



SITE PLAN REPORT

CHAMPAIGN-URBANA CENTRAL HOTEL & SHOPPING HUB

Douglas Square Redevelopment Proposal

UP 503 - Physical Planning



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EXECUTIVE SUMMARY

AT A GLANCE

The Champaign-Urbana Central Hotel (or CU Central), aims to transform Champaign-Urbana into the premier commercial and recreational hub in Central Illinois. The project is proposed to revitalize the economy in Champaign-Urbana by opening up new avenues of capital generation and also to serve as the epicenter for the development of a central commercial district in the future.

Upon completion, the proposed project aims to generate an influx of tourism into the cities and provide for a centrally located, state-of-the-art commercial hub. This report analyses the socio-economic contexts pertaining to the project, the best management practices and strategies to ensure an ecologically sustainable addition to the natural and built environment, and finally, urban design paradigms that guide the new development.

The financial feasibility analysis takes into account the current demographics of Champaign County and projects its revenues and potential sources of income with respect to market trends. Site engineering analysis is undertaken to assess the suitability of the selected site in terms of stormwater runoff. Hydro Modelling is carried out to test four stormwater runoff scenarios. A Low Impact Development (LID) strategy is decided by assessing Best Management Practices (BMPs). The primary aim of analyzing the urban design paradigms pertaining is to steer away from intrusive development processes that negatively impact the surrounding environment and the neighborhood context. The secondary objective of the development is to address the accessibility issues of the Douglas Square site. A combination of Low Impact Development (LID) and Transit-Oriented Development (TOD) are selected for the project. The street pattern & design analysis addresses the design challenges related to planning for access and circulation by various modes of transport to the site by laying out the site's network of different pathways.

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THE **MISSION**

"Revitalization of Champaign-Urbana in synchronization with nature."

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INTRODUCTION

PROJECT & ANALYSIS SUMMARY

The CU Central Hotel & Shopping Hub is a commercial development that is proposed to revitalize the economy in Champaign-Urbana by opening up new avenues of capital generation and also to serve as the epicenter for the development of a central commercial district, in the future. The Site Engineering Report (SER) analyzes various factors that govern the parameters for the new development.

Neighborhood & Regional Context

The Neighborhood & Regional Context section consists of the site selection process, the development type selection scenarios, and the Natural Systems Suitability of Champaign-Urbana, which provides a local and regional context for the proposed development.

Financial Feasibility

The Financial Feasibility section consists of a 10-year pro forma to assess the viability of the proposed development. The calculation of the return on interest is based on various relevant considerations and conceptual plans for the development.

Ecological Sustainability

The Ecological Sustainability section covers the selection of Best Management Practices (BMP) to strive to maintain a minimal ecological footprint on the natural environment. Stormwater runoff modeling and drainage systems are designed based on these considerations.

Urban Design Paradigms

The Urban Design Paradigms section describes the design philosophy of the proposed development, which seeks to address the challenges posed by the natural and built environment, and taking advantage of the existing preconditions at the selected site.

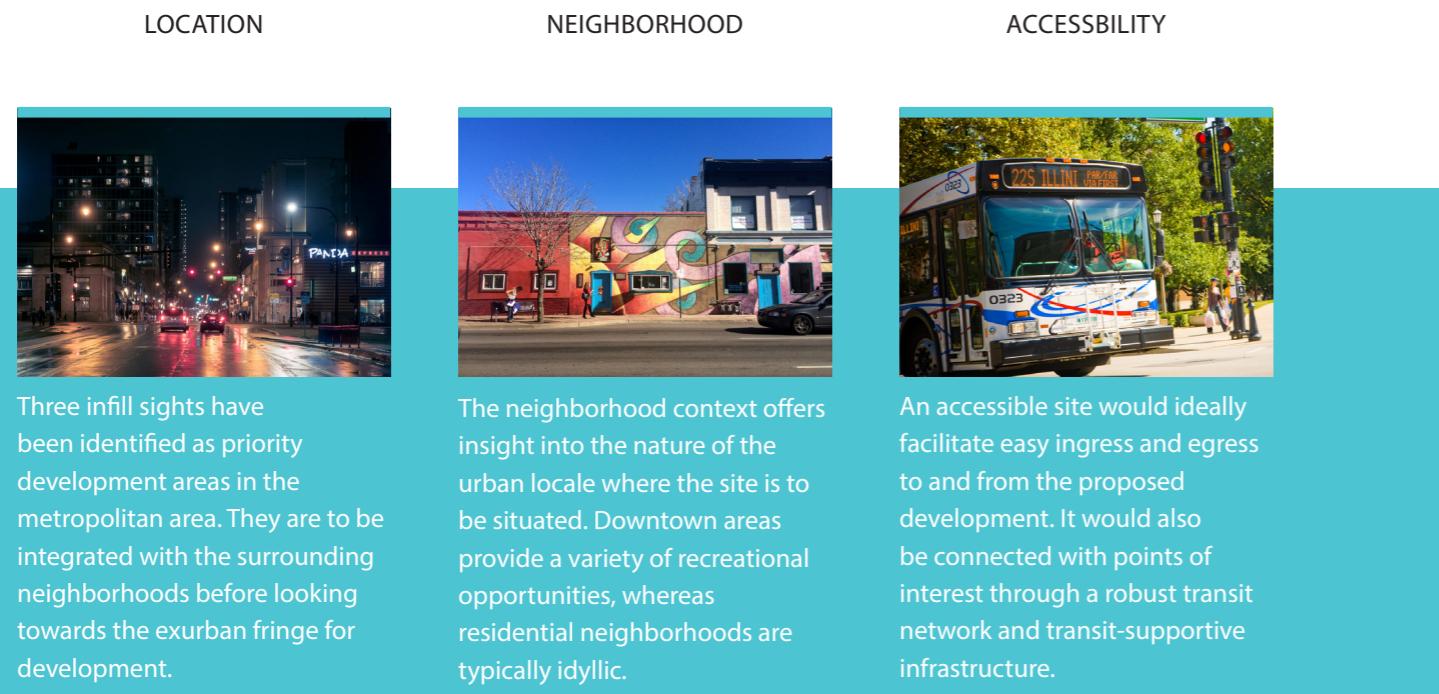
NEIGHBORHOOD & REGIONAL CONTEXT

The development scenarios considered for this project are commercial and resident-centric developments at one of the three infill sites. The sites are Country Fair Shopping Center, Douglas Square, and Orchard Downs Family Housing.

