Opportunities and Challenges in Whole-Building Retrofits

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A project submitted
in partial fulfillment of the requirements
for the degree of
Master of Science in Natural Resources and Environment
at the University of Michigan
December 2009

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Technical progress consists not only of inventions and innovations that require heavy capital investments but also a stream of relatively cheap changes and improvements whose cumulative effect is a drastic reduction of input of resources accompanied by increases in output. The major capital stock of an industrially advanced nation is not its physical equipment; it is the body of knowledge amassed from tested findings of empirical science and the capacity and training of its population to use this knowledge effectively. One can easily envisage a situation in which technological progress permits output to increase at a high rate without any additions to the stock of capital goods.

Kuznets, S. (1968) Toward a Theory of Economic Growth

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Figures 1, 2. The Book Cadillac Hotel in Detroit was one of the finest hotels in the country in the 1920s, boasting over 1,200 rooms. After decades of abandonment, it was renovated and opened as a Westin Hotel in Fall 2008. The top photo is from 1997.

Executive Summary

The premise of this project is that the most sustainable type of real estate development is the adaptive reuse of an existing building. Adaptive reuse of inner city buildings is an opportunity to return underutilized, close-in land for housing and other uses, to improve the environmental impact of buildings, and to provide robust rates of return which compensate developers for the higher risk inherent in this type of development.

Buildings and the built environment have considerable deleterious effects on the natural environment, largely attributable to the energy consumed to operate them. The fossil fuels used to satisfy that energy demand contribute to global climate change, localized climate change, and damaging health effects.

However, the built environment has considerable opportunities for positive contribution, and chief among them is the opportunity for re-use of existing buildings. It is imperative, for social, environmental, and economic reasons, that building re-use become more common practice.

Part I of this paper explores the existing framework for adaptive building-reuse in the United States. The industry analysis includes the current state of land use impacts, building impacts, life-cycle analysis of buildings, brownfield redevelopment, and preservation. Then, existing writing about the topic is reviewed.

Part II reviews the landscape as faced by a real estate developer, and highlights the opportunities and challenges. The development cycle is analyzed in each stage to understand the decision-making process, stakeholders, and benefits to an adaptive reuse project.

Part III is a case study in the Cass Corridor neighborhood of Detroit, Michigan, an area ripe with existing building stock with incredible architectural character. A site overview is proceeded by a financial analysis of four development options for a typical apartment and retail building in the neighborhood: 1) Demolish and rebuild conventional; 2) Demolish and rebuild a LEED-NC 3.1 Gold building; 3) Renovate as a conventional building; and 4) Renovate as a LEED-NC 3.1 Gold building. Although several incentives are offered to developers to encourage adaptive reuse development, the most profitable option proves to be to demolish the existing building and build a conventional new building.

Based on the analysis, recommendations for streamlining the adaptive reuse process include the creation of a national database of existing buildings, restructuring of existing incentives for better alignment with developer needs, and education about financial benefits of energy efficiency projects. In the case of Detroit, the city should focus on economic stimulation on top of the above recommendations, since the city already offers many incentives for redevelopment beyond what is offered by other municipalities.

By first exploring the impact of the built environment on the natural environment, then by exploring the real estate development cycle with regards to adaptive reuse, and lastly by applying these lessons to a case in Detroit, this project aims to clarify the opportunities and constraints for adaptive reuse of existing buildings as a means for sustainable development.

Figure 3. The world's first dual LEED-Platinum building: The Mutual Building in Lansing, Michigan received a LEED-CI and LEED-CS certification in 2008 and is listed on the National Register of Historic Places.

Part 1 - Exploring the Impacts of the Built Environment on the Natural Environment

"Older buildings are already a step ahead of the game, but....we need to consider how to incorporate green practices without destroying the historic integrity of a building or the character of a neighborhood. There needs to be a balance."
- Emily Wadhams, Vice-president for Public Policy, National Trust for Historic Preservation

Intoduction to Part I

Buildings and the built environment have tremendous impact on the natural environment. This section examines those effects, as well as several programs and incentives to change those impacts for the better.
Starting first at a broad scale, urban development in the US has had irrevocable impact on natural ecosystems. Second, buildings themselves have incredible contributions which could cause permanent environmental damage. Third, life-cycle analysis is making in-roads into the building industry. Fourth, brownfields and the related programs are examined. Fifth, historic preservation impacts are analyzed for their relation to adaptive re-use. Sixth, national trends on adaptive re-use are reviewed.
Last, existing writing on the topic of adaptive reuse is reviewed.

Figure 4. The integration of nature and modern building in a high-tech way. This is the typical understanding of "green building."

Land Use Impacts

The American landscape is driven by real estate development. Between 1992 and 1997, the average rate of developed acreage more than doubled to 3 million acres per year. Urbanized area in the US quadrupled between 1950 and 2001[i]. Between 2000 and 2005, the US population grew at a rate of approximately 5%[ii] and is projected to reach nearly 400 million people by 2050, an increase of 50% over 1990 population[iii]. At the same time, the average American per-square-foot "footprint" is increasing. For example, from 1950 to 2000, the average area per person in a new US single family home increased from 292 square feet to 840 square feet, which represents a 188% increase [iv]. Hence, new development is imminent as buildings strive to keep up to provide enough space for the growing population.

Additionally, as the global population trends to increased urbanization, cities must be able to respond to their environmental impacts. Cities are notorious for larger consumption of resources (although usually lower on a per-capita basis), especially in the developed world[v]. While cities can benefit from synergistic relationships between increased population density and decreased environmental impacts, they must be mindful of the balance between retrofitting existing building stock and creating new buildings.

Environmental Impacts of Buildings

In 1997, developed land in the United States constituted approximately 7% of non-federal lands. However, the rate of development growth from 1992-1997 was greater than the previous 5 years, indicating a averaged doubling of development growth rate. Most of this land comes from forest, pasture, and cropland[vi]. Coupled with this, many urban areas have seen reduced population growth in their central cores, but population has expanded into an expanded metropolitan region. The consumption of outlying land has greatly outstripped the overall population growth rate in many cities (See Table 1). The causes for this change are numerous, but are generally attributed to increased motor vehicle usage, social preferences, and public policy.

Land use impacts of development of "Greenfield" sites impacts habitat, water quality, and human health. The dramatically increased rate of developing land in the last 20 years has had incredibly deleterious impacts on the environment.

Habitat loss and fragmentation are two major consequences of increased land development. Fragmentation can lead to decreased contiguous habitat zones, decreased travel area for species, and fewer interactions between species. Water quantity is decreased as previously undeveloped land is covered with impervious surfaces. Water quality is often decreased as well, as the "first flush" effect gathers oils, acids, and other chemicals left on highways, rooftops, and parking lots. Human health has been impacted by sprawl development through chronic disease from vehicular greenhouse gas emissions and increased obesity from decreased walkable development.
Seventy-six percent of all electricity generated by US power plants goes to supply the Building

i. See US EPA, Reference 52.
ii. See US Census Bureau, Reference 47.
iii. See US Census Bureau, Reference 48.
iv. See Center for Sustainable Systems, Reference 10.
v. See World Resources Institute, Reference 58.
vi. See US Department of Agriculture, Reference 49.

Percent Change in Land Development and Sprawl Factors, 1982-1997

	Sprawl Factors: % Growth		Overall Sprawl		Sprawl Apportionment	
State	Population	Per Capita Land Consumption	Percent Growth in Land Area	Growth in Developed Land (in 1,000 acres)	Population Growth Factor's Portion	Per Capita Land Use Factor's Portion
Alabama	10.1 %	26.6 %	39.3 %	635.7	28.9 %	71.1 %
Arizona	57.5 %	-13.0 %	37.0 %	402.8	144.3 %	-44.3 %
Arkansas	10.0 %	12.0 %	23.2 %	265.7	45.7 %	54.3 %
California	29.8 %	1.6 %	31.9 %	1,318.1	94.3 %	5.7 %
Colorado	27.1 %	5.1 %	33.6 %	415.2	82.8 %	17.2 %
Connecticut	4.1 %	11.8 %	16.4 %	123.3	26.6 %	73.4 %
Delaware	22.7 %	10.1 %	35.0 %	58.5	68.1 %	31.9 %
Florida	40.2 %	13.0 %	58.5 %	1,913.4	73.4 %	26.6 %
Georgia	32.5 %	26.2 %	67.2 %	1,590.3	54.8 %	45.2 %
Hawaii	19.7 %	0.6 %	20.4 %	30.5	96.6 %	3.4 %
Idaho	24.3 %	10.4 %	37.2 %	204.7	68.9 %	31.1 %
Illinois	5.1 %	12.5 %	18.3 %	492.3	29.9 %	70.1 %
Indiana	7.4 %	14.7 %	23.2 %	425.6	34.2 %	65.8 %
Iowa	-1.2 %	8.9 %	7.6 %	119.9	-16.1 %	116.1 %
Kansas	9.0 %	3.6 %	12.9 %	221.4	70.8 %	29.2 %
Kentucky	6.1 %	43.0 %	51.7 %	592.2	14.2 %	85.8 %
Louisiana	0.0 %	31.6 %	31.6 %	389.9	-0.1 %	100.1 %
Maine	9.5 %	27.6 %	39.7 %	202.5	27.3 %	72.7 %
Maryland	18.9 %	13.8 %	35.3 %	322.7	57.2 %	42.8 %
Massachusetts	6.0 %	35.0 %	43.1 %	445.2	16.2 %	83.8 %
Michigan	7.3 %	21.3 %	30.1 %	820.2	26.8 %	73.2 %
Minnesota	13.5 %	12.0 %	27.1 %	465.6	52.7 %	47.3 %
Mississippi	6.8 %	23.2 %	31.6 %	353.8	24.1 %	75.9 %
Missouri	9.7 %	10.1 %	20.8 %	433.5	48.9 %	51.1 %
Montana	9.3 %	7.5 %	17.5 %	153.7	55.1 %	44.9 %
Nebraska	4.7 %	3.6 %	8.5 %	94.4	56.3 %	43.7 %
Nevada	90.1 %	-26.3 %	40.1 %	109.2	190.4 %	-90.4 %
New Hampshire	23.8 %	25.5 %	55.3 %	209.6	48.5 %	51.5 %
New Jersey	8.4 %	29.6 %	40.5 %	512.7	23.7 %	76.3 %
New Mexico	26.3 %	16.8 %	47.6 %	371.7	60.0 %	40.0 %
New York	3.1 %	17.1 %	20.8 %	547.8	16.4 %	83.6 %
North Carolina	23.4 %	29.3 %	59.6 %	1,439.7	45.0 %	55.0 %
North Dakota	-4.2 %	10.8 %	6.2 %	57.6	-71.5 %	171.5 %
Ohio	4.2 %	24.5 %	29.8 %	828.5	15.9 %	84.1 %
Oklahoma	3.4 %	16.9 %	20.9 %	332.8	17.5 %	82.5 %
Oregon	21.7 %	5.1 %	27.9 %	266.7	79.8 %	20.2 %
Pennsylvania	1.4 %	39.3 %	41.3 %	1,164.4	4.1 %	95.9 %
Rhode Island	3.4 %	15.8 %	19.8 %	33.1	18.7 %	81.3 %
South Carolina	18.2 %	31.6 %	55.5 %	748.4	37.8 %	62.2 %
South Dakota	5.8 %	8.3 %	14.6 %	122.3	41.6 %	58.4 %
Tennessee	15.8 %	36.1 %	57.5 %	865.9	32.2 %	67.8 %
Texas	26.2 %	7.9 %	36.3 %	2,280.5	75.3 %	24.7 %
Utah	32.5 %	6.2 %	40.7 %	191.5	82.4 %	17.6 %
Vermont	13.4 %	15.4 %	30.8 %	74.8	46.8 %	53.2 %
Virginia	22.6 %	16.3 %	42.6 %	784.5	57.4 %	42.6 %
Washington	31.0 %	2.5 %	34.3 %	527.8	91.6 %	8.4 %
West Virginia	-6.9 %	60.7 %	49.6 %	289.7	-17.7 %	117.7 %
Wisconsin	10.0 %	10.5 %	21.6 %	428.7	48.7 %	51.3 %
Wyoming	-5.2 %	23.5 %	17.1 %	93.8	-34.0 %	134.0 %
Average:	15.5 %	16.2 %	32.8 %	505.6	49.7 %	50.3 %

Table 1. Percentage Change in Land Development and Sprawl Factors for 49 States, 1982-1997.

Sector[vii]. Programs like the US Green Building Council's LEED-NC program have shown an average of 24% decreases in energy use through the rigor of the LEED process, which shows a step in the right direction for reduction of resource use[viii]. However, much work remains to be done in reducing the impacts coming from existing buildings.

Data from the U.S. Energy Information Administration illustrates that buildings are responsible for almost half (48%) of all greenhouse gas emissions annually[ix]. Buildings account 39% of US annual carbon dioxide emissions, making the building sector the largest CO2 emitter[x].

The US Environmental Protection Agency estimated in 1996 that the per-capita estimate for building-generated waste was 2.8 pounds per day, or 136 million tons of waste generated annually[xi].

Building interiors are responsible for localized environmental issues, including off-gassing from volatile organic compounds, tenant discomfort, and illness such as sick building syndrome.

A building's specific location can amplify or deafen its environmental impacts. For example, a building located in an exurban location can lead to increased vehicle use, leading to increased environmental impacts caused by the building's location. The average vehicle miles traveled for the building's occupants is one way to grasp the impact of the building. Another way a building's specific location can show varying environmental impacts is its location with respect to floodplains, existing development, and agricultural land. Buildings which are sited in or adjacent to floodplains can have impact on the water quality of the watershed. Buildings which are within existing development may mitigate environmental impacts by reducing required mobility and increasing use of existing infrastructure. Buildings which are located on prime agricultural land are not ideal because the agriculture must be displaced to a site where more chemicals may be used to make up for lack of prime soil.

Life Cycle Assessment of Buildings

Life Cycle Assessment (LCA) is a type of study commonly found in industrial ecology exercises, and is used to quantify and classify environmental and social impacts of products. LCA is a nascent tool in the building industry, but is expected to become more prevalent as it becomes included in building environmental assessment. The latest version of LEED-NC, introduced in 2009, includes a foray into LCA through environment and human impact credit weighting. LCA is especially useful in assessing building retrofits as it balances the existing impacts against the input impacts to weigh a type of cost-benefit analysis based on environmental and social impact.

A literature search of building LCAs reveals a lack of in-depth work in this field. The main characteristics of the few completed studies show that side-by-side comparisons are often used, that a building's use is a defining factor of its impacts, and the building's geographic location is key to understanding its impacts. Comparisons are often used to determine the design direction of the project. For example, a developer will usually base the structural components on engineering and cost. The developer could also take into consideration

vii. See Energy Information Administration, Reference 19.
viii. See Turner, Reference 46.
ix. See Energy Information Administration, Reference 19.
x. See US Green Building Council, Reference 54.
xi. See US EPA, Reference 53.

the difference that could occur by using a concrete-framed building or a steel-framed building. That side-by-side comparison would give more data points for the decision. LCAs also make sense in comparing effects of building retrofits and renovations. A building's use is also a key determinant of its impact. A conventional American single-family home would incur more impact than an office building, due to the higher person-density of the office and the exposure to the external environment. Additionally, a building's impacts can be defined by its geographic location. Since, on average, 93% of a building's environmental impacts are related to the energy used in the Use phase, the region's source of energy determines the building's impacts. New buildings with integrated alternative energy-producing technology are providing innovative ways to improving this issue.

Developing a methodology for a building LCA requires a balance between the building's unique character and the generalized nature of buildings in total. The more greatly tailored a building LCA can be, the greater credibility and utility of the data. However, the LCA process is inherently reliant on national and global databases which provide general data. Building retrofit LCAs have a distinct advantage of existing data in which to use as a baseline.

Brownfields

A brownfield is defined by the US Environmental Protection Agency as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant."[xii] Brownfield sites should not be confused with Superfund

Figure 5. Detroit's Brownfield Redevelopment Authority, a quasi-public arm of the city, approved a $600,000 brownfield tax credit to help pay to clean up the building at 2210 Park Ave. The credit will cover approximately 10% of the estimated $6-million cost of the renovation work.

sites, which have significant negative human health effects and require Federal assistance. It is estimated that 450,000 brownfield sites exist in the US. Primary challenges facing brownfield redevelopment include environmental liability concerns, financial barriers, cleanup during construction timeline, and market potential. Many brownfield sites, as shown in Figure 5 above, are largely intact buildings, instead of a toxic dump site, which is a common layperson vision.

For Federal programs, a Phase I Assessment is completed to identify the presence, type, and extent of contamination which may be present

xii. See US EPA, Reference 50.

on the site. A Phase II Assessment may then take place in order to sample a specific contaminant and create a remediation plan[xiii]. Common materials found in brownfield sites include asbestos in insulation and tile, lead in paint and plumbing, and industrial chemicals. The complex evaluation process of determining the contamination type and cleanup procedures is performed by only a handful of environmental engineering firms, which creates a bottleneck for development. However, the environmental remediation that is required of brownfields sites generally do not limit the reuse alternatives of the site[xiv].

Incentives can be the factor that make redevelopment projects work; therefore, they are imperative to address. Due to the shared value seen by governmental and private entities in adaptive reuse and green buildings, a myriad of incentives are offered to developers.

Community development grants are often used to aid a developer in the upfront stages of due diligence and site investigation. These grants are especially helpful to developers, since much municipal funding is only receivable after development.

One of the most often used incentives in building redevelopment is tax-increment financing, or TIF. The basic premise of a TIF is to freeze a site's property taxes at pre-development level, and use an assumed incremental increase in the post-development property tax contribution to issue a municipal bond. This bond is used to pay for upfront infrastructure costs associated with the project. The bond is often sold on the private bond market, which brings associated challenges. The primary challenge is that private bondholders tend to be risk averse, and redevelopment has an inherent risk associated with it which may make the project unattractive to tense investors[xv]. Secondly, TIF bonds are often sold only when the vertical development is 100% assured. Because of this, some due diligence and possible remediation costs could not be covered using TIF funding. Lastly, some municipalities do not allow TIF funding to be used in brownfield remediation costs since the development is a private development. As a private development, the funds would be taxable, and thus be less attractive to bond investors. To help mitigate this issue, the state of Michigan has created 2 alternative financing offerings in the form of two loan programs. The Brownfields Redevelopment Loan (BRL) is used for cleanup of contaminated properties and Revitalization Revolving Loans (RRL) is used for demolition and site preparation. The two programs are designed to bring upfront funding to redevelopment projects due to their flexible terms: no payments are due for the first five years and the projects carry a two-percent interest rate[xvi].

