

DEVELOPING WITH TRANSIT

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Potential TOD locations along NE Corridor identified by students, Hendersonville, TN.
Image source: University of Tennessee Knoxville, College of Architecture & Design (UTCAD)

Pioneering new Development Concepts for TN

With broad support of both the public and private sectors, Greater Nashville is rapidly laying the groundwork for an extension of its mass transit network out into the region.

In conjunction with these efforts, University of Tennessee School of Architecture (UT) urban design students in Spring 2009 and 2010, under the direction of Associate Professor T. K. Davis, worked as teams on projects for five potential or existing transit station stops in Greater Nashville. The Nashville Area Metropolitan Planning Organization (MPO) sponsored the studio, in close cooperation and collaboration with the Nashville Civic Design Center. An example of teaching, creative designs, and service learning as a form of applied research, the design proposals applied current urban design theories and best practices related to Transit-Oriented Development (TOD) and Livable Communities.

The Spring 2009 semester focused on an existing station stop and its immediate vicinity in Lebanon for TOD sites. For the Spring 2010, the MPO identified four sites for “Transit Villages” in suburban areas surrounding Nashville. One site, in Donelson, has an existing commuter rail transit stop, which could serve as a catalyst for economic development. At the remaining sites, however, the future mode of mass transit was yet to be determined. In these cases, design proposals were requested that would be capable of accommodating all three of the potential

mass transit options: commuter rail, light rail transit (LRT) or bus rapid transit (BRT). Subsequent discussion has focused on BRT as the probable mode for this northeast corridor.

A unique aspect of the 2009 and 2010 studios was the formation of interdisciplinary teams pairing UT urban design students with students from the Vanderbilt University Owen School of Management (VU). Under the direction of VU faculty member Thomas McDaniel, a case study of regional transit villages was the “Capstone Project” for the Real Estate Development Program.

These urban design studios sought to balance three equally important agendas. First, to present a very intense learning opportunity in urban design for the students. Second, to engage design students in the thinking about the priorities of developers, on the principle that this knowledge can significantly empower the designer to be proactive, and not reactive, thus adding value to the project design through economics. Finally, to structure the studio as a public advocacy of TOD as a way to build “Livable Communities.”

Could this collaboration between two university programs and disciplines, be a model for in-depth consideration of TOD in other metropolitan areas? This publication is put forth, in part, to discuss the challenges and opportunities of a “creative work as applied research” teaching and learning model. It also discloses design and development outcomes as case studies, and suggests where Nashville goes from here.



Charlotte TOD station, Charlotte, NC. Image source: Charlotte Area Transit System

What is TOD?

Transit-Oriented Development is generally defined as a mixed-use neighborhood or a community within a half-mile maximum, or ten minute walk, from a mass transit stop.

Concentrating development within a 2,500-foot radius encourages walkable, pedestrian-friendly environments. In this model, medium to high densities are desirable, yielding increased property values. A variety of housing types, and prices, promote diversity of choice for residents. With the exception of “park and ride” accommodation at the transit center, parking requirements are typically reduced. In comparison to traditional suburban sprawl, TOD enhances quality of life for its residents, improves public health by encouraging walking rather than driving, is inherently environmentally sustainable due to its compact density, and increases transit ridership.

TOD necessitates public-private partnerships, by virtue of the public sector’s investment in transit infrastructure that determines a TOD’s location. Because of the complexity of design and development issues related to TOD, the urban design studio served as an ideal “laboratory” to test basic principles of TOD in suburban settings, including marketing and financial analysis of the final design proposals.

The Urban Land Institute (ULI) has pointed out that high-

density, mixed-use real estate development in proximity to mass transit is “one of the hottest development trends... Far-flung greenfield homes may cost less, but filling the gas tank burns holes in wallets. Both empty nesters and their young adult offspring gravitate to live in more exciting and sophisticated 24-hour places—whether urban or suburban—with pedestrian-accessible retail, restaurants and offices. Transit-oriented development at subways and light rail stations almost cannot miss.”

The term “Transit-Oriented Development” can be difficult to envision by the general public. “Transit Village” is a commonly accepted and more readily understood alternative term for TOD in a suburban context. The sought-after characteristics of “Livable Communities” are based on ten principles—including “providing transit options”—articulated by the American Institute of Architects (AIA).

As an interdisciplinary and multi-institutional collaboration, the objective of the Spring 2010 semester was to develop urban design proposals for four priority sites identified by the MPO as potential transit villages in the Nashville region. The design proposal for each site emerged from a team of three advanced architecture students from the University of Tennessee and two to three real estate development students from Vanderbilt University.

As their Capstone project, the Vanderbilt students worked with the Tennessee students in a relationship analogous to design and development co-consultants. The Vanderbilt teams conducted a land assessment, a market study, a stakeholder analysis, an economic analysis as a pro forma of a component of the development, and evaluated both financing capacity and public-private partnership strategies that might enable the design students' projects to achieve economic viability.

In developing the design proposals, the urban design students interpreted and sought to fulfill the principles and goals of TOD. Priority was given to creating a sense of community through walkable streets and high quality public spaces, with parking requirements carefully considered. Each student was responsible for developing at least one of their team's housing types in plans and sections at 1" = 8' detail in order to allow realistic estimates for the development pro formas. Designs sought to meet basic standards of the International Building Code, as well as LEED-ND criteria.

Given the complexity of changing transportation infrastructure and land development, all of the designs were represented as a "full build-out" of three logical phases of development identified for each site.

For both the design and development students, the initial four weeks of the semester was spent developing expertise in the topic of TOD. Two required texts were Peter Calthorpe's *The Next American Metropolis: Ecology, Community, and The American Dream* and Gloria Ohland and Hank Ditmar's *The New Transit Town: Best Practices in Transit-Oriented Development*.

The urban design students researched and analyzed the sites and housing type precedents, through targeted exercises. One particularly useful exercise involved the collage of known precedents superimposed and transformed for each of the four transit village sites, inspired by Rem Koolhaas' design process for the IJ-Plein in Rotterdam. This helped students to understand the scale of the sites, as well as to experiment with different densities and spatial patterns.

In addressing the environmental issues of the various sites, students created a site context "Greenprint," a method championed by the National Land Trust for mapping an area's natural resources to guide growth. The Community Resource Inventory found in the publication *Growing Greener* includes nine elements to be mapped: Wetlands and their buffers, Floodways and floodplains, Moderate and steep slopes, Aquifer recharge areas, Woodlands, Productive farmlands, Significant wildlife habitats, Historic, archeological, and cultural features, and Scenic view sheds from public roads.

Both design and development students shared their early research and analysis with each other. The real estate students initially conducted their own land assessment in a market study, and identified project constraints. It was interesting to observe throughout the semester, from beginning to end, how the unique criteria each sub-group brought to the discussion modified the four teams' work and proposals.

The semester culminated in an all-day public review event, in which the teams presented their work for comments and criticism in front of six or more regional experts, most of whom were planners, ULI Nashville developers, architects, and regional civic leaders. More than 30 professionals attended the eight-hour review.

The design and development students were able to make recommendations regarding public-private partnerships that could provide legal and financial incentives to achieve the benefits of TOD. From the financial analysis, we were able to estimate the magnitude of annual tax revenue at full build-out of each project, which allows one to make the case to local officials and the community-at-large of the economic benefits to the local tax base provided by medium density development of TOD.

Tax Increment Financing or TIF, is a public-private financing technique employed for over 50 years in the United States to enable redevelopment and community improvement projects. When new development is proposed, higher future property tax revenues are generally anticipated. This difference, called the tax increment, can be captured within designated redevelopment areas under this financing technique, and utilized to pay for initial infrastructure and other front-end development costs that enable a project to become viable, which otherwise would not be feasible. Such costs can include land acquisition, parking facilities, and streetscape improvements.

Joint public-private development incentives proposed for all the sites included TIF, a public land acquisition and disposition plan, adjusted zoning to promote density and diversity, reduced parking requirements, and Location Efficient Mortgages (LEMs). LEMs are mortgages available to households whose locations require lower transportation costs. LEMs can enable households to purchase homes they might otherwise not be able to afford.

TK Davis, Associate Professor
University of Tennessee College of Architecture + Design



Top: Orenco Station, Hillsboro, OR. Image source: M.O. Stevens
 Middle: Pearl District, Portland, OR. Image source: NCDC
 Bottom: Orenco Station, Hillsboro, OR. Image source: Sitephocus

Top: Orenco Station, Hillsboro, OR. Image source: M.O. Stevens
 Middle: Pearl District, Portland, OR. Image source: NCDC
 Bottom: Orenco Station, Hillsboro, OR. Image source: Sitephocus

Top: Town Center Station + MAX Park-N-Ride, Clackamas, OR. Image source: NCDC
 Bottom: Orenco Station, Hillsboro, OR. Image source: Sitephocus

Portland TODs

In the 1970s Portland developed strong planning policies to promote higher density, mixed-use developments within its urban areas. Portland is a trailblazer in developing transit-oriented communities—often ranked one of the greenest cities in the world, and considered one of the most “European” cities in the US. Portland was the first US city to re-introduce the modern streetcar into the city fabric, giving priorities to public transit and pedestrian environments. As a result, the city has seen significant return on investments (ROI) with a public contribution of \$89M and \$2.5B in private development along the streetcar corridor.

One of the Portland’s first TODs was Orenco Station, an award-winning development focused around the MAX light rail transit line. It is an example of a successful suburban TOD, with more than 22% of its inhabitants using mass transit for commuting, compared to the 6% of the overall region. A more recent accomplishment is the Pearl District neighborhood, which is located in an area that was historically industrial. Many infrastructure improvements were put in place that allowed for the Pearl district’s success, including removal of a freeway ramp and extension of the streetcar line. Another key component was the city’s commitment to diversity and affordability. The goal for affordable, subsidized housing units in this district was set by the city at 35%.



Charlotte TODs

Charlotte, NC exemplifies a southern city that has utilized land-use zoning changes, in conjunction with strategic planning for transit, to help create numerous new TODs along its 9.5 mile LYNX light rail line. LYNX, which opened in 2007, records 15,000 daily users.

Charlotte has seen ROI well over 300% since the rail line's completion. The \$1.87 billion in private investment and development along the south corridor spurred \$515 million in additional real estate tax value, an increase of 121% since 2000.

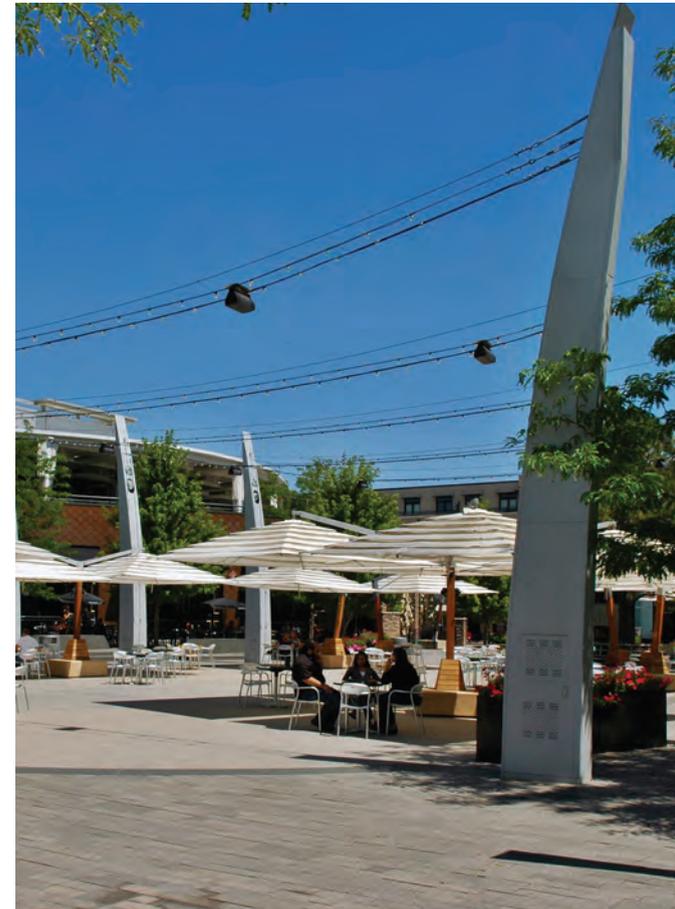
The city established an acquisition fund to purchase land near the stations planned along its South Corridor light rail line to ensure the development of mixed-income, mixed-use TOD. Charlotte's City Council capitalized the fund with an initial grant of \$5 million.

Source: Center for Transit-Oriented Development
www.reconnectingamerica.org

Top: New Bern Station, Charlotte, NC. Image source: Charlotte Area Transit System
 Bottom: East/West Station, Charlotte, NC. Image source: Charlotte Area Transit System

Top: Bland Street Station, Charlotte, NC. Image source: Charlotte Area Transit System

Top: New Bern Station, Charlotte, NC. Image source: Charlotte Area Transit System
 Bottom: LYNX Blue Line map, Charlotte, NC. Image source: Charlotte Area Transit System



Denver TODs

Nashville’s projected population growth will bring one million more people to the Middle TN region in the next 20 years. Another way to conceptualize this transformation is that the Nashville region in 2035 will be roughly the same size as the Denver Metropolitan area is today.

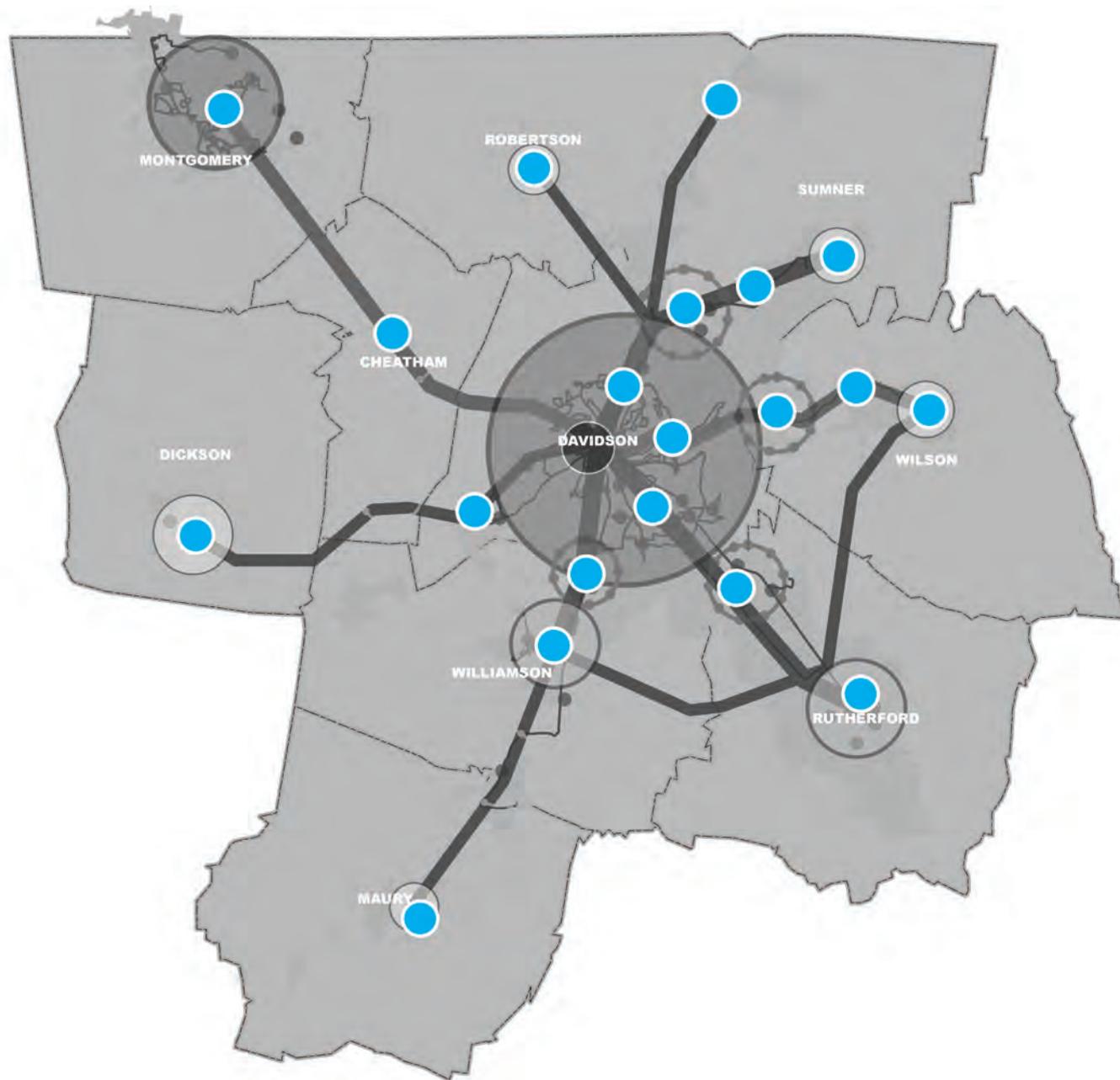
Denver’s recent accomplishments with TOD highlight what is possible in a city that suffered from sprawling land use patterns similar to Nashville. Denver’s political leaders saw the need for a change in development patterns and moved quickly to implement light rail infrastructure. Their fast-paced light rail construction displays how public-private investments, incorporating public transportation and pedestrian-friendly spaces with new development, can translate into higher qualities of life for people of all income levels.