Population density is analyzed as part of this proposal, but since the Census tracts are retrieved from the year 2010, less emphasis has been placed on population density in site selection.

Lower density zones are ideally assumed to be suitable for this development since a more substantial area is required for the construction of CU Central. A lower density zone ensures minimal relocation of the resident population and also minimizes disruption of daily life for the surrounding local community, owing to heavy construction work.

The analysis incorporates a backtracking approach wherein it focuses on three aspects of the sites. This approach narrows down the selection process and can facilitate the analysis of the two scenarios.



THE NEIGHBORHOOD What fits?

Site Selection Matrix				
Site	Location	Neighborhood	Accessibility	
<i>Country Fair Shopping Center</i>	229 S Mattis Ave, Champaign, IL 61821; Western fringe of Champaign	Strip malls, administrative buildings, small shopping centers, and restaurant outlets	CFSC is itself a bus hub; located at the intersection of Springfield and Mattis	
<i>Douglas Square</i>	414 Nathaniel Burch Dr, Champaign, IL 61820; Centrally located, 20 min. walking distance to Downtown Champaign	Near to the Urbana Country Club, Crystal Lake Park, Douglas Park; many restaurant outlets, and churches	Situated off a major bus route, on Bradley Avenue	
<i>Orchard Downs Family Housing</i>	1801-1815 Orchard Pl, Urbana, IL 61801; South Urbana, close to the UI Arboretum, and Florida and Lincoln Playing Field, surroundings include sprawling suburban residential zones	The sizeable residential plot itself, adjacent to the UI Arboretum, and Florida and Lincoln Playing Field, surroundings include sprawling suburban residential zones	Closely spaced bus stops and one Zipcar spot; located further in from the main roads, thus limited points of ingress/egress	

Redevelopment Potential (RP)				
Site	Location	Neighborhood	Accessibility	RP
<i>Country Fair Shopping Center</i>	0		5	10
<i>Douglas Square</i>	10		10	5
<i>Orchard Downs Family Housing</i>	5		5	5

The Redevelopment Potential Index concl that Douglas Square is the ideal site for a new development, albeit with tradeoffs in accessibility, which are addressed in the Urban Design Paradigms section of the SPR.

Scenario – A: Residential Development

A new strictly residential zone is deemed to be relatively less feasible as it is inferred from the market trends for Champaign-Urbana that 10.36% of the total housing stock is classified as vacant (Neighborhood Scout).

Scenario – B: Commercial Development

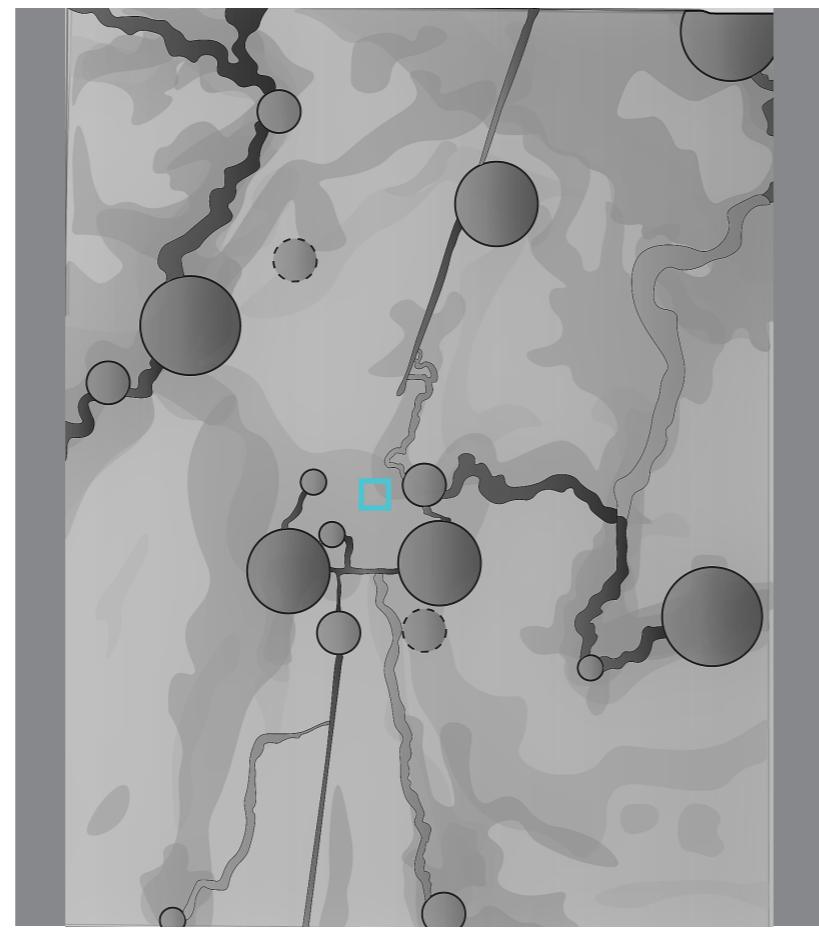
The commercial scenario does not have any detrimental tradeoffs; instead it can potentially revitalize the economically worse-off, albeit centrally located area, by taking advantage of the preexisting site conditions.



THE REGION

Where does it fit?

