

# **Imagine Blacksburg: Using immersive 3D models to explore density**

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partial fulfillment of the requirements for the degree of

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## ACADEMIC ABSTRACT

This project explores the challenges of increasing density in a college town grappling with how to appropriately respond to expected population growth. It presents a concept idea for a section of Downtown Blacksburg, Virginia that meets the various planning goals for the community. It also experiments with an innovative way of presenting and fostering discussion around this kind of vision by inviting stakeholders to experience models of the concept in an immersive three dimensional environment.

Common negative perceptions of density lead to resistance to increased density projects by the public and elected representatives. While there seems to be a consensus of understanding that denser development is preferable to sprawl, Americans in communities across the country have been resisting efforts to increase density. In Blacksburg higher density is often met with fear of student housing located too close to single family neighborhoods. Density resistance is rooted largely in the lack of general knowledge of what density looks like, how it is built, and how it feels once built. The negative aspects of high density neighborhoods, which have caused fearful reactions, are results of poor design, not an inevitability caused by density.<sup>1</sup> This thesis uses two approaches to argue for the advantages of higher density development. Methods include background research of densification elsewhere, a neighborhood redevelopment proposal, and a research event in which a select group of participants completed surveys, viewed presentations of 3D computer models of virtual developments in Blacksburg, and discussed their opinions and thoughts about the models and proposal. This project has demonstrated that 3D modeling is a more effective planning tool for helping decision-makers perceive density and understand the value of quality designs than typical planning tools based on 2D presentations.

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<sup>1</sup> "Lincoln Institute of Land Policy," Education, *Visualizing Density*, (2016), <http://www.lincolnst.edu/subcenters/visualizing-density/>.

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## GENERAL AUDIENCE ABSTRACT

This project explores the difficulties of increasing density in a college town struggling with how to plan for population growth. It presents a concept idea for a section of Downtown Blacksburg, Virginia that meets the various planning goals for the community. It also experiments with an innovative way of presenting plans with 3D computer models to prompt discussion about the vision by inviting a group of people to experience 3D models of the concept in an immersive display.

Many citizens and elected representatives have negative preconceptions of density which make them leery of projects that increase density in the neighborhood in which they are proposed. Even though there seems to be a common understanding that denser development is preferable to sprawl, Americans in communities across the country have been resisting efforts to increase density. In Blacksburg higher density is often met with fear of student housing located too close to single family neighborhoods. Density resistance is rooted largely in the lack of general knowledge of what density looks like, how it is built, and how it feels once built. The negative aspects of high density neighborhoods are results of poor design, not inherent traits of density.<sup>2</sup> This thesis uses two approaches to argue for the advantages of higher density development. Methods include background research of densification elsewhere, a neighborhood redevelopment proposal, and a research event in which a select group of participants completed surveys, viewed presentations of 3D computer models of conceptual developments in Blacksburg, and discussed their opinions and thoughts about the models and proposed ideas. This project has shown that 3D modeling is a better planning tool for helping decision-makers understand density and quality design than typical planning tools based on 2D presentations.

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<sup>2</sup> "Lincoln Institute of Land Policy," Education, *Visualizing Density*, (2016), <http://www.lincolnst.edu/subcenters/visualizing-density/>.

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# Chapter 1

## Introduction

This thesis tests the assertion that urbanization and high density infill development in the core of town is a judicious strategy for growth in college towns like Blacksburg, Virginia. It also examines the efficacy of three-dimensional (3D) computer models and immersive 3D environments in visualizing density and helping stakeholders to appreciate its value. The research portion underlying this project utilized 3D models of the infill development concept described in this paper, displayed in Virginia Tech's (VT) *Visionarium* to a purposely selected participant sample. Data was collected via surveys and semi-structured discussions with participants. In addition to being a graduate student, I serve on Blacksburg Town Council and Planning Commission. I am in a unique position to understand the history, planning and current discussions regarding the properties addressed in this project. The model of a denser, human-scaled community, which I call *Imagine Blacksburg*, is not rooted in idealistic determinism, but based on real examples and experiences in Blacksburg.

### Blacksburg, Virginia<sup>3</sup>



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<sup>3</sup> EAG, *Blacksburg VA Summer 2008*, Photograph, July 27, 2008, [https://en.wikipedia.org/wiki/File:Blacksburg\\_VA\\_Summer\\_2008.jpg](https://en.wikipedia.org/wiki/File:Blacksburg_VA_Summer_2008.jpg).

## Problem Statement

Blacksburg, like many college towns, is poised for population growth due to VT's plans to increase student enrollment.<sup>4</sup> This paper argues that intentional urbanization accomplished with higher density infill development is the answer to providing the capacity for population growth. Although the town's planning documents agree with this assertion, urban infill development has not yet been successful in Blacksburg. Urbanism is compact, vertical, dense development that is walkable, relevant to the human scale, and accessible to a diverse mix of people; it offers a variety of affordable housing options, commercial and public spaces, as well as social, environmental and economic sustainability.<sup>5</sup> This paper introduces an infill development concept for the Progress Street neighborhood in Downtown Blacksburg, and refers to the concept as *Imagine Blacksburg*. This concept can also be applied to other key areas in town, and is supported by the town's planning documents.

### Human scale versus auto-centric street development photos<sup>6</sup>



Although the American Dream has long included ownership of a single-family home on its own expanse of yard, that dream will become less attainable if predictions for 100 million

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<sup>4</sup> Tonia Moxley, "Virginia Tech President Focuses on Growth," *The Roanoke Times*, July 5, 2015, sec. Higher Education, [http://www.roanoke.com/news/education/higher\\_education/virginia\\_tech/virginia-tech-president-focuses-on-growth/article\\_923455d6-44ed-5711-bd25-71effc668e53.html](http://www.roanoke.com/news/education/higher_education/virginia_tech/virginia-tech-president-focuses-on-growth/article_923455d6-44ed-5711-bd25-71effc668e53.html).

<sup>5</sup> Wes Craiglow, "City Planning Like a Farmer & Urban Crop Yield" (educational, TEDx, University of Central Arkansas, March 4, 2016), <http://www.strongtowns.org/journal/2016/5/26/non-typical-city-planner-thinking>.

<sup>6</sup> Andrew Alexander Price, "Human-Scale Streets," Weblog, *AndrewAlexanderPrice*, (April 22, 2014), <http://www.andrewalexanderprice.com/blog20140422.php#.V6909q3LmJl>.

more people in the United States by 2050 are correct.<sup>7</sup> In the future, our built environments must include more density in order to address rising energy and transportation costs, disappearing agricultural and open space, and necessary energy efficiency and reductions of climate changing emissions.<sup>8</sup> *Imagine Blacksburg*'s vision will facilitate compact, dense growth for the town in key areas, while respecting and supporting the character and integrity of the surrounding neighborhoods.

### **Brief overview of the gaps filled by this project**

In order to preserve the character of the town in the face of imminent population growth and the established need for new housing, Blacksburg must make code changes to allow increased density and height in key areas, like in and immediately surrounding the downtown core. These changes are supported by the Blacksburg Comprehensive Plan, additional adopted documents, as well as Blacksburg Town Council Strategies. A stated objective is to “review the zoning ordinance and subdivision ordinance, as well as other parts of the Town Code, to determine if these regulations adequately implement the Town’s Comprehensive Plan.”<sup>9</sup> Zoning ordinance amendments are needed to implement the Residential Infill Design Guidelines, and to encourage residential infill development in the downtown area that includes a mix of uses and services that are able to support a larger residential population.<sup>10</sup> Unfortunately, based on the history of denser, urban infill proposals in Blacksburg and elsewhere code changes will not be adopted unless the various stakeholders, including residents in the surrounding neighborhoods and public officials, come to see density not as a threat to their way of life and preconceptions of a high-quality community, but as an opportunity to build better communities. These concepts can be applied to other communities as well, especially college towns with growing student populations. Visualization tools that more tangibly show the scale, feel and design of urban density than the tools currently being used by planners in Blacksburg may help to provide more positive views of what density can look like. Tools like this may be more widely useful to communities as they struggle to make the case for denser, more livable environments.

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<sup>7</sup> “1996-2046 Blacksburg Comprehensive Plan” (Town of Blacksburg, update 2014), <http://tobweb.org/docs/comp%20plan/Individual%20Chapters/Introduction.pdf>.

<sup>8</sup> “Lincoln Institute of Land Policy.”

<sup>9</sup> “1996-2046 Blacksburg Comprehensive Plan.” Land Use Chapter p.26.

<sup>10</sup> *Ibid.* Land Use Chapter p.26.

Historically, when faced with rezoning applications or land use changes, many decision-makers in Blacksburg have had difficulty envisioning denser urban development in currently low-medium density areas. When developments are proposed and described using site plans, elevations and renderings on paper and verbal slide presentations controversy erupts because everyone in the room has a different vision of what the proposal would look and feel like. The conceptual presentation of developments and buildings in 3D models, particularly in an immersive display, may give stakeholders a much better sense of how they will look and feel. 3D modeling tools may prove invaluable in educating and guiding decision makers as they consider zoning code amendments.

## **New housing needed in Blacksburg**

When Blacksburg was developing its 2013 Economic Development Strategy Update it became clear, through many public meetings with various citizen groups, that housing is an important component of economic and community development.<sup>11</sup> A common goal evolved amongst town citizens, representatives and planners to increase housing in Downtown Blacksburg for professional demographics. Subsequently, the “Downtown Blacksburg Housing Market Strategy,” study was commissioned in 2015 jointly by the Town of Blacksburg and the Blacksburg Baptist Church. The study results revealed that strategic downtown housing development is necessary to retain young, educated professionals in Blacksburg.<sup>12</sup> Downtown Blacksburg is walkable and charmingly historic, developed with human-scale buildings. The area enjoys the foot traffic, cultural events and vibrancy inherent to a large university town. Although downtown is an attractive place to live and work, the town has not yet achieved developments that provide housing for those who prefer to live in mixed-use, walkable neighborhoods.<sup>13</sup>

The Blacksburg Comprehensive Plan amended in 2016 to express the desire for increased density and urbanization as the town grows:

*“The planned growth of the University has accelerated the need for proactive planning in the Town to consider how to best accommodate this growth. The*

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<sup>11</sup> “Town of Blacksburg Economic Development Strategy Update” (Arnett Muldrow and Associates, April 2013), p.24.

<sup>12</sup> Development Strategies, “Downtown Blacksburg Housing Market Strategy,” Print (Blacksburg, VA: Town of Blacksburg, July 2015). p.5.

<sup>13</sup> Ibid. p.9.

*consideration of more urban forms of development – particularly with respect to increased density in redevelopment and infill – will be a strong consideration in the five year update of the Comprehensive Plan scheduled for 2017. Integrating new forms of development into the existing fabric of the town and keeping the overall small-town character of the community will be the key to a successful growth management strategy.”<sup>14</sup>*

Although Blacksburg plans to integrate new forms of development, the town has not integrated any new planning tools to augment stakeholders, the public, planners, commissioners and council members’ ability to envision how these new forms would fit into the existing built environment. Using 3D models can focus all stakeholders on the same vision and idea, while reducing frustration and misunderstanding of concepts.

## **The research question**

*Imagine Blacksburg* is a visioning project with a 5 to 15-year horizon. In order for denser infill development to be successful in Blacksburg the town must grow by urbanizing as opposed to suburbanizing. Urbanization can help avoid the common pitfalls of growth such as sprawl, traffic congestion and compromised environment and quality of life. These goals are also shared by other growing American towns and cities. This thesis seeks to answer several questions that are critical to reaching urbanization goals: First, what would urban infill development look and feel like in our towns and neighborhoods? Second, how might it be achieved from a planning perspective? Third, can computerized visualization tools help local officials and other stakeholders to better understand density?

*Imagine Blacksburg* focuses on key sites with infill potential located in the Bennett Hill/Progress Neighborhood, the Old Town Residential neighborhood and Downtown Commercial zones of town. These sites are: 1) the town-owned parking area at 221 Progress Street; 2) the Baptist Church-owned properties, which include the 500 block North Main Street and the 500 block of Progress Street; and 3) the corridor along Church Street from Clay Street through the Progress Street parking area, and the alley and right of way from Wilson Avenue through the Baptist Church property, to Giles Road and beyond.

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<sup>14</sup> “Blacksburg 2046, 2016 Amendments” (Town of Blacksburg, 2016).

## Roadmap and Methodology

Literature and laboratory research and methodology have been driven by two hypotheses:

Hypothesis #1: Using 3D models to display proposed infill developments and site redevelopments increases stakeholder acceptance of increasing density. The 3D models reduce cognitive bias about increasing density and make people more open and amenable to proposed projects because they can see and feel the new development in a much more visceral way than they can with 2D site plans, renderings or drawings.

Hypothesis #2: Participants agree that using 3D models in land use planning and decision-making processes is superior to 2D site plans, renderings or drawings, such that using 3D modeling as a planning tool would facilitate better decisions.

I began with literature research regarding both Blacksburg's plans to grow via urban densification and nationwide trends and issues surrounding increasing density. A thorough review of Blacksburg's planning documents revealed strong support for urbanization versus suburbanization as the town grows. Research revealed that while densification is generally preferred over sprawl, communities struggle with accepting higher density in existing neighborhoods and commercial areas.<sup>15</sup> Cognitive bias against increasing density commonly blinds stakeholders to its advantages. While the literature supports my argument for well-designed higher density in Downtown Blacksburg, empirical data from numerous public rezoning and planning meetings has proven that 2D pictures and text are not sufficiently convincing.<sup>16</sup> In order to be persuasive, I wanted to take this research further and propose a planning tool that has the potential to break down cognitive barriers and preconceived notions of density, thereby helping planners and decision makers view proposed projects in a new light.

My idea was to create 3D models of *Imagine Blacksburg's* infill development proposals to tangibly present the density, size and scale of buildings and to highlight the importance of public spaces and alternative transportation infrastructure to densification. These models would be placed into a 3D model of the Town of Blacksburg, displaying my virtual development within the town's existing built environment to a group of stakeholders. Participants would complete

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<sup>15</sup> Anthony Downs, "Smart Growth: Why We Discuss It More Than We Do It," *Journal of the American Planning Association* 71:4 (November 26, 2007): 367-78.

<sup>16</sup> "Lincoln Institute of Land Policy."

surveys and observe presentations of these models to determine the value of this tool for planning higher density. In order to achieve these goals I needed help from experts in modeling and visualization. I enlisted the help of Andres Del Pozo, an architecture graduate student with the design skills and ability to help me build the models in *Sketchup*. Further, Dr. Nicholas Polys, Director of the Advanced Research Computing (ARC) Visualization Group at VT agreed to assist me in presenting the models to the research participant group using the visualization tools in VT's ARC Laboratory. The models were designed under the direction of Dr. Polys to ensure that the final models would be compatible with *3D Blacksburg* and the *Visionarium*. A key component of the research design was the ability to present the models within Blacksburg's built environment; this was done by importing them into the *3D Blacksburg* platform which has been developed under the direction of Dr. Polys as well as professors in VT's Center for Geospatial Information Technology (CGIT).

*“CGIT is leading an initiative to create a comprehensive three-dimensional model of the Town of Blacksburg, Virginia. The virtual model will include topography, aerial photography, and buildings in a 3-D environment that can be used to visualize related spatial information such as building interiors, utilities, and networks. ‘3D Blacksburg’ is being designed with three groups in mind: town operations administrators, the general public, and research institutions. The framework also serves as an educational and outreach tool for Virginia Tech students and researchers in diverse academic disciplines.”*<sup>17</sup>

The *Visionarium* is a 3D graphics and visualization system which is displayed in a cube constructed of movie screens on which both real and virtual spaces can be projected. When participants in this project walked inside the cube they virtually walked into the *Imagine Blacksburg* sites, with the proposed developments displayed around them. This display allows the user to envision density in a powerful, tangible way (See *Figure 1.1*).

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<sup>17</sup> “3D Blacksburg,” Education, *Center for Geospatial Information Technology*, (2017), <http://www.cgit.vt.edu/research/projects/3d-blacksburg.html>.

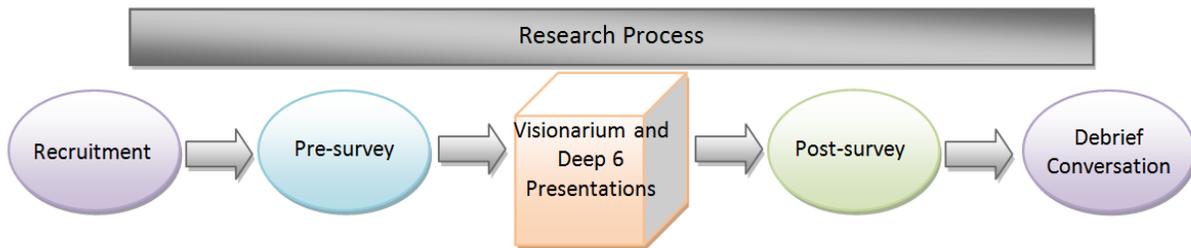
**Figure 1.1 - Visionarium presentation**



Photos by Todd Schenk

3D digital modeling for planning and urban design can utilize *SketchUp* or other software as a tool to supplement typical 2D design representations for the sake of engaging the public and decision-makers in a more dynamic way. Communities may benefit from using 3D models to address concerns and conflicts early in the decision-making process. Traditionally, 2D site plans, elevations and renderings are used in the land use public process. Visualization technology is advancing such that the design process will increasingly involve a more expansive approach that accurately represents urban scale, the relationship between zoning districts, buildings, and local character.<sup>18</sup> In this study, the Town of Blacksburg’s Progress Street area has been modeled using these new technologically advanced tools. *SketchUp* was chosen to create the models because of its compatibility with the *Visionarium* platform and *3D Blacksburg*.<sup>19</sup>

**Figure 1.2**



Surveys were designed to capture participants’ perceptions and thoughts on density both before and after viewing the models, with a focus toward the hypotheses being tested. The

<sup>18</sup> Emmanuel Velazco, “3D Digital Modeling For Urban Design + Planning” (City of Pismo Beach, June 2012).

<sup>19</sup> Ibid.

surveys had a series of photographs showing concepts of lower and higher density developments on the chosen sites (See *Appendices B and C*). A Likert Scale was used in order to analyze the data with Wilcoxon tests. Fifteen stakeholders were purposely selected to participate in the laboratory research event, which was held December, 2016, at VT's ARC laboratory (See *Figure 1.2*). Participants included: representatives from the Bennett-Hill Progress Neighborhood, representatives from the Old Town Neighborhood, Blacksburg planning commissioners, Town Council members, Blacksburg administrators and planners, private developers, VT students in the master of urban and regional planning program, and VT undergraduate liberal arts students.

Participants completed a survey prior to experiencing displays of the *Imagine Blacksburg* models via two visual computing tools: the *Deep 6* computer monitors and the immersive *Visionarium* (See *Appendix B*). Participants viewed and experienced both existing virtual buildings as well as conceptual buildings in Blacksburg's streetscape. In the *Visionarium* participants wore 3D glasses in order to view the models in life-size displays that materialized around them, giving them an immersive experience. I guided them on a tour of the models using a hand-held controller, which allowed us to virtually fly over Downtown Blacksburg, walk up and down the improved alley, and stand next to the proposed buildings. Participants also viewed the models on the *Deep 6* monitors, which provided non-immersive 3D models on a 2D platform displaying both moving scenarios as well as static scenes of the models. There was significant discussion during the presentation which was captured on video and transcribed in the findings portion of this thesis.

After the presentation participants completed the survey again, providing me with before and after data to analyze using Wilcoxon matched-pairs tests (See *Appendix C*). After the presentation a group debriefing discussion was held with participants to share thoughts and ideas of the experience. The debrief was led by Dr. Todd Schenk to reduce any bias that might occur because of my relationship with stakeholders. I designed a list of questions to prompt discussion relevant to the hypotheses (See *Appendix A*). Written notes and a video/audio recording were taken. The chosen approach for testing the hypotheses was advantageous in several ways, but some weaknesses were also revealed; these are discussed in detail in Chapter 5.

The ability to envision future development in an accurate, spatially realistic way is helpful to planners, developers, residents and decision-makers. Geographic Information Systems

(GIS) software and aerial photography can be used to create 2D maps and photographs with increasingly accurate and intricate detail of current development. However, the ability to use 3D models increases understanding, context and scale in a powerful way to aid the work of decision-makers. Additionally, the 3D models allow us to place virtual buildings into modeled sites to see more closely what they would look like in reality.

As communities face a variety of planning challenges, including how to manage growth and competing interests among diverse stakeholders, planning tools should adapt in order to provide the best decision-making possible. *Imagine Blacksburg* seeks to introduce the use of 3D building models inserted into the existing built environment of Blacksburg using the VT *Visionarium* as an innovative tool for town planning. This format allows decision makers to experience the density, size and placement of virtual buildings during planning stages for proposed developments. The model, if used regularly, would be a valuable tool to study the impact of planned urban development, and to engage the public and stakeholders such that they can visualize consequences and engage in discussions in an informed and meaningful manner. The *SketchUp* models and the *Visionarium* display provide contextualized understanding of development plans that can be shared by policy makers, the public and planners.

## **This thesis**

This thesis is comprised of six chapters. Chapter 2 presents the background information that began my interest in pursuing the best ways to increase density and provide housing in Blacksburg. Chapter 3 includes literature review and research findings surrounding perceptions of density and visualization planning tools and technologies. Chapter 4 introduces my redevelopment idea for the downtown and Progress Street neighborhood that visualizes increased density for the area. Chapter 5 explains the 3D modeling experiment findings and recommendations. Finally, Chapter 6 is a summary discussion, suggestions for the future and conclusion.

# Chapter 2

## Background

### Land use planning in Blacksburg

The Town of Blacksburg, Virginia has adopted several planning documents which have asserted three recommendations for Downtown Blacksburg, but do not include solutions for achieving these recommendations. The three recommendations are: 1) additional and more varied housing downtown by increasing density; this housing is intended to increase quality of housing stock, bolster downtown businesses, and reinvigorate the neighborhoods close to downtown; 2) widening the downtown, which is currently narrow and linear along Main Street; 3) increased use of alternative modes of transportation. The documents have been written by private consultants hired by the town, and include infill development guidelines, an economic development plan and a downtown housing market study. While they have been adopted as guiding documents, their effectiveness is not being realized. This project explores the challenges of increasing density and presents a neighborhood infill development concept to meet the three recommendations above.

The Town of Blacksburg uses a mixture of the following visualization tools when considering rezoning or conditional use permit applications: staff report text document, 2D site plans, renderings and drawings, floor plans, maps produced with geographical information systems (GIS) software, and projected presentations of slides developed using the same tools (See *Appendices E – I*). Empirical observations have revealed that during work sessions and public meetings each person in the room has a different image in mind of the development being proposed. Decision makers struggle to understand exactly what the applicant proposes to build, what it will look like, whether it fits the neighborhood and the comprehensive plan.

Blacksburg comprehensive planning is done judiciously and regularly. Each year amendments are considered and adopted, while every five years the entire comprehensive plan is significantly updated. This process requires significant time and effort from staff, planning commissioners and volunteers. While decision makers consult the comprehensive plan for guidance when considering land use and development applications, unfortunately the zoning

code does not complement or implement the goals and strategies of the plan. The result is that by-right developments occur despite the fact that they are contrary to the plan. Meanwhile successful rezoning and conditional use permits effectively change the zoning and use whether they fit the comprehensive plan or not. Applicants argue that decisions made according to the higher goals of the comprehensive plan are unfair when similar developments are allowed by the zoning code. Suggested changes to the zoning code are typically met with resistance from the business community because the code is more lenient than the comprehensive plan. They consider updates to the zoning code as government overreach and regulation, not understanding the need for zoning code to implement the comprehensive plan. Additionally, fear of the unknown and comfort with the familiar create reticence from citizens, appointees and elected officials to change the zoning code. I argue that the use of 3D modeling tools would alleviate fear and discomfort; stakeholders would be open to new ideas if they had a collective understanding of what the proposed changes to zoning code would actually look and feel like in the landscape of Blacksburg.

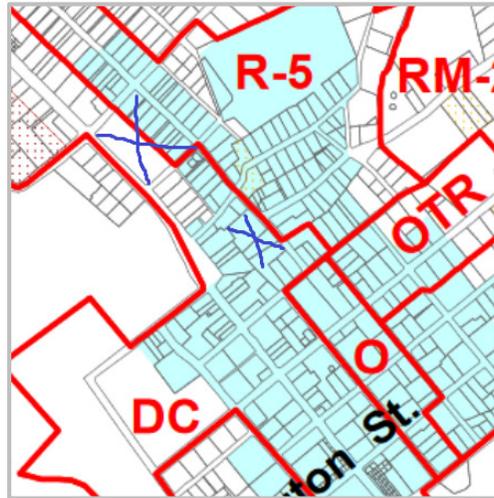
The Town of Blacksburg's parking area at 221 Progress Street and the Baptist Church's block between Progress and Main Streets are perfectly situated to receive increased density that will create the urban vitality that Blacksburg seeks as the town's population grows. However, changes to the zoning code are necessary to achieve higher density and mixed-use. These properties lie in Downtown Commercial and R-5 zones, which currently do not allow high density residential (See *Figure 2.1*). Although Blacksburg has designated certain areas of town as "Urban Development Areas," and has a "Mixed-use" zoning category, the town has been mostly unsuccessful in attaining vertical mixed-use development. Unfortunately, this is common throughout the United States.<sup>20</sup> This mixed-use conundrum has been attributed to a lack of meaningful zoning definitions. There are key distinctions between American and European zoning that explain how European countries achieve true mixed-use, while American communities that want mixed-use infill development stagnate in frustration.<sup>21</sup>

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<sup>20</sup> "Lincoln Institute of Land Policy."

<sup>21</sup> Sonia Hirt, "To Zone or Not to Zone? Comparing European and American Land-Use Regulation," *PNDonline*, 2010, [www.planung-neu-denken.de](http://www.planung-neu-denken.de).

**Figure 2.1 - Downtown Blacksburg Zoning Districts<sup>22</sup>**



Most United States (U.S.) land use policies provide extreme protection of single-family housing areas in comparison to practices elsewhere in the world. Exclusive zones in the U.S. discourage mixed-uses, while German zoning categories, to use a European example, create them.<sup>23</sup> The U.S. and German systems had some different goals from the beginning. In Germany the focus was on relieving crowding, controlling negative industrial externalities, and protection of rural land. American zoning shares these goals, but has added emphasis on protecting single-family housing. Because of this difference German regulations concentrate on bulk and density, while the U.S. codes concentrate on land use incompatibility. The result of this difference is that Germany allows many commercial uses in residential areas, while in the U.S. this is not the case. Mixing of these uses is done deliberately in Germany as a way to prevent segregation of the rich and poor, while separation of residential and commerce was a principal contribution to planning in the U.S.<sup>24</sup> Additionally, single and two-family homes are indistinguishable in German planning and typically coexist freely. Single-family living is an especially elevated status in the U.S.

The U.S. has much to learn from the German system as the country becomes more densely populated and culturally diverse, and climate change and income inequality worsen.

<sup>22</sup> "Blacksburg WebGIS View Online Maps, Zoning Map," government, *Town of Blacksburg*, (July 18, 2016), <http://www.blacksburg.gov/home/showdocument?id=9>.

<sup>23</sup> Sonia Hirt, "The Devil Is In The Definitions: Contrasting American & German Approaches to Zoning," *Journal of the American Planning Association* 73, No.4 (Autumn 2007): 436–53.

<sup>24</sup> *Ibid.*

Development sprawl, exclusive residential areas and dependence on personal vehicles must be reversed in the U.S. to meet these challenges. Applying some elements of German-style zoning in the U.S. would enable more mixed-use, transit-oriented developments that would provide more density and housing options while decreasing urban sprawl. Blacksburg could use German zoning tools to reform town planning and building practices. Specifically, expanding the uses that are allowed in areas like Progress Street would accommodate growth without increasing urban sprawl. In mixed-use neighborhoods residents would be able to meet many of their daily needs without driving cars. Additionally, if developers have the ability to build at higher densities than those previously allowed in Blacksburg, they could provide a variety of housing options across a greater price range and still make a profit. Thus, affordable housing would be available to people in multiple income brackets. Lifestyles would also be more affordable for those who meet their daily needs and commute to work by foot, bicycle or public transportation.

### **The need for density in Blacksburg**

Growth in Blacksburg is directly related to student enrollment growth at Virginia Tech (VT). When enrollment at VT grew significantly in the 1970s many of Blacksburg's single-family homes, especially those close to downtown and the VT campus, converted to student rental properties. The trend for many homeowners was to move to new large-lot subdivisions on the outskirts of town, or to large acreages in surrounding counties, while renting their former homes to students. This trend sparked a political movement to protect in-town neighborhoods. Blacksburg citizens elected candidates who would protect neighborhoods by increasing code enforcement, especially of over-occupied student rentals. Additionally, the town was rezoned in 1997, which reduced allowable densities in many residential areas. The neighborhood protection movement has been an important component of protecting and improving quality of life in town. However, this movement has largely focused on preservation of the uniquely American ideal of exclusive single-family neighborhoods. Dense multi-family development has been viewed with suspicion, as exclusively for transient students and incompatible with the peaceful daily life of long-term residents. However, in the early 2000s Blacksburg citizens wanted to avoid urban sprawl, leading to new candidates who were elected on platforms of smart growth ideals.

Smart Growth was defined in 2004 by the Environmental Protection Agency as “development that serves the economy, the community, and the environment. It changes the terms of the development debate away from the traditional growth/no growth question to how and where should new development be accommodated.”<sup>25</sup> Many planning and zoning tools are used to achieve smart growth such as transit-oriented development, form-based code, cluster development, urban development areas, and mixed use. Although smart growth is defined by a variety of organizations using varying terms, the concept is collectively viewed as compact, urban development that facilitates residents’ ability to walk to work, school, and entertainment and shopping areas, while preserving rural areas.<sup>26</sup>

Smart Growth was conceived as a reaction to the undesirable trend of growth through sprawl; the vast majority of Americans have negative views of sprawl.<sup>27</sup> Blacksburg’s citizenry is no exception; the desire to urbanize rather than suburbanize as the town grows has established this ideal not only in the complexion of the town’s elected officials but also in adopted planning documents. This paper advocates for use of several Smart Growth principles. These include:

- *“Raising residential densities in both new-growth areas and existing neighborhoods.”*
- *Providing for more mixed land uses and pedestrian-friendly layouts to minimize the use of cars on short trips.*
- *Revitalizing older existing neighborhoods.*
- *Creating more affordable housing.*
- *Reducing obstacles to developer entitlement.*
- *Adopting more diverse regulations concerning aesthetics, street layouts, and design.”*<sup>28</sup>

Unfortunately the movement has stymied at the point of planning and has not been codified in town ordinances.

Even though Blacksburg’s comprehensive plan is amended annually and updated significantly every five years, the town has not made significant changes to its zoning code since 1997. The zoning code still allows and encourages suburban development, and does not

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<sup>25</sup> Gerrit Knaap and Emily Talen, “New Urbanism and Smart Growth: A Few Words From The Academy,” *International Regional Science Review* 28, no. 2 (April 2005): p.107.

<sup>26</sup> *Ibid.* p.108.

<sup>27</sup> Downs, “Smart Growth: Why We Discuss It More Than We Do It.”

<sup>28</sup> *Ibid.* p. 368

encourage or incentivize Smart Growth principles, other than a few amendments that have passed since 2010, such as a density bonus for preserving historic structures and an arts overlay district. This paradox could be attributed to the fact that Americans in general resist Smart Growth for common reasons: 1) It alters the benefits and cost structure of the status quo, and most people resist changes to the status quo unless the changes produce a clear benefit for them. 2) In cases where Smart Growth principles are mandated by the state power is shifted away from local governments who do not want to reduce their power over land use decisions. 3) Fear that increased residential densities will reduce property values; as well as the view that lower-income households are undesirable for social, educational and security reasons, and possible traffic congestion and crowded schools. 4) The tendency for Smart Growth policies to raise housing prices is seen as a disadvantage by renters and first-time homebuyers. 5) Smart Growth policies typically fail to reduce traffic congestion. 6) Increased regulatory processes related to infill and redevelopment in already developed areas. 7) Restricted profits for owners of outlying greenfield sites. 8) The fundamental conflict between comprehensive planning to determine future growth and decentralized, free-market development.<sup>29</sup>

The principles of Smart Growth that are needed for Downtown Blacksburg do not provoke all of the common reasons for resistance. The only significant obstacle to raising densities in both new and existing neighborhoods is number three above, resistance to increased density.<sup>30</sup> However, implementing higher densities is often viewed to be very unlikely due to resistance by nearby homeowners and the pressure they put on local officials to block such developments.<sup>31</sup> This phenomenon has occurred recently in Blacksburg when new, higher density projects were proposed. Ordinance #1690 proposed an infill college student apartment building with approximately 650 bedrooms on a commercial property located on Prices Fork Road, one of two major arterial roadways in Blacksburg. The adjacent single-family neighborhood organized strong opposition to the proposal, which was denied October 8, 2013. Ordinance #1739 proposed to replace a single-family home on a four-acre lot located on Main Street with a 34-unit condominium building. The proposal met with neighborhood resistance, although it was ultimately adopted October 14, 2014. As Blacksburg faces its next phase of

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<sup>29</sup> Ibid.

<sup>30</sup> Ibid. p. 374

<sup>31</sup> Ibid. p. 375

growth urbanization in a compact, dense form will be essential to preserving quality of life. Educating the public about the benefits of well designed and built density will be an important part of planning.

The single-family zoning districts (R-4) in Blacksburg allow four homes per acre, with occupancy limited to a “family plus two unrelated” people. Additionally, some of the medium-density (R-5) neighborhoods have advocated for lower occupancy limits and down-zoning to single-family. Low-density and low occupancy limits are perceived by some to be the solution to incompatible lifestyle problems that arise when homes in single-family neighborhoods are rented to multiple college students. Due to decades of friction between homeowners and inattentive landlords of over-occupied student rentals, permanent residents have grown resistant to any form of new student housing developments located near their neighborhoods. However, the town’s enforcement personnel and residents have observed over time that problems mostly occur in single-family student rental homes rather than smaller-unit multi-family dwellings. These observations, coupled with changing demographics and economic trends, show that proliferation of low-density, single-family development as a preferred growth pattern would be a mistake for Blacksburg’s future.

Some say that state level intervention and policies are needed for Smart Growth principles to be carried out in practice. “The Governor is best situated to coordinate the efforts of myriad state agencies related to growth, and to provide them with the incentives to make Smart Growth a reality.”<sup>32</sup> However, when Virginia mandated that localities designate Urban Development Areas in their Comprehensive Planning in 2010 opposition arose from the politically conservative Tea Party constituency and the mandate was subsequently reduced to an optional status.<sup>33</sup> Decisions should remain at the local level, but better planning tools are needed to educate the public and decision makers about how increased density policies can benefit their communities. Most people cannot envision the look and feel of added density using two-dimensional pictures and text descriptions, whereas three-dimensional models stimulate and augment the imagination giving viewers more accurate perceptions of the scale and mass of

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<sup>32</sup> Ibid.

<sup>33</sup> “Tea Party,” political, *Tea Party Teaparty.org*, (2017), <https://www.teaparty.org/>.

proposed developments. Perhaps the use of three-dimensional models can suspend or overcome pre-existing cognitive biases that prejudice stakeholders' perceptions of increasing density.

## Target Sites

*Imagine Blacksburg* is a vision for urban infill and redevelopment of three catalyst downtown sites. The Blacksburg Comprehensive Plan as well as other adopted town planning documents promote urban compact development as opposed to suburban development to meet future growth.<sup>34</sup> The location of these three catalyst sites encompass the corridor along Church Street and the segment of Progress Street that runs parallel to Main Street, beginning at Jackson Street in Downtown Blacksburg and ending at its intersection with North Main Street (See *Figure 2.2*).

**Figure 2.2 – Target sites**



Source: CONNEXplorer<sup>35</sup>

This proposal imagines an urban infill redevelopment of two sites on Progress Street: the Baptist Church property, encompassing the entire 500 block of North Main and Progress Streets, and a large, significant town-owned parking area located at 221 Progress Street, situated behind

<sup>34</sup> "1996-2046 Blacksburg Comprehensive Plan." Sustainable Community Chapter p.1-3.

<sup>35</sup> CONNEXplorer (U.S.A.: Eagleview Pictometry, 2016), <http://explorer.pictometry.com/index.php>.

commercial buildings on Main Street. Additionally, *Imagine Blacksburg* proposes a Downtown Alternative Transportation Corridor (DATC) that includes improvements to the entire length of the existing alley situated between North Main Street and Progress Street, and the addition of a connection of this alley through the town-owned parking area site (See *Figure 2.3*). Thus, a new public pedestrian and bicycle throughway is established as part of this redevelopment area.

**Figure 2.3 – Target sites**



Source: CONNECTExplorer<sup>36</sup>

This section of Progress Street is adjacent to the Main Street commercial downtown area to the west and low density residential neighborhoods to the east. Progress Street is largely residential, but includes some business and civic uses as well. The town classifies Progress Street as a “collector road” due to high traffic volume, although the infrastructure of the segment pertinent to this vision is a narrow, local street. “Collector roads connect the local street system to the arterial roads and thus carry a higher level of traffic than local streets...they primarily route traffic from neighborhoods to major employment and commercial centers.”<sup>37</sup>

<sup>36</sup> Ibid.

<sup>37</sup> “Bicycle Blacksburg Bicycle Master Plan 2015” (Town of Blacksburg, 2015).

The Progress Street parking area and the Baptist Church sites are currently being considered for redevelopment. This redevelopment should provide for increased residential and commercial density, additional public space, safe alternative transportation connections and parking for the downtown. The potential redevelopment of the Progress Street corridor should promote the redevelopment of other targeted sites in town, such as the old Blacksburg middle school site on Main Street (OBMS), much of the remainder of Progress Street and Church Street, as well as other collector streets that divide low-density neighborhoods and higher impact uses. The vision for the DATC can also be applied to other alleys and corridors throughout town. The suggested redevelopment of these sites will spur new infill, renovation and improvement projects adjacent and parallel to downtown, which will serve to improve neighborhood conditions, increase business activity and foot traffic downtown, increase walking and bicycling options by improving infrastructure, and locating additional residential units close to the university and other places of employment.

Additionally, an essential element of new infill development is that it creates a variety of housing options that attracts a demographic mix of tenants.<sup>38</sup> Changes to Blacksburg's Zoning Ordinance are necessary to allow the increased housing density on both commercial and residentially zoned properties. Due to expected growth, town officials have expressed support for implementing changes to the zoning ordinance that are consistent with the Comprehensive Plan's vision for the community.<sup>39</sup> Blacksburg's community goals include housing and transportation choices that emphasize close proximity to jobs, shopping and schools, in addition to enhancing energy independence and natural resource protection.<sup>40</sup>

The catalyst sites are located within walking distance of the VT campus, Harding Avenue Elementary School, and Downtown Blacksburg; the sites are bicycling distance to everywhere in town and within a short walk to Blacksburg Transit bus stops. Additionally, recognizing that community sustainability relies upon a healthy combination of environmental, economic and social sustainability, the town is supportive of local businesses and employers as well as cultural centers such as the Blacksburg Farmer's Market and the Alexander Black House museum. Increasing density in the Progress Street area strategically positions shoppers, employees and

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<sup>38</sup> Development Strategies, "Downtown Blacksburg Housing Market Strategy."

<sup>39</sup> "Town Council Strategic Goals," government, *Town of Blacksburg*, (April 12, 2016), <http://www.blacksburg.gov/town-council/town-council/strategic-goals>.