A similar case exists for Nashville to begin implementing similar concepts set forth in the *2035 Regional Transportation Plan* now, to prevent last-minute reactionary plans to future, more costly congestion problems.

Top: Belmar, Denver, CO. Image source: Sitephocus
Bottom: Lincoln Station, Denver, CO. Image source: Jeffrey Beall

Top: Belmar, Denver, CO. Image source: Sitephocus

Top: Belmar, Denver, CO. Image source: Sitephocus
Bottom: Belmar, Denver, CO. Image source: Sitephocus



Development Supporting Transit

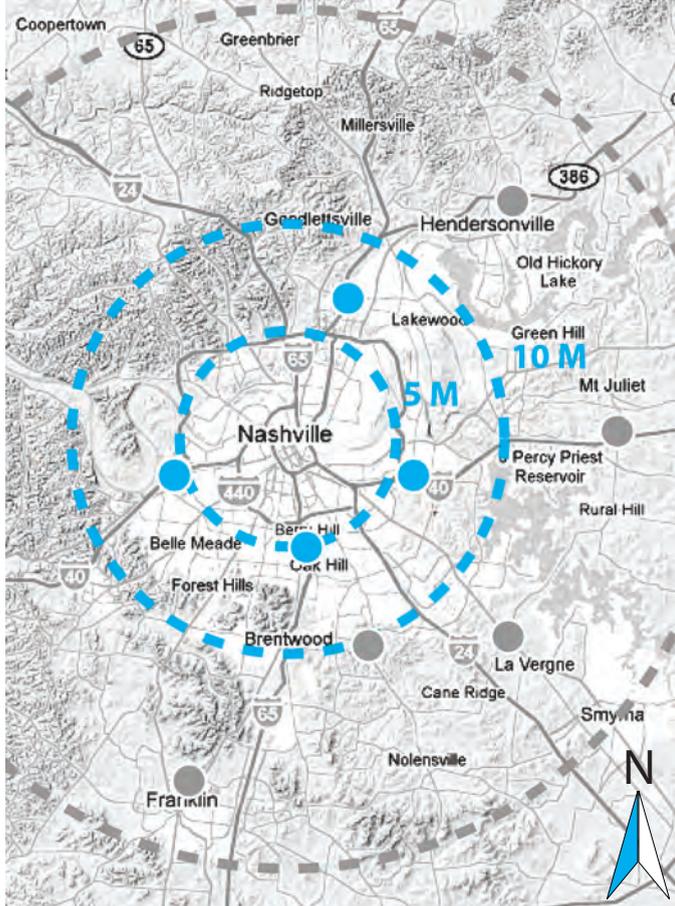
The 2035 *Regional Transportation Plan* identifies strategic corridors ideal for implementing higher levels of service for mass transit options. Consistent ridership increases along the east and northeast corridors make these routes ideal for promoting how a new focus on development patterns could have positive affects, not only for the transportation system, but also for local communities by creating more liveable environments and economic opportunities.

Access to transportation is a necessity in today's world, but in car-centric cities like Nashville, mobility options for most people present only one choice, the automobile. As driving costs continue to rise, obesity rates are questioned, and the population ages, more options are sought by a larger percentage of the population. New opportunities for connectivity must also be paired with affordability. TODs are most successful when they incorporate a mix of incomes. Allowing both market-rate and affordable units within the same developments provides variety in culture and demographics,

Nashville Area Metropolitan Planning Organization's 2035 *Regional Transportation Plan* with ideal locations for Transit Oriented Development along existing and future high frequency transit.
Image source: NCDC + Nashville Area MPO

A POSTWAR SUBURBS

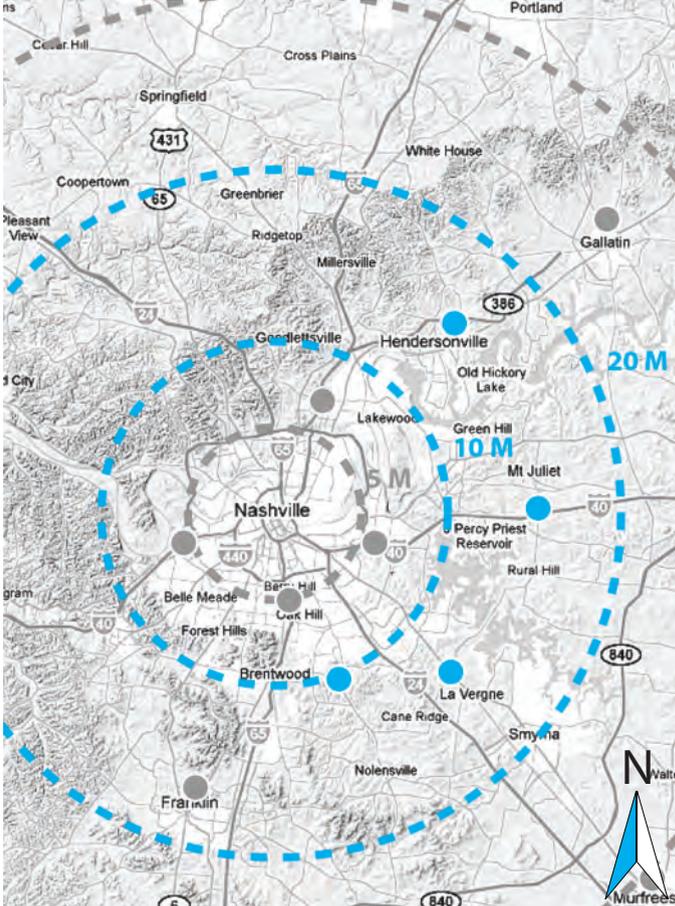
Postwar neighborhoods sprung out of the housing boom following WWII—starting the trend of suburbanization that became the dominant land use pattern across the US. Many new publications exist on the idea of “retrofitting” suburban areas to make them more transit friendly. Areas such as Madison and Donelson show great potential in becoming new models of livable communities, focusing on transit as a central component of their transformations.



Map highlighting proximities of postwar suburbs to downtown Nashville, TN. Image source: © 2011 Google + NCDC

B EDGE CITIES

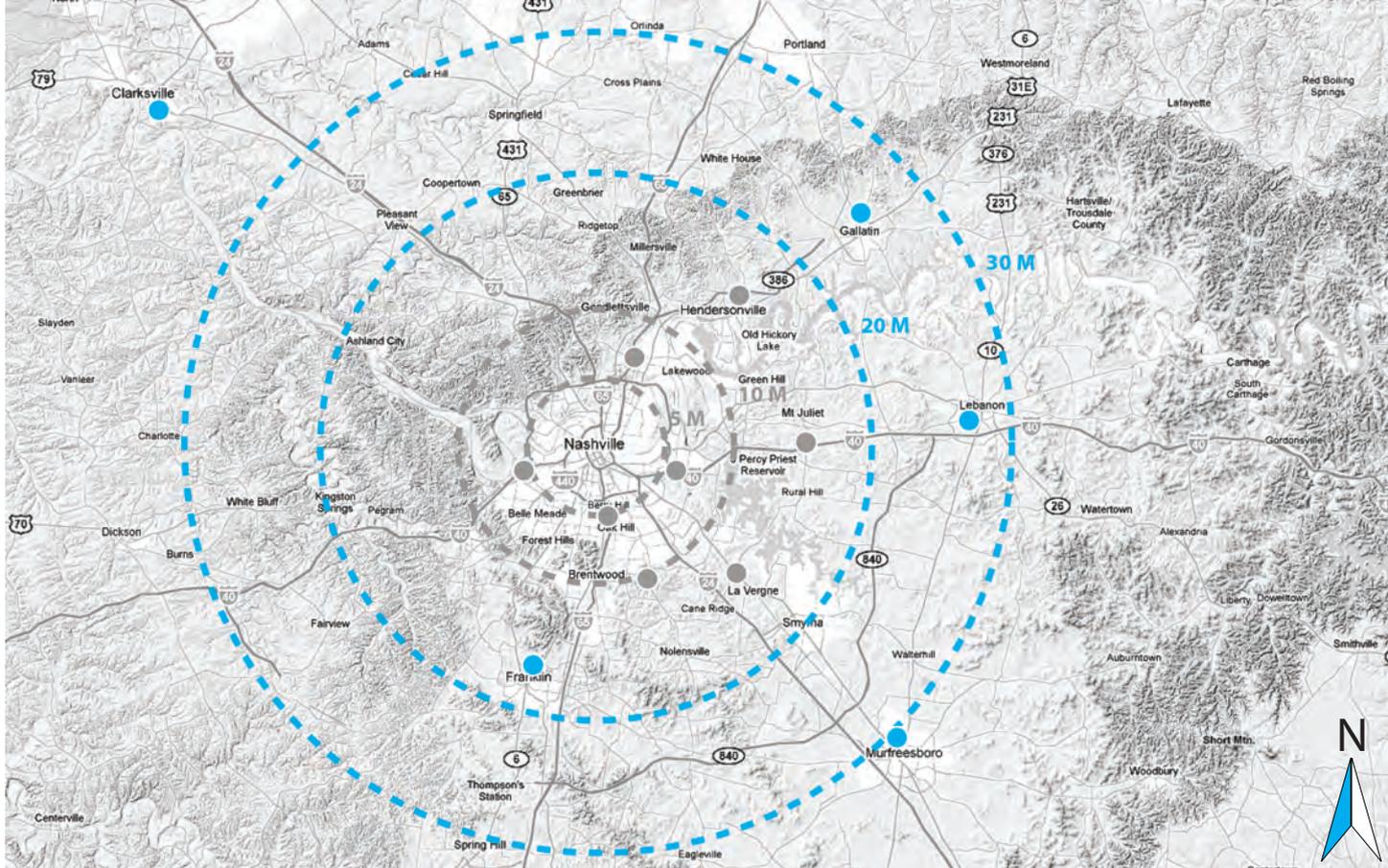
An Edge City refers to a concentration of business, shopping, and entertainment outside a traditional urban area in what had recently been a residential suburb. Areas around Nashville, like Mt. Juliet and Hendersonville, have become shopping destinations and prime locations for office parks, restaurants and entertainment.



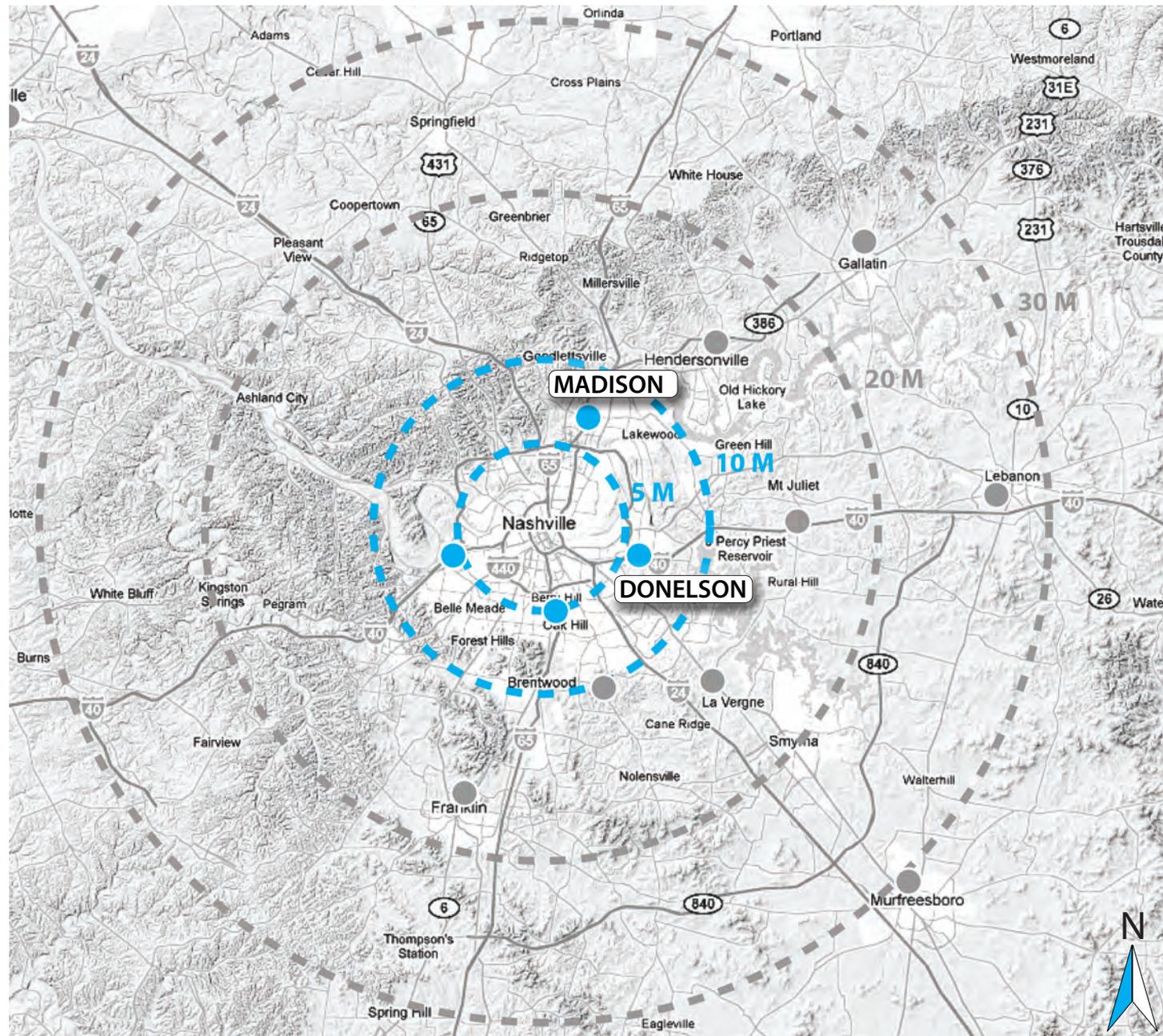
Map highlighting proximities of edge cities to downtown Nashville, TN. Image source: © 2011 Google + NCDC

C SATELLITE CITIES

Satellite Cities are small to medium sized towns located near a much larger metropolitan area. They have their own form of city government and jobs base and unique character, including historic downtowns surrounded by traditional neighborhoods and suburbs.



Map highlighting proximities of satellite cities to downtown Nashville, TN. Image source: © 2011 Google + NCDC



Map highlighting proximities of postwar suburbs to downtown Nashville.
 Image source: © 2011 Google + NCDC

Postwar Suburbs

The Postwar suburbs of Nashville epitomized the “American Dream” during the furious growth period following WWII. Emphasis was placed on providing safe environments, large lots, ownership of single-family dwellings and most importantly, efficient access for the automobile. As cities have continued to expand outward, newer suburbs have replaced the earlier suburbs in popularity. As a result, postwar communities are sometimes considered aging—in need of redevelopment. A great opportunity exists for these communities to embrace future development paired with public transit infrastructure.

