Attachment B

YELLOWBRIDGE

Planned Unit Development

Apex, North Carolina

Submittal Dates
First Submittal: March 1, 2022
Second Submittal: April 8, 2022
Third Submittal: May 13, 2022
Fourth Submittal: June 10, 2022
Fifth Submittal: June 28, 2022

Developer
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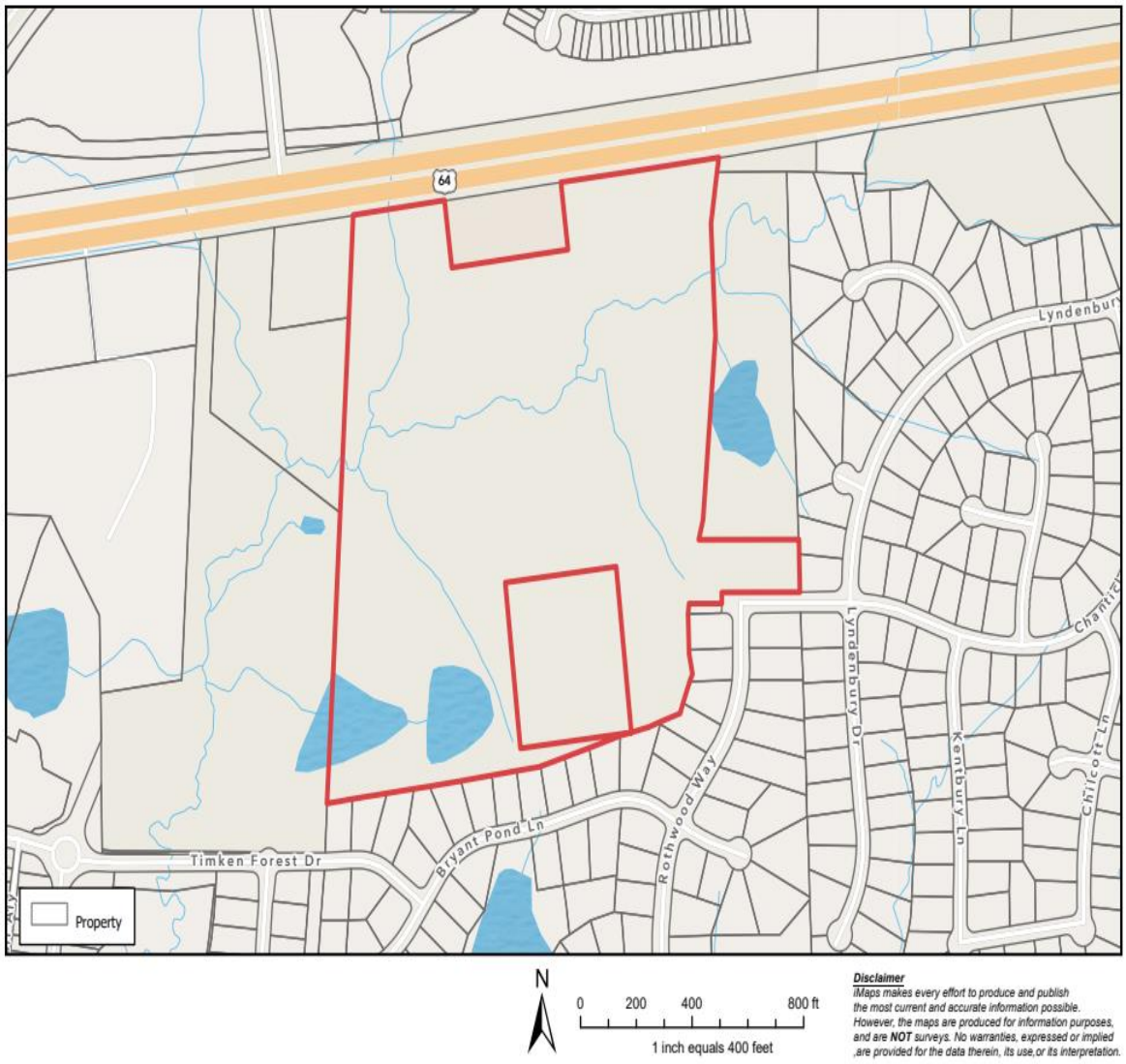
VICINITY MAP



PROJECT DATA

Name of Project:	Yellowbridge PUD
Property Owner:	Yellowbridge Capital, LLC 113 Mill Point Road Kitty Hawk, NC 27949
Developer:	Lennar Corporation Raleigh Division 1100 Perimeter Park Drive, Suite 112 Morrisville, NC 27560
Prepared by:	Parker Poe Adams & Bernstein LLP 301 Fayetteville Street, Suite 1400 Raleigh, NC 27601 Peak Engineering & Design 1125 Apex Peakway Apex, NC 27502
Current Zoning:	Rural Residential (RR)
Proposed Zoning:	Planned Unit Development Conditional Zoning (PUD-CZ)
Current 2045 Land Use Map Designation:	Medium Density Residential
Proposed 2045 Land Use Map Designation	Residential Area: Medium Density Residential Commercial Area: Commercial Services
Site Address:	2817 US 64 Highway W Apex NC 27523 2813 US 64 Highway W Apex NC 27523
Property Identification Number:	0722752304 0722743789 (the "Property")
Total Acreage:	48.43 acres
Area Designated as Mixed Use on LUM	None
Area Proposed as Non- Residential:	3.5 acres

PURPOSE STATEMENT

This document and the accompanying exhibits submitted herewith (collectively, the "PUD") are provided pursuant to the Town of Apex Unified Development Ordinance ("UDO") Planned Unit Development provisions. This PUD addresses the development of approximately 48.43 acres along US 64 Highway W, less than one mile from the 540/US-64 interchange. The Property is undeveloped and within the Town's Extra Territorial Planning jurisdiction. Yellowbridge PUD will be a mixed-use community with two districts, the Residential District and the Commercial District.

Yellowbridge PUD will feature a mix of single-family detached homes, alley loaded townhouses, front loaded townhouses, and commercial uses with walking paths and open space (the "Development"). The mix of housing types will serve residents with varying budgets, backgrounds, and family needs. The community will be conveniently located to existing amenities and have easy access to highways. The neighborhood style commercial uses fronting US-64 Highway West will create a transition in development intensity from the highway south through the Development. The PUD is intended to create flexibility in design and land uses to deliver a high quality residential development that fits the context of existing development in the area. The Residential District is consistent with the Property's Medium Density Land Use Map ("LUM") designation; and generally, with the Apex Comprehensive Plan's ("Peak Plan") goal of accommodating a mix of housing types to serve the Town's growing and increasingly diverse population. Although the LUM does not specifically designate the Property for commercial uses, the portion of the Property fronting US-64 Highway West is appropriate for the neighborhood serving commercial uses permitted by this PUD. The Commercial District is located directly across US-64 Highway West from the Westford PUD which permits a variety of residential, office, and commercial uses along the road. Additionally, the Commercial District is located adjacent to the Local Bar and is separated from the Residential District by a stream and wetlands that will act as a natural buffer between future commercial uses and residential neighborhoods to the south.

CONSISTENCY WITH PLANNED UNIT DEVELOPMENT STANDARDS

(i) The uses proposed to be developed in the PD plan for PUD-CZ are those uses permitted in Sec. 4.2.2 Use Table

RESPONSE: The uses permitted within The Yellowbridge PUD are permitted within this designation in UDO Section 4.2.2 Use Table.

(ii) The uses proposed in the PD Plan for PUD-CZ can be entirely residential, entirely non-residential, or a mix of residential and non-residential uses, provided a minimum percentage of non-residential land area is included in certain mixed use areas as specified on the 2045 Land Use Map. The location of uses proposed by the PUD-CZ must be shown in the PD Plan with a maximum density for each type of residential use and a maximum square footage for each type of non-residential use.

RESPONSE: The Yellowbridge PUD is a mixed use community with a mix of housing types and commercial uses outlined in this PUD.

(iii) The dimensional standards in Sec. 5.1.3 Table of Intensity and Dimensional Standards, Planned Development Districts may be varied in the PD Plan for PUD-CZ. The PUD-CZ shall demonstrate compliance with all other dimensional standards of the UDO, North Carolina Building Code, and North Carolina Fire Code.

RESPONSE: This PUD specifies intensity and dimensional standards for the project. The PUD's standards are consistent with the UDO's vision for Planned Unit Developments – to provide site specific, high-quality neighborhoods that preserve natural features and exhibit compatibility with, and connectivity to, surrounding land uses. Except as specifically stated in this PUD, Yellowbridge will comply with all other requirements of the UDO and will comply with all applicable requirements of the North Carolina Building Code and the North Carolina Fire Code.

(iv) The development proposed in the PD Plan for PUD-CZ encourages cluster and compact development to the greatest extent possible that is interrelated and linked by pedestrian ways, bikeways and other transportation systems. At a minimum, the PD Plan must show sidewalk improvements as required by the Advance Apex: The 2045 Transportation Plan and the Town of Apex Standard Specifications and Standard Details, and greenway improvements as required by the Town of Apex Parks, Recreation, Greenways, and Open Space Plan and the Advance Apex: The 2045 Transportation Plan. In addition, sidewalks shall be provided on both sides of all streets for single-family detached homes.

RESPONSE: Yellowbridge PUD will feature sidewalks throughout. Sidewalks will connect the project and the adjacent Abbington neighborhood, improving pedestrian connectivity. The PUD also commits to significant right of way dedication and roadway improvements called for by the Transportation Plan.

(v) The design of development in the PD Plan for PUD-CZ results in land use patterns that promote and expand opportunities for walkability, connectivity, public transportation, and an efficient compact network of streets. Cul-de-sacs shall be avoided unless the design of the subdivision and the existing or proposed street system in the surrounding area indicate that a through street is not essential in the location of the proposed cul-de-sac, or where sensitive environmental areas such as streams, floodplains, and wetlands would be substantially disturbed by making road connections.

RESPONSE: The proposed street layout has been designed to enhance pedestrian and vehicular connectivity while protecting sensitive environmental features and being mindful of existing residential development. The development will facilitate the vision of the Transportation Plan by extending the existing Chanticlair Drive stub street across the site to the west. Additionally, the project will extend a public street to the north to US-64 Highway West which will increase connectivity and provide Abbington residents an additional route to US-64 Highway West.

(vi) The development proposed in the PD Plan for PUD-CZ is compatible with the character of surrounding land uses and maintains and enhances the value of surrounding properties.

RESPONSE: The proposed development is compatible with the character of the existing and planned uses in the surrounding area. This area of the Town's ETJ is at the intersection between growing sections of northwest Apex and historically rural, western Wake County. Adjacent properties are largely residential subdivisions with some commercial uses nearby. Nearby residential developments include the Villages at Westford Apartments, the Townes at Westford, the Stratford at Abbington, the Abbington Community, and the Sweetwater Community and Town Center. The Villages at Westford Apartments are directly across US 64 Highway West and consist of 296 apartments with a clubhouse and pool that were constructed in 2019 as part of the Westford PUD. The Stratford at Abbington and the Abbington Community are both single-family detached subdivisions. The Sweetwater Community and Town Center is a residential and commercial site with townhomes, single family homes and various commercial uses.

Yellowbridge PUD will provide a mix of housing types and neighborhood serving commercial uses that offer a transition between US 64 Highway West and the lower intensity Abbington community to the south. Density will transition from more dense townhomes to larger lot single-family detached homes as the site moves north to south. Additionally, this PUD contains buffer commitments and design standards that will ensure compatibility with neighboring uses.

(vii) The development proposed in the PD Plan for PUD-CZ has architectural and design standards that are exceptional and provide higher quality than routine developments. All residential uses proposed in a PD Plan for PUD-CZ shall provide architectural elevations representative of the residential structures to be built to ensure the Standards of this Section are met.

RESPONSE: Yellowbridge PUD will feature high quality and thoughtful design. Architectural standards, design controls, and conceptual elevations are included in this PUD.

CONSISTENCY WITH CONDITIONAL ZONING STANDARDS

Yellowbridge PUD is consistent with the conditional zoning standards set forth in UDO Section 2.3.3.F.1-10. Please see the accompanying PUD-CZ Application for the statements of consistency addressing each standard.

PERMITTED USES

The Property may be used for the uses listed below. The permitted uses are subject to the limitations and regulations stated in the UDO and any additional limitations or regulations stated below. For convenience, some relevant sections of the UDO may be referenced; such references do not imply that other sections of the UDO do not apply. Homeowners Association covenants shall not restrict the construction of accessory dwelling units.

RESIDENTIAL DISTRICT

The following uses shall be permitted in the Residential District:

Residential	
Single-family	Permitted
Townhouse	Permitted
Accessory apartment*	Permitted
Recreational Uses	
Park, active	Permitted
Greenway	Permitted
Park, passive	Permitted
Recreation facility, private	Permitted
Utility, minor	Permitted

* Homeowners Association covenants shall not restrict the construction of accessory dwelling units.

COMMERCIAL DISTRICT

The following uses shall be permitted in the Commercial District:

Restaurant, general	Permitted
Restaurant, drive-through	Permitted
Medical or dental office or clinic	Permitted
Medical or dental laboratory	Permitted
Office, business or professional	Permitted
Publishing office	Permitted
Artisan Studio	Permitted
Barber and beauty shop	Permitted
Book store	Permitted
Convenience store	Permitted
Dry cleaners and laundry service	Permitted

Farmer’s market	Permitted
Financial institution	Permitted
Floral shop	Permitted
Greenhouse or nursery, retail	Permitted
Grocery, general	Permitted
Grocery, specialty	Permitted
Health/fitness center or spa	Permitted
Kennel	Permitted
Newsstand or gift shop	Permitted
Personal service	Permitted
Pharmacy	Permitted
Printing and copying service	Permitted
Real estate sales	Permitted
Repair services, limited	Permitted
Retail sales, general	Permitted
Studio for art	Permitted
Tailor shop	Permitted
Upholstery shop	Permitted
Pet services	Permitted
Day care facility	Permitted
Veterinary clinic or hospital	Permitted
Utility, minor	Permitted

AFFORDABLE HOUSING

The Development shall include a minimum of two (2) residential restricted affordable housing townhouse or detached single-family median-income ownership units (the “Affordable Units”). The Affordable Units shall be constructed on-site and sold (includes unit price and lot price) at a mutually agreeable maximum affordable housing median-income ownership initial sales price (the “Initial Sales Price”). The Affordable Units shall be occupied by low or median-income households earning no more than one-hundred percent (100%) of the Raleigh NC Metropolitan Statistical Area (MSA), Area Median Income (AMI), adjusted for family size as most recently published by HUD (the “Income Limit")(. For purposes of calculating the Initial Sales Price for the Affordable Units, affordable shall mean a reasonable down payment and monthly housing costs expected during the first calendar year of occupancy, including utilities or utility allowances, mortgage loan principal and interest, mortgage insurance, property taxes, homeowner’s insurance, homeowner’s association dues, if any, and all other property assessments, dues and fees assessed as a condition of property ownership, which does not exceed thirty percent (30%) times (x’s) one-hundred percent (100%) times (x’s) the annual median-income limit (100% AMI Category), based on a family size that is equal to the actual number of bedrooms as the Affordable Units, applicable to the Raleigh, NC MSA as most recently published by the HUD. A restrictive covenant (i.e. resale deed restriction) with a minimum affordability period of fifteen (15) years (the “Affordability Period”) shall be recorded in the Wake County Registry against each of the Affordable Units concurrently at the close of escrow upon the sale of the Affordable Units. A restrictive covenant (i.e. affordable housing agreement) between the Town and applicant shall be recorded in the Wake County Registry against each of the lots for the Affordable Units prior to the issuance of a building permit for such lots to memorialize the affordable housing terms and conditions of the approved zoning condition. The Affordable Units may be townhouses or single-family detached houses, at the discretion of the developer, and shall be designated on the Master Subdivision Final Plat, which may be amended from time to time. Final Affordable Housing Unit floor plan selection which includes the unit size and bedroom size will be at the discretion of the developer. The Affordable Units may be provided in multiple phases or in one single phase. Developer will work with the Town to identify qualifying buyers for the first sale of the Affordable Units (the “First Sale”). Following the First Sale of the Affordable Units, Developer shall not be responsible for managing the Affordable Units or performing marketing, applicant screening, and selection related to future sales of the Affordable Units. Town staff will assist with the administrative duties of the Affordable Units during the Affordable Period.

DESIGN CONTROLS

Development shall comply with the following minimum design controls.

UNIVERSAL DESIGN CONTROLS

Total Project Area	48.43 acres
Maximum Built-Upon Area	70% of gross site acreage

RESIDENTIAL DISTRICT DESIGN CONTROLS

Maximum Residential Density	160 units
Maximum Residential Density	3.6 units/acre
Proposed Land Area	44.93 acres
Front Loaded Townhouses	
Minimum Lot Size	None
Minimum Lot Width	18 ft.
Minimum Setbacks	
Front	10 ft.
Side	0 ft. (5 ft. for end units)
Rear	5 ft.
Corner Side	8 ft.
Maximum Building Height	3 stories; 45 ft.
Minimum Building Separation	10 ft.
Minimum Buffer/RCA Setbacks	10 ft. for buildings 5 ft. for parking areas
Rear Loaded Townhouses	
Minimum Lot Size	None
Minimum Lot Width	18 ft.
Minimum Setbacks	
Front	5 ft.
Side	0 ft. (5 ft. for end units)
Rear	5 ft.
Corner Side	8 ft.
Maximum Building Height	3 stories; 45 ft.
Minimum Building Separation	10 ft.
Single-Family Detached	
Minimum Lot Size	6,000 square feet
Minimum Lot Width*	50 ft.
Minimum Setbacks	
Front	20 ft.
Side	6 ft.

Rear	15 ft.
Corner Side	8 ft.
Maximum Building Height	3 stories; 45 ft.
Minimum Buffer/RCA Setbacks	10 ft. for buildings 5 feet for parking areas
Minimum Resource Conservation Area	30% of gross site acreage

*Single-family detached homes adjacent to the Property's southernmost property line adjacent to the Abbington neighborhood from the northwestern corner of PIN 0722645333 to the northeastern corner of PIN 0722748868 shall have a minimum lot width of 60 feet.

COMMERCIAL DISTRICT DESIGN CONTROLS

Proposed Land Area	3.5 acres
Maximum Building Square Footage	25,000 SF
Minimum Setbacks	
Front (US-64)	10 ft.
Side	10 ft.
Rear	10 ft.
Corner Side	10 ft.
Maximum Building Height	50 ft.
Minimum Buffer/RCA Setbacks	10 ft. for buildings 5 ft. for parking areas
Minimum Resource Conservation Area	25% of gross site acreage

LANDSCAPING, BUFFERING, AND SCREENING

Perimeter buffers shall be built and planted to the following lot width and planting standards:

Along the Property's shared property line with PIN 0722762014	30 ft. Type A
Along the Property's US-64 Highway West frontage east of PIN 0722762014*	50 ft. Type A*
Along the Property's US-64 Highway West frontage west of PIN 0722762014	100 ft. Type E

Along the Property's westernmost boundary	20 ft. Type B
Along the north and south side of Chanticlair Drive west of the intersection of Chanticlair Drive and the US-64 access road	10 ft. Type D
Along the north side of Chanticlair Drive from the westernmost boundary of the gas easement to the intersection of Chanticlair Drive and the US-64 access road**	18 ft. Type A**
Along the Property's easternmost boundary adjacent to PIN 0722850629	10 ft. Type B
Along the gas easement	10 ft. Type A
Along the Property's southern property line from the northwest corner of PIN 0722645333 to the northeast corner of PIN 0722741431***	50 ft. Type A***
Along the Property's southern property line from the northeast corner of PIN 0722741431 to the northwest corner of PIN 0722748868****	50 ft. Type A****

* The Development shall meet requirements (i) through (iii) in UDO Section 8.2.6(B)(5)(f)(ii)(c) to reduce the buffer width along US-64 Highway West to 50 feet.

** The developer shall construct a decorative landscape wall within the buffer, parallel to Chanticlair Drive. The landscape wall shall be constructed of brick, stone, or similar materials, and be similar in design and character to the existing landscape wall along the south side of Chanticlair Drive in Abbington.

*** This portion of the perimeter buffer shall remain undisturbed and supplemented with Type A buffer plantings.

**** This portion of the perimeter buffer shall be cleared, graded, include a minimum 3-foot berm, and be replanted to a Type A buffer standard.

ARCHITECTURAL STANDARDS

Yellowbridge PUD offers the following architectural controls to ensure a consistency of character throughout the development, while allowing for enough variety to create interest and avoid monotony. Elevations included are conceptual examples. Final elevations must comply with these architectural standards but may vary from the conceptual elevations. Further details may be provided at the time of Residential Master Subdivision Plan submittal.

RESIDENTIAL DISTRICT DESIGN GUIDELINES

Single-Family Detached:

1. Vinyl siding is not permitted; however, vinyl windows, decorative elements and trim are permitted.
2. The roof shall be pitched at 5:12 or greater for 75% of the building designs.
3. Eaves shall project at least 12 inches from the wall of the structure.
4. Garage doors shall have windows, decorative details or carriage-style adornments on them.
5. The garage shall not protrude more than 1 foot out from the front façade and front porch.
6. Garages on the front façade of a home that faces the street shall not exceed 30% of the total width of the house and garage together.
7. The visible side of a home on a corner lot facing the public street shall contain at least 3 decorative elements such as, but not limited to, the following elements:
   - Windows
   - Bay window
   - Recessed window
   - Decorative window
   - Trim around the windows
   - Wrap around porch or side porch
   - Two or more building materials
   - Decorative brick/stone
   - Decorative trim
   - Decorative shake
   - Decorative air vents on gable
   - Decorative gable
   - Decorative cornice
   - Column
   - Portico
   - Balcony
   - Dormer
8. A varied color palette shall be utilized on homes throughout the subdivision to include a minimum of three color families for siding and shall include varied trim, shutter, and accent colors complementing the siding color.
9. House entrances for units with front-facing single-car garages shall have a prominent covered porch/stoop area leading to the front door.
10. The rear and side elevations of the units that can be seen from the right-of-way shall have trim around the windows.
11. Front porches shall be a minimum of 5 feet deep.
12. No more than 25% of lots may be accessed with J-driveways. There shall be no more than 3 such homes in a row on any single block. Any lots eligible for a J-driveway home shall be identified on the Final Plat.

13. In addition, all single-family detached homes shall include:
    1. Covered front porches
    2. Crawl space foundations
    3. Custom porch railings
    4. Masonry on all elevations up to first floor window sills
    5. Multiple roof lines and gables
    6. Shutters or trim on all front elevation windows
    7. Pediments, crossheads, or 1x6 or greater trim on all front elevation windows
    8. Multiple siding styles

Townhouses (front and alley loaded):

1. Vinyl siding is not permitted; however, vinyl windows, decorative elements and trim are permitted.
2. The roofline cannot be a single mass; it must be broken up horizontally and vertically between every unit.
3. Garage doors must have windows, decorative details or carriage-style adornments on them.
4. House entrances for units with front-facing single-car garages shall have a covered porch/stoop area leading to the front door.
5. The garage cannot protrude more than 1 foot out from the front façade or front porch.
6. The visible side of a townhome on a corner lot facing the public street shall contain at least 3 decorative elements such as, but not limited to, the following elements:
    - Windows
    - Bay window
    - Recessed window
    - Decorative window
    - Trim around the windows
    - Wrap around porch or side porch
    - Two or more building materials
    - Decorative brick/stone
    - Decorative trim
    - Decorative shake
    - Decorative air vents on gable
    - Decorative gable
    - Decorative cornice
    - Column
    - Portico
    - Balcony
    - Dormer
7. Building facades shall have horizontal relief achieved by staggering the units.
8. A varied color palette shall be utilized on homes throughout the subdivision to include a minimum of three color families for siding and shall include varied trim, shutter, and accent colors complementing the siding color.

9. The rear and side elevations of the units with right-of-way frontage shall have trim around the windows.

CONCEPTUAL RESIDENTIAL DISTRICT BUILDING ELEVATIONS

COMMERCIAL DISTRICT DESIGN GUIDELINES

1. Architectural treatments such as varying roof forms, façade articulation, breaks in roof, walls with texture materials and ornamental details shall be incorporated to add visual interest.

2. Large expanses of blank walls greater than 25 feet in length or height shall be broken up with windows or other architectural features to reduce visual impacts.

3. Roof features may include flat roofs with parapet, hip roofs or awnings with metal or canvas material.

COMMERCIAL DISTRICT MATERIALS

Non-residential exteriors shall incorporate variation in materials. The front façade and other facades located along a public right-of-way may include:

1. Brick and/or stone masonry

2. Decorative concrete block (integral color or textured)

3. Stone accents

4. Aluminum storefronts with anodized or pre-finished colors

5. EIFS cornices, and parapet trim

6. EIFS or synthetic stucco shall not be used in the first four feet above grade and shall be limited to only 25% of each building façade

7. Precast concrete

8. Soffit and fascia materials to be considered include EIFS with crown trim elements

9. Cementitious siding

Rear elevations of non-residential buildings facing opaque landscape buffers or not visible from vehicular use areas or public rights-of-way may incorporate decorative concrete masonry, metal coping, or EIFS trim.

REPRESENTATIVE COMMERCIAL DISTRICT BUILDING ELEVATIONS

PARKING AND LOADING

Parking shall comply with minimum parking standards set forth in UDO Section 8.3.

SIGNAGE

Signage shall comply with UDO Section 8.7.

In addition, the project shall install at least one (1) sign per SCM discouraging the use of fertilizer and to reduce pet waster near SCM drainage areas. The sign(s) shall be installed in locations that are publicly accessible, such as adjacent to, but outside of public property and/or public easement(s), amenity centers, sidewalks, greenways, or side paths.

CONSTRUCTION TRAFFIC

All heavy duty construction traffic shall enter and exit the site via US-64 Highway West. Heavy duty construction traffic shall not use Chanticlair Drive, Rothwood Way, or Lyndenbury Drive. “No Construction Traffic” signage shall be posted along Chanticlair Drive and Rothwood Way.

NATURAL RESOURCES AND ENVIRONMENTAL DATA

RIVER BASINS AND WATERSHED PROTECTION OVERLAY DISTRICTS

The Property is within the Beaver Creek Basin, Jordan Lake Watershed, and Primary Watershed Protection Overlay District as shown on the Town of Apex Watershed Protection Overlay Map 2019. This PUD will comply with all built upon area, vegetated conveyances, structural SCMs and riparian stream buffer requirements of UDO Section 6.1.8.

Resource Conservation Areas (RCA)

The Development will meet or exceed the minimum Resource Conservation Area ("RCA") requirements in UDO Section 8.1.2 and 2.3.4. The Property is located west of 540 and is therefore required to preserve a minimum of 30% RCA for the Residential District and 25% RCA for the Commercial District. Designated RCA areas will be consistent with UDO Section 8.1.2(B). Preserved streams, wetlands, and associated riparian buffers provide the primary RCAs throughout the Property. Additional RCAs may include stormwater management areas, multi-use paths, and perimeter buffers.

Floodplain

The project site does not sit within a designated current or future 100-year floodplain as shown on the Town of Apex Watershed & FEMA Map dated April 2015. FIRM Panel 3720072200J dated May 2, 2006 does not include a floodplain within the property boundary.

Historic Structures

There are no known historic structures present on the Property.

Environmental Commitments Summary

The following environmental conditions shall apply to the Development:

- All dwelling units shall be pre-configured with conduit for a solar energy system.
- The project shall install at least one (1) sign per SCM discouraging the use of fertilizer and to reduce pet waste near SCM drainage areas. The sign(s) shall be installed in locations that are publicly accessible, such as adjacent to, but outside of public property and/or public easement(s), amenity centers, sidewalks, greenways, or side paths.
- The project shall install a minimum of two (2) pet waste stations.
- The project shall plant drought resistant warm season grasses throughout the development to minimize irrigation and chemical use.
- Stormwater control devices shall be designed and constructed so that post development peak runoff does not exceed pre-development peak runoff conditions for the 24-hour, 1 year, 10 year, and 25 year storm events.
- Landscaping shall include at least four (4) native hardwood tree species throughout the Development.

- No clearing or land disturbance shall be permitted within the riparian buffer, except the minimum necessary to install required road and utility infrastructure and SCM outlets. The SCM water storage and treatment shall not be permitted within the riparian buffer. Sewer infrastructure shall be designed to minimize impacts to riparian buffers.
- Any outdoor lighting installed in the commercial area and on private amenities, signs, landscaping, walls, or fences shall be full cutoff LED fixtures with a maximum color temperature of 3000k. This condition shall not apply to lighting on single-family homes, townhouses, accessory buildings, or street lighting.
- At least 75% of plants shall be native species. Landscaping will be coordinated with and approved by the Planning Department at site or subdivision review.

STORMWATER MANAGEMENT

Stormwater control devices shall be designed and constructed to exceed UDO standards so that post development peak runoff does not exceed pre-development peak runoff conditions for the 24-hour, 1 year, 10 year, and 25 year storm events. Otherwise, the Development shall meet all stormwater management requirements for quality and quantity treatment in accordance with Section 6.1 of the UDO.

Acceptable stormwater structures shall include detention ponds, constructed wetlands, bio-retention areas, or other approved devices consistent with the NC DEQ Stormwater Design Manual and the Town of Apex UDO**.**

PARKS AND RECREATION

This project was reviewed by the Parks, Recreation, and Cultural Resources Advisory Commission on April 27, 2022 and a fee-in-lieu of dedication was recommended.

Single-family detached Units:	$ 3,753.89 x 50 =	$ 187,694.50
Single-family attached Units:	$ 2,528.25 x 110 =	$ 278,107.50
Total residential fee in lieu per current unit count:		**$ 465,802**

The final unit count and total fee-in-lieu will be calculated at Master Subdivision Plan and Construction Document review.

PUBLIC FACILITIES

The proposed PUD shall meet all Public Facilities requirements as set forth in UDO Section 2.3.4(F)(1)(f) and be designed to comply with the Town's Sewer and Water Master Plan and Standards and Specifications. Road and utility infrastructure shall be as follows:

GENERAL ROADWAY INFRASTRUCTURE

Except as set forth herein, all proposed roadway infrastructure and right-of-way dedications will be consistent with the Town of Apex Comprehensive Transportation Plan and Bicycle and Pedestrian System Plan in effect as of the submission date of this rezoning.

TRANSPORTATION IMPROVEMENTS

The following conditions regarding transportation improvements apply and shall be phased consistent with the Traffic Impact Analysis that has been performed for this rezoning, which is on file with the Town of Apex.

- All proposed driveway access and improvements on state-maintained roadways are subject to both Apex and NCDOT review and approval.

- A maximum of one (1) access point shall be proposed on US 64, to be constructed as a left-in/right-in/right-out public street access at the existing median break with a stop-controlled northbound approach with one lane of ingress and one lane of egress and an exclusive eastbound right turn lane with a minimum 100 feet of storage and appropriate deceleration length and taper on US Hwy 64. Improve the median break and construct physical separation between turn lanes to accommodate trucks and prevent both improper left turns and vehicular turning-movement conflicts.

- Construct an exclusive eastbound U-turn median break on US Hwy 64, approximately halfway between the site access at the existing median break and Kellyridge Drive including a U-turn lane with a minimum of 100 feet of storage and appropriate deceleration length and taper. If the eastbound U-turn lane is removed from the existing median break location to the west, extend the storage to 150 feet at this location.

- Consistent with the Transportation Plan Thoroughfare and Collector Street Map, Chanticlair Drive shall be extended westward as a Major Collector Street with a minimum 60-foot right-of-way, consistent with Town Standards.

- No residential driveways shall be permitted on existing or future Major Collector Street(s).

- Rothwood Way shall be extended north and stubbed to the southernmost property line of PIN 0722850629. Homes located on Rothwood Way shall take driveway access from Rothwood Way.

- The extension of Chanticlair Drive shall be constructed concurrently with the project but shall remain closed to traffic between Yellowbridge and Abbington subdivisions until such time that the 50th CO is approved for Yellowbridge. The form of closure shall be noted on the subdivision plan and subject to Town staff approval.

- Potential Access Points shown on the Conceptual Site Plan and Conceptual Utility Plan (C100) are not shown in exact locations but show required connections. Connections may only be removed from the subdivision connectivity requirements of the PUD if the developer shows to the satisfaction of the Planning Director, in consultation with the Technical Review Committee (TRC), that the construction of the connection would be impractical based on environmental conditions found in the field at the time of Master Subdivision Plan approval.

PEDESTRIAN AND BICYCLE IMPROVEMENTS

Per UDO requirements, sidewalks shall be provided along both sides of all streets.

WATER AND SANITARY SEWER

All lots within the Development will be served by Town of Apex water and sanitary sewer. The utility design will be finalized at the time of Master Subdivision Plan or Site Plan approval and be based on available facilities adjacent to the site at that time. The design will meet the current Town of Apex master plans for water and sewer. A conceptual utility plan is included in the PUD Concept Plan for reference.

OTHER UTILITIES

Electricity will be provided by Apex Electric. Phone, cable, and gas will be provided by the Developer and shall meet Town of Apex standards as outlined in the UDO.

PHASING

The Development will be completed in phases. Final locations of phases will be determined at the time of Master Subdivision Review and Approval.

CONSISTENCY WITH LAND USE PLAN

The proposed Development is generally consistent with Advance Apex 2045: The Apex Comprehensive Plan, adopted in February 2019. The Land Use Map designates the Property as Medium Density Residential which allows a PUD zoning district and contemplates the housing types and densities proposed in the Residential District. This PUD updates the LUM designation of the Commercial District to Commercial Services. Although the LUM does not specifically designate the Property for commercial uses, the portion of the Property fronting US-64 Highway West is appropriate for the neighborhood serving commercial uses permitted by this PUD. The Commercial District is located directly across US-64 Highway West from the Westford PUD which permits a variety of residential, office, and commercial uses along the road. Additionally, the Commercial District is located adjacent to the Local Bar and is separated from the Residential District by a stream and wetlands that will act as a natural buffer between future commercial uses and residential neighborhoods to the south.

COMPLIANCE WITH UDO

The development standards adopted for this PUD are in compliance with those set forth in the current version of the Town's Unified Development Ordinance (UDO). This PUD shall be the primary governing document for the development of Yellowbridge. All standards and regulations in this PUD shall control over general standards of the UDO. Provided, however, that if a specific regulation is not addressed in this PUD, UDO regulations shall control.

