OWOSSO

Brownfield Redevelopment Authority

Regular Meeting
8:30 a.m., October 12, 2015
Owosso City Council Chambers
Owosso City Hall

MEMORANDUM

301 W. MAIN ▪ OWOSSO, MICHIGAN 48867-2958 ▪ WWW.CI.OWOSSO.MI.US

DATE: October 5, 2015

TO: Owosso Brownfield Redevelopment Authority Board

FROM: Susan Montenegro

RE: BRA Meeting of October 12, 2015

Please see the enclosed packet for the Owosso Brownfield Redevelopment Authority (BRA) meeting of Monday, October 12, 2015. This meeting will be at **8:30am** in the city council chambers of city hall, 301 W. Main St., Owosso, MI.

The authority is meeting to hold a public hearing and deliberate on Qdoba/Owosso Cleaners Brownfield plan, #16. The applicant is seeking to capture local and state school taxes (MEGA). Notice has been distributed to all local taxing jurisdictions.

The BRA is also to hold its annual meeting which includes the selection of officers. Currently, David Vaughn sits as the Chairperson, John Horvath as Vice-Chairperson and General Grant as the Secretary/Treasurer. Normally, the bylaws call for the establishment of a nomination committee, but I expect we can move forward with nomination as taken on the floor. Even though we haven't met since November of last year we still need to have the formal process of officer selection completed.

The site developer and/or his representative will be available to further explain the project. That is all for now. **Contact me if you have any questions, comments, or other information for the BRA.**

Meeting Agenda

Brownfield Redevelopment Authority

Monday, October 12, 2015, 8:30 a.m.
Owosso City Council Chambers, 301 W Main Street
Owosso, MI

Call to order and roll call:

Review and approval of agenda: October 12, 2015

Review and approval of minutes: November 19, 2014

Communications:

1) Resolutions (Reference)
2) Staff memorandum (Reference)
3) Regular meeting minutes of November 19, 2014 (Resolution)
4) Brownfield notices
5) Brownfield Plan #16
6) Reimbursement agreement for plan #16
7) MDEQ Grant and Loan Application

Public Comments:

Public Hearings: 910 E. Main Street

Items of Business:

1) 910 E. Main Street – Brownfield Plan Approval
2) Election of Officers

Public Comments:

Board Comments:

Adjournment:

[The City of Owosso will provide necessary reasonable auxiliary aids and services, such as signers for the hearing impaired and audio tapes of printed materials being considered at the meeting, to individuals with disabilities at the meeting/hearing upon 72 hours notice to the City of Owosso. Individuals with disabilities requiring auxiliary aids on services should contact the City of Owosso by writing or calling Amy Kirkland, City Clerk, 301 W. Main St, Owosso, MI 48867 (989) 725-0500 or on the Internet. The City of Owosso Website address is www.ci.owosso.mi.us.]

Affirmative Resolutions

Brownfield Redevelopment Authority

Monday, October 12, 2015, 8:30 a.m.
Owosso City Council Chambers, 301 W Main Street
Owosso, MI

Resolution 151012-01

Motion:_____
Support:_____

The Owosso Brownfield Redevelopment Authority hereby approves the agenda of October 12, 2015 as presented.

Ayes:_____
Nays:_____

Approved:___ Denied:___

Resolution 151012-02

Motion:_____
Support:_____

The Owosso Brownfield Redevelopment Authority hereby approves the minutes of November 19, 2014 as presented.

Ayes:_____
Nays:_____

Approved:___ Denied:___

Resolution 151012-03

Motion:_____
Support:_____

WHEREAS, the Brownfield Redevelopment Authority (the "Authority") of the City of Owosso, pursuant to and in accordance with the provisions of the Brownfield Redevelopment Financing Act, being Act 381 of the Public Acts of the State of Michigan of 1996, as amended (the "Act"), has prepared and recommended for approval by the Authority a Brownfield Plan entitled District #16, "910 E. Main Street" (the "Plan"), pursuant to and in accordance with Section 13 of the Act; and

WHEREAS, the Authority has, at least ten (10) days but not more than forty (40) days before the meeting of the Authority at which this resolution has been considered, provided notice to and fully informed all taxing jurisdictions which are affected by the Financing Plan (the "Taxing Jurisdictions") about the fiscal and economic implications of the proposed Financing Plan, and the Authority has previously provided to the Taxing Jurisdictions a reasonable opportunity to express their views and recommendations regarding the Financing Plan and in accordance with Sections 13 (10) and 14 (1) of the Act; and

WHEREAS, the Authority has made the following determinations and findings:

A. The Plan constitutes a public purpose under the Act;

B. The Plan meets all of the requirements for a Brownfield Plan set forth in Section 13 of the Act;

C. The proposed method of financing the costs of the eligible activities, as described in the Plan is feasible and the Authority has the ability to arrange the financing;

D. The costs of the eligible activities proposed in the Plan are reasonable and necessary to carry out the purposes of the Act;

E. The amount of captured taxable value estimated to result from the adoption of the Plan is reasonable; and

F. The square footage of the proposed building is 6,291 square feet.

G. Line item cost details are eligible expenses that serve a public good.

H. Local redevelopment area details are accurate.

WHEREAS, as a result of its review of the Plan and upon consideration of their views and recommendations of the Taxing Jurisdictions, the Authority desires to proceed with approval of the Plan and to forward the Plan to the City Council of the City of Owosso for adoption.

NOW THEREFORE, BE IT RESOLVED THAT:

1. **Plan Approved**. Pursuant to the authority vested in the Authority by the Act, and pursuant to and in accordance with the provisions of Section 14 of the Act, the Plan is hereby approved in the form considered by the Authority on October 12, 2015, and maintained on file in the office of the City Clerk.

2. **Severability**. Should any section, clause or phrase of this Resolution be declared by the Courts to be invalid, the same shall not affect the validity of this Resolution as a whole nor any part thereof other than the part so declared to be invalid.

3. **Repeals**. All resolutions or parts of resolutions in conflict with any of the provisions of this Resolution are hereby repealed.

Resolution 151012-04

Motion:_____
Support:_____

The Owosso Brownfield Redevelopment Authority hereby elects its new slate of officers for the 2015/2016 Fiscal Year.

Chairperson _____
Vice-Chairperson _____
Secretary/Treasurer _____

Ayes:_____
Nays:_____

Approved:___ Denied:___

Resolution 151012-05

Motion:_____
Support:_____

The Owosso Brownfield Redevelopment Authority hereby adjourns the October 12, 2015 meeting, effective at _____am.

Ayes:_____
Nays:_____

Approved:___ Denied:___

MINUTES
OWOSSO BROWNFIELD REDEVELOPMENT AUTHORITY
MEETING OF NOVEMBER 07, 2013

Meeting was called to order at 8:38 a.m. by Secretary/Treasurer David Vaughn in the absence of chairperson and vice-chairperson.

Roll Call:

Members Present: Loreen Bailey (left at 8:58 am), General Grant, Mark Erickson, Larry Cook, John Horvath, Secretary/Treasurer David Vaughn, Richard Williams.

Members Absent: Mike Bazelides, Chairman Tom Cook, Richard Williams

Others Present: Adam Zettel, Assistant City Manager and Director of Community Development; JP Buckingham, Tri Terra; Ryan J. Kincaid, Kincaid Henry Building Group, Inc.; Tom Kurtz, Vice President of Chamber of Commerce; Justin Horvath, Shiawassee Economic Development Partnership.

AGENDA:

It was moved by Authority Member Larry Cook and supported by Authority Member Erickson to approve the agenda for November 7, 2013 as presented with the addition of the election of Chairperson and Vice-Chairperson.
Yeas all. Motion passed.

MINUTES:

It was moved by Authority Member Erickson and supported by Authority Member Bailey to approve the minutes of the meeting from August 29, 2013.
Yeas all. Motion passed.

COMMUNICATIONS:

1) Resolutions
2) Staff memorandum
3) Regular meeting minutes of August 29, 2013
4) Brownfield notices
5) Brownfield Plan # 15
6) Draft agreements for plan # 15

PUBLIC COMMENTS: None

PUBLIC HEARING: Owosso Brownfield Redevelopment District # 15, Armory Building, 201 & 215 N. Water St.

Mr. Adam Zettel, Assistant City Manager and Director of Community Development, stated this is a development that has been discussed for many years. The armory building is about 100 years old. It has long been talked about moving or demolishing the Chamber of Commerce building in front of the armory. It now appears we have the possibility to do that. The request today is to assist in an environmental remediation for about $495,000 over 18 years. Mr. Zettel recommends the Authority approve this project.

Mr. JP Buckingham, Tri Terra, previously worked on the Lansing armory and said that the soil around the Owosso armory has glass and other items that will need to be removed. The armory has asbestos in the plaster and floor tiles which adds to the cost of remediation. There will need to be a new access door and the utilities will need to be moved.

Ryan Kincaid, Kincaid Henry Building Group, Inc., added that he worked on the Marshall Street Armory and won a governor's award for the work done there. The Owosso armory façade has been maintained in great shape. When the chamber building is removed this will create a plaza space. This will have some seating. There are plans for a deck on the back space for building users. They have looked at other armories around the state. This is a hidden gem right on the river. Structurally the building is sound. We need to tackle the lead and asbestos abatement. The lower level will be used for offices, a kitchen, maybe a farmers market. The main level was which was used for troops and stage acts will be used for shared offices; the stage area for shared conference area. The upper balcony level will have extended glassed-in areas. The building will be decorated with military arts and colors.

8:57 am Authority Member Bailey left the meeting.

Mr. Justin Horvath, Shiawassee Economic Development Partnership, has had potential tenants approach him who are really excited about the spaces. Some don't have business spaces yet; some what to expand from current spaces. This will be offering entrepreneurial and incubator business opportunities. The chamber is taking the lead in this aspect.

Secretary/Treasurer Vaughn stated you are leaving out a big segment – the senior citizens – you have 12 steps to the first floor.

Mr. Kincaid said we can't mess up the front, but the overhead doors on the south side – we can take the grade down and that becomes a store front. That will have access to the elevator.

Mr. Tom Kurtz, Vice-Chairperson of the Chamber of Commerce, stated he will be chairperson of the Chamber during this construction and this project makes sense. The rent rates will be competitive with other buildings in the area.

Motion by Authority Member Grant, Supported by Authority Member Erickson:

WHEREAS, the Brownfield Redevelopment Authority (the "Authority") of the City of Owosso, pursuant to and in accordance with the provisions of the Brownfield Redevelopment Financing Act, being Act 381 of the Public Acts of the State of Michigan of 1996, as amended (the "Act"), has prepared and recommended for approval by the Authority a Brownfield Plan entitled District #15, "201 N. Water Street" (the "Plan"), pursuant to and in accordance with Section 13 of the Act; and

WHEREAS, the Authority has, at least ten (10) days but not more than forty (40) days before the meeting of the Authority at which this resolution has been considered, provided notice to and fully informed all taxing jurisdictions which are affected by the Financing Plan (the "Taxing Jurisdictions") about the fiscal and economic implications of the proposed Financing Plan, and the Authority has previously provided to the Taxing Jurisdictions a reasonable opportunity to express their views and recommendations regarding the Financing Plan and in accordance with Sections 13 (10) and 15 (1) of the Act; and

WHEREAS, the Authority has made the following determinations and findings:

A. The Plan constitutes a public purpose under the Act;

B. The Plan meets all of the requirements for a Brownfield Plan set forth in Section 13 of the Act;

C. The proposed method of financing the costs of the eligible activities, as described in the Plan is feasible and the Authority has the ability to arrange the financing;

D. The costs of the eligible activities proposed in the Plan are reasonable and necessary to carry out the purposes of the Act;

E. The amount of captured taxable value estimated to result from the adoption of the Plan is reasonable; and

F. The square footage of the building is 30,000 square feet

G. Line item cost details are eligible expenses that serve a public good.

H. Local redevelopment area details are accurate.

WHEREAS, as a result of its review of the Plan and upon consideration of their views and recommendations of the Taxing Jurisdictions, the Authority desires to proceed with approval of the Plan and to forward the Plan to the City Council of the City of Owosso for adoption.

NOW THEREFORE, BE IT RESOLVED THAT:

1. Plan Approved. Pursuant to the authority vested in the Authority by the Act, and pursuant to and in accordance with the provisions of Section 15 of the Act, the Plan is hereby approved in the form considered by the Authority on November 7, 2013, and maintained on file in the office of the City Clerk.

2. Severability. Should any section, clause or phrase of this Resolution be declared by the Courts to be invalid, the same shall not affect the validity of this Resolution as a whole nor any part thereof other than the part so declared to be invalid.

3. Repeals. All resolutions or parts of resolutions in conflict with any of the provisions of this Resolution are hereby repealed.

Yeas all.

ITEMS OF BUSINESS:

1) Election of Officers

Mr. Vaughn resigned as Secretary/Treasurer.

Nominated were David Vaughn for Chairperson; John Horvath for Vice-Chairperson; General Grant for Secretary/Treasurer to serve through to the July 2014 annual meeting. Yeas all. Motions passed.

ADJOURNMENT:

Motion by Board Member Grant, supported by Board Member Erickson to adjourn the meeting at 9:18 a.m.

General Grant, Secretary/Treasurer

mms

ACT 381 COMBINED BROWNFIELD PLAN

TO CONDUCT
ELIGIBLE DEQ RESPONSE
AND/OR
MSF NON-ENVIRONMENTAL
ACTIVITIES

OWOSSO QDOBA AND RETAIL
830, 832, 834, AND 910 EAST MAIN STREET
OWOSSO, SHIAWASSEE COUNTY, MICHIGAN

August 13, 2015

Prepared on Behalf of:

Southwind Restaurants, LLC
109 East Broadway
Mount Pleasant, Michigan 48858
Contact Person: Kevin Egnatuk
Telephone: 989-205-1136

Prepared By:

PM Environmental, Inc.
3340 Ranger Road
Lansing, Michigan 48906
Contact Person: Jessica DeBone
Telephone: (517) 325-9875

PM Environmental, Inc.
3340 Ranger Road
Lansing, Michigan 48906
Contact Person: Adam Patton
Telephone: (517) 325-9867

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1.0 INTRODUCTION

1.1 Proposed Redevelopment and Future Use

Southwind Restaurants, LLC (ñSouthwindò), intends to demolish the vacant 2,236 square foot commercial building and three vacant dwellings (two with outbuildings/garages) totaling 3,692 square feet for the construction of a new retail plaza. 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. Additionally, a parking lot will be constructed to the north and east of the new commercial building with surrounding landscaping. The proposed building will be a single-story slab-on-grade structure. The site will require new curbs, gutters, and approaches.

It is anticipated that the new restaurant will create 12 full time jobs and 15 part time jobs and the two retail spaces will create an additional 10 full time jobs and 15 part time jobs.

Anticipated total cost and private investment for this project is estimated to be approximately $2.5 Million, including acquisition. Of this total investment approximately $886,000 is contributed towards the hard cost investment of the building.

A rendering of the building is provided as Figure 6 of this Plan.

1.2 Eligible Property Information

1.2.1 Property Eligibility and Location

The eligible property consists of one parcel, which was combined from four legal parcels with street addresses of 830, 832, 834, and 910 East Main Street, Shiawassee County, Michigan. The subject property is listed under the new combined parcel number of 050-580-000-070-00 and totals .68 acres. The subject property is considered ñeligible propertyò as defined by Act 381, Section 2 because (a) the subject property was previously utilized or is currently utilized for a commercial purpose; (b) it is located within the City of Owosso, a qualified local governmental unit under Act 381, as amended; and (c) the subject property is determined to be a ñfacility.ò

Parcel Legal Description: LOT 83, 84, 85, & 87 STAFFORD GARDNER & TRANKLES CENTRAL ADD EXC N 10' OF SD LOTS. ALSO EXC A PART OF LOT 87 BEG AT A PT ON E LN LOT 87 25' SOUTH OF NE COR TH N ON E LN 15' TH W 15 ' TH SE'LY TO POB

A property location map and eligible property map are included as Figures 1 and 2 of this Plan.

1.2.2 Current Ownership

The subject property is currently owned by Southwind Restaurant, LLC; 109 East Broadway, Mount Pleasant, Michigan 48858. Southwind purchased the subject property in November 16, 2014.

Contact Person: Kevin Egnatuk
Phone: 989-205-1136
Email: kegnatuk@comcast.net

1.2.3 Proposed Future Ownership

The proposed future ownership will remain the same.

1.2.4 Delinquent Taxes, Interest, and Penalties

There are no delinquent taxes for the subject property as of the completion of this report.

1.2.5 Existing and Proposed Future Zoning for Each Eligible Property

The subject property is currently B-4: General Business District. It is proposed that the zoning remain unchanged.

1.3 Historical & Previous Use and Ownership of Each Eligible Property

The residential parcels (moving west to east on the subject property) formerly known as 830, 832, and 834 East Main Street, were developed with several dwellings in the 1930s and have been utilized for residential purposes since that time. Prior ownership for each address is outlined below;

- 830 East Main Street: SMITH, RANDALL
- 832 East Main Street: MOREL, LAVERNE W. & MARION L. TRUST
- 834 East Main Street: SHUSTER, TERRANCE L & WENDY

910 East Main Street, the eastern most building, was developed in at least the early 1930s with a gasoline filling and/or service station. The property was occupied by various filling stations and automotive service stations until the 1960s, was occupied various drycleaners from the 1960s until 2012, and has been vacant since that time. Most recent ownership was under ACKELS, JEREMY J., preceeded by RUBOB REAL ESTATE, LLC in 2013 and NUDI, LOUIS S. ESTATE in 2012 and ROSE WORKS, LLC from 2004 through 2012.

1.4 Current Use of Each Eligible Property

The subject property is currently vacant.

1.5 Summary of Liability

The current owner and developer, Southwind Restaurants, LLC prepared and submitted a Baseline Environmental Assessment (BEA) in accordance with Part 201 and is not a liable party.

Review of city directories indicate that prior ownership of the eastern most building was listed as East Side Super Service beginning in the early 1930s, and Palmer's Sales and Service Filling Station in 1945. The subject property was likely operating as a filling station and automotive service garage until the early 1960s. The subject property operated as a drycleaners 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. Assessment records indicate Rubob Real Estate LLC purchased the eastern building in June 2012 from Nudi Louis. According to previous site investigations Rubob Real Estate LLC did not occupy or lease

the subject property. Jeremey Ackels purchased the subject property in August 2013, which remained unoccupied during ownership. A viable liable party is not identified at this time.

1.6 Summary of Environmental Study Documents

Global Environmental Engineering (GEE) completed a Phase I Environmental Site Assessment (ESA) for the subject property 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 subject property (910 East Main, eastern building) historically operated as a gasoline station and automotive service garage from the late 1920ôs to early 1960s and a drycleaners from the late 1960s to 2012. A BEA was completed for the subject property 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 subject property (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 on July 31, 2012, which included a subsurface investigation on the subject property. Eight (8) soil borings were completed using a Geoprobe direct push tool operated by Fibertec of Brighton, Michigan to depths between 12 and 16 feet below surface grade. Soil cores were collected in four-foot lengths and logged in the field. The soils from each core were screened for presence of contaminants using visual, olfactory and a hand held organic vapor analyzer.

Each soil sample collected was preserved, transported, and analyzed in accordance with MDEQ Remediation and Redevelopment Division (RRD) Operational Memorandum No 2, Sampling Guidance, dated October 22, 2004. Global delivered the samples using chain-of-custody procedures to Merit Laboratories, Inc. in East Lansing, Michigan for laboratory analysis. Analysis included volatile organic compounds (VOCs), polynuclear aromatic compounds (PNAs), lead (Pb), cadmium (Cd), and chromium (Cr). Five soil samples were submitted for analysis and two additional soil samples were submitted and held by the lab pending results of the initial five samples. Perched groundwater was encountered in one of the soil borings at a depth of approximately 14-16 feet below grade. A groundwater sample was collected from a temporary monitoring well and submitted to the lab for analysis.

The compounds detected within the laboratory analytical results of the soil and groundwater samples were compared to the MDEQ Generic Cleanup Criteria and Screening Levels as presented in Part 201 Rules 299.1 through 299.50, dated December 30, 2013 entitled ñCleanup Criteria Requirements for Response Activity.ò

The soil borings were drilled along the north, east, and southeast sides of the eastern most subject property building in areas believed most likely to reveal impact from historical gas station, automotive garage and dry-cleaning activities. Laboratory results indicated detectable concentrations of several compounds in all five of the soil samples. Compounds detected include: 1,2,4-trimethylbenzene, n-propylbenzene, n-butylbenzene, cis-1-2-dichloroethylene, tetrachloroethylene, trichloroethylene and naphthalene. The groundwater collected identified cis-1-2-dichloroethylene and tetrachloroethylene.

1,2,4-trimethylbenzene, n-propylbenzene, n-butylbenzene, cis-1-2-dichloroethylene, tetrachloroethylene, trichloroethylene and naphthalene exceed the Part 201 Generic Cleanup Criteria and Screening Levels for soil; and, cis-1-2-dichloroethylene and tetrachloroethylene exceed the Part 201 Generic Cleanup Criteria and Screening Levels for groundwater.

A BEA and Section7a Compliance Analysis were completed by GEE on November 20, 2014 based on the facility status of the subject property.

1.7 Summary of Environmental/Brownfield Conditions

PM Environmental Inc., (PM) completed additional soil and groundwater investigation activities in April, 2015. Investigations were conducted to investigate areas where excavation of utilities, building footings, and other infrastructure features are planned during construction, and in areas south and west of the eastern most subject property building, which were not previously investigated, to further assess soil and/or groundwater concentrations. The additional investigation was required to assess appropriate soil management, potential subject property exposure and related due care consideration during and following redevelopment activities.

Investigations document VOC and PNA concentrations in soil above the Part 201 Residential and Nonresidential Groundwater Surface Water Interface Protection (GSIP), Drinking Water Protection (DWP), Direct Contact (DC), and Soil Volatilization to Indoor Air (SVII) cleanup criteria, and Soil Saturation (Csat) Screening Levels. Concentrations of VOCs and/or PNAs in groundwater were identified above the above Part 201 Drinking Water Protection (DWP) and Groundwater Surface Water Interface (GSI) criteria.

The subject property is a ñfacilityò in accordance with Part 201 of P.A. 451, as amended, and the rules promulgated thereunder. No underground storage tanks (USTs) are known to be present.

As previously stated a BEA was completed for Southwind Restaurants, LLC, within 45 days of their purchase.

Soil and groundwater analytical tables from the April 2015 investigations are provided as Table 1 and Table 2 of this Plan. Soil boring locations and analytical data are provided in Figures 4A-4C of this Plan.

1.8 Summary of Functionally Obsolete Blighted and/or Historic Conditions

Not applicable to this project.

1.9 Summary of Historic Qualities

Not applicable to this project.

2.0 DESCRIPTION OF COSTS & SCOPE OF WORK

Tax Increment Financing revenues will be used to reimburse the costs of "eligible activities" (as defined by Section 2 of Act 381, as amended) as permitted under the Brownfield Redevelopment Financing Act that include: Baseline Environmental Site Assessments, Due Care Activities, Additional Response Activities (Demolition), Asbestos Survey, Abatement and Reporting, and preparation of a Brownfield Plan as described in this Plan. A complete listing of these activities is included in Table 3 of this Plan.

2.1 DEQ Eligible Activities

2.1.1 Baseline Environmental Assessment

Baseline Environmental Assessment activities include Phase I ESA, Phase II ESA, Baseline Environmental Assessment, and Documentation of Due Care Compliance at a total cost of $14,000.

2.1.2 Due Care Activities

As it pertains to the activities needed to safely redevelop the site and comply with Due Care as a non-liable party, the following activities are proposed.

2.1.2.1 Disposal and Transport of Contaminated Soils

Disposal and transport of chlorinated solvent contaminated soils to a Type II landfill and groundwater management and disposal to a licensed facility associated with development activities are anticipated to include contaminated soil and groundwater associated with building improvements for the construction of building foundations, parking and driveway features, and associated utility infrastructure at an estimated cost of $152,000. Each excavation area is broken out below based on anticipated cubic yards of contaminated soil to be transported and disposed.

- Building Footing Excavation Areas (90 cubic yards);
- Alleyway Storm Sewer Excavation and Grading (100 cubic yards);
- Parking Lot and Sidewalk Curb and Gutter Excavation (40 cubic yards);
- Parking Lot Entrance/Approach Excavation/Grading (60 cubic yards);
- Utility Trenching/Excavation (90 cubic yards);
- Groundwater Removal, Management, and Disposal (8,000 gallons).

An O&M plan will be prepared for all areas where building foundation and other surface cover is required to prevent unacceptable exposures.

2.1.2.2 Removal, Transport and Disposal of Contaminated Building Materials

Removal, transport and disposal of approximately 55 cubic yards of contaminated concrete building slab and footing materials is required following demolition activities of existing site improvements at an estimated cost of $25,000.

2.1.2.3 Chemical Resistant Gasketing

Chemical-Resistant Nitrile Gasketing for Sanitary, Storm, and Water Utility Piping is required to prevent migration of any residual contaminated soil following excavation activities at an estimated cost of $5,500.

2.1.2.4 Vapor Barrier System

Design and Installation of a Passive Spray-Applied Vapor Barrier System for the New Building at an estimated cost of $38,000.

As indicated in Section 1.1, the subject property will be redeveloped with a new building containing three tenant spaces; therefore, the vapor intrusion pathway is relevant. Due to the identified exceedances of the Part 201 Nonresidential SVII cleanup criteria in the vadose zone, the MDEQ Nonresidential VISLs, and because petroleum and chlorinated VOC and PNA soil impacts exceeding the Part 201 GCC are present beneath the subject property, including those that are representative of residual LNAPL saturation, a Land Science Technologies Geo-SealÈ passive vapor intrusion barrier system that is compatible with the compounds identified in soil and groundwater will be installed at the proposed subject property building prior to occupancy, to prevent soil gas from entering the building and prevent potential inhalation exposures to occupants.

Vapor barrier design specifications and layout will be consistent with the guidelines included in the May 2013 MDEQ Guidance Document for the Vapor Intrusion Pathway. Following installation, the vapor barrier system will be operated in accordance with a system-specific operation and maintenance (O&M) manual prepared by the system engineer. The O&M manual will include a contingency plan to convert the passive system to an active system using in-line vent fans in the event that O&M inspections demonstrate that the venting system is ineffective and/or if the vapor barrier liner system if damaged or cannot be repaired. O&M actions will include periodic smoke testing events to document continuity of flow within the vapor barrier system, visual inspections of the vapor barrier system components (test ports, vent risers/valves/rain caps) for damage, and insertion of smoke tubes within test ports to demonstrate passive flow within the system (i.e. visual indication) and that the system is exhausting via the vent risers. Records of vapor barrier system installation, O&M, and contingency actions will be maintained by Southwind Restaurants, LLC.

Installation and maintenance of a vapor barrier and ventilation system will consist of the following components to prevent intrusion of sub-slab vapors from entering the building:

- Approximately 300 linear-feet of fabric-wrapped VaporVentÈ trenchless gas collection piping installed beneath the floor slab. The VaporVentÈ acts as a means for collection and pressure relief of sub-slab vapors via vertical vent piping that exits above the roof line

of the building. Appendix C includes technical specifications for the VaporVentÈ piping and associated end outlets.

Additional sub-grade utilities (i.e. plumbing, electrical etc.) will be installed under the building slab prior to the installation of the spray-applied vapor barrier membrane system.

- Four three-inch diameter vertical poly-vinyl chloride (PVC) vent pipes, which are connected to the VaporVentÈ piping via VaporVentÈ end outlet fittings will be installed within the Building. Each vertical vent will be located within the interior wall spaces (i.e., supported as required by local plumbing code), will exit approximately 2-feet above the finished roof parapet, will be oriented with vertical outlets to induce passive flow within the system, and will be equipped with rain caps to prevent intrusion of precipitation during storm events. No roof-mounted heating, ventilation, and air conditioning system air intakes will be present within 15 feet of the vapor barrier roof vents. All vent piping will be equipped with labels identifying them as vapor mitigation system components.

  Each vent stack will be equipped with a shutoff valve. Four 2-inch diameter test ports will be installed at the southern 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 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.

  To ensure the integrity of the vapor barrier, no additional test ports are proposed within the building other than those outlined above.

- A spray applied vapor barrier system consisting of an initial layer of Geo-SealÈ 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 fabric at all penetration locations; a spray application of Geo-SealÈ CORE vapor barrier material at a thickness of 60 mils; followed by a top layer of Geo-SealÈ BOND protection material.

  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 during vapor barrier installation, per manufacturer requirements, to document that the required barrier thickness specification is met. Records of coupon testing will be maintained by Southwind Restaurants, LLC.

  The layered construction of the vapor barrier provides additional strength relative to the spray-applied barrier material alone, provides a uniform substrate for product application, and provides puncture resistance and increases adhesion to the surface concrete cap applied over horizontal areas. The vapor barrier components were designed by the manufacturer to control vapor intrusion associated with the contaminants identified in soil and groundwater at the subject property including petroleum compounds such as benzene toluene, ethylbenzene, and xylenes (collectively referred to as BTEX), PNAs, and

chlorinated solvents. Refer to Appendix C for Geo-SealÈ Film-11 Geomembrane, Geo-SealÈ CORE, and Geo-SealÈ BOND product specifications.

Manufacturer-published diffusion rate specifications for compounds representative of volatile contaminants of concern identified in soil and groundwater beneath the eastern portion of the subject property (building), include the following:

- Benzene ï 6.9E-16 mĮ/second
- PCE ï 4.0E-17 mĮ/second

- Prior to the installation of the vapor barrier, all sub-slab utilities are installed and stubbed above finished floor elevation to facilitate installation of the vapor barrier such that all penetrations are encapsulated with the vapor barrier material using manufacturer-specified termination method, to ensure a vapor-tight seal. Vent riser outlet stubs will be temporarily capped and labeled as ñvapor mitigation system pipingò prior to sealing with the vapor barrier material to ensure that they are differentiated from other piping stubs. Refer to Appendix C for typical penetration sealing diagrams.

- The vapor barrier test ports will be used during construction-phase and post-construction smoke testing and O&M inspection events. During each smoke testing event, indicator smoke will be introduced into each of the vapor barrier test ports to demonstrate the following:

  - Overall tightness of the vapor barrier following initial application over horizontal areas (i.e., as evidenced by the lack of indicator smoke);
  - Overall system tightness prior to occupancy of the building;
  - Continuity of flow through the VaporVentÈ piping (i.e., visual indication via the presence of smoke exiting the vent stacks);
  - Integrity of the vapor barrier system, which will be documented via a visual inspection of the first floor areas of the building, including all tenant spaces.

  O&M inspection events will include visual inspections of the vapor barrier system components (test ports, vent risers/valves/rain caps) for damage that could inhibit the function of the system. Each will also include the insertion of smoke tubes within each of the vapor barrier system test ports to demonstrate passive flow within the system (i.e. visual indication) and that the system is exhausting via the vent risers.

  The test ports will be equipped with vapor tight, locking caps when not in use.

  The schedule for smoke testing and O&M inspection activities will be in general accordance with the table below:

Smoke Testing and O&M Inspection Schedule

Frequency	Smoke Testing Events	O&M Inspection Events
During Vapor Barrier Installation	X	
Following Concrete Cap Installation	X	
Following Vent Riser Installation	X	X
1 Week Prior to Building Occupancy	X	X
Quarterly During Building Operations		X
Annually During Building Operations	X	

X = Acton conducted during the specified timeframe

- A surface cap of reinforced concrete, in the form of the building floor slab (4ò minimum thickness) will be applied over all horizontal areas of the building footprint to protect the vapor barrier membrane and provide an attachment point for interior wall framing and other interior building components. Building/construction plans will require that all floor fastener depths be less than the thickness of the surface concrete cap.

2.1.2.5 Visual Demarcation Underlayment

Installation of Visual Demarcation Underlayment in non-paved areas requiring a dermal contact surface barrier to ensure the safety of anyone digging on the subject property following development and/or public safety should the non-paved area become eroded at an estimated cost of $1,250. While the northeast corner of the property will be paved, the demarcation underlayment will be needed in unpaved areas adjacent to the north and east right-of-way surrounding the property.

An O&M plan will be prepared for all areas where building foundation and other surface cover is required to prevent unacceptable exposures.

2.1.2.6 Oversight, Monitoring, Reporting

Plan for Response Activity Preparation, Oversight, Monitoring, Laboratory Analysis, Project Management, and Reporting associated with Due Care Activities by and Environmental Professional is estimated at a cost of $18,000.

2.1.1 Additional Response Activities

2.1.1.1 Demolition

Demolition of the former Dry Cleaner building and improvements will be required to access the contaminated soil for remediation and due care activities. Demolition includes the 2,236 square foot commercial building located on the eastern portion of the subject property as well as surrounding concrete and grass surface cover totaling approximately 8,000 square feet, estimated at a cost of $15,000.

The three vacant dwellings (two with outbuildings/garages) totaling 3,692 square feet will be demolished by the developer for the construction of the new retail plaza at an estimated cost of $20,000.

2.1.1.1 Asbestos Survey

A Pre-Renovation Asbestos Containing Materials (ACM) Survey was conducted to identify, locate, classify, analyze, and estimate quantities of ACM that must be removed or managed according to Federal, State, or local agency requirements prior to demolition at a cost of $5,830.

2.1.2 Develop/Prepare Combined Brownfield Plan

Preparation of the Combined Brownfield Plan and associated activities (e.g. meetings with the City of Owosso Brownfield Redevelopment Authority (OBRA), etc.) at a cost of approximately $12,000.

2.2 MSF Eligible Activities

MSF Eligible Activities are not applicable to this Plan.

2.3 Local Only Eligible Activities

2.3.1 Asbestos Abatement

The identified ACM at the subject property will be disturbed as part of the demolition activities and therefore, will require abatement prior to demolition by a licensed asbestos abatement contractor. If additional suspect materials are identified during renovation, these materials will be sampled to determine their characteristics (i.e. whether they must be treated as ACM or not) or assumed to be ACM and handled accordingly and prior to their removal and disposal. Pre-Demolition Asbestos Abatement, Oversight, and Clearance Testing is estimated at a cost of $16,750.

3.0 TAX INCREMENT REVENUE ANALYSIS

3.1 Estimate of Captured Taxable Value and Tax Increment Revenues

Incremental taxes on real property included in the redevelopment project will be captured under this Plan to reimburse eligible activity expenses. Tax increment revenue capture is estimated to begin in 2016. The effective base taxable value of the land and real property is $184,000; no personal property is associated with the site. The estimated taxable value of the completed development is $575,000 estimated to begin in summer of 2016. Tax increment revenue assumes a one-year phase-in for completion of the redevelopment, which has been incorporated into the tax impact and cash flow assumptions for this work plan. An annual increase in taxable value of 1% has been used for calculation of future tax increments in this work plan.

The OBRA will capture tax increment revenues for 5 years following payback, to build the Local Site Remediation Revolving Fund (LSRRF). The estimated captured taxable value and tax increment revenues for the subject property and millages levied by the taxing jurisdictions for each year of the Plan are presented in Table 4.

3.2 Method of Financing and Description of Advances Made by the Municipality

Eligible activities presented in this plan are anticipated to be funded partially through a MDEQ Brownfield Redevelopment Loan totaling $292,963, which will pay for the necessary Due Care Activities. The MDEQ Loan will be repaid with Tax Increment Financing Revenues created as a result of the new investment on the subject property.

Additional remediation and soil excavation activities outside of this Plan are anticipated to be funded through a MDEQ Grant totaling $249,000 and additional State funds encumbered by the MDEQ. These activities are anticipated to include the following;

- Additional Soil and Groundwater Characterization and Delineation Activities
- Bid Specification Preparation, Bid Meeting and Contactor Selection
- Excavation Contractor Mobilization/Demobilization
- Shoring Design and Installation (195 linear feet)
- Removal and Disposal of up to 1,435 cubic yards of contaminated, land-disposal restricted soils
- Removal and Disposal of up to 635 cubic yards of contaminated soils
- Removal and Disposal of up to 15,000 gallons of contaminated groundwater
- Excavation Backfilling and Compaction
- Pavement Cover Installation
- Environmental Professional Excavation Oversight, Onsite and Perimeter Air Monitoring, Excavation Verification Sampling, and Laboratory Analysis
- Environmental Professional Project Management and Reporting

Figure 4A includes the anticipated excavation area and proposed delineation boring/sample locations associated with the MDEQ Grant activities.

Additional activities not paid for by the MDEQ Loan under this Plan totaling $52,005 will be initially funded by Southwind. Costs for the eligible activities funded by Southwind will be repaid under the Michigan brownfield redevelopment financing program with incremental taxes generated by the future development of the subject property. No advances will be made by the municipality for this project.

These costs are broken out further in Table 3 attached to this Plan.

3.3 Maximum Amount of Note or Bonded Indebtedness

The City of Owosso will act as the grantee for the MDEQ Loan anticipated for this project.

3.4 Duration of Brownfield Plan

The duration of this work plan should be not less than the period required to reimburse all eligible activities plus five years for additional capture to build the LSRRF. The approval date of the Brownfield Plan by the City Council will mark the beginning of the reimbursement period, unless modified at the discretion of the City as allowed under Act 381.

In no event, shall this Plan extend beyond the capture period for the City's local revolving loan fund, or the maximum term of 35 years allowed by Section 13 of Act 381.

3.5 Estimated Impact of Tax Increment Financing on Revenues of Taxing Jurisdictions

Tax increments are projected to be captured and applied to (i) reimbursement of eligible activity costs to the MDEQ Loan, (ii) reimbursement of eligible activity costs for the developer, (iii) payment of OBRA administrative and operating expenses, (iv) payment to the State Brownfield Fund and (v) deposits into the OBRA's LSRRF, as follows:

Total Activities Funded by TIF	**Estimated Costs**
MDEQ Brownfield Redevelopment Loan Reimbursement	$ 292,963
Developer Reimbursement	$ 74,967
OBRA Administrative Fees	$ 24,000
State Brownfield Fund	$ 32,838
Capture for Local Site Remediation Revolving Fund	$ 120,288
Total	**$ 545,056**

Taxes will continue to be generated to taxing jurisdictions on local captured millages and state school millages at the base taxable value of $184,000 throughout the duration of this plan totaling approximately $226,416 or $9,434 annually as presented in the table below.

Local Tax Millages		
Seniors	0.3500	$ 64
Med Care	2.0000	$ 368
Veterans PA214	0.1000	$ 18
Veterans Voted	0.1400	$ 26
MSU Extension	0.0500	$ 9
INTMD Sch	3.9040	$ 718
Library	1.2500	$ 230
City Oper	14.0370	$ 2,583
SATA	0.3285	$ 60
County Oper	5.1146	$ 941
Total Local Taxes (capturable)	**27.2741**	**$ 5,018**
School Millages		
School Operating	18.0000	$ 3,312
SET (only 3 millages are available for BF TIF capture)	6.0000	$ 1,104
Total School Taxes	**24.0000**	**$ 4,416**
Total Local and School Taxes	**51.2741**	**$ 9,434**

Non-capturable millages will see an immediate increase in tax revenue following redevelopment and will provide anticipated new tax revenue of $4,012 throughout the duration of this plan.

For a complete breakdown of the captured millages and developer reimbursement please see Table 4.

4.0 INFORMATION REQUIRED BY SECTION 15(15) OF THE STATUTE FOR NON-ENVIRONMENTAL ACTIVITIES (required for work plans submitted for MSF consideration)

This section is not required for non-MSF work plans.