<sup>40</sup> "1996-2046 BLACKSBURG COMPREHENSIVE PLAN." Sustainable Community Chapter

interested people close to activity centers, not only supporting the existing businesses and activities but attracting new business development, arts and cultural opportunities.<sup>41</sup> New buildings should be constructed to achieve green building and energy efficiency certifications, and major infill projects should follow sustainable neighborhood practices.<sup>42</sup> Blacksburg is committed to “...a healthy, active Downtown area that equally serves an increasing permanent resident population, students, and visitors.”<sup>43</sup>

With expected growth at the University, VT administrators have discussed building a “faculty village” on campus. *Imagine Blacksburg* asserts that many faculty members would prefer to live in town rather than on the university campus. Creating a faculty village on Progress Street is a win-win for the town and university, as it provides desirable housing for faculty and staff while revitalizing neighborhoods close to campus. The two Progress Street infill redevelopment projects will provide housing that appeals to faculty and others by providing a varied price range, units that vary by size, some for rent and some for sale in a desirable downtown location. These new residential units would be attractive to young families, professionals, faculty and staff as well as empty-nesters and retirees, due to their location within walking distance to Harding Avenue Elementary, public parks and libraries, Henderson Lawn, the Lyric Theater, downtown businesses, VT campus cultural activities, the Moss Arts Center, as well as sporting events (See *Figure 2.4*). These sites are also walking distance to bus stops and the larger network of bicycle and pedestrian infrastructure throughout the neighborhood and town. The town recently improved pedestrian infrastructure leading to Harding Avenue Elementary through the Safe Routes to School program. These sites would encourage lower rates of vehicle ownership and high use of alternative transportation, especially non-motorized choices. Elevators and structured parking would be included in mixed-use buildings, and a grocery store will be a key element to include in the Progress Street mixed use structure. This location, developed with an attractive variety of mixed uses will create a community with opportunities for lifelong living.

The *Imagine Blacksburg* vision qualifies as a “Lifelong Community” as it provides “...an array of housing types that appeal to individuals both young and old, opportunities for healthy

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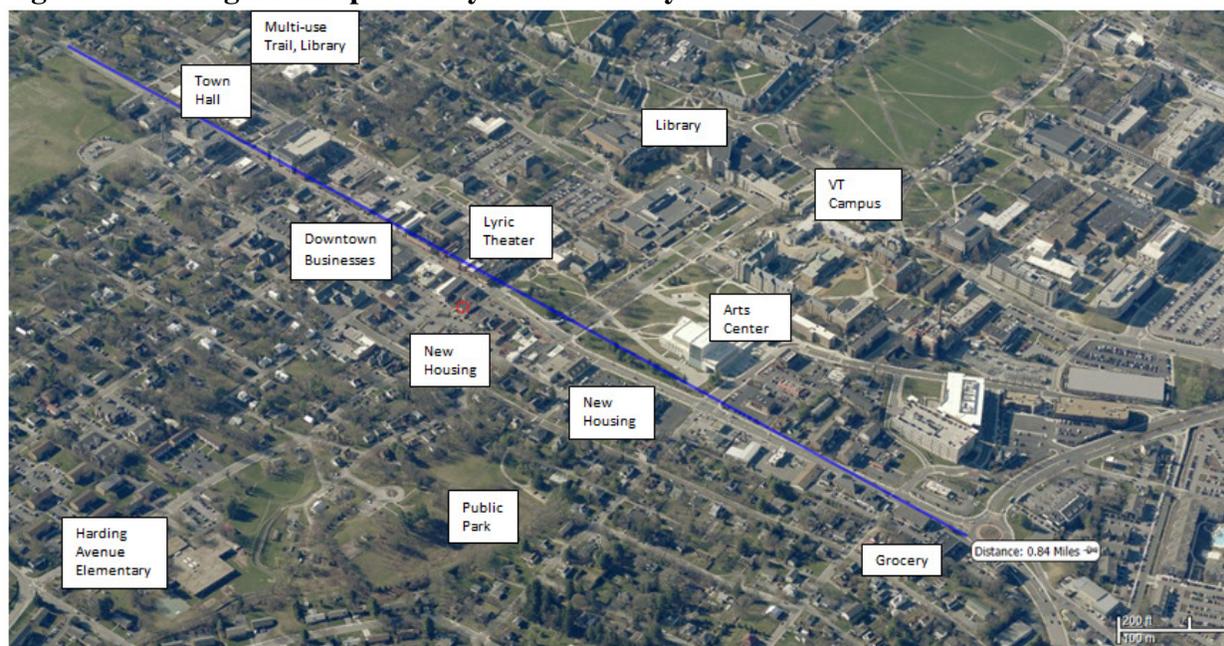
<sup>41</sup> Ibid. Sustainable Community Chapter, p.1-3.

<sup>42</sup> Ibid. p.7.

<sup>43</sup> Ibid. p.4. Jobs and Housing Chapter.

living with ways to get around that meet the needs of individuals who do not drive, safe sidewalks and interesting places to walk, and convenient access to shopping and basic services.”<sup>44</sup> Additionally, the proposed redevelopment incorporates the seven principles of Lifelong Communities: connectivity, pedestrian access and transit, neighborhood retail and services, social interaction, diversity of dwelling types, healthy living, and consideration for existing residents (See *Figure 2.4*).<sup>45</sup>

**Figure 2.4 – Target sites’ proximity to community amenities**



Source: CONNEXExplor<sup>46</sup>

At the Baptist Church site, townhouses on the Progress Street frontage would have alley access for parking. Setbacks would match the current residences on Progress Street, and important historic structures would be preserved. Building new infill townhouses along the block will provide more residential density while preserving neighborhood character. The Main Street side of the Baptist Church property would be developed as multi-floor mixed use buildings with commercial uses on the ground floor and several residential floors providing a variety of units.

<sup>44</sup> “Lifelong Communities Handbook: Creating Opportunities for Lifelong Living” (Atlanta Regional Commission, 2015), <http://atlantaregionsplan.com/>.

<sup>45</sup> Ibid.

<sup>46</sup> CONNEXExplor.

The building would likely include some structured parking for residents, which could be accessed from the alley.

The Progress Street parking structure will be wrapped with residential units fronting on Progress Street. The building would include a ground-floor grocery, public structured parking as well as residential units that fit into the Faculty Village concept. Public-private partnership opportunities exist for the Progress Street parking area because it is owned by the Town of Blacksburg. The Town can negotiate with a developer at low or no cost in return for desirable, high quality development at housing prices that are affordable to Blacksburg's working population. There are two small houses on Wilson Avenue that border the parking area which could be purchased by the developer to enlarge the redevelopment space (See *Figure 2.5*).

**Figure 2.5 - 221 Progress Street, Blacksburg, Virginia<sup>47</sup>**



The DATC extension and redevelopment includes the current pedestrian east-west connection trail segment from Harding Avenue to Main Street (See *Figure 2.6*), a public plaza area located at the intersection with the north-south alley, which will be extended through the site as a non-vehicular throughway, from Wilson Avenue to Church Street (See *Figure 2.7*). The

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<sup>47</sup> Henry Coddington, *Photos of 3 Catalyst Sites in Downtown Blacksburg*, Photographs, June 2016.

throughway will be extended in both north and south directions: south along Church Street, connecting the Progress Street sites to the OBMS property at the end of Church Street (See *Figure 2.8*), and north across Giles Road to connect to North Main Street sidewalks (See *Figure 2.9*). Improving connectivity and quality of the throughway will compensate for the lack of bicycle lanes on Main Street through the downtown area, as well as widen the perceived area of downtown.

**Figure 2.6 - Walkway through 221 Progress Street parking lot<sup>48</sup>**



**Figure 2.7 - Proposed Downtown Alternative Transportation Corridor route through 221 Progress Street parking lot<sup>49</sup>**



<sup>48</sup> Cecile Newcomb, *Photos of Sites in Downtown Blacksburg and Bennett-Hill/Progress Neighborhood*, Photographs, June 2016.

<sup>49</sup> Coddington, *Photos of 3 Catalyst Sites in Downtown Blacksburg*.

**Figure 2.8 - Proposed Downtown Alternative Transportation Corridor route along Church Street<sup>50</sup>**



**Figure 2.9 - Alley easement, and alley between Giles Road and Turner Street<sup>51</sup>**



*Imagine Blacksburg* successfully widens Blacksburg’s downtown, by identifying opportunities for full-block development and downtown expansion.<sup>52</sup> This recommendation originates from the fact that Blacksburg’s existing downtown development is linear and shallow along Main Street. Downtowns in localities similar to Blacksburg often have multiple parallel streets that include commercial activity and dense housing.<sup>53</sup> The redevelopment concept is located within two of the districts identified by the downtown housing study as opportunities for expansion of downtown: the “Mixed-Use/Central Business District” and “Special Opportunity

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<sup>50</sup> Ibid.

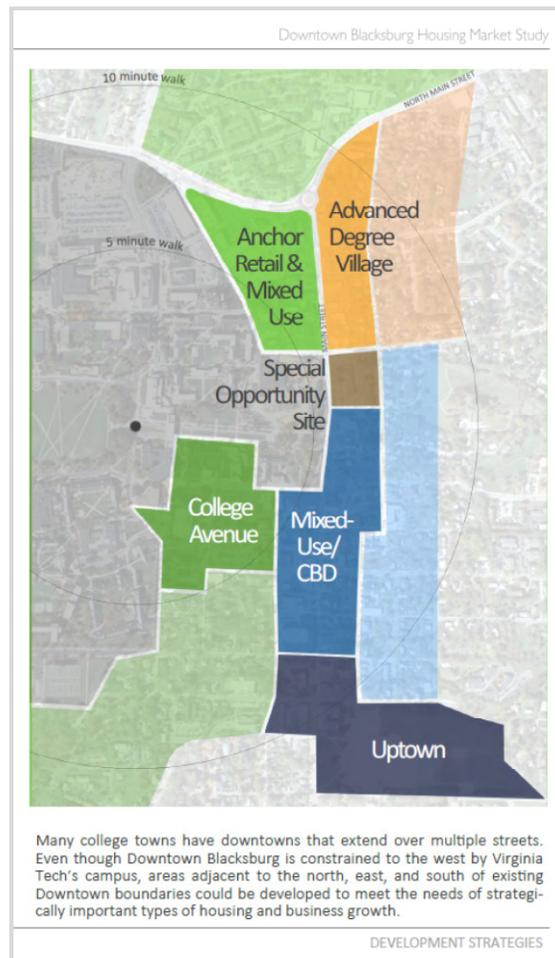
<sup>51</sup> Ibid.

<sup>52</sup> Development Strategies, “Downtown Blacksburg Housing Market Strategy.”

<sup>53</sup> Ibid.

Site” (See *Figure 2.10*).<sup>54</sup> Expansion in these areas can be accomplished in a way that enhances the existing neighborhoods while providing greater density to accommodate future economic development and job growth in Downtown Blacksburg.

**Figure 2.10 – New district suggestions**



Source: Downtown Blacksburg Housing Market Strategy<sup>55</sup>

<sup>54</sup> Ibid. P. 113.

<sup>55</sup> Ibid.

# Chapter 3

## Literature Review and Research Findings

### Understanding and changing perceptions of density

Census results, demographic studies and population forecasts for American communities show that the ability and desire to buy a suburban-style single family home is not realistic for many. The idealistic single-family home occupied by a nuclear family does not make sense for contemporary society that is redefining marriage and family, while simultaneously experiencing unprecedented income inequality and a shrinking middle class. Planners have overemphasized home ownership and must adjust their practices to the reality that at least half of new housing demand from now to 2050 may be for rentals.<sup>56</sup> In 2015 homeownership was at its lowest point since the 1960s. Predictions forecast that home ownership will fall to 1950s levels due to four phenomena: 1) Economic forces have brought an end to the days of no-money-down, easy mortgage qualification. 2) Home ownership is no longer a popular vehicle for secure retirement investment. 3) There is a relationship between education, income and home ownership, but political support for public education has declined. 4) The United States (U.S.) is predicted to be a majority-minority nation by 2050, while fewer than half of New Majority households own their homes and 70 percent of white households own theirs.<sup>57</sup> Additionally, it has become unusual for individuals to work their entire career with one company; thus, renting has become more attractive to mobile professionals.

The following three points of advice are applicable to Blacksburg: First, planning should take into account that the typical house lasts 100 years, but will have multiple occupants. Therefore, approvals for new housing should not hinge on long-term occupants. Second, 40 percent of Americans prefer to own or rent an attached home in a walkable community, but less than 10 percent of attached housing in the U.S. fits that description. “Building low-rise apartments, condos, town houses, cluster cottage homes, etc., on infill and redevelopment sites

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<sup>56</sup> Arthur C. Nelson, “The New Home Ownership Reality,” *Planning, The Magazine of the American Planning Association*, June 2016.

<sup>57</sup> Ibid.

can meet most of America's housing -especially renter- needs to 2050."<sup>58</sup> Third, the common practice of charging higher permitting fees for compact development than is charged for sprawl development must be reversed.<sup>59</sup> Low-density development typically costs local government more than the tax revenue generates due to the disproportionately higher services required, as opposed to denser areas.<sup>60</sup> Dense development not only provides needed housing, it also generates more revenue for the locality.

Walkable, dense development generates three times the revenue that suburban development generates. "Landscape performance" is a way to calculate the revenue generated by various zoning districts using a system similar to the way farmers decide which acres of their farm get the highest crop yield. When suburban-style development and urban, downtown development are compared on a revenue-by-acre and expense-per-acre basis, calculations reveal that 82% of a big-box store site is unproductive land, while a three story downtown commercial building is fifteen times more productive. Downtowns are generating three times the revenue in every case studied. There are many advantages of urban development, such as a diverse, resilient mix of goods and services, and adaptive, reusable structures built to the human scale. These elements inspire social interaction and more equitable lifestyle opportunities. While the majority of the land in the suburbs is dedicated to ease of access for vehicles, urban infill is ideally built for people.<sup>61</sup> For example, many people travel to urban downtowns to experience the cultural offerings, while "Nobody goes to the suburbs on vacation!"<sup>62</sup> Despite these advantages established residents often oppose increasing density in their communities.

In the City of Los Angeles, Mayor Eric Garcetti wants to remove barriers to building second units on single family lots as a way to add housing that would make the city more affordable for both renters and homeowners.<sup>63</sup> However, others think that second units, often called "granny flats," are positioning the need for more housing in expensive cities against the

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<sup>58</sup> Ibid.

<sup>59</sup> Ibid.

<sup>60</sup> "Cost of Community Services Studies" (American Farmland Trust, August 2010), [farmlandinfo.org](http://farmlandinfo.org).

<sup>61</sup> Craiglow, "City Planning Like a Farmer & Urban Crop Yield."

<sup>62</sup> Ibid.

<sup>63</sup> Emily Badger, "The next Big Fight over Housing Could Happen, Literally, in Your Back Yard," *The Washington Post*, August 7, 2016, [https://www.washingtonpost.com/news/wonk/wp/2016/08/07/why-building-a-home-on-your-own-land-has-become-so-controversial/?hpid=hp\\_rhp-more-top-stories\\_no-name%3Ahomepage%2Fstory](https://www.washingtonpost.com/news/wonk/wp/2016/08/07/why-building-a-home-on-your-own-land-has-become-so-controversial/?hpid=hp_rhp-more-top-stories_no-name%3Ahomepage%2Fstory).

interests of established neighbors to preserve their communities. Similar battles occur when large developments are proposed adjacent to single-family neighborhoods.<sup>64</sup> Palo Alto, California is experiencing similar problems, where the preservation of single-family developments has driven the cost of housing to astronomical proportions.

In her “Letter of Resignation from the Palo Alto Planning and Transportation Commission” Kate Downing says, “*After many years of trying to make it work in Palo Alto, my husband and I cannot see a way to stay in Palo Alto and raise a family here. We rent our current home with another couple for \$6200 a month; if we wanted to buy the same home and share it with children and not roommates, it would cost \$2.7M and our monthly payment would be \$12,177 a month in mortgage, taxes, and insurance. That’s \$146,127 per year—an entire professional’s income before taxes. This is unaffordable even for an attorney and a software engineer.*”<sup>65</sup>

Palo Alto’s police department and public schools cannot fill open positions because of the inflated cost of housing in the city and surrounding area. Local officials turn a deaf ear to planners who suggest changes to city zoning codes that would help right the jobs-housing imbalance that causes housing prices throughout the Bay Area to spiral out of control. Suggestions have included allowing two floors of housing instead of one in mixed-use developments, minimum density requirements that encourage developers to build apartments rather than penthouses, legalizing duplexes, easing restrictions on accessory units, leveraging residential parking permit programs to provide housing for people who do not want or need two cars, and allowing vertical mixed uses in commercial areas. These measures are the zoning tools that add needed housing units while maintaining the character of neighborhoods and preserving historic structures.<sup>66</sup> Blacksburg is in a position to enact similar changes to its zoning code in order to prevent skyrocketing housing costs. In order to plan for these changes, ample public education about the positive aspects of higher density is needed.

A common negative preconception is that increased density inevitably leads to over-occupancy. The difference between density and over-occupancy (or over-crowding) is an

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<sup>64</sup> Ibid.

<sup>65</sup> Kate Downing, “Letter of Resignation from the Palo Alto Planning and Transportation Commission,” August 10, 2016, <https://shift.newco.co/letter-of-resignation-from-the-palo-alto-planning-and-transportation-commission-f7b6facd94f5#.8bvkaen1a>.

<sup>66</sup> Ibid.

important distinction to understand when considering increased density. While density is typically measured in bedrooms or units per acre, over-crowding or over-occupancy refers to persons per bedroom or unit. Smaller units with one or two bedrooms are less likely to become overcrowded than units with more bedrooms and square footage. In Blacksburg, larger units with more bedrooms tend to be over-occupied by enterprising tenants who find additional roommates who contribute to the rent. This distinction is often lost in density discussions.

There appears to be global consensus that denser development is preferable to sprawl; but when the conversation shifts to the community scale Americans across the country resist efforts to increase density. Density resistance can be attributed to a lack of general knowledge of what density looks like, how it is built, and how it feels once built.<sup>67</sup> Many people have preconceptions that high density includes crowding and no green space or privacy (See *Figure 3.1*). However, these negative aspects in high density neighborhoods are results of poor design, not an inevitability caused by density.<sup>68</sup>

**Figure 3.1- Overcrowded Houses<sup>69</sup>**



Street lay out, land subdivision, amenities, building arrangement and details, landscaping and public spaces are components of design that make dense neighborhoods desirable (See

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<sup>67</sup> "Lincoln Institute of Land Policy."

<sup>68</sup> Ibid.

<sup>69</sup> *New Statistics from the Office for National Statistics (ONS) Revealed That More than Three Million People Now Live in a Household with at Least Five Other Individuals.*, Photograph, July 19, 2016, <http://www.telegraph.co.uk/news/politics/10863346/figures-show-surge-in-overcrowded-homes.html>.

*Figure 3.2).* Architectural diversity and green infrastructure provided by parks, tree-lined streets and greenways provide a necessary connection to the natural world. Interconnected streets and walkways create community oriented neighborhood interaction.<sup>70</sup> Unit size is also an important consideration. Blacksburg’s friction between student rentals and longer-term residents is typically caused by dwellings with three or more bedrooms that become over-occupied by four or more tenants. Resident friction is minimal when rental buildings provide one or two bedroom apartments. Unit size determines not only the number of occupants, but also the number of cars surrounding the building as well as the capacity for large parties.

**Figure 3.2 – High-density residential neighborhood**



Source: The Lincoln Institute of Land Policy<sup>71</sup>

Three conditions are required for urban vitality: pedestrian-friendly streetscapes, a mix of uses, and density.<sup>72</sup> Shops, restaurants and cultural institutions need a certain level of nearby residential density to remain fiscally viable. Quality design is critical in order to provide adequate parking and streets and simultaneously prevent cars and their infrastructure from overwhelming the neighborhood. Design tradeoffs will always exist. While spacious yards, privacy, quiet, and convenient parking are appealing features of low-density areas, urban areas

<sup>70</sup> “Lincoln Institute of Land Policy.”

<sup>71</sup> *A Bird’s Eye View Yards, Streets, Parks and More. Visualizing Density*, Photographs, accessed October 21, 2016, <http://datatoolkits.lincolnst.edu/subcenters/visualizing-density/tour/t6.aspx>.

<sup>72</sup> “Lincoln Institute of Land Policy.”

offer access to a rich fabric of services, convenience and social interaction. New compact neighborhoods can offer some of the best qualities of low-density neighborhoods by employing practices that use high quality architecture and careful site planning (See *Figure 3.3*). Additionally, vertical building is essential to achieving higher density while using smaller footprints to create significant green spaces. Variation in block shape, building types, landscape and settlement pattern provide important contrast and diversity, which are vital components to successful density.<sup>73</sup>

**Figure 3.3**



Longmont, Colorado<sup>74</sup>



Radburn, New Jersey<sup>75</sup>

### **Traditional visualization planning tools**

Traditionally, decision and support tools for land use planning have included 2D representations including site plans, renderings and drawings, floor plans, maps, and projected presentations of the same items (See *Appendices E – I*).<sup>76</sup> Unfortunately, these tools rely heavily on users' experience and ability to visualize proposed projects in order to understand the true impact of a design. Stakeholders in land use planning include a variety of lay people including neighborhood representatives, appointed commissioners and elected officials with varying backgrounds and experiences, many of whom are not skilled at analyzing development plans or planning documents. Decision makers struggle to understand the scale, massing and architectural

<sup>73</sup> Ibid.

<sup>74</sup> *A Bird's Eye View Yards, Streets, Parks and More. Visualizing Density.*

<sup>75</sup> Ibid.

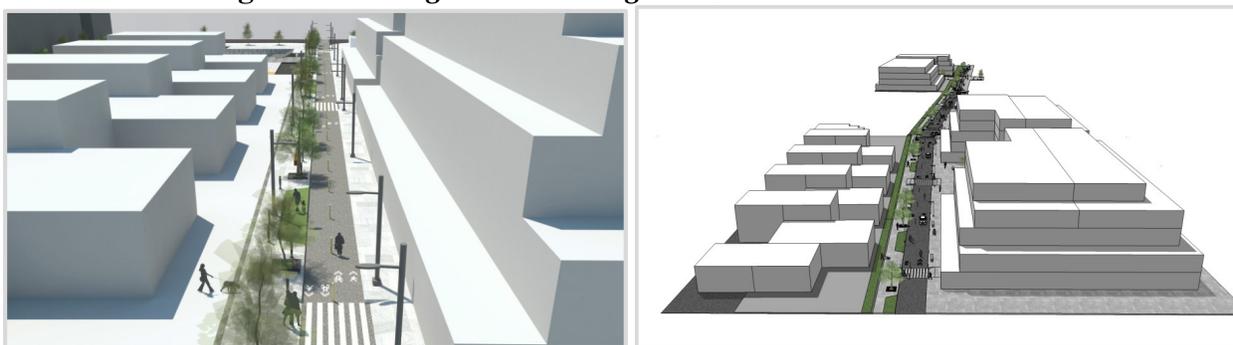
<sup>76</sup> Aileen Nygaard, The use of 3D models by the Planning Department of Pismo Beach, CA, telephone, March 1, 2017.

design details of rezoning and development applications. Visualization technology has advanced such that proposals can be presented with a more expansive approach that precisely represents urban scale- and relationship to the neighborhoods and surrounding environment such that the all users collectively know what the development will look like and whether it fits the neighborhood and the comprehensive plan.<sup>77</sup>

### **New technologies for visualizing density**

Understandably, the decision to increase density becomes bogged down by decision-makers' and citizens' inability to imagine what new development will look and feel like. Negative stereotypes and experiences from poorly designed urban areas are difficult to overcome, while unknown consequences of increasing density create reasonable fear of losing neighborhood vitality and quality of life. Simultaneously, developers are motivated by profit and have difficulty relating to residents' concerns. In order to encourage sustainable development planners need to fill the role of translator by finding common ground between interest groups and by promoting innovative technical, architectural and institutional solutions to conflict.<sup>78</sup> The use of 3D modeling can provide a virtual reality experience that helps stakeholders envision the look, feel and scale of proposed higher density developments (See *Figure 3.4*). Apropos the first hypothesis of this thesis, the ability to see what virtual developments will look like, using 3D models, may reduce fear of the unknown, inform discussion and decisions, and increase acceptance of higher density amongst citizens, planners and legislators.

**Figure 3.4 - *Imagine Blacksburg models***<sup>79</sup>



<sup>77</sup> Ibid.

<sup>78</sup> Scott Campbell, "Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of Sustainable Development," *Journal of the American Planning Association* 62, no. 3 (November 26, 2007): 296–312. p.305

<sup>79</sup> Andres Salazar Del Pozo, *Blacksburg 3D*, SketchUp Modeling Software, December 2016.

## Downtown Pismo Beach, California: a 3D modeling example

In 2012 the City of Pismo Beach, California, participated in a thesis project experiment whereby a 3D model was created using *Sketchup* to display a redevelopment plan for Downtown Pismo Beach. The Planning Department referenced and showcased the model during planning commission meetings to establish mutual understanding of pertinent details of the plan.<sup>80</sup> The model was also presented to the public and city council for their input and feedback.<sup>81</sup> They found that the model presented data that was otherwise unavailable, which allowed greater access and understanding of the downtown development. The experiment successfully provided “a greater understanding of the context and consequences of planned development between stakeholders, policy makers, technical planning staff and the concerned public.”<sup>82</sup> Reception of the models has been so positive that the planning department has continued to develop models of properties throughout the city.<sup>83</sup> Subsequently, in 2017 the Pismo Beach City Council directed their staff to require 3D models to be submitted with all new development site plan applications.<sup>84</sup>

The Town of Blacksburg promotes varying housing types including rental or starter homes for graduate students and young families and professional housing in the downtown area.<sup>85</sup> Residential problems and neighborhood degradation have occurred in Blacksburg over the last 30 years of population growth. The pattern of single-family homes that were converted to undergraduate student housing, many of which have been ill-managed and ill-maintained, happened largely in the neighborhoods within walking distance of the University, including the Progress Street area. While the area remains an attractive location, the key to attracting a variety of residents is building quality housing that includes desirable amenities (See *Figure 3.5*). Design and construction that provides residents a high quality of life in downtown

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<sup>80</sup> Velazco, “3D Digital Modeling For Urban Design + Planning.” P.13

<sup>81</sup> Ibid. p.23

<sup>82</sup> Ibid. P.7

<sup>83</sup> Ibid. p.24

<sup>84</sup> Nygaard, The use of 3D models by the Planning Department of Pismo Beach, CA.

<sup>85</sup> “1996-2046 Blacksburg Comprehensive Plan.” Jobs and Housing Chapter p.21.

neighborhoods would encourage sales and renovations of older properties to provide housing to a variety of demographics.<sup>86</sup>

**Figure 3.5- Models of proposed residential buildings, Garden Village, Berkeley, California<sup>87</sup>**



<sup>86</sup> "1996-2046 BLACKSBURG COMPREHENSIVE PLAN." Jobs and Housing Chapter p.14.

<sup>87</sup> Stanley Saitowitz, *Garden Village*, Photographs, accessed October 21, 2016, <http://www.saitowitz.com/work/garden-city/>.

# Chapter 4

## Visualizing Density in Blacksburg

The Interventions: three components of a neighborhood redevelopment idea

### I. 221 Progress Street, Public Parking Area

221 Progress Street parking area, Blacksburg, Virginia<sup>88</sup>



Blacksburg is supportive of a mixed-use infill development at 221 Progress Street to achieve long term plans for structured parking downtown.<sup>89</sup> Toward that end, the town purchased a surface lot in 2013 and a defunct restaurant building in 2014 at 221 Progress Street. The recent demolition of the restaurant has cleared the way for redevelopment of the property. There is currently a dearth of housing in Blacksburg that is available and affordable to young professionals, young families, married students, graduate/professional students as well as those who wish to downsize and live in town.<sup>90</sup> New housing at 221 Progress Street can be strategically designed for these demographics potentially adding a few hundred bedrooms to the

<sup>88</sup> Coddington, *Photos of 3 Catalyst Sites in Downtown Blacksburg*.

<sup>89</sup> "1996-2046 BLACKSBURG COMPREHENSIVE PLAN" (Town of Blacksburg, update 2014), <http://tobweb.org/docs/comp%20plan/Individual%20Chapters/Introduction.pdf>. Jobs and Housing Chapter, Objective 28. p.19.

<sup>90</sup> *Ibid.* Jobs and Housing Chapter, The Changing Housing Market. p.12.

downtown housing market. To retain young professionals in town, “a particularly desired product is one with relatively small units (i.e. 600 square feet) that rent for under \$1000/month.”<sup>91</sup> There is likely to be neighborhood opposition to this project because of negative preconceptions of increased density and traffic. Design details will be extremely important to produce a project that compliments the character of the neighborhood, brings positive amenities such as a grocery store and public space, and carefully addresses traffic flow.

To preserve the character of the town and provide needed housing as population increases, Blacksburg must make some changes to the zoning code to allow increased density and height in key areas. The town-owned Progress Street site is a fortuitous opportunity for a catalyst project to meet this goal. Infill projects on public land present excellent opportunities for public property and private development options. The development should be mutually beneficial by giving the developer options for projects while attaining key goals of the town. Density bonuses would be a mutually beneficial tool to use, whereby the developer would be allowed additional density in exchange for a building(s) that meets the town’s goals.

Buildings should be oriented to the street and public spaces for a pedestrian-friendly environment, a visually rich street edge and resident safety created by human activity.<sup>92</sup> Redevelopment of the Progress Street area should be carefully oriented toward all streets and pedestrian ways throughout and surrounding the project similar to the buildings shown in *Figure 4.1*. This can be accomplished with residential units fronting on Progress Street similar to those in *Figure 4.2*, and a mixed used building that includes a ground-floor grocery, public structured parking, and several stories of residential units that fit into the faculty village concept.

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<sup>91</sup> Development Strategies, “Downtown Blacksburg Housing Market Strategy.”

<sup>92</sup> “Town of Blacksburg Residential Infill Development Guidelines” (Town of Blacksburg, December 2011).

**Figure 4.1 - Mixed-use development in Henderson, Nevada and Roanoke, Virginia<sup>93</sup>**



**Figure 4.2 - Multi-family residential development<sup>94</sup>**



Importantly, the Downtown Alternative Transportation Corridor (DATC) traverses the site as a north-to-south pedestrian and bicycle path, connecting the alley at Wilson Street to Church Street. Church Street should be redeveloped as a “Complete Street” to encompass all forms of transportation in a safe, shared corridor. “A Complete Streets approach integrates

<sup>93</sup> Carolyn Torma, *The District at Green Valley Ranch*, Photograph, 2007.

<sup>94</sup> Andrew Alexander Price, “Granularity,” Weblog, *AndrewAlexanderPrice*, (October 21, 2015), <http://www.andrewalexanderprice.com/blog20151021.php#.V69nZa3LmJk>.

people and place in the planning, design, construction, operation, and maintenance of our transportation networks. This helps to ensure streets are safe for people of all ages and abilities, balances the needs of different modes, and supports local land uses, economies, cultures, and natural environments.”<sup>95</sup> The DATC will intersect with an east-to-west pedestrian and bicycle path, forming a public plaza between the new mixed use building and the rear of the existing buildings on Main Street and College Avenue Extension (See *Figure 4.3*).

**Figure 4.3 - Public plaza and throughway spaces at 221 Progress Street<sup>96</sup> and Public Square in Mexico City, Mexico<sup>97</sup>**



<sup>95</sup> “National Complete Streets Coalition,” Education, *Smart Growth America*, (2017), <https://smartgrowthamerica.org/program/national-complete-streets-coalition/>.

<sup>96</sup> *CONNECTExplorer*.

<sup>97</sup> Dennis Pieprz, *Mexico City Squares*, Photograph, April 28, 2016, <http://commonedge.org/why-mexican-squares-may-be-the-best-public-spaces-in-the-world/>.

Scale and massing, architectural features, as well as character and context are extremely important to the design of the buildings.<sup>98</sup> The new buildings should be designed to fit their increased height into the context of surrounding structures to reinforce neighborhood character and a pedestrian friendly environment.<sup>99</sup> Architectural design features that are similar to nearby buildings and infill designs that blend with traditional architecture of Blacksburg and Southwest Virginia help ease new buildings into existing neighborhoods.<sup>100</sup> A creative approach should be embraced by the town so that new investments simultaneously enhance both the downtown neighborhoods and the commercial district.

The town-owned Progress Street parking area presents a unique opportunity for a public-private partnership (PPP) to meet two main goals for development:

*“1.) Attractive, high quality projects that are compatible with the surrounding areas and contribute to the Town’s character. 2.) Projects that are economically viable and allow the developer to meet his or her client’s objectives. These two goals are not mutually exclusive; the town and development community need to work together on these goals. It is of mutual benefit for Blacksburg to be a progressive community with development services that meet citizens’ needs and expectations.”<sup>101</sup>*

The Town of Blacksburg has the ability to partner with a developer in order to achieve a signature project. Many options are possible, for example: 1.) The town could retain ownership of the land and a portion of the building, while giving or selling the air space above to a developer in exchange for a proffered development. 2.) The Town can sell the land to a developer for by-right or proffered development. 3.) The Town can give the land to a developer with a creative, mutually beneficial contracted scenario. A recent example of this type of PPP exists in Roanoke, Virginia. The City of Roanoke struck a deal with a builder to allow construction of a 127-room hotel atop the city’s Market Parking Garage in Downtown Roanoke in 2013 (See *Figure 4.1*). The city sold the air rights above the building, retaining ownership of the garage itself. The ground floor was also sold to commercial businesses. Taxpayer dollars were not used to fund the project; grant funds came from new revenue generated by the hotel as

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<sup>98</sup> “Town of Blacksburg Residential Infill Development Guidelines.”

<sup>99</sup> Ibid. p.22.

<sup>100</sup> Ibid. p.23-24.

<sup>101</sup> “1996-2046 BLACKSBURG COMPREHENSIVE PLAN.” Land Use Chapter p.7.

well as proceeds from the sale.<sup>102</sup> Similar projects have been accomplished in Staunton, Virginia and Miami Beach, Florida (See *Figure 4.4*).

A close working relationship between town planners, officials, and a developer will be crucial to achieving a project that sets the example for high density infill development in Downtown Blacksburg. A shared vision to provide outdoor public spaces, alternative transportation infrastructure, and public parking as well as quality housing and needed commercial businesses built affordably and attractively is a tall order. However, due to ownership and location 221 Progress Street is the perfect site to achieve this vision.

**Figure 4.4 – Parking garages**



Staunton, Virginia parking garage<sup>103</sup>



Ballet Valet Parking Garage, Miami Beach<sup>104</sup>

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<sup>102</sup> Matt Chittum, “Roanoke City Council Approves Hotel on Top of Market Garage,” *The Roanoke Times*, December 17, 2013, <http://www.roanoke.com/news/local/roanoke/>.

<sup>103</sup> *Nicely Designed Parking Garage in Staunton*, Photograph, October 9, 2013, <https://citybicycletrips.com/2013/10/09/shenandoah-valley-lexington-to-staunton-and-back-921-222013/>.

<sup>104</sup> Dan Forer, *Ballet Valet Parking Garage*, Photograph, n.d.

## II. The Public Alley

Photos of the public alley, Blacksburg, Virginia<sup>105</sup>



This project suggests the alley as a catalyst project, not to disallow motorized vehicles where they are currently allowed, but to elevate the status of the alley for use by pedestrians and especially bicycles. Completing its connections through downtown will establish it as the DATC. As explained earlier the DATC establishes a linear multi-modal throughway for bicycle and pedestrian connectivity through downtown, as well as local vehicle access to commercial loading docks, garbage and utilities, and parking. The DATC should begin at North Main Street, near its intersection with Progress Street, include the entire length of the existing alley situated between North Main Street and Progress Street, extend through the Progress Street parking area, and continue along Church Street as an on-street facility to the OBMS property (See *Figure 4.5*).

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<sup>105</sup> Coddington, *Photos of 3 Catalyst Sites in Downtown Blacksburg*.

**Figure 4.5 - Main Street Blacksburg, Virginia, paralleled by the public alley<sup>106</sup>**

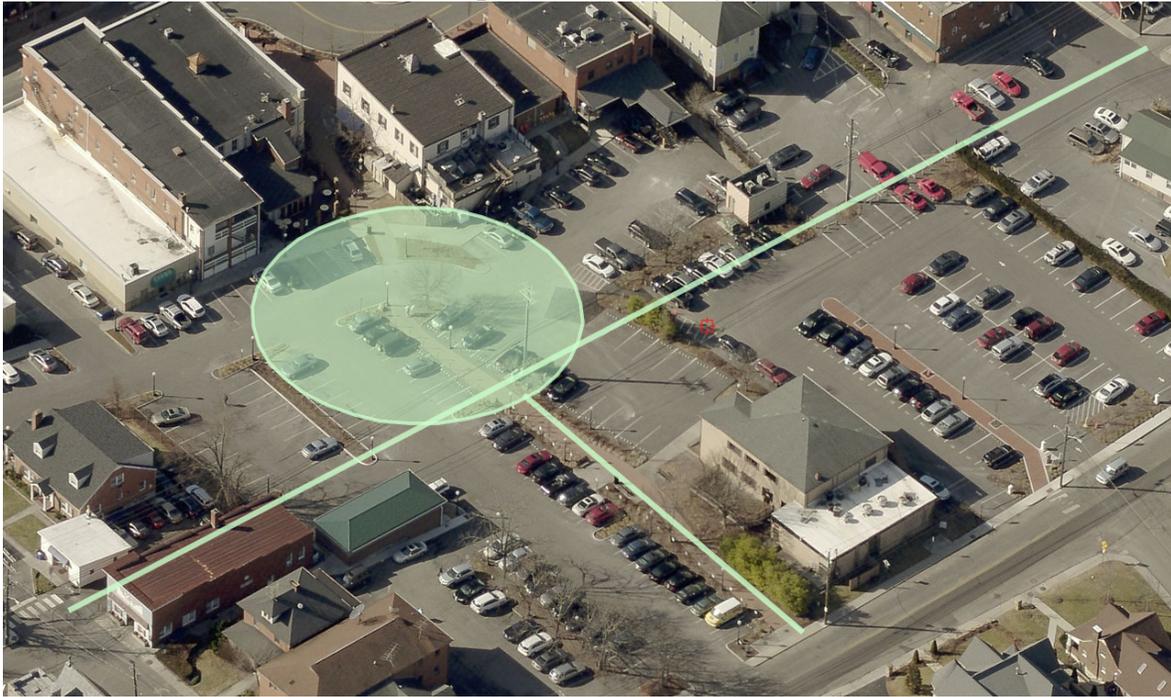


The section through 221 Progress Street should be pedestrian and bicycle use only, creating a new public pedestrian and bicycle throughway as part of this redevelopment area. The DATC extension and redevelopment includes the current pedestrian east-west connection from Harding Avenue to Main Street, a public plaza area located at the intersection with the north-south alley, which will be extended through the site as a non-vehicular throughway, from Wilson Avenue to Church Street (See *Figure 4.6*). The throughway will be extended in both north and south directions: south along Church Street, connecting the Progress Street sites to the Old Blacksburg Middle School (OBMS) property at the end of Church Street, and north across Giles Road to connect to North Main Street sidewalks (See *Figure 4.7*).

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<sup>106</sup> CONNECTExplorer.

**Figure 4.6 - Public plaza and throughway spaces at 221 Progress Street<sup>107</sup>  
and Public square, Mexico City, Mexico<sup>108</sup>**



<sup>107</sup> Ibid.

<sup>108</sup> Pieprz, *Mexico City Squares*.

**Figure 4.7 – Downtown Alternative Transportation Corridor throughways**



Church Street<sup>109</sup>



Public easement<sup>110</sup>

A beautification competition between the land and business owners along the entire length of the alley is a way to create the feel of a linear park and a throughway conducive to non-vehicular travel, while simultaneously building community and ownership of the public space. *Figure 4.8* offers a comparison between an alley designed strictly for utilitarian access versus alleys that have been intentionally designed to support the activities happening nearby. The alley beautification would also enhance and support adjacent businesses and residences, as well as make the DATC safer and more inviting. Improving connectivity and the quality of the throughway will compensate for the lack of bicycle lanes on Main Street through the downtown area, as well as widen the perceived area of downtown. Crosswalks for the DATC are necessary at all street crossings. “Crosswalks provide higher visibility to pedestrians at logical crossing points and can be basic white striping or can include other elements such as raised surfaces or aesthetic materials.”<sup>111</sup> Additional streetscape designs could be placed strategically to encourage pedestrian activity and promote safety and security.<sup>112</sup>

<sup>109</sup> Coddington, *Photos of 3 Catalyst Sites in Downtown Blacksburg*.