The second common incentive often found in building redevelopment is historic building tax credits. This process involves both state and federal bureaucracy, and since the credits are not granted until after development, the funds are not useful for upfront work by the developer. However, the credits can be sold to third-parties, which can be used to defray those costs immediately once the building is finished.

A third post-development incentive is insurance. Certain insurance companies offer improved services, rates, or conditions to green buildings. Fireman's Fund began

xiii. See US EPA, Reference 50.
xiv. See Mallach, Reference 30.
xv. See Paull, Reference 39.
xvi. See US EPA, Reference 51.

offering its Green-Gard insurance in 2006 to new and redeveloped commercial buildings[xvii]. Green-Gard recognizes the lowered risk incurred in a building with installed state-of-the-art electrical, plumbing, and roof systems, and offers discounted pricing accordingly. Fireman's Fund also offers special coverage for historic buildings, certified or not, which recognizes the additional time, skilled labor, or unique materials which must be procured when a historic building is damaged.

However well-meaning these incentives may be, they present a challenge of complexity to developers, due to their municipal specificity and increased logistics. Since each municipality has unique incentives, and variation can exist even within the same municipality, understanding the requisites and opportunities can be quite daunting. Additionally, some of the incentives may significantly add to the timeline of the project, as the paperwork is sifted through various levels of bureaucracy. Some developers choose to hire external consultants to fill this role, but that incurs additional cost and coordination for the project.

On the Federal side, the Federal Brownfields Tax Incentive Program, first initiated in 1997 and extended through December 2009, allows for environmental cleanup costs to be fully deducted in the year in which they are incurred, instead of being capitalized over the life of the project[xviii]. Originally included in the Tax Relief Act of 1997, the goal of the Program is to "spur the cleanup and revitalization of brownfield properties." The project must contain or potentially contain hazardous substances on the property to qualify for funding.

The Small Business Liability Relief and Brownfields Revitalization Act of 2002 shifts the primary responsibility of brownfield administration from the Federal level to the state level, and provided three distinct funding programs related to brownfields. Eligible entities for this funding include: a general purpose unit of local government, a land clearance authority, a State-created government entity or redevelopment agency, an Indian Tribe, or an Alaskan Native Regional or Village Corporation[xix]. The three funding sources created are the Brownfield Assessment Grant, the Brownfield Revolving Loan Funds, and Brownfield Remediation or Cleanup Grants. Assessment Grants provide initial project funding to identify, characterize, and assess contaminant presence and to plan for remediation. Revolving Loan Funds allow recipients to give loans to developers or other entities for site remediation. In order to qualify, the recipient must contribute at least 20% matching funds for the project, unless the EPA would characterize this as placing undue hardship on the recipient. Remediation and Cleanup Grants are to be used directly for brownfield remediation. Considerations taken into account for funding requests for these Grants include the inclusion of long-term civic goals, including park systems and existing infrastructure. Since the initiation of the Federal Brownfields Program, the EPA has awarded 1,255 Assessment Grants totaling $298 million, 230 Revolving Loan Fund Grants totaling $217 million, and 426 cleanup grants totaling $79 million, for a total of $594 million. The funding budget for fiscal year 2008 was over $74 million[xx].

Federal programs address larger issues across the country - some states are showing initiative in tackling brownfields in their municipalities as well.

xvii: See Fireman's Fund, Reference 20.
xviii: See US EPA, Reference 50.
xix. See Johnson, Reference 28.
xx: See US EPA, Reference 51

The state of New Jersey provides a project-based view of brownfield redevelopment. The New Jersey Brownfields Redevelopment Interagency Team (BRIT) provides brownfield redevelopers with access to 24 state agencies and resources in a coordinated manner[xxi]. BRIT is overseen by the New Jersey Department of Community Affairs' Office of Smart Growth, and convenes to assess projects in the initial phases and assist throughout the process. BRIT is used when more than five state agencies are needed to weave together legal, planning, environmental, infrastructure, and financing issues on a particular project. Financing is coordinated through various agencies including the New Jersey Economic Development Authority, New Jersey Redevelopment Authority, New Jersey Commerce and Economic Growth Commission, New Jersey Office of Smart Growth, New Jersey Environmental Infrastructure Trust, and the New Jersey Housing and Mortgage Finance Agency. Although each program is distinct in its scope, financing is available from site assembly and acquisition through management.

The state of Wisconsin's brownfield legislation focuses on assisting public sector initiatives. In 1999, Wisconsin enacted legislation to allow cancellation of delinquent property taxes on contaminated property through coordination between the Wisconsin Department of Natural Resources and the local municipality in which the property is located. The local taxing authority has discretionary authority to negotiate provisions for tax cancellation with the DNR, based on site conditions and cleanup. A second program allows municipalities to assign foreclosure to tax-delinquent brownfield properties and deliver the properties to new owners. These new owners must have an approved agreement with the Wisconsin DNR for cleanup and remediation action. This method is preferred by municipalities as it places the cleanup liability on the new owner. A third Wisconsin program, the Site Assessment Grant Program (SAG) aids local governments in assessment of contaminated sites, including Phase I and II environmental assessments, demolition, asbestos abatement, and disposal of hazardous or abandoned chemicals. Applicants for the grant must not be the party who caused the site contamination, and the local government must be allowed access to the site in order to undergo the remediation work[xxii].

The state of Michigan has taken brownfield redevelopment work to a local scale by the 1996 establishment of the Brownfield Redevelopment Authorities (BRA)[xxiii]. These city and county-based entities are given authority to issue tax-increment financing and bonds for environmental and redevelopment costs incurred. This type of upfront financing is key to incentivizing developers at an early stage.

A Michigan property owner may also apply for a Single Business Tax Brownfield Redevelopment Credit. This option allows for up to 10% development costs, up to $1 million.

National Trends on Adaptive Reuse

In 1994, over 4.5 million commercial buildings existed in the US, with over half of those buildings were built before 1970. Given their number, existing buildings have the greatest potential to lower the overall burden placed by the built environment on the natural envi-

xxi: See Bartsch, Reference 3.
xxii: See Bartsch, Reference 3.
xxiii. See Diamond, Reference 17.

The Secretary of the Interior's Standards for Rehabilitation [xix]

The Standards (Department of Interior regulations, 36 CFR 67) pertain to historic buildings of all materials, construction types, sizes, and occupancy and encompass the exterior and the interior, related landscape features and the building's site and environment as well as attached, adjacent, or related new construction.

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.

4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.

6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

8. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

xix. See US National Park Service, Reference 55.

ronment. For a building to be truly sustaining it needs to endure and adapt to climate change incrementally over time.

The building reuse trend increased dramatically in the 1990s with the trend to increased urbanization from Generation X and baby boomers, coupled with abandoned buildings in gentrifying neighborhoods. Former manufacturing sites from New England to the mid-Atlantic region became prime sites for revitalization. Seaport warehouses with water views and deep floorplates became in-demand. Across the US, empty downtowns have found new life thanks to the renovation of existing buildings into more value-added assets. Conventional wisdom held that keeping the original use on a building, and doing as little upfront renovation as possible would bring the most value. But with unique, historic buildings, many owners and developers have found that transforming a former warehouse into a residential or office use has given the most return on their investment.

The US Department of the Interior's Standards for Rehabilitation, shown on the facing page and developed in the 1970s, focus on economic and technical feasibility while retaining the historic character of the building. These standards are used from a top-down approach and as they are implemented at the US Federal and state level. Projects must comply with the ten defined standards in order to qualify for tax credits. Environmental integration is not taken into account, which leaves a large area for interpretation with parties of possible conflicts of interest. Recent discussions have urged the historic preservation movement to include green standards; however, there is resistance to change the currently open standards to a more rigid set, according to Emily Wadhams,

Figure 6. Milwaukee's historic Third Ward features several renovated buildings turned from warehouses to mixed-use retail and residential buildings.

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the vice-president for public policy at the National Trust for Historic Preservation: "We don't think the standards need to change. They are broad enough....Older buildings are already a step ahead of the game, but we also think they can be made more energy efficient.... There needs to be a balance."[xxiv] It is possible that a LEED-like system may be developed for preservation projects. For adaptive reuse projects, developers often tap into the Historic Rehabilitation Tax Credit. This incentive directly reduces taxes at ten to twenty percent of eligible costs, depending on the building's age, whether it is located in a historic district, or whether it is listed on the National Register of Historic Places. Buildings which are certified as historic can receive up to a 20% tax credit, whereas non-historic, non-residential buildings built before 1936 can receive up to a 10% tax credit for rehabilitation work[xxv]. The credit is intended to defray material, equipment, and professional costs, and is not eligible to be used against land acquisition costs, landscaping, furnishings and appliances, or an enlargement of a historic building. The credit reduces the amount of income tax owed instead of reducing the amount of taxable income and is applicable to commercial real estate.

The Internal Revenue Service is in charge of setting the boundaries of this credit, while the National Park Service is charged with compliance and conformance of predetermined standards. In order to be eligible for the 20% credit, a project must be depreciable as an income-producing property, must be substantial enough to incur $5,000 in costs over a 24-month period, must be returned to use after the work is complete, and must be a certified historic structure when returned to service. In order to be eligible for the 10% credit, a project must retain at least 50% of existing external walls as external walls, must retain at least 75% of existing external walls as external or internal walls, and retain at least 75% of the building's internal structural framework. The credit's process occurs in three steps: the National Park Service determines if the building qualifies for the credit, then determines if the proposed change is in compliance with standards, then determines if the completed changes align with the building's historic standards. A developer works through state-level historic preservation officers for the first two stages, after which the application is sent to the National Park Service. After completion of the project, the tax credits are awarded to the developer. A compliance rule requires retention of the building for five years by the developer, nor can any additional construction be performed that would alter the building's historic integrity. If a developer cannot use the entire amount of tax reduction available from the credit, he or she may sell the credit to a third party and receive additional project equity from the sale.

At a localized scale, thirty states have enacted legislation to permit local governments to abate property taxes on historic buildings.

The Clinton Foundation established the Clinton Climate Initiative (CCI) in August 2006 in order to aid large cities in adaptation in the face of climate change[xxvi]. CCI has partnered with C40 Large Cities Climate Leadership Group to help those cities accelerate their reduction of greenhouse gas emissions. The CCI has three main methods for assistance: implementation of large emission-reducing programs, utilization of scale to encourage purchase of new technologies, and development of measurement tools to identify and track success. The CCI's Energy Efficiency Building Retrofit Program is one of the hallmarks of CCI's success. By bringing together energy service companies, financial institutions, and municipalities, the Program works to reduce the impact of existing buildings on energy use and greenhouse gas emissions. Through energy performance contracting, building owners are able to finance emission-cutting building renovations with expected future utility savings. Energy service companies (ESCOs) who are partners with the CCI contractually agree energy savings and maximum project costs in order to reduce risk for building owners. Under the program, owners may receive up to 100% financing for a retrofit project. The CCI is an example of a creative, long-term approach to improving the built environment's impact on the natural environment.

xxiv. See O'Connell, Reference 37.
xxv. See Cohn, Reference 13.
xxvi. See William J. Clinton Foundation, Reference 57.

Existing Writing about Adaptive Re-use

Writing about adaptive re-use of existing building has its first spike in the 1970s and 1980s, after the first energy crisis in the US spurred redevelopment. According to the National Preservation Press in 1977[xxvii], there exist ten reasons why reusing buildings is economically advantageous:

1. "Rehabilitation is labor-intensive and thus is not as influenced by skyrocketing costs of building materials for new construction.
2. Maintaining an existing building saves the increasingly high cost of purchasing undeveloped land.
3. Reusing an old building saves demolition costs.
4. People are often willing to pay competitive rental rates in renovated old buildings.
5. Renovation of existing buildings can take less time than new construction and can take place in stages.
6. Old buildings often can be acquired for a very low price.
7. Renovation can provide tax advantages.
8. Increased federal, state, and local funds are available for rehabilitation.
9. Rehabilitation imposes fewer public and social costs than new construction.
10. Reusing old buildings conserves energy."

These ten factors are similar to those opportunities found 25 years later. Derek Latham's 2000 book, "The Creative Re-Use of Buildings," cites five reasons for appeal from older buildings[xxviii]:

1. "Archeological motives: concerned with buildings as pieces of historic evidence, and the intrinsic value of that architectural evidence to our own and future generations.
2. Aesthetic appreciation: Visual amenity is concerned with the subjective enjoyment society experiences from its visual environment. Regional style as an amenity exemplifies aesthetic appreciation. Cultural values carry forward an enduring message of pride in a community.
3. Economic: Tourism and leisure can spring from existing buildings. Re-use is cheaper, quicker, and a good investment. Old buildings are valuable energy resources. Re-use creates new jobs.
4. Functional value: Historic buildings, creatively reused, can act as a catalyst and lubricator to the process of introducing alternative functions into areas otherwise swamped by market competition.
5. Psychological need: Creative re-use has popular appeal because humans cling to a core preservation reflex and the security of the familiar.

Both the National Preservation Press and Latham listed observations that are mainly

xxvii. See Bunnell, Reference 6.
xxviii. See Latham, Reference 29.

true today as well. Latham also outlines three forces which ultimately create a building reuse project - they can be people-driven, building-driven, or policy-driven. People-driven projects are started either when an individual or group has a need for a particular use and are searching for a building to fulfill it; or by an owner of a building who is looking to a way to creatively adapt his or her building. A building-driven project is started when the character of the building is so notable that redevelopment comes in the form of a silent cry. A policy-driven project is led by governmental incentives, either in general or within a specific district or area.

It is important to note that redevelopment during the late 1970s and 1980s was assisted by changes in the federal tax code. For example, previous to the Tax Reform Act of 1976, tax deductions were allowed for demolishing designated historic buildings and new construction on the site of a razed certified historic structure was eligible for accelerated depreciation. The 1981 Economic Recovery Tax Act actually turned the tables and permitted a tax deduction up to 25 percent of the value of adaptive reuse work. $1.1 billion in construction qualified for the tax break in 1981, and doubled to $2.2 billion in 1983[xxix]. The packaging of public-private partnerships in adaptive reuse work has been key to providing enough capital for the projects. For example, public financing can lever enough private financing to make a project feasible. In Sherban Cantacuziono's 1989 book, "Re/Architecture," he reports that the cost of conversion properties is fully competitive with equivalent new work, although he concedes that much of that money is available in the form of government incentives[xxx].

On the social side, one of the challenges faced by developers is that of buyer acceptance of a "used" building. According to the UK Department of the Environment in 1987, the US was an early adopter of this model: "Even major American companies are happy to use refurbished mills as headquarters or production plants, whereas in Britain few large companies would do so." For the commons, a major advantage posed by reuse projects is that the "total energy embodied in construction represents a real resource that is non-renewable."[xxxi] Given the current debate about the availability and production of energy resources for the common good of humanity, re-using existing buildings has been recognized as an alternative to abate additional energy use.

On the regulatory side, the acceptance of multiple uses within one building is a problem not only faced by redeveloped buildings, but a strong factor when a developer is creating alternate schemes for the building layout. According to the UK Department of the Environment, the US has led on this issue. Policy is increasingly important for adaptive reuse. The long lifespan of the existing building stock means the majority of it will be in use in 50 to 100 years time. It is crucial to develop policy that encourages early adaptation of existing buildings[xxxii].

On the design side, working within an established context can be more challenging than starting from scratch. Contemporary demands for mechanical equipment, telecommunications, lighting, and accessibility create an increased number of balls that the design team must juggle - that were not necessarily in place when an existing building was constructed. The book "Adaptive Reuse," suggests that "the 'new' and the 'old' act as respectful backdrops and at other times encourage the best of 'new' and 'old' to be foils to each other."[xxxiii]

Ironically, some of the most fervent opponents to adaptive reuse have come from the historic preservation and rehabilitation movements. This is because, according to Sherban Cantacuzino, "the emphasis has also shifted from accurate and reverential restoration to a freer and more creative attitude to the changes that an old building may undergo; from the building as an art object to the building as the product of a whole socio-economic system."[xxxiv] Older buildings, even common, non-civic older buildings, are seen as part of an urban fabric that contains a history but also a future - thus spurring development of the building instead of maintaining it as a relic of the past.

Recently, adaptive reuse buildings have garnered attention for energy efficiency upgrades. According to the Bay Area Local Initiatives Support Corporation (LISC), the average payback for most energy efficiency measures is under three years, and energy efficiency is the "cornerstone of any green rehabilitation project."[xxxv]

Conclusion

Because of the impact that buildings have on land use, health, and society, new opportunities have developed for developers to take a leading role in bringing harmony between buildings and the natural environment. Next, the role of developers and their challenges will be reviewed.

xxix. See Diamonstein, Reference 18.
xxx. See Cantacuziono, Reference 8.
xxxi. See Austin, Reference 2.
xxxii. See Austin, Reference 2.
xxxiii. See Camilleri, Reference 7.
xxxiv. See Cantacuzino, Reference 8.
xxxv. See Somers, Reference 42.

Part 2 - Examining the Role of Real Estate Development in Adaptive Reuse

"In general, there has been a growing interest in historical buildings recently. The appreciation of past achievements in architecture and design, and being in a different environment than what is offered by contemporary buildings, make historical buildings attractive."
- Kasha Bali, Property Manager with Downtown Properties Holdings, Los Angeles

Intoduction to Part II

Given the tremendous opportunities posed by buildings to make positive change on the environment, what real estate industry demands prevent it? This section will review the real estate industry's typical cycle and issues faced by the developer when starting an adaptive reuse project.

The first section reviews the challenges and benefits faced by developers in starting any real estate project. Second, the real-estate circle of risks is outlined, with relationship to each phase of building development. Last, an analysis is performed to find the most outstanding gaps between the current state of adaptive reuse development and the needs of developers.

Figure 7. Real estate developers create profound impacts on cities.

Challenges

There are real and perceived factors which hinder redevelopment of existing buildings. The greatest is uncertainty: the greatest fear in the developer's mind is often the lack of upfront access to the issues that may be present on the site. Some urban properties may have limited or restricted access during the due diligence process, or surrounding activity may make the construction phase logistically daunting. Many older buildings are often inflexible in design. For instance, a former storage building may have a high density of supporting columns compared to a modern building. Uncertainty in the overall economic market can contribute to developer hesitation on any project, and a use-specific downturn can negatively affect a specific project even in an overall bull economy.