EXHIBIT A
Legal Description
The Property

PIN# 0722752304 & 0722743789
All that certain real property situated in White Oak Township, Wake County, North Carolina, described as follows:

Beginning at a set iron rod on the northern right of way line of Chanticlair Drive, said iron rod marking the southwestern corner of Lot 74 as said lot is shown and so designated on that certain subdivision plat entitled "Windsor at Abbington – Phase 1, Section A, Map 2, Lots 24-27 & 65-74" recorded in Book of Maps 1998, Page 203, Wake County Registry; thence along the northern right of way line of Chanticlair Drive, South 89°37'45" West 280.73 feet to a set iron rod; thence South 00°22'15" East 30.04 feet to a set iron rod at the centerline of the western terminus of Chanticlair Drive and the northeastern corner of the 0.08 acre Reserved Area depicted on that certain subdivision plat entitled "Stratford at Abbington, Phase 1: Lots 1-31, 65-75, Owner: Highway 64, LLC" recorded in Book of Maps 2006, Pages 2638 to 2640, Wake County Registry; thence along the northern and western boundary of said Reserved Area and continuing along the northwestern boundary of said Stratford at Abbington subdivision the following nine courses: (1) South 89°37'45" West 118.01 feet to a set iron rod; (2) South 05°29'21" West 40.93 feet to a set iron rod; (3) South 01°54'29" East 98.00 feet to a set iron rod; (4) South 11°29'28" East 62.80 feet to a set iron rod; (5) South 22°27'50" West 118.06 feet to a found iron pipe; (6) South 70°08'38" West 118.71 feet to a found iron pipe; (7) South 77°30'46" West 65.05 feet to a found iron pipe; (8) South 73°46'05" West 40.75 feet to a found iron pipe; and (9) South 73°28'08" West 311.49 feet to a found iron pipe at an angle point in the northern boundary of Lot 64 as said lot is shown and so designated on that certain subdivision plat entitled "Stratford at Abbington, Phase 2: Lots 32-64, Owner: Highway 64, LLC" recorded in Book of Maps 2008, Pages 33 and 34, Wake County Registry; thence along the northern boundary of said Stratford at Abbington Phase 2 subdivision South 82°16'49" West 758.57 feet to a found iron pipe with cap at the northwestern corner of Lot 56 of said Stratford at Abbington Phase 2 subdivision, said point also being on the eastern boundary of Lot 2 as said lot is shown and so designated on that certain plat entitled "Recombination Survey for Cecil V. Campfield and Wife Sharon K. Campfield" recorded in Book of Maps 1995, Page 334, Wake County Registry; thence along the eastern boundary of said Campfield plat the following two courses: (1) North 03°08'59" East 417.75 feet to a found bent iron pipe; and (2) North 03°12'21" East 406.54 feet to a found iron pipe with cap at the southeastern corner of Lot 'A' as said lot is shown and so designated on that certain plat entitled "Recombination for Joel V. Perry" recorded in Book of Maps 1985, Page 522, Wake County Registry; thence along the eastern boundary of said Perry plat North 03°11'42" East 841.95 feet to a found iron rod with cap on the southern right of way line of U.S. Highway 64; thence along said southern right of way line North 82°54'26" East 331.57 feet to a set iron rod at the northwestern corner of the parcel depicted on that certain plat entitled "Boundary Survey, Property of Calvin Mills, Prepared for David and Sharon Raymer" recorded in Book of Maps 2004, Page 698, Wake County Registry; thence along the western, southern and eastern boundary of said Mills plat the following three courses: (1) South 07°08'43" East 189.52 feet to a found iron pipe; (2) North 82°51'17" East 420.02 feet to a found iron pipe; and (3) North 07°08'43" West 189.14 feet to a set iron rod on the southern right of way line of

U.S. Highway 64; thence along said southern right of way line the following two courses: (1) North 82°54'26" East 265.68 feet to a set iron rod; and (2) North 82°53'08" East 305.02 feet to a set iron rod at the northwestern corner of Area “B” as shown and so designated on that certain plat entitled “Property of Blakely-Braswell Land Company, LLC” recorded in Book of Maps 1996, Page 634, Wake County Registry; thence along the western boundary of said Area “B”, South 11°47'52" West 42.58 feet to a found iron pipe with cap at the northwestern corner of Tract ‘A’ as said lot is shown and so designated on that certain plat entitled “Property of Calvin E. Mills, Alta Belle P. Mills, Ted Mills & Randy Mills By William R. Hoke & Paul Stam, Jr., Co-trustees” recorded in Book of Maps 1984, Page 404, Wake County Registry; thence along the western and southern boundaries of said Mills plat the following five courses: (1) South 07°43'26" West 146.44 feet to a found iron pipe with cap; (2) South 03°03'23" East 318.20 feet to a found iron pipe with cap; (3) South 05°04'48" West 519.04 feet to a found iron pipe with cap; (4) South 15°45'44" West 60.82 feet to a found iron pipe with broken cap; and (5) South 89°57'43" East 359.26 feet to a found iron pipe with cap on the western boundary of Lot 73 of the previously mentioned Windsor at Abbington subdivision plat recorded in Book of Maps 1998, Page 203, Wake County Registry; thence along the western boundary of said Windsor at Abbington subdivision South 02°25'07" East 148.61 feet to the point of beginning.

Containing 48.2331 acres, more or less, and being all of Lot “B” as said lot is shown and so designated on that certain plat entitled “Subdivision, Property of Gaither Bryant Garner, Jr. and Gerald L. Hornick” recorded in Book of Maps 1984, Page 1516, Wake County Registry, TOGETHER WITH all of Tract 1 as said tract is shown and so designated on that certain plat entitled “Division for Gerald L. Hornick, et ux and G. Bryant Garner, et ux” recorded in Book of Maps 2003, Page 474, Wake County Registry, LESS AND EXCEPT the area dedicated as public right of way for Chanticlair Drive as recorded in Deed Book 11778, Page 1490, Wake County Registry.

<REZONING>

YELLOWBRIDGE PUD

2817 US 64 HWY W
APEX, NORTH CAROLINA 27502
PROJECT NUMBER: 210701
DATE March 1, 2022

RIPARIAN BUFFERS AND WETLANDS:

RIPARIAN BUFFERS AND WETLANDS LOCATED ON SITE BY S&EC TO BE CONFIRMED BY THE US ARMY CORPS OF ENGINEERS AND TOWN OF APEX.

OWNER
YELLOWBRIDGE CAPITOL, LLC
113 MILL POND ROAD
KITTY HAWK, NC 27949-4082
Contact: TOM COLHOUN
COLHOUN REAL ESTATE
P: (919) 267-6928

APPLICANT
LENNAR CORPORATION - RALEIGH DIVISION
STEPHEN DORN
1100 PERIMETER DRIVE SUITE 112
MORRISVILLE, NC 27560
P: (919) 224-9922
www.lennar.com

ENGINEER/LAND PLANNER
PEAK ENGINEERING & DESIGN, PLLC
JEFF ROACH, P.E.
5448 APEX PEAKWAY #368
APEX, NC 27502
P: (919) 439-0100
www.PeakEngineering.com

SURVEYOR
JMT (JOHNSON, MIRMIRAN & THOMPSON, INC.)
MIKE ZMUDA
1130 SITUS COURT SUITE 200
RALEIGH, NC 27606
P: (804) 267-1258
www.jmt.com

ENVIRONMENTAL CONSULTANT
SOIL & ENVIRONMENTAL CONSULTANTS, PA
STEVEN BALL, RF, PWS
8412 FALLS OF NEUSE ROAD, SUITE 104
RALEIGH, NC 27615
P: (919) 846-5900
www.SandEC.com

TRAFFIC ENGINEER
RAMEY KEMP & ASSOCIATES, INC.
RYNAL STEPHENSON, P.E.
5805 FARINGDON PLACE, SUITE 100
RALEIGH, NC 27609
P: (919) 872-5115
www.RameyKemp.com

SITE INFORMATION:

Property Owner	Property Address	PIN	REID	Acreage	Deed Book/Plat Book & Page
YELLOWBRIDGE CAPITAL, LLC 113 MILL POINT RD KITTY HAWK NC 27949-4082	2817 US 64 HWY W	0722-75-2304	0133648	43.90 acres	DB 013508 PG 01177 BM 2003 Pg474
YELLOWBRIDGE CAPITAL, LLC 113 MILL POINT RD KITTY HAWK NC 27949-4082	2813 US 64 HWY W	0722-74-3789	0138551	4.34 acres	DB 013508 PG 01181 BM 2003 Pg474
Total Deeded Acreage:				**48.43 acres**	

Township: White Oak

Flood Zone Information: Firm Panel 3720072200J dated July 19, 2022
does not show the presence of flood zones on the property

Watershed Information: Primary Watershed Protection Overlay District, Beaver Creek Basin, Cape Fear River Basin

Historical: Per the NC SHPO, no historical structures are located within the project boundary

Annexation: Annexation required for utility services

Existing Zoning: RR - Rural Residential
Proposed Zoning: Planned Unit Development - Conditional Zoning (PUD-CZ)
2045 Land Use Map: Medium Density Residential

Existing Use: Single Family Residential and vacant property
Proposed Uses: Residential

Single-family	Townhouse	Accessory apartment
Park, active	Park, passive	Greenway
Recreation facility, private	Utility, minor	

* Homeowners Association covenants shall not restrict the construction of accessory dwelling units

Commercial

Restaurant, general	Restaurant, drive-through	Medical or dental office or clinic	Medical or dental laboratory
Office, business or professional	Publishing office	Artisan Studio	Barber and beauty shop
Book store	Convenience store		
Dry cleaners and laundry service	Farmer's market	Financial institution	Floral shop
Greenhouse or nursery, retail	Grocery, general	Grocery, specialty	
Health/fitness center or spa	Kennel	Newsstand or gift shop	Personal service
Pharmacy	Printing and copying service	Real estate sales	Repair services, limited
Retail sales, general	Studio for art	Tailor shop	Upholstery shop
Pet services	Day care facility	Veterinary clinic or hospital	Utility, minor

* Refer to PD Text for a list of uses and other zoning standards

Maximum Number of Lots: 160 dwelling units
Proposed Project Density: 3.56 dwelling units/acre (< 6.0 units/acre for Medium Density Residential districts)

Lots:	Min Lot Size	Min Lot Width	Max Building Height
Single-family detached	6,000 SF	50 feet	45 feet / 3 stories
Single-family attached (townhouse)	N/A	18 feet	45 feet / 3 stories

Parking Requirements:
Single Family Detached: 2 spaces/dwelling unit required
Single Family Attached: 2 spaces/dwelling unit + 0.25 guest spaces/dwelling unit
Single Family parking provided by driveway and garage (min 2 spaces/lot)

Building Setbacks (minimum setbacks unless otherwise noted):

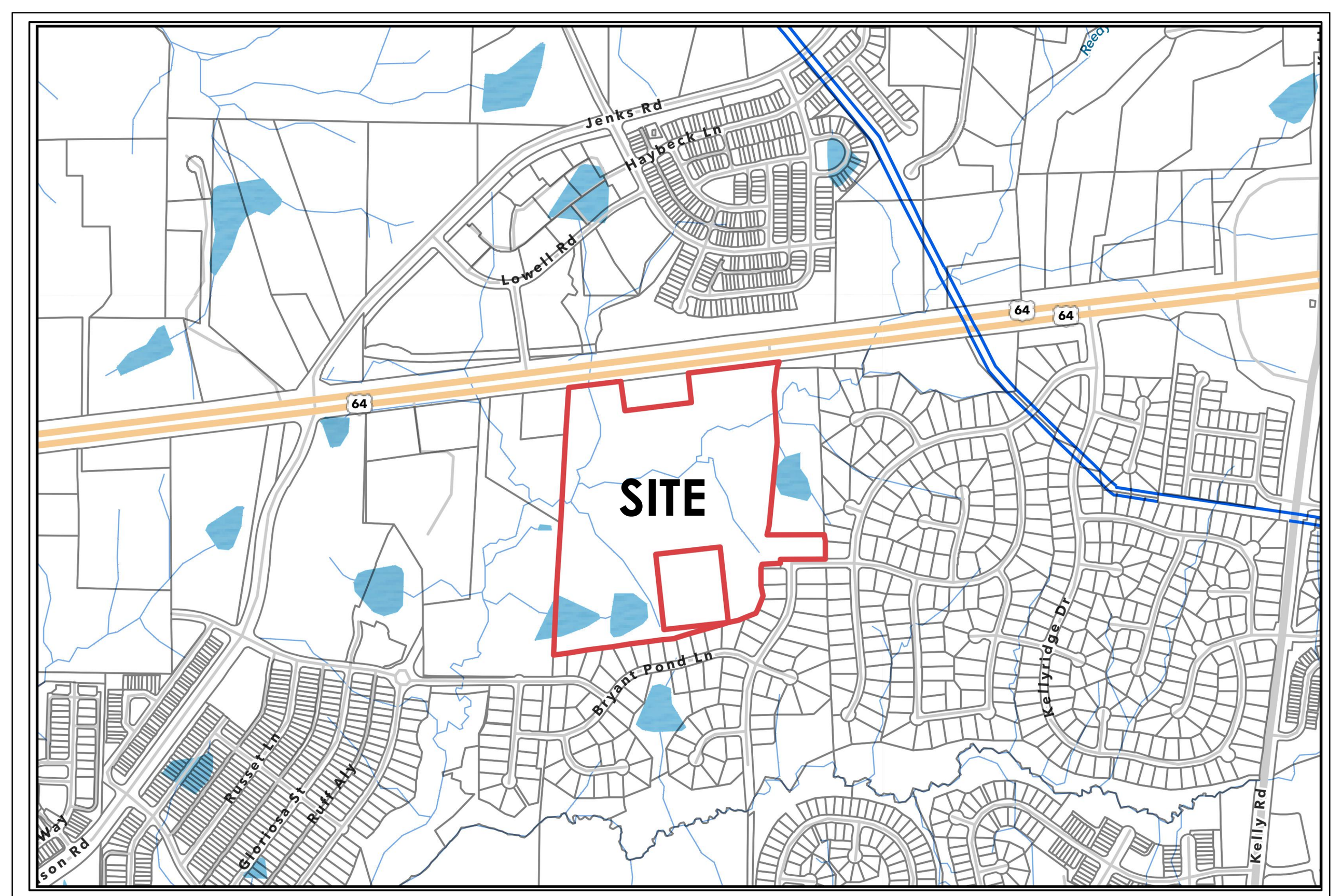
Residential:	Single-family	Townhouse (front loaded)	Townhouse (rear loaded)
Front:	20 feet	10 feet	5 feet
Rear:	15 feet	5 feet	5 feet
Side:	6 feet	0 feet (5' for end units)	0 feet (5' for end units)
Side (Corner Lot):	8 feet	8 feet	8 feet
Min. Building Separation		10 feet	10 feet

Commercial:
Non Residential Square Footage: 25,000 SF
Maximum Building Height: 50 feet
Setbacks:
Front: (US Hwy 64) 10 feet
Rear: 10 feet
Side: 10 feet
From Buffer/RCA: 10' for Buildings/5' for Parking Areas
Parking: Per UDO Section 8.3

Maximum Build Upon Area: 33.90 acres, 70%
RCA Required: 15.20 acres
14.53 aces + 0.68 acres (30% overall + 5% Mass Grading for single-family detached)
RCA to be Provided: 15.20 acres minimum
Grading: Site to be "Mass Graded"
% of total lots to be graded prior to first plat: 50% (limited by Apex UDO to a maximum acreage for mass grading)
maximum of 20 acres of clearing for single-family detached section
% of the pre-development drainage areas that have been preserved within their natural basins: 90%

INDEX OF DRAWINGS:

AERIAL MAP NO SCALE



VICINITY MAP NO SCALE

REZONING CASE # 22CZ06
(SUBMITTED ON 3/1/2022)

PEAK Engineering & Design
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NC License #P-0673

project: YELLOWBRIDGE PUD
2813/2817 US 64 HWY WEST
WHITE OAK TOWNSHIP
APEX, NORTH CAROLINA 27502

seal: PRELIMINARY NOT FOR CONSTRUCTION

No.	DATE	REVISION	BY
2	MAY 13, 2022	TOWN OF APEX - 2ND ZONING COMMENTS	JR
3	JUNE 10, 2022	TOWN OF APEX - 3RD ZONING COMMENTS	JR
4	JUNE 22, 2022	TOWN OF APEX - 4TH ZONING COMMENTS	JR
5	AUGUST 29, 2022	TOWN OF APEX - COUNCIL MEETING ZONING COMMENTS	JR

title: COVER SHEET

proj #: 210701
date: MARCH 1, 2022
dwg by: FS chkd by: JR
scale: As Noted
sheet: C000
(PUD PLAN)

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REQUIRED PLAN NOTES:

1) NO SITE DEVELOPMENT ACTIVITY INCLUDING, BUT NOT LIMITED TO, TESTING, CLEARING, INSTALLATION OF S&E MEASURES, OR GRADING SHALL OCCUR UNTIL REQUIRED TREE PROTECTION FENCING HAS BEEN INSTALLED AND INSPECTED. A TREE PROTECTION FENCING INSTALLATION PERMIT MAY BE OBTAINED AT THE PLANNING DEPARTMENT OR ONLINE AT HTTP://WWW.APEXNC.ORG/215/APPLICATIONS-SCHEDULES.
2) TREE PROTECTION FENCING MUST BE PLACED:
   a. ONE FOOT AWAY FROM ANY SAVED TREE FOR EACH INCH OF DIAMETER AT BREAST HEIGHT,
   b. ALONG THE OUTSIDE LINE OF THE 100-YEAR FLOODPLAIN AND THE OUTSIDE EDGE OF ANY RIPARIAN BUFFER, AND
   c. AT LEAST 10 FEET AWAY FROM ANY OTHER DESIGNATED RCA SUCH AS, BUT NOT LIMITED TO, HISTORIC BUILDINGS AND STRUCTURES, WETLANDS, AND PONDS.
3) ADDITIONAL TREE PROTECTION FENCING MAY BE REQUIRED IN OTHER LOCATIONS CLOSE TO CONSTRUCTION ACTIVITY WHERE IT IS DEEMED NECESSARY BY THE ZONING ENFORCEMENT OFFICER; SUCH AREAS MAY INCLUDE, BUT ARE NOT LIMITED TO, COMMON PROPERTY LINES OR NEAR PUBLIC AREAS (SIDEWALKS, ETC.).

LEGEND (EXISTING CONDITIONS)

- TPF — TREE PROTECTION FENCE
- EXISTING TREE LINE
- zone 1 / zone 2 — EXISTING STREAM BUFFER
- FW — EXISTING 100YR FLOODWAY BOUNDRARY
- EXISTING FLOODPLAIN BOUNDARY
- EXISTING 100 YR FLOODPLAIN
- FWG — EXISTING FLOOD FRINGE
- STEEP SLOPE AREA (GREATER THAN 3:1)
- EXISTING WETLANDS
- EXISTING PERENNIAL STREAM
- EXISTING INTERMITTENT STREAM
- ZoD / CRZ — CRITICAL ROOT ZONE

EXISTING CONDITIONS NOTES:

1. *BOUNDARY SURVEY FROM WAKE COUNTY GIS DATA*
2. *TOPOGRAPHIC INFORMATION FROM WAKE COUNTY GIS DATA*
3. *NO SLOPES EQUAL TO OR GREATER THAN 3:1 FOUND ON THE SITE.*
4. *NO HISTORIC INVENTORY SITES OR NATURAL INVENTORY AREAS LOCATED ON OR WITHIN 100' OF THIS PROPERTY.*
5. *NO GREENWAY OR TRAILS ARE LOCATED ON THIS SITE. GREENWAY OR TRAILS MAYBE PLANNED FOR THIS SITE AS PER THE GREENWAY MASTER PLAN.*
6. *TREE SURVEY INFORMATION PROVIDED BY S&EC, INC.*
7. *100 YR FLOOD PLAIN IS LOCATED ON OR WITHIN 100' OF THIS PROPERTY*
8. PRIMARY WATERSHED PROTECTION OVERLAY DISTRICT, BEAVER CREEK BASIN, CAPE FEAR RIVER BASIN.

1 C002 **EXISTING CONDITIONS**
SCALE: 1"=100'

PEAK Engineering & Design
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ph: 919.439.0100
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NC License #P-0673

project:
YELLOWBRIDGE PUD
2813,2817 US 64 HWY WEST
WHITE OAK TOWNSHIP
APEX, NORTH CAROLINA 27502

seal:
NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT
PRELIMINARY NOT FOR CONSTRUCTION
STEVEN A. ROACH

No.	DATE	REVISION	BY
5	AUGUST 29, 2022	TOWN OF APEX – COUNCIL MEETING COMMENTS	JR
4	JULY 18, 2022	TOWN OF APEX – 2ND ZONING COMMENTS	JR
3	JUNE 10, 2022	TOWN OF APEX – 2ND ZONING COMMENTS	JR
2	MAY 13, 2022	TOWN OF APEX – 2ND ZONING COMMENTS	JR

title:
EXISTING CONDITIONS

proj #:
210701

date:
MARCH 1, 2022

dwg by: FS
chkd by: JR

scale:
As Noted

sheet:
C002
(PUD PLAN)

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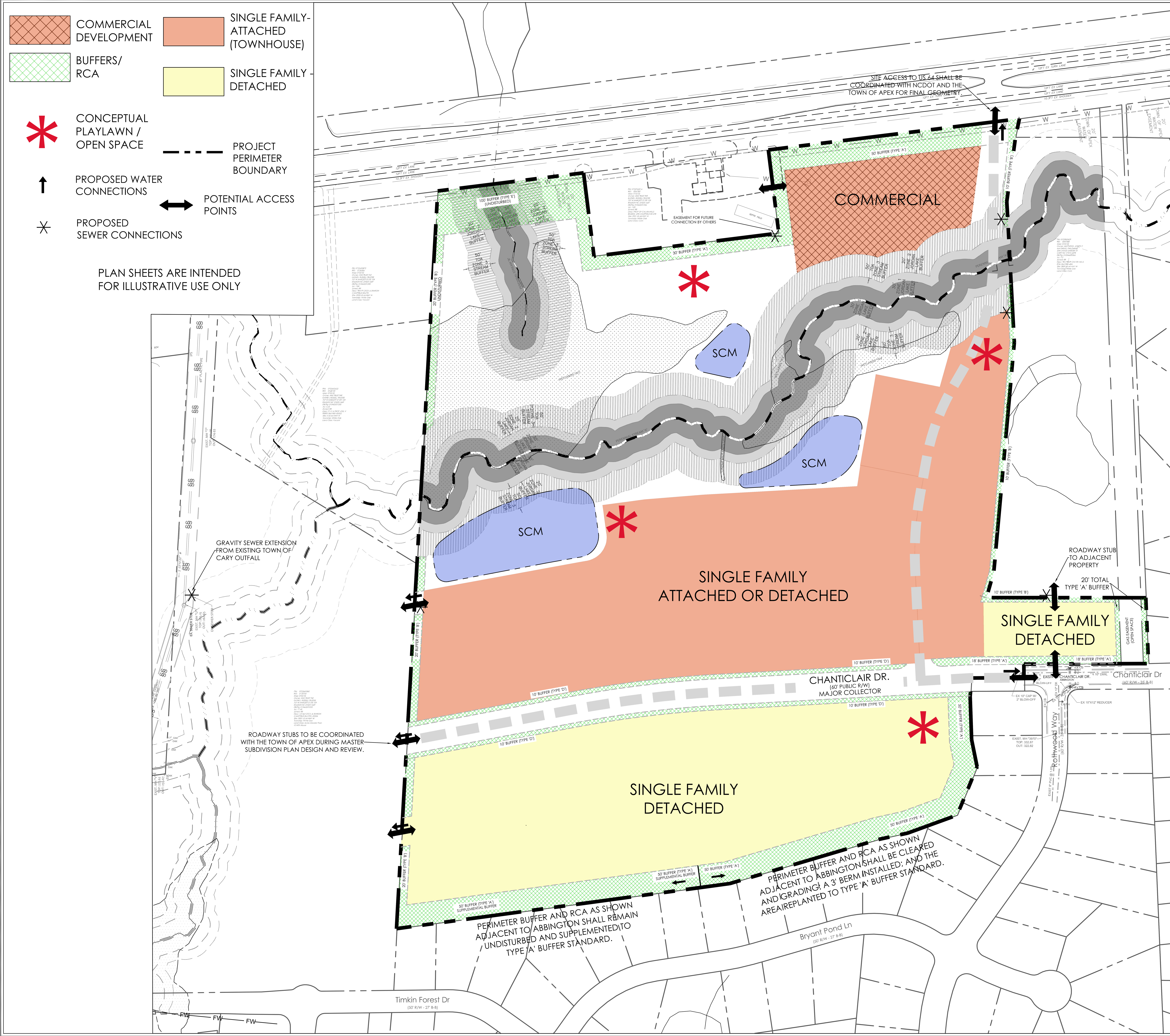

SITE AND UTILITY NOTES:

1. DEVELOPMENT ACCESS AND STUB STREET LOCATIONS SHALL BE FINALIZED AT MASTER SUBDIVISION PLAN DESIGN AND APPROVAL.
2. FINAL RESOURCE CONSERVATION AREA (RCA), OPEN SPACE, AND PLAY LAWN LOCATIONS SHALL BE COORDINATED WITH STAFF AND BUILDER DURING MASTER SUBDIVISION PLAN DESIGN AND APPROVAL.
3. ALL ZONING PLAN SHEETS ARE PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY. FINAL DESIGN COMPONENTS ARE DETERMINED AT MASTER SUBDIVISION PLAN.
4. REFER TO PD TEXT DOCUMENTS FOR A LIST OF ALLOWABLE USES, ZONING CONDITIONS, AND OTHER DESIGN STANDARDS FOR THE DEVELOPMENT.
5. ENVIRONMENTAL FEATURES ARE SUBJECT TO FINAL REVIEW CONCURRENCE WITH VARIOUS REGULATING AGENCIES.
6. PUBLIC PEDESTRIAN AND VEHICULAR ACCESS IS SHOWN FOR CONCEPTUAL PURPOSES AND ARE SUBJECT TO REVISIONS DURING THE MASTER SUBDIVISION PLAN DESIGN AND APPROVAL.
7. ALL SITE ELEMENTS ARE REQUIRED TO MEET OR EXCEED TOWN OF APEX, NCDOT, OR OTHER REVIEW AUTHORITY STANDARD DESIGN SPECIFICATIONS.
8. PROJECT WILL COMPLY WITH ADOPTED TOWN MASTER PLANS INCLUDING TRANSPORTATION, WATER, SEWER, AND GREENWAYS.
9. THE PROJECT IS REQUESTING FULL TOWN SERVICES, INCLUDING BUT NOT LIMITED TO WATER, SEWER AND ELECTRICITY.
10. THE PROJECT WILL NOT UTILIZE PRIVATE SEWAGE DISPOSAL.

POTENTIAL ACCESS POINTS:

Potential Access Points shown on the Conceptual Site Plan / Conceptual Utility Plan (C100) are not shown in exact locations but show required connections. Connections can only be removed from the subdivision connectivity requirements of the PUD if the developer shows to the satisfaction of the Planning Director, in consultation with the Technical Review Committee (TRC), that the construction of the connection would be impractical based on environmental conditions found in the field at the time of Master Subdivision Plan approval.

SCALE: 1" = 100'

1 C100 CONCEPTUAL SITE PLAN/ CONCEPTUAL UTILITY PLAN

SCALE: 1"=100'

PEAK Engineering & Design
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project: *YELLOWBRIDGE PUD*
2813/2817 US 64 HWY WEST
WHITE OAK TOWNSHIP
APEX, NORTH CAROLINA 27502

seal: PRELIMINARY NOT FOR CONSTRUCTION — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24427 JEFFREY A. ROACH

No.	DATE	REVISION	BY
2	MAY 13, 2022	TOWN OF APEX – 2ND ZONING COMMENTS	JR
3	JUNE 10, 2022	TOWN OF APEX – 3RD ZONING COMMENTS	JR
4	JUNE 22, 2022	TOWN OF APEX – 4TH ZONING COMMENTS	JR
5	AUGUST 29, 2022	TOWN OF APEX – COUNCIL MEETING ZONING COMMENTS	JR

title: *CONCEPTUAL SITE PLAN/ CONCEPTUAL UTILITY PLAN*

proj #: 210701

date: MARCH 1, 2022

dwg by: FS chkd by: JR

scale: As Noted

sheet: *C100* (PUD PLAN)

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RAMEY KEMP ASSOCIATES

TOGETHER WE ARE LIMITLESS

Yellow Bridge Residential

Traffic Impact Analysis
Apex, North Carolina

RKA

rameykemp.com

TRAFFIC IMPACT ANALYSIS

FOR

YELLOW BRIDGE RESIDENTIAL

LOCATED

IN

APEX, NORTH CAROLINA

Prepared For:
Lennar Corporation – Raleigh Division
1100 Perimeter Park Drive, Suite 112
Morrisville, NC 27560

Prepared By:
Ramey Kemp & Associates, Inc.
5808 Faringdon Place, Suite 100
Raleigh, NC 27609
License #C-0910

FEBRUARY 2022

RKA Project No. 22004

Prepared By: TF

Reviewed By: NB

TRAFFIC IMPACT ANALYSIS
YELLOW BRIDGE
APEX, NORTH CAROLINA

EXECUTIVE SUMMARY

1. Development Overview

A Traffic Impact Analysis (TIA) was conducted for the proposed Yellow Bridge Residential development in accordance with the Town of Apex (Town) Unified Development Ordinance (UDO) and North Carolina Department of Transportation (NCDOT) capacity analysis guidelines. The proposed development is to be located south of US 64 and west of the Abbington subdivision in Apex, North Carolina. The proposed development is expected to consist of 59 single-family homes, 83 townhomes, and 25,000 square feet (sq. ft.) of retail space to be built out in 2026. Site access is proposed via one (1) left-over driveway along US 64 at the existing median break, and one (1) internal connection to Chanticlair Drive.

2. Existing Traffic Conditions

The study area for the TIA was determined through coordination with the Town and NCDOT and consists of the following existing intersections:

- US 64 and Median Break

Existing peak hour traffic volumes were determined based on a combination of previously collected traffic counts at the intersection of US 64 and Jenks Road / Richardson Road, and new turning movement counts conducted at the existing median break. Previously conducted traffic counts at the intersection of US 64 and Jenks Road / Richardson Road were collected in October 2021 during typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods, while schools were in session for in person learning. These previously conducted counts were utilized to determine through volume traffic at the median break. Turning movement volumes at the median break were determined based on traffic counts conducted at the existing median break, in January 2022, during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods, while schools were in session for in person learning. Weekday AM and PM traffic volumes were balanced between study intersections, where appropriate.

3. Site Trip Generation

The proposed development is assumed to consist of a maximum of 59 single-family homes, 83 townhomes, and 25,000 square feet (sq. ft.) of retail space. Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE Trip Generation Manual, 10th Edition. Table E-1 provides a summary of the trip generation potential for the site.

Table E-1: Site Trip Generation

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single-Family Homes (210)	59 DU	640	12	35	38	23
Multi-Family Homes (Low-Rise) (220)	83 DU	588	9	31	31	19
Shopping Center (820)	25 KSF	944	15	9	45	50
Total Trips		**2,172**	**36**	**75**	**114**	**92**
*Internal Capture (2% AM & 1% PM)**			*0*	*-2*	*-11*	*-12*
Total External Trips			**36**	**73**	**103**	**80**
Pass-By Trips: Shopping Center (34% PM)			-	-	*-14*	*-14*
Total Primary Trips			**36**	**73**	**89**	**66**

*Utilizing methodology contained in the NCHRP Report 684.

4. Future Traffic Conditions

Through coordination with the Town and NCDOT, it was determined that an annual growth rate of 3% would be used to generate 2026 projected weekday AM and PM peak hour traffic volumes. The following adjacent developments were identified to be considered under future conditions:

- Westford Residential (currently 75% built-out)
- Legacy PUD (US 64 Residential)
- Sweetwater Development

The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2022 Existing Traffic Conditions
- 2026 No-Build Traffic Conditions
- 2026 Build Traffic Conditions

5. Capacity Analysis Summary

The analysis considered weekday AM and PM peak hour traffic for 2018 existing, 2022 no-build, and 2022 build conditions. Refer to Section 7 of the TIA for the capacity analysis summary performed at each study intersection.

6. Recommendations

Based on the findings of this study, specific geometric and traffic control improvements have been identified at study intersections. The improvements are summarized below and are illustrated in Figure E-1.

Recommended Improvements by Developer

US 64 and Median Break / Site Access

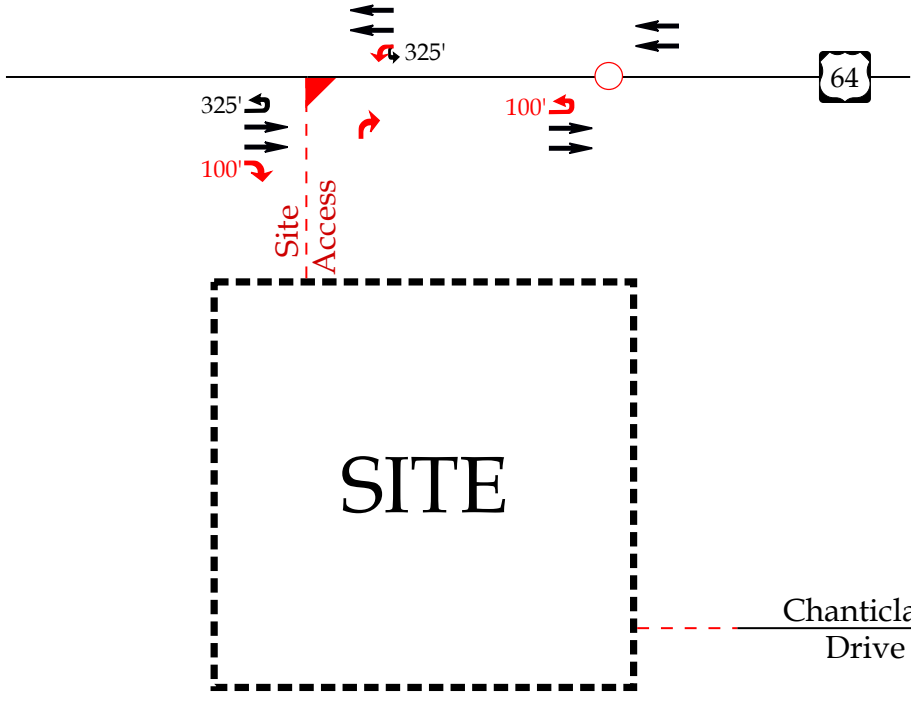
- Construct the northbound approach (Site Access) with one ingress and one egress lane striped as an exclusive right-turn lane.
- Provide stop-control for the northbound approach (Site Access). The proposed intersection will be configured as a left-over.
- Construct an exclusive eastbound (US 64) right-turn lane with a minimum of 100 feet of storage and appropriate decel and taper.
- Restripe the existing westbound (US 64) u-turn lane to provide for a westbound left-turn movement.

