



LINCOLN COUNTY PLANNING & INSPECTIONS DEPARTMENT
302 NORTH ACADEMY STREET, SUITE A, LINCOLNTON, NORTH CAROLINA 28092
704-736-8440 OFFICE 704-736-8434 INSPECTION REQUEST LINE 704-732-9010 FAX

To: Board of Commissioners
Planning Board

From: Randy Hawkins, Zoning Administrator

Date: December 20, 2016

Re: PD #2016-7
Queen City Land, LLC, applicant
Parcel ID# 34127, 34124 and 34130

The following information is for use by the Lincoln County Board of Commissioners and Planning Board at their joint meeting/public hearing on January 9, 2017.

REQUEST

The applicant is requesting the rezoning of 84.7 acres from B-G (General Business) and R-SF (Residential Single-Family) to PD-R (Planned Development-Residential) to permit a subdivision with up to 165 single-family detached homes. (A preliminary plan that was presented at a community involvement meeting in October called for up to 200 homes, but it was subsequently amended.)

Under the Lincoln County Unified Development Ordinance, any proposed subdivision with 50 or more lots is subject to approval through the planned development process.

A concept plan and guidelines for the proposed development have been submitted as part of the rezoning application and would serve as the master plan for the development if the rezoning request is approved. A traffic impact analysis has also been submitted.

SITE AREA AND DESCRIPTION

The property is located on the west side of N.C. 16 Business about 800 feet north of Hagers Hollow Drive in Catawba Springs Township. It is adjoined by property zoned R-SF, B-N (Neighborhood Business), I-G (General Industrial) and R-T (Transitional Residential). Land uses in the area include residential, business, industrial and institutional.

A Duke Energy transmission right-of-way, a railroad right-of-way and Forney Creek cross this property. A multi-tenant commercial development is located on N.C. 16 Business just to the north of this property. An industrial building is located behind the commercial building. Denver Wesleyan Church, a small industrial park and the Hagers

Hollow subdivision are located to the south. The stream that crosses the property is separated from the proposed home sites by the railroad right right-of-way.

The proposed subdivision would have two access points on N.C. 16 Business south of the commercial development, plus an emergency access road on the north side.

A small portion (just under an acre) of the front of this property is located in a WS-IV Critical Area watershed district, but the rest of the property lies outside a water-supply watershed. Portions of the property along Forney Creek are located in a 100-year floodplain.

PLAN CONFORMANCE

This property is part of an area designated by the Lincoln County Land Use Plan as Residential Suburban, suitable for densities of upwards of 1-2 units per acre depending on the provision of utilities. The proposed subdivision would be served by county water and sewer.

The county's greenway plan identifies Forney Creek as a proposed connection to the Carolina Thread Trail. Under the master plan for this development, the area west of Forney Creek would be transferred to the Catawba Lands Conservancy. Existing portions of the Carolina Thread Trail are located on land protected by the conservancy.

Based on the total acreage of the property (the 84.7 acres does not include the railroad right-of-way), the proposed density of the development is 1.95 homes per acre. (Not including the proposed conservation area, the proposed density is 2.4 homes per acre.)

UDO COMPLIANCE

The UDO requires that a planned development include a minimum of 12.5% recreation and open space. More than 25% of the acreage in this development would be accessible as open space (not including the area west of the railroad right-of-way but including the Duke Energy right-of-way).

The proposed plan also complies with the UDO's subdivision standards for external access, internal connectivity, block length and cul-de-sac length.

STAFF'S RECOMMENDATION

Staff recommends that the rezoning request be approved. See proposed statement for rationale.

PD# 2016-7 (Glenwood) Capacity Statement

Public Schools

The proposed development of 165 single-family lots is in the St. James Elementary, North Lincoln Middle and North Lincoln High districts. Based on current student generation rates, the development is projected to produce approximately 55 students spread over the K-12 system. Per the county's Adequate Public Facilities Ordinance and its associated Memorandums of Understanding, the associated schools and the system in general have the capacity to handle the proposed development.

Water and Sewer

See Item K in applicant's report.



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704-736-8440 OFFICE 704-736-8434 INSPECTION REQUEST LINE 704-732-9010 FAX

Zoning Amendment Staff's Proposed Statement of Consistency and Reasonableness

Case No. **PD #2016-7**

Applicant **Queen City Land, LLC**

Parcel ID# **34127, 34124 and 34130**

Location **west side of N.C. 16 Business north of Hagers Hollow Drive**

Proposed amendment **rezone from B-G and R-SF to PD-R to permit a subdivision with up to 165 lots for single-family detached homes**

This proposed amendment **is consistent** with the Lincoln County Comprehensive Land Use Plan and other adopted plans in that:

This property is located in an area designated by the Land Use Plan as Suburban Residential, suitable for densities of upwards of 1-2 units per acre depending on the provisions of utilities. The proposed development will be served by county water and sewer. The proposed density is 1.95 homes per acre. Forney Creek is identified on the county's greenway plan as a proposed connection to the Carolina Thread Trail. Under the master plan for this development, the area west of Forney Creek would be transferred to the Catawba Lands Conservancy and could be developed as part of the Carolina Thread Trail.

This proposed amendment **is reasonable and in the public interest** in that:

This property is located adjacent to an existing residential development and to other properties that area zoned residential. The plans for this subdivision meet all of the requirements of the Unified Development Ordinance. Amenities will be provided as part of the master plan. Traffic improvements will be provided to mitigate the impact of the development. The plan reserves a conservation area that could serve as a location for a public trail.

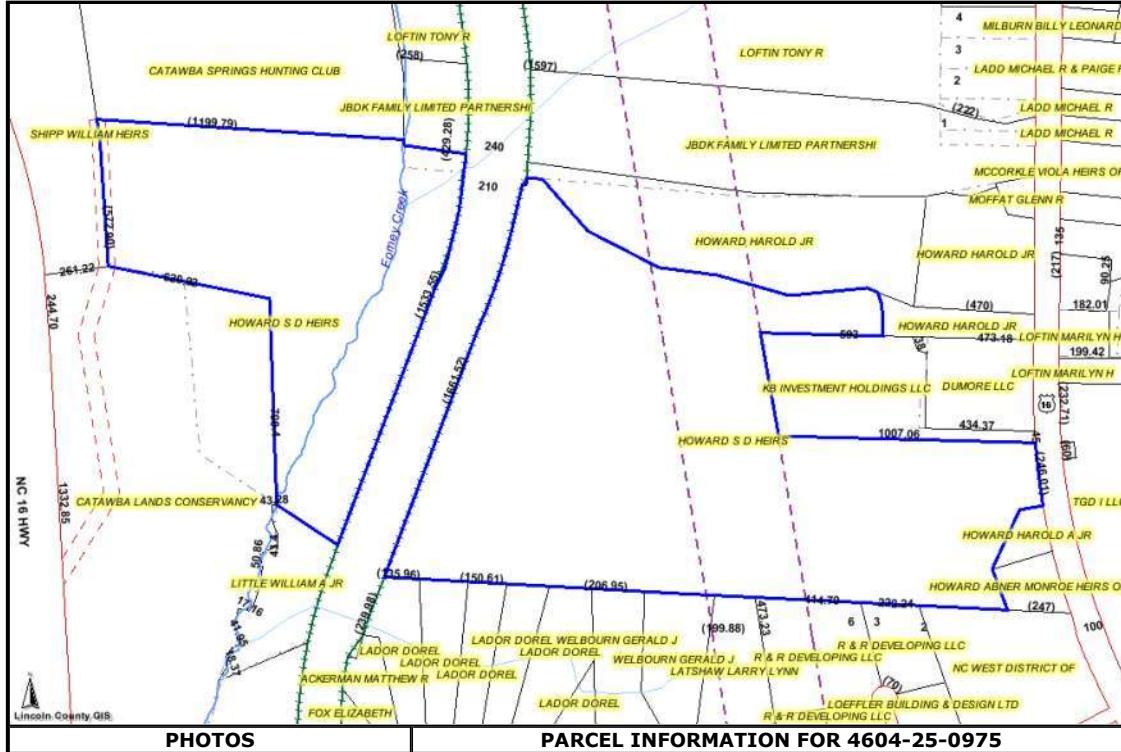


Lincoln County, NC

Office of the Tax Administrator, GIS Mapping Division
 Lincoln County and its mapping contractors assume no legal responsibility for
 the information contained on this map. This map is not to be used for land
 conveyance. The map is based on NC State Plane Coordinate System 1983 NAD.



Date: 9/9/2016 Scale: 1 Inch = 600 Feet



PHOTOS



PARCEL INFORMATION FOR 4604-25-0975

Parcel ID	60174	Owner	HOWARD S D HEIRS
Map Account	4604-00 18250	Mailing Address	C/O RONALD HOWARD 2978 RON HOWARD LANE DENVER NC 280370000
Deed Land Value	2374-936 \$841,925	Recorded Total Value	1/1/1993 \$841,925
Description Address Township	HOMESITE SEE PARCEL#34127 N NC 16 BUSINESS HWY CATAWBA SPRINGS		----- All values are for tax year 2016. -----
Improvement			
Parcel ID	34127	Owner	HOWARD S D HEIRS
Map Account	4604-00 18250	Mailing Address	C/O RONALD HOWARD 2978 RON HOWARD LANE DENVER NC 280370000
Deed Land Value	2374-936 \$384,780	Recorded Total Value	1/1/1993 \$385,086
Description Address Township	HOMESITE SEE PARCEL#60174 2457 N NC 16 BUSINESS HWY CATAWBA SPRINGS		----- All values are for tax year 2016. -----
Main Improvement			
Main Sq Feet	2225	Stories	CONVENTIONAL (PRE WWII)
		1.37	Year Built
Zoning District	Calculated Acres	Voting Precinct	Calculated Acres
B-G	82.83	DENVER WEST (DW28) WESTPORT (WP32)	28.27 54.56
Watershed Class		Sewer District	
Not in a watershed	81.89	Not in the sewer district	73.59
WS-IVP	0.93	In the sewer District	9.24
2000 Census County			
37109	071100	Tract	Block
37109	071100		1030
37109	071100		0.09
37109	071100		21.16
37109	071100		4.01
37109	071100		45.84
37109	071100		1.31
37109	071100		3.62
37109	071100		3.72
Flood	Zone Description		Panel
AE	SPECIAL FLOOD HAZARD AREA BASE ELEVATION DETERMINED - 100 YEAR		3710460400 2.13
AEFW	FLOODWAY AREA - 100 YEAR FLOOD HAZARD		3710460400 0.7
SHADED	OTHER FLOOD AREA - 500 YEAR FLOOD HAZARD		3710460400 6.66
X	NO FLOOD HAZARD		371046040073.33



Lincoln County, NC

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Date: 9/23/2016 Scale: 1 Inch = 300 Feet



PHOTOS		PARCEL INFORMATION FOR 4604-35-9327						
		Parcel ID 34124 Owner HOWARD HAROLD A JR Map 4604-10 Mailing Address 2529 N HIGHWAY 16 Account 0156081 Recorded 6/30/2005 Sale Price 0 Deed 1714-410 Total Value \$115,409 Previous Parcel Land Value \$108,900 <p>----- All values are for tax year 2016. -----</p>						
		Description STORE HWY 16 Deed Acres 0.9 Address 2435 N NC 16 BUSINESS HWY Tax Acres 0.72 Township CATAWBA SPRINGS Tax/Fire District DENVER / EL SEWER Main Improvement SERVICE STATION Value \$4,813 Main Sq Feet 2284 Stories 1 Year Built 1965 						
		Zoning District B-G Calculated Acres 0.73 Voting Precinct WESTPORT (WP32) Calculated Acres 0.73 Watershed Class Not in a watershed 0.71 Sewer District In the sewer District 0.73 WS-IVP WS-IVP 0.01 2000 Census County 37109 Tract 071100 Block 2003 0.73 Flood X Zone Description NO FLOOD HAZARD Panel 3710460400 0.73						



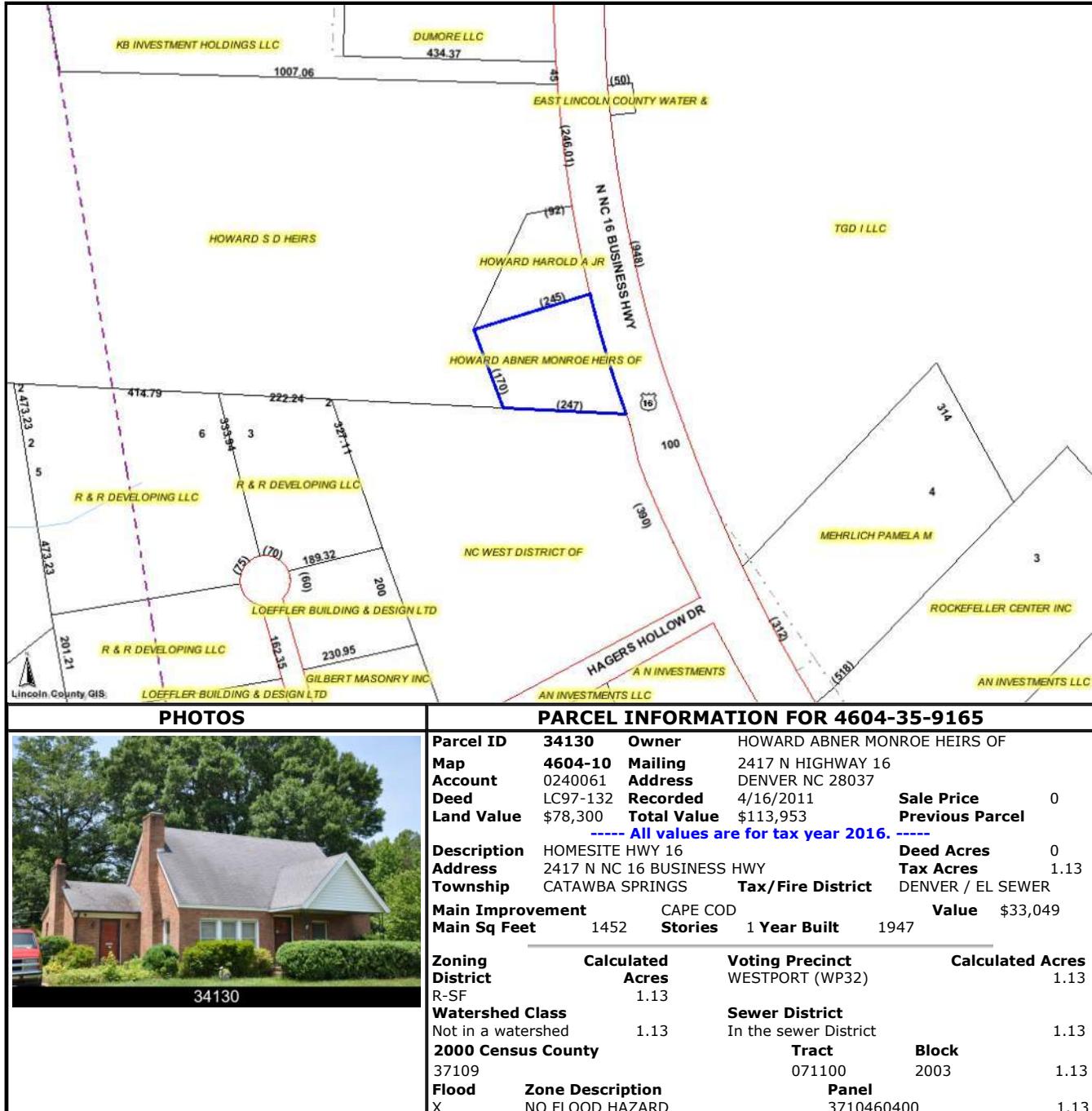
Lincoln County, NC

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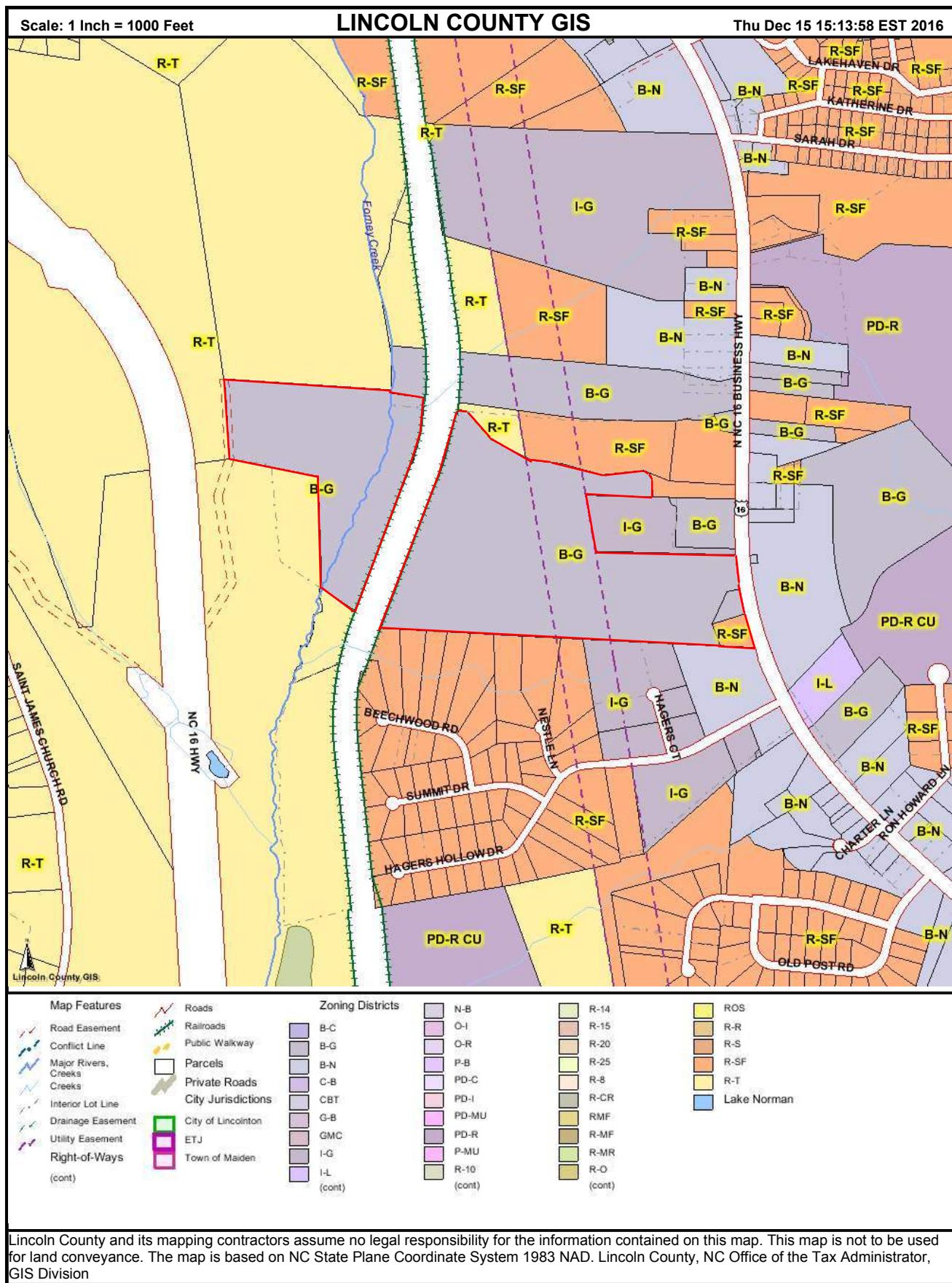


Date: 9/23/2016 Scale: 1 Inch = 300 Feet



PD #2016-7

Subject property is outlined in red





Planned Development Rezoning Application

Lincoln County Planning and Inspections Department
Zoning Administrator
302 N. Academy St., Lincolnton, NC 28092
Phone: (704)736-8440 Fax: (704)732-9010

PART I

Applicant Name: Queen City Land, LLC

Applicant Address: 11535 Carmel Commons Blvd, Suite 101, Charlotte, NC 28226

Applicant Phone Number: 704-363-1809

Property Owner Name: Howard S D Heirs, c/o Ronald Howard (Parcel 60174)
Howard Harold A Jr (Parcel 34124)
Howard Abner Monroe Heirs of (Parcel 34130)

Property Owner Address: 2978 Ron Howard Lane, Denver, NC 28037
2529 N. Hwy 16, Denver, NC 28037
2417 N. Hwy 16, Denver, NC 28037

Property Owner Phone Number _____

PART II

Property Location: 2457 N NC 16 Business Hwy, Denver, NC 28037

Property ID (10 digits): 4604-25-0975, 4604-35-9327 and 4604-35-9165

Property size: 84.85 acres

Parcel # (5 digits): 60174, 34124 and 34130

Deed Book(s): 2374	Page(s): 936
1714	410
LC97	132

PART III

Existing Zoning District: R-SF & B-G Proposed Zoning District: PD-R

Briefly describe how the property is being used and any existing structures:
Mostly wooded. Prior service station. Residential home/landscape business.

