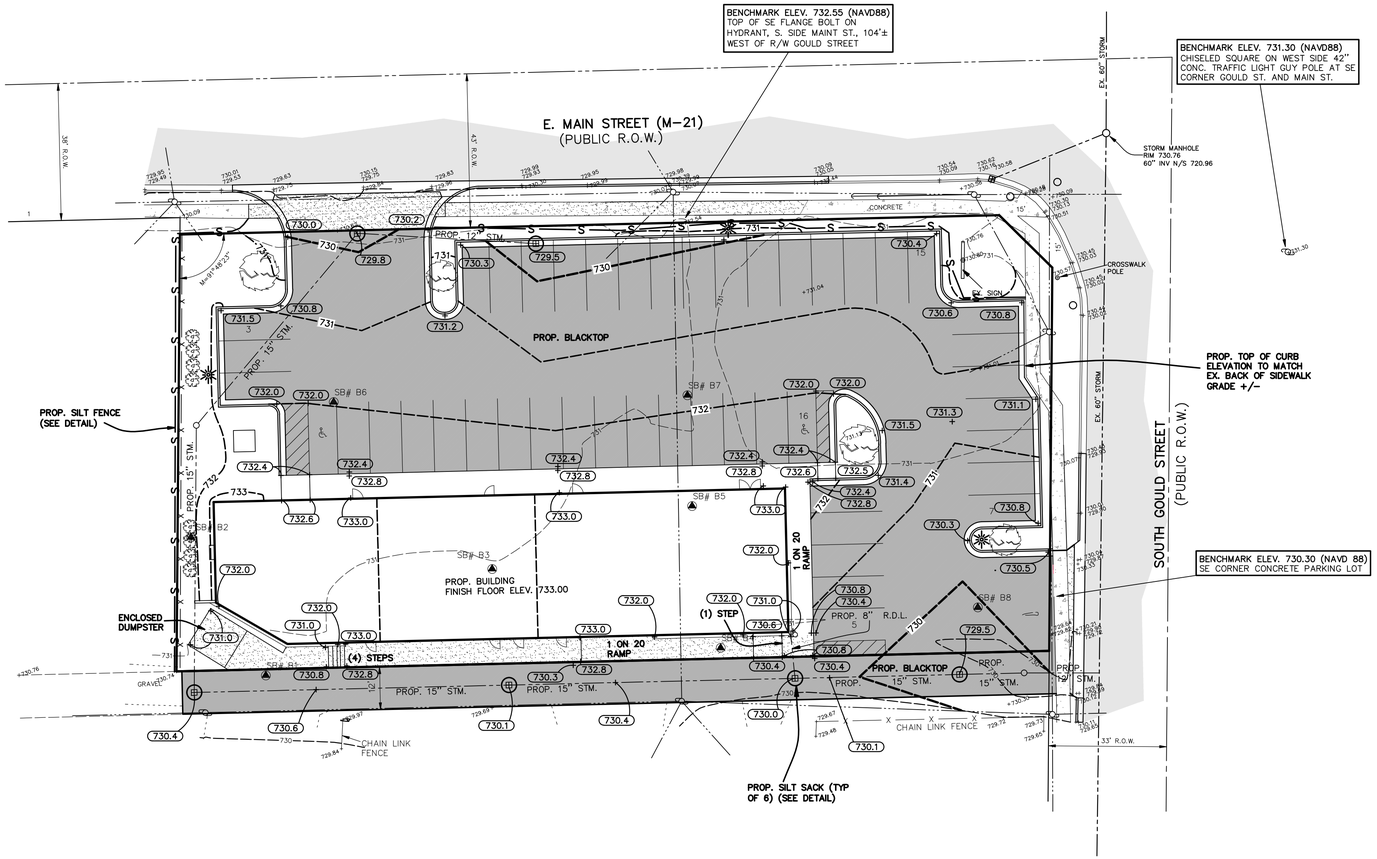
IN: PART OF THE NW 1/4, SECTION 19, T7N, R3E, CITY OF OWOSSO, SHIAWASSEE COUNTY, MICHIGAN

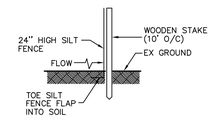
REVISIONS:
3/20/15 REV. PER OWNER (JSD)
3/10/15 REV. SAN. LATERAL (JSD)

exxel engineering, inc.
planners · engineers · surveyors
5252 Clyde Park, S.W. • Grand Rapids, MI 49509
Phone: (616) 531-3660 Fax: (616) 531-2121
www.exxelengineering.com

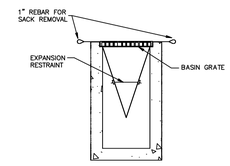
DRAWN BY: JSD
APPROVED BY: DDG
FILE NO.: 141574E
PROJ. ENG.: DDG
PROJ. SURV.: BMF
DATE: 3/2/2015

SHEET 2 of 3





SILT FENCE DETAIL



SILT SACK DETAIL

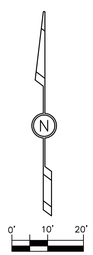
SOIL EROSION CONTROL NOTES :

1. ALL SOIL EROSION CONTROL MEASURES ARE TO BE IN PLACE PRIOR TO THE START OF ANY GRADING.
2. INSPECT AND MAINTAIN ALL TEMPORARY SOIL EROSION CONTROLS AFTER EACH SIGNIFICANT RAINFALL AND UNTIL THE SITE HAS BEEN PERMANENTLY STABILIZED.
3. ALL NON-PAVED SURFACES SHALL BE TOPSOILED WITH MINIMUM OF 4" TOPSOIL AND SEEDED.
4. PLACE ALL NEW STORM CATCHBASIN GRATES IN SILT SACKS UNTIL PAVING BEGINS.
5. PLACE SILT FENCE AS SHOWN ON PLAN AND PER DETAIL.
6. CONTRACTOR SHALL MINIMIZE TRACKING OF MUD AND SOIL ONTO ROADWAYS.
7. AREA OF DISTURBANCE IS 0.76 ACRES.

STATE OF MICHIGAN
DONALD DE GROOT ENGINEER No. 34629
LICENSED PROFESSIONAL ENGINEER

811 Know what's **below.** **Call** before you dig.

LOCATION MAP



SCALE: 1" = 20'

GRADING AND SOIL EROSION CONTROL PLAN
QDOBA/RETAIL SITE RE-DEVELOPMENT AT 910 E. MAIN ST.

FOR: SOUTHWIND RESTAURANTS
109 EAST BROADWAY
MT. PLEASANT, MI 48858
ATTN: KEVIN EGNATUK

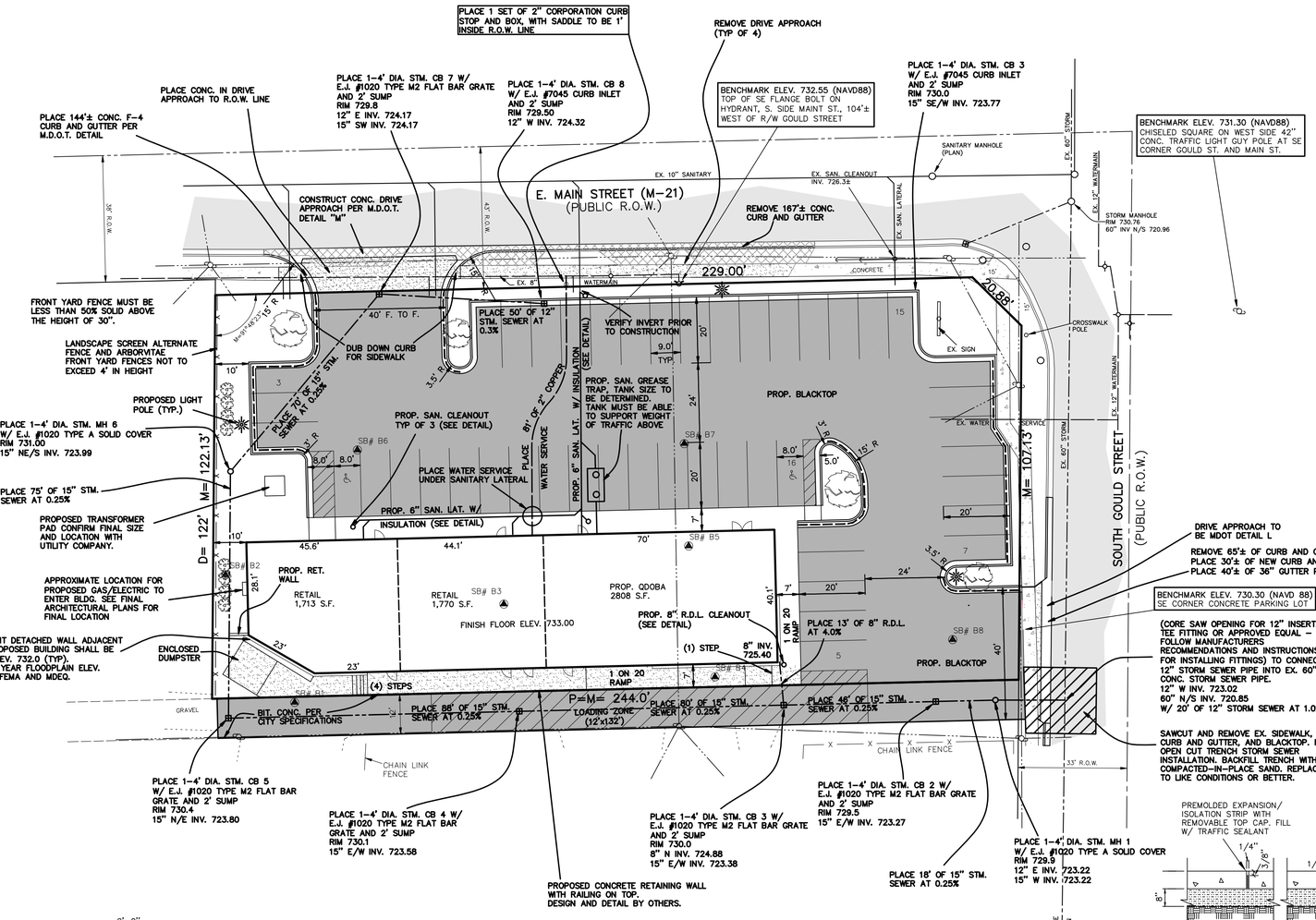
IN: PART OF THE NW 1/4, SECTION 19, T7N, R3E,
CITY OF OWOSSO, SHIAWASSEE COUNTY, MICHIGAN