<sup>110</sup> *Ibid.*

<sup>111</sup> “Town of Blacksburg Residential Infill Development Guidelines.”

<sup>112</sup> *Ibid.* p.25-29.

**Figure 4.8 – Public alleyways**



Alley designed for utilitarian uses<sup>113</sup>



Alleyways designed for multiple uses<sup>114</sup>



Alleys are a valuable public good and can serve multiple functions for the community. Chicago has found that alleys can help protect water resources through use of permeable pavement and other innovative design details that allow water to permeate into the ground rather than funneling it into the storm sewer system (See *Figure 4.9*). Additionally, Chicago has a program called “Make Way for People” that allows temporary events such as artwalks to take place in the city’s alleys. The city finds that supporting innovative uses of the public alleys improves street safety and promotes walking and bicycling, which in turn supports economic development for Chicago’s local businesses and revitalizes Chicago’s neighborhoods.<sup>115</sup>

**Figure 4.9 – Alley retrofitted with permeable pavement**



Chicago public alley<sup>116</sup>

<sup>113</sup> Coddington, *Photos of 3 Catalyst Sites in Downtown Blacksburg*.

<sup>114</sup> Price, “Human-Scale Streets.”

<sup>115</sup> “CDOT Make Way for People,” government, *City of Chicago*, (2010), [https://www.cityofchicago.org/city/en/depts/cdot/supp\\_info/make\\_way\\_for\\_people.html](https://www.cityofchicago.org/city/en/depts/cdot/supp_info/make_way_for_people.html).

<sup>116</sup> Catherine Gass, *Alleys Incorporating Green Alley Principles*, Photograph, 2009, <http://burnhamplan100.lib.uchicago.edu/newberryexhibit/green-metropolis/managing-water.shtml>.

The DATC, as an improvement and addition to the overall town network of alternative transportation infrastructure, has the support of town planning documents. Bicycle facilities should routinely be considered and prioritized during routine road maintenance, reconstruction, construction, and land development in order to create a bicycle friendly community.<sup>117</sup>

“Transportation accounts for most of the total end use energy consumed by the Town of Blacksburg. The Town can improve its transportation energy efficiency and reduce pollutant emissions with its transit system, a reasonably compact development pattern, and by expanding the greenway, bikeway, and walkway systems.”<sup>118</sup>

To improve livability as the town evolves into its next stage of growth, Blacksburg needs to elevate the status and safety of bicycling and walking throughout its transportation infrastructure. Copenhagen, Denmark has achieved thirty percent commuter traffic by bicycle due to financial and ideological commitment and prioritization of bicycle infrastructure. The turning point for Copenhagen was when the city achieved widespread agreement “that cycling is not a goal in itself but a prioritized means to a political end: a more livable city for all.”<sup>119</sup> Denmark’s Cycling Federation has declared that the organization is not anti-car, but rather pro-mobility. Infrastructure investment should view cycling as a piece of a wider mobility puzzle; once a cohesive network is established for bicycles people will choose to cycle and the number of cycling commuters will grow.<sup>120</sup>

Pedestrian and bicycle friendly infrastructure is essential to Blacksburg’s identity as a walkable and bikeable community.<sup>121</sup> While pedestrian circulation systems are required to be constructed in all new developments, it is very difficult to provide them when improving existing streets. For example, when the Downtown section of South Main Street was rebuilt in 2010, the road was reduced from four lanes to three in order to provide space for wider sidewalks and traffic calming and safety. Due to lack of right-of-way space the decision was made not to include bicycle lanes on Main Street, a decision that disappointed many residents. Extending and improving the alley during redevelopment of 221 Progress Street provides the opportunity to

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<sup>117</sup> “Bicycle Blacksburg Bicycle Master Plan 2015” (Town of Blacksburg, 2015).

<sup>118</sup> “1996-2046 BLACKSBURG COMPREHENSIVE PLAN” (Town of Blacksburg, update 2014), <http://tobweb.org/docs/comp%20plan/Individual%20Chapters/Introduction.pdf>. Environment Chapter p.12.

<sup>119</sup> Derek Scally, “How Copenhagen Reshaped Minds by Reshaping Roads,” *Irish Times*, April 20, 2016, <http://www.irishtimes.com/news/health/how-copenhagen-reshaped-minds-by-reshaping-roads-1.2606388>.

<sup>120</sup> Ibid. Klaus Bondham

<sup>121</sup> “1996-2046 BLACKSBURG COMPREHENSIVE PLAN.” Land Use Chapter p.3.

create a bicycle friendly route through downtown, parallel to Main Street. The Designated Bicycle Route by Difficulty Map shows that the Main Street corridor is ranked as highest in difficulty for traffic volume, road hazards, street and lane width, existing bicycle facilities, and slope (See *Appendix D*).<sup>122</sup> The proposed DATC helps meet the town's goal to provide more connections to benefit those who wish to travel without reliance on a car or bus.<sup>123</sup>

### **III. Baptist Church Properties: the 500 Block of Progress Street and the 500 Block of North Main Street**

The need for housing that is available and affordable to young professionals, young families, married students, graduate/professional students as well as those who wish to downsize and live in Blacksburg is widely understood.<sup>124</sup> The Baptist Church properties present an excellent opportunity to provide approximately 1000 new bedrooms to the downtown housing market, which can strategically be designed for these demographics. It is the expressed desire of the Town to ensure that infill development both contributes to the vibrancy of the neighborhood and the economic vitality of the town. Furthermore, new infill development should enhance, rather than threaten the character of the neighborhood in which it is located.<sup>125</sup>

The Baptist Church properties consist of two main components: a commercially zoned parcel on Main Street, and six residentially zoned parcels on Progress Street, comprising a whole block. These two components should be planned, zoned and developed differently, while preserving the public alley that runs between them as part of the DATC. The Main Street parcel should become a high-density mixed use downtown commercial development while the Progress Street parcels should be redeveloped through an overlay that allows medium-density attached housing (See *Figure 4.10*).

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<sup>122</sup> "Bicycle Blacksburg Bicycle Master Plan 2015."

<sup>123</sup> "1996-2046 BLACKSBURG COMPREHENSIVE PLAN." Land Use Chapter p.20.

<sup>124</sup> *Ibid.* Jobs and Housing Chapter p.12.

<sup>125</sup> *Ibid.* Jobs and Housing Chapter p.12.

**Figure 4.10 – Mixed-use downtown development and medium-density housing**



Davis, California<sup>126</sup>



Glenview, Illinois<sup>127</sup>

### **500 Block of Progress Street**

#### **500 block of Progress Street, Blacksburg, Virginia<sup>128</sup>**



The Baptist Church-owned properties in the 500 block of Progress Street are poised for redevelopment. The vast majority of the properties, once owner-occupied homes, have become neglected, rundown rentals. In order to grow according to community values and new urbanist concepts such as preserving character and sustainable development, while simultaneously adding new housing stock, Blacksburg must make some allowances for increased density and height in key areas. Creating an overlay for a faculty village concept is a way to allow increased residential density along Progress Street that will provide new infill housing while supporting the existing neighborhood. Results show that infill developments increase the value of nearby

<sup>126</sup> *Davis CA Hallmark Inn*, Photograph, 2012, [https://www.tripadvisor.com/Hotel\\_Review](https://www.tripadvisor.com/Hotel_Review).

<sup>127</sup> Carolyn Torma, *Townhouses Glenview IL*, Photograph, 2005, <https://planning.org/imagelibrary/details/9001481/>.

<sup>128</sup> Coddington, *Photos of 3 Catalyst Sites in Downtown Blacksburg*.

residential properties. However, while scale of new buildings does not significantly impact housing prices, height can cause negative externalities.<sup>129</sup> Properly sized and carefully designed new development in key areas will likely encourage conversion from undergraduate student rentals to graduate student, family and professional rentals and homeownership in the surrounding neighborhood.

New urbanist tools are based on traditional city guidelines. Many cities are using these tools to revitalize inner-city neighborhoods to meet economic development and re-urbanization goals.<sup>130</sup> Blacksburg can incorporate new urbanism or smart growth design guidelines into plans and land development codes to accommodate urban infill, mixed use, and alternative modes of transportation. Communities in Orlando, Florida have effectively integrated new urbanist tools to realize community goals for housing rehabilitation projects. To be successful planning must be proactive and comprehensive, incorporating neighbor participation and recommendations. Changes to zoning code should require specific performance standards from the private sector, such as the inclusion of affordable units, green building and public amenities in exchange for increased density. “Design guidelines that encourage new development consistent with preferred local historic patterns can create distinct and appealing environments, attracting private investment.”<sup>131</sup>

Older neighborhoods that ring downtown areas are proving to be highly desirable to millennials. These older neighborhoods tend to have a diverse mix of housing types and mature landscaping that offer a high-quality urban lifestyle (See *Figure 4.11*).<sup>132</sup> Perhaps most important is their proximity to public amenities such as schools, parks, libraries, museums, transit, cultural centers and shopping districts. The neighborhoods close to Downtown Blacksburg provide a diverse array of housing types, as well as close proximity to public amenities, making them attractive to the demographics the Town wishes to attract to live downtown, such as Millennials (See *Figure 4.12*).

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<sup>129</sup> Joseph T.L. Ooi and Thao T.T. Le, “The Spillover Effects of Infill Developments on Local Housing Prices,” *Regional Science and Urban Economics* 43 (2013): 850–61.

<sup>130</sup> Kristin Larsen, “New Urbanism’s Role in Inner-City Neighborhood Revitalization,” *Housing Studies* 20, no. 5 (September 2005): 795–813.

<sup>131</sup> *Ibid.*

<sup>132</sup> Jennifer Griffin, “Affordable Urban Lifestyles for Millennials with Children, Part II,” Education, *Strong Towns*, (July 12, 2016), <http://www.strongtowns.org/journal/2016/7/11/affordable-urban-lifestyles-for-millennials-with-children-part-ii>.

Figure 4.11

Tulsa, OK: Housing Types within Collar Neighborhoods



mid-rise apartments



6-flat



4-flat (fourplex)



townhouse courtyard (attached)



duplex courtyard



small single-family detached



large single-family detached

Tulsa, Oklahoma<sup>133</sup>

<sup>133</sup> Jennifer Griffin, *Tulsa, OK: Housing Types within Collar Neighborhoods*, Photograph, July 12, 2016, <http://www.strongtowns.org/journal/2016/7/11/affordable-urban-lifestyles-for-millennials-with-children-part-ii>.

**Figure 4.12**



Existing housing variety along Progress Street, Blacksburg<sup>134</sup>

<sup>134</sup> Cecile Newcomb, *Residential Buildings on Progress Street, Blacksburg VA*, Photograph, June 2016.

400 and 600 Block of Progress Street, Blacksburg, Virginia



Existing housing variety along Progress Street, Blacksburg<sup>135</sup>

A rental-to-homeownership conversion trend has recently been sparked by Blacksburg's Affordable Housing Program and the Live, Work, Sell Arts District Overlay; however, the proposed infill projects at the Baptist Church site will advance the trend considerably. Blacksburg's Affordable Housing Program is focused on converting several student rental

<sup>135</sup> Ibid.

houses into long-term affordable owner-occupied homes in the Bennett Hill/Progress Street neighborhood.<sup>136</sup> The Live, Work, Sell Arts District is an overlay district in the Bennett Hill/Progress neighborhood that allows a homeowner or tenant “to be an artist who lives in the home, has studio space and can sell their art from the home.”<sup>137</sup> The infill projects at the Baptist Church site must be planned and built carefully, so that they will truly be assets to both the downtown and the Bennett Hill/Progress neighborhood. Two important elements to a cohesive redevelopment are scale and massing.

Scale and massing is experienced through architectural features and character and context. Buildings should fit within the context of the surrounding structures to reinforce neighborhood character and a pedestrian friendly environment.<sup>138</sup> Architectural design features similar to nearby buildings and infill designs that blend with traditional architecture of Blacksburg and Southwest Virginia will help blend increased density into the existing fabric of the neighborhood.<sup>139</sup> Blacksburg’s urban/walkable neighborhoods are located near downtown, and typically provide higher density residential. Additionally, these neighborhoods are within walking distance of employment, education and commercial centers. They have access to all modes of transportation: buses, bicycle and pedestrian infrastructure. The location of the Baptist Church properties makes them logical places for increased density.<sup>140</sup>

National demographic trends such as “an aging population, changes from the traditional single-family household to increasing numbers of single-person households, and change to ethnic and minority compositions” are also affecting Blacksburg.<sup>141</sup> Additionally, the number of homes within walking distance of Virginia Tech (VT) and downtown is limited, as well as too expensive for young families, young professionals and employees of VT and downtown businesses who would like to live there. Creative strategies are needed to encourage

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<sup>136</sup> “Affordable Housing Fourth Year Annual Action Plan” (Town of Blacksburg, 2015),

<http://www.blacksburg.gov/Home/ShowDocument?id=3564>.

<sup>137</sup> “Live, Work, Sell Arts Overlay Zone,” government, *Town of Blacksburg*, (July 26, 2016),

<http://www.blacksburg.gov/community/arts-and-culture/arts-and-cultural-district-incentive-zones/live-work-sell-arts-overlay-zone>.

<sup>138</sup> “Town of Blacksburg Residential Infill Development Guidelines.” p.22.

<sup>139</sup> *Ibid.* p.23-24.

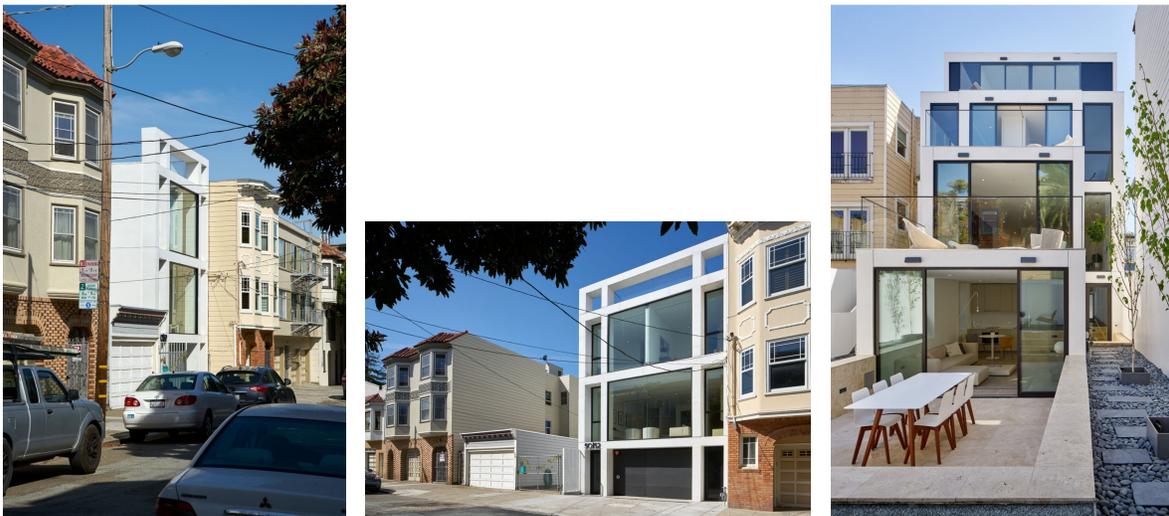
<sup>140</sup> “1996-2046 BLACKSBURG COMPREHENSIVE PLAN.” p.19.

<sup>141</sup> *Ibid.* Portrait of Blacksburg p.4.

homeownership in these neighborhoods.<sup>142</sup> The infill development of the Baptist Church properties could create a variety of housing types in a price range affordable to many.

The 500 block of Progress Street includes five houses that are contributing structures to the town's Historic District. It is an objective of the town to work with property owners to upgrade and renovate buildings and to find adaptive reuse opportunities that support the goals of the Historic District. The community values the character created by historic landmarks and properties, and intends to maintain and protect them.<sup>143</sup> Historic structures present challenges and opportunities for infill redevelopment, renovation and reuses. Some of these structures are worthy of being retained and refurbished; new infill units can be built between and around them in a way that is appropriate to the scale and character of the neighborhood. Use or reuse of historic properties contributes to the economic base and neighborhood vitality and charm. Using the existing historic structures along Progress Street to set the design principles for infill residential to create a row of townhouses and/or small apartment buildings will enhance the neighborhood as well as spur improvements to properties nearby and throughout the neighborhood (See *Figure 4.13*).

**Figure 4.13 – Infill residential development**



Oakwood Street, San Francisco<sup>144</sup>

<sup>142</sup> Ibid. Land Use Chapter p.20.

<sup>143</sup> Ibid.

<sup>144</sup> Stanley Saitowitz, *50 Oakwood*, Photographs, accessed October 22, 2016, <http://www.saitowitz.com/work/50-oakwood/>.

The Town of Blacksburg recently passed a new density bonus in the Downtown Commercial zoning district, which allows a greater number of bedrooms in exchange for retention and rehabilitation of contributing historic structures.<sup>145</sup> The faculty village overlay should offer a similar incentive. A one hundred percent or more density bonus (ninety-six or more bedrooms per acre) would be appropriate for the 500 block of Main Street, while a fifty percent density bonus (up to seventy-two bedrooms per acre) may be appropriate for the 500 block of Progress Street, if designed carefully to fit the neighborhood.

For the Downtown Commercial zoning district, including the 500 block of North Main Street, the density bonus should be available to developers who offer additional amenities in exchange for the bonus, such as certified green building and development and a certain percentage of affordable housing units along with high quality design and materials. In the 500 block of Progress Street the density bonus should be offered in exchange for housing that targets multiple demographics, built to certified green building and development standards. These measures would help satisfy several town goals: 1) additional residential density that is sensitive to the neighborhood and lower surrounding densities, 2) urbanization elements that are included in the town's sustainability goals, 3) provide equity as the neighborhood experiences new investment and potential gentrification.

There is general agreement that the R-5 districts in Blacksburg are not serving the town well. Originally the transitional residential (R-5) zones were intended to be a buffer between commercial and low-density (R-4) zoning districts. However, they are located in places that have differing characteristics and growth pressures. The R-5 section of Progress Street would be better served by an overlay that encourages creative, denser redevelopment. The purpose of the R-5 district does not preclude higher density development in transitional residential areas. "The Transitional Residential District is to provide for a transitional land use between low density residential and higher intensity land uses. This is a predominantly residential district with neighborhood character. Conditional uses which are sensitive to and reinforce the residential neighborhood character are appropriate...properties along arterial and collector roads are particularly suited ... livability or small-town character of the Transitional Residential District is

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<sup>145</sup> "Blacksburg, Virginia - Code of Ordinances. Appendix A-Ordinance No. 1137 Blacksburg Zoning Ordinance. District Standards." (Town of Blacksburg, June 23, 2016), [https://www2.municode.com/library/va/blacksburg/codes/code\\_of\\_ordinances?nodeId=CO\\_APXAORNO1137BLZ\\_OOR\\_ARTIIIDIST\\_DIV14DOCODI\\_S3142SIDESt](https://www2.municode.com/library/va/blacksburg/codes/code_of_ordinances?nodeId=CO_APXAORNO1137BLZ_OOR_ARTIIIDIST_DIV14DOCODI_S3142SIDESt).

made up of tree lined streets, open space, and greenways interspersed within a more urban residential pattern.”<sup>146</sup> The R-5 section of Progress Street is developed with older buildings varying from single-family homes to buildings with three to twenty apartments. Some of the structures are well maintained while others are increasingly run-down. The variety of buildings, lot sizes and uses create a valuable fabric for the neighborhood, and new investment would help stimulate both new and renovated housing in both the downtown and surrounding neighborhoods.

### **500 Block of North Main Street**

*Imagine Blacksburg* envisions vertical mixed use infill development on the 500 block of North Main Street, which is zoned Downtown Commercial. The development idea is similar to the Peabody Place Mixed Use Development in Memphis, Tennessee, which “restored and adapted an entire downtown Memphis block of historic dilapidated buildings as a new integrated multi-use development, including retail, residential, offices and dining. The project served as a catalyst for Memphis’ urban renaissance, and has won an impressive 16 design awards (See *Figure 4.14*).”<sup>147</sup>

**Figure 4.14 – Mixed-use infill development**



Downtown Memphis, Tennessee<sup>148</sup>

<sup>146</sup> Ibid.

<sup>147</sup> “Hnedak Bobo Group,” Industry, accessed July 28, 2016, <http://www.hbginc.com/projects/adaptivereuse/peabody-place-historic-redevelopment/#.V5plhjXLmJk>.

<sup>148</sup> Jeffrey Jacobs, *Peabody Place Historic Redevelopment*, 2010, <http://www.hbginc.com/projects/adaptivereuse/peabody-place-historic-redevelopment/#.V5plhjXLmJk>.

The DATC runs directly through the Baptist Church property, separating the commercial section from the residential section. As mentioned elsewhere in this document, the DATC should be preserved and improved as a centralizing amenity that drives the design for redevelopment of the block. The alley provides connectivity as well as access to parking behind the residences on Progress Street and the buildings on Main Street. The townhomes below are a conceptual example of the back of buildings that could easily be adjacent to the alley. Also, planting a line of trees along the alley would provide an important link to nature as density is increased (See *Figure 4.15*).

**Figure 4.15 – Design details adjacent to public alleyways**



Row houses<sup>149</sup>



Davis, California<sup>150</sup>

The downtown development sketch below is a conceptual example of a dense, mixed use infill development that would be appropriate for the 500 Block of Main Street, with commercial uses on the ground floor and residential above (See *Figure 4.16*).

<sup>149</sup> Dean Brennan and Al Zelinka, *Row Houses*, Photograph, 2001, <https://planning.org/imagelibrary/details/9000663/>.

<sup>150</sup> *Walkable Aggie Village, Davis CA*, Photograph, accessed August 13, 2016, [http://www.huffingtonpost.com/f-kaid-benfield/we-want-more-walkable-nei\\_b\\_8678134.html](http://www.huffingtonpost.com/f-kaid-benfield/we-want-more-walkable-nei_b_8678134.html).

**Figure 4.16 – Mixed-use infill development**



Main Street, Memphis, Tennessee<sup>151</sup>

Attractive building corners and entrances should activate all sides of the development, including streets and the alley. Design elements for all corners and facades of the new commercial development of the Baptist Church property should “face” both the neighborhood and the downtown (See *Figure 4.17*).

**Figure 4.17 – Design details for corner buildings**



Chicago, Illinois<sup>152</sup>

<sup>151</sup> *Main Street Memphis Demonstration Block*, Sketch, accessed July 28, 2016, <http://www.hbginc.com/projects/adaptivereuse/main-street-demonstration-block/#.V5pHezXLmJk>.

<sup>152</sup> Marya Morris, *The Perfect Cup*, Photograph, 2001.

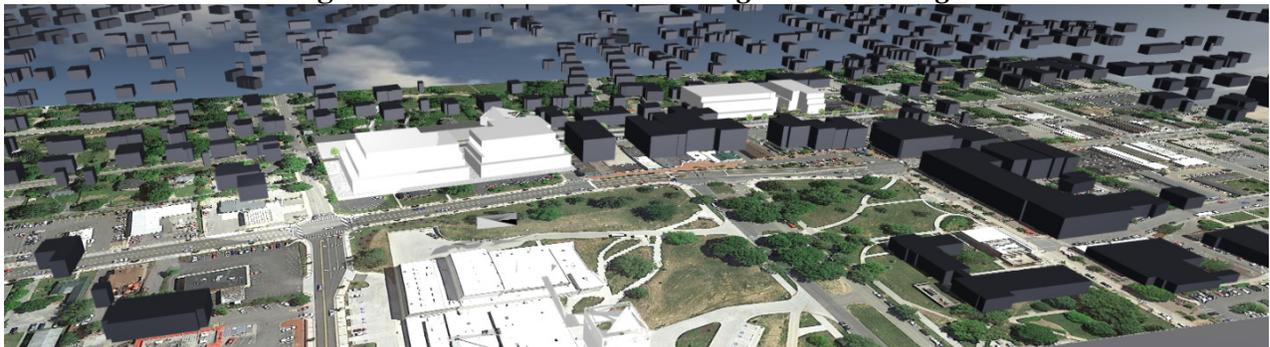
# Chapter 5

## 3D Experiment Findings

### **Introduction: *Imagine Blacksburg* research models presentation event**

The research component of this project included a pre-survey, presentation, post survey and debrief (See *Figure 1.2*). The event was held in the Advanced Research Computing Department at VT on December 9, 2016. Models of the conceptual infill developments suggested by *Imagine Blacksburg* were presented in two ways: as an immersive virtual tour in the *Visionarium*, and on the *Deep 6* computer station which displayed both static and revolving scenes of the models on four large monitors (See *Figure 5.2*). These models are also available online.<sup>153</sup> *Figure 5.1* is a screenshot of the online virtual environment. Fifteen participants experienced the 3D conceptual models for the Baptist Church properties at the 500 North Main Street and 500 Progress Street blocks, the connecting alley, and the parking lots at 221 Progress Street. Participants took a survey both before and after the presentation and participated in a debrief discussion afterward.

**Figure 5.1 – Online model of *Imagine Blacksburg***



Screenshot of online model display<sup>154</sup>

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<sup>153</sup> Nicholas Polys, “Cecile’s Thesis Project,” December 5, 2016, [http://metagrid2.sv.vt.edu/~npolys/3DBBurg/Cecile/Dec5/FlatWorld2\\_bin.html](http://metagrid2.sv.vt.edu/~npolys/3DBBurg/Cecile/Dec5/FlatWorld2_bin.html).

<sup>154</sup> *Ibid.*

**Figure 5.2 - *Deep 6* computer monitors presentation, Virginia Tech**



*Deep 6* computer monitors<sup>155, 156</sup>

**Figure 5.3 - *Visionarium* presentation, Virginia Tech**



*Visionarium* presentation<sup>157, 158</sup>

<sup>155</sup> Michael Hudson, *Research Video for Imagine Blacksburg*, Video, December 9, 2016.

<sup>156</sup> Todd Schenk, *Imagine Blacksburg Research Presentation Event*, Photographs, December 9, 2016.

<sup>157</sup> Hudson, *Research Video for Imagine Blacksburg*.

<sup>158</sup> Schenk, *Imagine Blacksburg Research Presentation Event*.

## Hypotheses

Two hypotheses were tested via this research. Likert scale data from the surveys was analyzed using the Wilcoxon matched-pairs signed ranks test. The hypotheses were:

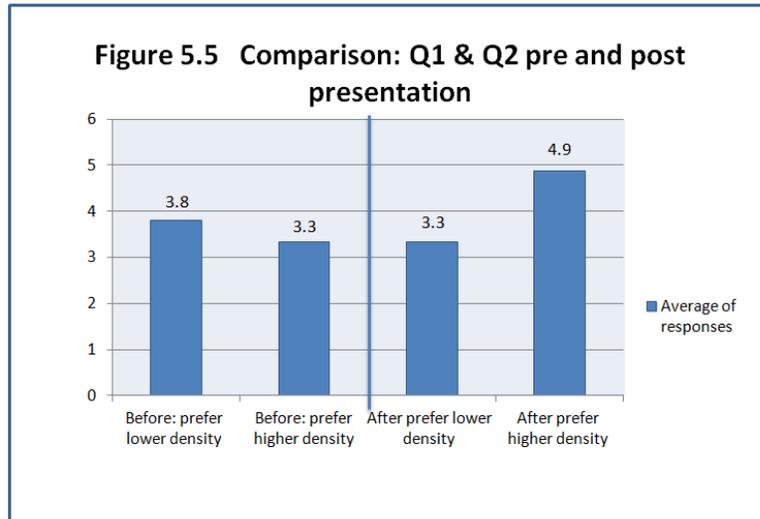
Hypothesis #1: Using 3D models to display proposed infill developments and site redevelopments increases stakeholder acceptance of increasing density. The 3D models reduce cognitive bias about increasing density and make people more open and amenable to proposed projects because they can see and feel the new development in a much more visceral way than they can with 2D site plans, renderings or drawings.

Hypothesis #2: Participants agree that using 3D models in land use planning and decision-making processes is superior to 2D site plans, renderings or drawings, such that using 3D modeling as a planning tool would facilitate better decisions.

### **Hypothesis 1 findings: 3D models increase acceptance of higher density**

Surveys tested participants' preference for higher density versus lower density using photos (See questions 1 and 2 in *Appendices B and C*) before and after the presentation of the models. Participants were asked how appropriate the 'building type and density' illustrated in the two photographs (low and high) would be for the project site. They ranked the appropriateness on a 7-point Likert scale from 'not at all/poor' (1) to 'always/very' (7). In accordance with hypothesis 1, there was a statistically significant increase from before to after in the participants' perceptions of the higher density photo, using a Wilcoxon matched-pairs signed ranks test. Therefore, we can reject the null hypothesis and conclude that the use of 3D models increased stakeholder acceptance of increasing density (See *Table 5.4*). As illustrated in *figure 5.5*, the mean response on participants' opinions on the appropriateness of the high-density photo increased from 3.3 to 4.9, a significant increase of 1.6. Conversely, mean response on participants' opinions on the appropriateness of the lower density photo only dropped by .5 from pre to post survey. This suggests that although the models increased acceptance of higher density, lower density generally remained more palatable.

Table 5.4 Density Questions Wilcoxon Test Results		
Matched-pairs signed ranks, one-tailed test		
Preference for higher density photo stronger		
Sample population	T-value	Level of significance
N=13	T=3	p<.05



The surveys and presentation event were catalysts for discussion above and beyond the survey questions. Participants engaged in discussion throughout the tour and debrief that truly imagined new options and ideas for higher density in Blacksburg, as well as ideas for improving 3D technologies as tools for land use planning. Some participants had a favorable view of increasing density prior to the presentation, while others arrived with a negative predisposition to increasing density. Most participants had a cautious or even suspicious approach to proposed development that increases density in the downtown core of Blacksburg.

After experiencing the presentation of the 3D models in both the immersive *Visionarium* and on the *Deep 6* computer monitors, the majority of the participants had a positive view of the possibilities presented by increasing density. One neighborhood representative admitted that he had a negative predisposition toward increasing density, and stated, “I must admit, my attitude toward higher density infill development in the neighborhood is much more positive after seeing the presentation.” The participants were keen to acknowledge that design details, multi-modal transportation infrastructure and public spaces are critical to successful implementation of projects that increase density above the limits currently allowed by Blacksburg’s zoning

ordinance. A town planner stated, “There are certain tipping points of density that you have to get to for some of the alternative transportation investments to work...we cannot make the car dependencies that are built into a relatively remote area go away just because we plunk down a little density here and there. So it has to be done extremely thoughtfully...it is tricky.”

Blacksburg is close to this density tipping point; by encouraging infill mixed-use developments the town will discourage traffic; alternatively, if housing is not built close to employment and commercial areas dependency on personal vehicles will increase, exacerbating traffic congestion and carbon emissions. Although single-occupancy-vehicle dependency has been common in Blacksburg, in the last few years college students have been collectively bringing fewer cars to town and seem to be relying increasingly on alternative transportation.<sup>159</sup> Infill and transit-oriented development in the commercial areas of town will encourage this trend to continue. If people live close enough to their workplace and commercial establishments that provide for daily needs, such as groceries, pharmacies and general merchandise stores, personal vehicles will be less necessary in Blacksburg.

While generally positive, it became clear that participants are concerned about how density is executed. Design details such as buildings that address the street on a pedestrian/human scale, buildings that address all directions when appropriate, the layout of residential units, private outdoor amenities, as well as location and treatment of public and open spaces, architectural design and materials, space around buildings, and cost of housing were mentioned as necessary for the success of higher density.

A town administrator stated that appropriate land uses are also critical to the success of density. “Design details and uses matter...in the *Visionarium* we saw massing diagrams of buildings...if those were just office spaces they would go dark at 5:00 p.m., whereas, if you have restaurants with outdoor dining you have people in those public spaces. You have to give people a reason to stay in those public spaces and activities so that people want to be there. It is about the design and uses.” A developer expanded the conversation by saying, “It is hard to build a development to attract people 24 hours a day, 7 days a week, so there have to be residential uses; they need to live there, they need a reason to be there.” Vertical mixed-use buildings that include

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<sup>159</sup> Town Staff, “Blacksburg Town Council Work Session” (public meeting, Blacksburg Town Council Work Sessions, Blacksburg, VA, 2017, 2016).

grocery stores, restaurants and other retail, housing for a variety of residents, parking and public spaces were mentioned as critical components of a dense environment. A planner mentioned that form-based code might be a good way to achieve the desirable mix of uses.

When asked who might live in the proposed buildings, a neighborhood representative said, “Probably upper-middle class people because they are going to be able to afford the parking...they are going to need to pay for structured parking so that it does not sprawl out into the neighborhood. It is going to be someone who is a professional.” On the other hand, a town planner stated “Density is ideal for lower-income when you combine it with transportation because you reduce transportation costs...so it may not automatically do that if you build structured parking, which raises the cost and prices people out of the market who it might be ideal for.” A graduate student suggested, “... you could find a way to cap the rent they are charging,” which led to discussion about requiring developers to include a certain percentage of affordable housing in multi-family buildings.

In response to the suggestion of requiring integration of affordability a town administrator said, “Affordability is tricky downtown because of construction costs.” He pointed out that in Blacksburg typical multi-family student rentals lease apartments by the bedroom. This format is more profitable than renting an entire unit to a family; therefore, banks are more likely to give financing to developers who build student housing. This financing phenomenon drives up the cost of construction in the area, making it difficult to convince developers to build non-student housing downtown where property values are high. “Student housing is the easiest thing to do here,” he said.

A neighborhood representative pointed out that when affordable and desirable housing is built in Blacksburg it is also attractive to the students, so it is less likely that young professionals or families would live there. One of his neighbors concurred, saying, “You cannot get the folks who actually want to live there as opposed to students.” He elaborated about the difficulties of building higher-density infill housing for non-students in the downtown area, “The density sort-of works against you for two reasons: we have these adjacencies with neighborhoods where you have single-family houses with pressure of density and student housing lifestyle issues right up against them.” These adjacencies fuel neighborhood opposition to new infill development.

The conversation expanded to include the difficulties of providing open space, a critical element of high density development. A community leader said, “The other thing I worry about

with more density downtown is the more you build, the more you need open space. There is a tradeoff between having some space and then giving it up for future development. If you do not reserve other spaces for folks to both mentally and physically not be in a dense environment all the time, you will make an area that ends up not being desirable.” An architecture professor added, “As long as there are cars people can move, and they will opt for sprawl development if there is no green space within the dense environment...the problem is how do you reserve that space at a point when it seems it is not needed.” These participants were expressing that decision-makers typically do not have the vision necessary to preserve large tracts of open space prior to growth and densification, before it is too late. Tension between development and open space preservation is especially difficult to navigate with centrally located, undeveloped, large parcels such as the former middle school site on South Main Street in Blacksburg.

Participants wondered if there are any examples of other college towns that have successfully densified, but nobody could think of an example. As part of this project I searched for an American success story to use as an example, but could not find one. “I think you could look at Davidson, North Carolina,” said a planning commissioner, “a lot of their new development has been done in concert with transportation.” A town administrator pointed out that in Davidson 100% of the college students live on campus, and that “they do not have the housing pressures that we have.”

The group did, however, discuss potential alternative audiences for this new housing. A town council member said, “There are a lot of professionals who want to live downtown. I think we need to construct residential units that appeal to professional people as opposed to students. What I am hearing from people my age (50-60) is that they want to downsize and move downtown to a condo, but there is no housing like that for them. My husband was saying that when he reaches the age that he cannot climb ladders and work in the yard he would like to live downtown, but he needs at least a balcony...somewhere in our home that he can go outside. It cannot just be an alley or parks, which are also needed, but I want my own private space that I can sit out with a cup of tea and watch people go by.” She believes that many professionals and retirees desire to “downsize” from their single-family homes to move downtown, but there is no housing that appeals to them available at this time. They are attracted to walkability to cultural and sporting events, restaurants and other entertainment and community events, as well as the

university campus. She stated the importance of design details that appeal to the demographic, such as private outdoor spaces, quality finishes and residential unit layout.

The town has an opportunity to set an example with the 221 Progress Street property by partnering with a developer to build a mixed-use development that includes professional and retiree housing as well as ground-floor retail. Perhaps once a successful development has occurred at 221 Progress Street developers would be likely to follow suit in the 500 block of North Main and Progress Streets.

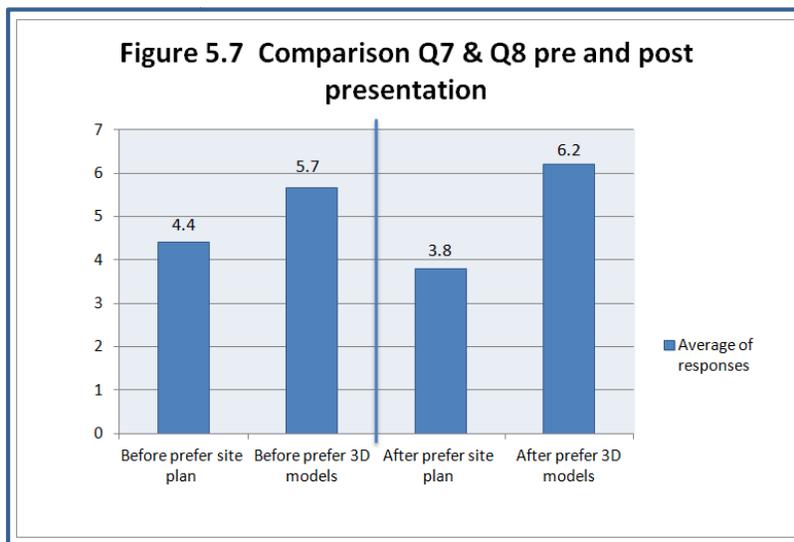
In terms of why participants would prefer density, many linked increased density to sustainability and environmental concerns. A planning commissioner stated, “Density is sort-of the antithesis to sprawl, so you kind-of lose all the negative aspects of sprawl, like highway infrastructure stretching out in linear corridors. So, if built correctly density is a net positive.” A town planner pointed out that higher density and alternative transportation have a reciprocal relationship for success, such that transportation infrastructure must be in place when density increases. Another planner said of open and public spaces, “how about changing what that green space looks like...not in the sense of large green open space, but plazas, outdoor dining, different places you can access in a block level that add up to valuable open space by paying attention to details.” Discussions throughout the presentation and debrief revealed that density is an appealing way for Blacksburg to handle growth. The 3D models stimulated conversation that touched on all of the reasons why clearly defined and illustrated plans are needed throughout the public planning processes to address and mitigate the impacts of proposed development.

### **Hypothesis 2 findings: participants prefer 3D models over traditional planning tools**

Survey questions also assessed participants’ preference for 3D models over 2D planning tools before and after the presentation of the models (See questions 7 and 8 in *Appendices B and C*). Question 7 asked participants to rank the effectiveness of examples of a 2D site plan and elevation pictures in helping them to visualize and understand the density and scale of potential development. Question 8 asked participants to rank the effectiveness of 3D renderings and models in helping them to visualize and understand the density and scale of potential development. They again ranked the appropriateness on a 7-point Likert scale from ‘not at all/poor’ (1) to ‘always/very’ (7). In accordance with hypothesis 2, there was a statistically significant increase from before to after in the participants’ preference for 3D models versus 2D

planning tools, using a Wilcoxon matched-pairs signed rank test. Therefore, we can reject the null hypothesis and conclude that using 3D models during land use planning and decision-making processes is superior to using 2D drawings and site plans (See *Table 5.6*). As illustrated in *figure 5.7*, the mean response on participants' preference for 3D models increased from 5.7 to 6.2, while preference for 2D tools decreased from 4.4 to 3.8. Interestingly, pre-survey results showed preference for models over site plans, although there was a stronger result in the post survey.