Briefly described the proposed planned development: residential subdivision

***SEE PLANNING DEPT. FOR PLANNED DEVELOPMENT FEES.**

I hereby certify that all knowledge of the information provided for this application and attachments is true and correct to the best of my knowledge.

Applicant's Signature

9/28/16
Date

Meeting Minutes

Date/Time: **Tuesday, October 11, 2016 – 7:00 pm**

Location: **East Lincoln Community Center, 8160 Optimist Club Rd, Denver, NC**

Purpose: **Lincoln County community involvement meeting to provide information regarding Glenwood subdivision proposal and to receive comments prior to public hearing.**

Presenters: **Robert Davis; David Lutz, P.E., CES Group Engineers, LLP**

Introduction:

Robert Davis introduced Lincoln County officials and staff attending the Community Involvement meeting – Commissioner Oakes, Planning Board Chair Christine Poinsette, Planning Board members Andrew Robinson and Gregory Smith, and Zoning Administrator Randy Hawkins. Glenwood is a proposed residential community located in East Lincoln County. Glenwood will feature up to 200 homes on 68+- acres with two (2) access points to NC Business 16. Mr. Davis notified attendees that the joint planning/commissioner meeting will be held November 7, 2016.

Mr. Lutz presented an overview of the community, which will meet or exceed all sections of the Lincoln County UDO and East Lincoln Development District requirements. This request would rezone the property to Planned Development-Residential. Mr. Lutz presented a slideshow describing the proposed development.

Key Features of the Community:

- Single family residential community on 68+- acres, with up to 200 homes.
- A small portion of the parcel along NC 16 Bus is within the WS-IVP watershed, though it does not impact the proposed layout. No portion of the proposed subdivision is in a flood zone.
- Over 25% Open Space; double the 12.5% that is required.
- Landscaped entrance with decorative entrance monument.
- 5' sidewalk along all proposed streets and canopy trees along both sides.
- Amenities to include trails, park benches/picnic areas, community garden, and/or dog park, dependent on market demands. If lot sizes increase, thereby increasing the home price range, additional options such as a clubhouse will be evaluated.
- Project is proposed in five (5) phases, with phase 1 anticipated to begin in 2017.

- 20' landscaped perimeter buffer along the overall subdivision property line, where required by the UDO, with existing vegetation remaining undisturbed as much as possible.

Additional Items from Slideshow:

1. Two (2) access points are proposed along NC 16 Bus, approximately 450' apart. The southern access point is proposed to line up with potential future development within Westport, which would likely justify a traffic signal in this location. If 2 full access points are constructed, it is anticipated that a third middle lane would be required by NCDOT between the two proposed access points.
2. Water and sewer has been discussed with Lincoln County Public Works. The sewer plant was recently doubled and the water plant is in design to double the capacity. Access to water and sewer is located along NC 16 Bus.
3. An emergency access drive was discussed, with the purpose of providing a second access point to the rear portion of the development in an emergency.
4. Use of the Duke Easement for trails was discussed, requiring an agreement from Duke Energy.
5. Future connection to an existing parcel, north of the proposed project was noted.
6. It was noted that the developer is willing to evaluate donating a portion of land, just west of Forney Creek to the Carolina Thread Trail and/or Catawba Land Conservancy.
7. Depending on market demand, open space amenities noted above will be incorporated.
8. The proposed roadways will be designed to NCDOT standards, with curb and gutter and a closed storm drainage system, out falling to proposed detention basins (locations to be determined) to control flow rates leaving the site.
9. Homes are expected to range in size from 1,500 sf to 2,500sf, with a price range of \$175K to \$225K. It was further discussed that during the home builders market study and final engineering, lot/home sizes may increase, thereby increasing the price range to \$275K and up.

Open Discussion

1. Emergency access – Concern was raised that the emergency access drive to the back half of subdivision needs to be further from the main drive. This concern has been noted and the plan has been revised accordingly, to provide the emergency access point on the north side of the parcel.
2. Open Space – Only areas east of the railroad, accessible to the subdivision, have been factored into the open space calculations. The layout of this site along with the Duke Utility Easement, provides the opportunity for an extensive trail network.

3. Duke Utility Easement – A question of whether the Duke Utility Easement can be utilized as proposed was raised, and the project and proposed uses have been discussed with Mr. Stephen Lord, Duke Energy Associate Asset Protection Specialist. The following are allowed within the Duke Utility Easement, following the right-of-way guidelines/restrictions - roadway, parking, trails and trees up to 15' in height.
4. Traffic – Concerns were mentioned regarding existing traffic on NC 16 Bus.

A traffic study is underway and will be available to the public once it's approved by the DOT. The study is incorporating the 2 proposed access points, as well as the intersections of Webbs Road / NC 16 Bus and Fairfield Forest Road / NC 16 Bus. Potential improvements at Fairfield Forest Road include providing a right turn lane along westbound Fairfield Forest Road. In addition, restriping of southbound NC 16 Bus at the intersection is being evaluated to improve southbound through and turning movements.

It was noted that if the Westport development on northbound NC 16 Bus is developed, a signal would likely be warranted. Furthermore, if the new elementary school is constructed adjacent to the Stratford subdivision, it is anticipated that a signal would be warranted at this location as well, thereby helping with the speeds and grouping of vehicles along this stretch of NC 16 Bus.

5. Schools – There were concerns regarding school capacity in the area. It was briefly discussed and noted from a community meeting the week prior, that the County schools are down by approximately 1,100 students since 2008. Students from this subdivision would likely attend Rock Springs Elementary, though a site for a new elementary school approximately ½ mile away is available.
6. Homes and Lot sizes – The minimum lot size was questioned and Mr. Hawkins noted that subdivisions within the Planned Development rezoning are not required to meet the ½ acre minimum. Commissioner Oakes noted that the County tends to hold the limit to 3/acre. This density bonus is allowed in return for the provision of a higher quality development. The initial price range of homes is anticipated to be \$175K to \$225K. Based on market studies, the home builder may make adjustments placing home values in the \$275K+ range.
7. Quality – A concern was raised that the development built would not match the pictures provided in the presentation. It is the intent of developer to provide a high quality project that represents what has been presented and adds value to the area.
8. Phasing – The construction of phase 1 would begin closest to NC 16 Bus, allowing the developer to utilize their resources best, by not constructing a long network of roads without

homes.

9. Land west of Forney Creek – A question was raised regarding the potential use of land west of Forney Creek. Mr. Covington with the Catawba Land Conservancy noted lands north and south of this portion of the site, and the overall goals of trail connectivity. The developer expressed the desire to work with the organizations and be part of enhancing the amenities for Lincoln County residents as a whole. Subsequent to the meeting, it has been presented to the developer that studies show trails are the #1 requested amenity and quality of life attributes of a community.
10. Stormwater – Concern was raised regarding the runoff from the subdivision. Storm water ponds are proposed to catch water from the storm drain pipes in order to control the flow rate of storm water leaving the site. Storm water will not dump onto the trail land.
11. Overall County Growth – There were concerns that the area is growing to quickly and the road networks are not able to handle the additional growth. Commissioner Oakes presented a summary of NCDOT roadway improvements for Lincoln County. Some of the highlights included the following:
 - a. Improvements at the intersection of NC 16 and Unity Church Road/Triangle Circle
 - b. The intersection of NC 73 and NC 16 Bus
 - c. Widening of NC 73 from NC 16 Bus to West Catawba Ave.
 - d. Widening of NC 150 from Harvel Road to NC 16
 - e. Improvements to the intersection of NC 16 Bus and Hagers Ferry Road/N. Pilot Knob
 - f. Completion of the widening of NC 16 in Catawba County
 - g. Improvements along Campground Road and Will Proctor
 - h. Widening NC 16 Bus to multi-lanes from NC 73 to Fairfield Forest
12. Bypass 16 and NC 16 Bus – A suggestion/request was made that NC 16 Bus widening be considered up to Webbs Road. A concern was raised that there are not adequate access points to NC 16. The extension of Webbs Road was discussed, but the cost of crossing the railroad and creek make this option non-viable. The option of connecting Denver Drive to St. James Church Road was discussed.
13. Attendees were made aware of the joint Commissioner and Planning Board meeting scheduled for November 7, 2016.

PD-R REPORT
FOR
HOWARD PROPERTY
2457 N. HWY 16
LINCOLN COUNTY, NORTH CAROLINA

PREPARED BY:



CES GROUP ENGINEERS, LLP
274 N. Hwy 16, Suite 300
Denver, NC 28037
Phone: 704-489-1500
Firm License #: F-1240

September 23, 2016

**PD-R CONDITIONS
HOWARD PROPERTY
2457 N. HWY 16,
LINCOLN COUNTY, NC**

1. PROJECT INFORMATION

The Howard property subdivision is a proposed single family residential community proposing a mix of single family detached homes on approximately 68+/- acres, on the west side NC 16 Business Hwy, just north of Denver Wesleyan Church (see PD-R Plan). The overall acreage is 84.85 acres of R-SF and B-G zoned property, with approximately 16.7+/- acres (west of the creek centerline) to be subdivided with the intent of transferring it to the Catawba Lands Conservancy.

The project will include Property ID numbers 4604-25-0975, 4604-35-9327 and 4604-35-9165. The development is requesting up to 165 lots with a density of 2.4 lots per acre, based on an average lot size of 52' x 120' with curb and gutter.

Access to the site will be from two (2) access points along N. Hwy 16. Land uses surrounding the site include single family residential, commercial, a church and vacant land. A Lincoln Co. GIS Zoning Map is included for reference.

A key feature of the proposed community will be the ample open space and community amenities. The proposed plan will exceed 25% open space (double the 12.5% required), which will remain undeveloped as natural buffer area and/or become passive and active open space.

Homes within the community will be offered for sale. Homes may range in size from approximately 1,600 square feet to approximately 3,000 square feet as dictated by the consumer or demand.

The property is currently zoned R-SF and B-G, with proposed zoning to be PD-R. The property has some flood zones along Forney Creek, west of the railroad tracks, though this area does not have any proposed homes. A small portion of parcel 34127 along NC 16 is within the WS-IVP watershed.

2. GENERAL PROVISIONS

The PD-R Plan is intended to reflect a generalized arrangement of the site in terms of lot layout, street network, and open space areas. Final lot configuration, placement and size of individual site elements, streets alignments, etc. may be altered or modified within the limits of the Ordinance as described in Section 9.5.13, and the standards established within these conditional notes during the design development (platting) and construction phases. The Petitioner reserves the right to make minor modifications and adjustments to the approved PD-R Plan, including minor reconfiguring lots and street layouts, subject to staff approval, provided that the total number of residential units does not exceed the maximum permitted. Any major modifications will require resubmittal to the Board of Commissioners.

3. DEVELOPMENT STANDARDS

Pursuant to Sections 2.4.9 and 9.5 of the Lincoln County Unified Development Ordinance entitled Planned Development Districts and Planned Development Review respectively; the Petitioner seeks to obtain approval of the use of the following Development Standards concurrently with the approval of the Rezoning Petition. These standards, as established both by the conditional notes as set out below and as depicted on the Preliminary Concept Plan shall be followed for development of the property. Unless otherwise approved as part of these conditional notes, the Lincoln County Unified Development Ordinance shall prevail when developing the site.

A. PERMITTED USES

- 1) The project shall be limited to 165 detached single family residential dwellings and any incidental or accessory uses.
- 2) Uses on the Common Open Space (COS) will include a community park consisting of a playground and picnic area. In addition, uses on the COS may include landscaping, fences, walls, berms, pedestrian trails, recreational uses, entry signage, monuments, dog park, community garden, and storm water BMPs (if required).

B. DENSITY

Gross residential density for the project will not exceed 2.5 units per acre. Open space areas shall be included in the calculations for gross residential density.

C. LOT STANDARDS

The proposed development includes a 20 Ft. (Class B) perimeter buffer. Residential lots will have the following setbacks:

Front Setback:	20 feet
Side Setback:	5 feet (10' corner)
Rear Setback :	20 feet

Building height shall be limited to 45 feet and lot width shall be 40 feet minimum. Lot platting will meet Lincoln County subdivision regulations.

D. GENERAL SITE DESIGN

The following items will be offered as part of this development:

- 1) Streets within the subdivision shall be designed per NCDOT standards. Roadways will be dedicated to NCDOT for maintenance once density requirements are met.
- 2) All fencing shall be consistent in nature and subject to review and approval by the property management association and shall respect all sight triangles. Front yard fencing is prohibited. Rear and side yard fencing, including fencing on corner lots, shall not exceed 5' in height. Fence materials may include wood, metal, or decorative PVC.
- 3) Sidewalks shall be provided along one side of all streets.
- 4) The project will contain the following amenity features.
 - a. Community park consisting of playground and picnic area.
 - b. Benches
 - c. Landscape areas
 - d. Enhanced entry
 - e. A signage plan shall be submitted for the development at the time construction drawings are prepared for the first section of the development. All signage shall conform to standards of the Lincoln County Unified Development Ordinance. Signage shall be monument style and shall complement the architectural characteristics of the neighborhood.

The project may (but not required) also contain the following amenity features:

- a. Dog park
- b. Community garden
- 5) Canopy street trees shall be placed at 40 feet on center along both sides of the proposed streets. Any existing trees in excess of 6 caliper inches within 20 feet of the right of way shall be credited for one required tree to be planted. Duke Energy right-of-way, intersection sight triangles, and proposed driveway locations may vary the placement of street trees.
- 6) Decorative lighting shall be used through the project.
- 7) Mail box kiosks locations will be reviewed by the Postmaster.
- 8) Dry utilities for telephone, cable TV, electricity, and natural gas will be provided by local utility companies. Utilities within the community shall be placed underground. The main feed lines and transformers from the main road may be located above ground.
- 9) Garbage collection will be provided by a private service and included in homeowner association dues.
- 10) Open Space

- a. The project will offer over 25+/-% of common open space. Common open space will be provided as generally depicted on the PD-R Plan.
- b. A portion of the open space will be active open space.
- c. The project will offer a 20 Ft. Class B perimeter buffer as depicted on the Planned Development Concept Plan.

E. STORMWATER COMPLIANCE

The development is not subject to permanent stormwater BMP measures, but will ensure offsite erosion does not occur from project runoff. Stream buffers shall be provided along all jurisdictional streams in accordance with NCDENR and Lincoln County requirements.

F. ESTABLISHMENT OF A PROPERTY ASSOCIATION

A Property Management Association shall be established and will be responsible for maintaining all rights-of-way landscaping, signs, amenity features, and common open space areas. The documents covering the structure of the association shall be filed with the recorded final plat.

G. RESTRICTIVE COVENANTS

Restrictive Covenants will be created and recorded prior to final plat recordation, to establish, among other items, permitted uses and maintenance responsibility of the property management association. Restrictive covenants will include language that ensures stream buffers, perimeter buffers, and setback areas are protected.

H. VEHICULAR ACCESS AND ROAD IMPROVEMENTS

- 1) Vehicular access:
 - a. Two access points will be provided from N. Hwy NC 16.
- 2) Improvements to Existing Roads: A Traffic Impact Analysis (TIA) has been completed. Any improvements by developer required by NCDOT will be installed per their requirements. Any improvement will be installed based on the timeline determined by NCDOT and the traffic engineer's phasing analysis. Below is a list of the full buildout improvements detailed in the TIA.

NC 16 Business Section

- NC 16 Business will be widened to a three-lane cross section to provide a TWLTL from just north of Site Access #1 south to Site Access #2.

Intersection of NC 16 Business and Webbs Road

- There are no improvements recommended at this intersection.

Intersection of NC 16 Business & Fairfield Forest Road/Wallace Lane

- There are no improvements recommended at this intersection, but the developer has agreed to contribute \$25,000 toward future improvements by NCDOT prior to the recording of the plat for Phase 1.

Intersection of NC 16 Business & Site Access 1

- Construct Site Access 1 to provide full access to NC 16 Business with one ingress lane and two egress lanes. Construct one exclusive left-turn lane and one exclusive right-turn lane on the eastbound approach of Site Access 1. The right-turn lane will provide a minimum of 50 feet of full width storage. The one ingress lane will receive traffic from proposed TWLTL on northbound NC 16 Business and from the shared through/right lane on southbound NC 16 Business.

Intersection of NC 16 Business & Site Access 2

- Construct Site Access 2 to provide full access to NC 16 Business with one ingress lane and one egress lane. Construct one shared left and right-turn lane on the eastbound approach of Site Access 2. The one ingress lane will receive traffic from proposed exclusive left-turn lane on northbound NC 16 Business and from the shared through/right lane on southbound NC 16 Business.
- Construct an exclusive left-turn lane on the northbound approach of NC 16 Business with a minimum of 100 feet of full-width storage and the appropriate bay taper.

I. CONSTRUCTION SCHEDULE AND PHASING

The development is proposed to be completed in three (3) phases.

