THE MIND, BODY & SPIRITS INSPIRED DINING ORGANIC RESTAURANT

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INTRODUCTION

The new Mind, Body & Spirits Inspired Dining Organic Restaurant, located at 301 S. Main Street in downtown Rochester, MI, opened in November of 2008. It is located on the southwest corner of S. Main Street and W. Third Street. It is housed in an existing two-story brick building with a full basement and has a New Greenhouse / Kitchen / Restrooms / Dining Deck Addition located in the former rear parking lot area to the west.

KEYWORDS

green architecture restaurant, greenhouse, sustainable technology, renewable energy systems, geothermal

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BUILDING TYPE

The original Main Street portion of this typical midwest turn-of-the-century small town two-story brick building was constructed in the 1880s and was known as the Mack Building (H.H. Mack was the builder). In the late 1880s it housed the B.A. Horvitz's dry goods and millinery store on the first floor with the owner's family living quarters located on the second floor (Figure 1). Over the ensuing years it housed the H.H. Mack Real Estate firm in the 1920s on the second floor and more recently The Country Mouse and Xochipilli Galleries in the 1960s and '70s. A fire on Thursday, November 18, 1971 destroyed the interior wood framed floors

FIGURE 1. Historical and Existing Southeast Exterior Views Looking Northwest.

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and interior walls, but the masonry brick exterior shell remained standing. New wood floors with interior perimeter 2×6 bearing walls were built. The last business to own and occupy the building was David John's DMJ Interiors (Figure 1) who relocated his business to another building in downtown Rochester, MI. He sold the building in November 2007 to Mike Plesz, CEO of Pleszure Food Group and the Owner of the Rochester Mills Restaurant & Brew Pub, the Royal Oak Restaurant & Brew Pub and the Detroit Restaurant & Brew Pub.

The design (Figure 2) and the renovation and construction of the Mind, Body and Spirits Inspired Dining Organic Restaurant took about six months each, with the design starting in November of 2007 and renovation and construction of the restaurant completed and opened for business in November of 2008 (Figure 3).

The energy efficient features of this new restaurant and addition include: energy efficient building insulated building walls and roof, SIP panel addition roof and new double glazed low-E argon gas filled windows.

FIGURE 2. New Ariel View of 3D CAD Design Model.

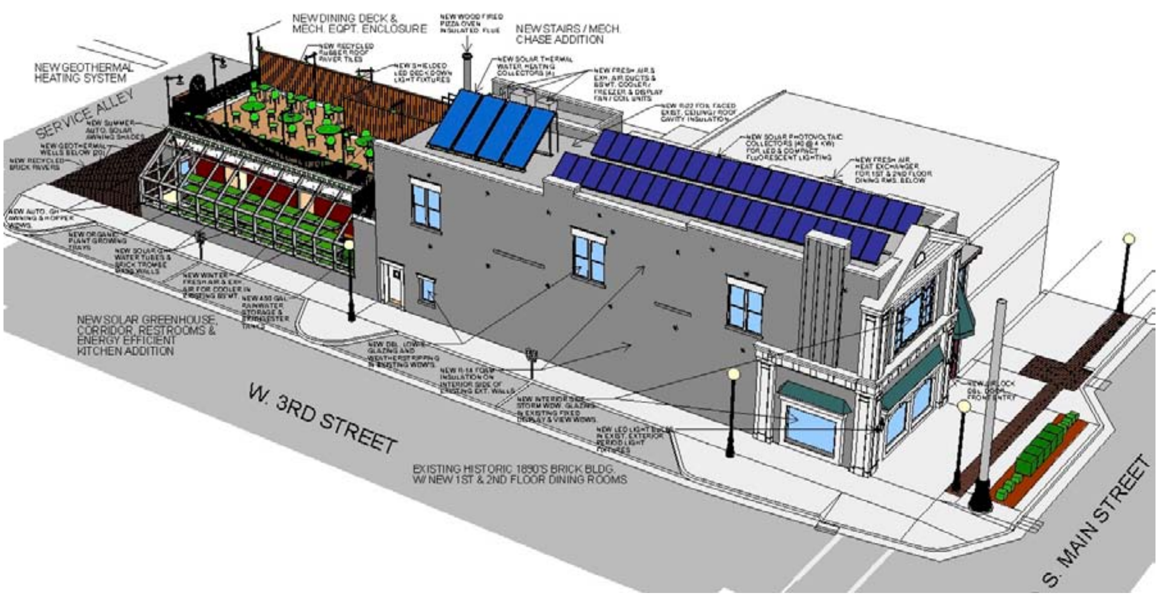

FIGURE 3. New Exterior Views Looking Northwest and Northeast.

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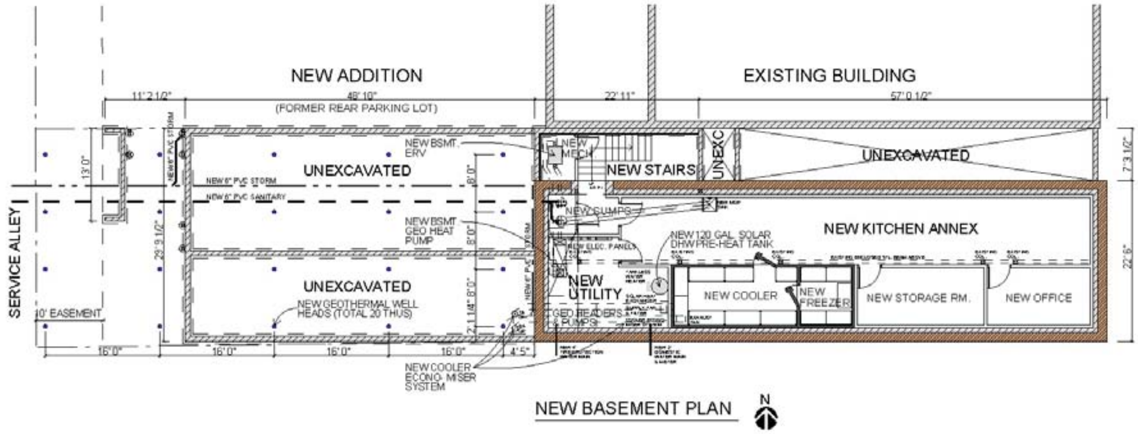