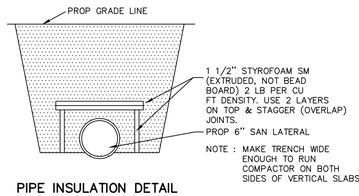
REVISIONS:
5/28/15 REV.-BROWNFIELD RE-DEVELOPMENT
3/20/15 REV. PER OWNER (JSD)

exxel engineering, inc.
planners · engineers · surveyors
5252 Clyde Park, S.W. • Grand Rapids, MI 49509
Phone: (616) 531-3660 Fax: (616) 531-2121
www.exxelengineering.com

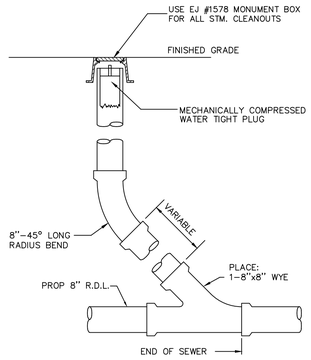
DRAWN BY: JSD
APPROVED BY: DDG
FILE NO.: 141574E
PROJ. ENG.: DDG
PROJ. SURV.: BMF
DATE: 3/2/2015

SHEET 3 of 3

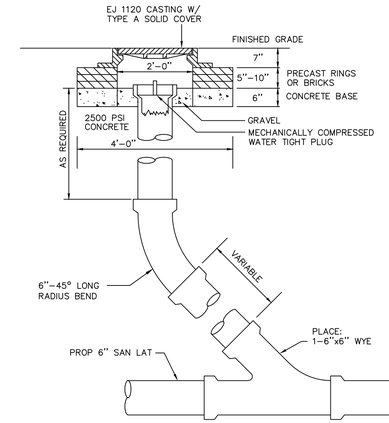




PIPE INSULATION DETAIL



8" ROOF DRAIN LEAD (R.D.L.) CLEANOUT DETAIL



SAN SEWER LATERAL CLEANOUT DETAIL

GENERAL NOTES:

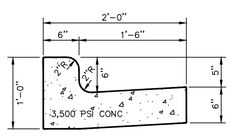
1. Legal Description: Lots 83-87, Stafford Gardner & Trankles Central Add. except the N. 10' of said lots and also except a part of Lot 87 beginning at a point on the E. line Lot 87, 25' S. of the NE corner; thence N. on the E. line 15'; thence SE'ly to POB.
2. This property contains approximately 0.7 acres.
3. Existing Zoning - B-4 General Business District
   Building Setback Requirements:
   Front yard: 15 feet
   Side yard:
   -Corner lot which borders on a residential district to the rear: 20 feet
   -Exterior side yard abutting a residential district: 10 feet
   Rear yard: Adjacent to R-1, R-2 or RT-1 district: 10 percent of the depth of the lot 13 feet provided to center of alley
4. Parking Requirements:
   Restaurant:
   1 per 75 s.f. of useable floor area:
   2800 s.f.-80% useable=2240 s.f. / 75 = 30 spaces
   Retail:
   1 per each 200 s.f. of useable floor area:
   3407 s.f.-80% useable = 2726 s.f. / 200 = 14 spaces
   TOTAL required: 44 spaces
   Parking Provided:
   Standard spaces 44
   Barrier free spaces 2
   TOTAL 46
5. Underground utilities:
   Sanitary sewer - connect to existing sanitary sewer leads under M-21 (provide grease trap as necessary)
   Watermain - connect to existing 8" watermain along south ROW of M-21
   Storm sewer - provide catch basins in parking lot with outlet pipe tapped into 60 inch storm sewer along Gould Ave., as shown.
6. Site is in Shiawassee River 100 year floodplain. Floodplain earth fill and compensating floodplain earth cut at 930 Jerome Ave. shall be performed in compliance with the terms and specifications of MDEQ Permit No. 14-78-0006-P issued January 23, 2015.
7. Work inside M-21 ROW to be coordinated with MDOT.
8. Due dilligence must be exercised regarding on site environmental conditions as outlined in the global.environmental engineering inc. reports dated Aug. 10, 2012 titled: Baseline Environmental Assessment Report and Section 7a Compliance Analysis for the 910 East Main Street Site.
9. All curb radius are 5' to face unless otherwise noted.
10. For existing soils and engineered fill specifications recommendations and light duty asphalt, medium duty asphalt, and concrete section requirements,
    Refer to: Geotechnical Engineering Investigation
    Report dated March 19, 2015
    W.E.S.I. Project No. 15-0014
    By: Wolverine Engineering & Surveyors, Inc.
    312 North Street
    Mason, MI 48854
    Attn: Dan Wisinski
    Phone: (517) 676-9200
11. For Brownfield Re-Development on the site, all construction activities must follow the MDEQ and PM ENVIRONMENTAL INC. requirements and recommendations.
    J. ADAM PATTON, CHMM
    Phone: (517) 325-9867
    Cell: (517) 202-4288
    PM ENVIRONMENTAL, INC.
    3340 Ranger Road
    Lansing, MI 48906

STORM SEWER NOTES:

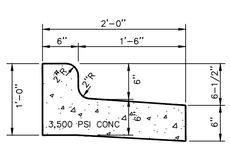
1. All storm sewer installation and materials for structures and pipe, including gaskets and seals to follow the requirements and recommendations of the MDEQ and PM ENVIRONMENTAL INC. for the Brownfield Re-Development. See general note No. 11 above.

SANITARY SEWER AND WATERMAIN NOTES:

1. All sanitary sewer and watermain materials and construction methods shall conform to the standard specifications and details of the City of Owosso.
2. Verify existing sanitary lateral location, size, and depth before construction.
3. Any un-used (abandoned) sanitary lateral and water services shall be plugged and trench backfilled per City of Owosso approved methods. Existing size, location and depth information shall be furnished to the City of Owosso for accurate record keeping purposes.
4. Proposed sanitary lateral and water service to have minimum 4 feet of earth cover, unless insulated and approved by the City.

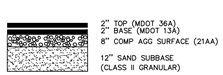


24" HEAD CURB DETAIL (PITCHED IN)

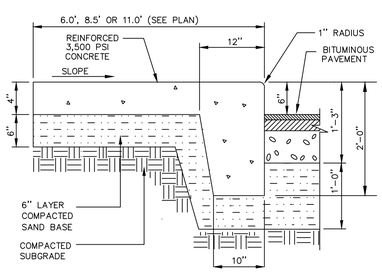


24" HEAD CURB DETAIL (PITCHED OUT)

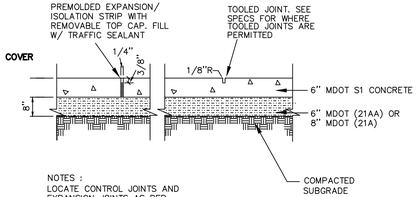
LIGHT DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)



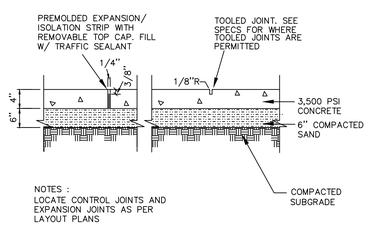
MEDIUM DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)



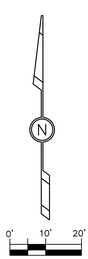
INTEGRAL CONC WALK/CURB



HEAVY DUTY CONC. DETAIL
(CONFIRM WITH SOIL REPORT)



4" CONCRETE WALKWAY DETAIL



SCALE: 1" = 20'

Know what's **below.** **Call** before you dig.

LOCATION MAP

QDOBA/RETAIL SITE RE-DEVELOPMENT AND UTILITY PLAN

FOR: SOUTHWIND RESTAURANTS
109 EAST BROADWAY
MT. PLEASANT, MI 48858
ATTN: KEVIN EGNATUK

IN: PART OF THE NW 1/4, SECTION 19, T7N, R3E, CITY OF OWOSSO, SHIAWASSEE COUNTY, MICHIGAN

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3/10/15 REV. SAN. LATERAL (JSD)

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DRAWN BY: JSD
APPROVED BY: DDG
FILE NO.: 141574E
PROJ. ENG.: DDG
PROJ. SURV.: BMF
DATE: 3/2/2015