5.0 SCHEDULE AND COSTS

5.1 Schedule

August-September 2015:

- Combined Brownfield Plan Application and Approval
- MEDQ Grant and Loan Application and Approval

October 2015:

- Pre-construction Soil, Groundwater, and Concrete Characterization Delineation Activities (outside of this Plan, anticipated to be funded through MDEQ Grant)
- Asbestos Abatement Activities
- Demolition Activities
- Transport and Disposal of Contaminated Building Materials
- MDEQ Remediation Activities (outside of this Plan, anticipated to be funded through MDEQ Grant and other State funds)

Spring 2016:

- Transport and Disposal of Contaminated Soil Associated with Development Activities
- Installation of Chemical-resistant Gasketing for Utilities
- Vapor Barrier Installation
- Installation of Visual Demarcation Underlayment
- Environmental Professional Oversight and Reporting Activities

5.2 Estimated Costs

5.2.1 Summary of Total Project Costs

A full listing of eligible brownfield activities is provided in Table 3 of this plan. Total investment for this project is estimated at $2,548,703, these costs are further detailed in section 5.3.

5.3 Sources and Uses of Incentives and Funds

Sources and Uses					
Sources	**Amount**		**Uses**	**Amount**	
Developer Equity	$	302,577	Acquisition	$	558,402
Permanent Financing	$	1,330,000	Hard Costs	$	885,988
Operating Note	$	400,000	Environmental Due Care	$	239,750
MDEQ Loan	$	292,963	Environmental Excavation Activities	$	249,000
MDEQ Grant	$	249,000	Demolition	$	35,000
			Soft Costs	$	86,400
			New Equipment	$	520,000
Total Sources of Capital	$	2,574,540	**Total Uses of Capital**	$	2,574,540

5.4 Summary of Relocation Actions

5.4.1 Estimates of Residents and Displacement of Individuals/Families

The property was vacant at time of purchase therefore this section is not applicable to this project.

5.4.2 Plan for Relocation of Displaced Persons

Not applicable to this project.

5.4.3 Provisions for Relocation Costs

Not applicable to this project.

5.4.4 Strategy for Compliance with Michiganôs Relocation Assistance Law

Not applicable to this project.

5.5 Description of Proposed Use of Local Site Remediation Revolving Fund

Not applicable to this project.

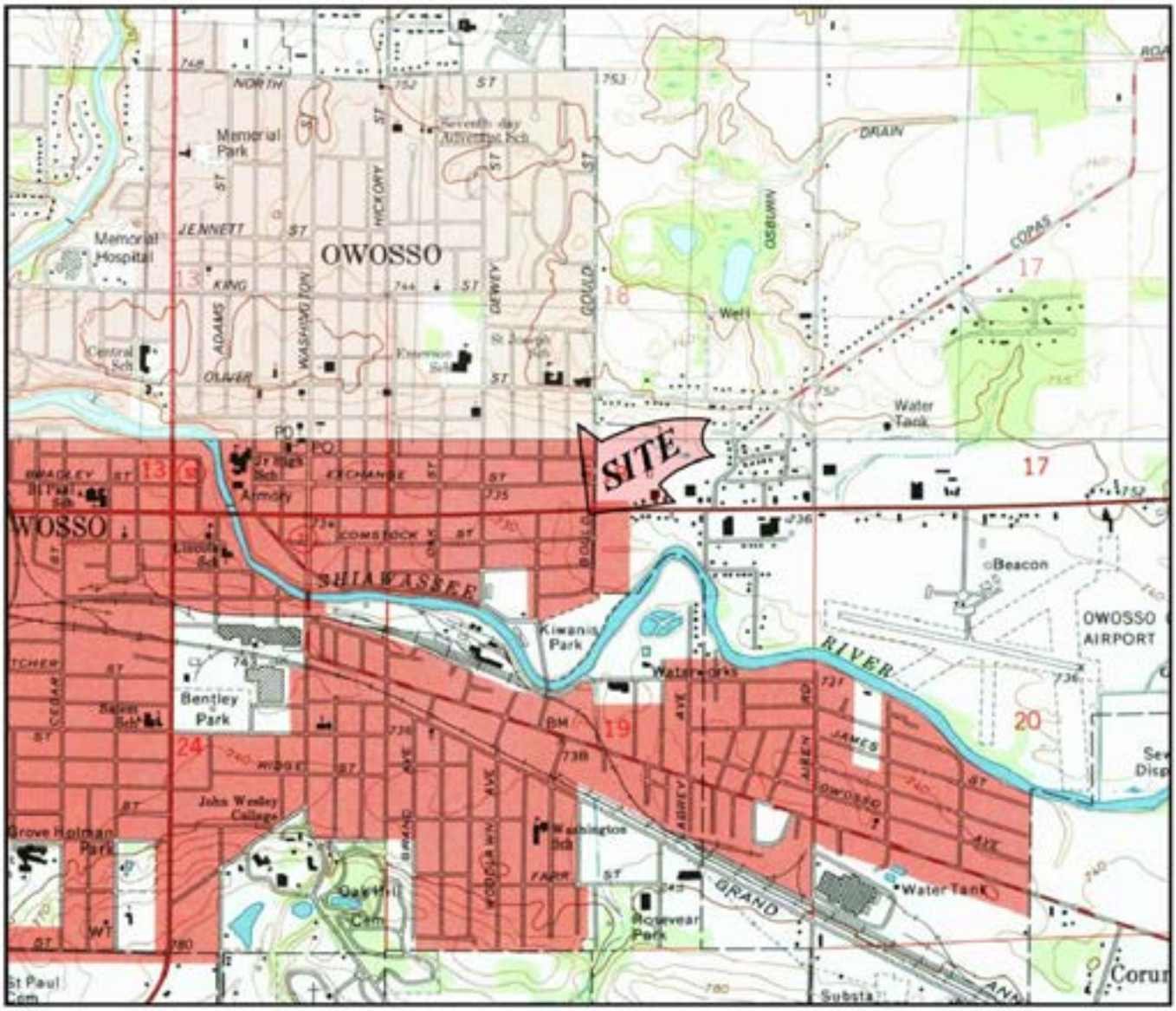
5.6 Other Material that the Authority or Governing Body Considers Pertinent

No additional material attached.

FIGURES

Figure 1

Scaled Property Location Map



MICHIGAN QUADRANGLE LOCATION

SHIAWASSEE COUNTY

SCALE 1:24,000

1 MILE 1/2 MILE 0 1 MILE

FIGURE 1

PROPERTY VICINITY MAP

USGS, 7.5 MINUTE SERIES

OWOSSO NORTH , MI QUADRANGLE, 1974.

OWOSSO SOUTH , MI QUADRANGLE, 1972.

PM ENVIRONMENTAL | Environmental & Engineering Services

PROJ: COMMERCIAL PROPERTY
830, 832, 834, AND 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 DATE: 6/8/2015

CHKD BY: AP SCALE: 1" = 2,000'

FILE NAME: 01-5363-0-001F01R00

Figure 2

Eligible Property Map

RESIDENTIAL

917 EAST MAIN STREET
STECHSCHOLTE GAS & OIL

1001 EAST MAIN STREET
WALGREEN'S PHARMACY

EAST MAIN STREET (M-21)

SANITARY (10" DIA.)

STORM (60" DIA.)

WATER (8" DIA.)

WATER (12" DIA.)

SIDEWALK

SIGN

1002 EAST MAIN STREET
RITE AID PHARMACY

APPROXIMATE LOCATION OF
FORMER DRY CLEANING MACHINE

830 EAST MAIN STREET
EXISTING HOUSE

832 EAST MAIN STREET
EXISTING HOUSE

834 EAST MAIN STREET
EXISTING HOUSE

910 EAST MAIN STREET
FORMER
DRY CLEANERS

CONCRETE

GRASS

GRAVEL

GARAGE

ALLEY

SOUTH GOULD STREET

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

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

PM ENVIRONMENTAL | Environmental & Engineering Services

FIGURE 2

GENERALIZED DIAGRAM OF THE SUBJECT PROPERTY AND ADJOINING PROPERTIES

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 [redacted] 30' IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	CHKD BY: AP	SCALE: 1" = 30'
	FILE NAME: 01-5363-0-001F02R00	

Figure 3

Sampling Location Map

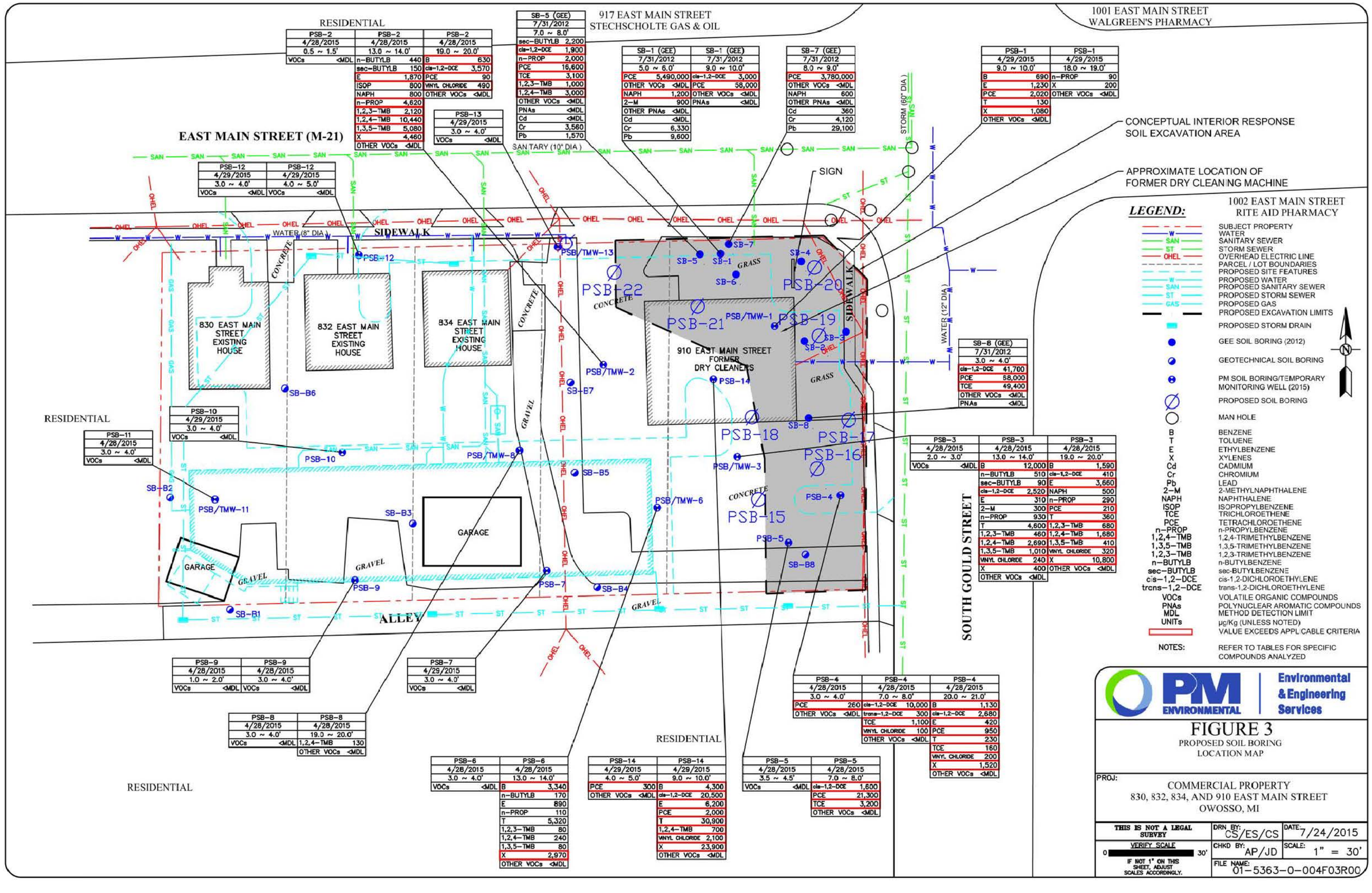

EAST MAIN STREET (M-21)
917 EAST MAIN STREET
STECHSCHOLTE GAS & OIL
1001 EAST MAIN STREET
WALGREEN'S PHARMACY
1002 EAST MAIN STREET
RITE AID PHARMACY
CONCEPTUAL INTERIOR RESPONSE
SOIL EXCAVATION AREA
APPROXIMATE LOCATION OF
FORMER DRY CLEANING MACHINE
SIGN
SIDEWALK
WATER (8" DIA.)
SANITARY (10" DIA.)
STORM (60" DIA.)
WATER (12" DIA.)
830 EAST MAIN STREET EXISTING HOUSE
832 EAST MAIN STREET EXISTING HOUSE
834 EAST MAIN STREET EXISTING HOUSE
910 EAST MAIN STREET FORMER DRY CLEANERS
GARAGE
GARAGE
ALLEY
SOUTH GOULD STREET
CONCRETE
GRASS
GRAVEL
RESIDENTIAL
RESIDENTIAL
RESIDENTIAL
PSB-22
PSB-21
PSB-20
PSB-19
PSB-18
PSB-17
PSB-16
PSB-15
PSB-14
PSB-13
PSB-12
PSB-11
PSB-10
PSB-9
PSB-8
PSB-7
PSB-6
PSB-5
PSB-4
PSB-3
PSB-2
PSB-1
PSB/TMW-1
PSB/TMW-2
PSB/TMW-3
PSB/TMW-4
PSB/TMW-5
PSB/TMW-6
PSB/TMW-7
PSB/TMW-8
PSB/TMW-9
PSB/TMW-10
PSB/TMW-11
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
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
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-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-13 4/29/2015 3.0 ~ 4.0' VOCs <MDL
PSB-12 4/29/2015 3.0 ~ 4.0' VOCs <MDL
PSB-12 4/29/2015 4.0 ~ 5.0' VOCs <MDL
SB-8 (GEE) 7/31/2012 3.0 ~ 4.0' cis-1,2-DCE 41,700 PCE 58,000 TCE 49,400 OTHER VOCs <MDL PNAs <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 n-PROP 930 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 NAPH 500 n-PROP 290 PCE 210 T 360 1,2,3-TMB 680 1,2,4-TMB 1,680 1,3,5-TMB 410 VINYL CHLORIDE 320 X 10,800 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
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-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-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-7 4/29/2015 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-10 4/29/2015 3.0 ~ 4.0' VOCs <MDL
PSB-11 4/28/2015 3.0 ~ 4.0' VOCs <MDL
LEGEND:
SUBJECT PROPERTY
WATER
SANITARY SEWER
STORM SEWER
OVERHEAD ELECTRIC LINE
PARCEL / LOT BOUNDARIES
PROPOSED SITE FEATURES
PROPOSED WATER
PROPOSED SANITARY SEWER
PROPOSED STORM SEWER
PROPOSED GAS
PROPOSED EXCAVATION LIMITS
PROPOSED STORM DRAIN
GEE SOIL BORING (2012)
GEOTECHNICAL SOIL BORING
PM SOIL BORING/TEMPORARY MONITORING WELL (2015)
PROPOSED SOIL BORING
MAN HOLE
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
N
PM ENVIRONMENTAL
Environmental & Engineering Services
FIGURE 3
PROPOSED SOIL BORING LOCATION MAP
PROJ:
COMMERCIAL PROPERTY
830, 832, 834, AND 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/ES/CS
DATE: 7/24/2015
CHKD BY: AP/JD
SCALE: 1" = 30'
FILE NAME: 01-5363-0-004F03R00

Figure 4

Map of Known Extent of Contamination

RESIDENTIAL

PSB-2		PSB-2		PSB-2	
4/28/2015		4/28/2015		4/28/2015	
0.5 ~ 1.5'		13.0 ~ 14.0'		19.0 ~ 20.0'	
VOCs	<MDL	n-BUTYLB	440	B	630
		sec-BUTYLB	150	cis-1,2-DCE	3,570
		E	1,870	PCE	90
		ISOP	800	VINYL CHLORIDE	490
		NAPH	800	OTHER VOCs	<MDL
		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		

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	

PSB-13		
4/29/2015		
3.0 ~ 4.0'		
VOCs	<MDL	

SB-1 (GEE)		SB-1 (GEE)	
7/31/2012		7/31/2012	
5.0 ~ 6.0'		9.0 ~ 10.0'	
PCE	5,490,000	cis-1,2-DCE	3,000
OTHER VOCs	<MDL	PCE	58,000
NAPH	1,200	OTHER VOCs	<MDL
2-M	900	PNAs	<MDL
OTHER PNAs	<MDL		
Cd	<MDL		
Cr	6,330		
Pb	9,600		

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-1		PSB-1	
4/29/2015		4/29/2015	
9.0 ~ 10.0'		18.0 ~ 19.0'	
B	690	n-PROP	90
E	1,230	X	200
PCE	2,020	OTHER VOCs	<MDL
T	130		
X	1,080		
OTHER VOCs	<MDL		

SB-8 (GEE)	
7/31/2012	
3.0 ~ 4.0'	
cis-1,2-DCE	41,700
PCE	58,000
TCE	49,400
OTHER VOCs	<MDL
PNAs	<MDL

PSB-3		PSB-3		PSB-3	
4/28/2015		4/28/2015		4/28/2015	
2.0 ~ 3.0'		13.0 ~ 14.0'		19.0 ~ 20.0'	
VOCs	<MDL	B	12,000	B	1,590
		n-BUTYLB	510	cis-1,2-DCE	410
		sec-BUTYLB	90	E	3,660
		cis-1,2-DCE	2,520	NAPH	500
		E	310	n-PROP	290
		2-M	300	PCE	210
		n-PROP	930	T	360
		T	4,600	1,2,3-TMB	680
		1,2,3-TMB	460	1,2,4-TMB	1,680
		1,2,4-TMB	2,690	1,3,5-TMB	410
		1,3,5-TMB	1,010	VINYL CHLORIDE	320
		VINYL CHLORIDE	240	X	10,800
		X	400	OTHER VOCs	<MDL
		OTHER VOCs	<MDL		

PSB-12		PSB-12	
4/29/2015		4/29/2015	
3.0 ~ 4.0'		4.0 ~ 5.0'	
VOCs	<MDL	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-9		PSB-9	
4/28/2015		4/28/2015	
1.0 ~ 2.0'		3.0 ~ 4.0'	
VOCs	<MDL	VOCs	<MDL

PSB-7	
4/29/2015	
3.0 ~ 4.0'	
VOCs	<MDL

PSB-8		PSB-8	
4/28/2015		4/28/2015	
3.0 ~ 4.0'		19.0 ~ 20.0'	
VOCs	<MDL	1,2,4-TMB	130
		OTHER VOCs	<MDL

PSB-6		PSB-6	
4/28/2015		4/28/2015	
3.0 ~ 4.0'		13.0 ~ 14.0'	
VOCs	<MDL	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-14		PSB-14	
4/29/2015		4/29/2015	
4.0 ~ 5.0'		9.0 ~ 10.0'	
PCE	300	B	4,300
OTHER VOCs	<MDL	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-5		PSB-5	
4/28/2015		4/28/2015	
3.5 ~ 4.5'		7.0 ~ 8.0'	
VOCs	<MDL	cis-1,2-DCE	1,600
		PCE	21,300
		TCE	3,200
		OTHER VOCs	<MDL

PSB-4		PSB-4		PSB-4	
4/28/2015		4/28/2015		4/28/2015	
3.0 ~ 4.0'		7.0 ~ 8.0'		20.0 ~ 21.0'	
PCE	260	cis-1,2-DCE	10,000	B	1,130
OTHER VOCs	<MDL	trans-1,2-DCE	300	cis-1,2-DCE	2,680
		TCE	1,100	E	420
		VINYL CHLORIDE	100	PCE	950
		OTHER VOCs	<MDL	T	230
				TCE	160
				VINYL CHLORIDE	200
				X	1,520
				OTHER VOCs	<MDL

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)

SOUTH GOULD STREET

ALLEY

SANITARY (10" DIA.)

STORM (60" DIA.)

WATER (8" DIA.)

WATER (12" DIA.)

SIDEWALK

SIGN

CONCEPTUAL INTERIOR RESPONSE SOIL EXCAVATION AREA

APPROXIMATE LOCATION OF FORMER DRY CLEANING MACHINE

830 EAST MAIN STREET EXISTING HOUSE

832 EAST MAIN STREET EXISTING HOUSE

834 EAST MAIN STREET EXISTING HOUSE

910 EAST MAIN STREET FORMER DRY CLEANERS

GARAGE

GARAGE

CONCRETE

GRASS

GRAVEL

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/TMW-1 PSB/TMW-2 PSB/TMW-3 PSB/TMW-4 PSB/TMW-5 PSB/TMW-6 PSB/TMW-7 PSB/TMW-8 PSB/TMW-9 PSB/TMW-10 PSB/TMW-11 PSB/TMW-12 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

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
- PROPOSED EXCAVATION LIMITS
- PROPOSED STORM DRAIN
- GEE SOIL BORING (2012)
- GEOTECHNICAL SOIL BORING
- PM SOIL BORING/TEMPORARY MONITORING WELL (2015)
- MAN HOLE

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 4A

SOIL BORING/TEMPORARY MONITORING WELL LOCATION MAP WITH SOIL ANALYTICAL RESULTS WITH CONCEPTUAL INTERIOR RESPONSE SOIL EXCAVATION AREA

PROJ:

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

THIS IS NOT A LEGAL SURVEY

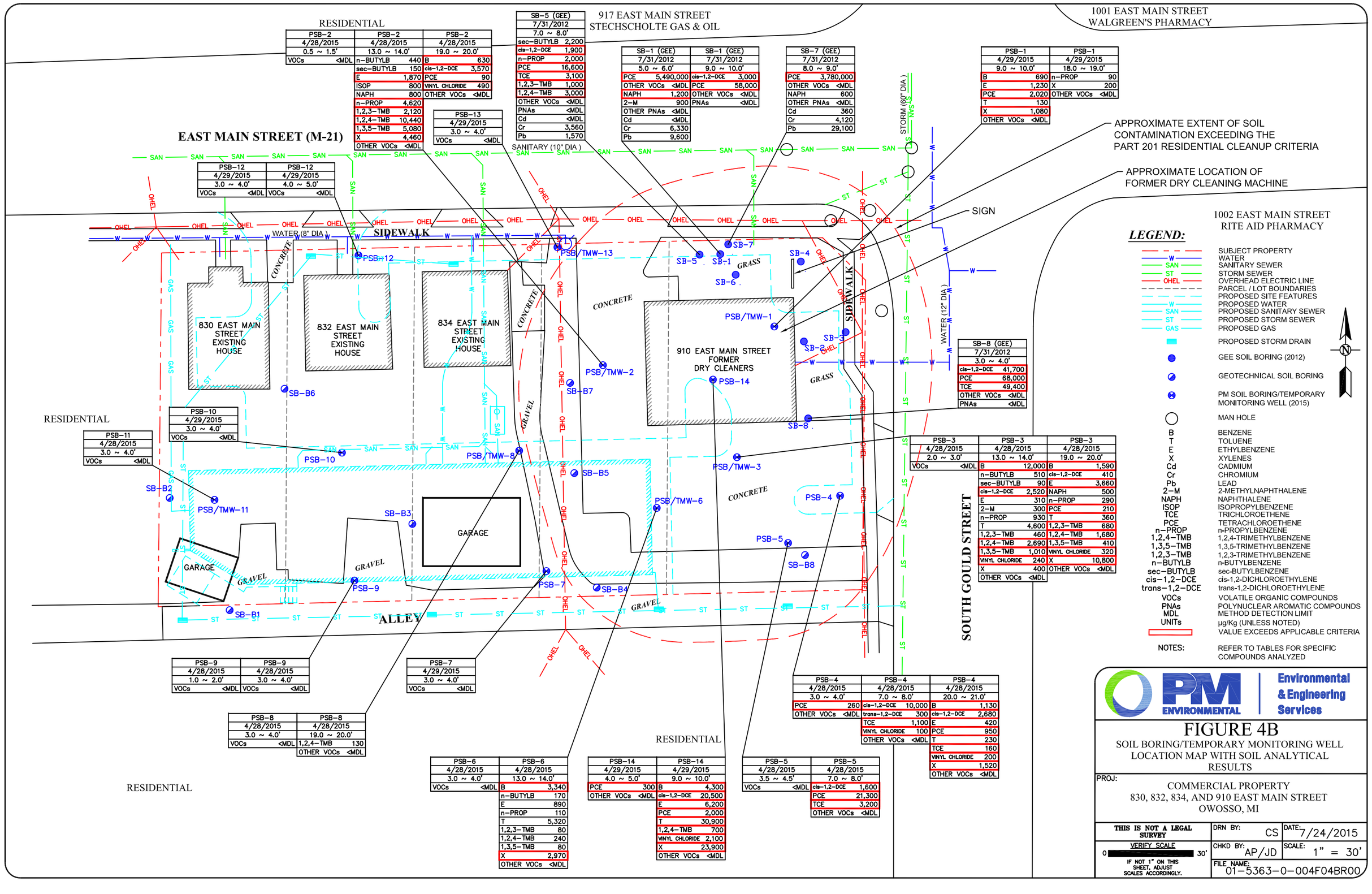
VERIFY SCALE 0 30'

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

DRN BY: CS | DATE: 7/24/2015

CHKD BY: AP/JD | SCALE: 1" = 30'

FILE NAME: 01-5363-0-004F04AR00


RESIDENTIAL
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
917 EAST MAIN STREET
STECHSCHOLTE GAS & OIL
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
1001 EAST MAIN STREET
WALGREEN'S PHARMACY
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-13 4/29/2015 3.0 ~ 4.0' VOCs <MDL
EAST MAIN STREET (M-21)
SANITARY (10" DIA)
STORM (60" DIA)
APPROXIMATE EXTENT OF SOIL CONTAMINATION EXCEEDING THE PART 201 RESIDENTIAL CLEANUP CRITERIA
APPROXIMATE LOCATION OF FORMER DRY CLEANING MACHINE
SIGN
PSB-12 4/29/2015 3.0 ~ 4.0' VOCs <MDL
PSB-12 4/29/2015 4.0 ~ 5.0' VOCs <MDL
WATER (8" DIA
WATER (12" DIA)
SIDEWALK
CONCRETE
GRASS
GRAVEL
ALLEY
GARAGE
830 EAST MAIN STREET EXISTING HOUSE
832 EAST MAIN STREET EXISTING HOUSE
834 EAST MAIN STREET EXISTING HOUSE
910 EAST MAIN STREET FORMER DRY CLEANERS
1002 EAST MAIN STREET
RITE AID PHARMACY
SOUTH GOULD STREET
PSB-10 4/29/2015 3.0 ~ 4.0' VOCs <MDL
PSB-11 4/28/2015 3.0 ~ 4.0' 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-7 4/29/2015 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
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-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 NAPH 500 n-PROP 290 PCE 210 T 360 1,2,3-TMB 680 1,2,4-TMB 1,680 1,3,5-TMB 410 VINYL CHLORIDE 320 X 10,800 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
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-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-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
LEGEND:
SUBJECT PROPERTY
WATER
SANITARY SEWER
STORM SEWER
OVERHEAD ELECTRIC LINE
PARCEL / LOT BOUNDARIES
PROPOSED SITE FEATURES
PROPOSED WATER
PROPOSED SANITARY SEWER
PROPOSED STORM SEWER
PROPOSED GAS
PROPOSED STORM DRAIN
GEE SOIL BORING (2012)
GEOTECHNICAL SOIL BORING
PM SOIL BORING/TEMPORARY MONITORING WELL (2015)
MAN HOLE
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 4B
SOIL BORING/TEMPORARY MONITORING WELL LOCATION MAP WITH SOIL ANALYTICAL RESULTS
PROJ:
COMMERCIAL PROPERTY
830, 832, 834, AND 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
DATE: 7/24/2015
CHKD BY: AP/JD
SCALE: 1" = 30'
FILE NAME: 01-5363-0-004F04BR00

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

EAST MAIN STREET (M-21)

SOUTH GOULD STREET

ALLEY

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

APPROXIMATE LOCATION OF FORMER DRY CLEANING MACHINE

SIGN

SANITARY (10" DIA.)

STORM (60" DIA.)

WATER (8" DIA.)

WATER (12" DIA.)

SIDEWALK

CONCRETE

GRASS

GRAVEL

GARAGE

830 EAST MAIN STREET EXISTING HOUSE

832 EAST MAIN STREET EXISTING HOUSE

834 EAST MAIN STREET EXISTING HOUSE

910 EAST MAIN STREET FORMER DRY CLEANERS

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
- WATER
- SANITARY SEWER
- STORM SEWER
- OVERHEAD ELECTRIC LINE
- PARCEL / LOT BOUNDARIES
- PROPOSED SITE FEATURES
- PROPOSED WATER
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED GAS
- PROPOSED STORM DRAIN
- GEE SOIL BORING (2012)
- GEOTECHNICAL SOIL BORING
- PM SOIL BORING/TEMPORARY MONITORING WELL (2015)
- MAN HOLE

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 4C

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

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

THIS IS NOT A LEGAL SURVEY

VERIFY SCALE
0 [redacted] 30'
IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRN BY: CS
DATE: 7/24/2015
CHKD BY: AP/JD
SCALE: 1" = 30'
FILE NAME: 01-5363-0-004F04CR00

Figure 5

Color Site Photographs

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 1

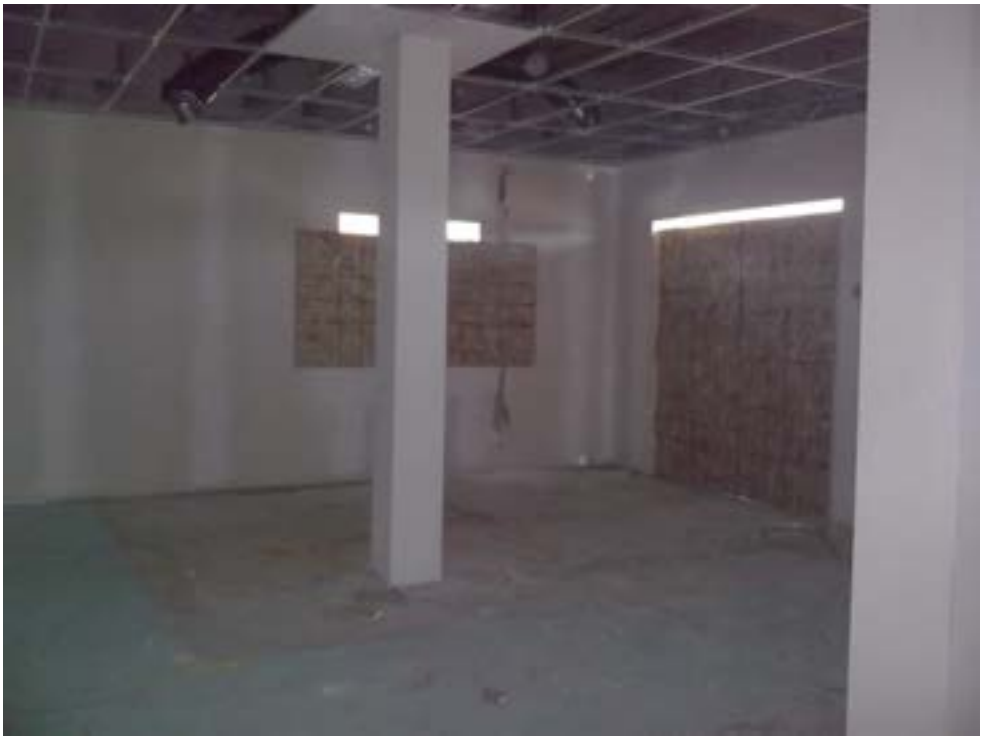
Exterior view of 910 East Main Street

Photograph 2

Interior view of 910 East Main Street

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 3



Interior view of 910 East Main Street

Photograph 4

Exterior view of 834 East Main Street

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 5

Interior view of 834 East Main Street

Photograph 6

View of detached garage associated with 834 E. Main Street

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 7

Interior view of detached garage associated with 834 E. Main Street

Photograph 8

Exterior view of 832 E. Main

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 9

Interior view of 832 E. Main

Photograph 10

Exterior view of 830 E. Main Street

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 11

Interior view of 830 E. Main Street

Photograph 12

View of detached shed associated with 830 East Main

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 13

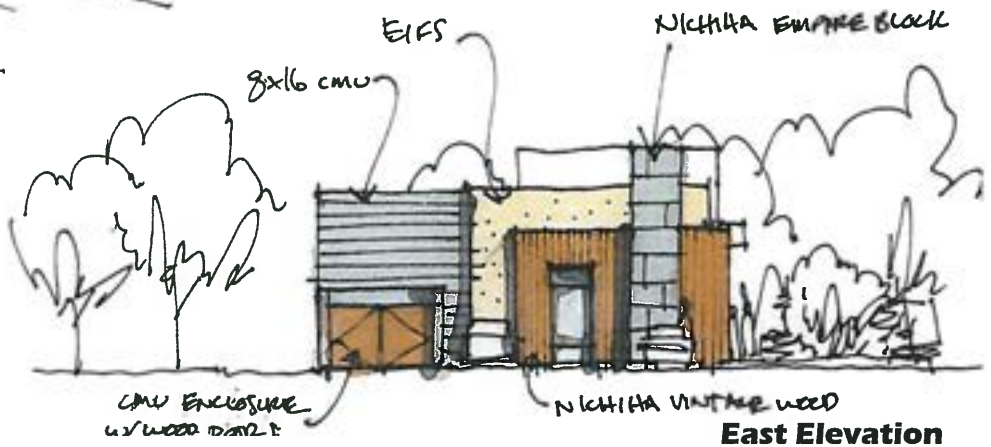
View of Subject Property from NE Corner of Intersection

Photograph 14

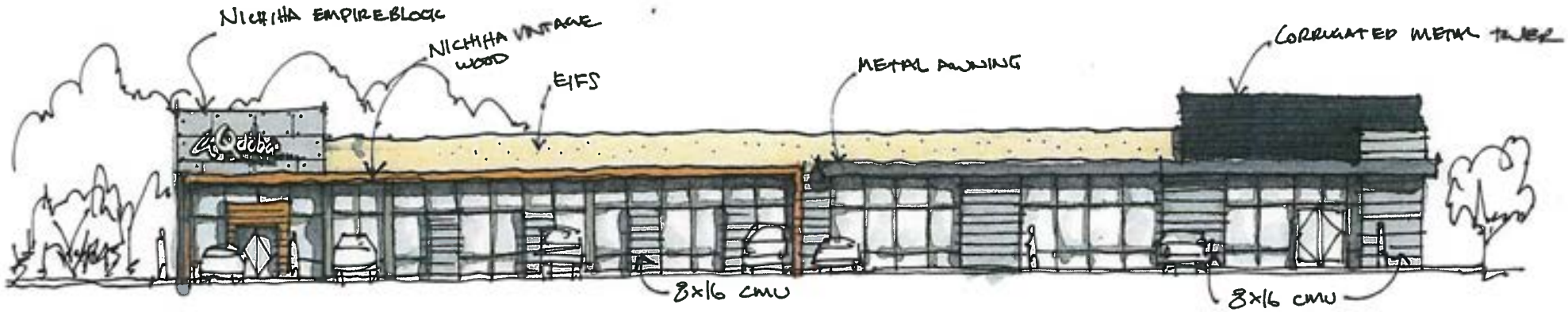
View of Subject Property from the West

Figure 6

Redevelopment Project Renderings



East Elevation



North Elevation

Imagine

Create

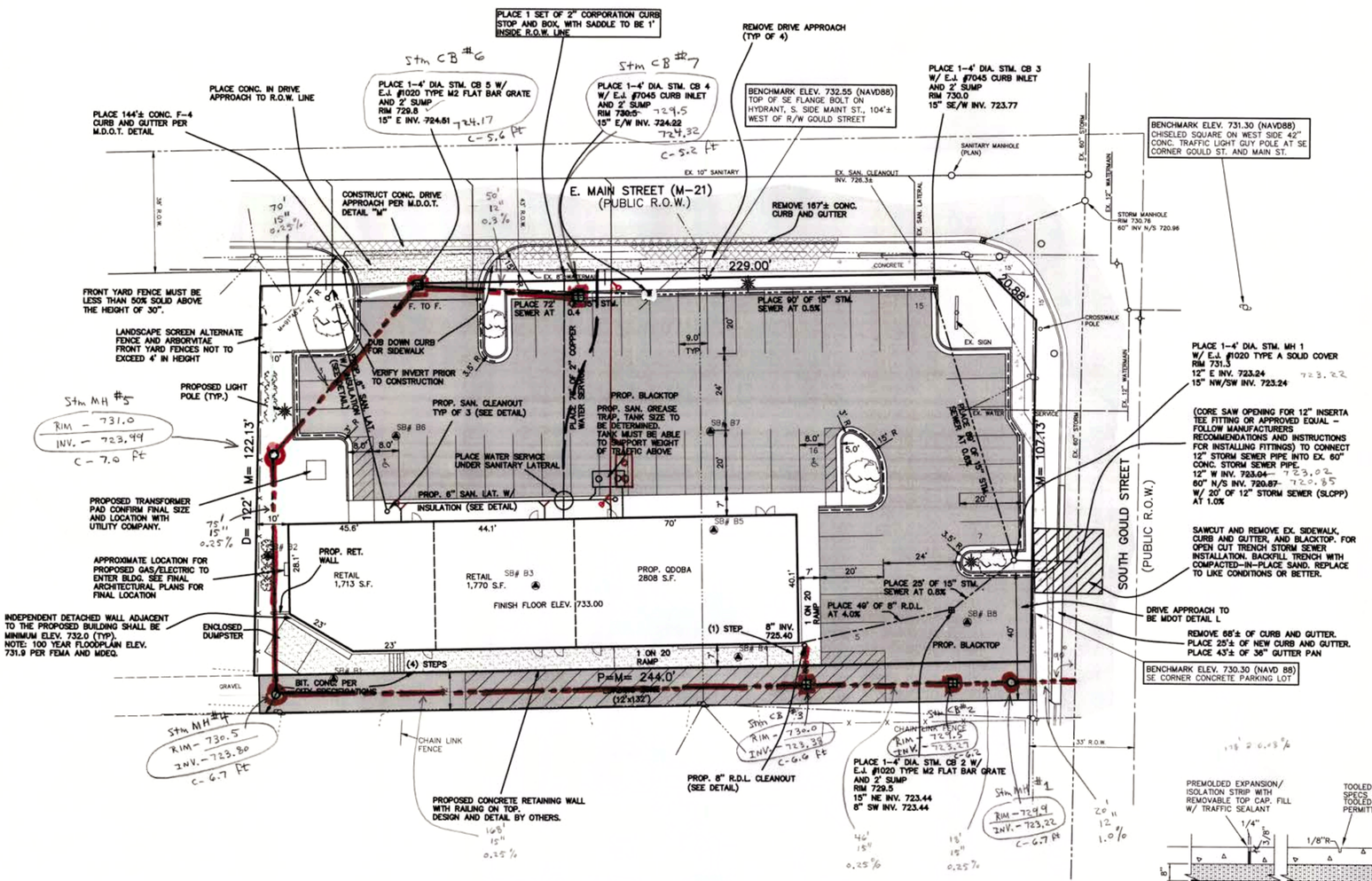
Excite

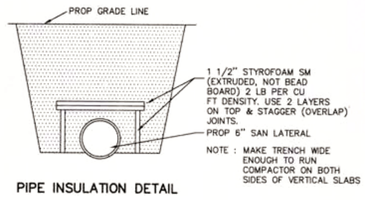
Dual Tenant Building

Main St. & South Gould_Owosso, MI

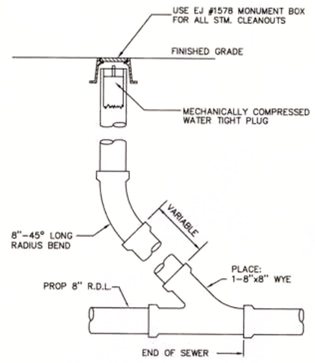
Figure 7

Engineering Site Plans

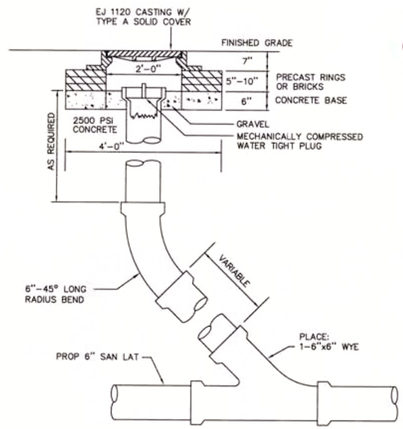




PIPE INSULATION DETAIL



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 diligence 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,
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    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.