J. MODEL HOMES/SALES OFFICES

Model homes may be constructed within residential areas at the developer's discretion. Mobile temporary sales offices shall be allowed at the developer's discretion and shall be subject to any special permits required by Lincoln County. All models shall have an approved all weather surface (stone, asphalt, etc.) prior to the issuance of a Certificate of Occupancy.

K. WATER AND SEWER AVAILABILITY

The property is within the Lincoln County Sewer District and Lincoln County Water District. The Petitioner understands that water and sewer availability must be approved by Lincoln County prior to development. It is the Petitioner's responsibility to incur all permit fees, availability fees, infrastructure costs for providing the water and sewer throughout the

project for all buildings. The Petitioner will comply with all the County's water and sewer standards.

Water and sewer lines are currently near the property. Sewer is to be provided by connecting to an existing sewer line just north of pump station 12 and water exists along the southbound side of NC 16.

L. APPLICABLE ORDINANCES

Development will be subject to the standards and requirements of the UDO in effect at the date of submission of the application for rezoning.

M. BINDING EFFECT

All conditions applicable to the development of the property approved with this rezoning, unless amended by the manner provided in the UDO, shall be binding to the Petitioner and subsequent owners of the Site and their assigns.

N. AMENDMENTS TO THE APPROVED CONDITIONAL DISTRICT PLAN

It is understood that the owner of the property must apply for any future amendments to the Development Standards, Conditional Notes and in accordance to the provisions of the UDO, Section 9.5.13.

HOWARD PROPERTY
ALSO KNOWN AS GLENWOOD
LINCOLN COUNTY, NC

Traffic Impact Analysis

November 30, 2016

PREPARED BY:

Jonathan Cate, PE, PTOE
A. Morton Thomas and Associates, Inc.
6131 Falls of Neuse Rd, Suite 106
Raleigh, NC 27609
(919) 855-9989

AMT Project File 16-0780.001
NC License No: F-1049



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Jonathan E. Cate

11-30-16

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EXECUTIVE SUMMARY

Howard Property (also referred to as Glenwood) is a proposed residential development located on the west side of NC 16 Business, north of Hagers Hollow Drive, between the Denver Wesleyan Church and the Harbor Winds strip mall in northeastern Lincoln County, North Carolina. The development is proposed to consist of single family homes and is assumed to be fully-completed in 2019 with a maximum total of 200 dwelling units.

This report summarizes the analyses of 2016 Existing conditions, 2019 No-Build conditions (without proposed development and with the Approved Adjacent Developments in place), 2019 Build conditions (with the proposed development in place), and 2019 Build Improved conditions (with proposed development and Recommended Improvements in place) during the AM and PM peak hours. In other words, this report analyzes the traffic conditions related to the full build-out of the proposed development.

AMT (A. Morton Thomas and Associates, Inc.) was retained to determine the potential traffic impacts of this development in accordance with the traffic study guidelines set forth by Lincoln County and the North Carolina Department of Transportation (NCDOT) and the transportation improvements that may be required to accommodate these impacts. This report presents trip generation, distribution, capacity analyses, and recommendations for transportation improvements required to meet anticipated traffic demands.

Lincoln County and NCDOT were contacted to obtain background information and to establish the elements to be covered in this traffic impact analysis (TIA).

As approved by Lincoln County and NCDOT, the following intersections are included as part of the area of influence for the development.

- NC 16 Business at Fairfield Forest Road/Wallace Lane (Signalized four-legged-intersection)
- NC 16 Business at Webbs Road (Signalized four-legged-intersection)
- NC 16 Business at Site Access 1 (*Proposed full-movement access*)
- NC 16 Business at Site Access 2 (*Proposed full movement access*)

Below is a detailed description of the existing study area roadway network. All Average Annual Daily Traffic (AADT) information provided in this description was obtained from the North Carolina Department of Transportation (NCDOT) via the www.ncdot.gov website.

NC 16 Business is a two-lane undivided roadway facility that travels north/south in the vicinity of the proposed development. NCDOT functional classification maps show NC 16 Business as a minor arterial in the area of the proposed development. Land uses along NC 16 Business are primarily low-density residential and commercial. The posted speed indicated on the traffic signal plans for NC 16 Business at Webbs Road is 50 miles per hour (mph). NCDOT Average Annual Daily Traffic (AADT) counts show 12,000 vehicles per day (vpd) on NC 16 Business in 2014 near Fairfield Forest Road.

Webbs Road (SR 1379) is a two lane undivided roadway facility that runs east/west from NC 16 Business to a residential area near Lake Norman. NCDOT functional classification maps show Webbs Road as a local road in the area of the proposed development. Land uses along Webbs Road are primarily low-density residential with some commercial at the intersection of Webbs Road at NC 16 Business. The posted speed indicated on the traffic signal plans for NC 16 Business at Webbs Road is 55 miles per hour (mph). NCDOT Average Annual Daily Traffic (AADT) counts show 5,600 vehicles per day (vpd) on Webbs Road in 2014 near Burton Lane.

Fairfield Forest Road (SR 1389) is a two-lane, east-west, local road providing access to mainly residential neighborhoods. NCDOT functional classification maps show Fairfield Forest Road as a local road in the area of the proposed development. The land use along Fairfield Forest Road in the vicinity of NC 16 Business is limited to commercial uses. The posted speed on Fairfield Forest Road is 45 miles per hour.

Wallace Lane is a two-lane, east-west, local road providing access to a residential neighborhood. There are no existing posted speed limit signs.

The purpose of this Traffic Impact Analysis Report is to assess the traffic carrying capacity of surrounding roadway network. There are a total of four (4) types of analyses for the intersections affected by the proposed development. First, the "Existing Conditions" analysis uses the traffic counts available to evaluate the current intersection operational performance. Traffic counts were taken in December 2015 and September 2016 at the study intersections. Secondly, the "No-Build" analysis examines the future traffic conditions where the proposed development is not constructed. A minimum growth factor of three percent (3%) per year is proposed to be used to determine future traffic volumes. Thirdly, the "Build" analysis comprises the full build-out of the site with the outlying future traffic, and evaluates the intersection operational performance. And lastly, the "Build Improved" analysis highlights the mitigation needed if the "Build" analysis shows deficiencies in the study area. This analysis will report improvements and their effect on the studied intersections. All of the analyses are performed for the AM and PM peak hours. That is, the highest volume hour between 7:00 and 9:00 AM for the AM peak hour and the highest volume hour between 4:00 and 6:00 PM for the PM peak hour. The two existing intersections are studied in all analysis scenarios and both peak hours.

Site Trip Generation and Distribution

The proposed development will be a residential development consisting of a maximum of 200 single family homes. Trip generation equations for the residential land use type (ITE Code 210) is provided in the ITE Trip Generation Manual, 9th Edition. It was estimated that a total of 150 trips (38 in, 112 out) will be generated from the proposed site in the AM peak hour and 200 trips (126 in, 74 out) will be generated in the PM peak hour. It should be noted that since the MOU was approved the site plan has been revised. The most recent site plan indicates 162 single-family lots on the property. To be conservative, the study is still based on 200 single-family units. The trip generation for the proposed development is shown in Table ES-1:

Table ES-1: Proposed Development Trip Generation

Land Use	Intensity	Daily Trips	AM Peak Hour Trips (vph)			PM Peak Hour Trips (vph)		
			Total	Enter	Exit	Total	Enter	Exit
Residential	200 D.U.	1,904	150	38	112	200	126	74
Total New External Site Trips		1,904	150	38	112	200	126	74

Currently, two points of access are planned. Site Access 1 is proposed to be a full-movement access point, envisioned to be located approximately 1,000 feet north of the intersection of NC 16 Business at Hagers Hollow Drive. Site Access 2 is proposed to also be a full-movement access point, envisioned to be located approximately 650 feet north of the intersection of NC 16 Business at Hagers Hollow Drive.

The site generated trips to and from the proposed site were distributed in accordance with the apparent traffic patterns by the users of the proposed development and the existing traffic patterns and land uses in the vicinity. The trip distribution is as follows:

- 70% to/from the south on NC 16 Business
- 20% to/from the north on NC 16 Business
- 5% to/from the east on Webbs Road
- 5% to/from the east on Fairfield Forest Road

2016 Existing Conditions

Traffic counts at the intersection of NC 16 Business and Webbs Road were performed by National Data & Surveying Services on Tuesday, December 8, 2015. Traffic counts at the intersection of NC 16 Business and Fairfield Forest Road/Wallace Lane were performed by A. Morton Thomas & Associates, Inc. on Wednesday, September 7, 2016. Since the two counts were performed during different calendar years and a basic comparison of the northbound/southbound mainline NC 16 Business traffic volumes indicated lower volumes in the vicinity of Webbs Road, the existing 2015 traffic volumes at the intersection of NC 16 Business and Webbs Road were increased by three percent (3%) growth for one year to obtain 2016 existing traffic volumes. Due to the large distance between the two existing intersections on NC 16 Business (1.5 miles), the counts were not adjusted to balance the volumes between the two study intersections. NC 16 Business at Webbs Road and Fairfield Forest Road/Wallace Lane operate as signalized intersections in the study area. For existing conditions, the phasing and timing parameters for both intersections were based on the signal plans that were obtained from the NCDOT, and according to the signal plans, the intersections function as isolated fully actuated signals.

The results of this analysis indicate that both existing study area intersections operate an acceptable overall level of service during both peak hours. One notable area is the westbound approach of Fairfield Forest Road at NC 16 Business. Analysis indicates that this approach operates at LOS D during the AM peak hour and LOS E during the PM peak hour.

2019 No-Build Conditions

As outlined in the approved MOU, existing traffic volumes were increased by three present (3%) growth per year to reflect 2019 background traffic volumes. Additionally, the no-build analysis scenario includes traffic from two (2) approved developments. Specifically, the Webbs Road Retail development and Phase II of the residential portion of the Stratford Subdivision development.

The results of this analysis indicate that both existing study area intersections are expected to continue to operate an acceptable overall level of service. However, the operation of the westbound approach of Fairfield Forest Road at US 16 Business is expected to deteriorate to LOS F during the PM peak hour. This may be attributed to high volumes on NC 16 Business requiring the majority of the signal green time to allow for efficient traffic flow (but resulting in insufficient green time for the minor legs of the intersection) and a single shared left/through/right lane from Fairfield Forest Road with a high left turn volume in the PM peak hour. During the AM peak hour, this approach is expected to continue to operate at LOS D.

2019 Build Conditions

The total future build traffic volumes include both the site traffic and traffic volumes from the no-build analysis. As discussed for the 2016 Existing Conditions, the counts at Webbs Road and Fairfield Forest Road/Wallace Lane were not adjusted to balance the volumes due to the large distance between the two intersections (1.5 miles). This results in a minimal volume imbalance along northbound and southbound NC 16 Business in the 2019 Build Conditions Synchro and SimTraffic models for the AM and PM peak hours. The build analysis evaluated the traffic conditions before any improvements are implemented.

The results of this analysis indicate that the signalized intersection of NC 16 Business at Webbs Road is expected to continue to operate at an acceptable overall level of service during both the AM and PM peak hours. Analysis also indicates that the signalized intersection of US 16 Business and Fairfield Forest Road/Wallace Lane is expected to operate at an acceptable overall level of service during both the AM and PM peak hours. The westbound approach of Fairfield Forest Road is expected to continue to operate at LOS F during the PM peak hour.

Analysis indicates that the unsignalized approach/egress to NC 16 Business from Site Access #1 is expected to operate at an unacceptable LOS F during the PM peak hour. In addition, the unsignalized approach/egress to NC 16 Business from Site Access #2 is expected to operate at an unacceptable LOS E during the PM peak hour. This may be attributed to insufficient gaps in mainline NC 16 Business traffic as residents attempt to turn left out of the development.

2019 Build Improved Conditions

Geometric improvements such as installation of turn-lanes are recommended and therefore analyzed in this scenario. These items are listed in the Recommendations section.

The results of this analysis show that with the recommended improvements in place, all study area intersections and approaches operate at an acceptable level of service with one exception. Specifically, the westbound approach of Fairfield Forest Drive at NC 16 Business operates at LOS F during the PM peak hour. However, no improvements are recommended at this intersection due to the low number of trips the proposed development is expected to contribute to the westbound approach during the PM peak hour. Specifically, the site is expected to add six trips to the approach which is less than 3% of the total of 230 trips expected to occur during the PM peak hour.

Capacity analysis for the intersection of NC 16 Business at Site Access #1 show that the intersection is expected to continue to operate at an LOS F during the PM peak hour with a northbound left-turn lane and an eastbound right-turn lane in place. As part of the recommended improvements, a two-way left turn lane (TWLTL) is constructed along NC 16 Business north and south of the intersection in the median. This TWLTL should be extended south to Site Access #2 (approximately 420 feet) as a frontage road for the proposed development, as well as north of Site Access #1 so motorists can utilize the lane to accelerate and merge into mainline NC 16 Business traffic.

Analysis indicates that with an exclusive northbound right-turn lane in place, the northbound left-turn movement from US 16 Business as well as the eastbound approach of Site Access 2 are expected to operate at acceptable levels during both peak hours. These are listed in the Recommendations section.

Conclusions/Recommendations

Howard Property (also referred to as Glenwood) is a proposed residential development located on the west side of NC 16 Business, north of Hagers Hollow Drive, between the Denver Wesleyan Church and the Harbor Winds strip mall in northeastern Lincoln County, North Carolina. The development is proposed to consist of single family homes and is assumed to be fully-completed in 2019 with a maximum total of 200 dwelling units.

It was estimated that a total of 150 trips (38 in, 112 out) will be generated from the proposed site in the AM peak hour and 200 trips (126 in, 74 out) will be generated in the PM peak hour.

The results of this analysis show that with the recommended improvements in place, all study area intersections and approaches operate at an acceptable level of service with one exception. Specifically, the westbound approach of Fairfield Forest Drive at NC 16 Business operates at LOS F during the PM peak hour. However, no improvements are recommended at this intersection due to the low number of trips the proposed development is expected to

contribute to the westbound approach during the PM peak hour. Specifically, the site is expected to add six trips to the approach which is less than 3% of the total of 230 trips expected to occur during the PM peak hour.

Capacity analysis for the intersection of NC 16 Business at Site Access #1 show that the intersection is expected to continue to operate at an LOS F during the PM peak hour with a northbound left-turn lane and an eastbound right-turn lane in place. As part of the recommended improvements, a two-way left turn lane (TWLTL) is constructed along NC 16 Business north and south of the intersection in the median. This TWLTL should be extended south to Site Access #2 (approximately 420 feet) as a frontage road for the proposed development, as well as north of Site Access #1 so motorists can utilize the lane to accelerate and merge into mainline NC 16 Business traffic.

Analysis indicates that with an exclusive northbound right-turn lane in place, the northbound left-turn movement from US 16 Business as well as the eastbound approach of Site Access 2 are expected to operate at acceptable levels during both peak hours. These are listed in the Recommendations section.

Based on the findings of this study, specific improvements have been identified and should be completed as part of the proposed development. The NCDOT *“Policy on Street and Driveway Access to North Carolina Highways”* manual was consulted to determine the appropriate storage for the recommended auxiliary lanes is warranted.

NC 16 Business Section

- NC 16 Business will be widened to a three-lane cross-section to provide a TWLTL from just north of Site Access #1 south to Site Access #2.

Intersection of NC 16 Business & Webbs Road

- There are no improvements recommended at this intersection.

Intersection of NC 16 Business & Fairfield Forest Road/Wallace Lane

- There are no improvements recommended at this intersection.

Intersection of NC 16 Business & Site Access 1

- Construct Site Access 1 to provide full access to NC 16 Business with one ingress lane and two egress lanes. Construct one exclusive left-turn lane and one exclusive right-turn lane on the eastbound approach of Site Access 1. The right-turn lane will provide a minimum of 50 feet of full width storage. The one ingress lane will receive traffic from the proposed TWLTL on northbound NC 16 Business and from the shared through/right lane on southbound NC 16 Business.

Intersection of NC 16 Business & Site Access 2

- Construct Site Access 2 to provide full access to NC 16 Business with one ingress lane and one egress lane. Construct one shared left and right-turn lane on the eastbound approach of Site Access 2. The one ingress lane will receive traffic from the proposed exclusive left-turn lane on northbound NC 16 Business and from the shared through/right lane on southbound NC 16 Business.
- Construct an exclusive left-turn lane on the northbound approach of NC 16 Business with a minimum of 100 feet of full-width storage and the appropriate bay taper.

INTRODUCTION

Howard Property (also referred to as Glenwood) is a proposed residential development located on the west side of NC 16 Business, north of Hagers Hollow Drive, between the Denver Wesleyan Church and the Harbor Winds strip mall in northeastern Lincoln County, North Carolina. The development is proposed to consist of single family homes and is assumed to be fully-completed in 2019 with a maximum total of 200 dwelling units.

This report summarizes the analyses of 2016 Existing conditions, 2019 No-Build conditions (without proposed development and with the Approved Adjacent Developments in place), 2019 Build conditions (with the proposed development in place), and 2019 Build Improved conditions (with proposed development and Recommended Improvements in place) during the AM and PM peak hours. In other words, this report analyzes the traffic conditions related to the full build-out of the proposed development.

AMT (A. Morton Thomas and Associates, Inc.) was retained to determine the potential traffic impacts of this development in accordance with the traffic study guidelines set forth by Lincoln County and the North Carolina Department of Transportation (NCDOT) and the transportation improvements that may be required to accommodate these impacts. This report presents trip generation, distribution, capacity analyses, and recommendations for transportation improvements required to meet anticipated traffic demands.

Lincoln County and NCDOT were contacted to obtain background information and to establish the elements to be covered in this traffic impact analysis (TIA). Please refer to Appendix A for a copy of the approved Memorandum of Understanding.