US 64 and Eastern U-Turn Location

- Construct an exclusive eastbound (US 64) u-turn lane with a minimum of 100 feet of storage and appropriate decel and taper to be located east of the existing median break and proposed site driveway location.

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- Existing Lane
- X' Storage (In Feet)
- Improvement by Developer



*Note: Roadway included for informational purposes only

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Recommended Lane Configurations Scale: Not to Scale | Figure E-1

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YELLOW BRIDGE RESIDENTIAL
APEX, NORTH CAROLINA

1. INTRODUCTION

The contents of this report present the findings of the Traffic Impact Analysis (TIA) conducted for the proposed Yellow Bridge Residential development located south of US 64 and west of the Abbington subdivision in Apex, North Carolina. The purpose of this study is to determine the potential impacts to the surrounding transportation system created by traffic generated by the proposed development, as well as recommend improvements to mitigate the impacts.

The proposed development, anticipated to be completed in 2026, is assumed to consist of the following uses:

- 59 single-family homes
- 83 townhomes
- 25,000 square feet (sq. ft.) retail space

The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2022 Existing Traffic Conditions
- 2026 No-Build Traffic Conditions
- 2026 Build Traffic Conditions

1.1. Site Location and Study Area

The proposed development is located south of US 64 and west of the Abbington subdivision in Apex, North Carolina. Refer to Figure 1 for the site location map.

The study area for the TIA was determined through coordination with the North Carolina Department of Transportation (NCDOT) and the Town of Apex (Town) and consists of the following existing intersections:

- US 64 and Median Break

Refer to Appendix A for the approved scoping documentation.

1.2. Proposed Land Use and Site Access

The site is located south of US 64 and west of the Abbington subdivision. The proposed development, anticipated to be completed in 2026, is assumed to consist of the following uses:

- 59 single-family homes
- 83 townhomes
- 25,000 square feet (sq. ft.) retail space

Site access is proposed via one (1) left-over driveway along US 64 at the existing median break, and one (1) internal connection to Chanticlair Drive. Refer to Figure 2 for a copy of the preliminary site plan.

1.3. Adjacent Land Uses

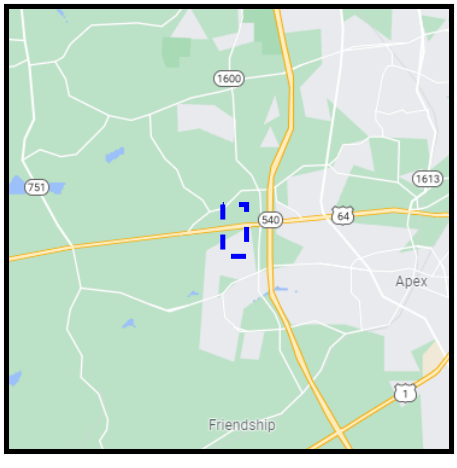
The proposed development is located in an area consisting primarily of commercial and residential development.

1.4. Existing Roadways

Existing lane configurations (number of traffic lanes on each intersection approach), lane widths, storage capacities, and other intersection and roadway information within the study area are shown in Figure 3. Table 1 provides a summary of this information, as well.

Table 1: Existing Roadway Inventory

Road Name	Route Number	Typical Cross Section	Speed Limit	Maintained By	2019 AADT (vpd)
US 64		4-lane divided	55 mph	NCDOT	27,000



N

LEGEND

- Proposed Site Location
- Study Intersection
- Study Area

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Site Location Map Scale: Not to Scale | Figure 1

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project:
YELLOWBRIDGE CAPITAL
2817 US 64 HWY W
WHITE OAK TOWNSHIP
APEX, NORTH CAROLINA 27502

seal:
NORTH CAROLINA PRELIMINARY NOT FOR CONSTRUCTION

title:
OVERALL SKETCH PLAN

proj #: 210701
date: *JULY 21, 2021*
dwg by: FS chkd by: JR
scale: As Noted
sheet: *SP-6*
(SKETCH PLAN)

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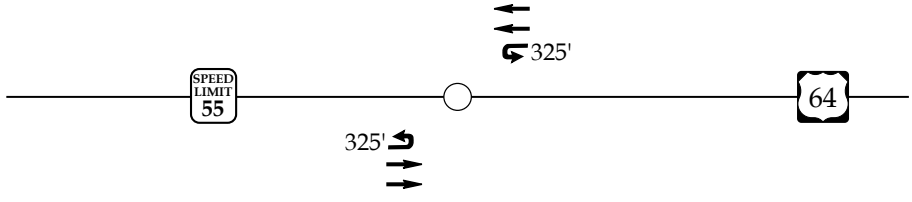
LEGEND

- Unsignalized Intersection
- Existing Lane
- X' Storage (In Feet)
- SPEED LIMIT XX Posted Speed Limit



RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	2022 Existing Lane Configurations Scale: Not to Scale | Figure 3

2. 2022 EXISTING PEAK HOUR CONDITIONS

2.1. 2022 Existing Peak Hour Traffic Volumes

Existing peak hour traffic volumes were determined based on a combination of previously collected traffic counts at the intersection of US 64 and Jenks Road / Richardson Road, and new turning movement counts conducted at the existing median break. Previously conducted traffic counts at the intersection of US 64 and Jenks Road / Richardson Road were collected in October 2021 during typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods, while schools were in session for in person learning. These previously conducted counts were utilized to determine through volume traffic at the median break. Turning movement volumes at the median break were determined based on traffic counts conducted at the existing median break, in January 2022, during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods, while schools were in session for in person learning. Weekday AM and PM traffic volumes were balanced between study intersections, where appropriate. Refer to Figure 4 for 2022 existing weekday AM and PM peak hour traffic volumes. A copy of the count data is located in Appendix B of this report.

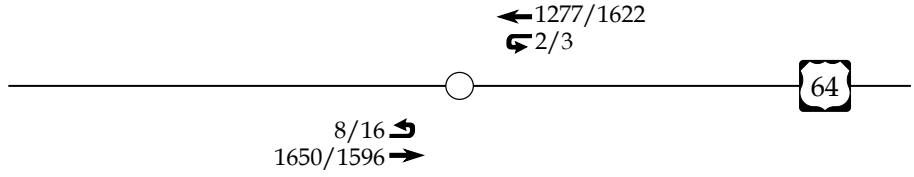
2.2. Analysis of 2022 Existing Peak Hour Traffic Conditions

The 2022 existing weekday AM and PM peak hour traffic volumes were analyzed to determine the current levels of service at the study intersections under existing roadway conditions. The results of the analysis are presented in Section 7 of this report.

LEGEND

◯ Unsignalized Intersection

X / Y → Weekday AM / PM Peak Hour Traffic



RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	2022 Existing Peak Hour Traffic Scale: Not to Scale | Figure 4

3. 2026 NO-BUILD PEAK HOUR CONDITIONS

In order to account for growth of traffic and subsequent traffic conditions at a future year, no-build traffic projections are needed. No-build traffic is the component of traffic due to the growth of the community and surrounding area that is anticipated to occur regardless of whether or not the proposed development is constructed. No-build traffic is comprised of existing traffic growth within the study area and additional traffic created as a result of adjacent approved developments.

3.1. Ambient Traffic Growth

Through coordination with the Town and NCDOT, it was determined that an annual growth rate of 3% would be used to generate 2026 projected weekday AM and PM peak hour traffic volumes. Refer to Figure 5 for 2026 projected peak hour traffic.

3.2. Adjacent Development Traffic

Through coordination with the Town and NCDOT, the following adjacent developments were identified to be included as an approved adjacent development in this study:

- Westford Residential (currently 75% built-out)
- Legacy PUD (US 64 Residential)
- Sweetwater Development - Commercial

Table 2, on the following page, provides a summary of the adjacent developments.

Table 2: Adjacent Development Information

Development Name	Location	Build-Out Year	Land Use / Intensity	TIA Performed
Westford Residential	North of US 64 and east of Jenks Road	2019*	90 single-family homes 300 apartments 225 townhomes	December 2016 by Kimley-Horn
Legacy PUD (US 64 Residential)	South of US 64, west of the former Tee-to-Green site	2026	75 single-family homes 400 apartments 11,000 sq. ft. Day Care 3,500 sq. ft. FF Restaurant	July 2021 by Kimley-Horn (Phase 2 TIA Addendum)
Sweetwater Development	South of the US 64 and Jenks Road / Richardson Road intersection	2019**	375 single-family homes 60 condominiums 50,000 sq. ft. office space 200,000 sq. ft. retail space 7,000 sq. ft. HTSD 1,490 sq. ft. FF w/ DT 4-lane Drive-In Bank	December 2014 by RKA

*Assumed currently 75% built-out.
**Residential portion is assumed fully built-out.

Based on coordination with the Town and NCDOT, it was assumed that the Westford Residential development is currently approximately 75% built-out at the time of scoping and therefore a portion of development site traffic is captured in the existing traffic counts. Similarly, it was assumed that the residential portion of the Sweetwater development was constructed at the time of data collection and therefore the associated trips were not considered in the calculation of adjacent development traffic.

It should be noted that the adjacent developments were approved, during scoping, by the Town and NCDOT. Adjacent development trips are shown in Figure 6. Adjacent development information can be found in Appendix C.

3.3. Future Roadway Improvements

Based on coordination with the NCDOT and the Town, it was determined there were no future roadway improvements to consider with this study.

3.4. 2026 No-Build Peak Hour Traffic Volumes

The 2026 no-build traffic volumes were determined by projecting the 2022 existing peak hour traffic to the year 2026, and adding the adjacent development trips. Refer to Figure 7 for an illustration of the 2026 no-build peak hour traffic volumes at the study intersections.

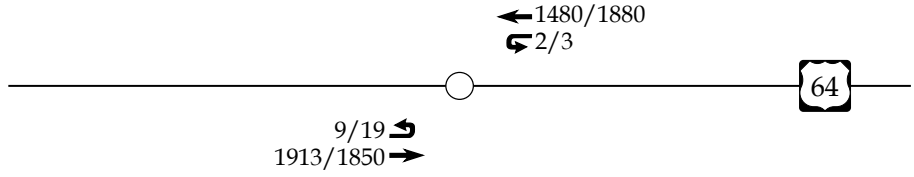
3.5. Analysis of 2026 No-Build Peak Hour Traffic Conditions

The 2026 no-build AM and PM peak hour traffic volumes at the study intersections were analyzed with future geometric roadway conditions and traffic control. The analysis results are presented in Section 7 of this report.

LEGEND

◯ Unsignalized Intersection

X / Y → Weekday AM / PM Peak Hour Traffic

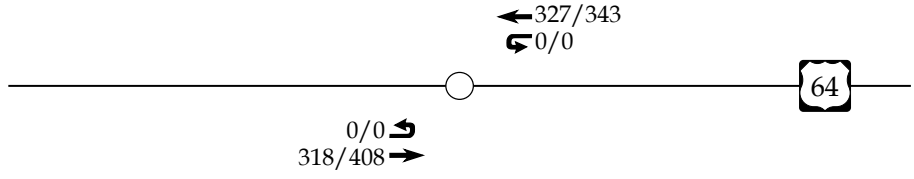


RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	2026 Projected Peak Hour Traffic Scale: Not to Scale | Figure 5

LEGEND

◯ Unsignalized Intersection

X / Y → Weekday AM / PM Peak Hour Adjacent Development Trips

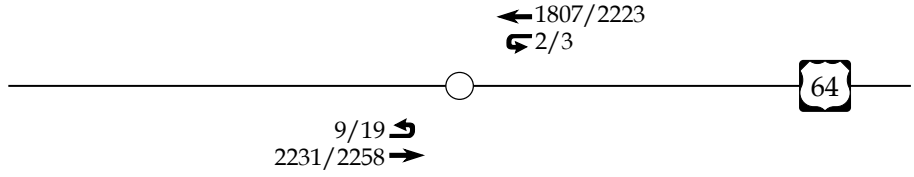


RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Peak Hour Adjacent Development Trips Scale: Not to Scale | Figure 6

LEGEND

◯ Unsignalized Intersection

X / Y → Weekday AM / PM Peak Hour Traffic



RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	2026 No-Build Peak Hour Traffic Scale: Not to Scale | Figure 7

4. SITE TRIP GENERATION AND DISTRIBUTION

4.1. Trip Generation

The proposed development is assumed to consist of 59 single-family homes, 86 townhomes, and 25,000 sq. ft. of retail space. Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE *Trip Generation Manual*, 10th Edition. Table 3 provides a summary of the trip generation potential for the site. It should be noted that several trip generation scenarios were considered and that the most conservative scenario was considered in the analysis. Refer to Appendix I for a summary of the proposed densities considered and a comparison of the expected trip generations.

Table 3: Trip Generation Summary

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single-Family Homes (210)	59 DU	640	12	35	38	23
Multi-Family Homes (Low-Rise) (220)	83 DU	588	9	31	31	19
Shopping Center (820)	25 KSF	944	15	9	45	50
Total Trips		**2,172**	**36**	**75**	**114**	**92**
*Internal Capture (2% AM & 1% PM)**			*0*	*-2*	*-11*	*-12*
Total External Trips			**36**	**73**	**103**	**80**
Pass-By Trips: Shopping Center (34% PM)			-	-	*-14*	*-14*
Total Primary Trips			**36**	**73**	**89**	**66**

*Utilizing methodology contained in the NCHRP Report 684.

It is estimated that the proposed development will generate approximately 2,172 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 111 trips (36 entering and 75 exiting) will occur during the

weekday AM peak hour and 206 trips (114 entering and 92 exiting) will occur during the weekday PM peak hour.

Internal capture of trips between the residential and retail uses was considered in this study. Internal capture is the consideration for trips that will be made within the site between different land uses, so the vehicle technically never leaves the internal site but can still be considered as a trip to that specific land use. Internal capture typically only considers trips between residential, office, and retail/restaurant land uses. Based on NCHRP Report 684 methodology, a weekday AM peak hour internal capture of 2% and a weekday PM peak hour internal capture rate of 11% was applied to the total trips. The internal capture reductions are expected to account for approximately 2 trips (0 entering and 2 exiting) during the weekday AM peak hour and 23 trips (11 entering and 12 exiting) during the weekday PM peak hour.

Pass-by trips were also taken into consideration in this study. Pass-by trips are made by the traffic already using the adjacent roadway, entering the site as an intermediate stop on their way to another destination. Pass-by percentages are applied to site trips after adjustments for internal capture. Pass-by trips are expected to account for approximately 28 trips (14 entering and 14 exiting) during the weekday PM peak hour. It should be noted that the pass-by trips were balanced, as it is likely that these trips would enter and exit in the same hour.

The total primary site trips are the calculated site trips after the reduction for internal capture and pass-by trips. Primary site trips are expected to generate approximately 109 trips (33 entering and 73 exiting) during the weekday AM peak hour and 155 trips (89 entering and 66 exiting) during the weekday PM peak hour.

4.2. Site Trip Distribution and Assignment

Trip distribution percentages used in assigning site traffic for this development were estimated based on a combination of existing traffic patterns, population centers adjacent to the study area, and engineering judgment.

It is estimated that the residential site trips will be regionally distributed as follows:

- 75% to/from the east via US 64
- 20% to/from the west via US 64
- 5% to/from the east via Chanticlair Drive

It is estimated that the commercial site trips will be regionally distributed as follows:

- 65% to/from the east via US 64
- 30% to/from the west via US 64
- 5% to/from the east via Chanticlair Drive

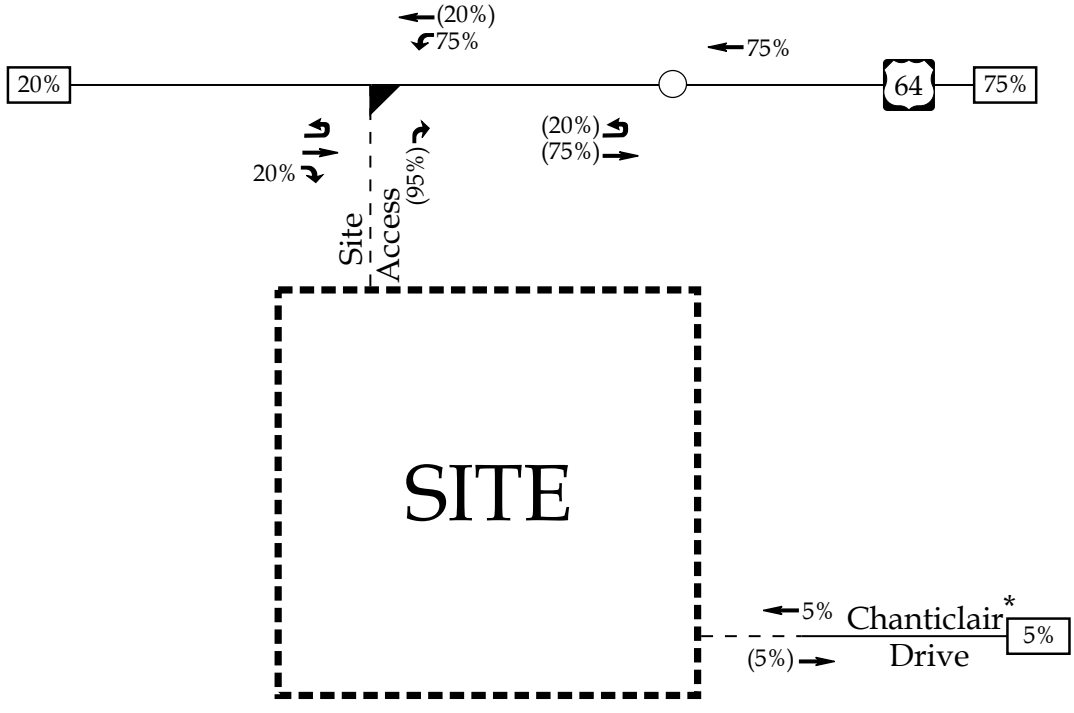
The residential site trip distribution is shown in Figure 8A, the commercial site trip distribution is shown in Figure 8B. Refer to Figure 9A and Figure 9B for the residential and commercial site trip assignment, respectively.

The pass-by site trips were distributed based on existing traffic patterns with consideration given to the proposed driveway access and site layout. Refer to Figure 10 for the pass-by site trip distribution. Pass-by site trips are shown in Figure 11.

The total site trips were determined by adding the primary site trips and the pass-by site trips. Refer to Figure 12 for the total peak hour site trips at the study intersections.

LEGEND

- Unsignalized Intersection
- Left-Over Intersection
- X% → Entering Trip Distribution
- (Y%) → Exiting Trip Distribution
- XX% Regional Trip Distribution

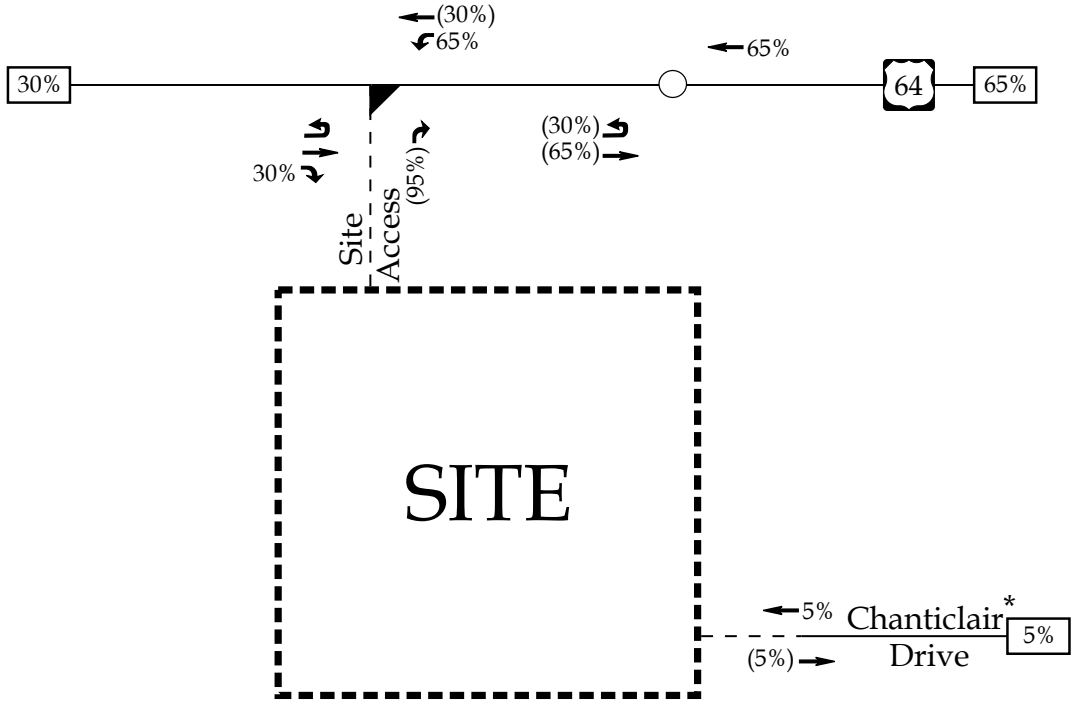


*Note: Roadway included for informational purposes only

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Residential Site Trip Distribution Scale: Not to Scale | Figure 8A

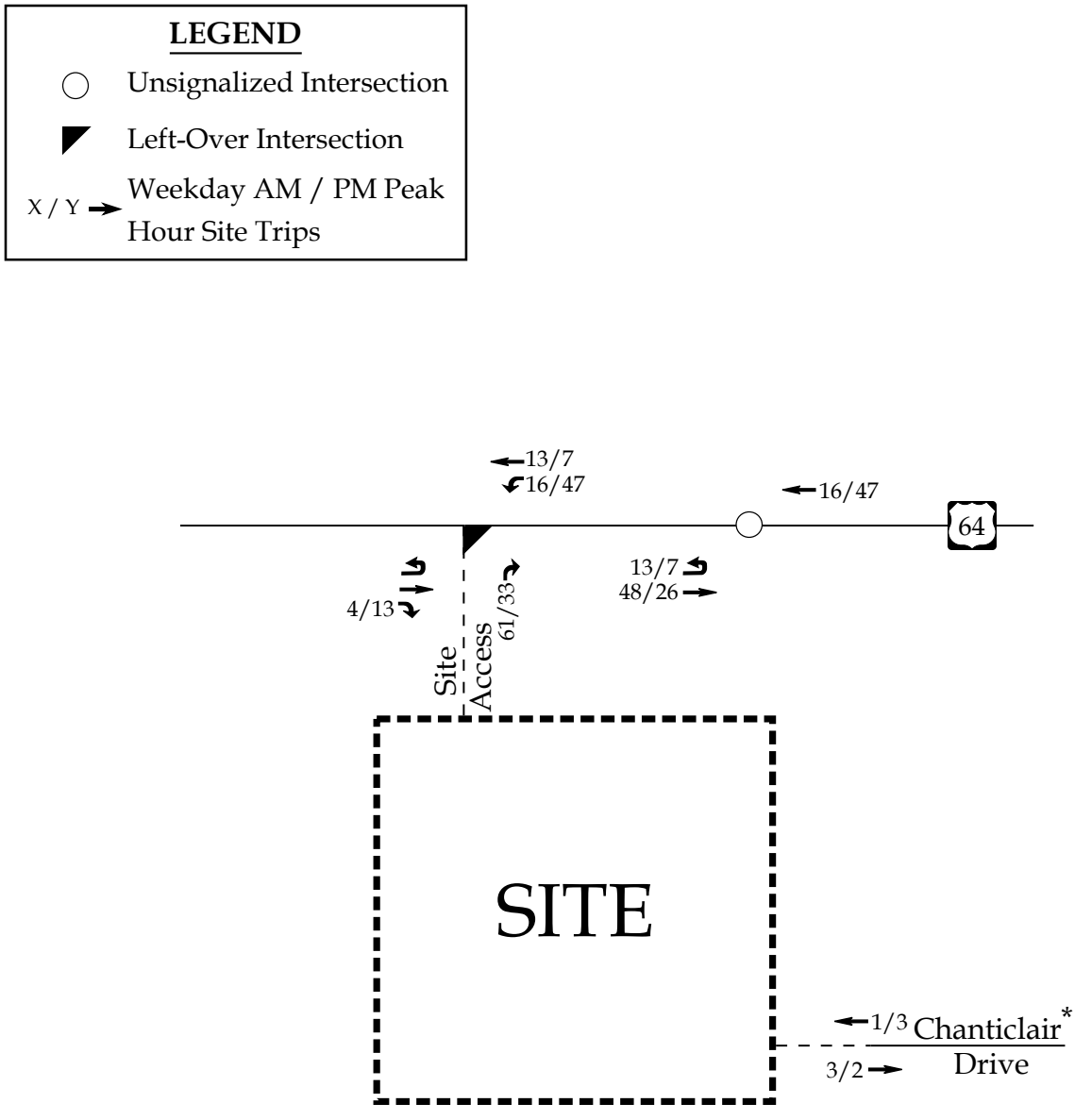
LEGEND

- ○ Unsignalized Intersection
- ◤ Left-Over Intersection
- X% → Entering Trip Distribution
- (Y%) → Exiting Trip Distribution
- XX% Regional Trip Distribution



*Note: Roadway included for informational purposes only

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Commercial Site Trip Distribution Scale: Not to Scale | Figure 8B

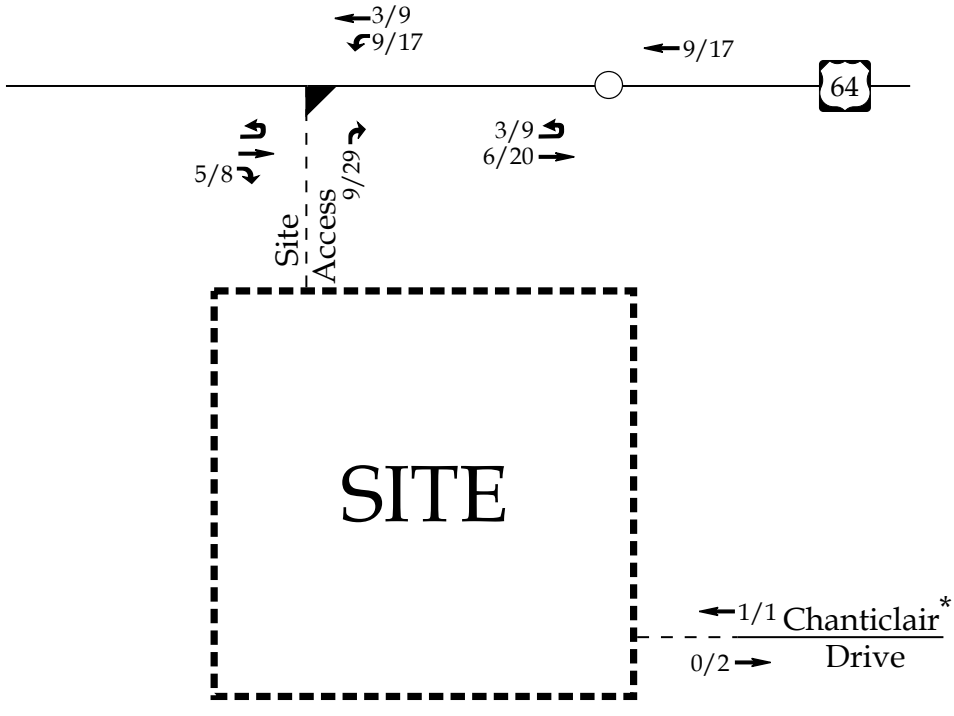


*Note: Roadway included for informational purposes only

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Residential Site Trip Assignment Scale: Not to Scale | Figure 9A

LEGEND

- ○ Unsignalized Intersection
- ◤ Left-Over Intersection
- X / Y → Weekday AM / PM Peak Hour Site Trips

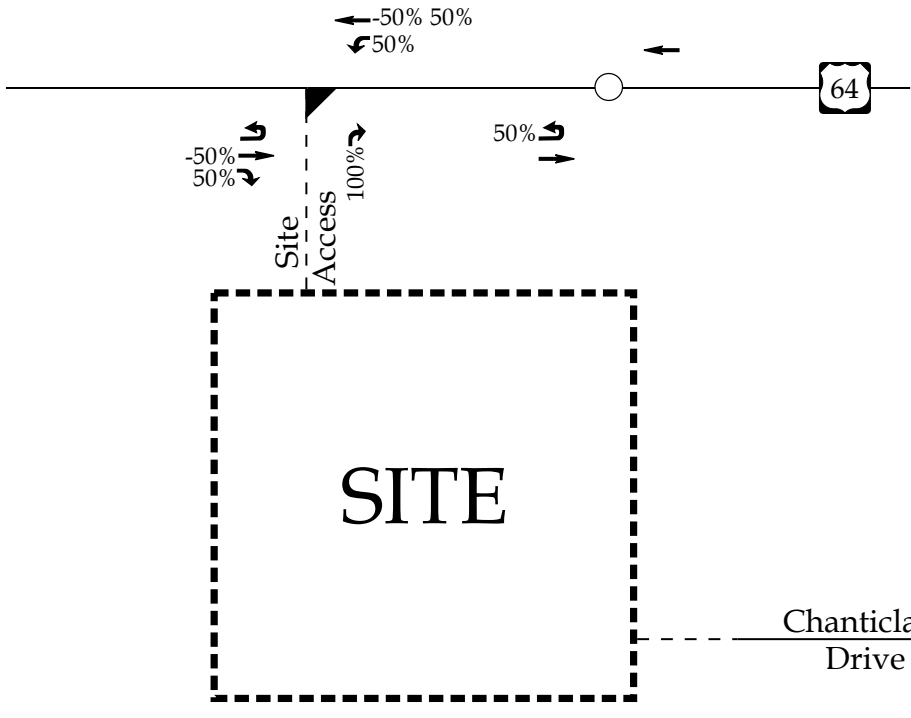


*Note: Roadway included for informational purposes only

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Commercial Site Trip Assignment Scale: Not to Scale | Figure 9B

LEGEND

- ○ Unsignalized Intersection
- ◤ Left-Over Intersection
- X% → Weekday PM Pass-By Trip Distribution

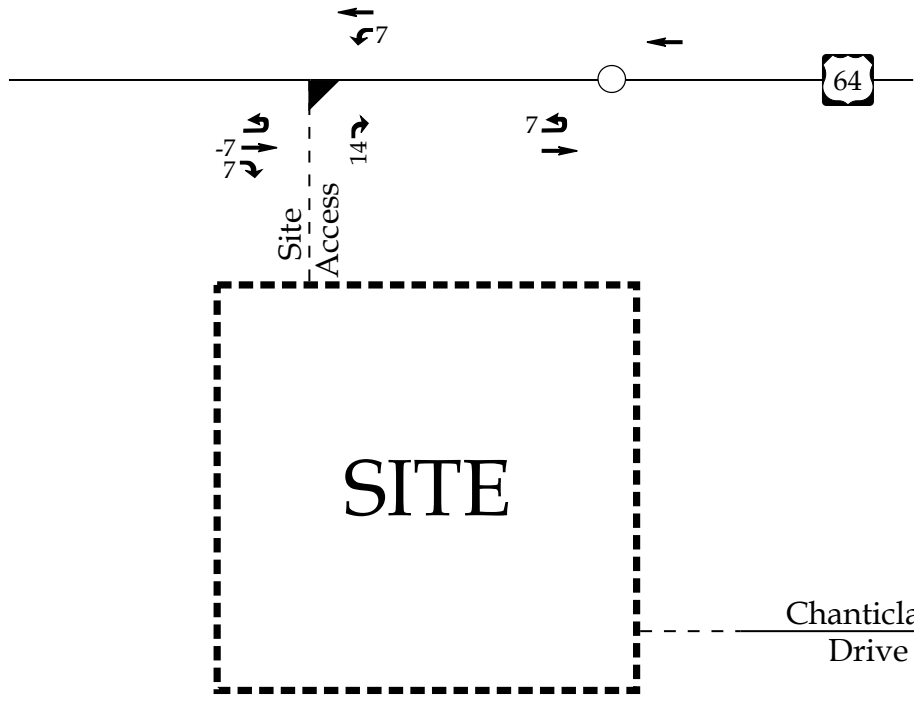


*Note: Roadway included for informational purposes only

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Pass-By Site Trip Distribution Scale: Not to Scale | Figure 10

LEGEND

- ○ Unsignalized Intersection
- ◤ Left-Over Intersection
- x → Weekday PM Peak Hour Pass-By Trips

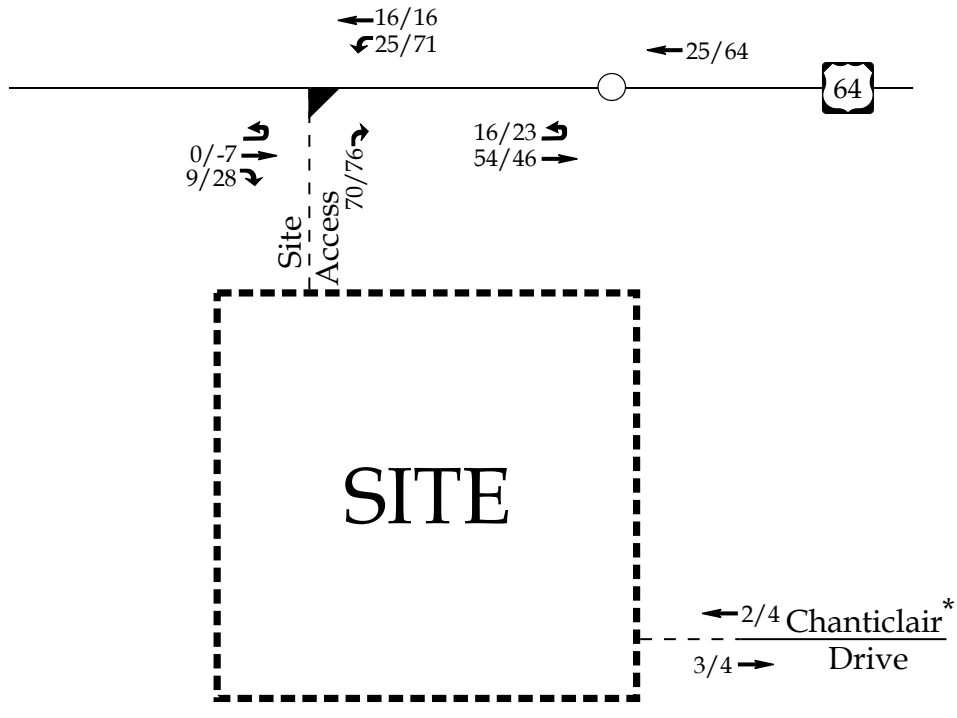


*Note: Roadway included for informational purposes only

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Pass-By Site Trip Assignment Scale: Not to Scale | Figure 11

LEGEND

- ○ Unsignalized Intersection
- ◤ Left-Over Intersection
- X / Y → Weekday AM / PM Peak Hour Site Trips



*Note: Roadway included for informational purposes only

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Total Site Trip Assignment Scale: Not to Scale | Figure 12

5. 2026 BUILD TRAFFIC CONDITIONS

5.1. 2026 Build Peak Hour Traffic Volumes

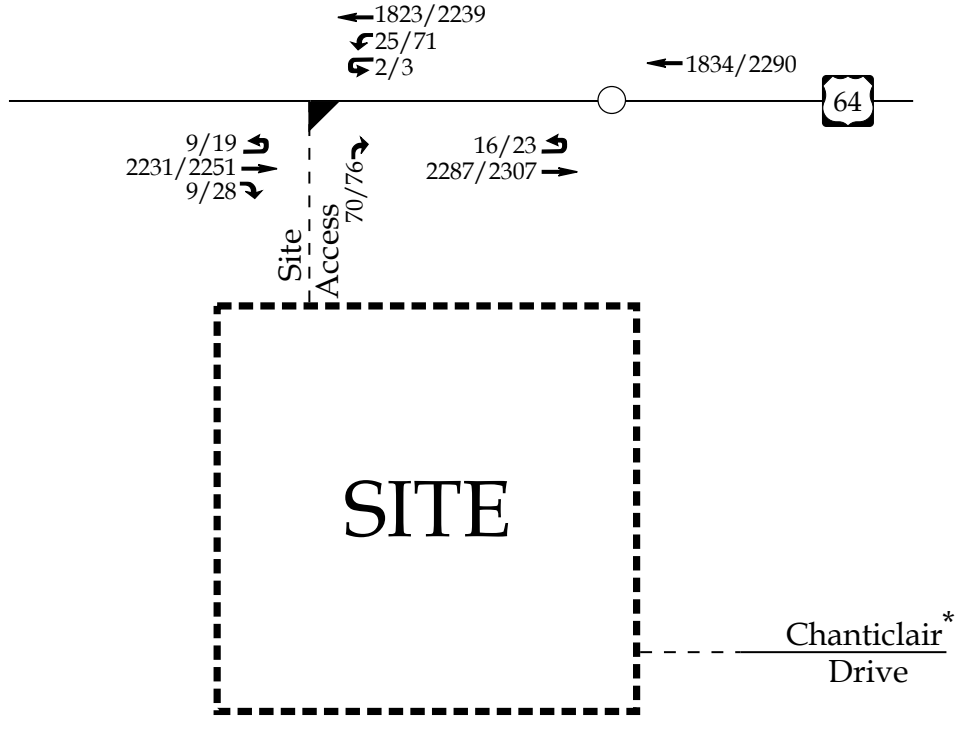
To estimate traffic conditions with the site fully built-out, the total site trips were added to the 2026 no-build traffic volumes to determine the 2026 build traffic volumes. Refer to Figure 13 for an illustration of the 2026 build peak hour traffic volumes with the proposed site fully developed.