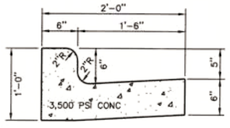
11. PM Environmental
J. Adam Patton, CHMM
Phone: (517) 325-9867
Cell: (517) 202-4288

STORM SEWER NOTES:

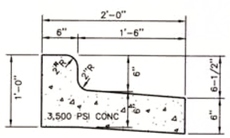
1. 12" storm sewer pipe shall be SLCPP with water tight joint connection
2. All 15" storm sewer pipe shall be C-76-III, or SLCPP with water tight joint connections.
3. 8" Roof drain lead and storm sewer pipe shall be PVC Schedule 40, or PVC SDR-26 pipe.
4. Storm sewer manhole and catchbasin structures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



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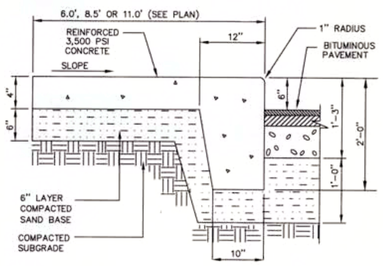


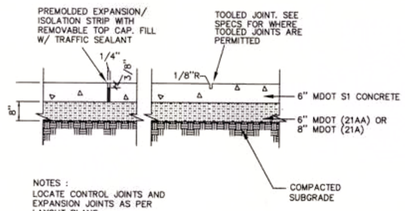
INTEGRAL CONC WALK/CURB

1.5" TOP (MDOT 36A)
1.5" BASE (MDOT 13A)
6" COMP AGG SURFACE (21AA)
12" SAND SUBBASE (CLASS II GRANULAR)

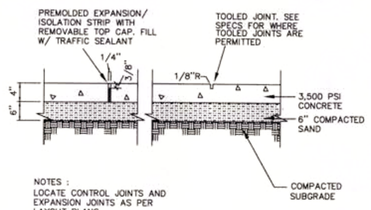
LIGHT DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)

2" TOP (MDOT 36A)
2" BASE (MDOT 13A)
8" COMP AGG SURFACE (21AA)
12" SAND SUBBASE (CLASS II GRANULAR)

MEDIUM DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)

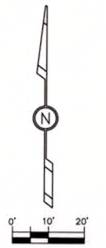


HEAVY DUTY CONC. DETAIL
(CONFIRM WITH SOIL REPORT)



4" CONCRETE WALKWAY DETAIL

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



SCALE: 1" = 20'

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

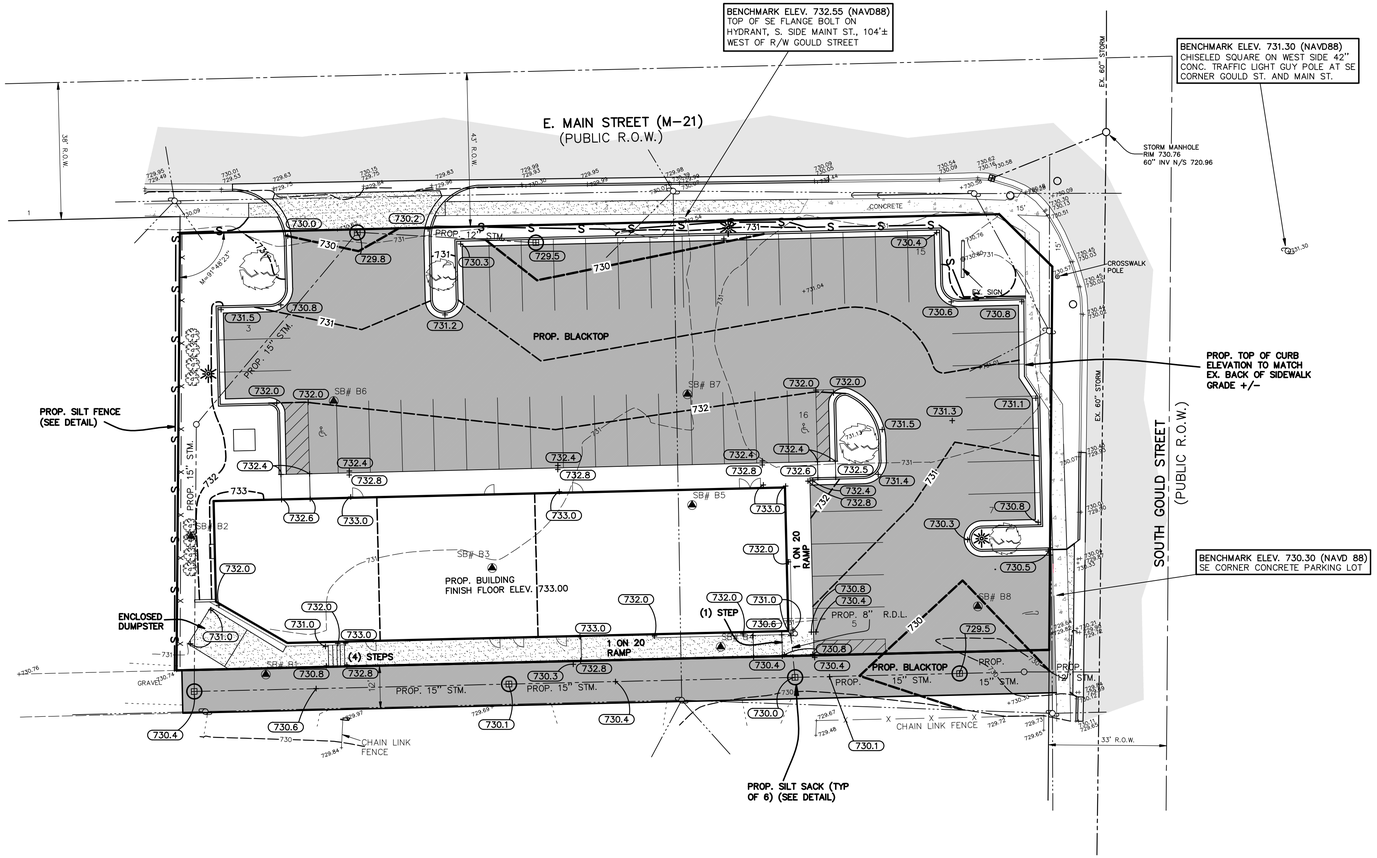
IN: PART OF THE NW 1/4, SECTION 19, T7N, R3E, CITY OF OWOSSO, SHIAWASSEE COUNTY, MICHIGAN

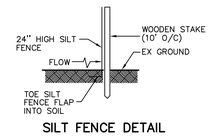
REVISIONS:
3/20/15 REV. PER OWNER (JSD)
3/10/15 REV. SAN. LATERAL (JSD)

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

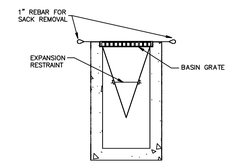
DRAWN BY: JSD
APPROVED BY: DDG
FILE NO.: 141574E
PROJ. ENG.: DDG
PROJ. SURV.: BMF
DATE: 3/2/2015

SHEET 2 of 3





SILT FENCE DETAIL



SILT SACK DETAIL

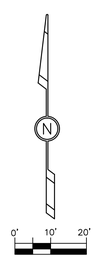
SOIL EROSION CONTROL NOTES :

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,
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REVISIONS:
5/28/15 REV.-BROWNFIELD RE-DEVELOPMENT
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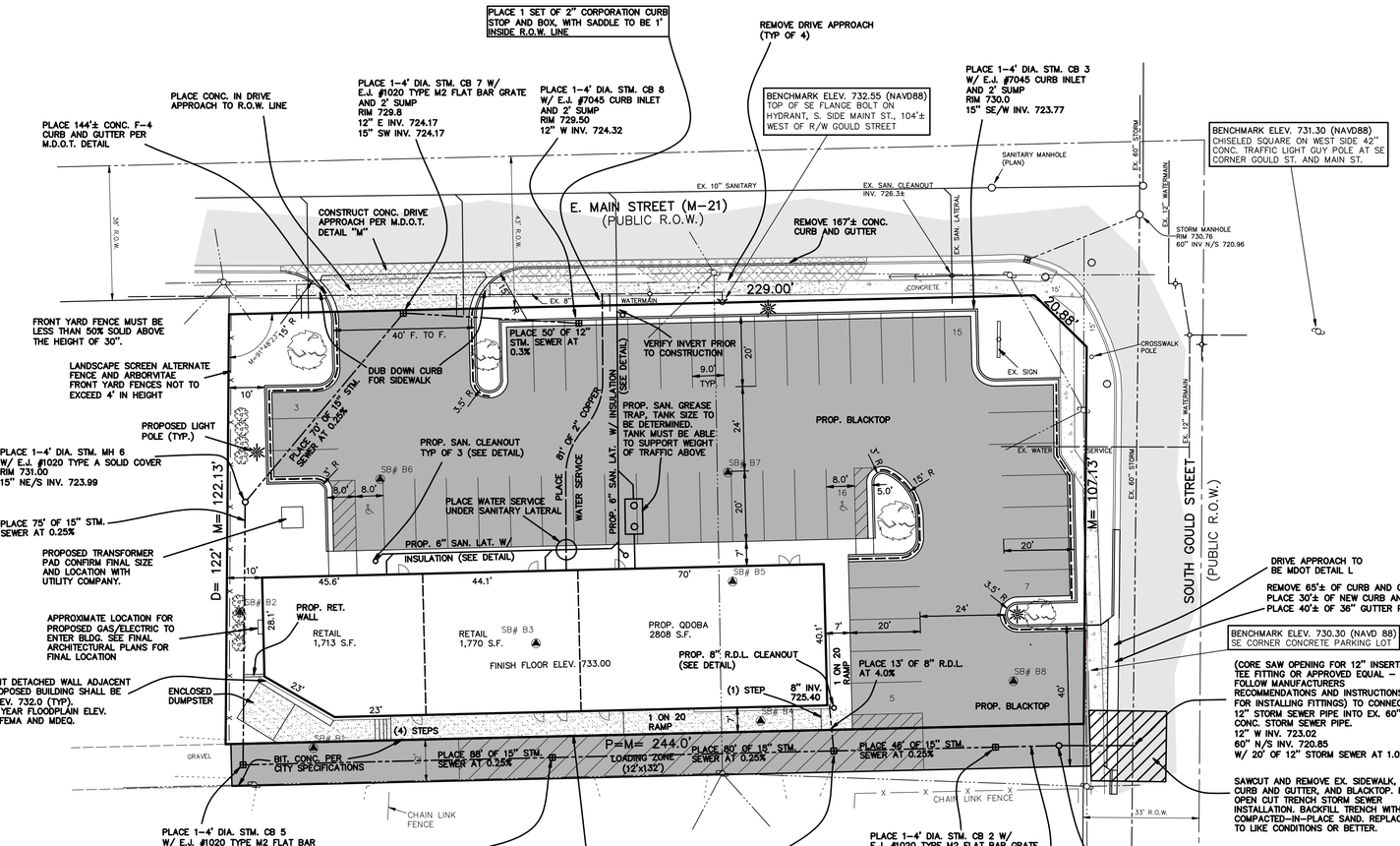
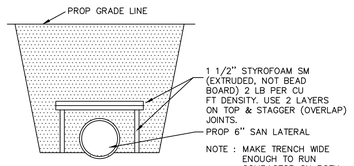
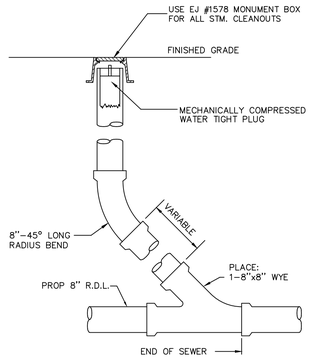
SHEET 3 of 3





PIPE INSULATION DETAIL



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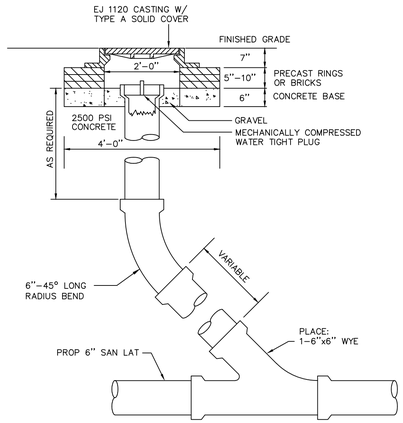
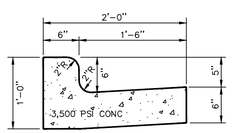


SAN SEWER LATERAL CLEANOUT DETAIL



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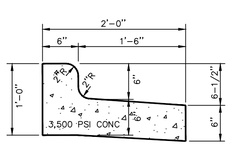

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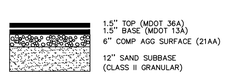
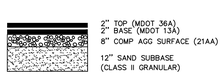


LIGHT DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)



MEDIUM DUTY PAVING CROSS SECTION
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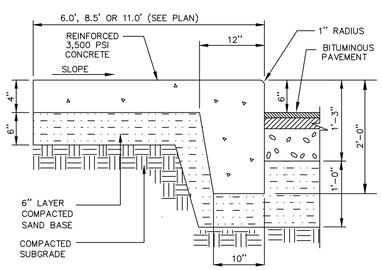

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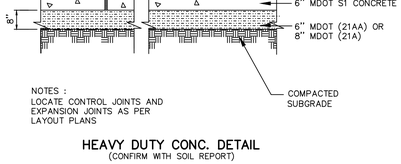

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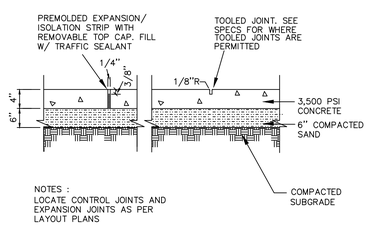

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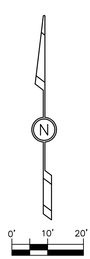

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    W.E.S.I. Project No. 15-0014
    By: Wolverine Engineering & Surveyors, Inc.
    312 North Street
    Mason, MI 48854
    Attn: Dan Wisinski
    Phone: (517) 676-9200
11. For Brownfield Re-Development on the site, all construction activities must follow the MDEQ and PM ENVIRONMENTAL INC. requirements and recommendations.
    J. ADAM PATTON, OHMM
    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.
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4. Proposed sanitary lateral and water service to have minimum 4 feet of earth cover, unless insulated and approved by the City.

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:
5/28/15 REV.-BROWNFIELD RE-DEVELOPMENT
3/20/15 REV. PER OWNER (JSD)
3/10/15 REV. SAN. LATERAL (JSD)

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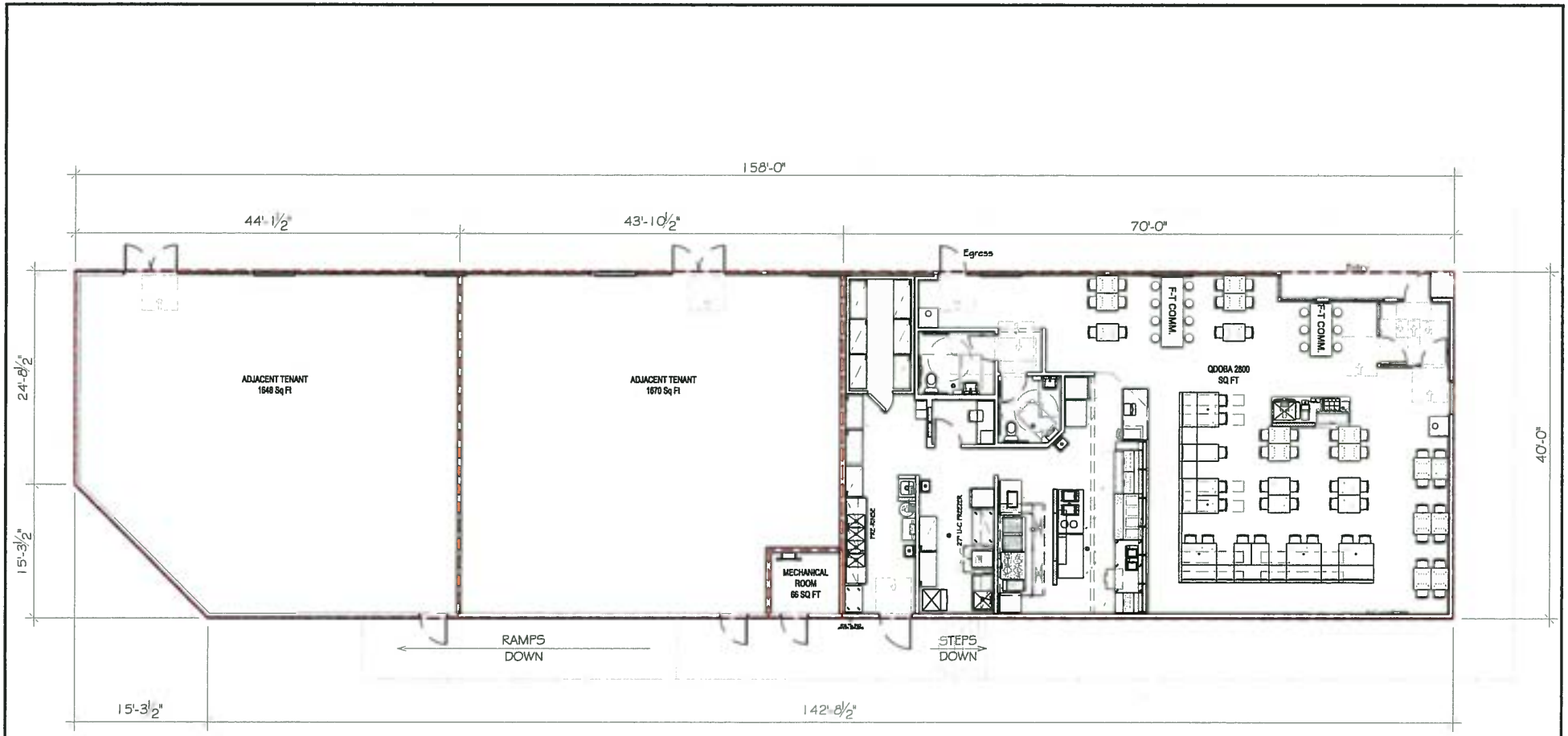
Phone: (616) 531-3660 Fax: (616) 531-2121
www.exxelengineering.com

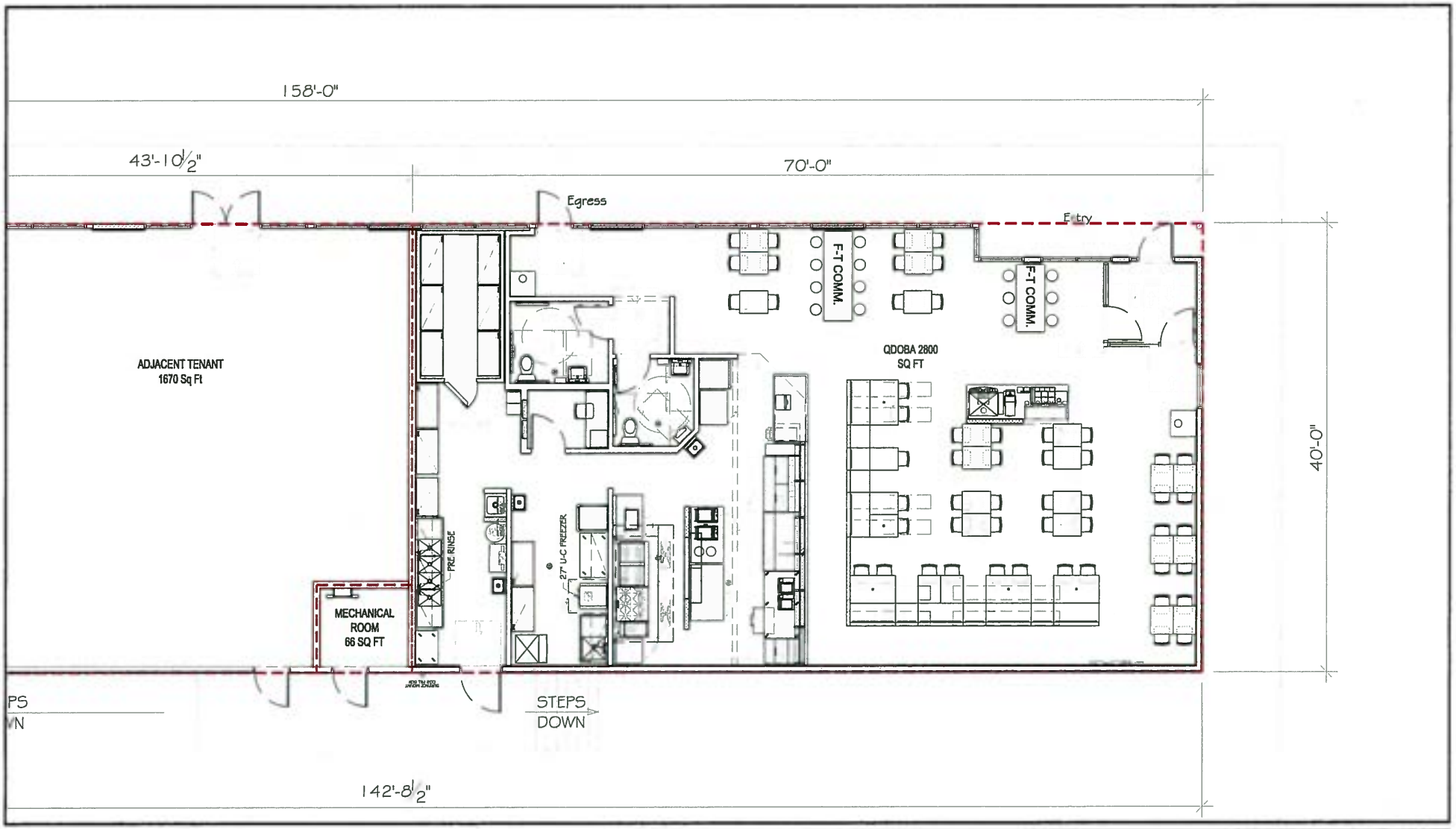
DRAWN BY: JSD
APPROVED BY: DDG
FILE NO.: 141574E
PROJ. ENG.: DDG
PROJ. SURV.: BMF
DATE: 3/2/2015

SHEET 2 of 3



PROJ. NO.: 14-480 DATE: 01/22/15 SHEET #: 005	LOD 6191 Sq Ft — DRAWN: JTC; CHECKED LEVEL 1: —; CHECKED LEVEL 2: —; APPROVED: —	Multi-Tenant [illegible] 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	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	LINDLE DESIGN GROUP 158 West Main St, Lena, IL 61048 PH: 815-369-9155 FAX: 815-369-4495 WWW.LINDLEDESIGN.COM

TABLES

Table 1

Summary of Soil Analytical Results

TABLE 1 (1 OF 1)
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 (Cg/Kg)			Benzene	n-Butylbenzene	sec-Butylbenzene	cis-1,2-Dichloroethylene	trans-1,2-Dichloroethylene	Ethylbenzene	Isopropyl benzene	2-Methylnaphthalene	Naphthalene	n-Propylbenzene	Tetrachloroethylene	Toluene	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#)			71432	104518	135988	156592	156605	100414	98828	91576	91203	103651	127184	108883	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	<10	<10	<10	<10	<10	**5,490,000**	<10	<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	**3,000**	<10	<10	<10	<10	<10	<10	**58,000**	<10	<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	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	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	**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	<10	<10	<10	<10	<10	**3,780,000**	<10	<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	<10	<10	<10	**41,700**	<10	<10	<10	<10	<10	<10	**68,000**	<10	**49,400**	<10	<10	<10	<10	<20	<MDL	<330	<330	<MDL	NA	NA	NA
PSB-1	04/29/2015	9.0-10.0	**690**	<80	<80	<80	<80	1,230	<400	<200	<400	<80	**2,020**	130	<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	<70	<400	<100	<400	90	<70	<70	<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	<70	<300	<100	<300	<70	<70	<70	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-2	04/28/2015	13.0.-14.0	<70	440	150	<70	<70	**1,870**	800	<100	800	**4,620**	<70	<70	<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	**630**	<70	<70	**3,570**	<70	<70	<300	<100	<300	<70	90	<70	<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	<80	<400	<200	<400	<80	<80	<80	<80	<80	<80	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
PSB-3	04/28/2015	13.0.-14.0	**12,000**	510	90	**2,520**	<70	310	<300	300	<300	930	<70	4,600	<70	460	**2,690**	**1,010**	**240**	400	<MDL	NA	NA	NA	NA	NA	NA
PSB-3	04/28/2015	19.0-20.0	**1,590**	<70	<70	410	<70	**3,660**	<400	<100	500	290	**210**	360	<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	<90	<400	<200	<400	<90	**260**	<90	<90	<90	<90	<90	<90	<290	<MDL	NA	NA	NA	NA	NA	NA
PSB-4	04/28/2015	7.0-8.0	<100	<100	<100	**10,000**	300	<100	<500	<200	<500	<100	<100	<100	**1,100**	<100	<100	<100	**100**	<300	<MDL	NA	NA	NA	NA	NA	NA
PSB-4	04/28/2015	20.0-21.0	**1,130**	<80	<80	**2,680**	<80	420	<400	<200	<400	<80	**950**	230	**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	<70	<300	<100	<300	<70	<70	<70	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-5	04/28/2015	7.0-8.0	<100	<100	<100	**1,600**	<100	<100	<500	<200	<500	<100	**21,300**	<100	**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	<80	<400	<200	<400	<80	<80	<80	<80	<80	<80	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
PSB-6	04/28/2015	13.0.-14.0	**3,340**	170	<70	<70	<70	890	<300	<100	<300	110	<70	5,320	<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	<70	<400	<100	<400	<70	<70	<70	<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	<70	<400	<100	<400	<70	<70	<70	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-8	04/28/2015	19.0-20.0	<80	<80	<80	<80	<80	<80	<400	<200	<400	<80	<80	<80	<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	<70	<300	<100	<300	<70	<70	<70	<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	<80	<400	<200	<400	<80	<80	<80	<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	<70	<300	<100	<300	<70	<70	<70	<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	<60	<300	<100	<300	<60	<60	<60	<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	<60	<300	<100	<300	<60	<60	<60	<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	<70	<300	<100	<300	<70	<70	<70	<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	<70	<300	<100	<300	<70	<70	<70	<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	<80	<400	<200	<400	<80	**300**	<80	<80	<80	<80	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
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**	<400	<400	**700**	<400	**2,100**	**23,900**	<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 (Cg/Kg)																											
Statewide Default Background Levels			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,200	18,000	21,000
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	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}	ID	ID	12,000	30,000 {X}	360	3,200	4,200	730	ID	1,200 {X}	5,400	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)			1,600	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}	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)			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	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			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	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			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	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)			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	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)			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}	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 (Cg/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	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)			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}	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)			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	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			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	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			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	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)			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	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)			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}	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 (Cg/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	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	450	50	50	50	200	250	7,500	440	140	52	10,000	50	3,200	2,200	1,700	40	290	Various	440	7,500	Various	NL	NL	NL
Nonresidential Vapor Intrusion Soil Screening Levels ($S_{VI\text{-}nr}$)			85	7,600	740	160	760	4,000	300	1.26E+05	8,900	2,400	1,000	1.69E+05	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

Summary of Groundwater Analytical Results

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 (Ğg/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 (Ğg/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) ¦				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) ¦				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 (Ğg/L)																								
Residential Groundwater Vapor Intrusion Screening Levels ($GW_{VI\text{-}res}$) ¦				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 ($GW_{VI\text{-}nr}$)¦				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 (Ğg/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

Table 3

Summary of Costs for Eligible Activities

Table 3: Estimated Costs of Eligible Activities				
Item/Activity	**TOAL ESTIMATED COSTS**	**MDEQ BROWNFIELD REDEVELOPMENT LOAN ELIGIBLE ACTIVITIES**	**MDEQ AND LOCAL ACT 381 ELIGIBLE ACTIVITIES**	**LOCAL ACT 381 ELIGIBLE ACTIVITIES**
Baseline Environmental Assessments				
Phase I ESA, Phase II/BEA	$ 2,250		$ 2,250	
Documentation of Due Care Compliance	$ 8,050		$ 8,050	
Baseline Environmental Assessments Sub-Total	**$ 10,300**		**$ 10,300**	
Due Care Activities				
Transport and disposal of contaminated waste soil associated with building footing, utility, parking lot, sidewalk, curb, and gutter excavation and groundwater removal management and disposal	$ 152,000	$ 152,000		
Removal, transport and disposal of contaminated concrete building slab and footing materials	$ 25,000	$ 25,000		
Chemical-resistant gasketing for sanitary, storm, and water utility piping	$ 5,500	$ 5,500		
Design and installation of passive spray-applied vapor barrier system	$ 38,000	$ 38,000		
Installation of visual demarcation underlayment in non-paved areas requiring dermal contact surface barrier	$ 1,250	$ 1,250		
Response activity preparation planning, oversight, monitoring, laboratory analysis, project management and reporting by an environmental professional	$ 18,000	$ 18,000		
Due Care Activities Sub-Total	**$ 239,750**	**$ 239,750**		
Additional Response Activities				
Building and Site Demolition	$ 35,000	$ 15,000	$ 20,000	
Demolition Sub-Total	**$ 35,000**	**$ 15,000**	**$ 20,000**	
Asbestos				
Pre-Demo Asbestos Survey/Reporting	$ 5,830		$ 5,830	
Asbestos Abatement, Oversight, Clearance Testing	$ 16,750			$ 16,750
Asbestos Sub-Total	**$ 22,580**		**$ 5,830**	**$ 16,750**
Preparation of Brownfield Plan and Act 381 Workplan				
Brownfield Plan and Act 381 Work Plan	$ 12,000		$ 12,000	
Brownfield Plan and Act 381 Work Plan Sub-Total	**$ 12,000**		**$ 12,000**	
Project Sub Totals	**$ 319,630**	**$ 254,750**	**$ 48,130**	**$ 16,750**
15% Contingency (Excludes Baseline Environmental Assessments and Brownfield Plan/Act 381 Work Plan)	$ 44,600	$ 38,213	$ 3,875	$ 2,513
Developer Eligible Reimbursement Total	**$ 364,230**	**$ 292,963**	**$ 52,005**	**$ 19,263**
TIF Capture for Local Site Remediation Revolving Fund (Local Only Taxes)	$ 113,580		$ 56,146	$ 57,434
Total Cost of Eligible Activities to be Funded through TIF	**$ 477,810**	**$ 292,963**	**$ 108,151**	**$ 76,696**

Table 4

MDEQ and Local Tax Capture Reimbursement Schedule

Tax Increment Financing Estimates
Table 4

		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
Base Taxable Value (pre-development)		$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000
Estimated New Taxable Value (estimated increase of 1%/year)			$ 575,000	$ 575,000	$ 580,750	$ 586,558	$ 592,423	$ 598,347	$ 604,331	$ 610,374	$ 616,478	$ 622,643	$ 628,869	$ 635,158	$ 641,509
Incremental Difference (New Taxable Value *minus* Existing)			$ 391,000	$ 391,000	$ 396,750	$ 402,558	$ 408,423	$ 414,347	$ 420,331	$ 426,374	$ 432,478	$ 438,643	$ 444,869	$ 451,158	$ 457,509
Local Taxes															
Seniors	0.3500		$ 137	$ 137	$ 139	$ 141	$ 143	$ 145	$ 147	$ 149	$ 151	$ 154	$ 156	$ 158	$ 160
Med Care	2.0000		$ 782	$ 782	$ 794	$ 805	$ 817	$ 829	$ 841	$ 853	$ 865	$ 877	$ 890	$ 902	$ 915
Veterans PA214	0.1000		$ 39	$ 39	$ 40	$ 40	$ 41	$ 41	$ 42	$ 43	$ 43	$ 44	$ 44	$ 45	$ 46
Veterans Voted	0.1400		$ 55	$ 55	$ 56	$ 56	$ 57	$ 58	$ 59	$ 60	$ 61	$ 61	$ 62	$ 63	$ 64
MSU Extension	0.0500		$ 20	$ 20	$ 20	$ 20	$ 20	$ 21	$ 21	$ 21	$ 22	$ 22	$ 22	$ 23	$ 23
INTMD Sch	3.9040		$ 1,526	$ 1,526	$ 1,549	$ 1,572	$ 1,594	$ 1,618	$ 1,641	$ 1,665	$ 1,688	$ 1,712	$ 1,737	$ 1,761	$ 1,786
Library	1.2500		$ 489	$ 489	$ 496	$ 503	$ 511	$ 518	$ 525	$ 533	$ 541	$ 548	$ 556	$ 564	$ 572
City Oper	14.0370		$ 5,488	$ 5,488	$ 5,569	$ 5,651	$ 5,733	$ 5,816	$ 5,900	$ 5,985	$ 6,071	$ 6,157	$ 6,245	$ 6,333	$ 6,422
SATA	0.3285		$ 128	$ 128	$ 130	$ 132	$ 134	$ 136	$ 138	$ 140	$ 142	$ 144	$ 146	$ 148	$ 150
County Oper	5.1146		$ 2,000	$ 2,000	$ 2,029	$ 2,059	$ 2,089	$ 2,119	$ 2,150	$ 2,181	$ 2,212	$ 2,243	$ 2,275	$ 2,307	$ 2,340
Total Local Taxes	**27.2741**		**$ 10,664**	**$ 10,664**	**$ 10,821**	**$ 10,979**	**$ 11,139**	**$ 11,301**	**$ 11,464**	**$ 11,629**	**$ 11,795**	**$ 11,964**	**$ 12,133**	**$ 12,305**	**$ 12,478**
School Taxes															
School Operating	18.0000		$ 7,038	$ 7,038	$ 7,142	$ 7,246	$ 7,352	$ 7,458	$ 7,566	$ 7,675	$ 7,785	$ 7,896	$ 8,008	$ 8,121	$ 8,235
SET	6.0000		$ 2,346	$ 2,346	$ 2,381	$ 2,415	$ 2,451	$ 2,486	$ 2,522	$ 2,558	$ 2,595	$ 2,632	$ 2,669	$ 2,707	$ 2,745
Total School Taxes	**24.0000**		**$ 9,384**	**$ 9,384**	**$ 9,522**	**$ 9,661**	**$ 9,802**	**$ 9,944**	**$ 10,088**	**$ 10,233**	**$ 10,379**	**$ 10,527**	**$ 10,677**	**$ 10,828**	**$ 10,980**
Total Capturable Millages	**51.2741**		**$ 20,048**	**$ 20,048**	**$ 20,343**	**$ 20,641**	**$ 20,942**	**$ 21,245**	**$ 21,552**	**$ 21,862**	**$ 22,175**	**$ 22,491**	**$ 22,810**	**$ 23,133**	**$ 23,458**
Local Non-Capturable Taxes															
City Debt	0.4973		$ 92	$ 92	$ 92	$ 92	$ 92	$ 92	$ 92	$ 92	$ 92	$ 92	$ 221	$ 221	$ 221
Local Total Non-Capturable Taxes	**0.4973**		**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 221**	**$ 221**	**$ 221**
3 Mils State Brownfield Fund (on incremental capture only)	3.0000		$ 1,173	$ 1,173	$ 1,190	$ 1,208	$ 1,225	$ 1,243	$ 1,261	$ 1,279	$ 1,297	$ 1,316	$ 1,335	$ 1,353	$ 1,373
Local Admin Fees			$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
Local Tax Capture after Fees			$ 9,664	$ 9,664	$ 9,821	$ 9,979	$ 10,139	$ 10,301	$ 10,464	$ 10,629	$ 10,795	$ 10,964	$ 11,133	$ 11,305	$ 11,478
School Tax Capture after SET Brownfield Fund			$ 8,211	$ 8,211	$ 8,332	$ 8,454	$ 8,577	$ 8,701	$ 8,827	$ 8,954	$ 9,082	$ 9,211	$ 9,342	$ 9,474	$ 9,608
Total Annual Available Tax Capture			**$ 17,875**	**$ 17,875**	**$ 18,153**	**$ 18,433**	**$ 18,716**	**$ 19,002**	**$ 19,291**	**$ 19,583**	**$ 19,877**	**$ 20,175**	**$ 20,476**	**$ 20,779**	**$ 21,086**
Total Cumulative Tax Capture			**$ 17,875**	**$ 35,750**	**$ 53,903**	**$ 72,336**	**$ 91,052**	**$ 110,055**	**$ 129,346**	**$ 148,929**	**$ 168,806**	**$ 188,981**	**$ 209,457**	**$ 230,236**	**$ 251,322**
MDEQ LOAN ELIGIBLE EXPENSES															
Local Taxes			$ 9,664	$ 9,664	$ 9,821	$ 9,979	$ 10,139	$ 10,301	$ 10,464	$ 10,629	$ 10,795	$ 10,964	$ 11,133	$ 11,305	$ 11,478
School Taxes			$ 8,211	$ 8,211	$ 8,332	$ 8,454	$ 8,577	$ 8,701	$ 8,827	$ 8,954	$ 9,082	$ 9,211	$ 9,342	$ 9,474	$ 9,608
Unreimbursed Eligible Expenses		**$ 292,963**	**$ 275,087**	**$ 257,212**	**$ 239,059**	**$ 220,626**	**$ 201,910**	**$ 182,908**	**$ 163,617**	**$ 144,034**	**$ 124,156**	**$ 103,981**	**$ 83,506**	**$ 62,726**	**$ 41,641**
LOCAL ONLY AND MDEQ ELIGIBLE EXPENSES															
Local Taxes			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
School Taxes			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Unreimbursed Eligible Expenses		**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**
LOCAL ONLY ELIGIBLE EXPENSES															
Local Taxes			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Unreimbursed Eligible Expenses		**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**
LOCAL SITE REMEDIATION REVOLVING FUND CAPTURE															
Local Taxes															
State Taxes															