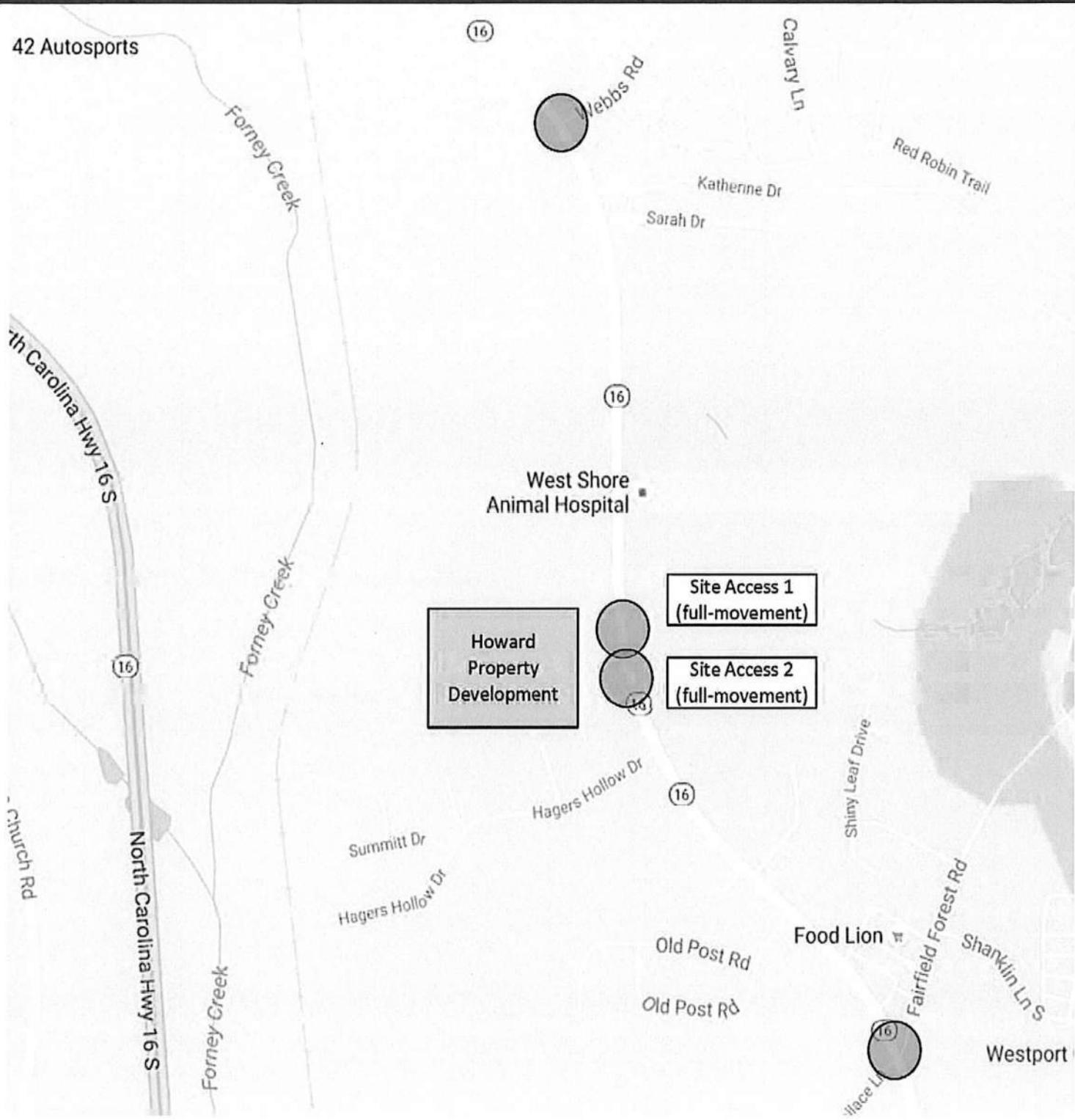
STUDY AREA DESCRIPTION

As approved by Lincoln County and NCDOT, the following intersections are included as part of the area of influence for the development (see Figure 1).

• NC 16 Business at Fairfield Forest Road/Wallace Lane	(Signalized four-legged-intersection)
• NC 16 Business at Webbs Road	(Signalized four-legged-intersection)
• NC 16 Business at Site Access 1	(<i>Proposed full-movement access</i>)
• NC 16 Business at Site Access 2	(<i>Proposed full movement access</i>)

Currently, two points of access are planned. Site Access 1 is proposed to be a full-movement access point, envisioned to be located approximately 1,000 feet north of the intersection of NC 16 Business at Hagers Hollow Drive. Site Access 2 is proposed to also be a full-movement access point, envisioned to be located approximately 650 feet north of the intersection of NC 16 Business at Hagers Hollow Drive. The proposed site plan is shown for illustrative purposes only in Figure 2.

(16)

**LEGEND**

- Howard Property Development
- = External Intersections
- = Site Driveways

AMTNOT
TO
SCALE**Howard Property Development
Traffic Impact Analysis****Study Area**

November 2016

FIGURE 1



Note: Since the MOU was approved the site plan has been revised. The most recent site plan indicates 162 single-family lots on the property. To be conservative, the study is still based on 200 single-family units.



NOT
TO
SCALE

Howard Property Development Traffic Impact Analysis

Site Plan

November 2016

FIGURE 2

FIGURE 2

EXISTING ROADWAY CONDITIONS

Below is a detailed description of the existing study area roadway network. All Average Annual Daily Traffic (AADT) information provided in this description was obtained from the North Carolina Department of Transportation (NCDOT) via the www.ncdot.gov website.

NC 16 Business is a two-lane undivided roadway facility that travels north/south in the vicinity of the proposed development. NCDOT functional classification maps show NC 16 Business as a minor arterial in the area of the proposed development. Land uses along NC 16 Business are primarily low-density residential and commercial. The posted speed indicated on the traffic signal plans for NC 16 Business at Webbs Road is 50 miles per hour (mph). NCDOT Average Annual Daily Traffic (AADT) counts show 12,000 vehicles per day (vpd) on NC 16 Business in 2014 near Fairfield Forest Road.

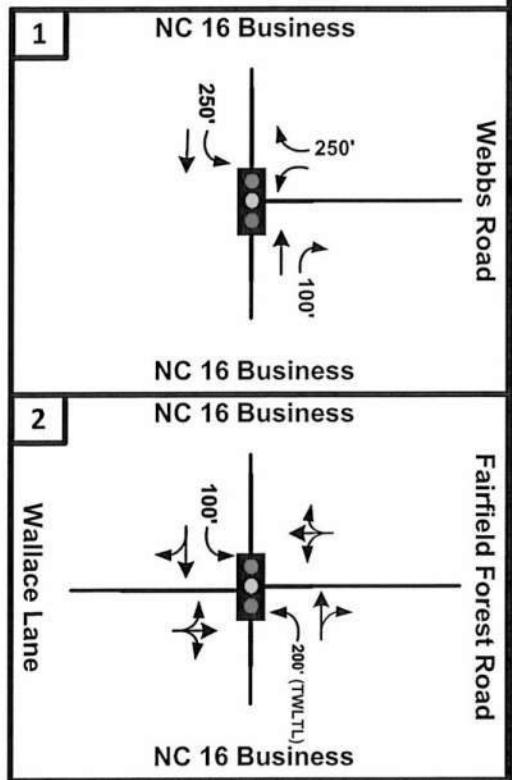
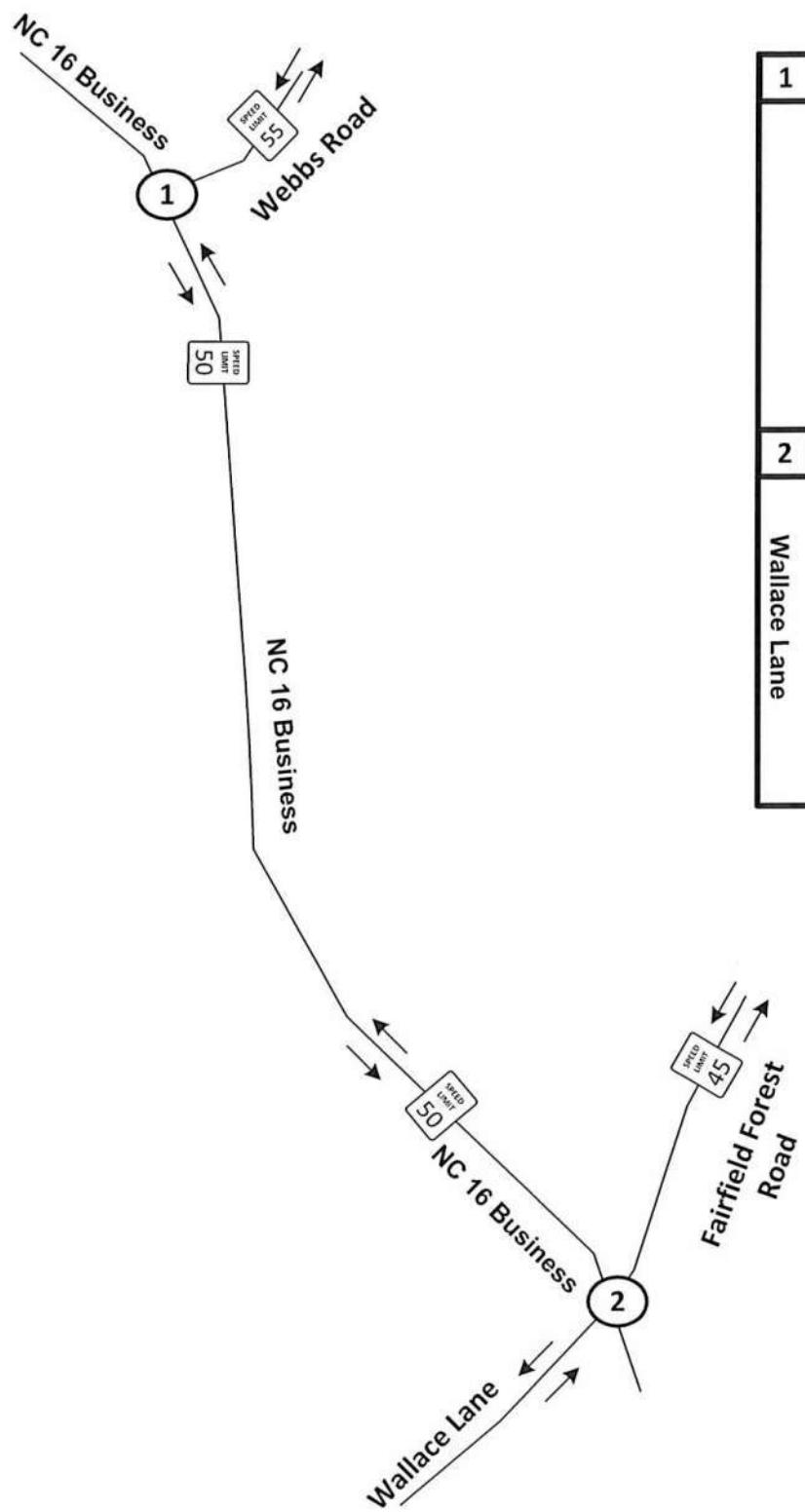
Webbs Road (SR 1379) is a two-lane undivided roadway facility that runs east/west from NC 16 Business to a residential area near Lake Norman. NCDOT functional classification maps show Webbs Road as a local road in the area of the proposed development. Land uses along Webbs Road are primarily low-density residential with some commercial at the intersection of Webbs Road at NC 16 Business. The posted speed indicated on the traffic signal plans for NC 16 Business at Webbs Road is 55 miles per hour (mph). NCDOT Average Annual Daily Traffic (AADT) counts show 5,600 vehicles per day (vpd) on Webbs Road in 2014 near Burton Lane.

Fairfield Forest Road (SR 1389) is a two-lane, east-west, local road providing access to mainly residential neighborhoods. NCDOT functional classification maps show Fairfield Forest Road as a local road in the area of the proposed development. The land use along Fairfield Forest Road in the vicinity of NC 16 Business is limited to commercial uses. The posted speed on Fairfield Forest Road is 45 miles per hour.

Wallace Lane is a two-lane, east-west, local road providing access to a residential neighborhood. There are no existing posted speed limit signs.

Both of the existing intersections within the proposed site area are signalized. The signal at NC 16 Business at Webbs Road is a three-phase fully-actuated and isolated signal maintained by NCDOT, while the signal at NC 16 Business at Fairfield Forest Road/Wallace Lane is a two-phase fully-actuated and isolated signal maintained by NCDOT. The signal plans for both intersections are located in Appendix E. The existing intersection geometrics are shown in Figure 3.

The purpose of this Traffic Impact Analysis Report is to assess the traffic carrying capacity of surrounding roadway network. There are a total of four (4) types of analyses for the intersections affected by the proposed development. First, the "Existing Conditions" analysis uses the traffic counts available to evaluate the current intersection operational performance. Traffic counts were taken in December 2015 and September 2016 at the study intersections. Secondly, the "No-Build" analysis examines the future traffic conditions where the proposed development is not constructed. A minimum growth factor of three percent (3%) per year is proposed to be used to determine future traffic volumes. Thirdly, the "Build" analysis comprises the full build-out of the site with the outlying future traffic, and evaluates the intersection operational performance. And lastly, the "Build Improved" analysis highlights the mitigation needed if the "Build" analysis shows deficiencies in the study area. This analysis will report improvements and their effect on the studied intersections. All of the analyses are performed for the AM and PM peak hours. That is, the highest volume hour between 7:00 and 9:00 AM for the AM peak hour and the highest volume hour between 4:00 and 6:00 PM for the PM peak hour. The two existing intersections are studied in all analysis scenarios and both peak hours.



LEGEND

- STOP: Existing Traffic Control
- Existing Roadway
- Existing Laneage
- XXX' Storage Bay Length
- SPEED LIMIT XX: Existing Posted Speed

AMT



NOT
TO
SCALE

Howard Property Development
Traffic Impact Analysis

2016 Existing Lane Configuration

November 2016

FIGURE 3

TRIP GENERATION

The proposed development will be a residential development consisting of 200 single family homes. Trip generation equations for the residential land use type (ITE Code 210) is provided in the ITE Trip Generation Manual, 9th Edition. It was estimated that a total of 150 trips (38 in, 112 out) will be generated from the proposed site in the AM peak hour and 200 trips (126 in, 74 out) will be generated in the PM peak hour.

It should be noted that since the MOU was approved the site plan has been revised. The most recent site plan indicates 162 single-family lots on the property. To be conservative, the study is still based on 200 single-family units.

The trip generation for the proposed development is shown in Table 1:

Table 1: Proposed Development Trip Generation

Land Use	Intensity	Daily Trips	AM Peak Hour Trips (vph)			PM Peak Hour Trips (vph)		
			Total	Enter	Exit	Total	Enter	Exit
Residential	200 D.U.	1,904	150	38	112	200	126	74
Total New External Site Trips		1,904	150	38	112	200	126	74

SITE ACCESS

Currently, two points of access are planned. Site Access 1 is proposed to be a full-movement access point, envisioned to be located approximately 1,000 feet north of the intersection of NC 16 Business at Hagers Hollow Drive. Site Access 2 is proposed to also be a full-movement access point, envisioned to be located approximately 650 feet north of the intersection of NC 16 Business at Hagers Hollow Drive.

TRIP DISTRIBUTION

The site generated trips to and from the proposed site were distributed in accordance with the apparent traffic patterns by the users of the proposed development and the existing traffic patterns and land uses in the vicinity. The trip distribution is as follows:

- 70% to/from the south on NC 16 Business
- 20% to/from the north on NC 16 Business
- 5% to/from the east on Webbs Road
- 5% to/from the east on Fairfield Forest Road

Trip distribution and trip assignment is shown in Figure 9 and Figure 10; respectively.

PROJECT TRAFFIC VOLUMES

Existing Traffic Volumes

Traffic counts at the intersection of NC 16 Business and Webbs Road were performed by National Data & Surveying Services on Tuesday, December 8, 2015. The counts were performed in five (5) minute intervals as required by MSTA guidelines. For the purpose of capacity analysis, these five-minute intervals were converted to fifteen (15) minute interval volumes solely for the purpose of calculating the peak hour factor (PHF). Traffic counts at the intersection of NC 16 Business and Fairfield Forest Road/Wallace Lane were performed by A. Morton Thomas & Associates, Inc. on Wednesday, September 7, 2016 and tabulated in fifteen (15) minute intervals. The traffic counts are located in Appendix B. Traditional calendar schools in Lincoln County were confirmed to be in-session on both dates that the counts were performed. The raw 2015/2016 Existing Traffic Volumes are shown on Figure 4a.

Since the two counts were performed during different calendar years and a basic comparison of the northbound/southbound mainline NC 16 Business traffic volumes indicated lower volumes in the vicinity of Webbs Road, the existing 2015 traffic volumes at the intersection of NC 16 Business and Webbs Road were increased by three percent (3%) growth for one year to obtain 2016 existing traffic volumes. The 2015 Existing Traffic Growth at NC 16 Business with Webbs Road is shown on Figure 4b. The 2016 Existing Traffic Volumes at both existing intersections are shown on Figure 4c. Due to the large distance between the two existing intersections on NC 16 Business (1.5 miles), the counts were not adjusted to balance the volumes between the two study intersections. The existing counts and traffic growth calculations are shown in Appendix C.

NC 16 Business at Webbs Road and Fairfield Forest Road/Wallace Lane operate as signalized intersections in the study area. For existing conditions, the phasing and timing parameters for both intersections were based on the signal plans that were obtained from the NCDOT, and according to the signal plans, the intersections function as isolated fully actuated signals. It should be noted that the traffic counts at Webbs Road recorded a small number of vehicles turning into the private driveway that is positioned on the west-side of the three-legged intersection. As this driveway does not operate under the control of the traffic signal and the volumes are minimal, these volumes have not been included in the calculations, figures, or traffic analysis.

Historical Growth Traffic (2019 Background Traffic)

Historical growth traffic is the increase in existing traffic volumes due to general usage increases and non-specific growth throughout the area. As agreed upon in the MOU, existing traffic volumes were increased by three percent (3%) growth per year to reflect 2019 background traffic volumes.

These 2019 Historical Growth Traffic Volumes are illustrated in Figure 5. The traffic calculations are shown in Appendix C.

Approved Development Traffic

Two (2) approved developments were indicated by Lincoln County to be included in the study.

- 1) The Webbs Road Retail development is located in the northeast quadrant at the intersection of NC 16 Business at Webbs Road. The TIA was completed in January of 2009 and as of the writing of this report, only the CVS Pharmacy has been completed. Therefore, the trips attributed to the CVS Pharmacy were subtracted from the total trips shown in the TIA. This is detailed in Table 2. Traffic calculations are shown in Appendix C and pertinent pages from the Webbs Road Retail TIA are located in Appendix D. The Webbs Road Retail trip assignments are shown on Figure 6a.

Table 2: Webbs Road Retail Approved Development Trips

Land Use	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
	Enter	Exit	Enter	Exit
Total Buildout	165	118	285	302
CVS	20	15	28	28
Adjusted Approved Development Trips	145	103	257	274

2) Phase II of Stratford Subdivision (residential) development, consisting of a total of 119 single family homes, is located on the east side of NC 16 Business, south of Sarah Drive. The TIA was revised and re-submitted to NCDOT in August of 2016 by A. Morton Thomas & Associates, Inc. Phase I will consist of the construction of approximately 49 homes, with a completion date of 2018. Phase II will consist of the construction of 70 additional homes (cumulative total of 119 homes), with a completion date of 2019. The approved development trips are detailed in Table 3. Traffic calculations are shown in Appendix C and pertinent pages from the Stratford Subdivision TIA are located in Appendix D. The Phase II Stratford Subdivision (residential) trip assignments are shown on Figure 6b.

Table 3: Phase II Stratford Subdivision (Residential) Approved Development Trips

Land Use	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
	Enter	Exit	Enter	Exit
Total Buildout	22	67	75	44
Approved Development Trips	22	67	75	44

The total approved adjacent development trips for both developments are shown on Figure 6c.

2019 No-Build Traffic Volumes

The historical growth traffic and approved adjacent development traffic volumes were then added to the existing volumes to determine the 2019 No-Build Traffic Volumes, which are shown in Figure 8. No roadway improvements were recommended at the study intersections, so the no-build intersection geometrics are identical to existing conditions and are shown on Figure 7.