Transit developments cannot occur in isolation. A successful TOD exemplifies a livable community, emphasizing all pedestrian environments. Incorporating and enhancing public transit into postwar suburbs begins to add to the components needed for a well-functioning community. The communities of Madison and Donelson are excellent examples of postwar suburbs poised for positive implementation strategies and positioned to pioneer transformations into transit-oriented developments. Both communities show need for a wide spectrum of improvements, concerning both public and private realms, and express a strong desire to embrace the principles of livable communities that are supported by successful transportation systems.



Section drawing through students' design of a Madison TOD.
Image source: UTCOAD

Madison Village

The proposed transit village for Madison Village was designed by Jordan Dugger, Josh Johnson and Arya Kabiri of the University of Tennessee, with development strategy by Peter Kleinberg and Gavin McDowell of Vanderbilt University.

Madison Village is an aging suburb in need of revitalization, lacking a town center as a true "place," and afflicted by a deteriorated commercial arterial. The students first examined a Metro Planning Department urban design plan that was the outcome of a recent public participation process. They sought to retain the best features of the plan, including an intensive redesign of the arterial over time to make it a walkable commercial boulevard. They also sought to design a "Village Green" at the location of a recently built public library as both a spatial and symbolic center for Madison Village.

To the south of this area is an aging strip mall, which students proposed to retrofit with new uses and new parking assumptions. The idea is to conceal parking behind the mall, turning the former parking area into an outdoor market. The entire precinct would make connections to potential new greenways, and spatially clarify sprawling surface parking lots. With the mall then a community center and entertainment venue, new terraces are proposed down to the creek that would have pathways leading to the Cumberland River, all located within walking distance.

Anchoring the new Village Green, a market hall building is introduced, with meeting and exhibition space above. The historic, relocated Amqui Station is incorporated as part of the ensemble. An existing supermarket becomes an anchor asset in the district, with mixed-use courtyard buildings and row houses developed to take advantage of future proximity to BRT in the arterial, and the supermarket.

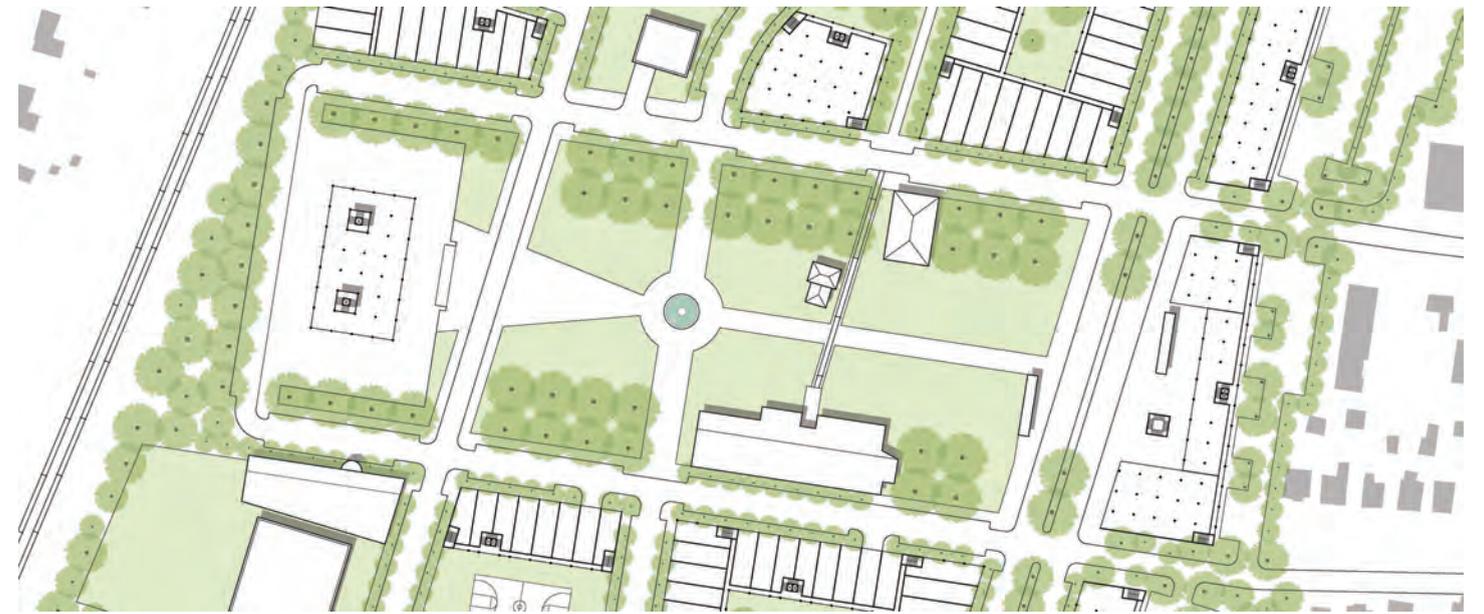
New row houses feature alley access to garage parking, with accessory apartments above the garages to double the density. These provide affordable housing for a nationally changing demographic of increasing single person or childless households, or for an aging population in need of nearby family care.



Conceptualized plan for a Madison TOD.
Image source: UTCOAD



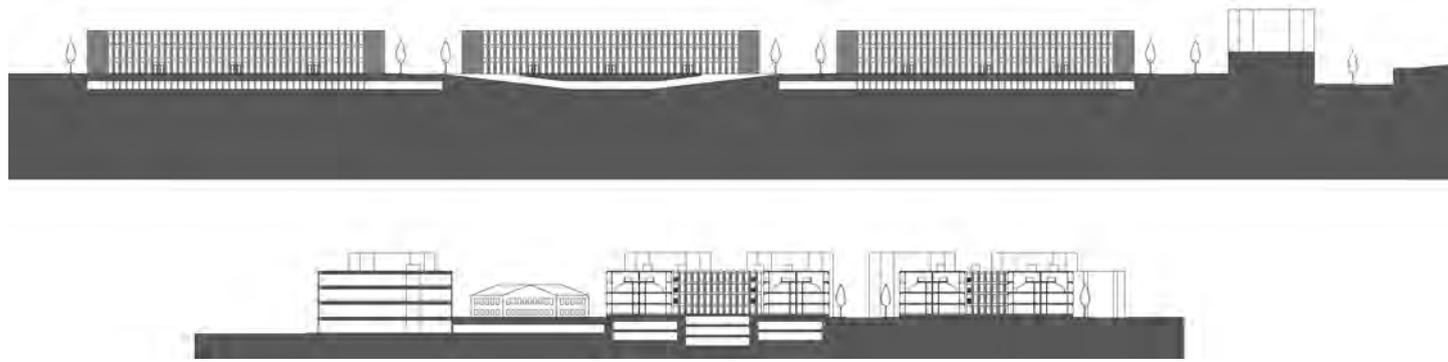
Perspective rendering of students' conceptual design for Madison Village.
Image source: UTCOAD



Enlarged plan of central green space in the proposed Madison village TOD design.
Image source: UTCOAD



Plan and section details of housing typologies and conceptual designs within the Madison Village.
Image source: UTCOAD



Section drawings through students' conceptual design of a Donelson TOD. Image source: UTCoAD

Donelson

The proposed transit village for Donelson was designed by Joshua Bradshaw, Brian Doherty and Jeffrey Stahl of the University of Tennessee, with development strategy by Shane Kaiser and Gavin Richey of Vanderbilt University.

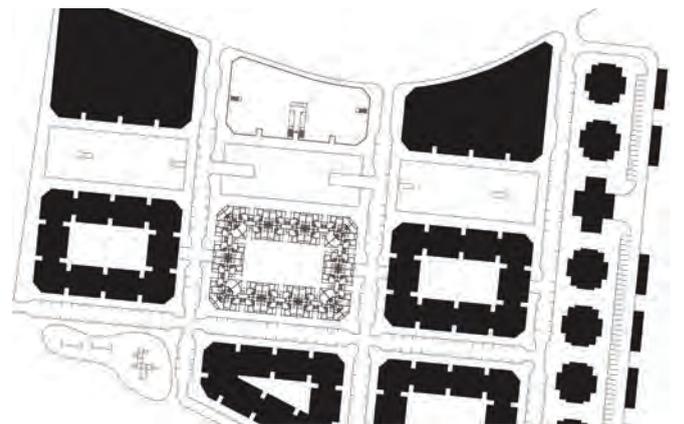
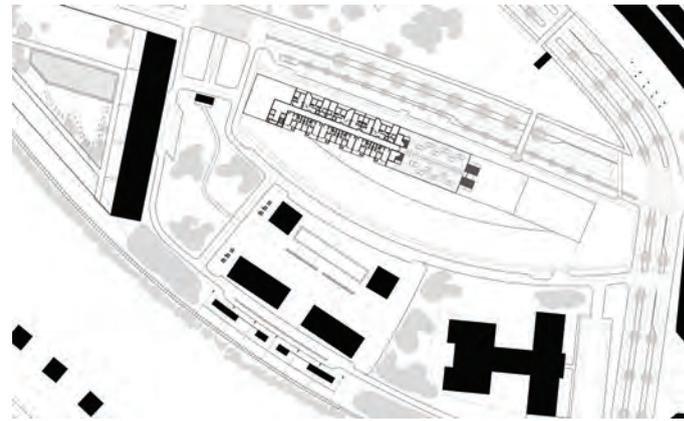
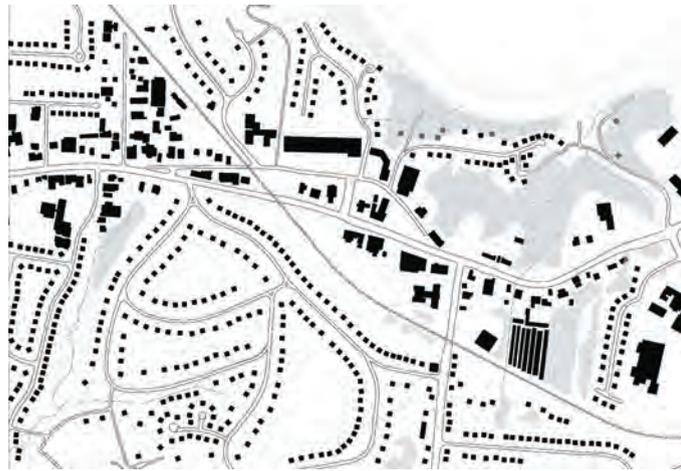
The existing Donelson transit stop for Nashville's commuter rail line is located adjacent to a run-down commercial strip in an aging postwar suburb. As part of their efforts to remediate problems associated with commercial arterials, the Metro Planning Department has engaged the Donelson community in numerous public meetings during the past several years. These meetings have been taken into careful consideration in the formulation of the students' proposal.

The absence of an identifiable center for this suburban town is its most conspicuous shortcoming. The design team proposed taking advantage of site topography to platform over needed parking, in order to make a new crescent-shaped village green where the historic Donelson Pike diverges from the arterial's previous realignment. To help spatially define the new "Crescent," a continuous curving two-story arcade is introduced to unify the disparate existing buildings around it. A small lake is formed as a park amenity in an existing ravine to the north of Donelson Pike, opening in turn to the oxbow of the Stones River. A new community center is proposed with terraces overlooking the lake element. Therefore, new

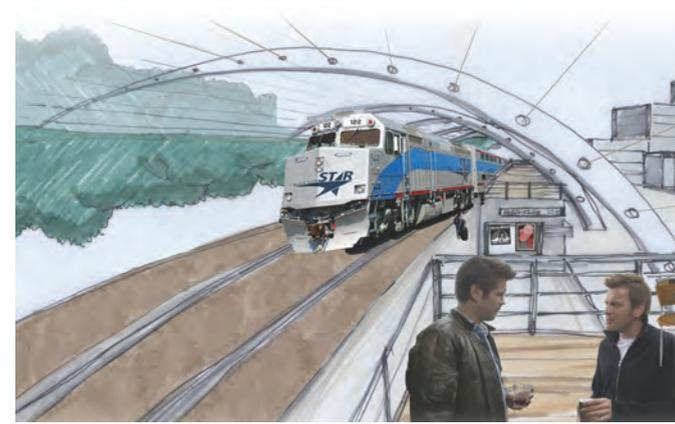
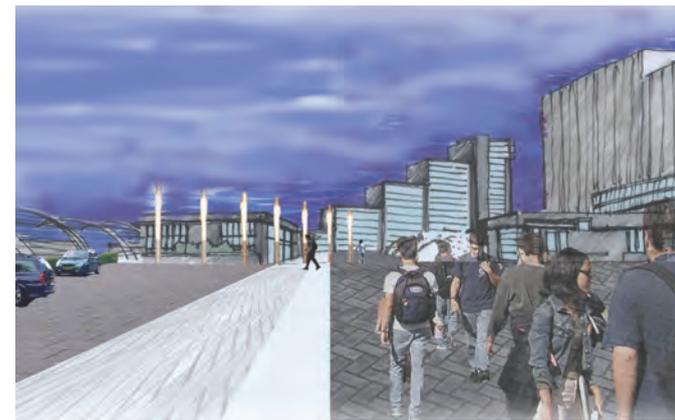
construction enhances existing landscape features, creating a sense of community identity for Donelson. A future connector to Madison Village towards the north, anticipated by Metro Planning, has been incorporated in the planning proposal. Consistent with best practices of TOD, commercial space, a new hotel, and mid-rise housing is proposed along the Pike. An outdoor market is proposed as a public plaza at the transit stop. The proposal also incorporates an existing senior center in a former elementary school, and generates considerable high-density housing to the east in courtyard blocks and six-story "urban villas."