Tax Increment Financing Estimates
Table 4

2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	
Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	
$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	
$ 647,924	$ 654,404	$ 660,948	$ 667,557	$ 674,233	$ 680,975	$ 687,785	$ 694,663	$ 701,609	$ 708,625	$ 715,712	
$ 463,924	$ 470,404	$ 476,948	$ 483,557	$ 490,233	$ 496,975	$ 503,785	$ 510,663	$ 517,609	$ 524,625	$ 531,712	
$ 162	$ 165	$ 167	$ 169	$ 172	$ 174	$ 176	$ 179	$ 181	$ 184	$ 186	$ 3,831
$ 928	$ 941	$ 954	$ 967	$ 980	$ 994	$ 1,008	$ 1,021	$ 1,035	$ 1,049	$ 1,063	$ 21,892
$ 46	$ 47	$ 48	$ 48	$ 49	$ 50	$ 50	$ 51	$ 52	$ 52	$ 53	$ 1,095
$ 65	$ 66	$ 67	$ 68	$ 69	$ 70	$ 71	$ 71	$ 72	$ 73	$ 74	$ 1,532
$ 23	$ 24	$ 24	$ 24	$ 25	$ 25	$ 25	$ 26	$ 26	$ 26	$ 27	$ 547
$ 1,811	$ 1,836	$ 1,862	$ 1,888	$ 1,914	$ 1,940	$ 1,967	$ 1,994	$ 2,021	$ 2,048	$ 2,076	$ 42,733
$ 580	$ 588	$ 596	$ 604	$ 613	$ 621	$ 630	$ 638	$ 647	$ 656	$ 665	$ 13,682
$ 6,512	$ 6,603	$ 6,695	$ 6,788	$ 6,881	$ 6,976	$ 7,072	$ 7,168	$ 7,266	$ 7,364	$ 7,464	$ 153,647
$ 152	$ 155	$ 157	$ 159	$ 161	$ 163	$ 165	$ 168	$ 170	$ 172	$ 175	$ 3,596
$ 2,373	$ 2,406	$ 2,439	$ 2,473	$ 2,507	$ 2,542	$ 2,577	$ 2,612	$ 2,647	$ 2,683	$ 2,719	$ 55,984
$ 12,653	**$ 12,830**	**$ 13,008**	**$ 13,189**	**$ 13,371**	**$ 13,555**	**$ 13,740**	**$ 13,928**	**$ 14,117**	**$ 14,309**	**$ 14,502**	**$ 298,539**
$ 8,351	$ 8,467	$ 8,585	$ 8,704	$ 8,824	$ 8,946	$ 9,068	$ 9,192	$ 9,317	$ 9,443	$ 9,571	$ 197,026
$ 2,784	$ 2,822	$ 2,862	$ 2,901	$ 2,941	$ 2,982	$ 3,023	$ 3,064	$ 3,106	$ 3,148	$ 3,190	$ 65,675
$ 11,134	**$ 11,290**	**$ 11,447**	**$ 11,605**	**$ 11,766**	**$ 11,927**	**$ 12,091**	**$ 12,256**	**$ 12,423**	**$ 12,591**	**$ 12,761**	**$ 262,701**
$ 23,787	**$ 24,120**	**$ 24,455**	**$ 24,794**	**$ 25,136**	**$ 25,482**	**$ 25,831**	**$ 26,184**	**$ 26,540**	**$ 26,900**	**$ 27,263**	**$ 561,240**
$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	**$ 4,012**
$ 221	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 4,012**
$ 1,392	$ 1,411	$ 1,431	$ 1,451	$ 1,471	$ 1,491	$ 1,511	$ 1,532	$ 1,553	$ 1,574	$ 1,595	**$ 32,838**
$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	**$ 24,000**
$ 11,653	$ 11,830	$ 12,008	$ 12,189	$ 12,371	$ 12,555	$ 12,740	$ 12,928	$ 13,117	$ 13,309	$ 13,502	**$ 274,539**
$ 9,742	$ 9,878	$ 10,016	$ 10,155	$ 10,295	$ 10,436	$ 10,579	$ 10,724	$ 10,870	$ 11,017	$ 11,166	**$ 229,863**
$ 21,396	**$ 21,708**	**$ 22,024**	**$ 22,343**	**$ 22,666**	**$ 22,991**	**$ 23,320**	**$ 23,652**	**$ 23,987**	**$ 24,326**	**$ 24,668**	**$ 504,402**
$ 272,717	**$ 294,426**	**$ 316,450**	**$ 338,793**	**$ 361,459**	**$ 384,450**	**$ 407,770**	**$ 431,421**	**$ 455,408**	**$ 479,734**	**$ 504,402**	
$ 11,653	$ 10,768.91										**$ 158,760**
$ 9,742	$ 9,476.16										**$ 134,203**
$ 20,245	**$ - **										
$ -	$ 1,061	$ 12,008	$ 12,189	$ 3,284							**$ 28,542**
$ -	$ 402	$ 10,016	$ 10,155	$ 2,890							**$ 23,463**
$ 52,005	**$ 50,541**	**$ 28,517**	**$ 6,174**	**$ - **							
$ -	$ -	$ -	$ -	$ 9,087	$ 12,555	$ 6,708					**$ 28,349**
$ 19,263	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 6,708**	**$ (0)**					
						$ 6,032	$ 12,581	$ 12,759	$ 12,940	$ 13,122	**$ 57,434**
						$ 10,915	$ 11,071	$ 11,228	$ 11,386	$ 11,546	**$ 56,146**

Tax Ratio	
Local Tax	53%
School Tax	47%

Brownfield Plan Eligible Expense Ratio			
MDEQ	$	344,967	94.71%
LOCAL	$	19,263	5.29%
TOTAL	$	364,230	100.00%

Eligible activity school/local reimbursement breakdown	
	MDEQ
Local Taxes	$187,302
School Taxes	$157,665
	$ 344,967

ATTACHMENTS

Attachment A

Approved Brownfield Plan and Resolution

(Available following local approval and execution)

Attachment B

Reimbursement Agreement

(Available following local approval and execution)

Attachment C

Vapor Barrier Specifications

SCALE: 1" = 120

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 C1
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 [redacted] 20' IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	CHKD BY: AP	SCALE: 1" = 20'
	FILE NAME: 01-5363-0-001FC1R00	

Land Science™ Technologies
1011 Calle Sombra - Ste. 110, San Clemente, CA 92673 P:949.366.8000 F:949.366.8090 www.landsciencetech.com

April 28, 2015

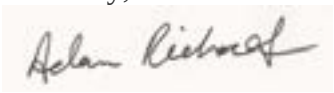
Adam Patton
Manager – Site Investigation Services
PM Environmental
3340 Ranger Road
Lansing, MI 48906

Re: Qdoba Retail – Owosso, MI – Geo-Seal® Site Compatibility

Dear Mr. Patton,

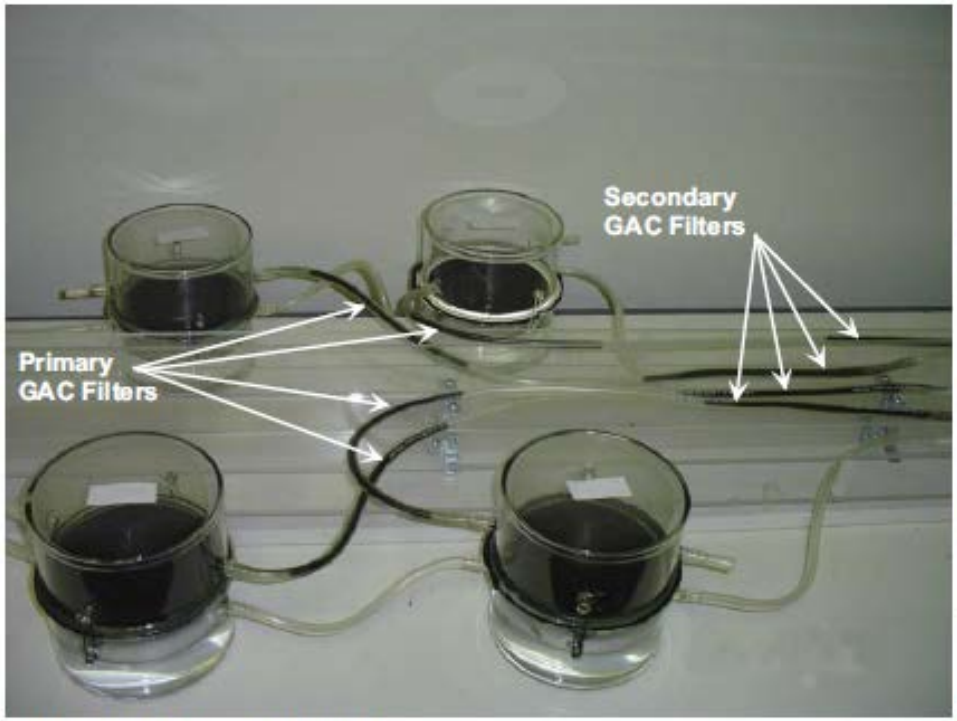
Upon review of the soil concentrations of PCE and an attachment provided from Global Environmental Engineering Inc. with soil boring data for the above referenced site, Land Science recommends the use of the FILM 11 base layer to be used in lieu of the Geo-Seal BASE layer. The FILM 11 base layer is an 11 mil cross laminated HDPE sheet which will provide additional chemical resistance protection per the site conditions. Therefore, Land Science Technologies verifies compatibility of the Geo-Seal system for the site and will approve warranty upon request.

Sincerely,

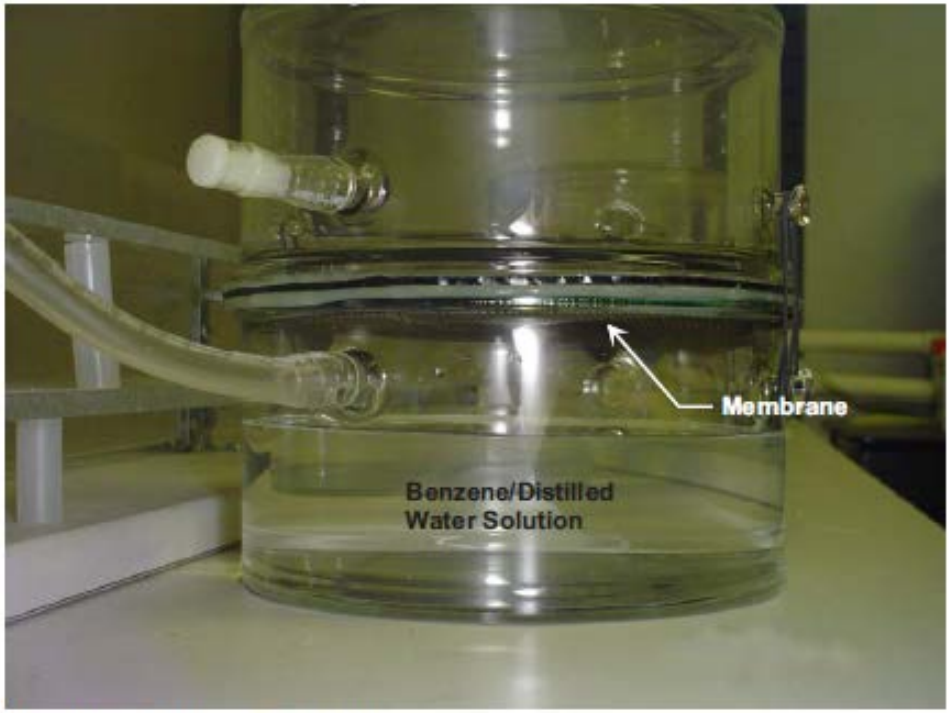


Adam Richards, PE
Central Region Technical Manager
arichards@landsciencetech.com
M: 312.515.1935

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 x 10^{-14} m^2/sec
Liquid Boot Plus	PCE	120,000 mg/m^3	3.1 x 10^{-16} m^2/sec
Geo-Seal	**PCE**	**90,000 mg/m^3**	**4.0 x 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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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

Land Science™ Technologies
www.landsciencetech.com

Product Data Sheet

Vapor-VentÊ

Vapor-VentÊ 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		1ò	1ò
Standard Widths		12ò	12ò
Roll Length		165 ft	165 ft
Roll Weight		65 lbs	68 lbs

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.

Vapor-VentÊ
SOIL GAS COLLECTION SYSTEM
Version 1.5

SECTION 02 56 19 ï GAS CONTROL

PART 1 ï 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-VentÊ installation.
3. Vapor-Vent accessories.

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

1. Division 2 Section ñEarthworkò, ñPipe Materialsò, ñSub-drainage systemsò, òGas Control Systemò, ñFluid-Applied gas barrierò
2. Division 3 Section ñCast-in-Place Concreteòfor concrete placement, curing, and finishing.
3. Division 5 Section ñExpansion Joint Cover Assembliesò, 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 manufacturerôs specifications.

B. Sample ï 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^{Ê} 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 manufacturerôs 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.

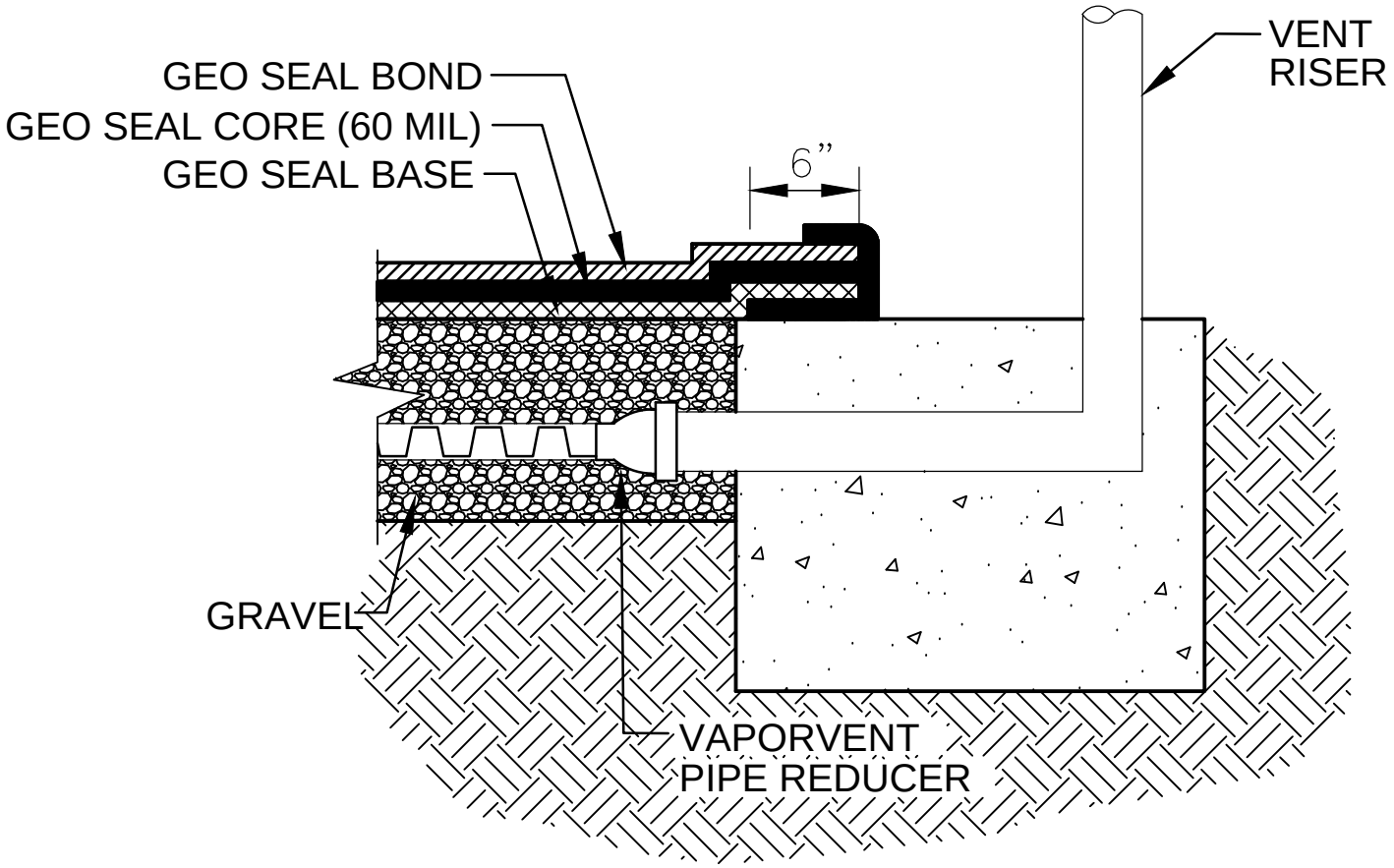
C. When crossing Vapor-Vent over footings or grade beams, **consult with the specifying environmental engineer and structural engineer for appropriate use and placement of solid pipe materials**. Place solid pipe over or through concrete surface and attach a Vapor-Vent End Out at both ends of the pipe 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.



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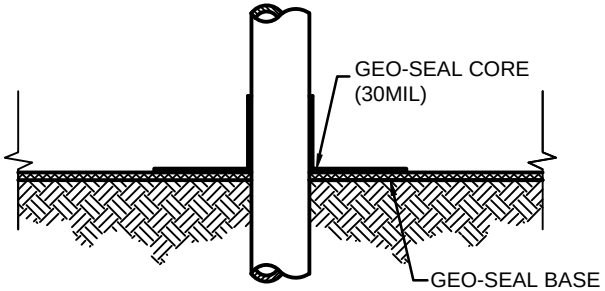
Geo-Seal®
Vapor Intrusion Barrier

DATE

SCALE

TITLE

VAPOR-VENT
VENT RISER



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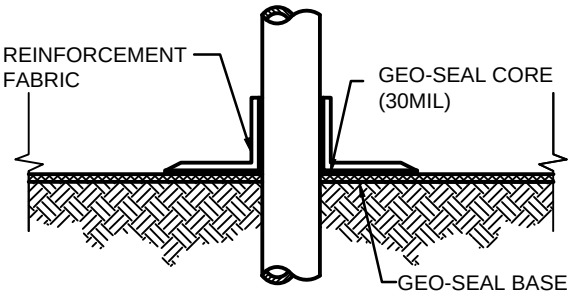

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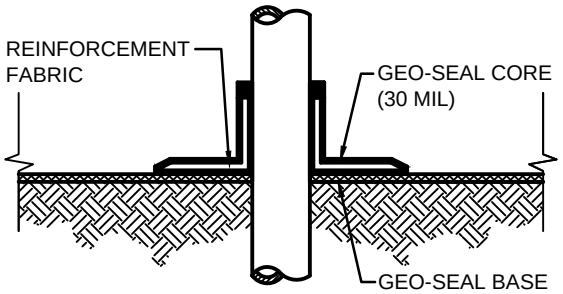

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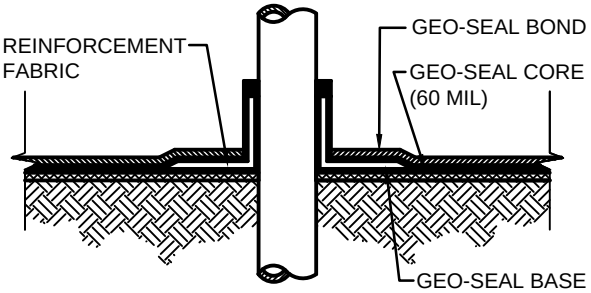

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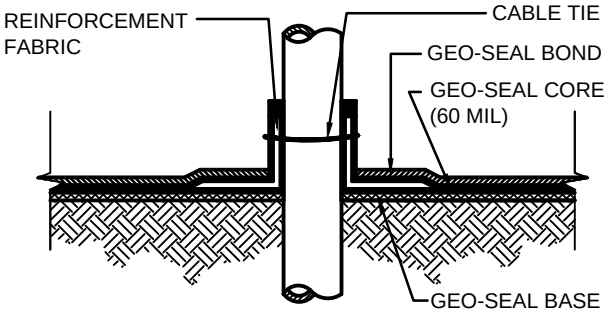

STEP 5

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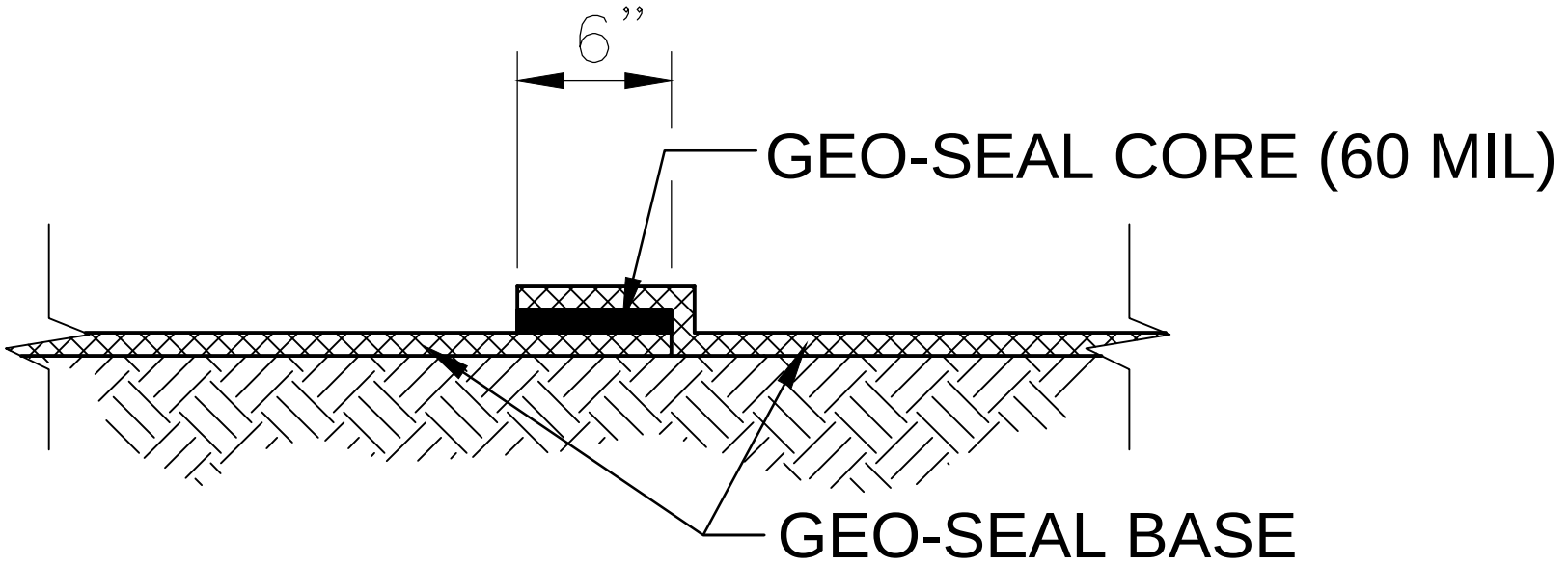
SCALE

TITLE

PENETRATION SEQUENCE



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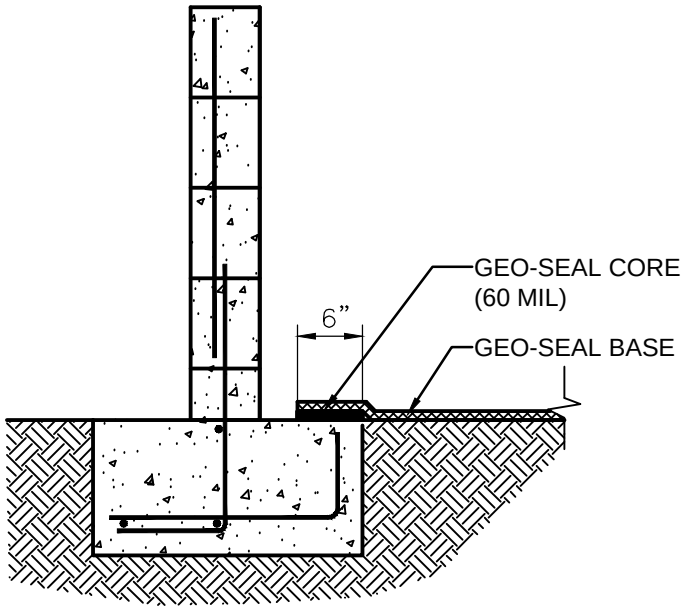
BASE OVERLAP DETAIL



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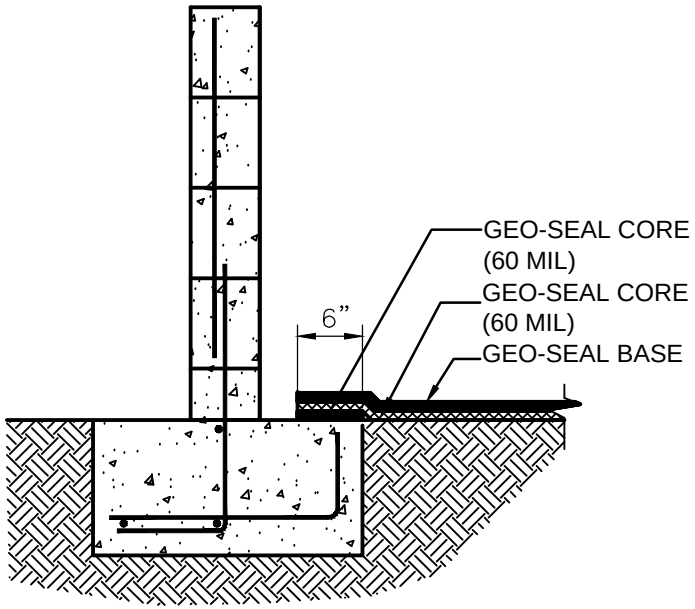

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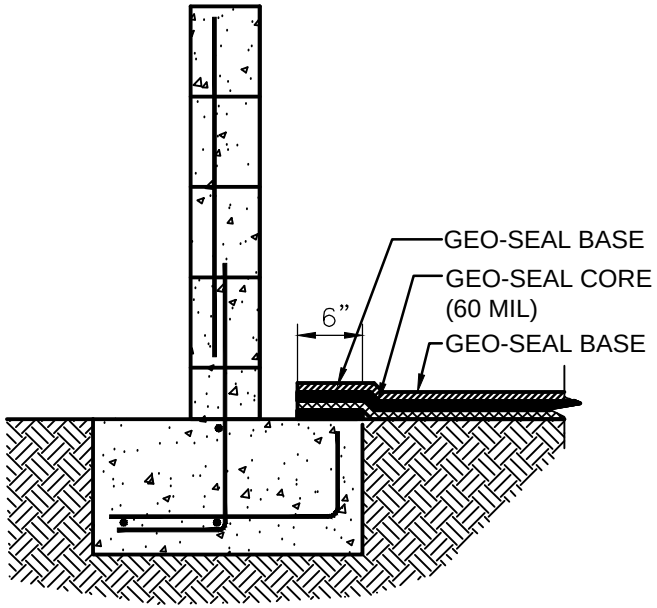

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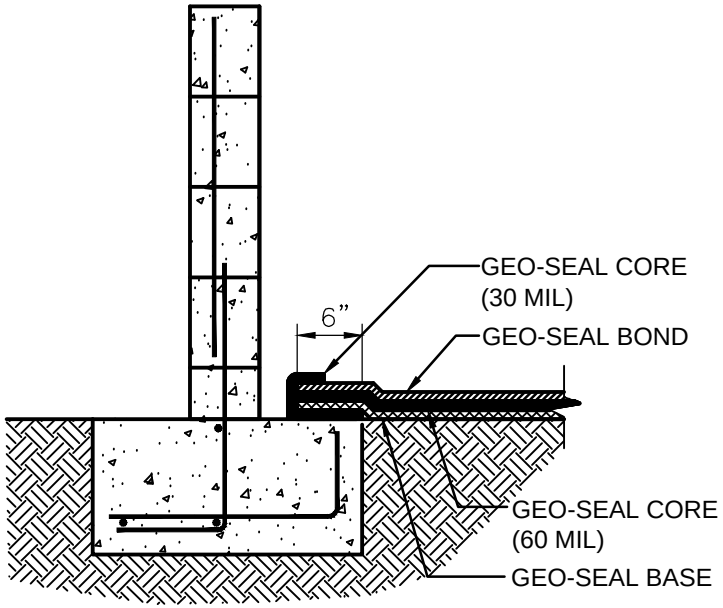

STEP 4

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DATE

SCALE

TITLE

TERMINATION SEQUENCE

Land Science™ Technologies

A DIVISION OF REGENESIS, Inc.

Geo-Seal®

Vapor Intrusion Barrier

www.landsciencetech.com

Geo-Seal®

Geo-Seal® is an advanced composite gas vapor management technology (patent pending) designed to eliminate potential indoor air quality health risks associated with subsurface contaminant vapor intrusion.

Geo-Seal is an ideal gas vapor management technology designed for use on Brownfields or any type of environmentally impaired site, i.e. manufacturing facilities, dry cleaners, gasoline service stations, landfills, etc. ***Geo-Seal*** is placed between the foundation of the building and the soil pad to eliminate vapor exposure pathways and stop contaminated vapors from permeating through the slab. Vapor management systems incorporating both ***Geo-Seal*** vapor barrier and *Vapor-Vent* ventilation provide industry leading sub-foundation vapor mitigation technology. By deploying these systems developers ensure a healthy indoor environment while reducing the cost of site remediation and expediting site construction.

Triple-Layer Protection

The triple-layer system used in ***Geo-Seal*** provides maximum redundancy and protection against the formation of vapor pathways both during and after installation. Such pathways can result from chemically induced materials breakdown, punctures, and seam weaknesses resulting from poor detail work and/or application installation imperfections around penetrations. ***Geo-Seal*** also provides unmatched protection from a range of contaminant vapors including those from petroleum-based products and chlorinated hydrocarbons.

Field-Proven Technology

Geo-Seal is manufactured in partnership with E-Pro™ Systems which has over 20 years experience in the building products industry and a leading track record in barrier systems for vapor and waterproofing applications.

Geo-Seal®

Diagram

Diagram labels

1. *Geo-Seal* BASE - The BASE layer is rolled out geotextile facing down, which allows Geo-Seal CORE to be applied directly to the high density polyethylene. The BASE layer provides the ultimate substrate and enables the spray layer to be free of shadowing and pinholes.

2. *Geo-Seal* CORE - The CORE is applied at 60 mils, is sprayed to the base layer, seals around penetrations and seals the seams of the BASE layer.

3. *Geo-Seal* BOND - A proprietary protection layer is placed over the CORE layer to enhance the curing of the membrane and increase puncture resistance.

4. **Vapor-Vent:**
   - Eliminates the need for trenching
   - Cost-effective compared to pipe and gravel systems
   - Eliminates long-term costs when configured as a passive system
   - Allows for rapid installation
   - When used with *Geo-Seal* provides maximum protection against contaminated vapor

Geo-Seal® Triple-Layer System
(2 Chemical Resistant Layers + 1 Spray Applied Core Layer)

Dual Chemical Resistant Layers
The ***BASE*** layer (bottom) and the ***BOND*** layer (top) are composed of a high-density polyethylene material bonded to a geo-textile on the out-facing side. High density polyethylene is known for chemical resistance, high tensile strength, excellent stress-crack resistance and for highly reliable subsurface containment. The geo-textile which is physically bonded to the chemical resistant layer accomplishes two goals; it allows the BOND layer to adhere to the slab, and provides a friction course between the BASE layer and the soil.

Spray Applied CORE Layer
The CORE layer is composed of a unique, elastic co-polymer modified asphaltic membrane which also provides additional protection against vapor transmission. This layer creates a highly-effective seal around slab penetrations and eliminates the need for mechanical fastening at termination points.

Chemical Resistance
The dual chemical resistant layers combined with the spray CORE form a barrier resistant to the most concentrated chemical pollutant vapors.

Enhanced Curing
Geo-Seal is “construction friendly” as the reduced curing time of the ***Geo-Seal*** CORE layer and the ability to apply it in cooler temperatures ensures quick installation and minimizes the impact on construction schedules.

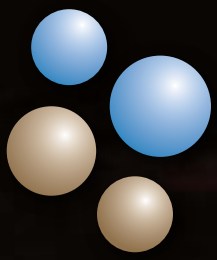
Puncture Resistance
Geo-Seal forms a highly puncture resistant barrier that greatly reduces the chance of damage occurring after installation and prior to the placement of concrete.

Removing Contained Vapors
Vapor-Vent can be used in conjunction with ***Geo-Seal*** to alleviate the buildup of vapors beneath structures as a result of vapor barrier implementation. ***Vapor-Vent*** can be utilized as an active or passive ventilation system depending on the requirements of the design engineer.

Certified Applicator Network
The application of ***Geo-Seal*** and ***Vapor-Vent*** can be performed by any one of many certified applicators throughout the country.

Service and Support
Geo-Seal representatives are available to provide job and site specific assistance. A local representative can ensure ***Geo-Seal*** and ***Vapor-Vent*** is installed as per the specification.

Geo-Seal®



Land Science™ Technologies

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***Land Science Technologies* (LST) ™** is dedicated to providing advanced technologies for sustainable land development. A goal of LST is to provide innovative and technically sound development solutions for underutilized environmentally impaired properties, commonly referred to as Brownfields.

LST's cost-effective, industry leading technologies offer engineering firms and real estate developers solutions to issues facing the development of Brownfields today. LST is a division of ***Regenesis, Inc.***, a global leader in groundwater and soil remediation technologies since 1994.

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Attachment D

MDEQ Vapor Intrusion Review Documentation

REQUEST FOR VAPOR INTRUSION REVIEW

TO BE FILLED OUT BY SUBMITTER:

DOCUMENT TITLE: 381 Brownfield Redevelopment – Eastside (Owosso) Dry Cleaners

PROJECT MGR: Eric Van Riper (Part 201) and Kim Sakowski (381)

DATE: 8/11/15

SITE NAME: (Former) Eastside Owosso Dry Cleaners and Historic Gasoline Stations

COUNTY/TWP: Owosso, MI

STIE ID 78000161 **INDEX** 44809 **PCA:** 30740 **PROJ:** 457097

DATE REVIEW NEEDED: August 11, 2015

COMMENTS/QUESTIONS FROM PM:

Please complete VI review for the adequacy of the proposed vapor barrier for the 381 project.

TO BE FILLED OUT BY REVIEWER:

DATE REVIEW COMPLETED: August 11, 2015

COMMENTS FROM REVIEWER:

Conclusion: The proposed passive (can convert to active) Geo-Seal Vapor barrier system, if properly implemented, should prevent unacceptable risk from sub-surface vapors emanating from chlorinated solvent and petroleum impacted groundwater and soils not excavated out. It is our understanding that the bulk of the grossly chlorinated solvent impacted soils under the proposed parking area will be excavated out utilizing other state funding sources. It is also our understanding that the proposed passive VI mitigation system is reviewed and approved by a private party engineer. Land Science is certifying their product for this project.

Discussion: The consultant utilized DEQ VI guidance (Appendix C.6- checklist for reviewing the design of a passive mitigation system). Since the venting collection system is different than table A.6.1 of our VI guidance, we leave it to the engineers and post-installation testing to determine if four risers is appropriate to gather the vapors and properly vent them to the outside. The proposed vapor mitigation system comprises two spray sealant layers, a core layer applied above a network of vapor vent lines designed to eliminate trenching (applied as a layer). The vapor vent lines are separated by about 360 feet of permeable material (gravel). Vent risers are connected and will exit the south side of the building connected to the north-south piping runs. On the south side of the

proposed building, vapor test ports are connected to each of the four (4) vents for smoke and pressure testing. The materials used within the layers are chemically resistant for the contaminants of concern.

VI CSM: While the VI CSM is not fully developed, the soils data indicate maximum concentrations of benzene (PSB/TW-6) are at 4,300 ug/kg benzene at 9'-10' depth near the proposed building footprint. To the east and northeast of the proposed non-residential building, a parking lot will be located over soils grossly impacted chlorinated and Stoddard solvents (petroleum based) of the former Eastside (Owosso) Dry Cleaners Part 201 facility. Maximum concentrations in the soils include 5,490,000 ug/kg PCE, 49,400 TCE ug/kg, 41,700 ug/kg cis-1,2 DCE and 490 ug/kg vinyl chloride. State-funded proposed work will excavate out the majority of these soils (manifest out as F-listed waste). Maximum concentrations of solvents in the shallow groundwater (4.8'-10' BGL) include PCE at 5,100 ug/l; TCE at 1,000 ug/l and vinyl chloride at 90 ug/l. Benzene maximum concentrations are 460 ug/l. Since these contaminants exceed VI screening levels for shallow groundwater, a pre-emptive approach to address VI risk is appropriate especially since full delineation of contaminants released over the years is not complete.

The 381 work plan includes excavation and disposal of up to 635 cubic yards of soils and 15,000 gallons of contaminated groundwater within the work area of the building footprint which will remove the shallow soils contamination and provide a layer of clean backfill to support bio-attenuation of at least some of the petroleum based vapors. The implementation of the VI mitigation system will include pre-installation of utility penetrations through the floor so that they may be properly sealed by the Geo-Seal multi-layer product. Smoke and "coupon" (swatches of the VI barrier) testing will be used to verify the integrity of the system. Depending on these and pressure test results, whether or not the system operates in a passive or active mode will be determined.

Essentially, this mitigation system appears to be designed to account for substantially higher concentrations of contaminants and is appropriate as a "belt and suspenders" approach that should achieve due care compliance over time if the O&M plan is implemented.

[signature]	8-11-15
Barbara Cowles	8-11-2015

Reviewer's Signatures **Date**

ACT 381 COMBINED BROWNFIELD PLAN

TO CONDUCT
ELIGIBLE DEQ RESPONSE
AND/OR
MSF NON-ENVIRONMENTAL
ACTIVITIES

OWOSSO QDOBA AND RETAIL
830, 832, 834, AND 910 EAST MAIN STREET
OWOSSO, SHIAWASSEE COUNTY, MICHIGAN

August 13, 2015

Prepared on Behalf of:

Southwind Restaurants, LLC
109 East Broadway
Mount Pleasant, Michigan 48858
Contact Person: Kevin Egnatuk
Telephone: 989-205-1136

Prepared By:

PM Environmental, Inc.
3340 Ranger Road
Lansing, Michigan 48906
Contact Person: Jessica DeBone
Telephone: (517) 325-9875

PM Environmental, Inc.
3340 Ranger Road
Lansing, Michigan 48906
Contact Person: Adam Patton
Telephone: (517) 325-9867

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1.0 INTRODUCTION

1.1 Proposed Redevelopment and Future Use

Southwind Restaurants, LLC (ñSouthwindò), intends to demolish the vacant 2,236 square foot commercial building and three vacant dwellings (two with outbuildings/garages) totaling 3,692 square feet for the construction of a new retail plaza. 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. Additionally, a parking lot will be constructed to the north and east of the new commercial building with surrounding landscaping. The proposed building will be a single-story slab-on-grade structure. The site will require new curbs, gutters, and approaches.

It is anticipated that the new restaurant will create 12 full time jobs and 15 part time jobs and the two retail spaces will create an additional 10 full time jobs and 15 part time jobs.

Anticipated total cost and private investment for this project is estimated to be approximately $2.5 Million, including acquisition. Of this total investment approximately $886,000 is contributed towards the hard cost investment of the building.

A rendering of the building is provided as Figure 6 of this Plan.

1.2 Eligible Property Information

1.2.1 Property Eligibility and Location

The eligible property consists of one parcel, which was combined from four legal parcels with street addresses of 830, 832, 834, and 910 East Main Street, Shiawassee County, Michigan. The subject property is listed under the new combined parcel number of 050-580-000-070-00 and totals .68 acres. The subject property is considered ñeligible propertyò as defined by Act 381, Section 2 because (a) the subject property was previously utilized or is currently utilized for a commercial purpose; (b) it is located within the City of Owosso, a qualified local governmental unit under Act 381, as amended; and (c) the subject property is determined to be a ñfacility.ò

Parcel Legal Description: LOT 83, 84, 85, & 87 STAFFORD GARDNER & TRANKLES CENTRAL ADD EXC N 10' OF SD LOTS. ALSO EXC A PART OF LOT 87 BEG AT A PT ON E LN LOT 87 25' SOUTH OF NE COR TH N ON E LN 15' TH W 15 ' TH SE'LY TO POB

A property location map and eligible property map are included as Figures 1 and 2 of this Plan.

1.2.2 Current Ownership

The subject property is currently owned by Southwind Restaurant, LLC; 109 East Broadway, Mount Pleasant, Michigan 48858. Southwind purchased the subject property in November 16, 2014.

Contact Person: Kevin Egnatuk
Phone: 989-205-1136
Email: kegnatuk@comcast.net

1.2.3 Proposed Future Ownership

The proposed future ownership will remain the same.

1.2.4 Delinquent Taxes, Interest, and Penalties

There are no delinquent taxes for the subject property as of the completion of this report.

1.2.5 Existing and Proposed Future Zoning for Each Eligible Property

The subject property is currently B-4: General Business District. It is proposed that the zoning remain unchanged.