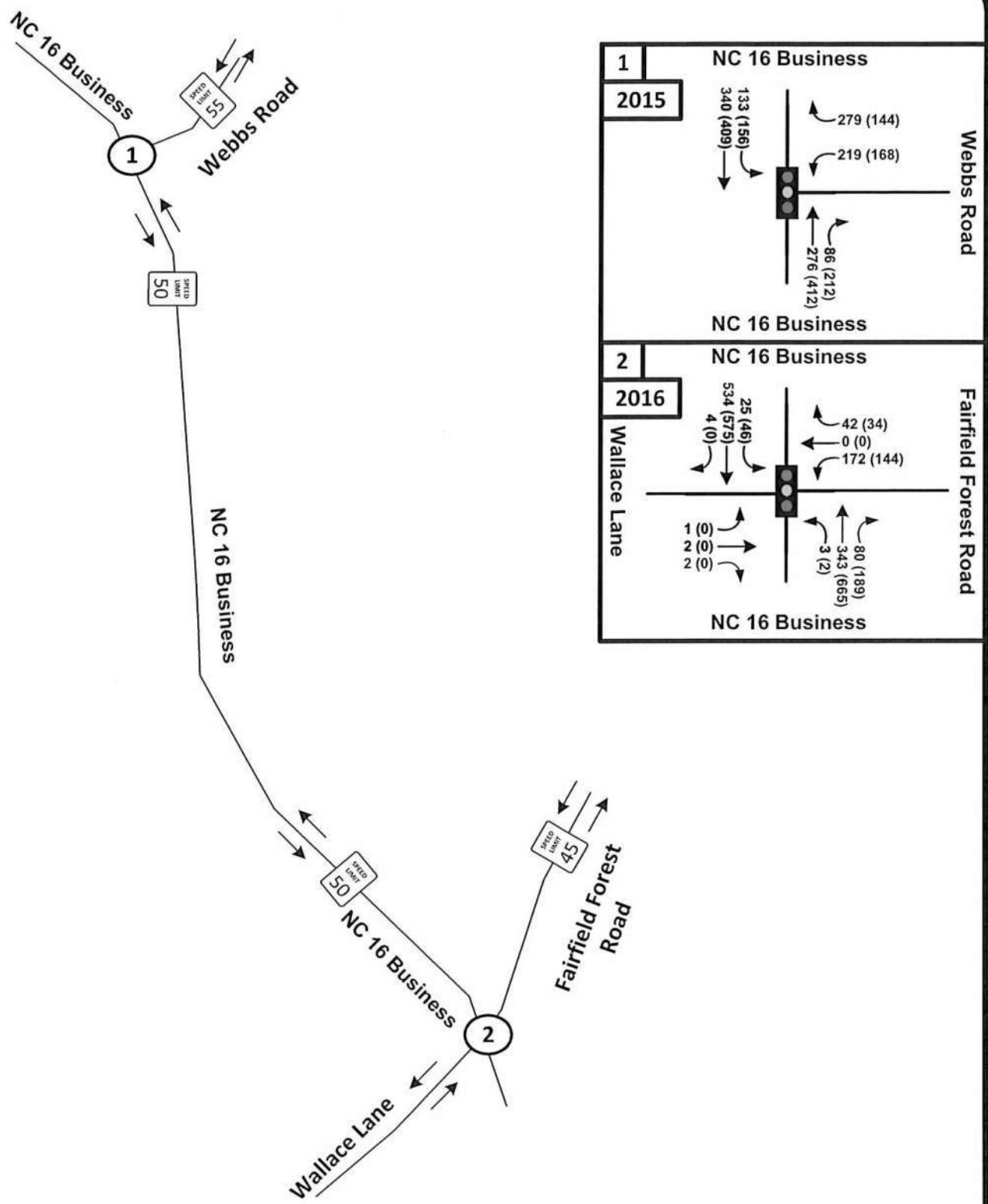
Proposed Development Traffic

The proposed development traffic was generated, distributed, and assigned to the adjacent roadway network as discussed previously. The site trip distribution percentages are shown on Figure 9 and the site trip assignments are shown on Figure 10. The traffic calculations are shown in Appendix C.

2019 Build Traffic Volumes

The 2019 build traffic volumes include the 2019 no-build traffic and the proposed development traffic. As discussed for the 2016 Existing Conditions, the counts at Webbs Road and Fairfield Forest Road/Wallace Lane were not adjusted to balance the volumes due to the large distance between the two intersections (1.5 miles). This results in a minimal volume imbalance along northbound and southbound NC 16 Business in the 2019 Build Conditions

Synchro and SimTraffic models for the AM and PM peak hours. The AM and PM peak-hour 2019 Build traffic volumes are shown in Figure 11. The traffic calculations are shown in Appendix C.



LEGEND

- STOP Existing Traffic Control
- Existing Roadway
- Existing Laneage
- Existing Posted Speed
- XX (XX) AM (PM) Peak Hour Volumes

AMT



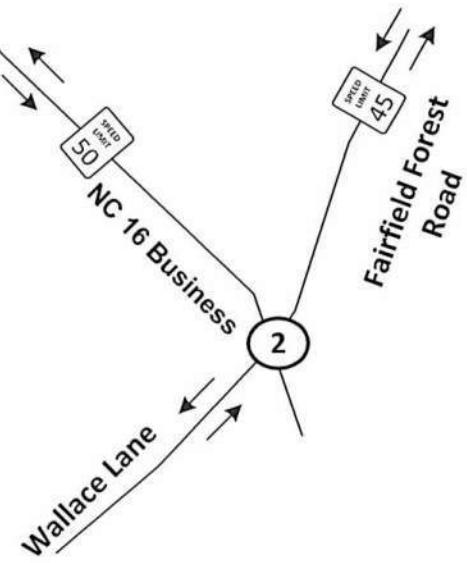
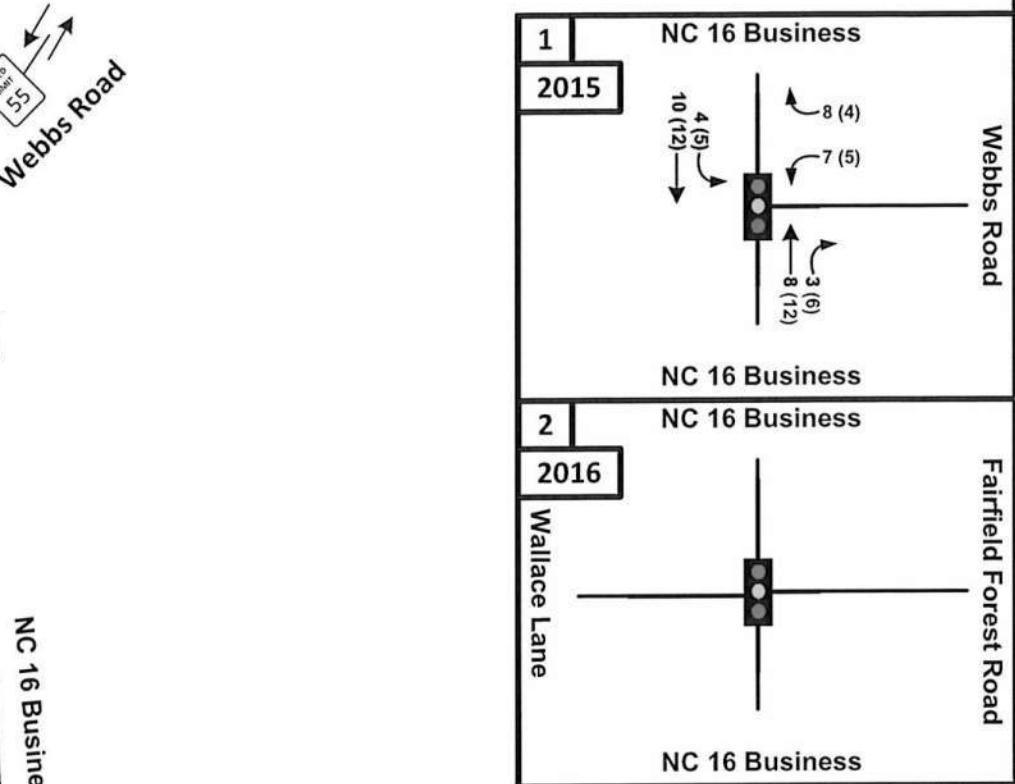
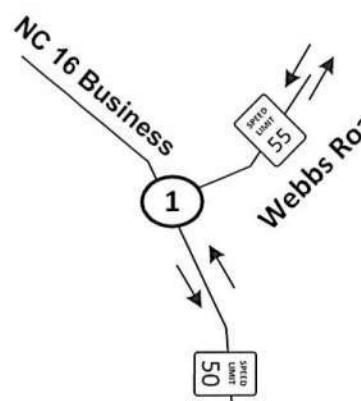
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Howard Property Development
Traffic Impact Analysis

2015/2016 Existing Traffic Volumes

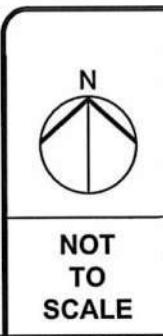
November 2016

FIGURE 4a



LEGEND	
	Existing Traffic Control
—	Existing Roadway
→	Existing Laneage
	Existing Posted Speed
XX (XX)	AM (PM) Peak Hour Volumes

AMT



Howard Property Development
Traffic Impact Analysis

2015 Existing Traffic Growth

November 2016

FIGURE 4b

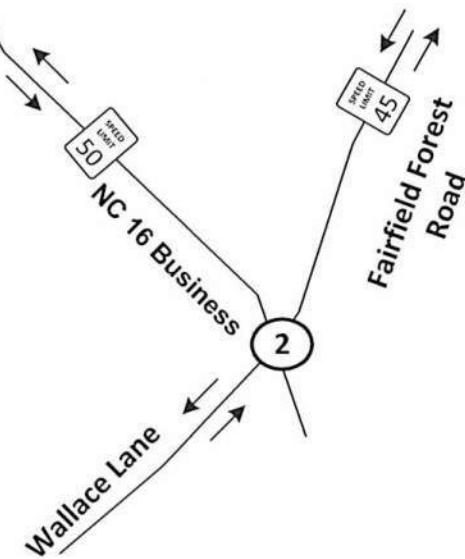
NC 16 Business

Webbs Road

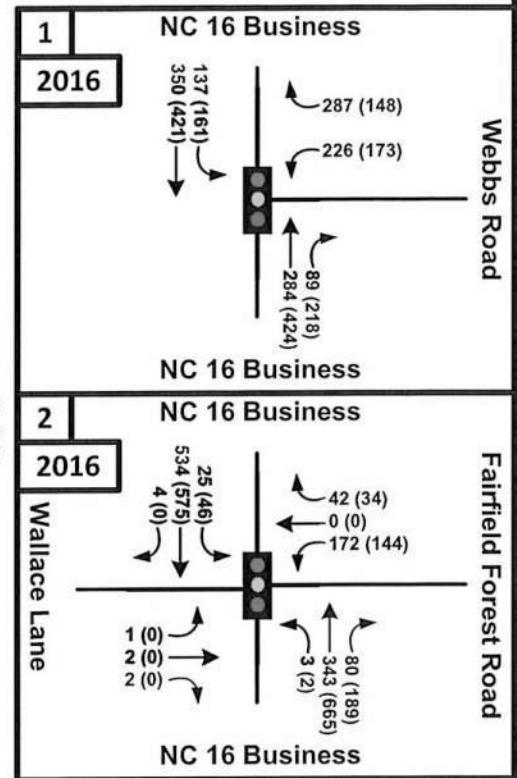
1

50

NC 16 Business



Note: Per NCDOT guidelines any turning movement volume less than 4 vph will be set to 4 vph in the analysis files.



LEGEND



Existing Traffic Control



Existing Roadway



Existing Laneage



Existing Posted Speed

XX (XX) AM (PM) Peak Hour Volumes



NOT
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SCALE

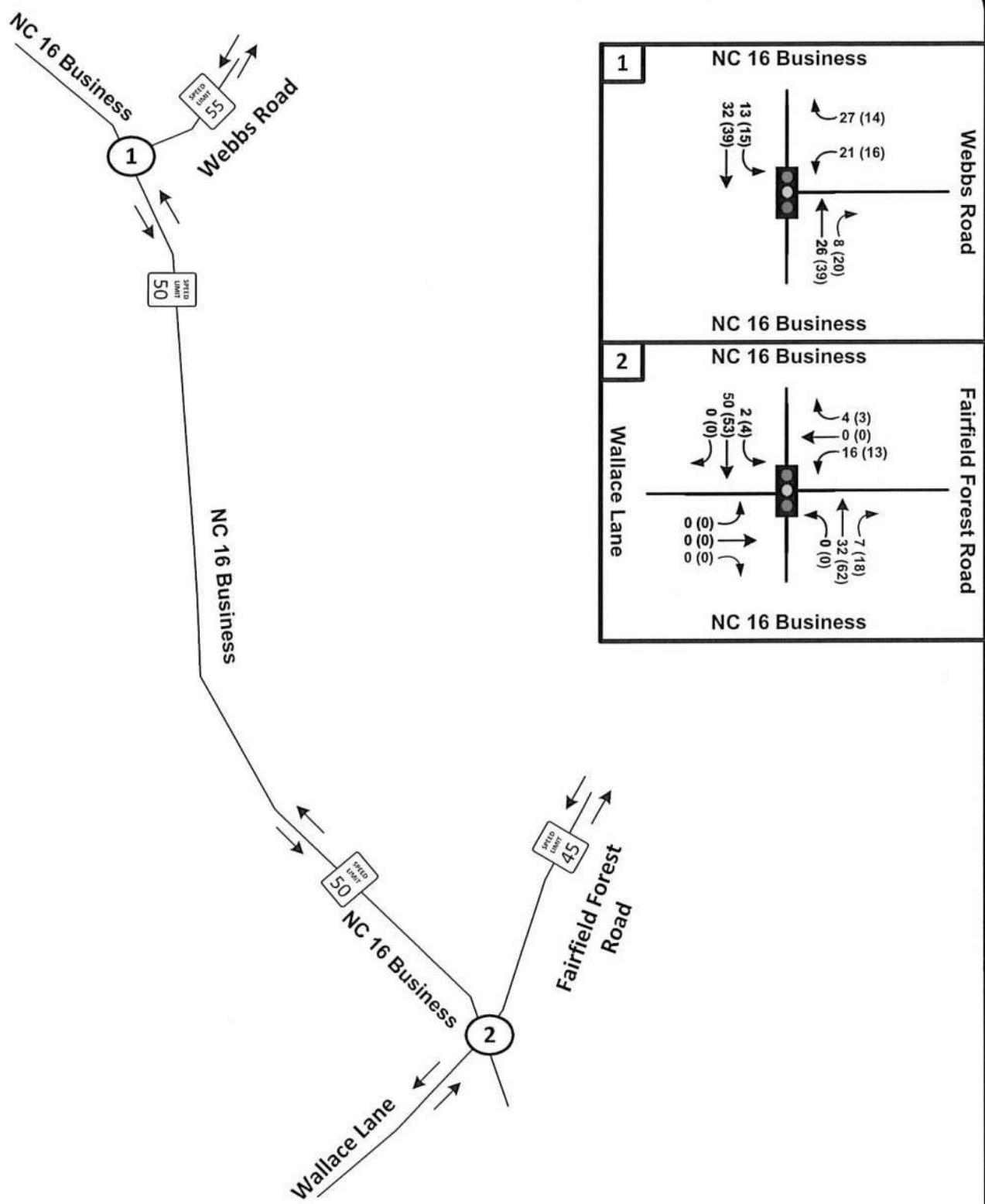
Howard Property Development
Traffic Impact Analysis

2016 Existing Traffic Volumes

November 2016

FIGURE 4c

AMT



LEGEND

- STOP Existing Traffic Control
- Existing Roadway
- Existing Laneage
- Existing Posted Speed
- SPEED LIMIT XX Existing (XX) AM (PM) Peak Hour Volumes

AMT



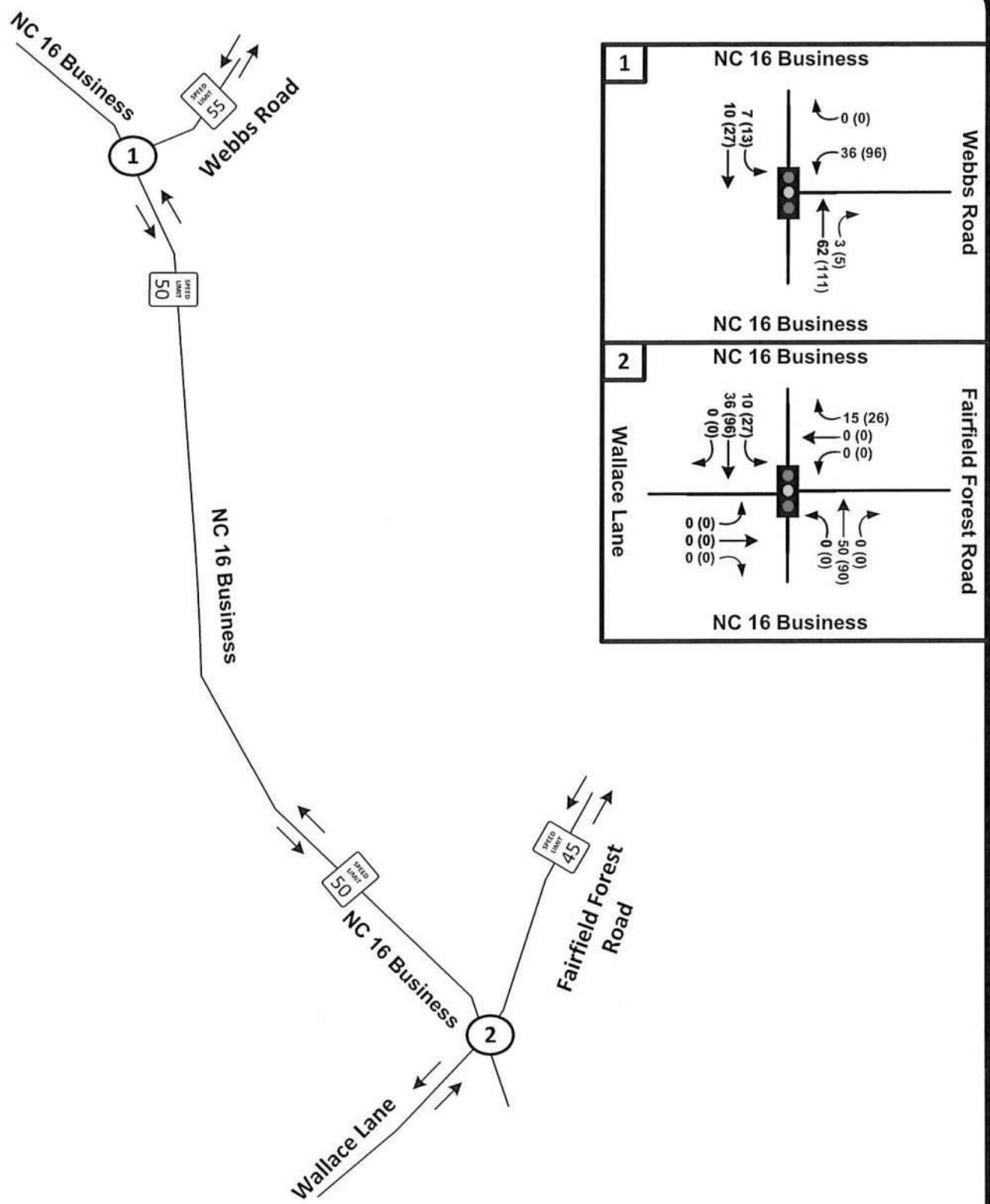
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Howard Property Development
Traffic Impact Analysis