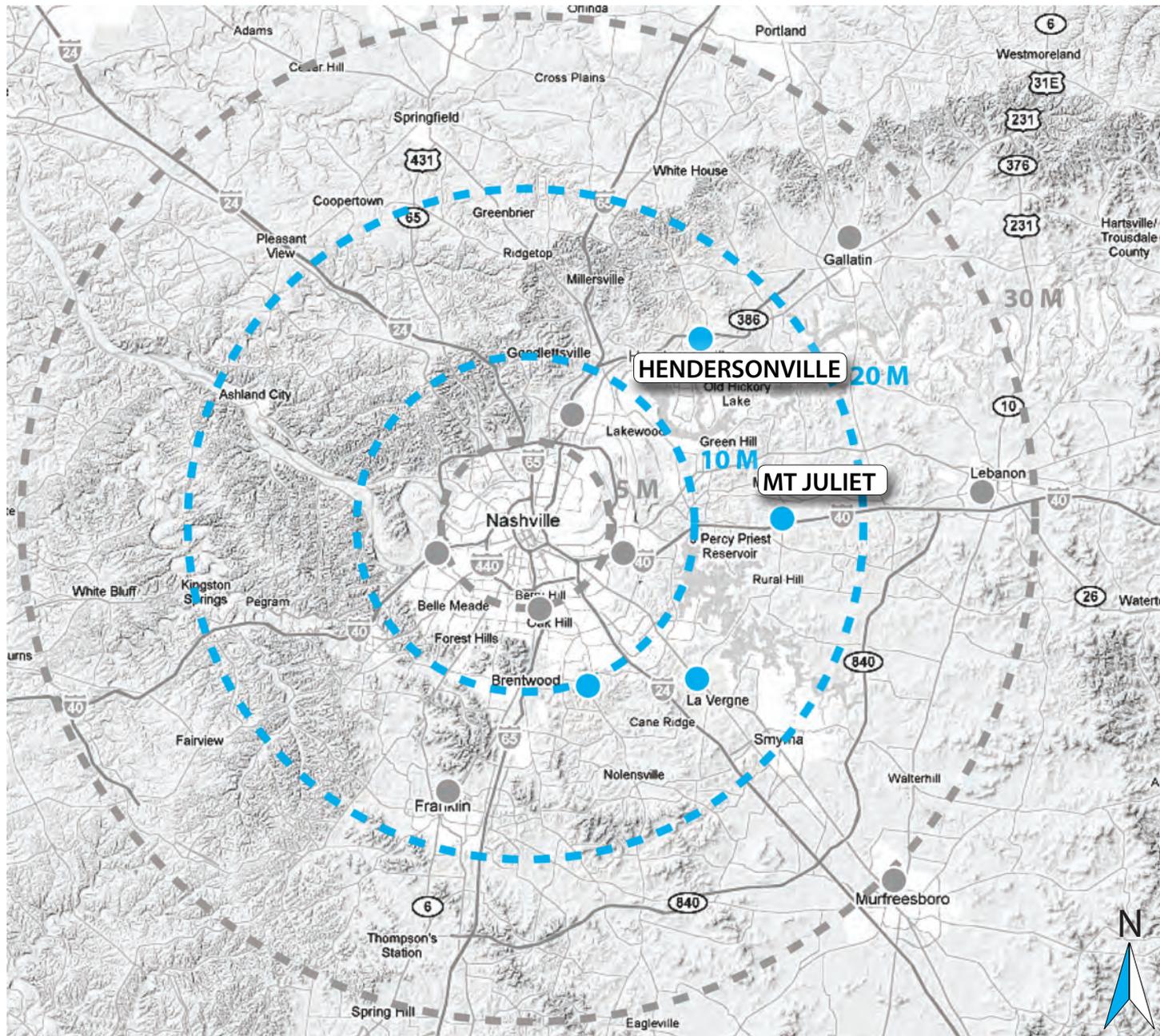
Conceptual plan of a Donelson TOD. Image source: UTCoAD



Enlarged plans and diagrams of the proposed Donelson TOD design.
All images above by UTCoAD



Perspective renderings of the proposed Donelson TOD.
All images above by UTCoAD



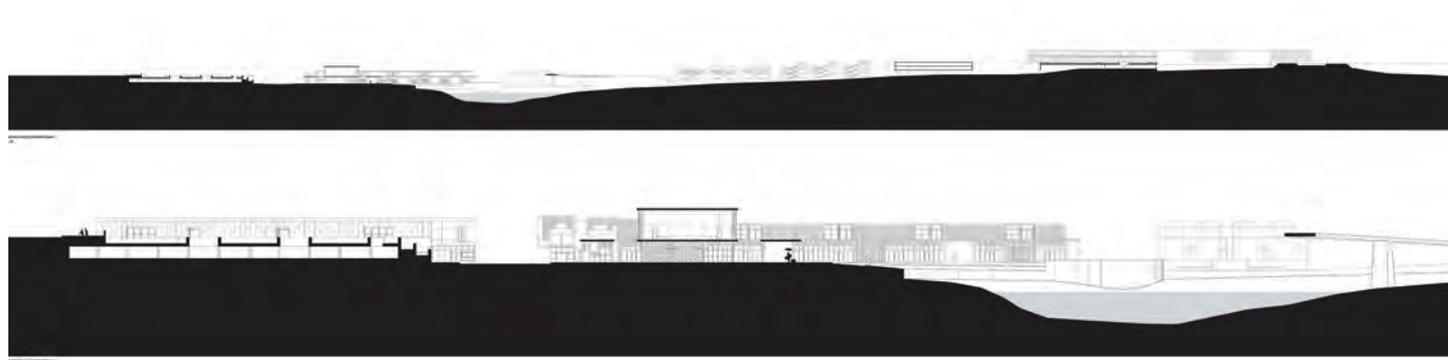
Map highlighting proximities of edge cities to downtown Nashville.
 Image source: © 2011 Google + NCDC

Edge Cities

The outward growth of suburbanization—away from existing metropolitan areas—spawned the concept of edge cities (e.g. Hendersonville and Mt. Juliet). They are sometimes derisively referred to as “Anywhere USA” because they lack the history, character and urban form that has traditionally defined a sense of place. Shopping centers, chain restaurants and office parks may abound, but typically there is no center to the community.

Efforts to change the “Anywhere USA” mentality are now being realized in communities across the country. Edge cities are beginning to utilize urban design practices to create more walkable streets, implement circulator transit systems and adopt codes that stress architectural character, all intended to create more livable communities.

As available open space in Middle TN dwindles, opportunities arise for Nashville’s edge cities to adopt new policies permitting higher density, mixed-use developments centered around existing or future transit station locations. These new TODs will help create a sense of place that ultimately create successful, engaged communities.



Hendersonville

The proposed transit village for Hendersonville was designed by Tyler Blevins, Dean McKenzie and Zach Sherrod of the University of Tennessee, with development strategy by Tom Miles, Stehen Songy and Andrew Steffens of Vanderbilt University.

The Hendersonville site selected for study has the potential to link Gallatin Pike to a new, more formal town center, opening the site to significant new office space along the Vietnam Veterans expressway. A new road, already in place, is facilitating this planning—tying it to greenways, and new civic and shopping venues to the west.

This was a very challenging site, constrained in its dimensions, bisected by a freight-only railroad and confronting contours that limited where one could build. Nevertheless, a wide variety of housing types have been invented, and the design proposal succeeds in capturing the feel of a village, with corresponding density. While one might have built taller and denser, this would have been in conflict with the scale of adjacent one and two story neighborhoods, and probably would have met with significant public resistance.

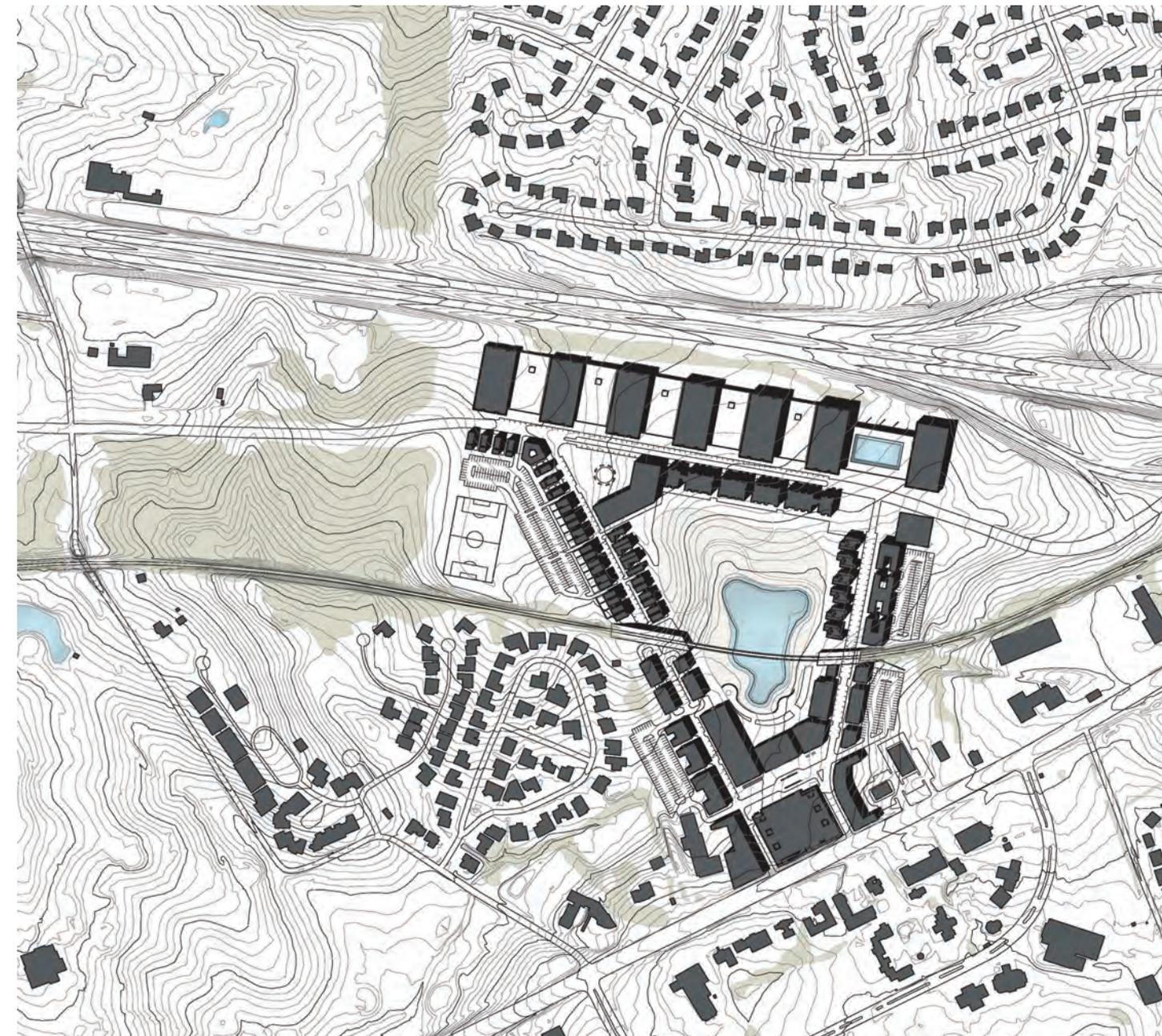
The existing railroad has been addressed by converting its embankments to a visually more open trestle as it traverses the site. A new water feature in the center of the site

development captures water draining from natural lines in the topography, and becomes a picturesque garden shared by residents.

At the southern, arterial end of the site, a village center would be located, lined by commercial space, with a green square atop a level of parking. Between the garden and the square are a marketplace and meeting and exhibit hall with views of both the garden and the public square.

Along the expressway to the north, considerable office space is developed above parking and commercial space, topped with green roofs.

Along the expressway to the north, considerable office space is developed above parking and commercial space, topped with green roofs.

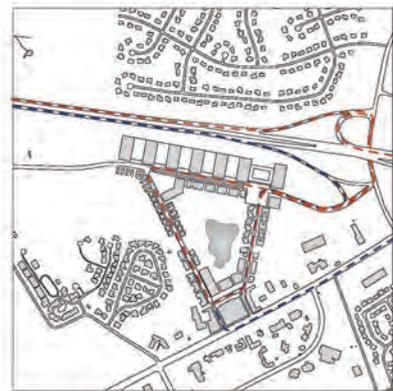


Conceptual plan drawing of the students' design for a TOD in Hendersonville.
Image source: UTCOAD





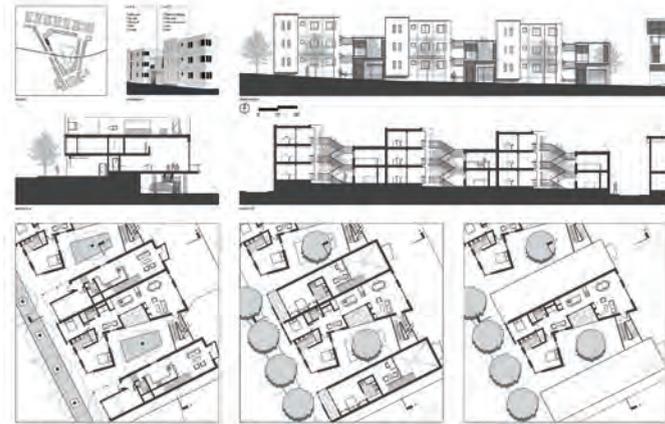
[roads and parking]
 ■ student parking
 ■ surface parking



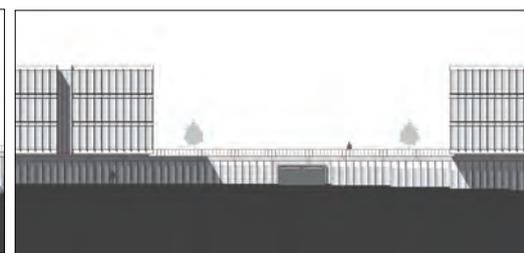
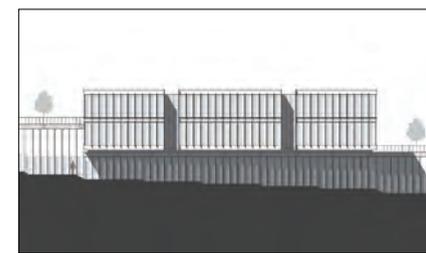
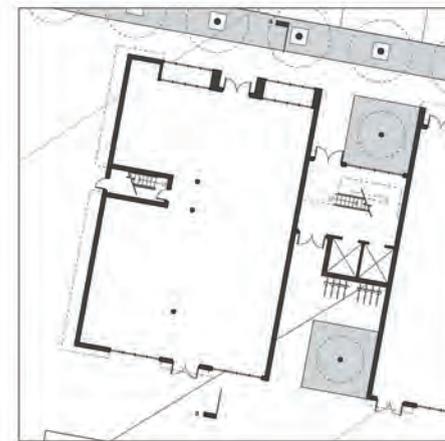
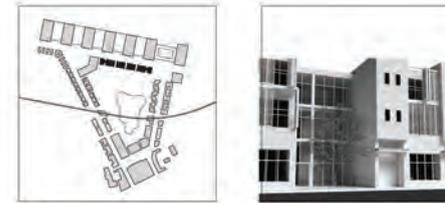
[bus rapid transit route]
 — transitway easement
 — away from residential



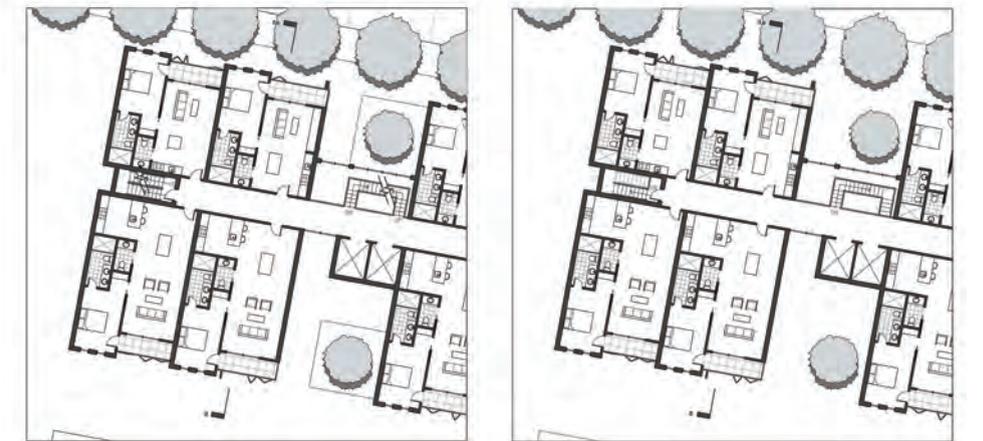
[2000' foot radius from station]

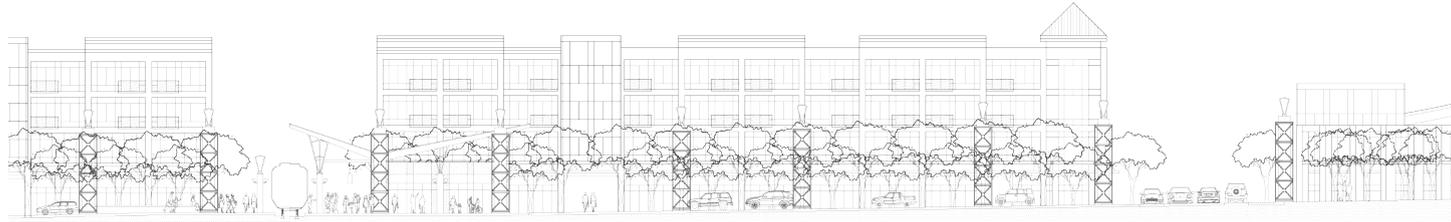


Enlarged plans and elevations of housing typologies in students' design for a Hendersonville TOD. All images above by UTCoAD



Enlarged plans and elevations of mixed use buildings in students' design for a Hendersonville TOD. All images above by UTCoAD





Mt Juliet

In September of 2006, the Music City Star regional commuter rail had just begun its operations from Lebanon to Nashville, with six stations located along its route, including Mt. Juliet. The commuter rail station location lies near the intersection of Division Street and Mt. Juliet Road, outfitted with covered shelters, an accessible platform and a large park-and-ride lot. Two miles south of the station, Providence Place was well under way in its second and third phases of retail, commercial and residential development. Hundreds of new homes within a few miles of commuter rail was good for ridership, but there was still very little activity occurring to the station's adjacent sites.