SHEET 2 of 3

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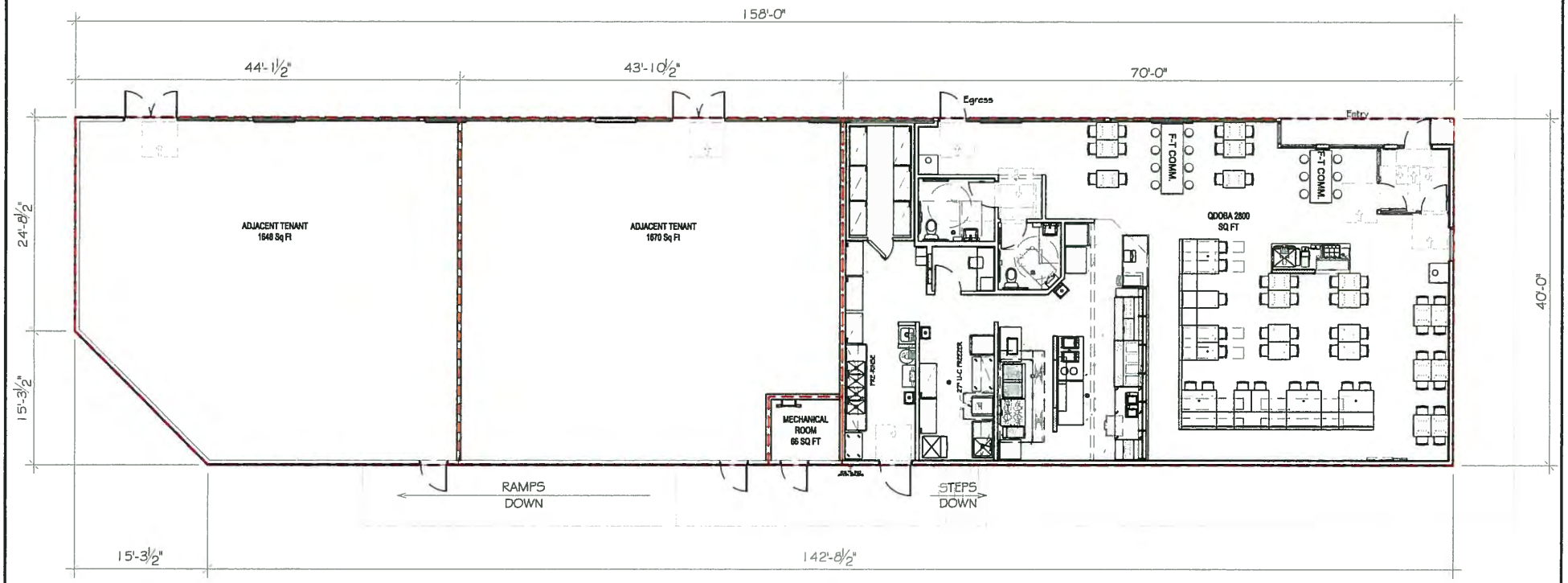
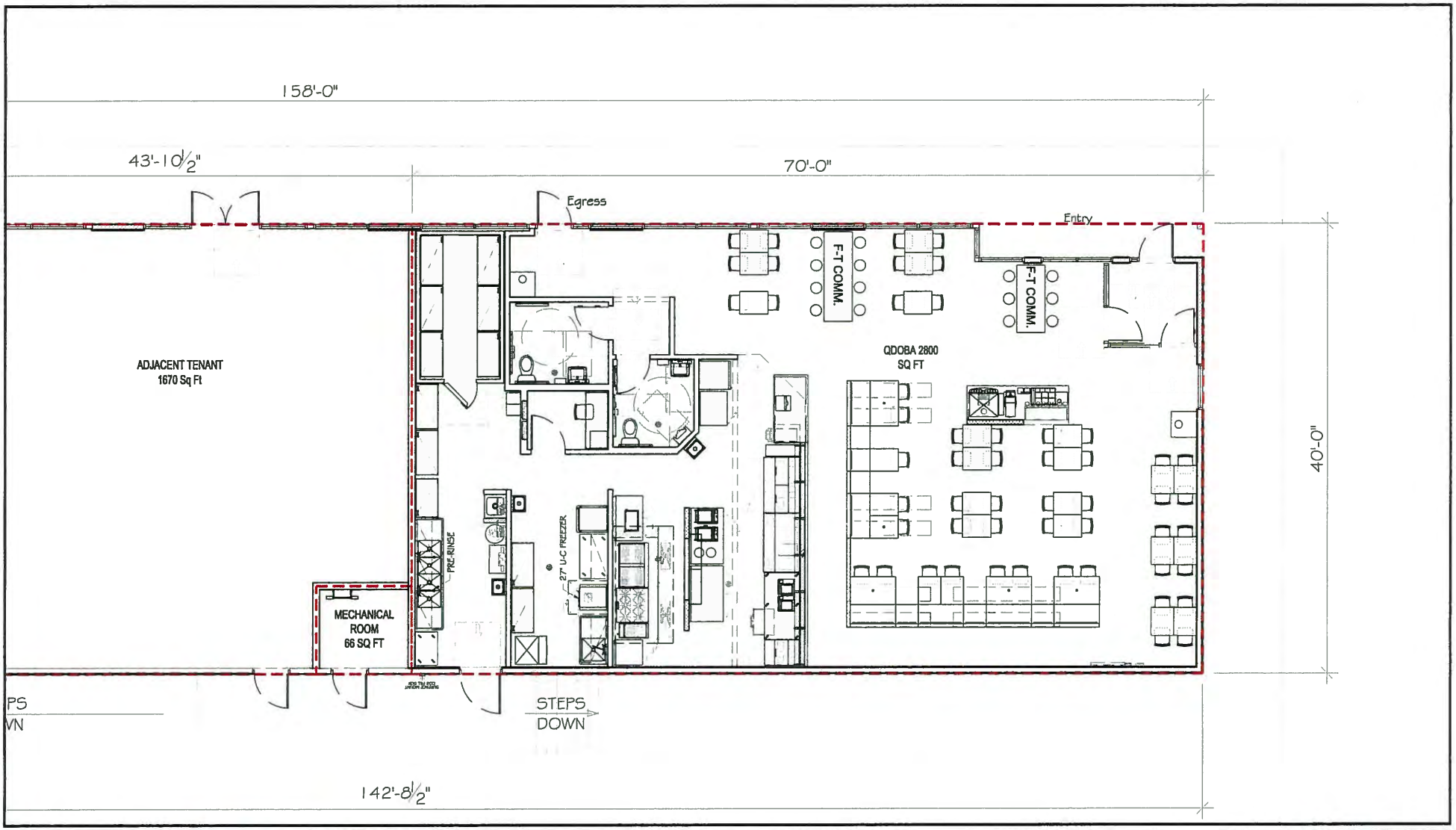


PROJ. NO.: 14-490 DATE: 01/22/15 SHEET # 005	LOD 6191 Sq Ft DRAWN: JTC	Multi-Tenant Building Owosso, MI	OWNER / TENANT: Johnroe SCALE: N.T.S.	THIS SCHEMATIC WAS PRODUCED FROM INFORMATION PROVIDED. A SITE SURVEY SHOULD BE COMPLETED TO VERIFY EXISTING CONDITIONS

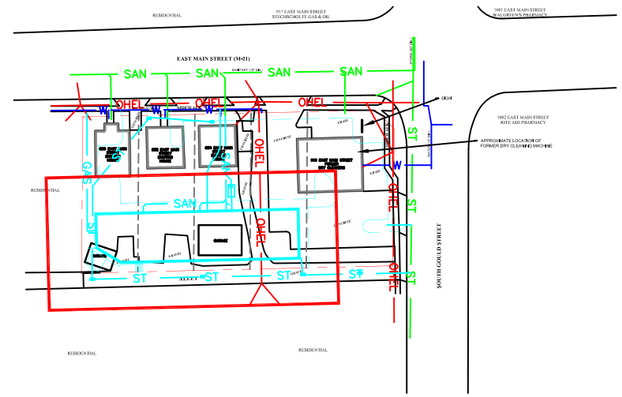
LIMBLE DESIGN GROUP
158 West Main St,
Lena, IL 61048
PH: 815-369-9155
FAX: 815-369-4495
WWW.LIMBLEDESIGN.COM



PROJ. NO.: 14-480 DATE: 01/22/15 SHEET #: 005	Schematic 2800 Sq Ft 80 Seats DRAWN BY: JTC	QDOBA Multi-Tenant Building Owosso, MI	OWNER / TENANT: Johnroe SCALE: 1/8" = 1'-0"	THIS SCHEMATIC WAS PRODUCED FROM INFORMATION PROVIDED. A SITE SURVEY SHOULD BE COMPLETED TO VERIFY EXISTING CONDITIONS	JINGLE DESIGN GROUP 158 West Main St, Lena, IL 61048 PH: 815-369-9155 FAX: 815-369-4495 WWW.JINGLEDESIGN.COM

Appendix D

PM ENVIRONMENTAL Environmental & Engineering Services



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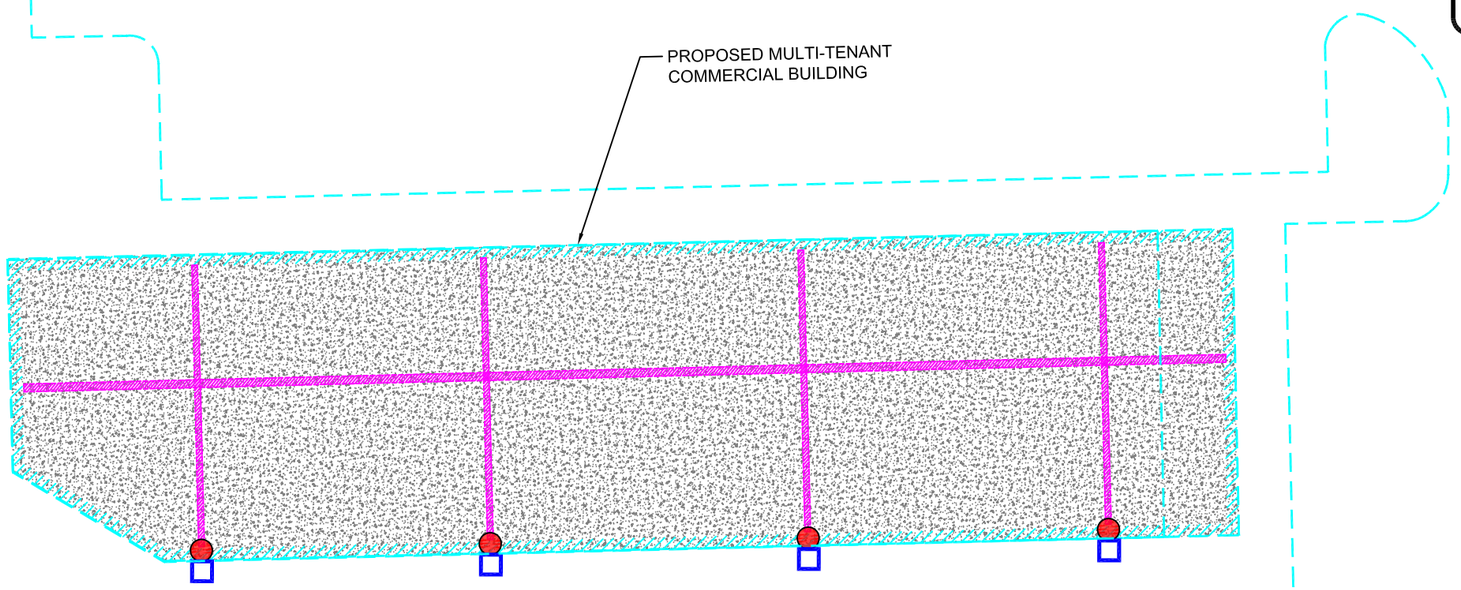


LEGEND:

	SUBJECT PROPERTY
W	WATER
SAN	SANITARY SEWER
ST	STORM SEWER
OHEL	OVERHEAD ELECTRIC LINE
	PARCEL / LOT BOUNDARIES
	PROPOSED SITE FEATURES
W	PROPOSED WATER
SAN	PROPOSED SANITARY SEWER
ST	PROPOSED STORM SEWER
GAS	PROPOSED GAS
	CONCRETE PAVEMENT
	VAPOR VENT SOIL GAS COLLECTION PIPING
	VAPOR BARRIER VENT RISER (SEE NOTES 1 AND 2)
	VAPOR BARRIER SYSTEM TEST PORT (SEE NOTE 3)

NOTE (1) ALL VAPOR BARRIER VENT PIPING TO BE EQUIPPED WITH LABELS IDENTIFYING THEM AS VAPOR MITIGATION SYSTEM COMPONENTS. THIS INCLUDES ALL VERTICAL RISERS ABOVE THE ROOF LINE.

NOTE (2) ALL VAPOR BARRIER VENT RISER OUTLETS WILL BE INSTALLED VERTICALLY AND WILL BE EQUIPPED WITH SHUTOFF VALVES AND RAIN CAPS.

NOTE (3) VAPOR BARRIER TEST PORTS WILL BE INSTALLED AT THE SOUTH BUILDING WALL AND WILL BE INSTALLED IN-LINE WITH SHUTOFF VALVES LOCATED ABOVE THE PORT ORIFICE.