1.3 Historical & Previous Use and Ownership of Each Eligible Property

The residential parcels (moving west to east on the subject property) formerly known as 830, 832, and 834 East Main Street, were developed with several dwellings in the 1930s and have been utilized for residential purposes since that time. Prior ownership for each address is outlined below;

- 830 East Main Street: SMITH, RANDALL
- 832 East Main Street: MOREL, LAVERNE W. & MARION L. TRUST
- 834 East Main Street: SHUSTER, TERRANCE L & WENDY

910 East Main Street, the eastern most building, was developed in at least the early 1930s with a gasoline filling and/or service station. The property was occupied by various filling stations and automotive service stations until the 1960s, was occupied various drycleaners from the 1960s until 2012, and has been vacant since that time. Most recent ownership was under ACKELS, JEREMY J., preceeded by RUBOB REAL ESTATE, LLC in 2013 and NUDI, LOUIS S. ESTATE in 2012 and ROSE WORKS, LLC from 2004 through 2012.

1.4 Current Use of Each Eligible Property

The subject property is currently vacant.

1.5 Summary of Liability

The current owner and developer, Southwind Restaurants, LLC prepared and submitted a Baseline Environmental Assessment (BEA) in accordance with Part 201 and is not a liable party.

Review of city directories indicate that prior ownership of the eastern most building was listed as East Side Super Service beginning in the early 1930s, and Palmer's Sales and Service Filling Station in 1945. The subject property was likely operating as a filling station and automotive service garage until the early 1960s. The subject property operated as a drycleaners 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. Assessment records indicate Rubob Real Estate LLC purchased the eastern building in June 2012 from Nudi Louis. According to previous site investigations Rubob Real Estate LLC did not occupy or lease

the subject property. Jeremey Ackels purchased the subject property in August 2013, which remained unoccupied during ownership. A viable liable party is not identified at this time.

1.6 Summary of Environmental Study Documents

Global Environmental Engineering (GEE) completed a Phase I Environmental Site Assessment (ESA) for the subject property 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 subject property (910 East Main, eastern building) historically operated as a gasoline station and automotive service garage from the late 1920ôs to early 1960s and a drycleaners from the late 1960s to 2012. A BEA was completed for the subject property 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 subject property (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 on July 31, 2012, which included a subsurface investigation on the subject property. Eight (8) soil borings were completed using a Geoprobe direct push tool operated by Fibertec of Brighton, Michigan to depths between 12 and 16 feet below surface grade. Soil cores were collected in four-foot lengths and logged in the field. The soils from each core were screened for presence of contaminants using visual, olfactory and a hand held organic vapor analyzer.

Each soil sample collected was preserved, transported, and analyzed in accordance with MDEQ Remediation and Redevelopment Division (RRD) Operational Memorandum No 2, Sampling Guidance, dated October 22, 2004. Global delivered the samples using chain-of-custody procedures to Merit Laboratories, Inc. in East Lansing, Michigan for laboratory analysis. Analysis included volatile organic compounds (VOCs), polynuclear aromatic compounds (PNAs), lead (Pb), cadmium (Cd), and chromium (Cr). Five soil samples were submitted for analysis and two additional soil samples were submitted and held by the lab pending results of the initial five samples. Perched groundwater was encountered in one of the soil borings at a depth of approximately 14-16 feet below grade. A groundwater sample was collected from a temporary monitoring well and submitted to the lab for analysis.

The compounds detected within the laboratory analytical results of the soil and groundwater samples were compared to the MDEQ Generic Cleanup Criteria and Screening Levels as presented in Part 201 Rules 299.1 through 299.50, dated December 30, 2013 entitled ñCleanup Criteria Requirements for Response Activity.ò

The soil borings were drilled along the north, east, and southeast sides of the eastern most subject property building in areas believed most likely to reveal impact from historical gas station, automotive garage and dry-cleaning activities. Laboratory results indicated detectable concentrations of several compounds in all five of the soil samples. Compounds detected include: 1,2,4-trimethylbenzene, n-propylbenzene, n-butylbenzene, cis-1-2-dichloroethylene, tetrachloroethylene, trichloroethylene and naphthalene. The groundwater collected identified cis-1-2-dichloroethylene and tetrachloroethylene.

1,2,4-trimethylbenzene, n-propylbenzene, n-butylbenzene, cis-1-2-dichloroethylene, tetrachloroethylene, trichloroethylene and naphthalene exceed the Part 201 Generic Cleanup Criteria and Screening Levels for soil; and, cis-1-2-dichloroethylene and tetrachloroethylene exceed the Part 201 Generic Cleanup Criteria and Screening Levels for groundwater.

A BEA and Section7a Compliance Analysis were completed by GEE on November 20, 2014 based on the facility status of the subject property.

1.7 Summary of Environmental/Brownfield Conditions

PM Environmental Inc., (PM) completed additional soil and groundwater investigation activities in April, 2015. Investigations were conducted to investigate areas where excavation of utilities, building footings, and other infrastructure features are planned during construction, and in areas south and west of the eastern most subject property building, which were not previously investigated, to further assess soil and/or groundwater concentrations. The additional investigation was required to assess appropriate soil management, potential subject property exposure and related due care consideration during and following redevelopment activities.

Investigations document VOC and PNA concentrations in soil above the Part 201 Residential and Nonresidential Groundwater Surface Water Interface Protection (GSIP), Drinking Water Protection (DWP), Direct Contact (DC), and Soil Volatilization to Indoor Air (SVII) cleanup criteria, and Soil Saturation (Csat) Screening Levels. Concentrations of VOCs and/or PNAs in groundwater were identified above the above Part 201 Drinking Water Protection (DWP) and Groundwater Surface Water Interface (GSI) criteria.

The subject property is a ñfacilityò in accordance with Part 201 of P.A. 451, as amended, and the rules promulgated thereunder. No underground storage tanks (USTs) are known to be present.

As previously stated a BEA was completed for Southwind Restaurants, LLC, within 45 days of their purchase.

Soil and groundwater analytical tables from the April 2015 investigations are provided as Table 1 and Table 2 of this Plan. Soil boring locations and analytical data are provided in Figures 4A-4C of this Plan.

1.8 Summary of Functionally Obsolete Blighted and/or Historic Conditions

Not applicable to this project.

1.9 Summary of Historic Qualities

Not applicable to this project.

2.0 DESCRIPTION OF COSTS & SCOPE OF WORK

Tax Increment Financing revenues will be used to reimburse the costs of "eligible activities" (as defined by Section 2 of Act 381, as amended) as permitted under the Brownfield Redevelopment Financing Act that include: Baseline Environmental Site Assessments, Due Care Activities, Additional Response Activities (Demolition), Asbestos Survey, Abatement and Reporting, and preparation of a Brownfield Plan as described in this Plan. A complete listing of these activities is included in Table 3 of this Plan.

2.1 DEQ Eligible Activities

2.1.1 Baseline Environmental Assessment

Baseline Environmental Assessment activities include Phase I ESA, Phase II ESA, Baseline Environmental Assessment, and Documentation of Due Care Compliance at a total cost of $14,000.

2.1.2 Due Care Activities

As it pertains to the activities needed to safely redevelop the site and comply with Due Care as a non-liable party, the following activities are proposed.

2.1.2.1 Disposal and Transport of Contaminated Soils

Disposal and transport of chlorinated solvent contaminated soils to a Type II landfill and groundwater management and disposal to a licensed facility associated with development activities are anticipated to include contaminated soil and groundwater associated with building improvements for the construction of building foundations, parking and driveway features, and associated utility infrastructure at an estimated cost of $152,000. Each excavation area is broken out below based on anticipated cubic yards of contaminated soil to be transported and disposed.

- Building Footing Excavation Areas (90 cubic yards);
- Alleyway Storm Sewer Excavation and Grading (100 cubic yards);
- Parking Lot and Sidewalk Curb and Gutter Excavation (40 cubic yards);
- Parking Lot Entrance/Approach Excavation/Grading (60 cubic yards);
- Utility Trenching/Excavation (90 cubic yards);
- Groundwater Removal, Management, and Disposal (8,000 gallons).

An O&M plan will be prepared for all areas where building foundation and other surface cover is required to prevent unacceptable exposures.

2.1.2.2 Removal, Transport and Disposal of Contaminated Building Materials

Removal, transport and disposal of approximately 55 cubic yards of contaminated concrete building slab and footing materials is required following demolition activities of existing site improvements at an estimated cost of $25,000.

2.1.2.3 Chemical Resistant Gasketing

Chemical-Resistant Nitrile Gasketing for Sanitary, Storm, and Water Utility Piping is required to prevent migration of any residual contaminated soil following excavation activities at an estimated cost of $5,500.

2.1.2.4 Vapor Barrier System

Design and Installation of a Passive Spray-Applied Vapor Barrier System for the New Building at an estimated cost of $38,000.

As indicated in Section 1.1, the subject property will be redeveloped with a new building containing three tenant spaces; therefore, the vapor intrusion pathway is relevant. Due to the identified exceedances of the Part 201 Nonresidential SVII cleanup criteria in the vadose zone, the MDEQ Nonresidential VISLs, and because petroleum and chlorinated VOC and PNA soil impacts exceeding the Part 201 GCC are present beneath the subject property, including those that are representative of residual LNAPL saturation, a Land Science Technologies Geo-SealÈ passive vapor intrusion barrier system that is compatible with the compounds identified in soil and groundwater will be installed at the proposed subject property building prior to occupancy, to prevent soil gas from entering the building and prevent potential inhalation exposures to occupants.

Vapor barrier design specifications and layout will be consistent with the guidelines included in the May 2013 MDEQ Guidance Document for the Vapor Intrusion Pathway. Following installation, the vapor barrier system will be operated in accordance with a system-specific operation and maintenance (O&M) manual prepared by the system engineer. The O&M manual will include a contingency plan to convert the passive system to an active system using in-line vent fans in the event that O&M inspections demonstrate that the venting system is ineffective and/or if the vapor barrier liner system if damaged or cannot be repaired. O&M actions will include periodic smoke testing events to document continuity of flow within the vapor barrier system, visual inspections of the vapor barrier system components (test ports, vent risers/valves/rain caps) for damage, and insertion of smoke tubes within test ports to demonstrate passive flow within the system (i.e. visual indication) and that the system is exhausting via the vent risers. Records of vapor barrier system installation, O&M, and contingency actions will be maintained by Southwind Restaurants, LLC.

Installation and maintenance of a vapor barrier and ventilation system will consist of the following components to prevent intrusion of sub-slab vapors from entering the building:

- Approximately 300 linear-feet of fabric-wrapped VaporVentÈ trenchless gas collection piping installed beneath the floor slab. The VaporVentÈ acts as a means for collection and pressure relief of sub-slab vapors via vertical vent piping that exits above the roof line

of the building. Appendix C includes technical specifications for the VaporVentÈ piping and associated end outlets.

Additional sub-grade utilities (i.e. plumbing, electrical etc.) will be installed under the building slab prior to the installation of the spray-applied vapor barrier membrane system.

- Four three-inch diameter vertical poly-vinyl chloride (PVC) vent pipes, which are connected to the VaporVentÈ piping via VaporVentÈ end outlet fittings will be installed within the Building. Each vertical vent will be located within the interior wall spaces (i.e., supported as required by local plumbing code), will exit approximately 2-feet above the finished roof parapet, will be oriented with vertical outlets to induce passive flow within the system, and will be equipped with rain caps to prevent intrusion of precipitation during storm events. No roof-mounted heating, ventilation, and air conditioning system air intakes will be present within 15 feet of the vapor barrier roof vents. All vent piping will be equipped with labels identifying them as vapor mitigation system components.

  Each vent stack will be equipped with a shutoff valve. Four 2-inch diameter test ports will be installed at the southern 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 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.

  To ensure the integrity of the vapor barrier, no additional test ports are proposed within the building other than those outlined above.

- A spray applied vapor barrier system consisting of an initial layer of Geo-SealÈ 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 fabric at all penetration locations; a spray application of Geo-SealÈ CORE vapor barrier material at a thickness of 60 mils; followed by a top layer of Geo-SealÈ BOND protection material.

  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 during vapor barrier installation, per manufacturer requirements, to document that the required barrier thickness specification is met. Records of coupon testing will be maintained by Southwind Restaurants, LLC.

  The layered construction of the vapor barrier provides additional strength relative to the spray-applied barrier material alone, provides a uniform substrate for product application, and provides puncture resistance and increases adhesion to the surface concrete cap applied over horizontal areas. The vapor barrier components were designed by the manufacturer to control vapor intrusion associated with the contaminants identified in soil and groundwater at the subject property including petroleum compounds such as benzene toluene, ethylbenzene, and xylenes (collectively referred to as BTEX), PNAs, and

chlorinated solvents. Refer to Appendix C for Geo-SealÈ Film-11 Geomembrane, Geo-SealÈ CORE, and Geo-SealÈ BOND product specifications.

Manufacturer-published diffusion rate specifications for compounds representative of volatile contaminants of concern identified in soil and groundwater beneath the eastern portion of the subject property (building), include the following:

- Benzene ï 6.9E-16 mĮ/second
- PCE ï 4.0E-17 mĮ/second

- Prior to the installation of the vapor barrier, all sub-slab utilities are installed and stubbed above finished floor elevation to facilitate installation of the vapor barrier such that all penetrations are encapsulated with the vapor barrier material using manufacturer-specified termination method, to ensure a vapor-tight seal. Vent riser outlet stubs will be temporarily capped and labeled as ñvapor mitigation system pipingò prior to sealing with the vapor barrier material to ensure that they are differentiated from other piping stubs. Refer to Appendix C for typical penetration sealing diagrams.

- The vapor barrier test ports will be used during construction-phase and post-construction smoke testing and O&M inspection events. During each smoke testing event, indicator smoke will be introduced into each of the vapor barrier test ports to demonstrate the following:

  - Overall tightness of the vapor barrier following initial application over horizontal areas (i.e., as evidenced by the lack of indicator smoke);
  - Overall system tightness prior to occupancy of the building;
  - Continuity of flow through the VaporVentÈ piping (i.e., visual indication via the presence of smoke exiting the vent stacks);
  - Integrity of the vapor barrier system, which will be documented via a visual inspection of the first floor areas of the building, including all tenant spaces.

  O&M inspection events will include visual inspections of the vapor barrier system components (test ports, vent risers/valves/rain caps) for damage that could inhibit the function of the system. Each will also include the insertion of smoke tubes within each of the vapor barrier system test ports to demonstrate passive flow within the system (i.e. visual indication) and that the system is exhausting via the vent risers.

  The test ports will be equipped with vapor tight, locking caps when not in use.

  The schedule for smoke testing and O&M inspection activities will be in general accordance with the table below:

Smoke Testing and O&M Inspection Schedule

Frequency	Smoke Testing Events	O&M Inspection Events
During Vapor Barrier Installation	X	
Following Concrete Cap Installation	X	
Following Vent Riser Installation	X	X
1 Week Prior to Building Occupancy	X	X
Quarterly During Building Operations		X
Annually During Building Operations	X	

X = Acton conducted during the specified timeframe

- A surface cap of reinforced concrete, in the form of the building floor slab (4ò minimum thickness) will be applied over all horizontal areas of the building footprint to protect the vapor barrier membrane and provide an attachment point for interior wall framing and other interior building components. Building/construction plans will require that all floor fastener depths be less than the thickness of the surface concrete cap.

2.1.2.5 Visual Demarcation Underlayment

Installation of Visual Demarcation Underlayment in non-paved areas requiring a dermal contact surface barrier to ensure the safety of anyone digging on the subject property following development and/or public safety should the non-paved area become eroded at an estimated cost of $1,250. While the northeast corner of the property will be paved, the demarcation underlayment will be needed in unpaved areas adjacent to the north and east right-of-way surrounding the property.

An O&M plan will be prepared for all areas where building foundation and other surface cover is required to prevent unacceptable exposures.

2.1.2.6 Oversight, Monitoring, Reporting

Plan for Response Activity Preparation, Oversight, Monitoring, Laboratory Analysis, Project Management, and Reporting associated with Due Care Activities by and Environmental Professional is estimated at a cost of $18,000.

2.1.1 Additional Response Activities

2.1.1.1 Demolition

Demolition of the former Dry Cleaner building and improvements will be required to access the contaminated soil for remediation and due care activities. Demolition includes the 2,236 square foot commercial building located on the eastern portion of the subject property as well as surrounding concrete and grass surface cover totaling approximately 8,000 square feet, estimated at a cost of $15,000.

The three vacant dwellings (two with outbuildings/garages) totaling 3,692 square feet will be demolished by the developer for the construction of the new retail plaza at an estimated cost of $20,000.

2.1.1.1 Asbestos Survey

A Pre-Renovation Asbestos Containing Materials (ACM) Survey was conducted to identify, locate, classify, analyze, and estimate quantities of ACM that must be removed or managed according to Federal, State, or local agency requirements prior to demolition at a cost of $5,830.

2.1.2 Develop/Prepare Combined Brownfield Plan

Preparation of the Combined Brownfield Plan and associated activities (e.g. meetings with the City of Owosso Brownfield Redevelopment Authority (OBRA), etc.) at a cost of approximately $12,000.

2.2 MSF Eligible Activities

MSF Eligible Activities are not applicable to this Plan.

2.3 Local Only Eligible Activities

2.3.1 Asbestos Abatement

The identified ACM at the subject property will be disturbed as part of the demolition activities and therefore, will require abatement prior to demolition by a licensed asbestos abatement contractor. If additional suspect materials are identified during renovation, these materials will be sampled to determine their characteristics (i.e. whether they must be treated as ACM or not) or assumed to be ACM and handled accordingly and prior to their removal and disposal. Pre-Demolition Asbestos Abatement, Oversight, and Clearance Testing is estimated at a cost of $16,750.

3.0 TAX INCREMENT REVENUE ANALYSIS

3.1 Estimate of Captured Taxable Value and Tax Increment Revenues

Incremental taxes on real property included in the redevelopment project will be captured under this Plan to reimburse eligible activity expenses. Tax increment revenue capture is estimated to begin in 2016. The effective base taxable value of the land and real property is $184,000; no personal property is associated with the site. The estimated taxable value of the completed development is $575,000 estimated to begin in summer of 2016. Tax increment revenue assumes a one-year phase-in for completion of the redevelopment, which has been incorporated into the tax impact and cash flow assumptions for this work plan. An annual increase in taxable value of 1% has been used for calculation of future tax increments in this work plan.

The OBRA will capture tax increment revenues for 5 years following payback, to build the Local Site Remediation Revolving Fund (LSRRF). The estimated captured taxable value and tax increment revenues for the subject property and millages levied by the taxing jurisdictions for each year of the Plan are presented in Table 4.

3.2 Method of Financing and Description of Advances Made by the Municipality

Eligible activities presented in this plan are anticipated to be funded partially through a MDEQ Brownfield Redevelopment Loan totaling $292,963, which will pay for the necessary Due Care Activities. The MDEQ Loan will be repaid with Tax Increment Financing Revenues created as a result of the new investment on the subject property.

Additional remediation and soil excavation activities outside of this Plan are anticipated to be funded through a MDEQ Grant totaling $249,000 and additional State funds encumbered by the MDEQ. These activities are anticipated to include the following;

- Additional Soil and Groundwater Characterization and Delineation Activities
- Bid Specification Preparation, Bid Meeting and Contactor Selection
- Excavation Contractor Mobilization/Demobilization
- Shoring Design and Installation (195 linear feet)
- Removal and Disposal of up to 1,435 cubic yards of contaminated, land-disposal restricted soils
- Removal and Disposal of up to 635 cubic yards of contaminated soils
- Removal and Disposal of up to 15,000 gallons of contaminated groundwater
- Excavation Backfilling and Compaction
- Pavement Cover Installation
- Environmental Professional Excavation Oversight, Onsite and Perimeter Air Monitoring, Excavation Verification Sampling, and Laboratory Analysis
- Environmental Professional Project Management and Reporting

Figure 4A includes the anticipated excavation area and proposed delineation boring/sample locations associated with the MDEQ Grant activities.

Additional activities not paid for by the MDEQ Loan under this Plan totaling $52,005 will be initially funded by Southwind. Costs for the eligible activities funded by Southwind will be repaid under the Michigan brownfield redevelopment financing program with incremental taxes generated by the future development of the subject property. No advances will be made by the municipality for this project.

These costs are broken out further in Table 3 attached to this Plan.

3.3 Maximum Amount of Note or Bonded Indebtedness

The City of Owosso will act as the grantee for the MDEQ Loan anticipated for this project.

3.4 Duration of Brownfield Plan

The duration of this work plan should be not less than the period required to reimburse all eligible activities plus five years for additional capture to build the LSRRF. The approval date of the Brownfield Plan by the City Council will mark the beginning of the reimbursement period, unless modified at the discretion of the City as allowed under Act 381.

In no event, shall this Plan extend beyond the capture period for the City's local revolving loan fund, or the maximum term of 35 years allowed by Section 13 of Act 381.

3.5 Estimated Impact of Tax Increment Financing on Revenues of Taxing Jurisdictions

Tax increments are projected to be captured and applied to (i) reimbursement of eligible activity costs to the MDEQ Loan, (ii) reimbursement of eligible activity costs for the developer, (iii) payment of OBRA administrative and operating expenses, (iv) payment to the State Brownfield Fund and (v) deposits into the OBRA's LSRRF, as follows:

Total Activities Funded by TIF	**Estimated Costs**
MDEQ Brownfield Redevelopment Loan Reimbursement	$ 292,963
Developer Reimbursement	$ 74,967
OBRA Administrative Fees	$ 24,000
State Brownfield Fund	$ 32,838
Capture for Local Site Remediation Revolving Fund	$ 120,288
Total	**$ 545,056**

Taxes will continue to be generated to taxing jurisdictions on local captured millages and state school millages at the base taxable value of $184,000 throughout the duration of this plan totaling approximately $226,416 or $9,434 annually as presented in the table below.

Local Tax Millages		
Seniors	0.3500	$ 64
Med Care	2.0000	$ 368
Veterans PA214	0.1000	$ 18
Veterans Voted	0.1400	$ 26
MSU Extension	0.0500	$ 9
INTMD Sch	3.9040	$ 718
Library	1.2500	$ 230
City Oper	14.0370	$ 2,583
SATA	0.3285	$ 60
County Oper	5.1146	$ 941
Total Local Taxes (capturable)	**27.2741**	**$ 5,018**
School Millages		
School Operating	18.0000	$ 3,312
SET (only 3 millages are available for BF TIF capture)	6.0000	$ 1,104
Total School Taxes	**24.0000**	**$ 4,416**
Total Local and School Taxes	**51.2741**	**$ 9,434**

Non-capturable millages will see an immediate increase in tax revenue following redevelopment and will provide anticipated new tax revenue of $4,012 throughout the duration of this plan.

For a complete breakdown of the captured millages and developer reimbursement please see Table 4.

4.0 INFORMATION REQUIRED BY SECTION 15(15) OF THE STATUTE FOR NON-ENVIRONMENTAL ACTIVITIES (required for work plans submitted for MSF consideration)

This section is not required for non-MSF work plans.

5.0 SCHEDULE AND COSTS

5.1 Schedule

August-September 2015:

- Combined Brownfield Plan Application and Approval
- MEDQ Grant and Loan Application and Approval

October 2015:

- Pre-construction Soil, Groundwater, and Concrete Characterization Delineation Activities (outside of this Plan, anticipated to be funded through MDEQ Grant)
- Asbestos Abatement Activities
- Demolition Activities
- Transport and Disposal of Contaminated Building Materials
- MDEQ Remediation Activities (outside of this Plan, anticipated to be funded through MDEQ Grant and other State funds)

Spring 2016:

- Transport and Disposal of Contaminated Soil Associated with Development Activities
- Installation of Chemical-resistant Gasketing for Utilities
- Vapor Barrier Installation
- Installation of Visual Demarcation Underlayment
- Environmental Professional Oversight and Reporting Activities

5.2 Estimated Costs

5.2.1 Summary of Total Project Costs

A full listing of eligible brownfield activities is provided in Table 3 of this plan. Total investment for this project is estimated at $2,548,703, these costs are further detailed in section 5.3.

5.3 Sources and Uses of Incentives and Funds

Sources and Uses					
Sources	**Amount**		**Uses**	**Amount**	
Developer Equity	$	302,577	Acquisition	$	558,402
Permanent Financing	$	1,330,000	Hard Costs	$	885,988
Operating Note	$	400,000	Environmental Due Care	$	239,750
MDEQ Loan	$	292,963	Environmental Excavation Activities	$	249,000
MDEQ Grant	$	249,000	Demolition	$	35,000
			Soft Costs	$	86,400
			New Equipment	$	520,000
Total Sources of Capital	$	2,574,540	**Total Uses of Capital**	$	2,574,540

5.4 Summary of Relocation Actions

5.4.1 Estimates of Residents and Displacement of Individuals/Families

The property was vacant at time of purchase therefore this section is not applicable to this project.

5.4.2 Plan for Relocation of Displaced Persons

Not applicable to this project.

5.4.3 Provisions for Relocation Costs

Not applicable to this project.

5.4.4 Strategy for Compliance with Michiganôs Relocation Assistance Law

Not applicable to this project.

5.5 Description of Proposed Use of Local Site Remediation Revolving Fund

Not applicable to this project.

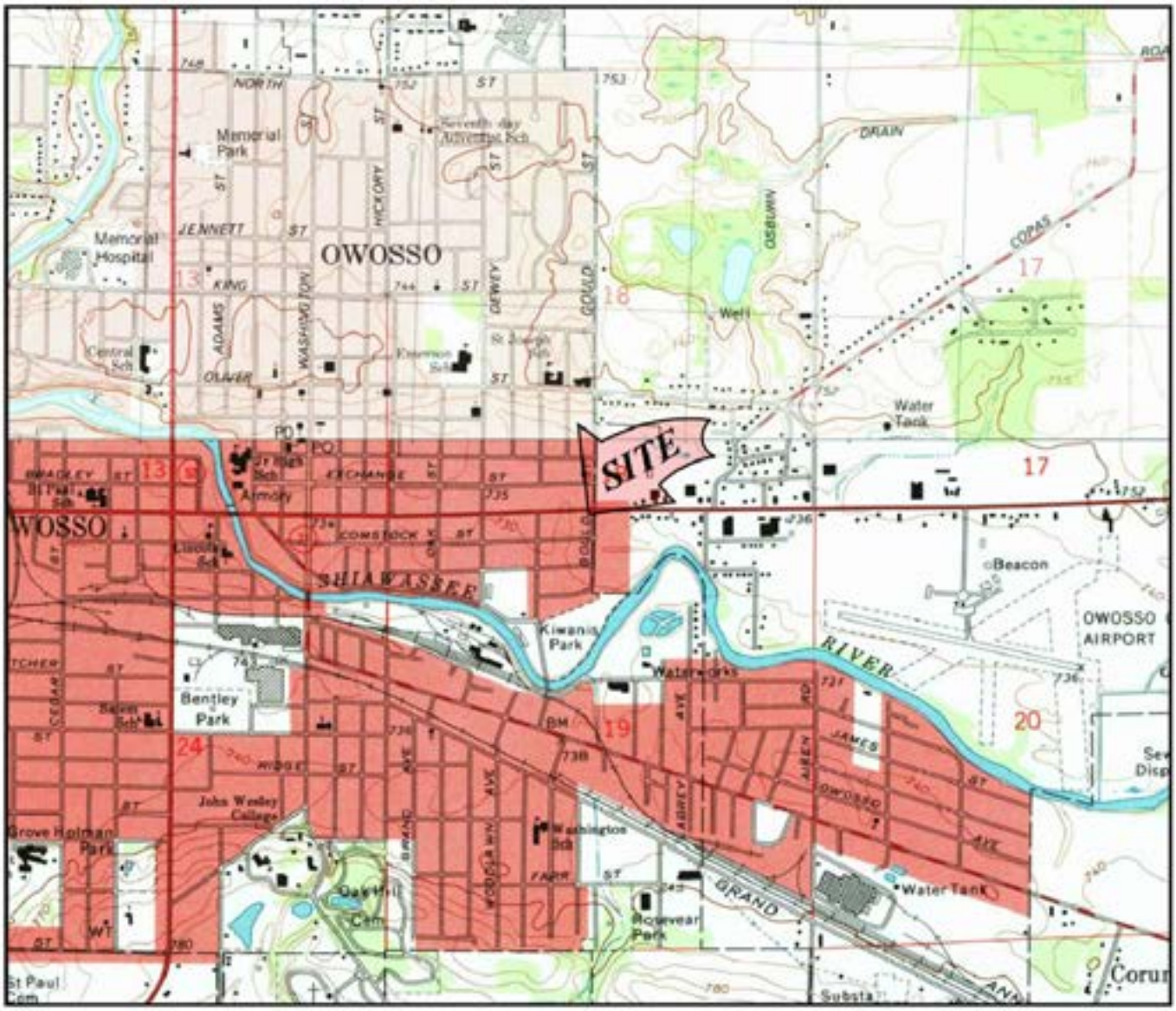
5.6 Other Material that the Authority or Governing Body Considers Pertinent

No additional material attached.

FIGURES

Figure 1

Scaled Property Location Map



MICHIGAN QUADRANGLE LOCATION

SHIAWASSEE COUNTY

SCALE 1:24,000

1 MILE 1/2 MILE 0 1 MILE

FIGURE 1

PROPERTY VICINITY MAP

USGS, 7.5 MINUTE SERIES

OWOSSO NORTH , MI QUADRANGLE, 1974.

OWOSSO SOUTH , MI QUADRANGLE, 1972.

PM ENVIRONMENTAL | Environmental & Engineering Services

PROJ: COMMERCIAL PROPERTY
830, 832, 834, AND 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 DATE: 6/8/2015

CHKD BY: AP SCALE: 1" = 2,000'

FILE NAME: 01-5363-0-001F01R00

Figure 2

Eligible Property Map

RESIDENTIAL

917 EAST MAIN STREET
STECHSCHOLTE GAS & OIL

1001 EAST MAIN STREET
WALGREEN'S PHARMACY

EAST MAIN STREET (M-21)

SANITARY (10" DIA.)

STORM (60" DIA.)

WATER (8" DIA.)

WATER (12" DIA.)

SIDEWALK

SIGN

1002 EAST MAIN STREET
RITE AID PHARMACY

APPROXIMATE LOCATION OF
FORMER DRY CLEANING MACHINE

830 EAST MAIN STREET
EXISTING HOUSE

832 EAST MAIN STREET
EXISTING HOUSE

834 EAST MAIN STREET
EXISTING HOUSE

910 EAST MAIN STREET
FORMER
DRY CLEANERS

CONCRETE

GRASS

GRAVEL

GARAGE

ALLEY

SOUTH GOULD STREET

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

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

PM ENVIRONMENTAL | Environmental & Engineering Services

FIGURE 2

GENERALIZED DIAGRAM OF THE SUBJECT PROPERTY AND ADJOINING PROPERTIES

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 [redacted] 30' IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	CHKD BY: AP	SCALE: 1" = 30'
	FILE NAME: 01-5363-0-001F02R00	

Figure 3

Sampling Location Map

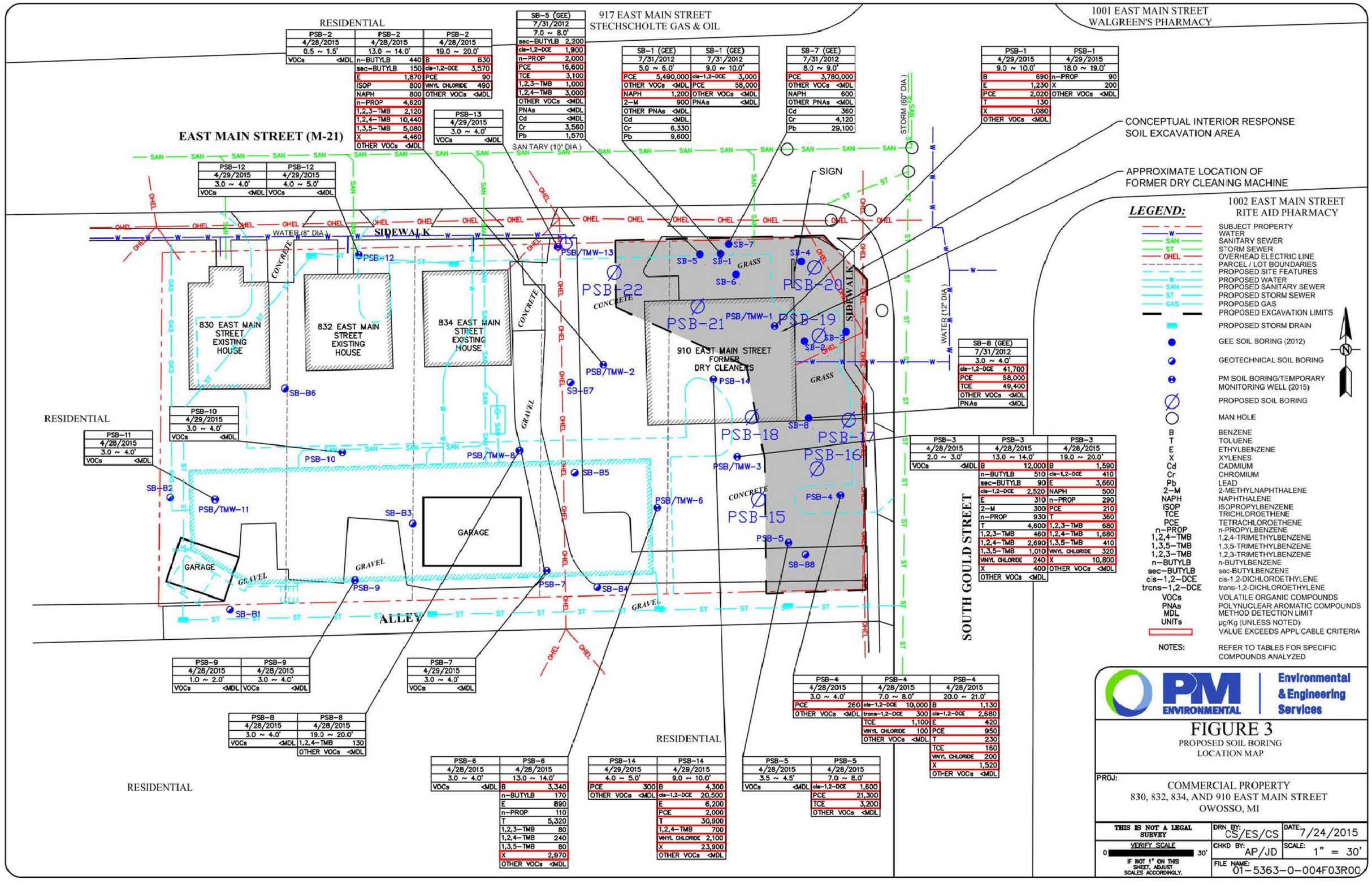

EAST MAIN STREET (M-21)
917 EAST MAIN STREET
STECHSCHOLTE GAS & OIL
1001 EAST MAIN STREET
WALGREEN'S PHARMACY
1002 EAST MAIN STREET
RITE AID PHARMACY
CONCEPTUAL INTERIOR RESPONSE
SOIL EXCAVATION AREA
APPROXIMATE LOCATION OF
FORMER DRY CLEANING MACHINE
SIGN
SIDEWALK
WATER (8" DIA.)
SANITARY (10" DIA.)
STORM (60" DIA.)
WATER (12" DIA.)
830 EAST MAIN STREET EXISTING HOUSE
832 EAST MAIN STREET EXISTING HOUSE
834 EAST MAIN STREET EXISTING HOUSE
910 EAST MAIN STREET FORMER DRY CLEANERS
GARAGE
GARAGE
ALLEY
SOUTH GOULD STREET
CONCRETE
GRASS
GRAVEL
RESIDENTIAL
RESIDENTIAL
RESIDENTIAL
PSB-22
PSB-21
PSB-20
PSB-19
PSB-18
PSB-17
PSB-16
PSB-15
PSB-14
PSB-13
PSB-12
PSB-11
PSB-10
PSB-9
PSB-8
PSB-7
PSB-6
PSB-5
PSB-4
PSB-3
PSB-2
PSB-1
PSB/TMW-1
PSB/TMW-2
PSB/TMW-3
PSB/TMW-4
PSB/TMW-5
PSB/TMW-6
PSB/TMW-7
PSB/TMW-8
PSB/TMW-9
PSB/TMW-10
PSB/TMW-11
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
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
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-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-13 4/29/2015 3.0 ~ 4.0' VOCs <MDL
PSB-12 4/29/2015 3.0 ~ 4.0' VOCs <MDL
PSB-12 4/29/2015 4.0 ~ 5.0' VOCs <MDL
SB-8 (GEE) 7/31/2012 3.0 ~ 4.0' cis-1,2-DCE 41,700 PCE 58,000 TCE 49,400 OTHER VOCs <MDL PNAs <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 n-PROP 930 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 NAPH 500 n-PROP 290 PCE 210 T 360 1,2,3-TMB 680 1,2,4-TMB 1,680 1,3,5-TMB 410 VINYL CHLORIDE 320 X 10,800 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
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-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-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-7 4/29/2015 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-10 4/29/2015 3.0 ~ 4.0' VOCs <MDL
PSB-11 4/28/2015 3.0 ~ 4.0' VOCs <MDL
LEGEND:
SUBJECT PROPERTY
WATER
SANITARY SEWER
STORM SEWER
OVERHEAD ELECTRIC LINE
PARCEL / LOT BOUNDARIES
PROPOSED SITE FEATURES
PROPOSED WATER
PROPOSED SANITARY SEWER
PROPOSED STORM SEWER
PROPOSED GAS
PROPOSED EXCAVATION LIMITS
PROPOSED STORM DRAIN
GEE SOIL BORING (2012)
GEOTECHNICAL SOIL BORING
PM SOIL BORING/TEMPORARY MONITORING WELL (2015)
PROPOSED SOIL BORING
MAN HOLE
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
N
PM ENVIRONMENTAL
Environmental & Engineering Services
FIGURE 3
PROPOSED SOIL BORING LOCATION MAP
PROJ:
COMMERCIAL PROPERTY
830, 832, 834, AND 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/ES/CS
DATE: 7/24/2015
CHKD BY: AP/JD
SCALE: 1" = 30'
FILE NAME: 01-5363-0-004F03R00

Figure 4

Map of Known Extent of Contamination

RESIDENTIAL

PSB-2		PSB-2		PSB-2	
4/28/2015		4/28/2015		4/28/2015	
0.5 ~ 1.5'		13.0 ~ 14.0'		19.0 ~ 20.0'	
VOCs	<MDL	n-BUTYLB	440	B	630
		sec-BUTYLB	150	cis-1,2-DCE	3,570
		E	1,870	PCE	90
		ISOP	800	VINYL CHLORIDE	490
		NAPH	800	OTHER VOCs	<MDL
		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		

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	

PSB-13		
4/29/2015		
3.0 ~ 4.0'		
VOCs	<MDL	

SB-1 (GEE)		SB-1 (GEE)	
7/31/2012		7/31/2012	
5.0 ~ 6.0'		9.0 ~ 10.0'	
PCE	5,490,000	cis-1,2-DCE	3,000
OTHER VOCs	<MDL	PCE	58,000
NAPH	1,200	OTHER VOCs	<MDL
2-M	900	PNAs	<MDL
OTHER PNAs	<MDL		
Cd	<MDL		
Cr	6,330		
Pb	9,600		

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-1		PSB-1	
4/29/2015		4/29/2015	
9.0 ~ 10.0'		18.0 ~ 19.0'	
B	690	n-PROP	90
E	1,230	X	200
PCE	2,020	OTHER VOCs	<MDL
T	130		
X	1,080		
OTHER VOCs	<MDL		

SB-8 (GEE)	
7/31/2012	
3.0 ~ 4.0'	
cis-1,2-DCE	41,700
PCE	58,000
TCE	49,400
OTHER VOCs	<MDL
PNAs	<MDL

PSB-3		PSB-3		PSB-3	
4/28/2015		4/28/2015		4/28/2015	
2.0 ~ 3.0'		13.0 ~ 14.0'		19.0 ~ 20.0'	
VOCs	<MDL	B	12,000	B	1,590
		n-BUTYLB	510	cis-1,2-DCE	410
		sec-BUTYLB	90	E	3,660
		cis-1,2-DCE	2,520	NAPH	500
		E	310	n-PROP	290
		2-M	300	PCE	210
		n-PROP	930	T	360
		T	4,600	1,2,3-TMB	680
		1,2,3-TMB	460	1,2,4-TMB	1,680
		1,2,4-TMB	2,690	1,3,5-TMB	410
		1,3,5-TMB	1,010	VINYL CHLORIDE	320
		VINYL CHLORIDE	240	X	10,800
		X	400	OTHER VOCs	<MDL
		OTHER VOCs	<MDL		

PSB-12		PSB-12	
4/29/2015		4/29/2015	
3.0 ~ 4.0'		4.0 ~ 5.0'	
VOCs	<MDL	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-9		PSB-9	
4/28/2015		4/28/2015	
1.0 ~ 2.0'		3.0 ~ 4.0'	
VOCs	<MDL	VOCs	<MDL

PSB-7	
4/29/2015	
3.0 ~ 4.0'	
VOCs	<MDL

PSB-8		PSB-8	
4/28/2015		4/28/2015	
3.0 ~ 4.0'		19.0 ~ 20.0'	
VOCs	<MDL	1,2,4-TMB	130
		OTHER VOCs	<MDL

PSB-6		PSB-6	
4/28/2015		4/28/2015	
3.0 ~ 4.0'		13.0 ~ 14.0'	
VOCs	<MDL	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-14		PSB-14	
4/29/2015		4/29/2015	
4.0 ~ 5.0'		9.0 ~ 10.0'	
PCE	300	B	4,300
OTHER VOCs	<MDL	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-5		PSB-5	
4/28/2015		4/28/2015	
3.5 ~ 4.5'		7.0 ~ 8.0'	
VOCs	<MDL	cis-1,2-DCE	1,600
		PCE	21,300
		TCE	3,200
		OTHER VOCs	<MDL

PSB-4		PSB-4		PSB-4	
4/28/2015		4/28/2015		4/28/2015	
3.0 ~ 4.0'		7.0 ~ 8.0'		20.0 ~ 21.0'	
PCE	260	cis-1,2-DCE	10,000	B	1,130
OTHER VOCs	<MDL	trans-1,2-DCE	300	cis-1,2-DCE	2,680
		TCE	1,100	E	420
		VINYL CHLORIDE	100	PCE	950
		OTHER VOCs	<MDL	T	230
				TCE	160
				VINYL CHLORIDE	200
				X	1,520
				OTHER VOCs	<MDL

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)

SOUTH GOULD STREET

ALLEY

SANITARY (10" DIA.)