In the spring semester following the grand opening of the Music City Star, one of TK Davis's first students to focus on TOD took the Mt. Juliet Station as his thesis project. After a thorough site analysis, Nathan Narwold began to rearrange existing program, while introducing new concepts to create a higher density, mixed use development, centered around the transit station. Moving the station across Mt. Juliet Road to be nestled into an existing residential community was an important move. From this location, he used the topography to guide the creation of both natural features, including a small lake from an existing creek, and new infrastructure.

A new network of neighborhood streets, arranged in a more traditional grid pattern, connects existing cul-de-sac

Section drawings through student's conceptual design of a Mt. Juliet TOD.
Image source: UTCOAD

neighborhoods on either side of proposed new development. A strong focus on implementing a pedestrian-friendly, urban environment was at the core of his design principles, compared to the more traditional, car-centric Providence Place. Other key features to his design include shared common space, parks, public plazas and event space. This TOD design is not only comprised of a mix of uses, but does so in less than a half-mile radius. Tightly knit, dense, walkable neighborhoods are imperative for a TOD's success.

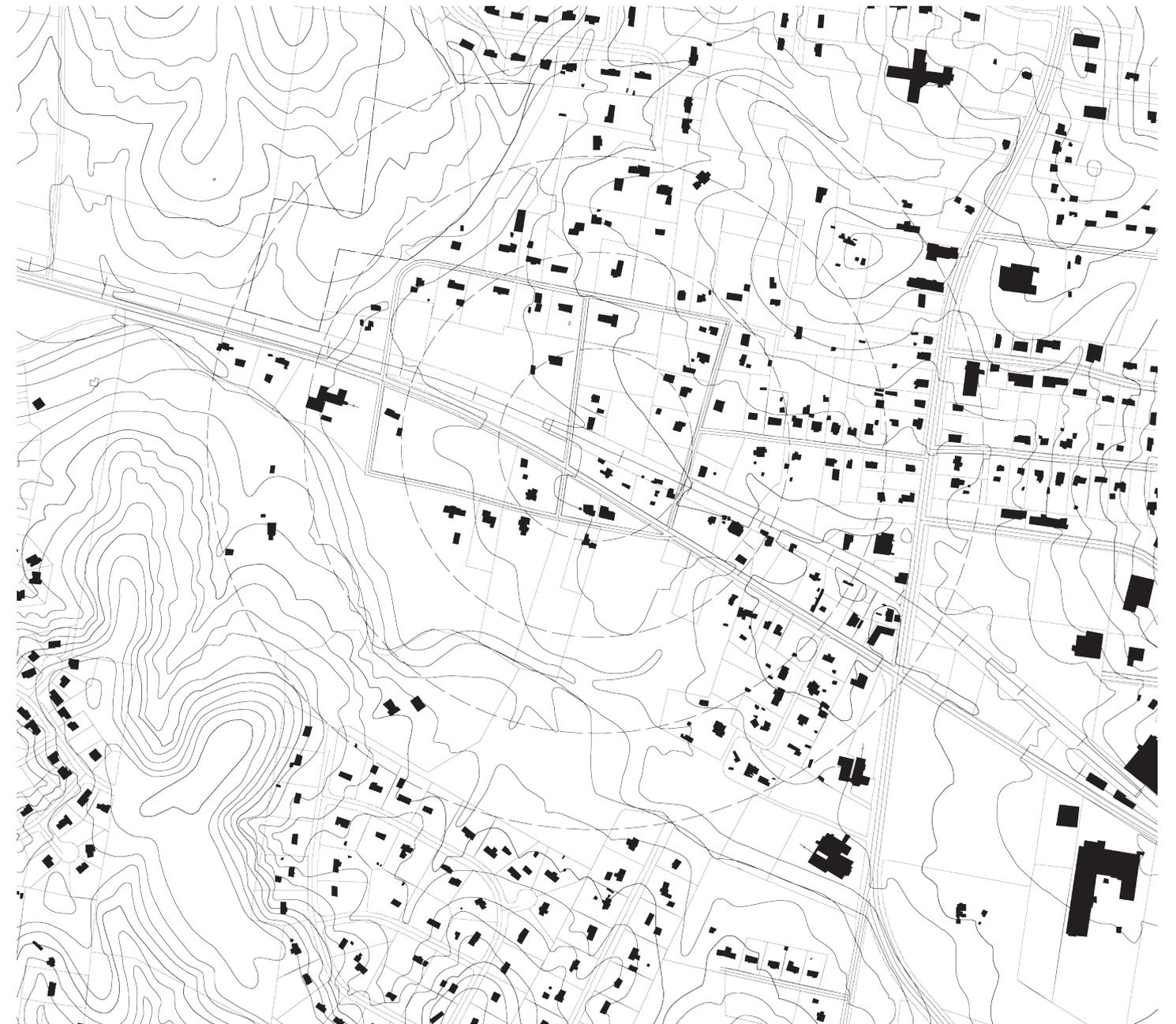


Figure ground of existing conditions around the Mt. Juliet Music City Star station area.
Image source: UTCOAD



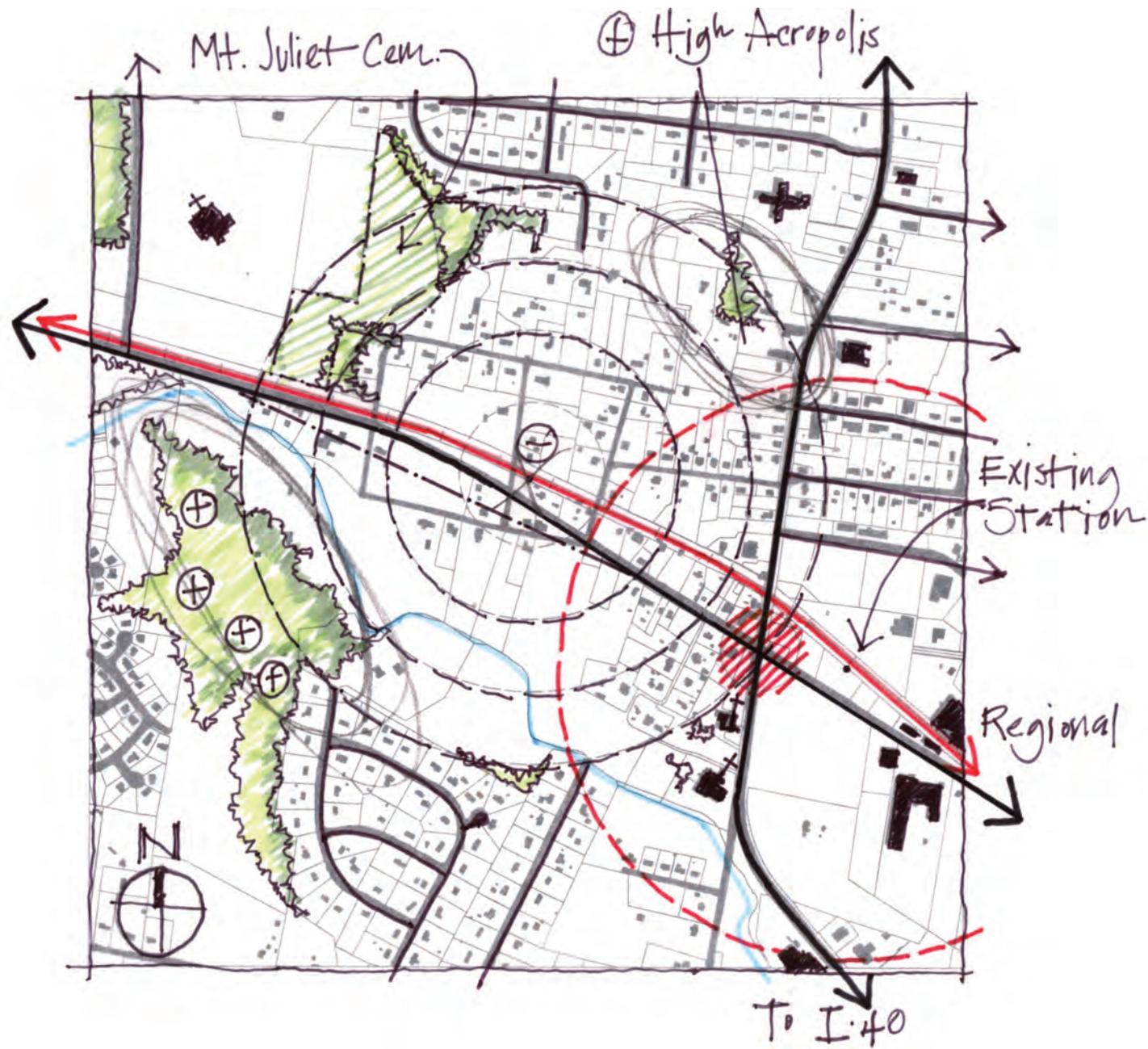
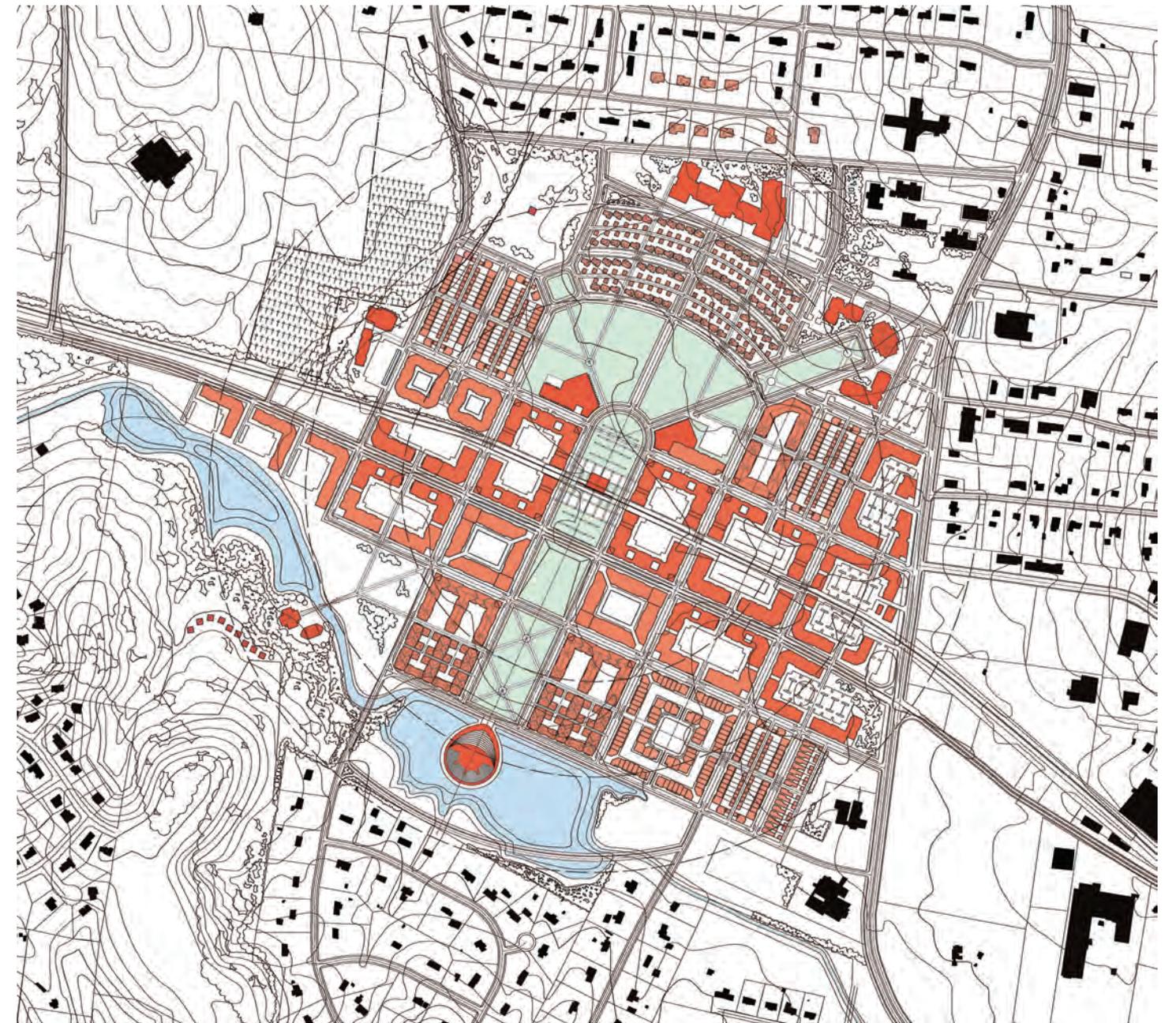


Diagram of Mt. Juliet transit station area, highlighting key features of the landscape and concepts for the proposed TOD.
Image source: UTCoAD



Final plan of the proposed Mt. Juliet TOD with relocated train station centered in the mixed use development.
Image source: UTCoAD



Gallatin Station

The proposed transit village for Gallatin was designed by Aaron Grohol, James Sloan, and Stephen Struttman of the University of Tennessee, with development strategy by Douglas Archibald, Russell Autry, and Clarence James of Vanderbilt University.

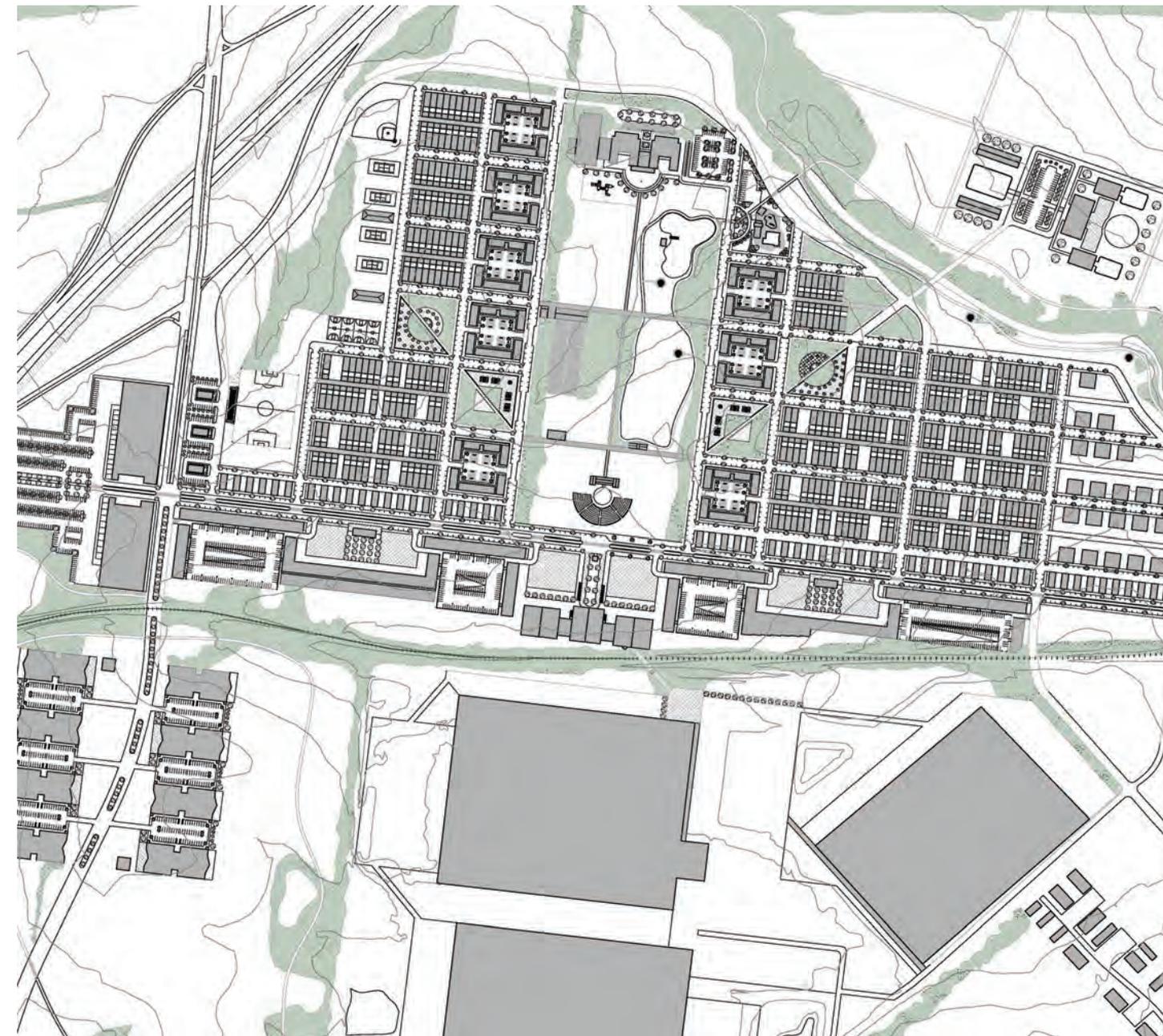
The Gallatin site proposed by the MPO is a pasture lying just across the CSX rail tracks from the one million square foot, 1,000 employee Southeast Region Distribution Center for The Gap, a global retailer. These two sites are separated by a tall line of trees. Gallatin is a high growth area approximately 30 miles from Nashville, very rapidly converting from an agrarian ambiance to a residential suburb.