The Natural Systems Suitability Report (NSSR) was carried out by the Department of Urban and Regional Planning at the University of Illinois at Urbana Champaign.



SOIL & SLOPE

The analysis for soil and slope is carried out by studying the soil characteristics and slope gradation, respectively, and representing the suitability for both on a composite map. Soil and slope are found to be relatively less detrimental thus were given the least weightage in the natural systems suitability analysis.

WATER

Water suitability in terms of vulnerability to flooding was examined, with floodzones being considered as unsuitable areas for development. Water suitability was given a moderate degree of importance since floodzones had been avoided altogether as an unsuitable site for development. The water flow for this development assesses the degree to which the natural movement of water would aid or hamper drainage flow.

LANDCOVER

The landcover assessment for Champaign County was carried out to aid in site selection, as certain categories of landcover such as croplands and wetlands were to be avoided in favor of preservation of the natural environment. Landcover elements are incorporated in the green infrastructure analysis for the NSSR.

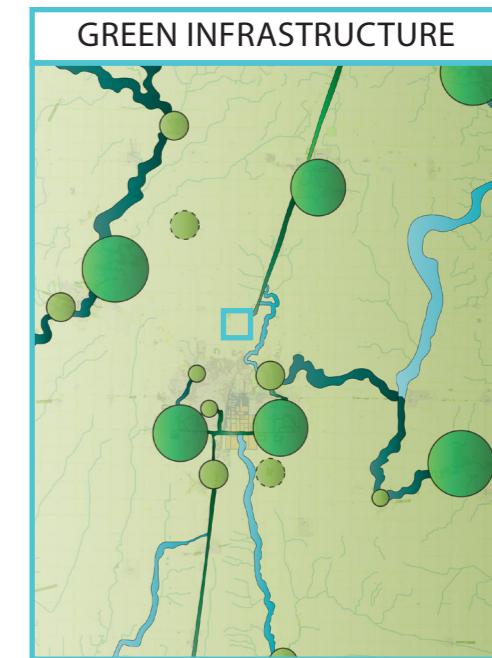
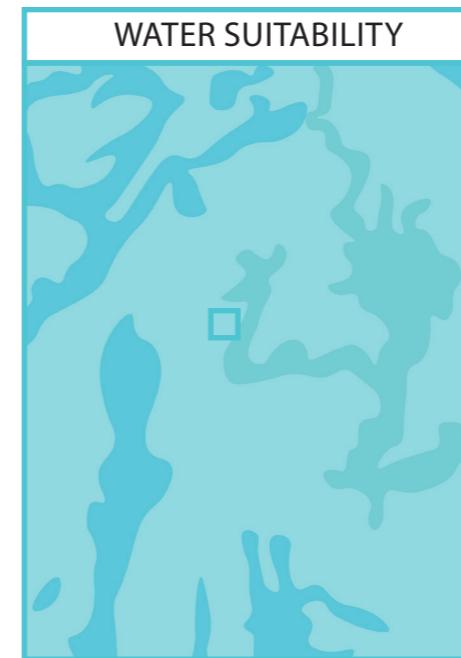
GREEN INFRASTRUCTURE

Green infrastructure is considered critical infrastructure and is considered to be of the highest level of importance. Ecological sustainability for the development proposed in the SPR draws from the inferences of the NSSR, to strike a balance between the built and natural environments.

NATURAL SYSTEMS SUITABILITY ANALYSIS

Can it fit?

The graphics below represent the natural systems suitability in a regional context. These graphics depict the conditions pertaining to soil & slope, water & floodplains, and green infrastructure hubs & links. The Douglas Square site is situated on suitable grounds based on the inferences from the following maps.



Darker shades depict respective unsuitability. The Natural Systems Suitability Map is a composite of the above graphics.

FINANCIAL FEASIBILITY



HOTEL COST



RETURN ON INVESTMENT



SHOPPING HUB COST

The hotel costing \$272,697,295 to construct with a FAR of 1.74, is the primary income generator with an average annual Net Operating Income (NOI) of \$123,648,473.

The 10-year Pro Forma calculates a 15% Internal Rate of Return for the proposed development in a decade. The Net Present Value is positive (NPV>0); thus, the development is financially feasible and can be submitted for further approvals.

The shopping hub built at \$717,895,225 is costlier to develop, with a FAR of 1.88; it also generates a significantly lower average annual NOI of \$47,136,189.

BASIS OF STUDY

Financial feasibility study is carried out to analyze cost versus benefit in terms of development cost and return on investment, considering loan repayment, revenue generation, and in-depth construction cost analysis. A 10-year pro forma analysis is used as the basis for the financial feasibility analysis. Champaign-Urbana Central (or CU Central), comprises of the 21-storeyed CU Central Hotel, which is modeled after a Caesars Palace (LV, Nevada), albeit on a 75-90% reduced scale. The CU Central Shopping Hub is modeled after the 3-storeyed Chadstone Shopping Center (Melbourne, Australia), similar in size and scale.

PRO FORMA 10 Years

Table 5.1 Hotel Area Calculations

Designation	Space	Area (m ²)	Area (Acres)	Income Generation
A	Convention	28000	6.92	High
B	Club	12000	2.97	High
C	Spa	5000	1.24	Low
D	Room	38800	0.96	High (considered in J)
E	Landscape	8500	2.10	NA
F	Miscellaneous	7000	1.73	NA
G	Required Land Area	64380	15.91	NA
H	Area of Plot	84000	20.76	
I	Ground Floor Area	64380	15.91	
J	G+20 Floor Area	81480	20.13	High
K	Gross Floor Area	145860	36.04	
L	FAR		1.74	
M	IG Acreage	126480	31.25	87% Area

Reference: Caesars Palace, LV

Table 5.4 Shopping Hub Area Calculations

Space	Area (m ²)	Area (SQFT)	Area (Acres)
Shop Floor Area	129,924	1,398,489	32.11
Shop Units	550		
Unit A	520		
Unit B	30		
Total Floor Area	221,217	2,381,158	54.66
Area of Plot	117,359	1,263,241	29
Perimeter	1545 m	5069 Ft	
FAR			1.88

The reference model for the Shopping Hub is Chadstone Shopping Center (built in 1960). Thus, the reference building costs also need to be adjusted to 2019 figures. According to the Office for National Statistics composite price index, prices in 2019 are 2,183.96% higher than average prices throughout 1960. The pound experienced an average inflation rate of 5.45% per year during this period, meaning the real value of a dollar decreased.