5.2. Analysis of 2026 Build Peak Hour Traffic Conditions

Study intersections were analyzed with the 2026 build traffic volumes using the same methodology previously discussed for existing and no-build traffic conditions. Intersections were analyzed with improvements necessary to accommodate future traffic volumes. The results of the capacity analysis for each intersection are presented in Section 7 of this report.

LEGEND

- ○ Unsignalized Intersection
- ◤ Left-Over Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic



*Note: Roadway included for informational purposes only

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	2026 Build Peak Hour Traffic Scale: Not to Scale | Figure 13

6. TRAFFIC ANALYSIS PROCEDURE

Study intersections were analyzed using the methodology outlined in the *Highway Capacity Manual* (HCM), 6th Edition published by the Transportation Research Board. Capacity and level of service are the design criteria for this traffic study. A computer software package, Synchro (Version 10.3), was used to complete the analyses for most of the study area intersections. Please note that the unsignalized capacity analysis does not provide an overall level of service for an intersection; only delay for an approach with a conflicting movement.

The HCM defines capacity as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions." Level of service (LOS) is a term used to represent different driving conditions, and is defined as a "qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers." Level of service varies from Level "A" representing free flow, to Level "F" where breakdown conditions are evident. Refer to Table 4 for HCM levels of service and related average control delay per vehicle for both signalized and unsignalized intersections. Control delay as defined by the HCM includes "initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay". An average control delay of 50 seconds at a signalized intersection results in LOS "D" operation at the intersection.

Table 4: Highway Capacity Manual – Levels-of-Service and Delay

UNSIGNALIZED INTERSECTION		SIGNALIZED INTERSECTION	
LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)	LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)
A	0-10	A	0-10
B	10-15	B	10-20
C	15-25	C	20-35
D	25-35	D	35-55
E	35-50	E	55-80
F	>50	F	>80

6.1. Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to the NCDOT Congestion Management Guidelines.

7. CAPACITY ANALYSIS

7.1. US 64 and Median Break / Site Access

The existing unsignalized median break along US 64 was analyzed under 2022 existing, 2026 no-build, and 2026 build traffic conditions with the lane configurations and traffic control shown in Table 5. Refer to Table 5 for a summary of the analysis results. Refer to Appendix D for the Synchro capacity analysis reports. Copies of the SimTraffic Queueing and Performance Reports can be found in Appendix F.

Table 5: Analysis Summary of US 64 and Median Break / Site Access

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB* WB**	1 UT, 2 TH 1 UT, 2 TH	C[1] C[1]	N/A	C[1] C[1]	N/A
2026 No-Build	EB* WB**	1 UT, 2 TH 1 UT, 2 TH	C[1] D[1]	N/A	D[1] D[1]	N/A
2026 Build	EB* WB** NB	1 UT, 2 TH, **1 RT** 1 UT-**LT**, 2 TH **1 RT**	C[1] F[1] E[2]	N/A	D[1] F[1] E[2]	N/A

*Synchro analyzed the EBU as NBL movements due to the nature of the median break and synchro limitations.
**Synchro analyzed the WBU as SBL movements due to the nature of the median break and synchro limitations.
Improvements to lane configurations by the developer shown in bold.
1. Level of service for major-street u-turn/left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of 2022 existing and 2026 no-build traffic conditions indicates that the major-street u-turn movements are expected to operate at LOS D or better during both the weekday AM and PM peak hours.

Upon buildout of the proposed development, the site driveway is proposed to connect as the 3rd leg at the existing median break. Under 2026 build traffic conditions the westbound major-street left-turn/u-turn movement is expected to operate at LOS F during both the weekday AM and PM peak hours. The eastbound u-turn movement is expected to operate at LOS D or better during the weekday AM and PM peak hours. The minor-street approach is expected to operate at LOS E during both the weekday AM and PM peak hours. These

levels of service are not uncommon for stop-controlled minor-street approaches (and major-street left-turn/u-turn movements) with heavy mainline traffic volumes. According to SimTraffic Performance Reports which report delays for each movement based on simulation modeling of the entire study network, the minor-street approach is expected to experience delays of less than 35 seconds during the weekday AM and PM peak hours under 2026 build traffic conditions.

Due to the poor levels-of-service expected at this intersection, a traffic signal was considered under 2026 build traffic conditions to achieve acceptable levels-of-service. Weekday AM and PM peak hour traffic volumes were utilized in evaluating the potential need for signalization based on the guidelines contained within the *Guidelines for Signalization of Intersections with Two or Three Approaches Final Report*, published by the Institute for Transportation Research and Education (ITRE). Based on a review of the expected queue lengths at this intersection it is reported that the minor-street approach is expected to exceed capacity during both the weekday AM and PM peak hours. However, due to the primarily residential nature of the site and the expected acceptable operation of the westbound left-turn movement into the site, a traffic signal is not recommended due to the additional delay that installation of a signal would add on the mainline corridor (US 64). Refer to Appendix G for the ITRE 95th percentile queue length calculations.

A right-turn lane was considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual) and an exclusive right-turn lane with 100 feet of storage is recommended on the eastbound approach (US 64). The existing storage for the westbound left-turn lane is expected to provide sufficient storage upon buildout of the development based on the NCDOT Driveway Manual and SimTraffic simulations under 2026 build traffic conditions. Refer to Appendix H for a copy of the turn-lane warrants.

7.2. US 64 and Future Eastern U-Turn Location

The proposed eastern u-turn location along US 64 was analyzed under 2026 build traffic conditions with the lane configurations and traffic control shown in Table 6. Refer to Table 6 for a summary of the analysis results. Refer to Appendix E for the Synchro capacity analysis reports. Copies of the SimTraffic Queueing and Performance Reports can be found in Appendix F.

Table 6: Analysis Summary of US 64 and Future Eastern U-Turn Location

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2026 Build	EB* WB	**1 UT**, 2 TH 2 TH	C[1] --	N/A	D[1] --	N/A

*Synchro analyzed the EBU as NBL movements due to the nature of the median break and synchro limitations.
Improvements to lane configurations by the developer shown in bold.
1. Level of service for major-street u-turn movement.

Upon buildout of the proposed development, a new u-turn location is expected to be constructed to facilitate site traffic exiting the development heading westbound on US 64. Capacity analysis of 2026 build traffic conditions indicates that the major-street u-turn movement is expected to operate at LOS D or better during the weekday AM and PM peak hours.

The eastbound u-turn movement was modeled with a combined storage of 200 feet in synchro due to limitations with superstreet modeling. Based on a review of SimTraffic simulations under 2026 build traffic conditions, queues for this movement are not expected to exceed 76 feet (approximately 3 vehicles) during the weekday AM and PM peak hours. Therefore, an eastbound (US 64) u-turn lane with 100 feet of storage is recommended at this location.

8. CONCLUSIONS

This Traffic Impact Analysis was conducted to determine the potential traffic impacts of the proposed Yellow Bridge Residential development, located south of US 64 and west of the Abbington subdivision in Apex, North Carolina. The proposed development, anticipated to be completed in 2026, is expected to consist of 59 single-family homes, 83 townhomes, and 25,000 sq. ft. of retail space. Site access to the proposed development is expected to be provided via one (1) left-over driveway along US 64 at the existing median break, and one (1) internal connection to Chanticlair Drive.

The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2022 Existing Traffic Conditions
- 2026 No-Build Traffic Conditions
- 2026 Build Traffic Conditions

Trip Generation

It is estimated that the proposed development will generate approximately 109 primary trips (33 entering and 73 exiting) during the weekday AM peak hour and 155 primary trips (89 entering and 66 exiting) during the weekday PM peak hour.

Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to NCDOT Congestion Management Guidelines. Refer to section 6.1 of this report for a detailed description of any adjustments to these guidelines made throughout the analysis.

Intersection Capacity Analysis Summary

All the study area intersections (including the proposed site driveways) are expected to operate at acceptable levels-of-service under existing and future year conditions with the exception of the intersections listed below. A summary of the study area intersections that are expected to need improvements are as follows:

US 64 and Median Break / Site Access 1

Under 2026 build traffic conditions the westbound major-street left-turn/u-turn movement is expected to operate at LOS F during both the weekday AM and PM peak hours. The minor-street approach is expected to operate at LOS E during both the weekday AM and PM peak hours. These levels of service are not uncommon for stop-controlled minor-street approaches (and major-street left-turn/u-turn movements) with heavy mainline traffic volumes. According to SimTraffic Performance Reports which report delays for each movement based on simulation modeling of the entire study network, the minor-street approach is expected to experience delays of less than 35 seconds during the weekday AM and PM peak hours under 2026 build traffic conditions.

Due to the poor levels-of-service expected at this intersection, a traffic signal was considered under 2026 build traffic conditions to achieve acceptable levels-of-service. Weekday AM and PM peak hour traffic volumes were utilized in evaluating the potential need for signalization based on the guidelines contained within the *Guidelines for Signalization of Intersections with Two or Three Approaches Final Report*, published by ITRE. Based on a review of the expected queue lengths at this intersection it is reported that the minor-street approach is expected to exceed capacity during both the weekday AM and PM peak hours. However, due to the primarily residential nature of the site and the expected acceptable operation of the westbound left-turn movement, a traffic signal is not recommended due to the additional delay that installation of a signal would add on the mainline corridor (US 64).

A right-turn lane was considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual) and an exclusive right-turn lane with 100 feet of storage is recommended on the eastbound approach (US 64). The existing storage for the westbound left-turn lane is expected to provide sufficient storage upon buildout of the development based on the NCDOT Driveway Manual and SimTraffic simulations under 2026 build traffic conditions.

9. RECOMMENDATIONS

Based on the findings of this study, specific geometric improvements have been identified and are recommended to accommodate future traffic conditions. See a more detailed description of the recommended improvements below. Refer to Figure 14 for an illustration of the recommended lane configuration for the proposed development.

Recommended Improvements by Developer

US 64 and Median Break / Site Access

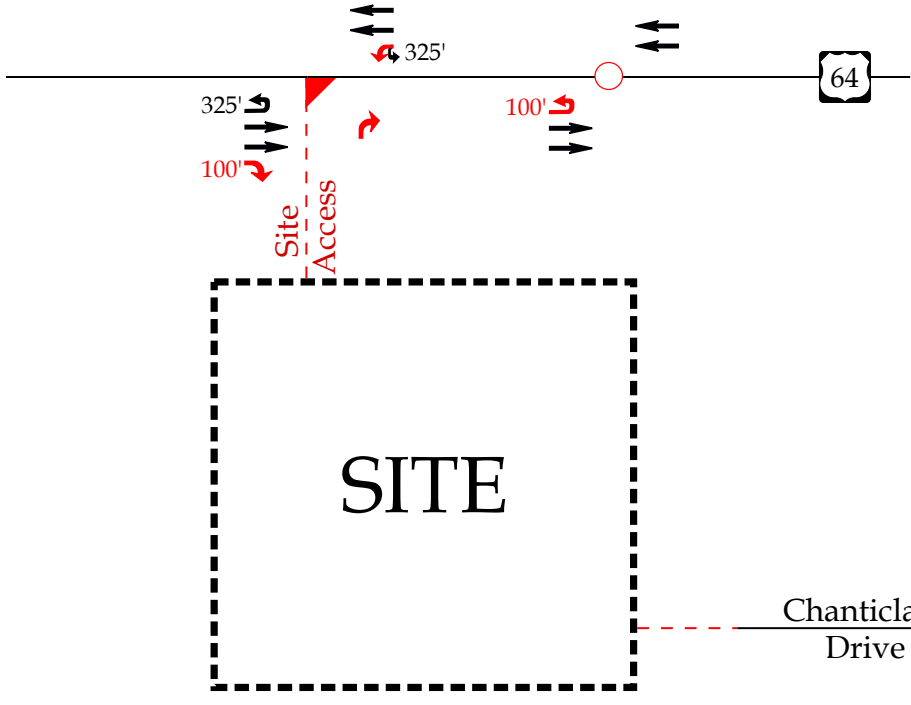
- Construct the northbound approach (Site Access) with one ingress and one egress lane striped as an exclusive right-turn lane.
- Provide stop-control for the northbound approach (Site Access). The proposed intersection will be configured as a left-over.
- Construct an exclusive eastbound (US 64) right-turn lane with a minimum of 100 feet of storage and appropriate decel and taper.
- Restripe the existing westbound (US 64) u-turn lane to provide for a westbound left-turn movement.

US 64 and Eastern U-Turn Location

- Construct an exclusive eastbound (US 64) u-turn lane with a minimum of 100 feet of storage and appropriate decel and taper to be located east of the existing median break and proposed site driveway location.

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- Existing Lane
- X' Storage (In Feet)
- Improvement by Developer



*Note: Roadway included for informational purposes only

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Recommended Lane Configurations Scale: Not to Scale | Figure 14

TECHNICAL APPENDIX

APPENDIX A

SCOPING DOCUMENTATION

RAMEY KEMP ASSOCIATES
TOGETHER WE ARE LIMITLESS

T 919 872 5115
5808 Faringdon Pl,
Raleigh, NC 27609

January 12, 2022

Russell Dalton, PE
Town of Apex
73 Hunter Street
Apex, NC 27502
P: 919-249-3358
E: russell.dalton@apexnc.org
[Sent via Email]

Reference: Yellow Bridge Residential
Apex, North Carolina

Subject: Memorandum of Understanding for TIA Report

Dear Mr. Dalton:

The following is a Memorandum of Understanding (MOU) outlining the proposed scope of work and assumptions related to the Traffic Impact Analysis (TIA) for the proposed Yellow Bridge Residential development in Apex, North Carolina. The proposed development is located south of US 64 and west of the Abbington subdivision. The development is expected to consist of 59 single-family homes, 83 townhomes, and 25,000 square feet (sq. ft.) of retail space. This MOU reflects the assumptions outlined during initial coordination between Ramey Kemp Associates (RKA), the Town of Apex (Town), and the North Carolina Department of Transportation (NCDOT). Refer to the attached site location map. Site access to the proposed development is expected to be provided via one (1) left-over driveway along US 64 at the existing median break, and one (1) internal connection to Chanticlair Drive.

The proposed development, anticipated to be completed in 2026, is expected to consist of the following land uses:

- 59 single-family homes
- 83 townhomes
- 25,000 sq. ft. retail space

Study Area

Based on a coordination with NCDOT and Town staff, the study area is proposed to consist of the following intersections:

- US 64 and Median Break (unsignalized)
- US 64 and Future Eastern U-Turn Location

Existing Traffic Volumes

Existing peak hour traffic volumes will be determined based on a combination of previously conducted traffic counts at the intersection US 64 and Jenks Road / Richardson Road, and new turning movement counts conducted at the existing median break. Previously conducted traffic counts at the intersection of US 64 and Jenks Road / Richardson Road were collected in October 2022 during typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 – 6:00 PM) peak periods, while schools were in session for in person learning. These previously conducted counts will be utilized to determine through volume traffic at the existing median break. Turning movement volumes will be determined based on traffic counts conducted at the existing median break, in January 2022 during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 – 6:00 PM) peak periods, while schools are in session for in person learning.

Background Traffic Volumes

Based on coordination with NCDOT and the Town, background traffic volumes will be determined by projecting 2022 existing traffic volumes to the year 2026 using a 3% annual growth rate. Additionally, it was determined that the following adjacent developments are to be included in this study:

- Westford (currently 75% build-out)
- Legacy PUD (US 64 Residential)

Future Roadway Improvements

Based on coordination with the Town and NCDOT, it was determined that there were no future roadway improvements to consider with this study.

Trip Generation

Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE *Trip Generation Manual*, 10th Edition. Refer to Table 1, on the following page, for a summary of the proposed site trip generation for full buildout of the proposed development.

Table 1: Trip Generation Summary

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)			Weekday PM Peak Hour Trips (vph)		
			Enter	Exit	Total	Enter	Exit	Total
Single-Family Home (210)	59 DU	640	12	35	47	38	23	61
Multi-Family Home (Low-Rise) (220)	95 DU	588	9	31	40	31	19	50
Shopping Center (820)	25 KSF	944	15	9	24	45	50	95
Total Trips		**2,172**	**36**	**75**	**111**	**114**	**92**	**206**
Internal Capture (2% AM, 11 %PM)			*0*	*-2*	*-2*	*-11*	*-12*	*-23*
Total External Trips			**36**	**73**	**109**	**103**	**80**	**183**
Pass-By Trips (Shopping Center: 34% PM):			-	-	-	*-14*	*-14*	*-28*
Total Primary Trips			**33**	**73**	**109**	**89**	**66**	**155**

It is estimated that the proposed development will generate approximately 2,172 site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 109 primary trips (33 entering and 73 exiting) will occur during the weekday AM peak hour and 155 primary trips (89 entering and 66 exiting) will occur during the weekday PM peak hour.

Trip Distribution and Assignment

Site trips are distributed based on the locations of existing traffic patterns, population centers adjacent to the study area, and engineering judgment. A summary of the overall distributions is below.

Residential:

- 75% to/from the east via US 64
- 20 % to/from the west via US 64
- 5% to/from the east via Chanticlair Drive

Commercial:

- 65% to/from the east via US 64
- 30 % to/from the west via US 64
- 5% to/from the east via Chanticlair Drive

Refer to the attached site trip distribution figures.

Analysis Scenarios

All capacity analyses will be performed utilizing Synchro (Version 10.3). All study intersections will be analyzed during the weekday AM and PM peak hours under the following proposed traffic scenarios:

- 2022 Existing Traffic Conditions
- 2026 No-Build Traffic Conditions
- 2026 Build Traffic Conditions

Report

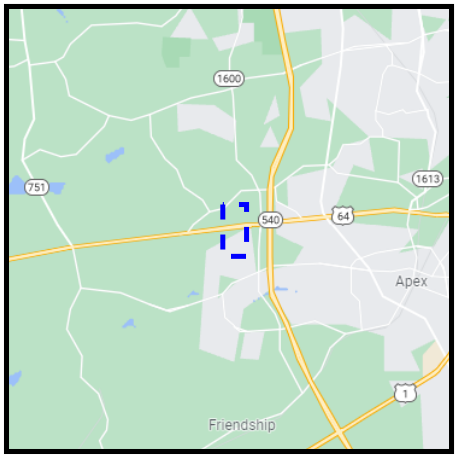
The TIA report will be prepared based on the Town and NCDOT requirements.

If you find this memorandum of understanding acceptable, please let me know so that we may include it in the TIA report. If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,
Ramey Kemp Associates,

Nate Bouquin P.E., PTOE
Traffic Engineering Project Manager

Attachments: Site Location Map
Site Plan
Proposed Site Trip Distribution Figures
NCHRP Internal Capture Reports



N

LEGEND

- Proposed Site Location
- Study Intersection
- Study Area

RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Site Location Map Scale: Not to Scale

PEAK Engineering & Design
1725 Apex Parkway, Apex, NC 27502
ph. 919.439.0150
www.PeakEngineering.com
NC License #P-0673

project:
YELLOWBRIDGE CAPITAL
2817 US 64 HWY W
WHITE OAK TOWNSHIP
APEX, NORTH CAROLINA 27502

seal:
NORTH CAROLINA PRELIMINARY NOT FOR CONSTRUCTION

title:
OVERALL SKETCH PLAN

proj #: 210701
date: *JULY 21, 2021*
dwg by: FS chkd by: JR
scale: As Noted
sheet: *SP-6*
(SKETCH PLAN)

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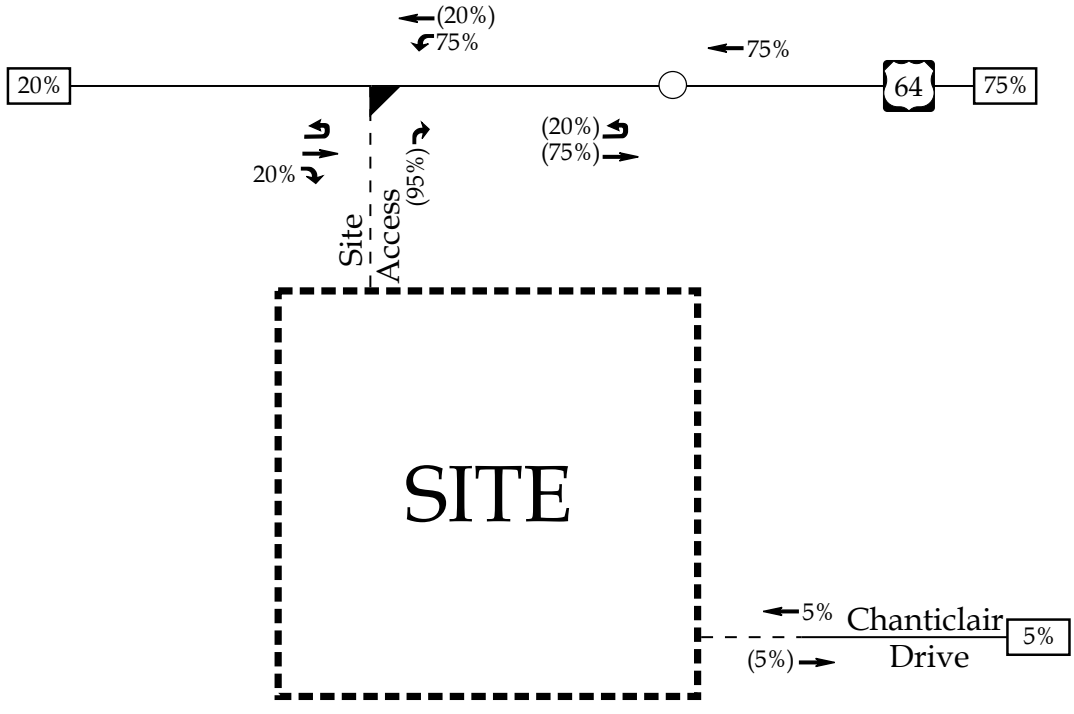
LEGEND

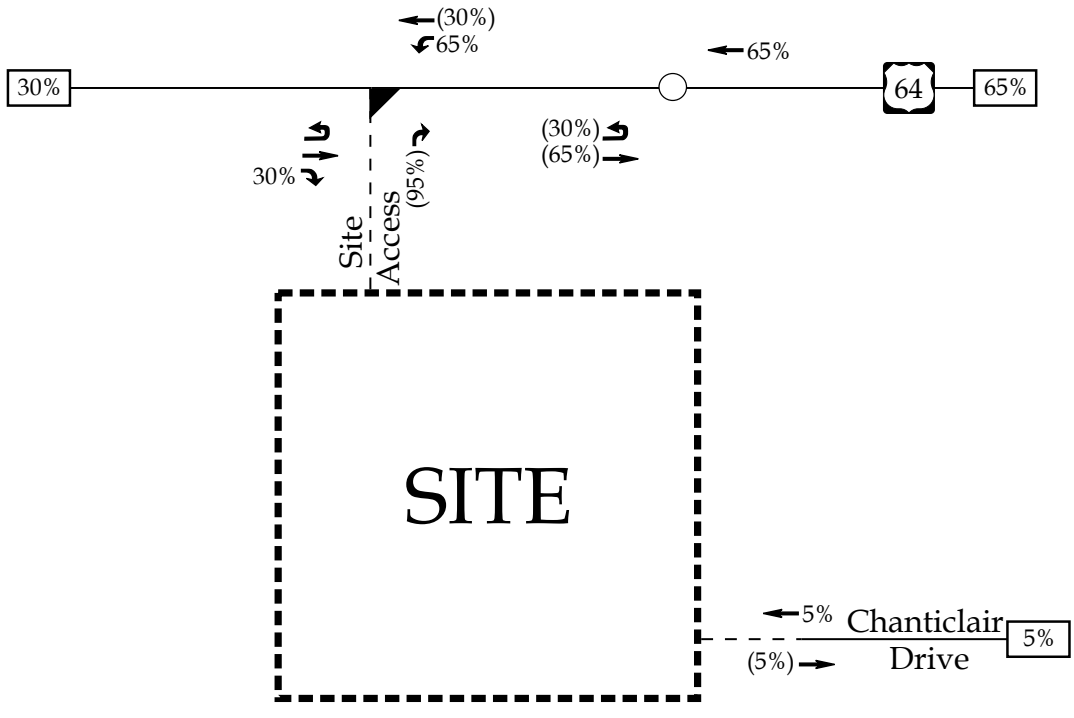
- Unsignalized Intersection
- Left-Over Intersection
- X% → Entering Trip Distribution
- (Y%) → Exiting Trip Distribution
- XX% Regional Trip Distribution



RKA RAMEY KEMP ASSOCIATES	Yellow Bridge Residential Apex, NC	Proposed Residential Site Trip Distribution Scale: Not to Scale

LEGEND

- ○ Unsignalized Intersection
- ◤ Left-Over Intersection
- X% → Entering Trip Distribution
- (Y%) → Exiting Trip Distribution
- XX% Regional Trip Distribution



RKA
RAMEY KEMP ASSOCIATES

Yellow Bridge Residential
Apex, NC

Proposed Commercial
Site Trip Distribution

Scale: Not to Scale

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Yellow Bridge Residential	**Organization:**	RKA
Project Location:	Apex, NC	**Performed By:**	TF
Scenario Description:	Full-Build	**Date:**	1/12/2022
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office						
Retail	820	25	KSF		15	9
Restaurant						
Cinema/Entertainment						
Residential	210, 220	59, 83	DU		21	66
Hotel						
All Other Land Uses[2]						
				0	36	75

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses[2]	1.10	0%	0%	1.10	0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	123	40	83
Internal Capture Percentage	2%	3%	1%
External Vehicle-Trips[5]	110	36	74
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	6%	0%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	0%	1%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Yellow Bridge Residential
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.10	0	0	1.10	0	0
Retail	1.10	15	17	1.10	9	10
Restaurant	1.10	0	0	1.10	0	0
Cinema/Entertainment	1.10	0	0	1.10	0	0
Residential	1.10	21	23	1.10	66	73
Hotel	1.10	0	0	1.10	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	3		1	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	1	15	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	1		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	3	0	0		0
Hotel	0	1	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	1	16	17	15	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	23	23	21	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	0	10	10	9	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	72	73	65	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Yellow Bridge Residential	**Organization:**	RKA
Project Location:	Apex, NC	**Performed By:**	TF
Scenario Description:	Full-Build	**Date:**	1/12/2022
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office						
Retail	820	25	KSF		45	50
Restaurant						
Cinema/Entertainment						
Residential	210, 220	59, 83	DU		69	42
Hotel						
All Other Land Uses[2]						
				0	114	92

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses[2]	1.10	0%	0%	1.10	0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail					2500	
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	7	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	5	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	227	126	101
Internal Capture Percentage	11%	10%	12%
External Vehicle-Trips[5]	185	104	81
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	10%	13%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	9%	11%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Yellow Bridge Residential
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.10	0	0	1.10	0	0
Retail	1.10	45	50	1.10	50	55
Restaurant	1.10	0	0	1.10	0	0
Cinema/Entertainment	1.10	0	0	1.10	0	0
Residential	1.10	69	76	1.10	42	46
Hotel	1.10	0	0	1.10	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	1		16	2	7	3
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	19	10	0		1
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	0	0	3	0
Retail	0		0	0	35	0
Restaurant	0	25		0	12	0
Cinema/Entertainment	0	2	0		3	0
Residential	0	5	0	0		0
Hotel	0	1	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	5	45	50	41	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	7	69	76	63	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	7	48	55	44	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	5	41	46	37	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

Tucker Fulle

From: Fenner, Edwin F <effenner@ncdot.gov>
Sent: Tuesday, January 18, 2022 5:45 PM
To: Nate Bouquin; Serge Grebenschikov; Russell Dalton; Brennan, Sean P
Cc: Tucker Fulle; Bunting, Clarence B; Walker, Braden M; Ishak, Doumit Y
Subject: RE: [External] Yellow Bridge Apex - TIA Scope
Attachments: MOU - Yellow Bridge Residential 01.12.22.pdf

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Nate,

The attached MOU looks good to the District.

Edwin Fenner, PE
Assistant District Engineer
Division 5/District 1
Department of Transportation

919-733-3213 office
919-715-5778 fax
effenner@ncdot.gov

4009 District Drive (Physical Address)
Raleigh, NC 27607

1575 Mail Service Center (Mailing Address)
Raleigh, NC 27699-1575

From: Nate Bouquin <nbouquin@rameykemp.com>
Sent: Thursday, January 13, 2022 12:06 AM
To: Serge Grebenschikov <Serge.Grebenschikov@apexnc.org>; Russell Dalton <Russell.Dalton@apexnc.org>; Brennan, Sean P <spbrennan@ncdot.gov>; Fenner, Edwin F <effenner@ncdot.gov>
Cc: Tucker Fulle <tfulle@rameykemp.com>; Bunting, Clarence B <cbunting@ncdot.gov>; Walker, Braden M <bmwalker1@ncdot.gov>; Ishak, Doumit Y <dishak@ncdot.gov>
Subject: [External] Yellow Bridge Apex - TIA Scope

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to Report Spam.

All –

Attached is the MOU for the Yellow Bridge development in Apex. This MOU is based off of the scoping meetings we had with NCDOT and the Town back in late December.

One small note with this – you will notice the trip generation includes retail. The developer is considering non-residential at the northernmost section of the site, along US 64. This hasn't been solidified yet, but we wanted to go ahead and include it in the TIA as it would be more conservative versus assuming all residential.

Please let us know your thoughts on this MOU.

Thanks!

Nate Bouquin, PE, PTOE
Traffic Engineering Project Manager
D 919 987 1301 | M 919 961 4065
RAMEY KEMP ASSOCIATES
TOGETHER WE ARE LIMITLESS

Email correspondence to and from this sender is subject to the N.C. Public Records Law and may be disclosed to third parties.

Tucker Fulle

From: Nate Bouquin
Sent: Thursday, January 13, 2022 10:37 AM
To: Serge Grebenschikov
Cc: Tucker Fulle
Subject: RE: Yellow Bridge Apex - TIA Scope
Attachments: Sweetwater TIA.pdf

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Thanks serge, we will make sure and include these changes.