Many developers stay as far away from adaptive reuse as possible because of the increased risk of the project, stemming from difficulties in assembly, title, environmental contamination, and structural uncertainty. Another reason is that redevelopment is perceived to be much more difficult and much more financially complex. Many adaptive reuse projects take on various levels of financing just to "make the numbers work," which in itself requires much more complexity in managing the ProForma and managing the multiple partners in the financing. Some additional financing may not become available until later phases of a project, while due diligence needs to take place at the very first stage. This misalignment of incentive timing can prove disastrous for developments.

Developers are hindered by differing social goals of the community. Some municipalities provide very straightforward assistance in redevelopment, while others make the oft-required variances difficult to obtain. Community groups can pressure developers to higher standards than are legally necessary, and fear of spreading environmental contamination often runs rampant in brownfield sites in particular. The external perception of the building, and the external perception of the contamination of a building, can sometimes prove a greater hardship to the redevelopment than real contamination.

Lastly, a developer may consider that a new building to be built to high performance standards may be more lucrative or marketable overall than the redevelopment of an existing asset. Depending on the priorities set forth in the project and the specific details of the buildings, this may be true. The development team must deliberate the incremental cost-benefit tradeoffs of each situation.

Green development of buildings is often hindered by a higher perceived cost. Many studies have shown an increased upfront cost of building to LEED or EnergyStar standards, but the premium varies widely. This uncertainty can lead to hesitation to proceed. Municipal utility connections in suburban locations often have similar, if not lower, costs to developers, even though the distance traveled by the infrastructure is much greater. In a sense, the urban locations subsidize the costs for the suburban or exurban locations. Developers who are not planning on holding a building for a long period of time will not necessarily reap the benefits of reduced operating costs, and this can disincentivize the higher upfront costs. Low energy and water costs create an environment in which their preservation is not as imperative – thus, in areas where these costs are low or heavily subsidized, green buildings may not be in great demand. The cost of LEED certification can vary up to 3-12 percent [xxxvi], depending on

xxxvi. See Haxton, Reference 22.

the level of certification pursued.

Experience, or lack thereof, can hinder a developer from pursuing green building. The design and/or construction team may not be familiar with new materials and technologies and be unwilling to put their professional reputation or liability at risk. Simple inertia may retard a change in attitude toward new materials, technologies, or methods of building. Engineers and architects may not be familiar with software modeling programs which are often used in providing baseline and actual cases for certification programs.

Benefits

The intangible benefits of both adaptive reuse and green building are clear. By keeping a structure active, a developer can increase the life of a possibly historically significant structure. Many older buildings were built with more craftsmanship, detail, and with more solidity than what might be built today. From a life cycle perspective, an existing building will most likely have much lower embodied energy in its materials. Overall construction time and costs may be lower, depending on the project's existing condition and the plans for redevelopment. Governmental approvals may be faster for redevelopment if the property is located in a specialized zone or if the building will feature certain historic or environmental characteristics which the municipality has deemed priorities. If this is the case, it is likely that there are tax or other incentives in place to not only get the project moving faster, but also to increase the project's financial feasibility.

One of the greatest intangible benefits of building redevelopment is the return on perception. That is, the redevelopment of an underutilized asset may have a multiplicative regenerative effect on a neighborhood, which may never have been envisioned without a first pioneer. A building or neighborhood which may never have been under consideration for investment can take a new life from the catalyst of a building retrofit. This can be quite attractive from a municipality's point of view.

Real Estate Circle of Risks Analysis

The Real Estate Development Circle of Risks, shown on the facing page, portrays the due diligence process for any developer when considering a new project. It was developed by Peter Allen, a professor of real estate development at the University of Michigan's Ross School of Business[xxxvii]. The Circle is a comprehensive way to view any new project from the myriad of risks that are inherent in any project. By analyzing and weighing those risks against calculated benefits, the developer can decide whether or not to move forward with a project.

The thirteen risks outlined in the Circle are the following:

1. Economic growth: The macro and microeconomic trends of a building's location. Some markets, such as New York City, demonstrate strong resilience to overall negative economic cycles. Other markets, such as Detroit, face strong downward trends when a particular industry is faltering.
2. Environmental: Buildings can offer tremendous environmental opportunities or disastrous environmental challenges. Asbestos, contaminated waste, and other brownfield contamination can provide additional financing opportunities for a project.
3. Market research: A developer must understand the competitive landscape for a

xxxvii. See Allen, Reference 1.

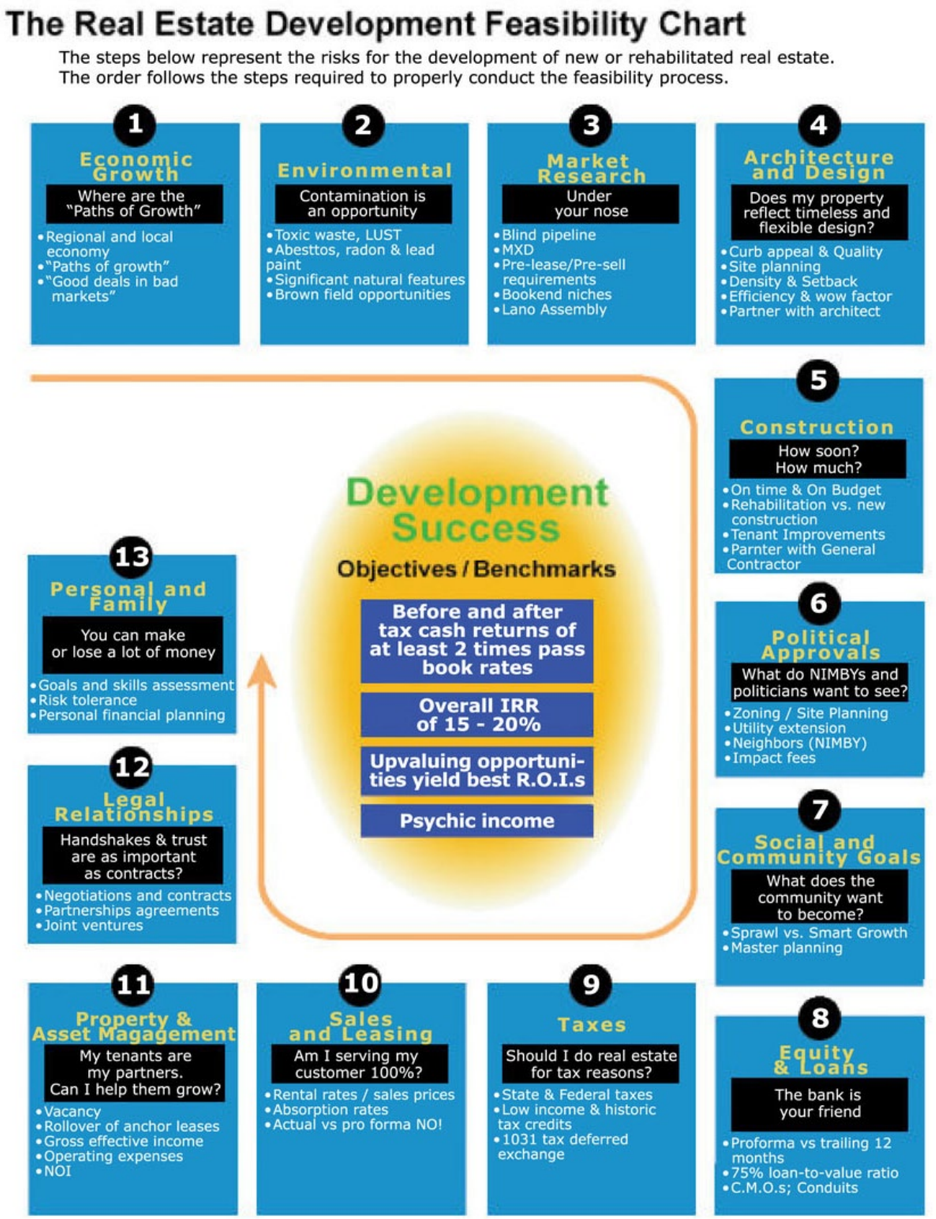

Figure 8. The "Real Estate Circle of Risks" details the various issues that a real estate developer must consider before undertaking a new project. Printed with permission of Peter Allen.

project, as well as hedge as many preleasing or presale options as possible.

4. Architecture and Design: Distinctive buildings tend to have a greater "curb appeal," and a design team can leverage experience in bringing a project to successful fruition.

5. Construction: Contractors offer partnership opportunities and experience in selecting options to decrease construction time and budgets.

6. Political approvals: A developer must work closely to align the project with existing zoning or propose a zoning variance. Various impact fees may also affect the bottom line of a project.

7. Social and Community Goals: Keeping in line with a community's density, design, and social goals will make the development process much smoother.

8. Equity and Loans: A developer must understand the macro and local development market's financing agenda. Creating and selling a believable vision is essential for garnering equity investors and debt financing.

9. Taxes: Taking on non-traditional real estate development projects can serve a developer well due to tax credits and incentives. Most common are for historic structures, environmental contamination, affordable housing, and structures in certain zones targeted for development.

10. Sales and Leasing: A developer must analyze the current absorption and rates for rental and for-sale buildings and update the financial structure of the development as the project matures.

11. Property and Asset Management: Managing the operating income of a building over its long lifetime is key to a positive return for a developer. This phase offers both technical challenges such as mechanical systems improvements to social challenges, such as maintaining a high level of tenancy.

12. Legal Relationships: Real estate development requires a great deal of partnerships in financial agreements, sales and leasing, and legal representation if a project goes awry. Additionally, variances and incentives require thorough understanding of regulatory conditions.

13. Personal and Family: Due to the high risk of real estate development, much personal risk is at stake. The risk tolerance of a developer must be high, with overall financial planning based on weighted probabilities of various outcomes. Non-recourse loans, if possible, are key.

Due to their unique nature, adaptive reuse projects have special issues to consider through the six phases of a building's life cycle. Those six phases are: (1) Due diligence, (2) Assembly, design, and approvals, (3) Construction, (4) Marketing and occupancy, (5)Management and Operations, and (6) End of Life. The Real Estate Circle of Risks is used as appropriate within each phase to analyze the opportunities and challenges offered redevelopment.

The (1)***due diligence phase*** begins when a site is identified and the developer makes the decision to investigate the feasibility of redevelopment on the site. He or she must consider the applicable risks that are outlined in the Real Estate Circle of Risks during this important phase.

Economic Growth: The developer must look at the overall market indicators for development, as well as the local market movement relating to employment and politics. She must understand the very localized possible effects of the project to stimulate the overall redevelopment of the area, including the long-term tax addition to the municipal coffers and the short-term boost in construction and related industries. The developer may be able to lend equity and experience to empower local developers, if she has main experience from outside of the area.

Environmental: The developer must investigate if environmental contamination exists on the site, and if so, follow the legal chain of custody to understand the ownership of the contamination. If the developer does not have experience, she may hire an environmental engineer to do a first-phase assessment. This assessment will determine if environmental risk is present, such as asbestos in floor tile or pipe insulation or underground chemical storage tanks.

Market Research: In the due diligence phase, the developer would perform a competitive analysis of other new and adaptive reuse buildings in the development pipeline. This would also be the time for the developer to analyze presale or prelease possibilities to assess the financing of the project.

Architecture and Design: The developer must make several determinations regarding the architecture and design during the due diligence phase. First, she must determine if the building can achieve historic tax credits. Second, she must determine the involvement of the state and local historic preservation boards, and understand the political landscape in that municipality regarding historic preservation. Third, she should contract an architect for a preliminary assessment of what architectural elements should be preserved during redevelopment. Fourth, the architect will need to determine if any code or zoning exceptions will be pursued. Fifth, the architect will begin a preliminary design for redevelopment, which can be used for rough pricing of the project.

Construction: The developer will need to analyze the construction timeline and costs to develop a preliminary budget for the project. She will need to understand if the construction will have a long timeline, filled with variability, or a short timeline, due to a lack of unforeseen circumstances. She will need to determine if the labor will need to be higher skilled to construct unique elements or integrate the existing character and elements with state-of-the-art new equipment and materials. She will also need to contract an engineering firm to determine if the existing infrastructure is safe, clean, and usable. Certain structural or mechanical equipment may be useable, but not in keeping with the new design or desired energy efficiency of the finished building.

Political approvals: If the architect determines that code or zoning variances will be needed, the developer should analyze the impact of these events on the timeline of the project. Additionally, if the developer is applying for certain incentives, she will need to assess the impact these approvals will have on the project.

Social and community goals: Existing buildings often need to be brought into compliance with the Americans with Disabilities Act (ADA), enacted in 1990, with the social goal of inclusion. The developer and architect will need to assess the impact of ADA on the building's entrances, stairwells and vertical movement, and washrooms, which are generally the areas where ADA has the greatest impact. If compliance costs are greater than 20% of the entire renovation budget, the developer may apply for exceptions. However, if the building is listed on the National Register of Historic Places, the developer will need to ensure compliance with the building's historic character. The developer will also need to assess possible development impact fees on her budget[xxxviii]. Many of these impact fees are used by municipalities to pay for increased school enrollment or infrastructure strain.

xxxviii. See Cohn, Reference 13.

However, the fees may be less stringent if the municipality is eager to push the revitalization forward.

Equity and loans: In the due diligence phase, the developer will need to set aside contingency funding for unforeseen findings and she should determine the lending environment for the project. She may begin to seek equity partners and purchasers of tax credits.

Taxes: The developer should investigate TIF opportunities, essentially freezing property taxes at the predevelopment levels.

Sales and leasing: In this phase, the developer should begin developing a marketing strategy for the target market. The demography of the market will affect the absorption of units and the price per square foot spent and expected.

Property management: The developer will need to determine if she intends to hold the property to sell the property after development. Some incentives depend on continued ownership. If the developer decides to hold the property, she should work to identify property management partners.

Legal relationships: The developer must investigate liens on the property in the initial phase. She must also identify any other legal issues such as environmental remediation and ownership for clean-up. The creation of a legal development entity (typically an LLC) should occur during due diligence, if the project will move forward.

Personal and family: The developer will need to determine the timing and amount of risk desired for personal reasons.

The (2)***Assembly, Design, and Approvals phase*** begins once the developer determines that the project is feasible and decides to move forward in earnest. This is the phase where the greater public has big input in the outcome of the project.

Environmental: In this phase, the developer must work with the environmental engineer to define steps to remove any contamination, and finalize the ownership for any contamination. The developer must determine if she is planning on pursuing LEED or another environmental certification. Generally, if this is determined early in the development process, it makes the certification process smoother and clearer. The total development team, including consultants, should be assembled at this point and tasked defined to reach the environmental goals of the project.

Architecture and Design: During this phase, the developer must work with the architect to create design development drawings to be used in seeking financing and public approvals. The architect will be helpful in determining the potential occupancy of the building as well as an initial budget of hard and soft costs. Infrastructure connections should be finalized during this phase. The developer must also work with various consultants, including mechanical, electrical, and plumbing engineers, interior designers, and landscape architects, to devise a cohesive scheme for the project.

Political approvals: The developer must finalize approvals from the municipality during this phase, before beginning construction. Very complex projects may require private-public partnerships where both sides offer expertise and benefits. For example, the municipality may be able to offer variances, tax incentives or credit guarantees and want to have an equity stake in the project. The site assembly may require eminent domain from the municipality in order to clear title problems for dismembered tracts of land. A great deal of coordination with the municipality takes place during this phase.

Social and Community: The developer should compare her proposed plan to the city's civic master plan or regional plan in order to verify that the proposed development is in-line with social goals. The developer should also work with neighbors and area stakeholders to get their buy-in for the proposed development, as this usually smoothes the political approvals process.

Equity and loans: In this phase, the developer should finalize her ProForma for the project, including the debt and equity funding sources.

Legal: The myriad of possible legal arrangements for complex reuse projects require clarity, especially early-on. Variances, public-private partnerships, eminent domain, etc, involve complex negotiation and contracts, which may add time to the life of the project.

The (3)***Construction phase*** of a redevelopment project can be especially interesting since the contractor is working with an existing structure and new construction. Surprises from the existing building can wreak havoc into the construction timeline, and most experienced redevelopers cite this possibility as one of the biggest factors for pursuing adaptive reuse projects.

Environmental: In the construction phase, any environmental remediation that needs to occur starts right away. The removal of asbestos or underground leaching tanks help give the developer peace of mind when they are off the site! If the project is seeking an environmental certification, the construction will need to be well-documented.

Architecture and Design: The architect will need to coordinate with the contractor, especially in clarifying what elements of the existing structure will need to be preserved and what means and methods should be used to achieve the preservation.

Construction: For some phases of construction, higher skilled or more experienced workers will be needed. For example, skilled masons may be needed to repair the exterior façade or experienced carpenters may be needed to preserve structural elements. The question of cost in construction for reuse materials is debatable. For example, specialized, low-production products tend to cost more because of lower economies of scale. Special order products to fit in with the existing structure could cost more than generic materials. If experienced laborers are scarce, some money may need to be spent on R&D or education. However, some materials may not be more costly. For example, some environmentally friendly materials come from recycled sources or from the waste stream so raw material cost is lower. If the products can be locally sourced, transporation costs may be lower. The developer can minimize additional costs by focusing on purchasing items that will get the "biggest bang for their buck," instead of ordering high volume, expensive items. Some construction challenges in adaptive reuse projects can include structural and mechanical issues. Older buildings tend to have shorter spans between columns, for example, every 18'-20' instead of 30'[xxxix]. Former industrial buildings may have a lower ceiling height, which could make a challenge for accommodating mechanical, lighting, and telecommunication lines which are necessary in modern buildings. Lastly, older buildings tend to have a smaller window-to-wall ratio than modern buildings, which can restrict wall placement and ultimately, daylighting

xxxix. See Mooney, Reference 36.

the space. Creative coordination between the design team and the construction team is necessary to accomplish the overall goals of the project.

Sales and Leasing: Presale or prelease should be underway by the time construction is happening at the project. If any customization is desired by future owners or tenants, this needs to be coordinated with the contractor.

The (4)***Marketing and Occupancy phase*** is one of the most exciting phases for the developer, as she is able to see the interest in the project and see it come alive through use after occupancy. The Power Plant Live! project shown on the facing page, is an example of how even "big-box" stores can be part of a redevelopment project. It is also a big test to see if the work so far will satisfy the tenants and meet the goals set forth in the initial phases of the project.

Market Research: The developer must research the items which will differentiate the project to the market and target the research to the marketing of the project. The developer must know how seasonality might affect the occupancy of the project. In residential projects, for example, warmer seasons tend to have higher move-in frequency. If other projects are opening up in the area, the developer must be aware and understand how to compete in the larger economic area. If any large events occur in the vicinity, the developer should take advantage of the great marketing opportunity.