Therefore, £6,000,000 in 1960 is equivalent in purchasing power to about £137,037,315.31 in 2019, a difference of £131,037,315.31 over 59 years. £137,037,315.31 converts to \$177,345,471.24 as of Oct'19.

However, there is a vast difference in Building Cost (BC) when compared with figures obtained from RSMeans' Square Foot Model calculations. The BC obtained from RSMeans is considered for further analysis.

Table 5.5 Shopping Hub Construction Costs

Construction Costs		
Building Cost	\$ 177,345,471.24	\$ 717,895,224.81
Cost/SQFT	\$ 74.48	\$ 301.49
Src:	1960 BC adjusted for inflation upwards of 2019	RSMeans (Cost/SQFT)

Table 5.3 Hotel Construction Costs

Construction Costs		
Building Cost	\$272,703,909.14	
Cost/SQFT	\$173.69	

Src: RSMeans

10-year Pro Forma for CU Central Hotel & Shopping Hub										
CU Central Hotel	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
	2026 Est. Market Value	Cap Rate	Internal Rate of Return Computation							
Annual Income (Other)	\$51,507,000	\$172,467,000	\$172,467,000	\$172,467,000	\$172,467,000	\$172,467,000	\$172,467,000	\$172,467,000	\$172,467,000	\$172,467,000
Annual Income (Hotel Rooms)	\$0	\$15,380,967	\$30,761,934	\$30,761,934	\$30,761,934	\$30,761,934	\$30,761,934	\$30,761,934	\$30,761,934	\$30,761,934
Actual Rent Income	\$51,507,000	\$187,847,967	\$203,228,934	\$203,228,934	\$203,228,934	\$203,228,934	\$203,228,934	\$203,228,934	\$203,228,934	\$203,228,934
Hotel Room Operating Expense (per SQFT)	\$2.50	\$2.58	\$2.65	\$2.73	\$2.81	\$2.90	\$2.99	\$3.07	\$3.17	\$3.26
Operating Expense (Outgoing)	\$0	\$112,192	\$226,336	\$235,920	\$246,798	\$254,832	\$261,087	\$269,629	\$277,528	\$286,854
Total Hotel Revenue	\$51,507,000	\$186,718,775	\$49,180,864	\$200,833,014	\$49,039,202	\$200,687,102	\$48,888,913	\$200,532,305	\$48,729,472	\$200,368,080
Actual Operating Expense per SQFT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Operating Expenses										
Actual Operating Expense Total	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Net Operating Income from Hotel	\$51,507,000	\$186,718,775	\$49,180,864	\$200,833,014	\$49,039,202	\$200,687,102	\$48,888,913	\$200,532,305	\$48,729,472	\$200,368,080
CU Central Shopping Hub	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Market Rent Income	\$7,201,094	\$7,268,126	\$7,268,126	\$7,268,126	\$7,268,126	\$7,268,126	\$7,268,126	\$7,268,126	\$7,268,126	\$7,268,126
Loss to Vacancy	-28,600,547	-19,067,031	-19,067,031	-19,067,031	-19,067,031	(-\$19,067,031)	(-\$19,067,031)	(-\$19,067,031)	(-\$19,067,031)	(-\$19,067,031)
Actual Rent Income	\$28,600,547	\$57,201,094	\$57,201,094	\$57,201,094	\$57,201,094	\$57,201,094	\$57,201,094	\$57,201,094	\$57,201,094	\$57,201,094
Operating Expense Passed on to Tenant (per SQFT)	\$6.00	\$6.18	\$6.18	\$6.18	\$6.18	\$6.18	\$6.18	\$6.18	\$6.18	\$6.18
Operating Expense (Income)	\$7,461,012	\$7,684,843	\$15,369,685	\$15,369,685	\$15,369,685	\$15,369,685	\$15,369,685	\$15,369,685	\$15,369,685	\$15,369,685
Total Retail Revenue	\$36,061,560	\$64,885,937	\$72,570,780	\$72,570,780	\$72,570,780	\$72,570,780	\$72,570,780	\$72,570,780	\$72,570,780	\$72,570,780
Actual Operating Expense per SQFT	-6.50	-6.50	-6.50	-6.50	-6.50	-6.50	-6.50	-6.50	-6.50	-6.50
Other Operating Expenses										
Actual Operating Expense Total	(\$16,165,527)	(\$21,554,036)	(\$21,554,036)	(\$21,554,036)	(\$21,554,036)	(\$21,554,036)	(\$21,554,036)	(\$21,554,036)	(\$21,554,036)	(\$21,554,036)
Net Operating Income from Shopping Hub	\$19,896,033	\$43,331,902	\$51,016,744	\$51,016,744	\$51,016,744	\$51,016,744	\$51,016,744	\$51,016,744	\$51,016,744	\$51,016,744
Total Net Operating Income (NOI)	\$71,403,033	\$230,050,676	\$102,523,744	\$237,735,519	\$102,523,744	\$237,735,519	\$102,523,744	\$237,735,519	\$102,523,744	\$237,735,519
Debt Service	\$53,209,518	\$56,491,364	\$59,975,628	\$63,674,704	\$67,602,116	\$71,771,667	\$76,199,396	\$80,898,136	\$85,807,756	\$91,185,124
Interest	\$40,966,219	\$37,684,373	\$34,200,109	\$30,500,943	\$26,573,821	\$22,404,074	\$17,977,351	\$13,277,602	\$8,207,982	\$2,980,613
Total Principal and Interest	\$94,175,737	\$94,175,737	\$94,175,737	\$94,175,737	\$94,175,737	\$94,175,737	\$94,175,737	\$94,175,737	\$94,175,737	\$94,175,737
Before Tax Cash Flow:	(\$22,772,704)	\$135,874,939	\$8,348,007	\$143,559,782	\$8,348,007	\$143,559,782	\$			