2019 Historical Growth Volumes

November 2016

FIGURE 5



LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Laneage
- Existing Posted Speed

XX (XX) AM (PM) Peak Hour Volumes

AMT



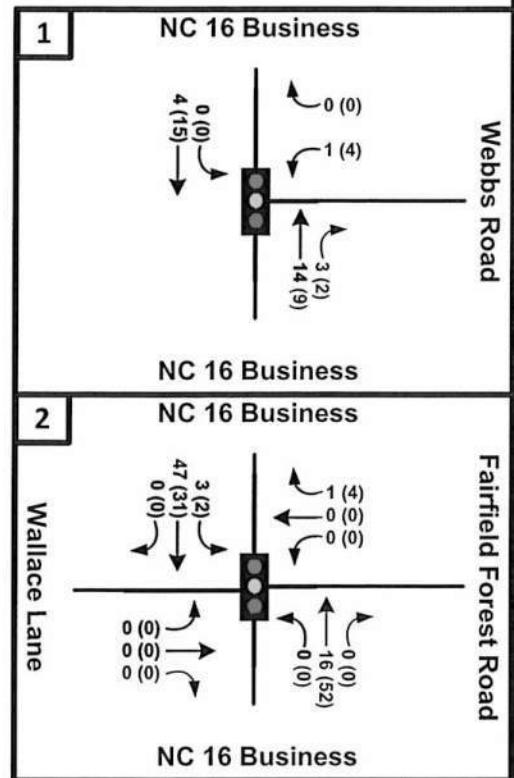
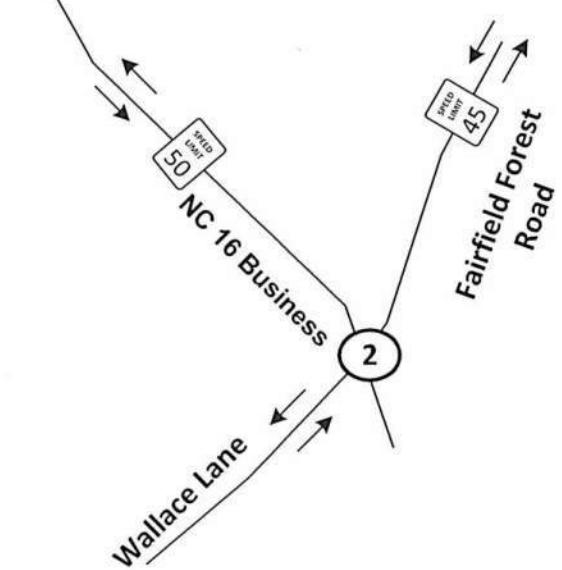
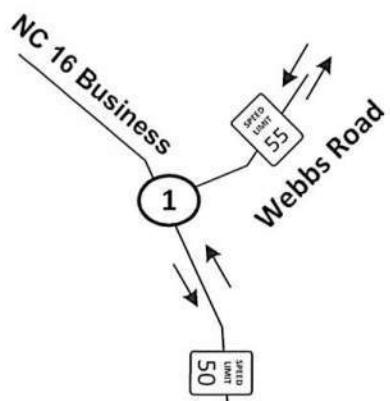
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Howard Property Development
Traffic Impact Analysis

Webbs Road Retail Development

November 2016

FIGURE 6a



LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Laneage
- Existing Posted Speed

XX (XX) AM (PM) Peak Hour Volumes



Howard Property Development
Traffic Impact Analysis

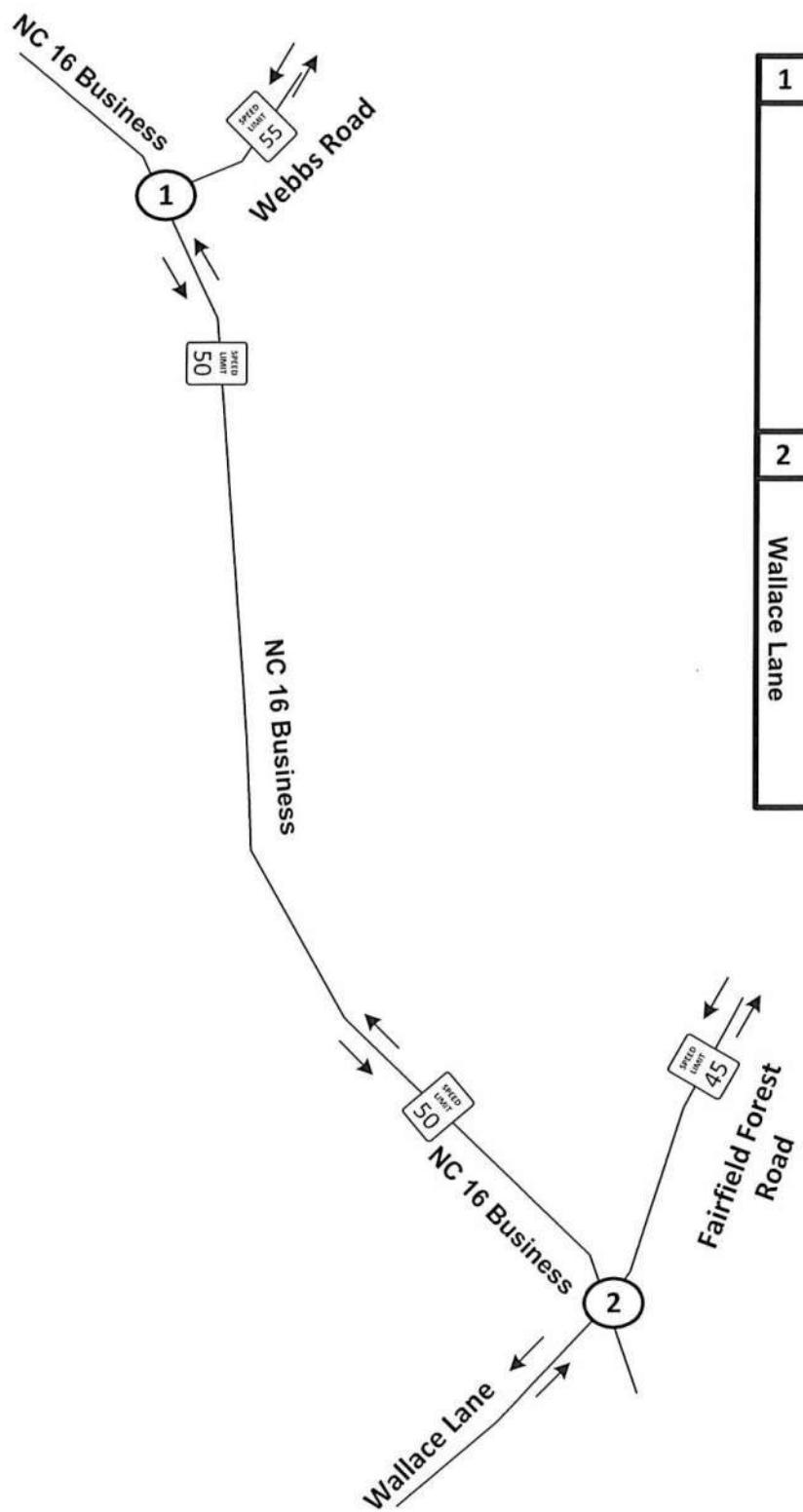
Stratford Subdivision Development

November 2016

NOT
TO
SCALE

AMT

FIGURE 6b



LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Laneage
- Existing Posted Speed

XX (XX) AM (PM) Peak Hour Volumes

AMT



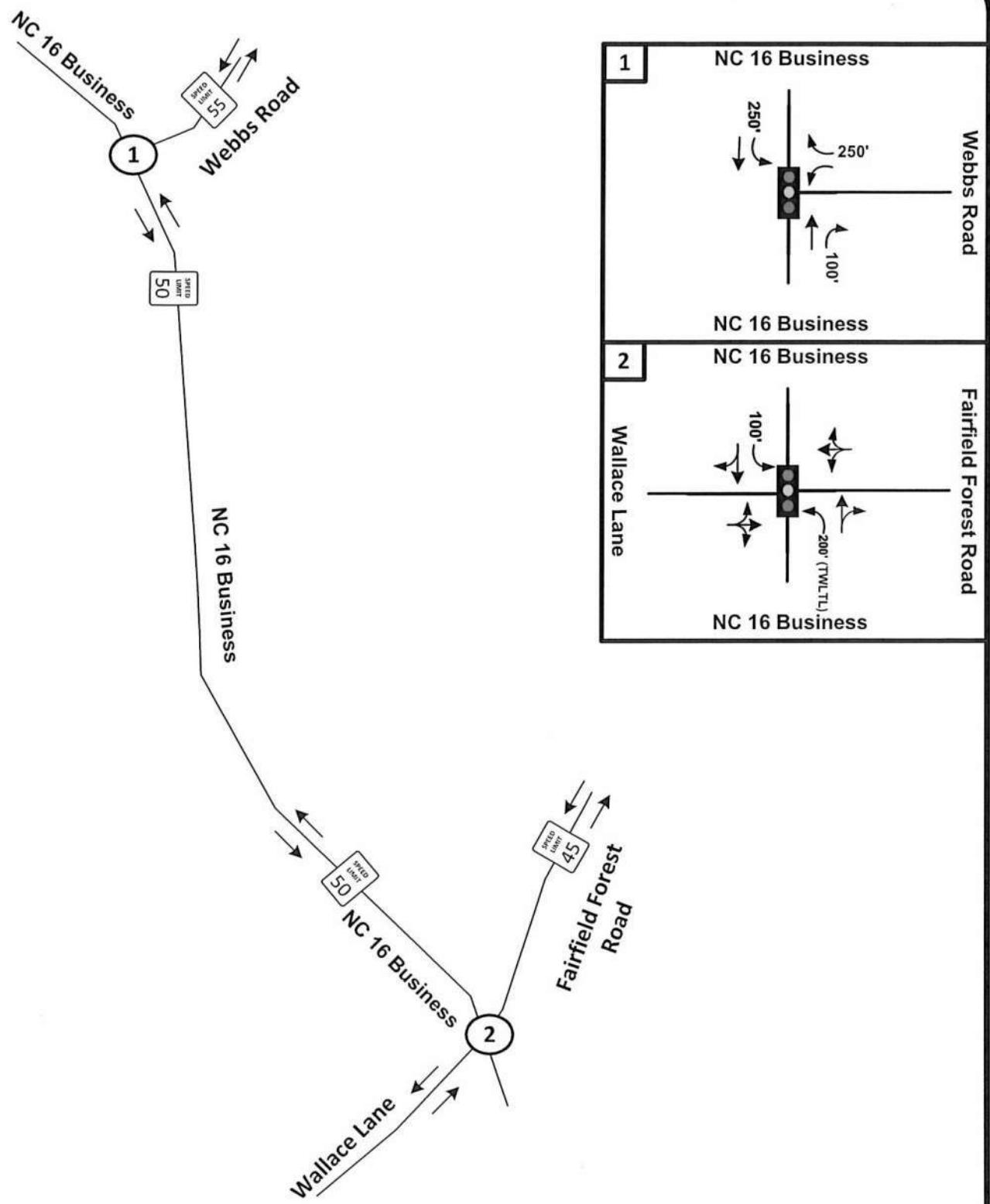
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Howard Property Development
Traffic Impact Analysis

Total Approved Development Volumes

November 2016

FIGURE 6c



LEGEND

- STOP: Existing Traffic Control
- Existing Roadway
- Existing Laneage
- XXX' Storage Bay Length
- SPEED LIMIT XX: Existing Posted Speed

AMT



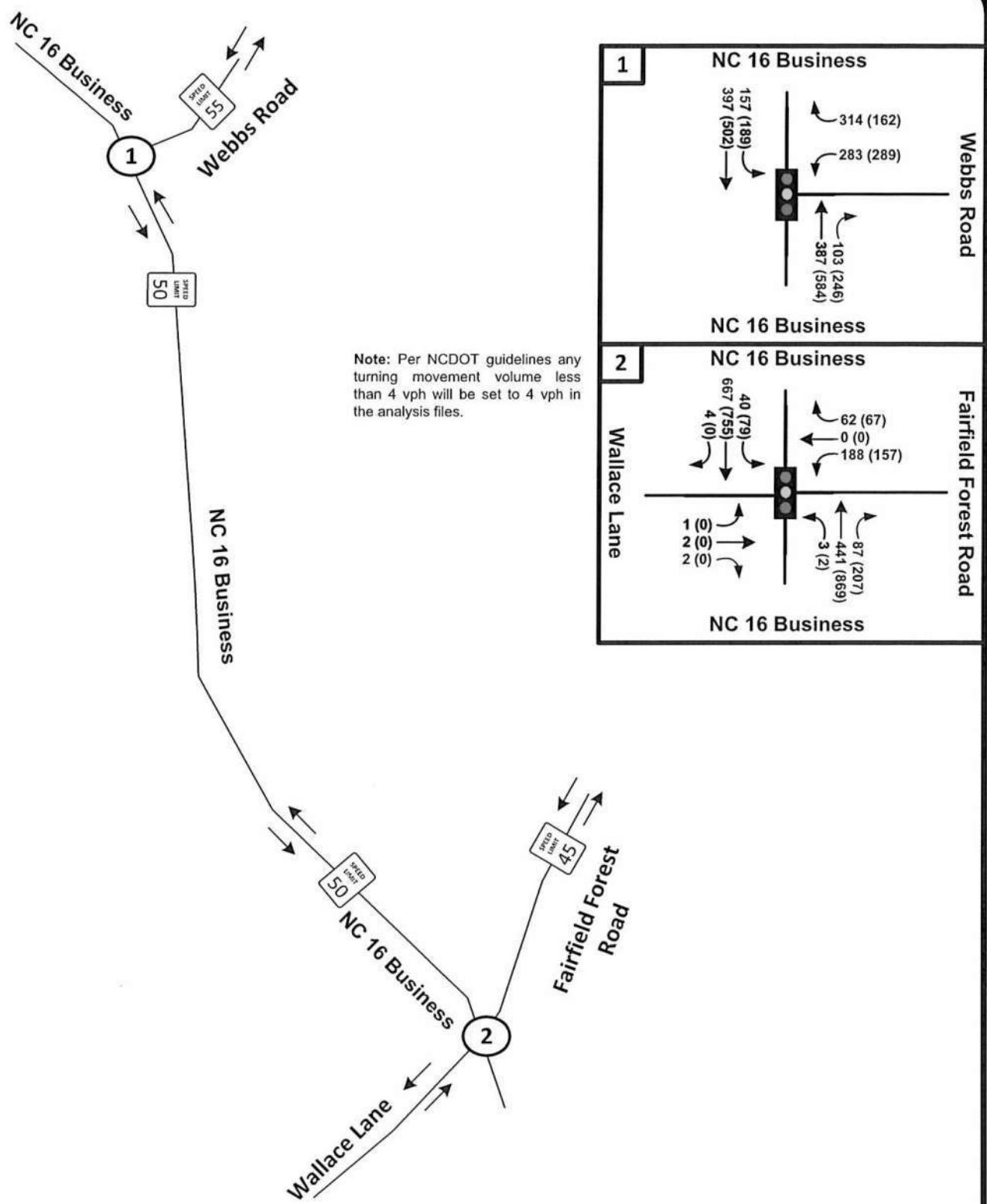
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Howard Property Development
Traffic Impact Analysis