Architecture and Design: The architect should be involved in verifying the construction and getting the punchlist finalized before occupancy. The building may also undergo commissioning to verify if the building is operating as expected. This is a typical item in projects seeking environmental certifications.

Sales and Leasing: The developer should use the market research in their sales and leasing strategy in order to know how the adaptive reuse can be used as a consumer benefit. The sales or leases need to have a clear method for paying utilities. Some developers may choose to charge a gross lease for tenants and reap any energy savings that were installed during construction. On the other hand, if lower utility costs can be used as a benefit for leasing, the developer may have triple-net leases or a form of agreement where the tenant or owners are responsible for utility payment.

Once the building is finished and occupied, the (5)***Operations phase*** is underway. The developer needs to be constantly aware of changing trends in building maintenance to maintain a competitive edge with the investment made in retrofitting the building.

Environmental: The developer will need to determine if she intends to pursue LEED for Existing Buildings. This certification focuses on the maintenance and operations of existing assets and is re-certified every three years. The developer will also need to develop a strategy for involving tenants in maintaining the vision and goals of the building, especially in later years when the tenants are further removed from the initial excitement of redevelopment.

Market Research: During the Operation phase, the developer will keep track of the building's status. Is it a catalyst for redevelopment? Is it a follower of technology? Research will be focused on comparable properties and the area's identity, and blending that with the developer's strategy.

Equity and Loans: Loans will be paid and equity returned during this phase, according to the agreements set in the first phases of the project. The project might also receive tax benefits from TIF or historic building incen-

Figure 9. The 2002 opening of Power Plant Live! in the Inner Harbor of Baltimore, Maryland, transformed two vacant blocks into a vibrant $35 million entertainment, retail, and office center.

tives.

Property Management: From the outset, the developer will need to determine property management guidelines, including the use of "green" cleaning products. As time goes on, the property management will need to focus on maintaining the older features and especially their connections to the newer features. The management will also need to keep up with the latest technologies to ensure that the building continues to be desirable to current and future tenants.

The (6)***End of life phase*** of a project comes from a combination of personal and professional aspirations for the developer as well as from the condition of the property.

Economic Growth: The developer will need to assess if the end of life for the building is personal, professional, due to the market, or due to the condition of the building. If economic conditions have changed, it is possible that the building could undergo another renovation into a new desirable use. However, if the building has truly reached the end of its structural life, demolition may make more sense.

Environmental: One determinant for the end of life may be its environmental impact. If technology has advanced rapidly since the building was redeveloped, it may be possible that by tearing down the existing building and building a high-tech replacement, that the overall building may have a lower environmental footprint, from a life-cycle perspective. If the existing building will be torn down, the developer will need to verify if materials disposal and regulation has changed from initial build-out.

Market research: The developer should be ever-cognizant of other possible uses for the building, and maintaining it at its highest and best use.

De-construction: The materials of the building should be separated in order to be reused or salvaged. The developer should create a plan to minimize the de-construction waste which is sent to municipal landfills.

Political approvals: If the developer is selling or deconstructing the building, she should determine the political approvals needed to move forward.

Social and Community Goals: Similar to political approvals, the developer should seek stakeholder input in the sale or deconstruction of the building at end of life.

Through the redevelopment process, the developer is faced with a unique set of decisions. With early and thorough due diligence and a cohesive set of guiding principles through the process, the developer can more quickly make decisions on the project.

Challenges and Opportunities

By recognizing the existing challenges in the redevelopment process, opportunities appear that can smooth the process. By making the process more available to developers, the opportunity to utilize existing assets to reduce the impact of buildings on the environment becomes a closer reality. The five main challenges are: Incorrect timing of incentives, unknown physical conditions of properties, unknown legal conditions of properties, lower probability of lending, and an overall increased variability in the process.

The timing of redevelopment incentives needs to be better aligned with when developers most need funding – at the beginning of the project. A redevelopment project generally requires more up-front due diligence work than a greenfield project. Because of this, more funding is needed in the due diligence phase. However, much TIF and preservation credits come at least midway through the construction phase, at the soonest. There is a misalignment of when developers need money and when they can hope to receive it. A new alignment or bridge between the two time periods is needed.

There are several methods which could alleviate this misalignment. First, a municipality could have a pool of funds which is maintained from earlier projects' returns which is then used to plowback funds into the early stages of due diligence. Private projects which receive municipal funding would be required to return some profits in the later years of the project, once the development is stabilized. In a public-private partnership, the public funds which are returned could also be included in this pool in order to spur more redevelopment. This would be a long-term approach since it would take several years to produce stabilized projects, and it would require public management of the funding, which brings increased political influence into the development that the developer must manage.

To help mitigate this issue, the state of Michigan has created 2 alternative financing offerings in the form of two loan programs. The Brownfields Redevelopment Loan (BRL) is used for cleanup of contaminated properties and Revitalization Revolving Loans (RRL) is used for demolition and site preparation. The two programs are designed to bring upfront funding to redevelopment projects due to their flexible terms: no payments are due for the first five years and the projects carry a two-percent interest rate.

The second main challenge for adaptive reuse is the unknown existing conditions of many properties. Developers are often hesitant to begin a project with several unknowns as they increase the developer's risk.

In order to understand the existing conditions at a site, two approaches could be used. First, the federal government could implement a national program to inventory existing buildings. This program could be modeled on the US Department of the Interior's Historic American Building Survey (HABS) or Historic American Engineering Record (HAER). These programs bring together a temporary interdisciplinary team to document historically significant structures in various sites in the US. The teams are typically assembled for 12 weeks during the summer academic break and consist of architects, engineers, historians, and photographers. The collected work is stored at the US Library of Congress. A similar program could be implemented to document the existing conditions of underutilized buildings across the country. The teams could include architects, engineers, contractors, developers, and photographers whose goal is to provide a library of existing conditions, opportunities, and challenges to the development community. If the existing conditions of potential project sites are well documented, it would reduce the upfront risk to the developer. A second possibility would be to have a municipal-level program where the city outlines priority districts for increased upfront spending for due diligence by developers. The developer would still need to investigate the existing conditions on the site, but the risk in the investigation would be reduced with funding. The city would also be able to guide redevelopment work in line with its master plan.

xl. See Mallach, Reference 30.

A third challenge for developers is tracking down legal documents for underutilized sites. Some areas have lived through decades of abandoned or ill-used buildings, with multiple owners, liens, and interventions. Often, it is not clear to the developer who really holds a clear title to a building and what kind of legal maneuvering is necessary to bring a building back to life. If an area is redeveloping quickly, a developer may want to assemble disparate sites quickly and needs to move rapidly in order for the due diligence to pay off to the maximum.

In order to alleviate this issue, city government should prioritize their legal documentation of existing buildings. While these records should be already accessible and correct in records offices, many developers find that they are out-of-date. A simple prioritization of this issue would help municipalities to encourage redevelopment. Cities could do this by prioritizing the updating of their records to areas where they want to target redevelopment. This strategy is supported by Alan Mallach in his book "Bringing Buildings Back."[xi] His advice is that a tracking system be developed and computerized and accessible to users such that proprietary or sensitive information is controlled. He also suggests that municipalities work with community development corporations (CDCs) to help speed this process.

A fourth challenge cited by developers is the reduced number of financial institutions who are willing to lend for redevelopment projects. This is because many institutions are less inclined to take on the risk associated with the uncertainty in this type of project. Without available financing, developers are hesitant or unable to push a project forward.
Financial institutions need to view redevelopment projects as a means of diversifying their investment portfolio. First of all, any project that receives historic funding has a required timeline for ownership of five years. Because of this, the project's risk is actually reduced because the developer/owner must commit to maintaining the property for a possible resale in five years. Second, like any portfolio of investment, redevelopment properties have a certain and specific risk. If a bank wants to have a balanced appetite for risk, it should include some riskier investments. Third, the amount of goodwill and marketing that a bank can receive from community redevelopment can lead to even more investment opportunities. This is especially true if the bank is local and the investment is local.

The fifth challenge of adaptive redevelopment is in its overall increased variability. Timelines, political approvals, community input, environmental remediation, structural stability, and trade coordination, to start, have an increased complexity in redevelopment work. This is a challenge that requires a higher risk tolerance and appetite for patience on the part of the developer.

Some of the overall variability can be mitigated through the aforementioned recommendations, but it is also worthwhile to note that adaptive reuse gives an opportunity for niche developers to gain experience and operate in a space generally passed over by larger development groups. The careful assessment of due diligence by a developer can help to reduce the overall project risk, but most developers will attest that there are always surprises that can't be smoothed away. This is partly what attracts the developers in the first place!

Conclusion

Real estate development is an inherently risky business involving a lot of players. Consequently, developers are constantly looking for options to lower their exposure to risk. Adaptive reuse projects can be very attractive to developers if the conditions and/or incentives are in-line with their development plans. However, in order to make the most attractive position for developers, municipalities should align their incentives with the needs of the development team.

Part 3 - Case Site: Cass Corridor in Detroit, Michigan

"Cities need old buildings so badly it is probably impossible for vigorous streets and districts to grow without them."
- Jane Jacobs, The Death and Life of Great American Cities

Introduction to Part III

The Cass Corridor is an area of Detroit that once boasted the pride and wealth of the city, the home of the Masonic Temple, the Symphony Orchestra, and the Institute of Art. In the second half of the twentieth century, however, the area fell to disuse, drugs, and decay. Today, there are many efforts underway to revitalize this area and reinforce its adjacent location to downtown employment, Wayne State University, sports stadiums, and culture.

Many historic buildings remain in this neighborhood. One such example is the original Hotel Fort Wayne, a luxury hotel when it was built in the 1920s. The second segment of Part III looks at four redevelopment scenarios to understand the viewpoint of a developer who might be interested in a site - should it be redeveloped at all? If so, is a new building more interesting to the developer or is an adaptive reuse more appropriate? Does a "green" rating like LEED make the building more attractive? A financial analysis is performed and assessed.

Figure 10: The downtown Detroit skyline, as seen from the banks of Windsor, Canada.

Sited between Detroit's downtown business and entertainment district and Wayne State University, the Cass Corridor is fortunately located for accessibility to jobs and leisure activities. Figure 11, below, shows the location of the Cass Corridor and the modeled site. The area's location is defined as a two-square mile area bordered to the north by Interstate 94, to the east by Woodward Avenue, to the south by Interstate 75/Fisher Freeway, and to the west by Michigan-10/John C. Lodge Freeway. The area is within a .75 mile (as measured from the center of the neighborhood) distance to Tigers Stadium, the Fox Theatre, the Detroit Institute of Art, the Detroit Symphony, and the Detroit Public Library.

The Cass Corridor boasts approximately 8,600 households with a higher population density (12.5 households/acre) than Detroit's average (10.6 households/acre). The average household income in 2007 was $35,107, approximately $12,000 below the City of Detroit average. Due to its higher density and a wide variation in the neighborhood's income, the neighborhood has one of the highest aggregate incomes of any neighborhood in Detroit. The Cass Corridor has also seen some of the greatest levels of new construction in the entire city, with 468 permitted units for construction - nearly 12% of the city's total – between 2000 and 2007. The median home sale value of the area ($219,103) in 2007 was significantly higher than the city's average

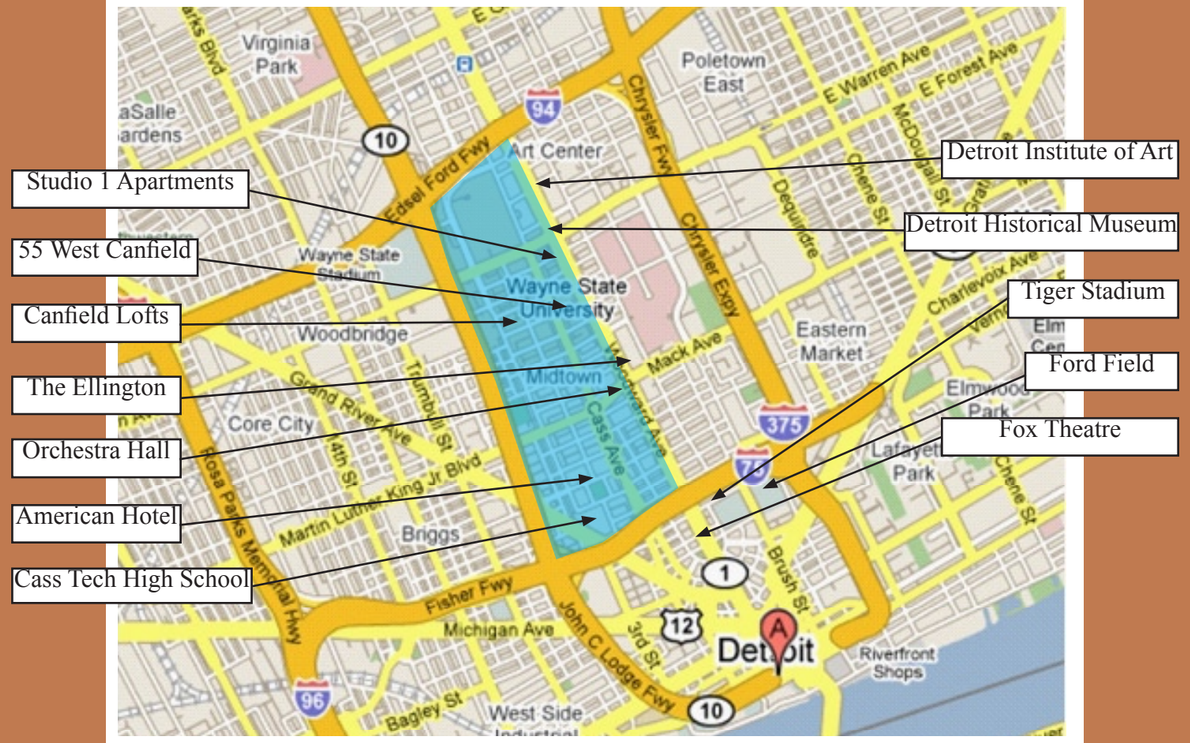

Figure 11. The Cass Corridor is located adjacent to the downtown business district of Detroit and is bounded by three highways. Wayne State University is located within the neighborhood.

xli. See Reppert, Reference 40.

($88,998)[xli]. Thus, one can see that this new construction is being sold at a higher price than re-sold housing.

The Cass Corridor's history has been mixed. Starting in the 1890s, the Cass Corridor was home to various industries and the wealthiest among Detroit's residents. The Whitney house, completed in 1894 for $400,000 and located along Woodward Avenue in the Cass Corridor, was the residence of Detroit's wealthiest resident in 1900, David Whitney, Jr. In 1912, the Willys Overland Company, predecessor to the Jeep vehicle brand, built a large showroom and repair center in the neighborhood. The home shown in Figure 12 below gives a sense of the stately character of homes built during Detroit's better times. Another building of note within the neighborhood is the Masonic Temple. This 12 million cubic-foot structure was opened in 1926 and is the largest Masonic Temple in the world.

However, the area declined in-step with the overall city of Detroit in the mid-twentieth century. In the 1960s and 70s, the area was a known center for creative poets, musicians, and artists. However, by the 1980s,it had a verifiable reputation as a hub of the drug trade in the Midwest and was terrorized by gangs, prostitution, and hard drug use.

The new millennium brought new development to the north end of the neighborhood, adjacent to Wayne State University. This development has been immensely aided by the University Cultural Center Association (UCCA). The UCCA was formed in 1976 to support and enhance the neighborhood through its 300 multi-sector representatives. Since 1995, the UCCA has focused on a strategic plan for redevelopment, expansion, and infrastructure

Figure 12. Greek Revival home at 4251 Cass Avenue, built in 1895. It serves as the current home of Pi Kappa Alpha - Delta Nu chapter of Wayne State University.

improvements in the Cass Corridor. In 2003, the UCCA initiated a streetscaping, façade improvement, and low-interest loan program for the area, totaling over $20 million dollars[xlii].

Some notable developments include:

1. Orchestra Hall and Max M. Fisher Music Center: The Detroit Symphony Orchestra (DSO) built its home on Woodward Avenue in 1919 and played in the hall until 1939. Badly deteriorating by the 1970s, it was saved from the wrecking ball by the DSO's principal bassoonist, Paul Ganson, who led a community effort to maintain the facility. In 2003, Orchestra Hall re-opened as the home for the DSO for the first time in 33 years. It had received a complete restoration and an adjacent facility, the Max M. Fisher Music Center, was added. The revitalization efforts helped bind the community and created a focus for more investment[xlii].

2. Canfield Lofts (460 West Canfield): Housed in Buick's former Detroit headquarters, this 2000 redevelopment of a 1922 brick building pioneered the whole-building retrofit movement in the Cass corridor. Thirty-five loft style units were built and sold out within 18 months by the Hubbell Group, led by Colin Hubbell[xliv].

3. The Ellington (3670 Woodward Avenue): One of the only new buildings to be constructed in the Cass Corridor, the Ellington features 55 condominium units and 12,500 square feet of retail. Starbucks, Bank of America, FedEx, and T-Mobile occupy its ground floor. Developer Peter Cummings, the former President of the DSO's Board of Directors and a developer located in Florida, leveraged

Figures 13, 14, 15.

xlii. See University Cultural Center Association, Reference 56.
xliii. See Crowell, Reference 14.
xliv. See Hubbell, Reference 25.

a personal commitment to the area in order to lead the development of this mixed-use building[xlv].

4. Lewis Cass Technical High School (2501 Second Avenue): One of four magnet high schools in the Detroit Public School System, this new 404,000 square foot building[xlvi] opened during the 2005-2006 school year. Notable Cass Tech alumni include Diana Ross, Lily Tomlin, Ellen Burstyn, David Alan Grier, and Jack White[xlvii].

5. 55 West Canfield Lofts (55 West Canfield): The second venture in the neighborhood by the Hubbell Group was a 1922 former warehouse for the City of Detroit. Deemed "functionally obsolete"[xlviii] due to twelve-foot high ceilings and closely-spaced martini-glass columns, 55 West Canfield was renovated to house 28 lofts and a 7,000 square foot bakery on the ground floor. According to the developer, "all electrical, plumbing, casing, trim, doors, and cabinets were reclaimed by Architectural Salvage Warehouse of Detroit."

6. Studio One Apartments (4501 Woodward Avenue): This $21 million project features 124 apartments and 30,000 square feet of ground-floor retail space. Wayne State University served as a partner to the deal and the apartments are geared to WSU students.