ECOLOGICAL SUSTAINABILITY

STORMWATER RUNOFF MODELLING

The Hydro Model is utilized to find the best and worse case scenarios, which are then analyzed for their efficiency in managing stormwater. The results of the model depend on various factors such as soil and slope conditions at the site, which influence the flow of water. The water is found to be flowing northward at the Douglas Square site. Other critical factors, such as the hydraulic length, land use types, and distribution, are also used as inputs to run the model.

STORMWATER RUNOFF SCENARIOS

For the site, the Hydraulic Length is found out to be 2300 ft, with an average slope being 0.26%.



PRE-DEVELOPMENT

The first scenario which considers conditions at the Douglas Square site as it may have been before human settlement.

Site comprising of 60% meadows, 40% woods/forest (25% poor cover, 15% good cover).



CONVENTIONAL

This scenario considers conditions on the site accounting for the proposed land use mix.



GREENFIELD/FARMLAND

This scenario considers conditions on the site if it was being used primarily for agricultural uses.

70% cultivated land (45% without conservation treatment and 25% with conservation treatment, 30% meadows (5% in poor condition and 25% in good condition).



GREEN DEVELOPMENT

This is an alternative scenario that uses stormwater management BMPs to reduce the quantity and rate of runoff generated by development on the site.

Green development accommodates woodlands as part of the development to maximize rainwater infiltration potential. The built environment is reduced to 64% (excluding 3% roads and pavements), and open spaces have been increased to 25%.

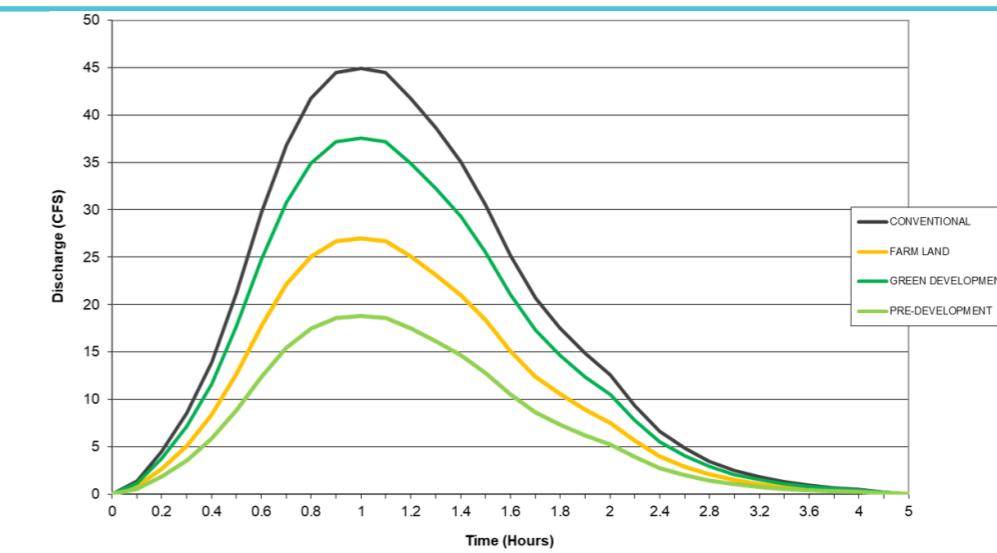


Figure 3.1 Unit Hydrograph for Douglas Square

The results of the model show a disparity in the peak stormwater runoff conditions in the best and worst-case scenarios, of at least 450 CFS (peaking at 7 hours). It is found that incorporating the described BMPs help reduce the stormwater runoff by 69%, as opposed to conventional development strategies.

SEWER SYSTEM SELECTION

Best alternative

STORMWATER MANAGEMENT SYSTEM

Based on the results of the Hydro Model, sizes of retention and detention ponds are calculated. These ponds are then situated in an optimal location on the site based on the flow of water and the slope suitability on site. A Low Impact Development (LID) strategy would be to incorporate an overland stormwater system as opposed to a conventional sewer system. The overland sewer system is designed such that the 0.26% slope across the hydraulic length poses no significant problem to the natural flow of water from the site to the public sewers.

METHODOLOGY

The first approach being the intrusive yet tested conventional sewer system linked to the main sewer line, which funnels stormwater out of the site and into treatment centers/storage facilities. This approach considers a conventional development scenario, with 90% of the total land comprised of a built-up area. The second approach is to design an overland stormwater system based on on-site suitability characteristics and Best Management Practices (BMPs). The green development scenario considered in the Hydro Model leaves room for woodlands (4% of total area), with the built-up area being reduced to 64% as opposed to 90% built-up area in the conventional scenario. Based on calculations carried out as part of the stormwater management system design, the following ponding requirements are fulfilled for the two scenarios.