Table 5.6 Models Questions: Wilcoxon Test Results		
Matched-pairs signed ranks, one-tailed test		
Preference for models after presentation		
Sample population	T-value	Level of Significance
N=13	T=1	p<.05



Participants overwhelmingly agreed that 3D models would be a significant improvement over traditional planning presentation tools to aid the understanding of all stakeholders throughout the planning process. There was ample enthusiasm about the 3D tools, both in the *Visionarium* and on the *Deep 6* monitors. Participants unanimously consider these tools to be an effective way to educate the public on land uses. A town council member stated, “if we could bring the tool into a public building and as part of the public process citizens could see what it would actually look like...it would help so much in getting good development and stopping bad development...if our citizens could really see... because people do have trouble looking at plans,

any kind of plans, to get a sense of what it is going to look like on the ground.” Participants believe the models can provide context to zoning decisions about height, mass, setbacks, and other impacts, and would aid planners, commissioners and elected officials in making better land use decisions. Planning commissioners and town planners pointed out that 3D tools would be particularly valuable to long-range future land use planning.

Participants liked some aspects of the 3D scenario more than others. A town administrator said, “I like the fact that she gave the buildings enough space around them to allow for outdoor dining and other activities to happen outside the buildings. I also like that she stepped back the heights...it helps it fit into the scale of downtown better...and obviously I like the concept of a throughway for pedestrians and bicycles.”

Participants had differing opinions when asked to compare the *Visionarium* and *Deep 6* display. A neighborhood representative said, “I thought that looking at the monitors was more helpful than the *Visionarium*. If you could have an animation traveling at eye level going through the models on the monitors it would be just as valuable to me as the *Visionarium*. One of the developers said that the *Visionarium* was much more valuable to helping him see and feel the impact of development, while his business partner stated that he preferred the *Deep 6* monitors. The first developer said, “I like the sense of immersion; you can see it around you and that is a helpful thing...providing that additional scope of height. My partner is more visual and can get a lot by looking at a picture or computer monitor that I cannot get. I need more information, for example, if I could control the immersive model I would do the eye level (walk mode), stop and look around more.” The other developer said, “the immersion distracted me from the size and scale, I could see more on the monitors, and felt better about my perception of size and scale. In the *Visionarium* there was too much going on...existing buildings look as big as the new buildings sometimes.”

Participants spontaneously brainstormed about enhanced features for the technology. A town planner stated that she would want more manipulability within the simulated environment, including the ability to easily dial the heights of buildings up and down, change densities and setbacks, and illustrate shadows at various times of day while viewing and discussing the models. A neighborhood representative wished that he could see the proposed developments from his front porch in order to experience how they would impact his daily life at home.

The logistical difficulties of bringing an immersive 3D experience to various locations for public meetings was discussed as a reason to use monitors as opposed to immersive displays. However, an architect explained that he uses *Sketchup* regularly to show building models in a variety of locations and settings. “You can actually take tours through models, in fact I did one the other day...you can have animation in screen-size environments that show from the model standpoint both visual clarity of what is happening inside the building and then the view from inside the building as well as going around the building to see what is happening with elevation and context scale....” He suggested that Pictometry Imagery<sup>160</sup> may be a technology that can be used in the near future to place the models into views of the real landscape. Planners can currently employ this technology by bringing models on a laptop computer to meeting venues that have projectors and large screens to display the models. Looking forward, the most practical and impactful tools may be virtual reality (VR) and/or augmented reality (AR) glasses that can be worn as participants walk through actual neighborhoods, viewing proposed developments overlaid upon the existing environment.

### **Visualization technology: strengths and weaknesses**

The building models used in this research were purposely and intentionally plain and void of architectural details in order to draw participants’ focus to scale and density rather than to architectural styles. Additionally, the *3D Blacksburg* platform contains mostly non-descript buildings that are essentially gray blocks, modeled to the accurate size, scale and location of real buildings in Blacksburg. It was my intention to design the models similar to the platform. This design allowed the models to display the scale and density of the proposed buildings in relation to the built environment without drawing attention to other details. The proposed developments were highlighted simply by being modeled in a lighter shade than the existing buildings (See *Figure 5.8*). While the simplicity was intentional, many participants expressed the desire to see models that include architectural details, design, and context such that they could feel the familiarity of the real downtown.

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<sup>160</sup> *CONNECTExplorer*.

**Figure 5.8 - Online model of *Imagine Blacksburg***



Virtual models placed in the 3D Blacksburg platform<sup>161</sup>

Some participants were frustrated by the lack of detail and context in the models. A graduate student remarked, “I wish the architectural features were on the existing buildings,” while another graduate student said, “I wish there was more differentiation between the real buildings and the models.” Based on my experience on planning commission and town council in Blacksburg, this is representative of many citizens and decision makers. Many people need detail and context to augment their imaginations. Participants stated that the models would be more purposive if they included windows, doors, balconies, landscaping and other accurate contextualizing details. A town planner stated that the models were “wildly contextualized,” and that “most people cannot relate to buildings without features.” I agree that these contextualizing details would be necessary in the case of a specific proposed development, but they were not appropriate for this research.

Design and use details are of paramount importance in zoning and building decisions, and so would be imperative for models for use in real-world planning and public decision-making processes. Two neighborhood representatives stated that “artist or architectural renderings (for proposed developments) are always beautiful,” and that “concept drawings make you feel lied to.” They liked the models because “the scale stands out, showing the dominant force of the how the development would move the gravity of downtown.” A developer agreed, saying that “the gray boxes are beneficial to planning, especially zoning, to see how high the buildings should be.”

The cost of computer equipment and software, as well as the technical ability and time required to develop large, detailed, accurate 3D models is significant, perhaps even

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<sup>161</sup> Polys, “Cecile’s Thesis Project.” [http://metagrid2.sv.vt.edu/~npolys/3DBBurg/Cecile/Dec5/FlatWorld2\\_bin.html](http://metagrid2.sv.vt.edu/~npolys/3DBBurg/Cecile/Dec5/FlatWorld2_bin.html)

insurmountable for practical planning purposes. Developing a 3D model of the entire town that includes all architectural and landscape details is not likely in towns without Computer Science and Geographic Information Systems (GIS) college programs such as Virginia Tech's. In fact, developing the *3D Blacksburg* model has been a years-long project that is still lacking many details and buildings. However, it is reasonable that less extensive 3D modeling can either replace or be included with 2D drawings from architects and developers who are presenting plans to the town in the near future. Even small-scale models would be a valuable addition to traditional planning visualization tools.

The Downtown Alternative Transportation Corridor (DATC) was modeled with conceptual details in order to bring to light the potential of the alley as a public thoroughway for bicycles and pedestrians. Participants were excited by this opportunity, expressing that they had not envisioned it independently, but that the detailed model showed them the value of the alley as public space, especially in a denser built environment. It was obvious that details such as trees, cars, people, public spaces and buildings provided enough context to elicit excitement and lively discussion amongst participants. A town planner pointed out that creating small public spaces such as outdoor dining, seat-walls, linear pathways, and so on can add up to a critical mass of open space that positively impacts daily life and makes higher density more acceptable.

The value of 3D models in planning processes (hypothesis 2) was relatively easily tested and affirmed with the methods and tools used in this research. Whether or not these models can positively shift users' perceptions of density (hypothesis 1) is more complicated. The findings seem to suggest this, but the real affirmation came through the more qualitative findings collected during the workshop debrief. Quantitatively assessing the first hypothesis more robustly would require much more time and expertise in creating more detailed models and a much more detailed terrain and realistic existing environment platform to place them in. Also, if a bigger sample size could be accommodated in the facility the results would have been stronger.

### **Survey limitations**

Survey questions 3-6 (See *Appendix C*) used pictures to display a variety of developments intended to invoke participants' views of density. However, the photos did not make clear distinctions between the fact that the first photo was a by-right density concept and

the second was a higher density concept. It is possible that participants defaulted to the photo that was most attractive to them based on their aesthetic preferences. That is, it is impossible to know if participants were responding to density or whether they prefer one building style over the other. The questions would have been clearer if they had included a photo of the existing development and a photo of a higher density development on the same site, as in questions 1 and 2. Additionally, questions 1-6 were too vague, and the photos did not make the judgment criteria clear.

The survey would have been more conclusive if I had asked pointed questions in both the pre- and post surveys about participants' views of density both before and after the presentation. Post survey questions 9-11 gave solid results as to the change of perceptions invoked by the models; however, these questions were not on the pre-workshop survey, so even though they provide conclusive evidence for the first hypothesis, it was not possible to glean information on any changes in a comparative sense (See *Appendix C*). Questions 7 and 8 were sufficiently clear to produce results for the second hypothesis; the pictures are actual site plans, renderings and pictures of 3D computer models. Participants gave conclusive answers that supported hypothesis 2 (See *Appendix B and C*). The survey design could have been improved by asking more pointed questions both before and after, and by using fewer, more explicit photographs.

## **Conclusion**

This research suggests that 3D models can significantly improve public planning processes and land use planning decisions. The survey instrument and video tape of the event provided robust analysis materials. The models and technology sparked enthusiasm and interest, such that participants were excited and talkative throughout the presentation, discussing their reactions to the models, the effectiveness of the tools, and future possibilities for the technology. The visual computing equipment available in the VT ARC laboratory and the ongoing expansion of the *3D Blacksburg* model by Dr. Polys provided invaluable visualization methods to test both hypotheses. It was evident from the conversations that the models brought the development idea and possibilities to life in ways that 2D tools do not. Also, my unique position and established relationships in Blacksburg enabled me to involve key stakeholders as participants. The nexus of urban planning and architecture created by the involvement of committee member Donna Dunay and graduate student Andres Del Pozo provided insight and design expertise that greatly

enhanced the project. It also catalyzed relationships between the ARC Visualization Group and both the Urban Affairs and Planning Department and the Architecture Department. Introducing the participant group to the use of the ARC laboratory and visual computing equipment for urban planning purposes exposed town planners and citizens to the possibilities of this technology.

# Chapter 6

## Discussion, Recommendations and Conclusion

### Discussion

#### Summary of study

This work presents ideas for increasing density and livability in Blacksburg's downtown. Research and examples of other communities, as well as national trends have shown that the ideas are likely to succeed if implemented. Additionally, the 3D model experiment and data have proven the value of 3D models as a useful tool for changing perceptions and making decisions surrounding increasing density. The 3D models allow users to see and feel proposed developments much more tangibly than traditional 2D renderings and site plans. To be useful in the real-world public planning process 3D models should be architecturally accurate. Details of the buildings, landscape, transportation infrastructure and public spaces should be realistic in order for decision-makers to judge the quality and intention of the development. As the technology develops placing the models in the real context of the townscape will be even more valuable.

The Town of Blacksburg values sustainability through balancing social equity, economic development and environmental protection.<sup>162</sup> The community, comprehensive plan and political actors are supportive of new policies and laws that can be adopted and implemented to meet the needs of these three conflicting interests. The development conflicts between social equity and environmental protection, the resource conflicts between environmental protection and economic development, and the property conflicts between economic development and social equity<sup>163</sup> all must be addressed by a continuous balancing act of the needs and interests of the community. Simply stating the desire to be sustainable in the comprehensive plan is idealistic and

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<sup>162</sup> "1996-2046 Blacksburg Comprehensive Plan." "A Sustainable Community" Chapter

<sup>163</sup> Campbell, "Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of Sustainable Development." p.297-300.

ineffective.<sup>164</sup> Concrete policies, strategies and objectives must be implemented in order to achieve sustainability goals.

### **Suggestions for the future – how to achieve Blacksburg’s Planning Goals**

Blacksburg has a well-established planning department and a citizenry interested in land use. Numerous individuals on town staff have advanced college degrees and experience in urban planning. This results in frequent updates and ample attention to the comprehensive plan. However, this attention has not translated to the zoning code. The most recent significant changes to Blacksburg’s zoning code were made in 1997. Blacksburg’s planners should take a more facilitative role in educating elected officials and the public about changes that can be made to the zoning code that codify tools and zoning district standards to affect sustainability measures. For example, in terms of economic stability, the town needs a diversified housing market for employees at various socioeconomic levels.<sup>165</sup> Diversified housing is more likely to be built if the zoning code includes density bonuses in exchange for meeting standards for affordable units, green building, and transit-oriented development. Elements of form-based code can also be implemented to provide development that decreases sustainability conflicts.

New investment in properties in both the downtown district, as well as other commercial areas can be expected to benefit the existing neighborhoods by stimulating investments in sales and renovations that are likely to attract diverse residents and homeowners. Increasing the population living within walking distance of downtown will also support existing businesses and encourage additional businesses to open downtown. However, to reduce the negative externalities of gentrification provisions should be made to ensure housing meets a variety of price points. Because the existing Blacksburg Affordable Housing Program in the Bennett Hill-Progress neighborhood has pre-dated new development, a small amount of long-term affordable housing is already provided for low-to-moderate income single-family homeowners. Density bonuses or other incentives can be offered in exchange for a percentage of affordable units in any future multi-family developments as well.

*Imagine Blacksburg’s* urban infill development concept can be applied to other sites in town, including the vacated Old Blacksburg Middle School property on South Main Street, the

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<sup>164</sup> Ibid. p.296

<sup>165</sup> “1996-2046 BLACKSBURG COMPREHENSIVE PLAN.” p.21.

length of Church Street, and perhaps other transitional residential (R-5) and commercially-zoned districts. Alley improvements are a logical link between sites and can be used to create a cohesive and logical widening of the core downtown. It is often impossible to add bicycle lanes to existing streets due to unavailable right of way. Transforming the existing alley into an alternative transportation corridor demonstrates how the town can create safe bicycle routes in areas of town where it is not possible to add bicycle lanes to existing roads. There are alleys throughout town, both improved and unimproved, that should be preserved as public property in perpetuity for the purpose of creating this type of public thoroughways.

Providing diversified housing opportunities, improving infrastructure and connectivity, and increasing density in ways that enhance both the adjacent low-density neighborhoods and the commercial downtown should be the guiding principles for redevelopment. The old middle school site on South Main Street is an important area for future housing as well as research and development. Additionally, the site is expected to “become a key anchor contributing to the vibrancy of Downtown Blacksburg.”<sup>166</sup> The same principles can be applied to the other commercially-zoned areas in town, such as University City Boulevard, and North and South Main Street. These areas would benefit from mixed use redevelopment that provides residential units above commercial uses. The residents would also benefit from proximity to public transit, employment areas and shopping and entertainment.

## **Recommendations**

### **Future research suggestions**

This research could be expanded into the realm of real-world urban planning by designing 3D models based on actual development, rezoning or conditional use permit applications. The models could be included as a supplement to the traditional presentation tools provided by applicants. Partnering with a psychology or sociology student as well as an architecture or landscape architect student, and computer scientists would contribute interesting dimensions to the research. The models could be displayed throughout the public hearing process, thereby providing input data from neighborhood meetings, subcommittee meetings, planning commission work sessions and public hearings, and town council work sessions and

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<sup>166</sup> Ibid. p.2.

public hearings. This process could generate valuable data on the use of planning tools to citizens, applicants, professional stakeholders, and appointed and elected officials. The data would inform development of 3D modeling technology for practical purposes in land use planning.

### **Applying 3D models to planning practice**

As communities plan for increased density and urbanization tools such as 3D models should be used to educate the public about the positive benefits versus negative aspects of density, and to allay fears or cognitive biases that hinder the process. Further, 3D models can reduce frustration over stakeholders' inability to visualize proposed ideas and developments. 3D models are successful at piquing interest, stimulating discussion and ideas about density, development and land uses. When all stakeholders have the same clear vision of the design details, scale, mass, and density of the development proposal discussions are productive and focused on the aspects of the project that are relevant to the public process. The same 3D models should be shown throughout the process to all stakeholders to focus conversations and considerations on the impacts of the proposed development.

Participants in the experiment were excited and interested in the potential use of 3D planning tools, and would like to see them integrated into the public planning process. However, 3D models being used for public planning processes should include meaningful architectural and site design details. Stakeholders cannot fully accept higher density proposals with the use of gray block building models. To move forward a financially viable version is necessary to make 3D models accessible for public meetings, open houses, on websites, and so on. While the immersive *Visionarium* is not likely to be feasible on this scale, perhaps a combination of somewhat mobile 3D immersion spaces and 2D screens, or the use of optical head-mounted displays, (i.e., AR and VR) will be developed for this use.

### **Conclusion**

For some United States residents, raised in and accustomed to a more monocultural, suburban environment, a cognitive bias may exist against increasing density in their neighborhoods and communities. Many reasons, both valid and invalid have served to create and perpetuate such an "anti-density" disposition. However, these reasons are becoming

unreasonable, and perhaps moot, due to population growth, climate change and other environmental factors, and economic realities, in addition to changing location preferences. Increasing density is an important land use tool to create sustainable, “live-work-shop” neighborhoods that provide housing, employment opportunities, and multi-modal transportation options that meet human needs in accordance with the demands of the 21<sup>st</sup> century. Many prefer to live in urban areas as opposed to being isolated in the suburbs. Single-occupancy vehicle commuting is appearing increasingly unsustainable, and walkable communities are highly desirable by young millennials, working professionals, and senior retirees. Blacksburg’s future growth should be designed and developed through a process of thoughtful and carefully calibrated urbanization.

As research by behavioral economists have revealed, the public good can be ameliorated through effective public messaging.<sup>167</sup> As this research has demonstrated, educating the public and decision-makers is an important, and imperative, component to changing cognitive biases and expanding perceptions about preferable development and land uses. 3D models are a valuable tool for land use planning and public policy processes; the use of these tools by planners is key to timely zoning changes to allow development that increases density. The doubting public can be educated, in part by 3D models, to better understand quality of life issues that are directly connected to increased density such as the density versus sprawl dilemma, energy usage and demands, access to affordable housing, positive health effects and community well being.

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<sup>167</sup> Cass R. Sunstein and Richard H. Thaler, *Nudge – Improving Decisions about Health, Wealth, and Happiness* (New Haven, CT: Yale University Press, 2008).

## References

- “3D Blacksburg.” Education. *Center for Geospatial Information Technology*, 2017.  
<http://www.cgit.vt.edu/research/projects/3d-blacksburg.html>.
- “1996-2046 Blacksburg Comprehensive Plan.” Town of Blacksburg, update 2014.  
<http://tobweb.org/docs/comp%20plan/Individual%20Chapters/Introduction.pdf>.
- A Bird’s Eye View Yards, Streets, Parks and More. Visualizing Density*. Photographs. Accessed October 21, 2016. <http://datatoolkits.lincolninst.edu/subcenters/visualizing-density/tour/t6.aspx>.
- “Affordable Housing Fourth Year Annual Action Plan.” Town of Blacksburg, 2015.  
<http://www.blacksburg.gov/Home/ShowDocument?id=3564>.
- Badger, Emily. “The next Big Fight over Housing Could Happen, Literally, in Your Back Yard.” *The Washington Post*. August 7, 2016.  
[https://www.washingtonpost.com/news/wonk/wp/2016/08/07/why-building-a-home-on-your-own-land-has-become-so-controversial/?hpid=hp\\_rhp-more-top-stories\\_no-name%3Ahomepage%2Fstory](https://www.washingtonpost.com/news/wonk/wp/2016/08/07/why-building-a-home-on-your-own-land-has-become-so-controversial/?hpid=hp_rhp-more-top-stories_no-name%3Ahomepage%2Fstory).
- “Bike Blacksburg Bicycle Master Plan 2015.” Town of Blacksburg, 2015.
- “Blacksburg 2046, 2016 Amendments.” Town of Blacksburg, 2016.
- “Blacksburg, Virginia - Code of Ordinances. Appendix A-Ordinance No. 1137 Blacksburg Zoning Ordinance. District Standards.” Town of Blacksburg, June 23, 2016.  
[https://www2.municode.com/library/va/blacksburg/codes/code\\_of\\_ordinances?nodeId=CO\\_APXAORNO1137BLZOO\\_ARTIIDIST\\_DIV14DOCODI\\_S3142SIDEST](https://www2.municode.com/library/va/blacksburg/codes/code_of_ordinances?nodeId=CO_APXAORNO1137BLZOO_ARTIIDIST_DIV14DOCODI_S3142SIDEST).
- “Blacksburg WebGIS View Online Maps, Zoning Map.” Government. *Town of Blacksburg*, July 18, 2016. <http://www.blacksburg.gov/home/showdocument?id=9>.
- Brennan, Dean, and Al Zelinka. *Row Houses*. Photograph, 2001.  
<https://planning.org/imagelibrary/details/9000663/>.

- Campbell, Scott. "Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of Sustainable Development." *Journal of the American Planning Association* 62, no. 3 (November 26, 2007): 296–312.
- "CDOT Make Way for People." Government. *City of Chicago*, 2010. [https://www.cityofchicago.org/city/en/depts/cdot/supp\\_info/make\\_way\\_for\\_people.html](https://www.cityofchicago.org/city/en/depts/cdot/supp_info/make_way_for_people.html).
- Chittum, Matt. "Roanoke City Council Approves Hotel on Top of Market Garage." *The Roanoke Times*. December 17, 2013. <http://www.roanoke.com/news/local/roanoke/>.
- Coddington, Henry. *Photos of 3 Catalyst Sites in Downtown Blacksburg*. Photographs, June 2016.
- CONNECTExplorer*. U.S.A.: Eagleview Pictometry, 2016. <http://explorer.pictometry.com/index.php>.
- "Cost of Community Services Studies." American Farmland Trust, August 2010. [farmlandinfo.org](http://farmlandinfo.org).
- Craiglow, Wes. "City Planning Like a Farmer & Urban Crop Yield." Educational presented at the TEDx, University of Central Arkansas, March 4, 2016. <http://www.strongtowns.org/journal/2016/5/26/non-typical-city-planner-thinking>.
- Davis CA Hallmark Inn*. Photograph, 2012. [https://www.tripadvisor.com/Hotel\\_Review](https://www.tripadvisor.com/Hotel_Review).
- Del Pozo, Andres Salazar. *Blacksburg 3D*. Sketchup Modeling Software, December 2016.
- Development Strategies. "Downtown Blacksburg Housing Market Strategy." Print. Blacksburg, VA: Town of Blacksburg, July 2015.
- Downing, Kate. "Letter of Resignation from the Palo Alto Planning and Transportation Commission," August 10, 2016. <https://shift.newco.co/letter-of-resignation-from-the-palo-alto-planning-and-transportation-commission-f7b6facd94f5#.8bvkaen1a>.
- Downs, Anthony. "Smart Growth: Why We Discuss It More Than We Do It." *Journal of the American Planning Association* 71:4 (November 26, 2007): 367–78.

- EAG. *Blacksburg VA Summer 2008*. Photograph, July 27, 2008.  
[https://en.wikipedia.org/wiki/File:Blacksburg\\_VA\\_Summer\\_2008.jpg](https://en.wikipedia.org/wiki/File:Blacksburg_VA_Summer_2008.jpg).
- Forer, Dan. *Ballet Valet Parking Garage*. Photograph, n.d.
- Gass, Catherine. *Alleys Incorporating Green Alley Principles*. Photograph, 2009.  
<http://burnhamplan100.lib.uchicago.edu/newberryexhibit/green-metropolis/managing-water.shtml>.
- Griffin, Jennifer. “Affordable Urban Lifestyles for Millennials with Children, Part II.” Education. *Strong Towns*, July 12, 2016.  
<http://www.strongtowns.org/journal/2016/7/11/affordable-urban-lifestyles-for-millennials-with-children-part-ii>.
- . *Tulsa, OK: Housing Types within Collar Neighborhoods*. Photograph, July 12, 2016.  
<http://www.strongtowns.org/journal/2016/7/11/affordable-urban-lifestyles-for-millennials-with-children-part-ii>.
- Hirt, Sonia. “The Devil Is In The Definitions: Contrasting American & German Approaches to Zoning.” *Journal of the American Planning Association* 73, No.4 (Autumn 2007): 436–53.
- . “To Zone or Not to Zone? Comparing European and American Land-Use Regulation.” *PNDonline*, 2010. [www.planung-neu-denken.de](http://www.planung-neu-denken.de).
- “Hnedak Bobo Group.” Industry. Accessed July 28, 2016.  
<http://www.hbginc.com/projects/adaptivereuse/peabody-place-historic-redevelopment/#.V5pIhjXLmJk>.
- Hudson, Michael. *Research Video for Imagine Blacksburg*. Video, December 9, 2016.
- Jacobs, Jeffrey. *Peabody Place Historic Redevelopment*, 2010.  
<http://www.hbginc.com/projects/adaptivereuse/peabody-place-historic-redevelopment/#.V5pIhjXLmJk>.
- Knaap, Gerrit, and Emily Talen. “New Urbanism and Smart Growth: A Few Words From The Academy.” *International Regional Science Review* 28, no. 2 (April 2005): 107–18.
- Larsen, Kristin. “New Urbanism’s Role in Inner-City Neighborhood Revitalization.” *Housing Studies* 20, no. 5 (September 2005): 795–813.

“Lifelong Communities Handbook: Creating Opportunities for Lifelong Living.” Atlanta Regional Commission, 2015. <http://atlantaregionsplan.com/>.

“Lincoln Institute of Land Policy.” Education. *Visualizing Density*, 2016. <http://www.lincolninst.edu/subcenters/visualizing-density/>.

“Live, Work, Sell Arts Overlay Zone.” Government. *Town of Blacksburg*, July 26, 2016. <http://www.blacksburg.gov/community/arts-and-culture/arts-and-cultural-district-incentive-zones/live-work-sell-arts-overlay-zone>.

*Main Street Memphis Demonstration Block*. Sketch. Accessed July 28, 2016. <http://www.hbginc.com/projects/adaptivereuse/main-street-demonstration-block/#.V5pHezXLmJk>.

Morris, Marya. *The Perfect Cup*. Photograph, 2001.

“National Complete Streets Coalition.” Education. *Smart Growth America*, 2017. <https://smartgrowthamerica.org/program/national-complete-streets-coalition/>.

Nelson, Arthur C. “The New Home Ownership Reality.” *Planning, The Magazine of the American Planning Association*, June 2016.

*New Statistics from the Office for National Statistics (ONS) Revealed That More than Three Million People Now Live in a Household with at Least Five Other Individuals*. Photograph, July 19, 2016. <http://www.telegraph.co.uk/news/politics/10863346/Figures-show-surge-in-overcrowded-homes.html>.

Newcomb, Cecile. *Imagine Blacksburg 3D Renderings*. Sketchup Modeling Software, November 2016.

———. *Photos of Sites in Downtown Blacksburg and Bennett-Hill/Progress Neighborhood*. Photographs, June 2016.

———. *Residential Buildings on Progress Street, Blacksburg VA*. Photograph, June 2016.

*Nicely Designed Parking Garage in Staunton*. Photograph, October 9, 2013. <https://citybiketrips.com/2013/10/09/shenandoah-valley-lexington-to-staunton-and-back-921-222013/>.

- Nygaard, Aileen. The use of 3D models by the Planning Department of Pismo Beach, CA. Telephone, March 1, 2017.
- Ooi, Joseph T.L., and Thao T.T. Le. “The Spillover Effects of Infill Developments on Local Housing Prices.” *Regional Science and Urban Economics* 43 (2013): 850–61.
- Pieprz, Dennis. *Mexico City Squares*. Photograph, April 28, 2016. <http://commonedge.org/why-mexican-squares-may-be-the-best-public-spaces-in-the-world/>.
- Polys, Nicholas. “Cecile’s Thesis Project,” December 5, 2016. [http://metagrid2.sv.vt.edu/~npolys/3DBBurg/Cecile/Dec5/FlatWorld2\\_bin.html](http://metagrid2.sv.vt.edu/~npolys/3DBBurg/Cecile/Dec5/FlatWorld2_bin.html).
- Price, Andrew Alexander. “Granularity.” Weblog. *AndrewAlexanderPrice*, October 21, 2015. <http://www.andrewalexanderprice.com/blog20151021.php#.V69nZa3LmJk>.  
———. “Human-Scale Streets.” Weblog. *AndrewAlexanderPrice*, April 22, 2014. <http://www.andrewalexanderprice.com/blog20140422.php#.V6909q3LmJl>.
- Saitowitz, Stanley. *50 Oakwood*. Photographs. Accessed October 22, 2016. <http://www.saitowitz.com/work/50-oakwood/>.  
———. *Garden Village*. Photographs. Accessed October 21, 2016. <http://www.saitowitz.com/work/garden-city/>.
- Scally, Derek. “How Copenhagen Reshaped Minds by Reshaping Roads.” *Irish Times*. April 20, 2016. <http://www.irishtimes.com/news/health/how-copenhagen-reshaped-minds-by-reshaping-roads-1.2606388>.
- Schenk, Todd. *Imagine Blacksburg Research Presentation Event*. Photographs, December 9, 2016.
- “Site Plan, Rendering.” Town of Blacksburg website, October 16, 2016.
- Staff, Town. “Blacksburg Town Council Work Session.” Public meeting presented at the Blacksburg Town Council Work Sessions, Blacksburg, VA, 2017 2016.
- Sunstein, Cass R., and Richard H. Thaler. *Nudge – Improving Decisions about Health, Wealth, and Happiness*. New Haven, CT: Yale University Press, 2008.

“Tea Party.” Political. *Tea Party Teaparty.org*, 2017. <https://www.teaparty.org/>.

Torma, Carolyn. *The District at Green Valley Ranch*. Photograph, 2007.

———. *Townhouses Glenview IL*. Photograph, 2005.

<https://planning.org/imagelibrary/details/9001481/>.

“Town Council Strategic Goals.” Government. *Town of Blacksburg*, April 12, 2016.

<http://www.blacksburg.gov/town-council/town-council/strategic-goals>.

“Town of Blacksburg Economic Development Strategy Update.” Arnett Muldrow and Associates, April 2013.

“Town of Blacksburg Residential Infill Development Guidelines.” Town of Blacksburg, December 2011.

unknown. *Pico Boulevard Mixed-Use Development*. City of Santa Monica. Accessed November 7, 2016. <http://www.smmirror.com/articles/News/Mixed-Used-Development-For-Former-Grammy-Building-In-Santa-Monica-To-Be-Studied/36189>.

*Urban Cohousing Google Search*. Accessed November 2, 2016.

[https://www.google.com/search?q=urban+cohousing&biw=1152&bih=544&source=lnms&tbm=isch&sa=X&sqi=2&ved=0ahUKEwixrYKDhYrQAhXHRCYKHWa8A2YQ\\_AUIBigB&dpr=1.67#q=urban%20cohousing&tbm=isch&tbs=rimg%3ACbXF3JzOGa74IjgAfzuyt7m85XevEwCKHxTKtPFwOeE5cnDgFcvuRe9X4vDr63JX8HmZ6tEQhVZam6q9QzUdVc\\_1ZXioSCQB\\_1O7K3ubzIEcewkrfNeJOMKhIJd68TAIofFMoRVDHbJeMaBIYqEgm08XA54TlycBEamBwjhLUq5yoSCeAVy-5F71fiEV5\\_1Vrn7MWS8KhIJ8OvrclfwZkR1R9XwIDCwYoqEgnq0RCFVlqbqhEFXVbMiewPdioSCb1DNR1Vz9leEUeZmn27-A9i&imgrc=mekHx26-ZBqViM%3A](https://www.google.com/search?q=urban+cohousing&biw=1152&bih=544&source=lnms&tbm=isch&sa=X&sqi=2&ved=0ahUKEwixrYKDhYrQAhXHRCYKHWa8A2YQ_AUIBigB&dpr=1.67#q=urban%20cohousing&tbm=isch&tbs=rimg%3ACbXF3JzOGa74IjgAfzuyt7m85XevEwCKHxTKtPFwOeE5cnDgFcvuRe9X4vDr63JX8HmZ6tEQhVZam6q9QzUdVc_1ZXioSCQB_1O7K3ubzIEcewkrfNeJOMKhIJd68TAIofFMoRVDHbJeMaBIYqEgm08XA54TlycBEamBwjhLUq5yoSCeAVy-5F71fiEV5_1Vrn7MWS8KhIJ8OvrclfwZkR1R9XwIDCwYoqEgnq0RCFVlqbqhEFXVbMiewPdioSCb1DNR1Vz9leEUeZmn27-A9i&imgrc=mekHx26-ZBqViM%3A).

Velazco, Emmanuel. “3D Digital Modeling For Urban Design + Planning.” City of Pismo Beach, June 2012.

*Walkable Aggie Village, Davis CA*. Photograph. Accessed August 13, 2016.

[http://www.huffingtonpost.com/f-kaid-benfield/we-want-more-walkable-nei\\_b\\_8678134.html](http://www.huffingtonpost.com/f-kaid-benfield/we-want-more-walkable-nei_b_8678134.html).

## Appendix A. Debrief questions

This is a list of possible questions to prompt discussion after participants have seen the 3D models presentation in both the *Visionarium* and on *Deep 6*. The discussion is semi-structured and will focus on the presentation and research topic.

### Perception questions:

Describe your perception of significantly increased residential and commercial density in the Downtown commercial area, including 221 Progress Street.

Describe your perception of increased residential density on the residential portion of Progress Street.

Overall would you say your view of increasing density in these areas is negative or positive?

Do you consider density more sustainable (environmentally, economically and socially) than sprawl?

How do you think density affects transportation and traffic?

When you think of high-density developments, who do you envision living there?

### Questions reflective of the Visionarium presentation:

What are your thoughts about the alley/bicycle throughway? How important were the models in helping you to envision this concept?

How did your experience in the Visionarium change your perspectives on density?

What aspects did you like about the higher density scenario?

What did you dislike about the higher density?

Do you think that having access to 3D models of proposed developments would help you make decisions about allowing zoning changes, conditional use permits, etc?

Did seeing the design in the Visionarium change your mind about increased density on Progress Street?

What role could the Visionarium have in current development processes?

Who should have access to 3D planning tools?

Evaluate the Visionarium against other ways you have been presented proposals.

Are the generic blocks a problem for you as far as helping you to envision density?

Would it be better to have detailed buildings in the model?

Do you think this tool would be a good conduit for public participation?

How would this tool change the dynamic between town council and the planning commission and between residents and town officials?

If your perceptions changed because of this experience what was it about the Visionarium that changed your mind?

What are the drawbacks to using this tool?

How might the models have misrepresented density?

## Appendix B. Pre-event survey

IRB 16-947

This survey is expected to take approximately 5 minutes to complete.

You will be able to save the survey and finish later if necessary. However, the survey is only available for one week.

### **Confidentiality statement:**

The purpose of this survey is solely for the purpose of fulfilling the research portion of the Master's Degree thesis project of Cecile Newcomb, a candidate in the Masters of Urban and Regional Planning program at Virginia Tech. Data from this survey will be stored securely and accessed only by the researcher. All survey data is anonymous; identifying information will not be recorded.

The future of the Progress Street and Main Street area is being considered due to the ownership status of the entire block of 500 N. Main and 500 Progress Street (Baptist Church properties) and 221 Progress Street (town-owned parking lot), as well as the expectation of growth in Blacksburg. This project envisions urban infill development for these sites that increases density and provides housing attractive to non-undergraduate-student populations in keeping with the objectives stated in Blacksburg's planning documents.

The pictures in this survey are meant to be conceptual examples of building types and density only; they are NOT meant to be presented as specific development proposals.

FOR EACH OF THE QUESTIONS or STATEMENTS BELOW, PLEASE CIRCLE THE (MOST) CORRECT ANSWER. PLEASE ANSWER FROM YOUR OWN PERSPECTIVE. FOR THE QUESTIONS ON A SCALE FROM 1 TO 7, 1 IS THE LEAST CONFIRMING (I.E., 'NOT AT ALL' OR 'VERY POOR') AND 7 IS THE STRONGEST CONFIRMATION (I.E., 'ALWAYS' OR 'VERY').

1. The buildings in the two pictures below are appropriate building types and density for the 500 block of Progress Street.



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2. The buildings in the picture below are appropriate building types and density for the 500 block of Progress Street.



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<sup>168</sup> Coddington, *Photos of 3 Catalyst Sites in Downtown Blacksburg.*

<sup>169</sup> "Lincoln Institute of Land Policy."

3. The development in this rendering shows appropriate building types and density for the Baptist Church site on the 500 block of Main Street (commercial parcel).



4. The building below would be an appropriate building type and density at the Baptist Church site on the 500 block of Main Street (commercial parcel).



5. The parking garage in this photo would be an appropriate building type and density at the town-owned Progress Street parking lot.

<sup>170</sup> Davis CA Hallmark Inn.

<sup>171</sup> unknown, *Pico Boulevard Mixed-Use Development*, City of Santa Monica, accessed November 7, 2016, <http://www.smmirror.com/articles/News/Mixed-Used-Development-For-Former-Grammy-Building-In-Santa-Monica-To-Be-Studied/36189>.



172

6. The mixed use building below, which includes structured parking, would be an appropriate building type and density at the town-owned Progress Street parking lot.



173

7. Pictures of site plans and renderings such as these help me to visualize and understand the density and scale of potential development.

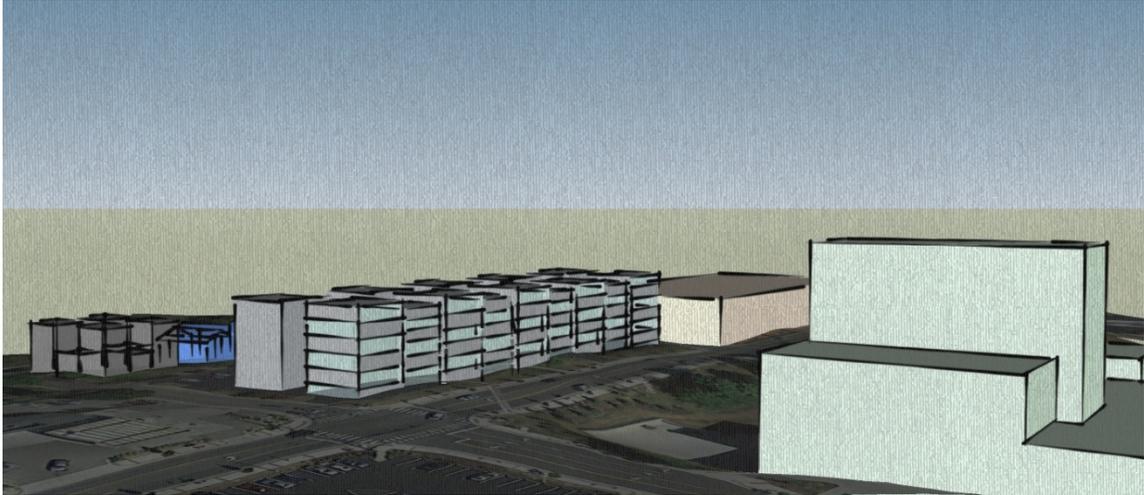
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<sup>172</sup> *Nicely Designed Parking Garage in Staunton.*

<sup>173</sup> *Urban Cohousing Google Search*, accessed November 2, 2016,

[https://www.google.com/search?q=urban+cohousing&biw=1152&bih=544&source=lnms&tbn=isch&sa=X&sqi=2&ved=0ahUKEwixrYKdHyrQAhXhRCYKHWa8A2YQ\\_AUIBigB&dpr=1.67#q=urban%20cohousing&tbn=isch&tbs=rimg%3ACbXF3JzOGa74ljgAfzuyt7m85XevEwCKHxTKtPFwOeE5cnDgFcvuRe9X4vDr63JX8HmZ6tEQhVZam6q9QzUdVc\\_1ZXioSCQB\\_1O7K3ubzlEcewkrfNeJOMKhIjd68TAlorfMoRVDHbJeMaBIYqEgm08XA54TlycBEamBwjhLUq5yoSCeAVy-5F71fiEV5\\_1Vrn7MWS8KhIJ8OvrclfwZkRIR9XwIDCwYqEgnq0RCFVlqbqHEFXVbMiewPdioSCb1DNR1Vz9leEUeZmn27-A9i&imgrc=mekHx26-ZBqViM%3A](https://www.google.com/search?q=urban+cohousing&biw=1152&bih=544&source=lnms&tbn=isch&sa=X&sqi=2&ved=0ahUKEwixrYKdHyrQAhXhRCYKHWa8A2YQ_AUIBigB&dpr=1.67#q=urban%20cohousing&tbn=isch&tbs=rimg%3ACbXF3JzOGa74ljgAfzuyt7m85XevEwCKHxTKtPFwOeE5cnDgFcvuRe9X4vDr63JX8HmZ6tEQhVZam6q9QzUdVc_1ZXioSCQB_1O7K3ubzlEcewkrfNeJOMKhIjd68TAlorfMoRVDHbJeMaBIYqEgm08XA54TlycBEamBwjhLUq5yoSCeAVy-5F71fiEV5_1Vrn7MWS8KhIJ8OvrclfwZkRIR9XwIDCwYqEgnq0RCFVlqbqHEFXVbMiewPdioSCb1DNR1Vz9leEUeZmn27-A9i&imgrc=mekHx26-ZBqViM%3A).