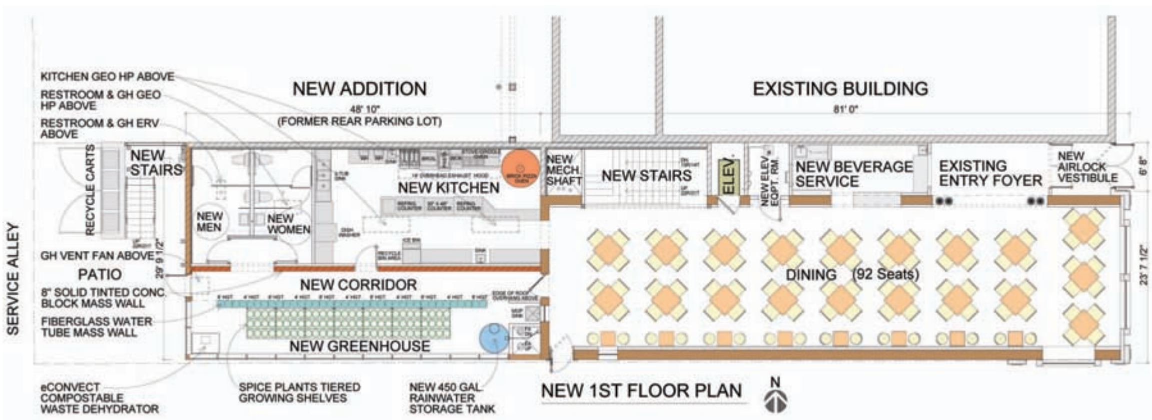

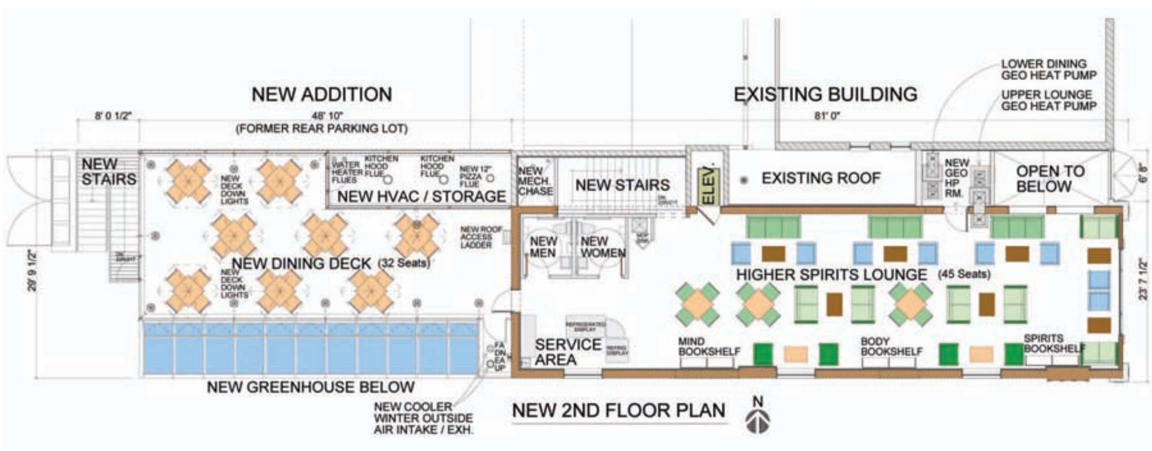

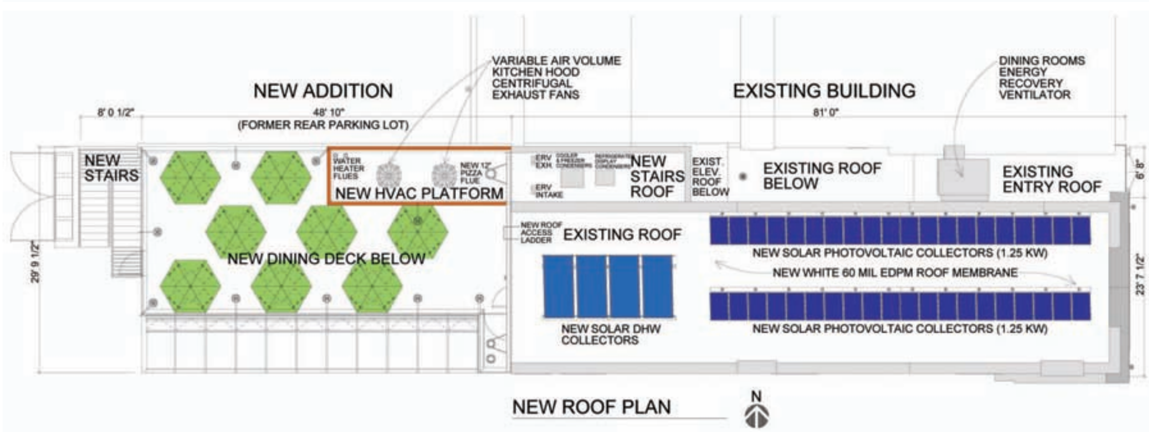

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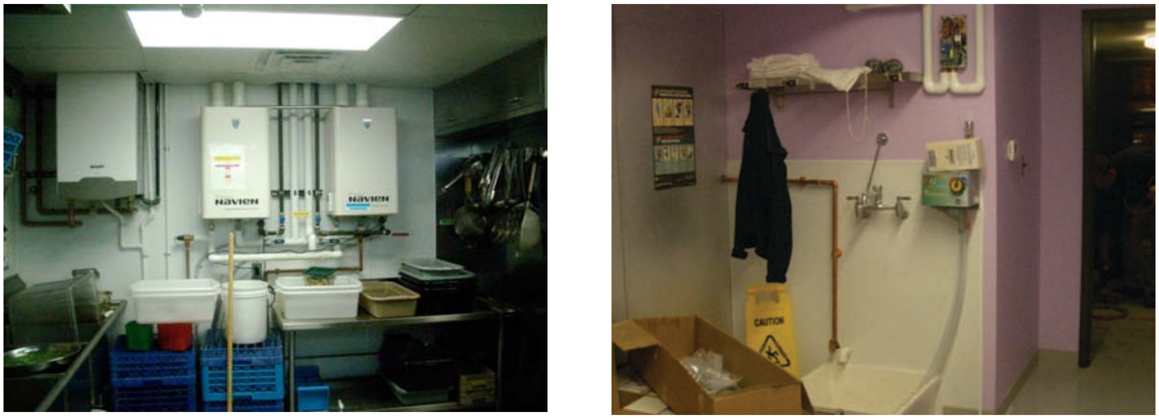
FIGURE 4. Instantaneous Gas Fired Boilers and Electric Fired Water Heaters.



Instantaneous Gas Fired Boilers and Electric Fired Water Heaters

Instantaneous gas and electric fired source water heaters for kitchen, restrooms, and service bar sinks and the dishwasher that uses hot water (Figure 4).

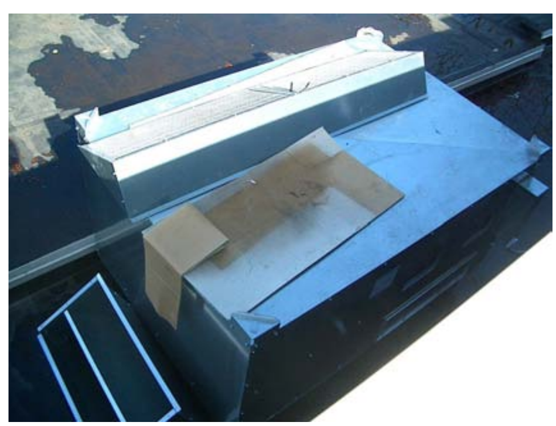
Navien America, Inc. Model NR-180 gas fired condensing 98% efficiency tankless water-heaters (2) with remote controllers Model NR-10DU are located along the north wall of the kitchen (Figure 4). They are used to provide hot water for back-up winter time heating for the two forced air water furnace heat pumps supplying the kitchen with conditioned and make-up air when the heating demand exceeds what the geothermal heat pumps and their associated geothermal wells can supply. Each Navien tankless water heaters reduces up to 964 lbs. of CO_2 per year compared to a conventional water heater, and up to 324 Lbs. of CO_2 per year compared to a tankless water heater.

Rooftop Energy Recovery Ventilators (ERVs)

Energy recovery ventilators (ERVs) were utilized for very efficient stale and/or polluted exhaust air and fresh ventilation air intake. Heat and moisture (sensible and latent heat) are exchanged through hydroscopic static plate resin cores in this air-to-air heat exchanger, transferring a portion of the humidity from the exhaust air stream to the fresh air stream.

A Renewaire, LLC rooftop EV300 was used for the basement kitchen annex and office spaces, another EV300 for the addition restrooms, and a larger rooftop HE4XRT for 1stand 2nd floor dining rooms (Figure 5). Pre-set CO_2 sensing controllers located in each dining room measure the CO_2 content in each dining room and compare these values to normal outside air CO_2 levels. As these dining rooms gradually fill up during the lunch and dinner hours with restaurant patrons, the inside CO_2 levels rise. When they reach the preset levels, the larger rooftop ERV turns on to exchange stale high content CO_2 air with fresh outside ventilation air.

FIGURE 5. Rooftop Energy Recovery Ventilator (ERV).