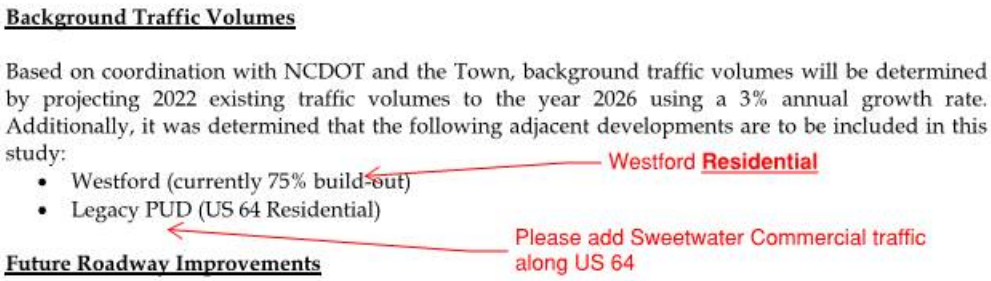
Nate Bouquin, PE, PTOE
Traffic Engineering Project Manager
D 919 987 1301 | M 919 961 4065
rameykemp.com

From: Serge Grebenschikov <Serge.Grebenschikov@apexnc.org>
Sent: Thursday, January 13, 2022 10:01 AM
To: Nate Bouquin <nbouquin@rameykemp.com>
Subject: RE: Yellow Bridge Apex - TIA Scope

Hi Nate,

Looking over the MOU I realized that I did not ask you to include Sweetwater Commercial. I think it would be prudent to do so as they are contributing around 200 vph on US 64, and the commercial phases are in construction today. Apologies for that. I have attached the Sweetwater TIA for reference.

Please see my markups in the screenshot below for Background Development Traffic. These are the only comments that I have.



Thanks

Serge Grebenschikov, PE
Traffic Engineer
Public Works & Transportation – Traffic
73 Hunter Street, 3rd Fl
PO Box 250

Apex, NC 27502
P: (919) 372-7448
E: Serge.Grebenschikov@apexnc.org

From: Nate Bouquin <nbouquin@rameykemp.com>
Sent: Thursday, January 13, 2022 12:06 AM
To: Serge Grebenschikov <Serge.Grebenschikov@apexnc.org>; Russell Dalton <Russell.Dalton@apexnc.org>; Brennan, Sean P <spbrennan@ncdot.gov>; Fenner, Edwin F <effenner@ncdot.gov>
Cc: Tucker Fulle <tfulle@rameykemp.com>; Bunting, Clarence B <cbunting@ncdot.gov>; Walker, Braden M <bmwalker1@ncdot.gov>; Ishak, Doumit Y <dishak@ncdot.gov>
Subject: Yellow Bridge Apex - TIA Scope

Notice: This message is from an external sender.
Do not click links or open attachments unless you trust the sender, and can verify the content is safe.

All –

Attached is the MOU for the Yellow Bridge development in Apex. This MOU is based off of the scoping meetings we had with NCDOT and the Town back in late December.

One small note with this – you will notice the trip generation includes retail. The developer is considering non-residential at the northernmost section of the site, along US 64. This hasn't been solidified yet, but we wanted to go ahead and include it in the TIA as it would be more conservative versus assuming all residential.

Please let us know your thoughts on this MOU.

Thanks!

Nate Bouquin, PE, PTOE
Traffic Engineering Project Manager
D 919 987 1301 | M 919 961 4065
RAMEY KEMP ASSOCIATES
TOGETHER WE ARE LIMITLESS

APPENDIX B

TRAFFIC COUNTS

File Name : Apex(US 64 and Jenks)AM Peak
Site Code :
Start Date : 10/28/2021
Page No : 1

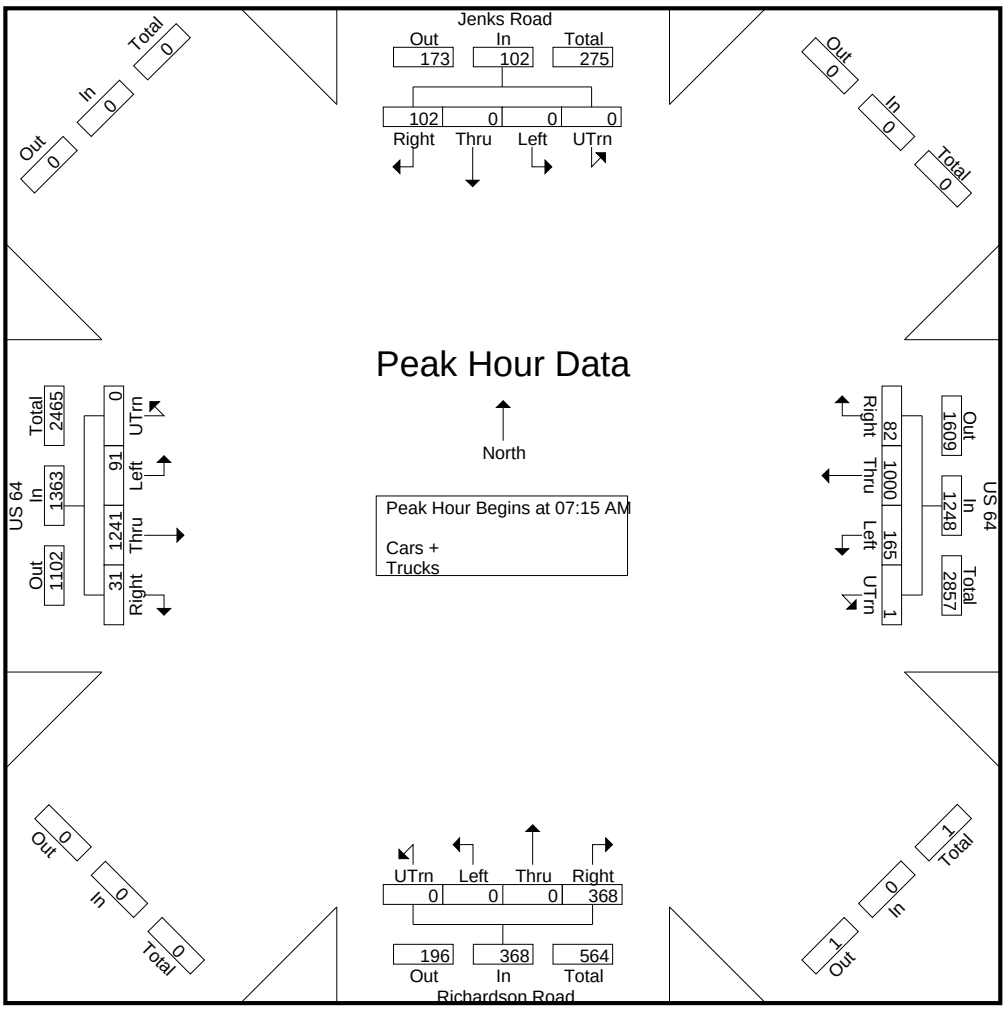
Groups Printed- Cars + - Trucks

	Jenks Road Southbound					US 64 Westbound					Richardson Road Northbound					US 64 Eastbound					
Start Time	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Int. Total
07:00 AM	19	0	0	0	19	19	225	33	0	277	74	0	0	0	74	4	253	15	0	272	642
07:15 AM	29	0	0	0	29	21	218	30	0	269	98	0	0	0	98	6	307	26	0	339	735
07:30 AM	22	0	0	0	22	14	253	36	1	304	106	0	0	0	106	6	341	21	0	368	800
07:45 AM	24	0	0	0	24	21	239	46	0	306	84	0	0	0	84	8	289	26	0	323	737
Total	94	0	0	0	94	75	935	145	1	1156	362	0	0	0	362	24	1190	88	0	1302	2914
08:00 AM	27	0	0	0	27	26	290	53	0	369	80	0	0	0	80	11	304	18	0	333	809
08:15 AM	33	0	0	0	33	12	238	47	2	299	71	0	0	0	71	16	276	26	0	318	721
08:30 AM	30	0	0	0	30	18	246	49	0	313	96	0	0	0	96	8	285	20	0	313	752
08:45 AM	29	0	0	0	29	18	267	45	0	330	90	0	0	0	90	7	263	16	0	286	735
Total	119	0	0	0	119	74	1041	194	2	1311	337	0	0	0	337	42	1128	80	0	1250	3017
Grand Total	213	0	0	0	213	149	1976	339	3	2467	699	0	0	0	699	66	2318	168	0	2552	5931
Apprch %	100	0	0	0		6	80.1	13.7	0.1		100	0	0	0		2.6	90.8	6.6	0		
Total %	3.6	0	0	0	3.6	2.5	33.3	5.7	0.1	41.6	11.8	0	0	0	11.8	1.1	39.1	2.8	0	43	
Cars +	211	0	0	0	211	137	1890	328	3	2358	697	0	0	0	697	66	2225	164	0	2455	5721
% Cars +	99.1	0	0	0	99.1	91.9	95.6	96.8	100	95.6	99.7	0	0	0	99.7	100	96	97.6	0	96.2	96.5
Trucks	2	0	0	0	2	12	86	11	0	109	2	0	0	0	2	0	93	4	0	97	210
% Trucks	0.9	0	0	0	0.9	8.1	4.4	3.2	0	4.4	0.3	0	0	0	0.3	0	4	2.4	0	3.8	3.5

TRAFFIC DATA COLLECTION

File Name : Apex(US 64 and Jenks)AM Peak
Site Code :
Start Date : 10/28/2021
Page No : 2

	Jenks Road Southbound					US 64 Westbound					Richardson Road Northbound					US 64 Eastbound					
Start Time	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**29**	0	0	0	**29**	21	218	30	0	269	98	0	0	0	98	6	307	**26**	0	339	735
07:30 AM	22	0	0	0	22	14	253	36	**1**	304	**106**	0	0	0	**106**	6	**341**	21	0	**368**	800
07:45 AM	24	0	0	0	24	21	239	46	0	306	84	0	0	0	84	8	289	26	0	323	737
08:00 AM	27	0	0	0	27	**26**	**290**	**53**	0	**369**	80	0	0	0	80	**11**	304	18	0	333	**809**
Total Volume	102	0	0	0	102	82	1000	165	1	1248	368	0	0	0	368	31	1241	91	0	1363	3081
% App. Total	100	0	0	0		6.6	80.1	13.2	0.1		100	0	0	0		2.3	91	6.7	0		
PHF	.879	.000	.000	.000	.879	.788	.862	.778	.250	.846	.868	.000	.000	.000	.868	.705	.910	.875	.000	.926	.952



TRAFFIC DATA COLLECTION

File Name : Apex(US 64 and Jenks)PM Peak
Site Code :
Start Date : 10/28/2021
Page No : 1

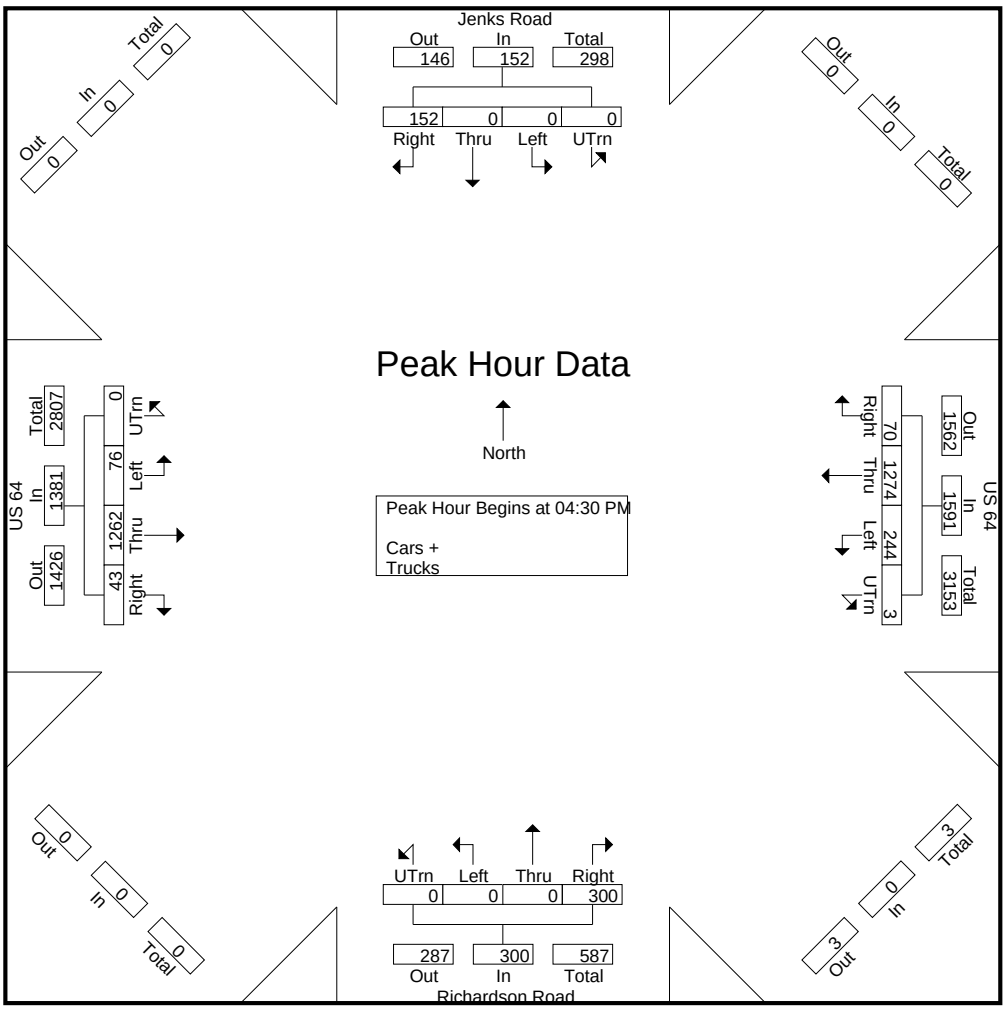
Groups Printed- Cars + - Trucks

	Jenks Road Southbound					US 64 Westbound					Richardson Road Northbound					US 64 Eastbound					
Start Time	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Int. Total
04:00 PM	35	0	0	0	35	12	302	56	0	370	50	0	0	0	50	6	237	18	0	261	716
04:15 PM	36	0	0	0	36	18	341	50	0	409	64	0	0	0	64	12	312	17	0	341	850
04:30 PM	35	0	0	0	35	14	318	62	0	394	75	0	0	0	75	11	292	19	0	322	826
04:45 PM	41	0	0	0	41	19	295	63	2	379	69	0	0	0	69	17	355	16	0	388	877
Total	147	0	0	0	147	63	1256	231	2	1552	258	0	0	0	258	46	1196	70	0	1312	3269
05:00 PM	40	0	0	0	40	19	315	58	1	393	90	0	0	0	90	4	316	17	0	337	860
05:15 PM	36	0	0	0	36	18	346	61	0	425	66	0	0	0	66	11	299	24	0	334	861
05:30 PM	25	0	0	0	25	20	293	61	2	376	57	0	0	0	57	12	271	15	0	298	756
05:45 PM	36	0	0	0	36	13	287	55	0	355	61	0	0	0	61	5	281	15	0	301	753
Total	137	0	0	0	137	70	1241	235	3	1549	274	0	0	0	274	32	1167	71	0	1270	3230
Grand Total	284	0	0	0	284	133	2497	466	5	3101	532	0	0	0	532	78	2363	141	0	2582	6499
Apprch %	100	0	0	0		4.3	80.5	15	0.2		100	0	0	0		3	91.5	5.5	0		
Total %	4.4	0	0	0	4.4	2	38.4	7.2	0.1	47.7	8.2	0	0	0	8.2	1.2	36.4	2.2	0	39.7	
Cars +	282	0	0	0	282	132	2456	465	5	3058	529	0	0	0	529	78	2309	141	0	2528	6397
% Cars +	99.3	0	0	0	99.3	99.2	98.4	99.8	100	98.6	99.4	0	0	0	99.4	100	97.7	100	0	97.9	98.4
Trucks	2	0	0	0	2	1	41	1	0	43	3	0	0	0	3	0	54	0	0	54	102
% Trucks	0.7	0	0	0	0.7	0.8	1.6	0.2	0	1.4	0.6	0	0	0	0.6	0	2.3	0	0	2.1	1.6

TRAFFIC DATA COLLECTION

File Name : Apex(US 64 and Jenks)PM Peak
Site Code :
Start Date : 10/28/2021
Page No : 2

	Jenks Road Southbound					US 64 Westbound					Richardson Road Northbound					US 64 Eastbound					
Start Time	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	35	0	0	0	35	14	318	62	0	394	75	0	0	0	75	11	292	19	0	322	826
04:45 PM	**41**	0	0	0	**41**	**19**	295	**63**	**2**	379	69	0	0	0	69	**17**	**355**	16	0	**388**	**877**
05:00 PM	40	0	0	0	40	19	315	58	1	393	**90**	0	0	0	**90**	4	316	17	0	337	860
05:15 PM	36	0	0	0	36	18	**346**	61	0	**425**	66	0	0	0	66	11	299	**24**	0	334	861
Total Volume	152	0	0	0	152	70	1274	244	3	1591	300	0	0	0	300	43	1262	76	0	1381	3424
% App. Total	100	0	0	0		4.4	80.1	15.3	0.2		100	0	0	0		3.1	91.4	5.5	0		
PHF	.927	.000	.000	.000	.927	.921	.921	.968	.375	.936	.833	.000	.000	.000	.833	.632	.889	.792	.000	.890	.976



RAMEY KEMP ASSOCIATES
5808 Faringdon Place
Suite 100
Raleigh, NC 27609
PH: 919-872-5115

File Name : US 64 and U-Turn Location
Site Code : 00000001
Start Date : 1/11/2022
Page No : 1

Groups Printed- Cars - TRKS - Semis

	From North					US 64 From East					From South					US 64 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turns	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turns	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
07:15 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	7	7	8
08:00 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	2	3
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	8	8	9
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	1	1	3
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:30 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	5	5	6
04:45 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	4	4	5
Total	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	11	11	15
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
05:15 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	5	5	6
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3
05:45 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	3	3	5
Total	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	13	13	16
Grand Total	0	0	0	0	0	0	0	0	9	9	0	0	0	0	0	0	0	0	39	39	48
Apprch %	0	0	0	0		0	0	0	100		0	0	0	0		0	0	0	100		
Total %	0	0	0	0	0	0	0	0	18.8	18.8	0	0	0	0	0	0	0	0	81.2	81.2	
Cars	0	0	0	0	0	0	0	0	9	9	0	0	0	0	0	0	0	0	34	34	43
% Cars	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	87.2	87.2	89.6
TRKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5
% TRKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.8	12.8	10.4
Semis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Semis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

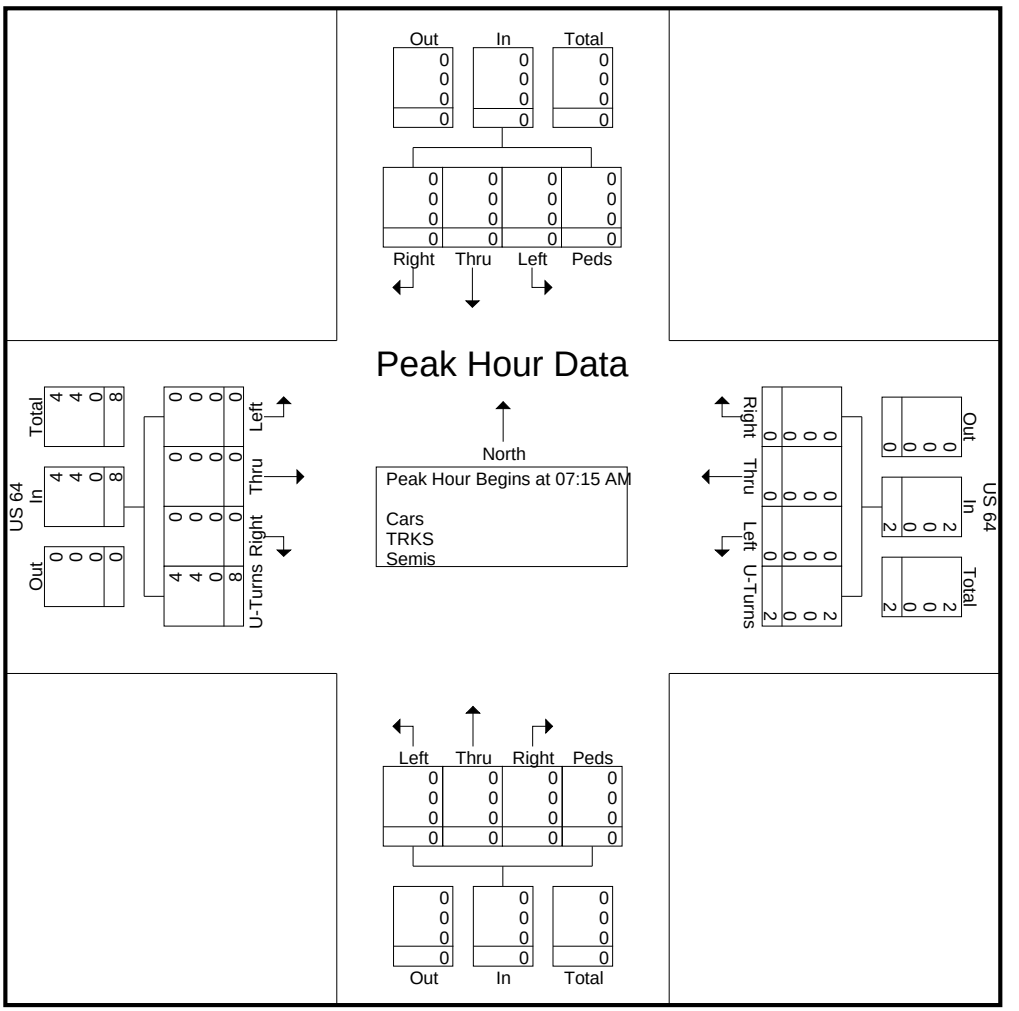
RAMEY KEMP ASSOCIATES
5808 Faringdon Place
Suite 100
Raleigh, NC 27609
PH: 919-872-5115

File Name : US 64 and U-Turn Location
Site Code : 00000001
Start Date : 1/11/2022
Page No : 2

	From North					US 64 From East					From South					US 64 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turns	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
08:00 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	2	3
Total Volume	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	8	8	10
% App. Total	0	0	0	0		0	0	0	100		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.500	.500	.000	.000	.000	.000	.000	.000	.000	.000	.400	.400	.500
Cars	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	4	4	6
% Cars	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	50.0	50.0	60.0
TRKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4
% TRKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50.0	50.0	40.0
Semis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Semis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RAMEY KEMP ASSOCIATES
5808 Faringdon Place
Suite 100
Raleigh, NC 27609
PH: 919-872-5115

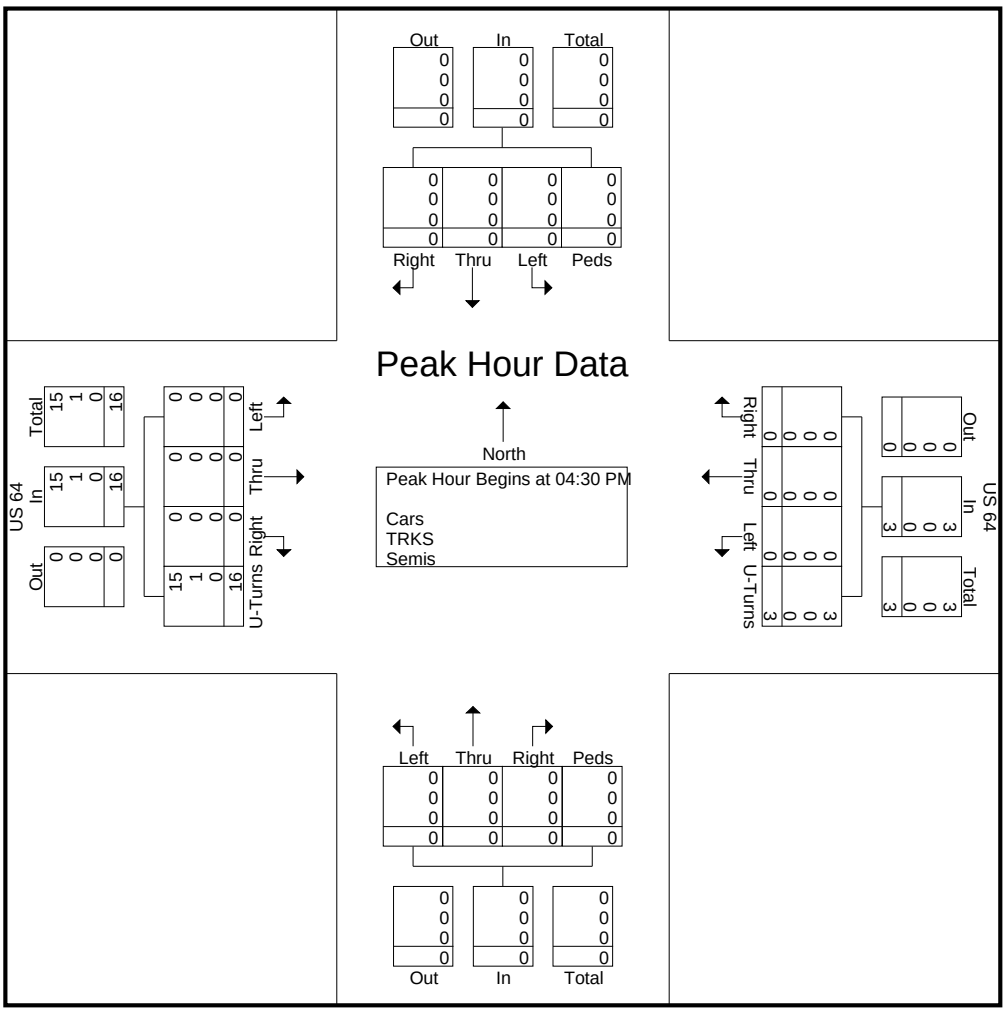
File Name : US 64 and U-Turn Location
Site Code : 00000001
Start Date : 1/11/2022
Page No : 3



RAMEY KEMP ASSOCIATES
5808 Faringdon Place
Suite 100
Raleigh, NC 27609
PH: 919-872-5115

File Name : US 64 and U-Turn Location
Site Code : 00000001
Start Date : 1/11/2022
Page No : 4

	From North					US 64 From East					From South					US 64 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turns	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turns	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	5	5	6
04:45 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	4	4	5
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
05:15 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	5	5	6
Total Volume	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	16	16	19
% App. Total	0	0	0	0		0	0	0	100		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.750	.750	.000	.000	.000	.000	.000	.000	.000	.000	.800	.800	.792
Cars	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	15	15	18
% Cars	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	93.8	93.8	94.7
TRKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
% TRKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.3	6.3	5.3
Semis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Semis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



APPENDIX C

ADJACENT DEVELOPMENT INFORMATION

Traffic Impact Analysis

for

Westford

Apex, North Carolina

Prepared for:

The Halle Companies

Apex, North Carolina

Prepared by:

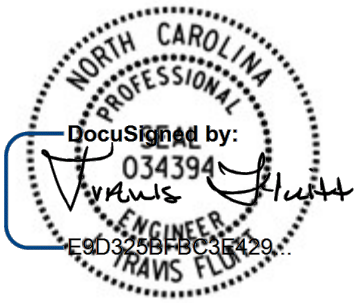
Kimley-Horn and Associates, Inc.

NC License #F-0102

421 Fayetteville Street Suite 600

Raleigh, NC 27601

(919) 677-2000



12/7/2016

December 2016

018995001

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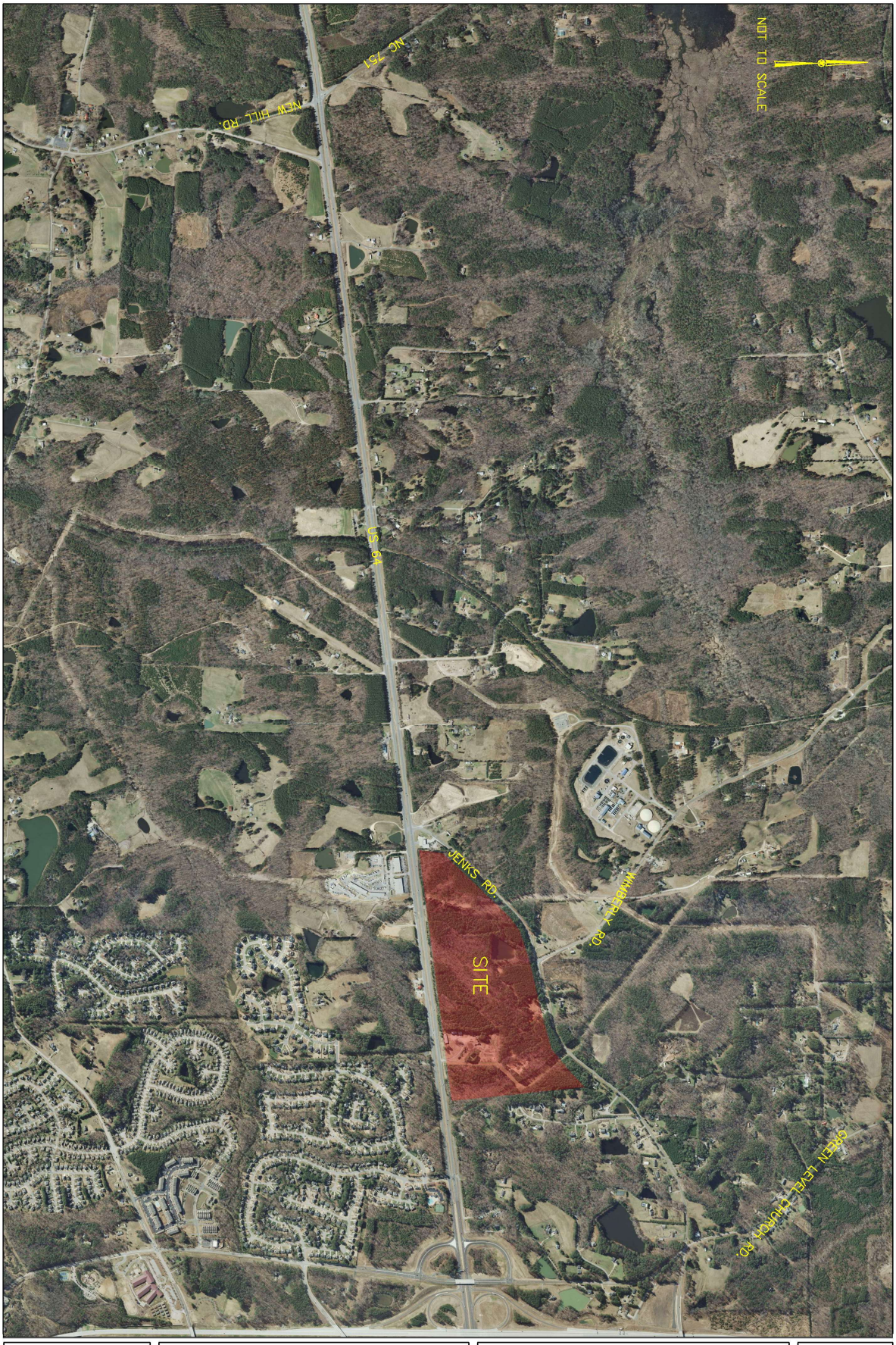

Kimley»Horn	WESTFORD APEX, NC TRAFFIC IMPACT ANALYSIS	SITE LOCATION	FIGURE 1

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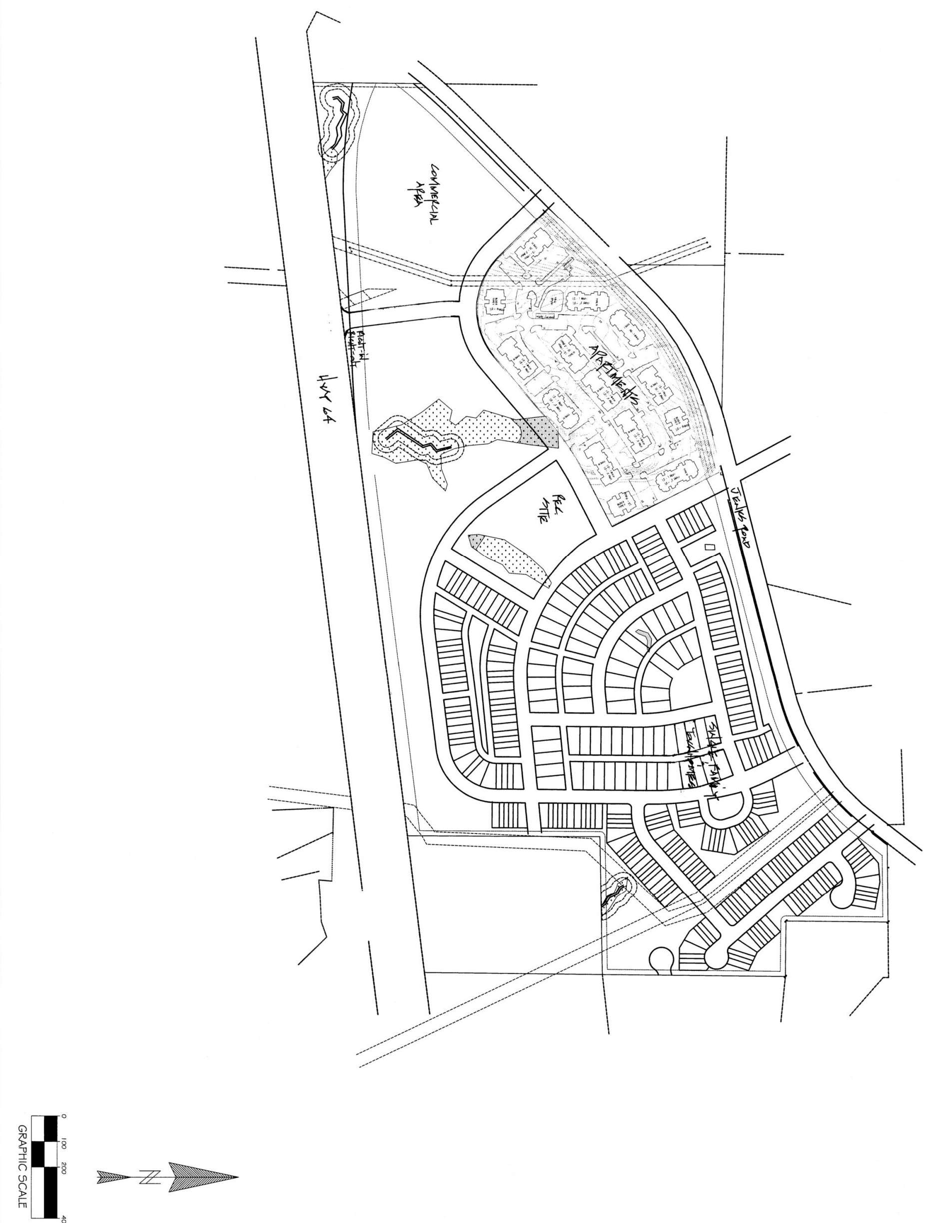

WESTFORD

MASTER SITE PLAN

TOWN OF APEX WAKE COUNTY, NORTH CAROLINA

PRELIMINARY SITE PLAN

SCALE 1"=200' DRAWN PDC

DATE DECEMBER 2, 2016

REVISION

SHEET 1

PROJECT

PRELIMINARY PLAN

221 N. SALEM ST.
SUITE 001
PO BOX 1062
APEX, NC 27502
Office: 919-387-1174
Registration: P-0151
www.jonescnossen.com

Jones & Cnossen ENGINEERING, PLLC

Civil Engineering | Construction Management | Land Planning

Kimley»Horn

WESTFORD
APEX, NC
TRAFFIC IMPACT ANALYSIS

CONCEPTUAL SITE PLAN

FIGURE 2

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.