176



177

9. How long have you lived in Blacksburg?
10. When traveling around Blacksburg do you mostly use a personal motorized vehicle, or do you commute mostly by alternative transportation (foot, bicycle, bus)?
11. Please add any comments you would like to share:

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<sup>176</sup> Cecile Newcomb, *Imagine Blacksburg 3D Renderings*, Sketchup Modeling Software, November 2016.

<sup>177</sup> *Ibid.*

## Appendix C. Post-event survey

IRB 16-947

This survey is expected to take approximately 5 minutes to complete.

Please finish the survey at this time.

### Confidentiality statement:

This survey being administered to inform the thesis project of Cecile Newcomb, a candidate in the Masters of Urban and Regional Planning program at Virginia Tech. It may also be used in further publications. Data from this survey will be stored securely and accessed only by the research team. All survey data is anonymous; identifying information will not be recorded.

PLEASE NOTE: The pictures in this survey are meant to be **conceptual**; they are NOT **representative of** specific development proposals.

The future development of the Progress Street and Main Street area is **under consideration** due to the expectation of **population** growth in Blacksburg. This project considers several different development alternatives.

FOR EACH OF THE QUESTIONS OR STATEMENTS BELOW, PLEASE MOVE THE SLIDER TO THE POSITION THAT BEST REFLECTS YOUR OPINION, WITH "1" CORRESPONDING TO STRONG DISAGREEMENT AND "7" CORRESPONDING TO STRONG AGREEMENT.

1. The buildings in this picture are appropriate density for the 500 block of Progress Street (residential zoning).



178

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<sup>178</sup> Coddington, *Photos of 3 Catalyst Sites in Downtown Blacksburg*.

2. The development in this picture shows appropriate density for the 500 block of Progress Street



(residential zoning).

179

3. The development in this rendering shows appropriate density for the Baptist Church site on the 500 block of Main Street (commercial parcel).



180

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<sup>179</sup> "Lincoln Institute of Land Policy."

<sup>180</sup> *Davis CA Hallmark Inn.*

4. The development in this photo shows appropriate density for the Baptist Church site on the 500 block of Main Street (commercial parcel).



181

5. The parking garage in this photo would be an appropriate density at the town-owned Progress Street parking lot.



182

6. This mixed use building, which includes structured parking, would be an appropriate density at the town-owned Progress Street parking lot.

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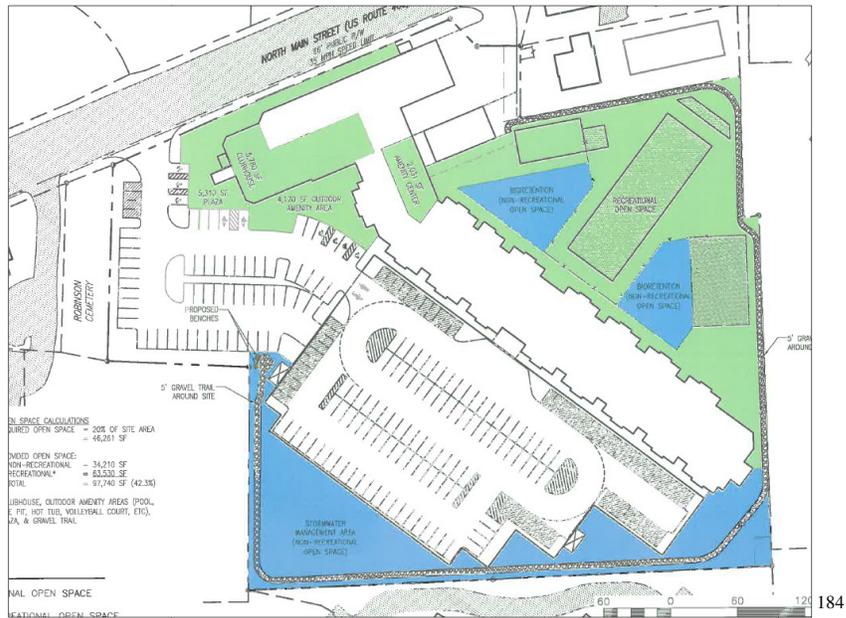
<sup>181</sup> unknown, *Pico Boulevard Mixed-Use Development*.

<sup>182</sup> *Nicely Designed Parking Garage in Staunton*.



183

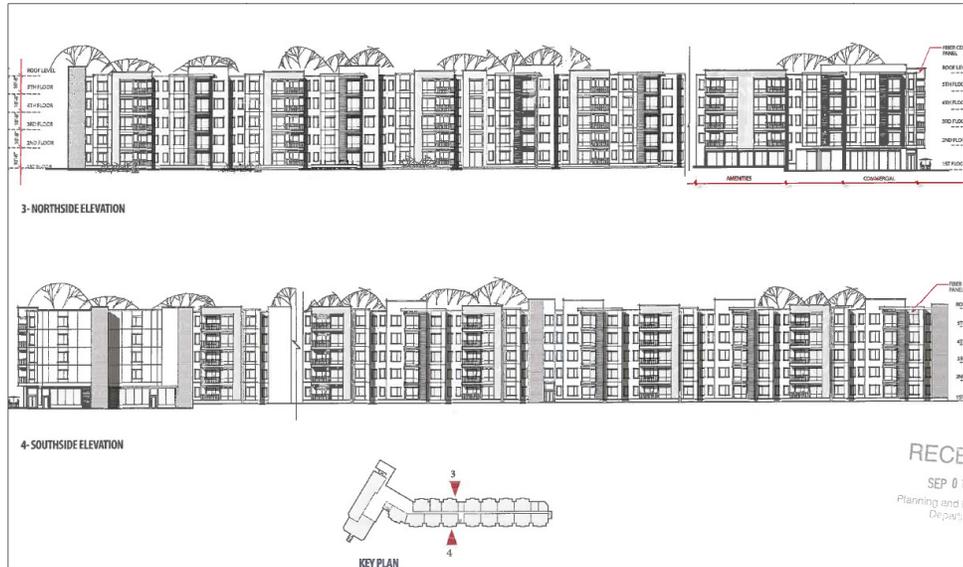
7. Pictures of site plans and renderings such as these help me to visualize and understand the density of potential development.



184

<sup>183</sup> Urban Cohousing Google Search.

<sup>184</sup> "Site Plan, Rendering."



185

- 3D renderings such as these help me to visualize and understand the density of potential development.



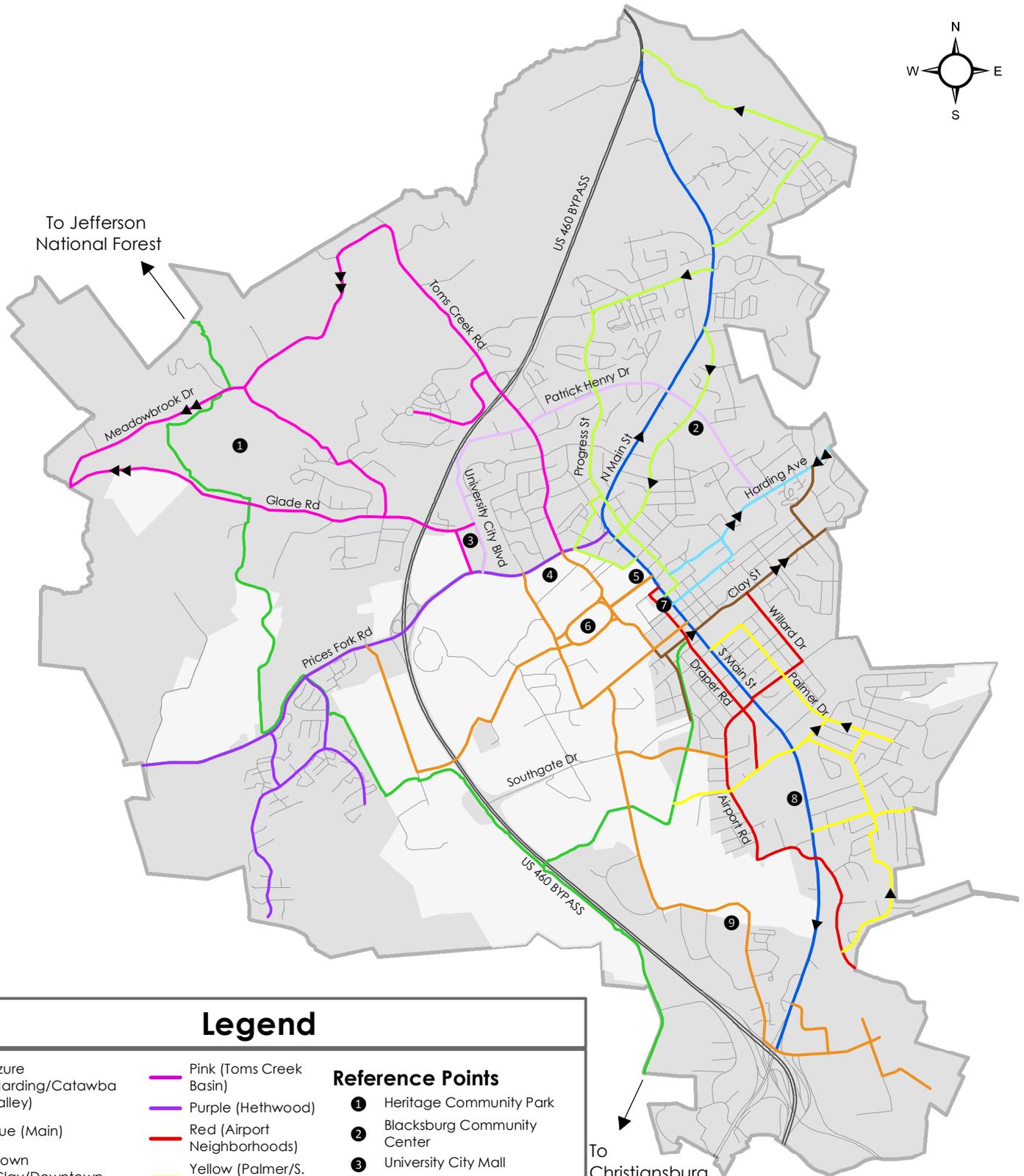
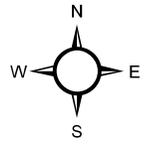
<sup>185</sup> *ibid.*



9. Seeing the 3D models in the Visionarium gave me a more *positive* perspective of increasing density with infill development than I had prior to viewing the models.
10. Seeing the 3D models on the Deep 6 computer monitors gave me a more *positive* perspective of increasing density than I had prior to viewing the models.
11. Seeing the 3D models did not change my perspective of increasing density.
12. Using 3D models in land use planning and decision-making processes would be helpful in my review of proposed developments.
13. Using 3D models in land use planning and decision-making processes would facilitate better decisions.
  
14. How long have you lived in Blacksburg?
15. When traveling around Blacksburg do you mostly use a personal motorized vehicle, or do you commute mostly by alternative transportation (foot, bicycle, bus)?
  
16. Please add any comments you would like to share:



# Blacksburg Designated Bicycle Routes



## Legend

- |                                  |                             |
|----------------------------------|-----------------------------|
| Azure (Harding/Catawba Valley)   | Pink (Toms Creek Basin)     |
| Blue (Main)                      | Purple (Hethwood)           |
| Brown (Clay/Downtown Connector)  | Red (Airport Neighborhoods) |
| Huckleberry Trail                | Yellow (Palmer/S. Main)     |
| Lilac (UCB/Patrick Henry)        | VT Campus & Properties      |
| Lime (Progress/Main Alternative) | US HWY 460 Bypass           |
| Orange (VT/Hokie Bikeways)       | Mild Slope                  |
|                                  | Steep Slope                 |

## Reference Points

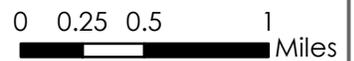
- 1 Heritage Community Park
- 2 Blacksburg Community Center
- 3 University City Mall
- 4 Future Multi-Modal Transit Facility
- 5 Center for the Arts
- 6 Drillfield
- 7 Farmers Market
- 8 First and Main Shopping Center
- 9 Corporate Research Center

To Christiansburg

Date: August 2015

Created by: Blacksburg GIS Services

Sources: Town of Blacksburg; Blacksburg Transit; Virginia Tech; CGIT at Virginia Tech; Blacksburg Corridor Committee



**MEMORANDUM**

**To:** Planning Commission

**From:** Kinsey O'Shea, AICP, Development Administrator *W*

**Date:** February 17, 2017

**Subject:** RZN17-0001 Request to Rezone 0.939 Acres from the General Commercial (GC) and Transitional Residential (R-5) Zoning Districts to the Planned Residential (PR) Zoning District in the 900 block of Progress Street, NW (Tax Parcels 226-B 1 3; and 226-B 1 2); by Craig Stipes of Broadstreet Partners, LLC (applicant/contract purchaser), and Dick A. Cook Trust and Mary K. Eaton Trust (property owner)

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**SUMMARY OF LAND USE REQUEST**

**Property Location:** 900-block of Progress Street

**Tax Parcel Number:** 226-B 1 2; 226-B 1 3

**Parcel Size:** 0.939 acres; 40,982 square feet

**Present Zoning District:** GC General Commercial and R-5 Transitional Residential

**Present Use:** Vacant

**Adjacent Zoning District:** North: R-5 Transitional Residential  
East: GC General Commercial  
South: GC General Commercial  
West: R-5 Transitional Residential

**Adjacent Uses:** North: Multi-family residential  
East: Restaurant (Abby's, across Montgomery Street)  
South: Financial Institution, Restaurant (Domino's)  
West: Single-; two-; and multi-family residential across Progress Street

**Adopted Future Land Use:** High Impact Commercial, Medium-density Residential

**Proposed Zoning District:** PR Planned Residential

**Proposed Use:** Single-unit and Multi-unit Multifamily dwellings

**Proposed Height:** 40'

**Proposed Setbacks:** 10' front; 5' side; 5' rear

**Proposed Density:** 19 units (20 units/acre); 52 bedrooms (55 bedrooms/acre)

**Proposed Parking:** 46 spaces (0.88 spaces/bedroom)

**Proposed Bike Parking:** 13 spaces minimum (0.25 spaces/bedroom)

## **APPLICATION**

Mr. Kevin Conner of Gay & Neel, Inc. submitted an application to rezone approximately 0.9 acres in the 900-block of Progress Street on behalf of Mr. Craig Stipes, of Broadstreet Partners, LLC, who is the contract purchaser of the property and the applicant for this request. The applicant requests to rezone the two parcels comprising the site from a mix of General Commercial (GC) and Transitional Residential (R-5), to the Planned Residential (PR) zoning district. The property is currently owned by the Dick A. Cook Trust and Mary K. Eaton Trust.

## **BACKGROUND/PREVIOUS REQUEST**

In 2014, this property was subject to a request to rezone to the Planned Residential District by a different applicant. The previous request proposed the development of 13 townhouses oriented around a central drive aisle, with a total of 39 bedrooms or 41 bedrooms per acre. The Progress Street frontage of the development included a row of 5 townhome units with building façade articulation, street trees and sidewalk, and two entrances into the development's drive aisle. The units were designed with pedestal parking that reduced the surface parking area but did result in the garage level of the unit at the ground level on Progress St. The layout did not include a connection to Montgomery Street. The applicant responded to neighborhood and Commission concerns about lack of usable open space by re-orienting buildings and parking to provide a tot lot area central to the development. The applicant provided this sort of recreation amenity in the development as a means to market this development to residents other than undergraduate students, which was also a neighborhood concern.

The application was withdrawn before action was taken by Town Council. The Planning Commission recommended approval of the request. The issues of discussion in the previous proposal were the loss of commercially zoned land, interaction of the development with Progress St., overall site design, and neighborhood compatibility. These issues are applicable to the current request as well.

## **CRITERIA FOR EVALUATION**

There are a number of analysis points for evaluation of a request to rezone a property within Town. The policies and maps in the Comprehensive Plan lend guidance to the Town's vision of growth in the future, while specific codes and requirements in the Zoning Ordinance, Subdivision Ordinance, and the Town Code ensure that the development meets all applicable regulations. In many cases, these guidelines and regulations overlap. In instances where there are multiple regulations governing a particular characteristic, such as parking or building orientation, additional code section references are provided in order to combine the analysis of the application into topical groups.

Section 1151 of the Zoning Ordinance requires the Commission to study all rezoning requests to determine:

- 1) *Whether the proposed amendment conforms to the general guidelines and policies contained in the Comprehensive Plan.*
- 2) *The relationship of the proposed amendment to the purposes of the general planning program of the Town, with appropriate consideration as to whether the change will further the purposes of [the Zoning Ordinance] and the general welfare of the entire community.*
- 3) *The need and justification for the change.*
- 4) *When pertaining to a change in the district classification of the property, the effect of the change, if any, on the property, surrounding property, and on public services and facilities. In addition, the Commission shall consider the appropriateness of the property for the proposed change as related to the purposes set forth at the beginning of each district classification.*

Section 1162 of the Zoning Ordinance states that proposals for rezoning to a planned zoning district constitute an application for conditional zoning. Section 1160 of the Zoning Ordinance states that the owner of the land may proffer conditions, which may be accepted by the Town if they meet the following standards:

- 1) *The rezoning itself must give rise for the need for the conditions*
- 2) *The conditions shall have a reasonable relation to the rezoning*
- 3) *The conditions shall be in conformity with the Comprehensive Plan*
- 4) *The conditions must be clearly understood and enforceable*
- 5) *The conditions must not require or allow a design or standard that is less restrictive than the general provisions of this ordinance*

### **EVALUATION OF APPLICATION**

This staff report is divided into topical areas of evaluation. Many of the overarching principles in the Comprehensive Plan, the Residential Infill Guidelines, and the Zoning Ordinance overlap into several main focus areas. To avoid redundancy, each topical section will contain principles and regulations for analysis from the Comp Plan, the Infill Guidelines, and the Ordinances so that each topic is only covered once.

#### **Development Overview**

The development proposal entails the construction of nine (9) new residential buildings, with a total of 19 units/52 bedrooms of purpose-built student housing. There will be five (5) buildings oriented toward Progress Street. The other buildings will be situated along the northern property line and be oriented interior to the site, facing the parking area. The development would consist of two different dwelling types: seven buildings will be three-story, four-bedroom single-family style dwellings; and two buildings will be three-story two-bedroom garden-style apartments. The two larger buildings will bookend three smaller buildings along Progress Street. All of the units will feature bed-bath parity, meaning that each bedroom will have its own en-suite bathroom. The site will also contain the parking for the development at a ratio of 0.88 parking spaces per bedroom, for a total of 46 parking spaces, and bicycle parking for at least 13 bicycles.

The application shows that the parking lot will connect through from Progress Street to Montgomery Street, though not in a straight line. The primary entrance to the site is on Progress Street, near the southernmost portion of the site adjacent to the drive-through exit aisle of the neighboring bank. The secondary entrance is off of Montgomery Street, and is the shared entrance for the neighboring Park Place condos (referred to in this report as the condos). The alignment of the proposed entrances on Progress Street and Montgomery Street does not lend itself for a straight through-connection, but a more direct connection could have negative traffic circulation impacts on the neighborhood and the development. The application states that no open space or recreation amenities will be provided for this development, due to its small size and proximity to downtown, transit, and services.

#### **Area Neighborhood and Existing Conditions**

The proposed development is located just off North Main Street, near the signalized intersection of Progress Street and North Main Street. The parcels are currently vacant, situated behind a branch of the National Bank of Blacksburg, and a Domino's Pizza restaurant. Immediately adjacent to the north are the two multifamily Park Place condo buildings. The larger condo building fronting on Progress Street contains 24 units; the smaller building fronting on Montgomery Street contains 12 units. The smaller building faces Montgomery Street, and is accessed via a curb cut and parking area that sits partially on the parcel subject to this rezoning application. This access is protected by an existing access easement

between the two properties. The master plan shows that the access for these units would be maintained and tie into the proposed development's parking area. The nearby blocks of Progress Street and Montgomery Street are a mix of commercial uses, and single-family, two-family, and multi-family dwellings that are largely leased, rather than owner-occupied. Heavener Hardware, Abby's Restaurant, two gas stations, Papa John's Pizza, and a copy and framing shop are nearby businesses along North Main Street and Progress Street.

The site is relatively flat, sloping gently down from the northern portion of the site adjacent to the Park Place Condos toward Main Street and Progress Street. There is not currently continuous sidewalk along the Progress Street frontage of the parcel. The Montgomery Street frontage of the parcel is improved with the curb cut and driveway to serve the smaller condo building next door.

#### **Student Housing Development Pressure**

Recently, Virginia Tech has indicated that the University is intentionally growing its undergraduate student population. Enrollment over the past several years has increased, and the University has revealed that an increase in enrollment of approximately 5,000 additional students is a goal with a total enrollment of 30,000 undergraduates by 2023, across all of Virginia Tech's local and distance campuses. With the increase in students will also come an increase in the number of faculty and staff and other support personnel, but no specific information has been released by the University.

In 2015 the Town accepted a downtown housing study entitled *Downtown Blacksburg Housing Market Study by Development Strategies* that looked at market demands for different housing types in the downtown area. One of the observations in the study was that a continuing market demand (vs. need) for new high-end student housing exists. New units have bed/bath parity, high end finishes and many upscale amenities. The Edge and The Retreat have met some of this demand. The housing study also identified a market for other housing types such as housing for young professionals.

The Town, as part of the 5-year update to the Comprehensive Plan is embarking on a study of student housing redevelopment potential. The focus area is redevelopment potential in the Patrick Henry/University City Boulevard corridor where there is a significant existing concentration of student housing. This study is expect to begin in Spring 2107 and conclude in the late fall.

#### **Previous Residential Rezoning Requests**

Since 2010, the Town has seen growth in the student housing redevelopment and infill development market. Several development and redevelopment applications have been filed over the past several years to address the incoming growth in undergraduate student population, and to update aging multifamily housing stock to be more in line with current market demands. Most of the market for new up-scale undergraduate housing has been met with large scale complexes such as The Edge and The Retreat. There is a place in the market for smaller scale new student housing options.

The chart below outlines all residential rezoning applications filed since 2010 and the density proposed. Not all requests were student housing related.

<b>Development Name</b>	<b>Status</b>	<b>Proposed Density</b>
Roper Energy Apartments PRD	approved, not constructed	60 br/ac
Terrace View PRD	withdrawn	43 br/ac
The Edge PRD	approved, completed	62 br/ac

Copper Beech O and GC to RM-27	withdrawn	27 br/ac
Grissom Lane PRD (seniors)	approved, completed	7 units/acre
University City Center PRD	denied	145 br/ac
Blacksburg Estates PRD	withdrawn	7 units/acre mixed SF & MF
Progress St Townhomes PRD	withdrawn	41 br/ac
Whipple South Townhomes PRD	approved, site plan review	29 br/ac
Eheart & Main PRD (non-student)	approved, site plan review	64 br/ac
Warren Street PRD	pending, applicant requested delay	154 br/ac
Fieldstone PRD (affordable housing)	approved, under construction	25 br/ac
The Retreat PRD	approved, completed	20 br/ac
North Main Lofts PRD (Site 1 & 2)	pending, under review	89 br/ac
Sturbridge Square	pending, under review	89 br/ac
Preston Row PRD (RZN 17-0001)	pending, under review	55 br/ac

### TOPICAL AREAS OF EVALUATION

There are many overlapping principles of design and planning found within the Town's Comprehensive Plan, Residential Infill Guidelines, Zoning and Subdivision Ordinances, and other codes. Within each of these topical areas, supporting language from these documents has been provided as analysis points for the evaluation of this request. Much of this supporting language is applicable to more than one topical area of analysis. These topics are discussed below.

#### **Building Orientation, Scale, Massing, Height**

The building orientation, scale, massing, and height of a development can help with the fit into an existing neighborhood if similar architectural features or other development patterns from the existing neighborhood are utilized. Infill developments should look as though they belong in the existing neighborhood around them, rather than being so discordantly different that the fabric of a neighborhood is negatively affected. There are a number of standards and principles in Town regulations that give guidance to help meet this goal:

- *Comprehensive Plan Land Use Policy LU.6 Consider the compatibility of development with surrounding uses. Utilize strategies such as landscaping or other buffering techniques along with modification of site design to minimize impacts and facilitate compatibility*
- *Residential Infill Guidelines Best Practice #1: Respect neighborhood context and enhance community character*
- *Residential Infill Guidelines Site Design & Parking: Buildings oriented toward streets are a key characteristic of Blacksburg's residential neighborhoods.*
- *Residential Infill Guidelines Site Design & Parking: Buildings should be designed to fit within the context of the surrounding structures and provide visual interest to pedestrians.*
- *Multifamily Dwelling Use & Design Standard for building orientation §4216 (a)(3):*
  - *The street elevation of the residential buildings shall have at least one (1) street-oriented entrance and contain the principal windows of the front unit.*

The application and master plan provided show that there will be 9 new buildings constructed on the site. Seven of the buildings will be 4-bedroom/4-bathroom single-unit dwellings resembling a three-story single-family home. The upper story of these units will be largely contained within the roof structure, but not low enough to be considered a half-story. They all feature front and rear doors, and windows on all sides, which add a higher-quality feel to the units. The front elevation of the units facing

Progress Street will have a full-width covered front porch with a low wall, while the interior units will have smaller front porches tucked behind a low wall. Please see the sheet 4/Appendix J of the application for the front elevation of the units facing Progress Street, and sheet 5/Appendix J of the application for the front elevation of the units facing interior to the site.

The other two buildings proposed will each be three-story, garden-style walkup apartments. Each building will have six two-bedroom units, for a total of 12 bedrooms per building. Similar to the interior single-unit buildings, each of these units will feature a "side" porch facing the front, partially concealed behind a low wall. The front façade of these buildings features an open breezeway with stairs to access the units as shown on the architectural elevation drawings. It is assumed that the front elevation is the street-facing elevation, however, it is unclear from the master plan, as the plan shows sidewalks approaching both the front and the rear elevation of the apartment buildings, but no entry into the building is found on the rear. The plan and the architectural drawings will have to be consistent in depicting which elevation is street-facing, and which elevation is interior-facing, as currently, the outline of the buildings and orientation of the sidewalks is not consistent with the architectural elevations provided. If the "front" elevation of these buildings is to face the parking area interior to the site, then the buildings do not meet the requirement to be street-oriented. Please see Sheet 6/Appendix J of the application for the elevations of the apartment buildings.

All of the buildings feature several different building materials, which helps to break up the scale and massing of the development. The two different building types will add some variability to the block, however, there is little variety offered in the different unit types' facades to provide visual interest from the street.

The neighborhood, as mentioned, is a mix of single-, two-, and multi-family dwellings. The homes across Progress Street from the development are smaller single-story dwellings of modest size. They have varying setbacks, from approximately 15' to more than 30'. The neighboring condominium buildings next door are three-story brick buildings that are set back off the street more than 75' and hidden behind a hedge to block the view of the parking area from the street.

The proposed buildings are generally larger in scale than the surrounding neighborhood buildings, especially the two 6-unit garden apartment buildings. The scale of the apartment buildings seems to be much greater than the smaller single-unit dwellings, and the apartment buildings may appear to dwarf both the proposed single-unit buildings in the development and the smaller existing dwellings across the street. The scale of the proposed buildings is not in keeping with the smaller scale of the neighborhood, when combined with a shallow 10' front setback. The buildings' scale could be reduced by increasing the setback, or decreasing the height and massing of the buildings. The single-unit buildings and the apartment buildings will each be approximately the same height, but the single-unit buildings will appear shorter due to the upper half-story rather than the full story on top.

#### **Physical Site Development: Setbacks, Lot Coverage, Buffer Yards & Landscaping**

The characteristics of physical site development are often regulated by the zoning district standards. As this is a request for a Planned Residential District, many of these standards are available for the applicant to propose as a part of the binding master plan and application. The combination of these standards and characteristics contributes to the overall nature of the development and its compatibility with the neighborhood.

- *Comprehensive Plan CCP 16. Responsible site design and development practices will minimize environmental impacts within the town*

- *Residential Infill Guidelines Best Practice #2: Provide transitions*
- *Residential Infill Guidelines Site Design and Parking: Streets [that] feature consistent front building setbacks...help define neighborhood character.*
- *Residential Infill Guidelines Site Design and Parking: The “green edge [landscaped setbacks between the...buildings and sidewalks]” provides residential streets with a clearly identifiable character; [landscaping] and fences are often used for transition between public and private space; provision of open space is critical for multifamily developments...*

The application proposes the following standards for the development:

- Permitted Uses
  - Multi-family dwelling
  - Single-unit multifamily dwelling (“one single-family type dwelling, occupied by a maximum of 4 unrelated individuals on a common lot with other use types”)
  - Community recreation, active & passive [*none identified on plan*]
  - Open Space [*none identified on plan*]
  - Utility services, minor [*none identified on plan*]
  - Multi-use trail, Public [*none identified on plan*]
  - Multi-use trail, Private [*none identified on plan*]
  - Associated trash and recycling facilities
- Height
  - 40’ maximum
- Setbacks
  - 10’ front setback
  - 5’ side setback
  - 5’ rear setback
- Lot Coverage
  - “as shown on the concept plan” [*no calculation has been provided on the plan*]
- Residential Density
  - 52 total bedrooms/52 total leases; 19 total units
  - 55.37 bedrooms per acre; 20.23 units per acre
- Occupancy
  - One person per lease per bedroom; no more than 4 unrelated persons shall occupy a dwelling unit. These occupancy restrictions shall not be applicable to families.
- Parking
  - 0.88 parking spaces per bedroom (46 spaces total)
- Bicycle Parking
  - 0.25 spaces per bedroom (13 spaces total)

In non-planned districts, the applicant must meet all the applicable district standards. Since the applicant proposes the standards in the PRD, the evaluation of the proposed standards is different. The evaluation should be based on how well the proposed standards, when applied, fit into the existing character of the surrounding neighborhood. There is flexibility in proposing the development’s standards, but the standards should not be so different from the surrounding districts as to create an incompatible use or physical layout.

The applicant is proposing standards which are generally less intense than the underlying GC zoning standards, but more intense than the R-5 district standards. For example, the GC district allows a 10’

front setback, 0' side and rear setback, and allows up to 60' in height with no additional setback, while the R-5 district requires a 35' front setback, 10' side setback, and 25' rear setback, and allows up to 35' maximum building height. Providing physical development standards to meet in the middle of these existing standards and uses will help the development fit into the context of the neighborhood better. Across the street from the development are one-story buildings, but the development is adjacent to two existing 3-story brick apartment buildings up Progress Street, and two single-story commercial buildings on Main Street. Furthermore, buildings set farther back from the street, or buildings that are smaller overall will help bring the scale of the buildings more in keeping with the other residential uses on the street. However, the shallower setback in the front allows the parking to be placed behind the buildings to give the buildings a relationship to the street.

### Setbacks

As mentioned above, the existing neighborhood is a mix of uses, building sizes, and physical development patterns. There is no consistent setback along this side of Progress Street, and the setback varies on the opposite side. The plan shows a consistent proposed setback of 10' along the Progress Street frontage. The 10' setback area between the sidewalk and the buildings does not show any improvements except street trees and walkways to unit doors. The area between Progress Street and the building face would include a 5 foot sidewalk starting at the back of curb, then an approximately 10' wide space between the sidewalk and the closest porch of the single-unit buildings, and the façade of the larger apartment buildings. However, there is some inconsistency in the plan and the architectural drawings of the larger apartment buildings. The plan shows that the front of the apartment buildings will align with the porch overhang of the single-unit buildings. However, on the architectural plans, the apartment building is shown to have a covered breezeway/portico that projects beyond the face of the building. This feature has not been accurately shown on the plans, and could affect how the space is configured and feels from a streetscape perspective. The plan and the architectural drawings will need to reflect this detail accurately as it has implications for the setback space in the front of the buildings. This area is where the required street trees would be placed, and will be the transition area between public and private space. The provision of some private space between the public street/sidewalk and the home is important, as that will encourage the use of the front yard space and porch. When little or no private space is provided, the front porch and yard may seem too public for use by the residents. No fencing for separation of public and private space has been provided. The intent is to have both a visual and functional streetscape and building relationship to the street.

### Buffering/Landscaping

There is no specific buffer yard requirement for the Planned Residential district, because the proposed developments can vary so widely. However, each application should be evaluated with regards to buffering to determine the appropriateness of the proposal as it relates to the surrounding uses and neighborhood. The applicant is proposing street trees meeting the ordinance standard, and has stated in the application that "hedges, trees, shrubs, and fences will provide privacy, a transition between spaces, and will buffer pedestrians from vehicle traffic." No landscaping other than street and parking lot trees has been shown. The development adjoins commercial uses on the south side, but this area is largely occupied by the parking areas for the proposed development, and is adjacent to the parking areas for the commercial uses. The rear elevation of the units along the northern property line will be approximately 8' away from the property line (as shown on the master plan, but could be as little as 5' as specified in the application). These units will have windows facing the end wall of the neighboring condo buildings. The neighboring condo buildings are located close to the property line, with no landscaping separating the two properties.

### **Streetscape, Bicycle and Pedestrian Improvements**

Many individual policies and regulations address streetscape and pedestrian improvements as being a high priority to encouraging walkability and contributing to a high quality of life in Town. Often, private development is critical in providing missing links in the sidewalk and trail network throughout Town, as there is not enough funding within the Town's budget to complete all the sidewalk projects as the Town grows. The Corridor Committee maintains a matrix of prioritized sidewalk projects to complete as funding becomes available through revenue-sharing and ongoing sidewalk project budgets. Town-funded or revenue-sharing projects are often limited by the existing right-of-way, as acquisition of land for improvements is often too costly and time-consuming. However, with private development, some additional improvements may be able to be accommodated on private property, with access easements, or dedication to the Town for public use, that otherwise might not be viable. Providing enhanced pedestrian and bicycle facilities will encourage alternate-transportation behavior and lead to less dependency on personal vehicle trips. These facilities may include wider sidewalks, separation between the street and the sidewalk with a vegetated buffer strip, covered bike parking, and a pleasant and safe streetscape experience. There are many principles discussing the importance of sidewalks and trails, and a number of regulations that require them to be installed as a way to implement the goal of an interconnected sidewalk and trail system:

- *Comprehensive Plan CCP 1. Well-designed pedestrian and bicycle friendly routes and facilities are essential to the Town's identity as a walkable and bikeable community.*
- *Comprehensive Plan Transportation Objective T.10 Complete the construction of a connected sidewalk system*
- *Comprehensive Plan Transportation Objective T.12 Maintain and improve the aesthetic quality of the pedestrian environment by planting street trees and other landscaping, and installing street furniture where appropriate.*
- *Residential Infill Guidelines Best Practice #3: Create a pedestrian friendly streetscape*
- *Residential Infill Guidelines Site Design & Parking: The design of the space between the edge of the curb and the front of a building is essential for encouraging pedestrian activity and promoting safety and security. [Sidewalks] contribute to the character of the neighborhoods by providing safe places for people to travel and interact with one another.*
- *Multifamily Dwelling Use & Design Standard for sidewalks §4216 (a)(2):*
  - *Sidewalks shall connect each unit to the parking area serving that unit, to other units on-site, and to other buildings or uses on adjacent lots*
- *Site Development Plans Minimum Standards and Improvements Required §5120(d)(1):*
  - *Sidewalks meeting the design standards of the Subdivision Ordinance shall be provide on public or private land along all parts of a site abutting a developed public street where such sidewalks do not exist as of the date of the application for site plan approval. The provision of these sidewalks will advance the goal of the Blacksburg comprehensive plan of development of "a network of walkways in the Town to increase the safety and convenience of pedestrian travel." The Town Council finds that the need for such sidewalks in this Town is substantially generated by the development*

The application shows that sidewalks will be installed along the development's Progress Street frontage and internally within the site linking buildings and parking. There is existing continuous sidewalk on the opposite side of Progress Street from Broce Drive to North Main Street. There is sidewalk on the development side of Progress Street (east side) from the Main Street corner to the end of the drive-through aisle at the bank, stopping just short of the development property. There is also sidewalk on the condo parcel's Progress Street frontage, but there is no continuous sidewalk along the frontage of the development parcel. The Town standard for sidewalk is a 4' vegetated landscape strip behind the

back of the curb, and then a 5' concrete sidewalk. Modifications to the standard can be granted based on several criteria. In this instance, the requirement of a standard sidewalk with vegetated strip would create some challenging transitions where the proposed sidewalk meets existing sidewalk near the property corners. In these cases, it is sometimes reasonable to install sidewalk meeting the existing conditions although this is not the desired sidewalk pattern.

Sidewalk width and location in and of itself does not contribute to the pedestrian experience alone; there are other factors that go into the pedestrian safety and usability of these facilities. Street trees, openness (visibility/no hiding places), building orientation and other characteristics can help (or hinder) a sidewalk's usability and safety. Buildings oriented to the street provide watchful eyes, but if the separation between the building and the street is very shallow, the sidewalk can sometimes feel as though it is infringing upon private space. Low, picket or stanchion-style fences can help separate the public space from the private space without creating a closed-off wall feeling. The development application shows a 10' setback from the property line to the edge of the porch, with no fencing proposed in the front yards.

There are no dedicated bicycle facilities in this area. There are sharrows indicated on the northeast portion of Progress Street between Main Street and Jackson Street, but no facilities along Progress Street NW. Similarly, there are no dedicated facilities for bicycles along Main Street. The applicant is providing bike racks to meet the standard in the zoning ordinance, at a rate of one bike rack for every four bedrooms (0.25 spaces/bedroom). However, with the reduction from the standard parking ratio proposed, additional bike racks above the minimum requirement may encourage more bike ridership, and reduce the dependency on personal vehicles.

### **Parking and Circulation**

The Planned Residential District allows applicants to choose a parking ratio that is different from the multifamily standard in the zoning ordinance with information to indicate why the proposed ratio is appropriate and will not have any negative effect on surrounding uses. The standard ratio is 1.1 parking spaces per bedroom. However, in certain situations, a lesser ratio may be appropriate given the development's proximity to transit, the University, services, and other points of interest. The applicant is proposing a parking ratio of 0.88 parking spaces per bedroom, but has not provided any substantiation or justification as to why the lesser ratio is appropriate. This development is located just 1300' from the northern edge of the Downtown Commercial zoning district. There is bus service located on both Progress Street and North Main Street within very short walking distance of the site. It is reasonable to expect that due to the location of this development, a number of the residents will utilize alternate transportation most of the time. However, providing the right amount of parking for a development is critical for the safety and convenience of the development's residents, but also for the safety and convenience of the surrounding neighborhood. Without adequate parking, residents and guests may overflow into the neighborhoods, where there may already be pressure for parking due to the high number of rental tenants who may or may not have adequate parking provided by individual landlords.

- *Residential Infill Guidelines Best Practice #4: Minimize visual impacts of parking*
- *Multifamily Dwelling Use & Design Standards §4216(a)(4): all parking spaces shall be located behind the front building line*

The applicant has indicated in the proffer statement, that a parking policy will be established, but no further information regarding the details of this policy or its enforcement have been provided. The application also shows that the parking lot would connect through from Progress Street to Montgomery

Street, though not in a straight line due to the location of the entrances off Progress Street and Montgomery Street. However, a more direct connection could have a negative impact on both the development and the neighborhood if an opportunity for cut-through traffic is provided with a more direct route. The parking is located behind the front building line with respect to Progress Street, as required in the Use & Design Standards for multifamily dwellings. While there are no buildings proposed on the Montgomery Street frontage, there is a connection provided through the parking lot, and for access to the neighboring condos. The parking for the condos is currently located entirely in front of the building line, but is not proposed to change, as it is not part of this development application. There is one parallel parking space within this proposed development that appears to be located slightly closer to the street than the closest existing parking spot on the neighboring property adjacent to Montgomery Street.