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Variable Air Volume Rooftop Kitchen Hood Exhaust Fans

Most commercial kitchen hoods operate at 100% capacity when the kitchen is in use, even during idle, non-cooking periods over the course of each business day. This costs the U.S. food service industry more than $2 billion in "wasted" energy every year. The Melink Intelli-Hood Controls were an excellent solution to this problem. Using a microprocessor and heat and optical smoke sensors, the fan speeds during idle periods are reduced to a preset minimum speed of between 10 and 50 percent, saving fan energy and conditioned make-up air. During actual moderate to intense cooking periods, the fan speed gradually increases to 100 percent based on the hood exhaust duct air temperature and/or the smoke in the hood, which is a function of how many kitchen cooking appliances are turned on. The Melink Intelli-Hood Controls consist of a variable speed air volume controller for the two rooftop centrifugal kitchen hood exhaust fans. The microprocessor is located in the upper left front end of the 14′ long stainless steel kitchen exhaust hood (Figure 6). A blue key pad is located on the front of the kitchen hood that allows the chef or cook to simply press on the hood lights and the exhaust fans at the start of each day—and that is all that has to be done! The Melink Intelli-Hood Controls take over and optimize energy efficiency by reducing the exhaust air and make-up air fan speeds. Kitchen comfort will also be improved by reducing the intake of hot and humid make-up air during idle cooking periods. When indoor and outdoor conditions are right for free cooling, the system can also act as an economizer, adjusting exhaust and make-up air fans speeds to maximize free cooling. Typical annual operating savings are $1,500 to $5,000 per hood with a payback of one to three years.

FIGURE 6. Variable Air Volume Rooftop Exhaust Fans (2) and 14′ Kitchen Hood.

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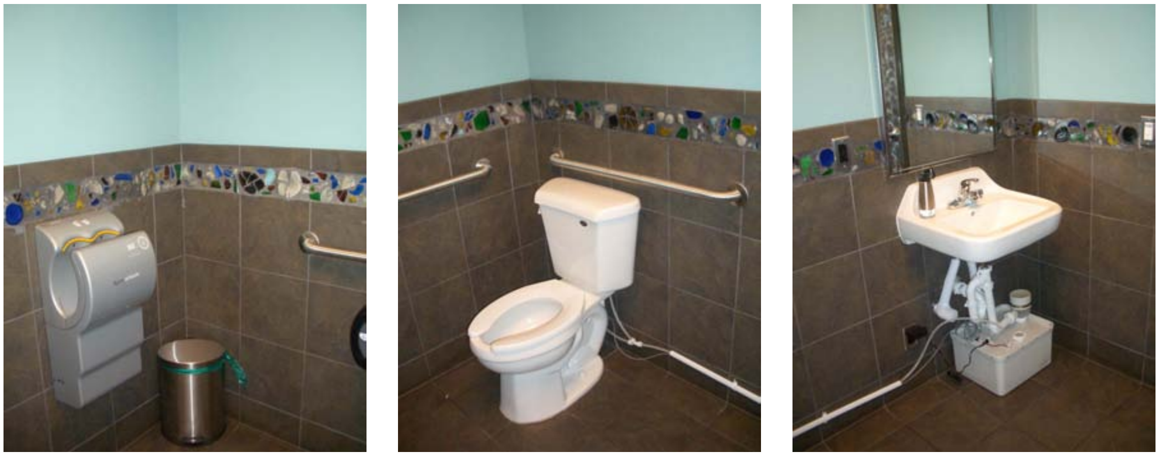
FIGURE 7. Restroom Hand Air Dryers and Grey Water Recycling.



Restroom Hand Air Dryers and Grey Water Recycling

The Mitsubishi Model JT-SB116EH-G-UL is a high-speed air hand dryer that requires a 120V / 60 H electric power source and has a 9.8 A rated current requirement. It has a fast drying time of 10–12 seconds compared to the 30 to 40 seconds required by a typical air dryer. It has an air flow rate of 185 mph at an air flow volume of 131 cu. ft. / minute. As your hands never touch the "Jet Towel," its usage is extremely sanitary. Water from your hands is collected in the unit's 1.7 pint drain tank, which can easily be emptied every few days (Figure 7).

The annual electrical energy savings compared to a standard hand dryer is estimated at $321 at a rate of $0.098/KwH. The annual electricity cost to use a Jet Towel is estimated at $22, annual energy use is 219 KwH and CO_2 emissions are 0.16 tons. Compare this to a standard electric dryer, the annual electricity cost is $342, annual energy use is 3,450 KwH and annual CO_2 emissions are 2.48 tons.

The WaterSaver Technologies, Inc. Aqus grey water recycling system ModelHMA_7000-EU located under the wall hung lavatories in the restrooms recycles lavatory water for use as water closet flushing water (Figure 7). It cleans and filters water that flows down standard sink drains and directs it into its reservoir tank that holds 5 1/2 gallons of water. Overflow goes directly to the water closets. The water is cleaned by using chlorine tablets to control bacterial and other contaminants, and a screen filters out hair and other objects. A small 12 VDC submersible centrifugal pump moves the water from the reservoir tank to the water closet. When the water closet is flushed, the toilet's fill valve will also run potable water to refill the toilet tank with approximately 65% reused water and 35% fresh water.

According to the manufacturer, the system is expected to save between 9 and 14 gallons of fresh water per day for two-person bathrooms with normal activities. This represents about 2,920 to 5,110 gallons of fresh water per year. At a combined average rate of $7.00 per 1,000 gallons of fresh water and waste water charges of numerous cities in the U.S., the anticipated economic savings per year range from $20.44 to$35.77. As usage will be much higher in the restaurant, the savings will be much greater.