Scenario – I: Conventional Sewer System

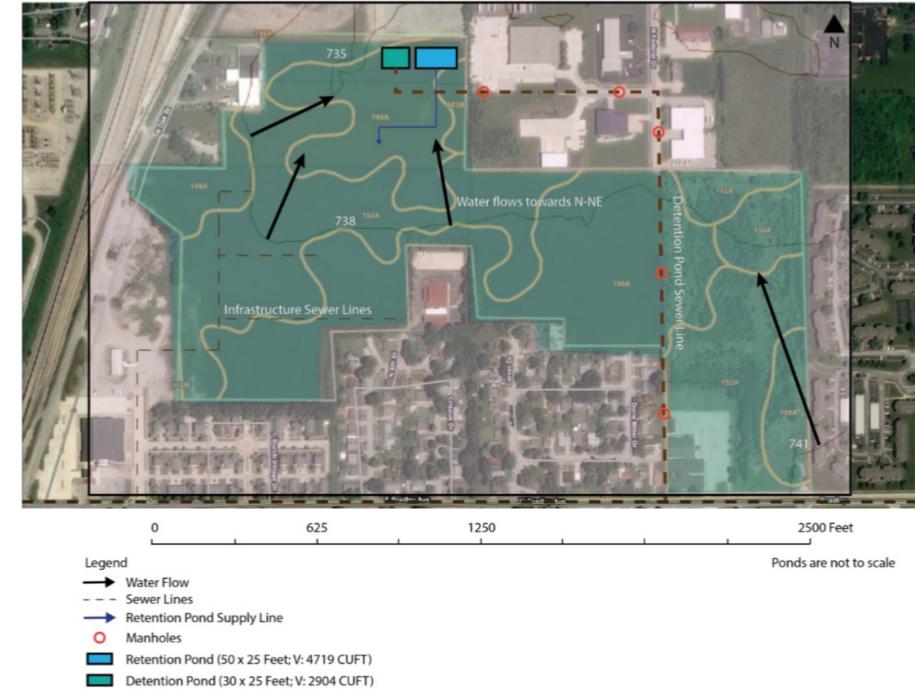
The Retention Pond is sized 50 x 25 x 4 feet and can store up to 4719 CUFT or 35301 US Gallons of water. The Detention Pond is sized 30 x 25 x 4 feet and can store up to 2904 CUFT or 21723 US Gallons of water, beyond which it would be required to release the detained water into the sewer system.

The main sewer line is assumed to be on Bradley Avenue. The difference in elevation between the two farthest points of the site is 3 feet (H: 741 & L: 738). This topographical condition amounts to a minor slope of 0.26%. Hence, it should prove to be of no consequence to place an “uphill” sewer line towards Bradley Avenue.

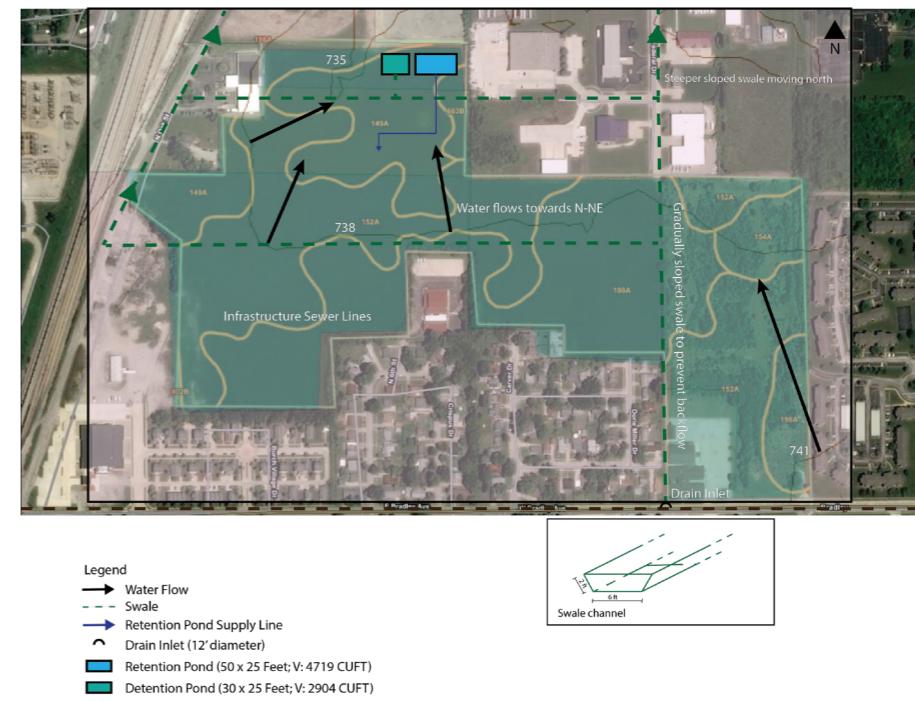
Scenario – II Overland Stormwater System

The alternative approach for effectively managing stormwater is an overland stormwater system. Constructed wetlands, swales, rain gardens, and buffers or a combination of these are typically incorporated as part of an overland stormwater system. This approach is significantly less intrusive and requires minimal excavation; however, it entails other incidental costs that offset the reductions in construction costs. Thus, there are trade-offs to be considered for both the overland stormwater system and conventional sewer system approaches. For this development, a provision of constructed wetland/woodland is to be provided with swales handling the bulk of the stormwater and channeling it to the public drains/sewers. Retention ponds resupply water to the development through a separate utility line.

CONVENTIONAL SEWER SYSTEM



OVERLAND STORMWATER SYSTEM



A conventional sewer system can be incorporated, though measures must be taken to account for the minimal 0.26% slope, should unforeseen problems arise. An overland stormwater system can be incorporated; however, the direction of the water flow must be adhered to strictly.



URBAN DESIGN PARADIGMS

Low Impact Development

Benchmarks: Ecological Sustainability, Improved Stormwater Management & Reduced Stormwater Runoff

A Low Impact Development (LID) strategy is selected to develop the commercial center serving the economic ambitions of the city, and at the same time, not be intrusive to the surrounding environment. Hydro Modelling is carried out to test four stormwater runoff scenarios.