PM ENVIRONMENTAL | Environmental & Engineering Services

FIGURE D1
PROPOSED VAPOR BARRIER LAYOUT

PROJ:
COMMERCIAL PROPERTY
830, 832, 834, AND 910 EAST MAIN STREET
OWOSSO, MI

THIS IS NOT A LEGAL SURVEY	DRN BY: CS	DATE: 5/7/2015
VERIFY SCALE 0 — 20' IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	CHKD BY: AP	SCALE: 1" = 20'
	FILE NAME: 01-5363-0-001FD1R00	

Appendix E

PM ENVIRONMENTAL Environmental & Engineering Services

Land Science™ Technologies
www.landsciencetech.com

Product Data Sheet

Vapor-Vent™

Vapor-Vent™ is a low profile, trenchless, flexible, sub slab vapor collection system used in lieu of perforated piping. Installation of Vapor-Vent increases construction productivity as it eliminates time consuming trench digging and costly gravel importation. Vapor-Vent is offered with two different core materials, Vapor-Vent POLY is recommended for sites with inert methane gas and Vapor-Vent is recommended for sites with aggressive chlorinated volatile organic or petroleum vapors.

VENT PROPERTIES	**TEST METHOD**	**Vapor-Vent POLY**	**Vapor-Vent**
Material		Polystyrene	HDPE
Comprehensive Strength	ASTM D-1621	9,500 lbs / ft^2	11,400 psf
Flow Rate (Hydraulic gradient = .1)	ASTM D-4716	30 gpm/ft width	30 gpm/ft width
Chemical Resistance		N/A	Excellent
FABRIC PROPERTIES	**TEST METHOD**	**Vapor-Vent POLY**	**Vapor-Vent**
Grab Tensile Strength	ASTM D-4632	100 lbs.	110 lbs.
Puncture Strength	ASTM D-4833	65 lbs.	30 lbs.
Mullen Burst Strength	ASTM D-3786	N/A	90 PSI
AOS	ASTM D-4751	70 U.S. Sieve	50 U.S. Sieve
Flow Rate	ASTM D-4491	140 gpm / ft2	95 gpm / ft2
UV Stability (500 hours)	ASTM D-4355	N/A	70% Retained
DIMENSIONAL DATA		**Vapor-Vent POLY**	**Vapor-Vent**
Thickness		1”	1”
Standard Widths		12”	12”
Roll Length		165 ft	165 ft
Roll Weight		65 lbs	68 lbs

Vapor-Vent™
SOIL GAS COLLECTION SYSTEM
Version 1.5

SECTION 02 56 19 – GAS CONTROL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Substrate preparation.
2. Vapor-Vent™ installation.
3. Vapor-Vent accessories.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 2 Section “Earthwork”, “Pipe Materials”, “Sub-drainage systems”, ”Gas Control System”, “Fluid-Applied gas barrier”.
2. Division 3 Section “Cast-in-Place Concrete” for concrete placement, curing, and finishing.
3. Division 5 Section “Expansion Joint Cover Assemblies”, for expansion-joint covers assemblies and installation.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide a gas venting material that collects gas vapors and directs them to discharge or to collection points as specified in the gas vapor collection system drawings and complies with the physical requirements set forth by the manufacturer.

1.4 SUBMITTALS

A. Submit Product Data for each type of gas venting system specified, including manufacturer’s specifications.

B. Sample – Submit representative samples of the following for approval:

1. Gas venting, Vapor-Vent.
2. Vapor-Vent accessories.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who is certified in writing and approved by vapor intrusion barrier manufacturer Land Science Technologies for the installation of the Geo-Seal® vapor intrusion barrier system.

B. Manufacturer Qualification: Obtain gas venting, vapor intrusion barrier and system components from a single manufacturer Land Science Technologies

C. Pre-installation Conference: A pre-installation conference shall be held prior to installation of the venting system, vapor intrusion barrier and waterproofing system to assure proper site and installation conditions, to include contractor, applicator, architect/engineer and special inspector (if any).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site as specified by manufacturer labeled with manufacturer’s name, product brand name and type, date of manufacture, shelf life, and directions for handling.

B. Store materials as specified by the manufacturer in a clean, dry, protected location and within the temperature range required by manufacturer. Protect stored materials from direct sunlight.

C. Remove and replace material that is damaged.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Land Science Technologies, San Clemente, CA. (949) 481-8118

1. Vapor-Vent™

2.2 GAS VENT MATERIALS

A. Vapor-Vent – Vapor-Vent is a low profile, trenchless, flexible, sub slab vapor collection system used in lieu or in conjunction with perforated piping. Vapor-Vent is offered with two different core materials, Vapor-Vent POLY is recommended for sites with inert methane gas and Vapor-Vent is recommended for sites with aggressive chlorinated volatile organic or petroleum vapors. Manufactured by Land Science Technologies

B. Vapor-Vent physical properties

VENT PROPERTIES	**TEST METHOD**	**VAPOR-VENT POLY**	**VAPOR-VENT**
Material		Polystyrene	HDPE
Comprehensive Strength	ASTM D-1621	9,000 lbs / ft^2	11,400 lbs / ft^2
In-plane flow (Hydraulic gradient-0.1)	ASTM D-4716	30 gpm / ft of width	30 gpm / ft of width
Chemical Resistance		N/A	Excellent
FABRIC PROPERTIES	**TEST METHOD**	**VAPOR-VENT POLY**	**VAPOR-VENT**
Grab Tensile Strength	ASTM D-4632	100 lbs.	110 lbs.
Puncture Strength	ASTM D-4833	65 lbs.	30 lbs.
Mullen Burst Strength	ASTM D-3786	N/A	90 PSI
AOS	ASTM D-4751	70 U.S. Sieve	50 U.S. Sieve
Flow Rate	ASTM D-4491	140 gpm / ft^2	95 gpm / ft^2
UV Stability (500 hours)	ASTM D-4355	N/A	70% Retained
DIMENSIONAL DATA			
Thickness		1”	1”
Standard Widths		12”	12”
Roll Length		165 ft	165 ft
Roll Weight		65 lbs	68 lbs

2.3 AUXILIARY MATERIALS

A. Vapor-Vent End Out

B. Reinforced Tape.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which gas vent system will be installed, with installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 SUBSTRATE PREPARATION

A. Verify substrate is prepared according to project requirements.

3.3 PREPARATION FOR STRIP COMPOSITE

A. Mark the layout of strip geocomposite per layout design developed by engineer.

3.4 STRIP GEOCOMPOSITE INSTALLATION

A. Install Vapor-Vent over substrate material where designated on drawings with the flat base of the core placed down and shall be overlapped in accordance with manufacturer's recommendations.

B. At areas where Vapor-Vent strips intersect cut and fold back fabric to expose the dimpled core. Arrange the strips so that the top strip interconnects into the bottom strip. Unfold fabric to cover the core and use reinforcing tape, as approved by the manufacturer, to seal the connection to prevent sand or gravel from entering the core.

C. When crossing Vapor-Vent over footings or grade beams, **consult with the specifying environmental engineer and structural engineer for appropriate use and placement of solid pipe materials**. Place solid pipe over or through concrete surface and attach a Vapor-Vent End Out at both ends of the pipe before connecting the Vapor-Vent to the pipe reducer. Seal the Vapor-Vent to the Vapor-Vent End Out using fabric reinforcement tape. Refer to Vapor-Vent detail provided by Land Science Technologies.

D. Place vent risers per specifying engineer's project specifications. Connect Vapor-Vent to Vapor-Vent End Out and seal with fabric reinforced tape. Use Vapor-Vent End Out with the specified diameter piping as shown on system drawings.

3.5 PLACEMENT OF OVERLYING AND ADJACENT MATERIALS

A. All overlying and adjacent material shall be placed or installed using approved procedures and guidelines to prevent damage to the strip geocomposite.

B. Equipment shall not be directly driven over and stakes or any other materials may not be driven through the strip geocomposite.

Land Science™ Technologies
www.landsciencetech.com

Product Data Sheet

Geo-Seal® FILM-11 Layer

The Geo-Seal™ FILM-11 layer is comprised of a high strength, cross laminated HDPE membrane (Class A Rating). The FILM-11 layer is installed over the substrate and the cross laminated HDPE provides the ideal surface for the application of the Geo-Seal CORE component. The FILM-11 layer can be used in lieu of, or in addition to, the standard Geo-Seal BASE layer to increase the performance of the standard Geo-Seal system or to meet the project needs.

PROPERTIES	TEST METHOD	Geo-Seal FILM-11
Film Thickness		11 mil
Classification	ASTM E 1745-09	Exceed Class A,B and C
Tensile	ASTM E 154-93	50 lbs / in
Puncture Resistance	ASTM D 1709	2400 grams
Water Vapor Permeance	ASTM E 96	0.020 Perms
Life Expectancy	ASTM E 154-93	Indefinite
Chemical Resistance	ASTM E 154-93	Excellent
Packaging: 12.75'x200'		

Land Science Technologies, Inc. / 1011 Calle Sombra / Suite 110 / San Clemente / CA / 92673
Ph. 949-366-8000 / F. 949- 366-8090

Geo-Seal® Vapor Intrusion Barrier
02 56 19.13
Fluid-Applied Gas Barrier
Version 1.4

Note: If membrane will be subjected to hydrostatic pressure, please contact Land Science Technologies™ for proper recommendations.

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.

1.2 SUMMARY

A. This section includes the following:

1. Substrate preparation:
2. Vapor intrusion barrier components:
3. Seam sealer and accessories.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 2 Section “Earthwork”, “Pipe Materials”, “Sub-drainage Systems”, “Gas Collection Systems”:
2. Division 3 Section “Cast-in-Place Concrete” for concrete placement, curing, and finishing:
3. Division 5 Section “Expansion Joint Cover Assemblies”, for expansion-joint covers assemblies and installation.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide a vapor intrusion barrier system that prevents the passage of methane gas and/or volatile organic compound vapors and complies with physical requirements as demonstrated by testing performed by an independent testing agency of manufacturer’s current vapor intrusion barrier formulations and system design.

1.4 SUBMITTALS

A. Submit product data for each type of vapor intrusion barrier, including manufacturer’s printed instructions for evaluating and preparing the substrate, technical data, and tested physical and performance properties.

B. Project Data - Submit shop drawings showing extent of vapor intrusion barrier, including details for overlaps, flashing, penetrations, and other termination conditions.

C. Samples – Submit representative samples of the following for approval:

1. Vapor intrusion barrier components.

D. Certified Installer Certificates – Submit certificates signed by manufacturer certifying that installers comply with requirements under the “Quality Assurance” article.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has been trained and certified in writing by the membrane manufacturer, Land Science Technologies™ for the installation of the Geo-Seal® System.