Figures 16, 17, 18.

xlv. See Cummings, Reference 15.
xlvi. See School Designs.com, Reference 41.
xlvii. See Cass Tech Alumni Association, Reference 9.
xlviii. See Hubbell, Reference 25.

While the Cass Corridor has had its stories of success, especially in the challenging environment of Detroit, it has also many more opportunities for improvement. For example, the Hotel Fort Wayne, shown in Figures 19,20, and 21, and called the American Hotel in more recent years, was built in 1926 for a cost of $1.8 million dollars, and has been shut since 1990[xlix]. It is located at the corner of Temple Street and Cass Street, adjacent to the Masonic Temple, and faces Cass Park and downtown Detroit. The building is one of the many symbols of Detroit's opulence in the first half of the twentieth-century and its decline ever since. Its terracotta cornice is a demonstration of the unique character that this type of building brought to the Cass Corridor.

However, the building's out-of-town landlord has no intentions of renovating the building due to low demand for its space, formerly holding over 300 hotel rooms. There are literally tens of buildings with the size and amount of unused square footage as the Hotel Fort Wayne in the Cass Corridor. While some buildings have been renovated and given a new life, economic complexities have prevented others from being given a new purpose. What remains are hollow shells which have not been economically valuable enough to be reused.

While the economy of Detroit is the prime reason that many of these buildings are not used to their full potential today, there are other effects in place to motivate developers to reuse existing buildings. Detroit, and the

Figures 19, 20. Existing conditions in an interior room and the external facade at the Hotel Fort Wayne.

xlix. See Isbbotson, Reference 27.

State of Michigan, has put many incentives in place for building reuse and leads the country in adaptive reuse and brownfields policy. If the economic situation in Detroit were to improve, the existing building stock would provide a fertile ground for adaptive reuse development.

Scenario analysis

The following study was prepared to take a site such as the Hotel Fort Wayne and model four possibilities for the site's rebirth. Those possibilities are:

1. Tear down the existing building and re-build a similar-sized building in a conventional manner
2. Tear down the existing building and re-build a similar-sized building to LEED-NC Gold standards
3. Renovate the existing building in a conventional manner
4. Renovate the building to LEED-NC Gold standards

The building is assumed to have two levels of retail with nine levels of apartments above

Figure 21. The exterior of the Hotel Fort Wayne currently. Note the open windows and boarded-up ground floor. A building of this size was used as a base for the four models.

for a total of an 11-story building. The total gross retail area is 16,320 square feet and the total gross apartment area is 73,440 square feet for a total of 89,760 square feet of gross occupied space. The apartments are assumed to be a mix of one, two, and three bedroom units with an average of 1,088 square feet per unit. 83 parking spaces are included for the retail and apartment uses. These spaces are located at-grade or in underground parking, depending on the model.

The new building options (1 and 2) are assumed to be constructed with reinforced concrete and brick veneer. The renovated building options (3 and 4) will retain the facade and internal structure but will be an over 50% renovation of interior space. There is assumed to be a certain amount of asbestos in the existing piping and wall surfaces, and lead paint is assumed to be on the wall surfaces.

The assumptions and data sources can be found in the Appendix.

The four models are run over six years in order to obtain tax credits. Those tax credits stipulate that the developer must hold the building for five years after occupancy.

Impacts and Incentives

Due to the location, the land use impacts of the proposed building are minimal. The proposed building is located in a previously developed area with existing utilities infrastructure and public transportation. Services such as banking, groceries, pharmacy, and dining are located within walking distance of the site, therefore minimizing independent vehicle use. No wetlands or wildlife corridors would be impacted by building a new building or renovating the existing building on the site.

Energy use and emissions on the site would vary depending on the model. However, in each case, the systems would be upgraded and the new project would create an improvement on the existing output.

The models take advantage of brownfields and historic tax credits where possible. Models 3 and 4 take advantage of the Michigan Business Tax for brownfields. This allows a 12.5 percent credit for eligible investments, including hard costs and some services costs like architecture and engineering fees[xlvi]. These credits can be sold for 95 percent of their value and used as equity[xlvii]. Models 3 and 4 also take advantage of enhanced State and Federal tax credits for historic building renovation. Under the standard program, buildings could qualify for 25 percent tax credits (5 percent Federal, 20 percent State). Under the enhanced credits in the state of Michigan, buildings could qualify for an additional 15 percent tax credit[xlviii]. In a typical market, these credits could be sold and used as equity at 90 percent of their value[xlix]. There were no credits for LEED buildings.

Circle of Risks

Like many adaptive reuse buildings, this site would require much work in the due diligence phase, especially since the environmental and legal aspects of the building are largely unknown. Economic growth challenges for the Detroit area are high, and the developer would need to assess at an early stage how much of a strain this could put on personal and family relationships over the next several years.

xlvi. See Michigan Economic Development Corporation, Reference 35.
xlvii. See Beal, Reference 4.
xlviii. See State of Michigan, Reference 44.
xlix. See Beal, Reference 4.

The assembly, design, and approvals stage would be key to the viability of this project. Assuming the project is approved by the City of Detroit, the real approvals for this project would come in the form of incentives and tax credit approvals.

The construction phase of the four models would vary. In Models 1 and 2, the existing building would be demolished and new construction would be put into its place. Models 3 and 4 may run across unique aspects of the existing building that would need to be mitigated, such as asbestos, mold, or 1920s construction techniques.

The marketing and occupancy phase of the project could be very exciting. There has not been much of a presence of LEED buildings in Detroit, so Models 2 and 4 could have a distinct advantage in faster occupancy or lower vacancy of units. Historic renovation is common and apparently desirable in Detroit, as shown by the opening of the Westin Hotel in the former Book Cadillac building and the renovations already done in the Cass Corridor.

The management and operations of the building would require attention to the tax incentives and credit requirements over the initial life of the building. The redevelopment itself could strengthen social and community goals within the Detroit core and help to link the downtown with the Wayne State area. Models 2 and 4 could apply for LEED-Existing Building certification.

At the end of the building's life in decades, the building could be redeveloped again or built new - The scenario analysis would need to be done again.

l. See Allen, Reference 1.
li. See Mattiesen, Reference 32.

Results

The first model achieves the highest rate of return of any of the models, even without any type of incentive. The internal rate of return (IRR) achieved is 17.4 percent, which is in the range of the desired rate of 15 to 20 percent minimum on the Real Estate Circle of Risks. Models 2, 3, and 4 achieve IRRs of 7.7, 12.6, and 9.3 percent, respectively. See Table 2 for highlights of some of the largest impacts on the rate of return.

Model 1 benefits from having the lowest construction costs per square foot without the cost of underground parking.

Model 2 benefits from lower costs of construction and higher LEED rents but the IRR is driven down significantly by the cost of underground parking. There are no incentives for LEED to help this model.

Model 3 has higher costs for construction without the benefits of marginal higher rent and lower vacancy that LEED buildings have been proven to reap. A 2.5 percent increase in rent from a higher willingness-to-pay for historic buildings aids the return.

Model 4 has the highest costs for construction but is able to command a 10 percent increase in apartment rent per month for LEED at a three percent lower vacancy[li]. The rents are higher as a historic building.

Both models 2 and 4 assume the LEED building has a portion of energy produced on site in order to qualify for a Michigan Alternative Energy Renaissance Zone, and thus are not required to pay property taxes.

Assessment

Assuming that the average real estate developer would desire a minimum IRR of 15 percent, it is easy to see why the residential real estate market within the City of Detroit is dire. It is also apparent why both the City and the State have become leaders in creating incentives for developers - it is a necessity to make up for lack of demand and rents charged to tenants. The government is trying to stimulate demand for talented residents. Even so, many developers would walk away from the increased paperwork of LEED or tax credits due to the desire to reduce complexity and legal costs.

So what does it take to stimulate this type of development in Detroit? The real answer is demand. Keeping other factors constant, the residential and retail vacancy rates for models 3 and 4 would need to be as low as six percent to make renovation appetizing to a developer. On the other hand, if vacancy is kept constant, and retail rents were raised nine percent to 18 dollars per square foot, models 3 and 4 would achieve IRRs above 18 percent. If instead residential rents were raised to $1,100 (a 36 percent increase), the IRRs would be in development range. To compare this rent within the Southeast Michigan region, if the apartments were rented at $1,600 per month, the IRR would jump to 30 percent. This is a typical rent for a renovated apartment in downtown Ann Arbor, Michigan. The challenge with these raises is the fact that there is already built supply in the area - that if the numbers became high enough, there would be a risk of too much flooding of the marketplace, which would drive the numbers back down again.

However, the most likely situation would be a combination of the above factors, instead of changing them in isolation. For Detroit, if average residential vacancy were to drop to 11 percent and average rent were to raise 95 dollars per month to 900 dollars per month, the IRR for models 3 and 4 would make renovation worthwhile. This combination is not without time and effort, but a rise in residential demand due to job growth and an 11 percent increase in rent seems more reasonable.

Other factors are certainly at work. Adaptive reuse is a desirable building product in Detroit - it is fairly common and accepted that existing buildings can be reused. This is not the case in all cities and should not be taken for granted. Another factor to consider for Detroit include the unknown factor of green building in the city. There is little precedent for LEED and other green-rated buildings within the city and it is unknown if residents will have the kind of demand premium that has been demonstrated in other US geographies. The last varying factor which could have significant effect on the models is the supply of building materials and labor. Building materials have undergone significant price increases and decreases in the last decade. This could affect the IRR of the models, depending on the structural and finishing details of a project. Also, Detroit labor unions are strong and often require Detroit residents to be the majority of the construction crew. This economic development mandate from the City has increased the cost of construction within Detroit, so that it is higher than the surrounding suburbs. While commendable for its job creation value, this mandate may need to be reviewed for how it negatively affects other sectors of the Detroit economy.

In order to stimulate development in Detroit, the government needs to create large economic development opportunities. The bulk of middle and upper level income job opportunities for Detroit lie in Southeast

Model	1	2	3	4
	Tear down, rebuild conventional	Tear down, rebuild LEED -NC Gold	Renovate conventional	Renovate to LEED - NC Gold
Construction cost per square foot - apartments	$108	$111	$130	$134
Construction cost per square foot - retail	$104	$106	$148	$152
Average rent per square foot - apartment (monthly rent)	$0.74 ($805)	$0.82 ($887)	$0.76 ($827)	$0.84 ($909)
Average rent per square foot - retail	$16.56	$16.56	$16.97	$16.97
Average apartment vacancy	19%	16%	19%	16%
Average retail vacancy	9%	6%	9%	6%
On grade parking at $8k per space	Yes	No	Yes	Yes
Underground parking at $40k per space	No	Yes	No	No
Upfront equity from incentives	0	0	$5.3M Historic tax credits $1.6M Brownfield tax credits	$5.5M Historic tax credits $1.7M Brownfield tax credits
Tax abatement from incentives	0	0% property taxes - Michigan Rennaissance Zone	0	0% property taxes - Michigan Rennaissance Zone
IRR	17.4%	7.7%	12.6%	9.3%

Table 2. Largest impacts on four financial models.

Michigan, not in Detroit. The state is working to incubate small business and green business, but it also needs to create a diversity of large companies. Those large companies should be headquartered in downtown Detroit.

The Detroit economy should be diversified. The long affair with the automobile industry can continue, even as the auto industry itself goes through major changes, but the current Detroit situation has proven to be too dependent on that particular industry. If, like Minneapolis, Detroit could create downtown corporate headquarters for large companies like Target and Ameriprise Financial, or bid for corporate headquarters like Chicago has for Boeing and Miller Coors, it would create a large number of upwardly mobile professionals and empty nesters - the typical demographic for urban living.

For the time being, it seems that Detroit has the "if you build it, they will come" mentality with building incentives and credits. Those programs, while very attractive, are not successful if there are no tenants to occupy the space. Detroit should focus on the larger economics - the first step in the Circle of Risks - in order to stimulate growth. The macro and microeconomics at work within Detroit create negative impacts not only for the shareholders of the "Big Three" auto makers. In the case of the existing stock of buildings, they are ready to be redeveloped and the government is ready to make the returns appetizing to developers.

Figures 22, 23. Images of better economic times in Detroit, specifically in Campus Martius.

Part 4 - Conclusion

Buildings play a tremendous role of the human environmental impacts on the natural environment. With emerging technology, those impacts can be measured, qualified, and improved upon. Buildings are also extremely accessible to the larger public - they provide a way for users to visibly and impactfully make an everyday difference in their contribution to a global issue. Buildings are constantly around us - one need not travel to exotic locales to make a difference.

There are currently two primary methods of improving the built environment's impacts - either through new construction or through the renovation of existing building assets. New high-performance construction is a viable way for developing economies to contain or improve impacts as they grow. New construction is also appropriate for urban infill situations where additional space is needed and the existing building stock is occupied. On the other hand, adaptive reuse should be preferred in developed economies and in areas where existing building stock is not fully utilized. The embodied energy contained in those buildings can be maintained and the quality of older materials can be appreciated for both their intrinsic value and contribution to comfort. On a larger scale, existing buildings contribute to the heritage and place-making of a city, which can never be replaced.

Unfortunately, many buildings are not reused due to complexity, misalignments of incentive programs, developer strategy, and environmental importance.
Existing buildings have increased complexity since there are many unknowns within the structure, its construction, ownership, and available programs. Also, many of those programs misalign funding opportunities by making funds available later in the projects' lifetime - instead of offering where it is needed most to clear out complexity, in the due diligence phase. A developer's strategy to build and sell a building also restricts this market - since many incentive programs require a holding strategy for a certain number of years. Last, if a city and its residence do not place a high priority on improving the environment, it is likely that redevelopment of existing buildings will not occur - in fact, it will probably lead to development at the other end of the spectrum - suburban greenfield development.

Figure 24: The redevelopment of Tobacco Row in Richmond, Virginia, created the opportunity to reuse existing building stock, revive a city's downtown, and reduce environmental impacts.

Opportunities exist to overcome these challenges. The US Department of the Interior could start an existing building database similar to the HABS/HAER program, with priority districts defined by municipalities. This would help reduce the unknowns in existing buildings. Historic, brownfield, and TIF financing can be restructured to give financing to the front end of the development cycle or the municipalities can be given an equity stake in the project through a public-private partnership. Alternatively, municipalities could allow bond-style financing to give developers the upfront capital they need and time the repayment when cash flow is positive. Last, developers should become more educated about the benefits of energy efficiency. If the developer can align his or her strategy to reap the rewards of energy efficiency upgrades in projects, he or she would be more incented to have a "hold" strategy for building projects. This could lead to an additional focus on green buildings within an area, developing a positive feedback loop.

By looking at a case study in the city of Detroit, we can see that many disincentives for redevelopment are in place and are quantifiable. Interestingly, Detroit and the state of Michigan have provided many avenues for redevelopment but both micro and macroeconomic forces have hindered their full potential.

The situation in Detroit is unique - but not terribly uncommon. Many cities face challenges with redevelopment, but Detroit's economy has amplified the problem. To make adaptive reuse more attractive, cities must signal that developing existing buildings is as high or greater of a priority to developing new buildings. This can be done through incentives like in Michigan or through zoning. A more ideal situation would be to establish certain landmark projects with high visibility - demonstrating a precedent of what is achievable and successful in the eyes of the municipality and its residents. Coupled with the prioritization, there must be demand for more developed space in a city. While the current economy is experiencing an oversupply of space, it will not be long before the wheels of investment begin to turn again.

The focus of this project is universal - streamlining the existing process for adaptive reuse and aligning incentives will help the process everywhere. In the case of distressed cities like Detroit, Cleveland, Syracuse, and others, economic growth would compound the success of the recommendations.

Appendix

The following pages provide details about the four financial models. The assumptions and references below are shared by each model. In the following pages, each model contains 6 tables of data:

1. Cost of Construction Estimate
2. Project Financing
3. Rental ProForma
4. Parking ProForma
5. Cash Flows and Rate of Return
6. Assumptions and references specific to each model

Assumptions for All Models:

1. One 11 story mixed use building.
2. Retail on ground and first level, residential units above for 9 levels.
3. Total square feet:
   - 2 levels retail at 8160 per floor
   - 9 levels residential at 8160 per floor
   - 5,000 sqft green space to rear of building
   - 10,000 sqft hardscape to rear of building
   - 80% efficiency of residential plan
   - Average of 6 units per floor at 1088 square feet per unit
   - 1 parking space per unit = 54 spaces
   - 4 parking spaces per 1000 sqft retail = 24 spaces
4. Existing building assumptions:
   - One 11 story building at 8160 sqft per floor, 12' floor to floor height
   - Asbestos removal:
     - 7000 square feet of flat surface asbestos (foam fireproofing) per floor
     - 250 linear feet of average 11" diameter pipe insulated with air cell asbestos per floor
5. Detroit Cost of Construction modifier: 103.2 (See RS Means)
6. Other cost of construction data is cited on tables. Percentages, etc. that are not cited are industry norms (See Allen, Peter)
7. Loan to Value Ratio (See Bulmash, Mark)
8. Interest rate (See Steelhead Capital)
9. Exit Capitalization Rate (See Allen, Peter)
10. Base apartment rental rates (See Heartland Business)
11. Base retail rental rates (See Marcus & Millichap)
12. Base apartment vacancy rates (See Heartland Business)
13. Base retail Vacancy Rates (See ABC News)
14. Federal Long Term Capital Gain Tax Rate (See US Internal Revenue Service)
15. Federal Ordinary Income Tax Rate (See US Internal Revenue Service)
16. Michigan Long Term Capital Gain Tax Rates (See State of Michigan)
17. Michigan Ordinary Income Tax Rates (See State of Michigan)
18. Property Tax Rates (See City Data)

Model 1: Cost of Construction Estimate

Cass Corridor - 2009 Cost of Construction Estimate

Property Location: Corner of Cass Avenue and Temple Street
Approximate Parcel Size: 41,230 Square feet
Detroit Cost Modifier: 103.2

Development Data (User Input)	Total SF		Development Description
Condos / Apartments (High Rise 8 to 24 Stories)	73,440	SF	average 1088 sqft per unit
Retail Stores	16,320	SF	ground floor retail
Greenspace (Landscaping)	5,000	SF	mixed ground cover, shrub, trees, gravel
Hard Scape (Landscaping)	10,000	SF	primarily concrete paving
Underground Parking	0	SF	Underground parking
On-grade parking	18,070	SF	On-grade parking
Total Development Area	**89,760**	**SF**	
Total Development Area without Parking	**89,760**	**SF**	
Floor Area Ratio with Parking	**218%**		
Floor Area Ratio without Parking	**218%**		