A Low Impact Development (LID) strategy is decided by assessing Best Management Practices (BMPs). The green development proposal includes 4% of the total land area to be allocated for woodlands to act as a retention area for excess stormwater to seep underground. The shopping complex's central atrium is designed to be open to the sky, with a majority of the area to be an open green space. The retail units are to be located on the periphery of the aforementioned green space. It is found that incorporating the described BMPs help reduce the stormwater runoff by 69%, as opposed to conventional development strategies.

Transit-Oriented Development

Benchmarks: Accessibility Improvement & Enhancing Bus Coverage

Transit-Oriented Development is an up and coming trend in creating vibrant, livable, sustainable communities. It focuses on creating compact, walkable, pedestrian-oriented, mixed-use communities centered around high-quality public transportation (PT) systems (TOD Institute, 2018).

TOD is regional planning, city revitalization, suburban renewal, and walkable neighborhoods combined. It is also an effective solution to the severe and growing problems of climate change and global energy security by creating dense, walkable communities that significantly reduce the need for driving and energy consumption (TOD Institute, 2018). Thus, incorporating TOD also overlaps with the goals described in the LID strategy.

The neighborhood context analysis found that although Bradley Avenue was a major bus route, the site itself was situated farther away to the north of Bradley Avenue, rendering it challenging to provide direct access. The TOD approach would facilitate the revitalization of the neighborhood, and the new transit facilities would also serve the surrounding areas through an extended impact zone. Additionally, the site is situated in the vicinity of Downtown Champaign (within 1 mile), which provides it with a boost in real estate value and trip generation.



STREET PATTERN & DESIGN

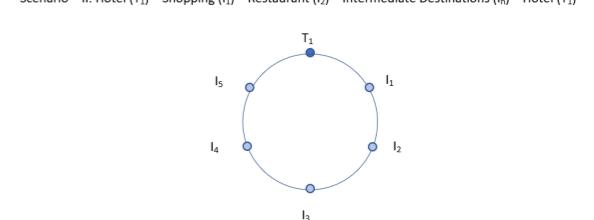
In a typical development there will be a variety of street types based on desired performance standards and the anticipated traffic impact of the surrounding uses. In addition, the pattern of the street network can take many forms depending on how values and objectives are prioritized.

The layout of the connectivity network addresses both issues of external connectivity, and internal pattern and design. A Transit-Oriented Development (TOD) paradigm is incorporated as a basis for the design of the network.

Scenario – I: Hotel (T_1) – Shopping (I_1) – Restaurant (I_2) – Gardens (I_3) – Downtown/City (T_2)



Scenario – II: Hotel (T_1) – Shopping (I_1) – Restaurant (I_2) – Intermediate Destinations (I_n) – Hotel (T_1)