### **Density & Occupancy, Lifestyle Conflicts**

Not only does the physical development of the property play into the neighborhood compatibility, but also the users of the development. There are a number of policies and goals that strive to help create a livable environment for a variety of different citizens. Blacksburg has been identified as both a great place to retire, as well as a good place to raise a family. While the University is actively growing, the Town does have a need for non-student housing to meet a wide range of market demands including recent graduates/young professionals; starter families; workforce and middle-income housing, as well as retiree/empty-nester and further opportunities for aging in place.

- *CCP 2. Lifestyle conflicts are inherent in a college town, where neighborhoods may have a mix of students and non-students.*
- *LU.7 Encourage developers to work with surrounding property owners and tenants to resolve community concerns prior to formalizing development plans.*
- *J&H.37 Market Blacksburg as a place for young professionals to live and work.*
- *J&H.38 Market Blacksburg as a good place to live to high school graduates entering the trade and service industries*
- *J&H. 48 Plan for the housing demands of a changing and diversifying population*
- *J&H. 51 Promote varying types of housing types needed, including:*
  - *Rental or starter homes for purchase by graduate students and young families*
  - *Young professional housing and services in the Downtown area*
  - *Workforce housing for those making 80% - 120% of AMI*
  - *Affordable workforce housing options for LMI families making less than 80% of AMI*
  - *Housing with universal design features to allow aging-in-place*
- *J&H. 52 As the active adult, retiree, and senior citizen population increases, promote varying types of housing needed. For example, provide smaller homes that retirees can downsize to such as townhomes or condos, as well as retirement communities and nursing home facilities.*

Certain amenities, layouts, and features of a development appeal to one demographic group more than others. Families or couples rarely require bed/bath parity or certain recreation amenities such as sport courts or pools, but rather space for home office or guests, and playgrounds or un-programmed open space. Empty-nesters/retirees and those desiring aging-in-place accommodations may look for wider hallways, zero-entry doors and shower facilities, and bed/bath on the main level. Providing some of these elements in some or all of the units will help the development appeal to a wider variety of residents than just students.

The units all feature bed/bath parity, which is a common feature to higher-end undergraduate student housing. The four-bedroom single-unit dwellings also feature a "sitting area" at the top of the stairs

outside of the “master suite” which is located on the top floor partially under the eaves of the building. While this sitting area does not have features that allow it to qualify as a bedroom under the building code, (bedrooms must not be passed through to reach another bedroom), the extra space (such as “dens” in other apartment and townhome developments) could encourage illegal overoccupancy of the units by residents looking to further share expenses with other roommates. However, this flexible type space could meet some of the needs of other market segments as home office space, game or playroom, or other uses.

### Open Space

The provision of open space is so important to the health and function of residential communities that it is included as a requirement for nearly every type of residential development. The Planned Residential Zoning District Standards and the Use & Design Standards for Multifamily Dwellings §4216(a)(6) require a minimum of 20% open space for developments. It is important that the open space be meaningful in its size and function. Only under certain circumstances can this request be modified, as found below. **The applicant is requesting to eliminate the requirement for the provision of open space, citing in the application, the development’s “proximity to downtown, close walking distance to services and transit, sidewalk construction, and small size of the parcel...” in response to the criteria listed below.** The applicant provided a graphic showing the location of nearby Transit stops (see Appendix G of the application)

- *CCP 6. Creation of public and private parks and recreation amenities is an important part of land use development decisions*
- *Create usable open space*
- *Multifamily Use & Design Standard for open space, recreation, and trails §4216(a)(6)*
  - *Except in the Downtown Commercial (DC) district and the Mixed Use (MXD) district, for any development of twenty (20) or more bedrooms, a minimum of twenty (20) percent of the gross land area shall be reserved as open space. A specific recreational activity area or areas shall be developed and maintained for the residents of the development as a part of this open space*
- Zoning Ordinance section 3113(b) allows an applicant to request a modification or elimination of the open space requirement provided that the development is less than 2 acres in size, and is evaluated based on a combination of criteria listed below:
  - *Maximize developable area*
  - *Proximity to downtown*
  - *Walking distance to services and transit*
  - *Density and intensity of use in relation to neighborhood context*
  - *Demonstrated access to nearby public open space*
  - *Alternative recreation space*
  - *Proposed improvements to the adjoining streetscape, which may include the construction of additional sidewalks or trails adjoining the street, buffer strips between the sidewalk and the street, or other streetscape amenities or improvements to public space as a part of the project.*
- **The Town Council will need to take action on the requested exception to Use and Design Standard §4216(a)(6) for the modification or elimination of required open space utilizing the criteria outlined above.**

The applicant is requesting to eliminate the requirement for open space. There is some open space provided in the development, mostly along the front (Progress Street), side (adjacent to the condos), and interior areas of the development. The plan shows that the buildings will be separated by a

minimum of 10', though the application states that the minimum separation shall be 8'. The Building Code requires a minimum of 10' separation if no fire wall is provided between units. There is very little greenspace shown on the plan, which could be a limiting factor for the residents.

Amenities can increase the enjoyment and sense of community in a development. There is very little area for residents to enjoy the outdoors onsite, and no one central gathering place for the residents which can contribute to a greater sense of community. Providing such a location can increase the safety and community feel of the development if it is utilized by the residents as a gathering place. There are, however, always concerns with a concentration of undergraduate student that gathering spaces may result in behavior that is intrusive especially if adjacent to single family homes.

The site is located approximately a quarter of a mile from Gilbert Linkous Elementary School, approximately 0.6 miles from Wong Park and the Municipal Park, and approximately 0.5 miles from the McBryde Village Tot Lot. These recreation opportunities are within walking distance, and there are many others within driving or transit distance from the site.

#### **Comprehensive Plan Map Series Evaluation of Application**

In evaluating whether the proposed use conforms to the general guidelines and policies contained in the Comprehensive Plan, all applicable sections of the Plan should be included in the review of the application. The Comprehensive plan offers a wide range of guiding principles for the future of development with Town. There was a concerted effort in the 2012 Comprehensive Plan update to strengthen the need for maintaining neighborhood character, giving guidance on development form, encouraging an expansion of housing types to serve different segments of the housing market other than undergraduate students, and continuing to promote alternate means of transportation. Many of these principles, goals and objectives address non-student housing as a need in Town to appeal to a variety of market segments, demographics, and price ranges. The topical areas of this staff report call out specific sections in the Plan as major points of analysis, but the merits of the application can be compared with many more sections of the Plan as well.

#### **Future Land Use Designations**

In evaluating whether the proposed planned residential development conforms to the general guidelines and policies contained in the Comprehensive Plan, the Future Land Use designation of the subject property shall be considered. The subject property has two Future Land Use Classifications as illustrated on the attached Future Land Use Map. The majority of the property is classified High Impact Commercial. High Impact Commercial is defined as:

*Large-scale commercial and office developments with a need for high visibility along arterial roads and with a high impact on the surrounding environment, including but not limited to lighting, noise, parking, and traffic. Examples include large retail establishments, large restaurants, hotels/motels, and service stations.*

The only area that is designated as Medium Density Residential is the portion of the site that fronts on Montgomery Street, and is the area in which the access easement to Park Place Condos is located. This area is approximately 2,500 square feet. Medium Density Residential is defined as:

*Up to and including ten dwelling units per acre, or up to 20 bedrooms per acre, whichever is less. Typical implementing Zoning Districts: Transitional Residential (R-5); Old Town Residential (OTR); Planned Residential (PR); and Planned Manufactured Home (PMH).*

### **Loss of Commercial Land**

There is a finite amount of land available for commercial use to meet the needs of the citizens of the Town. This property, while designated as commercial on the Future Land Use map, may not be as desirable for businesses that need high visibility unless it can be combined with other parcels in the future. The property has limited visibility from North Main Street, as it sits behind two commercially-developed parcels that front on North Main Street. This property alone is also not likely to develop as a commercial or a mixed use development with a commercial component due to its location, lack of visibility, and small size. Development of the subject parcel as residential does limit the future commercial redevelopment potential of this area. Loss of potential commercial redevelopment must be weighed against the stated desire in the Comprehensive Plan for urban residential infill development in and around the Downtown area.

### **Mixed Use Areas and Urban Development Areas**

A portion of the subject property lies within a mixed-use designation in this area along North Main Street. The description in the Comprehensive Plan for Mixed Use Area C is as follows:

*Mixed Use Area C is located along North Main Street between Prices Fork and Patrick Henry Drive. A balance of commercial and residential mixed uses is desired to provide a natural transition from the commercial orientation on North Main Street, Prices Fork and Patrick Henry Drive to the adjacent residential uses. Limited vehicular entrances on these arterial streets and landscaping techniques should be implemented to avoid the impression of a strip commercial shopping center.*

The front portion of the property is designated as an Urban Development Area (UDA). UDAs and Mixed-Use Areas are intended to serve as focal points for commercial and residential growth in town. However, the designation of UDA does not prevent developments outside a UDA, nor obligate the Town to approve rezoning or conditional use permit applications within a UDA. The designation of a UDA does not affect zoning, nor does it mandate a specific type of development.

### **Neighborhood, Employment and Service Areas Map**

In reviewing the Neighborhood, Employment and Service Areas map, the property is covered by the "Commercial Areas" designation. If this land is removed from commercial use, and considering that the existing neighborhood is largely residential in character, the development will share more characteristics with the "Urban/Walkable Neighborhoods" designation. Some of the important characteristics of the urban walkable neighborhoods are summarized below:

- *Single-family residential character and neighborhood identity should be preserved in these areas.*
- *Minimize lifestyle conflicts with education and effective property management*
- *Access to Downtown services and amenities provides opportunities for aging-in-place*
- *Neighborhood traffic circulation can be a concern*
- *New development, infill development, and renovation of existing structures should utilize the Residential Infill Guidelines and Blacksburg Historic Overlay guidelines where applicable*
- *Aging housing stock and poor management is a critical issue for neighborhood character and identity*
- *Limited parking is an issue in these neighborhoods. Any opportunities to reduce the number of vehicles being parked in this area should be explored and encouraged.*

### **Paths to the Future Map**

The Comprehensive Plan Transportation Objective and Policy #7 states that “as part of the development review process, when proposed developments include trails as shown on the Paths to the Future map, determine how the trail will be incorporated into the development design and how the trail will be connected to internal sidewalks and bike routes.” The Paths to the Future map shows an existing Public route adjacent to this site along Progress Street. There are no proposed trail corridors through or adjacent to the site.

### **Zoning Ordinance Evaluation of Application**

#### **Intent of Districts**

There is a statement of purpose for each district in the Zoning Ordinance.

#### ***Planned Residential §3110***

*The purpose of this district is to provide for the development of planned residential communities that incorporate a variety of housing options as well as certain limited commercial and office uses designed to serve the inhabitants of the district. This district is intended to allow greater flexibility than is generally possible under conventional zoning district regulations by encouraging ingenuity, imagination and high quality design to create a superior living environment for the residents of the planned community. The PR district is particularly appropriate for parcels which contain a number of constraints to conventional development. In addition to an improved quality of design, the PR district creates an opportunity to reflect changes in the technology of land development, provide opportunities for new approaches to home ownership, and provide for an efficient use of land which can result in reduced development costs.*

It is the burden of the applicant to prove that the design submitted meets the intent of the Planned Residential District. In some cases, a development application for a PR district provides the Town with a housing model or type that is not found elsewhere in town, such as the Shadowlake Village Co-Housing Community PR district. In other instances, the PR district allows an applicant to put forward housing for an underserved population and proffer limitations to ensure the need is met as with the Grissom Lane Senior Housing development. In all cases, these applications are reviewed singularly by the Planning Commission and Town Council for their merits on a case-by-case basis.

The applicant states that their proposal meets and implements the Residential Infill Guidelines, which, according to the Comprehensive Plan, is a Land Use Objective & Policy. They further indicate that the existing zoning district standards for either General Commercial or R-5 Transitional Residential do not allow them to pursue the density and site layout desired for this infill development. The applicant has provided their analysis and justification for the request for a change in zoning designation on pages 8-11 of the application.

### **IMPACTS ON PUBLIC INFRASTRUCTURE**

In evaluating the potential effect on public services and facilities that this rezoning would have, the Town Engineering department has reviewed the Master Plan and application and the following comments are provided. Many of the specific engineering requirements listed below will also be addressed and met during the site plan review stage, should the rezoning be approved.

#### **Stormwater**

The stormwater concept plan was submitted as a part of the application, and has been reviewed by the Town Engineering staff. The concept plan has been denied at this time. Please see the attached letter

from Town Stormwater Engineer Kafi Howard outlining the deficiencies in the plan.

### **Water**

Town water is available to the site, and current infrastructure for water service is adequate for the proposed development. The Town Water Resources Manager has reviewed the plan and has no comments on the proposed rezoning as it relates to the Town's public water service.

### **Sanitary Sewer**

Town sanitary sewer serves the site. The existing infrastructure is adequate for the proposed development. The Town's Wastewater Engineer has reviewed the proposed development and has stated that the sanitary sewer model indicates that there is adequate sewer capacity to support the proposed development.

### **Traffic**

A traffic impact analysis form (TIA) was submitted as a part of this application, and shows that the proposed development does not trip the threshold for requiring a VDOT traffic analysis (5,000 trips per day). The TIA form shows that the proposed development would generate approximately 133 trips per day according to the ITE standards. However, due to the proximity of this development to transit, services and Downtown, it may be reasonable to expect that this number may be lower. The Director of the Engineering & GIS Department has reviewed this proposal and has no traffic or transportation comments.

### **Transit**

The site is currently served by Blacksburg Transit, with several stops nearby on both Progress Street, and North Main Street. There is not a stop adjacent to the development, and the applicant is not proposing any improvements to transit facilities.

### **NEIGHBORHOOD MEETING**

A neighborhood meeting was held on February 2, 2017. There were several citizen attendees, as well as staff, and representatives from the applicant team. Notes and the sign-in sheet are attached.

### **SUMMARY**

The Planning Commission is asked to consider and make a recommendation of approval or denial of the proposed Rezoning request. If the request is approved, the property will be rezoned Planned Residential with any proffers offered by the applicant and accepted by Town Council. It is the Council's decision if the proffers offered are sufficient to address and mitigate any negative impacts. If denied, the property will continue to be zoned as existing and any such subsequent development application will have to adhere to all the minimum standards found therein. The decision to grant or deny the rezoning request is a discretionary decision, and should be made according to the criteria outlined in §1151, and with the analysis provided.

The Planning Commission will need to make a recommendation on the proposed exception to the Use and Design Standards for Multifamily Dwellings which include:

**Use and Design Standard §4216 (a)(6) for the elimination of required open space.**

### **PROFFERED CONDITIONS**

- 1) The property shall be developed in substantial conformance with the submitted rezoning package entitled "Planned Residential District Rezoning for Preston Row" rezoning package

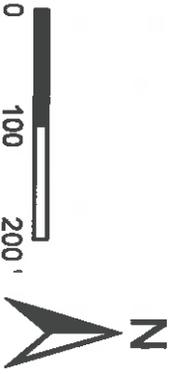
dated January 3, 2017, prepared by Gay & Neel, Inc. This includes the site development plan and architectural schematics.

- 2) The maximum building height for any structure within the development shall be 40 feet, measured from the grade at the front door of any structure to the peak of the roof.
- 3) Full cut-off parking lot lighting shall be provided within the development to prevent light spill-over onto neighboring lands and to minimize light pollution from the site.
  - *Staff discussion: this proffer is no more restrictive than the development standards for lighting, found in Zoning Ordinance section §5601.*
- 4) The applicant shall develop a parking policy and shall issue parking permits/stickers to residents.
  - *Staff discussion: More clarity is required regarding this proffer to evaluate methodology for the system, and ensure its enforceability.*
- 5) Occupancy of the units within this development shall be restricted to a maximum of one person per lease per bedroom.
  - *Staff discussion: It is understood that the intent of this proffer is to limit the occupancy of the units, but more clarity should be given to address how this proffer would apply to units occupied by families.*



# RZN17-0001 Preston Row Planned Residential Development

 Subject Parcel  
 Parcels



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Blacksburg**  
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2015 Aerials provided by Pictometry  
Town of Blacksburg, P&B Dept. 02.17.17

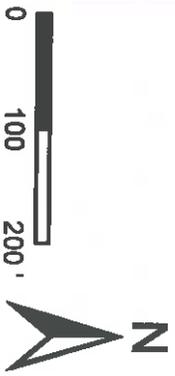




# RZN17-0001 Preston Row Planned Residential Development

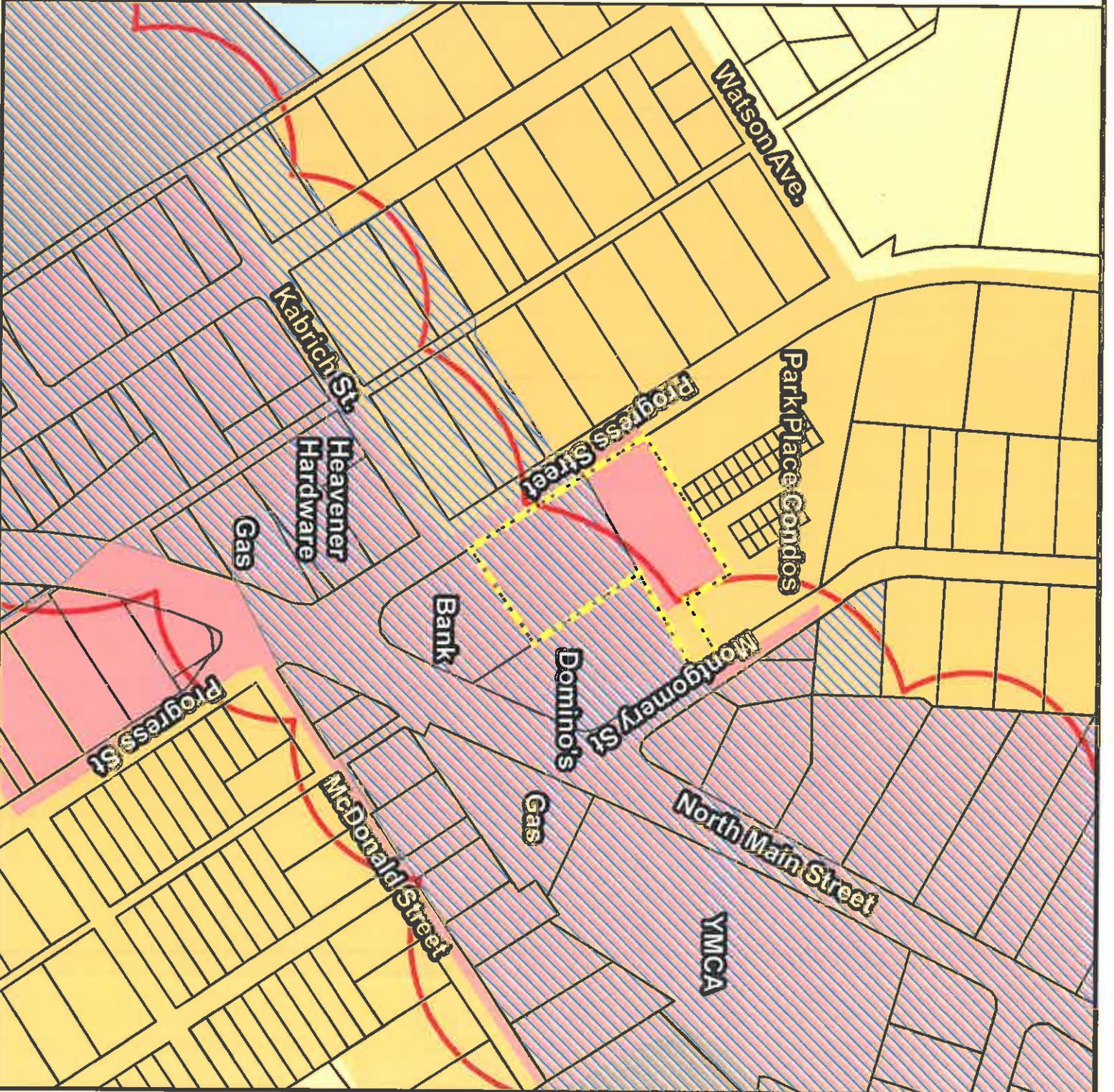
## Future Land Use

-  Subject Parcel
-  Parcels
-  Mixed Use Areas
-  Urban Development Areas
-  Low Density Residential
-  Medium Density Residential
-  High Density Residential
-  Civic
-  High Impact Commercial



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2016 Aerials provided by Pictometry  
Town of Blacksburg, P&B Dept. 02.17.17

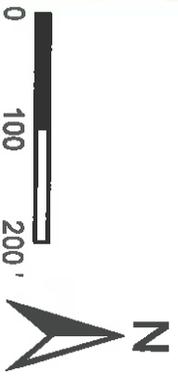




# RZN17-0001 Preston Row Planned Residential Development

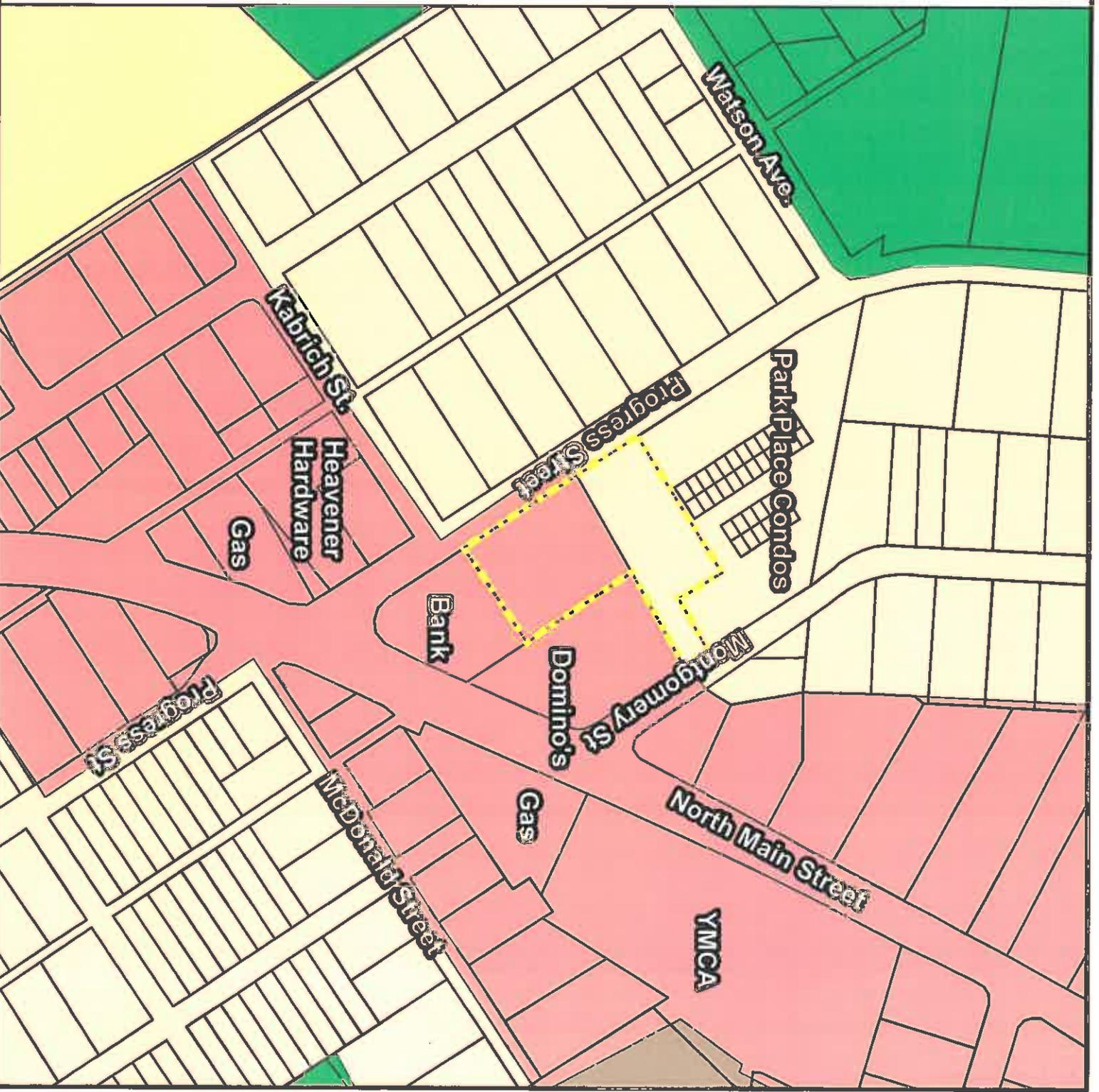
## Zoning

-  Subject Parcel
-  Parcels
-  R-4 Low Density Residential
-  R-5 Transitional Residential
-  RM-48 Medium Density Multiunit Residential
-  GC General Commercial
-  PR Planned Residential



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Town of Blacksburg, P&B Dept. 02.17.17





Monday, January 30, 2017

Gay and Neel  
Attn: Kevin Conner  
1260 Radford St  
Christiansburg, VA 24073

RE: RZN17-0001 Preston Row - Planned Residential Development

Dear Mr. Kevin Conner:

The Engineering Department has completed the review of the Preston Row Planned Residential Development Stormwater Concept Plan. The Concept Plan is **not approved** at this time. This 0.939 acre site is located along Progress Street, N Main Street and Montgomery St. It proposes the development of a 52-bedroom residential complex with 19 dwellings.

This stormwater concept plans shows the ability of the site to treat all of the necessary stormwater detention regulations on site with the construction of an underground detention facility. This facility will reduce the 1 and 10 year peak flows leaving the property. Only a portion of the water quality requirements will be met onsite, approximately 50%. The remaining water quality requirements will be met by purchasing off-site credits. This complies with the local water quality regulations, but will not provide any benefits within the Town of Blacksburg.

*To gain approval for this stormwater concept plan the following comments must be addressed:*

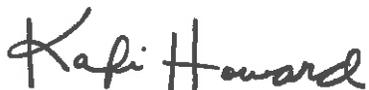
1. An availability letter must be provided to document that at this time there are available water quality credits to use for this site.
2. The ADS Underground stormwater system with Isolator Row has not been approved in the Town of Blacksburg because adequate access and maintenance has not been able to be established. Currently the inspection port is 12" diameter and does not allow visual observation of the underground system.

*Other items that are notable:*

1. The Town of Blacksburg Town has implemented a stormwater utility fee based on total impervious lot coverage. The rezoned area of this parcel would generate a stormwater fee of approximately **\$36.36 dollars per month** for this site. For more information on the details of the Stormwater Utility fee, please go to: <http://www.blacksburg.gov/stormwaterfund>.
2. No stormwater utility credits will be provided for water quality met with nutrient credits.

Please contact Kafi Howard with the Engineering Department at 961-1124 or via email [khoward@blacksburg.gov](mailto:khoward@blacksburg.gov) if you have questions or concern regarding this review. If you would like to schedule a post review meeting please also contact me.

Sincerely,



Kafi Howard, Town Engineer – Stormwater, (540) 961-1124



**Neighborhood Meeting Notes for RZN17-0001**  
**Preston Row Planned Residential District 900-Block of Progress Street, NW**  
**February 2, 2017**

A neighborhood meeting was held to discuss the request to rezone approximately 0.9 acres in the 900-block of Progress Street NW. Members from the applicant team, staff, and several citizens were in attendance. Please see the sign-in sheet.

At the meeting, staff gave a brief overview of the process and the schedule, as well as provided an opportunity for the public to ask questions of staff.

The applicant team discussed the makeup of the development team and their previous similar projects, and went over the details of the current rezoning request.

At the conclusion of their remarks, the floor was opened for citizen comment and questions.

- A citizen asked if this development was intended for students.
- There were questions and concerns regarding the amount of parking provided. Several citizens felt that the parking would not be adequate for the residents, and would cause spillover into the neighborhood. Several citizens asked if parking could be shared with the neighboring businesses.
- One citizen noted that Virginia Tech is de-emphasizing parking, making it distant and inconvenient and thereby encouraging transit usage and other alternate transportation methods instead.
- One citizen asked about the timeline for completion for this project.
- A citizen asked what the buildings would look like, and what the materials would be.
- There were several citizens who felt that there was not nearly enough green or open space on the site. They were concerned that residents with pets would have nowhere to go with their pets outside. Citizens also felt that there just wasn't enough room around the buildings or around the site, and that it felt tight. There was a general feeling that there was not enough greenspace for the residents.
- A citizen spoke and said that the signalized intersection at Progress & Main will be good for this development. Citizens also said that the traffic on Toms Creek is getting bottlenecked, with additional troubles on UCB and at Broce, especially at peak hours.
- There were several concerns regarding the makeup of the tenants, and what the price point would be for the units. The concern is that the units, leased by the bedroom as proposed, will make them unaffordable to a variety of users, especially non-students. There is also a concern that this leasing style, combined with the makeup of the units, will appeal to undergraduate residents and will lead to lifestyle conflicts with the neighborhood.
- A neighbor was concerned that this development was simply too much for the area—that it doesn't look like a "hometown" but rather a small city.



## Kinsey O'Shea

---

**From:** Velma Pierce [piercevelma@yahoo.com]  
**Sent:** Thursday, February 02, 2017 3:58 PM  
**To:** Kinsey O'Shea  
**Subject:** Rezoning at 904 Progress

Ms. Kinsey:

I am absolutely against this rezoning. The increase of 53 bedrooms per acre is absurd. Progress Street is already a busy street with an elementary school close by. We do not need to increase the traffic on this street any more than we have to. I am unable to attend this meeting, but I wanted to voice my opinion. You did not put an address on the blue card so there probably will not be a good attendance for this meeting.

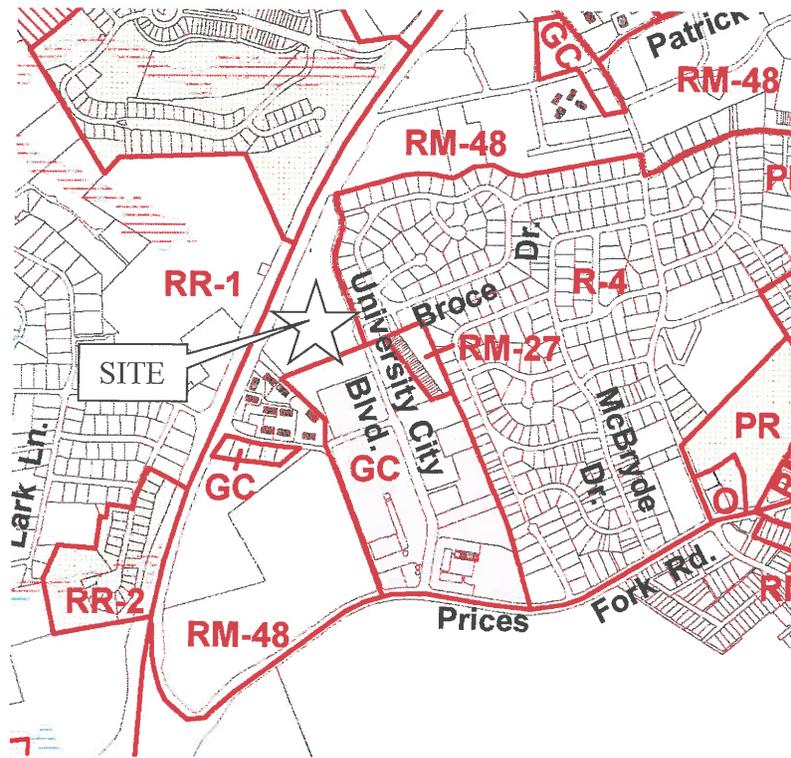


## Appendix F

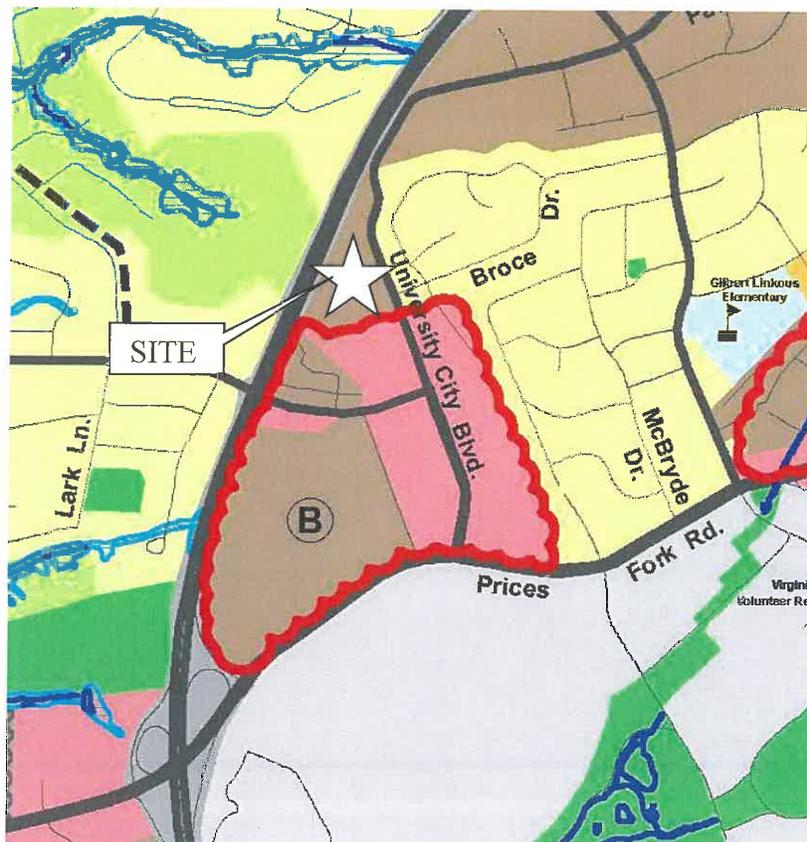
# Appendix

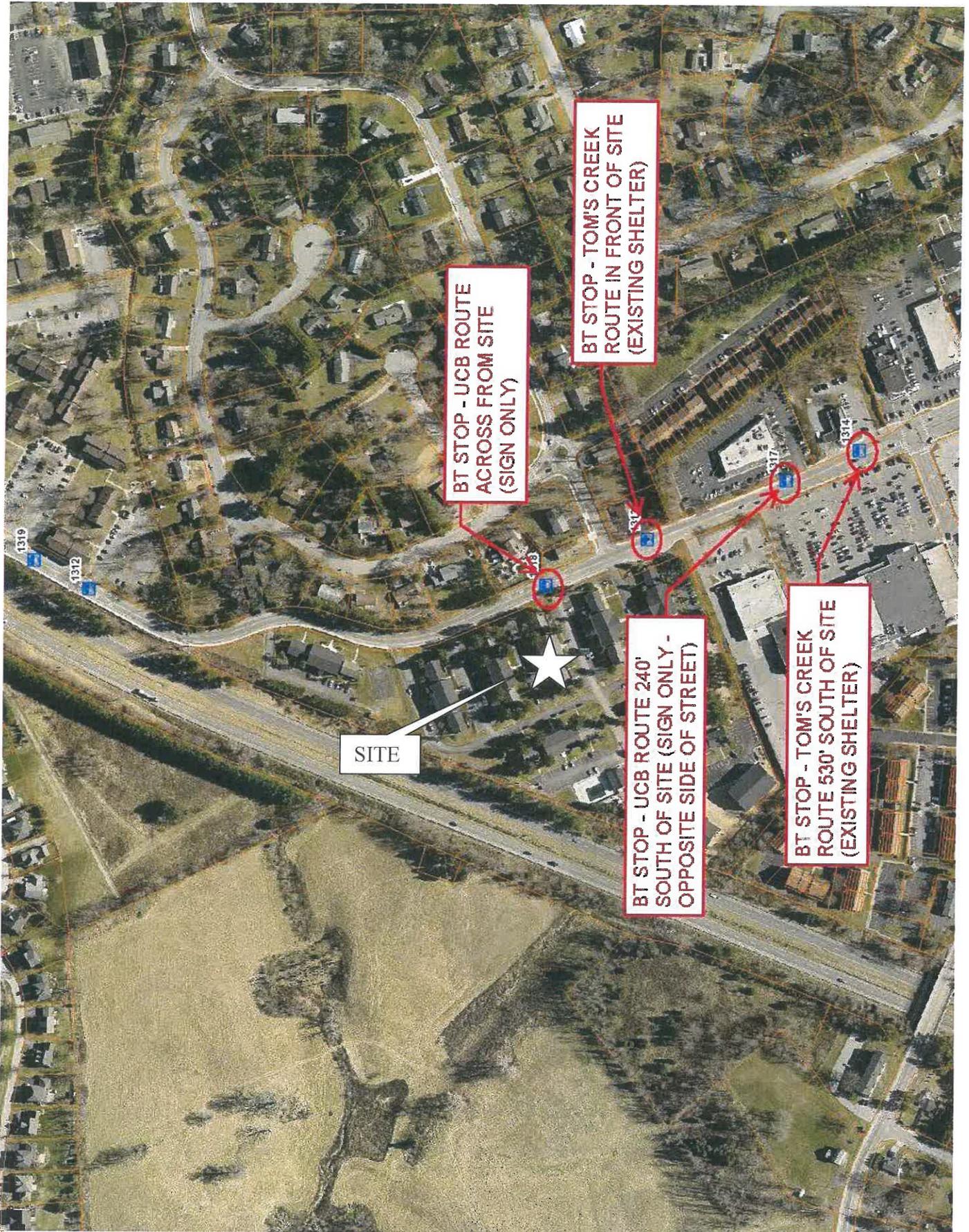
PAGES 28-29.....	Zoning and Transit Maps
SHEET Z1.0, Z1.1.....	Overall Existing Parcel Map
SHEET Z2.0.....	Existing Zoning & Land Use Map
SHEET Z3.0, Z3.1.....	Existing Conditions & Demolition Plan
SHEET Z4.0-Z4.3 .....	Master Plan
SHEET Z5.0, Z5.1.....	Open Space Plan
SHEET A00 .....	Architectural Site Plan
SHEET A01-A06.....	Floor Plans (Levels 1-6)
SHEET A07 .....	Building Sections
SHEET A08-A11.....	Building Elevations

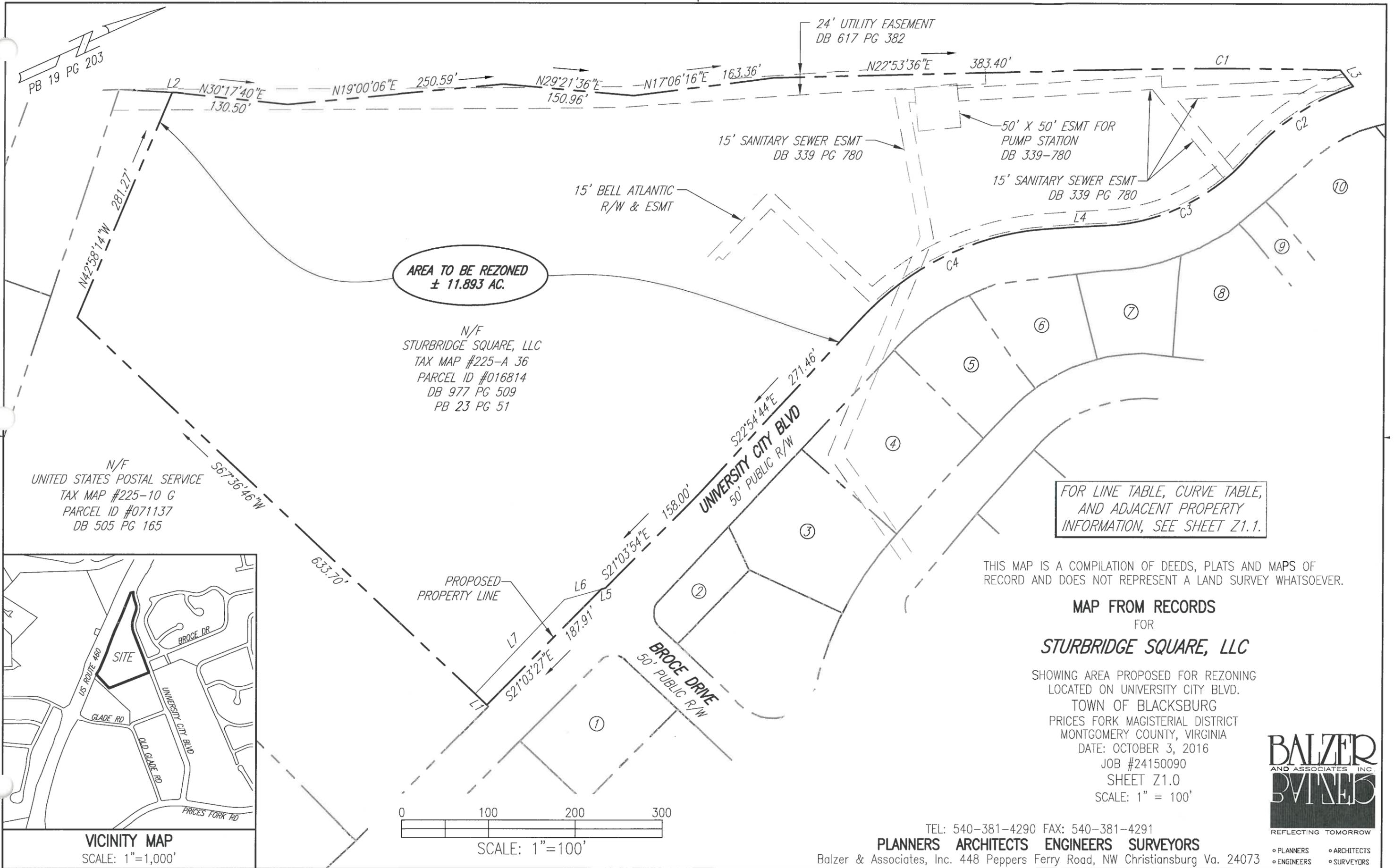
EXISTING ZONING MAP



FUTURE LAND USE MAP







**AREA TO BE REZONED  
± 11.893 AC.**

N/F  
STURBRIDGE SQUARE, LLC  
TAX MAP #225-A 36  
PARCEL ID #016814  
DB 977 PG 509  
PB 23 PG 51

N/F  
UNITED STATES POSTAL SERVICE  
TAX MAP #225-10 G  
PARCEL ID #071137  
DB 505 PG 165

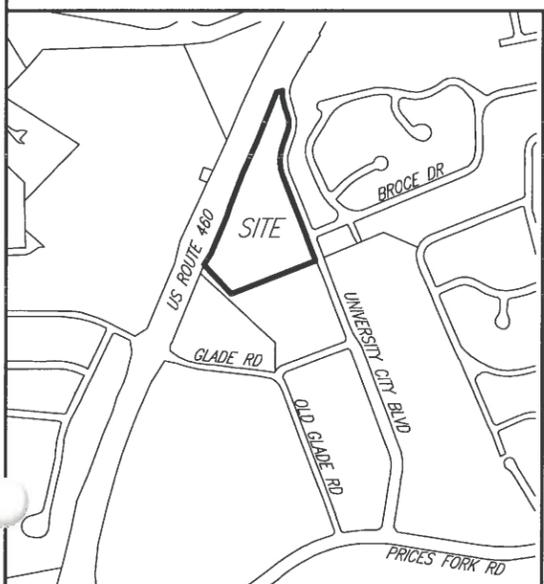
FOR LINE TABLE, CURVE TABLE,  
AND ADJACENT PROPERTY  
INFORMATION, SEE SHEET Z1.1.