STORM (60" DIA.)

WATER (8" DIA.)

WATER (12" DIA.)

SIDEWALK

SIGN

CONCEPTUAL INTERIOR RESPONSE SOIL EXCAVATION AREA

APPROXIMATE LOCATION OF FORMER DRY CLEANING MACHINE

830 EAST MAIN STREET EXISTING HOUSE

832 EAST MAIN STREET EXISTING HOUSE

834 EAST MAIN STREET EXISTING HOUSE

910 EAST MAIN STREET FORMER DRY CLEANERS

GARAGE

GARAGE

CONCRETE

GRASS

GRAVEL

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/TMW-1 PSB/TMW-2 PSB/TMW-3 PSB/TMW-4 PSB/TMW-5 PSB/TMW-6 PSB/TMW-7 PSB/TMW-8 PSB/TMW-9 PSB/TMW-10 PSB/TMW-11 PSB/TMW-12 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

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
- PROPOSED EXCAVATION LIMITS
- PROPOSED STORM DRAIN
- GEE SOIL BORING (2012)
- GEOTECHNICAL SOIL BORING
- PM SOIL BORING/TEMPORARY MONITORING WELL (2015)
- MAN HOLE

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 4A

SOIL BORING/TEMPORARY MONITORING WELL LOCATION MAP WITH SOIL ANALYTICAL RESULTS WITH CONCEPTUAL INTERIOR RESPONSE SOIL EXCAVATION AREA

PROJ:

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

THIS IS NOT A LEGAL SURVEY

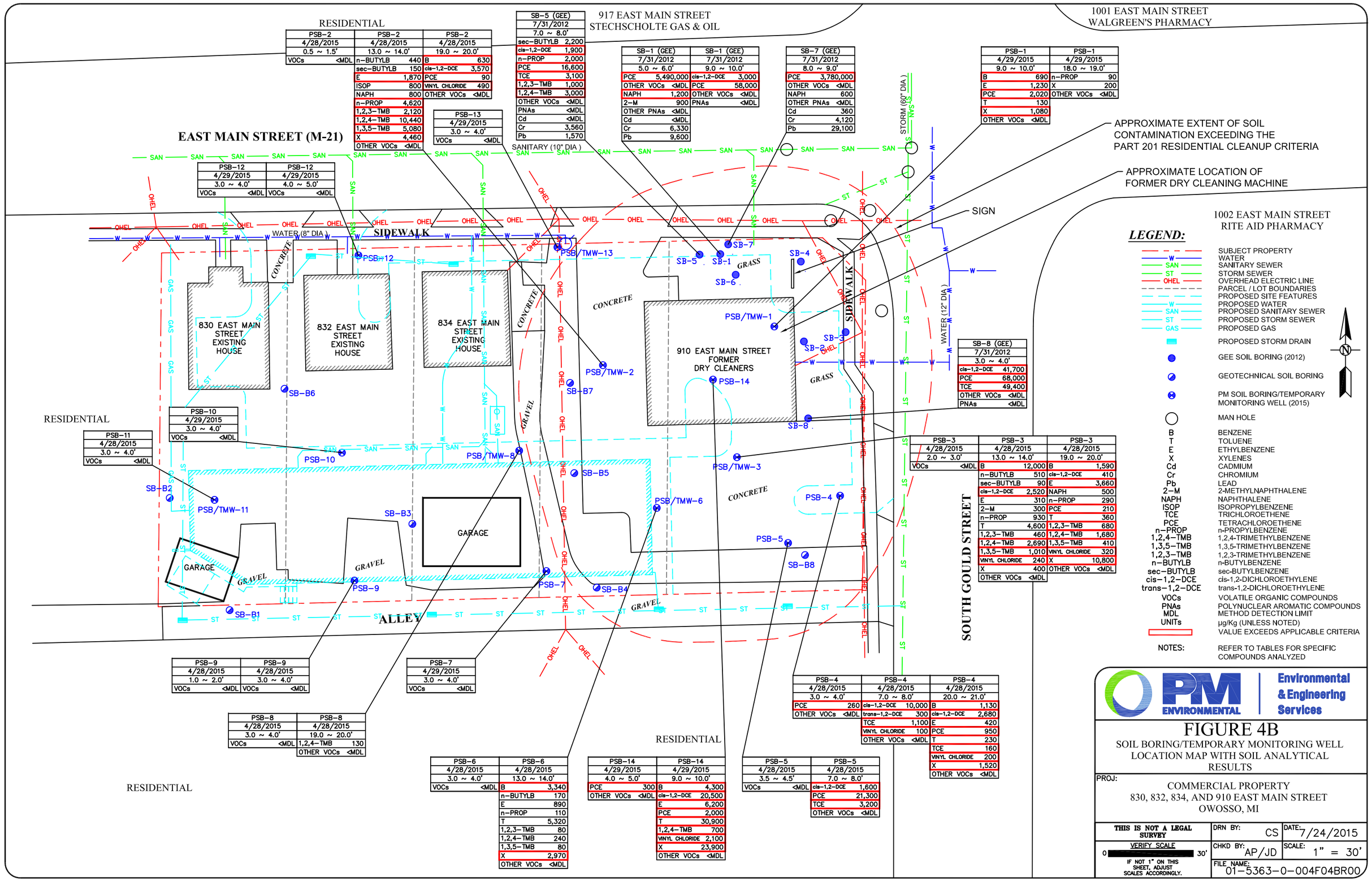
VERIFY SCALE 0 30'

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

DRN BY: CS | DATE: 7/24/2015

CHKD BY: AP/JD | SCALE: 1" = 30'

FILE NAME: 01-5363-0-004F04AR00


RESIDENTIAL
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
917 EAST MAIN STREET
STECHSCHOLTE GAS & OIL
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
1001 EAST MAIN STREET
WALGREEN'S PHARMACY
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-13 4/29/2015 3.0 ~ 4.0' VOCs <MDL
EAST MAIN STREET (M-21)
SANITARY (10" DIA)
STORM (60" DIA)
APPROXIMATE EXTENT OF SOIL CONTAMINATION EXCEEDING THE PART 201 RESIDENTIAL CLEANUP CRITERIA
APPROXIMATE LOCATION OF FORMER DRY CLEANING MACHINE
SIGN
PSB-12 4/29/2015 3.0 ~ 4.0' VOCs <MDL
PSB-12 4/29/2015 4.0 ~ 5.0' VOCs <MDL
WATER (8" DIA
WATER (12" DIA)
SIDEWALK
CONCRETE
GRASS
GRAVEL
ALLEY
GARAGE
830 EAST MAIN STREET EXISTING HOUSE
832 EAST MAIN STREET EXISTING HOUSE
834 EAST MAIN STREET EXISTING HOUSE
910 EAST MAIN STREET FORMER DRY CLEANERS
1002 EAST MAIN STREET
RITE AID PHARMACY
SOUTH GOULD STREET
PSB-10 4/29/2015 3.0 ~ 4.0' VOCs <MDL
PSB-11 4/28/2015 3.0 ~ 4.0' 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-7 4/29/2015 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
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-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 NAPH 500 n-PROP 290 PCE 210 T 360 1,2,3-TMB 680 1,2,4-TMB 1,680 1,3,5-TMB 410 VINYL CHLORIDE 320 X 10,800 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
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-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-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
LEGEND:
SUBJECT PROPERTY
WATER
SANITARY SEWER
STORM SEWER
OVERHEAD ELECTRIC LINE
PARCEL / LOT BOUNDARIES
PROPOSED SITE FEATURES
PROPOSED WATER
PROPOSED SANITARY SEWER
PROPOSED STORM SEWER
PROPOSED GAS
PROPOSED STORM DRAIN
GEE SOIL BORING (2012)
GEOTECHNICAL SOIL BORING
PM SOIL BORING/TEMPORARY MONITORING WELL (2015)
MAN HOLE
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 4B
SOIL BORING/TEMPORARY MONITORING WELL LOCATION MAP WITH SOIL ANALYTICAL RESULTS
PROJ:
COMMERCIAL PROPERTY
830, 832, 834, AND 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
DATE: 7/24/2015
CHKD BY: AP/JD
SCALE: 1" = 30'
FILE NAME: 01-5363-0-004F04BR00

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

EAST MAIN STREET (M-21)

SOUTH GOULD STREET

ALLEY

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

APPROXIMATE LOCATION OF FORMER DRY CLEANING MACHINE

SIGN

SANITARY (10" DIA.)

STORM (60" DIA.)

WATER (8" DIA.)

WATER (12" DIA.)

SIDEWALK

CONCRETE

GRASS

GRAVEL

GARAGE

830 EAST MAIN STREET EXISTING HOUSE

832 EAST MAIN STREET EXISTING HOUSE

834 EAST MAIN STREET EXISTING HOUSE

910 EAST MAIN STREET FORMER DRY CLEANERS

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
- WATER
- SANITARY SEWER
- STORM SEWER
- OVERHEAD ELECTRIC LINE
- PARCEL / LOT BOUNDARIES
- PROPOSED SITE FEATURES
- PROPOSED WATER
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED GAS
- PROPOSED STORM DRAIN
- GEE SOIL BORING (2012)
- GEOTECHNICAL SOIL BORING
- PM SOIL BORING/TEMPORARY MONITORING WELL (2015)
- MAN HOLE

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 4C

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

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

THIS IS NOT A LEGAL SURVEY

VERIFY SCALE
0 [redacted] 30'
IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRN BY: CS
DATE: 7/24/2015
CHKD BY: AP/JD
SCALE: 1" = 30'
FILE NAME: 01-5363-0-004F04CR00

Figure 5

Color Site Photographs

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 1

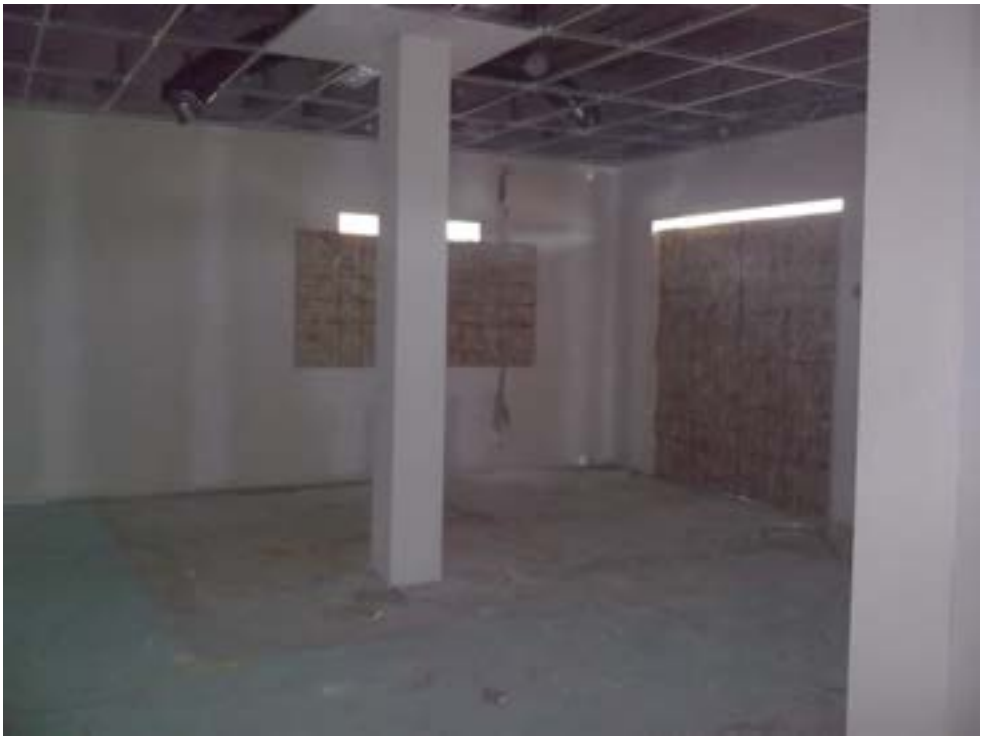
Exterior view of 910 East Main Street

Photograph 2

Interior view of 910 East Main Street

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 3



Interior view of 910 East Main Street

Photograph 4

Exterior view of 834 East Main Street

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 5

Interior view of 834 East Main Street

Photograph 6

View of detached garage associated with 834 E. Main Street

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 7

Interior view of detached garage associated with 834 E. Main Street

Photograph 8

Exterior view of 832 E. Main

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 9

Interior view of 832 E. Main

Photograph 10

Exterior view of 830 E. Main Street

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 11

Interior view of 830 E. Main Street

Photograph 12

View of detached shed associated with 830 East Main

Photographs collected during site reconnaissance on April 14, 2015 through April 16, 2015
PM Project No. 01-5363-0-002
Location: 910, 834, 832 and 830 East Main Street, Owosso, Michigan

Photograph 13

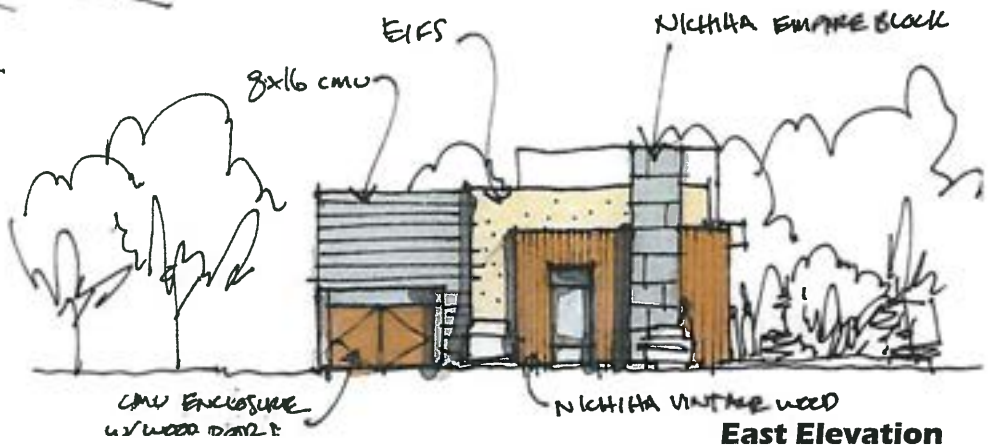
View of Subject Property from NE Corner of Intersection

Photograph 14

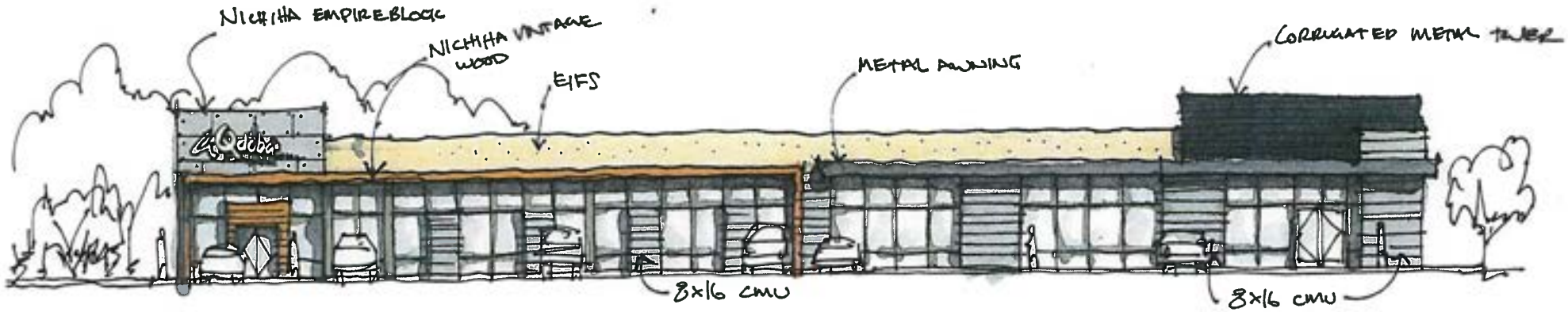
View of Subject Property from the West

Figure 6

Redevelopment Project Renderings



East Elevation



North Elevation

Imagine

Create

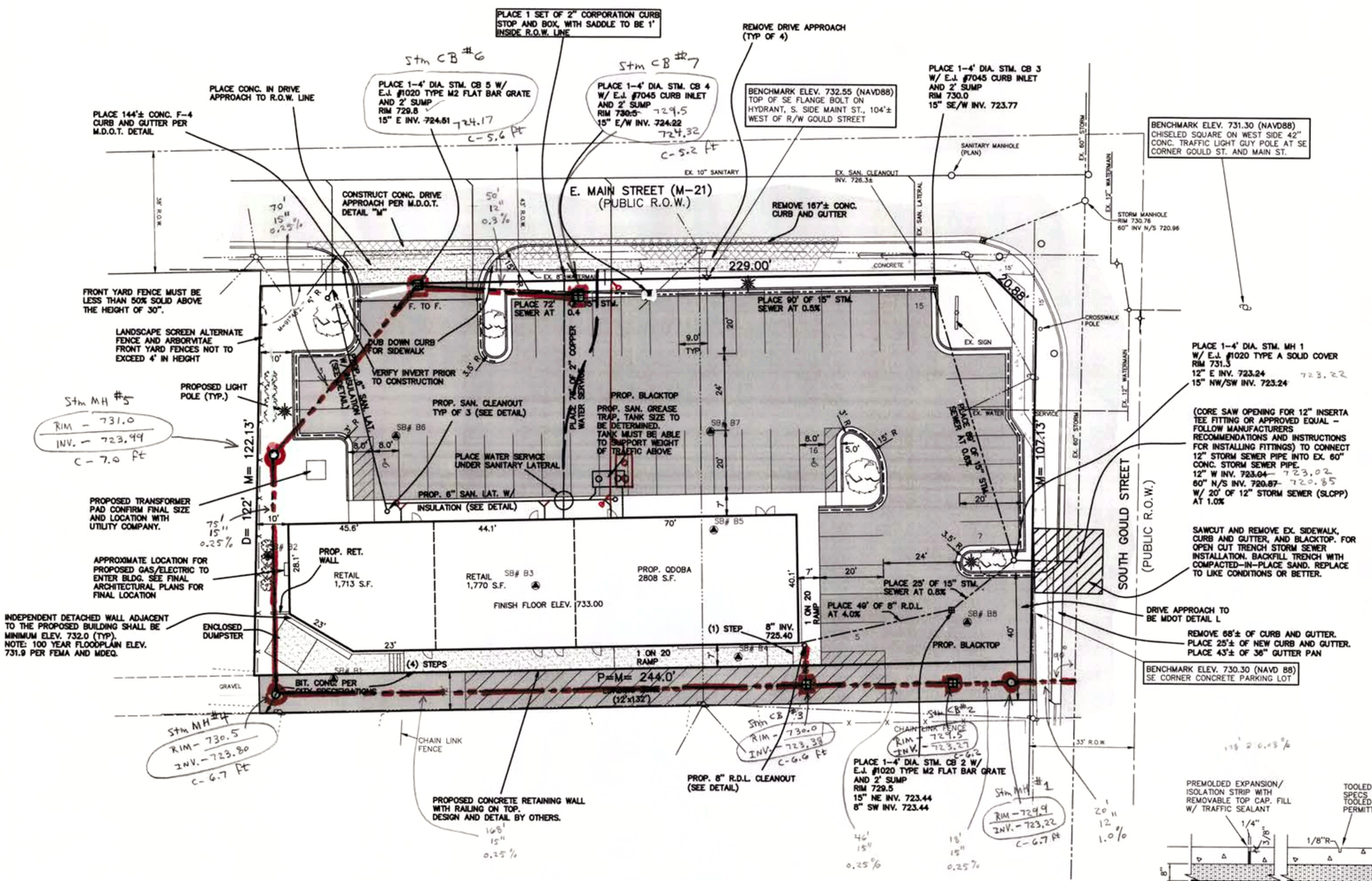
Excite

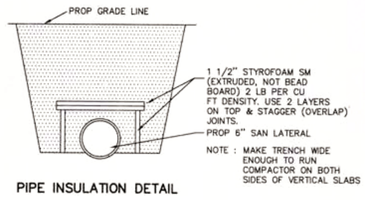
Dual Tenant Building

Main St. & South Gould_Owosso, MI

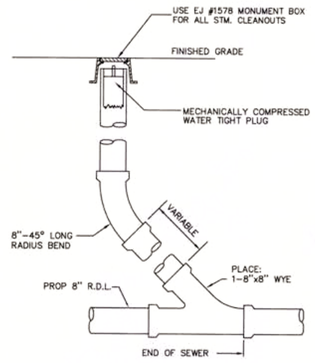
Figure 7

Engineering Site Plans

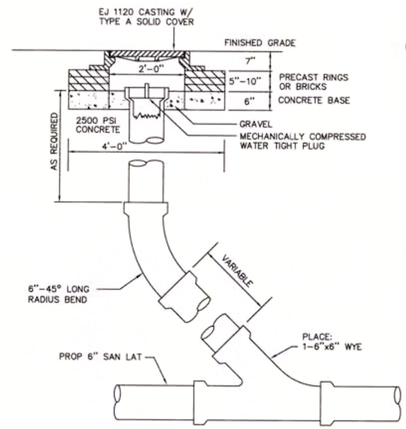




PIPE INSULATION DETAIL



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 diligence 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.

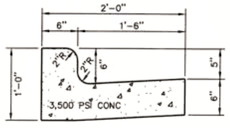
11. PM Environmental
J. Adam Patton, CHMM
Phone: (517) 325-9867
Cell: (517) 202-4288

STORM SEWER NOTES:

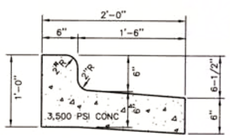
1. 12" storm sewer pipe shall be SLCPP with water tight joint connection
2. All 15" storm sewer pipe shall be C-76-III, or SLCPP with water tight joint connections.
3. 8" Roof drain lead and storm sewer pipe shall be PVC Schedule 40, or PVC SDR-26 pipe.
4. Storm sewer manhole and catchbasin structures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

SANITARY SEWER AND WATERMAIN NOTES:

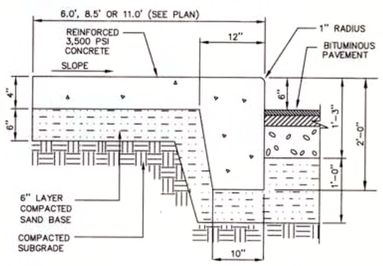
1. All sanitary sewer and watermain materials and construction methods shall conform to the standard specifications and details of the City of Owosso.
2. Verify existing sanitary lateral location, size, and depth before construction.
3. Any un-used (abandoned) sanitary lateral and water services shall 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)



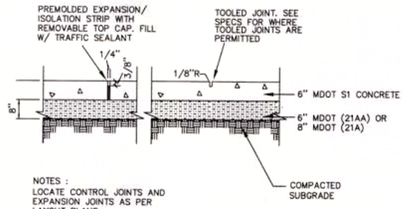
24" HEAD CURB DETAIL (PITCHED OUT)



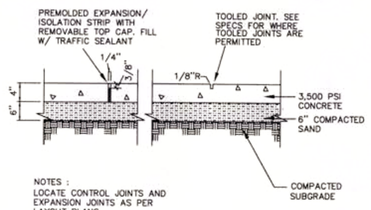
INTEGRAL CONC WALK/CURB

LIGHT DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)

MEDIUM DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)

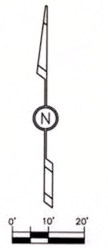


HEAVY DUTY CONC. DETAIL
(CONFIRM WITH SOIL REPORT)



4" CONCRETE WALKWAY DETAIL

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



SCALE: 1" = 20'

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

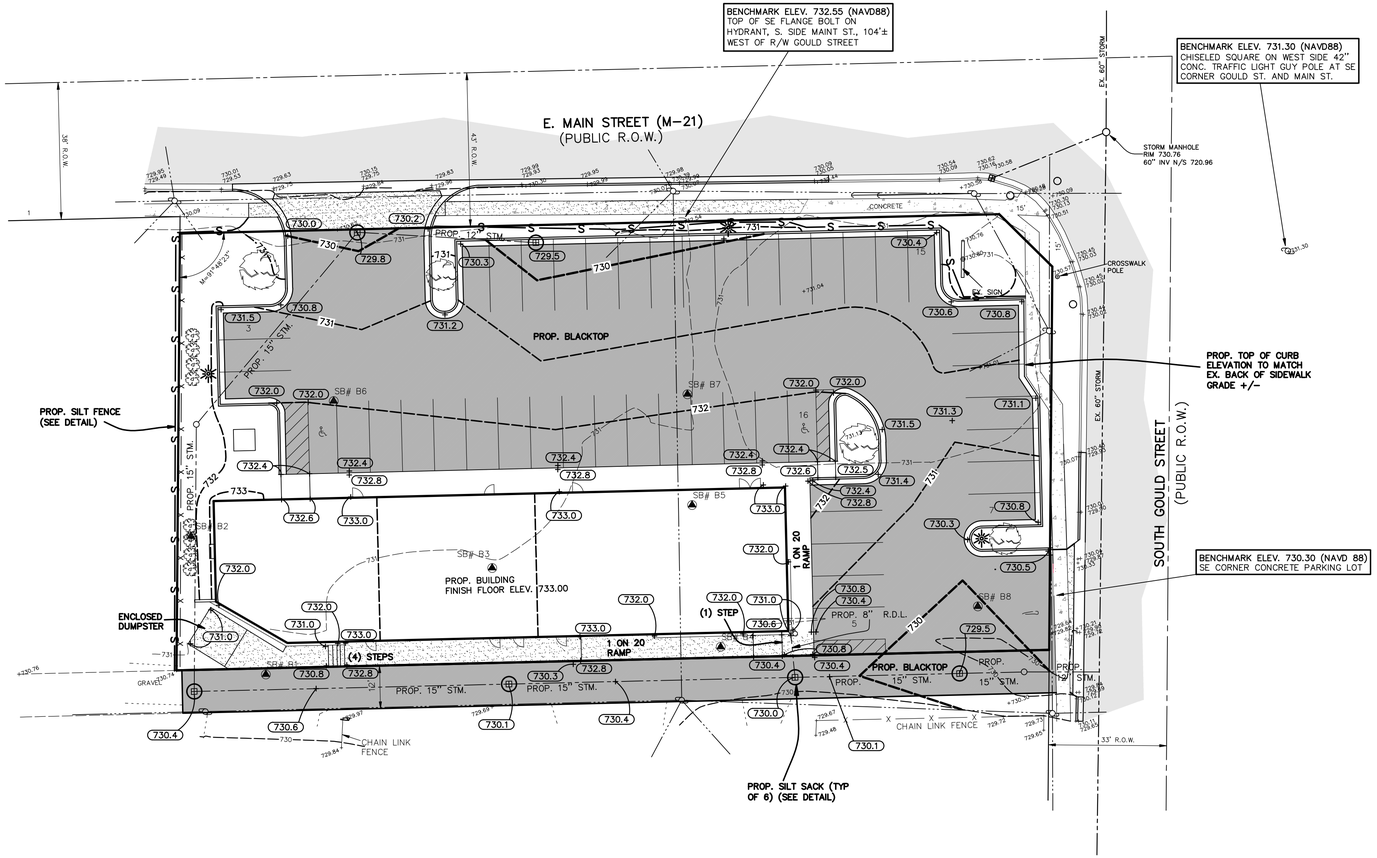
IN: PART OF THE NW 1/4, SECTION 19, T7N, R3E, CITY OF OWOSSO, SHIAWASSEE COUNTY, MICHIGAN

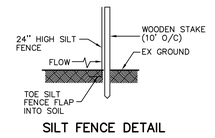
REVISIONS:
3/20/15 REV. PER OWNER (JSD)
3/10/15 REV. SAN. LATERAL (JSD)

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

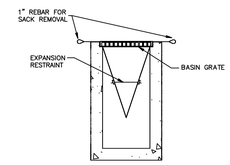
DRAWN BY: JSD
APPROVED BY: DDG
FILE NO.: 141574E
PROJ. ENG.: DDG
PROJ. SURV.: BMF
DATE: 3/2/2015

SHEET 2 of 3





SILT FENCE DETAIL



SILT SACK DETAIL

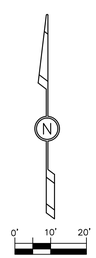
SOIL EROSION CONTROL NOTES :

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

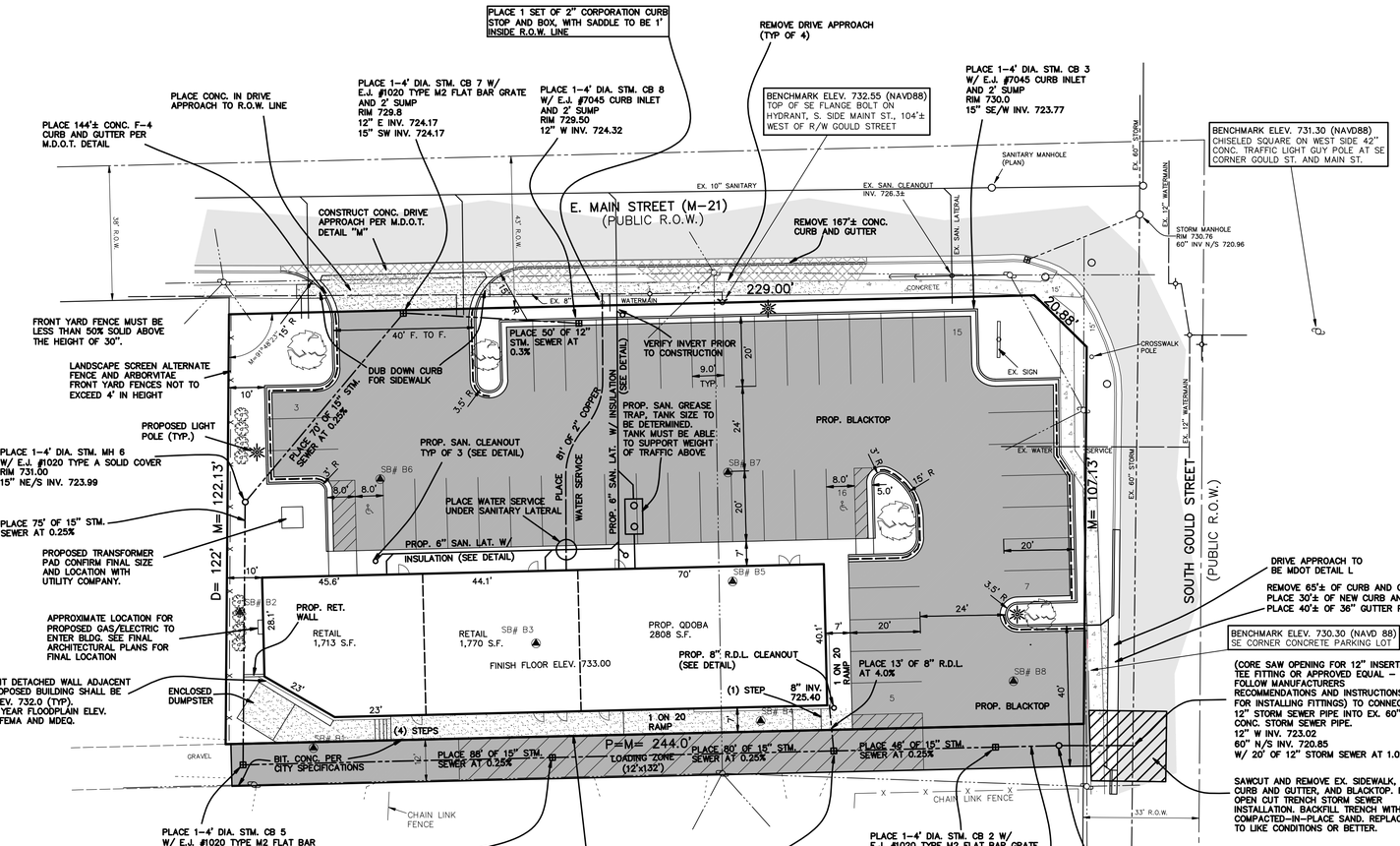
IN: PART OF THE NW 1/4, SECTION 19, T7N, R3E,
CITY OF OWOSSO, SHIAWASSEE COUNTY, MICHIGAN

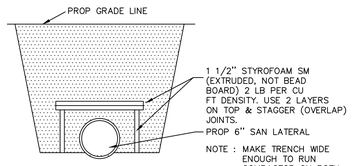
REVISIONS:
5/28/15 REV.-BROWNFIELD RE-DEVELOPMENT
3/20/15 REV. PER OWNER (JSD)

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

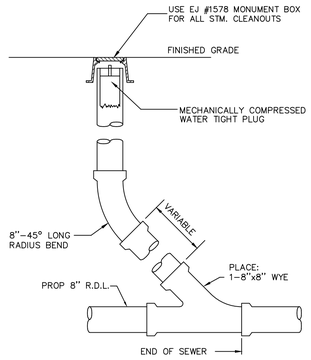
DRAWN BY: JSD
APPROVED BY: DDG
FILE NO.: 141574E
PROJ. ENG.: DDG
PROJ. SURV.: BMF
DATE: 3/2/2015

SHEET 3 of 3

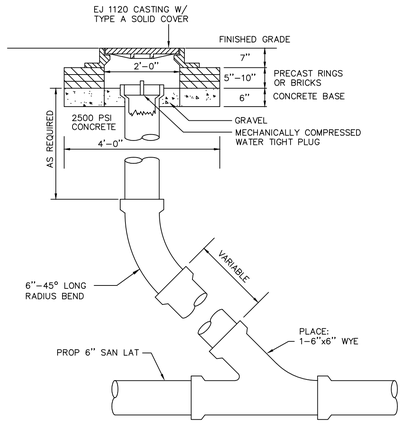




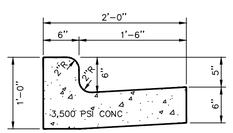
PIPE INSULATION DETAIL



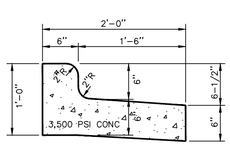
8" ROOF DRAIN LEAD (R.D.L.) CLEANOUT DETAIL



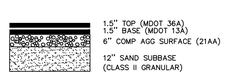
SAN SEWER LATERAL CLEANOUT DETAIL



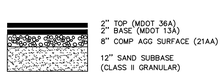
24" HEAD CURB DETAIL (PITCHED IN)



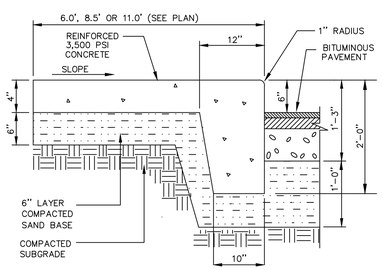
24" HEAD CURB DETAIL (PITCHED OUT)



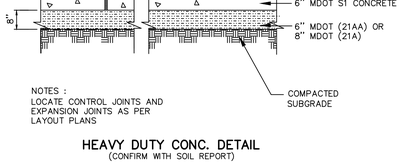
LIGHT DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)



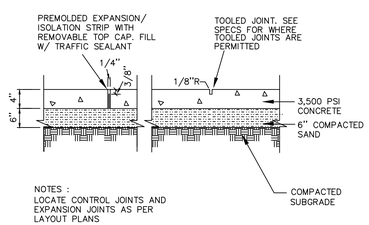
MEDIUM DUTY PAVING CROSS SECTION
(CONFIRM WITH SOIL REPORT)



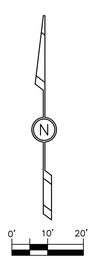
INTEGRAL CONC WALK/CURB



HEAVY DUTY CONC. DETAIL
(CONFIRM WITH SOIL REPORT)



4" CONCRETE WALKWAY DETAIL



SCALE: 1" = 20'

LOCATION MAP

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, OHMM
    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.