B. Manufacturer Qualification: Obtain vapor intrusion barrier materials and system components from a single manufacturer source Land Science Technologies.

C. Field Sample: Apply vapor intrusion barrier system field sample to 100 ft^2 (9.3 m^2) of field area demonstrate application, detailing, thickness, texture, and standard of workmanship.

1. Notify engineer or special inspector one week in advance of the dates and times when field sample will be prepared.

2. If engineer or special inspector determines that field sample, does not meet requirements, reapply field sample until field sample is approved.

3. Retain and maintain approved field sample during construction in an undisturbed condition as a standard for judging the completed methane and vapor intrusion barrier. An undamaged field sample may become part of the completed work.

D. Pre-installation Conference: A pre-installation conference shall be held prior to application of the vapor intrusion barrier system to assure proper site and installation conditions, to include contractor, applicator, architect/engineer, other trades influenced by vapor intrusion barrier installation and special inspector (if any).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site as specified by manufacturer labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.

B. Store materials as specified by the manufacturer in a clean, dry, protected location and within the temperature range required by manufacturer. Protect stored materials from direct sunlight. If freezing temperatures are expected, necessary steps should be taken to prevent the freezing of the Geo-Seal CORE and Geo-Seal CORE Detail components.

C. Remove and replace material that cannot be applied within its stated shelf life.

1.7 PROJECT CONDITIONS

A. Protect all adjacent areas not to be installed on. Where necessary, apply masking to prevent staining of surfaces to remain exposed wherever membrane abuts to other finish surfaces.

B. Perform work only when existing and forecasted weather conditions are within manufacturer's recommendations for the material and application method used.

C. Minimum clearance of 24 inches is required for application of product. For areas with less than 24-inch clearance, the membrane may be applied by hand using Geo-Seal CORE Detail.

D. Ambient temperature shall be within manufacturer's specifications. (Greater than +45ºF/+7ºC.) Consult manufacturer for the proper requirements when desiring to apply Geo-Seal CORE below 45ºF/7ºC.

E. All plumbing, electrical, mechanical and structural items to be under or passing through the vapor intrusion barrier system shall be positively secured in their proper positions and appropriately protected prior to membrane application.

F. Vapor intrusion barrier shall be installed before placement of fill material and reinforcing steel. When not possible, all exposed reinforcing steel shall be masked by general contractor prior to membrane application.

G. Stakes used to secure the concrete forms **shall not penetrate** the vapor intrusion barrier system after it has been installed. If stakes need to puncture the vapor intrusion barrier system after it has been installed, the necessary repairs need to be made by a certified Geo-Seal applicator. To confirm the staking procedure is in agreement with the manufactures recommendation, contact Land Science Technologies.

1.8 WARRANTY

A. General Warranty: The special warranty specified in this article shall not deprive the owner of other rights the owner may have under other provisions of the contract documents, and shall be in addition to, and run concurrent with, other warranties made by the contractor under requirements of the contract documents.

B. Special Warranty: Submit a written warranty signed by vapor intrusion barrier manufacturer agreeing to repair or replace vapor intrusion barrier that does not meet requirements or that does not remain methane gas and/or volatile organic compound vapor tight within the specified warranty period. Warranty does not include failure of vapor intrusion barrier due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in the attached to structures that exceed 1/16 inch (1.58 mm) in width.

1. Warranty Period: 1 year after date of substantial completion.

C. Additional warranties are available upon request to the manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Geo-Seal; Land Science Technologies™, San Clemente, CA. (949) 481-8118

1. Geo-Seal BASE sheet layer
2. Geo-Seal CORE spray layer and Geo-Seal CORE Detail
3. Geo-Seal BOND protection layer

2.2 VAPOR INTRUSION BARRIER SPRAY MATERIALS

A. Fluid applied vapor intrusion barrier system – Geo-Seal CORE; a single course, high build, polymer modified, asphalt emulsion. Waterborne and spray applied at ambient temperatures. A nominal thickness of 60 dry mils, unless specified otherwise. Non-toxic and odorless. Geo-Seal CORE Detail has similar properties with greater viscosity and is roller or brush applied. Manufactured by Land Science Technologies.

B. Fluid applied vapor intrusion barrier physical properties.

Geo-Seal CORE – TYPICAL CURED PROPERTIES

Properties	Test Method	Results
Tensile Strength - CORE only	ASTM 412	32 psi
Tensile Strength - Geo-Seal System	ASTM 412	662 psi
Elongation	ASTM 412	4140%
Resistance to Decay	ASTM E 154 Section 13	4% Perm Loss
Accelerated Aging	ASTM G 23	No Effect
Moisture Vapor Transmission	ASTM E 96	.026 g/ft^2/hr
Hydrostatic Water Pressure	ASTM D 751	26 psi
Perm rating	ASTM E 96 (US Perms)	0.21
Methane transmission rate	ASTM D 1434	Passed
Adhesion to Concrete & Masonry	ASTM C 836 & ASTM C 704	11 lbf./inch
Hardness	ASTM C 836	80
Crack Bridging	ASTM C 836	No Cracking
Heat Aging	ASTM D 4068	Passed
Environmental Stress Cracking	ASTM D 1693	Passed
Oil Resistance	ASTM D543	Passed
Soil Burial	ASTM D 4068	Passed
Low Temp. Flexibility	ASTM C 836-00	No Cracking at –20°C
Resistance to Acids:		
Acetic		30%
Sulfuric and Hydrochloric		13%
Temperature Effect:		
Stable		248°F
Flexible		13°F

Geo-Seal CORE Detail – TYPICAL CURED PROPERTIES

Properties	Test Method	Results
Tensile Strength	ASTM 412	32 psi
Elongation	ASTM 412	3860%
Resistance to Decay	ASTM E 154 Section 13	9% Perm Loss
Accelerated Aging	ASTM G 23	No Effect
Moisture Vapor Transmission	ASTM E 96	.026 g/ft^2/hr
Hydrostatic Water Pressure	ASTM D 751	28 psi
Perm rating (US Perms)	ASTM E 96	0.17
Methane transmission rate	ASTM D 1434	Passed
Adhesion to Concrete & Masonry	ASTM C 836	7 lbf./inch
Hardness	ASTM C 836	85
Crack Bridging	ASTM C 836	No Cracking
Low Temp. Flexibility	ASTM C 836-00	No Cracking at –20ºC
Resistance to Acids:		
Acetic		30%
Sulfuric and Hydrochloric		13%
Temperature Effect:		
Stable		248°F
Flexible		13°F

2.3 VAPOR INTRUSION BARRIER SHEET MATERIALS

A. The Geo-Seal BASE layer and Geo-Seal BOND layer are chemically resistant sheets comprised of a 5 mil high density polyethylene sheet thermally bonded to a 3 ounce non woven geotextile.

B. Sheet Course Usage

1. As foundation base layer, use Geo-Seal BASE course and/or other base sheet as required or approved by the manufacturer.

2. As top protective layer, use Geo-Seal BOND layer and/or other protection as required or approved by the manufacturer.

C. Geo-Seal BOND and Geo-Seal BASE physical properties.

Properties	Test Method	Results
Film Thickness		5 mil
Composite Thickness		18 mil
Water Vapor Permeability	ASTM E 96	0.214
Adhesion to Concrete	ASTM D 1970	9.2 lbs/inch^2
Dart Impact	ASTM D 1790	>1070 gms, method A
		594 gms, method B
Puncture Properties Tear	ASTM B 2582 MD	11,290 gms
	ASTM B 2582 TD	13,150 gms

2.4 AXILLARY MATERIALS

A. Geo-Seal FILM-11 may be used in lieu of, or in addition to, the standard Geo-Seal BASE and Geo-Seal BOND material when project conditions require a higher level of chemical resistance or greater durability is required. Contact Land Science Technologies for the proper recommendation and approval.

Properties	Test Method	Results
Film Thickness		11 mil
Classification	ASTM E 1745-09	Exceed Class A,B and C
Tensile	ASTM E 154-93	45 lbs / in
Puncture Resistance	ASTM D 1709	2400 grams
Water Vapor Permeance	ASTM E 96	0.020 Perms
Life Expectancy	ASTM E 154-93	Indefinite
Chemical Resistance	ASTM E 154-93	Excellent

B. Sheet Flashing: 60-mil reinforced modified asphalt sheet good with double-sided adhesive.

C. Reinforcing Strip: Manufacturer's recommended polypropylene and polyester fabric.

D. Gas Venting Materials: Geo-Seal Vapor-Vent or Geo-Seal Vapor-Vent Poly, and associated fittings.

E. Seam Detailing Sealant Mastic: Geo-Seal CORE Detail, a high or medium viscosity polymer modified water based asphalt material.

1. Back Rod: Closed-cell polyethylene foam.

PART 3 – EXECUTION

3.1 AUXILIARY MATERIALS

A. Examine substrates, areas, and conditions under which vapor intrusion barrier will be applied, with installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 SUBGRADE SURFACE PREPARATION

A. Verify substrate is prepared according to manufacturer's recommendations. On a horizontal surface, the substrate should be free from material that can potentially puncture the vapor intrusion barrier. Additional protection or cushion layers might be required if the earth or gravel substrate contains too many jagged points and edges that could puncture one or more of the system components. Contact manufacturer to confirm substrate is within manufactures recommendations.

B. Geo-Seal can accommodate a wide range of substrates, including but not limited to compacted earth, sand, aggregate, and mudslabs.

1. Compacted Earth: Remove pieces of debris, gravel and/or any other material that can potentially puncture the Geo-Seal BASE. Remove any debris from substrate that can potentially puncture the Geo-Seal system prior to application.

2. Sand: A sand subgrade requires no additional preparation, provided any material that can potentially puncture the Geo-Seal BASE layer is not present.

3. Aggregate: Contact the manufacturer to ensure the aggregate layer will not be detrimental to the membrane. **The gravel layer must be compacted and rolled flat.** Ideally a ¾" minus gravel layer with rounded edges should be specified; however the Geo-Seal system can accommodate a wide variety of different substrates. Contact Land Science Technologies if there are questions regarding the compatibility of Geo-Seal and the utilized substrate. Exercise caution when specifying pea gravel under the membrane, if not compacted properly, pea gravel can become an unstable substrate.

4. Mudslabs: The use of a mubslab under the Geo-Seal system is acceptable, contact Land Science Technologies for job specific requirements.

C. Mask off adjoining surface not receiving the vapor intrusion barrier system to prevent the spillage or over spray affecting other construction.