Base Cost of Construction Estimate	Base Cost / SF	Base Cost	Upgrade % Applied	Total Base Cost	Cost / SF Dev. Type	Cost / SF Total
Condos / Apartments (High Rise 8 to 24 Stories)	$105.41	$ 7,989,032	1.00	$ 7,989,032	$ 108.78	$ 89.00
Retail Stores	$100.87	$ 1,698,877	1.00	$ 1,698,877	$ 104.10	$ 18.93
Greenspace (Landscpaing)	$101.40	$ 523,224	1.00	$ 523,224	$ 104.64	$ 5.83
Hard Scape (Landscaping)	$26.50	$ 273,480	1.00	$ 273,480	$ 27.35	$ 3.05
Underground parking	$ 114.29	$ -	1.00	$ -	NA	$ -
On-grade parking	$ 21.33	$ 397,829	1.00	$ 397,829	$ 22.02	$ 4.43
Base Construction Cost Estimate		**$ 10,484,613**		**$ 10,882,442**		**$ 121.24**

Final Cost of Construction Estimate			
Total Base Cost of Construction Estimate	$ 10,882,442	$ 121.24	per SF Total
Site Demolition	$ 355,450	$ 3.96	per SF Total
Bulk Asbestos Removal, additional	$ 109,725	$ 1.22	per SF Total
Site Work and Underground Utility Work ($6.95 / SF of Parcel)	$ 286,549	$ 3.19	per SF Total
Subotal - Hard Construction Costs	**$ 11,634,165**	**$ 129.61**	**per SF Total**
Construction Project Management Fees (2.75% of Hard Construction Costs)	$ 319,940	$ 3.56	per SF Total
Legal Costs (0.5% of Hard Construction Costs)	$ 54,412	$ 0.61	per SF Total
Initial Site Survey (RS Means Average)	$ 1,964	$ 0.02	per SF Total
Soil Boring / Foundation Analysis (RS Means Average)	$ 1,771	$ 0.02	per SF Total
Architectural / Engineering Fees (6% of Hard Construction Costs)	$ 698,050	$ 7.78	per SF Total
Insurance (RS Means Average)	$ 47,883	$ 0.53	per SF Total
Permit Fees (Per City of Detroit Schedule)	$ 99,170	$ 1.10	per SF Total
Site Demolition Fees (Per City of Detroit Schedule)	$ 24,391	$ 0.27	per SF Total
Plan Review Fees (Per City of Detroit Schedule)	$ 11,000	$ 0.12	per SF Total
Sales Commision (4% of Hard Construction Costs)	$ 465,367	$ 5.18	per SF Total
Closing Costs and Title (2% of Hard Construction Costs)	$ 232,683	$ 2.59	per SF Total
Subtotal - Soft Construction Costs	**$ 1,956,630**	**$ 21.80**	**per SF Total**
Total Project Hard and Soft Construction Costs	**$ 13,590,795**	**$ 151.41**	**per SF Total**
Contigency Allowances (as per RS Means) 15.00%	**$ 2,038,619**	**$ 22.71**	**per SF Total**
Total Project Hard and Soft Construction Costs w/ Contingency	**$ 15,629,415**	**$ 174.12**	**per SF Total**

Model 1: Project Financing

TOTAL PROJECT COST	**($14,541,866)**
Equity:	
less parking	$119,349
less rental	$3,679,071
less residential	$2,971,218
TOTAL EQUITY	**$6,769,637**
TOTAL DEBT	**($7,772,229)**

Model 1: Rental ProForma

SUPPORTING CALCULATIONS & ASSUMPTIONS:

Inflation	3.0%	(annualized forecast through 2013)
Base = January 1, 2008		Cash flows assumed to occur on January 1 for the upcoming year.

REVENUE

Store	Effective Area (ft²)	Gross Rent per ft² (YR 1 $)	Rent (YR 1 $)
Apartments	58,752	$8.90	$522,612
Retail Stores	13,056	$198.72	$2,594,488
Total	**71,808**		**$3,117,100**

Year	Apt Vacancy Rate	Apt Rent	Vacancy
YR 2	20%	$538,290	($107,658)
YR 3	19%	$554,439	($105,343)
YR 4	18%	$571,072	($102,793)
YR 5	17%	$588,204	($99,995)
avg	9%		

Year	Retail Vacancy Rate	Retail Rent	Vacancy
YR 2	10%	$2,672,323	($267,232)
YR 3	9%	$2,752,493	($247,724)
YR 4	8%	$2,835,067	($226,805)
YR5	7%	$2,920,119	($204,408)
avg	9%		

OPERATING EXPENSES:

Expense	Cost per ft² (YR 1 $)	Total Area (ft²)	Expense (YR 1 $)
Water & Sewer	($3.38)	89,760	($301,594)
Insurance	($4.44)	89,760	($398,534)
Flood Insurance	($2.28)	89,760	($204,653)
Maintenance	($6.60)	89,760	($592,416)
Janitorial	($9.84)	31,008	($305,119)
Property Taxes			($46,510)
	($26.52)		($1,848,826)

Gas & Electric	Cost per ft²	Vacant Area (ft²)	Expense
YR 2	($1.55)	16,320	($25,214)
YR 3	($1.59)	15,422	($24,542)
YR 4	($1.64)	14,525	($23,807)
YR5	($1.69)	13,627	($23,006)
Management Fees	5.0%	of Gross Effective Rent	
Exit Capitalization Rate	7.5%		

DEPRECIATION:

Rental Construction Cost	$12,263,570
Rental Property Acquisition Cost	$684,275
Land Cost as % of Acq. Cost	5.6%
Land Cost	$38,181
# Years	39
Depreciation Base	$12,225,389
Depreciation/Year (straight line)	$313,472

FINANCING: 70%

Loan to Value	
Total Debt	$8,584,499
Interest Rate	6.5%
Amortization Period	10
Annual Payment	$1,194,144
Total Equity	$3,679,071

TAX RATES:

Federal Long Term Capital Gain (5+ years)	15.0%
Federal Ordinary Income	35.0%
Michigan Long Term Capital Gain	3.9%
Michigan Ordinary Income	5.0%

GAIN ON SALE:

Selling price	$16,835,000
Less: Sales Fees (6%)	($842,000)
Less: Cost	($685,000)
Plus: Depreciation	$1,254,000
Taxable Gain	$16,562,000
Capital Gain Tax	($3,131,000)
Sales Proceeds	$15,993,000
Loan Payoff	($5,781,000)
Capital Gain Tax	($3,131,000)
Cash Flow	$7,081,000

	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6
REVENUE:						
Apartment Rent	$0	$538,290	$554,439	$571,072	$588,204	($1)
Retail Rent	$0	$2,672,323	$2,752,493	$2,835,067	$2,920,119	$3,007,723
Vacancy	$0	($374,890)	($353,068)	($329,598)	($304,403)	($304,403)
Reimbursed CAM	$0	$342,772	$353,055	$363,647	$374,557	$0
Gross Effective Rent	$0	$3,178,495	$3,306,919	$3,440,188	$3,578,477	$2,703,320
OPERATING EXPENSES:						
Gas & Electric	$0	($25,214)	($24,542)	($23,807)	($23,006)	$0
Water & Sewer	$0	($310,641)	($319,961)	($329,559)	($339,446)	$0
Insurance (incl. Flood)	$0	($621,283)	($639,921)	($659,119)	($678,893)	$0
Maintenance	$0	($610,188)	($628,494)	($647,349)	($666,769)	$0
Janitorial	$0	($314,272)	($323,700)	($333,411)	($343,414)	$0
Property Taxes	$0	($47,906)	($49,343)	($50,823)	($52,348)	$0
Management Fees	$0	($160,531)	($166,347)	($170,307)	($175,416)	$0
Total Operating Expenses	$0	($2,090,036)	($2,151,308)	($2,214,376)	($2,279,292)	$0
Net Operating Income	**$0**	**$1,088,460**	**$1,155,611**	**$1,225,812**	**$1,299,185**	**$2,703,320**
Less Debt Service	$0	($1,194,144)	($1,194,144)	($1,194,144)	($1,194,144)	$0
Before Tax Cash Flow	$0	($105,684)	($38,533)	$31,668	$105,041	$2,703,320
Plus: Principal	$0	$636,152	$677,501	$721,558	$768,439	$0
Less: Depreciation	$0	($313,472)	($313,472)	($313,472)	($313,472)	$0
Taxable Income	**$0**	**$216,896**	**$325,497**	**$439,736**	**$560,009**	**$0**
CASH FLOW ANALYSIS:						
Tax Savings (Burden)	$0	($86,690)	($130,036)	($175,674)	($223,723)	$0
Before Tax Cash Flow	$0	($105,684)	($38,533)	$31,668	$105,041	$0
Less: Income Tax	$0	($86,690)	($130,036)	($175,674)	($223,723)	$0
Equity Investment	($3,679,071)	$0	$0	$0	$0	$0
Sales Proceeds	$0	$0	$0	$0	$0	$7,081,000
Total Cash Flow	**($3,679,071)**	**($192,374)**	**($168,569)**	**($144,006)**	**($118,682)**	**$7,081,000**
Return on Equity		-2.9%	-1.0%	0.9%	2.9%	0.0%
Debt Service Coverage		91%	97%	103%	109%	0%

NPV	$673,164
IRR	11.17%

Model 1: Parking ProForma

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6		
Total Parking Spaces	78	78	78	78	78	78	Parking Construction Cost	$ 397,829
Monthly Fees							Parking Property Acquisition Cost	($137,755)
Monthly Parking Fee	$75	$75	$75	$75	$75	$75	Land Cost as % of Acq. Cost	34.6%
Allocation to Monthly Use	0	54	54	54	54	54	Land Cost	($47,700)
Percent Occupancy by Monthly Contracts	98%	98%	98%	98%	98%	98%		
							Inflation	3%
Hourly Fees								
Number of Spaces	0	24	24	24	24	24		
Nonwork Days	110	110	110	110	110	110		
Daily Parking Hours	24	24	24	24	24	24		
Percent Utilization	45%	45%	45%	45%	45%	45%		
Work Days	255	255	255	255	255	255		
Daily Parking Hours	24	24	24	24	24	24		
Percent Utilization	55%	55%	55%	55%	55%	55%	**DEPRECIATION:**	
Hourly Parking Rate	$1.25	$1.29	$1.33	$1.37	$1.41	$1.37	# Years	39
							Depreciation Base	$ 445,529
Expenses							Depreciation/Year (straight line)	$ $11,424
Operating Expenses (% of Gross Revenue)	25%	25%	25%	25%	25%	25%		
							FINANCING:	70%
							Loan to Value	
Parking Revenue								
Monthly Parking	$ -	$ 49,056.84	$ 50,528.55	$ 52,044.40	$ 52,044.40	$ 52,044.40	Total Debt	$278,480
Hourly Parking	$ -	$ 143,838.88	$ 151,464.36	$ 159,520.19	$ 164,305.80	$ 59,520.19	Interest Rate	6.5%
Total Parking Revenue	$ -	$ 192,895.72	$ 201,992.90	$ 211,564.59	$ 216,350.20	$ 111,564.59	Amortization Period	10
Expenses	$0.00	($49,670.65)	($53,573.57)	($57,795.59)	($59,102.93)	($57,795.59)	Annual Payment	$38,738
Net Operating Income	$0	$ 143,225.07	$ 148,419.33	$ 153,769.01	$ 157,247.27	$ 53,769.01	Total Equity	$119,349
less Depreciation		($11,424)	($11,424)	($11,424)	($11,424)	($11,424)	-	
less Principal		$20,637	$21,978	$23,407	$24,928	$23,407		
less Equity Investment	($119,349)							
plus Sales Proceeds						$1,404,000	**TAX RATES:**	15.0%
Cash Flow	**($119,349)**	**$152,438**	**$158,974**	**$165,752**	**$170,752**	**$1,404,000**	Federal Long Term Capital Gain (5+ years)	
Exit Cap Rate		7.5%					Federal Ordinary Income	35.0%
							Michigan Long Term Capital Gain	3.9%
NPV		$468,083.30						
IRR		146%					Michigan Ordinary Income	5.0%
							GAIN ON SALE:	
							Selling price	$2,112,000
							Less: Sales Fees (5%)	($106,000)
							Less: Cost	$138,000
							Plus: Depreciation	$46,000
							Taxable Gain	$2,190,000
							Capital Gain Tax	($414,000)
							Sales Proceeds	$2,006,000
							Loan Payoff	($188,000)
							Capital Gain Tax	($414,000)
							Cash Flow	$1,404,000

Model 1: Cash Flows and Rate of Return

CASH FLOW	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6
Apt and Retail	($3,679,071)	($192,374)	($168,569)	($144,006)	($118,682)	$7,081,000
Parking	($119,349)	$152,438	$158,974	$165,752	$170,752	$1,404,000
Total	**($3,798,420)**	**($39,936)**	**($9,595)**	**$21,746**	**$52,069**	**$8,485,000**

NPV	**$1,839,499**
IRR	**17.4%**

Model 1: Assumptions

Assumptions for Model 1:

83 parking spaces at grade at 300 sqft/space to rear of building
Reinforced concrete construction, Type IIA

Model 2: Cost of Construction Estimate

Cass Corridor - 2009 Cost of Construction Estimate

Property Location: Corner of Cass Avenue and Temple Street
Approximate Parcel Size: 24,910 Square feet
Detroit Cost Modifier: 103.2

Development Data (User Input)	Total SF		Development Description
Condos / Apartments (High Rise 8 to 24 Stories)	73,440	SF	average 1088 sqft per unit
Retail Stores	16,320	SF	ground floor retail
Greenspace (Landscaping)	10,000	SF	mixed ground cover, shrub, trees, gravel
Hard Scape (Landscaping)	5,000	SF	primarily concrete paving
Underground Parking	16,320	SF	Underground parking
On-grade parking	1,750	SF	On-grade parking
Total Development Area	**106,080**	**SF**	
Total Development Area without Parking	**89,760**	**SF**	
Floor Area Ratio with Parking	**426%**		
Floor Area Ratio without Parking	**360%**		

Base Cost of Construction Estimate	Base Cost / SF	Base Cost	Upgrade % Applied	Total Base Cost	Cost / SF Dev. Type	Cost / SF Total
Condos / Apartments (High Rise 8 to 24 Stories)	$105.41	$ 7,989,032	1.03	$ 8,204,736	$ 111.72	$ 77.34
Retail Stores	$100.78	$ 1,697,361	1.03	$ 1,743,190	$ 106.81	$ 16.43
Greenspace (Landscpaing)	$101.40	$ 1,046,448	1.00	$ 1,046,448	$ 104.64	$ 9.86
Hard Scape (Landscaping)	$26.50	$ 136,740	1.00	$ 136,740	$ 27.35	$ 1.29
Underground parking	$ 114.29	$ 1,924,827	1.01	$ 1,944,076	$ 119.12	$ 18.33
On-grade parking	$ 21.33	$ 38,528	1.00	$ 38,528	$ 22.02	$ 0.36
Base Construction Cost Estimate		**$ 10,869,581**		**$ 13,113,718**		**$ 123.62**

Final Cost of Construction Estimate			
Total Base Cost of Construction Estimate	$ 13,113,718	$ 123.62	per SF Total
Site Demolition	$ 355,450	$ 3.35	per SF Total
Bulk Asbestos Removal, additional	$ 109,725	$ 1.03	per SF Total
Site Work and Underground Utility Work ($6.95 / SF of Parcel)	$ 173,125	$ 1.63	per SF Total
Subotal - Hard Construction Costs	**$ 13,752,017**	**$ 129.64**	**per SF Total**
Construction Project Management Fees (2.75% of Hard Construction Costs)	$ 378,180	$ 3.57	per SF Total
Legal Costs (0.5% of Hard Construction Costs)	$ 65,569	$ 0.62	per SF Total
Initial Site Survey (RS Means Average)	$ 1,187	$ 0.01	per SF Total
Soil Boring / Foundation Analysis (RS Means Average)	$ 1,771	$ 0.02	per SF Total
Architectural / Engineering Fees (6% of Hard Construction Costs)	$ 825,121	$ 7.78	per SF Total
Insurance (RS Means Average)	$ 57,700	$ 0.54	per SF Total
Permit Fees (Per City of Detroit Schedule)	$ 117,020	$ 1.10	per SF Total
Site Demolition Fees (Per City of Detroit Schedule)	$ 24,391	$ 0.23	per SF Total
Plan Review Fees (Per City of Detroit Schedule)	$ 11,000	$ 0.10	per SF Total
Sales Commision (4% of Hard Construction Costs)	$ 550,081	$ 5.19	per SF Total
Closing Costs and Title (2% of Hard Construction Costs)	$ 275,040	$ 2.59	per SF Total
Subtotal - Soft Construction Costs	**$ 2,307,060**	**$ 21.75**	**per SF Total**
Total Project Hard and Soft Construction Costs	**$ 16,059,076**	**$ 151.39**	**per SF Total**
Contigency Allowances (as per RS Means) 15.00%	**$ 2,408,861**	**$ 22.71**	**per SF Total**
Total Project Hard and Soft Construction Costs w/ Contingency	**$ 18,467,938**	**$ 174.09**	**per SF Total**

Model 2: Project Financing

TOTAL PROJECT COST	**($17,169,982)**
Equity:	
less parking	$594,781
less rental	$4,341,590
less residential	$3,508,199
TOTAL EQUITY	**$8,444,569**
TOTAL DEBT	**($8,725,413)**

Model 2: Rental ProForma

SUPPORTING CALCULATIONS & ASSUMPTIONS:

Inflation	3.0%	(annualized forecast through 2013)
Base = January 1, 2008		Cash flows assumed to occur on January 1 for the upcoming year.