THIS MAP IS A COMPILATION OF DEEDS, PLATS AND MAPS OF  
RECORD AND DOES NOT REPRESENT A LAND SURVEY WHATSOEVER.

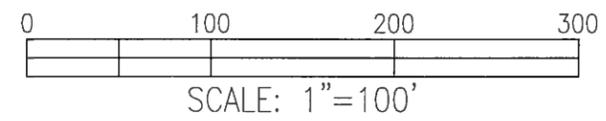
**MAP FROM RECORDS  
FOR  
STURBRIDGE SQUARE, LLC**

SHOWING AREA PROPOSED FOR REZONING  
LOCATED ON UNIVERSITY CITY BLVD.  
TOWN OF BLACKSBURG  
PRICES FORK MAGISTERIAL DISTRICT  
MONTGOMERY COUNTY, VIRGINIA

DATE: OCTOBER 3, 2016  
JOB #24150090  
SHEET Z1.0  
SCALE: 1" = 100'



**VICINITY MAP**  
SCALE: 1"=1,000'



TEL: 540-381-4290 FAX: 540-381-4291  
**PLANNERS ARCHITECTS ENGINEERS SURVEYORS**  
Balzer & Associates, Inc. 448 Peppers Ferry Road, NW Christiansburg Va. 24073

**BALZER**  
AND ASSOCIATES, INC.  
**ENGINEERS**  
REFLECTING TOMORROW

- PLANNERS
- ARCHITECTS
- ENGINEERS
- SURVEYORS

ADJACENT PROPERTY OWNER INFORMATION

1. N/F ONISHI, SHINZO & MITSUKO  
TAX MAP #225-1 SEC 3 9  
PARCEL ID #004843  
DB 570 PG 829
2. N/F 902 BROCE LLC  
TAX MAP #225-1 SEC 3 60  
PARCEL ID #014587  
DB 2015 PG 7875  
PB 1160 PG 853
3. N/F OWENS, SHARON K. & JOHNNY D.  
TAX MAP #225-1 SEC 3 58  
PARCEL ID #005417  
DB 1179 PG 758  
PB 769 PG 668
4. N/F JONES, STEPHEN D. & MABEL C.  
TAX MAP #225-1 SEC 3 57  
PARCEL ID# 009989  
DB 393 PG 684  
PB 3 PG 196
5. N/F SUTHERLAND, GRANT  
TAX MAP #225-1 SEC 3 56  
PARCEL ID #010786  
DB 2011 PG 4369  
PB 3 PG 196
6. N/F VAGHELA, NISHANTSINH B. & SHARMA, RAHUL S.  
TAX MAP #225-1 SEC 3 55  
PARCEL ID #017275  
DB 2010 PG 2599  
PB 387 PG 894
7. N/F TACZAK, MICHAEL J.  
TAX MAP #225-1 SEC 3 54  
PARCEL ID #001437  
DB 2009 PG 2284  
PB 3 PG 196
8. N/F SIMMONS, JONATHAN D.  
TAX MAP #225-1 SEC 3 53  
PARCEL ID #001138  
DB 2005 PG 2994  
PB 1023 PG 349
9. N/F RENEAU, RAYMOND B. JR & NANCY M.  
TAX MAP #225-1 SEC 3 52,5\*  
PARCEL ID #008585  
DB 521 PG 456  
PB 8 PB 39
10. N/F RENEAU, RAYMOND B. JR & NANCY M.  
TAX MAP #225-1 SEC 3 52,5\*  
PARCEL ID #008585  
DB 521 PG 456  
PB 8 PB 39

LINE TABLE		
LINE	BEARING	DISTANCE
L1	N67°42'16"E	18.62'
L2	S22°53'36"W	3.25'
L3	N75°16'16"E	24.28'
L4	N21°12'16"E	65.85'
L5	S08°34'16"W	5.05'
L6	S08°34'16"W	44.12'
L7	S22°16'46"E	150.00'

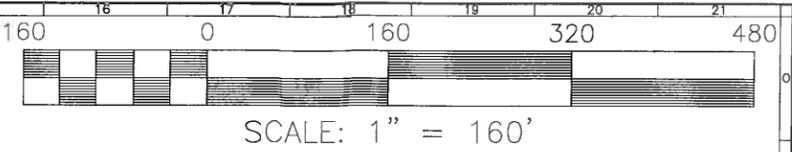
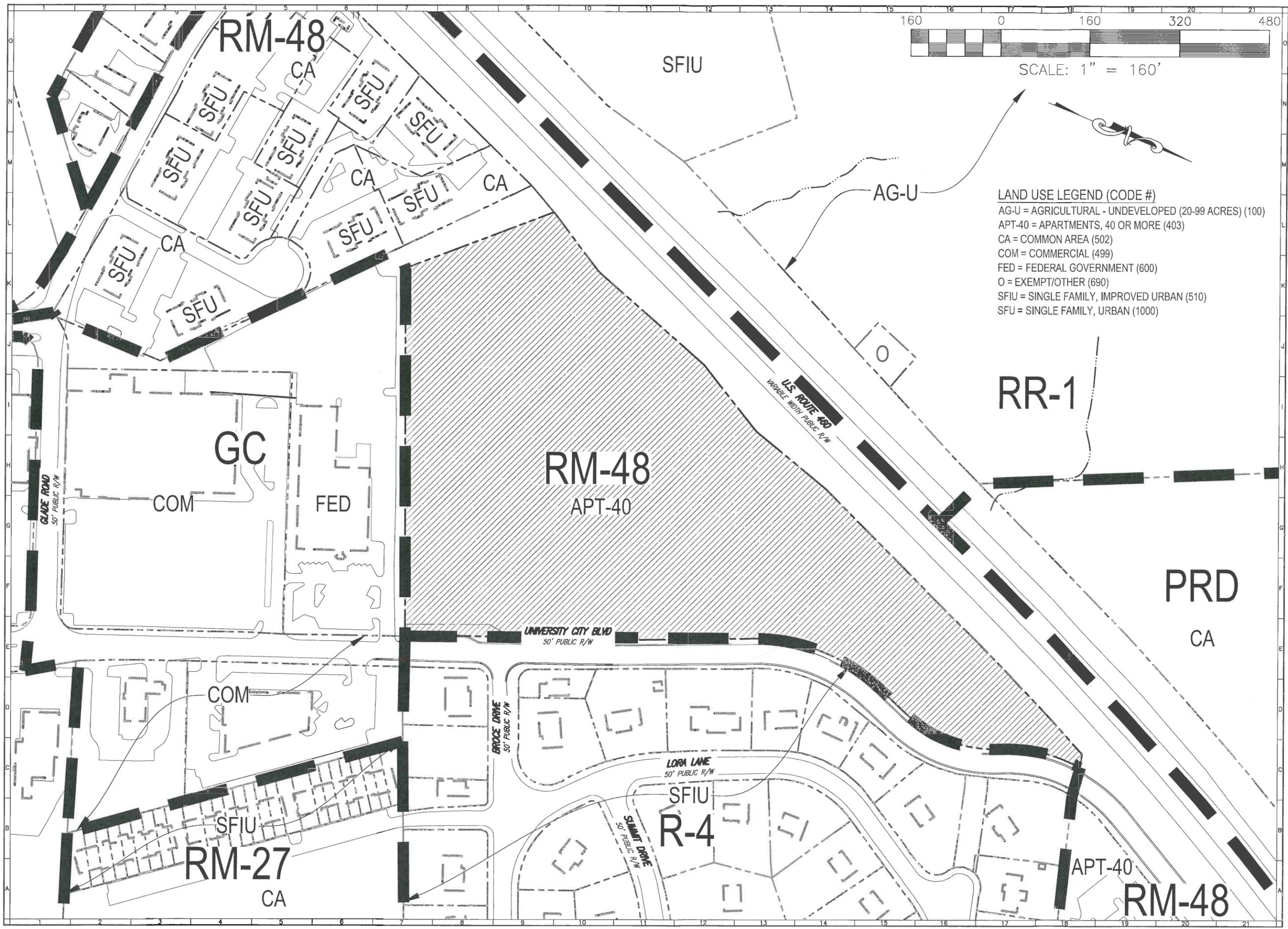
CURVE TABLE						
CURVE	ARC LENGTH	RADIUS	TANGENT	CHORD BEARING	CHORD LENGTH	DELTA ANGLE
C1	273.71'	5661.58'	136.88'	N24°16'46"E	273.69'	2°46'12"
C2	148.82'	279.00'	76.23'	S09°30'52"E	147.07'	30°33'45"
C3	183.85'	229.00'	97.20'	N01°47'44"W	178.95'	46°00'00"
C4	249.56'	324.11'	131.33'	N00°51'14"W	243.44'	44°07'00"

THIS MAP IS A COMPILATION OF DEEDS, PLATS AND MAPS OF RECORD AND DOES NOT REPRESENT A LAND SURVEY WHATSOEVER.

**MAP FROM RECORDS**  
FOR  
**STURBRIDGE SQUARE, LLC**

SHOWING AREA PROPOSED FOR REZONING  
LOCATED ON UNIVERSITY CITY BLVD.  
TOWN OF BLACKSBURG  
PRICES FORK MAGISTERIAL DISTRICT  
MONTGOMERY COUNTY, VIRGINIA  
DATE: OCTOBER 3, 2016  
JOB #24150090  
SHEET Z1.1  
SCALE: 1" = 100'





- LAND USE LEGEND (CODE #)**
- AG-U = AGRICULTURAL - UNDEVELOPED (20-99 ACRES) (100)
  - APT-40 = APARTMENTS, 40 OR MORE (403)
  - CA = COMMON AREA (502)
  - COM = COMMERCIAL (499)
  - FED = FEDERAL GOVERNMENT (600)
  - O = EXEMPT/OTHER (690)
  - SFIU = SINGLE FAMILY, IMPROVED URBAN (510)
  - SFU = SINGLE FAMILY, URBAN (1000)



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FAX 540-381-4291

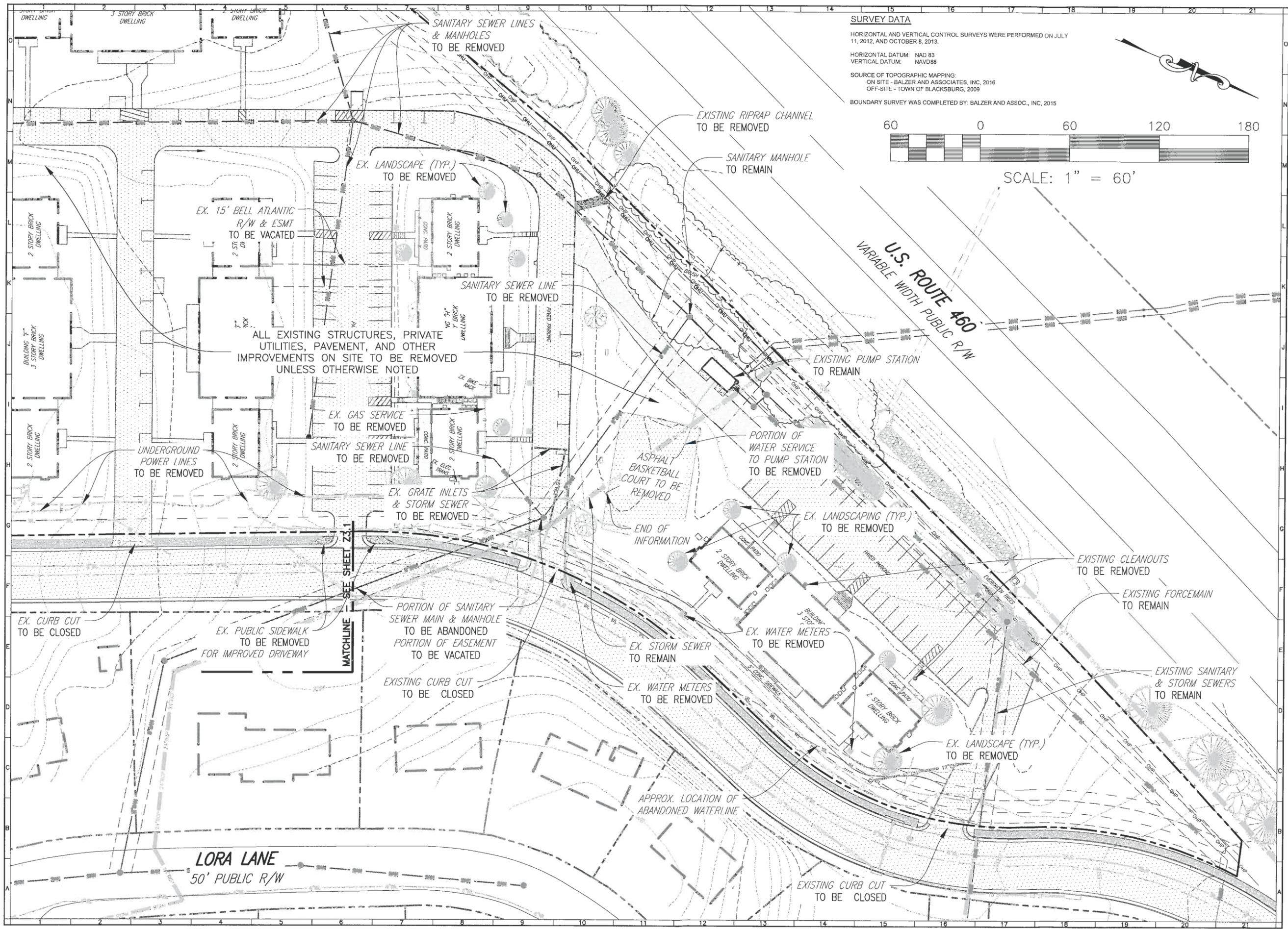
PRELIMINARY  
NOT FOR CONSTRUCTION

STURBRIDGE SQUARE  
911-1011 UNIVERSITY CITY BOULEVARD  
EXISTING ZONING & LAND USE MAP

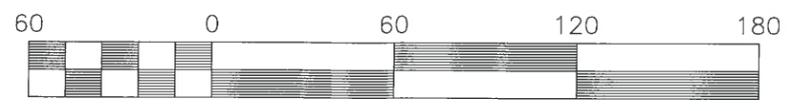
PRICES FORK MAGISTERIAL DISTRICT  
TOWN OF BLACKSBURG, VIRGINIA

DRAWN BY GLM  
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CHECKED BY SMS  
DATE 10/3/16  
SCALE 1" = 160'  
REVISIONS:

SHEET NO.  
**Z2.0**  
JOB NO. 24150090.00



**SURVEY DATA**  
 HORIZONTAL AND VERTICAL CONTROL SURVEYS WERE PERFORMED ON JULY 11, 2012, AND OCTOBER 8, 2013.  
 HORIZONTAL DATUM: NAD 83  
 VERTICAL DATUM: NAVD88  
 SOURCE OF TOPOGRAPHIC MAPPING:  
 ON SITE - BALZER AND ASSOCIATES, INC, 2016  
 OFF-SITE - TOWN OF BLACKSBURG, 2009  
 BOUNDARY SURVEY WAS COMPLETED BY: BALZER AND ASSOC., INC, 2015



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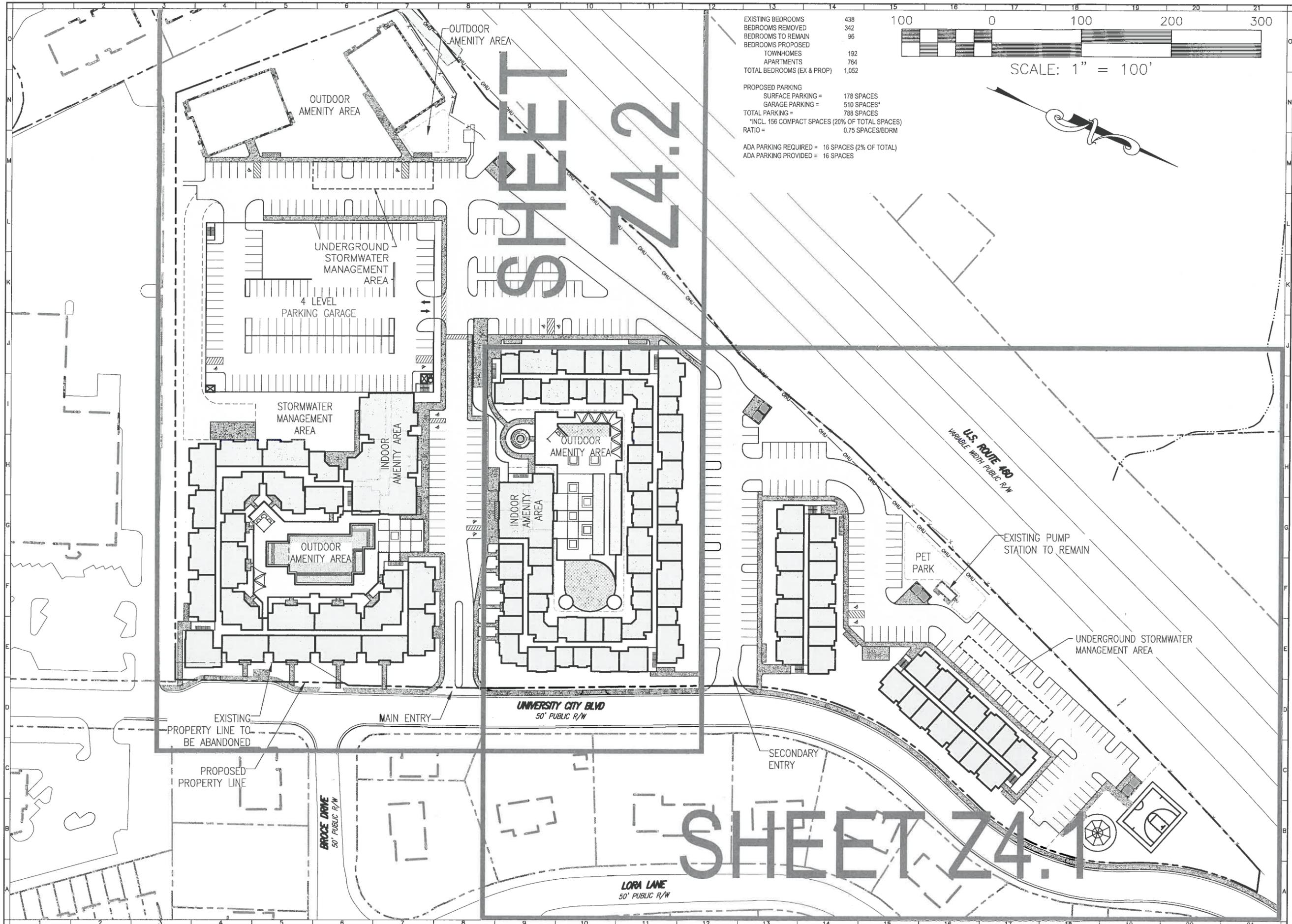
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**STURBRIDGE SQUARE**  
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**EXISTING CONDITIONS & DEMOLITION PLAN**  
 PRICES FORK MAGISTERIAL DISTRICT  
 TOWN OF BLACKSBURG, VIRGINIA

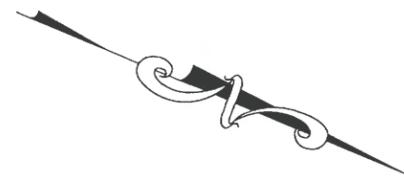
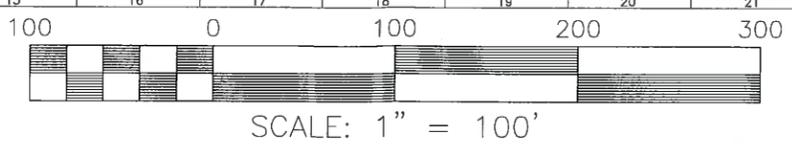
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 DATE: 10/3/16  
 SCALE: 1" = 60'  
 REVISIONS:

SHEET NO.  
**Z3.0**  
 JOB NO. 24150090.00





EXISTING BEDROOMS	438
BEDROOMS REMOVED	342
BEDROOMS TO REMAIN	96
BEDROOMS PROPOSED	
TOWNHOMES	192
APARTMENTS	764
TOTAL BEDROOMS (EX & PROP)	1,052
PROPOSED PARKING	
SURFACE PARKING =	178 SPACES
GARAGE PARKING =	510 SPACES*
TOTAL PARKING =	788 SPACES
*INCL. 156 COMPACT SPACES (20% OF TOTAL SPACES)	
RATIO =	0.75 SPACES/BDRM
ADA PARKING REQUIRED =	16 SPACES (2% OF TOTAL)
ADA PARKING PROVIDED =	16 SPACES



SHEET Z4.2

SHEET Z4.1



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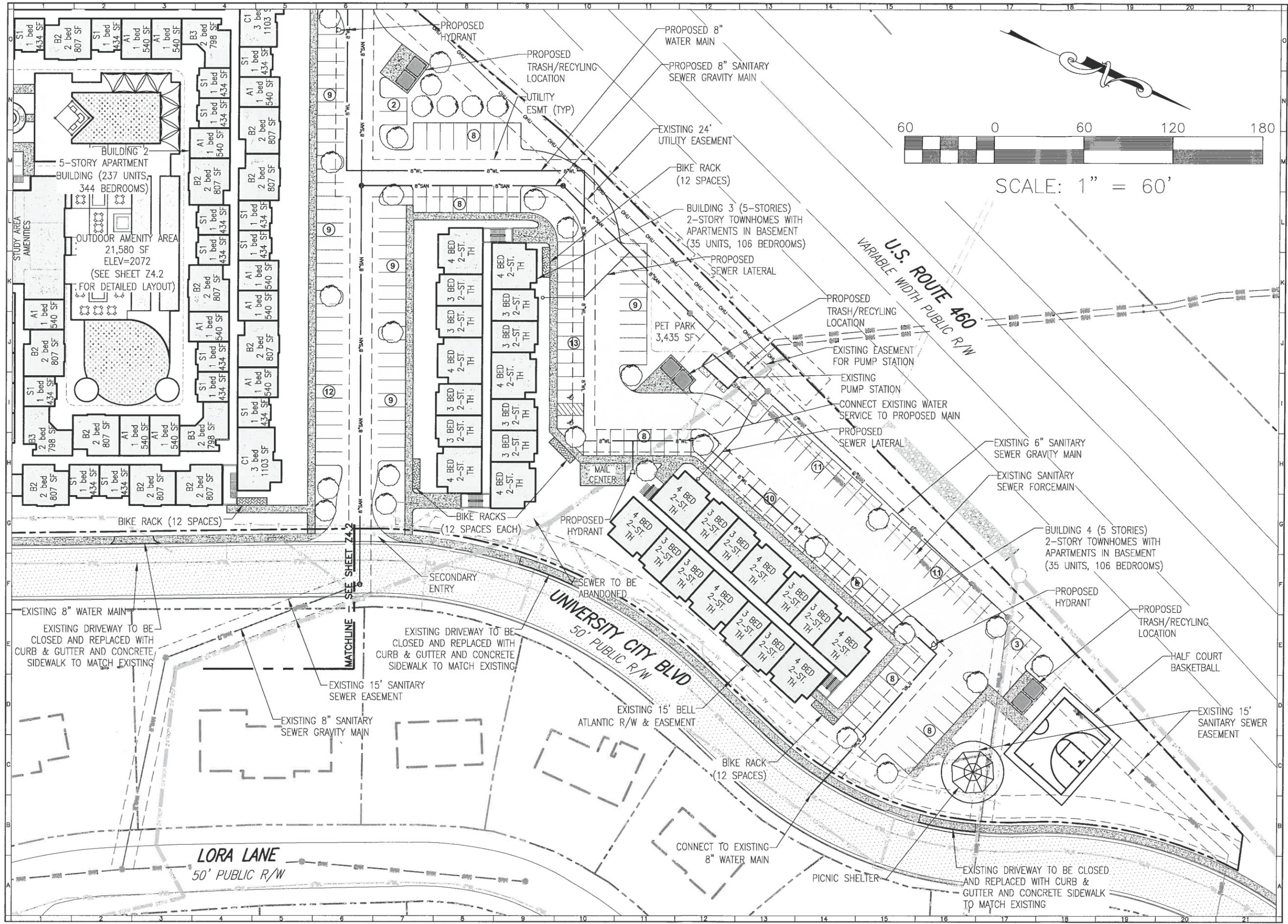
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**OVERALL MASTER PLAN**  
 PRICES FORK MAGISTERIAL DISTRICT  
 TOWN OF BLACKSBURG, VIRGINIA

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 REVISIONS:

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**Z4.0**  
 JOB NO. 24150090.00



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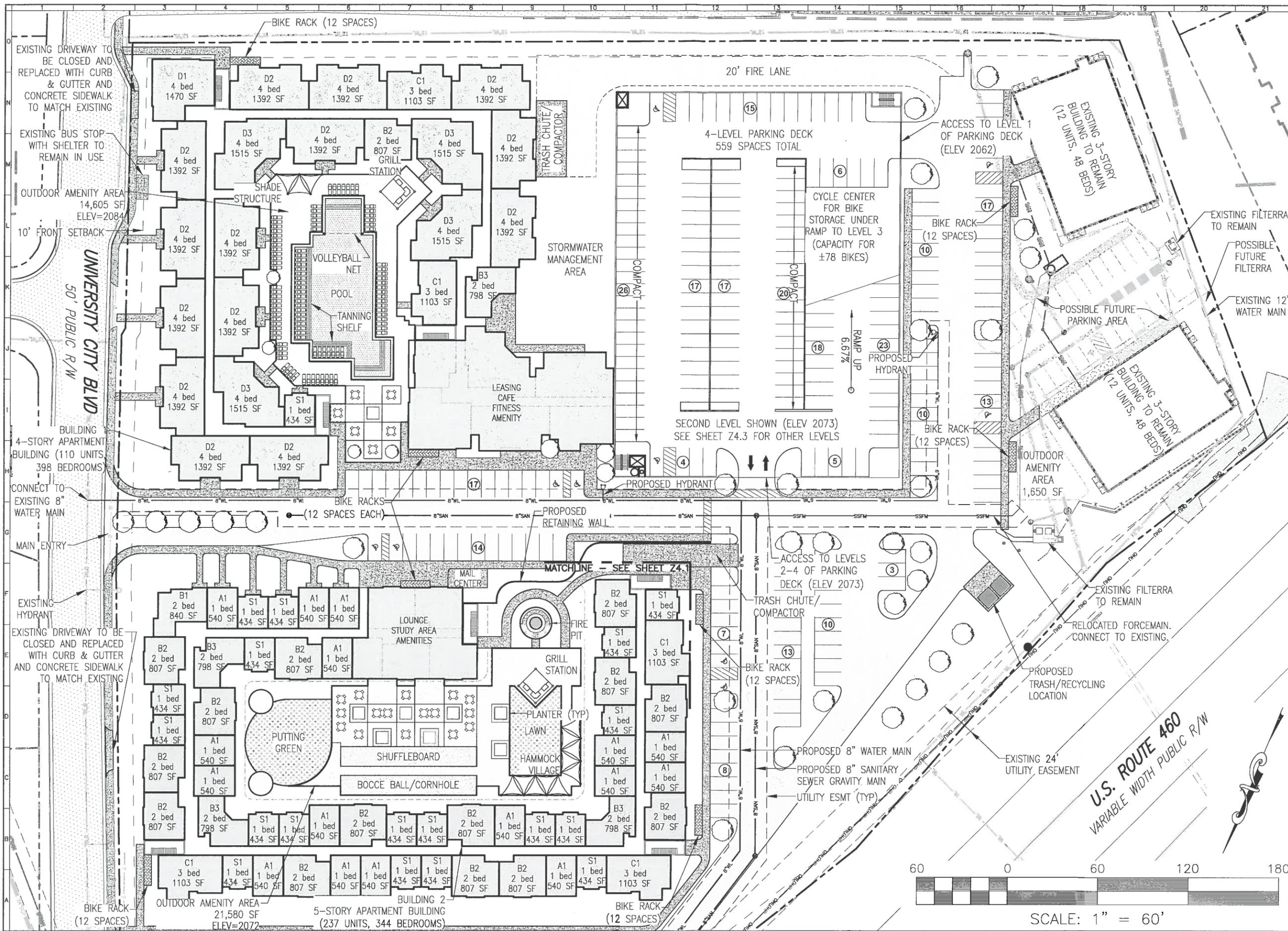
STURBRIDGE SQUARE  
911-1011 UNIVERSITY CITY BOULEVARD

MASTER PLAN

PRICES FORK MAGISTERIAL DISTRICT  
TOWN OF BLACKSBURG, VIRGINIA

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DATE 10/3/16  
SCALE 1" = 60'  
REVISIONS:

SHEET NO.  
**Z4.1**  
JOB NO. 24150090.00



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 LAND SURVEYING  
 ARCHITECTURE  
 STRUCTURAL ENGINEERING  
 TRANSPORTATION ENGINEERING  
 ENVIRONMENTAL & SOIL SCIENCE  
 WETLAND DELINEATIONS & STREAM EVALUATIONS

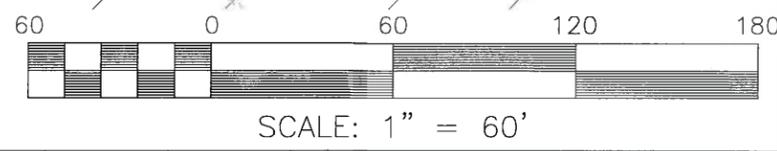
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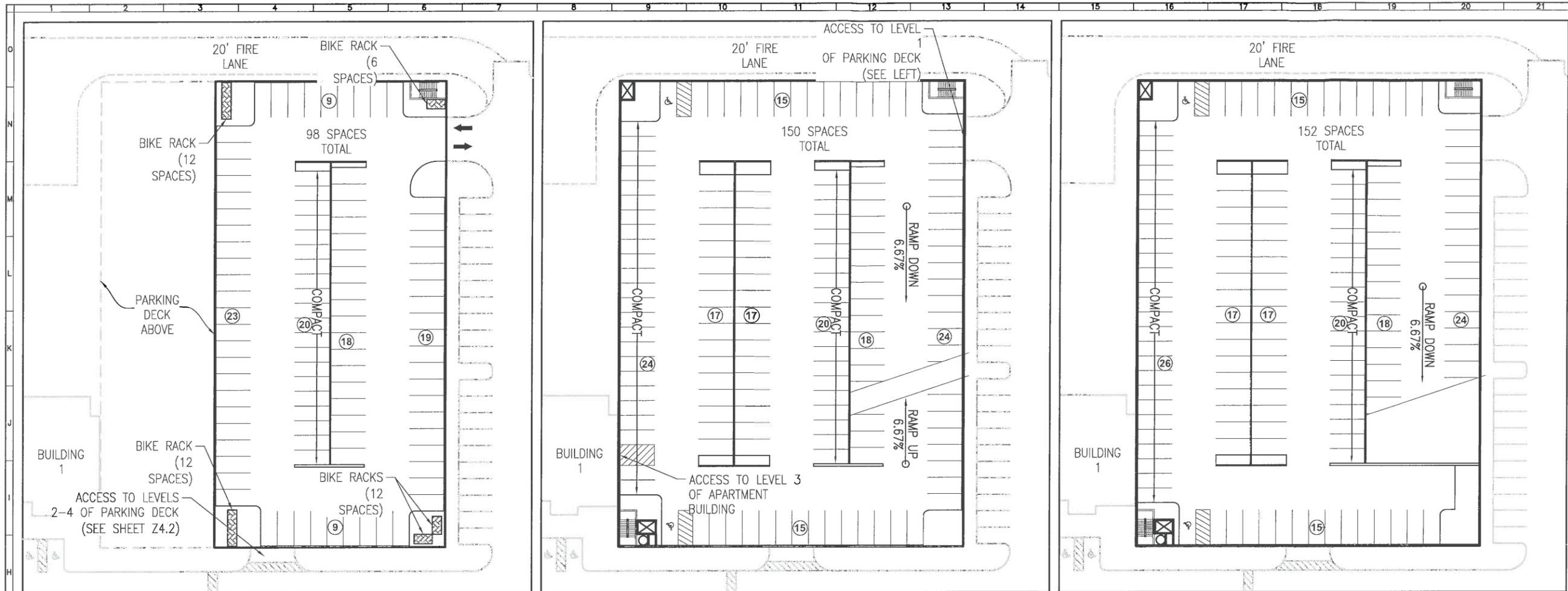
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**STURBRIDGE SQUARE**  
 911-1011 UNIVERSITY CITY BOULEVARD  
 PRICES FORK MAGISTERIAL DISTRICT  
 TOWN OF BLACKSBURG, VIRGINIA  
**MASTER PLAN**

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 SCALE 1" = 60'  
 REVISIONS:

SHEET NO.  
**Z4.2**  
 JOB NO. 24150090.00

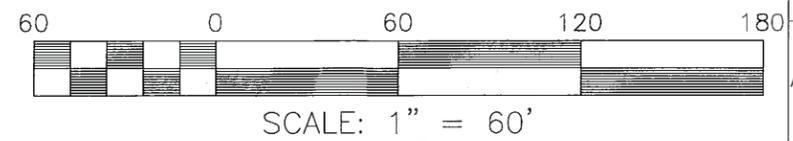




PARKING DECK LEVEL 1 (EL. 2062)  
SCALE: 1"=60'

PARKING DECK LEVEL 3 (EL. 2084)  
SCALE: 1"=60'

PARKING DECK LEVEL 4 (EL. 2095)  
SCALE: 1"=60'



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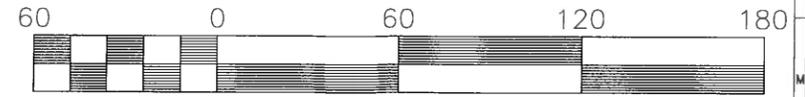
STURBRIDGE SQUARE  
9111-1011 UNIVERSITY CITY BOULEVARD  
PARKING DECK LAYOUT  
PRICES FORK MAGISTERIAL DISTRICT  
TOWN OF BLACKSBURG, VIRGINIA

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DATE 10/3/16  
SCALE 1" = 60'  
REVISIONS:

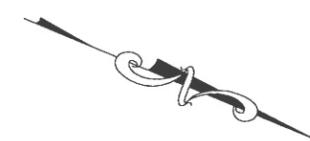
**LEGEND**

- RECREATIONAL OPEN SPACE
- NON-RECREATIONAL OPEN SPACE

OPEN SPACE CALCULATIONS  
 REQUIRED OPEN SPACE = 20% OF SITE AREA  
 = 103,703 SF  
 PROVIDED OPEN SPACE:  
 NON-RECREATIONAL = 45,275 SF  
 RECREATIONAL = 74,710 SF  
 TOTAL = 119,985 SF (23.1%)



SCALE: 1" = 60'



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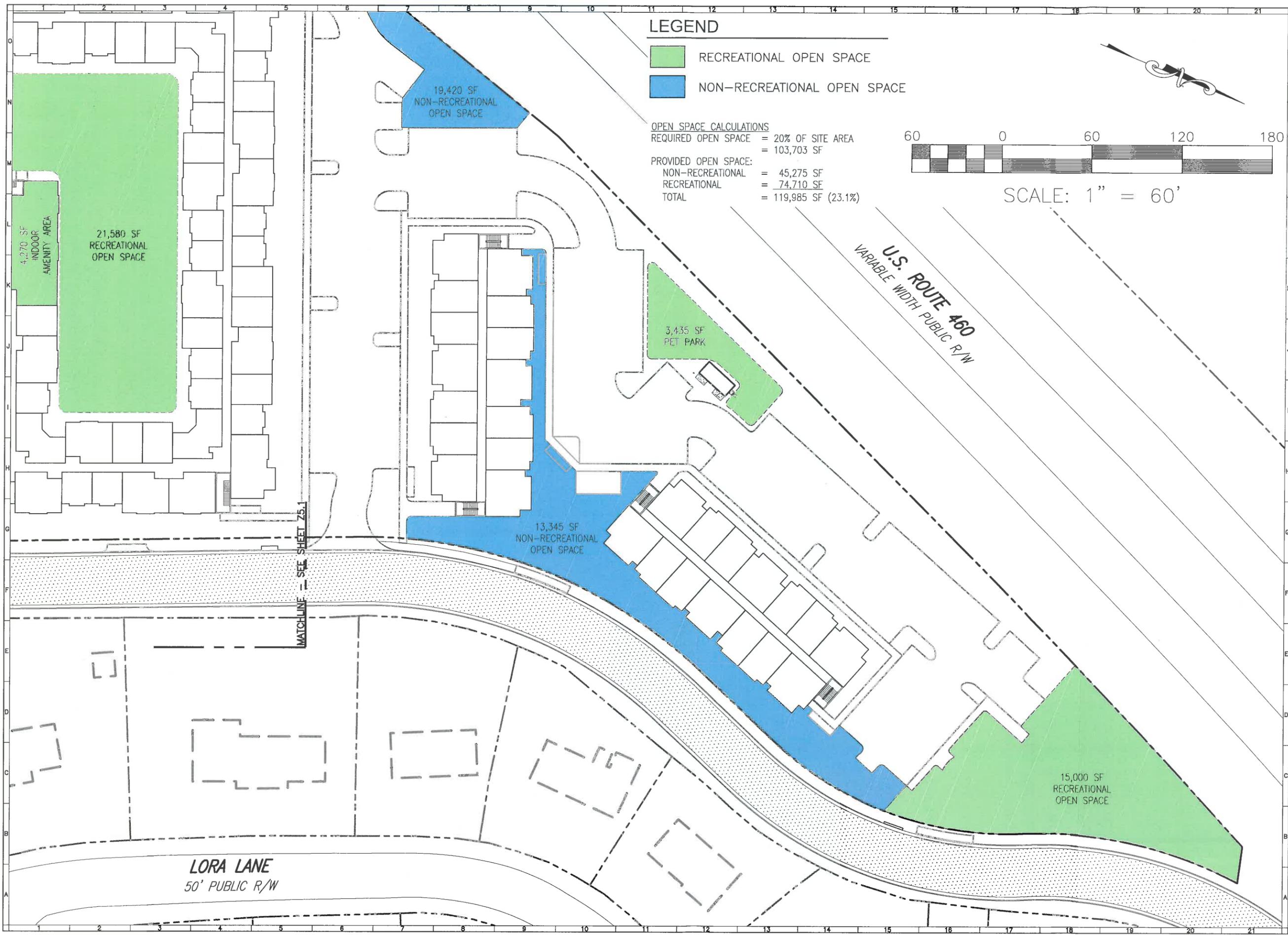
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PRELIMINARY  
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STURBRIDGE SQUARE  
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 OPEN SPACE PLAN  
 PRICES FORK MAGISTERIAL DISTRICT  
 TOWN OF BLACKSBURG, VIRGINIA