D. Earth, sand or gravel subgrades should be prepared and compacted to local building code requirements.

3.3 CONCRETE SURFACE PREPARATION

A. Clean and prepare concrete surface to manufacturer's recommendations. In general, only apply the Geo-Seal CORE material to dry, clean and uniform substrates. Concrete surfaces must be a light trowel, light broom or equivalent finish. Remove fins, ridges and other projections and fill honeycomb, aggregate pockets, grout joints and tie holes, and other voids with hydraulic cement or rapid-set grout. It is the applicator's responsibility to point out unacceptable substrate conditions to the general contractor and ensure the proper repairs are made.

B. When applying the Geo-Seal CORE or Geo-Seal CORE Detail material to concrete it is important to not apply the product over standing water. Applying over standing water will result in the membrane not setting up properly on the substrate

C. Surfaces may need to be wiped down or cleaned prior to application. This includes, but is not limited to, the removal of forming oils, concrete curing agents, dirt accumulation, and other debris. Contact form release agent manufacturer or concrete curing agent manufacturer for VOC content and proper methods for removing the respective agent.

D. Applying the Geo-Seal CORE to "green" concrete is acceptable and can be advantageous in creating a superior bond to the concrete surface. To help reduce blistering, apply a primer coat of only the asphalt component of the Geo-Seal CORE system. Some blistering of the membrane will occur and may be more severe on walls exposed to direct sunlight. Blistering is normal and will subside over time. Using a needle nose depth gauge confirm that the specified mil thickness has been applied.

3.4 PREPARATIONS AND TREATMENT OF TERMINATIONS

A. Prepare the substrate surface in accordance with Section 3.3 of this document. Concrete surfaces that are not a light trowel, light broom or equivalent finish, will need to be repaired.

B. Terminations on horizontal and vertical surfaces should extend 6" onto the termination surface. Job specific conditions may prevent a 6" termination. In these conditions, contact manufacturer for recommendations.

C. Apply 30 mils of Geo-Seal CORE to the terminating surface and then embed the Geo-Seal BASE layer by pressing it firmly into the Geo-Seal CORE layer. Next, apply 60 mils of Geo-Seal CORE to the BASE layer. When complete, apply the Geo-Seal BOND layer. After the placement of the Geo-Seal BOND layer is complete, apply a final 30 mil seal of the Geo-Seal CORE layer over the edge of the termination. For further clarification, refer to the termination detail provided by manufacturer.

D. The stated termination process is appropriate for terminating the membrane onto exterior footings, pile caps, interior footings and grade beams. When terminating the membrane to stem walls or vertical surfaces the same process should be used.

3.5 PREPARATIONS AND TREATMENT OF PENETRATIONS

A. All pipe penetrations should be securely in place prior to the installation of the Geo-Seal system. Any loose penetrations should be secured prior to Geo-Seal application, as loose penetrations could potentially exert pressure on the membrane and damage the membrane after installation.

B. To properly seal around penetrations, cut a piece of the Geo-Seal BASE layer that will extend 6" beyond the outside perimeter of the penetration. Cut a hole in the Geo-Seal BASE layer just big enough to slide over the penetration, ensuring the Geo-Seal BASE layer fits snug against the penetration, this can be done by cutting an "X" no larger than the inside diameter of the penetration. There should not be a gap larger than a 1/8" between the Geo-Seal BASE layer and the penetration. Other methods can also be utilized, provided, there is not a gap larger than 1/8" between the Geo-Seal BASE layer and the penetration.

C. Seal the Geo-Seal BASE layer using Geo-Seal CORE or Geo-Seal CORE Detail to the underlying Geo-Seal BASE layer.

D. Apply one coat of Geo-Seal CORE Detail or Geo-Seal CORE spray to the Geo-Seal BASE layer and around the penetration at a thickness of 30 mils. Penetrations should be treated in a 6-inch radius around penetration and 3 inches onto penetrating object.

E. Embed a fabric reinforcing strip after the first application of the Geo-Seal CORE spray or Geo-Seal CORE Detail material and then apply a second 30 mil coat over the embedded joint reinforcing strip ensuring its complete saturation of the embedded strip and tight seal around the penetration.

F. After the placement of the Geo-Seal BOND layer, a cable tie should then be placed around the finished penetration. The cable tie should be snug, but not overly tight so as to slice into the finished seal.

OPTION: A final application of Geo-Seal CORE may be used to provide a finishing seal after the Geo-Seal BOND layer has been installed.

NOTE: Metal or other slick penetration surfaces may require treatment in order to achieve proper adhesion. For plastic pipes, sand paper may be used to achieve a profile, an emery cloth is more appropriate for metal surfaces. An emery cloth should also be used to remove any rust on metal surfaces.

3.6 GEO-SEAL BASE LAYER INSTALLATION

A. Install the Geo-Seal BASE layer over substrate material in one direction with six-inch overlaps and the geotextile (fabric side) facing down.

B. Secure the Geo-Seal BASE seams by applying 60 mils of Geo-Seal CORE between the 6” overlapped sheets with the geotextile side down.

C. Visually verify there are no gaps/fish-mouths in seams.

D. For best results, install an equal amount of Geo-Seal BASE and Geo-Seal CORE in one day. Leaving unsprayed Geo-Seal BASE overnight might allow excess moisture to collect on the Geo-Seal BASE. If excess moisture collects, it needs to be removed.

NOTE: In windy conditions it might be necessary to encapsulate the seam by spraying the Geo-Seal CORE layer over the completed Geo-Seal BASE seam.

3.7 GEO-SEAL CORE APPLICATION

A. Set up spray equipment according to manufacturer’s instructions.

B. Mix and prepare materials according to manufacturer’s instructions.

C. The two catalyst nozzles (8001) should be adjusted to cross at about 18" from the end of the wand. This apex of catalyst and emulsion spray should then be less than 24" but greater than 12” from the desired surface when spraying. When properly sprayed the fan pattern of the catalyst should range between 65° and 80°.

D. Adjust the amount of catalyst used based on the ambient air temperature and surface temperature of the substrate receiving the membrane. In hot weather use less catalyst as hot conditions will quickly “break” the emulsion and facilitate the curing of the membrane. In cold conditions and on vertical surfaces use more catalyst to “break” the emulsion quicker to expedite curing and set up time in cold conditions.

E. To spray the Geo-Seal CORE layer, pull the trigger on the gun. A 42° fan pattern should form when properly sprayed. Apply one spray coat of Geo-Seal CORE to obtain a seamless membrane free from pinholes or shadows, with an average dry film thickness of 60 mils (1.52 mm).

F. Apply the Geo-Seal CORE layer in a spray pattern that is perpendicular to the application surface. The concern when spraying at an angle is that an area might be missed. Using a perpendicular spray pattern will limit voids and thin spots, and will also create a uniform and consistent membrane.

G. Verify film thickness of vapor intrusion barrier every 500 ft^2. (46.45 m^2), for information regarding Geo-Seal quality control measures, refer to the quality control procedures in Section 3.9 of this specification.

H. The membrane will generally cure in 24 to 48 hours. As a rule, when temperature decreases or humidity increases, the curing of the membrane will be prolonged. The membrane does not need to be fully cured prior the placement of the Geo-Seal BOND layer, provided mil thickness has been verified and a smoke test will be conducted.

I. **Do not penetrate** membrane after it has been installed. If membrane is penetrated after the membrane is installed, it is the responsibility of the general contractor to notify the certified installer to make repairs.

J. If applying to a vertical concrete wall, apply Geo-Seal CORE directly to concrete surface and use manufacturer’s recommended protection material based on site specific conditions. If applying Geo-Seal against shoring, contact manufacturer for site specific installation instructions.

NOTE: Care should be taken to not trap moisture between the layers of the membrane. Trapping moisture may occur from applying a second coat prior to the membrane curing. Repairs and detailing may be done over the Geo-Seal CORE layer when not fully cured.

3.8 GEO-SEAL BOND PROTECTION COURSE INSTALLATION

A. Install Geo-Seal BOND protection course perpendicular to the direction of the Geo-Seal BASE course with overlapped seams over nominally cured membrane no later than recommended by manufacturer and before starting subsequent construction operations.

B. Sweep off any water that has collected on the surface of the Geo-Seal CORE layer, prior to the placement of the Geo-Seal BOND layer.

C. Overlap and seam the Geo-Seal BOND layer in the same manner as the Geo-Seal BASE layer.

D. To expedite the construction process, the Geo-Seal BOND layer can be placed over the Geo-Seal CORE immediately after the spray application is complete, provided the Geo-Seal CORE mil thickness has been verified.

3.9 QUALITY ASSURANCE

A. The Geo-Seal system must be installed by a trained and certified installer approved by Land Science Technologies.

B. For projects that will require a material or labor material warranty, Land Science Technologies will require a manufacturer's representative or certified 3rd party inspector to inspect and verify that the membrane has been installed per the manufacturer's recommendations.

The certified installer is responsible for contacting the inspector for inspection. Prior to application of the membrane, a notice period for inspection should be agreed upon between the applicator and inspector.

C. The measurement tools listed below will help verity the thickness of the Geo-Seal CORE layer. As measurement verification experience is gained, these tools will help confirm thickness measurements that can be obtained by pressing one's fingers into the Geo-Seal CORE membrane.

To verify the mil thickness of the Geo-Seal CORE, the following measurement devices are required.

1. Mil reading caliper: Calipers are used to measure the thickness of coupon samples. To measure coupon samples correctly, the thickness of the Geo-Seal sheet layers (18 mils each) must be taken into account. Mark sample area for repair.

2. Wet mil thickness gauge: A wet mil thickness gauge may be used to quickly measure the mil thickness of the Geo-Seal CORE layer. The thickness of the Geo-Seal sheet layers do not factor into the mil thickness reading.

   NOTE: When first using a wet mil thickness gauge on a project, collect coupon samples to verify the wet mil gauge thickness readings.

3. Needle nose digital depth gauge: A needle nose depth gauge should be used when measuring the Geo-Seal CORE thickness on vertical walls or in field measurements. Mark measurement area for repair.

To obtain a proper wet mil thickness reading, take into account the 5 to 10 percent shrinkage that will occur as the membrane fully cures. Not taking into account the thickness of the sheet layers, a freshly sprayed membrane should have a minimum wet thickness of 63 (5%) to 66 (10%) mils.