Winter Outside Air Intake for the Basement Walk-In Cooler and Freezer

The basement walk-in cooler and freezer were intended to employ the "Freeaire Refrigeration, Inc." All Climate Polar Package System with a pair of intake and exhaust circulation fans rated at 115V/60 Hz/1 P/61 W each. The system moves filtered cold outside air in the winter inside

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to refrigerate the basement walk-in freezer and to cool the basement walk-in cooler, thereby reducing the electrical energy normally used to run the compressor evaporator fans and condensing units to produce cold air. In the winter, when the system is in use, the walk-in cooler and freezer commonly use less than 10% of the energy needed by the compressor system to do the same job, for 150 days or more, each year. Total annual energy reductions from 20% to nearly 50% can be achieved. Using this system results in less compressor wear and tear, fewer compressor breakdowns and repair costs, compressor replacement, and lost product. The Owner, however, has elected to not install this system at the date of this writing. The renewable energy features of this new restaurant and addition include:

Solar Photovoltaic Collectors

G.E. photovoltaic collector system rated at 2.5 KW (10 Panels @ 250W/Panel) for helping power the restaurant lighting systems composed primarily of compact fluorescent, T5 fluorescent and LED lights (Figure 8). Solar Domestic Hot Water Collectors

The Solar DHW System consists of four Heliodyne flat plate collectors (4′×10′)connected to two A.O. Smith TJV-120M 120 gallon solar preheat tanks in the basement (Figure 9). The

FIGURE 8. G.E. Photovoltaic Solar Electric Panels (2 Banks of 5 Panels @ 250 W / Panel).

FIGURE 9. Solar Domestic Hot Water Collectors (4 Panels) and Solar Pre-Heat Tank.

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FIGURE 10. Greenhouse Spice Plants, Solar Thermal Mass Water Tubes and TrombeWalls.

collector side pump is controlled by a Heliotrope Thermal, Inc. Delta-T Model DTT-84 solar control.

Passive Solar Greenhouse and Organic Spice Plants

Passive solar greenhouse addition with tinted solid filled concrete block walls, 4″ insulated (underfloor) concrete floor and Kalwall fiberglass water storage tubes for growing the organic spices for use in the recipes of the organic restaurant (Figure 10).

Geothermal Wells and Heat Pumps

The six geothermal heat pumps are water-to-air WaterFurnace heat pumps with Fronius IG heat pump controllers (Figure 11). Three heat pumps are used to heat and cool the basement and the lower and upper dining rooms, two heat and cool the kitchen in the addition, and one heats and cools the restrooms and the greenhouse in the addition.

The six geothermal heat pumps take advantage of the nearly constant earth temperature (50–55 degrees Fahrenheit) below the frost line to heat and cool the restaurant. In the winter, when the outside air is much colder than the earth temperature, a liquid refrigerant of food grade polypropylene glycol is pumped through the 20 geothermal well pipes buried deep underground (800 to 1000 feet deep wells) to extract heat (Figure 10), which is brought into the restaurant and run through the six geothermal heat pumps to warm the various restaurant spaces. In the summer, when the earth is cooler than the outside air, the heat pumps are reversed in operation to cool the restaurant.

The green features of this new restaurant and addition include:

Compostable Kitchen and Paper Waste Dehydrator

The eCovect Model DH-100w aerobic compostable waste dehydrator, manufactured by the Somat Company, rapidly dehydrates food waste along with compostable disposables like paper straws and napkins, producing a humus-rich soil amendment. This conversion is accomplished without the use of enzymes, fresh water, or venting and with no other byproducts, result-

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FIGURE 11. Geothermal Wells and Heat Pumps.

ing in zero sewer and landfill impact (Figure 12). It can process 110–220 lbs. of food waste input load a day. A 200/220V, 50/60 Hertz, 3 Phase electrical connection is required as an energy input source. The system also recycles its heat energy reducing overall energy consumption. Within 24 hours, the food waste and paper products put into this compostable waste dehydrator will come out as a simple soil amendment that can be used for landscaping purposes or added to other compost for gardening. The weight and volume of the food waste and paper products can be reduced by as much as 9 to 1 (93%).

FIGURE 12. High Speed Aerobic Compostable Waste Dehydrator.

Sustainable Bamboo, Cork, and Recycled Rubber Tiles Flooring

Sustainable pressed bamboo and cork flooring were installed in the lower and upper level dining rooms as the finish flooring. Both flooring types are made from renewable resources, are attractive, and at the same time durable, moisture resistant, low-maintenance, and cost effective. Both

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flooring types cost about $6 to $8 per square foot and are available in a wide range of colors from light honey all the way to dark ebony.

A very rapidly renewable resource, bamboo grows much faster than hardwood trees and can be harvested after about five years. Stalks of bamboo—technically a grass—are split lengthwise and reformed into planks using formaldehyde-free resins. Their natural striations create a very tight-grained beautiful texture. Both horizontal grain (flat grain) and vertical grain (edge grain) planks are available. Planks are generally about 3 3/4″ wide by 5/8″ thick by 77 inches in length.

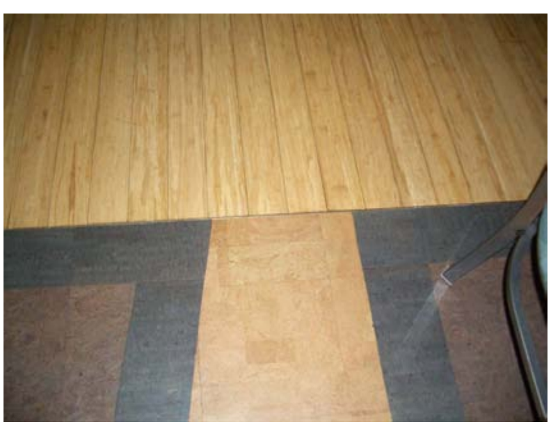
Cork flooring is made using the bark of the cork oak tree. The bark is trimmed from a cork oak tree every nine years, leaving the tree and the forest undamaged. It is not unusual to have a 200-year-old tree still producing cork bark. However, cork flooring is actually made from the waste of the cork wine stopper manufacturing process so cork flooring is a recycled product. All pigments, varnishes, and adhesives used in producing cork tiles should be water-based, solvent free, and have no VOCs. Cork flooring is beautiful, durable, soft, offers sound and vibration reduction and thermal insulation, is anti-allergenic and insect resistant, is easily installed, has good elasticity, and is fire resistant. Tile shapes range from rectangles, squares, hexagons, and triangles from 6 inches to 36inches. The flooring adhesive should be a water-based contact adhesive to eliminate off-gassing and any VOCs.