URBAN DESIGN

Philosophy in practice

TOD LAYOUT & LAND DISTRIBUTION

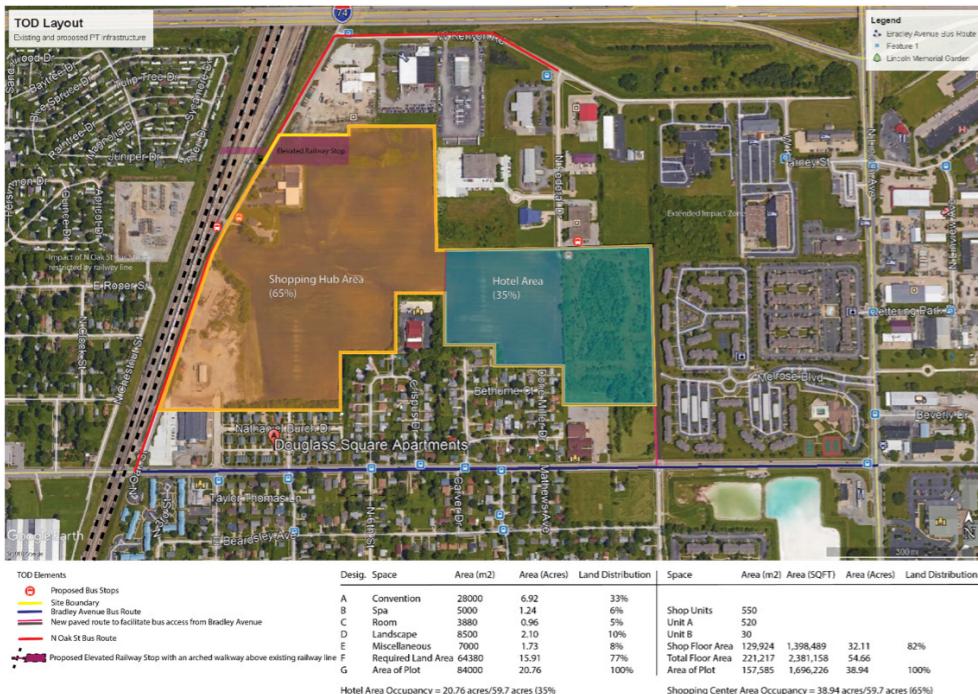


Figure 5.1 Land Parcel Distribution

SITE PLAN & STREET NETWORK

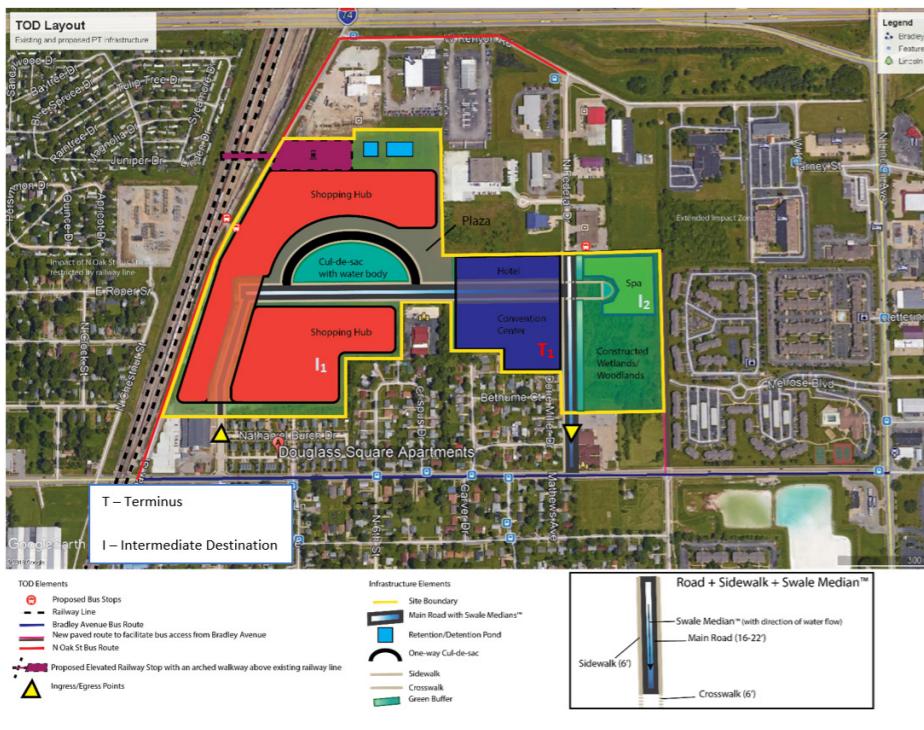
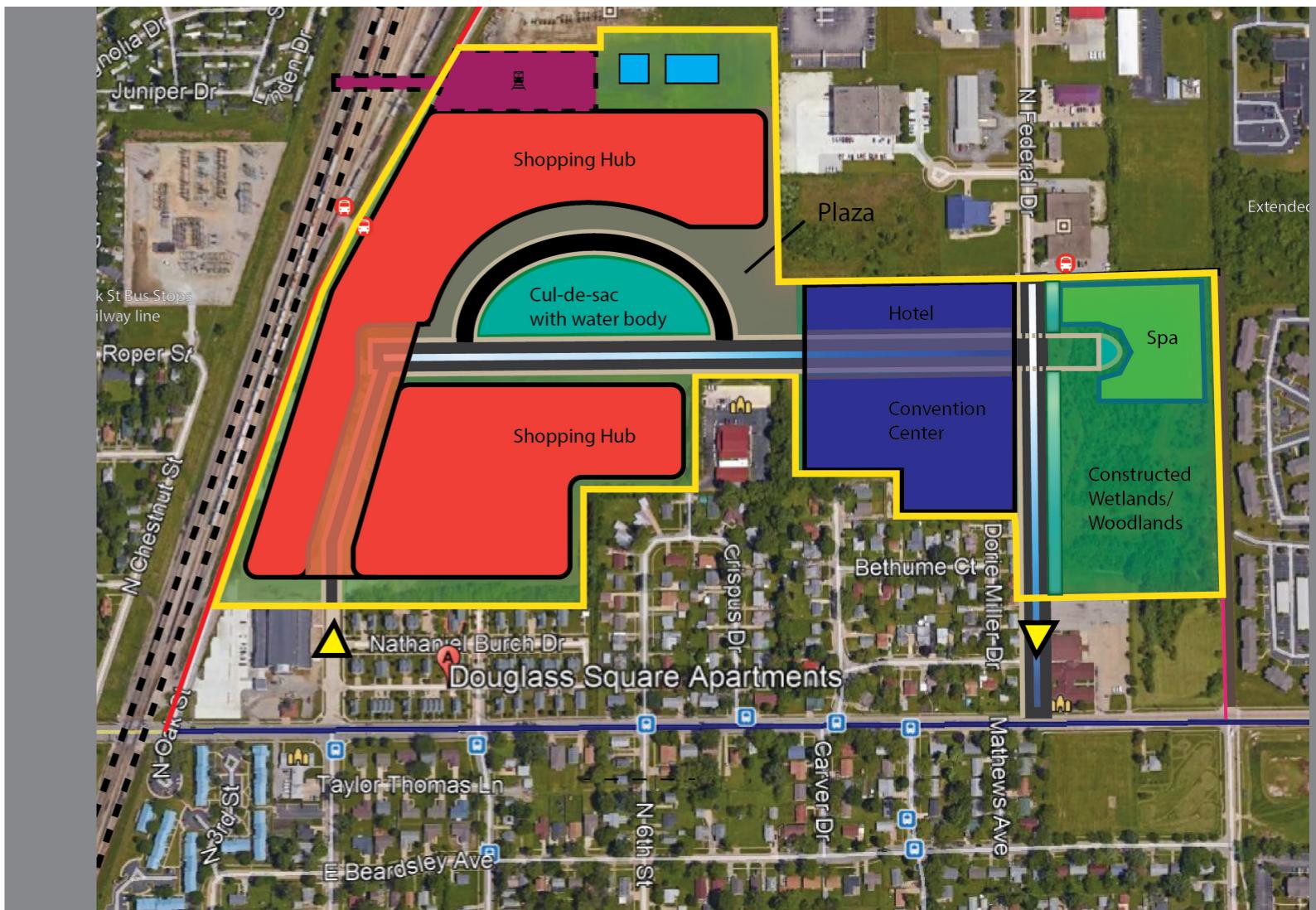


Figure 5.2 Site Layout Plan with Street Network



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SITE PLAN

Champaign-Urbana Central Hotel & Shopping Hub

Prepared for:
Champaign City Council

Proposal issued:
12/15/2019

Proposal valid to:
12/15/2021

Image References
<https://www.5280.com/2015/11/5280-neighborhood-guide-santa-fe/>
<https://campustowns.com/blog-post/green-street-project-update-hydro-grant/cumtd-bus/>
<https://imgur.com/r/cityporn/UrnwHoA>