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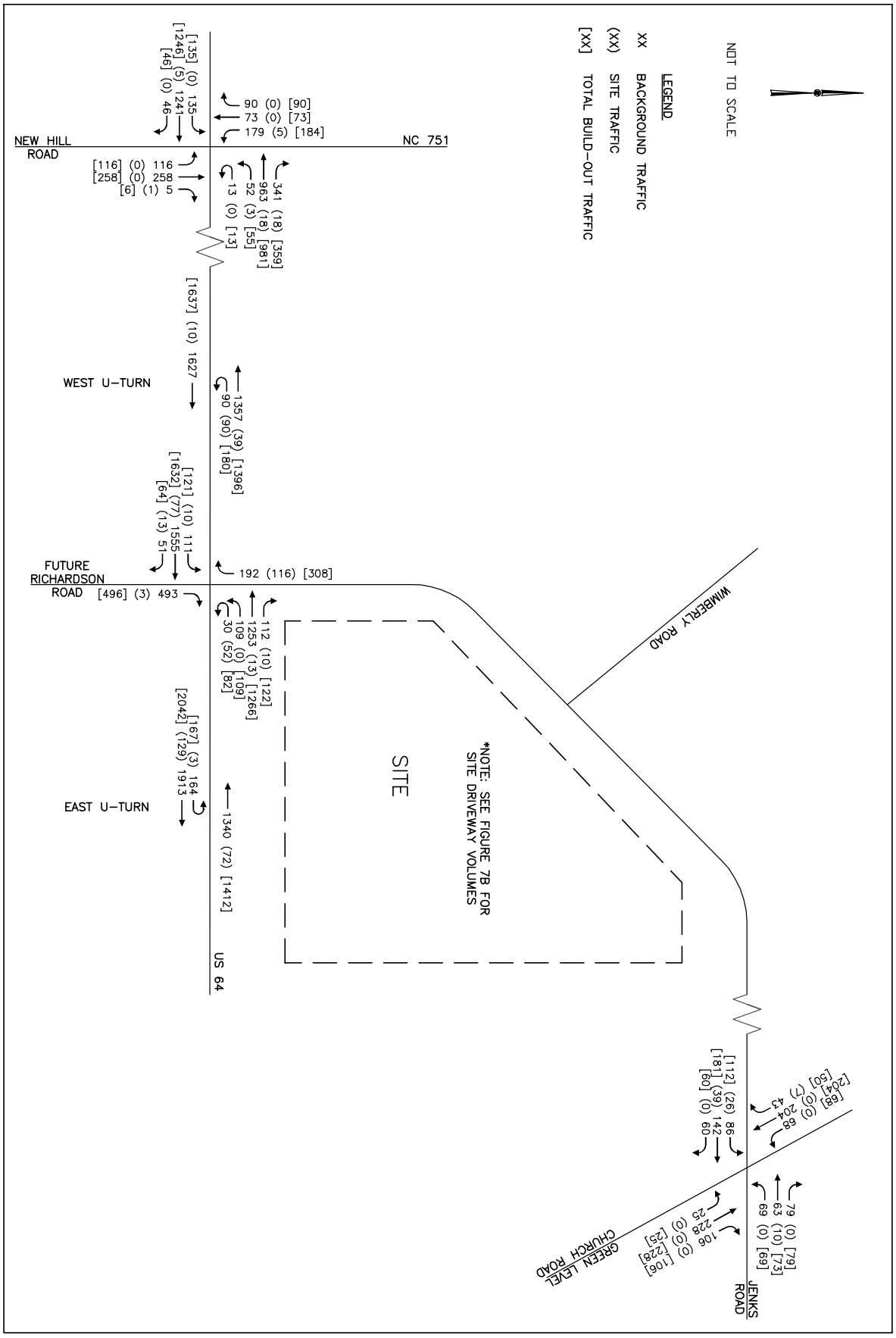

Kimley»Horn	WESTFORD APEX, NC TRAFFIC IMPACT ANALYSIS	PROJECTED (2019) BUILD-OUT AM PEAK HOUR TRAFFIC VOLUMES EXTERNAL INTERSECTIONS	FIGURE 7A

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.

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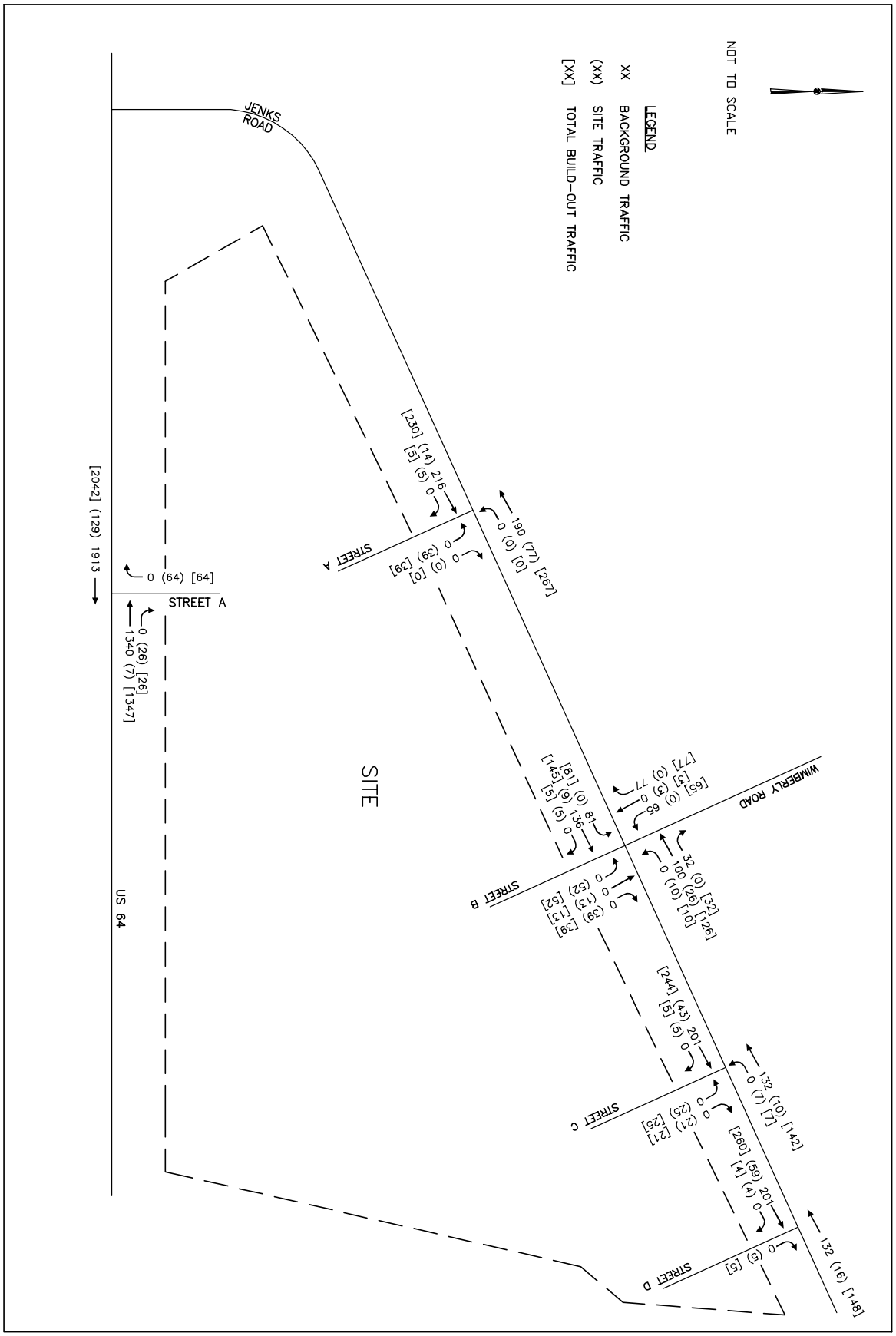

Kimley»Horn	WESTFORD APEX, NC TRAFFIC IMPACT ANALYSIS	PROJECTED (2019) BUILD-OUT AM PEAK HOUR TRAFFIC VOLUMES SITE DRIVEWAYS	FIGURE 7B

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.

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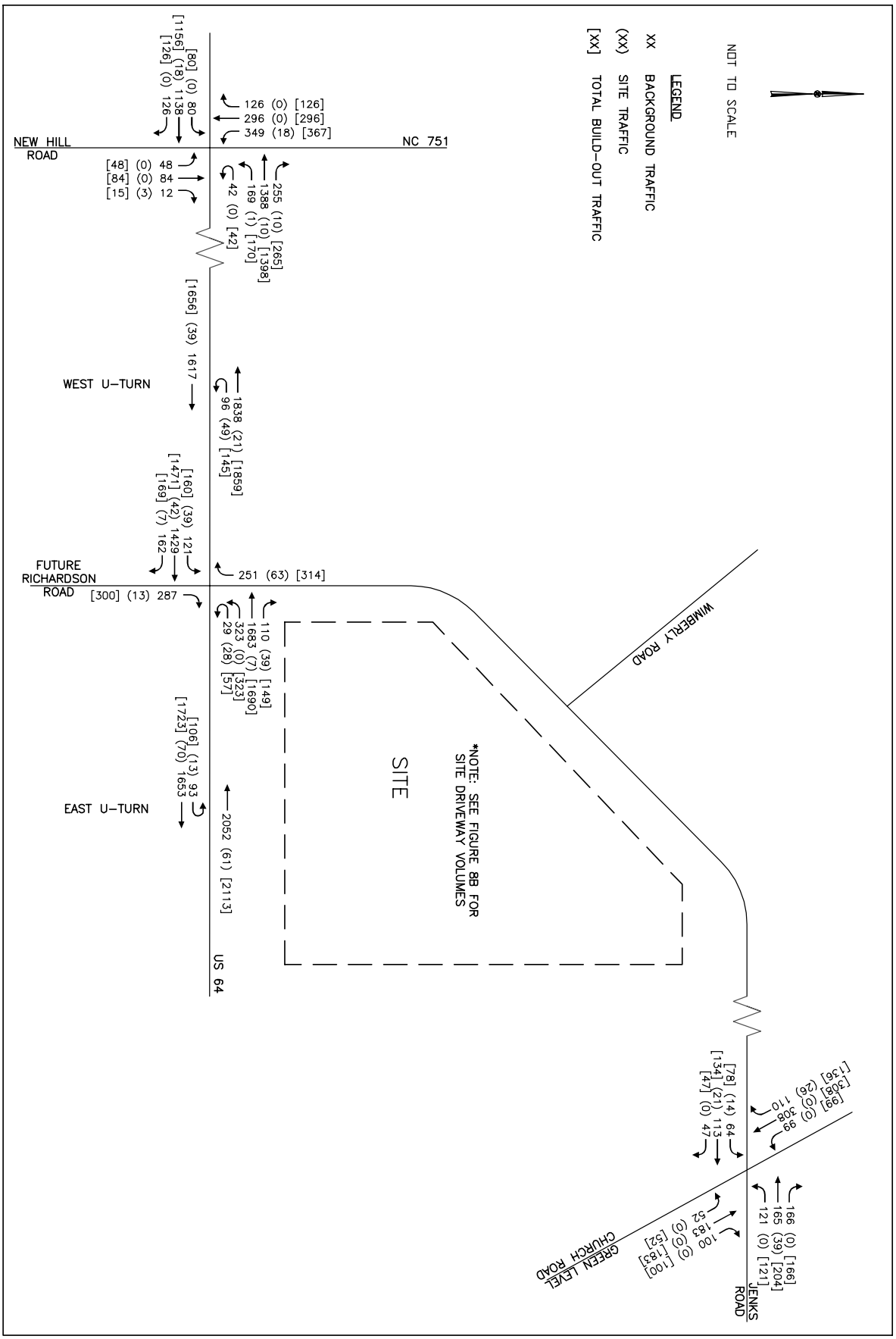

Kimley»Horn	WESTFORD APEX, NC TRAFFIC IMPACT ANALYSIS	PROJECTED (2019) BUILD-OUT PM PEAK HOUR TRAFFIC VOLUMES EXTERNAL INTERSECTIONS	FIGURE 8A

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.

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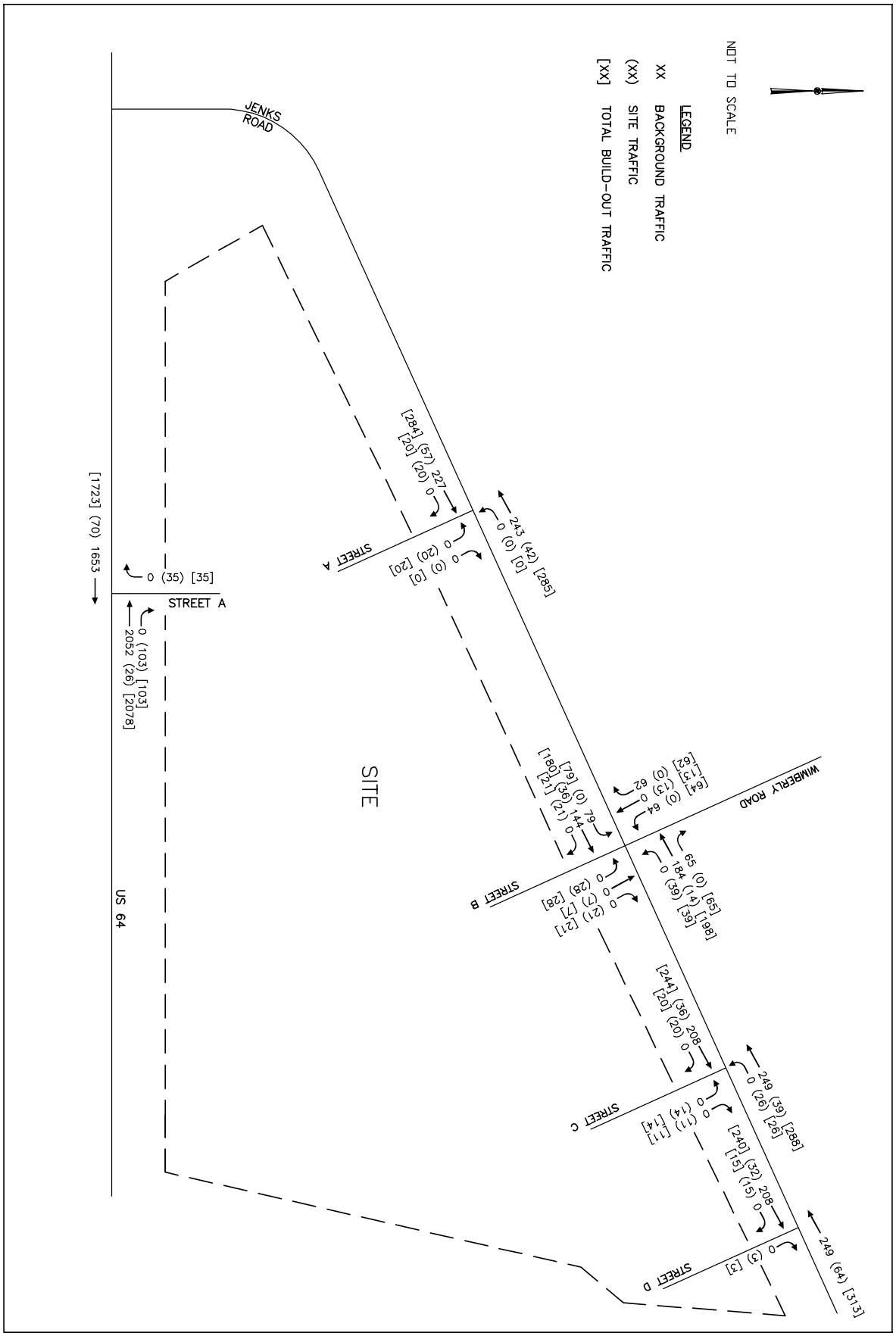

Kimley»Horn	WESTFORD APEX, NC TRAFFIC IMPACT ANALYSIS	PROJECTED (2019) BUILD–OUT PM PEAK HOUR TRAFFIC VOLUMES SITE DRIVEWAYS	FIGURE 8B

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY–HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY–HORN AND ASSOCIATES, INC.

7.0 Recommendations

The following roadway improvements are committed to be performed by other developments in the area:

US 64 at Jenks Road:

- Convert existing intersection to a superstreet configuration with left turn crossovers and downstream U-Turns (by Sweetwater Phase 1)
- Monitor crossovers for MUTCD traffic signal warrants and install a traffic signal if warrants are met (by Sweetwater Phase 1)
- Construct a single westbound left-turn lane with 300 feet of storage and a single right-turn lane with 100 feet of storage on US 64 (by Sweetwater Phase 1)
- Construct a single eastbound left-turn lane with 300 feet of storage and a single right-turn lane with 50 feet of storage on US 64 (by Sweetwater Phase 1)
- Extend the westbound left-turn lane on US 64 to provide 500 feet of storage (by Smith Farm prior to platting 300 units)
- Extend the eastbound right-turn lane on US 64 to provide 100 feet of storage (by Smith Farm prior to platting of 360 units)
- Construct an additional northbound right-turn lane on Richardson Road with 300 feet of storage (by Smith Farm prior to platting 360 units)

US 64 at West U-turn:

- Construct a single lane U-turn with 250 feet of storage (by Sweetwater Phase 1)
- Monitor for MUTCD traffic signal warrants and install a traffic signal if warrants are met (by Sweetwater Phase 1)

US 64 at East U-turn:

- Construct a single lane U-turn with 250 feet of storage on US 64 (by Sweetwater Phase 1)
- Monitor for MUTCD traffic signal warrants and install a traffic signal if warrants are met (by Sweetwater Phase 1)
- Extend eastbound U-turn lane on US 64 to provide 400 feet of storage (by Smith Farm Phase 1)

Green Level Church Road at Jenks Road:

- Monitor this intersection for MUTCD traffic signal warrants and install a traffic signal if warrants are met (by The Preserve at White Oak Creek)

The following roadway improvements are recommended to be performed to accommodate projected Westford site traffic based on the analysis presented herein:

US 64 at Jenks Road:

- If not already done by others, monitor this intersection for MUTCD traffic signal warrants for the eastbound left-turn, the westbound through and right-turn, and the southbound right-turn movements and install a traffic signal if warrants are met

US 64 at West U-Turn:

- If not already done by others, monitor this intersection for MUTCD traffic signal warrants and install a traffic signal if warrants are met

Jenks Road at Green Level Church Road:

- If not already done by others, monitor this intersection for MUTCD traffic signal warrants and install a traffic signal if warrants are met

Jenks Road at Wimberly Road / Street B:

- Construct an exclusive westbound left-turn lane with a minimum of 50 feet of storage on Jenks Road
- Construct an exclusive eastbound left-turn lane with a minimum of 50 feet of storage on Jenks Road

US 64 at Street A:

- Construct an exclusive westbound right-turn lane with a minimum of 75 feet of storage on US 64

Jenks Road at Street A:

- Construct an exclusive westbound left-turn lane with a minimum of 50 feet of storage on Jenks Road
- Provide separate left- and right-turn lanes on the northbound approach of Street A

Jenks Road at Street C:

- Construct an exclusive westbound left-turn lane with a minimum of 50 feet of storage on Jenks Road

Analysis indicates that with the committed and recommended improvements in place, all of the study intersections are expected to operate at an acceptable level of service. The recommended lane geometry is shown on Figure 9.

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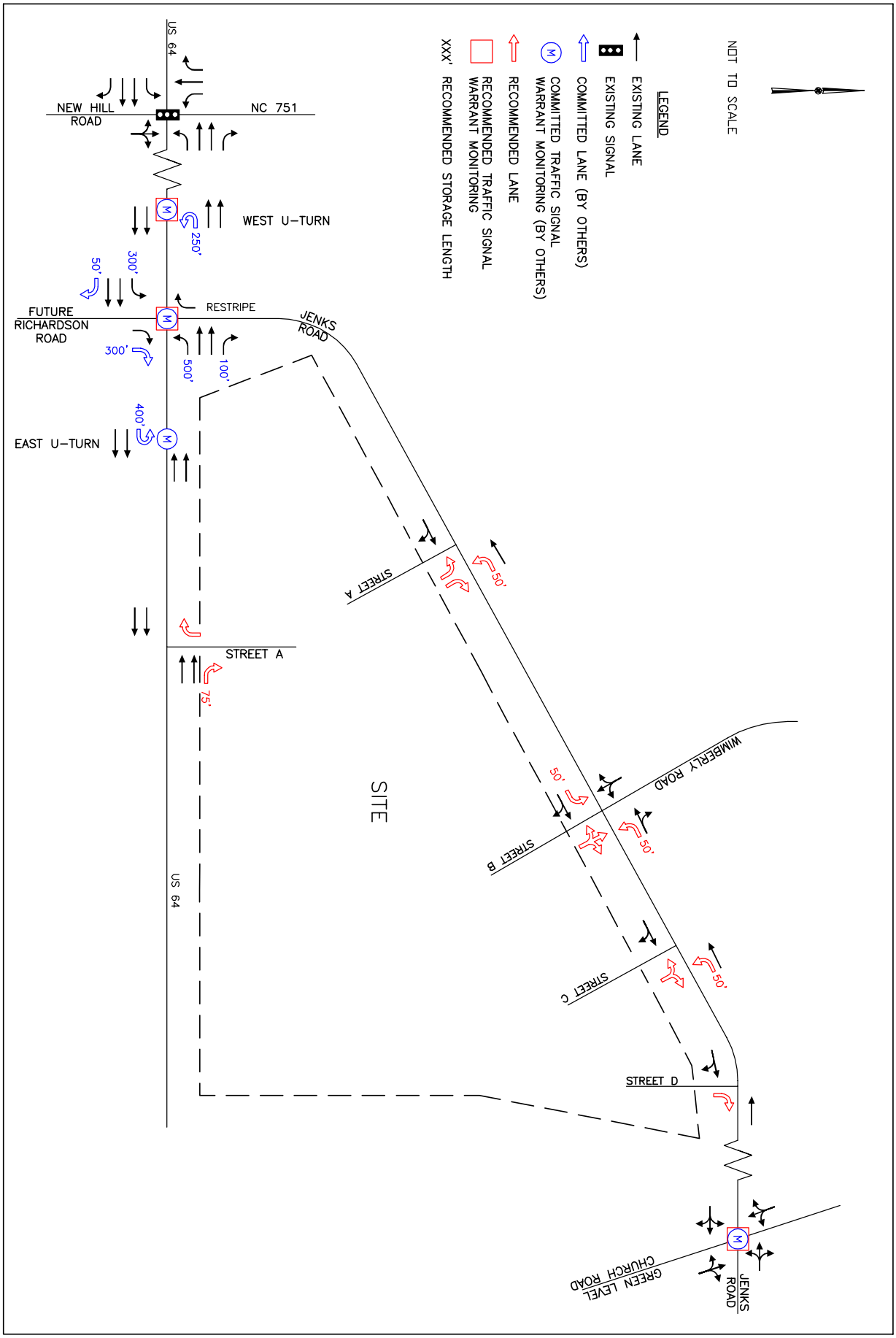

Kimley»Horn	WESTFORD APEX, NC TRAFFIC IMPACT ANALYSIS	RECOMMENDED ROADWAY LANEAGE	FIGURE 9

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KIMLEY-HORN AND ASSOCIATES, INC
NC License #F-0102

MEMORANDUM

To:	Mr. Serge Grebenschikov, P.E., Town of Apex Mr. Russell Dalton, P.E., Town of Apex
From:	Travis Fluitt, P.E., Kimley-Horn and Associates, Inc,
Date:	July 9, 2021
Subject:	US 64 Residential, Apex, NC – Phase 2 TIA Addendum

NORTH CAROLINA PROFESSIONAL SEAL 034394 ENGINEER TRAVIS FLUITT
DocuSigned by:
E9D325B4BC3E429...
7/9/2021

Kimley-Horn has prepared this addendum to the *US 64 Residential TIA* (Kimley-Horn, April 2021) to evaluate the traffic impact of Phase 2 of the proposed development. Per the original TIA, Phase 1 of the development was assumed to include 400 apartment units and to be built-out by 2024. For this analysis, Phase 2 of the development is assumed to include 75 single family homes, a 11,000 square foot (SF) day care center, and a 3,500 SF drive-thru fast-food restaurant. Phase 2 is assumed to be built-out by 2026.

This report presents trip generation, directional distribution, traffic analyses, and recommendations for transportation improvements required to meet anticipated traffic demands in conjunction with build-out of Phase 2 of the proposed development in the 2026 study year.

Study Area

The study area intersections were obtained from the original TIA and were not modified as part of this analysis. Consistent with the original TIA, two site access scenarios were analyzed:

With RI/RO Driveway Scenario

- Proposed access road connection to US 64 opposite Flying Hawk Road
- Existing right-in/right-out (RI/RO) driveway on US 64

Without RI/RO Driveway Scenario

- Proposed access road connection to US 64 opposite Flying Hawk Road

Background Traffic

The projected (2024) background traffic volumes from the original TIA were grown at a 3% annual rate up to the 2026 study year to calculate the projected (2026) background traffic volumes.

Trip Generation and Assignment

Consistent with the original TIA, the trip generation potential of the proposed development was determined using the traffic generation data published in the *ITE Trip Generation Handbook* (Institute of Transportation Engineers, Tenth Edition, 2017). The trip generation is summarized in Table 1.

Table 1 ITE Traffic Generation (Vehicles)								
Land Use Code	Land Use	Intensity		Daily	AM Peak Hour		PM Peak Hour	
				Total	In	Out	In	Out
210	Single Family Housing	75	d.u.	798	15	43	49	28
221	Multifamily Housing (Mid-Rise)	400	d.u.	2,178	35	98	102	66
565	Day Care Center	11,000	s.f.	524	64	57	57	65
934	Fast-Food Restaurant	3,500	s.f.	1,648	72	69	59	55
Subtotal				5,148	186	267	267	214
Internal Capture Reduction				*462*	*17*	*17*	*18*	*18*
Pass-by Capture/Diverted Link Trips				*730*	*28*	*32*	*40*	*39*
Total Net New External Trips				**3,956**	**141**	**218**	**209**	**157**

As shown in Table 1, the development is anticipated to generate approximately 3,956 new external trips on a typical weekday, with 359 new external trips during the AM peak hour and 366 new external trips during the PM peak hour.

Internally captured trips are trips that begin and end on the project site and do not access the external roadway network. ITE Methodology indicates that internal capture between the proposed land uses will represent approximately 7.5% of site trips in both peak hours.

Pass-by trips are trips already on the network that will make a trip to the site as they pass by on the adjacent street. ITE Methodology indicates that approximately 49% of the AM peak hour trips and 50% of the PM peak hour trips associated with the fast-food restaurant will be pass-by trips. ITE Methodology also indicates that up to 50% of the day care trips in the PM peak hour may be diverted link trips. Consistent with previous studies performed in the Town, a diverted link trip percentage of 25% was applied to the PM peak hour day care trips to present a conservative analysis.

The proposed site-generated trips were assigned to the surrounding roadway network. Due to the addition of the commercial traffic, the following overall distribution was used for Phase 2:

- 70% to/from the east on US 64
- 30% to/from the west on US 64

The proposed pass-by trips were assigned to the roadway network based on the directional distribution of background volumes along US 64.

Full trip generation calculations, site-generated trip assignment, and pass-by trip assignment are shown on the intersection spreadsheets attached to this memorandum.

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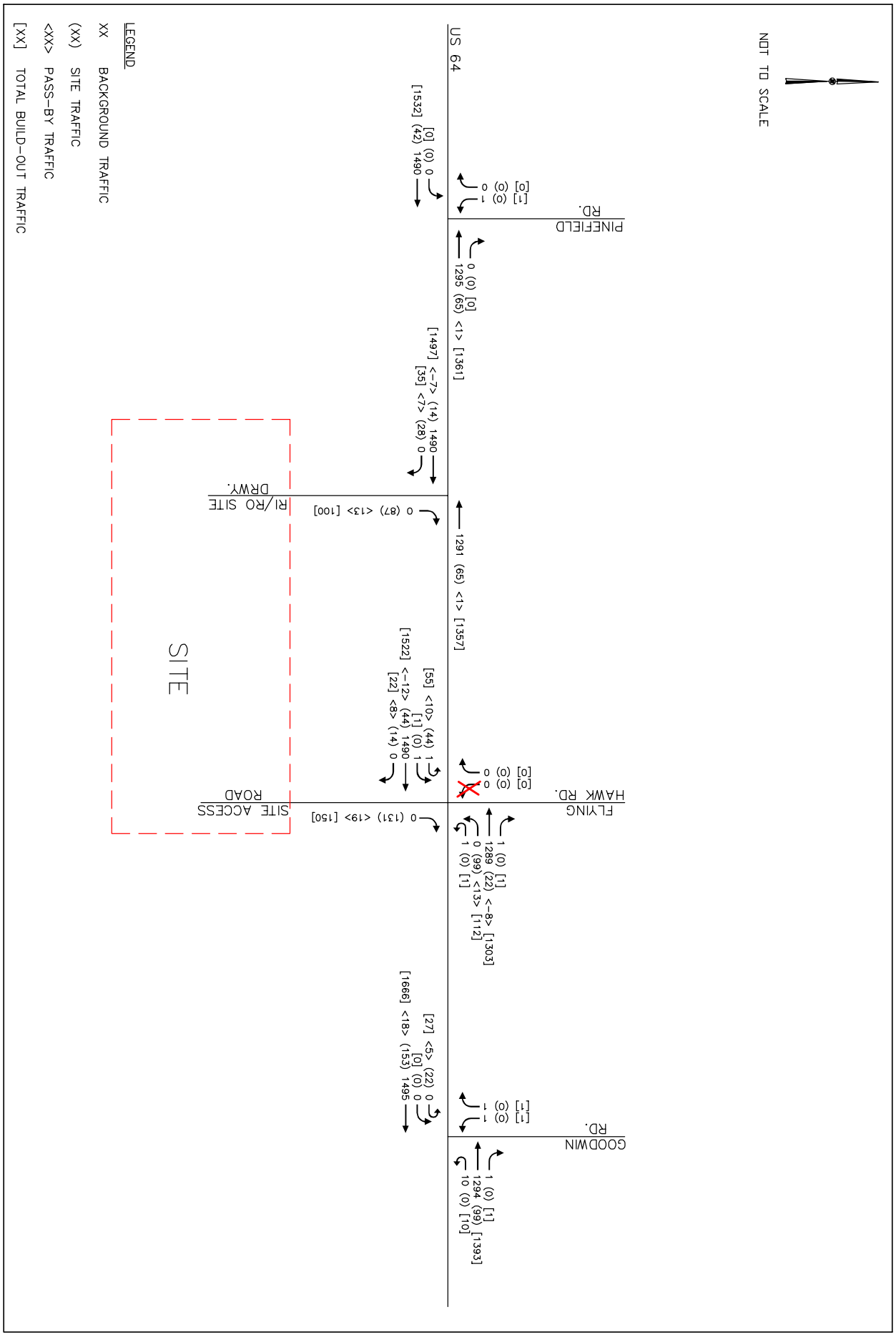

Kimley»Horn	US 64 RESIDENTIAL – PHASE 2 APEX, NC TRAFFIC IMPACT ANALYSIS	PROJECTED (2026) PHASE 2 BUILD–OUT AM PEAK HOUR TRAFFIC VOLUMES – WITH RI/RO DRIVEWAY	FIGURE 1

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PROJECTED (2026) PHASE 2 BUILD-OUT
PM PEAK HOUR TRAFFIC VOLUMES
– WITH RI/RO DRIVEWAY