Interlocking recycled outdoor rubber tiles (18″×18″) were used as the outdoor dining deck flooring. The recycled rubber tiles are made from recycled ground up rubber tires (80%) and specifically formulated new rubber binding agents (20%) providing acoustical isolation and mechanical protection for the 60 mil EDPM rubber roof membrane below at the upper level outdoor dining deck with rainwater drainage channels on the bottom side (Figure 13).

Sustainable Tabletops Made of Agricultural and Forest Waste Products

The MBS organic restaurant has sustainable table tops made of sunflower seed husks and sawdust waste products combined with thermo-setting plastic resins (Figure 14). They are manufactured from rapidly renewable agricultural and forest fiber waste products. These bio-based waste products can be used for cabinets, interior table surfaces, furniture, and architectural applications and can be stained or left natural. These materials cut, sand, and route with standard woodworking tools, and traditional wood staining and finishing techniques can be

FIGURE 13. Sustainable Bamboo, Cork and Recycled Rubber Tires Outdoor Tile Flooring.



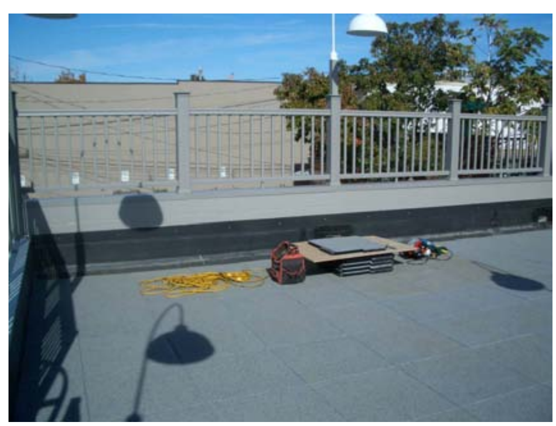


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FIGURE 14. Sustainable Sunflower Seed Husks & Sawdust Tabletops.

used to create a wide range of appearances. Four foot by eight foot panels are manufactured in 1/2″, 3/4″ and 1″ thicknesses. These products are intended for interior applications only and are not recommended for kitchen and/or bath countertop applications.

Recycled Broken Colored Glass Aggregate for Concrete Floors

Recycled crushed colored glass aggregate was used in the greenhouse, restrooms, and kitchen concrete floors and as embedded broken color glass feature strips in the public restrooms wainscot wall tile (Figure 15).

Conventional concrete aggregate consists of well-graded sands (fine aggregates) and various sizes and shapes of well-graded gravel and stones (course aggregate).Concrete aggregate typically accounts for 70–80% of the concrete volume with the remainder being Portland cement and clean water to allow the hydration process to begin. Nearly all crushed and broken glass waste can be used as a sand and gravel substitute. Glass aggregate in concrete can be problematic though, due to the alkali silica reaction between the cement paste and the glass aggregate,

FIGURE 15. Recycled Colored Glass Aggregate for Conc. Floors and Wall Feature Strips.

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which over time can lead to weakened concrete and decreased long-term durability. Research has been done on types of glass and other additives to stop or decrease the alkali silica reaction and thereby maintain the finished concrete strength. However, further research is still needed before glass cullet can be used in structural concrete applications. Current applications for waste-glass concrete are bike paths, footpaths, slabs, gutters, and similar non-structural work.

Insulation of Existing Exterior Brick Walls

The existing 1st floor 12″ thick triple wythe exterior brick walls were already insulated with 3 1/2″ of fiberglass batt insulation in the interior side of the perimeter 2×6 bearing walls and have a total R-value of 16.77.

The existing 2nd floor 12″ thick triple wythe exterior brick walls were uninsulated in the interior side of the perimeter 2×2 furring and had a total R-value of 3.70. These exterior brick walls were insulated with 2″ of rigid polyurethane board insulation added in the 2×2 furring cavities and have a total new R-value of 19.58. This represents a 524%improvement in the total R-value of these exterior brick walls and brings the new 2nd floor exterior walls new R-value more in line with the existing 1st floor exterior brick walls R-value of 16.77.

Recycled Brick in New Exterior Walls

A new three-level open steel tread stairs and mechanical chase addition was constructed at the northwest corner of the existing brick building. To facilitate access to the new 3-level open steel stairs, the existing triple wythe brick walls along the length of these open stairs was carefully removed in the 1st and 2nd floors with new steel beams and columns taking their place. A majority of these 130 +/– year old bricks were reclaimed and reused as the exterior brick veneer for the New Greenhouse / Kitchen / Restrooms / Dining Deck Addition. The exterior brick on the new addition now matches perfectly with the exterior brick on the existing building allowing for a more seamless and graceful blending of the old and the new.