2019 Lane Configuration

November 2016

FIGURE 7



Existing Traffic Control

— Existing Roadway

Existing Laneage

XX

XX (XX) AM (PM) Peak Hour Volumes

AMT



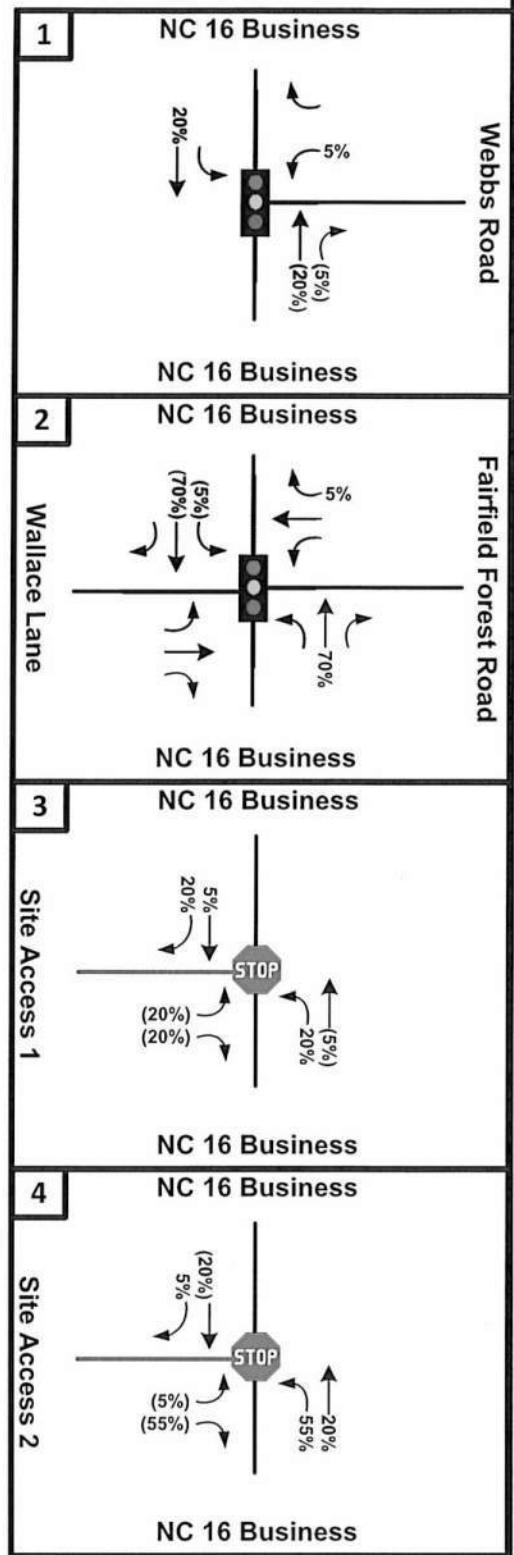
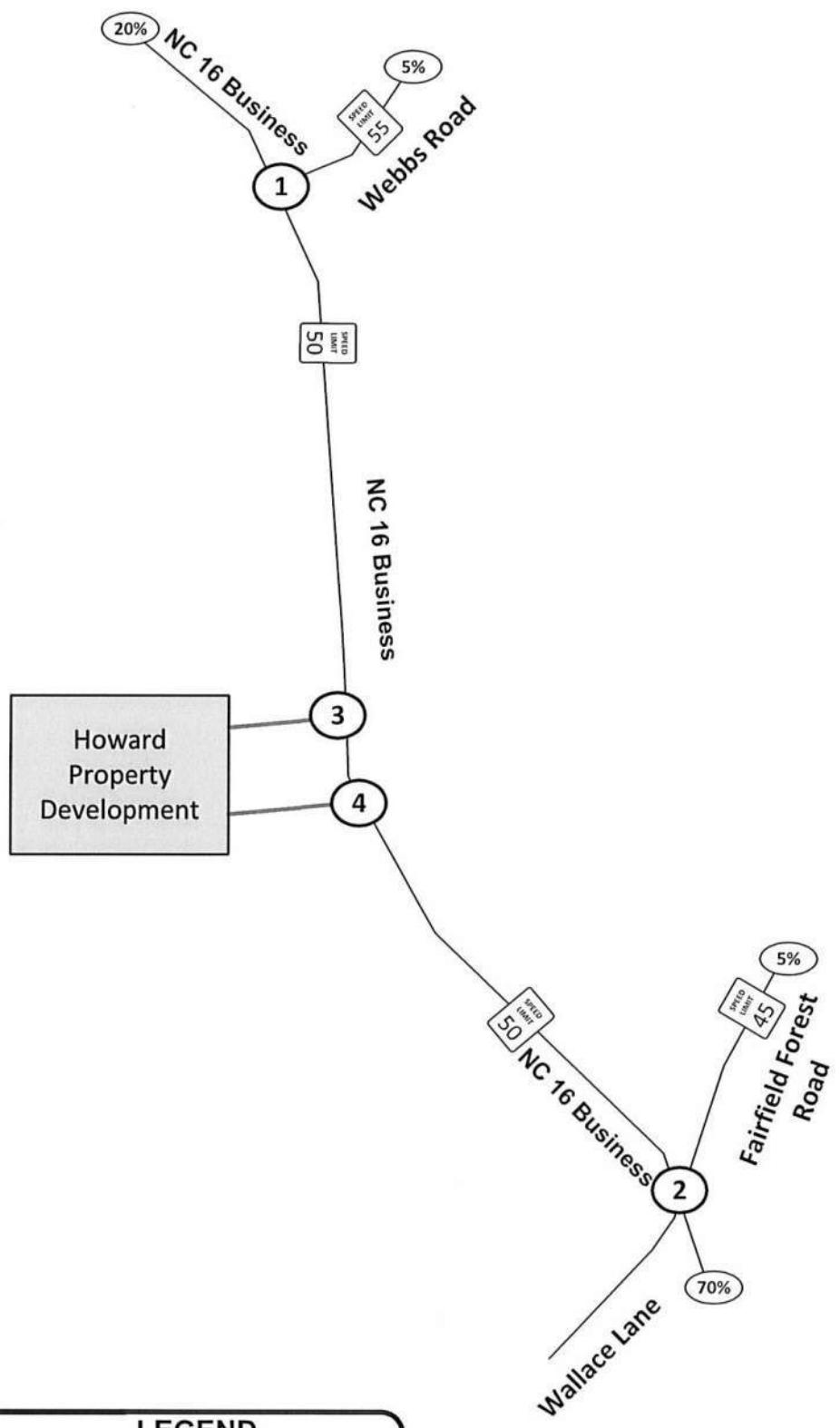
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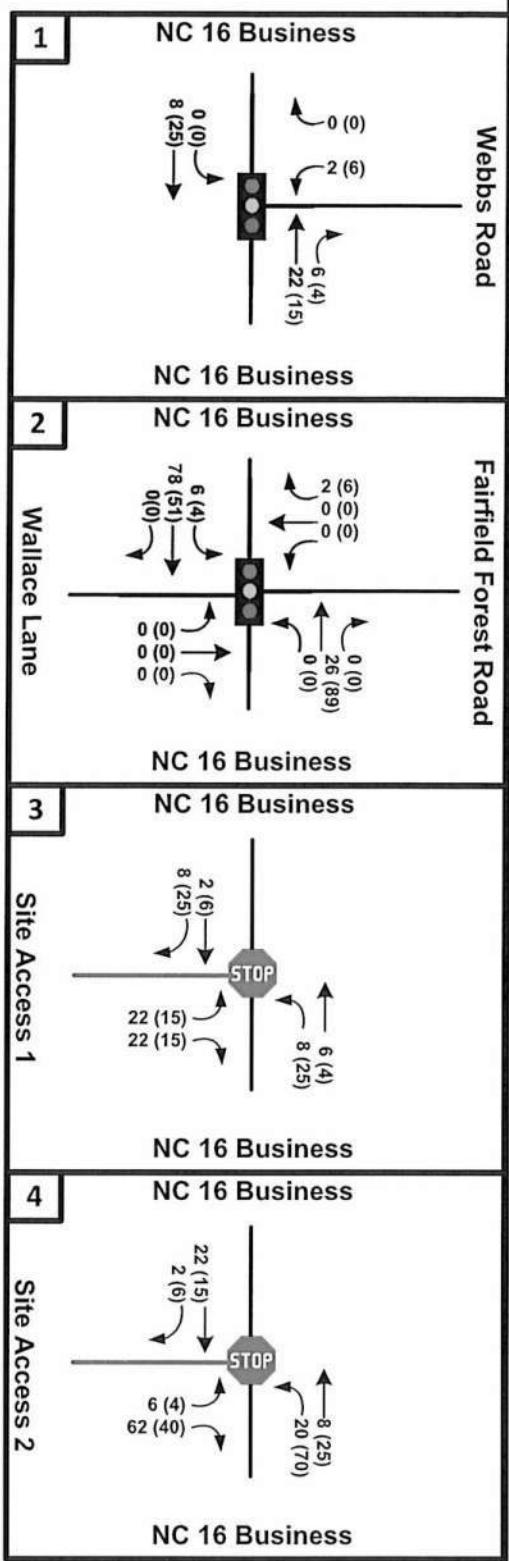
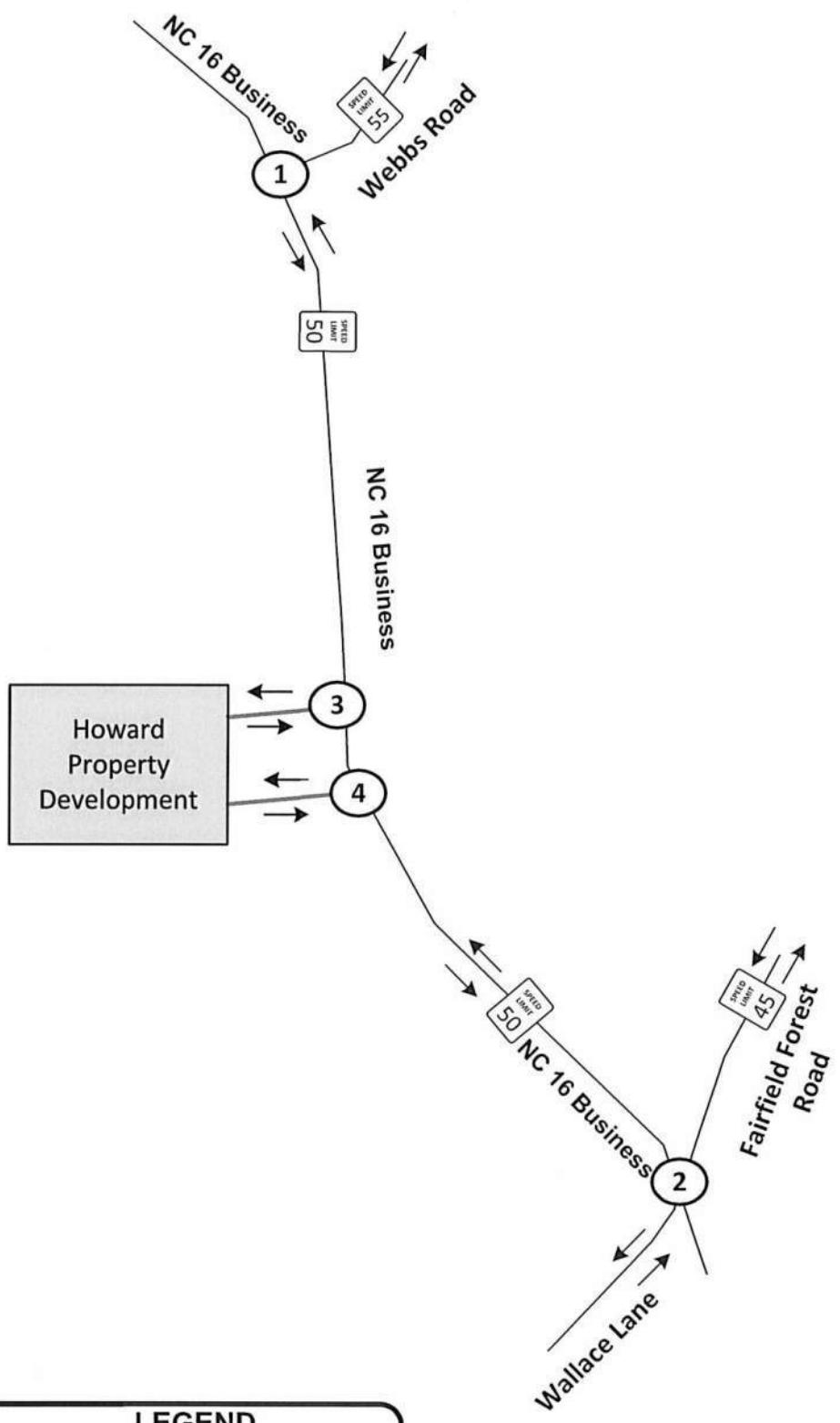
Howard Property Development Traffic Impact Analysis

2019 No-Build Traffic Volumes

November 2016

FIGURE 8





LEGEND

- STOP sign: Existing Traffic Control
- Solid line: Existing Roadway
- Arrow: Existing Laneage
- SPEED LIMIT sign: Existing Posted Speed
- Dashed line: Proposed Site Access
- XX (XX): AM (PM) Peak Hour Volumes

AMT

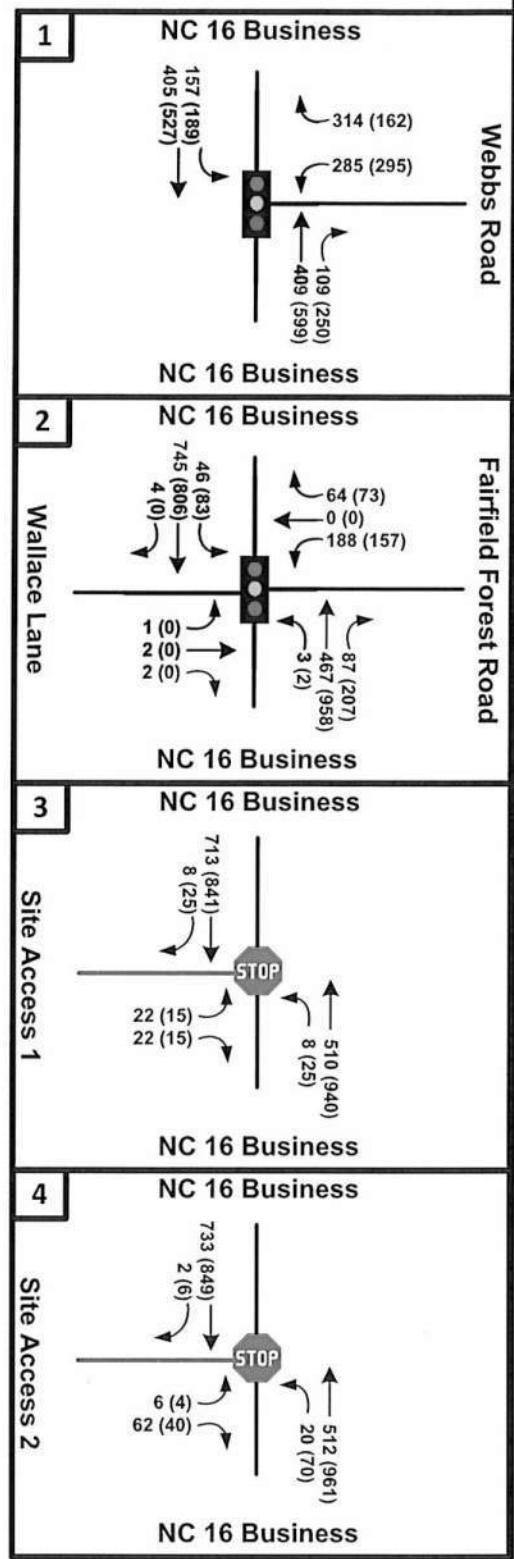
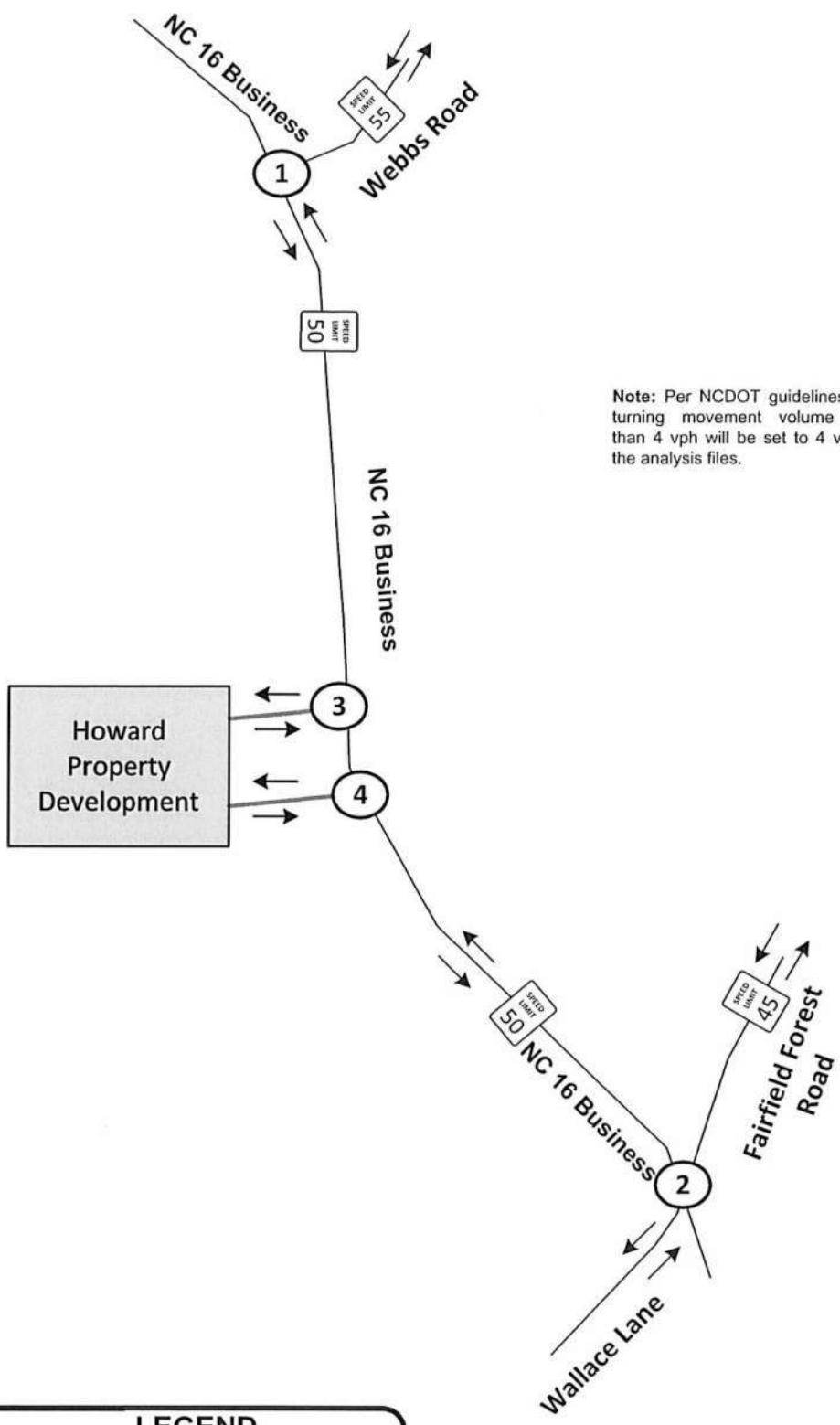
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Howard Property Development Traffic Impact Analysis

New Site Trip Assignment

November 2016

FIGURE 10



LEGEND

- STOP Existing Traffic Control
- Existing Roadway
- Existing Laneage
- Existing Posted Speed
- Proposed Site Access
- XX (XX) AM (PM) Peak Hour Volumes

AMT

N
NOT
TO
SCALE

Howard Property Development Traffic Impact Analysis

2019 Build Traffic Volumes

November 2016

FIGURE 11

CAPACITY ANALYSIS

2016 Existing Analysis

The [Highway Capacity Manual](#) defines capacity as the maximum suitable flow rate at which vehicles reasonably can be expected to traverse a point during a specified time period. Capacity uses the measure of efficiency, Level-of-Service (LOS), to describe the traffic performance at intersections. LOS is defined for the overall intersection delay for signalized intersections. An acceptable LOS for a signalized intersection is considered to be LOS D or better (i.e. A, B, C or D).

At unsignalized intersections, the LOS is defined by the control delay for the movement that must yield right-of-way. It may be typical for stop-controlled minor streets to experience long delays during peak periods, while the majority of the traffic flows through the intersection on the major street experiencing little or no delay.

The procedures outlined in the [Highway Capacity Manual](#), 2010 Update were used as guidelines for the analysis of the study area intersections. This manual provides procedures for the analysis of both signalized and unsignalized intersections. LOS categories range from LOS "A" (best) to "F" (worst) as shown in Table 4.