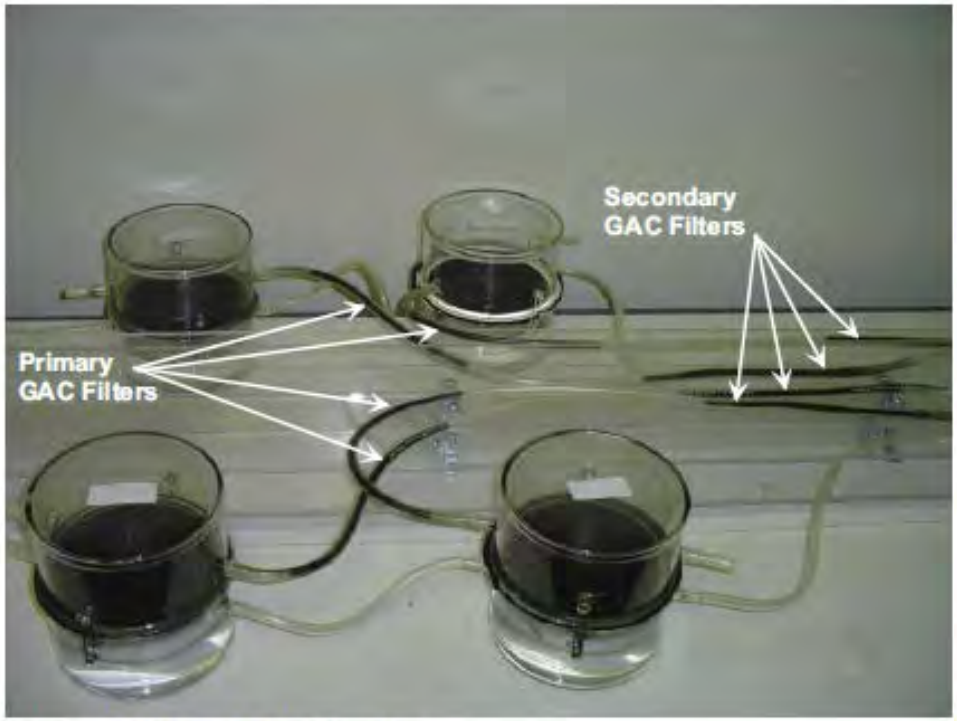
Methods on how to properly conduct Geo-Seal CORE thickness sampling can be obtained by reviewing literature prepared by Land Science Technologies.

D. It should be noted that taking too many destructive samples can be detrimental to the membrane. Areas where coupon samples have been removed need to be marked for repair.

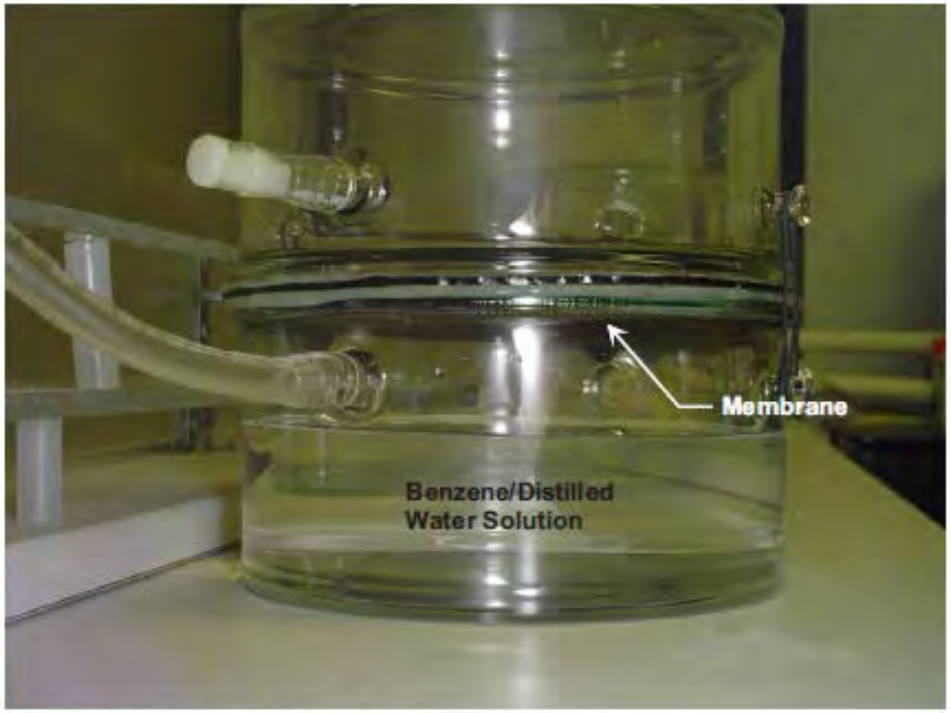
E. Smoke Testing is highly recommended and is the ideal way to test the seal created around penetrations and terminations. Smoke Testing is conducted by pumping non-toxic smoke underneath the Geo-Seal vapor intrusion barrier and then repairing the areas where smoke appears. Refer to smoke testing protocol provided by Land Science Technologies. For projects that will require a material or labor material warranty, Land Science Technologies will require a smoke test.

F. Visual inspections prior to placement of concrete, but after the installation of concrete reinforcing, is recommended to identify any punctures that may have occurred during the installation of rebar, post tension cables, etc. Punctures in the Geo-Seal system should be easy to indentify due to the color contrasting layers of the system.

GeoKinetics Method



Overview of Diffusion Test Chambers



Close-Up of Diffusion Test Chamber

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Diffusion Rates ~ PCE

Product	Contaminant	Test Concentration	Result
Liquid Boot	PCE	6,000 mg/m^3	2.74×10^{-14} m^2/sec
Liquid Boot Plus	PCE	120,000 mg/m^3	3.1×10^{-16} m^2/sec
Geo-Seal	**PCE**	**90,000 mg/m^3**	**4.0×10^{-17} m^2/sec**

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Diffusion Rates ~ Benzene

Product	Contaminant	Test Concentration	Result
Liquid Boot	Benzene	43,000 ppm	3.35×10^{-11} m^2/sec
Liquid Boot Plus	Benzene	Not reported	4.5×10^{-15} m^2/sec
Geo-Seal	**Benzene**	**125,500 ppm**	**6.9×10^{-16} m^2/sec**

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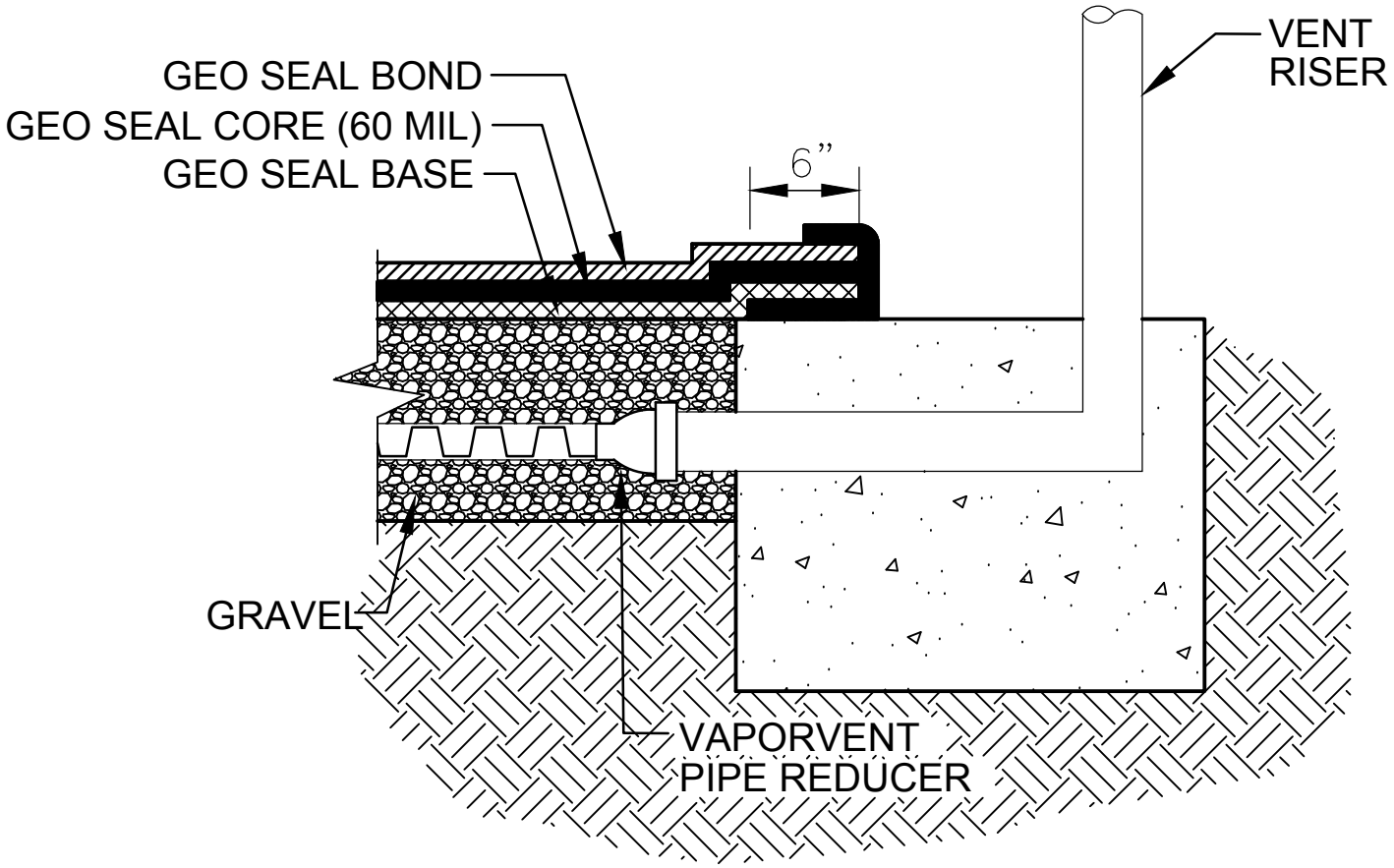

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Geo-Seal®
Vapor Intrusion Barrier

DATE

SCALE

TITLE

VAPOR-VENT
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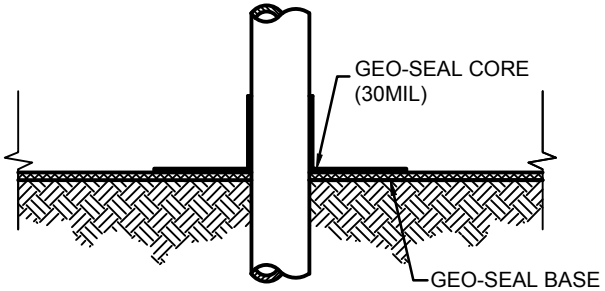
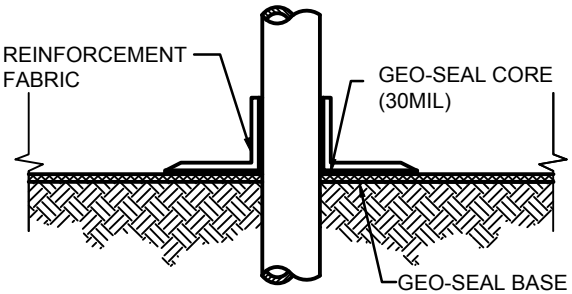