The recycled bricks were used as a brick veneer on the new 8″ thick CMU addition walls with 2″ of rigid polystyrene insulation in the exterior south and west walls of the addition and as brick veneer around the trash and recycling carts enclosure at the rear alley (Figure 16).

FIGURE 16. Recycled Brick Veneer for New Addition and Trash Enclosure Exterior Walls.

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Reclaiming and reusing existing brick masonry makes sense because it lasts for decades, is fire resistant, durable, sustainable, made of locally manufactured and readily available natural raw materials, and is installed by local skilled masons. Recycled bricks are also both environmentally responsible and beautiful. As far as energy use goes, a lot less energy and raw materials goes into reusing existing recycled masonry brick in a new masonry building or addition than building a new masonry building using new masonry brick and concrete block units. Our landfills also are less burdened by masonry rubble from a demolished masonry building. This is very important if we are to move to a more sustainable future.

New Greenhouse CMU Passive Solar Trombe Wall

The New Greenhouse / Restrooms / Kitchen / Dining Deck Addition has a structural CMU passive solar trombe wall located between the rear of the new south facing greenhouse east / west corridor and the new restrooms and kitchen located on the north side of this CMU wall. This structural CMU trombe wall supports the new addition SIP roof and its new dining deck located above.

Today's generally used generic term trombe wall describes a passive solar south facing thermal mass masonry storage wall behind south-facing double glass that was originally conceived, designed, constructed, and tested in several passive solar heated prototype buildings that were built in Fort-Romeu-Odello-Via, France in 1956 by the now world renown but late passive solar research pioneer, inventor, and engineer Felix Trombe. He found through experimentation that the darker colored masonry walls located in direct sunlight behind south-facing glass performed the best in converting the sunlight that struck them into heat energy much like a closed dark colored interior of a car becomes unbearably hot in the summer sun. However, the concrete in these solid masonry unit mass walls absorbs and captures the free solar generated heat by continuously conducting it through these mass walls at the rate of about 1 inch per hour, thereby preventing overheating of the adjacent air like the thinner non-mass car seats.

Felix Trombe found that solid dark colored masonry mass walls 8 to 16 inches thick performed the best over a 24-hour winter day, allowing the free solar heat absorbed and stored in these walls in the daytime to conduct through to the back side by the evening and nighttime hours. This free solar heat is then evenly reradiated naturally to the building spaces that are in direct contact with these thermal mass walls. Whatever the trombe wall "sees" it heats by surface radiation much like heating with a wood stove does, only at a much lower temperature. Radiating heat from a large low temperature thermal mass wall is more comfortable than dry, forced air heating and the air temperature in these spaces can be kept at a much lower temperature than forced air heated spaces. This passive solar design technique is known as the direct gain solar approach when there is room between the south facing glass and the thermal mass wall like our greenhouse design and the indirect gain solar approach when the south glass is within a few inches of the thermal mass wall.

The new greenhouse trombe wall is composed of solid 8″ tinted structural split face burnished concrete masonry units that were manufactured locally. A mixed dark two-color three-band pattern was chosen to complement and accentuate the transom glazing installed in this trombe wall at the top to allow for natural day lighting into the kitchen from the greenhouse, a lighter dark colored band in the middle for contrasting visual interest, and then the same darker "wainscot height" colored band that matches the upper band to minimize any wall stains due to passing restaurant patrons and staff or after hours floor cleaning. Everest blue-grey and Milander brown were the masonry colors chosen. The lower 4′-2″ wainscot band is Everest blue-grey in color as well as the upper 2′-8″ Kitchen transom glazing band. The center 3′-4″ band is Milander brown in color. The roof deck overhang above the pedestrian corridor

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has been designed to shade the trombe wall during the summer months so that it can, when cooled at night with the motorized opening of the lower and upper greenhouse glazing bands and the use of an outside nighttime air ventilation fan, act to cool down this concrete thermal mass trombe wall, thus keeping the greenhouse cooler during the daytime (Figure 17).

The total amount of thermal mass in our concrete block thermal mass wall is:

Volume = W× L× H

= 0′-8″ × 48′-2″ × 9′-6″ – 0′-8″ × 3′-4″ × 6′-10″ (Kitchen Door)

– 0′-8″ × 6′-0″ × 6′-10″ (Restrooms Opening)

– 0′-8″ × 3′-4″ × 24′-2″ (Transom Glass)

= 208.84 Cubic Feet

Total Thermal Mass = Volume × Weight of Solid Concrete Block

= 208.84 Cubic Feet × 140 Lbs./Cubic Foot

= 29,227 Lbs.

New Greenhouse Passive Solar Water Tube Thermal Storage Wall

The New Greenhouse / Restrooms / Kitchen / Dining Deck Addition has a Solar Components Corporation, a 18″ diameter fiberglass water storage tubes wall on the new south greenhouse side of the east/west pedestrian corridor (Figure 18).

FIGURE 17. View of New CMU Trombe Thermal Mass Wall at New Greenhouse Corridor.

FIGURE 18. View of New Water Tube Thermal Mass Wall at New Greenhouse Corridor.