QDOBA/RETAIL SITE RE-DEVELOPMENT AND UTILITY PLAN

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

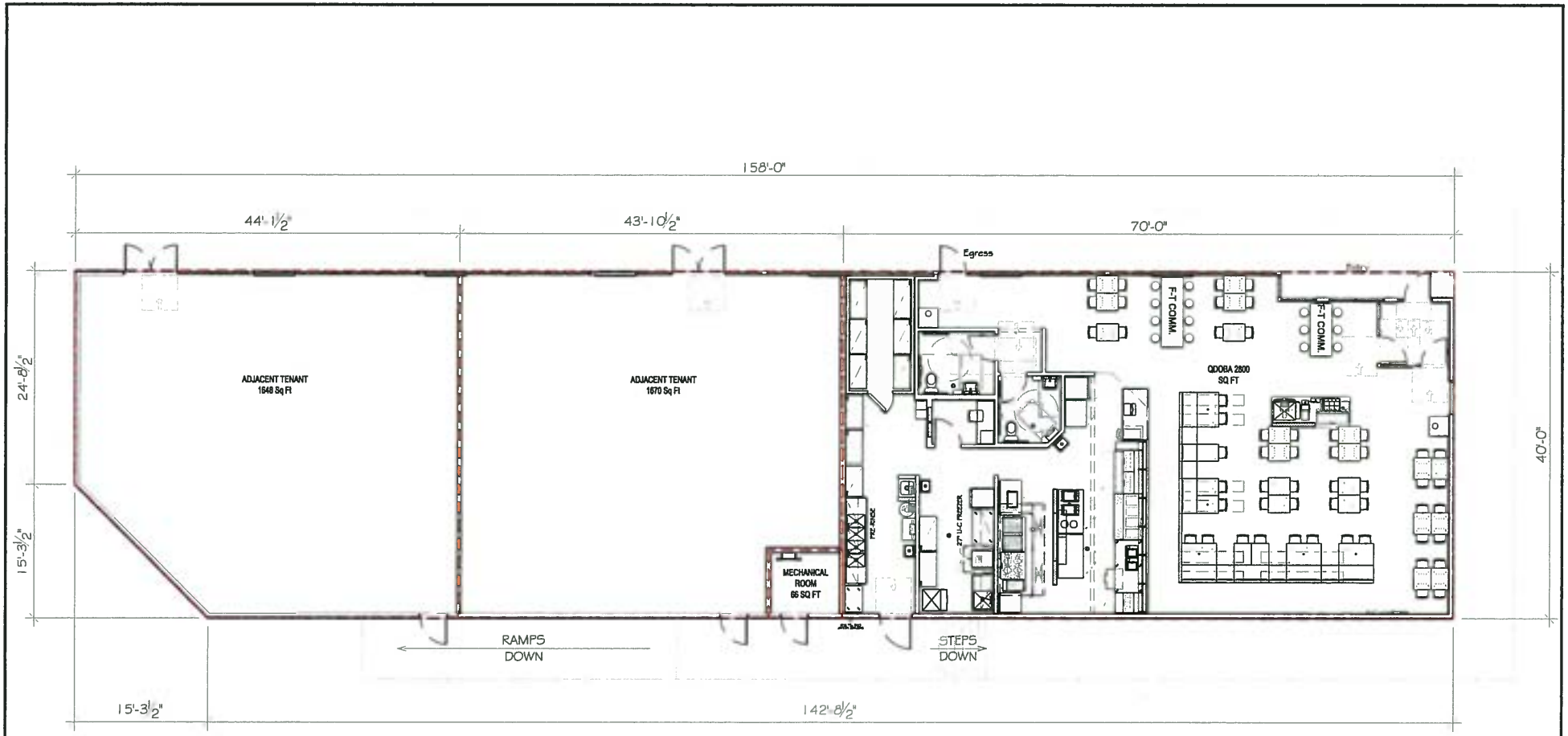
IN: PART OF THE NW 1/4, SECTION 19, T7N, R3E, CITY OF OWOSSO, SHIAWASSEE COUNTY, MICHIGAN

REVISIONS:
5/28/15 REV.-BROWNFIELD RE-DEVELOPMENT
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

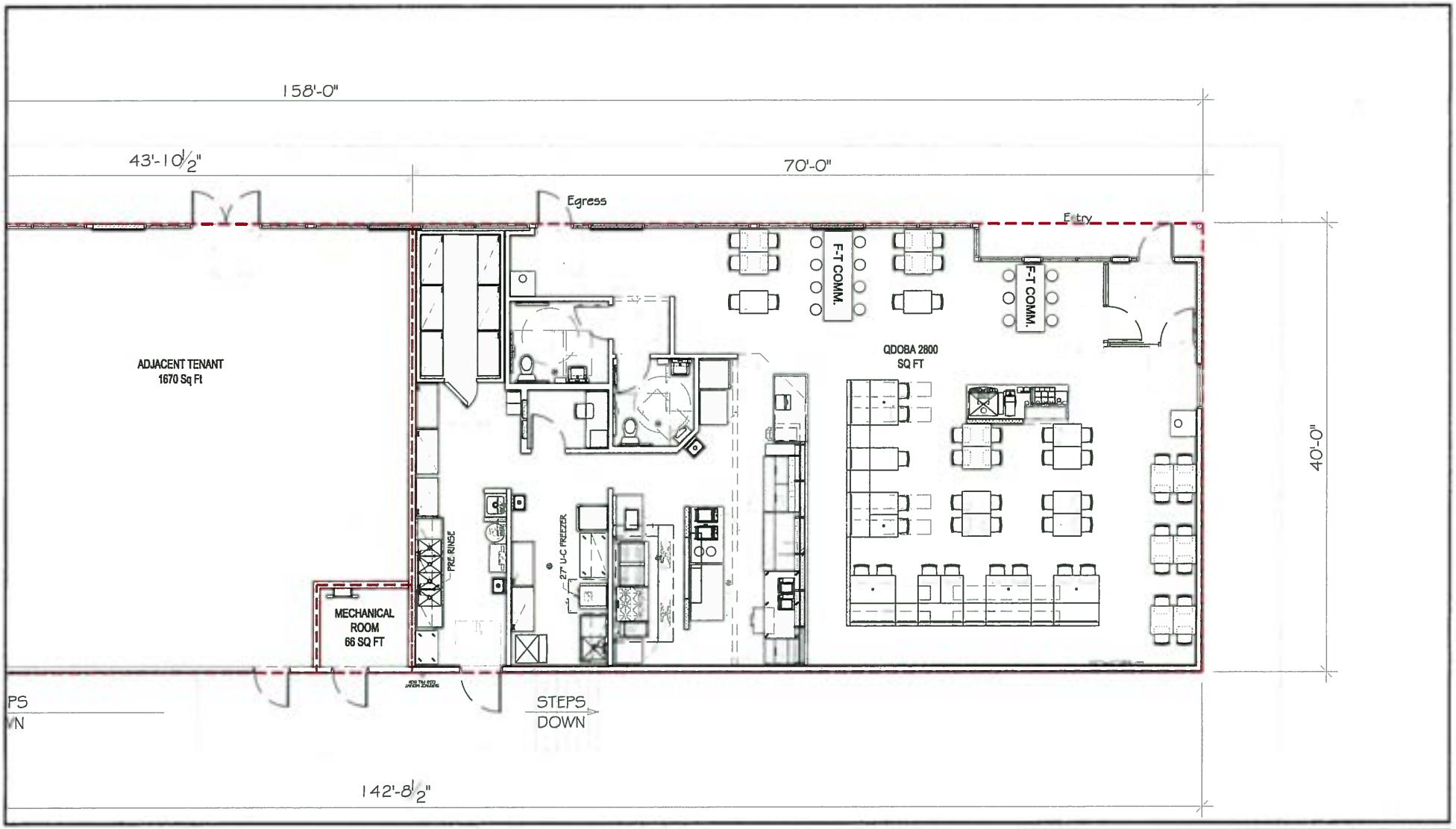
DRAWN BY: JSD
APPROVED BY: DDG
FILE NO.: 141574E
PROJ. ENG.: DDG
PROJ. SURV.: BMF
DATE: 3/2/2015

SHEET 2 of 3



PROJ. NO.: 14-480 DATE: 01/22/15 SHEET #: 005	LOD 6191 Sq Ft DRAWN: JTC	Multi-Tenant 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

LUMBLE DESIGN GROUP
158 West Main St,
Lena, IL 61048
PH: 815-369-9155
FAX: 815-369-4495
www.lumbledesign.com



PROJ. NO.: 14-480 DATE: 01/22/15 SHEET #: 005	Schematic 2800 Sq Ft 80 Seats	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	LINDLE DESIGN GROUP 158 West Main St, Lena, IL 61048 PH: 815-369-9155 FAX: 815-369-4495 WWW.LINDLEDESIGN.COM

TABLES

Table 1

Summary of Soil Analytical Results

TABLE 1 (1 OF 1)
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 (Cg/Kg)			Benzene	n-Butylbenzene	sec-Butylbenzene	cis-1,2-Dichloroethylene	trans-1,2-Dichloroethylene	Ethylbenzene	Isopropyl benzene	2-Methylnaphthalene	Naphthalene	n-Propylbenzene	Tetrachloroethylene	Toluene	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#)			71432	104518	135988	156592	156605	100414	98828	91576	91203	103651	127184	108883	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	<10	<10	<10	<10	<10	**5,490,000**	<10	<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	**3,000**	<10	<10	<10	<10	<10	<10	**58,000**	<10	<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	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	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	**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	<10	<10	<10	<10	<10	**3,780,000**	<10	<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	<10	<10	<10	**41,700**	<10	<10	<10	<10	<10	<10	**68,000**	<10	**49,400**	<10	<10	<10	<10	<20	<MDL	<330	<330	<MDL	NA	NA	NA
PSB-1	04/29/2015	9.0-10.0	**690**	<80	<80	<80	<80	1,230	<400	<200	<400	<80	**2,020**	130	<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	<70	<400	<100	<400	90	<70	<70	<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	<70	<300	<100	<300	<70	<70	<70	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-2	04/28/2015	13.0.-14.0	<70	440	150	<70	<70	**1,870**	800	<100	800	**4,620**	<70	<70	<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	**630**	<70	<70	**3,570**	<70	<70	<300	<100	<300	<70	90	<70	<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	<80	<400	<200	<400	<80	<80	<80	<80	<80	<80	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
PSB-3	04/28/2015	13.0.-14.0	**12,000**	510	90	**2,520**	<70	310	<300	300	<300	930	<70	4,600	<70	460	**2,690**	**1,010**	**240**	400	<MDL	NA	NA	NA	NA	NA	NA
PSB-3	04/28/2015	19.0-20.0	**1,590**	<70	<70	410	<70	**3,660**	<400	<100	500	290	**210**	360	<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	<90	<400	<200	<400	<90	**260**	<90	<90	<90	<90	<90	<90	<290	<MDL	NA	NA	NA	NA	NA	NA
PSB-4	04/28/2015	7.0-8.0	<100	<100	<100	**10,000**	300	<100	<500	<200	<500	<100	<100	<100	**1,100**	<100	<100	<100	**100**	<300	<MDL	NA	NA	NA	NA	NA	NA
PSB-4	04/28/2015	20.0-21.0	**1,130**	<80	<80	**2,680**	<80	420	<400	<200	<400	<80	**950**	230	**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	<70	<300	<100	<300	<70	<70	<70	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-5	04/28/2015	7.0-8.0	<100	<100	<100	**1,600**	<100	<100	<500	<200	<500	<100	**21,300**	<100	**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	<80	<400	<200	<400	<80	<80	<80	<80	<80	<80	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
PSB-6	04/28/2015	13.0.-14.0	**3,340**	170	<70	<70	<70	890	<300	<100	<300	110	<70	5,320	<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	<70	<400	<100	<400	<70	<70	<70	<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	<70	<400	<100	<400	<70	<70	<70	<70	<70	<70	<70	<70	<170	<MDL	NA	NA	NA	NA	NA	NA
PSB-8	04/28/2015	19.0-20.0	<80	<80	<80	<80	<80	<80	<400	<200	<400	<80	<80	<80	<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	<70	<300	<100	<300	<70	<70	<70	<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	<80	<400	<200	<400	<80	<80	<80	<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	<70	<300	<100	<300	<70	<70	<70	<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	<60	<300	<100	<300	<60	<60	<60	<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	<60	<300	<100	<300	<60	<60	<60	<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	<70	<300	<100	<300	<70	<70	<70	<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	<70	<300	<100	<300	<70	<70	<70	<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	<80	<400	<200	<400	<80	**300**	<80	<80	<80	<80	<80	<80	<280	<MDL	NA	NA	NA	NA	NA	NA
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**	<400	<400	**700**	<400	**2,100**	**23,900**	<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 (Cg/Kg)																											
Statewide Default Background Levels			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,200	18,000	21,000
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	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}	ID	ID	12,000	30,000 {X}	360	3,200	4,200	730	ID	1,200 {X}	5,400	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)			1,600	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}	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)			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	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			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	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			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	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)			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	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)			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}	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 (Cg/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	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)			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}	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)			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	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			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	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			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	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)			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	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)			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}	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 (Cg/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	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	450	50	50	50	200	250	7,500	440	140	52	10,000	50	3,200	2,200	1,700	40	290	Various	440	7,500	Various	NL	NL	NL
Nonresidential Vapor Intrusion Soil Screening Levels ($S_{VI\text{-}nr}$)			85	7,600	740	160	760	4,000	300	1.26E+05	8,900	2,400	1,000	1.69E+05	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

Summary of Groundwater Analytical Results

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 (Ğg/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 (Ğg/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) ¦				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) ¦				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 (Ğg/L)																								
Residential Groundwater Vapor Intrusion Screening Levels ($GW_{VI\text{-}res}$) ¦				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 ($GW_{VI\text{-}nr}$)¦				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 (Ğg/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

Table 3

Summary of Costs for Eligible Activities

Table 3: Estimated Costs of Eligible Activities				
Item/Activity	**TOAL ESTIMATED COSTS**	**MDEQ BROWNFIELD REDEVELOPMENT LOAN ELIGIBLE ACTIVITIES**	**MDEQ AND LOCAL ACT 381 ELIGIBLE ACTIVITIES**	**LOCAL ACT 381 ELIGIBLE ACTIVITIES**
Baseline Environmental Assessments				
Phase I ESA, Phase II/BEA	$ 2,250		$ 2,250	
Documentation of Due Care Compliance	$ 8,050		$ 8,050	
Baseline Environmental Assessments Sub-Total	**$ 10,300**		**$ 10,300**	
Due Care Activities				
Transport and disposal of contaminated waste soil associated with building footing, utility, parking lot, sidewalk, curb, and gutter excavation and groundwater removal management and disposal	$ 152,000	$ 152,000		
Removal, transport and disposal of contaminated concrete building slab and footing materials	$ 25,000	$ 25,000		
Chemical-resistant gasketing for sanitary, storm, and water utility piping	$ 5,500	$ 5,500		
Design and installation of passive spray-applied vapor barrier system	$ 38,000	$ 38,000		
Installation of visual demarcation underlayment in non-paved areas requiring dermal contact surface barrier	$ 1,250	$ 1,250		
Response activity preparation planning, oversight, monitoring, laboratory analysis, project management and reporting by an environmental professional	$ 18,000	$ 18,000		
Due Care Activities Sub-Total	**$ 239,750**	**$ 239,750**		
Additional Response Activities				
Building and Site Demolition	$ 35,000	$ 15,000	$ 20,000	
Demolition Sub-Total	**$ 35,000**	**$ 15,000**	**$ 20,000**	
Asbestos				
Pre-Demo Asbestos Survey/Reporting	$ 5,830		$ 5,830	
Asbestos Abatement, Oversight, Clearance Testing	$ 16,750			$ 16,750
Asbestos Sub-Total	**$ 22,580**		**$ 5,830**	**$ 16,750**
Preparation of Brownfield Plan and Act 381 Workplan				
Brownfield Plan and Act 381 Work Plan	$ 12,000		$ 12,000	
Brownfield Plan and Act 381 Work Plan Sub-Total	**$ 12,000**		**$ 12,000**	
Project Sub Totals	**$ 319,630**	**$ 254,750**	**$ 48,130**	**$ 16,750**
15% Contingency (Excludes Baseline Environmental Assessments and Brownfield Plan/Act 381 Work Plan)	$ 44,600	$ 38,213	$ 3,875	$ 2,513
Developer Eligible Reimbursement Total	**$ 364,230**	**$ 292,963**	**$ 52,005**	**$ 19,263**
TIF Capture for Local Site Remediation Revolving Fund (Local Only Taxes)	$ 113,580		$ 56,146	$ 57,434
Total Cost of Eligible Activities to be Funded through TIF	**$ 477,810**	**$ 292,963**	**$ 108,151**	**$ 76,696**

Table 4

MDEQ and Local Tax Capture Reimbursement Schedule

Tax Increment Financing Estimates
Table 4

		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
Base Taxable Value (pre-development)		$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000
Estimated New Taxable Value (estimated increase of 1%/year)			$ 575,000	$ 575,000	$ 580,750	$ 586,558	$ 592,423	$ 598,347	$ 604,331	$ 610,374	$ 616,478	$ 622,643	$ 628,869	$ 635,158	$ 641,509
Incremental Difference (New Taxable Value *minus* Existing)			$ 391,000	$ 391,000	$ 396,750	$ 402,558	$ 408,423	$ 414,347	$ 420,331	$ 426,374	$ 432,478	$ 438,643	$ 444,869	$ 451,158	$ 457,509
Local Taxes															
Seniors	0.3500		$ 137	$ 137	$ 139	$ 141	$ 143	$ 145	$ 147	$ 149	$ 151	$ 154	$ 156	$ 158	$ 160
Med Care	2.0000		$ 782	$ 782	$ 794	$ 805	$ 817	$ 829	$ 841	$ 853	$ 865	$ 877	$ 890	$ 902	$ 915
Veterans PA214	0.1000		$ 39	$ 39	$ 40	$ 40	$ 41	$ 41	$ 42	$ 43	$ 43	$ 44	$ 44	$ 45	$ 46
Veterans Voted	0.1400		$ 55	$ 55	$ 56	$ 56	$ 57	$ 58	$ 59	$ 60	$ 61	$ 61	$ 62	$ 63	$ 64
MSU Extension	0.0500		$ 20	$ 20	$ 20	$ 20	$ 20	$ 21	$ 21	$ 21	$ 22	$ 22	$ 22	$ 23	$ 23
INTMD Sch	3.9040		$ 1,526	$ 1,526	$ 1,549	$ 1,572	$ 1,594	$ 1,618	$ 1,641	$ 1,665	$ 1,688	$ 1,712	$ 1,737	$ 1,761	$ 1,786
Library	1.2500		$ 489	$ 489	$ 496	$ 503	$ 511	$ 518	$ 525	$ 533	$ 541	$ 548	$ 556	$ 564	$ 572
City Oper	14.0370		$ 5,488	$ 5,488	$ 5,569	$ 5,651	$ 5,733	$ 5,816	$ 5,900	$ 5,985	$ 6,071	$ 6,157	$ 6,245	$ 6,333	$ 6,422
SATA	0.3285		$ 128	$ 128	$ 130	$ 132	$ 134	$ 136	$ 138	$ 140	$ 142	$ 144	$ 146	$ 148	$ 150
County Oper	5.1146		$ 2,000	$ 2,000	$ 2,029	$ 2,059	$ 2,089	$ 2,119	$ 2,150	$ 2,181	$ 2,212	$ 2,243	$ 2,275	$ 2,307	$ 2,340
Total Local Taxes	**27.2741**		**$ 10,664**	**$ 10,664**	**$ 10,821**	**$ 10,979**	**$ 11,139**	**$ 11,301**	**$ 11,464**	**$ 11,629**	**$ 11,795**	**$ 11,964**	**$ 12,133**	**$ 12,305**	**$ 12,478**
School Taxes															
School Operating	18.0000		$ 7,038	$ 7,038	$ 7,142	$ 7,246	$ 7,352	$ 7,458	$ 7,566	$ 7,675	$ 7,785	$ 7,896	$ 8,008	$ 8,121	$ 8,235
SET	6.0000		$ 2,346	$ 2,346	$ 2,381	$ 2,415	$ 2,451	$ 2,486	$ 2,522	$ 2,558	$ 2,595	$ 2,632	$ 2,669	$ 2,707	$ 2,745
Total School Taxes	**24.0000**		**$ 9,384**	**$ 9,384**	**$ 9,522**	**$ 9,661**	**$ 9,802**	**$ 9,944**	**$ 10,088**	**$ 10,233**	**$ 10,379**	**$ 10,527**	**$ 10,677**	**$ 10,828**	**$ 10,980**
Total Capturable Millages	**51.2741**		**$ 20,048**	**$ 20,048**	**$ 20,343**	**$ 20,641**	**$ 20,942**	**$ 21,245**	**$ 21,552**	**$ 21,862**	**$ 22,175**	**$ 22,491**	**$ 22,810**	**$ 23,133**	**$ 23,458**
Local Non-Capturable Taxes															
City Debt	0.4973		$ 92	$ 92	$ 92	$ 92	$ 92	$ 92	$ 92	$ 92	$ 92	$ 92	$ 221	$ 221	$ 221
Local Total Non-Capturable Taxes	**0.4973**		**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 92**	**$ 221**	**$ 221**	**$ 221**
3 Mils State Brownfield Fund (on incremental capture only)	3.0000		$ 1,173	$ 1,173	$ 1,190	$ 1,208	$ 1,225	$ 1,243	$ 1,261	$ 1,279	$ 1,297	$ 1,316	$ 1,335	$ 1,353	$ 1,373
Local Admin Fees			$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
Local Tax Capture after Fees			$ 9,664	$ 9,664	$ 9,821	$ 9,979	$ 10,139	$ 10,301	$ 10,464	$ 10,629	$ 10,795	$ 10,964	$ 11,133	$ 11,305	$ 11,478
School Tax Capture after SET Brownfield Fund			$ 8,211	$ 8,211	$ 8,332	$ 8,454	$ 8,577	$ 8,701	$ 8,827	$ 8,954	$ 9,082	$ 9,211	$ 9,342	$ 9,474	$ 9,608
Total Annual Available Tax Capture			**$ 17,875**	**$ 17,875**	**$ 18,153**	**$ 18,433**	**$ 18,716**	**$ 19,002**	**$ 19,291**	**$ 19,583**	**$ 19,877**	**$ 20,175**	**$ 20,476**	**$ 20,779**	**$ 21,086**
Total Cumulative Tax Capture			**$ 17,875**	**$ 35,750**	**$ 53,903**	**$ 72,336**	**$ 91,052**	**$ 110,055**	**$ 129,346**	**$ 148,929**	**$ 168,806**	**$ 188,981**	**$ 209,457**	**$ 230,236**	**$ 251,322**
MDEQ LOAN ELIGIBLE EXPENSES															
Local Taxes			$ 9,664	$ 9,664	$ 9,821	$ 9,979	$ 10,139	$ 10,301	$ 10,464	$ 10,629	$ 10,795	$ 10,964	$ 11,133	$ 11,305	$ 11,478
School Taxes			$ 8,211	$ 8,211	$ 8,332	$ 8,454	$ 8,577	$ 8,701	$ 8,827	$ 8,954	$ 9,082	$ 9,211	$ 9,342	$ 9,474	$ 9,608
Unreimbursed Eligible Expenses		**$ 292,963**	**$ 275,087**	**$ 257,212**	**$ 239,059**	**$ 220,626**	**$ 201,910**	**$ 182,908**	**$ 163,617**	**$ 144,034**	**$ 124,156**	**$ 103,981**	**$ 83,506**	**$ 62,726**	**$ 41,641**
LOCAL ONLY AND MDEQ ELIGIBLE EXPENSES															
Local Taxes			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
School Taxes			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Unreimbursed Eligible Expenses		**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**	**$ 52,005**
LOCAL ONLY ELIGIBLE EXPENSES															
Local Taxes			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Unreimbursed Eligible Expenses		**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**
LOCAL SITE REMEDIATION REVOLVING FUND CAPTURE															
Local Taxes															
State Taxes															

Tax Increment Financing Estimates
Table 4

2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	
Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	
$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	$ 184,000	
$ 647,924	$ 654,404	$ 660,948	$ 667,557	$ 674,233	$ 680,975	$ 687,785	$ 694,663	$ 701,609	$ 708,625	$ 715,712	
$ 463,924	$ 470,404	$ 476,948	$ 483,557	$ 490,233	$ 496,975	$ 503,785	$ 510,663	$ 517,609	$ 524,625	$ 531,712	
$ 162	$ 165	$ 167	$ 169	$ 172	$ 174	$ 176	$ 179	$ 181	$ 184	$ 186	$ 3,831
$ 928	$ 941	$ 954	$ 967	$ 980	$ 994	$ 1,008	$ 1,021	$ 1,035	$ 1,049	$ 1,063	$ 21,892
$ 46	$ 47	$ 48	$ 48	$ 49	$ 50	$ 50	$ 51	$ 52	$ 52	$ 53	$ 1,095
$ 65	$ 66	$ 67	$ 68	$ 69	$ 70	$ 71	$ 71	$ 72	$ 73	$ 74	$ 1,532
$ 23	$ 24	$ 24	$ 24	$ 25	$ 25	$ 25	$ 26	$ 26	$ 26	$ 27	$ 547
$ 1,811	$ 1,836	$ 1,862	$ 1,888	$ 1,914	$ 1,940	$ 1,967	$ 1,994	$ 2,021	$ 2,048	$ 2,076	$ 42,733
$ 580	$ 588	$ 596	$ 604	$ 613	$ 621	$ 630	$ 638	$ 647	$ 656	$ 665	$ 13,682
$ 6,512	$ 6,603	$ 6,695	$ 6,788	$ 6,881	$ 6,976	$ 7,072	$ 7,168	$ 7,266	$ 7,364	$ 7,464	$ 153,647
$ 152	$ 155	$ 157	$ 159	$ 161	$ 163	$ 165	$ 168	$ 170	$ 172	$ 175	$ 3,596
$ 2,373	$ 2,406	$ 2,439	$ 2,473	$ 2,507	$ 2,542	$ 2,577	$ 2,612	$ 2,647	$ 2,683	$ 2,719	$ 55,984
$ 12,653	**$ 12,830**	**$ 13,008**	**$ 13,189**	**$ 13,371**	**$ 13,555**	**$ 13,740**	**$ 13,928**	**$ 14,117**	**$ 14,309**	**$ 14,502**	**$ 298,539**
$ 8,351	$ 8,467	$ 8,585	$ 8,704	$ 8,824	$ 8,946	$ 9,068	$ 9,192	$ 9,317	$ 9,443	$ 9,571	$ 197,026
$ 2,784	$ 2,822	$ 2,862	$ 2,901	$ 2,941	$ 2,982	$ 3,023	$ 3,064	$ 3,106	$ 3,148	$ 3,190	$ 65,675
$ 11,134	**$ 11,290**	**$ 11,447**	**$ 11,605**	**$ 11,766**	**$ 11,927**	**$ 12,091**	**$ 12,256**	**$ 12,423**	**$ 12,591**	**$ 12,761**	**$ 262,701**
$ 23,787	**$ 24,120**	**$ 24,455**	**$ 24,794**	**$ 25,136**	**$ 25,482**	**$ 25,831**	**$ 26,184**	**$ 26,540**	**$ 26,900**	**$ 27,263**	**$ 561,240**
$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	$ 221	**$ 4,012**
$ 221	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 221**	**$ 4,012**
$ 1,392	$ 1,411	$ 1,431	$ 1,451	$ 1,471	$ 1,491	$ 1,511	$ 1,532	$ 1,553	$ 1,574	$ 1,595	**$ 32,838**
$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	**$ 24,000**
$ 11,653	$ 11,830	$ 12,008	$ 12,189	$ 12,371	$ 12,555	$ 12,740	$ 12,928	$ 13,117	$ 13,309	$ 13,502	**$ 274,539**
$ 9,742	$ 9,878	$ 10,016	$ 10,155	$ 10,295	$ 10,436	$ 10,579	$ 10,724	$ 10,870	$ 11,017	$ 11,166	**$ 229,863**
$ 21,396	**$ 21,708**	**$ 22,024**	**$ 22,343**	**$ 22,666**	**$ 22,991**	**$ 23,320**	**$ 23,652**	**$ 23,987**	**$ 24,326**	**$ 24,668**	**$ 504,402**
$ 272,717	**$ 294,426**	**$ 316,450**	**$ 338,793**	**$ 361,459**	**$ 384,450**	**$ 407,770**	**$ 431,421**	**$ 455,408**	**$ 479,734**	**$ 504,402**	
$ 11,653	$ 10,768.91										**$ 158,760**
$ 9,742	$ 9,476.16										**$ 134,203**
$ 20,245	**$ - **										
$ -	$ 1,061	$ 12,008	$ 12,189	$ 3,284							**$ 28,542**
$ -	$ 402	$ 10,016	$ 10,155	$ 2,890							**$ 23,463**
$ 52,005	**$ 50,541**	**$ 28,517**	**$ 6,174**	**$ - **							
$ -	$ -	$ -	$ -	$ 9,087	$ 12,555	$ 6,708					**$ 28,349**
$ 19,263	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 19,263**	**$ 6,708**	**$ (0)**					
						$ 6,032	$ 12,581	$ 12,759	$ 12,940	$ 13,122	**$ 57,434**
						$ 10,915	$ 11,071	$ 11,228	$ 11,386	$ 11,546	**$ 56,146**

Tax Ratio	
Local Tax	53%
School Tax	47%

Brownfield Plan Eligible Expense Ratio			
MDEQ	$	344,967	94.71%
LOCAL	$	19,263	5.29%
TOTAL	$	364,230	100.00%

Eligible activity school/local reimbursement breakdown	
	MDEQ
Local Taxes	$187,302
School Taxes	$157,665
	$ 344,967

ATTACHMENTS

Attachment A

Approved Brownfield Plan and Resolution

(Available following local approval and execution)

Attachment B

Reimbursement Agreement

(Available following local approval and execution)

Attachment C

Vapor Barrier Specifications

SCALE: 1" = 120

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 C1
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 [redacted] 20' IF NOT 1" ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	CHKD BY: AP	SCALE: 1" = 20'
	FILE NAME: 01-5363-0-001FC1R00	

Land Science™ Technologies
1011 Calle Sombra - Ste. 110, San Clemente, CA 92673 P:949.366.8000 F:949.366.8090 www.landsciencetech.com

April 28, 2015

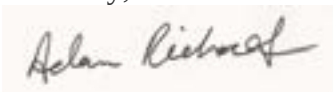
Adam Patton
Manager – Site Investigation Services
PM Environmental
3340 Ranger Road
Lansing, MI 48906

Re: Qdoba Retail – Owosso, MI – Geo-Seal® Site Compatibility

Dear Mr. Patton,

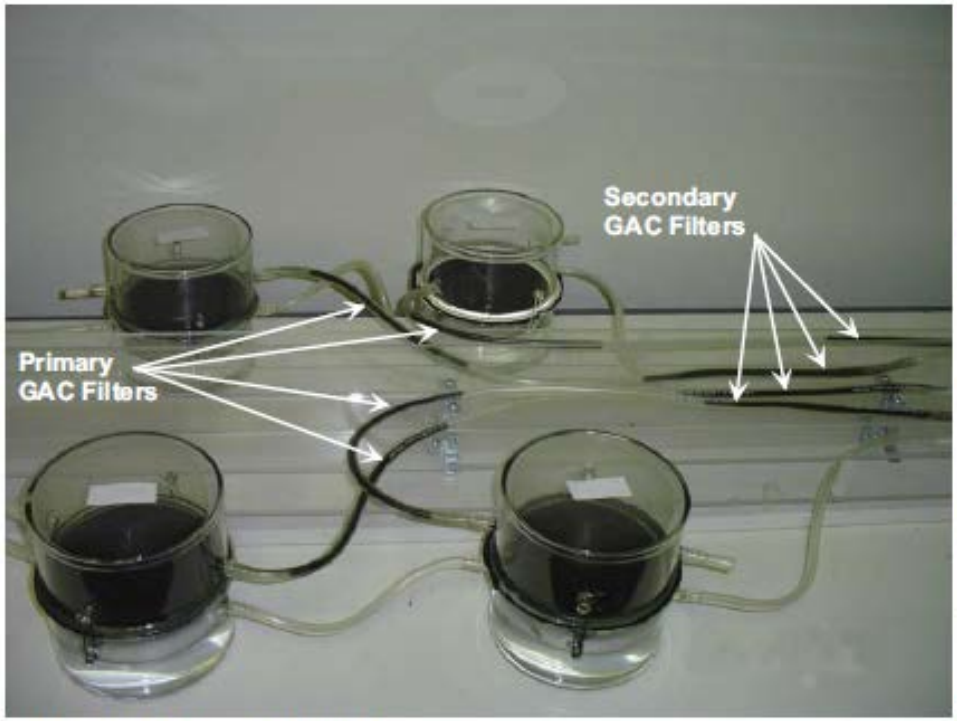
Upon review of the soil concentrations of PCE and an attachment provided from Global Environmental Engineering Inc. with soil boring data for the above referenced site, Land Science recommends the use of the FILM 11 base layer to be used in lieu of the Geo-Seal BASE layer. The FILM 11 base layer is an 11 mil cross laminated HDPE sheet which will provide additional chemical resistance protection per the site conditions. Therefore, Land Science Technologies verifies compatibility of the Geo-Seal system for the site and will approve warranty upon request.

Sincerely,

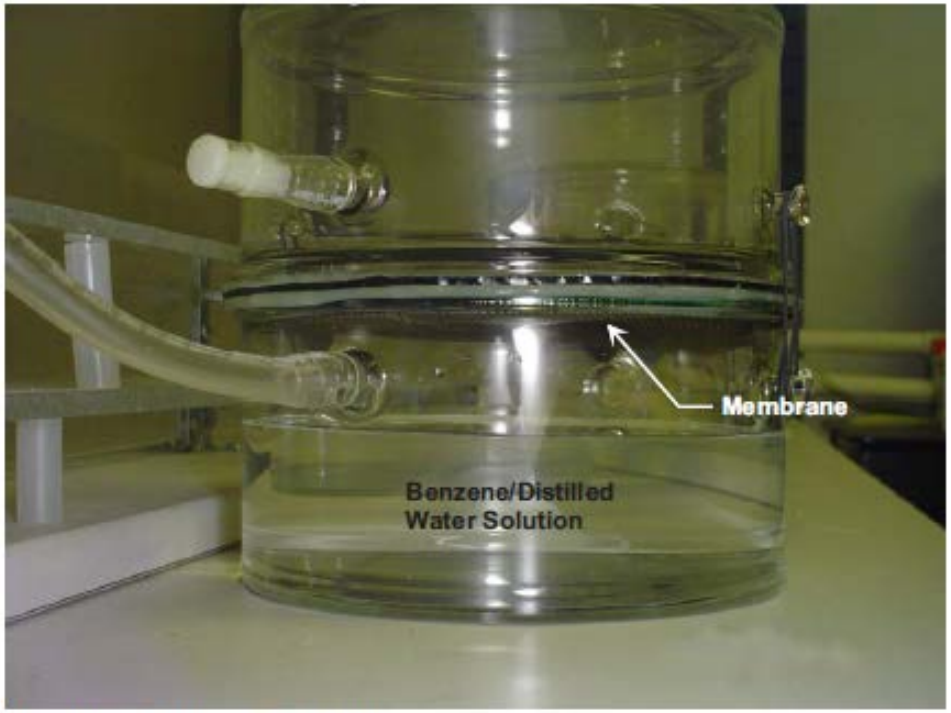


Adam Richards, PE
Central Region Technical Manager
arichards@landsciencetech.com
M: 312.515.1935

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 x 10^{-14} m^2/sec
Liquid Boot Plus	PCE	120,000 mg/m^3	3.1 x 10^{-16} m^2/sec
Geo-Seal	**PCE**	**90,000 mg/m^3**	**4.0 x 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**

Land Science™ Technologies
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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

Land Science™ Technologies
www.landsciencetech.com

Product Data Sheet

Vapor-VentÊ

Vapor-VentÊ 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		1ò	1ò
Standard Widths		12ò	12ò
Roll Length		165 ft	165 ft
Roll Weight		65 lbs	68 lbs

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.

Vapor-VentÊ
SOIL GAS COLLECTION SYSTEM
Version 1.5

SECTION 02 56 19 ï GAS CONTROL

PART 1 ï 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-VentÊ installation.
3. Vapor-Vent accessories.

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

1. Division 2 Section ñEarthworkò, ñPipe Materialsò, ñSub-drainage systemsò, òGas Control Systemò, ñFluid-Applied gas barrierò
2. Division 3 Section ñCast-in-Place Concreteòfor concrete placement, curing, and finishing.
3. Division 5 Section ñExpansion Joint Cover Assembliesò, 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 manufacturerôs specifications.

B. Sample ï 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^{Ê} 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 manufacturerôs 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.

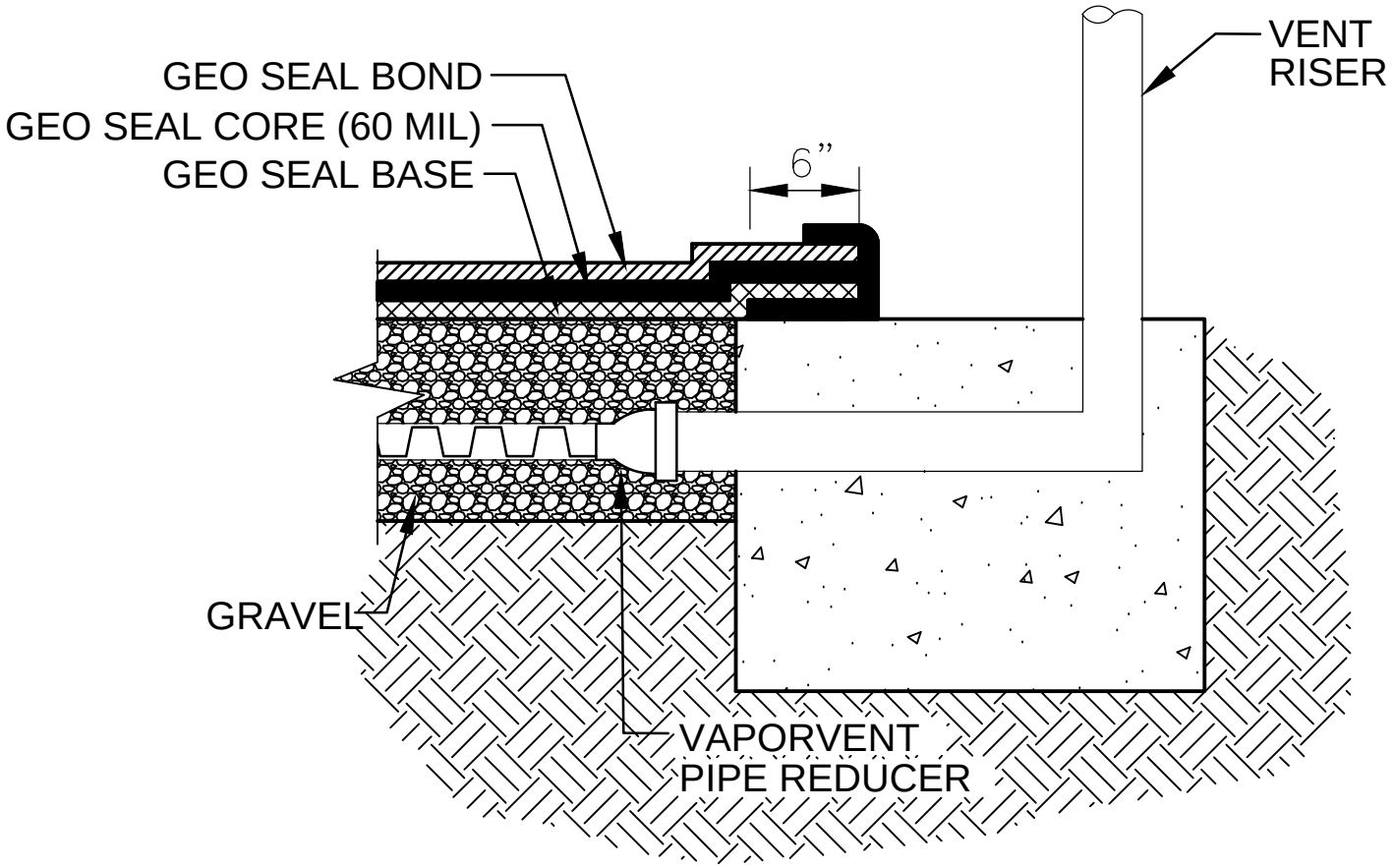
C. When crossing Vapor-Vent over footings or grade beams, **consult with the specifying environmental engineer and structural engineer for appropriate use and placement of solid pipe materials**. Place solid pipe over or through concrete surface and attach a Vapor-Vent End Out at both ends of the pipe 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.