STEP 1



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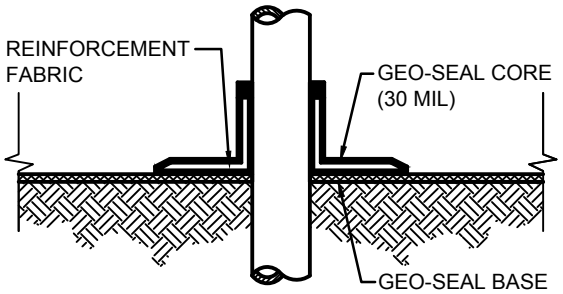

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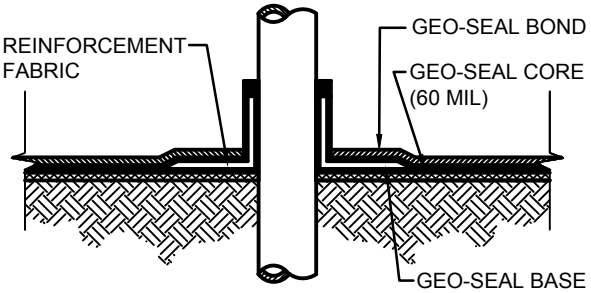
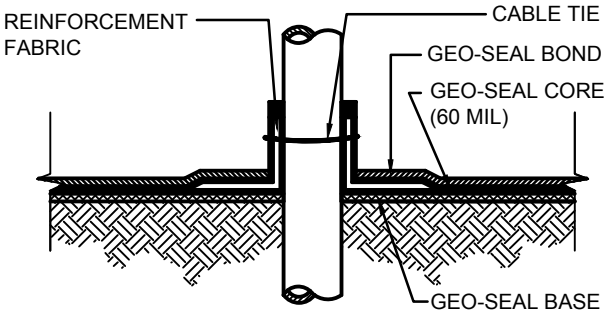


STEP 4



STEP 5

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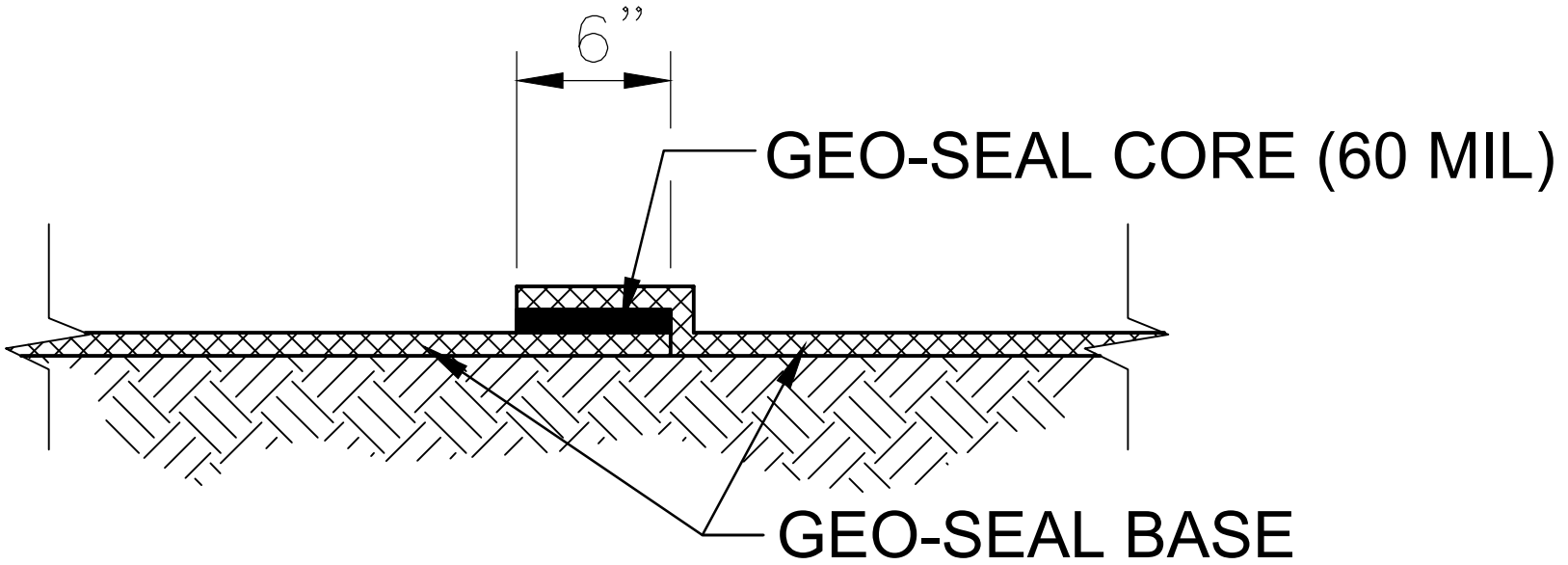
Geo-Seal® Vapor Intrusion Barrier

DATE

SCALE

TITLE

PENETRATION SEQUENCE



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Geo-Seal® Vapor Intrusion Barrier

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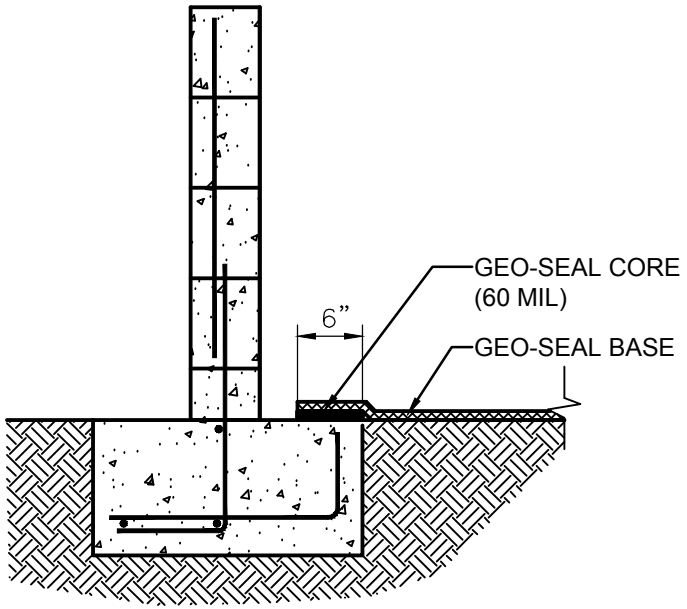
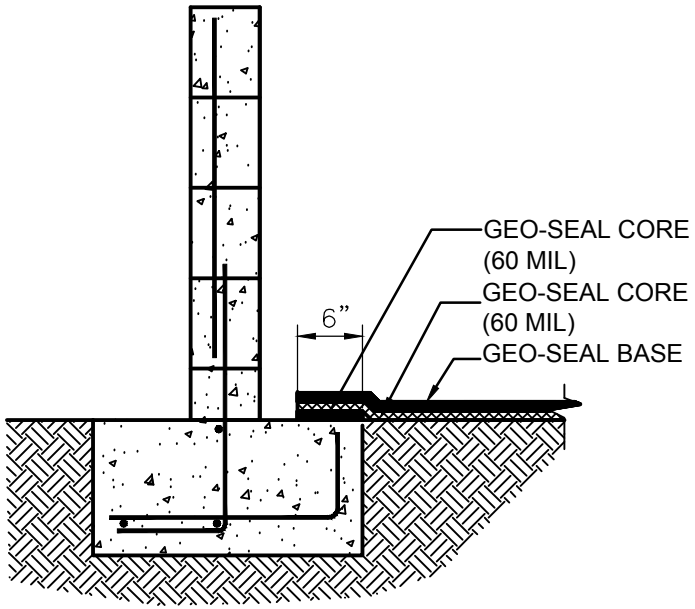
SCALE

TITLE

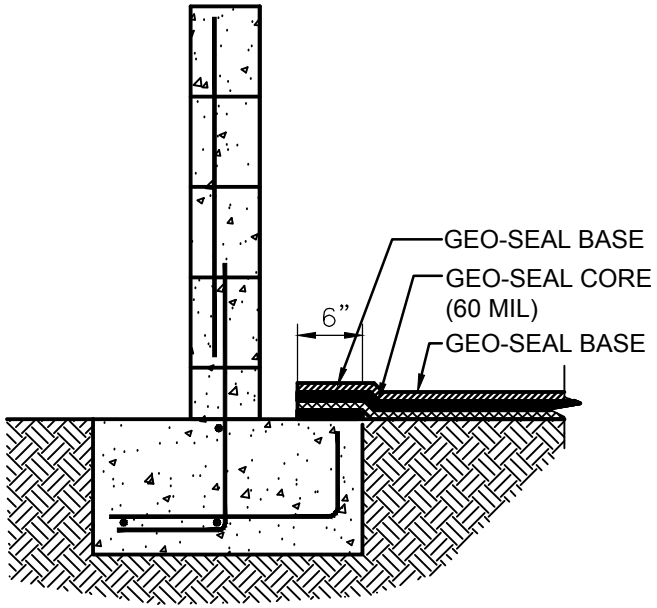
BASE OVERLAP DETAIL



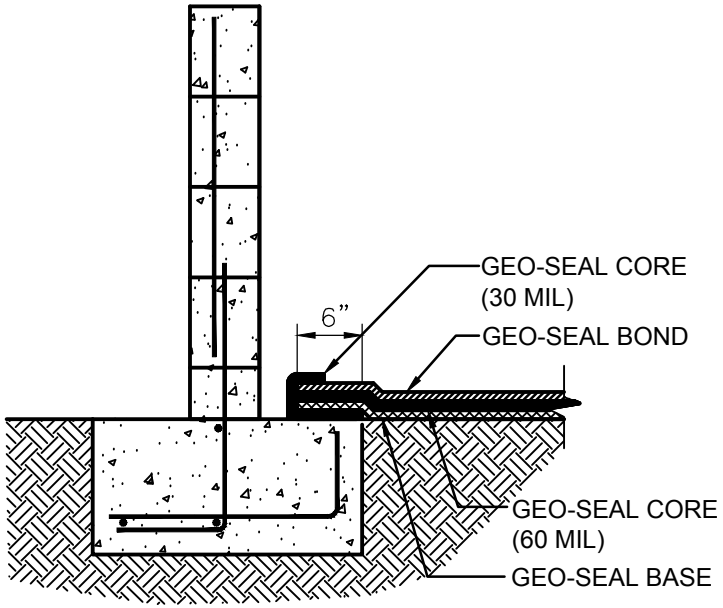
STEP 1



STEP 2



STEP 3



STEP 4

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TERMINATION SEQUENCE