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 SCALE 1" = 60'  
 REVISIONS:

SHEET NO.  
**Z5.0**  
 JOB NO. 24150090.00



MATCHLINE - SEE SHEET Z5.1

**LORA LANE**  
 50' PUBLIC R/W

**U.S. ROUTE 460**  
 VARIABLE WIDTH PUBLIC R/W

PRELIMINARY  
NOT FOR CONSTRUCTION

**STURBRIDGE SQUARE**  
917-1011 UNIVERSITY CITY BOULEVARD  
OPEN SPACE PLAN  
PRICES FORK MAGISTERIAL DISTRICT  
TOWN OF BLACKSBURG, VIRGINIA

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DATE 10/3/16  
SCALE 1" = 60'

REVISIONS:

SHEET NO.  
**Z5.1**  
JOB NO. 24150090.00



UNIT TYPE	#Beds/#Baths	Size in Net HSF	# Units	# of Beds	Total Net HSF
S1	1/1	434	78	78	33,852
A1	1/1	540	68	68	36,720
A2	1/1	640	8	8	5,120
B1	2/2	840	3	6	2,520
B2	2/2	807	72	144	58,104
B3	2/2	788	16	32	12,768
B4	2/2	881	6	12	5,286
TH-C	3/3	1,269	32	96	40,608
C1	3/3	1,108	24	72	26,592
D1	4/4	1,470	6	24	8,820
D2	4/4	1,392	61	244	84,912
D3	4/4	1,515	19	76	28,785
TH-D	4/4	1,618	24	96	38,832

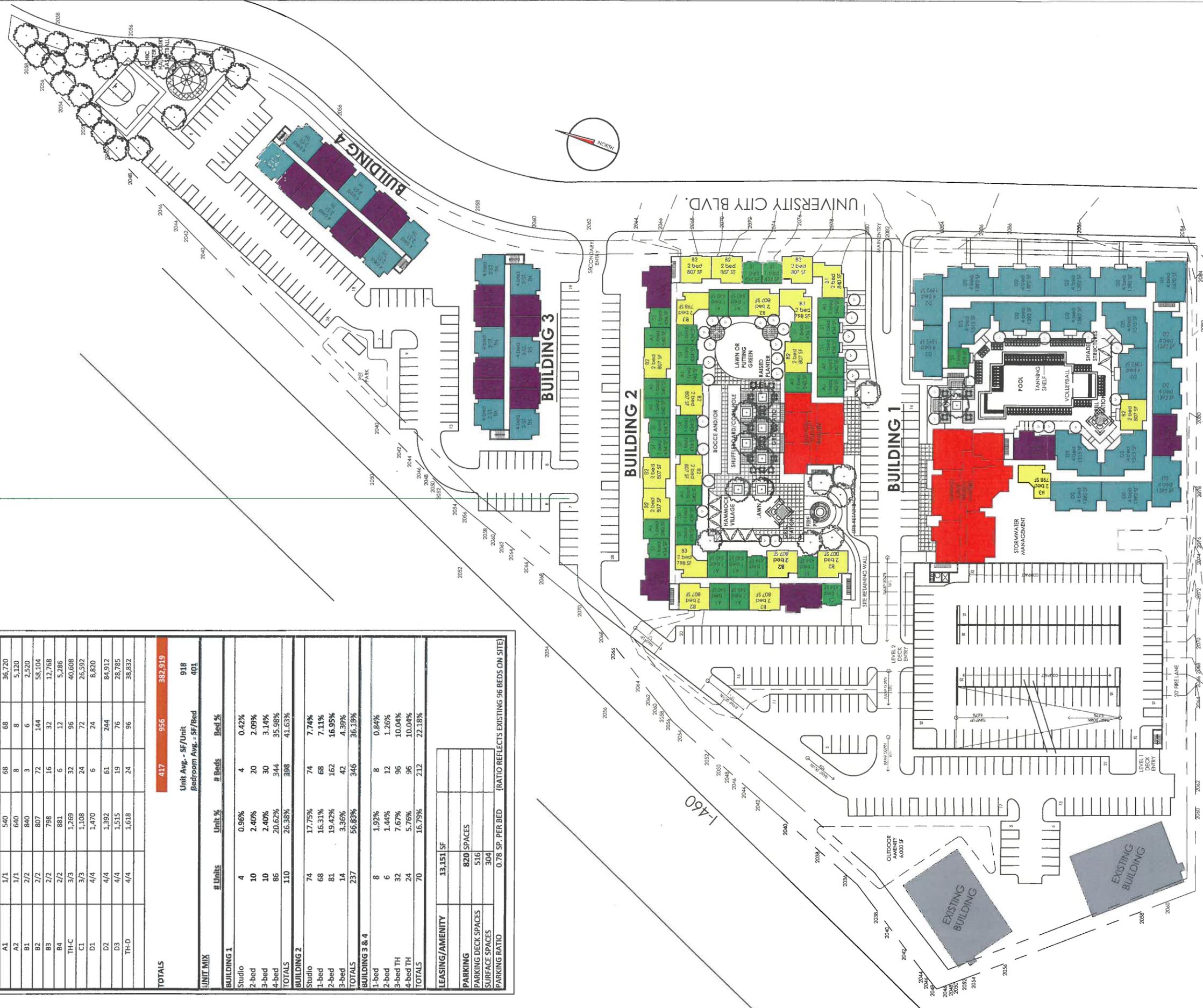
**TOTALS**      **417**    **956**    **382,919**

**UNIT MIX**      **Unit Avg. - SF/Unit**      **918**

**Bedroom Avg. - SF/Bed**      **401**

BUILDING	# Units	Unit %	# Beds	Bed %
<b>BUILDING 1</b>				
Studio	4	0.96%	4	0.42%
2-bed	10	2.40%	20	2.09%
3-bed	10	2.40%	30	3.14%
4-bed	86	20.62%	344	35.98%
<b>TOTALS</b>	<b>110</b>	<b>26.38%</b>	<b>398</b>	<b>41.63%</b>
<b>BUILDING 2</b>				
Studio	74	17.75%	74	7.74%
1-bed	68	16.31%	68	7.11%
2-bed	81	19.42%	162	16.95%
3-bed	14	3.36%	42	4.39%
<b>TOTALS</b>	<b>237</b>	<b>56.83%</b>	<b>346</b>	<b>36.19%</b>
<b>BUILDING 3 &amp; 4</b>				
1-bed	8	1.92%	8	0.84%
2-bed	6	1.44%	12	1.26%
3-bed TH	32	7.67%	96	10.04%
4-bed TH	24	5.76%	96	10.04%
<b>TOTALS</b>	<b>70</b>	<b>16.79%</b>	<b>212</b>	<b>22.18%</b>

<b>LEASING/AMENITY</b>	<b>13,151 SF</b>
<b>PARKING</b>	<b>820 SPACES</b>
<b>PARKING DECK SPACES</b>	<b>516</b>
<b>SURFACE SPACES</b>	<b>304</b>
<b>PARKING RATIO</b>	<b>0.78 SP. PER BED (RATIO REFLECTS EXISTING 96 BEDS ON SITE)</b>



**STURBRIDGE SITE  
MASTER PLAN CONCEPT**

**A00**

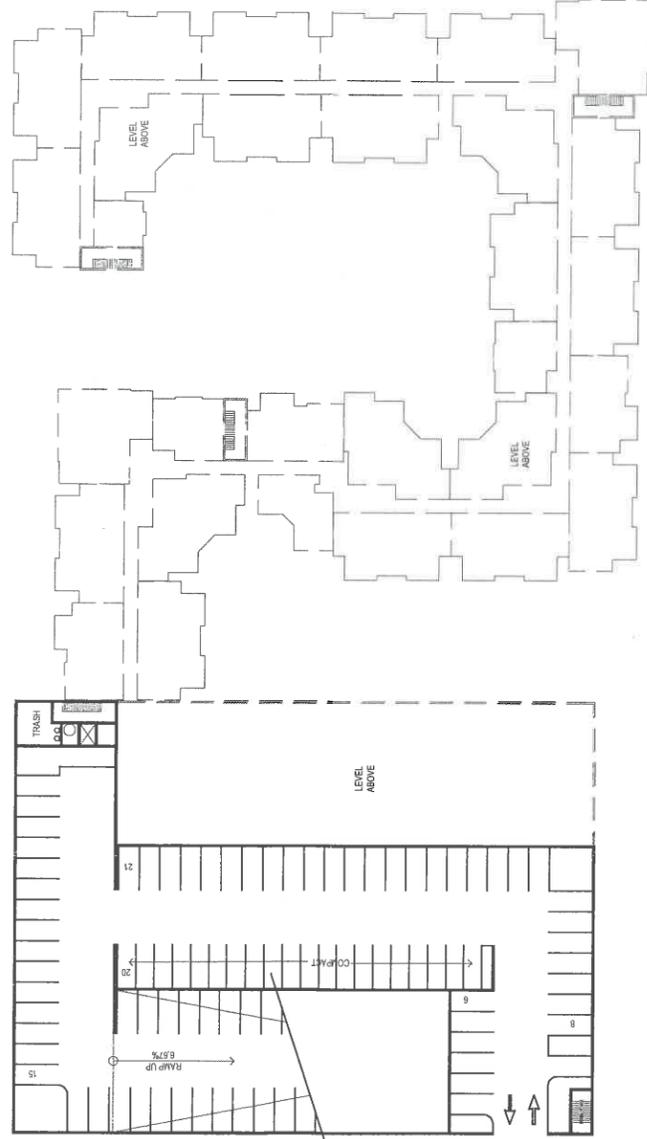
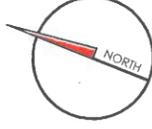
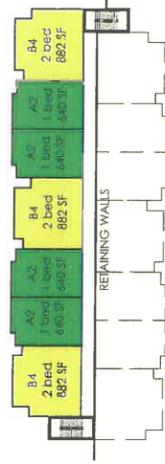
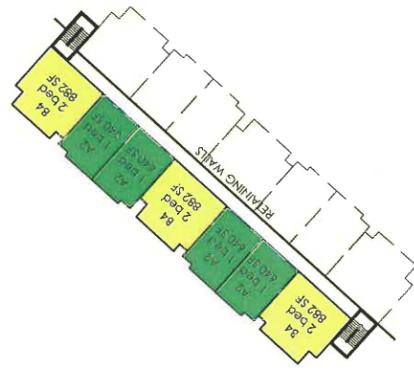
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Blacksburg, VA

SH160065.00

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**LEVEL 1**  
(2061.7)

A01

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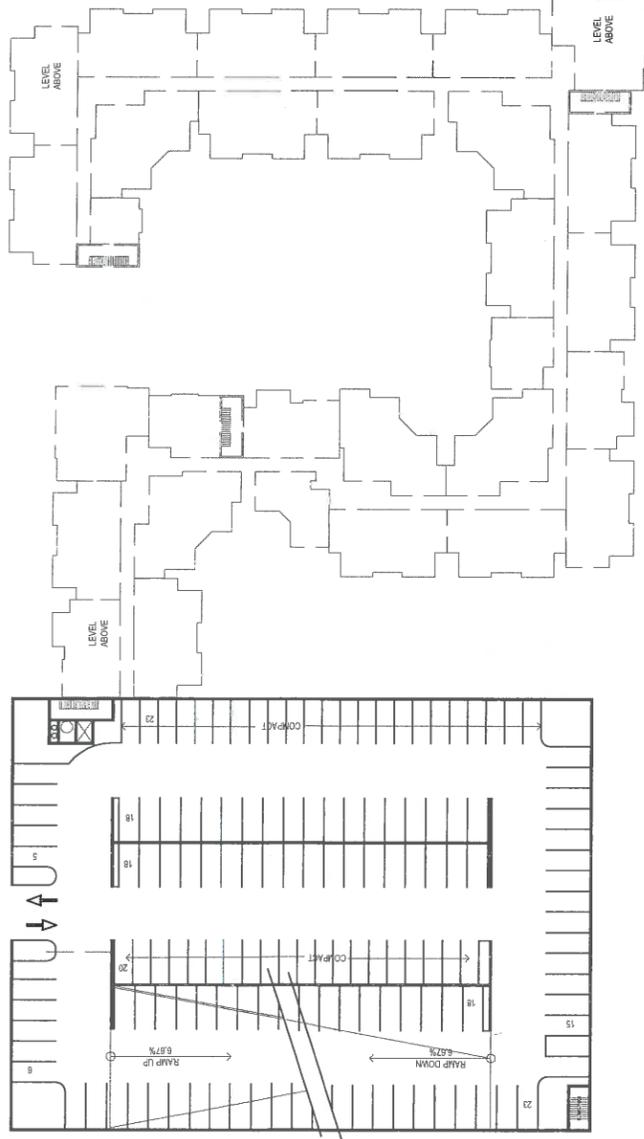
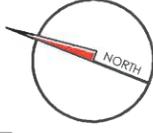
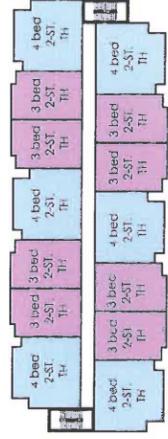
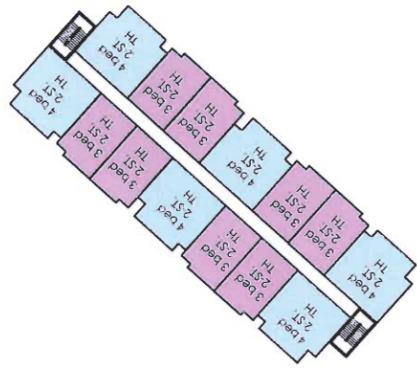
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**BSB**  
DESIGN

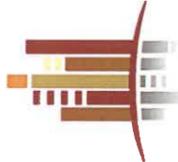
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A02

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**BSB**  
DESIGN

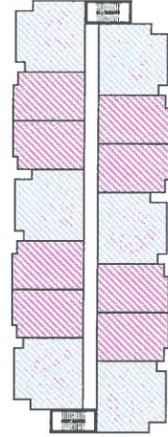
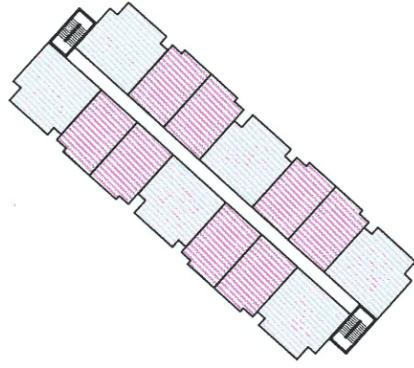
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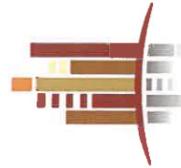
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**LEVEL 3**  
(2084.7)

**A03**  
**Sturbridge Square PRD**  
Blacksburg, VA

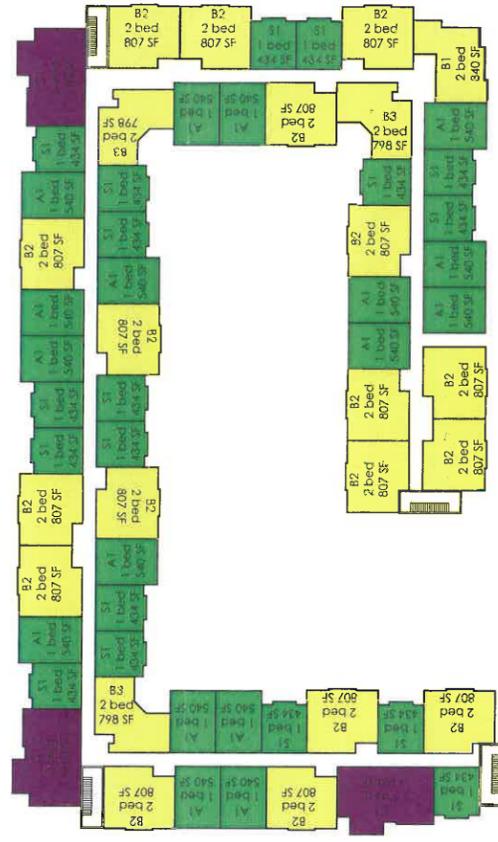
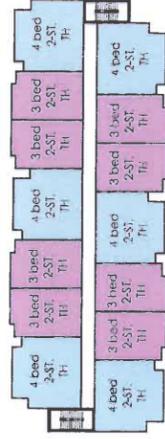
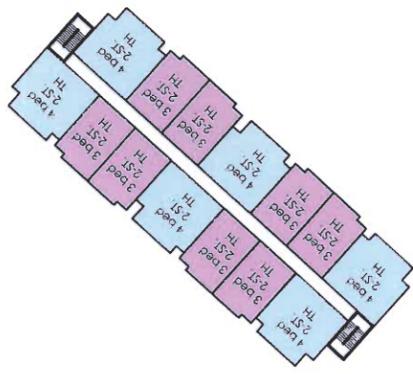


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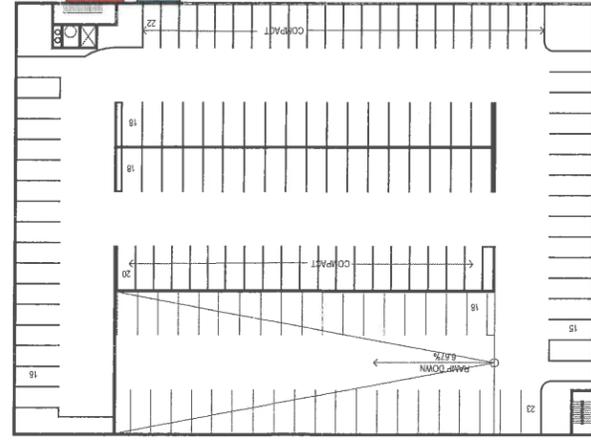
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**LEVEL 4**  
(2095.7)



**A04**

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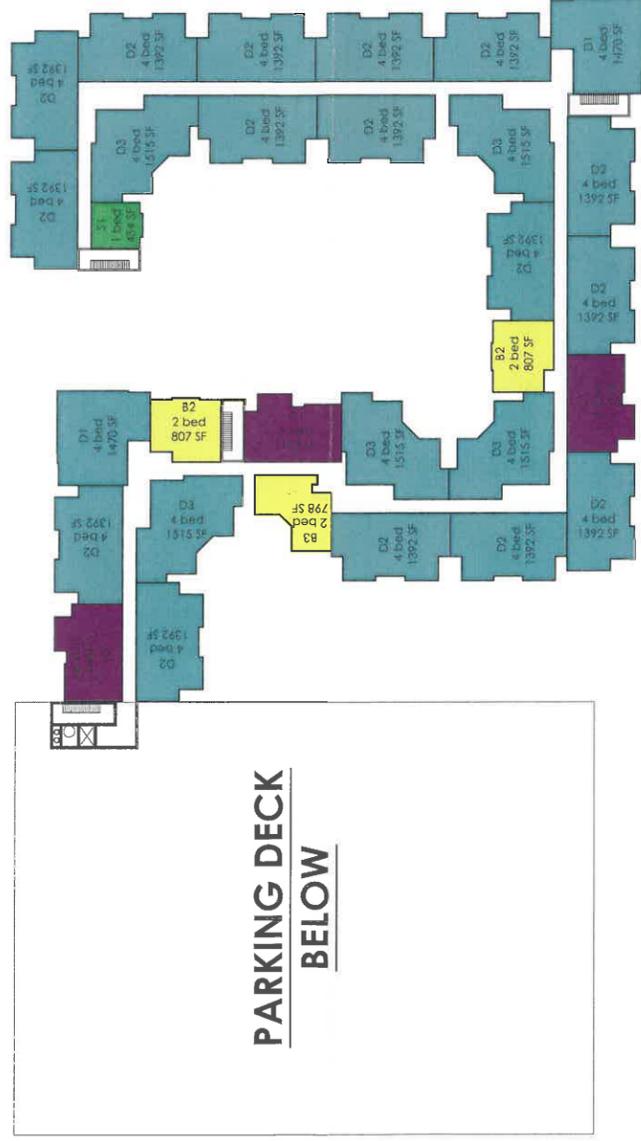
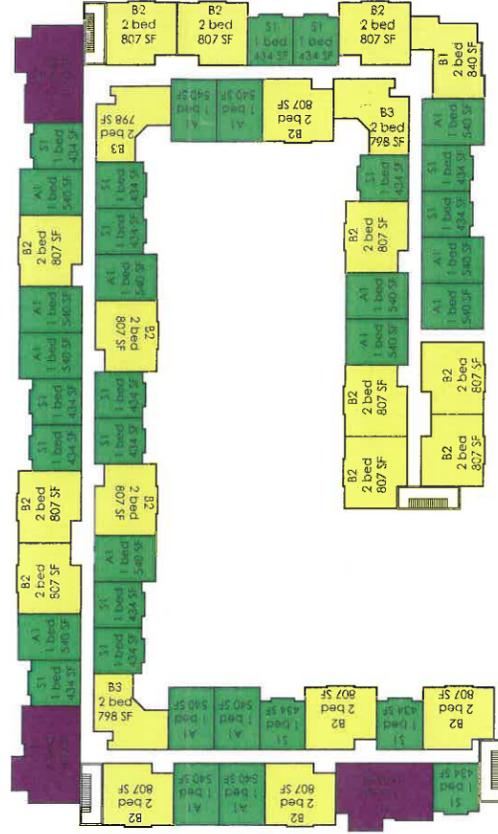
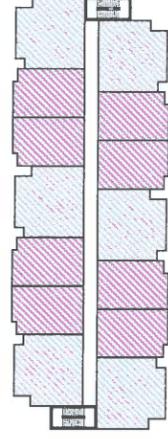
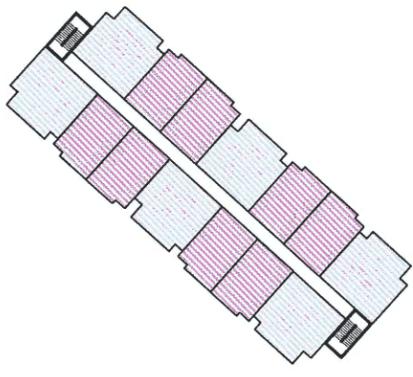


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**LEVEL 5**  
(2106.7)

**PARKING DECK  
BELOW**

A05

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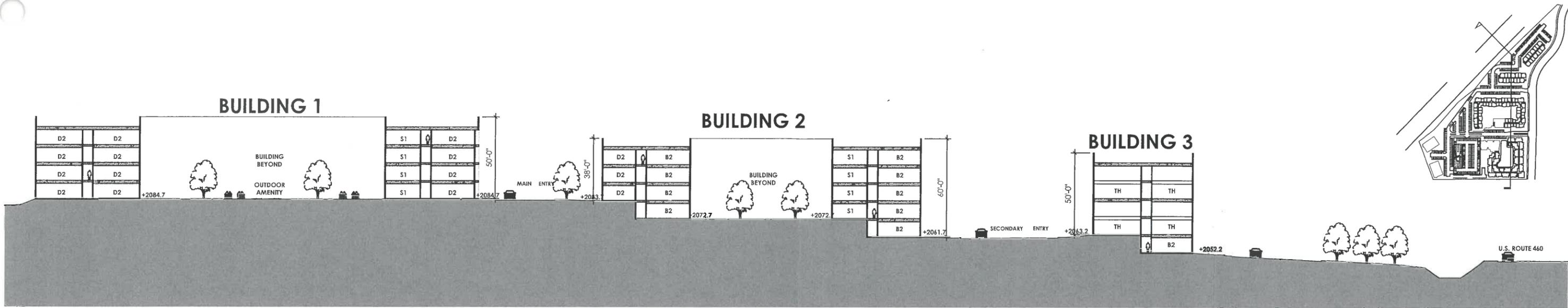
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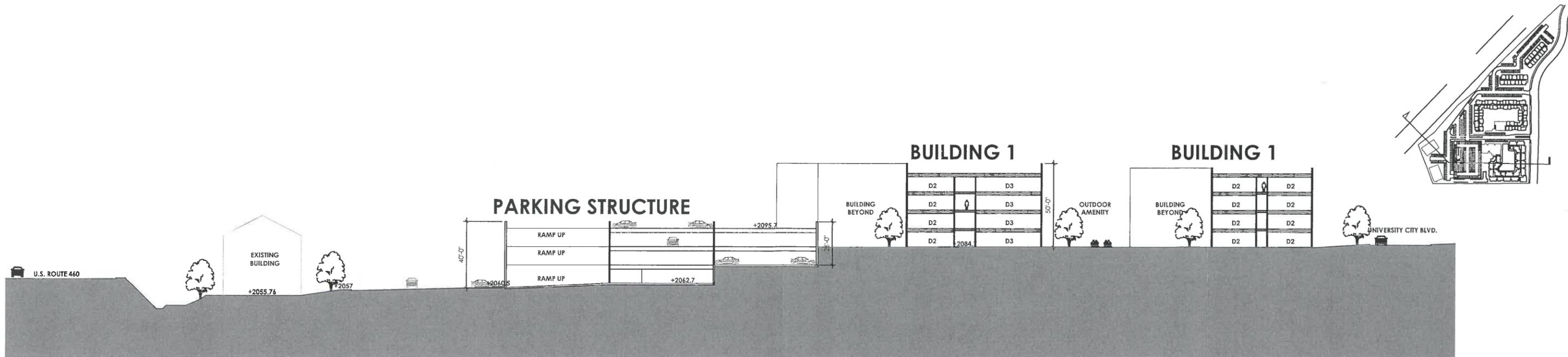
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SITE SECTION B



SITE SECTION A

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A07

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# BUILDING 1

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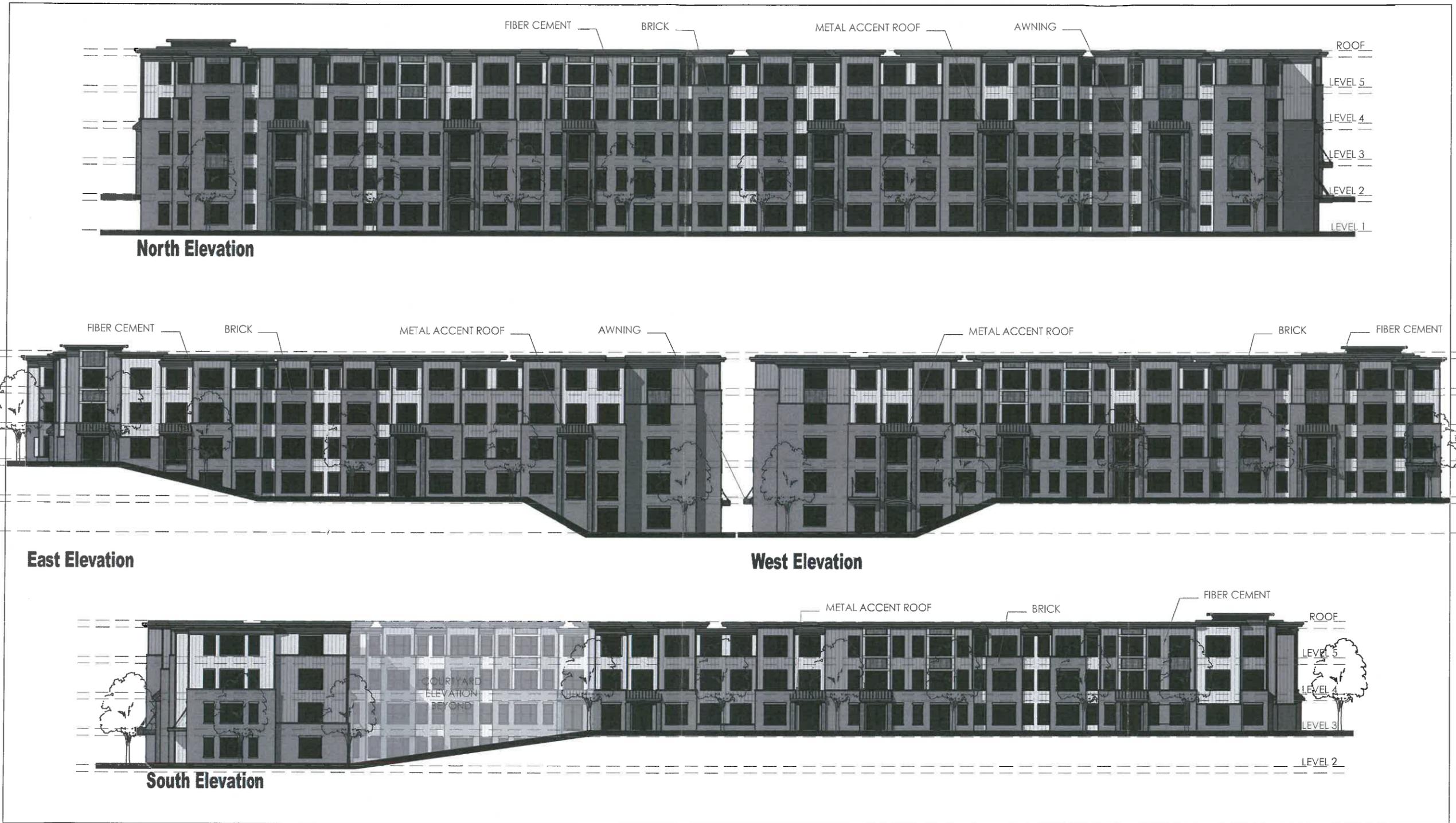
A08

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## BUILDING 2

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A09

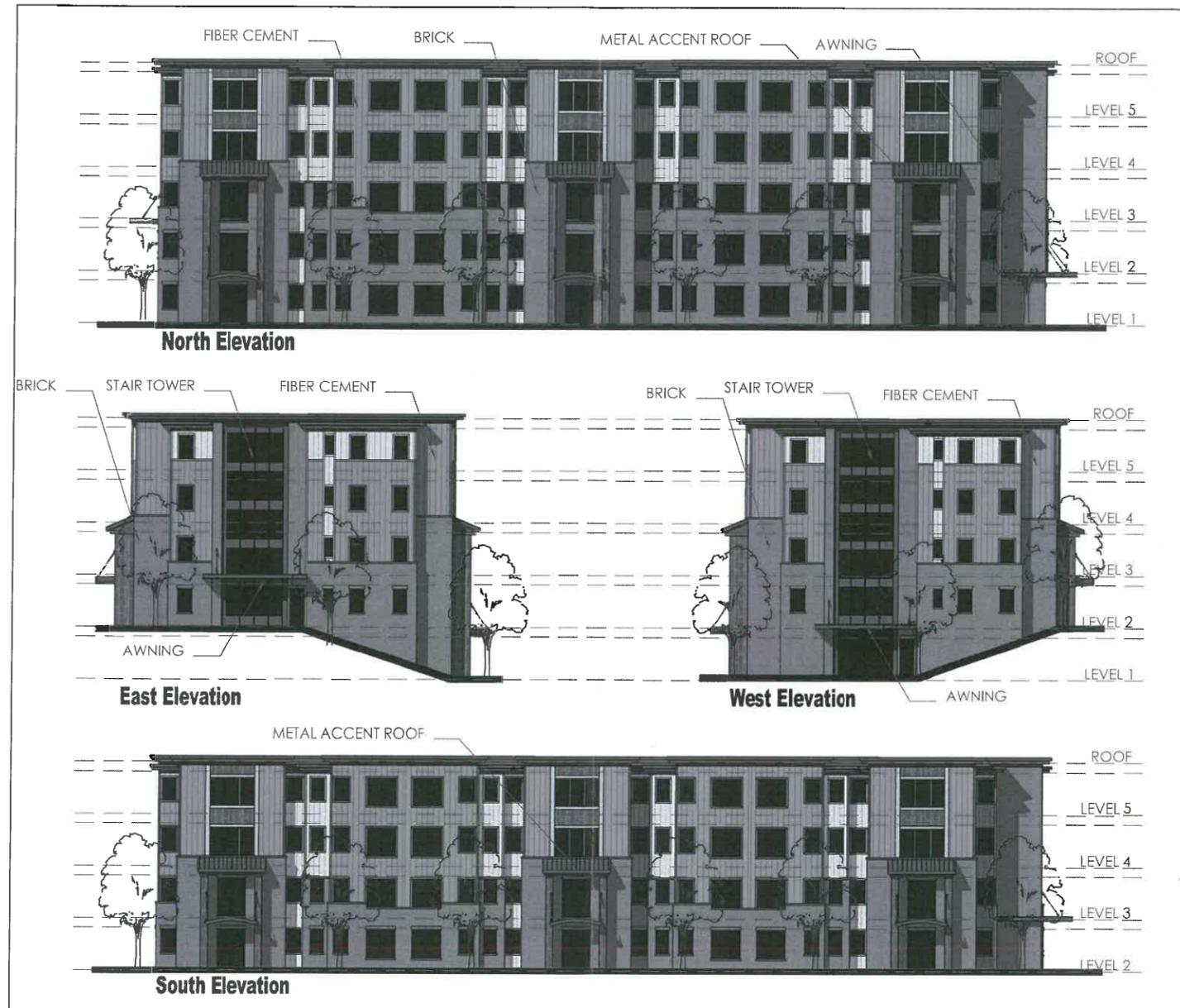
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## BUILDING 3 (BUILDING 4 SIMILAR)

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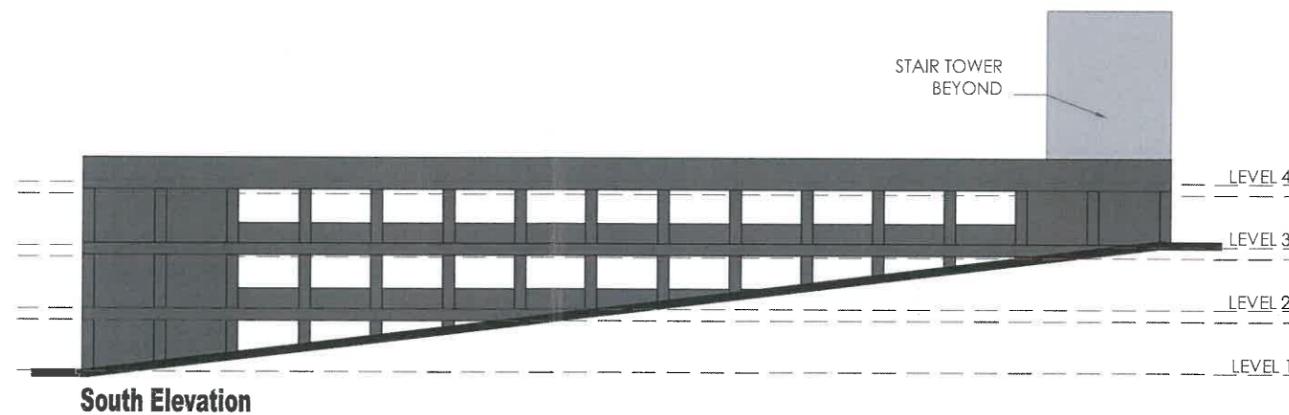
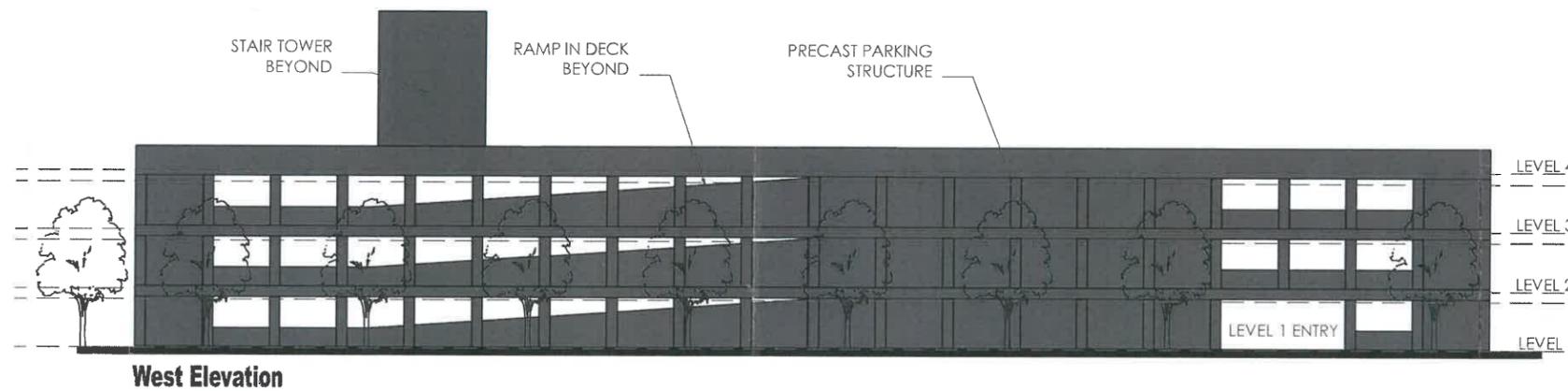
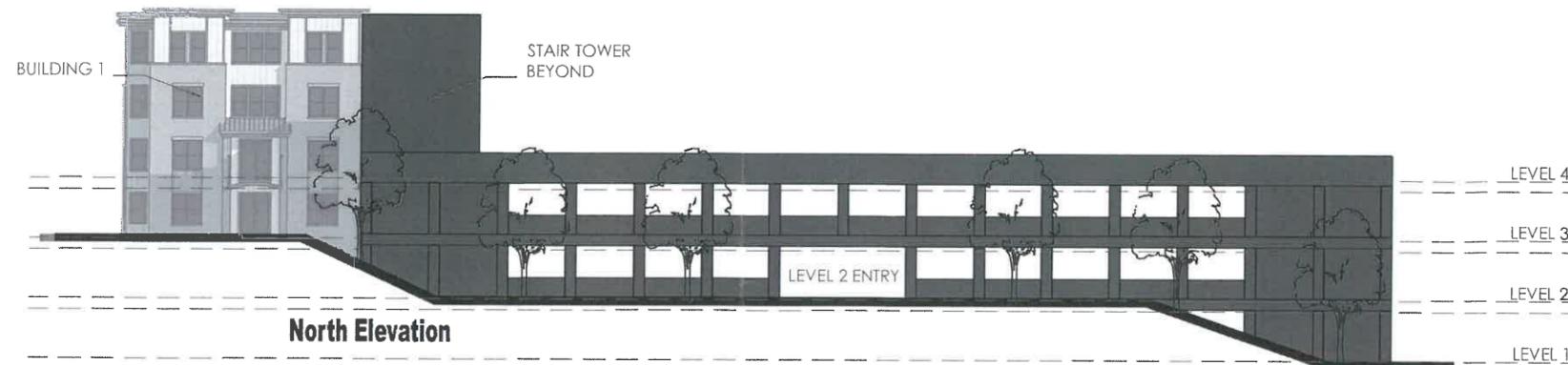
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**A10**  
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# PARKING STRUCTURE

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A11

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