US 64 RESIDENTIAL – PHASE 2
APEX, NC
TRAFFIC IMPACT ANALYSIS

FIGURE
2

Kimley»Horn

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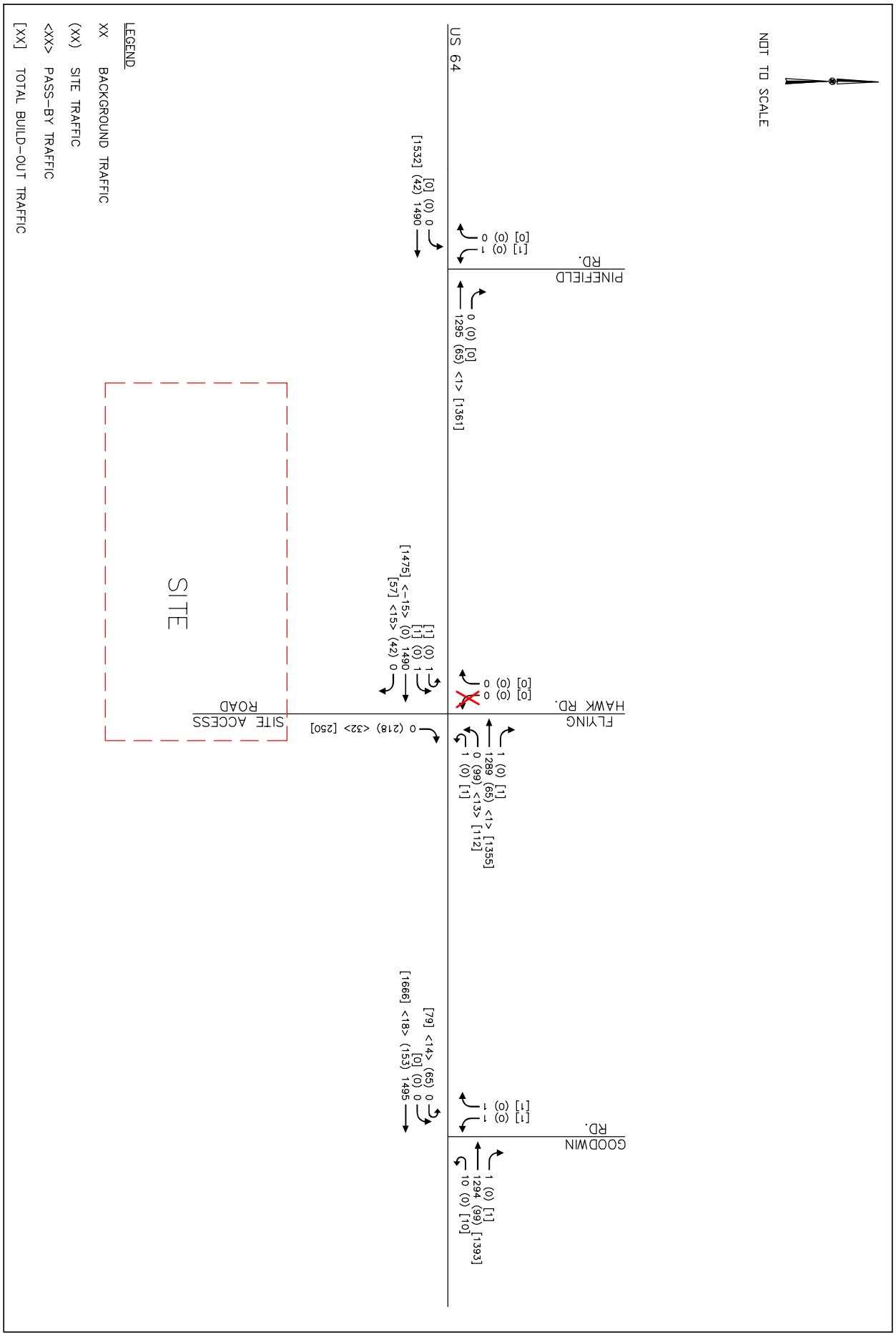

Kimley»Horn	US 64 RESIDENTIAL – PHASE 2 APEX, NC TRAFFIC IMPACT ANALYSIS	PROJECTED (2026) PHASE 2 BUILD–OUT AM PEAK HOUR TRAFFIC VOLUMES – NO RI/RO DRIVEWAY	FIGURE 3

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PROJECTED (2026) PHASE 2 BUILD-OUT
PM PEAK HOUR TRAFFIC VOLUMES
– NO RI/RO DRIVEWAY

US 64 RESIDENTIAL – PHASE 2
APEX, NC
TRAFFIC IMPACT ANALYSIS

FIGURE
4

Kimley»Horn

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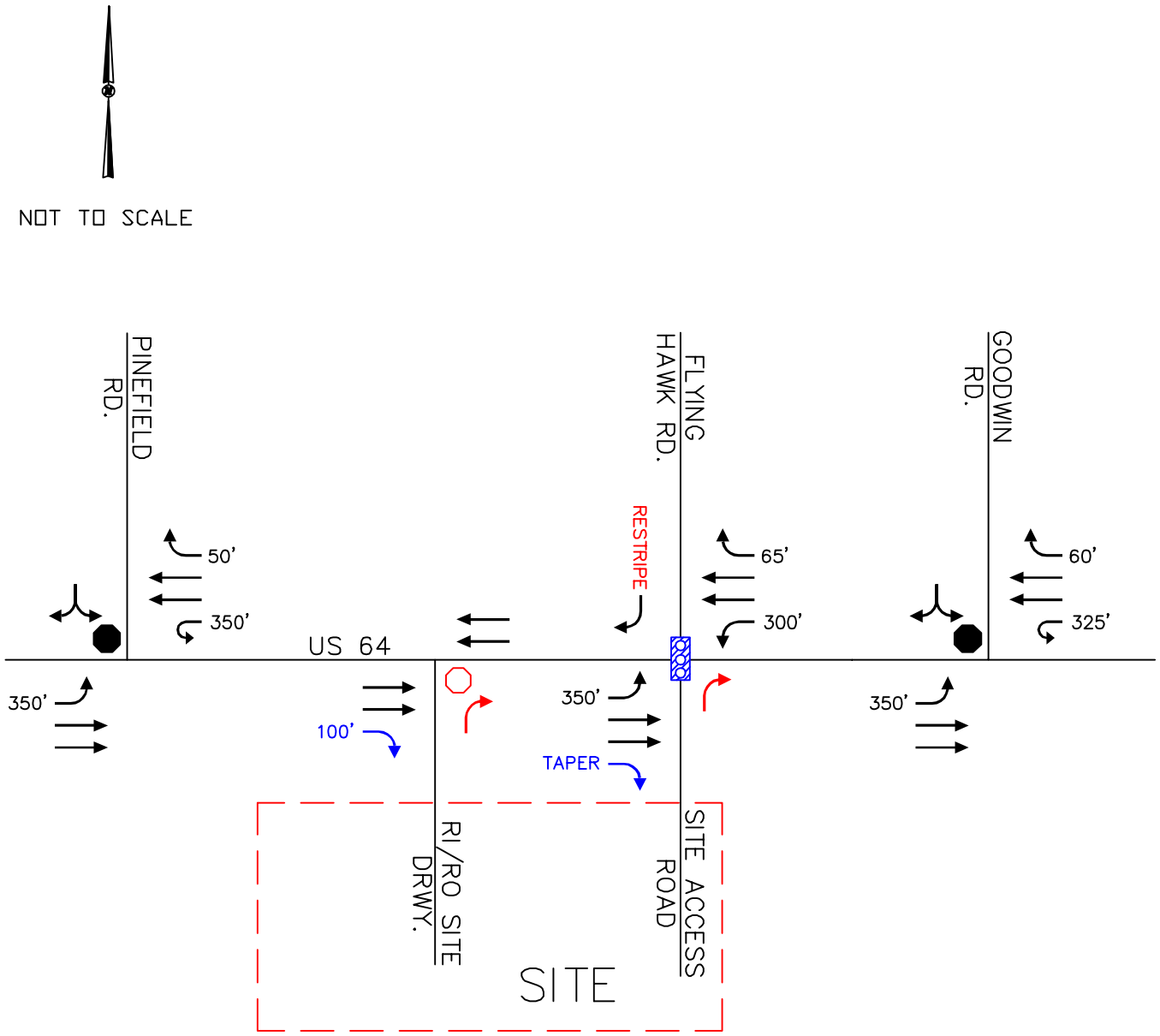

Kimley»Horn	US 64 RESIDENTIAL – PHASE 2 APEX, NC TRAFFIC IMPACT ANALYSIS	RECOMMENDED ROADWAY LANEAGE – WITH RI/RO DRIVEWAY	FIGURE 5

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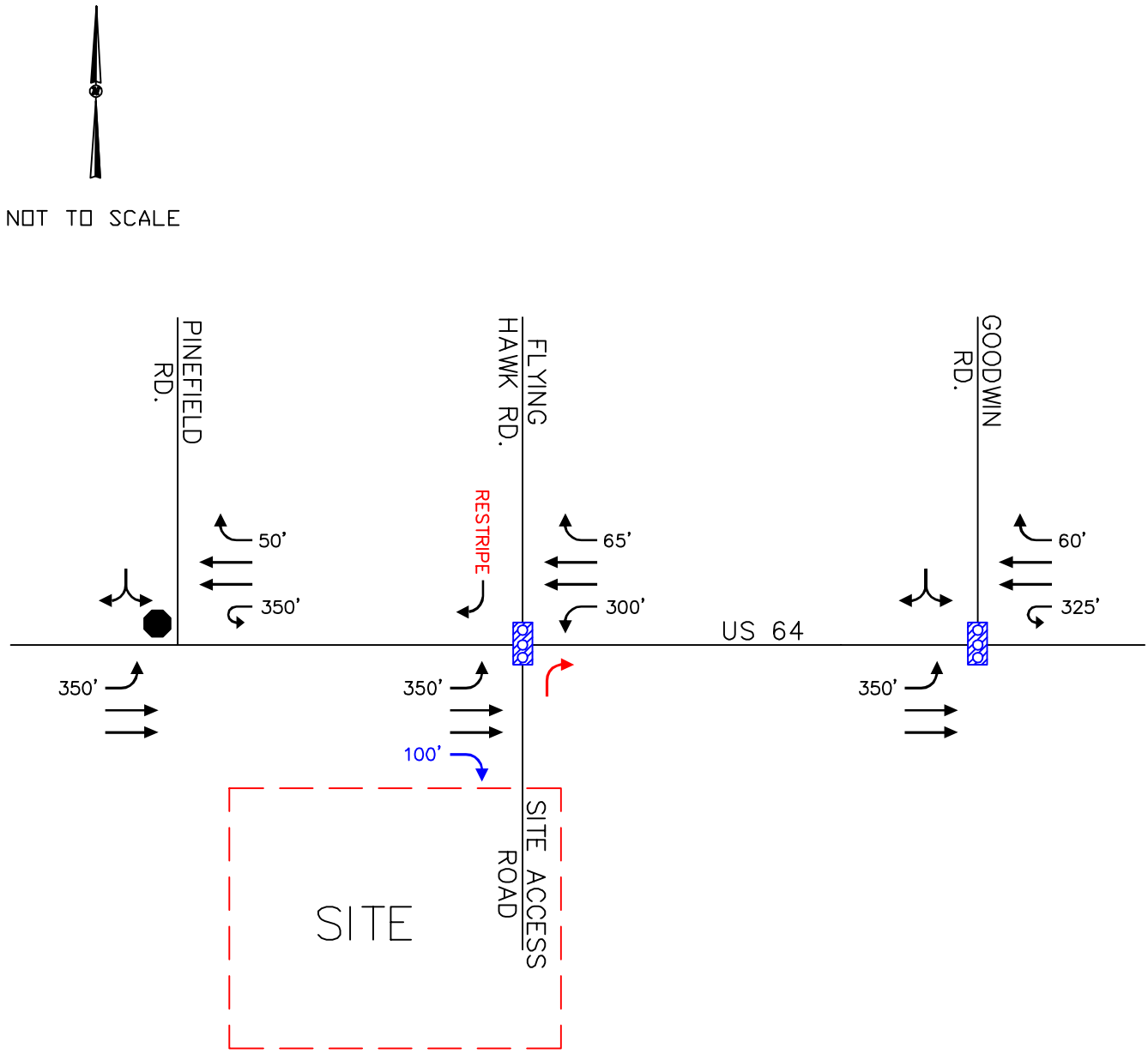

LEGEND

- EXISTING LANE
- EXISTING STOP SIGN
- PHASE 1 RECOMMENDED LANE (FROM ORIGINAL TIA)
- PHASE 2 RECOMMENDED MONITORING FOR SIGNALIZATION
- PHASE 2 RECOMMENDED LANE
- XX' STORAGE LENGTH

Kimley»Horn	US 64 RESIDENTIAL – PHASE 2 APEX, NC TRAFFIC IMPACT ANALYSIS	RECOMMENDED ROADWAY LANEAGE – NO RI/RO DRIVEWAY	FIGURE 6

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Traffic Impact Analysis

For

Sweetwater Development

Located in

Apex, North Carolina

Prepared For:
ExperienceOne Homes, LLC,
P.O. Box 5509
Cary, NC 27512

Prepared By:
Ramey Kemp & Associates, Inc.
5808 Faringdon Place, Suite 100
Raleigh, NC 27609
NC Corporate License # C-0910

December 2014

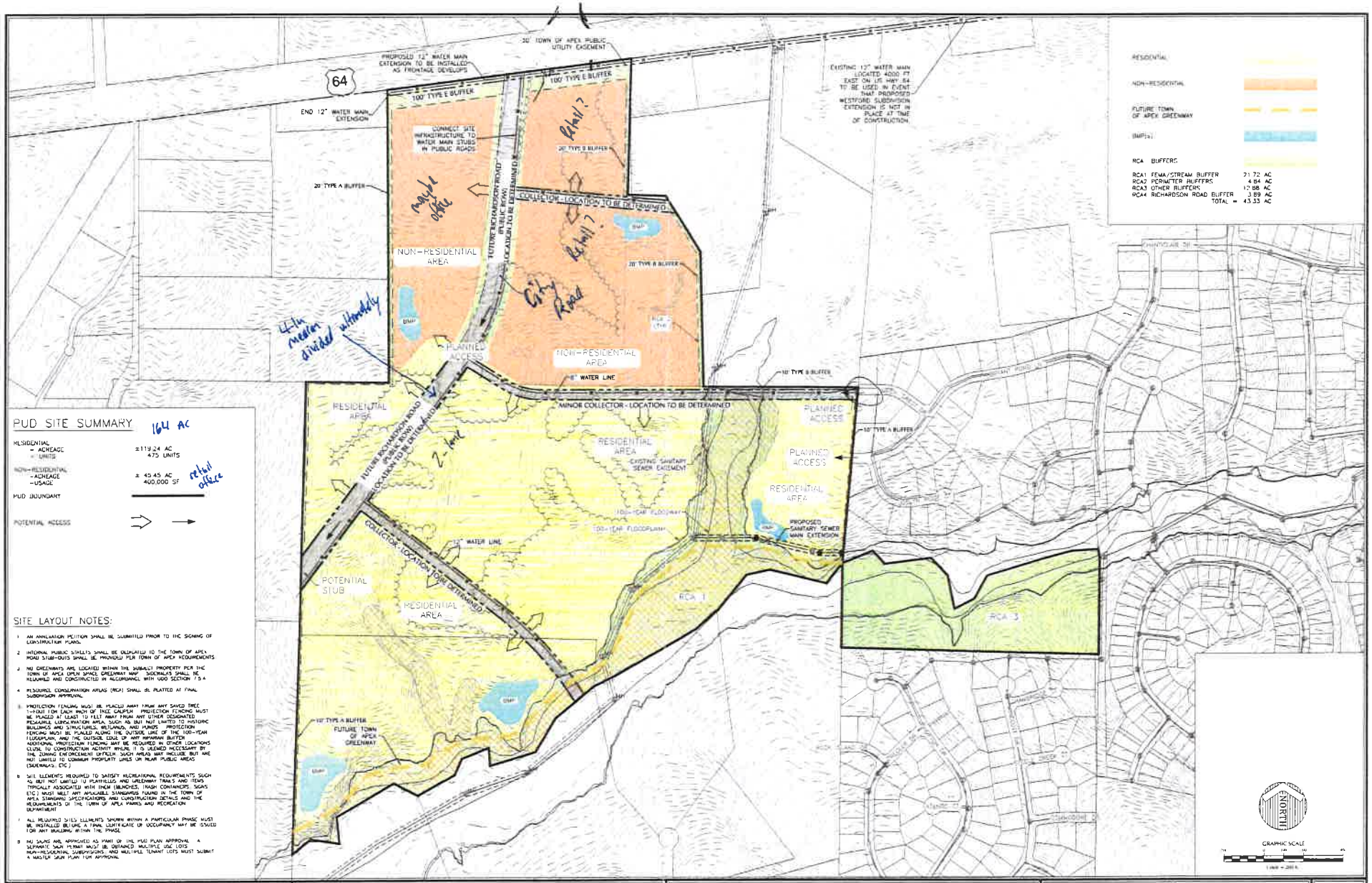
RKA Project #14260

LEGEND

★ Site Location

● Existing Study Intersection

RAMEY KEMP & ASSOCIATES TRANSPORTATION ENGINEERS	Jenks Road Development Apex, North Carolina	Site Location Map Figure 1



PUD SITE SUMMARY

164 AC

RESIDENTIAL	
- ACREAGE	±119.24 AC
- UNITS	475 UNITS
NON-RESIDENTIAL	
- ACREAGE	± 43.45 AC
- USAGE	400,000 SF retail office
PUD BOUNDARY	
POTENTIAL ACCESS	

SITE LAYOUT NOTES:

1. AN ANNEXATION PETITION SHALL BE SUBMITTED PRIOR TO THE SIGNING OF CONSTRUCTION PLANS.
2. INTERNAL PUBLIC STREETS SHALL BE DELIVERED TO THE TOWN OF APEX ROAD STUB-OUTS SHALL BE PROVIDED PER TOWN OF APEX REQUIREMENTS
3. NO GREENWAYS ARE LOCATED WITHIN THE SUBJECT PROPERTY PER THE TOWN OF APEX OPEN SPACE GREENWAY MAP. SIDEWALKS SHALL BE REQUIRED AND CONSTRUCTED IN ACCORDANCE WITH UDO SECTION 7.5.A
4. RESOURCE CONSERVATION AREAS (RCA) SHALL BE PLATTED AT FINAL SUBDIVISION APPROVAL
5. PROTECTION FENCING MUST BE PLACED AWAY FROM ANY SAVED TREE 1-FOOT FOR EACH INCH OF TREE CALIPER. PROTECTION FENCING MUST BE PLACED AT LEAST 10 FEET AWAY FROM ANY OTHER DESIGNATED RESOURCE CONSERVATION AREA SUCH AS BUT NOT LIMITED TO HISTORIC BUILDINGS AND STRUCTURES, WETLANDS, AND PONDS. PROTECTION FENCING MUST BE PLACED ALONG THE OUTSIDE LINE OF THE 100-YEAR FLOODPLAIN, AND THE OUTSIDE EDGE OF ANY RIPARIAN BUFFER. ADDITIONAL PROTECTION FENCING MAY BE REQUIRED IN OTHER LOCATIONS CLOSE TO CONSTRUCTION ACTIVITY WHERE IT IS DEEMED NECESSARY BY THE ZONING ENFORCEMENT OFFICER. SUCH AREAS MAY INCLUDE, BUT ARE NOT LIMITED TO, COMMON PROPERTY LINES OR NEAR PUBLIC AREAS (SIDEWALK, ETC.)
6. SITE ELEMENTS REQUIRED TO SATISFY RECREATIONAL REQUIREMENTS SUCH AS, BUT NOT LIMITED TO, PLAYFIELDS AND GREENWAY TRAILS AND ITEMS TYPICALLY ASSOCIATED WITH THEM (BENCHES, TRASH CONTAINERS, SIGNS ETC.) MUST MEET ANY APPLICABLE STANDARDS FOUND IN THE TOWN OF APEX STANDARD SPECIFICATIONS AND CONSTRUCTION DETAILS AND THE REQUIREMENTS OF THE TOWN OF APEX PARKS AND RECREATION DEPARTMENT
7. ALL REQUIRED SITE ELEMENTS SHOWN WITHIN A PARTICULAR PHASE MUST BE INSTALLED BEFORE A FINAL CERTIFICATE OF OCCUPANCY MAY BE ISSUED FOR ANY BUILDING WITHIN THE PHASE.
8. NO SIGNS ARE APPROVED AS PART OF THE PUD PLAN APPROVAL. A SEPARATE SIGN PERMIT MUST BE OBTAINED. MULTIPLE USE LOTS (NON-RESIDENTIAL SUBDIVISIONS AND MULTIPLE TENANT LOTS) MUST SUBMIT A MASTER SIGN PLAN FOR APPROVAL.

No.	Revision	Date	By
1			
2			
3			
4			
5			

Designed: | Scale: AS NOTED
Drawn By: BRT | Date: 08-2014
Checked By: | Job No.: 02140249

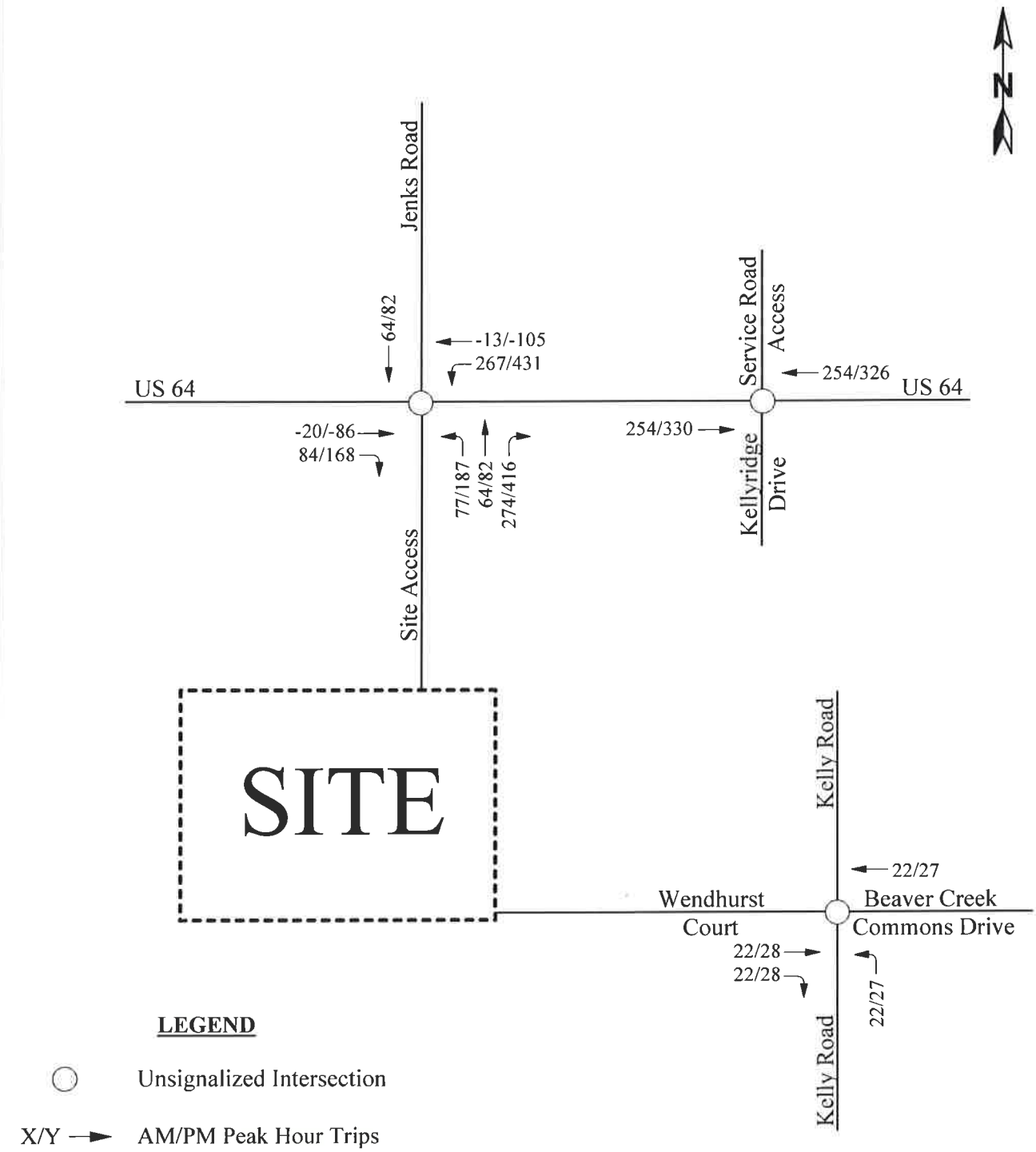
SWEETWATER

APEX | WAKE COUNTY | NORTH CAROLINA

PRELIMINARY LAYOUT PLAN

WITHERS & RAVENEL
ENGINEERS | PLANNERS | SURVEYORS
111 Corporate Drive East, North Carolina 27511 tel 919-469-3340 www.withersravenel.com License No. C-0832

Sheet No. 02



RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Sweetwater Development

Apex, North Carolina

Total Site Trips

Scale: Not to Scale | Figure 12

9. RECOMMENDATIONS

Based on the findings of this study, specific geometric improvements have been identified and are recommended to accommodate future traffic conditions. Improvements that are necessary and recommended to accommodate a residential phase and full site build out generated traffic are identified below. These are improvements recommended for the development. Refer to Figure 14 and Figure 14a for the recommended improvements.

Residential:

US 64 and Jenks Road/Site Access

- Convert the intersection to a superstreet design.
- Convert the southbound approach of Jenks Road to provide a single right turn lane and one inbound lane.
- Construct the Site Access (Jenks Road extension) with one outbound lane and one inbound lane. The outbound lane should be a single right turn lane.
- Install stop signs at the intersections.
- Construct a single westbound left turn lane at the Site Access intersection with a minimum of 275 feet of storage.
- A single eastbound left turn lane is currently provided at the Jenks Road intersection with 250 feet of storage which should be adequate for this phase.
- Construct a U-turn opening on US 64 approximately 800-1,000 feet east of the Site Access. Provide one u-turn lane with a minimum of 150 feet of storage plus appropriate taper.
- Construct a u-turn opening on US 64 approximately 800-1,000 feet west of Jenks Road. Provide one u-turn lane with a minimum of 250 feet of storage and appropriate taper.
- Install a stop sign at the u-turn locations.
- Consider modifying the potential interchange design to accommodate future traffic volumes and require less right-of-way.

Kelly Road and Wendhurst Court/Beaver Creek Commons Drive

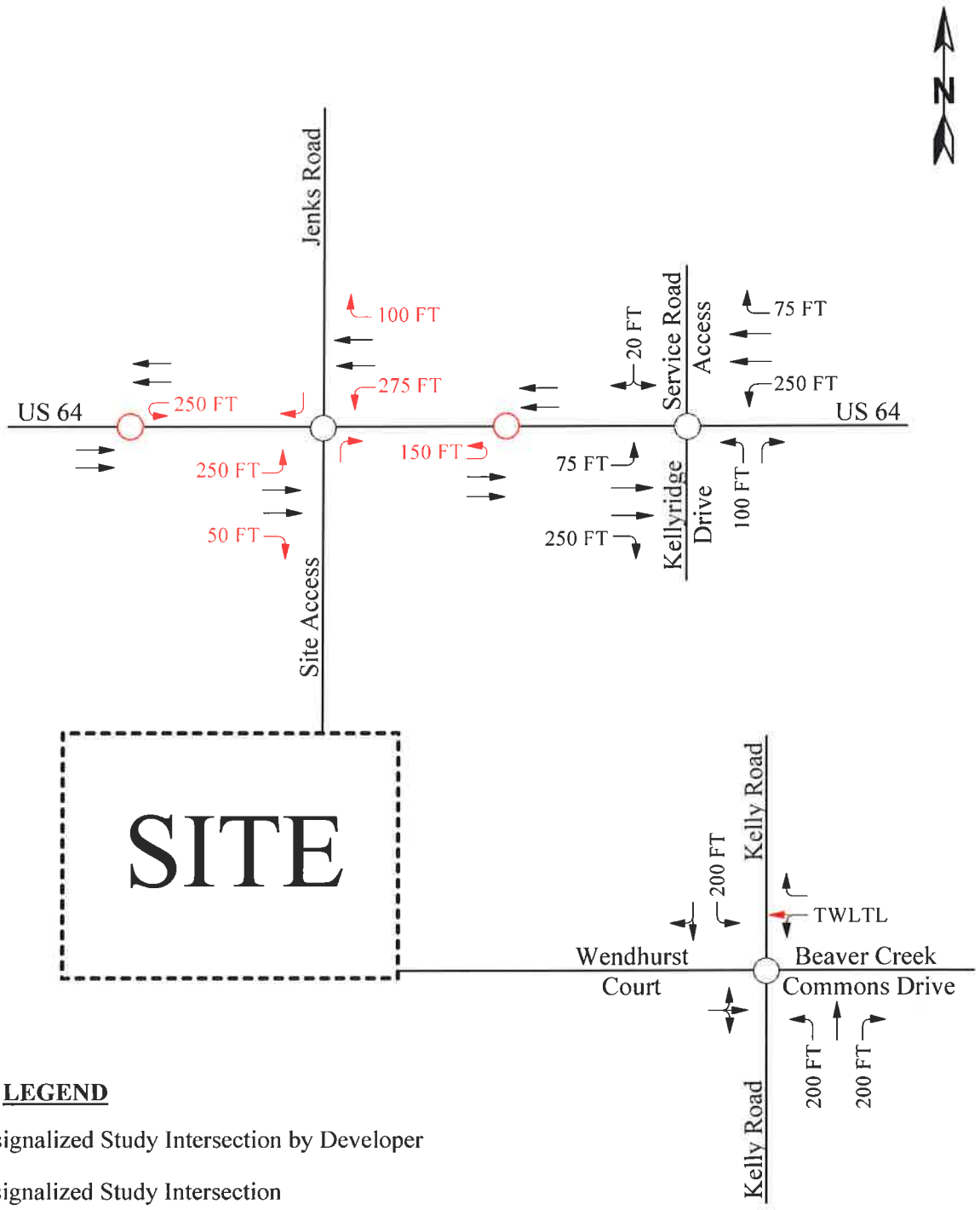
- Provide through movement striping on the westbound leg.

Full Build Out:

The following recommendations do not consider the residential phase and are intended to be considered independently.

US 64 and Jenks Road/Site Access

- Convert the intersection to a superstreet design. It is anticipated this will be required with the initial phase of the development
- Convert the southbound approach of Jenks Road to provide dual right turn lanes and one inbound lane.
- Construct the Site Access (Jenks Road extension) with a minimum of two outbound lanes and one inbound lane. The outbound lanes should be dual right turn lanes.
- Install traffic signals at the intersection when warranted
- Construct dual westbound left turn lanes at the Site Access signal with a minimum of 300 feet of storage.
- Construct dual eastbound left turn lanes at the Jenks Road signal with a minimum of 300 feet of storage.
- Construct a u-turn opening on US 64 approximately 800-1,000 feet east of the Site Access. Provide dual u-turn lanes with a minimum of 250 feet of full width storage plus appropriate taper.
- Construct a u-turn opening on US 64 approximately 800-1,000 feet west of Jenks Road. Provide one u-turn lane with a minimum of 250 feet of storage and appropriate taper.
- Install a traffic signal at the u-turn locations when warranted.
- Consider modifying the potential interchange design to accommodate future traffic volumes and require less right-of-way.