Table 4: Level of Service Criteria

LEVEL OF SERVICE	SIGNALIZED INTERSECTION CONTROL DELAY (SEC/VEH)	UN SIGNALIZED INTERSECTION CONTROL DELAY (SEC/VEH)	INTERSECTION LEVEL-OF-SERVICE DESCRIPTION
A	≤ 10.0	≤ 10.0	Free flow, insignificant delays.
B	10.1 – 20.0	10.1 – 15.0	Stable operation, minimal delays
C	20.1 – 35.0	15.1 – 25.0	Stable operation, acceptable delays
D	35.1 – 55.0	25.1 – 35.0	Restricted flow, common delays.
E	55.1 – 80.0	35.1 – 50.0	Maximum capacity, extended delays. Volumes at or near capacity. Long queues form upstream from intersection.
F	> 80	> 50.0	Forced flow, excessive delays. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

The LOS analysis was completed through the use of Synchro/SimTraffic, version 9.1. The software package categorizes the LOS based on HCM methodology and criteria. According to industry standards, any signalized intersection or any approach of an unsignalized intersection is considered acceptable if the average delay is at LOS D or better with the LOS A representing little or no delay. Any signalized intersection or approach with a LOS of E or F is considered substandard and may need solutions to improve the operational performance. Signal plans were obtained from NCDOT. These plans can be found in Appendix E.

It should be noted that per NCDOT guidelines any turning movement volume less than 4 vph will be set to 4 vph in the analysis files.

The intersection and individual approach LOS results from the 2016 Existing Analysis are displayed in Table 5.

Table 5: Level of Service Analysis – 2016 Existing Traffic Conditions

LOCATION	2016 EXISTING TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 1 – NC 16 Business at Webbs Road (SIGNALIZED)		
OVERALL	B (15.5)	B (14.6)
Westbound	B (19.6)	C (21.7)
Northbound	B (17.9)	B (16.5)
Southbound	A (8.6)	A (8.3)
INTERSECTION 2 – NC 16 Business at Fairfield Forest Road/Wallace Lane (SIGNALIZED)		
OVERALL	B (17.5)	B (19.7)
Eastbound	B (17.2)	C (30.1)
Westbound	D (40.3)	E (63.8)
Northbound	B (11.4)	B (16.3)
Southbound	B (12.0)	A (8.8)

The results of this analysis indicate that both existing study area intersections operate an acceptable overall level of service during both peak hours. One notable area is the westbound approach of Fairfield Forest Road at NC 16 Business. Analysis indicates that this approach operates at LOS D during the AM peak hour and LOS E during the PM peak hour. Synchro and SimTraffic output pages can be found in Appendix F-1 and F-2.

2019 No-Build Analysis

The site is proposed to be completed by year 2019. As agreed upon in the MOU, existing traffic volumes were increased by three percent (3%) growth per year with the addition of the approved adjacent development trips to reflect 2019 no-build traffic volumes. The intersection and individual approach LOS results from the 2019 No-Build Analysis are displayed in Table 6.

Table 6: Level of Service Analysis – 2019 No-Build Traffic Conditions

LOCATION	2019 NO-BUILD TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 1 – NC 16 Business at Webbs Road (SIGNALIZED)		
OVERALL	B (17.1)	C (21.6)
Westbound	C (21.6)	C (34.1)
Northbound	B (20.0)	C (23.6)
Southbound	A (9.7)	B (11.1)
INTERSECTION 2 – NC 16 Business at Fairfield Forest Road/Wallace Lane (SIGNALIZED)		
OVERALL	B (16.6)	C (29.3)
Eastbound	B (19.6)	D (49.0)
Westbound	D (40.7)	F (143.8)
Northbound	B (10.1)	C (20.0)
Southbound	B (12.8)	A (9.9)

The results of this analysis indicate that both existing study area intersections are expected to continue to operate an acceptable overall level of service. However, the operation of the westbound approach of Fairfield Forest Road at US 16 Business is expected to deteriorate to LOS F during the PM peak hour. This may be attributed to high volumes on NC 16 Business requiring the majority of the signal green time to allow for efficient traffic flow (but resulting in insufficient green time for the minor legs of the intersection) and a single shared left/through/right lane from Fairfield Forest Road with a high left turn volume in the PM peak hour. During the AM peak hour, this approach is expected to continue to operate at LOS D. Synchro and SimTraffic output pages can be found in Appendix F-3 and F-4.

2019 Build Analysis

The total future build traffic volumes include both the site traffic and traffic volumes from the No-Build Analysis. The Build Analysis evaluates the traffic conditions before any improvements are implemented. The intersection and individual approach LOS results from the 2019 Build Analysis are displayed in Table 7.

Table 7: Level of Service Analysis – 2019 Build Traffic Conditions

LOCATION	2019 BUILD TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 1 – NC 16 Business at Webbs Road (SIGNALIZED)		
OVERALL	B (17.6)	C (22.1)
Westbound	C (22.3)	D (35.6)
Northbound	C (20.6)	C (23.8)
Southbound	A (9.9)	B (11.5)
INTERSECTION 2 – NC 16 Business at Fairfield Forest Road/Wallace Lane (SIGNALIZED)		
OVERALL	B (18.0)	D (39.9)
Eastbound	C (22.4)	D (55.0)
Westbound	D (50.09)	F (227.0)
Northbound	A (9.6)	C (22.9)
Southbound	B (13.7)	B (13.0)
INTERSECTION 3 – NC 16 Business at Site Access 1 (STOP-CONTROLLED)		
Northbound Left-Turn	A (9.4)	B (10.2)
Eastbound	D (25.7)	F (63.0)
INTERSECTION 4 – NC 16 Business at Site Access 2 (STOP-CONTROLLED)		
Northbound Left-Turn	A (9.6)	B (10.6)
Eastbound	C (19.2)	E (37.1)

The results of this analysis indicate that the signalized intersection of NC 16 Business at Webbs Road is expected to continue to operate at an acceptable overall level of service during both the AM and PM peak hours. Analysis also indicates that the signalized intersection of US 16 Business and Fairfield Forest Road/Wallace Lane is expected to operate at an acceptable overall level of service during both the AM and PM peak hours. The westbound approach of Fairfield Forest Road is expected to continue to operate at LOS F during the PM peak hour.

Analysis indicates that the unsignalized approach/egress to NC 16 Business from Site Access #1 is expected to operate at an unacceptable LOS F during the PM peak hour. In addition, the unsignalized approach/egress to NC 16 Business from Site Access #2 is expected to operate at an unacceptable LOS E during the PM peak hour. This may be attributed to insufficient gaps in mainline NC 16 Business traffic as residents attempt to turn left out of the development. Synchro and SimTraffic output pages can be found in Appendix F-5 and F-6.

2019 Build Improved Analysis

Table 8 shows the analysis results within the study area with the recommended improvements in place. Additional geometric improvements such as installation of turn-lanes are recommended and therefore analyzed in this scenario. The full-list of recommended improvements are listed in the Conclusions section. Synchro and SimTraffic output pages can be found in Appendix F-7 and F-8.

Table 8: Level of Service Analysis – 2019 Build Improved Traffic Conditions

LOCATION	2019 BUILD IMPROVED TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 1 – NC 16 Business at Webbs Road (SIGNALIZED)		
OVERALL	B (17.6)	C (22.1)
Westbound	C (22.3)	D (35.6)
Northbound	C (20.6)	C (23.8)
Southbound	A (9.9)	B (11.5)
INTERSECTION 2 – NC 16 Business at Fairfield Forest Road/Wallace Lane (SIGNALIZED)		
OVERALL	B (18.0)	D (39.9)
Eastbound	C (22.4)	D (55.0)
Westbound	D (50.09)	F (227.0)
Northbound	A (9.6)	C (22.9)
Southbound	B (13.7)	B (13.0)
INTERSECTION 3 – NC 16 Business at Site Access 1 (STOP-CONTROLLED)		
Northbound Left-Turn	A (9.4)	B (10.2)
Eastbound	C (23.5)	F (52.8)
INTERSECTION 4 – NC 16 Business at Site Access 2 (STOP-CONTROLLED)		
Northbound Left-Turn	A (9.6)	B (10.6)
Eastbound	C (17.4)	C (20.9)

The results of this analysis show that with the recommended improvements in place, all study area intersections and approaches operate at an acceptable level of service with one exception. Specifically, the westbound approach of Fairfield Forest Drive at NC 16 Business operates at LOS F during the PM peak hour. However, no improvements are recommended at this intersection due to the low number of trips the proposed development is expected to contribute to the westbound approach during the PM peak hour. Specifically, the site is expected to add six trips to the approach which is less than 3% of the total of 230 trips expected to occur during the PM peak hour.

Capacity analysis for the intersection of NC 16 Business at Site Access #1 show that the intersection is expected to continue to operate at an LOS F during the PM peak hour with a northbound left-turn lane and an eastbound right-turn lane in place. As part of the recommended improvements, a two-way left turn lane (TWLTL) is constructed along NC 16 Business north and south of the intersection in the median. This TWLTL should be extended south to

Site Access #2 (approximately 420 feet) as a frontage road for the proposed development, as well as north of Site Access #1 so motorists can utilize the lane to accelerate and merge into mainline NC 16 Business traffic.

Analysis indicates that with an exclusive northbound right-turn lane in place, the northbound left-turn movement from US 16 Business as well as the eastbound approach of Site Access 2 are expected to operate at acceptable levels during both peak hours. These are listed in the Recommendations section.

CONCLUSIONS

Howard Property (also referred to as Glenwood) is a proposed residential development located on the west side of NC 16 Business, north of Hagers Hollow Drive, between the Denver Wesleyan Church and the Harbor Winds strip mall in northeastern Lincoln County, North Carolina. The development is proposed to consist of single family homes and is assumed to be fully-completed in 2019 with a maximum total of 200 dwelling units.

It was estimated that a total of 150 trips (38 in, 112 out) will be generated from the proposed site in the AM peak hour and 200 trips (126 in, 74 out) will be generated in the PM peak hour.

The results of this analysis show that with the recommended improvements in place, all study area intersections and approaches operate at an acceptable level of service with one exception. Specifically, the westbound approach of Fairfield Forest Drive at NC 16 Business operates at LOS F during the PM peak hour. However, no improvements are recommended at this intersection due to the low number of trips the proposed development is expected to contribute to the westbound approach during the PM peak hour. Specifically, the site is expected to add six trips to the approach which is less than 3% of the total of 230 trips expected to occur during the PM peak hour.

Capacity analysis for the intersection of NC 16 Business at Site Access #1 show that the intersection is expected to continue to operate at an LOS F during the PM peak hour with a northbound left-turn lane and an eastbound right-turn lane in place. As part of the recommended improvements, a two-way left turn lane (TWLTL) is constructed along NC 16 Business north and south of the intersection in the median. This TWLTL should be extended south to Site Access #2 (approximately 420 feet) as a frontage road for the proposed development, as well as north of Site Access #1 so motorists can utilize the lane to accelerate and merge into mainline NC 16 Business traffic.

Analysis indicates that with an exclusive northbound right-turn lane in place, the northbound left-turn movement from US 16 Business as well as the eastbound approach of Site Access 2 are expected to operate at acceptable levels during both peak hours. These are listed in the Recommendations section.

RECOMMENDATIONS

Based on the findings of this study, specific improvements have been identified and should be completed as part of the proposed development. The NCDOT *“Policy on Street and Driveway Access to North Carolina Highways”* manual was consulted to determine the appropriate storage for the recommended auxiliary lanes if warranted. The results of the turn lane warrants performed at the two site access points are located in Appendix C.

NC 16 Business Section

- NC 16 Business will be widened to a three-lane cross-section to provide a TWLTL from just north of Site Access 1 south to Site Access 2.

Intersection of NC 16 Business & Webbs Road

There are no improvements recommended at this intersection.

Intersection of NC 16 Business & Fairfield Forest Road/Wallace Lane

There are no improvements recommended at this intersection.

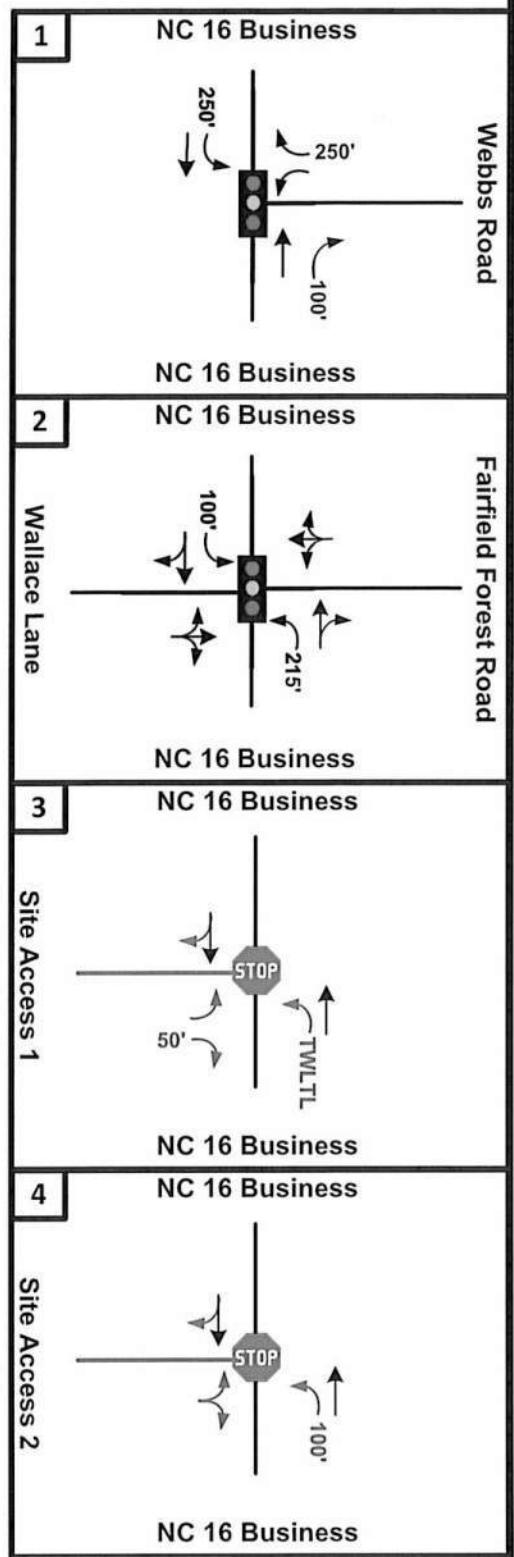
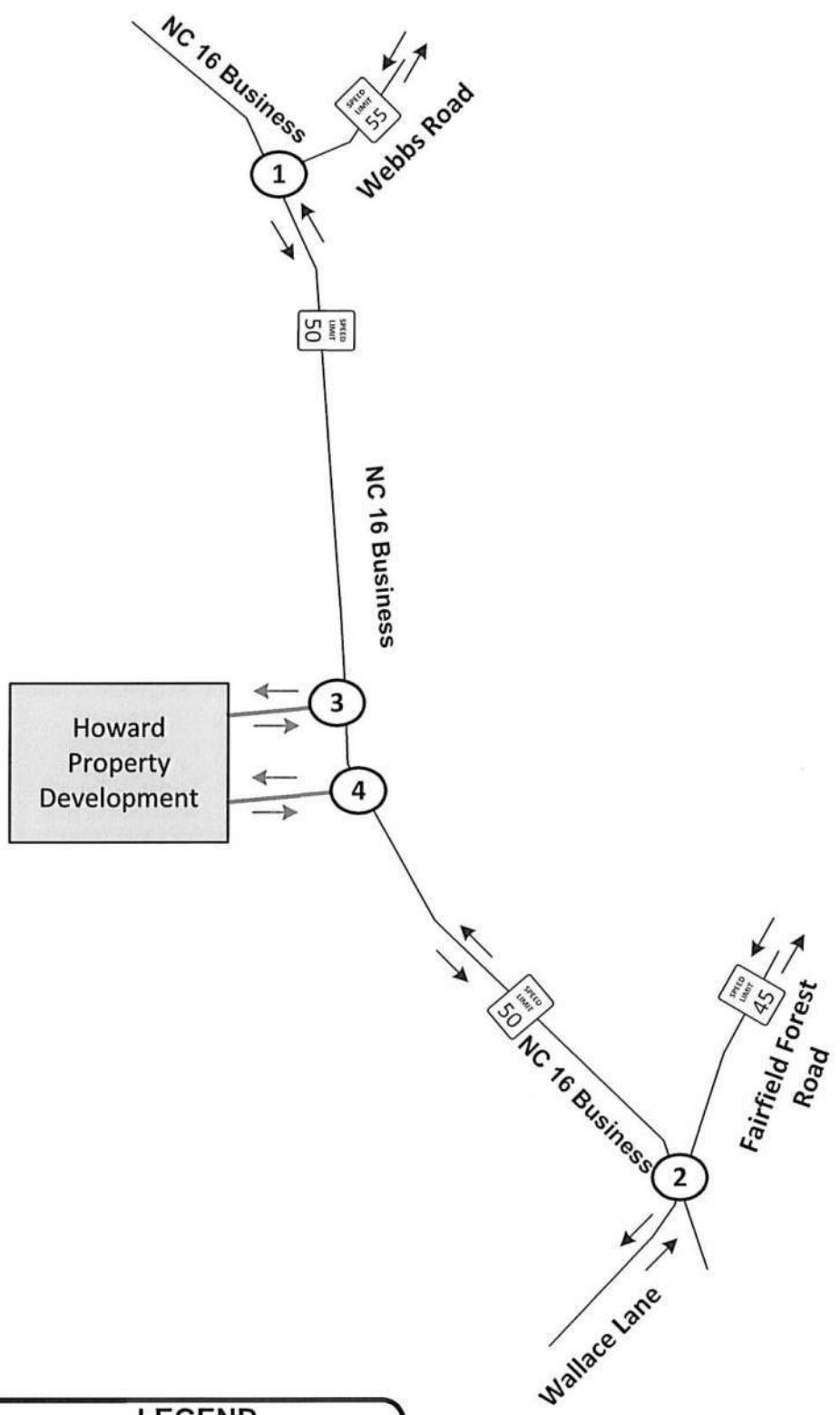
Intersection of NC 16 Business & Site Access 1

- Construct Site Access 1 to provide full access to NC 16 Business with one ingress lane and two egress lanes. Construct one exclusive left-turn lane and one exclusive right-turn lane on the eastbound approach of Site Access 1. The right-turn lane will provide a minimum of 50 feet of full width storage. The one ingress lane will receive traffic from the proposed TWLTL on northbound NC 16 Business and from the shared through/right lane on southbound NC 16 Business.

Intersection of NC 16 Business & Site Access 2

- Construct Site Access 2 to provide full access to NC 16 Business with one ingress lane and one egress lane. Construct one shared left and right-turn lane on the eastbound approach of Site Access 2. The one ingress lane will receive traffic from the proposed exclusive left-turn lane on northbound NC 16 Business and from the shared through/right lane on southbound NC 16 Business.
- Construct an exclusive left-turn lane on the northbound approach of NC 16 Business with a minimum of 100 feet of full-width storage and the appropriate bay taper.

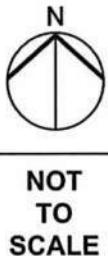
The Recommended Improvements are shown in Figure 12.



LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Laneage
- Existing Posted Speed
- Proposed Site Access
- Recommended Laneage
- XXX' Recommended Bay Length

AMT



Howard Property Development Traffic Impact Analysis

Recommended Improvements

November 2016

FIGURE 12