Rental Construction Cost	$14,471,985
Rental Property Acquisition Cost	$684,275
Land Cost as % of Acq. Cost	4.7%
Land Cost	$32,354

DEPRECIATION:

# Years	39
Depreciation Base	$14,439,611
Depreciation/Year (straight line)	$370,246

FINANCING: 70%

Loan to Value	
Total Debt	$10,130,376
Interest Rate	6.5%
Amortization Period	10
Annual Payment	$1,409,183
Total Equity	$4,341,590

TAX RATES:

Federal Long Term Capital Gain (5+ years)	15.0%
Federal Ordinary Income	35.0%
Michigan Long Term Capital Gain	3.9%
Michigan Ordinary Income	0.0%

GAIN ON SALE:

Selling price	$17,272,000
Less: Sales Fees (5%)	($864,000)
Less: Cost	($365,000)
Plus: Depreciation	$1,481,000
Taxable Gain	$17,524,000
Capital Gain Tax	($3,252,000)
Sales Proceeds	$16,408,000
Loan Payoff	($6,822,000)
Capital Gain Tax	($3,252,000)
Cash Flow	$6,334,000

REVENUE	Store	Effective Area (ft^2)	Gross Rent per ft^2 (YR 1 $)	Rent (YR 1 $)
	Apartments	58,752	$0.78	$574,873
	Retail Stores	13,056	$198.72	$2,594,488
	Total	71,808		$3,169,362

	Year	Apt Vacancy Rate	Apt Rent	Vacancy
$0	YR 2	18%	$592,119	($106,581)
$0	YR 3	16%	$609,883	($97,581)
$0	YR 4	15%	$628,179	($94,227)
$0	YR5	14%	$647,025	($90,583)
$0	avg	16%		

	Year	Retail Vacancy Rate	Retail Rent	Vacancy
$0	YR 2	8%	$2,672,323	($213,786)
$0	YR 3	6%	$2,752,493	($165,150)
$0	YR 4	5%	$2,835,067	($141,753)
$0	YR5	4%	$2,920,119	($116,805)
$0	avg	6%		

OPERATING EXPENSES:	Expense	Cost per ft^2 (YR 1 $)	Total Area (ft^2)	Expense (YR 1 $)
$0	Water & Sewer	($3.36)	89,760	($301,594)
$0	Insurance	($4.44)	89,760	($398,534)
$0	Flood Insurance	($2.28)	89,760	($204,653)
$0	Maintenance	($6.60)	89,760	($592,416)
$0	Janitorial	($3.44)	31,008	($305,119)
$0	Property Taxes	$0.00	89,760	$0
$0		($26.52)		($1,802,316)

	Gas & Electric	Cost per ft^2	Vacant Area (ft^2)	Expense
$0	YR 2	($1.21)	14,595	($17,645)
$0	YR 3	($1.24)	12,735	($15,805)
$0	YR 4	($1.28)	11,832	($181,525)
$0	YR 5	($1.32)	10,934	($172,787)
0.0%				
0%				

	YR 1	YR 2	YR 3	YR 4	YR5	YR 6
	$0	$592,119	$609,883	$628,179	$647,025	($1)
	$0	$2,672,323	$2,752,493	$2,835,067	$2,920,119	$2,920,119
	$0	($318,367)	($327,917)	($337,755)	($347,888)	($360,536)
	$0	$334,149	$344,174	$354,499	$365,134	$2,829,536
	$0	$3,279,224	$3,443,819	$3,581,766	$3,724,890	$2,829,536
	$0	($210,046)	($189,608)	($181,525)	($172,787)	$0
	$0	($310,641)	($319,961)	($329,559)	($339,446)	$0
	$0	($621,283)	($639,921)	($659,119)	($678,893)	$0
	$0	($610,188)	($628,494)	($647,349)	($666,769)	$0
	$0	($314,272)	($323,700)	($333,411)	($343,414)	$0
	$0	$0	$0	$0	$0	$0
	$0	($163,222)	($168,119)	($173,162)	($178,357)	$0
	$0	($2,229,653)	($2,269,803)	($2,324,126)	($2,379,066)	$0
	$0	$1,048,571	$1,174,015	$1,257,639	$1,345,224	$2,829,536
	$0	($1,409,183)	($1,409,183)	($1,409,183)	($1,409,183)	$0
	$0	($360,612)	($235,167)	($151,544)	($63,959)	$0
	$0	$750,708	$799,504	$851,472	$906,818	$0
	$0	($370,246)	($370,246)	($370,246)	($370,246)	$0
	$0	$19,850	$194,091	$329,682	$472,613	$0
	$0	($6,948)	($67,932)	($115,389)	($165,414)	$0
	$0	($360,612)	($235,167)	($151,544)	($63,959)	$0
	$0	$0	$0	$0	$0	$0
	($4,341,590)	$0	$0	$0	$0	$0
	$0	$0	$0	$0	$0	$6,334,000
	($4,341,590)	($360,612)	($235,167)	($151,544)	($63,959)	$6,334,000
		-8.3%	-5.4%	-3.5%	-1.5%	0.0%
		74%	83%	89%	95%	0%

NPV	($593,876)
IRR	4.48%

Model 2: Parking ProForma

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
Total Parking Spaces	0	78	78	78	78	78	78 Parking Construction Cost $ 1,982,604
Monthly Fees							Parking Property Acquisition Cost ($137,755)
Monthly Parking Fee	$100	$100	$100	$100	$100	$100	$0 Land Cost as % of Acq. Cost 6.9%
Allocation to Monthly Use	0	54	54	54	54	54	54 Land Cost ($9,571)
Percent Occupancy by Monthly Contracts	98%	98%	98%	98%	98%	98%	98%
							Inflation 3%
Hourly Fees							
Number of Spaces	0	24	24	24	24	24	24
Nonwork Days	110	110	110	110	110	110	110
Daily Parking Hours	24	24	24	24	24	24	24
Percent Utilization	45%	45%	45%	45%	45%	45%	45% **DEPRECIATION:**
Work Days	255	255	255	255	255	255	255
Daily Parking Hours	24	24	24	24	24	24	24 # Years 39
Percent Utilization	55%	55%	55%	55%	55%	55%	55% Depreciation Base $ 1,992,175
Hourly Parking Rate	$1.25	$1.29	$1.33	$1.37	$1.41	$0.00	$0.00 Depreciation/Year (straight line) $51,081
Expenses							
Operating Expenses (% of Gross Revenue)	25%	25%	25%	25%	25%	25%	25% **FINANCING:** 70%
							Loan to Value
							Total Debt $1,387,823
Parking Revenue							- Interest Rate 6.5%
Monthly Parking	$ -	$ 65,409.12	$ 67,371.39	$ 69,392.54	$ 71,474.31	$	- Amortization Period 10
Hourly Parking	$ -	$ 143,838.88	$ 151,464.36	$ 159,520.19	$ 168,031.58	$	- Annual Payment $193,053
Total Parking Revenue	$ -	$ 209,248.00	$ 218,835.75	$ 228,912.73	$ 239,505.89	$	$0.00 Total Equity $594,781
Expenses	$0.00	($53,881.36)	($58,040.71)	($62,534.78)	($61,672.77)		-
Net Operating Income	$0	$ 155,366.64	$ 160,795.04	$ 166,377.95	$ 177,833.12	$	**TAX RATES:**
less Depreciation		($51,081)	($51,081)	($51,081)	($51,081)		Federal Long Term Capital Gain (5+ years) 15.0%
less Principal		$102,844	$109,529	$116,648	$124,231		
less Equity Investment	($594,781)					$760,000	Federal Ordinary Income 35.0%
plus Sales Proceeds						**$760,000**	Michigan Long Term Capital Gain 3.9%
Cash Flow	**($594,781)**	**$207,129**	**$219,243**	**$231,945**	**$250,982**		
							Michigan Ordinary Income 5.0%
		Exit Cap Rate	7.5%				**GAIN ON SALE:**
							Selling price $2,285,000
		NPV	$512,332.58				Less: Sales Fees (5%) ($114,000)
		IRR	36%				Less: Cost $138,000
							Plus: Depreciation $205,000
							Taxable Gain $2,514,000
							Capital Gain Tax ($476,000)

Model 2: Cash Flows and Rate of Return

CASH FLOW	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6
Apt and Retail	($4,341,590)	($360,612)	($235,167)	($151,544)	($63,959)	$6,334,000
Parking	($594,781)	$207,129	$219,243	$231,945	$250,982	$760,000
Total	**($4,936,371)**	**($153,482)**	**($15,925)**	**$80,401**	**$187,023**	**$7,094,000**

NPV	**($58,136)**
IRR	**7.7%**

Model 2: Assumptions

5 parking spaces at grade at 300 sqft/space to rear of building
2 levels of underground parking
Reinforced concrete construction, Type IIA. Face brick.

Approved as a Michigan Alternative Energy Rennaissance Zone with special tax incentives: No state income or property tax.
LEED-NC Gold is 2.7% more expensive to construct than conventional construction (See CoStar)
LEED-NC Gold achieves 10% greater occupancy. (See Mattiesen, L.F.)

Model 3: Cost of Construction Estimate

Cass Corridor - 2009 Cost of Construction Estimate

Property Location: Corner of Cass Avenue and Temple Street
Approximate Parcel Size: 41,230 Square feet
Detroit Cost Modifier: 103.2

Development Data (User Input)	Total SF		Development Description
Condos / Apartments (High Rise 8 to 24 Stories)	73,440	SF	average 1088 sqft per unit
Retail Stores	16,320	SF	ground floor retail
Greenspace (Landscaping)	5,000	SF	mixed ground cover, shrub, trees, gravel
Hard Scape (Landscaping)	10,000	SF	primarily concrete paving
Underground Parking	0	SF	Underground parking
On-grade parking	18,070	SF	On-grade parking
Total Development Area	**89,760**	**SF**	
Total Development Area without Parking	**89,760**	**SF**	
Floor Area Ratio with Parking	**218%**		
Floor Area Ratio without Parking	**218%**		

Base Cost of Construction Estimate	Base Cost / SF	Base Cost	Upgrade % Applied	Total Base Cost	Cost / SF Dev. Type	Cost / SF Total
Condos / Apartments (High Rise 8 to 24 Stories)	$126.50	$ 9,587,445	1.00	$ 9,587,445	$ 130.55	$ 106.81
Retail Stores	$143.70	$ 2,420,230	1.00	$ 2,420,230	$ 148.30	$ 26.96
Greenspace (Landscpaing)	$101.40	$ 523,224	1.00	$ 523,224	$ 104.64	$ 5.83
Hard Scape (Landscaping)	$26.50	$ 273,480	1.00	$ 273,480	$ 27.35	$ 3.05
Underground parking	$ 114.29	$ -	1.00	$ -	NA	$ -
On-grade parking	$ 21.33	$ 397,829	1.00	$ 397,829	$ 22.02	$ 4.43
Base Construction Cost Estimate		**$ 12,804,379**		**$ 13,202,208**		**$ 147.08**

Final Cost of Construction Estimate				
Total Base Cost of Construction Estimate		$ 13,202,208	$ 147.08	per SF Total
Site Demolition		$ 355,450	$ 3.96	per SF Total
Bulk Asbestos Removal, additional		$ 109,725	$ 1.22	per SF Total
Site Work and Underground Utility Work ($6.95 / SF of Parcel)		$ 286,549	$ 3.19	per SF Total
Subotal - Hard Construction Costs		**$ 13,953,931**	**$ 155.46**	**per SF Total**
Construction Project Management Fees (2.75% of Hard Construction Costs)		$ 383,733	$ 4.28	per SF Total
Legal Costs (1.5% of Hard Construction Costs; higher due to tax credit issues)		$ 198,033	$ 2.21	per SF Total
Initial Site Survey (RS Means Average)		$ 1,964	$ 0.02	per SF Total
Soil Boring / Foundation Analysis (RS Means Average)		$ 1,771	$ 0.02	per SF Total
Architectural / Engineering Fees (6% of Hard Construction Costs)		$ 837,236	$ 9.33	per SF Total
Insurance (RS Means Average)		$ 58,090	$ 0.65	per SF Total
Permit Fees (Per City of Detroit Schedule)		$ 117,728	$ 1.31	per SF Total
Site Demolition Fees (Per City of Detroit Schedule)		$ 24,391	$ 0.27	per SF Total
Plan Review Fees (Per City of Detroit Schedule)		$ 11,000	$ 0.12	per SF Total
Sales Commision (4% of Hard Construction Costs)		$ 558,157	$ 6.22	per SF Total
Closing Costs and Title (2% of Hard Construction Costs)		$ 279,079	$ 3.11	per SF Total
Subtotal - Soft Construction Costs		**$ 2,471,181**	**$ 27.53**	**per SF Total**
Total Project Hard and Soft Construction Costs		**$ 16,425,113**	**$ 182.99**	**per SF Total**
Contigency Allowances (as per RS Means)	**15.00%**	**$ 2,463,767**	**$ 27.45**	**per SF Total**
Total Project Hard and Soft Construction Costs w/ Contingency		**$ 18,888,880**	**$ 210.44**	**per SF Total**

Model 3: Project Financing

TOTAL PROJECT COST	**($17,719,823)**
Equity:	
less Federal and State Historic tax credit	$5,324,820
less Michigan Business Tax (Brownfield) credit	$1,657,029
less TIF from OPRA	$100,000
less parking	$119,349
less rental	$4,472,691
less residential	$3,620,543
TOTAL EQUITY	**$8,312,583**
TOTAL DEBT	**($9,407,241)**

Model 3: Rental ProForma

	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6
REVENUE:						
Apartment Rent	$0	$551,748	$568,300	$585,349	$602,910	($1)
Retail Rent	$0	$2,739,131	$2,821,305	$2,905,944	$2,993,122	$2,993,122
Vacancy	$0	($411,654)	($361,894)	($337,838)	($312,013)	($102,495)
Reimbursed CAM	$0	$297,023	$305,934	$315,112	$324,565	$0
Gross Effective Rent	$0	$3,176,248	$3,333,645	$3,468,567	$3,608,584	$2,890,628
OPERATING EXPENSES:						
Gas & Electric	$0	($305,599)	($294,509)	($285,690)	($276,076)	$0
Water & Sewer	$0	($56,480)	($58,175)	($59,920)	($61,718)	$0
Insurance (incl. Flood)	$0	($621,283)	($639,921)	($659,119)	($678,893)	$0
Maintenance	$0	($610,188)	($628,494)	($647,349)	($666,769)	$0
Janitorial	$0	($314,272)	($323,700)	($333,411)	($343,414)	$0
Property Taxes	$0	($47,906)	($49,343)	($50,823)	($52,348)	$0
Management Fees	$0	($164,544)	($169,480)	($174,565)	($179,802)	$0
Total Operating Expenses	$0	($2,120,272)	($2,163,623)	($2,210,876)	($2,259,018)	$0
Net Operating Income	**$0**	**$1,055,976**	**$1,170,022**	**$1,257,690**	**$1,349,566**	**$2,890,628**
Less Debt Service	$0	($1,451,735)	($1,451,735)	($1,451,735)	($1,451,735)	$0
Before Tax Cash Flow	$0	($395,759)	($281,713)	($194,045)	($102,169)	$0
Plus: Principal	$0	$773,377	$823,647	$877,184	$934,201	$0
Less: Depreciation	$0	($381,476)	($381,476)	($381,476)	($381,476)	$0
Taxable Income	**$0**	**($3,858)**	**$160,457**	**$301,663**	**$450,555**	**$0**
CASH FLOW ANALYSIS:						
Tax Savings (Burden)	$0	$1,541	($64,103)	($120,514)	($179,997)	$0
Before Tax Cash Flow	$0	($395,759)	($281,713)	($194,045)	($102,169)	$0
Less: Income Tax	$0	$1,541	($64,103)	($120,514)	($179,997)	$0
Equity Investment	($4,472,691)	$0	$0	$0	$0	$0
Sales Proceeds	$0	$0	$0	$0	$0	$6,120,000
Total Cash Flow	**($4,472,691)**	**($394,218)**	**($345,816)**	**($314,559)**	**($282,166)**	**$6,120,000**
Return on Equity		-8.8%	-6.3%	-4.3%	-2.3%	0.0%
Debt Service Coverage		73%	81%	87%	93%	0%

NPV	**($1,246,703)**
IRR	**1.17%**

SUPPORTING CALCULATIONS & ASSUMPTIONS:

Inflation	3.0%	(annualized forecast through 2013)
Base = January 1, 2008		Cash flows assumed to occur on January 1 for the upcoming year.

REVENUE

Store	Effective Area (ft^2)	Gross Rent per ft^2 (YR 1 $)	Rent (YR 1 $)
Apartments	58,752	$9.12	$535,677
Retail Stores	13,056	$203.69	$2,659,351
Total	**71,808**		**$3,195,028**

Year	Apt Vacancy Rate	Apt Rent	Vacancy
YR 2	20%	$551,748	($110,350)
YR 3	19%	$568,300	($107,977)
YR 4	18%	$585,349	($105,363)
YR5	17%	$602,910	($102,495)
avg	19%		

Year	Retail Vacancy Rate	Retail Rent	Vacancy
YR 2	11%	$2,739,131	($301,304)
YR 3	9%	$2,821,305	($253,917)
YR 4	8%	$2,905,944	($232,476)
YR 5	7%	$2,993,122	($209,519)
avg	9%		

OPERATING EXPENSES:

Expense	Cost per ft^2 (YR 1 $)	Total Area (ft^2)	Expense (YR 1 $)
Water & Sewer	($3.36)	16,320	($54,835)
Insurance	($4.44)	89,760	($398,534)
Flood Insurance	($2.28)	89,760	($204,653)
Maintenance	($6.60)	89,760	($592,416)
Janitorial	($9.84)	31,008	($305,119)
Property Taxes			($46,510)
	($26.52)		($1,602,067)

Gas & Electric	Cost per ft^2	Vacant Area (ft^2)	Expense
YR 2	($1.55)	16,483	($305,599)
YR 3	($1.59)	15,422	($294,509)
YR 4	($1.64)	14,525	($285,690)
YR5	($1.69)	13,627	($276,076)

Management Fees	5.0%	of Gross Effective Rent
Exit Capitalization Rate	7.5%	

Rental Construction Cost	$14,908,969
Rental Property Acquisition Cost	$684,275
Land Cost as % of Acq. Cost	4.6%
Land Cost	$31,406

DEPRECIATION:

# Years	39
Depreciation Base	$14,877,563
Depreciation/Year (straight line)	$381,476

FINANCING:

Loan to Value	70%
Total Debt	$10,436,278
Interest Rate	6.5%
Amortization Period	10
Annual Payment	$1,451,735
Total Equity	$4,472,691

TAX RATES:

Federal Long Term Capital Gain (5+ years)	15.0%
Federal Ordinary Income	35.0%
Michigan Long Term Capital Gain	3.9%
Michigan Ordinary Income	5.0%

GAIN ON SALE:

Selling price	$17,273,000
Less: Sales Fees (5%)	($864,000)
Less: Cost	($685,000)
Plus: Depreciation	$1,526,000
Taxable Gain	$17,250,000
Capital Gain Tax	($3,261,000)
Sales Proceeds	$16,409,000
Loan Payoff	($7,028,000)
Capital Gain Tax	($3,261,000)
Cash Flow	$6,120,000