The site proposed has many intrinsic advantages: a circle of buildable area within a half mile radius of the proposed transit station, proximity to an expressway, and relatively flat topography, all of which gave the designers flexibility in proposing economically viable development. The proposal seeks to maximize the housing density and mixed-use without excessive height. Street sections have been carefully considered, with on-street parking encouraged. Alternatively, parking is found a half level below grade under courtyard housing terraces.

Section drawings through students' conceptual design of a Gallatin TOD.
Image source: UTCoAD

A large quadrangle lined by housing with a rail or bus station and hotel to its south, and an elementary school to the north, anchors the transit village's layout. Courtyard housing blocks and "urban villas" complement linear apartment buildings along a boulevard perpendicular to the quad providing a wide variety of housing types and prices. A perimeter road has a park-like ambiance, with connections to walking, biking and horse trails (including a connection to an equestrian farm), as well as athletic facilities.

This urban design plan proposal seeks to build considerable phase one commercial space in close proximity to the expressway, helping to capitalize the transit village at the front end of its development. An office complex is located to the southwest of the housing precincts.



Plan drawing of students' design for a Gallatin TOD.
Image source: UTCoAD



Enlarged plans and section drawings of housing typologies in the students' design for a Gallatin TOD.
All images above by UTCoAD



Perspective and elevation drawings of various conditions throughout the proposed Gallatin design.
All images above by UTCoAD

Lebanon

During the Spring semester of 2009, Associate Professor T. K. Davis led sixteen advanced level graduate and undergraduate urban design students in exploring the potential of transit-oriented infill development in Lebanon, Tennessee.

The design studio initiative followed two prior, well-attended community assessment and visioning meetings, followed by reports, completed in 2007 and 2008. Both efforts were a collaboration formed as the American Institute of Architects (AIA) 150 Blueprint for America initiative, involving AIA Middle Tennessee, The City of Lebanon, Cumberland Region Tomorrow, the Greater Nashville Regional Council, the Nashville Civic Design Center, and the University of Tennessee College of Architecture and Design. The first topics explored were “Lebanon’s Town Center and Its Neighborhoods; Strengths, Weaknesses, Opportunities and Threats” and “The Potential of Transit-Oriented Development.” The next topic a year later was “The Potential of an Urban Redevelopment Plan in Lebanon.”

Lebanon, located 32 miles to the east of downtown Nashville, is the final stop on Nashville’s Music City Star commuter rail line. One of the interesting characteristics of the Lebanon site is that the TOD half mile radius encompassed its historic town square (unique in Tennessee as the intersection of two state highways at a “courthouse” town square), as well as a

large mill complex which has been adaptively redeveloped as a conference center, and a greenway system that links the square and the mill to the transit stop and beyond, to a very popular town park. There is considerable potential for infill development and structured parking, in the downtown core’s blocks surrounding the historic square. The challenges of the half-mile radius surrounding the station is that it contains, in part, a 100-year flood zone, and existing neighborhoods of modest scale and density.

The studio divided into design teams of four, each to develop a master plan identifying sites where development could and should occur, with a determination of the building types, configurations, and massing that might produce contextually appropriate architecture and public space. Individual students then developed one or more components of their master plan in greater detail.

Ultimately, six sites of opportunity were identified: The Music City Star Station controlled by the Regional Transit Authority, the Lebanon Historic Town Square and its four blocks, The Mill at Lebanon imagined as an “office and conference campus,” a deteriorated strip mall on North Cumberland Street Downtown, Town Creek Park South as a gateway space from the interstate into Lebanon and Cumberland University, the Hill Street North Neighborhood, and the Greenway North Neighborhood.



Figure-ground plan drawing of downtown Lebanon. Existing buildings in black, proposed designs in gray.
Image source: UTCoAD

A LEBANON TRANSIT STATION

The Music City Star commuter train terminates near the historic square in Lebanon, TN. Currently the area surrounding the existing station is comprised of a mix of land use typologies. The site itself is primarily devoted to a park-and-ride lot for commuters.



Figure-ground plan drawing of area around the existing Music City Star train station. Existing buildings in black, proposed designs in gray. Image source: UTCoAD

B THE MILL AT LEBANON

Originally occupied by Woolen Mills, a manufacturer of wool products, this historic building has been successfully renovated to provide retail, restaurant and event space for the community. Adjacent to the Music City Star, this site has great potential to continue its development to include residential and office space.

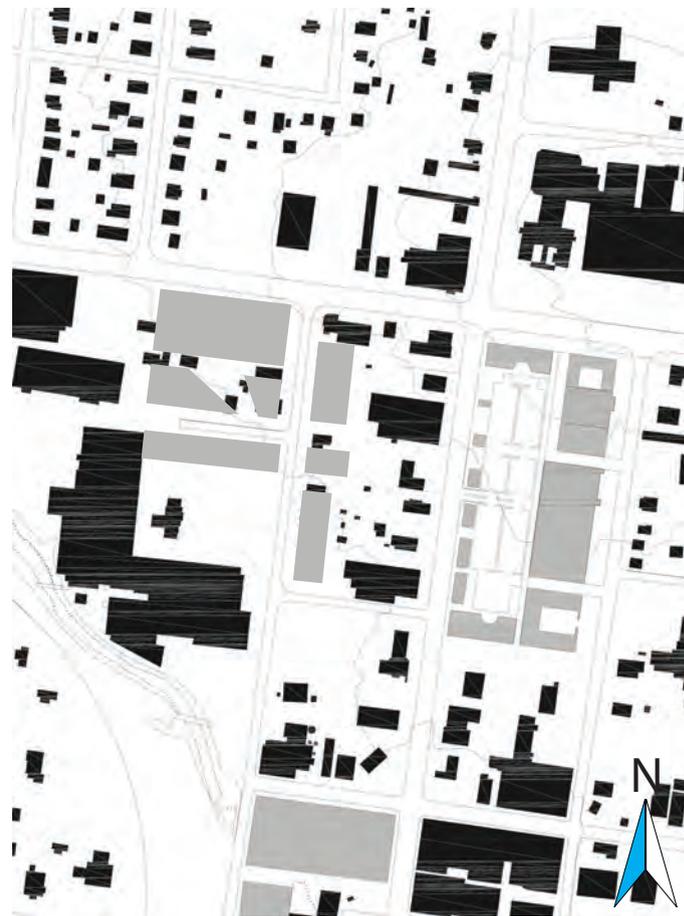


Figure-ground plan drawing of area around The Mill at Lebanon. Existing buildings in black, proposed designs in gray. Image source: UTCoAD

C HISTORIC TOWN SQUARE

Once a bustling central business district for the city of Lebanon, the Historic Town Square is primarily a collection of retail and antique shops. Most buildings have been preserved and renovated over the years, but still much potential exists in transforming the numerous underutilized properties.



Figure-ground plan drawing of area around the Historic Town Square. Existing buildings in black, proposed designs in gray. Image source: UTCoAD

D TOWN CREEK PARK SOUTH

Just south of the town square, Town Creek Park is nestled in a unique landscape between rail yards, main arterial streets, industrial and residential land uses, as well as a fluctuating active creek flowing through the city.



Figure-ground plan drawing of area around the town creek park, just south of Lebanon's Historic town Square. Existing buildings in black, proposed designs in gray. Image source: UTCoAD

The existing zoning pre-dated the presence of the commuter rail transit stop, so students sought either maximize its potential, or knowingly advocate for variances or modifications of the zoning ordinance to maximize the unique potential of the transit stop for new scales and density of development.

In addition, students could, with restraint and considerable discretion, acquire for demolition non-residential structures that they felt were dilapidated, underutilized, or inappropriate as uses within the half-mile radius. Acquisition of existing residential structures to enable new development was possible, but had to be held to an absolute minimum.

The semester culminated in a series of reviews and presentations at the Nashville Civic Design Center (NCDC) with “jurors” from the Urban Land Institute Nashville District Council, an evening presentation before citizens of Lebanon, and a final design review at the University of Tennessee College of Architecture & Design in Knoxville. In addition, an Urban Design Forum was held to present the projects for discussion at the NCDC, and a joint presentation was made to the Nashville Area Metropolitan Planning Organization and the Regional Transit Authority Board of Directors.

LEBANON TRANSIT STATION



Rendered perspective drawings of various conditions throughout the student's design of a new transit station TOD in Lebanon, TN.
All images above by UTCoAD

Key Findings During Both Semesters

Density assumptions for a transit village in a suburban context presented a key dilemma for the design and development students. Suburban communities tend to resist buildings significantly taller than their context, yet higher density is required for a viable return on investment, as well as being a way to boost ridership for mass transit. In general, the students found that 3-6 story buildings seemed plausible for a suburban transit village.

Three of the sites identified were considering one of three choices for transit: commuter rail, LRT and BRT. National trends, and discussions throughout the semester indicated that bus systems are the least appealing to the riding public, although they clearly represent the lowest initial infrastructure investment. Interestingly, the cost of rail infrastructure investment provides the most permanent guarantees to developers for long-range stability and success in real estate development. Bus routes can change, while the permanence of a rail stop insures the stability of nearby property values.

All of the design proposals developed a range of unit types, including affordable dwellings. The students were especially impressed with the economic viability of creating “two bedroom flexible-unit types” which, with a simple door hardware change and the inclusion of a kitchenette, could

be alternatively marketed as a one bedroom apartment with balcony and an adjacent studio apartment with balcony. Accessory units such as “granny flats,” often above the garage in a block with landscaped alleys, are a type we need to recuperate. Not only can this flexibility double density, but it accommodates live/work, or the more diverse and smaller demographic trends of the contemporary household (not to mention the changing spatial needs of households over long periods of life).

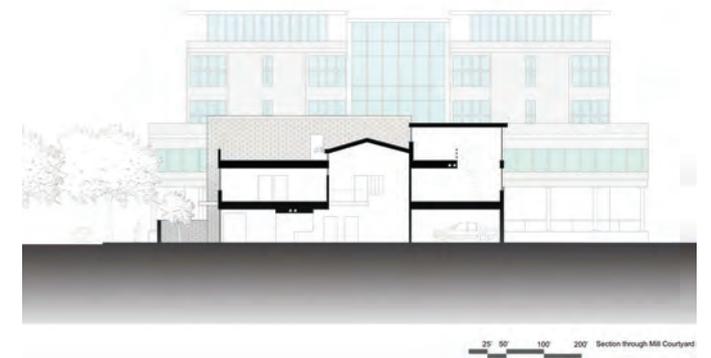
With regard to the work of the development teams, three thoughts occur. First, it is somewhat problematic to undertake a financial assessment of a new transit village in the context of our “Great Recession,” where money is not being lent, very little construction is underway, and all bets are off. What does one assume for a baseline condition: today’s facts or tomorrow’s potential facts? This is compounded by the absence of in-state TOD “comparables” for the development students to model.

A second related challenge the development students faced was coming to grips with the logical timeline of transit villages relative to planning, design, construction, and phased build-out. If a mass transit line is not anticipated to be operational for up to five years, then that logically would be when phase one of the project becomes occupied—and



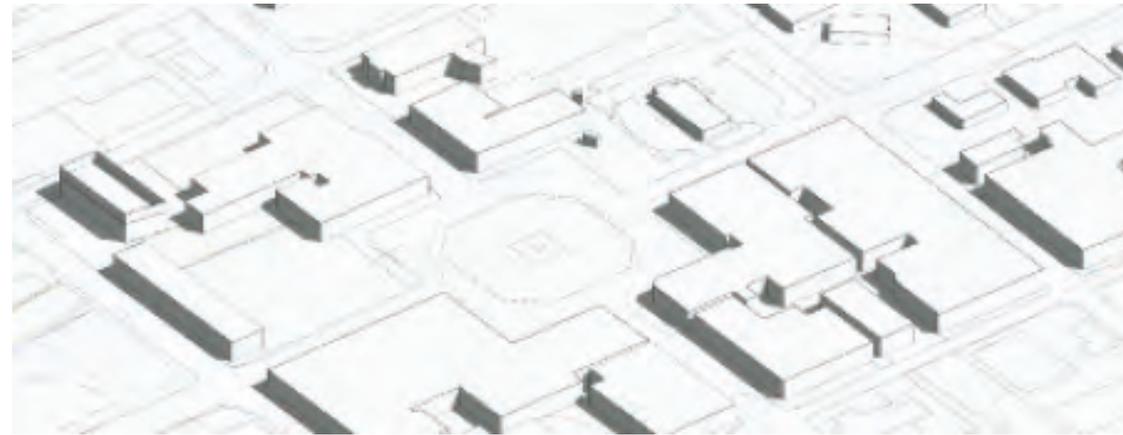
Rendered plan drawings of the student’s conceptual design around the Mill near Lebanon’s Historic Town Square. All images above by UTCoAD

THE MILL AT LEBANON



Perspective and section drawings of the student’s conceptual design around the Mill near Lebanon’s Historic Town Square. All images above by UTCoAD

HISTORIC TOWN SQUARE

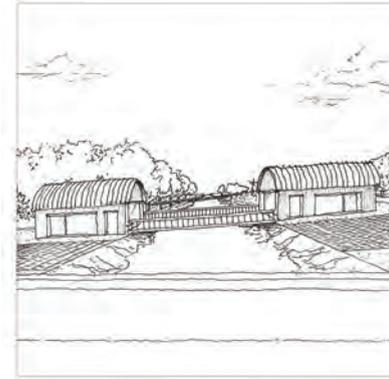


not before. The subsequent two phases would probably be completed in another 5-10 year time frame. Hence, we are looking at metrics that are well over the horizon, and unknown. This uncertainty makes analysis very difficult. As a result, the development students tended to want to focus their quantitative analysis on only phase one, and often only on an initial portion of phase one. This limited the value of the financial analysis, because it didn't project a precise tax increment over time that would accrue beneficially to both the project and the community.

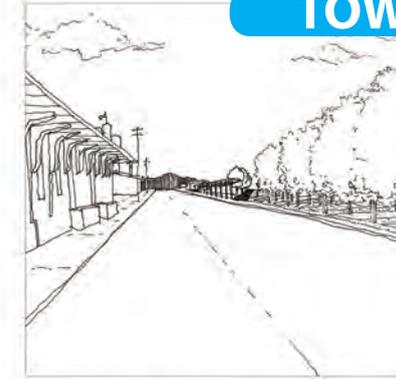
Third, given a long build-out period, initial cash flow, or "internal rate of return" (IRR) is going to inherently be relatively low. IRR on a project is the annualized effective compounded return rate, or discount rate, that makes the net present value of cash flows equal to zero. Internal rates of return are used to evaluate the profitability of projects, with the higher its IRR, the more attractive the project. IRR is a key metric developers use in determining whether to "pull the trigger" to proceed on a development. The initial IRR is low because most of the heavy development costs are front-loaded: land acquisition, design and approval fees, site preparation, infrastructure improvements, etc. As the project gets built-out over time, these front end costs are amortized and cash flow improves significantly.