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These Solar Components Corporation low cost water storage containers are designed to be the most economical thermal mass storage per gallon of water stored. They provide faster usable BTU gain in 60% less space and 80% less weight than with rock or masonry storage walls. The containers can transmit some natural daylight with a clear water fill or the tubes can be filled with dyed water to increase solar absorption efficiency and to provide for greater visual design versatility. The corrosion free fiberglass container construction comes in 4 standard sizes (12″ diameter × 4′ and 8′ heights and 18″ diameter × 5′ and 10′ heights) to complement any design. Friction fit fiberglass caps with a foam tape seal are provided with each tube. Increased solar gain can be accomplished with 3 dyes, namely midnight black, solar bronze, and indigo blue. The 12″×4′ tube costs $109 and the 18″×10′ tube costs $243. These self-supporting tubes are easy to install on flat level floors, as the largest tube weighs less than 20 lbs. empty. As an example of water being an efficient medium for thermal storage, an 18″ diameter water tube that is 4 ft. in height can hold 53 gallons of water that weighs 442 lbs., and it has a thermal heat storage capacity of 8,840 BTUs at a 20° Fahrenheit water temperature rise. There are 20 tubes at 0.75 ft. in diameter × 4 ft. in height and 10 tubes at 0.75 ft. in diameter × 8 ft. in height. All of the standard 18″ in diameter × 5 ft. in height tubes were cut down to 4 ft. high tubes and all of the standard 18″ in diameter × 10 ft. in height tubes were cut down to 8 ft. in height tubes to match the scale and proportions of the greenhouse space and the adjacent tinted and color banded solid concrete block thermal mass wall along the pedestrian corridor.

The total weight of water in each tube type is pi × r2 × h × 7.5 gal./cubic ft. × 8.33 lbs/gal. where r = 0.75 ft. and h = 4 ft. or 8 ft. This greenhouse has 20 tubes at 0.75 ft. diameter × 4 ft. in height, which can hold 8,835.6 lbs. of water and 10 tubes at 0.75 ft. in diameter × 8 ft. in height, which can hold 8,832.2 lbs. of water for a total water thermal mass storage of 17, 667.8 lbs. At a 20° Fahrenheit water temperature rise, the thermal heat storage capacity of these water tubes is 353,356 BTUs.

FIGURE 19. View of the New Greenhouse Tiered Spice Plant Growing Shelves.

New Greenhouse Tiered Growing Shelves

The new Greenhouse has three tiered levels of 18″ deep plant growing shelves (Figure 19). These tiered and setback levels allow all of the 12″ diameter clay potted organic spice plants to best be exposed to the available daily south side incoming sunlight year-round. These tiered shelves are made of vinyl covered steel mesh panels 18″ wide × 4′-0″ long × 2″ height mounted in interlocking vinyl covered steel support legs.

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CONCLUSION

The MBS restaurant was undertaken as a fast track design build process. Sustainable buildings really need more time for the design to mature and to ensure that the architectural and mechanical plans can best inform the construction process. The owner's desire for instant gratification should be met with advice to slow down and think things through.

Communication among all participants is key to the success of any project, and even more so for a complicated building like a green restaurant. The MBS design team included a variety of special engineering consultants whose input needed to be integrated into the construction plans. Early identification of all building specialties to be included will help to ease the design and construction processes.

The MBS project was packed with innovative materials, resource efficient devices, and state of the art mechanical systems. Putting all of this together into a working whole requires a thorough commissioning process. An energy monitoring or building automation system is crucial to diagnose any problems at start up. All of the HVAC equipment in the MBS restaurant are BACNet ready, but the owner chose not to install a central control system to monitor the building's operation.

Restaurants are known to be one of the most energy intensive building types. The life time of most restaurants is short. There is little incentive to include energy saving elements when re-establishing or starting a new one. To do so implies a commitment to the future of the business. This is what makes MBS so unique.

The design team did not run an analysis of expected energy use and costs, so there is no means to compare with historical or estimated consumption. Likewise, the MBS restaurant cannot be compared with other restaurants because there is no national database, like energy star, available through the federal energy research labs.

The expectation has been that, given the numerous energy efficient devices used in the building, that the restaurant would use close to 50% less energy than a similar restaurant without the energy innovations. Due to the cost involved, the owner decided against a LEED process which would have provided a complete picture of energy consumption.

The owner of MBS does have three brew-pubs which could be audited for energy consumption. Although these have different kinds of operation, they could be rated and compared with the MBS facility. A unit of comparison such as BTU/Square Foot or BTU/Meal Served may be useful. That comparison has not yet occurred.

Naturally, architects prefer to start with a blank slate and design new buildings which reflect the desire of their clients. However, there is nothing like an adaptive reuse of an existing building project to fully challenge the integrative skills of design professionals. The configuration of space available for functional programming becomes the greatest problem to solve. The tight urban location of the MBS restaurant made this even more difficult.

The MBS restaurant utilizes every square inch of the site and the building enclosure. Getting all of the spatial relationships to work and finding room for all of the kitchen and mechanical equipment was a major focus of the design process. The geothermal wells had to be placed beneath the new solar greenhouse whereas, if this were a new building, extra open land could have been available for this purpose.

There were also certain elements of the existing building that did not work for its new use. The existing stairs did not meet code and required replacement in a new location. The same was true for the restrooms. These are expensive modifications.

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On the bright side, however, businesses that "go green" demonstrate to their patrons that they are taking proactive steps to improve our natural environment. A patron is more likely to spend their money at an eco-friendly business, knowing that they share the same values when it comes to taking steps towards preserving our natural environment.

The Mind, Body and Spirits Inspired Dining Organic Restaurant strives to be an exceptional organic restaurant using only on-site organically grown spices; a model green restaurant that employs recycled and sustainable building materials and finishes; and a restaurant that harvests the benefits of building and equipment energy efficiencies and renewable energy systems to help preserve our natural environment. It also has table top flip cards explaining the restaurant's green features to help inform and inspire their dining patrons!

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