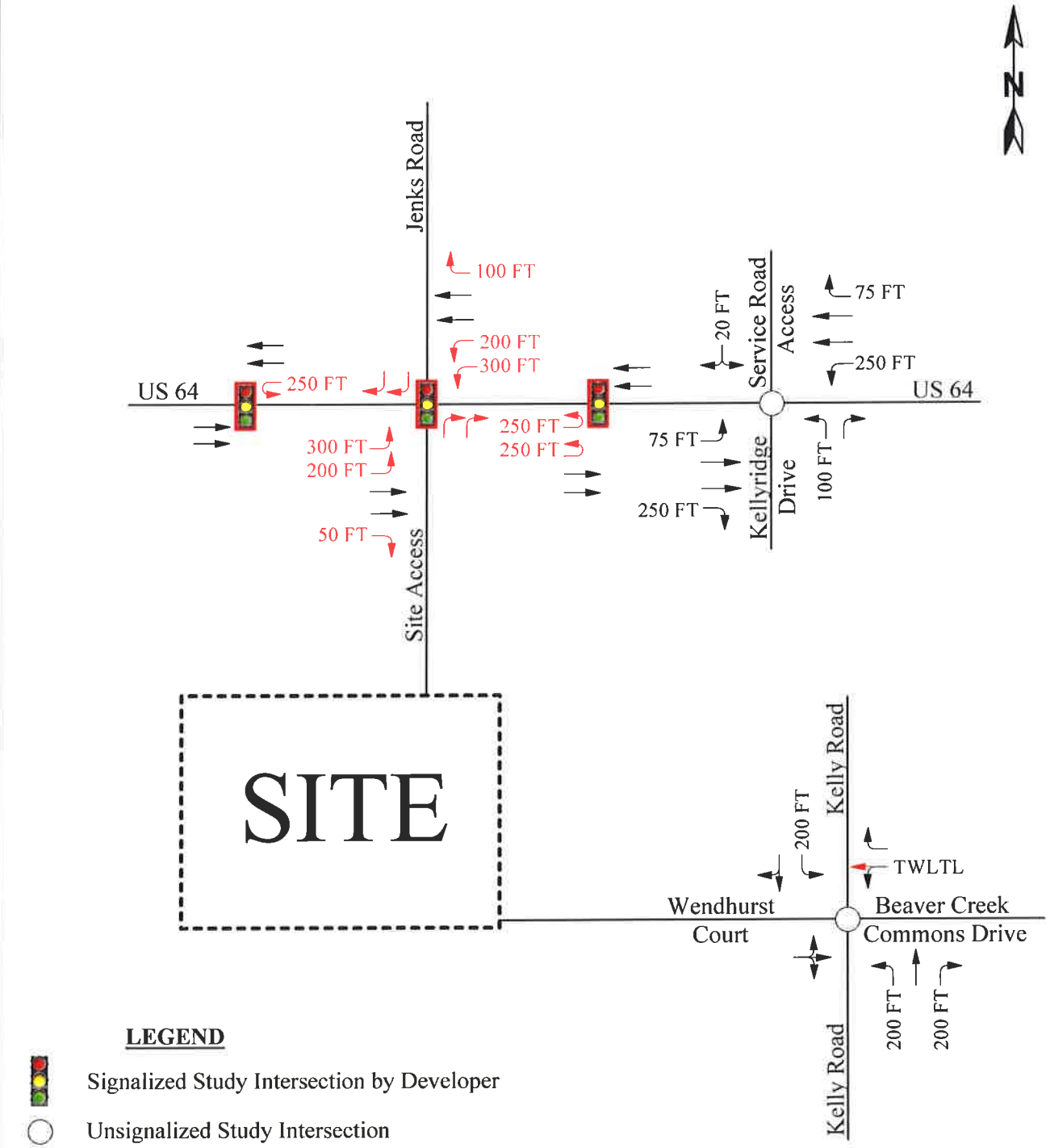
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Sweetwater Development

Apex, North Carolina

Recommended Lanes and Traffic Control - Residential

Scale: Not to Scale | Figure 14



RAMEY KEMP & ASSOCIATES TRANSPORTATION ENGINEERS	Sweetwater Development Apex, North Carolina	Recommended Lanes and Traffic Control - Full Build Out Scale: Not to Scale | Figure 14a

APPENDIX D

CAPACITY ANALYSIS CALCULATIONS

US 64

&

MEDIAN BREAK

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↰	
Traffic Vol, veh/h	0	1650	0	0	4	0
Future Vol, veh/h	0	1650	0	0	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	16983	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1833	0	0	4	0

Major/Minor	Major1		Minor2	
Conflicting Flow All	-	0	917	-
Stage 1	-	-	0	-
Stage 2	-	-	917	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	271	0
Stage 1	0	-	-	0
Stage 2	0	-	350	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	271	-
Mov Cap-2 Maneuver	-	-	271	-
Stage 1	-	-	-	-
Stage 2	-	-	350	-

Approach	EB	SB
HCM Control Delay, s	0	18.5
HCM LOS		C

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	271
HCM Lane V/C Ratio	-	0.016
HCM Control Delay (s)	-	18.5
HCM Lane LOS	-	C
HCM 95th %tile Q(veh)	-	0.1

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↰	
Traffic Vol, veh/h	0	2231	0	0	4	0
Future Vol, veh/h	0	2231	0	0	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	16983	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2479	0	0	4	0

Major/Minor	Major1		Minor2	
Conflicting Flow All	-	0	1240	-
Stage 1	-	-	0	-
Stage 2	-	-	1240	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	167	0
Stage 1	0	-	-	0
Stage 2	0	-	236	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	167	-
Mov Cap-2 Maneuver	-	-	167	-
Stage 1	-	-	-	-
Stage 2	-	-	236	-

Approach	EB	SB
HCM Control Delay, s	0	27.1
HCM LOS		D

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	167
HCM Lane V/C Ratio	-	0.027
HCM Control Delay (s)	-	27.1
HCM Lane LOS	-	D
HCM 95th %tile Q(veh)	-	0.1

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2231	9	0	0	0	0	0	70	4	25	0
Future Vol, veh/h	0	2231	9	0	0	0	0	0	70	4	25	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	16983	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2479	10	0	0	0	0	0	78	4	28	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	1240	1240	2489	-
Stage 1	-	-	-	-	-	-	0	0	-
Stage 2	-	-	-	-	-	-	1240	2489	-
Critical Hdwy	-	-	-	-	-	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	-	-	-	-	-	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	0	-	-	0	0	167	131	29	0
Stage 1	0	-	-	0	0	-	-	-	0
Stage 2	0	-	-	0	0	-	186	58	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	167	70	29	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	70	29	-
Stage 1	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	99	58	-

Approach	EB	NB	SB
HCM Control Delay, s	0	44.1	$ 344.8
HCM LOS		E	F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	SBLn1
Capacity (veh/h)	167	-	-	32
HCM Lane V/C Ratio	0.466	-	-	1.007
HCM Control Delay (s)	44.1	-	-	$ 344.8
HCM Lane LOS	E	-	-	F
HCM 95th %tile Q(veh)	2.2	-	-	3.5

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↰	
Traffic Vol, veh/h	0	1596	0	0	4	0
Future Vol, veh/h	0	1596	0	0	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	16983	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1773	0	0	4	0

Major/Minor	Major1		Minor2	
Conflicting Flow All	-	0	887	-
Stage 1	-	-	0	-
Stage 2	-	-	887	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	284	0
Stage 1	0	-	-	0
Stage 2	0	-	363	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	284	-
Mov Cap-2 Maneuver	-	-	284	-
Stage 1	-	-	-	-
Stage 2	-	-	363	-

Approach	EB	SB
HCM Control Delay, s	0	17.9
HCM LOS		C

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	284
HCM Lane V/C Ratio	-	0.016
HCM Control Delay (s)	-	17.9
HCM Lane LOS	-	C
HCM 95th %tile Q(veh)	-	0

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↰	
Traffic Vol, veh/h	0	2258	0	0	4	0
Future Vol, veh/h	0	2258	0	0	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	16983	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2509	0	0	4	0

Major/Minor	Major1		Minor2	
Conflicting Flow All	-	0	1255	-
Stage 1	-	-	0	-
Stage 2	-	-	1255	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	164	0
Stage 1	0	-	-	0
Stage 2	0	-	232	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	164	-
Mov Cap-2 Maneuver	-	-	164	-
Stage 1	-	-	-	-
Stage 2	-	-	232	-

Approach	EB	SB
HCM Control Delay, s	0	27.6
HCM LOS		D

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	164
HCM Lane V/C Ratio	-	0.027
HCM Control Delay (s)	-	27.6
HCM Lane LOS	-	D
HCM 95th %tile Q(veh)	-	0.1

Intersection	
Int Delay, s/veh	38.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱						↱		↰	
Traffic Vol, veh/h	0	2251	28	0	0	0	0	0	76	4	71	0
Future Vol, veh/h	0	2251	28	0	0	0	0	0	76	4	71	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	16983	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2501	31	0	0	0	0	0	84	4	79	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	1251	1251	2532	-
Stage 1	-	-	-	-	-	-	0	0	-
Stage 2	-	-	-	-	-	-	1251	2532	-
Critical Hdwy	-	-	-	-	-	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	-	-	-	-	-	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	0	-	-	0	0	164	129	~ 27	0
Stage 1	0	-	-	0	0	-	-	-	0
Stage 2	0	-	-	0	0	-	183	~ 55	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	164	63	~ 27	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	63	~ 27	-
Stage 1	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	89	~ 55	-

Approach	EB	NB	SB
HCM Control Delay, s	0	48.2	$ 1186.4
HCM LOS		E	F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	SBLn1
Capacity (veh/h)	164	-	-	28
HCM Lane V/C Ratio	0.515	-	-	2.976
HCM Control Delay (s)	48.2	-	-	$ 1186.4
HCM Lane LOS	E	-	-	F
HCM 95th %tile Q(veh)	2.5	-	-	10

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	1277	8	0
Future Vol, veh/h	0	0	0	1277	8	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	1419	9	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	710	-
Stage 1	-	-	0	-
Stage 2	-	-	710	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	368	0
Stage 1	0	-	-	0
Stage 2	0	-	448	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	368	-
Mov Cap-2 Maneuver	-	-	368	-
Stage 1	-	-	-	-
Stage 2	-	-	448	-

Approach	WB	NB
HCM Control Delay, s	0	15
HCM LOS		C

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	368	-
HCM Lane V/C Ratio	0.024	-
HCM Control Delay (s)	15	-
HCM Lane LOS	C	-
HCM 95th %tile Q(veh)	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	1807	9	0
Future Vol, veh/h	0	0	0	1807	9	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2008	10	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	1004	-
Stage 1	-	-	0	-
Stage 2	-	-	1004	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	238	0
Stage 1	0	-	-	0
Stage 2	0	-	315	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	238	-
Mov Cap-2 Maneuver	-	-	238	-
Stage 1	-	-	-	-
Stage 2	-	-	315	-

Approach	WB	NB
HCM Control Delay, s	0	20.8
HCM LOS		C

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	238	-
HCM Lane V/C Ratio	0.042	-
HCM Control Delay (s)	20.8	-
HCM Lane LOS	C	-
HCM 95th %tile Q(veh)	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↰	
Traffic Vol, veh/h	0	0	0	1823	9	0
Future Vol, veh/h	0	0	0	1823	9	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2026	10	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	1013	-
Stage 1	-	-	0	-
Stage 2	-	-	1013	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	235	0
Stage 1	0	-	-	0
Stage 2	0	-	312	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	235	-
Mov Cap-2 Maneuver	-	-	235	-
Stage 1	-	-	-	-
Stage 2	-	-	312	-

Approach	WB	NB
HCM Control Delay, s	0	21
HCM LOS		C

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	235	-
HCM Lane V/C Ratio	0.043	-
HCM Control Delay (s)	21	-
HCM Lane LOS	C	-
HCM 95th %tile Q(veh)	0.1	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↰	
Traffic Vol, veh/h	0	0	0	1622	16	0
Future Vol, veh/h	0	0	0	1622	16	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	1802	18	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	901	-
Stage 1	-	-	0	-
Stage 2	-	-	901	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	278	0
Stage 1	0	-	-	0
Stage 2	0	-	357	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	278	-
Mov Cap-2 Maneuver	-	-	278	-
Stage 1	-	-	-	-
Stage 2	-	-	357	-

Approach	WB	NB
HCM Control Delay, s	0	18.8
HCM LOS		C

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	278	-
HCM Lane V/C Ratio	0.064	-
HCM Control Delay (s)	18.8	-
HCM Lane LOS	C	-
HCM 95th %tile Q(veh)	0.2	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↰	
Traffic Vol, veh/h	0	0	0	2223	19	0
Future Vol, veh/h	0	0	0	2223	19	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2470	21	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	1235	-
Stage 1	-	-	0	-
Stage 2	-	-	1235	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	169	0
Stage 1	0	-	-	0
Stage 2	0	-	238	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	169	-
Mov Cap-2 Maneuver	-	-	169	-
Stage 1	-	-	-	-
Stage 2	-	-	238	-

Approach	WB	NB
HCM Control Delay, s	0	29.3
HCM LOS		D

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	169	-
HCM Lane V/C Ratio	0.125	-
HCM Control Delay (s)	29.3	-
HCM Lane LOS	D	-
HCM 95th %tile Q(veh)	0.4	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	2239	19	0
Future Vol, veh/h	0	0	0	2239	19	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2488	21	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	1244	-
Stage 1	-	-	0	-
Stage 2	-	-	1244	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	166	0
Stage 1	0	-	-	0
Stage 2	0	-	235	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	166	-
Mov Cap-2 Maneuver	-	-	166	-
Stage 1	-	-	-	-
Stage 2	-	-	235	-

Approach	WB	NB
HCM Control Delay, s	0	29.8
HCM LOS		D

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	166	-
HCM Lane V/C Ratio	0.127	-
HCM Control Delay (s)	29.8	-
HCM Lane LOS	D	-
HCM 95th %tile Q(veh)	0.4	-

APPENDIX E

CAPACITY ANALYSIS CALCULATIONS

US 64

&

FUTURE EASTERN U-TURN LOCATION

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↰	
Traffic Vol, veh/h	0	0	0	1834	16	0
Future Vol, veh/h	0	0	0	1834	16	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2038	18	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	1019	-
Stage 1	-	-	0	-
Stage 2	-	-	1019	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	233	0
Stage 1	0	-	-	0
Stage 2	0	-	309	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	233	-
Mov Cap-2 Maneuver	-	-	233	-
Stage 1	-	-	-	-
Stage 2	-	-	309	-

Approach	WB	NB
HCM Control Delay, s	0	21.7
HCM LOS		C

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	233	-
HCM Lane V/C Ratio	0.076	-
HCM Control Delay (s)	21.7	-
HCM Lane LOS	C	-
HCM 95th %tile Q(veh)	0.2	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↰	
Traffic Vol, veh/h	0	0	0	2290	23	0
Future Vol, veh/h	0	0	0	2290	23	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2544	26	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	1272	-
Stage 1	-	-	0	-
Stage 2	-	-	1272	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	159	0
Stage 1	0	-	-	0
Stage 2	0	-	227	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	159	-
Mov Cap-2 Maneuver	-	-	159	-
Stage 1	-	-	-	-
Stage 2	-	-	227	-

Approach	WB	NB
HCM Control Delay, s	0	31.9
HCM LOS		D

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	159	-
HCM Lane V/C Ratio	0.161	-
HCM Control Delay (s)	31.9	-
HCM Lane LOS	D	-
HCM 95th %tile Q(veh)	0.6	-

APPENDIX F

SIMTRAFFIC QUEUEING & PERFORMANCE RESULTS

4: US 64 EB & Median Break Performance by movement

Movement	EBL	EBT	All
Denied Del/Veh (s)	1.6	0.3	0.3
Total Del/Veh (s)	2.6	0.8	0.8

5: US 64 EB & Median Break Performance by movement

Movement	EBT	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.1	18.4	0.1

6: Median Break & US 64 WB Performance by movement

Movement	WBL	WBT	All
Denied Del/Veh (s)	2.7	0.2	0.2
Total Del/Veh (s)	2.4	1.1	1.1

7: Median Break & US 64 WB Performance by movement

Movement	WBT	NBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.1	9.6	0.1

Total Network Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	2.3

Intersection: 4: US 64 EB & Median Break

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 5: US 64 EB & Median Break

Movement	SB
Directions Served	L
Maximum Queue (ft)	28
Average Queue (ft)	4
95th Queue (ft)	21
Link Distance (ft)	59
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Median Break & US 64 WB

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Median Break & US 64 WB

Movement	NB
Directions Served	L
Maximum Queue (ft)	28
Average Queue (ft)	6
95th Queue (ft)	24
Link Distance (ft)	59
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

4: US 64 EB & Median Break Performance by movement

Movement	EBL	EBT	All
Denied Del/Veh (s)	1.8	0.6	0.6
Total Del/Veh (s)	2.9	1.2	1.2

5: US 64 EB & Median Break Performance by movement

Movement	EBT	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.1	30.2	0.2

6: Median Break & US 64 WB Performance by movement

Movement	WBL	WBT	All
Denied Del/Veh (s)	2.1	0.4	0.4
Total Del/Veh (s)	3.2	1.5	1.5

7: Median Break & US 64 WB Performance by movement

Movement	WBT	NBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.1	22.4	0.2

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	3.2

Intersection: 4: US 64 EB & Median Break

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: US 64 EB & Median Break

Movement	SB
Directions Served	L
Maximum Queue (ft)	28
Average Queue (ft)	5
95th Queue (ft)	21
Link Distance (ft)	59
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Median Break & US 64 WB

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Median Break & US 64 WB

Movement	NB
Directions Served	L
Maximum Queue (ft)	43
Average Queue (ft)	8
95th Queue (ft)	31
Link Distance (ft)	59
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

4: US 64 EB & Median Break Performance by movement

Movement	EBL	EBT	All
Denied Del/Veh (s)	1.9	0.6	0.6
Total Del/Veh (s)	3.2	1.7	1.7

5: Site Access/Median Break & US 64 EB Performance by movement

Movement	EBT	EBR	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	1.6	0.0
Total Del/Veh (s)	0.2	0.0	28.5	59.0	43.3	1.7

6: Median Break & US 64 WB Performance by movement

Movement	WBL	WBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	4.3	1.1	1.1

7: Median Break & US 64 WB Performance by movement

Movement	WBT	NBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.1	21.6	0.2

8: US 64 EB & Eastern U-Turn Location Performance by movement

Movement	EBL	EBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	3.9	1.6	1.6

9: Eastern U-Turn Location & US 64 WB Performance by movement

Movement	WBT	NBL	All
Denied Del/Veh (s)	0.3	0.0	0.3
Total Del/Veh (s)	1.1	20.0	1.2

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	5.2

Intersection: 4: US 64 EB & Median Break

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 5: Site Access/Median Break & US 64 EB

Movement	EB	EB	NB	SB
Directions Served	T	T	R	LT
Maximum Queue (ft)	4	4	92	80
Average Queue (ft)	0	0	36	26
95th Queue (ft)	3	3	71	64
Link Distance (ft)	66	66	1062	60
Upstream Blk Time (%)				2
Queuing Penalty (veh)				1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Median Break & US 64 WB

Movement	WB
Directions Served	L
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	225
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Median Break & US 64 WB

Movement	NB
Directions Served	L
Maximum Queue (ft)	38
Average Queue (ft)	7
95th Queue (ft)	28
Link Distance (ft)	59
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: US 64 EB & Eastern U-Turn Location

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 9: Eastern U-Turn Location & US 64 WB

Movement	NB
Directions Served	L
Maximum Queue (ft)	48
Average Queue (ft)	13
95th Queue (ft)	38
Link Distance (ft)	60
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1

4: US 64 EB & Median Break Performance by movement

Movement	EBL	EBT	All
Denied Del/Veh (s)	2.1	0.3	0.3
Total Del/Veh (s)	2.7	0.8	0.9

5: US 64 EB & Median Break Performance by movement

Movement	EBT	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.1	12.0	0.1

6: Median Break & US 64 WB Performance by movement

Movement	WBL	WBT	All
Denied Del/Veh (s)	1.7	0.3	0.3
Total Del/Veh (s)	2.7	1.3	1.3

7: Median Break & US 64 WB Performance by movement

Movement	WBT	NBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.1	17.4	0.3

Total Network Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	2.5

Intersection: 4: US 64 EB & Median Break

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: US 64 EB & Median Break

Movement	SB
Directions Served	L
Maximum Queue (ft)	28
Average Queue (ft)	4
95th Queue (ft)	20
Link Distance (ft)	59
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Median Break & US 64 WB

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Median Break & US 64 WB

Movement	NB
Directions Served	L
Maximum Queue (ft)	50
Average Queue (ft)	14
95th Queue (ft)	39
Link Distance (ft)	59
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

4: US 64 EB & Median Break Performance by movement

Movement	EBL	EBT	All
Denied Del/Veh (s)	1.7	0.6	0.6
Total Del/Veh (s)	3.3	1.2	1.3

5: US 64 EB & Median Break Performance by movement

Movement	EBT	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.1	35.2	0.2

6: Median Break & US 64 WB Performance by movement

Movement	WBL	WBT	All
Denied Del/Veh (s)	1.6	0.5	0.5
Total Del/Veh (s)	4.1	1.9	1.9

7: Median Break & US 64 WB Performance by movement

Movement	WBT	NBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.1	40.4	0.5

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	3.6

Intersection: 4: US 64 EB & Median Break

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: US 64 EB & Median Break

Movement	SB
Directions Served	L
Maximum Queue (ft)	32
Average Queue (ft)	5
95th Queue (ft)	21
Link Distance (ft)	59
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Median Break & US 64 WB

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Median Break & US 64 WB

Movement	NB
Directions Served	L
Maximum Queue (ft)	64
Average Queue (ft)	17
95th Queue (ft)	47
Link Distance (ft)	59
Upstream Blk Time (%)	1
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

4: US 64 EB & Median Break Performance by movement

Movement	EBL	EBT	All
Denied Del/Veh (s)	1.8	0.6	0.6
Total Del/Veh (s)	3.6	2.0	2.1

5: Site Access/Median Break & US 64 EB Performance by movement

Movement	EBT	EBR	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.5	0.0
Total Del/Veh (s)	0.3	0.0	35.1	83.4	85.4	4.0

6: Median Break & US 64 WB Performance by movement

Movement	WBL	WBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	22.6	1.6	2.2

7: Median Break & US 64 WB Performance by movement

Movement	WBT	NBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.2	35.9	0.4

8: US 64 EB & Eastern U-Turn Location Performance by movement

Movement	EBL	EBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	4.2	1.7	1.7

9: Eastern U-Turn Location & US 64 WB Performance by movement

Movement	WBT	NBL	All
Denied Del/Veh (s)	0.6	0.0	0.6
Total Del/Veh (s)	1.6	59.8	2.2

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	7.6

Intersection: 4: US 64 EB & Median Break

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 5: Site Access/Median Break & US 64 EB

Movement	EB	NB	SB
Directions Served	R	R	LT
Maximum Queue (ft)	17	111	113
Average Queue (ft)	1	45	66
95th Queue (ft)	7	91	118
Link Distance (ft)	66	1062	60
Upstream Blk Time (%)			30
Queuing Penalty (veh)			22
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Median Break & US 64 WB

Movement	WB	WB
Directions Served	L	T
Maximum Queue (ft)	77	44
Average Queue (ft)	15	3
95th Queue (ft)	80	43
Link Distance (ft)		990
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	225	
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 7: Median Break & US 64 WB

Movement	NB
Directions Served	L
Maximum Queue (ft)	59
Average Queue (ft)	16
95th Queue (ft)	43
Link Distance (ft)	59
Upstream Blk Time (%)	1
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: US 64 EB & Eastern U-Turn Location

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 9: Eastern U-Turn Location & US 64 WB

Movement	NB
Directions Served	L
Maximum Queue (ft)	76
Average Queue (ft)	24
95th Queue (ft)	57
Link Distance (ft)	60
Upstream Blk Time (%)	3
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 23

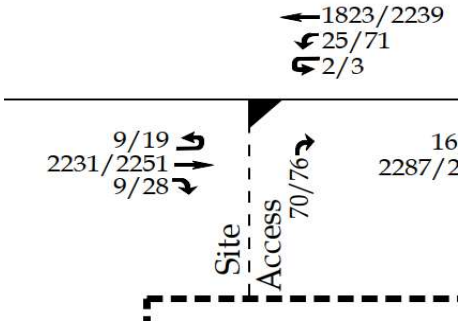
APPENDIX G

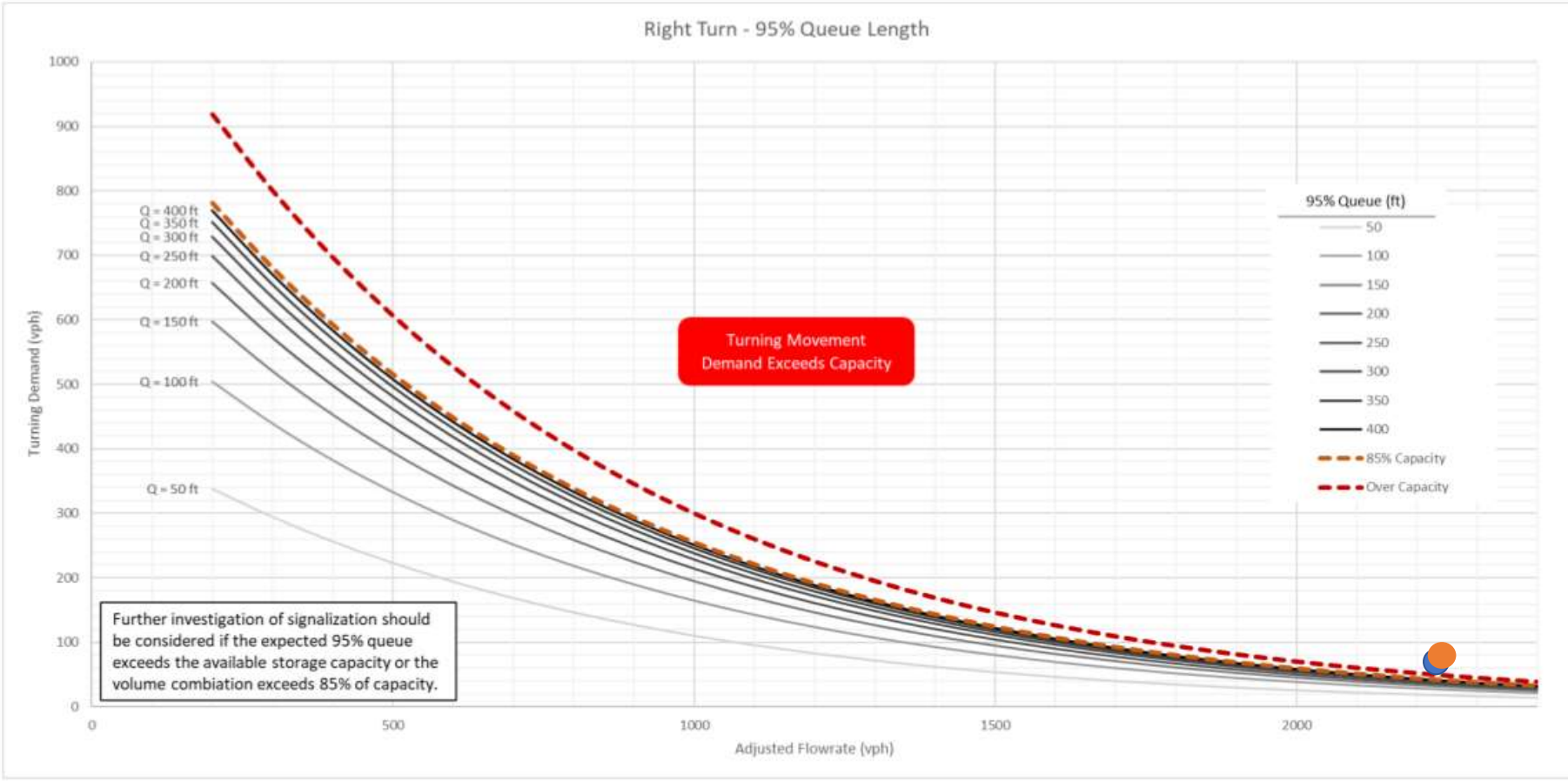
ITRE 95th PERCENTILE QUEUE LENGTH CALCULATIONS

Northbound Right-Turn Movement

AM Peak Hour	
t =	
CVAF =	1.00000E+00
Conflicting =	2,240
ACV =	2,240
Turn Vol =	70

PM Peak Hour	
t =	
CVAF =	1
Conflicting =	2,279
ACV =	2,279
Turn Vol =	76

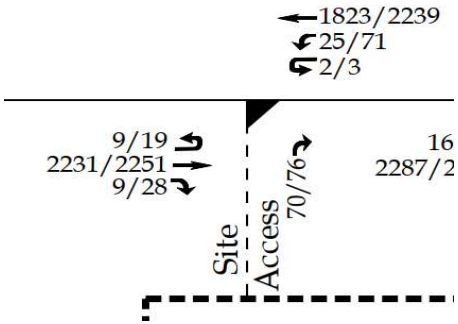


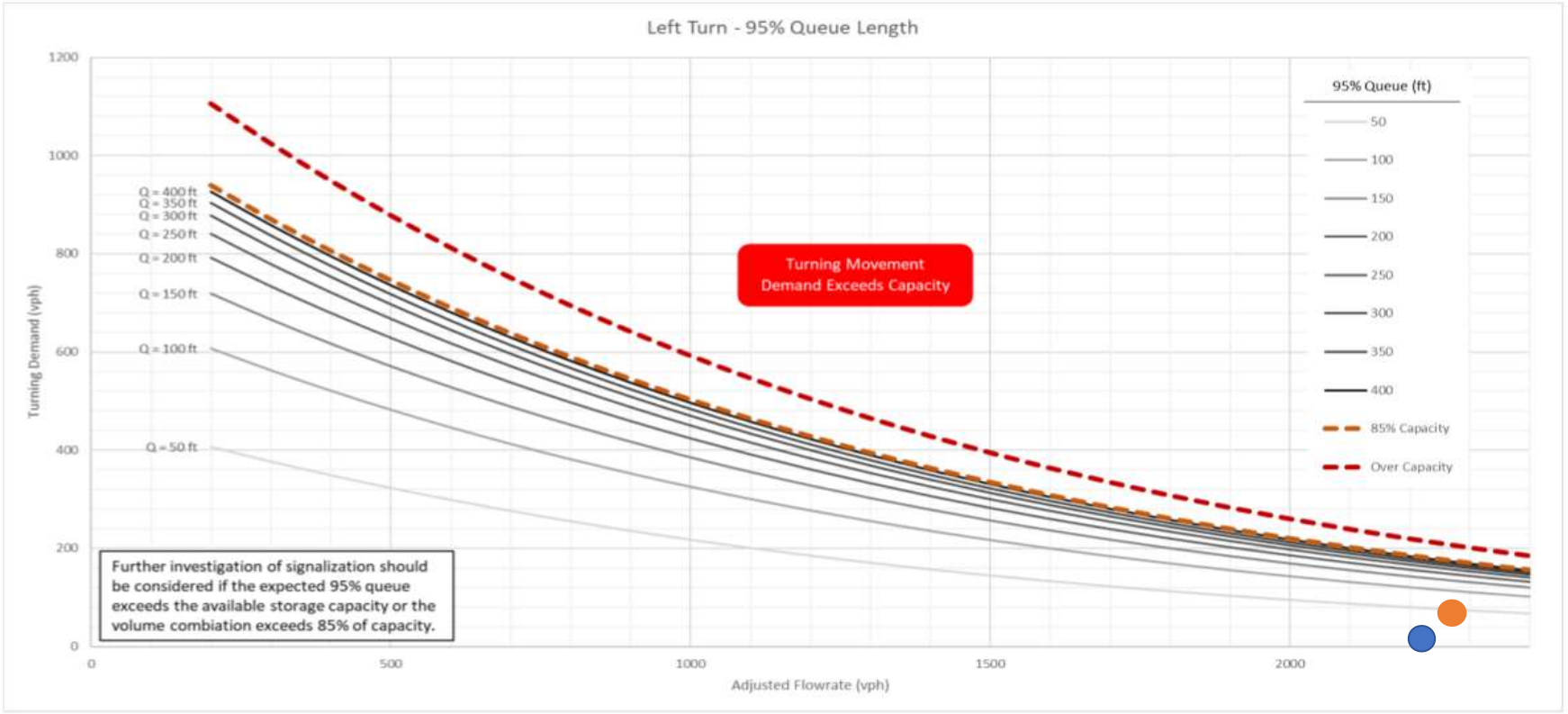


Westbound Left-Turn Movement

AM Peak Hour	
t =	
CVAF =	1
Conflicting =	2240
ACV =	2,240
Turn Vol =	27

PM Peak Hour	
t =	
CVAF =	1
Conflicting =	2279
ACV =	2,279
Turn Vol =	74





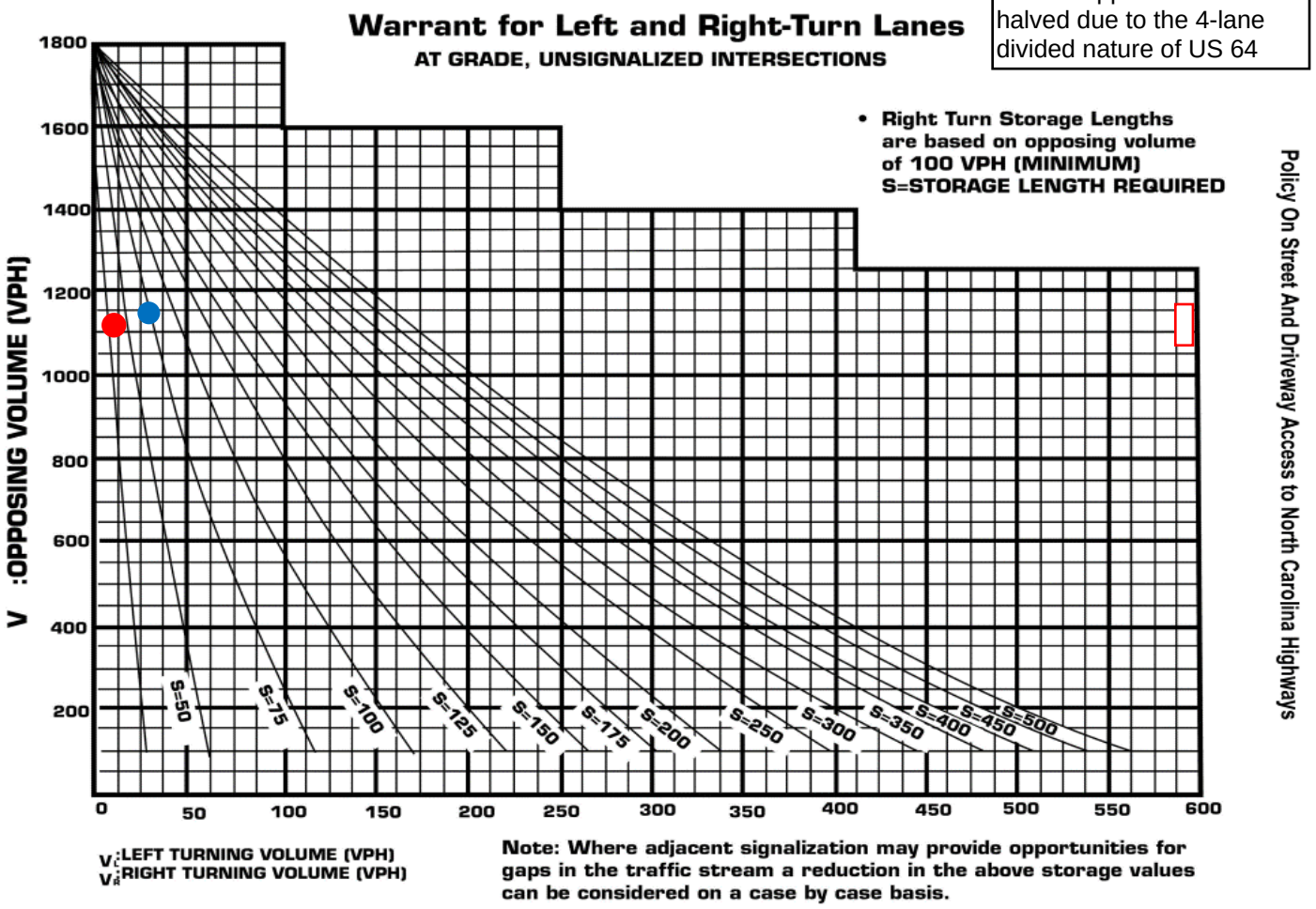
APPENDIX H

TURN LANE WARRANTS

YELLOW BRIDGE RESIDENTIAL

TURN LANE STORAGE WARRANTS

NOTE: Approach volumes halved due to the 4-lane divided nature of US 64



INTERSECTION: US 64 & Median Break

SCENARIO	Movement	Turn Lane	Turning Volume (V_R/V_L)	Approach / Opposing Volume (V_A/V_O)	Symbol
AM Build	WBR	Right	9	1125	
PM Build	EBR	Right	28	1154	

RAMEY KEMP ASSOCIATES
TOGETHER WE ARE LIMITLESS

APPENDIX I

TRIP GENERATION COMPARISON

Table 1: Trip Generation Summary – Scenario 1

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single-Family Homes (210)	53 DU	580	11	32	35	20
Multi-Family Homes (Low-Rise) (220)	103 DU	741	11	38	38	23
Total Trips		**1,321**	**22**	**70**	**73**	**43**

Table 2: Trip Generation Summary – Scenario 2

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single-Family Homes (210)	44 DU	489	9	27	29	17
Multi-Family Homes (Low-Rise) (220)	107 DU	768	12	39	39	23
Shopping Center (820)	25 KSF	944	15	9	45	50
Total Trips		**2,201**	**36**	**75**	**113**	**90**

Table 3: Trip Generation Summary – Scenario 3

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single-Family Homes (210)	59 DU	640	12	35	38	23
Multi-Family Homes (Low-Rise) (220)	83 DU	587	9	31	31	19
Shopping Center (820)	25 KSF	944	15	9	45	50
Total Trips		**2,171**	**36**	**75**	**114**	**92**

Table 4: Trip Generation Summary Comparison

Scenario	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
		Enter	Exit	Enter	Exit
Scenario 3 [Analyzed in the TIA]	**2,171**	**36**	**75**	**114**	**92**
Scenario 1 Difference (+/-) [Scenario 1 – Scenario 3]	-850	-14	-5	-41	-49
Scenario 2 Difference (+/-) [Scenario 2 – Scenario 3]	+30	0	0	-1	-2