Top: Before and after, bird's-eye perspective massing drawings
Middle + bottom: Elevation drawings of the Lebanon Historic Town Square showing proposed infill, mixed-use buildings. All images above by UTCoAD



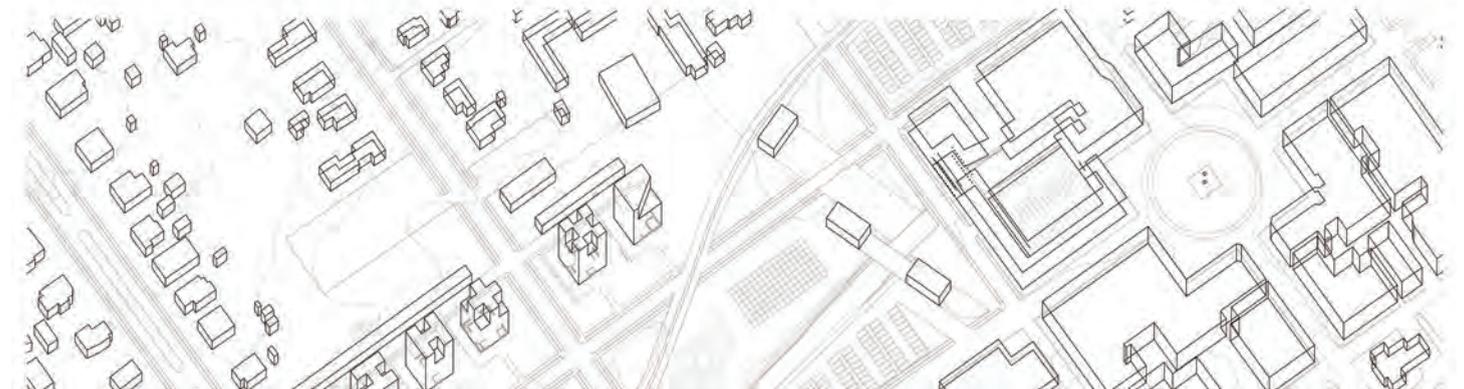
VIEW SOUTH TO FARMERS MARKET



VIEW SOUTH TO PERGOLA + ORCHARD



VIEW NORTH TO AMPHITHEATER



We argue, as Christopher Leinberger with the Brookings Institution does, that what is needed is “patient money” investment (perhaps borrowed in tranches), and held over a much longer period of time than that of a 5-7 year “flip” of ownership. Leinberger states that the total return on investment is much higher through such long-term investment.

The TOD urban design studio benefited the students and the School of Architecture in several interesting ways. Students benefited from the exposure of their work to civic leaders, public sector agencies in Metro Nashville, design and development professionals, and ULI membership.

The University of Tennessee benefits from the high visibility of relevant and engaged outreach in the state’s capital city, consistent with the University’s land grant mission. In addition, the College’s partnership with the Nashville Civic Design Center (NCDC) has been substantially strengthened through utilizing the Center as a base of operations for studio presentations at NCDC events, as well as exhibitions, publications, and web site access of this work.

In conclusion, the TOD urban design studio was characterized by its applicability as a public advocacy, and demonstrated a learning process and consideration of a wide range of issues. Student evaluations and review commentary strongly suggest

the study promoted innovation through teaching, creative design, and outreach service as applied research. The design students also extensively engaged the development students in their financial thinking and priorities, and were empowered as designers to add ideas and be proactive to improve the value of both the designs and economics of the projects. National trends and emerging practices in urban design were applied in a comprehensive way to suburban areas now recognizing their need for public transit. The advent of Transit villages would have enormous value in Middle Tennessee in creating more livable communities.

TK Davis, Associate Professor
University of Tennessee College of Architecture + Design



Elevation drawings of proposed mixed-use TOD design at Town Creek Park South. All images above by UTCAD



COMPLETE STREETS



TRANSIT INFRASTRUCTURE



PEDESTRIAN CONNECTIONS



WALKABLE PROXIMITIES



PUBLIC SPACE



SUSTAINABILITY



STRUCTURED PARKING



MIXED-USE DEVELOPMENT

Tool Box

The components that create successful communities can be likened to a “kit of parts” that, when used correctly, produce efficient and successful TODs. Careful attention must be given when applying these various tools, ensuring quality of design and functionality. These components can function together in a cohesive plan, creating a new type of development, catering to all users in the area.

Many TODs around the country incorporate design features and amenities to best suit the community’s needs. One of the primary concepts of a TOD is its ability to sustain quality of life, maximizing development potential without making a large physical footprint, thus having as minimal impact as possible. This concept may trigger other practices of sustainability; such as: water conservation, energy harvesting, pedestrian-friendly streets and most importantly, emphasizing public transit options as an integral component to the development.

Top: A “complete street,” Portland OR. Image source: NCDC
Middle: Pearl District, Portland, OR. Image source: Sitephocus
Bottom: Solar Canopies in parking lot, Vacaville, CA. Image source: NCDC

Top: MAX light rail infrastructure, Portland, OR.
Middle: Union square plaza + cafes, San Francisco, CA
Bottom: MAX Park and Ride structured parking + retail, Clackamas, OR
All images above by NCDC

Top: Urban greenway, Portland, OR. Image source: NCDC
Bottom: Pearl District, Portland, OR. Image source: Sitephocus



Rendering of the pending Hamilton Springs transit station along the Music City Star corridor, Lebanon, TN. Image source: Lose & Associates, Inc.

Hamilton Springs

Hamilton Springs is the first community in Middle Tennessee that will be planned, designed and constructed as a traditional neighborhood “village” with residences and businesses centered around a train station. It will emphasize use of transportation modes other than cars. Hamilton Springs is located in west Lebanon on property fronted along Highway 70 and extending to Old Horn Springs Road.

The plan for Hamilton Springs has been commended by transportation and planning officials throughout the region, noting that the project will encourage community and economic development efforts and enhance transportation infrastructure in a sustainable way. The first phase for this landmark TOD project is expected to break ground in early 2012.

When the project was announced, Michael Skipper, director of the Nashville Area Metropolitan Planning Organization, noted, “The region’s new 2035 Regional Transportation Plan rewards communities that find ways to attract mixed-use developments with a range of housing and job opportunities by providing funding for much needed infrastructure improvements to accommodate the growth that is coming our way.”



Madison Station: Greyfield TOD

A greyfield TOD prototype was developed using Madison as an example location and assuming service by the Gallatin Pike BRT. Greyfield TODs are developments within existing urbanized areas that are supported by permanent transit infrastructure such as platforms or stations for BRT and LRT.

Within areas served by transit, they offer an opportunity to upgrade transit service and utilize existing infrastructure while enhancing prosperous areas that offer density, a mix of uses, and/or destinations that are characteristic of successful TODs. Upgrading transit infrastructure can facilitate the redevelopment of existing areas. As with most infill development, it is difficult to assemble large properties. Due to common constraints, the existing development patterns can make it difficult to establish an ideal urban environment.

Examples of constraints include:

- Existing street network can limit the establishment of marketable block sizes
- Limited right-of-way width reduces transit infrastructure options
- Location of existing buildings can disrupt ideal blocks and interior parking opportunities
- Existing development has been developed at lower than desirable densities for transit oriented development

Bird's eye view of Greyfield TOD Madison Station concept. Image source: Nashville Area MPO

Like varying areas of cities, not all TODs are alike. Each has its unique qualities and challenges. While transit infrastructure and/or other public investments can be a catalyst for new development, ultimately each instance is heavily influenced by market forces. The real estate market strongly drives the mix of uses and potential businesses within a TOD and dictates the level of density it can successfully support.

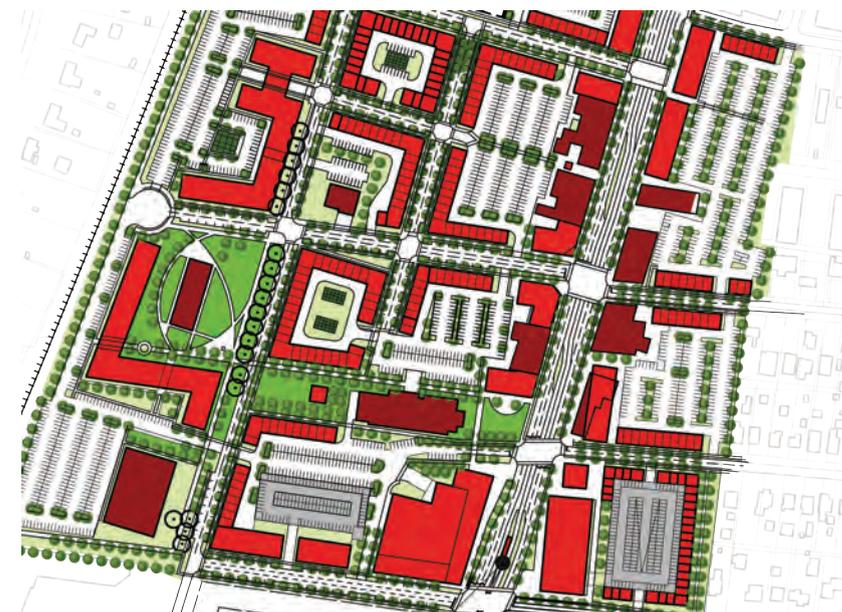
The greyfield TOD shown encompasses nearly 63 acres. It illustrates TOD infill opportunities within Madison, an established but aging low density commercial thoroughfare corridor, primarily comprised of a mix of one-story buildings. While the area's transportation options include walking and bus service, access is focused on the automobile. Typical of many thoroughfare commercial areas outside of the downtown core, the economies of the real estate market limit the ability to utilize parking garages, due to higher cost per space that cannot be supported by current lease rates. As a result, the development densities shown are moderate but appropriately scaled to the existing context. Building heights range between one and four stories.

-Excerpted for the Nashville Area MPO's *NorthEast Corridor Mobility Study*

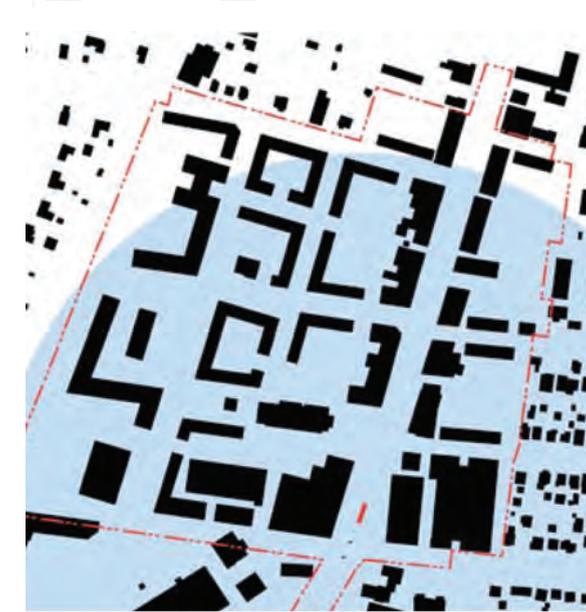


Bird's eye view of Greyfield TOD Madison Station concept. Image source: Nashville Area MPO

- | | | |
|--|---|--|
| ■ New Retail | ■ Residential townhomes | ■ Park/Open Space |
| ■ Existing Retail | ■ Residential Flats | ■ Structured Parking |
| ■ New Office | ■ Public | |



Madison Station Conceptual Plan
Image source: Nashville Area MPO



Portion of concept within 1/4 mile radius from transit platform. Image source: Nashville Area MPO



Bird's-eye perspective of the conceptual Saundersville station TOD.
Image source: Nashville Area MPO

Saundersville Station: Greenfield TOD

The prototype Hendersonville TOD site spans 46 acres and portions of eight parcels of land, located between a limited access highway and major arterial roadway. These parcels are largely undeveloped with the exception of the Terrace at Bluegrass Assisted Living and Memory Care Community and Hendersonville Animal Hospital. The site is an extension of a planned office and retail development. The first phase of the project includes a retail center, office, and a public library.

The Hendersonville TOD prototype is classified as a greenfield. Greenfield TODs are planned districts built on undeveloped land. As with all TODs, permanent transit infrastructure (i.e. BRT and LRT) is a central component of the area. Greenfields offer their own unique opportunities and challenges. These include:

- Large undeveloped parcels offer considerable flexibility in the form they can take
- Site requires new infrastructure and services to be provided for the development
- They are further away from urban centers
- Development eliminates existing landscape character and reduce open space within a community

The concept plan incorporates 195,000 sf of new commercial space. With the exception of the mezzanine retail space above the grocery store, commercial spaces are located on the first floor. Retail opportunities line the main street connecting

the two distinct areas of the development. A medium-sized grocery store (40,000 sf) anchors the mixed-use concept at the intersection of the boulevard and the north-south main street. An opportunity for a junior retailer (10,000-12,000 sf) is accommodated within the most southern portion of the development at the corner of the main street and the major arterial. The commercial space in the northern portion of the development is served by structured parking while the uses in the southern half are served by surface parking. Due to the mix of uses, availability of transit, and facilitation of pedestrian access, the development anticipates a reduction of at least 25% in the need for parking.

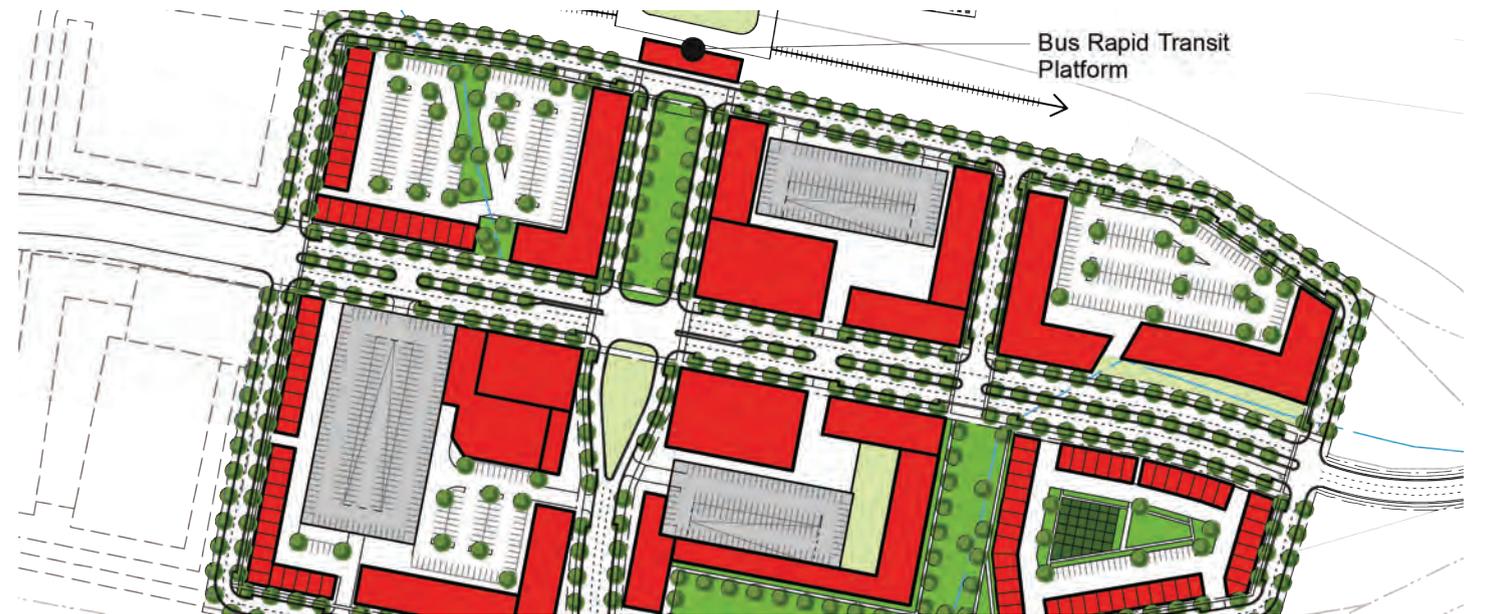
The concept also includes a total of 304,000 sf of office. Of this total, approximately 65% is located in two 100,000 sf office buildings anchoring two of the four corners at the intersection of the main street and boulevard near the transit station. They are served by two parking structures. The remaining office space is located within upper stories of retail buildings along the main street connecting the two halves of the development. Residential units are comprised of loft style flats and 3-story townhouses. The overall development averages 17.6 residential units per acre. These architectural residential typologies offer the opportunity to maximize residential uses within close proximity of the transit station while minimizing building heights throughout the development.