Model 3:
Parking
ProForma

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total Parking Spaces	0	78	78	78	78	78
Monthly Fees						
Monthly Parking Fee	$75	$75	$75	$75	$75	$75
Allocation to Monthly Use	0	54	54	54	54	54
Percent Occupancy by Monthly Contracts	98%	98%	98%	98%	98%	98%
Hourly Fees						
Number of Spaces	0	24	24	24	24	24
Nonwork Days	110	110	110	110	110	110
Daily Parking Hours	24	24	24	24	24	24
Percent Utilization	45%	45%	45%	45%	45%	45%
Work Days	255	255	255	255	255	255
Daily Parking Hours	24	24	24	24	24	24
Percent Utilization	55%	55%	55%	55%	55%	55%
Hourly Parking Rate	$1.25	$1.29	$1.33	$1.37	$1.41	
Expenses						
Operating Expenses (% of Gross Revenue)	25%	25%	25%	25%	25%	25%
Parking Revenue						
Monthly Parking	$ -	$ 49,056.84	$ 50,528.55	$ 52,044.40	$ 53,605.73	$
Hourly Parking	$ -	$ 143,838.88	$ 151,464.36	$ 159,520.19	$ 168,031.58	$
Total Parking Revenue	$ -	$ 192,895.72	$ 201,992.90	$ 211,564.59	$ 221,637.31	$
Expenses	$0.00	($49,670.65)	($53,573.57)	($57,795.59)	($62,363.69)	
Net Operating Income	$0	$ 143,225.07	$ 148,419.33	$ 153,769.01	$ 159,273.62	$
less Depreciation		($11,424)	($11,424)	($11,424)	($11,424)	
less Principal		$20,637	$21,978	$23,407	$24,928	
less Equity Investment	($119,349)					
plus Sales Proceeds					$1,404,000	
Cash Flow	**($119,349)**	**$152,438**	**$158,974**	**$165,752**	**$1,576,778**	

Exit Cap Rate 7.5%

NPV	$469,494.77
IRR	167%

Parking Construction Cost	$ 397,829
Parking Property Acquisition Cost	($137,755)
$0 Land Cost as % of Acq. Cost	34.6%
54 Land Cost	($47,700)
	3%
24	
110	
24	
45%	
255 **DEPRECIATION:**	39
24 # Years	
55% Depreciation Base	$ 445,529
$0.00 Depreciation/Year (straight line)	$11,424
25% **FINANCING:**	70%
Loan to Value	
Total Debt	$278,480
- Interest Rate	6.5%
- Amortization Period	10
- Annual Payment	$38,738
$0.00 Total Equity	$119,349
-	
TAX RATES:	15.0%
Federal Long Term Capital Gain (5+ years)	
$0 Federal Ordinary Income	35.0%
$0 Michigan Long Term Capital Gain	3.9%
Michigan Ordinary Income	5.0%
GAIN ON SALE:	$2,112,000
Selling price	($106,000)
Less: Sales Fees (5%)	$138,000
Less: Cost	$46,000
Plus: Depreciation	$2,190,000
Taxable Gain	($414,000)
Capital Gain Tax	
Sales Proceeds	$2,006,000
Loan Payoff	($188,000)
Capital Gain Tax	($414,000)
Cash Flow	$1,404,000

Model 3: Cash Flows and
Rate of Return

CASH FLOW	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6
Apt and Retail	($4,472,691)	($394,218)	($345,816)	($314,559)	($282,166)	$6,120,000
Parking	($119,349)	$152,438	$158,974	$165,752	$1,576,778	$1,576,778
$ to retailers						
Total	**($4,592,040)**	**($241,780)**	**($186,843)**	**($148,807)**	**$1,294,612**	**$7,696,778**

NPV	**$1,014,491**
IRR	**12.6%**

Model 3: Assumptions

Michigan Business Tax credit for brownfields at 12.5% of hard costs can be sold as equity at 95% of value (See Beal, F.)
Historic tax credits at 20% Federal and 20% state can be sold as equity at 90% of value (See Beal, F.)
Cost of Re-Construction (See McGraw Hill Construction Sweets)
83 parking spaces at grade at 300 sqft/space to rear of building

Model 4: Cost of Construction Estimate

Cass Corridor - 2009 Cost of Construction Estimate

Property Location: Corner of Cass Avenue and Temple Street
Approximate Parcel Size: 24,910 Square feet
Detroit Cost Modifier: 103.2

Development Data (User Input)	Total SF		Development Description
Condos / Apartments (High Rise 8 to 24 Stories)	73,440	SF	average 1088 sqft per unit
Retail Stores	16,320	SF	ground floor retail
Greenspace (Landscaping)	10,000	SF	mixed ground cover, shrub, trees, gravel
Hard Scape (Landscaping)	5,000	SF	primarily concrete paving
Underground Parking	0	SF	Underground parking
On-grade parking	18,070	SF	On-grade parking
Total Development Area	**89,760**	**SF**	
Total Development Area without Parking	**89,760**	**SF**	
Floor Area Ratio with Parking	**360%**		
Floor Area Ratio without Parking	**360%**		

Base Cost of Construction Estimate	Base Cost / SF	Base Cost	Upgrade % Applied	Total Base Cost	Cost / SF Dev. Type	Cost / SF Total
Condos / Apartments (High Rise 8 to 24 Stories)	$126.50	$ 9,587,445	1.03	$ 9,846,306	$ 134.07	$ 109.70
Retail Stores	$143.70	$ 2,420,230	1.03	$ 2,485,576	$ 152.30	$ 27.69
Greenspace (Landscpaing)	$101.40	$ 1,046,448	1.00	$ 1,046,448	$ 104.64	$ 11.66
Hard Scape (Landscaping)	$26.50	$ 136,740	1.00	$ 136,740	$ 27.35	$ 1.52
Underground parking	$ 114.29	$ -	1.01	$ -	NA	$ -
On-grade parking	$ 26.67	$ 497,286	1.00	$ 497,286	$ 27.52	$ 5.54
Base Construction Cost Estimate		**$ 13,190,863**		**$ 14,012,357**		**$ 156.11**

Final Cost of Construction Estimate			
Total Base Cost of Construction Estimate	$ 14,012,357	$ 156.11	per SF Total
Site Demolition	$ 355,450	$ 3.96	per SF Total
Bulk Asbestos Removal, additional	$ 109,725	$ 1.22	per SF Total
Site Work and Underground Utility Work ($6.95 / SF of Parcel)	$ 173,125	$ 1.93	per SF Total
Subtotal - Hard Construction Costs	**$ 14,650,656**	**$ 163.22**	**per SF Total**
Construction Project Management Fees (2.75% of Hard Construction Costs)	$ 402,893	$ 4.49	per SF Total
Legal Costs (1.5% of Hard Construction Costs; higher due to tax credit issues)	$ 210,185	$ 2.34	per SF Total
Initial Site Survey (RS Means Average)	$ 1,187	$ 0.01	per SF Total
Soil Boring / Foundation Analysis (RS Means Average)	$ 1,771	$ 0.02	per SF Total
Architectural / Engineering Fees (6% of Hard Construction Costs)	$ 879,039	$ 9.79	per SF Total
Insurance (RS Means Average)	$ 61,654	$ 0.69	per SF Total
Permit Fees (Per City of Detroit Schedule)	$ 124,209	$ 1.38	per SF Total
Site Demolition Fees (Per City of Detroit Schedule)	$ 24,391	$ 0.27	per SF Total
Plan Review Fees (Per City of Detroit Schedule)	$ 11,000	$ 0.12	per SF Total
Sales Commision (4% of Hard Construction Costs)	$ 586,026	$ 6.53	per SF Total
Closing Costs and Title (2% of Hard Construction Costs)	$ 293,013	$ 3.26	per SF Total
Subtotal - Soft Construction Costs	**$ 2,595,369**	**$ 28.91**	**per SF Total**
Total Project Hard and Soft Construction Costs	**$ 17,246,025**	**$ 192.13**	**per SF Total**
Contigency Allowances (as per RS Means) 15.00%	**$ 2,586,904**	**$ 28.82**	**per SF Total**
Total Project Hard and Soft Construction Costs w/ Contingency	**$ 19,832,928**	**$ 220.96**	**per SF Total**

Model 4: Project Financing

TOTAL PROJECT COST	**($18,502,842)**
Equity:	
less Federal and State Historic tax credit	$5,590,690
less Michigan Business Tax (Brownfield) credit	$1,739,765
less TIF from OPRA	$100,000
less parking	$149,186
less rental	$4,674,440
less residential	$3,780,531
TOTAL EQUITY	**$8,604,156**
TOTAL DEBT	**($9,898,685)**

Model 4: Rental ProForma

SUPPORTING CALCULATIONS & ASSUMPTIONS:

Inflation	3.0%	(annualized forecast through 2013)	
Base = January 1, 2008		Cash flows assumed to occur on January 1 for the upcoming year.	
		Rental Construction Cost	$15,581,466
		Rental Property Acquisition Cost	$684,275
		Land Cost as % of Acq. Cost	4.4%
		Land Cost	$30,051

REVENUE

Store	Effective Area (ft^2)	Gross Rent per ft^2 (YR 1 $)	Rent (YR 1 $)
Apartments	58,752	$10.03	$589,245
Retail Stores	13,056	$203.69	$2,659,351
Total	71,808		$3,248,596

Year	Apt Vacancy Rate	Apt Rent	Vacancy
YR 2	18%	$606,922	($109,246)
YR 3	16%	$625,130	($100,021)
YR 4	15%	$643,884	($96,583)
YR 5	14%	$663,200	($92,848)
avg	16%		

Year	Retail Vacancy Rate	Retail Rent	Vacancy
YR 2	8%	$2,739,131	($219,130)
YR 3	6%	$2,821,305	($169,278)
YR 4	5%	$2,905,944	($145,297)
YR 5	4%	$2,993,122	($119,725)
avg	6%		

OPERATING EXPENSES:

Expense	Cost per ft^2 (YR 1 $)	Total Area (ft^2)	Expense (YR 1 $)
Water & Sewer	($3.36)	89,760	($301,594)
Insurance	($4.44)	89,760	($398,534)
Flood Insurance	($2.28)	89,760	($204,653)
Maintenance	($6.60)	89,760	($592,416)
Janitorial	($3.04)	31,008	($305,119)
Property Taxes	$0.00	89,760	$0
	($26.52)		($1,802,316)

Gas & Electric	Cost per ft^2	Vacant Area (ft^2)	Expense
YR 2	($1.47)	14,625	($510,046)
YR 3	($1.24)	12,730	($189,608)
YR 4	($1.28)	11,832	($181,525)
YR 5	($1.32)	10,934	($172,787)

Rental Vacancy	39
# Years	
Depreciation Base	$15,551,415
Depreciation/Year (straight line)	$398,754
FINANCING:	70%
Loan to Value	
Total Debt	$10,907,026
Interest Rate	6.5%
Amortization Period	10
Annual Payment	$1,517,218
Total Equity	$4,674,440

TAX RATES:

Federal Long Term Capital Gain (5+ years)	15.0%
Federal Ordinary Income	35.0%
Michigan Long Term Capital Gain	3.9%
Michigan Ordinary Income	0.0%

GAIN ON SALE:

Selling price	$18,321,000
Less: Sales Fees (5%)	($916,000)
Less: Cost	($685,000)
Plus: Depreciation	$1,136,000
Taxable Gain	($3,462,000)
Capital Gain Tax	
Sales Proceeds	$17,405,000
Loan Payoff	($7,345,000)
Capital Gain Tax	($3,462,000)
Cash Flow	$6,598,000

Management Fees	5.0%	of Gross Effective Rent	
Exit Capitalization Rate	7.5%		

	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6
Apartment Rent	$0	$606,922	$625,130	$643,884	$663,200	($1)
Retail Rent	$0	$2,739,131	$2,821,305	$2,905,944	$2,993,122	$2,993,122
Vacancy	$0	($328,377)	($269,299)	($241,880)	($212,573)	($92,848)
Reimbursed CAM	$0	$334,149	$344,174	$354,499	$365,134	$0
Gross Effective Rent	$0	$3,351,826	$3,521,310	$3,662,447	$3,808,884	$2,900,274
OPERATING EXPENSES:						
Gas & Electric	$0	($210,046)	($189,608)	($181,525)	($172,787)	$0
Water & Sewer	$0	($310,641)	($319,961)	($329,559)	($339,446)	$0
Insurance (incl. Flood)	$0	($621,283)	($639,921)	($659,119)	($678,893)	$0
Maintenance	$0	($610,188)	($628,494)	($647,349)	($666,769)	$0
Janitorial	$0	($314,272)	($323,700)	($333,411)	($343,414)	$0
Property Taxes	$0	$0	$0	$0	$0	$0
Management Fees	$0	($167,703)	($172,327)	($177,461)	($182,856)	$0
Total Operating Expenses	$0	($2,233,754)	($2,274,006)	($2,328,455)	($2,384,125)	$0
Net Operating Income	**$0**	**$1,118,093**	**$1,247,304**	**$1,333,992**	**$1,424,759**	**$2,900,274**
Less: Debt Service	$0	($1,517,218)	($1,517,218)	($1,517,218)	($1,517,218)	$0
Before Tax Cash Flow	$0	($399,126)	($269,915)	($183,227)	($92,460)	$0
Plus: Principal	$0	$808,262	$860,799	$916,751	$976,340	$0
Less: Depreciation	$0	($398,754)	($398,754)	($398,754)	($398,754)	$0
Taxable Income	**$0**	**$10,382**	**$192,130**	**$334,770**	**$485,126**	**$0**
CASH FLOW ANALYSIS:						
Tax Savings (Burden)	$0	($3,634)	($67,245)	($117,169)	($169,794)	$0
Before Tax Cash Flow	$0	($399,126)	($269,915)	($183,227)	($92,460)	$0
Less: Income Tax	$0	$0	$0	$0	$0	$0
Equity Investment	($4,674,440)	$0	$0	$0	$0	$0
Sales Proceeds	$0	$0	$0	$0	$0	$6,598,000
Total Cash Flow	**($4,674,440)**	**($399,126)**	**($269,915)**	**($183,227)**	**($92,460)**	**$6,598,000**
Return on Equity		-8.5%	-5.8%	-3.9%	-2.0%	0.0%
Debt Service Coverage		74%	82%	88%	94%	0%

NPV	($537,317)
IRR	3.49%

Model 4: Parking ProForma

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
Total Parking Spaces	0	78	78	78	78	78	Parking Construction Cost $ 497,286
Monthly Fees							Parking Property Acquisition Cost ($137,755)
Monthly Parking Fee	$75	$75	$75	$75	$75	$75	27.7%
Allocation to Monthly Use	0	54	54	54	54	54	Land Cost ($38,160)
Percent Occupancy by Monthly Contracts	98%	98%	98%	98%	98%	98%	
							Inflation 3%
Hourly Fees							
Number of Spaces	0	24	24	24	24	24	
Nonwork Days	110	110	110	110	110	110	
Daily Parking Hours	24	24	24	24	24	24	
Percent Utilization	45%	45%	45%	45%	45%	45%	
Work Days	255	255	255	255	255	255	**DEPRECIATION:**
Daily Parking Hours	24	24	24	24	24	24	# Years 39
Percent Utilization	55%	55%	55%	55%	55%	55%	Depreciation Base $ 535,446
Hourly Parking Rate	$1.25	$1.29	$1.33	$1.37	$1.41	$0.00	Depreciation/Year (straight line) $13,729
Expenses							
Operating Expenses (% of Gross Revenue)	25%	25%	25%	25%	25%	25%	**FINANCING:** 70%
							Loan to Value
							Total Debt $348,101
Parking Revenue							Interest Rate 6.5%
Monthly Parking	$ -	$ 49,056.84	$ 50,528.55	$ 52,044.40	$ 53,605.73	$ -	Amortization Period 10
Hourly Parking	$ -	$ 143,838.88	$ 151,464.36	$ 159,520.19	$ 168,031.58	$ -	Annual Payment $48,422
Total Parking Revenue	$ -	$ 192,895.72	$ 201,992.90	$ 211,564.59	$ 221,637.31	$ -	Total Equity $149,186
Expenses	$0.00	($49,670.65)	($53,573.57)	($57,795.59)	($60,547.27)	$0.00	
Net Operating Income	$0	$ 143,225.07	$ 148,419.33	$ 153,769.01	$ 161,090.04	$ -	**TAX RATES:** 15.0%
less Depreciation		($13,729)	($13,729)	($13,729)	($13,729)		Federal Long Term Capital Gain (5+ years)
less Principal		$25,796	$27,473	$29,258	$31,160		35.0%
less Equity Investment	($149,186)					$1,355,000	Federal Ordinary Income 3.9%
plus Sales Proceeds							Michigan Long Term Capital Gain
Cash Flow	**($149,186)**	**$155,292**	**$162,163**	**$169,298**	**$178,521**	**$1,355,000**	5.0%
							Michigan Ordinary Income
							GAIN ON SALE: $2,112,000
							Selling price ($106,000)
							Less: Sales Fees (5%) $138,000
							Less: Cost $55,000
							Plus: Depreciation $2,199,000
							Taxable Gain ($416,000)
							Capital Gain Tax
							Sales Proceeds $2,006,000
							Loan Payoff ($235,000)
							Capital Gain Tax ($416,000)
							Cash Flow $1,355,000

Exit Cap Rate 7.5%

NPV	$470,760.01
IRR	123%

Model 4: Cash Flows and Rate of Return

CASH FLOW	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6
Apt and Retail	($4,674,440)	($399,126)	($269,915)	($183,227)	($92,460)	$6,598,000
Parking	($149,186)	$155,292	$162,163	$169,298	$178,521	$1,355,000
$ to retailers						
Total	**($4,823,626)**	**($243,834)**	**($107,752)**	**($13,929)**	**$86,061**	**$7,953,000**

NPV	**$299,167**
IRR	**9.3%**

Model 4: Assumptions

Approved as a Michigan Alternative Energy Rennaissance Zone with special tax incentives:
No state income or property tax
Michigan Business Tax credit for brownfields at 12.5% of hard costs can be sold as equity at 95% of value (See Beal, F.)
Historic tax credits at 20% Federal and 20% state can be sold as equity at 90% of value (See Beal, F.)
Cost of Re-Construction (See McGraw Hill Construction Sweets)
LEED-NC Gold is 2.7% more expensive to construct than conventional construction (See CoStar)
LEED-NC Gold achieves 10% greater occupancy. (See Mattiesen, L.F.)
83 parking spaces at grade at 300 sqft/space to rear of building

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