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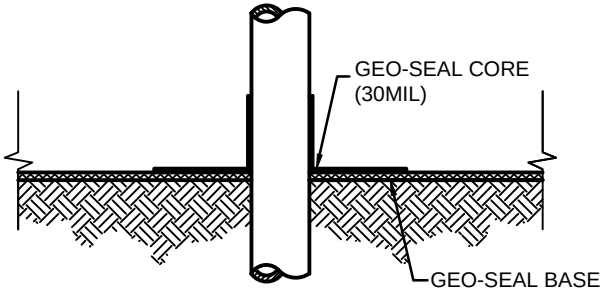
Geo-Seal®
Vapor Intrusion Barrier

DATE

SCALE

TITLE

VAPOR-VENT
VENT RISER



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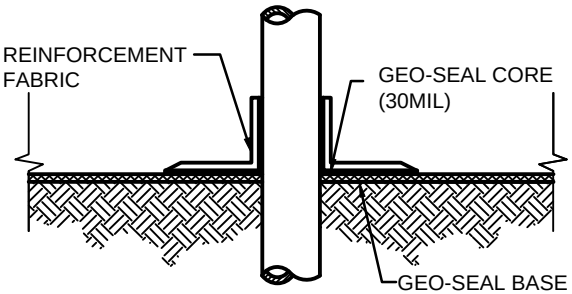

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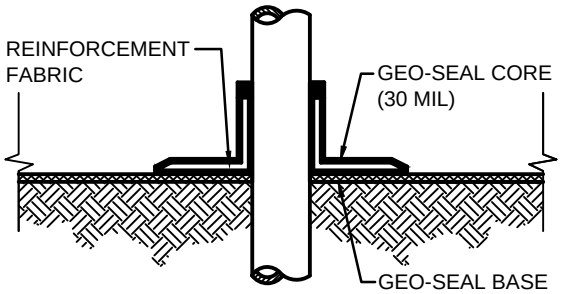

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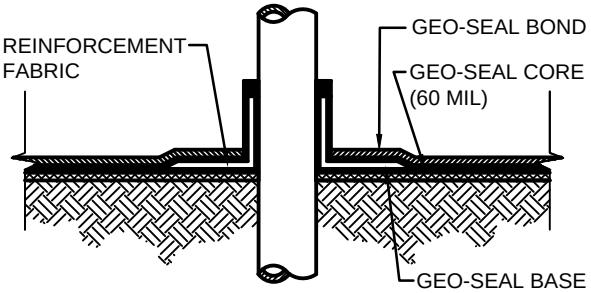

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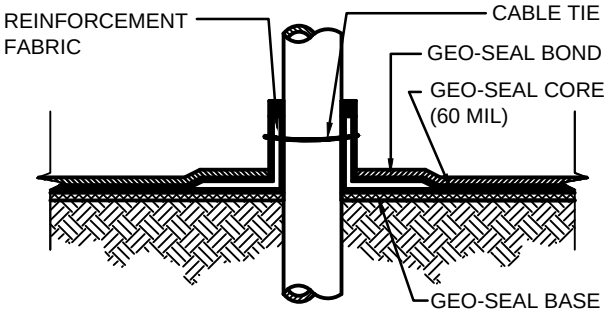

STEP 5

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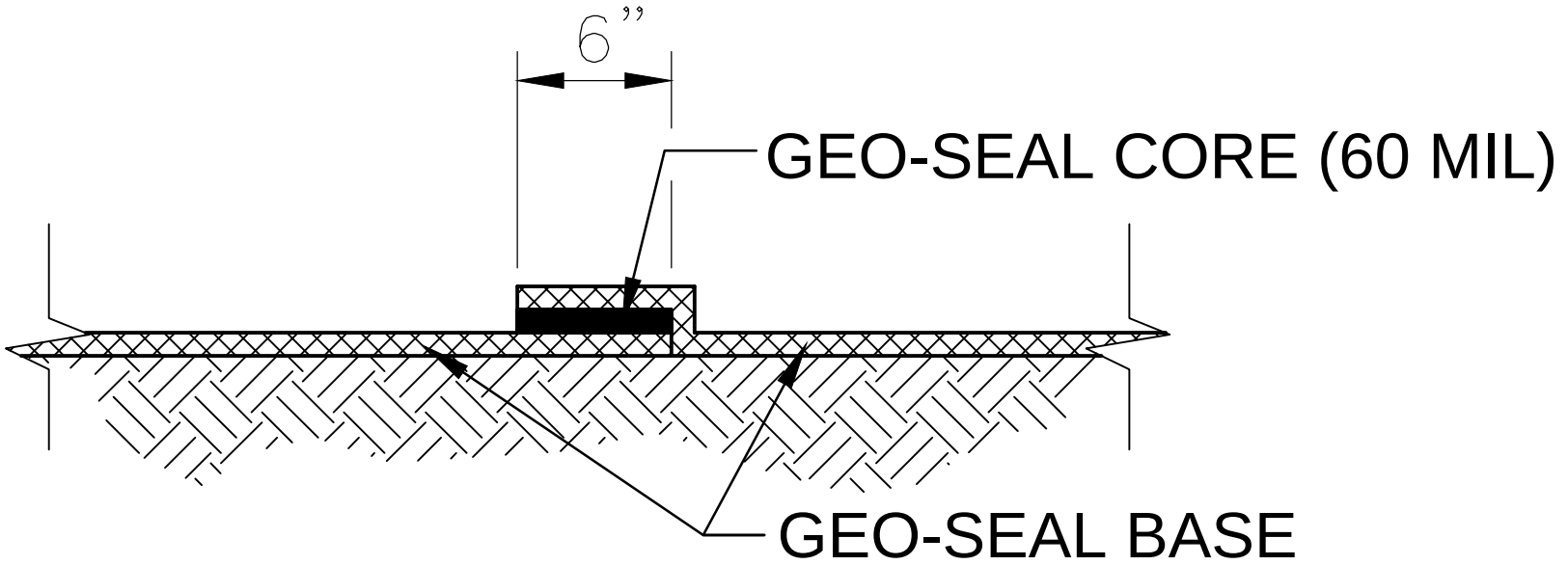
SCALE

TITLE

PENETRATION SEQUENCE



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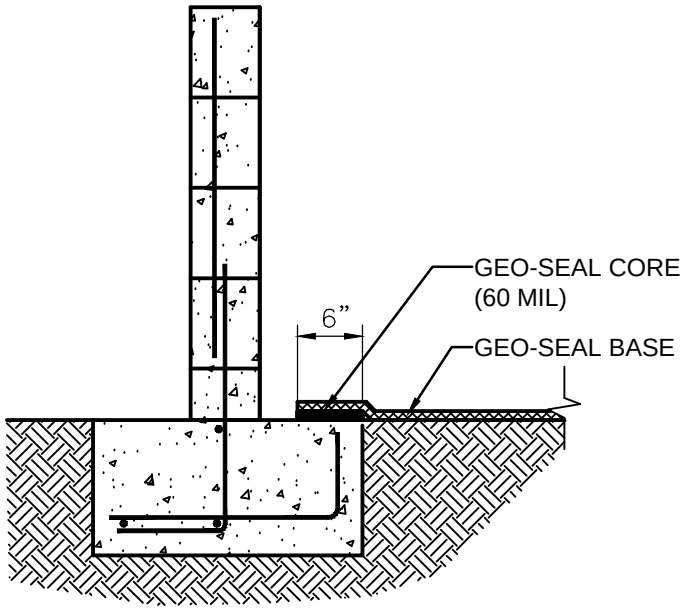
BASE OVERLAP DETAIL



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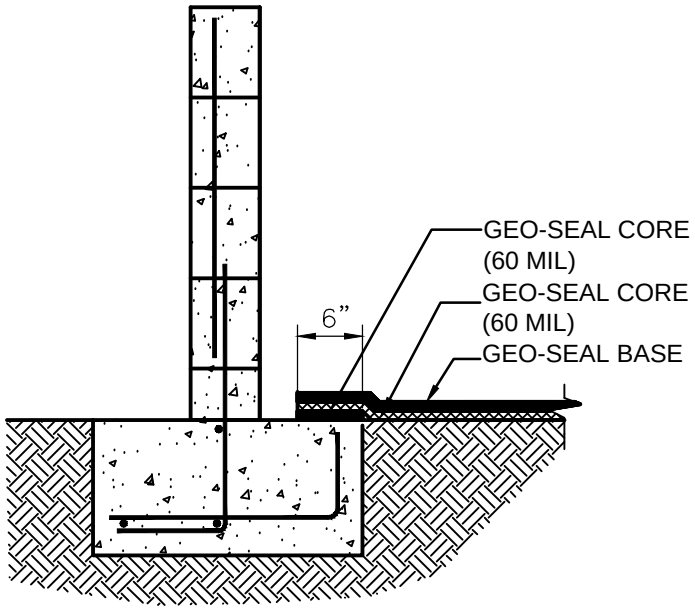

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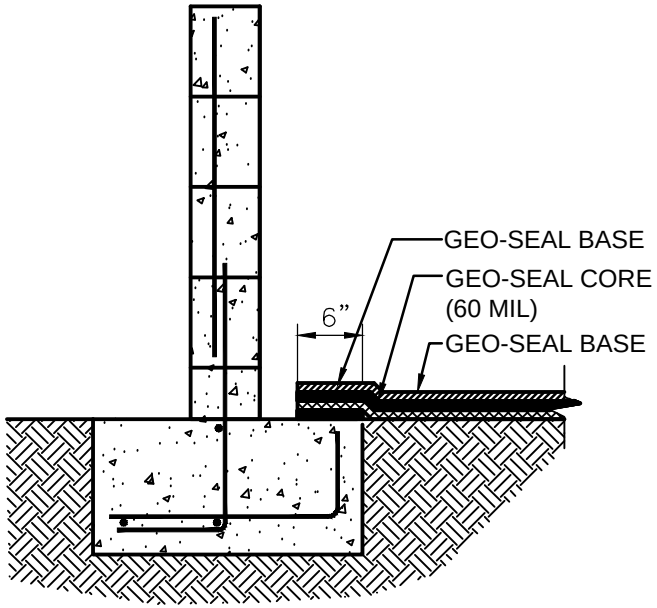

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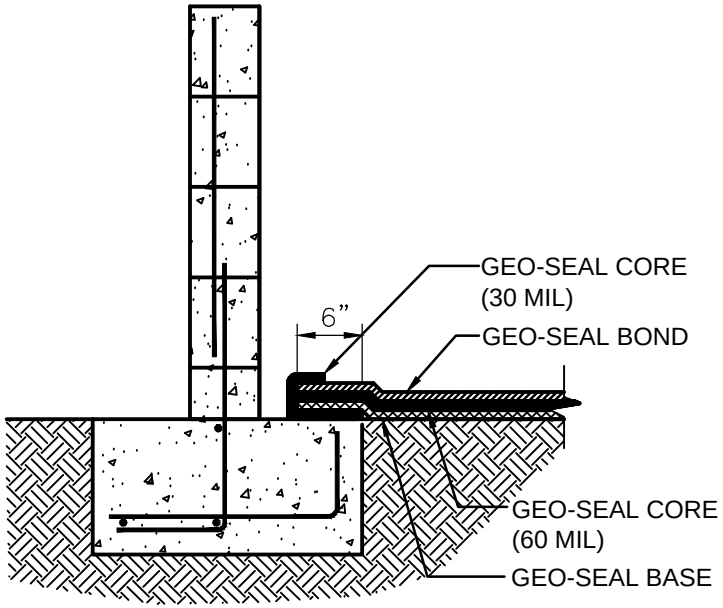

STEP 4

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Geo-Seal®
Vapor Intrusion Barrier

DATE

SCALE

TITLE

TERMINATION SEQUENCE

Land Science™ Technologies

A DIVISION OF REGENESIS, Inc.

Geo-Seal®

Vapor Intrusion Barrier

www.landsciencetech.com

Geo-Seal®

Geo-Seal® is an advanced composite gas vapor management technology (patent pending) designed to eliminate potential indoor air quality health risks associated with subsurface contaminant vapor intrusion.

Geo-Seal is an ideal gas vapor management technology designed for use on Brownfields or any type of environmentally impaired site, i.e. manufacturing facilities, dry cleaners, gasoline service stations, landfills, etc. ***Geo-Seal*** is placed between the foundation of the building and the soil pad to eliminate vapor exposure pathways and stop contaminated vapors from permeating through the slab. Vapor management systems incorporating both ***Geo-Seal*** vapor barrier and *Vapor-Vent* ventilation provide industry leading sub-foundation vapor mitigation technology. By deploying these systems developers ensure a healthy indoor environment while reducing the cost of site remediation and expediting site construction.

Triple-Layer Protection

The triple-layer system used in ***Geo-Seal*** provides maximum redundancy and protection against the formation of vapor pathways both during and after installation. Such pathways can result from chemically induced materials breakdown, punctures, and seam weaknesses resulting from poor detail work and/or application installation imperfections around penetrations. ***Geo-Seal*** also provides unmatched protection from a range of contaminant vapors including those from petroleum-based products and chlorinated hydrocarbons.

Field-Proven Technology

Geo-Seal is manufactured in partnership with E-Pro™ Systems which has over 20 years experience in the building products industry and a leading track record in barrier systems for vapor and waterproofing applications.

Geo-Seal®

Diagram

Diagram labels

1. *Geo-Seal* BASE - The BASE layer is rolled out geotextile facing down, which allows Geo-Seal CORE to be applied directly to the high density polyethylene. The BASE layer provides the ultimate substrate and enables the spray layer to be free of shadowing and pinholes.

2. *Geo-Seal* CORE - The CORE is applied at 60 mils, is sprayed to the base layer, seals around penetrations and seals the seams of the BASE layer.

3. *Geo-Seal* BOND - A proprietary protection layer is placed over the CORE layer to enhance the curing of the membrane and increase puncture resistance.

4. **Vapor-Vent:**
   - Eliminates the need for trenching
   - Cost-effective compared to pipe and gravel systems
   - Eliminates long-term costs when configured as a passive system
   - Allows for rapid installation
   - When used with *Geo-Seal* provides maximum protection against contaminated vapor

Geo-Seal® Triple-Layer System
(2 Chemical Resistant Layers + 1 Spray Applied Core Layer)

Dual Chemical Resistant Layers
The ***BASE*** layer (bottom) and the ***BOND*** layer (top) are composed of a high-density polyethylene material bonded to a geo-textile on the out-facing side. High density polyethylene is known for chemical resistance, high tensile strength, excellent stress-crack resistance and for highly reliable subsurface containment. The geo-textile which is physically bonded to the chemical resistant layer accomplishes two goals; it allows the BOND layer to adhere to the slab, and provides a friction course between the BASE layer and the soil.

Spray Applied CORE Layer
The CORE layer is composed of a unique, elastic co-polymer modified asphaltic membrane which also provides additional protection against vapor transmission. This layer creates a highly-effective seal around slab penetrations and eliminates the need for mechanical fastening at termination points.

Chemical Resistance
The dual chemical resistant layers combined with the spray CORE form a barrier resistant to the most concentrated chemical pollutant vapors.

Enhanced Curing
Geo-Seal is “construction friendly” as the reduced curing time of the ***Geo-Seal*** CORE layer and the ability to apply it in cooler temperatures ensures quick installation and minimizes the impact on construction schedules.

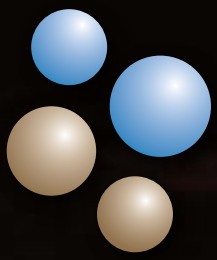
Puncture Resistance
Geo-Seal forms a highly puncture resistant barrier that greatly reduces the chance of damage occurring after installation and prior to the placement of concrete.

Removing Contained Vapors
Vapor-Vent can be used in conjunction with ***Geo-Seal*** to alleviate the buildup of vapors beneath structures as a result of vapor barrier implementation. ***Vapor-Vent*** can be utilized as an active or passive ventilation system depending on the requirements of the design engineer.

Certified Applicator Network
The application of ***Geo-Seal*** and ***Vapor-Vent*** can be performed by any one of many certified applicators throughout the country.

Service and Support
Geo-Seal representatives are available to provide job and site specific assistance. A local representative can ensure ***Geo-Seal*** and ***Vapor-Vent*** is installed as per the specification.

Geo-Seal®



Land Science™ Technologies

A DIVISION OF REGENESIS, Inc.

***Land Science Technologies* (LST) ™** is dedicated to providing advanced technologies for sustainable land development. A goal of LST is to provide innovative and technically sound development solutions for underutilized environmentally impaired properties, commonly referred to as Brownfields.

LST's cost-effective, industry leading technologies offer engineering firms and real estate developers solutions to issues facing the development of Brownfields today. LST is a division of ***Regenesis, Inc.***, a global leader in groundwater and soil remediation technologies since 1994.

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Technologies
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Attachment D

MDEQ Vapor Intrusion Review Documentation

REQUEST FOR VAPOR INTRUSION REVIEW

TO BE FILLED OUT BY SUBMITTER:

DOCUMENT TITLE: 381 Brownfield Redevelopment – Eastside (Owosso) Dry Cleaners

PROJECT MGR: Eric Van Riper (Part 201) and Kim Sakowski (381)

DATE: 8/11/15

SITE NAME: (Former) Eastside Owosso Dry Cleaners and Historic Gasoline Stations

COUNTY/TWP: Owosso, MI

STIE ID 78000161 **INDEX** 44809 **PCA:** 30740 **PROJ:** 457097

DATE REVIEW NEEDED: August 11, 2015

COMMENTS/QUESTIONS FROM PM:

Please complete VI review for the adequacy of the proposed vapor barrier for the 381 project.

TO BE FILLED OUT BY REVIEWER:

DATE REVIEW COMPLETED: August 11, 2015

COMMENTS FROM REVIEWER:

Conclusion: The proposed passive (can convert to active) Geo-Seal Vapor barrier system, if properly implemented, should prevent unacceptable risk from sub-surface vapors emanating from chlorinated solvent and petroleum impacted groundwater and soils not excavated out. It is our understanding that the bulk of the grossly chlorinated solvent impacted soils under the proposed parking area will be excavated out utilizing other state funding sources. It is also our understanding that the proposed passive VI mitigation system is reviewed and approved by a private party engineer. Land Science is certifying their product for this project.

Discussion: The consultant utilized DEQ VI guidance (Appendix C.6- checklist for reviewing the design of a passive mitigation system). Since the venting collection system is different than table A.6.1 of our VI guidance, we leave it to the engineers and post-installation testing to determine if four risers is appropriate to gather the vapors and properly vent them to the outside. The proposed vapor mitigation system comprises two spray sealant layers, a core layer applied above a network of vapor vent lines designed to eliminate trenching (applied as a layer). The vapor vent lines are separated by about 360 feet of permeable material (gravel). Vent risers are connected and will exit the south side of the building connected to the north-south piping runs. On the south side of the

proposed building, vapor test ports are connected to each of the four (4) vents for smoke and pressure testing. The materials used within the layers are chemically resistant for the contaminants of concern.

VI CSM: While the VI CSM is not fully developed, the soils data indicate maximum concentrations of benzene (PSB/TW-6) are at 4,300 ug/kg benzene at 9'-10' depth near the proposed building footprint. To the east and northeast of the proposed non-residential building, a parking lot will be located over soils grossly impacted chlorinated and Stoddard solvents (petroleum based) of the former Eastside (Owosso) Dry Cleaners Part 201 facility. Maximum concentrations in the soils include 5,490,000 ug/kg PCE, 49,400 TCE ug/kg, 41,700 ug/kg cis-1,2 DCE and 490 ug/kg vinyl chloride. State-funded proposed work will excavate out the majority of these soils (manifest out as F-listed waste). Maximum concentrations of solvents in the shallow groundwater (4.8'-10' BGL) include PCE at 5,100 ug/l; TCE at 1,000 ug/l and vinyl chloride at 90 ug/l. Benzene maximum concentrations are 460 ug/l. Since these contaminants exceed VI screening levels for shallow groundwater, a pre-emptive approach to address VI risk is appropriate especially since full delineation of contaminants released over the years is not complete.

The 381 work plan includes excavation and disposal of up to 635 cubic yards of soils and 15,000 gallons of contaminated groundwater within the work area of the building footprint which will remove the shallow soils contamination and provide a layer of clean backfill to support bio-attenuation of at least some of the petroleum based vapors. The implementation of the VI mitigation system will include pre-installation of utility penetrations through the floor so that they may be properly sealed by the Geo-Seal multi-layer product. Smoke and "coupon" (swatches of the VI barrier) testing will be used to verify the integrity of the system. Depending on these and pressure test results, whether or not the system operates in a passive or active mode will be determined.

Essentially, this mitigation system appears to be designed to account for substantially higher concentrations of contaminants and is appropriate as a "belt and suspenders" approach that should achieve due care compliance over time if the O&M plan is implemented.

[signature]	8-11-15
Barbara Cowles	8-11-2015

Reviewer's Signatures **Date**

REIMBURSEMENT AGREEMENT

This Brownfield Redevelopment Loan Agreement is made on this _____ day of _____, 2015 between DEVELOPER RESTAURANTS, LLC of 109 East Broadway Street, Mount Pleasant, Michigan 48858 ("Developer") and the Owosso Brownfield Redevelopment Authority (the "Authority").

RECITALS

A. Developer is the owner of certain property located at the southwest corner of East Main Street and South Gould Street in the City of Owosso. The property is legally described on the attached Exhibit A (the "Property").

B. The Property has been deemed a "facility" under Part 201 of Michigan's National Resources and Environmental Protection Act ("Part 201").

C. Developer proposes to construct a commercial retail development on the Property (the "Development") in accordance with the Site Plan approved by the City of Owosso Planning Commission on September 22, 2014.

D. There are certain eligible costs which Developer will incur as a result of the redevelopment of the Property consisting of certain environmental assessment activities, due care activities, additional response activities (demolition), and asbestos abatement activities and other costs which are eligible for reimbursement under Act 381 (collectively referred to as "Eligible Activities".) The City of Owosso Brownfield Redevelopment Authority ("OBRA") has incurred and will continue to incur certain costs in connection with the Brownfield Plan ("Administrative Costs"), for administrative and operating activities, and for preparing and administering this project. The cost of the Eligible Activities and the Administrative Costs are collectively referred to as "Costs" or "Eligible Costs". The types of Eligible Activities and the Eligible Activity Costs are more fully described in the Brownfield Plan adopted on October 12, 2015 by the OBRA and approved by the City Council on _____, pursuant to Act 381. The costs and activities identified in the Brownfield Plan are estimates; the actual costs may vary depending on the nature and extent of unknown conditions encountered on the Property. However, the maximum reimbursement for Eligible Activity costs is capped at the amount approved in the Brownfield Plan and further limited by the terms of this agreement.

E. In order to facilitate the redevelopment of the Property, the City has entered into a Clean Michigan Initiative Implementation ("CMI") Brownfield Redevelopment Loan Contract with the Michigan Department of Environmental Quality ("MDEQ") dated _____ 2015 (the "City/MDEQ Loan Agreement"). Under the City/MDEQ Loan Agreement, the MDEQ has committed to make available to the City the amount of Two Hundred Ninety-Two Thousand Nine Hundred Sixty Three Dollars ($292,963) to provide loan funding to cover costs associated with the redevelopment of the Property.

F. The proceeds of the MDEQ loan to the City will be made available to fund eligible expenses necessary for the redevelopment of the Property, which will include the costs identified in Exhibit B ("Eligible Expenses").

G. This Agreement also sets forth the terms and conditions under which Developer and the City will utilize and repay the loan proceeds made available by MDEQ to the City and Developer for Eligible Activities incurred outside of the MDEQ Loan as approved in the Brownfield Plan attached here to as Exhibit C.

In consideration of the premises and mutual covenants contained in this Agreement, Developer and the City hereby agree as follows:

1. Development. Developer shall commence work to implement the activities to be funded by the MDEQ loan proceeds after a work plan for such activities is approved by the City and MDEQ. Developer will use its reasonable best efforts to complete such work by September 30, 2016. For those costs which Developer seeks reimbursement from available Tax Increment Revenue (TIR) and/or MDEQ Loan proceeds, Developer shall submit a Brownfield Plan and Work Plan, which identifies the activities, cost budget and schedule to complete the activities.

a. The parties agree that this Agreement and the Tax Increment Revenues collected and distributed pursuant to the Brownfield Plan are intended to fund only the Eligible Costs that have been approved by the Authority.

b. Prior to the initiation of eligible activities, Developer shall submit a detailed Implementation Plan that includes, at minimum, applicable estimates of the following items related solely to eligible activities;

   (i) Cost estimates for project costs related to eligible activities; and

   (ii) The Implementation Plan costs shall be provided in the same format as Exhibit A to the Brownfield Plan for the Brownfield Plan costs approved by the Authority.

c. Developer shall comply fully with all local ordinances, state and federal laws, and all applicable local, state and federal rules and regulations. Nothing in this Agreement shall abrogate the effect of any local ordinance.

d. The Agreement does not obligate the City to issue any permit required by law to implement the Development.

e. Noncompliance with this Agreement or discovery of material irregularities at any time are regarded as material breaches of this Agreement. The Authority, in addition to any other remedy provided by law, may do one or more of the following:

   (i) withhold future payments to the extent such reimbursed payments relate directly to the noncompliance with the Agreement;

   (ii) recover reimbursement payments already disbursed to the extent such reimbursed payments relate directly to the noncompliance with the Agreement; or

   (iii) terminate this Agreement.

2. Capture of Taxes. The City shall, during the term of this Agreement, collect all Tax Increment Revenues from the Property and transmit revenues generated from real and personal property to reimburse the parties for the costs of eligible activities based upon the following priority:

a. Michigan Department of Environmental Quality – Remediation and Redevelopment Division for the loan of $292,963.00
b. Planned administrative costs of $1,500.00 per year;
c. Developer's Eligible Expenses; and
d. Local Site Remediation Revolving Loan Fund.

Such reimbursement shall not be more than the tax increment revenues captured during the duration of

the Brownfield Plan from the taxable improvements located on the Property, including both real property and personal property. Nor shall the total amount of reimbursement be for more than the reasonable and necessary cost of the eligible activities approved by the Authority or otherwise permitted by the Act.

3. Submittal of Costs. Before requesting any reimbursement, Developer shall pay and submit an affidavit of payment for the reasonable and necessary costs of the eligible activities that have been approved by the Authority. For those Eligible Costs for which the Developer seeks reimbursement from the Authority, Developer shall submit to the Authority such of the following as may be required by Authority representatives:

a. a written statement detailing the costs;

b. a written explanation as to why reimbursement is appropriate under the Plan and this Agreement;

c. copies of invoices from consultants, contractors, engineers, attorneys or others who provided such services;

d. copies of full unconditional waiver(s) from the vendor(s) documenting that the invoice was actually paid;

e. if, not already submitted, copies of the contract with the contractor or supplier providing the services or supplies for which reimbursement is sought;

f. a statement from the engineer and project manager overseeing the work recommending payment; and

g. any other documentation requested by the Authority, in a format and on such forms approved by the Authority, with Developer's request for reimbursement to assist the Authority in determining whether the work was performed as approved.

All documentation related to the request for reimbursement shall be submitted within ninety (90) days after the completion of each approved eligible activity. No later than receipt of a Certificate of Occupancy and prior to reimbursement payments being initiated, Developer shall submit to the Authority a report of the results of the eligible activities performed. Such results shall include, without limitation, any abatement reports, demolition and disposal documentation, supplemental environmental investigation reports and response activity reports. In addition, Developer shall submit construction lien waivers from the contractors and subcontractors for the approved eligible activities prior to any payments being initiated. Developer may submit a reimbursement request including such information whenever it is available for many years thereafter. Developer and Authority agree that no reimbursement requests will be accepted by the Authority after December 31, 2017.

In no event shall Eligible Costs exceed the estimates developed pursuant to paragraphs 1.b(i) and (ii) unless the Brownfield Plan is amended pursuant to paragraph 1.

If all real and personal property taxes relating to the site are not paid before interest and penalties attach, the duty to pay reimbursements to Developer or it assigns shall cease.

4. Payment of Eligible Brownfield Plan and Work Plan Costs. Payments to Developer shall be made as follows:

a. Within 60 days of its receipt of the materials identified in paragraph 3 above, the Authority shall decide whether the payment request is for Eligible Costs and whether such costs are accurate. The Authority will determinate the amount to be reimbursed, based upon the reasonable and necessary costs of the eligible activities approved by the Authority and the State or otherwise

permitted by the Act in light of the actual costs presented in Developer's submitted documentation. Such amount shall not exceed the amounts set forth in Section 4(d), subject to such amendments as may have been approved by the Authority, nor shall such costs be reduced by the Authority without good cause shown, such approvals not to be withheld unreasonably. If the Authority determines all or a portion of the requested payment is for the Eligible Costs and is accurate, it shall see that the portion of the payment request that is for Eligible Cost and is accurate is processed as provided in subparagraph (b) below. If the Authority disputes the accuracy of any portion of any payment request or that any portion of any payment is for the Eligible Costs, it shall notify Developer in writing of its determination and reasons for its determination. Developer shall have 28 days to address the reasons given by the Authority and shall have an opportunity to meet with the Authority's representatives or, if the Authority Board consents, to meet with the Authority's Board to discuss and resolve any remaining dispute. In doing so, Developer shall provide the Authority a written response to the Authority's decision and the reasons given by the Authority. If the parties do not resolve the dispute in such a manner, it shall be resolved as provided in paragraph 6 below.

b. Once it approves any request for payment as Eligible Costs and approves the accuracy of such costs, the Authority shall pay Developer the amounts for which submissions have been made pursuant to paragraph 4 of this Agreement by June 30th of the following year, as directed by the Brownfield Plan, until all of the amounts for which submissions have been made have been fully paid to the Parties, or the repayment obligation expires, whichever occurs first.

c. The repayment obligation under this Agreement shall expire upon the payment by the Authority to the Parties of all amounts due to the Parties under this Agreement or a maximum of 30 years of TIR reimbursement, whichever occurs first.

d. The following applies to the amount to be reimbursed under this Agreement:

   (i). The OBRA will use captured taxes as referred to in section 2 to reimburse Developer for Eligible Costs total amount not to exceed $482,548.

   (ii). The amount of Eligible Costs to be reimbursed with the capture of taxes levied for school operating purposes ("School Taxes") is estimated to be $110,400.

   (iii). The amount of Eligible Costs to be reimbursed with the capture of taxes not levied for school operating purposes ("Local Taxes") is estimated to be $124,450.

   (iv). Upon payment to Developer of total reimbursement as outlined above being met, or expiration of the Plan, reimbursements to Developer shall cease.

e. The sole source for any reimbursement shall be Tax Increment Revenues. To the extent permitted by law, such reimbursements, once approved by the Authority under subparagraph b. above shall be and remain valid and binding obligations of the Authority until paid or until expiration of the time for payment as provided in subparagraphs c. and d. above. However, Developer shall bear any risk of a change in law prohibiting reimbursement at the time Tax Increment revenues are available for reimbursement to Developer for costs that were Eligible Costs at the time the Authority approved them. In no event shall Developer be reimbursed for any approved eligible costs that have been or will be reimbursed or credited against other obligations by any other governmental entity.

f. If any of the Property is substantially destroyed by fire or natural events or causes as determined by the building official of the City, this Agreement shall terminate unless reconstruction occurs at any equal or greater taxable value within twelve (12) months of the date of the loss. No payments shall be made during the period of reconstruction. Payments shall resume when the reconstruction is substantially complete as determined by the Building Official.

g. In addition to any other remedies provided in this Agreement, if any payment made by the Authority is determined to be improper or outside of the scope of its obligations under this Agreement, or in the event of Developer's breach or default of this Agreement, Developer shall, at the request of the Authority, repay or return any monies paid by the Authority that are directly related to said breach, default or improper payment.

5. Adjustments to Eligible Costs. An estimate of the costs to be included as Eligible Costs is included in the Brownfield Plan and Work Plan. Adjustments for types and amount of costs may be made upon submittal by Developer with an explanation as to the reason for the change in cost amount or type of activity, and the City shall be obligated to make MDEQ loan proceeds available on an adjusted basis provided the total costs to be reimbursed for the project do not exceed the total loan amount stated in the City/MDEQ Loan Agreement and the costs are eligible.

6. Dispute of Eligible Costs. If there is a dispute over whether a cost submitted by Developer is an "Eligible Cost", the dispute shall be resolved by an independent qualified professional chosen by mutual agreement of the parties. If the parties are unable to agree upon a professional, then each party (the City, the Authority and Developer) shall appoint an independent qualified professional to review the Authority's decision, provided that each party chooses a professional that has not been directly employed by or provided services to that party for a period of two (2) years before the date of proposed appointment. If and to the extent that two of the three qualified professionals so selected agree that costs submitted are eligible pursuant to Brownfield Plan and was previously approved by the Authority, this shall constitute an award and Developer shall be reimbursed those costs in accordance with this Agreement. In addition, any such award may be used as the basis for the Shiawassee County Circuit Court rendering judgment that such award constitutes a final decision under statutory arbitration.

7. Reporting. Developer shall complete and submit to the City quarterly progress reports, which satisfy the City's obligation as borrower under the City/MDEQ Loan Agreement and under Act 381. The report shall be sent by the City in time for the City to meet the deadlines for submittal under the City/MDEQ Loan Agreement and Act 381.

8. Compliance with the City/MDEQ Loan Agreement. Developer agrees to comply with the terms and conditions of the City/MDEQ Loan Agreement. Developer shall not take any action or fail to take any action which would cause the City, as the borrower under the City/MDEQ Loan Agreement, to be in default or violate any provision of the City/MDEQ Loan Agreement. If the City claims that Developer has caused the City to be in default or violate a provision of the City/MDEQ Loan Agreement, the City shall provide written notice of the claimed default or violation and Developer shall cure the default within thirty (30) days of the date of receipt of such notice; provided, however, that if the claimed default or violation cannot be reasonably cured within that time period, the City may elect to grant Developer an additional period of time to cure the default.

9. Loan Payments by Developer. Under the City/MDEQ Loan Agreement, as reflected on the Amortization Schedule attached as Exhibit B to that agreement, the City is required to make loan payments to the MDEQ. The parties mutually agree and understand that tax increment revenues generated in accordance with a Brownfield Plan approved by the OBRA and will be used to repay the MDEQ loan proceeds. It is expected that there will be sufficient available tax increment revenues to repay the full MDEQ loan amount. However, notwithstanding anything in this Agreement to the contrary, if for any reason the Development does not result in sufficient revenues to satisfy the Authority's reimbursement obligations, the Developer agrees that it will not have any claim or further recourse of any kind or nature against the city of Owosso or the Authority. Subject to Developer's right to request an amendment to the Plan Amendment of Act 381 Work Plan, in the event the captured tax revenues are insufficient, the Developer assumes financial responsibility for any unreimbursed shortfall.

The authority shall be under no obligation to reimburse, nor shall interest accrue on, any Eligible Costs so long as Developer's property taxes are delinquent.

10. Access for Inspection. Employees and agents of the Authority and the City are authorized to enter upon the Property following a minimum of one (1) business day notice to Developer for the purpose of inspecting the work related to the authorized eligible activities and making determinations that such work is being performed in accordance with the Brownfield Plan in a workmanlike manner.

11. Indemnification. Developer shall defend, indemnify and hold the City and Authority, and their agents, representatives and employees (hereinafter "Indemnified Persons") harmless from any loss, expense (including reasonable legal counsel fees) or liability of any nature due to any and all suits, actions, legal or administrative proceedings, or claims arising from or on account of the acts or omissions of Developer, its officers, employees, agent or any persons acting on its behalf or under its control, in implementing the eligible activities described in the approved work plans or arising in any way from this Agreement, including but not limited to, claims for damages, reimbursement or set-off arising from, or on account of, any contract, agreement, loan contract or arrangement between Developer and any person for the performance of eligible activities or the terms of this Agreement, including claims on account of construction

12. Insurance. During construction, Developer and any contractor or subcontractor shall provide and maintain comprehensive general liability insurance with the limits of One Million and No/100 ($1,000,000.00) Dollars combined single limit, for claims which may arise from Developer's operations under this Agreement, naming the Authority and the City as additionally names insureds. Proof of such insurance shall be provided to the Authority in care of the Authority's Administrator prior to initiating any redevelopment activities.

13. Payment of Taxes. Developer or any of its successor or assignees of Developer shall pay all real and personal property taxes or special assessments levied on any portion of the Development on or before the date the same are payable, before any additional interest penalty for late payment is applied.

14. Developer's Representations, Warranties and Covenants. The Developer hereby makes the following representations, warranties and covenants:

(i.) Eligible Property. The Property is "eligible property" as defined in Act 381 and is eligible for the capture of Tax Increment Revenues pursuant to Act 381.

(ii.) Eligible Costs. The Developer will only submit for reimbursement under Paragraph 4 hereof such costs that it has reasonably determined are "Eligible Costs" within the meaning of Act 381.

(iii.) Due Authorization. The representatives signing this Agreement are duly authorized by the Developer to enter into this Agreement.

15. Events of Default. Each of the following shall constitute and event of default:

(i.) Any representation or warranty made by the Developer in this Agreement proves to have been incorrect or incomplete in any material respect when made or deemed to be made.

(ii.) The Developer fails to observe or perform any covenant or agreement contained in this Agreement for 30 days after written notice thereof shall have been given to the Developer by the Authority.

(iii.) The Developer abandons or withdraws from the reuse and development of the Property or indicates its intention to do so.

(iv.) The Developer fails to pay any funds within 30 days of the date due which are required to be paid to the Authority pursuant to this Agreement, including but not limited to its real and personal property taxes as set forth in Paragraph 13 hereof.

(v.) The Developer terminates its existence.

(vi.) The Developer files an appeal with the Michigan State Tax Tribunal contesting any taxes assessed against the Property or the taxable value, assessed value or state equalized value of the Property.

(vii.) Any material provision of this Agreement shall cease to be valid and binding on the Developer or shall be declared null and void; the validity or enforceability of such provision shall be contested or denied by the Developer, or the Developer denies that it is bound by this Agreement.

16. Remedies upon Default. If any event of default as defined above shall occur and be continuing for 30 days after written notice of default from the Authority, the Authority shall have the right, but not the obligation, to terminate this Agreement effective immediately and the Developer shall be responsible for all costs which the Authority has incurred in connection with the Property and this Development Agreement, and shall be responsible for all Eligible Costs, without contribution from Tax Increment Revenues collected by the Authority from taxes levied on the Property.

17. Assignment. Developer's rights and obligations under this Agreement may not be assigned without prior written consent of the City, should consent be required it will not be unreasonably withheld.

18. Waiver. No term, condition, covenant or provision as to this Agreement may be waived, except in writing, signed by the waiving party. No oral statements, course of conduct or course of dealing shall be deemed a waiver. No waiver by any party of any violation or breach of this Agreement shall be deemed or construed to be a waiver of any other violation or breach, whether continuing waiver of any violation or breach.

19. Termination. This Agreement shall terminate when all of the obligations required under this agreement have been fulfilled, a default has occurred, or upon mutual agreement of the parties.

20. Notices. All notices and communications required by this Agreement shall be in writing and shall be sufficiently given and deemed delivered when received if mailed by registered or certified mail or upon receipt of facsimile addressed to the respective parties as follows:

If to City of Owosso:
City Clerk
Owosso City Hall
301 West Main Street, Owosso, Michigan 48867
Telephone No. (989) 725-0599

If to Developer Restaurants, LLC:
Kevin Egnatuk
Developer Restaurants, LLC
109 East Broadway, Mount Pleasant,
Michigan 48858
Telephone No. (989) 205-1136

or to such other addresses such party may specify by appropriate notice.

By signing below, all parties represent and warrant their authority to enter into this Agreement on behalf of the respective organizations. The parties have signed this Agreement as of the date first written above.

Owosso Brownfield Redevelopment Authority

By: _____
David Vaughn
Its: President

By: _____
General Grant
Its: Secretary

Developer Restaurants, LLC

By: _____
Kevin Egnatuk

Its: _____