-Excerpted for the Nashville Area MPO's *NorthEast Corridor Mobility Study*

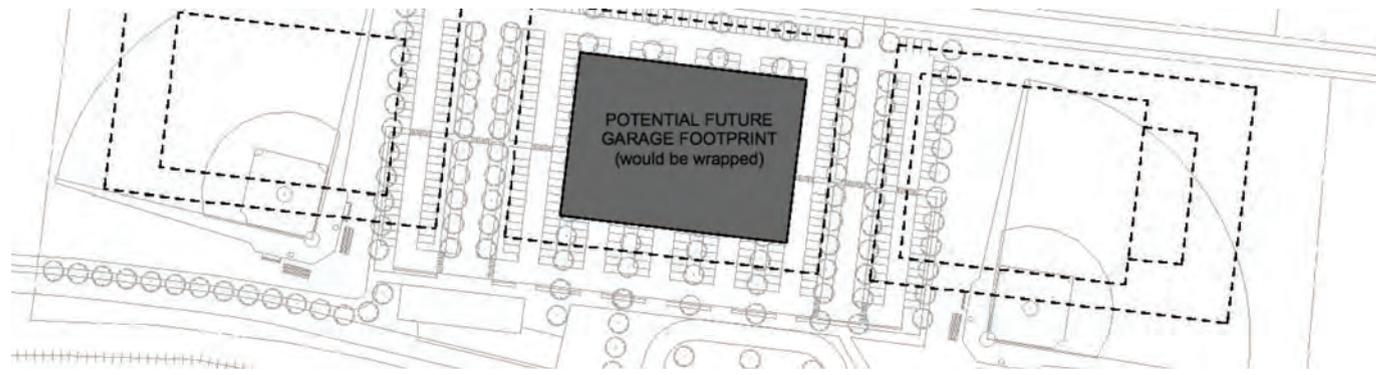
PUBLIC: SAUNDERSVILLE STATION



Bird's-eye perspective of the conceptual Saundersville station TOD and surrounding community.
Image source: Nashville Area MPO



Conceptual plan drawing of Saundersville station TOD.
Image source: Nashville Area MPO



Gallatin: End of Line TOD

A park-and-ride lot is envisioned at the end of the Northeast Corridor. The terminus includes a transit station for the bus rapid transit and/or light rail line and a parking lot.

The location of the facility takes advantage of its proximity to a major intersection along the limited access highway. It has been internalized into the development area in order facilitate future development around it.

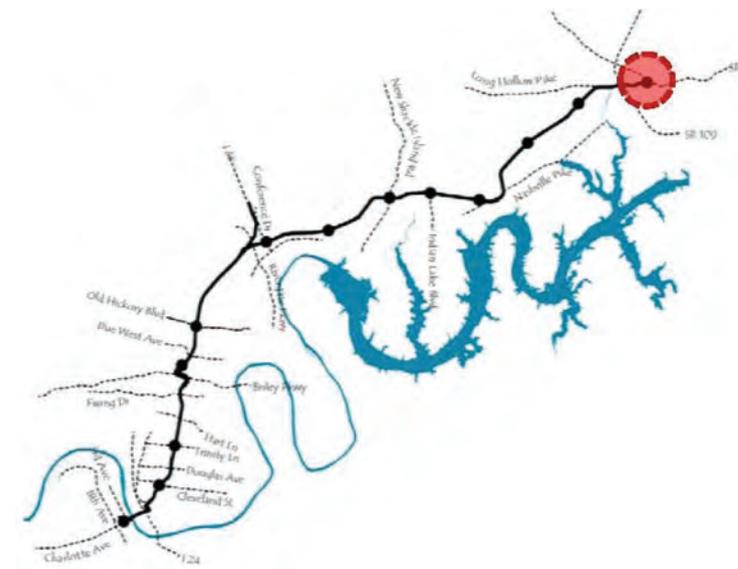
Due to its current relative isolation, no development is proposed on the site in the first phase and all parking is provided exclusively for commuters. This could include both commuters using the transit line and/or those participating in carpooling. The parking capacity at the end of line facility is 390 vehicles (4.7 acres). The concept anticipates future development on the site as the market for the area matures. The location of the drive aisles are designed to allow for future high-density development and parking structures to replace the surface parking, while keeping the entry drives and associated streetscape. The size of the transit station can accommodate up to 8,000 sf of retail associated with the commuter traffic.

The parking lot incorporates a series of sidewalks throughout the parking lot to increase pedestrian safety to the facility. Additionally, green infrastructure elements (i.e. bio-retention, pervious pavements) are used to mitigate the developments

Conceptual plan drawing of a Gallatin end-station park and ride, Gallatin, TN. Image source: Nashville Area MPO

impact and manage the stormwater on the site. In an effort to increase transportation choices, a greenway connects the transit station to nearby development (i.e. employers) and bike lockers within the transit station are provided. The two large vacant areas on the site can be used to expand the parking lot or build park and recreation facilities for the community (i.e. baseball fields, playground).

-Excerpted for the Nashville Area MPO's *NorthEast Corridor Mobility Study*



Gallatin end-station location in relation to the overall rapid transit route, Gallatin, TN. Image source: Nashville Area MPO

PUBLIC: GALLATIN STATION

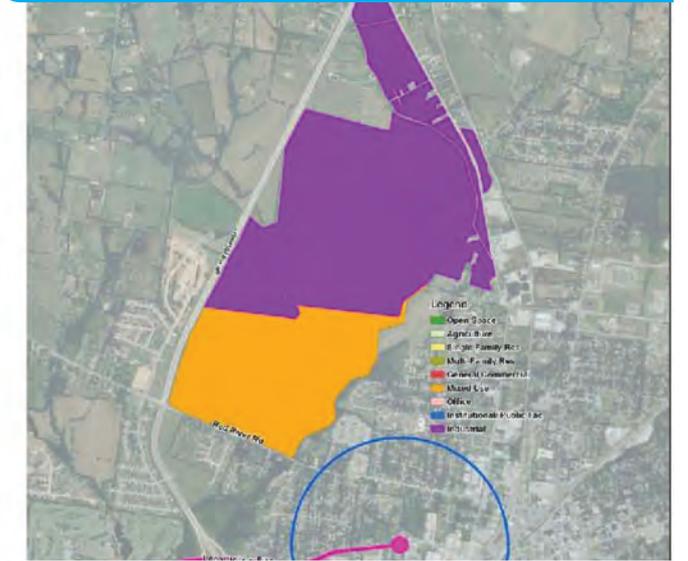
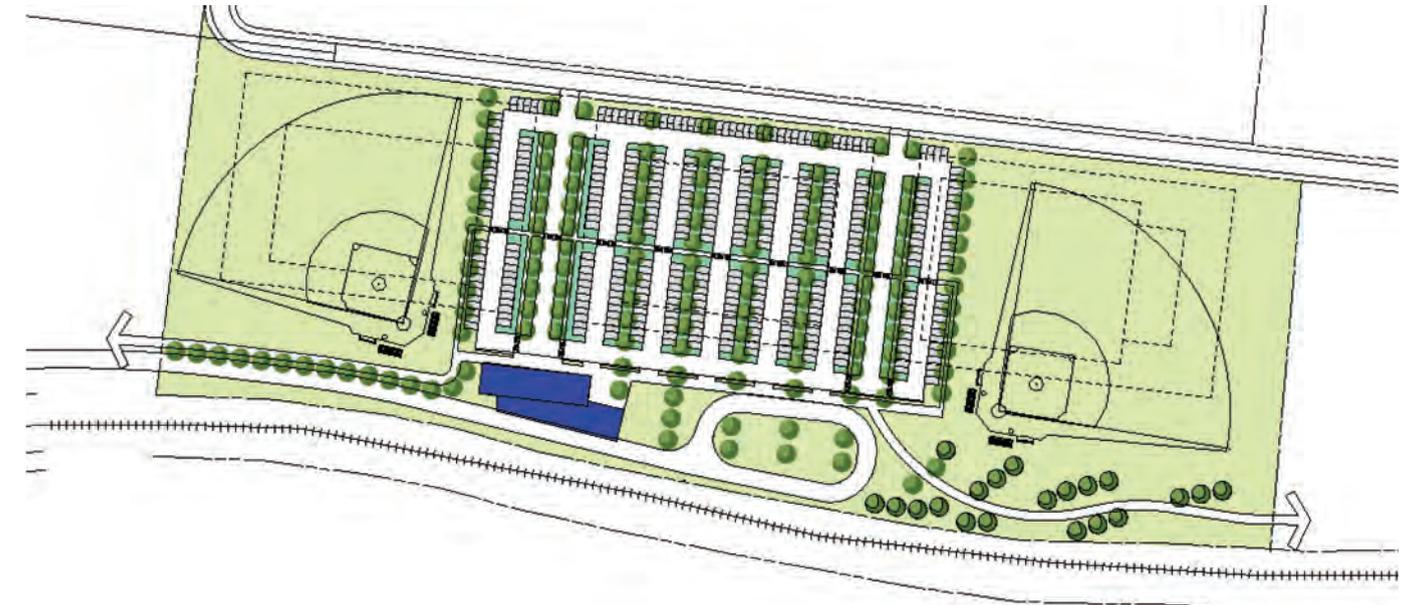


Diagram showing future land use near the proposed Gallatin end-station, Gallatin, TN. Image source: Nashville Area MPO



Conceptual plan drawing of a proposed multi-use, Gallatin station park-and-ride with sports fields and park space adjacent to the end-station, Gallatin, TN. Image source: Nashville Area MPO

TOD's and Impacts of Health

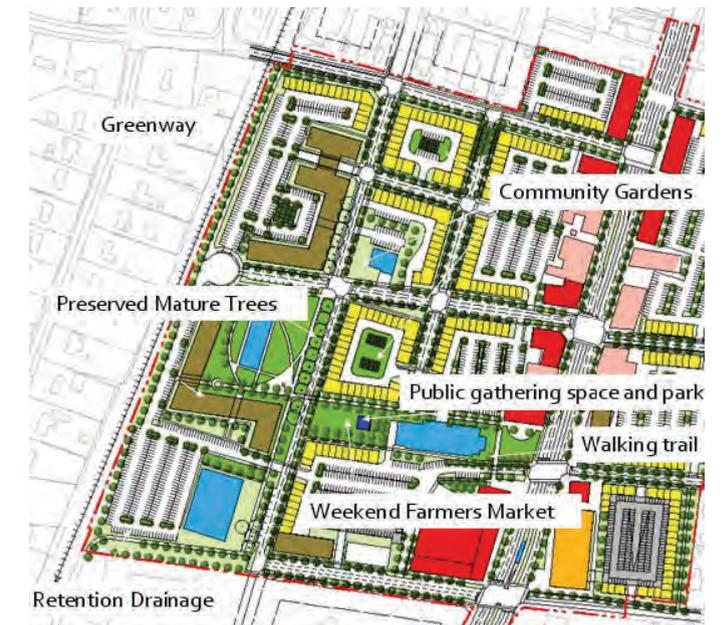
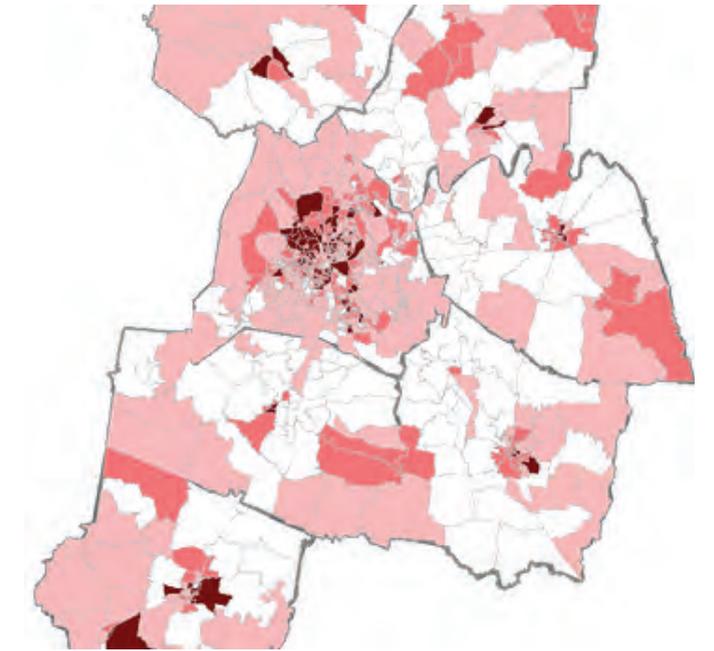
The opportunity to get physical activity as part of travel is available through facilities such as sidewalks, bike lanes, greenways and transit. These facilities have no membership fees or hours of operation, and combine the purposes of traveling and getting physical activity. With the rise of the automobile and the construction of the Interstate system in the 1950's, Americans have increasingly relied on the car. Interestingly, the increase in obesity follows a similar trend linked to the increase in vehicle miles traveled (VMT). The more roadways that were constructed without accommodations for bicycles or pedestrians, the more car trips were made, and obesity rates rose accordingly. Several studies have also shown that areas with more suburban land uses patterns (residential separated from commercial, for example) also have higher rates of obesity than more traditionally urban areas with mixtures of land uses. In fact, one study shows that compact development will reduce the need to drive between 20 and 40 percent, resulting in a reduction in VMT by 30 percent.

In response to the need to integrate considerations of health into transportation planning and other projects of the built environment, Health Impact Assessments (HIAs) were created approximately a decade ago, and until recently, were used primarily in European countries. An HIA is "a combination of procedures, methods, and tools by which a

policy, program, or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population" (1999 Gothenburg consensus statement). As of 2009, approximately 60 HIAs had been conducted in the United States, with approximately four involving a major transportation component such as a transit center. An HIA pilot project was conducted in coordination with the Nashville area MPO to intercept and alter health outcomes such as obesity, physical inactivity, asthma, injuries, and social equity in conjunction with the *Northeast Corridor Study's* proposed Transit-Oriented Development (TOD) sites. The Centers for Disease Control has formalized six "steps" to conduct a Health Impact Assessment. These six steps are categorized in the following way: screening, scoping, assessing risks and benefits, developing recommendations, reporting, and evaluating. The first phase of the HIA was completed in the Spring of 2010, resulting in design considerations that were included in the landscape and architectural renderings for one TOD site featuring elements such as senior housing, community gardens, walking paths, a community gathering space and public art. The second phase of the HIA is currently being conducted, and involves focus groups and surveys centered around the public's perception of the relationship between the built environment and health.

In addition to conducting an HIA, the MPO conducted other data analysis to consider the incorporation of health outcomes into transportation planning. A few examples include the High Health Impact Areas from the Regional Bicycle and Pedestrian Study which looked at areas with higher rates of impoverished, elderly and minority populations; analyzing projects in relationship to proximity to schools; as well as analyzing projects in relationship to grocery stores, farmers markets and emergency food sources. By considering transportation corridors as links to community amenities such as schools, food, religious centers, parks and community centers, the MPO was able to highlight the importance of transportation corridors for the economic, personal and environmental health of the community, and went beyond looking at transportation corridors as opportunities to move motor vehicles as quickly as possible from point A to point B. Transportation corridors must serve a variety of users, modes and destinations efficiently and safety.

-Excerpted from the Nashville Area MPO 2035 Regional Transportation Plan



Top: Map showing Nashville's Health Impact Areas

Image source: Nashville Area MPO

Bottom: Incorporating recommendations from the Madison health impact assessment into the Madison station design concept

Image source: Nashville Area MPO